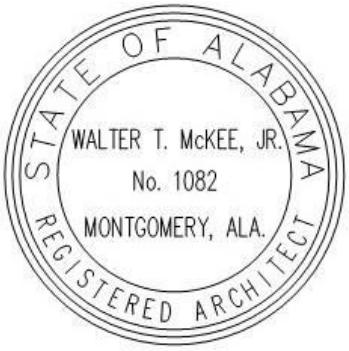
LATHAN · McKEE
ARCHITECTS

Project Manual

Cafeteria Addition
at
Crossville High School
for
Dekalb County Board of Education
Crossville, Alabama

LATHAN MCKEE PROJECT NO. 26-032-00
July 1, 2026

Alabama Division of Construction Management No.



631 South Hull Street – Montgomery, Alabama 36104 334-834-9933

TABLE OF CONTENTS

Cafeteria Addition
at
Crossville High School
for
Dekalb County Board of Education
Crossville, Alabama

LATHAN MCKEE PROJECT NO. 26-032-00

BIDDING REQUIREMENTS

- Advertisement For Bids
- Instructions to Bidders (DCM Form C-2)
- Request For Information (Lathan McKee Form)
- Prior Approval/Substitution Request Form (Lathan McKee Form)
- Proposal Form (DCM Form C-3)
- Form Of Bid Bond (DCM Form C-4)
- Special Instructions to Bidders (Lathan McKee Form)

CONTRACT FORMS

- Preparation and Approval of Construction Contracts and Bonds (DCM Form B-7)
- Construction Contract (DCM Form C-5)
- Performance Bond (DCM Form C-6)
- Payment Bond (DCM Form C-7)
- General Conditions of the Contract (DCM Form C-8)
- Instructions for Contractor's Insurance Company (Article 37 of DCM Form C-8)
- Supplement to General Conditions of the Contract (Lathan McKee Form)
- State of Alabama Disclosure Statement Form, Required by Article 3B of Title 41, Code of Alabama 1975 with Information and Instructions regarding Relationships Between Contractor/Grantees and Public Officials/Employees.
- State of Alabama E-Verify Memorandum of Understanding Instructions with ABC Bulletin and Revised Alabama Immigration Law Guidance for School Boards.
- Supplemental E-Verify Memorandum of Understanding (Lathan Mckee Form)
- Alabama Department of Revenue – Sales and Use Tax Division – Application for Sales and Use Tax Certificate of Exemption (ST:EX-01)
- Alabama Department of Finance Real Property Management Division of Construction Management Permit Fee & Re-Inspection Fee Calculation Worksheet

GENERAL CONDITIONS

- Pre-Construction Conference Checklist (DCM Form B-8)
- Detail Of Project Sign (DCM Form C-15)
- Application and Certificate for Payment (DCM Form C-10)
- Schedule Of Values, (DCM Form C-10SOV, Attachment to DCM Form C-10)
- Inventory Of Stored Materials, (DCM Form C-10SM, Attachment to DCM Form C-10)
- Progress Schedule and Report (DCM Form C-11,)
- Change Order Checklist, (DCM Form B-12, For Use With DCM Form C-12
- Contract Change Order (DCM Form C-12 (fully locally-funded K-12 Schools)
- Change Order Justification (DCM Form B-11)
- Change Order Proposal Recap Sheet (Lathan Mckee Form, LM 0825)
- General Contractor's Roofing Guarantee (DCM Form C-9)
- Certificate of Substantial Completion (DCM Form C-13 & 13A)
- Final Payment Checklist (DCM Form B-13)
- Contractor's Affidavit of Payment of Debts and Claims (DCM Form C-18)
- Contractor's Affidavit of Release of Liens (DCM Form C-19)
- Consent of Surety to Final Payment (DCM Form C-20)
- Form of Advertisement for Completion (DCM Form C-14)
- Act 2009-657 Requiring Certification Of Fire Alarm Contractors (DCM Memorandum)
- State Of Alabama Department Of Insurance – Application For State Fire Marshal's Certified Fire Alarm Contractor Permit
- Certificate of Asbestos Free Building Materials (Lathan McKee Form)

TECHNICAL SPECIFICATIONS

DIVISION 01	**GENERAL REQUIREMENTS**
01000	Alternates
01010	Scope of Work
01011	Contingency Allowances
01045	Cutting and Patching
01250	Contract Modification Procedures
01290	Payment Procedures
01320	Construction Progress Documentation
01322	Photographic Documentation
01330	Submittal Requirements
01500	Temporary Facilities and Controls
01600	Product Requirements
01700	Execution Requirements

01770	Closeout Procedures
01781	Project Record Documents
01782	Operation and Maintenance Data

DIVISION 02 SITE WORK

02070	Selective Demolition
02055	Soils for Earthwork
02060	Aggregates for Earthwork
02300	Earthwork
02551	Natural Gas Distribution Steel
02552	Natural Gas Distribution HDPE
02630	Storm Drainage
02923	Landscape Grading
02924	Seeding
02910	Sodding and Topsoil
02925	Steel Ornamental Privacy Fence Systems & Gates
02930	Temporary Chain Link Fencing & Gates
02931	Vinyl Coated Chain Link Fencing & Gates

DIVISION 03 CONCRETE

03310	Cast-In-Place Concrete
03950	Concrete Sealer

DIVISION 04 MASONRY

04200	Unit Masonry

DIVISION 05 METAL

05210	Steel Joists
05310	Steel Deck
05500	Miscellaneous Steel Fabrications
05510	Metal Stairs
05540	Metal Studs

DIVISION 06 CARPENTRY

06100	Rough Carpentry
06200	Finish Carpentry

DIVISION 07 MOISTURE PROTECTION

07200 Insulation

07600 Flashing and Sheet Metal

07900 Joint Sealers

DIVISION 08 DOORS, WINDOWS AND GLASS

08100 Steel Doors and Frames

08211 Wood Doors

08310 Coiling Counter Doors

08330 Coiling Doors

08380 Traffic Doors (Kitchen)

08410 Aluminum Storefront

08565 Interior Exchange Window Unit

08700 Finish Hardware

08800 Glazing

DIVISION 09 FINISHES

09250 Gypsum Drywall

09301 Porcelain Tile

09302 Ceramic Tile

09510 Acoustical Ceilings

09650 Rubber Base

09651 Luxury Vinyl Tile (LVT) Flooring

09672 Resinous Flooring

09900 Painting

DIVISION 10 SPECIALTIES

10160 Toilet Partitions

10200 Louvers

10410 Identifying Devices

10500 Lockers

10531 Aluminum Hanger Rod Canopy

10800 Toilet Accessories

DIVISION 11 EQUIPMENT

11400 Food Service Equipment

11614 Stage Curtains and Accessories

DIVISION 12 FURNISHINGS

Not Applicable

DIVISION 13 SPECIAL CONSTRUCTION

13120 Pre-Engineered Metal Building

13670 Extruded Aluminum Walkway Canopy

DIVISION 14 CONVEYING SYSTEM

Not Applicable

DIVISION 15 MECHANICAL

15010 General Mechanical Provisions

15140 Water Piping Distribution- **See Division 2 Site Works**

15150 Sewer Piping, Materials**-See Division 2 Site Works**

15400 Plumbing

15500 Fire Sprinkler

15700 Heating, Ventilation, and Air Conditioning

DIVISION 16 ELECTRICAL

16100 Electrical

16231 Packaged Engine Generator

16415 Transfer Switches

16715 Structured Cabling

END OF TABLE OF CONTENTS

ADVERTISEMENT FOR BIDS

CAFETERIA ADDITION
AT CROSSVILLE HIGH SCHOOL
FOR DEKALB COUNTY BOARD OF EDUCATION

MCKEE PROJECT NO. #26-032

Sealed proposals for this project shall be received by Mr. Wayne Lyles, Superintendent, Dekalb County Schools, 393 Main Street E, Raiunsville, AL 35986 | 256-638-7265, **until 2:00 PM Central Time, Tuesday, July 21, 2026** then opened and read aloud.

Pre-qualification proposals will be received at the office of McKee and Associates Architects, 3500 Eastern Blvd., Suite, Montgomery, AL 36116 until **2:00 p.m. Local Time, Thursday, July 9, 2026**. Forms should be emailed to ***mckeeplans@gmail.com.***

Requirements for Pre-qualification: All General Contractors shall contact the Architect at ***mckeeplans@gmail.com*** to receive the criteria to be used for the pre-qualification of this project (AIA Document A305 and Questionnaire).

All General Contractors bidding on this project shall be required to visit the site and examine all existing conditions prior to submitting their proposal and shall be arranged by the contractor with the school.

All Bidders shall have general liability and workman's compensation insurance. The project shall be bid excluding taxes. Bids must be submitted on proposal forms furnished by the Architect or copies thereof. No bid may be withdrawn after scheduled closing for receipt of bids for a period of ninety (90) days. The Owner reserves the right to reject any or all proposals and to waive technical errors if, in the Owners judgment, the best interests of the Owner will thereby be promoted.

A certified check or Bid Bond payable to **Dekalb County Schools** in an amount not less than five percent (5%) of the amount of the bid, but in no event more than $10,000.00 must accompany the bidder's sealed proposal. Performance and statutory labor and material payment bonds will be required at the signing of the Contract.

All bidders bidding in amounts exceeding that established by the State Licensing Board for General Contractors must be licensed under the provisions of Title 34, Chapter 8, Code of Alabama, 1975, and must show evidence of license before bidding or bid will not be received or considered by the Architect. All bidders shall show such evidence by clearly displaying their current license number on the outside of the sealed envelope in which the proposal is delivered.

PDFs of the project can be reviewed by going to the Lathan McKee website at www.lathanmckee.com and under "Project Bid List" selecting "Montgomery". The documents may be viewed on-line and printed by General Contractors, Sub-Contractors and Suppliers. Documents published through this procedure are the only documents endorsed by the Architect. The Architect is unable to monitor, confirm and maintain other

websites that provide documents. Notices of Addenda being posted will be provided to entities that have *CONFIRMED* bidding for this particular project. The Architect retains ownership and copyrights of the documents. If bidders require printed sets, please submit request to the Architect at mckeeplans@gmail.com. Include your first & last name, company name, address, phone number and the project name and number. Print sets are to be returned in reusable condition within ten days after bid opening.

All RFIs and RFAs regarding the bid documents shall be sent and addressed through emails found on the RFI and RFA forms in the project manual. **NOTE: ONLY THE RFI AND RFA FORMS IN THE PROJECT MANUAL WILL BE ACCEPTED.** The Architect will not accept inquiries via telephone or fax.

Completion Time: See scope of work in Project Manual.

Supervision: Contractor to ensure proper supervision of all work.

Owner: Mr. Wayne Lyles, Superintendent, Dekalb County Schools, 393 Main Street E, Raiunsville, AL 35986 | 256-638-7265

Architect: Lathan McKee Architects, 631 South Hull Street, Montgomery, Alabama 36104, Phone: 334-834-9933

INSTRUCTIONS TO BIDDERS

CONTENTS

1. Bid Documents
2. General Contractor's State Licensing Requirements
3. Qualifications of Bidders and Prequalification Procedures
4. Preference to Resident Contractors
5. Examination of Bid Documents and the Site of the Work
6. Explanations and Interpretations
7. Substitutions
8. Preparation and Delivery of Bids
9. Withdrawal or Revision of Bids
10. Opening of Bids
11. Incomplete and Irregular Bids
12. Bid Errors
13. Disqualification of Bidders
14. Consideration of Bids
15. Determination of Low Bidder by Use of Alternates
16. Unit Prices
17. Award of Contract

1. BID DOCUMENTS:

The Bid Documents consist of the Advertisement for Bids, these Instructions to Bidders, any supplements to these Instructions to Bidders, the Proposal Form and the Accounting of Sales Tax, and the proposed Contract Documents. The proposed Contract Documents consist of the Construction Contract, the Performance Bond and Payment Bond, the Conditions of the Contract (General, Supplemental, and other Conditions), Drawings, Specifications and all addenda issued prior to execution of the Construction Contract. Bid Documents may be obtained or examined as set forth in the Advertisement for Bids.

2. GENERAL CONTRACTOR'S STATE LICENSING REQUIREMENTS:

When the amount bid for a contract is $100,000 or more, the bidder must be licensed by the State Licensing Board for General Contractors and must show the Architect evidence of license before bidding or the bid will not be received by the Architect or considered by the Awarding Authority. A bid exceeding the bid limit stipulated in the bidder's license, or which is for work outside of the type or types of work stipulated in the bidder's license, will not be considered. In case of a joint venture of two or more contractors, the amount of the bid shall be within the maximum bid limitation as set by the State Licensing Board for General Contractors of the combined limitations of the partners to the joint venture.

3. QUALIFICATIONS of BIDDERS and PREQUALIFICATION PROCEDURES:

a. Any special qualifications required of general contractors, subcontractors, material suppliers, or fabricators are set forth in the Bid Documents.

b. The Awarding Authority may have elected to prequalify bidders. Parties interested in bidding for this contract are directed to the Advertisement for Bids and Supplemental Instructions to Bidders to determine whether bidders must be prequalified and how they may obtain copies of the Awarding Authority's published prequalification procedures and criteria.

c. Release of Bid Documents by the Architect to a prospective bidder will not constitute any determination by the Awarding Authority or Architect that the bidder has been found to be qualified, prequalified, or responsible.

4. PREFERENCE to RESIDENT CONTRACTORS:
(If this project is federally funded in whole or in part, this Article shall not apply.)

a. In awarding the Contract, preference will be given to Alabama resident contractors and a nonresident bidder domiciled in a state having laws granting preference to local contractors shall be awarded the Contract only on the same basis as the nonresident bidder's state awards contracts to Alabama contractors bidding under similar circumstances.

b. A nonresident bidder is a contractor which is neither organized and existing under the laws of the State of Alabama, nor maintains its principal place of business in the State of Alabama. A nonresident contractor which has maintained a permanent office within the State of Alabama for at least five continuous years shall not thereafter be deemed to be a non-resident contractor so long as the contractor continues to maintain a branch office within Alabama.

5. EXAMINATION of BID DOCUMENTS and the SITE of the WORK:

Before submitting a bid for the Work, the bidders shall carefully examine the Bid Documents, visit the site, and satisfy themselves as to the nature and location of the Work, and the general and local conditions, including weather, the general character of the site or building, the character and extent of existing work within or adjacent to the site and any other work being performed thereon at the time of submission of their bids. They shall obtain full knowledge as to transportation, disposal, handling, and storage of materials, availability of water, electric power, and all other facilities in the area which will have a bearing on the performance of the Work for which they submit their bids. The submission of a bid shall constitute a representation by the bidder that the bidder has made such examination and visit and has judged for and satisfied himself or herself as to conditions to be encountered regarding the character, difficulties, quality, and quantities of work to be performed and the material and equipment to be furnished, and as to the contract requirements involved.

6. EXPLANATIONS and INTERPRETATIONS:

a. Should any bidder observe any ambiguity, discrepancy, omission, or error in the drawings and specifications, or in any other bid document, or be in doubt as to the intention and meaning of these documents, the bidder should immediately report such to the Architect and request clarification.

b. Clarification will be made only by written Addenda sent to all prospective bidders. Neither the Architect nor the Awarding Authority will be responsible in any manner for verbal answers or instructions regarding intent or meaning of the Bid Documents.

c. In the case of inconsistency between drawings and specifications or within either document, a bidder will be deemed to have included in its bid the better quality or greater quantity of the work involved unless the bidder asked for and obtained the Architect's written clarification of the requirements before submission of a bid.

7. SUBSTITUTIONS:

a. The identification of any product, material, system, item of equipment, or service in the Bid Documents by reference to a trade name, manufacturer's name, model number, etc. (hereinafter referred to as "source"), is intended to establish a required standard of performance, design, and quality and is not intended to limit competition unless the provisions of paragraph "d" below apply.

b. When the Bid Documents identify only one or two sources, or three or more sources followed by "or approved equal" or similar wording, the bidder's proposal may be based on a source not identified but considered by the bidder to be equal to the standard of performance, design and quality as specified; however, such substitutions must ultimately be approved by the Architect. If the bidder elects to bid on a substitution without "Pre-bid Approval" as described below, then it will be understood that proof of compliance with specified requirements is the exclusive responsibility of the bidder.

c. When the Bid Documents identify three or more sources and the list of sources is not followed by "or approved equal" or similar wording, the bidder's proposal shall be based upon one of the identified sources, unless the bidder obtains "Pre-bid Approval" of another source as described below. Under these conditions it will be expressly understood that no product, material, system, item of equipment, or service that is not identified in the Bid Documents or granted "Pre-Bid Approval" will be incorporated into the Work unless such substitution is authorized and agreed upon through a Contract Change Order.

d. If the Bid Documents identify only one source and expressly provide that it is an approved sole source for the product, material, system, item of equipment, or service, the bidder's proposal must be based upon the identified sole source.

e. Procedures for "Pre-bid Approval". If it is desired that a product, material, system, piece of equipment, or service from a source different from those sources identified in the Bid Documents be approved as an acceptable source, application for the approval of such source must reach the hands of the Architect at least ten days prior to the date set for the opening of bids. At the Architect's discretion, this ten day provision may be waived. The application for approval of a proposed source must be accompanied by technical data which the applicant desires to submit in support of the application. The Architect will give consideration to reports from reputable independent testing laboratories, verified experience records showing the reputation of the proposed source with previous users, evidence of reputation of the source for prompt delivery, evidence of reputation of the source for efficiency in servicing its products, or any other pertinent written information. The application to the Architect for approval of a proposed source must be accompanied by a schedule setting forth in which respects the materials or equipment submitted for consideration differ from the materials or equipment designated in the Bid Documents. The burden of proof of the merit of the proposed substitution is upon the proposer. To be approved, a proposed source must also meet or exceed all express requirements of the Bid Documents. Approval, if granted, shall not be effective until published by the Architect in an addendum to the Bid Documents.

8. PREPARATION and DELIVERY of BIDS:

a. DCM Form C-3: Proposal Form:

(1) Bids must be submitted on the Proposal Form as contained in the Bid Documents; only one copy is required to be submitted. A completed DCM Form C-3A: Accounting of Sales Tax must be submitted with the Proposal Form.

(2) All information requested of the bidder on the Proposal Form must be filled in. The form must be completed by typewriter or hand-printed in ink.

(3) Identification of Bidder: On the first page of the Proposal Form the bidder must be fully identified by completing the spaces provided for:

- **(a)** the legal name of the bidder,
- **(b)** the state under which laws the bidder's business is organized and existing,
- **(c)** the city (and state) in which the bidder has its principal offices,
- **(d)** the bidder's business organization, i.e., corporation, partnership, or individual (to be indicated by marking the applicable box and writing in the type of organization if it is not one of those listed), and
- **(e)** the partners or officers of the bidder's organization, if the bidder is other than an individual. If the space provided on the Proposal Form is not adequate for this listing, the bidder may insert "See Attachment" in this space and provide the listing on an attachment to the Proposal Form.

(4) Where indicated by the format of the Proposal Form, the bidder must specify lump sum prices in both words and figures. In case of discrepancy between the prices shown in words and in figures, the words will govern.

(5) All bid items requested in the Proposal Form, including alternate bid prices and unit prices for separate items of the Work, must be bid. If a gross sum of bid items is requested in the Proposal Form, the gross sum shall be provided by the bidder.

(6) In the space provided in the Proposal Form under "Bidder's Alabama License", the bidder must insert his or her current general contractor's state license number, current bid limit, and type(s) of work for which bidder is licensed.

(7) The Proposal Form shall be properly signed by the bidder. If the bidder is:

- **(a)** **an individual**, that individual or his or her "authorized representative" must sign the Proposal Form;
- **(b)** **a partnership,** the Proposal Form must be signed by one of the partners or an "authorized representative" of the Partnership;
- **(c)** **a corporation,** the president, vice-president, secretary, or "authorized representative" of the corporation shall sign and affix the corporate seal to the Proposal Form.

As used in these Instructions to Bidders, "authorized representative" is defined as a person to whom the bidder has granted written authority to conduct business in the bidder's behalf by signing and/or modifying the bid. Such written authority shall be signed by the bidder (the individual proprietor, or a member of the Partnership, or an officer of the Corporation) and shall be attached to the Proposal Form.

(8) Interlineation, alterations or erasures on the Proposal Form must be initialed by the bidder or its "authorized representative".

b. DCM Form C-3A: Accounting of Sales Tax

A completed DCM Form C-3A: Accounting of Sales Tax must be submitted with DCM Form C-3: Proposal Form. Submission of DCM Form C-3A is required, it is not optional. A proposal shall be rendered non-responsive if an Accounting of Sales Tax is not provided.

c. Bid Guaranty

(1) The Proposal Form must be accompanied by a cashier's check, drawn on an Alabama bank, or a Bid Bond, executed by a surety company duly authorized and qualified to make such bonds in the State of Alabama, payable to the Awarding Authority.

(2) If a Bid Bond is provided in lieu of a cashier's check, the bond shall be on the Bid Bond form as stipulated in the Bid Documents.

(3) The amount of the cashier's check or Bid Bond should not be less than five percent of the contractor's bid, but is not required to be in an amount more than ten thousand dollars.

d. Delivery of Bids:

(1) Bids will be received until the time set, and at the location designated, in the Advertisement for Bids unless notice is given of postponement. Any bid not received prior to the time set for opening bids will be rejected absent extenuating circumstances and such bids shall be rejected in all cases where received after other bids are opened.

(2) Each bid shall be placed, together with the bid guaranty, in a sealed envelope. On the outside of the envelope the bidder shall write in large letters "Proposal", below which the bidder shall identify the Project and the Work bid on, the name of the bidder, and the bidder's current general contractor's state license number.

(3) Bids may be delivered in person, or by mail if ample time is allowed for delivery. When sent by mail, the sealed envelope containing the bid, marked as indicated above, shall be enclosed in another envelope for mailing.

9. WITHDRAWAL or REVISION of BIDS:

a. A bid may be withdrawn prior to the time set for opening of bids, provided a written request, executed by the bidder or the bidder's "authorized representative", is filed with the Architect prior to that time. The bid will then be returned to the bidder unopened.

b. A bid which has been sealed in its delivery envelope may be revised by writing the change in price and date on the outside of the delivery envelope over the signature of the bidder or the bidder's "authorized representative". In revising the bid in this manner, the bidder must only write the amount of the change in price on the envelope **and must not reveal the bid price.**

c. Written communications, signed by the bidder or its "authorized representative", to revise bids will be accepted if received by the Architect prior to the time set for opening bids. The Architect will record the instructed revision upon opening the bid. Such written communication may be by facsimile if so stipulated in Supplemental Instructions to Bidders. In revising the bid in this manner, the bidder must only write the amount of the change in price **and must not reveal the bid price.**

d. Except as provided in Article 12 of these Instructions to Bidders, no bid shall be withdrawn, modified, or corrected after the time set for opening bids.

10. OPENING of BIDS:

a. Bids will be opened and read publicly at the time and place indicated in the Advertisement for Bids. Bidders or their authorized representatives are invited to be present.

b. A list of all proposed major subcontractors and suppliers will be submitted by Bidders to the Architect at a time subsequent to the receipt of bids as established by the Architect in the Bid Documents but in no event shall this time exceed twenty-four (24) hours after receipt of bids. If the list includes a fire alarm contractor and/or fire sprinkler contractor, Bidders will also submit a copy of the fire alarm contractor's and/or fire sprinkler contractor's permits from the State of Alabama Fire Marshal's Office.

11. INCOMPLETE and IRREGULAR BIDS:

A bid that is not accompanied by data required by the Bid Documents, or a bid which is in any way incomplete, may be rejected. Any bid which contains any uninitialed alterations or erasures, or any bid which contains any additions, alternate bids, or conditions not called for, or any other irregularities of any kind, will be subject to rejection.

12. BID ERRORS:

a. Errors and Discrepancies in the Proposal Form. In case of error in the extension of prices in bids, the unit price will govern. In case of discrepancy between the prices shown in the figures and in words, the words will govern.

b. Mistakes within the Bid. If the low bidder discovers a mistake in its bid, the low bidder may seek withdrawal of its bid without forfeiture of its bid guaranty under the following conditions:

(1) Timely Notice: The low bidder must notify the Awarding Authority and Architect in writing, within three working days after the opening of bids, that a mistake was made. This notice must be given within this time frame whether or not award has been made.

(2) Substantial Mistake: The mistake must be of such significance as to render the bid price substantially out of proportion to the other bid prices.

(3) Type of Mistake: The mistake must be due to calculation or clerical error, an inadvertent omission, or a typographical error which results in an erroneous sum. A mistake of law, judgment, or opinion shall not constitute a valid ground for withdrawal without forfeiture.

(4) Documentary Evidence: Clear and convincing documentary evidence of the mistake must be presented to the Awarding Authority and the Architect as soon as possible, but no later than three working days after the opening of bids.

The Awarding Authority's decision regarding a low bidder's request to withdraw its bid without penalty shall be made within 10 days after receipt of the bidder's evidence or by the next regular meeting of the Awarding Authority. Upon withdrawal of bid without penalty, the low bidder shall be prohibited from (1) doing work on the project as a subcontractor or in any other capacity and (2) bidding on the same project if it is re-bid.

13. DISQUALIFICATION of BIDDERS:

Any bidder(s) may be disqualified from consideration for contract award for the following reasons:

a. Collusion. Any agreement or collusion among bidders or prospective bidders in restraint of freedom of competition to bid at a fixed price or to refrain from bidding or otherwise shall render the bids void and shall cause the bidders or prospective bidders participating in such agreement or collusion to be disqualified from submitting further bids to the Awarding Authority on future lettings. (See § 39-2-6, Code of Alabama 1975, for possible criminal sanctions.)

b. Advance Disclosure. Any disclosure in advance of the terms of a bid submitted in response to an Advertisement for Bids shall render the proceedings void and require re-advertisement and rebid.

c. Failure to Settle Other Contracts. The Awarding Authority may reject a bid from a bidder who has not paid, or satisfactorily settled, all bills due for labor and material on other contracts in force at the time of letting.

14. CONSIDERATION of BIDS:

a. After the bids are opened and read publicly, the bid prices will be compared and the results of this comparison will be available to the public. Until the final award of the contract, however, the Awarding Authority shall have the right to reject any or all bids, and it shall have the right to waive technical errors and irregularities if, in its judgment, the bidder will not have obtained a competitive advantage and the best interests of the Awarding Authority will be promoted.

b. If the Bid Documents request bids for projects or parts of projects in combination or separately, the Bid Documents must include supplements to, these Instructions to Bidders setting forth applicable bid procedures. Award or awards will be made to the lowest responsible and responsive bidder or bidders in accordance with such bid procedures.

15. DETERMINATION of LOW BIDDER by USE of ALTERNATES:

a. The Awarding Authority may request alternate bid prices (alternates) to facilitate either reducing the base bid to an amount within the funds available for the project or adding items to the base bid within the funds available for the project. Alternates, if any, are listed in the

Proposal Form in the order in which they shall cumulatively deduct from or add to the base bid for determining the lowest bidder.

b. If alternates are included in the Proposal Form, the Awarding Authority shall determine the dollar amount of funds available and immediately prior to the opening of bids shall announce publicly the funds available for the project. The dollar amount of such funds shall be used to determine the lowest bidder as provided herein below, notwithstanding that the actual funds available for the project may subsequently be determined to be more or less than the expected funds available as determined immediately prior to the time of the opening of bids.

c. If the base bid of the lowest bidder exceeds the funds available and alternate bid prices will reduce the base bids to an amount that is within the funds available, the lowest bidder will be determined by considering, in order, the fewest number of the alternates that produces a price within the funds available. If the base bid of the lowest bidder is within the funds available and alternate bid prices will permit adding items to the base bid, the lowest bidder will be determined by considering, in order, the greatest number of the alternates that produces a price within the funds available.

d. After the lowest bidder has been determined as set forth above, the Awarding Authority may award that bidder any combination of alternates, provided said bidder is also the low bidder when only the Base Bid and such combination of alternates are considered.

16. UNIT PRICES:

a. Work Bid on a Unit Price Basis. Where all, or part(s), of the planned Work is bid on a unit price basis, both the unit prices and the extensions of the unit prices constitute a basis of determining the lowest responsible and responsive bidder. In cases of error in the extension of prices of bids, the unit price will govern. A bid may be rejected if any of the unit prices are obviously unbalanced or non-competitive.

b. Unit Prices for Application to Change Orders. As a means of predetermining unit costs for changes in certain elements of the Work, the Bid Documents may require that the bidders furnish unit prices for those items in the Proposal Form. Unit prices for application to changes in the work are not a basis for determining the lowest bidder. Non-competitive unit prices proposed by the successful bidder may be rejected and competitive prices negotiated by the Awarding Authority prior to contract award. Unit prices for application to changes in the work are not effective unless specifically included and agreed upon in the Construction Contract.

17. AWARD of CONTRACT:

a. The contract shall be awarded to the lowest responsible and responsive bidder unless the Awarding Authority finds that all the bids are unreasonable or that it is not in the best interest of the Awarding Authority to accept any of the bids. A responsible bidder is one who, among other qualities determined necessary for performance, is competent, experienced, and financially able to perform the contract. A responsive bidder is one who submits a bid that complies with the terms and conditions of the Advertisement for Bids and the Bid Documents. Minor irregularities in the bid shall not defeat responsiveness.

b. A bidder to whom award is made will be notified by telegram, confirmed facsimile, or letter to the address shown on the Proposal Form at the earliest possible date. Unless other

time frames are stipulated in Supplemental Instructions to Bidders, the maximum time frames allowed for each step of the process between the opening of bids and the issuance of an order to proceed with the work shall be as follows:

(1)	Award of contract by Awarding Authority	30 calendar days after the opening of bids
(2)	Contractor's return of the fully executed contract, with bonds and evidence of insurance, to the Awarding Authority	15 calendar days after the contract has been presented to the contractor for signature (from the Lead Design Professional)
(3)	Awarding Authority's approval of the contractor's bonds and evidence of insurance and completion of contract execution	20 calendar days after the contractor presents complete and acceptable documents to the Architect
(4)	Notice To Proceed issued to the contractor along with distribution of the fully executed construction contract to all parties.	15 calendar days after final execution of contract by the Awarding Authority, by various State Agencies if required and by the Governor if his or her signature on the contract is required by law

The time frames stated above, or as otherwise specified in the Bid Documents, may be extended by written agreement between the parties. Failure by the Awarding Authority to comply with the time frames stated above or stipulated in Supplemental Instructions to Bidders, or agreed extensions thereof, shall be just cause for the withdrawal of the contractor's bid and contract without forfeiture of bid security.

c. Should the successful bidder or bidders to whom the contract is awarded fail to execute the Construction Contract and furnish acceptable Performance and Payment Bonds and satisfactory evidence of insurance within the specified period, the Awarding Authority shall retain from the bid guaranty, if it is a cashier's check, or recover from the principal or the sureties, if the guaranty is a bid bond, the difference between the amount of the contract as awarded and the amount of the bid of the next lowest responsible and responsive bidder, but not more than $10,000. If no other bids are received, the full amount of the bid guaranty shall be so retained or recovered as liquidated damages for such default. Any sums so retained or recovered shall be the property of the Awarding Authority.

d. All bid guaranties, except those of the three lowest bona fide bidders, will be returned immediately after bids have been checked, tabulated, and the relation of the bids established. The bid guaranties of the three lowest bidders will be returned as soon as the contract bonds and the contract of the successful bidder have been properly executed and approved. When the award is deferred for a period of time longer than 15 days after the opening of the bids, all bid guaranties, except those of the potentially successful bidders, shall be returned. If no award is made within the specified period, as it may by agreement be extended, all bids will be rejected, and all guaranties returned. If any potentially successful bidder agrees in writing to a stipulated extension in time for consideration of its bid and its bid was guaranteed with a cashier's check, the Awarding Authority may permit the potentially successful bidder to substitute a satisfactory bid bond for the cashier's check.

END of INSTRUCTIONS TO BIDDERS

REQUEST FOR INFORMATION (RFI)

Email this form in its entirety to Project Manager listed below.
The Architect reserves the right not to answer any Request For Information received after **2:00 p.m., Two (2) days prior to the bid date**.

To: Lathan Mckee, Architects

Francis Hernandez; Project Manager

fhernandez@lathanmckee.com
Email

From: _____
Name

_____
Company

_____
Email

Project: _____

Project Number: _____

Request For Information Number: _____

Issue Date: _____

☐ BID PHASE ☐ CONSTRUCTION PHASE

Procedures for "Explanations and Interpretations":

a. Should any bidder observe any ambiguity, discrepancy, omission, or error in the drawings and specifications, or in any other bid document, or be in doubt as to the intention and meaning of these documents, the bidder should immediately report such to the Architect and request clarification.

b. **Clarification will be made only by written Addenda sent to all prospective bidders or can be accessed by going to the McKee web site - mckeeassoc.com and clicking on the tab "Files" to retrieve the Addendums.** Neither the Architect nor the Owner will be responsible in any manner for verbal answers or instructions regarding intent or meaning of the Bid Documents.

c. **In the case of inconsistency between drawings and specifications or within either document, a bidder will be deemed to have included in its bid the better quality or greater quantity of the work involved unless the bidder asked for and obtained the Architect's written clarification of the requirements before submission of a bid.**

REQUEST FOR INFORMATION DESCRIPTION: *(Fully describe the question or type of information requested.)*

REFERENCES/ATTACHEMENTS: *(List specific documents researched when seeking the information requested.)*

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Drawing Sheet Number: _____ Title: _____

Plan: _____ Elevation: _____ Section: _____ Detail: _____

Other:

RECEIVERS REPLY:

Signed by:_____ Date:_____ Copies to:_____

REQUEST FOR APPROVAL (RFA)
PRIOR APPROVAL/SUBSTITUTION REQUEST

Email this form in its entirety to Project Manager listed below.
All products, materials, systems, equipment and services requested for prior approval must be submitted to the architect for approval **no later than 2:00 p.m., Ten (10) days prior to the bid date**.

To: Lathan Mckee, Architects

Francis Hernadez; Project Manager

fhernandez@lathanmckee.com
Email

Substitution Request Number: _____

From: _____

Date: _____

Project: _____

A/E Project Number: _____

Re: _____

Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Procedures for "Substitutions" and "Pre-Bid Approval":

a. The identification of any product, material, system, item of equipment, or service in the Bid Documents by reference to a trade name, manufacturer's name, model number, etc. (hereinafter referred to as "source"), is intended to establish a required standard of performance, design, and quality and is not intended to limit competition unless the provisions of paragraph "D" below apply.

b. When the Bid Documents identify only one or two sources, or three or more sources followed by "or approved equal" or similar wording, the bidder's proposal may be based on a source not identified but considered by the bidder to be equal to the standard of performance, design and quality as specified; however, such substitutions must ultimately be approved by the Architect. If the bidder elects to bid on a substitution without "Pre-bid Approval" as described below, then it will be understood that proof of compliance with specified requirements is the exclusive responsibility of the bidder.

c. When the Bid Documents identify three or more sources and the list of sources is not followed by "or approved equal" or similar wording, the bidder's proposal shall be based upon one of the identified sources, unless the bidder obtains "Pre-bid Approval" of another source as described below. Under these conditions it will be expressly understood that no product, material, system, item of equipment, or service that is not identified in the Bid Documents or granted "Pre-Bid Approval" will be incorporated into the Work unless such substitution is authorized and agreed upon through a Contract Change Order.

d. If the Bid Documents identify only one source and expressly provide that it is an approved sole source for the product, material, system, item of equipment, or service, the bidder's proposal must be based upon the identified sole source.

e. **Procedures for "Pre-Bid Approval".** If it is desired that a product, material, system, piece of equipment, or service from a source different from those sources identified in the Bid Documents be approved as an acceptable source, application for the approval of such source must reach the hands of the Architect **at least ten days prior to the date set for the opening of bids**. At the Architect's discretion, this ten day provision may be waived. **The application for approval of a proposed source must be accompanied by technical data which the applicant desires to submit in support of the application.** The Architect will give consideration to reports from reputable independent testing laboratories, verified experience records showing the reputation of the proposed source with previous users, evidence of reputation of the source for prompt delivery, evidence of reputation of the source for efficiency in servicing its products, or any other pertinent written information. **The application to the Architect for approval of a proposed source must be accompanied by a schedule setting forth in which respects the materials or equipment submitted for consideration differ from the materials or equipment designated in the Bid Documents.**

The burden of proof of the merit of the proposed substitution is upon the proposer. To be approved, a proposed source must also meet or exceed all express requirements of the Bid Documents. Approval, if granted, shall not be effective until published by the Architect in an addendum to the Bid Documents.

The undersigned requests consideration of the following product substitution:

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Supporting Data Attached: ☐ Product Description ☐ Drawings ☐ Photographs ☐ Performance & Test Data ☐ Specifications

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned states and certifies the following: (Mark Boxes as Applicable)

☐ Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.

or

☐ Proposed substitution differs from what is specified in the Bid Documents. Submitted Data clearly identifies all differences from what is specified in the Bid Documents.

☐ No changes will be required to the Contract Documents for the proper installation of the proposed product substitution.

or

☐ Changes will be required to the Contract Documents for the proper installation of the proposed product substitution. Submitted Data clearly identifies description of changes.

and

☐ Warranty will be furnished for proposed substitution ☐ Equal to or ☐ Superior to specified product.

☐ Proposed substitution does not affect dimensions shown on the drawings and functional clearances.

☐ No changes will be required to the building design, engineering design or detailing by the proposed substitution.

☐ Proposed substitution will have no adverse effect on other trades and will not affect or delay construction progress schedule.

☐ No maintenance is required by the proposed substitution other than that required for originally specified product.

☐ Other Information:

The undersigned further states that they have read the corresponding specification sections in the project manual and confirms that the function, appearance and quality of the proposed substitution are equivalent to or superior to the originally specified product.

Submitted by: (Print) Signature: Date:

Firm: Address:

Email: Telephone:

A/E REVIEW AND ACTION

☐ Substitution Approved ☐ Substitution Approved as noted ☐ Substitution Rejected

☐ Substitution Request Received to Late

Comments:

Signed by: Date:

UNIT PRICE ITEM LEGEND

Cafeteria Addition
at
Crossville High School
for
Dekalb County Board of Education
Crossville, Alabama

LATHAN MCKEE PROJECT NO. 26-032-00

Legal Name of Bidder _____

Mailing Address _____

The General Contractor shall include the Unit Prices below in their Base Bid Proposal. The quantities assigned below are above and beyond the amounts required to complete the work required by the bid documents. This Unit Price Item Legend shall be submitted with the sealed Proposal.

SCHEDULE OF UNIT PRICES:

UNIT PRICES: The Unit Prices below establishes Unit Prices so that the Owner can delete/add quantities from the Contract(s) required.

UNIT PRICE #1: The Contractor shall include in his Base Bid proposal the cost for [an **Additional**] **750,000** Cubic Yards Measured In Place (CYMIP) of removal and off-site disposal of unsuitable soil and furnishing, placing and compacting of acceptable fill material from below the finished subgrade and tested to meet requirements specified for the affected area, in accordance with [the Geotechnical Report and] Section 02055 " Soils for Earthwork."
750,000 CYMIP @ _____/CYMIP = **$**_____ **Included in Base Bid**

ACCOUNTING OF SALES TAX
Attachment to DCM Form C-3: Proposal Form

To: _____ Date: _____
(Awarding Authority)

NAME OF PROJECT _____

_____

SALES TAX ACCOUNTING

Pursuant to Act 2013-205, Section 1(g) the Contractor accounts for the sales tax NOT included in the bid proposal form as follows:

ESTIMATED SALES TAX AMOUNT

BASE BID: $_____

Alternate No. 1 (……..) ☐(add) ☐(deduct) $_____
(Insert key word for Alternate)

Alternate No. 2 (……..) ☐(add) ☐(deduct) $_____

Alternate No. 3 (……..) ☐(add) ☐(deduct) $_____

Alternate No. 4 (……..) ☐(add) ☐(deduct) $_____

Alternate No. 5 (……..) ☐(add) ☐(deduct) $_____

Alternate No. 6 (……..) ☐(add) ☐(deduct) $_____

Legal Name of Bidder _____

Mailing Address _____

***By (Legal Signature)** _____

*Name (type or print) _____ *(Seal)*

*Title _____

Telephone Number _____

Email Address _____

Note: A completed DCM Form C-3A: Accounting of Sales Tax must be submitted with DCM Form C-3: Proposal Form. Submission of DCM Form C-3A with DCM Form C-3 is required, it is not optional. A proposal shall be rendered non-responsive if an Accounting of Sales Tax is not provided.

BID BOND

The **PRINCIPAL** (*Bidder's company name and address*)
Name:
Address:

The **SURETY** (*Company name and primary place of business*)
Name:
Address:

The **OWNER** (*Entity name and address*)
Name:
Address:

The **PROJECT** for which the Principal's Bid is submitted: (*Project name as it appears in the Bid Documents*)

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned Principal and Surety, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Owner in the **PENAL SUM of five percent (5%) of the amount of the Principal's bid, but in no event more than Ten-thousand Dollars ($10,000.00)**.

THE CONDITION OF THIS OBLIGATION is that the Principal has submitted to the Owner the attached bid, which is incorporated herein by reference, for the Project identified above.

NOW, THEREFORE, if, within the terms of the Bid Documents, the Owner accepts the Principal's bid and the Principal thereafter either:

(a) executes and delivers a Construction Contract with the required Performance and Payment Bonds (each in the form contained in the Bid Documents and properly completed in accordance with the bid) and delivers evidence of insurance as prescribed in the Bid Documents, or

(b) fails to execute and deliver such Construction Contract with such Bonds and evidence of insurance, but pays the Owner the difference, not to exceed the Penal Sum of this Bond, between the amount of the Principal's Bid and the larger amount for which the Owner may award a Construction Contract for the same Work to another bidder,

then, this obligation shall be null and void, otherwise it shall remain in full force and effect.

The Surety, for value received, hereby stipulates and agrees that the obligation of the Surety under this Bond shall not in any manner be impaired or affected by any extension of the time within which the Owner may accept the Principal's bid, and the Surety does hereby waive notice of any such extension.

SIGNED AND SEALED this _____ day of _____, _____.

ATTEST:

_____

PRINCIPAL:

_____

By _____

_____
Name and Title

SURETY:

ATTEST:

_____

_____

By_____

_____
Name and Title

SPECIAL INSTRUCTIONS TO BIDDERS

1.1 INTENT OF INSTRUCTIONS

A. The Special Instructions to Bidders are intended to amplify the abbreviated Advertisement and to give other details which shall allow interested parties to prepare bids which accurately reflect the scope of the Work. The Special Instructions to Bidders are meant to be viewed as a complement to the general Instructions to Bidders found in the Project Manual. Should any discrepancy or ambiguity be noted, the Special Instructions to Bidders shall defer to the general Instructions to Bidders.

1.2 EXPLANATION AND INTERPRETATION

A. Should any Bidder or subcontractor find any ambiguity, discrepancy, omission, or error in the Drawings and Project Manual, or insufficient information to provide a complete job, or be in doubt as to the intent and meaning thereof, he should at once report such in writing to Architect and request clarification prior to bidding

B. Clarification shall be made only by written Addenda during the bid period and sent to all perspective Bidders. The Architect and Consultants shall not be responsible for verbal answers regarding intent or meaning of the Contract Documents, or for any verbal instructions, by whomsoever made, prior to the award of the Contract.

C. Additionally, all designed systems and/or assemblies are to be proposed and bid as complete assemblies or operational systems. Drawings are indicating intent and not attempting to fully obtain or detail required work.

1.3 BIDDER REQUIREMENTS

A. All Bidders must honor their bid proposals for a period of 90 calendar days from date of bid opening.

B. The Contractor MUST Field Verify all existing conditions prior to submitting bid proposal.

C. The **Apparent Low Bidder *AND* Apparent Second Lowest Bidder** must submit to the **Architect a direct Contact Name, Phone Number and Email Address for the Bonding Company and a list of the principal Subcontractors, suppliers, and fabricators he plans to use for each category of work.** The list of Subcontractors, Suppliers and Fabricators must be received by the Architect within **24 hours following the Bid Opening** (email to: **krawlinson@lathanmckee.com**). Once the successful bidder has obtained approval from the Owner, no changes in Subcontractors, Suppliers or Fabricators shall be made without the express, written consent of the Owner. Contractor shall request consent in writing from the Owner and Architect and provide specific and reasonable explanation as to the necessity of said change. Should said change be approved by the Owner, the Contractor must submit the desired replacement Subcontractor to the Architect and obtain written approval of the Subcontractor.

1.4 OPENING OF PROPOSALS

A. The Owner shall, according to applicable laws and regulations pertaining to bid openings, receive and review all Proposals submitted, according to the method selected below:

1. Proposals shall be opened and read publicly at the time and place indicated in the Advertisement.

2. Proposals may be rejected if they contain any omissions, alterations of forms, additions not called for, conditional bids, alternate bids unless called for, incomplete bids, erasures, or irregularities of any kind. Proposals in which the unit or lump sum prices bid are obviously unbalanced may be rejected. Additions to or deductions from the Bid amount may be written on the outside of the sealed bid, or by letter enclosed in the sealed bid envelope.

1.5 DETERMINATION of LOW BIDDER by USE of ALTERNATES

A. The Awarding Authority may request alternate bid prices (alternates) to facilitate either reducing the base bid to an amount within the funds available for the project or adding items to the base

bid within the funds available for the project. Alternates, if any, are listed in the Proposal Form in the order in which they shall cumulatively deduct from or add to the base bid for determining the lowest bidder.

B. If alternates are included in the Proposal Form, the Awarding Authority shall determine the dollar amount of funds available and immediately prior to the opening of bids shall announce publicly the funds available for the project. The dollar amount of such funds shall be **used to determine the lowest bidder** as provided herein below, notwithstanding that the actual funds available for the project may subsequently be determined to be more or less than the expected funds available as determined immediately prior to the time of the opening of bids.

C. **If additional funds become available after the bid opening, the Owner may at his option elect to award to the lowest base bid bidder a contract based on the Contractors base bid amount and additional Alternates.**

D. If the base bid of the lowest bidder **exceeds** the funds available and alternate bid prices will reduce the base bids to an amount that is **within** the funds available, the lowest bidder will be determined by considering, in order, the fewest number of the alternates that produces a price within the funds available.

E. If the base bid of the lowest bidder is within the funds available and alternate bid prices will permit adding items to the base bid, the lowest bidder will be determined by considering, in order, the greatest number of the alternates that produces a price within the funds available.

F. After the lowest bidder has been determined as set forth above, the Awarding Authority may award that bidder any combination of alternates, provided said bidder is also the low bidder when only the Base Bid and such combination of alternates are considered.

1.6 AWARD OF CONTRACT

A. The Bidder to whom the award is made shall be notified by letter to the address shown on his Proposal at the earliest possible date. At such time, at the option of the Owner, additional information such as a complete financial statement may be required from the successful Bidder.

1.7 EXECUTION OF CONTRACT

A. The Contract shall be signed by the successful Bidder, in the number of counterparts provided in the Contract Agreement and returned to the Owner with satisfactory Contract Bonds within ten (10) days after the date of Notice of Award.

1.8 PERFORMANCE BOND AND PAYMENT BOND

A. The intent of the Performance Bond is to ensure the faithful performance of each and every condition, stipulation, and requirements of the Contract and to indemnify and save harmless the Owner, Architect, and Consultants from any and all damages, either directly or indirectly (arising out of any failure to perform same). The successful Bidder to whom the Contract is awarded shall furnish at his expense an acceptable Performance Bond in an amount equal to one hundred percent (100%) of the Contract Price of the Contract as awarded. Said Bond shall be made on the approved Bond form, shall be furnished by a surety company duly authorized and qualified to make such bonds in the State of Alabama, shall be countersigned by an authorized agent resident in the State who is qualified for the execution of such instruments, and shall have attached thereto power of attorney of the signing official. In case of default on the part of the Contractor, all expenses incident to ascertaining and collecting losses suffered by the Owner under the Bond, the direct costs of administration, architectural, engineering, and legal services, shall lie against the Contract Bond for Performance of the Work.

B. In addition thereto, the successful Bidder to whom the Contract is awarded shall furnish at his expense a Payment Bond with good and sufficient surety payable to the Owner in an amount not less than one hundred percent (100%) of the Contract Price, with the obligation that the Contractor shall promptly make payment to all persons furnishing him or them with labor, material, feedstuffs, or supplies for or in prosecution of the Work provided for in the Contract and for the payment or reasonable attorneys' fees, incurred by successful claimants or plaintiffs in suits on said Bond.

C. The **Apparent Low Bidder *AND* Apparent Second Lowest Bidder** must submit to the **Architect a direct Contact Name, Phone Number and Email Address for the Bonding Company** within 24 hours of the bid opening.

D. **Cost Submission Requirements:** As required by the Supplemental General Conditions, the Contractor must provide the **total cost** for each of the following divisions:

- Civil
- Plumbing
- Mechanical
- Electrical

Include the **Architectural Project Name and Number** and the requested costs in **one consolidated document**. Please submit all requested information promptly to avoid delays.

1.9 APPROVAL OF CONTRACT

A. No Contract is binding upon the Owner until it has been executed by the Owner and the successful Bidder and copies delivered.

1.10 CAD FILES

A. McKee & Associates CAD Files shall not be provided. Should the contractor require CAD Files they are encouraged to seek online PDF to CAD File Conversion vendors and/or software.

1.11 LIST OF SUBCONTRACTORS

A. The **Apparent Low Bidder *AND* Apparent Second Lowest Bidder** must submit to the Architect **a direct Contact Name, Phone Number and Email Address for the Bonding Company and a list of the principal Subcontractors, suppliers, and fabricators he plans to use for each category of work** must be received by the Architect within twenty-four hours following the Bid Opening. Email to **krawlinson@lathanmckee.com.** Once the successful bidder has obtained approval from the Owner, no changes in Subcontractors, suppliers and fabricators shall be made without the express, written consent of the Owner.

1.12 LIST OF SUBCONTRACTORS SUBMITTAL FORM

Email this form in its entirety to contact listed below.

The **Apparent Low Bidder *AND* Apparent Second Lowest Bidder** must submit to the Architect **a direct Contact Name, Phone Number and Email Address for the Bonding Company and** the principal Subcontractors, suppliers, and fabricators he plans to use for each category of work. The list of Subcontractors must be received by the Architect within twenty-four hours following the Bid Opening.

To: Lathan Mckee, Architects

Kayla Rawlinson

krawlinsonk@lathanmckee.com
Email

From: _____
Company

_____
Name

_____
Email

_____
Phone Number

Project Name: _____

Project Number: _____ Issue Date: _____

Bid Date: _____

Category of Work	Name of Sub to Perform Work	Name of Supplier
SURETY		

END OF SECTION

PREPARATION AND APPROVAL OF
CONSTRUCTION
CONTRACTS* and *BONDS
SUBMITTED ELECTRONICALLY

CHECKLIST

Use with DCM Forms C-5, C-6, & C-7
and DCM Forms 9-A, 9-B, & 9-C

CONSTRUCTION CONTRACT - DCM Form C-5 or DCM Form 9-A (PSCA Projects) The numbers in the left column below correspond to numbers in the left margin of the Contract form.	
(1)	**PROJECT NUMBER(S):** DCM will insert the DCM Project Number in the field provided. • On DCM Form 9-A, insert the PSCA Project Number in the field provided.
(2)	**DATE:** Do not select a date beyond today's date.
(3)	**OWNER:** Insert the full, legal name, address, email, and telephone number of the Owner (Awarding Authority). • On DCM Form 9-A, insert the name, address, email, and telephone number of the Local Owner (city or county school board, college, university, etc.) after "Alabama Public School and College Authority"
(4)	**CONTRACTOR:** Insert the Contractor's company name, correct mailing address, email, and telephone number. For State Agency projects, the Contractor Company name and address must match the name and address registered in the State of Alabama Accounting and Resource System (STAARS) or AL Buys (if registered), used by most State Agencies to pay Vendors. The Contractor Company name and address must be consistent across all documents in the same contract package, in order to avoid Comptroller's Office rejection. • On DCM Form 9-A: The Contractor Company name and address must match the name and address registered in STAARS or AL Buys used by the State to pay Vendors. The Contractor Company name and address must be consistent across all documents in the same contract package, in order to avoid Comptroler's rejection.
(5)	**The WORK:** Insert the complete name of the Project; same as in the Bid Documents.
(6)	**CONTRACT DOCUMENTS**: Insert the date of the Bid Documents
(7)	**ADDENDA:** Identify, by number and date, all pre-bid Addenda that were issued to the Bid Documents. If none were issued, insert "None". All Addenda shall be submitted to DCM for review prior to contract issuance.
(8)	**ARCHITECT:** Insert the full, legal name, address, email, and telephone number of the Project Architectural or Engineering firm.
(9)	**CONTRACT SUM:** The Contract Sum is the total of the Contract's Base Bid and accepted Bid Alternate Prices, if any. Insert the Contract Sum in words and figures, verifying that this amount corresponds with the CERTIFIED TABULATION OF BIDS.
(10)	**BID ALTERNATE PRICES**: Identify which, if any, Bid Alternate Prices are accepted and included in the Contract Sum by inserting either (a) "No Alternate Prices Requested in Bid", (b) "No Alternate Prices Accepted", or (c) a listing of the accepted Alternates by number and dollar amount.
(11)	**The CONTRACT TIME:** State the Contract Time in words and in figures.
(12)	**LIQUIDATED DAMAGES:** If the Owner has computed a daily rate for liquidated damages, insert the amount in both words and figures in the spaces provided.
(13)	**SPECIAL PROVISIONS:** This space may be used to incorporate Special Provisions into the Contract, such as unit prices, compliance with enacted provisions, and value engineering. If the solicitation for bids required Unit Prices, insert a statement of which Unit Prices, if any, are accepted and incorporated into the Contract. If more space is needed, Special Provisions may be stated on an attachment that is cited in the Special Provisions section. • DCM Form 9-A is published bearing Special Provision **"A. Severable Payments"**, which is where the portions of the Contract Sum to be paid by the PSCA and the Local Owner are to be stated. Obtain these amounts from Local Owner and insert them in the spaces provided. Other Special Provisions, such as disposition of Unit Prices, may be inserted below this provision.
(14)	**STATE GENERAL CONTRACTOR'S LICENSE:** Insert the Contractor's current state general contracting license number, bid limit, and classification in the spaces provided.

(15)	**SIGNATURES - APPROVING and CONTRACTING PARTIES** The documents will forward to the signers in sequential order.

PERFORMANCE BOND, DCM Form C-6 or DCM Form 9-B (PSCA Projects), and
PAYMENT BOND, DCM Form C-7 or DCM Form 9-C (PSCA Projects)

Required for contracts of $100,000.0 or more, with surety's power-of-attorney - required per Section 39-2-8 of the Code of Alabama.

(1)	**SURETY'S BOND NUMBER** should be inserted in the field provided.
(2)	**PRINCIPAL:** Contractor's name and address is to be the same as appears in the Construction Contract.
(3)	**SURETY:** The full, legal name and address of the bonding company.
(4)	**OWNER:** The Owner's name and address is to be the same as appears in the Construction Contract.
(5)	**PENAL SUM:** The Penal Sum of each Bond is to be the Contract Sum of the Construction Contract and is to be inserted in both words and figures.
(6)	The **Date** of the Construction Contract**:** The date that appears on the Construction Contract.
(7)	The **PROJECT:** The same name or description as appears in the Construction Contract.
(8)	**DATE:** After "SIGNED AND SEALED" is to appear the date upon which Surety signs the Bond. **THIS DATE CANNOT PRECEDE THE DATE OF THE CONSTRUCTION CONTRACT.**
(9)	**CONTRACTOR'S SIGNATURE:** The Contractor's name must appear beneath "CONTRACTOR", under which the signature of a member or officer of the firm must appear with the name and title of the signing party appearing beneath the signature.
(10)	**SURETY'S SIGNATURE:** The full, legal name of the bonding company must appear under "SURETY", under which the signature of an individual having power of attorney for the bonding company must appear with the individual's name and title appearing beneath the signature.
(11)	**ATTACHED POWER OF ATTORNEY:** Attached to each of the Bonds must be a Power of Attorney, signed by an officer of the bonding company, for the individual e-signing the bond on behalf of the bonding company. **The date of the Power of Attorney must not precede the date of the bond.**

ATTACHMENTS

The following documents must be attached to the Construction Contract:

- Insurance Certificate (attach copy): It is the responsibility of the design professional to ensure all insurance requirements are discussed with bidders prior to a bid and that Contractor has provided the requirements to their insurance provider. Contractor must obtain all insurance coverage specified in Article 37 of the General Conditions of the Contract - required per Section 39-2-8 of the Code of Alabama.
- Surety's power-of-attorney: Required for Performance Bond, which is required for contracts of $100,000.00 or more per Section 39-2-8 of the Code of Alabama.
- Surety's power-of-attorney: Required for Payment Bond, which is required for contracts of $100,000.00 or more per Section 39-2-8 of the Code of Alabama.
- Certified Tabulation of Bids (attach copy): Required for all projects including those with informal bids -required per Section 39-2-6 of the Code of Alabama.
- DCM Form C-3: Proposal Form (attach copy): If bid proposal was adjusted by notation on outside of envelope, also attach copy of outside of envelope including notation.
- DCM Form C-3A: Accounting of Sales Tax (attach copy): Attachment must be of the executed C-3A from the bid -required per Section 40-9-14.1 of the Code of Alabama.
- E-Verify Memorandum of Understanding (attach copy): Entire document required - required per Section 31-13-25(b) of the Code of Alabama.
- Alabama Vendor Disclosure Statement - required per Section 41-16-82 of the Code of Alabama. Contractor must mail one original completed wet-signed notarized and dated hardcopy to DCM along with DCM Form: Transmittal of Alabama Vendor Disclosure Statement. DCM will perform a review, and if the document is correct, will attach a scan of the Disclosure Statement to the Contract.

DCM USER FEES:

- **PSCA-Funded Projects & Fully Locally-Funded State Agency Projects:** The Contract Document Administration Fee-CC and the Permit Fee must be paid by the time a Construction Contract for a PSCA-funded project or state agency/authority project is submitted to DCM for review, or when a fully locally-funded project Construction Contract is converted to PSCA. Contract reviews can begin once the fees have been paid.

- **Fully Locally-Funded K-12 Projects:** The Permit Fee must be paid by the time a copy of a fully locally-funded K-12 school project's executed Construction Contract is received at DCM's office from the State Department of Education (SDE). * See Permit Fee exception below.

- **General Information:**

  Basic Contract Document Administration (CDA) Fee: This fee covers review of the Agreement Between Owner and Architect (O/A Agreement) and Construction Contract for state agency projects, and partially or fully PSCA-funded projects of K-12 public schools and universities and the related amendments, change orders, service invoices and pay requests. This fee does not apply to fully locally-funded K-12 public school projects or fully locally-funded university projects. The Basic CDA Fee covers review of the original submitted document and one revision. The total basic CDA fee is 1/2 of 1% of the total construction cost, due in two parts: 1/4 of 1% (.25%) of the Project Budget for administration of the O/ A Agreement. 1/4 of 1% (.25%) of the Construction Contract Amount for administration of the Construction Contract. The CDA Fee for a PSCA-funded O/A Agreement or Construction Contract is limited by the Project Construction Cost funded by PSCA.
  Additional Revised Contract Document Fee: When more than one revision of a Construction Contract is required, an additional fee of $200.00 will be charged to the design professional for each additional submittal until the document is executed.
  Basic Permit Fee: This fee covers required project inspections. The Permit Fee must be paid before a construction contract is reviewed by DCM, or becomes due when a self-performance letter or fully locally-funded K-12 construction contract is received by DCM, and must be paid before a Pre-Construction Conference is scheduled with DCM Inspectors*
  Note: Although DCM does not review the construction contracts of fully locally-funded public K-12 projects, the Permit Fee must be paid before the required Pre-Construction Conference is scheduled with DCM Inspectors for such projects.*

  * Exception: Permit Fees are not owed for fully locally-funded public K-12 projects with an estimated cost of $750,000.00 or Less for capital improvement or alterations, additions, repair, or maintenance of heating, ventilation, and air conditioning systems or any alterations, additions, repair, or maintenance of a roof; all such projects are still subject to DCM pre-construction conferences and inspections.

  ∇ Determination of whether or not a project is in the $750,000.00 or Less classification for Permit Fees is based on the cost of the entire project including all phases and bid packages. If total of bids received for all phases and bid packages exceeds $750,000.00 for a fully locally-funded public K-12 project, then a Permit Fee is owed.

  Fees May Be Paid online at www.dcm.alabama.gov or paid with a physical check. Make check payable to: "Finance - Construction Management", include the DCM (BC) Project #, if assigned, on the check and attach the CDA Fees Calculation Worksheet and/or the Permit Fees Calculation Worksheet (also available on www.dcm.alabama.gov). Mail payment to: Finance - Construction Management, P.O. Box 301150, Montgomery, AL 36130-1150. For payments using Public School and College Authority (PSCA) funds and for state agency inter-fund transfers: contact Jennie Jones at 334-242-4808 or jennie.jones@realproperty.alabama.gov.

This form is provided solely for the purpose of inclusion in the project manual. A Construction Contract for fully locally-funded K-12 projects must be initiated via the appropriate DocuSign link from DCM's Engage Portal at https://engagealabama-rpm.facilityforce.cloud by the Lead Design Professional Firm.

(1) **DCM (BC) Project No.**

CONSTRUCTION CONTRACT

Numbers in margin correspond to "Checklist", DCM Form B-7

(2) This Construction Contract is entered into this day of in the year of

(3) between the **OWNER,**
Entity Name:
Address:
Email & Phone #:

(4) and the **CONTRACTOR,**
Company Name:
Address:
Email & Phone #:

(5) for the **WORK** of the Project, identified as:

(6) The **CONTRACT DOCUMENTS** are dated and have been amended by
(7) **ADDENDA**

(8) The **ARCHITECT** is
Firm Name:
Address:
Email & Phone #:

(9) The **CONTRACT SUM** is
Dollars ($) and is the sum of the Contractor's Base Bid for the Work and the following
(10) **BID ALTERNATE PRICES:**

(11) The **CONTRACT TIME** is ( ) calendar days.

THE OWNER AND THE CONTRACTOR AGREE AS FOLLOWS: The Contract Documents, as defined in the General Conditions of the Contract (DCM Form C-8), are incorporated herein by reference. The Contractor shall perform the Work in accordance with the Contract Documents. The Owner will pay and the Contractor will accept as full compensation for such performance of the Work, the Contract Sum subject to additions and deductions (including liquidated damages) as provided in the Contract Documents. The Work shall commence on a date to be specified in a Notice to Proceed issued by the Owner (or by the Lead Design Professional on the Owner's behalf), and shall then be substantially completed within the Contract Time.

(12) **LIQUIDATED DAMAGES** for which the Contractor and its Surety (if any) shall be liable and may be required to pay the Owner in accordance with the Contract Documents shall be equal to six percent interest per annum on the total Contract Sum unless a dollar amount is stipulated in the following space, in which case liquidated damages shall be determined at _____ dollars ($_____) per calendar day.

Numbers in margin correspond to "Checklist", DCM Form B-7

(13) **SPECIAL PROVISIONS** *(Insert any Special Provisions here, such as acceptance or rejection of unit prices. If Special Provisions are continued in an attachment, identify the attachment below)*:

(14) **STATE GENERAL CONTRACTOR'S LICENSE:** The Contractor does hereby certify that Contractor is currently licensed by the Alabama State Licensing Board for General Contractors and that the certificate for such license bears the following:

License No.:

Classification(s):

Bid Limit:

The Owner and Contractor have entered into this Construction Contract as of the date first written above and have executed this Construction Contract in sufficient counterparts to enable each contracting party to have an originally executed Construction Contract each of which shall, without proof or accounting for the other counterparts, be deemed an original thereof.

The Owner does hereby certify that this Construction Contract was let in accordance with the provisions of Title 39, Code of Alabama 1975, as amended, and all other applicable provisions of law, and that the terms and commitments of this Construction Contract do not constitute a debt of the State of Alabama in violation of Article 11, Section 213 of the Constitution of Alabama, 1901, as amended by Amendment Number 26.

(15)

APPROVAL

ALABAMA STATE DEPARTMENT OF EDUCATION (SDE)
(*Required for locally-funded, SDE projects.*)

By_____ Date:_____
State Superintendent of Education

CONTRACTING PARTIES

_____
Contractor Company

By _____
Signature

Name & Title _____

_____
Owner Entity

By _____
Signature

Name(s) & Title(s) _____

Routing of the Construction Contract to reviewers and e-signers is automated through DocuSign. DocuSign links for fully locally-funded contract documents are available from DCM's Engage Portal at https://engagealabama-rpm.facilityforce.cloud

ARTICLE 37
CONTRACTOR'S and SUBCONTRACTORS' INSURANCE

(Provide entire Article 37 to Contractor's insurance representative.)

A. GENERAL

(1) RESPONSIBILITY. The Contractor shall be responsible to the Owner from the time of the signing of the Construction Contract or from the beginning of the first work, whichever shall be earlier, for all injury or damage of any kind resulting from any negligent act or omission or breach, failure or other default regarding the work by the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of who may be the owner of the property.

(2) INSURANCE PROVIDERS. Each of the insurance coverages required below shall be issued by an insurer licensed by the Insurance Commissioner to transact the business of insurance in the State of Alabama for the applicable line of insurance, and such insurer (or, for qualified self-insureds or group self-insureds, a specific excess insurer providing statutory limits) must have a Best Policyholders Rating of "A-" or better and a financial size rating of Class V or larger.

(3) NOTIFICATION ENDORSEMENT. Each policy shall be endorsed to provide that the insurance company agrees that the policy shall not be canceled, changed, allowed to lapse or allowed to expire for any reason until thirty days after the Owner has received written notice by certified mail as evidenced by return receipt or until such time as other insurance coverage providing protection equal to protection called for in the Contract Documents shall have been received, accepted and acknowledged by the Owner. Such notice shall be valid only as to the Project as shall have been designated by Project Name and Number in said notice.

(4) INSURANCE CERTIFICATES. The Contractor shall procure the insurance coverages identified below, or as otherwise required in the Contract Documents, at the Contractor's own expense, and to evidence that such insurance coverages are in effect, the Contractor shall furnish the Owner an insurance certificate(s) acceptable to the Owner and listing the Owner as the certificate holder. The insurance certificate(s) must be delivered to the Owner with the Construction Contract and Bonds for final approval and execution of the Construction Contract. The insurance certificate must provide the following:

- **(a)** Name and address of authorized agent of the insurance company
- **(b)** Name and address of insured
- **(c)** Name of insurance company or companies
- **(d)** Description of policies
- **(e)** Policy Number(s)
- **(f)** Policy Period(s)
- **(g)** Limits of liability
- **(h)** Name and address of Owner as certificate holder
- **(i)** Project Name and Number, if any
- **(j)** Signature of authorized agent of the insurance company
- **(k)** Telephone number of authorized agent of the insurance company
- **(l)** Mandatory thirty day notice of cancellation / non-renewal / change

(5) MAXIMUM DEDUCTIBLE. Self-insured retention, except for qualified self-insurers or group self-insurers, in any policy shall not exceed $25,000.00.

B. INSURANCE COVERAGES

Unless otherwise provided in the Contract Documents, the Contractor shall purchase the types of insurance coverages with liability limits not less than as follows:

(1) WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE

(a) Workers' Compensation coverage shall be provided in accordance with the statutory coverage required in Alabama. A group insurer must submit a certificate of authority from the Alabama Department of Industrial Relations approving the group insurance plan. A self-insurer must submit a certificate from the Alabama Department of Industrial Relations stating the Contractor qualifies to pay its own workers' compensation claims.

(b) Employer's Liability Insurance limits shall be at least:

.1 Bodily Injury by Accident - $1,000,000 each accident

.2 Bodily Injury by Disease - $1,000,000 each employee

(2) COMMERCIAL GENERAL LIABILITY INSURANCE

(a) Commercial General Liability Insurance, written on an ISO Occurrence Form (current edition as of the date of Advertisement for Bids) or equivalent, shall include, but need not be limited to, coverage for bodily injury and property damage arising from premises and operations liability, products and completed operations liability, blasting and explosion, collapse of structures, underground damage, personal injury liability and contractual liability. The Commercial General Liability Insurance shall provide at minimum the following limits:

Coverage	Limit
.1 General Aggregate	$ 2,000,000.00 per Project
.2 Products, Completed Operations Aggregate	$ 2,000,000.00 per Project
.3 Personal and Advertising Injury	$ 1,000,000.00 per Occurrence
.4 Each Occurrence	$ 1,000,000.00

(b) Additional Requirements for Commercial General Liability Insurance:

.1 The policy shall name the Owner, Architect, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, consultants and employees as additional insureds, state that this coverage shall be primary insurance for the additional insureds; and contain no exclusions of the additional insureds relative to job accidents.

.2 The policy must include separate per project aggregate limits.

(3) COMMERCIAL BUSINESS AUTOMOBILE LIABILITY INSURANCE

(a) Commercial Business Automobile Liability Insurance which shall include coverage for bodily injury and property damage arising from the operation of any owned, non-owned or hired automobile. The Commercial Business Automobile Liability Insurance Policy shall provide not less than $1,000,000 Combined Single Limits for each occurrence.

(b) The policy shall name the Owner, Architect, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, consultants, and employees as additional insureds.

(4) COMMERCIAL UMBRELLA OR COMMERCIAL EXCESS LIABILITY INSURANCE

(a) Commercial Umbrella or Commercial Excess Liability Insurance to provide excess coverage above the Commercial General Liability, Commercial Business Automobile

Liability and the Workers' Compensation and Employer's Liability to satisfy the minimum limits set forth herein.

(b) Minimum Combined Primary Commercial General Liability and Commercial Umbrella or Commercial Excess Limits of:

.1 $ 5,000,000 per Occurrence

.2 $ 5,000,000 Aggregate

(c) Additional Requirements for Commercial Umbrella or Commercial Excess Liability Insurance:

.1 The policy shall name the Owner, Architect, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, consultants, and employees as additional insureds.

.2 The policy must be on an "occurrence" basis.

(5) BUILDER'S RISK INSURANCE

(a) The Builder's Risk Policy shall be made payable to the Owner and Contractor, as their interests may appear. The policy amount shall be equal to 100% of the Contract Sum, written on a Causes of Loss - Special Form (current edition as of the date of Advertisement for Bids), or its equivalent. All deductibles shall be the sole responsibility of the Contractor.

(b) The policy shall be endorsed as follows:

"The following may occur without diminishing, changing, altering or otherwise affecting the coverage and protection afforded the insured under this policy:

(i) Furniture and equipment may be delivered to the insured premises and installed in place ready for use; or

(ii) Partial or complete occupancy by Owner; or

(iii) Performance of work in connection with construction operations insured by the Owner, by agents or lessees or other contractors of the Owner, or by contractors of the lessee of the Owner."

Exception: projects containing only abatement and/or only demolition do not require Builder's Risk insurance, unless required by the Owner. Note: projects containing any scope of work besides abatement and/or demolition require Builder's Risk insurance.

C. SUBCONTRACTORS' INSURANCE

(1) WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE. The Contractor shall require each Subcontractor to obtain and maintain Workers' Compensation and Employer's Liability Insurance coverages as described in preceding Paragraph B, or to be covered by the Contractor's Workers' Compensation and Employer's Liability Insurance while performing Work under the Contract.

(2) LIABILITY INSURANCE. The Contractor shall require each Subcontractor to obtain and maintain adequate General Liability, Automobile Liability, and Umbrella or Excess Liability Insurance coverages similar to those described in preceding Paragraph B. Such coverage shall be in effect at all times that a Subcontractor is performing Work under the Contract.

(3) ENFORCEMENT RESPONSIBILITY. The Contractor shall have responsibility to enforce its Subcontractors' compliance with these or similar insurance requirements; however, the Contractor shall, upon request, provide the Architect or Owner acceptable evidence of insurance for any Subcontractor.

D. TERMINATION of OBLIGATION to INSURE

Unless otherwise expressly provided in the Contract Documents, the obligation to insure as provided herein shall continue as follows:

(1) BUILDER'S RISK INSURANCE. The obligation to insure under Subparagraph B(5) shall remain in effect until the Date of Substantial Completion as shall be established in the Certificate of Substantial Completion. In the event that multiple Certificates of Substantial Completion covering designated portions of the Work are issued, Builder's Risk coverage shall remain in effect until the Date of Substantial Completion as shall be established in the last issued Certificate of Substantial Completion. However, in the case that the Work involves separate buildings, Builder's Risk coverage of each separate building may terminate on the Date of Substantial Completion as established in the Certificate of Substantial Completion issued for each building.

(2) PRODUCTS and COMPLETED OPERATIONS. The obligation to carry Products and Completed Operations coverage specified under Subparagraph B(2) shall remain in effect for two years after the Date(s) of Substantial Completion.

(3) ALL OTHER INSURANCE. The obligation to carry other insurance coverages specified under Subparagraphs B(1) through B(4) and Paragraph C shall remain in effect after the Date(s) of Substantial Completion until such time as all Work required by the Contract Documents is completed. Equal or similar insurance coverages shall remain in effect if, after completion of the Work, the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, returns to the Project to perform warranty or maintenance work pursuant to the terms of the Contract Documents.

E. WAIVERS of SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors performing construction or operations related to the Project, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss. But said waiver shall apply only to the extent the loss or damage is covered by builder's risk insurance applicable to the Work or to other property located within or adjacent to the Project, except such rights as they may have to proceeds of such insurance held by the Owner or Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors, if any, and the subcontractor, sub-subcontractors, suppliers, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The Policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to the person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. The waivers provided for in this paragraph shall not be applicable to loss or damage that occurs after final acceptance of the Work. Any provision found herein which attempts to waive or invalidate the subrogation interests of Alabama's State Insurance Fund against any party to this contract or any other person or entity is void and invalid. No such waiver is intended or made by the parties to this agreement with regard to any property insured by the State Insurance Fund.

Numbers in margin correspond to second page of "Checklist", DCM Form B-7

(1) # PERFORMANCE BOND

SURETY'S BOND NUMBER

Do not staple this form; use clips.

(2) The **PRINCIPAL** (*Company name and address of Contractor as appears in the Construction Contract*)
Name:
Address:

(3) The **SURETY** (*Company name and primary place of business*)
Name:
Address:

(4) The **OWNER** (*Entity name and address, same as appears in the Construction Contract*)
Name:
Address:

(5) The **PENAL SUM** of this Bond (the Contract Sum)

Dollars ($).

(6) **DATE** of the Construction Contract :

(7) The **PROJECT**: (*Same as appears in the Construction Contract*)

1. **WE, THE PRINCIPAL (hereinafter "Contractor") AND THE SURETY**, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Owner in the Penal Sum stated above for the performance of the Contract, and Contract Change Orders, in accord with the requirements of the Contract Documents, which are incorporated herein by reference. If the Contractor performs the Contract, and Contract Change Orders, in accordance with the Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

2. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

Numbers in margin correspond to second page of "Checklist", DCM Form B-7

3. Whenever the Architect gives the Contractor and the Surety, at their addresses stated above, a written Notice to Cure a condition for which the Contract may be terminated in accordance with the Contract Documents, the Surety may, within the time stated in the notice, cure or provide the Architect with written verification that satisfactory positive action is in process to cure the condition.

4. The Surety's obligation under this Bond becomes effective after the Contractor fails to satisfy a Notice to Cure and the Owner:

(a) gives the Contractor and the Surety, at their addresses stated above, a written Notice of Termination declaring the Contractor to be in default under the Contract and stating that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the notice; and

(b) gives the Surety a written demand that, upon the effective date of the Notice of Termination, the Surety promptly fulfill its obligation under this Bond.

5. In the presence of the conditions described in Paragraph 4, the Surety shall, at its expense:

(a) On the effective date of the Notice of Termination, take charge of the Work and be responsible for the safety, security, and protection of the Work, including materials and equipment stored on and off the Project site, and

(b) Within twenty-one days after the effective date of the Notice of Termination, proceed, or provide the Owner with written verification that satisfactory positive action is in process to facilitate proceeding promptly, to complete the Work in accordance with the Contract Documents, either with the Surety's resources or through a contract between the Surety and a qualified contractor to whom the Owner has no reasonable objection.

6. As conditions precedent to taking charge of and completing the Work pursuant to Paragraph 5, the Surety shall neither require, nor be entitled to, any agreements or conditions other than those of this Bond and the Contract Documents. In taking charge of and completing the Work, the Surety shall assume all rights and obligations of the Contractor under the Contract Documents; however, the Surety shall also have the right to assert "Surety Claims" to the Owner in accordance with the Contract Documents. The presence or possibility of a Surety Claim shall not be just cause for the Surety to fail or refuse to promptly take charge of and complete the Work or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

7. By accepting this Bond as a condition of executing the Construction Contract, and by taking the actions described in Paragraph 4, the Owner agrees that:

(a) the Owner shall promptly advise the Surety of the unpaid balance of the Contract Sum and, upon request, shall make available or furnish to the Surety, at the cost of reproduction, any portions of the Project Record, and

(b) as the Surety completes the Work, or has it completed by a qualified contractor, the Owner shall pay the Surety, in accordance with terms of payment of the Contract Documents, the unpaid balance of the Contract Sum, less any amounts that may be or become due the Owner from the Contractor under the Construction Contract or from the Contractor or the Surety under this Bond.

8. In the presence of the conditions described in Paragraph 4, the Surety's obligation includes responsibility for the correction of Defective Work, liquidated damages, and reimbursement of any reasonable expenses incurred by the Owner as a result of the Contractor's default under the Contract, including architectural, engineering, administrative, and legal services.

Numbers in margin correspond to second page of "Checklist", DCM Form B-7

9. Nothing contained in this Bond shall be construed to mean that the Surety shall be liable to the Owner for an amount exceeding the Penal Sum of this Bond, except in the event that the Surety should be in default under the Bond by failing or refusing to take charge of and complete the Work pursuant to Paragraph 5. If the Surety should fail or refuse to take charge of and complete the Work, the Owner shall have the authority to take charge of and complete the Work, or have it completed, and the following costs to the Owner, less the unpaid balance of the Contract Sum, shall be recoverable under this Bond:

(a) the cost of completing the Contractor's responsibilities under the Contract, including correction of Defective Work;

(b) additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees incident to completing the Work;

(c) interest on, and the cost of obtaining, funds to supplement the unpaid balance of the Contract Sum as may be necessary to cover the foregoing costs;

(d) the fair market value of any reductions in the scope of the Work necessitated by insufficiency of the unpaid balance of the Contract Sum and available supplemental funds to cover the foregoing costs; and

(f) additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees incident to ascertaining and collecting the Owner's losses under the Bond.

10. All claims and disputes arising out of or related to this bond, or its breach, shall be resolved in accordance with Article 24, General Conditions of the Contract.

(8) **SIGNED AND SEALED** this _____ day of _____, _____.

(9 & 10)

SURETY:	**CONTRACTOR as PRINCIPAL:**
_____ Company Name	_____ Company Name
By_____ Signature	By _____ Signature
_____ Name and Title	_____ Name and Title

(11) NOTE: Original power of attorney for the Surety's signatory shall be furnished with each of the original three bond forms to be attached to each of the three contract copies (with original signatures) per project.

Do not staple this form; use clips. Purpose: quickly and efficiently scan thousands of documents into DCM's database.

Numbers in margin correspond to second page of "Checklist", DCM Form B-7

(1) # PAYMENT BOND

SURETY'S BOND NUMBER

Do not staple this form; use clips.

(2) The **PRINCIPAL** (*Company name and address of Contractor, same as appears in the Construction Contract*)
Name:
Address:

(3) The **SURETY** (*Company name and primary place of business*)
Name:
Address:

(4) The **OWNER(s)** (*Entity name and address, same as appears in the Construction Contract*)
Name:
Address:

(5) The **PENAL SUM** of this Bond (the Contract Sum)

Dollars ($).

(6) **DATE** of the Construction Contract:

(7) The **PROJECT**: (*Same as appears in the Construction Contract*)

1. **WE, THE PRINCIPAL (hereinafter "Contractor") AND THE SURETY**, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Owner in the Penal Sum stated above to promptly pay all persons supplying labor, materials, or supplies for or in the prosecution of the Contract, which is incorporated herein by reference, and any modifications thereof by Contract Change Orders. If the Contractor and its Subcontractors promptly pay all persons supplying labor, materials, or supplies for or in the prosecution of the Contract and Contract Change Orders, then this obligation shall be null and void; otherwise to remain and be in full force and effect.

2. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

Numbers in margin correspond to second page of "Checklist", DCM Form B-7

3. Any person that has furnished labor, materials, or supplies for or in the prosecution of the Contract and Contract Change Orders for which payment has not been timely made may institute a civil action upon this Bond and have their rights and claims adjudicated in a civil action and judgment entered thereon. Notwithstanding the foregoing, a civil action may not be instituted on this bond until 45 days after written notice to the Surety of the amount claimed to be due and the nature of the claim. The civil action must commence not later than one year from the date of final settlement of the Contract. The giving of notice by registered or certified mail, postage prepaid, addressed to the Surety at any of its places of business or offices shall be deemed sufficient. In the event the Surety or Contractor fails to pay the claim in full within 45 days from the mailing of the notice, then the person or persons may recover from the Contractor and Surety, in addition to the amount of the claim, a reasonable attorney's fee based on the result, together with interest on the claim from the date of the notice.

4. Every person having a right of action on this bond shall, upon written application to the Owner indicating that labor, material, or supplies for the Work have been supplied and that payment has not been made, be promptly furnished a certified copy of this bond and the Construction Contract. The claimant may bring a civil action in the claimant's name on this Bond against the Contractor and the Surety, or either of them, in the county in which the Work is to be or has been performed or in any other county where venue is otherwise allowed by law.

5. This bond is furnished to comply with Code of Alabama, §39-1-1, and all provisions thereof shall be applicable to civil actions upon this bond.

6. All claims and disputes between Owner and either the Contractor or Surety arising out of or related to this bond, or its breach, shall be resolved in accordance with Article 24, General Conditions of the Contract.

(8) **SIGNED AND SEALED** this _____ day of _____, _____.

(9 & 10)

SURETY:	**CONTRACTOR as PRINCIPAL:**
_____ Company Name	_____ Company Name
By_____ Signature	By _____ Signature
_____ Name and Title	_____ Name and Title

(11) NOTE: Original power of attorney for the Surety's signatory shall be furnished with each of the original three bond forms to be attached to each of the three contract copies (with original signatures) per project.

Do not staple this form; use clips. Purpose: quickly and efficiently scan thousands of documents into DCM's database.

GENERAL CONDITIONS of the CONTRACT

CONTENTS

1. Definitions
2. Intent and Interpretation of the Contract Documents
3. Contractor's Representation
4. Documents Furnished to Contractor
5. Ownership of Drawings
6. Supervision, Superintendent, & Employees
7. Review of Contract Documents and Field Conditions by Contractor
8. Surveys by Contractor
9. Submittals
10. Documents and Samples at the Site
11. "As-built" Documents
12. Progress Schedule
13. Materials, Equipment & Substitutions
14. Safety & Protection of Persons & Property
15. Hazardous Materials
16. Inspection of the Work
17. Correction of Work
18. Deductions for Uncorrected Work
19. Changes in the Work
20. Claims for Extra Cost or Extra Work
21. Differing Site Conditions
22. Claims for Damages
23. Delays
24. Resolution of Claims and Disputes
25. Owner's Right to Correct Work
26. Owner's Right to Stop or Suspend the Work
27. Owner's Right to Terminate Contract
28. Contractor's Right to Suspend or Terminate
29. Progress Payments
30. Certification & Approvals for Payments
31. Payments Withheld
32. Substantial Completion
33. Occupancy or Use Prior to Completion
34. Final Payment
35. Contractor's Warranty
36. Indemnification Agreement
37. Insurance
38. Performance and Payment Bonds
39. Assignment
40. Construction by Owner or Separate Contracts
41. Subcontracts
42. Architect's Status
43. Cash Allowances
44. Permits, Laws and Regulations
45. Royalties, Patents and Copyrights
46. Use of the Site
47. Cutting and Patching
48. In-progress and Final Cleanup
49. Liquidated Damages
50. Use of Foreign Material
51. Sign

ARTICLE 1
DEFINITIONS

Whenever the following terms, or pronouns in place of them, are used in the Contract Documents, the intent and meaning shall be interpreted as follows:

A. ALABAMA DIVISION OF CONSTRUCTION MANAGEMENT: The Technical Staff of the Alabama Division of Construction Management.

B. ARCHITECT: The Architect is the person or entity lawfully licensed to practice architecture in the State of Alabama, who is under contract with the Owner as the primary design professional for the Project and identified as the Architect in the Construction Contract. The term "Architect" means the Architect or the Architect's authorized representative. If the employment of the Architect is terminated, the Owner shall employ a new Architect whose status under the Contract Documents shall be that of the former Architect. If the primary design professional for the Project is a Professional Engineer, the term "Engineer" shall be substituted for the term "Architect" wherever it appears in this document.

C. COMMISSION: The former Alabama Building Commission, for which the Alabama Division of Construction Management has been designated by the Legislature as its successor.

D. CONTRACT: The Contract is the embodiment of the Contract Documents. The Contract represents the entire and integrated agreement between the Owner and Contractor and supersedes any prior written or oral negotiations, representations or agreements that are not incorporated into the Contract Documents. The Contract may be amended only by a Contract Change Order or a Modification to the Construction Contract. The contractual relationship which the Contract creates between the Owner and the Contractor extends to no other persons or entities. The Contract consists of the following Contract Documents, including all additions, deletions, and modifications incorporated therein before the execution of the Construction Contract:

(1) Construction Contract
(2) Performance and Payment Bonds
(3) Conditions of the Contract (General, Supplemental, and other Conditions)
(4) Specifications
(5) Drawings
(6) Contract Change Orders
(7) Modifications to the Construction Contract (applicable to PSCA Projects)

E. CONTRACT SUM: The Contract Sum is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents. The term "Contract Sum" means the Contract Sum stated in the Construction Contract as may have been increased or decreased by Change Order(s) in accordance with the Contract Documents.

F. CONTRACT TIME: The Contract Time is the period of time in which the Contractor must achieve Substantial Completion of the Work. The date on which the Contract Time begins is specified in the written Notice To Proceed issued to the Contractor by the Owner or Director. The Date of Substantial Completion is the date established in accordance with Article 32. The term "Contract Time" means the Contract Time stated in the Construction Contract as may have been extended by Change Order(s) in accordance with the Contract Documents. The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

G. CONTRACTOR: The Contractor is the person or persons, firm, partnership, joint venture, association, corporation, cooperative, limited liability company, or other legal entity, identified as such in the Construction Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

H. DCM: The Alabama Division of Construction Management.

I. DCM PROJECT INSPECTOR: The member of the Technical Staff of the Alabama Division of Construction Management to whom the Project is assigned relative to executing the respective inspections and authorities described in Article 16, Inspection of the Work.

J. DEFECTIVE WORK: The term "Defective Work" shall apply to: **(1)** any product, material, system, equipment, or service, or its installation or performance, which does not conform to the requirements of the Contract Documents, **(2)** in-progress or completed Work the workmanship of which does not conform to the quality specified or, if not specified, to the quality produced by skilled workers performing work of a similar nature on similar projects in the state, **(3) s**ubstitutions and deviations not properly submitted and approved or otherwise authorized, **(4)** temporary

supports, structures, or construction which will not produce the results required by the Contract Documents, and **(5)** materials or equipment rendered unsuitable for incorporation into the Work due to improper storage or protection.

K. DIRECTOR: The Director of the Alabama Division of Construction Management.

L. DRAWINGS: The Drawings are the portions of the Contract Documents showing graphically the design, location, layout, and dimensions of the Work, in the form of plans, elevations, sections, details, schedules, and diagrams.

M. NOTICE TO PROCEED: A proceed order issued by the Owner or Director, as applicable, fixing the date on which the Contractor shall begin the prosecution of the Work, which is also the date on which the Contract Time shall begin.

N.1 OWNER: The Owner is the entity or entities identified as such in the Construction Contract and is referred to throughout the Contract Documents as if singular in number. The term "Owner" means the Owner or the Owner's authorized representative. The term "Owner" as used herein shall be synonymous with the term "Awarding Authority".

N.2 AWARDING AUTHORITY: §39-2-1 (1) of the Code of Alabama, 1975, as amended definition: Any governmental board, commission, agency, body, authority, instrumentality, department, or subdivision of the state, its counties and municipalities. This term includes, but shall not be limited to, the Department of Transportation, the Division of Real Property Management of the Department of Finance, the State Board of Education, and any other entity contracting for public works. This term shall exclude the State Docks Department and any entity exempted from the competitive bid laws of the state by statute.

O. THE PROJECT: The Project is the total construction of which the Work required by these Contract Documents may be the entirety or only a part with other portions to be constructed by the Owner or separate contractors.

P. PROJECT MANUAL: The Project Manual is the volume usually assembled for the Work which may include the Advertisement for Bids, Instructions to Bidders, sample forms, General Conditions of the Contract, Supplementary Conditions, and Specifications of the Work.

Q. SPECIFICATIONS: The Specifications are that portion of the Contract Documents which set forth in writing the standards of quality and performance of products, equipment, materials, systems, and services and workmanship required for acceptable performance of the Work.

R. SUBCONTRACTOR: A Subcontractor is a person or entity who is undertaking the performance of any part of the Work by virtue of a contract with the Contractor. The term "Subcontractor" means a Subcontractor or its authorized representatives.

S. THE WORK: The Work is the construction and services required by the Contract Documents and includes all labor, materials, supplies, equipment, and other items and services as are necessary to produce the required construction and to fulfill the Contractor's obligations under the Contract. The Work may constitute the entire Project or only a portion of it.

ARTICLE 2
INTENT and INTERPRETATION of the CONTRACT DOCUMENTS

A. INTENT

It is the intent of the Contract Documents that the Contractor shall properly execute and complete the Work described by the Contract Documents, and unless otherwise provided in the Contract, the Contractor shall provide all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work, in full accordance with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

B. COMPLEMENTARY DOCUMENTS

The Contract Documents are complementary. If Work is required by one Contract Document, the Contractor shall perform the Work as if it were required by all of the Contract Documents. However, the Contractor shall be required to perform Work only to the extent that is consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

C. ORDER of PRECEDENCE

Should any discrepancy arise between the various elements of the Contract Documents, precedence shall be given to them in the following order unless to do so would contravene the apparent Intent of the Contract Documents stated in preceding Paragraph A:

(1) The Construction Contract.
(2) Addenda, with those of later date having precedence over those of earlier date.
(3) Supplementary Conditions (or other Conditions which modify the General Conditions of the Contract).
(4) General Conditions of the Contract.
(5) The Specifications.
(6) Details appearing on the Drawings; large scale details shall take precedence over smaller scale details.
(7) The Drawings; large scale drawings shall take precedence over smaller scale drawings.

D. ORGANIZATION

Except as may be specifically stated within the technical specifications, neither the organization of the Specifications into divisions, sections, or otherwise, nor any arrangement of the Drawings shall control how the Contractor subcontracts portions of the Work or assigns Work to any trade.

E. INTERPRETATION

(1) The Contract Documents shall be interpreted collectively, each part complementing the others and consistent with the Intent of the Contract Documents stated in preceding Paragraph A. Unless an item shown or described in the Contract Documents is specifically identified to be furnished or installed by the Owner or others or is identified as "Not In Contract" ("N.I.C."), the Contractor's obligation relative to that item shall be interpreted to include furnishing, assembling, installing, finishing, and/or connecting the item at the Contractor's expense to produce a product or system that is complete, appropriately tested, and in operative condition ready for use or subsequent construction or operation of the Owner or separate contractors. The omission of words or phases

for brevity of the Contract Documents, the inadvertent omission of words or phrases, or obvious typographical or written errors shall not defeat such interpretation as long as it is reasonably inferable from the Contract Documents as a whole.

(2) Words or phrases used in the Contract Documents which have well-known technical or construction industry meanings are to be interpreted consistent with such recognized meanings unless otherwise indicated.

(3) Except as noted otherwise, references to standard specifications or publications of associations, bureaus, or organizations shall mean the latest edition of the referenced standard specification or publication as of the date of the Advertisement for Bids.

(4) In the case of inconsistency between Drawings and Specifications or within either document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation.

(5) Any portions of the Contract Documents written in longhand must be initialed by all parties..

(6) Any doubt as to the meaning of the Contract Documents or any obscurity as to the wording of them, shall be promptly submitted in writing to the Architect for written interpretation, explanation, or clarification.

F. SEVERABILITY.

The partial or complete invalidity of any one or more provision of this Contract shall not affect the validity or continuing force and effect of any other provision.

ARTICLE 3
CONTRACTOR'S REPRESENTATIONS

By executing the Construction Contract the Contractor represents to the Owner:

A. The Contractor has visited the site of the Work to become familiar with local conditions under which the Work is to be performed and to evaluate reasonably observable conditions as compared with requirements of the Contract Documents.

B. The Contractor shall use its best skill and attention to perform the Work in an expeditious manner consistent with the Contract Documents.

C. The Contractor is an independent contractor and in performance of the Contract remains and shall act as an independent contractor having no authority to represent or obligate the Owner in any manner unless authorized by the Owner in writing.

ARTICLE 4
DOCUMENTS FURNISHED to CONTRACTOR

Unless otherwise provided in the Contract Documents, twenty sets of Drawings and Project Manuals will be furnished to the Contractor by the Architect without charge. Other copies requested will be furnished at reproduction cost.

ARTICLE 5
OWNERSHIP of DRAWINGS

All original or duplicated Drawings, Specifications, and other documents prepared by the Architect, and furnished to the Contractor are the property of the Architect and are to be used solely for this Project and not to be used in any manner for other work. Upon completion of the Work, all copies of Drawings and Specifications, with the exception of the Contractor's record set, shall be returned or accounted for by the Contractor to the Architect, on request.

ARTICLE 6
SUPERVISION, SUPERINTENDENT, and EMPLOYEES

A. SUPERVISION and CONSTRUCTION METHODS

(1) The term "Construction Methods" means the construction means, methods, techniques, sequences, and procedures utilized by the Contractor in performing the Work. The Contractor is solely responsible for supervising and coordinating the performance of the Work, including the selection of Construction Methods, unless the Contract Documents give other specific instructions concerning these matters.

(2) The Contractor is solely and completely responsible for job site safety, including the protection of persons and property in accordance with Article 14.

(3) The Contractor shall be responsible to the Owner for acts and omissions of not only the Contractor and its agents and employees, but all persons and entities, and their agents and employees, who are performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

(4) The Contractor shall be responsible to inspect the in-progress and completed Work to verify its compliance with the Contract Documents and to insure that any element or portion of the Work upon which subsequent Work is to be applied or performed is in proper condition to receive the subsequent Work.

B. SUPERINTENDENT

(1) The Contractor shall employ and maintain a competent level of supervision for the performance of the Work at the Project site, including a superintendent who shall:
(a) have full authority to receive instructions from the Architect or Owner and to act on those instructions and **(b)** be present at the Project site at all times during which Work is being performed.

(2) Before beginning performance of the Work, the Contractor shall notify the Architect in writing of the name and qualifications of its proposed superintendent so that the Owner may review the individual's qualifications. If, for reasonable cause, the Owner refuses to approve the individual, or withdraws its approval after once giving it, the Contractor shall name a different superintendent for the Owner's review and approval. Any disapproved superintendent will not perform in that capacity thereafter at the Project site.

C. EMPLOYEES

The Contractor shall permit only fit and skilled persons to perform the Work. The Contractor shall enforce safety procedures, strict discipline, and good order among persons performing the Work. The Contractor will remove from its employment on the Project any person who deliberately or persistently produces non-conforming Work or who fails or refuses to conform to reasonable rules of personal conduct contained in the Contract Documents or implemented by the Owner and delivered to the Contractor in writing during the course of the Work.

ARTICLE 7
REVIEW of CONTRACT DOCUMENTS and FIELD CONDITIONS by CONTRACTOR

A. In order to facilitate assembly and installation of the Work in accordance with the Contract Documents, before starting each portion of the Work, the Contractor shall examine and compare the relevant Contract Documents, and compare them to relevant field measurements made by the Contractor and any conditions at the site affecting that portion of the Work.

B. If the Contractor discovers any errors, omissions, or inconsistencies in the Contract Documents, the Contractor shall promptly report them to the Architect as a written request for information that includes a detailed statement identifying the specific Drawings or Specifications that are in need of clarification and the error, omission, or inconsistency discovered in them.

(1) The Contractor shall not be expected to act as a licensed design professional and ascertain whether the Contract Documents comply with applicable laws, statutes, ordinances, building codes, and rules and regulations, but the Contractor shall be obligated to promptly notify the Architect of any such noncompliance discovered by or made known to the Contractor. If the Contractor performs Work without fulfilling this notification obligation, the Contractor shall pay the resulting costs and damages that would have been avoided by such notification.

(2) The Contractor shall not be liable to the Owner for errors, omissions, or inconsistencies that may exist in the Contract Documents, or between the Contract Documents and conditions at the site, unless the Contractor knowingly fails to report a discovered error, omission, or inconsistency to the Architect, in which case the Contractor shall pay the resulting costs and damages that would have been avoided by such notification.

C. If the Contractor considers the Architect's response to a request for information to constitute a change to the Contract Documents involving additional costs and/or time, the Contractor shall follow the procedures of Article 20, Claims for Extra Cost or Extra Work.

D. If, with undue frequency, the Contractor requests information that is obtainable through reasonable examination and comparison of the Contract Documents, site conditions, and previous correspondence, interpretations, or clarifications, the Contractor shall be liable to the Owner for reasonable charges from the Architect for the additional services required to review, research, and respond to such requests for information.

ARTICLE 8
SURVEYS by CONTRACTOR

A. The Contractor shall provide competent engineering services to assure accurate execution of the Work in accordance with the Contract Documents. The Contractor shall verify the figures given for the contours, approaches and locations shown on the Drawings before starting any Work and be responsible for the accuracy of the finished Work. Without extra cost to the Owner, the Contractor shall engage a licensed surveyor if necessary to verify boundary lines, keep within property lines, and shall be responsible for encroachments on rights or property of public or surrounding property owners.

B. The Contractor shall establish all base lines for the location of the principal components of the Work and make all detail surveys necessary for construction, including grade stakes, batter boards and other working points, lines and elevations. If the Work involves alteration of or addition to existing structures or improvements, the Contractor shall locate and measure elements of the existing conditions as is necessary to facilitate accurate fabrication, assembly, and installation of new Work in the relationship, alignment, and/or connection to the existing structure or improvement as is shown in the Contract Documents.

ARTICLE 9
SUBMITTALS

A. Where required by the Contract Documents, the Contractor shall submit shop drawings, product data, samples and other information (hereinafter referred to as Submittals) to the Architect for the purpose of demonstrating the way by which the Contractor proposes to conform to the requirements of the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Architect without action.

B. The Contractor shall be responsible to the Owner for the accuracy of its Submittals and the conformity of its submitted information to the requirements of the Contract Documents. Each Submittal shall bear the Contractor's approval, evidencing that the Contractor has reviewed and found the information to be in compliance with the requirements of the Contract Documents. Submittals which are not marked as reviewed and approved by the Contractor may be returned by the Architect without action.

C. The Contractor shall prepare and deliver its submittals to the Architect sufficiently in advance of construction requirements and in a sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. In coordinating the Submittal process with its construction schedule, the Contractor shall allow sufficient time to permit adequate review by the Architect.

D. By approving a Submittal the Contractor represents not only that the element of Work presented in the Submittal complies with the requirements of the Contract Documents, but also that the Contractor has:

(1) found the layout and/or dimensions in the Submittal to be comparable with those in the Contract Documents and other relevant Submittals and has made field measurements as necessary to verify their accuracy, and
(2) determined that products, materials, systems, equipment and/or procedures presented in the Submittal are compatible with those presented, or being presented, in other relevant Submittals and

with the Contractor's intended Construction Methods.

E. The Contractor shall not fabricate or perform any portion of the Work for which the Contract Documents require Submittals until the respective Submittals have been approved by the Architect.

F. In the case of a resubmission, the Contractor shall direct specific attention to all revisions in a Submittal. The Architect's approval of a resubmission shall not apply to any revisions that were not brought to the Architect's attention.

G. If the Contract Documents specify that a Submittal is to be prepared and sealed by a registered architect or licensed engineer retained by the Contractor, all drawings, calculations, specifications, and certifications of the Submittal shall bear the Alabama seal of registration and signature of the registered/licensed design professional who prepared them or under whose supervision they were prepared. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of such a Submittal, provided that all performance and design criteria that such Submittal must satisfy are sufficiently specified in the Contract Documents. The Architect will review, approve or take other appropriate action on such a Submittal only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance or design criteria specified in the Contract Documents.

H. DEVIATIONS

(1) The Architect is authorized by the Owner to approve "minor" deviations from the requirements of the Contract Documents. "Minor" deviations are defined as those which are in the interest of the Owner, do not materially alter the quality or performance of the finished Work, and do not affect the cost or time of performance of the Work. Deviations which are not "minor" may be authorized only by the Owner through the Change Order procedures of Article 19.

(2) Any deviation from the requirements of the Contract Documents contained in a Submittal shall be clearly identified as a "Deviation from Contract Requirements" (or by similar language) within the Submittal and, in a letter transmitting the Submittal to the Architect, the Contractor shall direct the Architect's attention to, and request specific approval of, the deviation. Otherwise, the Architect's approval of a Submittal does not constitute approval of deviations from the requirements of the Contract Documents contained in the Submittal.

(3) The Contractor shall bear all costs and expenses of any changes to the Work, changes to work performed by the Owner or separate contractors, or additional services by the Architect required to accommodate an approved deviation unless the Contractor has specifically informed the Architect in writing of the required changes and a Change Order has been issued authorizing the deviation and accounting for such resulting changes and costs.

I. ARCHITECT'S REVIEW and APPROVAL

(1) The Architect will review the Contractor's Submittals for conformance with requirements of, and the design concept expressed in, the Contract Documents and will approve or take other appropriate action upon them. This review is not intended to verify the accuracy and completeness of details such as dimensions and quantities nor to substantiate installation instructions or performance of equipment or systems, all of which remain the responsibility of the Contractor. However, the Architect shall advise the Contractor of any errors or omissions which the Architect

may detect during this review. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

(2) The Architect will review and respond to all Submittals with reasonable promptness to avoid delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time to permit adequate review.

(3) No corrections or changes to Submittals indicated by the Architect will be considered as authorizations to perform Extra Work. If the Contractor considers such correction or change of a Submittal to require Work which differs from the requirements of the Contract Documents, the Contractor shall promptly notify the Architect in writing in accordance with Article 20, Claims for Extra Cost or Extra Work.

J. CONFORMANCE with SUBMITTALS

The Work shall be constructed in accordance with approved Submittals.

ARTICLE 10
DOCUMENTS and SAMPLES at the SITE

A. "AS ISSUED" SET

The Contractor shall maintain at the Project site, in good order, at least one copy of all Addenda, Change Orders, supplemental drawings, written directives and clarifications, and approved Submittals intact as issued, and an updated construction schedule.

B. "POSTED" SET

The Contractor shall maintain at the Project site, in good order, at least one set of the Drawings and Project Manual into which the Contractor has "posted"(incorporated) all Addenda, Change Orders, supplemental drawings, clarifications, and other information pertinent to the proper performance of the Work. The Contractor shall assure that all sets of the Drawings and Project Manuals being used by the Contractor, Subcontractors, and suppliers are "posted" with the current information to insure that updated Contract Documents are used for performance of the Work.

C. RECORD SET

One set of the Drawings and Project Manual described in Paragraph B shall be the Contractor's record set in which the Contractor shall record all field changes, corrections, selections, final locations, and other information as will be duplicated on the "As-built" documents required under Article 11. The Contractor shall record such "as-built" information in its record set as it becomes available through progress of the Work. The Contractor's performance of this requirement shall be subject to confirmation by the Architect at any time as a prerequisite to approval of Progress Payments.

D. The documents and samples required by this Article to be maintained at the Project site shall be readily available to the Architect, Owner, DCM Project Inspector, and their representatives.

ARTICLE 11
"AS-BUILT" DOCUMENTS

A. Unless otherwise provided in the Contract Documents, the Contractor shall deliver two (2) sets of "As-built" documents, as described herein, to the Architect for submission to the Owner upon completion of the Work. Each set of "As-built' documents shall consist of a copy of the Drawings and Project Manual, in like-new condition, into which the Contractor has neatly incorporated all Addenda, Change Orders, supplemental drawings, clarifications, field changes, corrections, selections, actual locations of underground utilities, and other information as required herein or specified elsewhere in the Contract Documents.

B. The Contractor shall use the following methods for incorporating information into the "As-built" documents:

(1) Drawings

(a) To the greatest extent practicable, information shall be carefully drawn and lettered, in ink, on the Drawings in the form of sketches, details, plans, notes, and dimensions as required to provide a fully dimensioned record of the Work. When required for clarity, sketches, details, or partial plans shall be drawn on supplemental sheets and bound into the Drawings and referenced on the drawing being revised.

(b) Where a revised drawing has been furnished by the Architect, the drawing of latest date shall be bound into the Drawings in the place of the superseded drawing.

(c) Where a supplemental drawing has been furnished by the Architect, the supplemental drawing shall be bound into the Drawings in an appropriate location and referred to by notes added to the drawing being supplemented.

(d) Where the Architect has furnished details, partial plans, or lengthy notes of which it would be impractical for the Contractor to redraw or letter on a drawing, such information may be affixed to the appropriate drawing with transparent tape if space is available on the drawing.

(e) Any entry of information made in the Drawings that is the result of an Addendum or Change Order, shall identify the Addendum or Change Order from which it originated.

(2) Project Manual

(a) A copy of all Addenda and Change Orders, excluding drawings thereof, shall be bound in the front of the Project Manual.

(b) Where a document, form, or entire specification section is revised, the latest issue shall be bound into the Project Manual in the place of the superseded issue.

(c) Where information within a specification section is revised, the deleted or revised information shall be drawn through in ink and an adjacent note added identifying the Addendum or Change Order containing the revised information.

C. Within ten days after the Date of Substantial Completion of the Work, or the last completed portion of the Work, the Contractor shall submit the "As-built" documents to the Architect for approval. If the Architect requires that any corrections be made, the documents will be returned in a reasonable time for correction and resubmission.

ARTICLE 12
PROGRESS SCHEDULE

(Not applicable if the Contract Time is 60 days or less.)

A. The Contractor shall within fifteen days after the date of commencement stated in the Notice to Proceed, or such other time as may be provided in the Contract Documents, prepare and submit to the Architect for review and approval a practicable construction schedule informing the Architect and Owner of the order in which the Contractor plans to carry on the Work within the Contract Time. The Architect's review and approval of the Contractor's construction schedule shall be only for compliance with the specified format, Contract Time, and suitability for monitoring progress of the Work and shall not be construed as a representation that the Architect has analyzed the schedule to form opinions of sequences or durations of time represented in the schedule.

B. If a schedule format is not specified elsewhere in the Contract Documents, the construction schedule shall be prepared using DCM Form C-11, "Sample Progress Schedule and Report", (contained in the Project Manual) or similar format of suitable scale and detail to indicate the percentage of Work scheduled to be completed at the end of each month. At the end of each month the Contractor shall enter the actual percentage of completion on the construction schedule submit two copies to the Architect, and attach one copy to each copy of the monthly Application for Payment. The construction schedule shall be revised to reflect any agreed extensions of the Contract Time or as required by conditions of the Work.

C. If a more comprehensive schedule format is specified elsewhere in the Contract Documents or voluntarily employed by the Contractor, it may be used in lieu of DCM Form C-11.

D. The Contractor's construction schedule shall be used by the Contractor, Architect, and Owner to determine the adequacy of the Contractor's progress. The Contractor shall be responsible for maintaining progress in accordance with the currently approved construction schedule and shall increase the number of shifts, and/or overtime operations, days of work, and/or the amount of construction plant and equipment as may be necessary to do so. If the Contractor's progress falls materially behind the currently approved construction schedule and, in the opinion of the Architect or Owner, the Contractor is not taking sufficient steps to regain schedule, the Architect may, with the Owner's concurrence, issue the Contractor a Notice to Cure pursuant to Article 27. In such a Notice to Cure the Architect may require the Contractor to submit such supplementary or revised construction schedules as may be deemed necessary to demonstrate the manner in which schedule will be regained.

ARTICLE 13
EQUIPMENT, MATERIALS, and SUBSTITUTIONS

A. Every part of the Work shall be executed in a workmanlike manner in accordance with the Contract Documents and approved Submittals. All materials used in the Work shall be furnished in sufficient quantities to facilitate the proper and expeditious execution of the Work and shall be new except such materials as may be expressly provided or allowed in the Contract Documents to be otherwise.

B. Whenever a product, material, system, item of equipment, or service is identified in the Contract Documents by reference to a trade name, manufacturer's name, model number, etc.(hereinafter

referred to as "source"), and only one or two sources are listed, or three or more sources are listed and followed by "or approved equal" or similar wording, it is intended to establish a required standard of performance, design, and quality, and the Contractor may submit, for the Architect's approval, products, materials, systems, equipment, or services of other sources which the Contractor can prove to the Architect's satisfaction are equal to, or exceed, the standard of performance, design and quality specified, unless the provisions of Paragraph D below apply. Such proposed substitutions are not to be purchased or installed without the Architect's written approval of the substitution.

C. If the Contract Documents identify three or more sources for a product, material, system, item of equipment or service to be used and the list of sources is not followed by "or approved equal" or similar wording, the Contractor may make substitution only after evaluation by the Architect and execution of an appropriate Contract Change Order.

D. If the Contract Documents identify only one source and expressly provide that it is an approved sole source for the product, material, system, item of equipment, or service, the Contractor must furnish the identified sole source.

ARTICLE 14
SAFETY and PROTECTION of PERSONS and PROPERTY

A. The Contractor shall be solely and completely responsible for conditions at the Project site, including safety of all persons (including employees) and property. The Contractor shall create, maintain, and supervise conditions and programs to facilitate and promote safe execution of the Work, and shall supervise the Work with the attention and skill required to assure its safe performance. Safety provisions shall conform to OSHA requirements and all other federal, state, county, and local laws, ordinances, codes, and regulations. Where any of these are in conflict, the more stringent requirement shall be followed. Nothing contained in this Contract shall be construed to mean that the Owner has employed the Architect nor has the Architect employed its consultants to administer, supervise, inspect, or take action regarding safety programs or conditions at the Project site.

B. The Contractor shall employ Construction Methods, safety precautions, and protective measures that will reasonably prevent damage, injury or loss to:

(1) workers and other persons on the Project site and in adjacent and other areas that may be affected by the Contractor's operations;

(2) the Work and materials and equipment to be incorporated into the Work and stored by the Contractor on or off the Project site; and

(3) other property on, or adjacent to, the Project site, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and other improvements not designated in the Contract Documents to be removed, relocated, or replaced.

C. The Contractor shall be responsible for the prompt remedy of damage and loss to property, including the filing of appropriate insurance claims, caused in whole or in part by the fault or negligence of the Contractor, a Subcontractor, or anyone for whose acts they may be liable.

D. The Contractor shall comply with and give notices required by applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety and protection of persons or property, including without limitation notices to adjoining property owners of excavation or other construction activities that potentially could cause damage or injury to adjoining property or persons thereon.

E. The Contractor shall erect and maintain barriers, danger signs, and any other reasonable safeguards and warnings against hazards as may be required for safety and protection during performance of the Contract and shall notify owners and users of adjacent sites and utilities of conditions that may exist or arise which may jeopardize their safety.

F. If use or storage of explosives or other hazardous materials or equipment or unusual Construction Methods are necessary for execution of the Work, the Contractor shall exercise commensurate care and employ supervisors and workers properly qualified to perform such activity.

G. The Contractor shall furnish a qualified safety representative at the Project site whose duties shall include the prevention of accidents. The safety representative shall be the Contractor's superintendent, unless the Contractor assigns this duty to another responsible member of its on-site staff and notifies the Owner and Architect in writing of such assignment.

H. The Contractor shall not permit a load to be applied, or forces introduced, to any part of the construction or site that may cause damage to the construction or site or endanger safety of the construction, site, or persons on or near the site.

I. The Contractor shall have the right to act as it deems appropriate in emergency situations jeopardizing life or property. The Contractor shall be entitled to equitable adjustment of the Contract Sum or Contract Time for its efforts expended for the sole benefit of the Owner in an emergency. Such adjustment shall be determined as provided in Articles 19 and 20.

J. The duty of the Architect and the Architect's consultants to visit the Project site to conduct periodic inspections of the Work or for other purposes shall not give rise to a duty to review or approve the adequacy of the Contractor's safety program, safety supervisor, or any safety measure which Contractor takes or fails to take in, on, or near the Project site.

ARTICLE 15
HAZARDOUS MATERIALS

A. A Hazardous Material is any substance or material identified as hazardous under any federal, state, or local law or regulation, or any other substance or material which may be considered hazardous or otherwise subject to statutory or regulatory requirements governing its handling, disposal, and/or clean-up. Existing Hazardous Materials are Hazardous Materials discovered at the Project site and not introduced to the Project site by the Contractor, a Subcontractor, or anyone for whose acts they may be liable.

B. If, during the performance of the Work, the Contractor encounters a suspected Existing Hazardous Material, the Contractor shall immediately stop work in the affected area, take measures appropriate to the condition to keep people away from the suspected Existing Hazardous Material, and

immediately notify the Architect and Owner of the condition in writing.

C. The Owner shall obtain the services of an independent laboratory or professional consultant, appropriately licensed and qualified, to determine whether the suspected material is a Hazardous Material requiring abatement and, if so, to certify after its abatement that it has been rendered harmless. Any abatement of Existing Hazardous Materials will be the responsibility of the Owner. The Owner will advise the Contractor in writing of the persons or entities who will determine the nature of the suspected material and those who will, if necessary, perform the abatement. The Owner will not employ persons or entities to perform these services to whom the Contractor or Architect has reasonable objection.

D. After certification by the Owner's independent laboratory or professional consultant that the material is harmless or has been rendered harmless, work in the affected area shall resume upon written agreement between the Owner and Contractor. If the material is found to be an Existing Hazardous Material and the Contractor incurs additional cost or delay due to the presence and abatement of the material, the Contract Sum and/or Contract Time shall be appropriately adjusted by a Contract Change Order pursuant to Article 19.

E. The Owner shall not be responsible for Hazardous Materials introduced to the Project site by the Contractor, a Subcontractor, or anyone for whose acts they may be liable unless such Hazardous Materials were required by the Contract Documents.

ARTICLE 16
INSPECTION of the WORK

A. GENERAL

(1) The Contractor is solely responsible for the Work's compliance with the Contract Documents; therefore, the Contractor shall be responsible to inspect in-progress and completed Work, and shall verify its compliance with the Contract Documents and that any element or portion of the Work upon which subsequent Work is to be applied or performed is in proper condition to receive the subsequent Work. Neither the presence nor absence of inspections by the Architect, Owner, Director, DCM Project Inspector, any public authority having jurisdiction, or their representatives shall relieve the Contractor of responsibility to inspect the Work, for responsibility for Construction Methods and safety precautions and programs in connection with the Work, or from any other requirement of the Contract Documents.

(2) The Architect, Owner, Director, DCM Project Inspector, any public authority having jurisdiction, and their representatives shall have access at all times to the Work for inspection whenever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection. All materials, workmanship, processes of manufacture, and methods of construction, if not otherwise stipulated in the Contract Documents, shall be subject to inspection, examination, and test at any and all places where such manufacture and/or construction are being carried on. Such inspections will not unreasonably interfere with the Contractor's operations.

(3) The Architect will inspect the Work as a representative of the Owner. The Architect's inspections may be supplemented by inspections by the DCM Project Inspector as a representative of the Alabama Division of Construction Management.

(4) The Contractor may be charged by the Owner for any extra cost of inspection incurred by the Owner or Architect on account of material and workmanship not being ready at the time of inspection set by the Contractor.

B. TYPES of INSPECTIONS

(1) SCHEDULED INSPECTIONS and CONFERENCES. Scheduled Inspections and Conferences are conducted by the Architect, scheduled by the Architect in coordination with the Contractor and DCM Project Inspector, and are attended by the Contractor and applicable Subcontractors, suppliers and manufacturers, and the DCM Project Inspector. Scheduled Inspections and Conferences of this Contract include:

(a) Pre-construction Conference.

(b) Pre-roofing Conference (not applicable if the Contract involves no roofing work)

(**c) Above Ceiling Inspection(s)**: An above ceiling inspection of all spaces in the building is required before the ceiling material is installed. Above ceiling inspections are to be conducted at a time when all above ceiling systems are complete and tested to the greatest extent reasonable pending installation of the ceiling material. System identifications and markings are to be complete. All fire-rated construction including fire-stopping of penetrations and specified identification above the ceiling shall be complete. Ceiling framing and suspension systems shall be complete with lights, grilles and diffusers, access panels, fire protection drops for sprinkler heads, etc., installed in their final locations to the greatest extent reasonable. Above ceiling framing to support ceiling mounted equipment shall be complete. The above ceiling construction shall be complete to the extent that after the inspection the ceiling material can be installed without disturbance.

(**d) Final Inspection(s):** A Final Inspection shall establish that the Work, or a designated portion of the Work, is Substantially Complete in accordance with Article 32 and is accepted by the Architect, Owner, and DCM Project Inspector as being ready for the Owner's occupancy or use. At the conclusion of this inspection, items requiring correction or completion ("punch list" items) shall be minimal and require only a short period of time for accomplishment to establish Final Acceptance of the Work. If the Work, or designated portion of the Work, includes the installation, or modification, of a fire alarm system or other life safety systems essential to occupancy, such systems shall have been tested and appropriately certified before the Final Inspection.

(**e) Year-end Inspection(s):** An inspection of the Work, or each separately completed portion thereof, is required near the end of the Contractor's one year warranty period(s). The subsequent delivery of the Architect's report of this inspection will serve as confirmation that the Contractor was notified of Defective Work found within the warranty period in accordance with Article 35.

(2) PERIODIC INSPECTIONS. Periodic Inspections are conducted throughout the course of the Work by the Architect, the Architect's consultants, their representatives, and the DCM Project Inspector, jointly or independently, with or without advance notice to the Contractor.

(3) SPECIFIED INSPECTIONS and TESTS. Specified Inspections and Tests include inspections, tests, demonstrations, and approvals that are either specified in the Contract Documents or required by laws, ordinances, rules, regulations, or orders of public authorities having jurisdiction, to be performed by the Contractor, one of its Subcontractors, or an independent testing laboratory or firm (whether paid for by the Contractor or Owner).

C. INSPECTIONS by the ARCHITECT

(1) The Architect is not authorized to revoke, alter, relax, or waive any requirements of the Contract Documents (other than "minor" deviations as defined in Article 9 and "minor" changes as defined in Article 19), to finally approve or accept any portion of the Work or to issue instructions contrary to the Contract Documents without concurrence of the Owner.

(2) The Architect will visit the site at intervals appropriate to the stage of the Contractor's operations and as otherwise necessary to:

(a) become generally familiar with the in-progress and completed Work and the quality of the Work,

(b) determine whether the Work is progressing in general accordance with the Contractor's schedule and is likely to be completed within the Contract Time,

(c) visually compare readily accessible elements of the Work to the requirements of the Contract Documents to determine, in general, if the Contractor's performance of the Work indicates that the Work will conform to the requirements of the Contract Documents when completed,

(d) endeavor to guard the Owner against Defective Work,

(e) review and address with the Contractor any problems in implementing the requirements of the Contract Documents that the Contractor may have encountered, and

(f) keep the Owner fully informed about the Project.

(3) The Architect shall have the authority to reject Defective Work or require its correction, but shall not be required to make exhaustive investigations or examinations of the in-progress or completed portions of the Work to expose the presence of Defective Work. However, it shall be an obligation of the Architect to report in writing, to the Owner, Contractor, and DCM Project Inspector, any Defective Work recognized by the Architect.

(4) The Architect shall have the authority to require the Contractor to stop work only when, in the Architect's reasonable opinion, such stoppage is necessary to avoid Defective Work. The Architect shall not be liable to the Contractor or Owner for the consequences of any decisions made by the Architect in good faith either to exercise or not to exercise this authority.

(5) "Inspections by the Architect" includes appropriate inspections by the Architect's consultants as dictated by their respective disciplines of design and the stage of the Contractor's operations.

D. INSPECTIONS by the DCM PROJECT INSPECTOR

(1) The DCM Project Inspector will:

(a) participate in scheduled inspections and conferences as practicable,

(b) perform periodic inspections of in-progress and completed Work to ensure code compliance of the Project and general conformance of the Work with the Contract Documents, and

(c) monitor the Contractor's progress and performance of the Work.

(2) The DCM Project Inspector shall have the authority to:

(a) reject Work that is not in compliance with the State Building Code adopted by the DCM, unless the Work is in accordance with the Contract Documents in which case the DCM Project Inspector will advise the Architect to initiate appropriate corrective action, and

(b) notify the Architect, Owner, and Contractor of Defective Work recognized by the DCM Project Inspector.

(3) The DCM Project Inspector's periodic inspections will usually be scheduled around key stages of construction based upon information reported by the Architect. As the Architect or Owner deems appropriate, the DCM Project Inspector, as well as other members of the Technical Staff, can be requested to schedule special inspections or meetings to address specific matters. The written findings of DCM Project Inspector will be transmitted to the Owner, Contractor, and Architect.

(4) The DCM Project Inspector is not authorized to revoke, alter, relax, or waive any requirements of the Contract Documents, to finally approve or accept any portion of the Work or to issue instructions contrary to the Contract Documents without concurrence of the Owner. The Contractor shall not proceed with Work as a result of instructions or findings of the DCM Project Inspector which the Contractor considers to be a change to the requirements of the Contract Documents without written authorization of the Owner through the Architect.

E. UNCOVERING WORK

(1) If the Contractor covers a portion of the Work before it is examined by the Architect and this is contrary to the Architect's request or specific requirements in the Contract Documents, then, upon written request of the Architect, the Work must be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

(2) Without a prior request or specific requirement that Work be examined by the Architect before it is covered, the Architect may request that Work be uncovered for examination and the Contractor shall uncover it. If the Work is in accordance with the Contract Documents, the Contract Sum shall be equitably adjusted under Article 19 to compensate the Contractor for the costs of uncovering and replacement. If the Work is not in accordance with the Contract Documents, uncovering, correction, and replacement shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

F. SPECIFIED INSPECTIONS and TESTS

(1) The Contractor shall schedule and coordinate Specified Inspections and Tests to be made at appropriate times so as not to delay the progress of the Work or the work of the Owner or separate contractors. If the Contract Documents require that a Specified Inspection or Test be witnessed or attended by the Architect or Architect's consultant, the Contractor shall give the Architect timely notice of the time and place of the Specified Inspection or Test. If a Specified Inspection or Test reveals that Work is not in compliance with requirements of the Contract Documents, the Contractor shall bear the costs of correction, repeating the Specified Inspection or Test, and any related costs incurred by the Owner, including reasonable charges, if any, by the Architect for additional services. Through appropriate Contract Change Order the Owner shall bear costs of tests, inspections or approvals which become Contract requirements subsequent to the receipt of bids.

(2) If the Architect, Owner, or public authority having jurisdiction determines that inspections, tests, demonstrations, or approvals in addition to Specified Inspections and Tests are required, the Contractor shall, upon written instruction from the Architect, arrange for their performance by an entity acceptable to the Owner, giving timely notice to the architect of the time and place of their performance. Related costs shall be borne by the Owner unless the procedures reveal that Work is not in compliance with requirements of the Contract Documents, in which case the Contractor shall

bear the costs of correction, repeating the procedures, and any related costs incurred by the Owner, including reasonable charges, if any, by the Architect for additional services.

(3) Unless otherwise required by the Contract Documents, required certificates of Specified Inspections and Tests shall be secured by the Contractor and promptly delivered to the Architect.

(4) Failure of any materials to pass Specified Inspections and Tests will be sufficient cause for refusal to consider any further samples of the same brand or make of that material for use in the Work.

ARTICLE 17
CORRECTION of DEFECTIVE WORK

A. The Contractor shall, at the Contractor's expense, promptly correct Defective Work rejected by the Architect or which otherwise becomes known to the Contractor, removing the rejected or nonconforming materials and construction from the project site.

B. Correction of Defective Work shall be performed in such a timely manner as will avoid delay of completion, use, or occupancy of the Work and the work of the Owner and separate contractors.

C. The Contractor shall bear all expenses related to the correction of Defective Work, including but not limited to: **(1)** additional testing and inspections, including repeating Specified Inspections and Tests**, (2)** reasonable services and expenses of the Architect, and **(3)** the expense of making good all work of the Contractor, Owner, or separate contractors destroyed or damaged by the correction of Defective Work.

ARTICLE 18
DEDUCTIONS for UNCORRECTED WORK

If the Owner deems it advisable and in the Owner's interest to accept Defective Work, the Owner may allow part or all of such Work to remain in place, provided an equitable deduction from the Contract Sum, acceptable to the Owner, is offered by the Contractor.

ARTICLE 19
CHANGES in the WORK

A. GENERAL

(1) The Owner may at any time direct the Contractor to make changes in the Work which are within the general scope of the Contract, including changes in the Drawings, Specifications, or other portions of the Contract Documents to add, delete, or otherwise revise portions of the Work. The Architect is authorized by the Owner to direct "minor" changes in the Work by written order to the Contractor. "Minor" changes in the Work are defined as those which are in the interest of the Owner, do not materially alter the quality or performance of the finished Work, and do not affect the cost or time of performance of the Work. Changes in the Work which are not "minor" may be authorized only by the Owner.

(2) If the Owner directs a change in the Work, the change shall be incorporated into the Contract by a Contract Change Order prepared by the Architect and signed by the Contractor, Owner, and other signatories to the Construction Contract, stating their agreement upon the change or changes in the Work and the adjustments, if any, in the Contract Sum and the Contract Time.

(3) Subject to compliance with Alabama's Public Works Law, the Owner may, upon agreement by the Contractor, incorporate previously unawarded bid alternates into the Contract.

(4) In the event of a claim or dispute as to the appropriate adjustment to the Contract Sum or Contract Time due to a directive to make changes in the Work, the Work shall proceed as provided in this article subject to subsequent agreement of the parties or final resolution of the dispute pursuant to Article 24.

(5) Consent of surety will be obtained for all Contract Change Orders involving an increase in the Contract Sum.

(6) Changes in the Work shall be performed under applicable provisions of the Contract Documents and the Contractor shall proceed promptly to perform changes in the Work, unless otherwise directed by the Owner through the Architect.

(7) All change orders require DCM Form C-12: Contract Change Order and DCM Form B-11: Change Order Justification. Only Change Orders 10% or greater of the current contract amount require the Owner's legal advisor's signature on DCM Form B-11: Change Order Justification.

B. DETERMINATION of ADJUSTMENT of the CONTRACT SUM

The adjustment of the Contract Sum resulting from a change in the Work shall be determined by one of the following methods, or a combination thereof, as selected by the Owner:

(1) Lump Sum. By mutual agreement to a lump sum based on or negotiated from an itemized cost proposal from the Contractor. Additions to the Contract Sum shall include the Contractor's direct costs plus a maximum 15% markup for overhead and profit. Where subcontract work is involved the total mark-up for the Contractor and a Subcontractor shall not exceed 25%. **Changes which involve a net credit to the Owner shall include fair and reasonable credits for overhead and profit on the deducted work, in no case less than 5%.** For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of bonds, superintendent and other job office personnel, watchman, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

(2) Unit Price. By application of Unit Prices included in the Contract or subsequently agreed to by the parties. However, if the character or quantity originally contemplated is materially changed so that application of such unit price to quantities of Work proposed will cause substantial inequity to either party, the applicable unit price shall be equitably adjusted.

(3) Force Account. By directing the Contractor to proceed with the change in the Work on a "force account" basis under which the Contractor shall be reimbursed for reasonable expenditures incurred by the Contractor and its Subcontractors in performing added Work and the Owner shall receive reasonable credit for any deleted Work. The Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting of the cost of the change together with

sufficient supporting data. Unless otherwise stated in the directive, the adjustment of the Contract Sum shall be limited to the following:

(a) costs of labor and supervision, including employee benefits, social security, retirement, unemployment and workers' compensation insurance required by law, agreement, or under Contractor's or Subcontractor's standard personnel policy;

(b) cost of materials, supplies and equipment, including cost of delivery, whether incorporated or consumed;

(c) rental cost of machinery and equipment, not to exceed prevailing local rates if contractor-owned;

(d) costs of premiums for insurance required by the Contract Documents, permit fees, and sales, use or similar taxes related to the change in the Work;

(e) reasonable credits to the Owner for the value of deleted Work, without Contractor or Subcontractor mark-ups; and

(f) for additions to the Contract Sum, mark-up of the Contractor's direct costs for overhead and profit not exceeding 15% on Contractor's work nor exceeding 25% for Contractor and Subcontractor on a Subcontractor's work. **Changes which involve a net credit to the Owner shall include fair and reasonable credits for overhead and profit on the deducted work, in no case less than 5%.** For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of insurance other than mentioned above, bonds, superintendent and other job office personnel, watchman, use and rental of small tools, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

C. ADJUSTMENT of the CONTRACT TIME due to CHANGES

(1) Unless otherwise provided in the Contract Documents, the Contract Time shall be equitably adjusted for the performance of a change provided that the Contractor notifies the Architect in writing that the change will increase the time required to complete the Work. Such notice shall be provided no later than:

(a) with the Contractor's cost proposal stating the number of days of extension requested, or

(b) within ten days after the Contractor receives a directive to proceed with a change in advance of submitting a cost proposal, in which case the notice should provide an estimated number of days of extension to be requested, which may be subject to adjustment in the cost proposal.

(2) The Contract Time shall be extended only to the extent that the change affects the time required to complete the entire Work of the Contract, taking into account the concurrent performance of the changed and unchanged Work.

D. CHANGE ORDER PROCEDURES

(1) If the Owner proposes to make a change in the Work, the Architect will request that the Contractor provide a cost proposal for making the change to the Work. The request shall be in writing and shall adequately describe the proposed change using drawings, specifications, narrative, or a combination thereof. Within 21 days after receiving such a request, or such other time as may be stated in the request, the Contractor shall prepare and submit to the Architect a written proposal, properly itemized and supported by sufficient substantiating data to facilitate evaluation. The stated time within which the Contractor must submit a proposal may be extended if, within that time, the Contractor makes a written request with reasonable justification thereof.

(2) The Contractor may voluntarily offer a change proposal which, in the Contractor's opinion, will reduce the cost of construction, maintenance, or operation or will improve the cost-effective performance of an element of the Project, in which case the Owner, through the Architect, will accept, reject, or respond otherwise within 21 days after receipt of the proposal, or such other reasonable time as the Contractor may state in the proposal.

(3) If the Contractor's proposal is acceptable to the Owner, or is negotiated to the mutual agreement of the Contractor and Owner, the Architect will prepare an appropriate Contract Change Order for execution. Upon receipt of the fully executed Contract Change Order, the Contractor shall proceed with the change.

(4) In advance of delivery of a fully executed Contract Change Order, the Architect may furnish to the Contractor a written authorization to proceed with an agreed change. However, such an authorization shall be effective only if it:

(a) identifies the Contractor's accepted or negotiated proposal for the change,
(b) states the agreed adjustments, if any, in Contract Sum and Contract Time,
(c) states that funds are available to pay for the change, and
(d) is signed by the Owner.

(5) If the Contractor and Owner cannot agree on the amount of the adjustment in the Contract Sum for a change, the Owner, through the Architect, may order the Contractor to proceed with the change on a Force Account basis, but the net cost to the Owner shall not exceed the amount quoted in the Contractor's proposal. Such order shall state that funds are available to pay for the change.

(6) If the Contractor does not promptly respond to a request for a proposal, or the Owner determines that the change is essential to the final product of the Work and that the change must be effected immediately to avoid delay of the Project, the Owner may:

(a) determine with the Contractor a sufficient maximum amount to be authorized for the change and
(b) direct the Contractor to proceed with the change on a Force Account basis pending delivery of the Contractor's proposal, stating the maximum increase in the Contract Sum that is authorized for the change.

(7) Pending agreement of the parties or final resolution of any dispute of the total amount due the Contractor for a change in the Work, amounts not in dispute for such changes in the Work may be included in Applications for Payment accompanied by an interim Change Order indicating the parties' agreement with part of all of such costs or time extension. Once a dispute is resolved, it shall be implemented by preparation and execution of an appropriate Change Order.

ARTICLE 20
CLAIMS for EXTRA COST or EXTRA WORK

A. If the Contractor considers any instructions by the Architect, Owner, DCM Project Inspector, or public authority having jurisdiction to be contrary to the requirements of the Contract Documents and will involve extra work and/or cost under the Contract, the Contractor shall give the Architect written notice thereof within ten days after receipt of such instructions, and in any event before proceeding to execute such work. As used in this Article, "instructions" shall include written or

oral clarifications, directions, instructions, interpretations, or determinations.

B. The Contractor's notification pursuant to Paragraph 20.A shall state: (1) the date, circumstances, and source of the instructions, **(2)** that the Contractor considers the instructions to constitute a change to the Contract Documents and why, and **(3)** an estimate of extra cost and time that may be involved to the extent an estimate may be reasonably made at that time.

C. Except for claims relating to an emergency endangering life or property, no claim for extra cost or extra work shall be considered in the absence of prior notice required under Paragraph 20.A.

D. Within ten days of receipt of a notice pursuant to Paragraph 20.A, the Architect will respond in writing to the Contractor, stating one of the following:

(1) The cited instruction is rescinded.

(2) The cited instruction is a change in the Work and in which manner the Contractor is to proceed with procedures of Article 19, Changes in the Work.

(3) The cited instruction is reconfirmed, is not considered by the Architect to be a change in the Contract Documents, and the Contractor is to proceed with Work as instructed.

E. If the Architect's response to the Contractor is as in Paragraph 20.D(3), the Contractor shall proceed with the Work as instructed. If the Contractor continues to consider the instructions to constitute a change in the Contract Documents, the Contractor shall, within ten days after receiving the Architect's response, notify the Architect in writing that the Contractor intends to submit a claim pursuant to Article 24, Resolution of Claims and Disputes

ARTICLE 21
DIFFERING SITE CONDITIONS

A. DEFINITION

"Differing Site Conditions" are:

(1) subsurface or otherwise concealed physical conditions at the Project site which differ materially from those indicated in the Contract Documents, or

(2) unknown physical conditions at the Project site which are of an unusual nature, differing materially from conditions ordinarily encountered and generally recognized as inherent in construction activities of the character required by the Contract Documents.

B. PROCEDURES

If Differing Site Conditions are encountered, then the party discovering the condition shall promptly notify the other party before the condition is disturbed and in no event later than ten days after discovering the condition. Upon such notice and verification that a Differing Site Condition exists, the Architect will, with reasonable promptness and with the Owner's concurrence, make changes in the Drawings and/or Specifications as are deemed necessary to conform to the Differing Site Condition. Any increase or decrease in the Contract Sum or Contract Time that is warranted by the changes will be made as provided under Article 19, Changes in the Work. If the Architect determines a Differing Site Condition has not been encountered, the Architect shall notify the

Owner and Contractor in writing, stating the reason for that determination.

ARTICLE 22
CLAIMS for DAMAGES

If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time after the discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

ARTICLE 23
DELAYS

A. A delay beyond the Contractor's control at any time in the commencement or progress of Work by an act or omission of the Owner, Architect, or any separate contractor or by labor disputes, unusual delay in deliveries, unavoidable casualties, fires, abnormal floods, tornadoes, or other cataclysmic events of nature, may entitle the Contractor to an extension of the Contract Time provided, however, that the Contractor shall, within ten days after the delay first occurs, give written notice to the Architect of the cause of the delay and its probable effect on progress of the entire Work.

B. Adverse weather conditions that are more severe than anticipated for the locality of the Work during any given month may entitle the Contractor to an extension of Contract Time provided, however;

(1) the weather conditions had an adverse effect on construction scheduled to be performed during the period in which the adverse weather occurred, which in reasonable sequence would have an effect on completion of the entire Work,

(2) the Contractor shall, within twenty-one days after the end of the month in which the delay occurs, give the Architect written notice of the delay that occurred during that month and its probable effect on progress of the Work, and

(3) within a reasonable time after giving notice of the delay, the Contractor provides the Architect with sufficient data to document that the weather conditions experienced were unusually severe for the locality of the Work during the month in question. Unless otherwise provided in the Contract Documents, data documenting unusually severe weather conditions shall compare actual weather conditions to the average weather conditions for the month in question during the previous five years as recorded by the National Oceanic and Atmospheric Administration (NOAA) or similar record-keeping entities.

C. Adjustments, if any, of the Contract Time pursuant to this Article shall be incorporated into the Contract by a Contract Change Order prepared by the Architect and signed by the Contractor, Owner, and other signatories to the Construction Contract or, at closeout of the Contract, by mutual written agreement between the Contractor and Owner. The adjustment of the Contract Time shall not exceed the extent to which the delay extends the time required to complete the entire Work of the Contract.

D. The Contractor shall not be entitled to any adjustment of the Contract Sum for damage due to delays claimed pursuant to this Article unless the delay was caused by the Owner or Architect and was either:

(1) the result of bad faith or active interference or

(2) beyond the contemplation of the parties and not remedied within a reasonable time after notification by the Contractor of its presence.

ARTICLE 24
RESOLUTION of CLAIMS and DISPUTES

A. APPLICABILITY of ARTICLE

(1) As used in this Article, "Claims and Disputes" include claims or disputes asserted by the Contractor, its Surety, or Owner arising out of or related to the Contract, or its breach, including without limitation claims seeking, under the provisions of the Contract, equitable adjustment of the Contract Sum or Contract Time and claims and disputes arising between the Contractor (or its Surety) and Owner regarding interpretation of the Contract Documents, performance of the Work, or breach of or compliance with the terms of the Contract.

(2) "Resolution" addressed in this Article applies only to Claims and Disputes arising between the Contractor (or its Surety) and Owner and asserted after execution of the Construction Contract and prior to the date upon which final payment is made. Upon making application for final payment the Contractor may reserve the right to subsequent Resolution of existing Claims by including a list of all Claims, in stated amounts, which remain to be resolved and specifically excluding them from any release of claims executed by the Contractor, and in that event Resolution may occur after final payment is made.

B. CONTINUANCE of PERFORMANCE

An unresolved Claim or Dispute shall not be just cause for the Contractor to fail or refuse to proceed diligently with performance of the Contract or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

C. GOOD FAITH EFFORT to SETTLE

The Contractor and Owner agree that, upon the assertion of a Claim by the other, they will make a good faith effort, with the Architect's assistance and advice, to achieve mutual resolution of the Claim. If mutually agreed, the Contractor and Owner may endeavor to resolve a Claim through mediation. If efforts to settle are not successful, the Claim shall be resolved in accordance with paragraph D or E below, whichever applies.

D FINAL RESOLUTION for STATE-FUNDED CONTRACTS

(1) If the Contract is funded in whole or in part with state funds, the final Resolution of Claims and Disputes which cannot be resolved by the Contractor (or its Surety) and Owner shall be by the Director, whose decision shall be final, binding, and conclusive upon the Contractor, its Surety, and the Owner.

(2) When it becomes apparent to the party asserting a Claim (the Claimant) that an impasse to mutual resolution has been reached, the Claimant may request in writing to the Director that the Claim be resolved by decision of the Director. Such request by the Contractor (or its Surety) shall be submitted through the Owner. Should the Owner fail or refuse to submit the Contractor's request within ten days of receipt of same, the Contractor may forward such request directly to the Director. Upon receipt of a request to resolve a Claim, the Director will instruct the parties as to procedures to be initiated and followed.

(3) If the respondent to a Claim fails or refuses to participate or cooperate in the Resolution procedures to the extent that the Claimant is compelled to initiate legal proceedings to induce the Respondent to participate or cooperate, the Claimant will be entitled to recover, and may amend its Claim to include, the expense of reasonable attorney's fees so incurred.

E. FINAL RESOLUTION for LOCALLY-FUNDED CONTRACTS

If the Contract is funded in whole with funds provided by a city or county board of education or other local governmental authority and the Contract Documents do not stipulate a binding alternative dispute resolution method, the final resolution of Claims and Disputes which cannot be resolved by the Contractor (or its Surety) and Owner may be by any legal remedy available to the parties. Alternatively, upon the written agreement of the Contractor (or its Surety) and the Owner, final Resolution of Claims and Disputes may be by submission to binding arbitration before a neutral arbitrator or panel or by submission to the Director in accordance with preceding Paragraph D.

ARTICLE 25
OWNER'S RIGHT to CORRECT DEFECTIVE WORK

If the Contractor fails or refuses to correct Defective Work in a timely manner that will avoid delay of completion, use, or occupancy of the Work or work by the Owner or separate contractors, the Architect may give the Contractor written Notice to Cure the Defective Work within a reasonable, stated time. If within ten days after receipt of the Notice to Cure the Contractor has not proceeded and satisfactorily continued to cure the Defective Work or provided the Architect with written verification that satisfactory positive action is in process to cure the Defective Work, the Owner may, without prejudice to any other remedy available to the Owner, correct the Defective Work and deduct the actual cost of the correction from payment then or thereafter due to the Contractor.

ARTICLE 26
OWNER'S RIGHT to STOP or SUSPEND the WORK

A. STOPPING the WORK for CAUSE

If the Contractor fails to correct Defective Work or persistently fails to carry out Work in accordance with the Contract Documents, the Owner may direct the Contractor in writing to stop the Work, or any part of the Work, until the cause for the Owner's directive has been eliminated; however, the Owner's right to stop the Work shall not be construed as a duty of the Owner to be exercised for the benefit of the Contractor or any other person or entity.

B. SUSPENSION by the OWNER for CONVENIENCE

(1) The Owner may, at any time and without cause, direct the Contractor in writing to suspend, delay or interrupt the Work, or any part of the Work, for a period of time as the Owner may determine.

(2) The Contract Sum and Contract Time shall be adjusted, pursuant to Article 19, for reasonable increases in the cost and time caused by an Owner-directed suspension, delay or interruption of Work for the Owner's convenience. However, no adjustment to the Contract Sum shall be made to the extent that the same or concurrent Work is, was or would have been likewise suspended, delayed or interrupted for other reasons not caused by the Owner.

ARTICLE 27
OWNER'S RIGHT to TERMINATE CONTRACT

A. TERMINATION by the OWNER for CAUSE

(1) Causes: The Owner may terminate the Contractor's right to complete the Work, or any designated portion of the Work, if the Contractor:

(a) should be adjudged bankrupt, or should make a general assignment for the benefit of the Contractor's creditors, or if a receiver should be appointed on account of the Contractor's insolvency to the extent termination for these reasons is permissible under applicable law;

(b) refuses or fails to prosecute the Work, or any part of the Work, with the diligence that will insure its completion within the Contract Time, including any extensions, or fails to complete the Work within the Contract Time;

(c) refuses or fails to perform the Work, including prompt correction of Defective Work, in a manner that will insure that the Work, when fully completed, will be in accordance with the Contract Documents;

(d) fails to pay for labor or materials supplied for the Work or to pay Subcontractors in accordance with the respective Subcontract;

(e) persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction, or the instructions of the Architect or Owner; or

(f) is otherwise guilty of a substantial breach of the Contract.

(2) Procedure for Unbonded Construction Contracts (Generally, contracts less than $100,000):

(a) Notice to Cure: In the presence of any of the above conditions the Architect may give the Contractor written notice to cure the condition within a reasonable, stated time, but not less than ten days after the Contractor receives the notice.

(b) Notice of Termination: If, at the expiration of the time stated in the Notice to Cure, the Contractor has not proceeded and satisfactorily continued to cure the condition or provided the Architect with written verification that satisfactory positive action is in process to cure the condition, the Owner may, without prejudice to any other rights or remedies of the Owner, give the Contractor written notice that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the written Notice of Termination.

(c) If the Contractor satisfies a Notice to Cure, but the condition for which the notice was first given reoccurs, the Owner may give the Contractor a seven day Notice of Termination

without giving the Contractor another Notice to Cure.

(d) At the expiration of the seven days of the termination notice, the Owner may:

.1 take possession of the site, of all materials and equipment stored on and off site, and of all Contractor-owned tools, construction equipment and machinery, and facilities located at the site, and

.2 finish the Work by whatever reasonable method the Owner may deem expedient.

(e) The Contractor shall not be entitled to receive further payment under the Contract until the Work is completed.

(f) If the Owner's cost of completing the Work, including correction of Defective Work, compensation for additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees due to the default and termination, is less than the unpaid balance of the Contract Sum, the excess balance less liquidated damages for delay shall be paid to the Contractor. If such cost to the Owner including attorney's fees, plus liquidated damages, exceeds the unpaid balance of the Contract Sum, the Contractor shall pay the difference to the Owner. Final Resolution of any claim or Dispute involving the termination or any amount due any party as a result of the termination shall be pursuant to Article 24.

(g) Upon the Contractor's request, the Owner shall furnish to the Contractor a detailed accounting of the Owner's cost of completing the Work.

(3) Procedure for Bonded Construction Contracts (Generally, contracts of $100,000 or more):

(a) Notice to Cure: In the presence of any of the above conditions the Architect may give the Contractor and its Surety written Notice to Cure the condition within a reasonable, stated time, but not less than ten days after the Contractor receives the notice.

(b) Notice of Termination: If, at the expiration of the time stated in the Notice to Cure, the Contractor has not proceeded and satisfactorily continued to cure the condition or provided the Architect with written verification that satisfactory positive action is in process to cure the condition, the Owner may, without prejudice to any other rights or remedies of the Owner, give the Contractor and its Surety written notice declaring the Contractor to be in default under the Contract and stating that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the written Notice of Termination.

(c) If the Contractor satisfies a Notice to Cure, but the condition for which the notice was first given reoccurs, the Owner may give the Contractor a Notice of Termination without giving the Contractor another Notice to Cure.

(d) Demand on the Performance Bond: With the Notice of Termination the Owner shall give the Surety a written demand that, upon the effective date of the Notice of Termination, the Surety promptly fulfill its obligation to take charge of and complete the Work in accordance with the terms of the Performance Bond.

(e) Surety Claims: Upon receiving the Owner's demand on the Performance Bond, the Surety shall assume all rights and obligations of the Contractor under the Contract. However, the Surety shall also have the right to assert "Surety Claims" to the Owner, which are defined as claims relating to acts or omissions of the Owner or Architect prior to termination of the Contractor which may have prejudiced its rights as Surety or its interest in the unpaid balance of the Contract Sum. If the Surety wishes to assert a Surety Claim, it shall give the Owner, through the Architect, written notice within twenty-one days after first recognizing the condition giving rise to the Surety Claim. The Surety Claim shall then be submitted to the Owner, through the Architect, no later than sixty days after giving notice thereof, but no such Surety Claims shall be considered if submitted after the date upon which final payment

becomes due. Final resolution of Surety Claims shall be pursuant to Article 24, Resolution of Claims and Disputes. The presence or possibility of a Surety Claim shall not be just cause for the Surety to fail or refuse to take charge of and complete the Work or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

(f) Payments to Surety: The Surety shall be paid for completing the Work in accordance with the Contract Documents as if the Surety were the Contractor. The Owner shall have the right to deduct from payments to the Surety any reasonable costs incurred by the Owner, including compensation for additional architectural, engineering, managerial, and administrative services, and attorneys' fees as necessitated by termination of the Contractor and completion of the Work by the Surety. No further payments shall be made to the Contractor by the Owner. The Surety shall be solely responsible for any accounting to the Contractor for the portion of the Contract Sum paid to Surety by Owner or for the costs and expenses of completing the Work.

(4) Wrongful Termination: If any notice of termination by the Owner for cause, made in good faith, is determined to have been wrongly given, such termination shall be effective and compensation therefore determined as if it had been a termination for convenience pursuant to Paragraph B below.

B. TERMINATION by the OWNER for CONVENIENCE

(1) The Owner may, without cause and at any time, terminate the performance of Work under the Contract in whole, or in part, upon determination by the Owner that such termination is in the Owner's best interest. Such termination is referred to herein as Termination for Convenience.

(2) Upon receipt of a written notice of Termination for Convenience from the Owner, the Contractor shall:

(a) stop Work as specified in the notice;

(b) enter into no further subcontracts or purchase orders for materials, services, or facilities, except as may be necessary for Work directed to be performed prior to the effective date of the termination or to complete Work that is not terminated;

(c) terminate all existing subcontracts and purchase orders to the extent they relate to the terminated Work;

(d) take such actions as are necessary, or directed by the Architect or Owner, to protect, preserve, and make safe the terminated Work; and

(e) complete performance of the Work that is not terminated.

(3) In the event of Termination for Convenience, the Contractor shall be entitled to receive payment for the Work performed prior to its termination, including materials and equipment purchased and delivered for incorporation into the terminated Work, and any reasonable costs incurred because of the termination. Such payment shall include reasonable mark-up of costs for overhead and profit, not to exceed the limits stated in Article 19, Changes in the Work. The Contractor shall be entitled to receive payment for reasonable anticipated overhead ("home office") and shall not be entitled to receive payment for any profits anticipated to have been gained from the terminated Work. A proposal for decreasing the Contract Sum shall be submitted to the Architect by the Contractor in such time and detail, and with such supporting documentation, as is reasonably directed by the Owner. Final modification of the Contract shall be by Contract Change Order pursuant to Article 19. Any Claim or Dispute involving the termination or any amount due a party as a result shall be resolved pursuant to Article 24.

ARTICLE 28
CONTRACTOR'S RIGHT to SUSPEND or TERMINATE the CONTRACT

A. SUSPENSION by the OWNER

If all of the Work is suspended or delayed for the Owner's convenience or under an order of any court, or other public authority, for a period of sixty days, through no act or fault of the Contractor or a Subcontractor, or anyone for whose acts they may be liable, then the Contractor may give the Owner a written Notice of Termination which allows the Owner fourteen days after receiving the Notice in which to give the Contractor appropriate written authorization to resume the Work. Absent the Contractor's receipt of such authorization to resume the Work, the Contract shall terminate upon expiration of this fourteen day period and the Contractor will be compensated by the Owner as if the termination had been for the Owner's convenience pursuant to Article 27.B.

B. NONPAYMENT

The Owner's failure to pay the undisputed amount of an Application for Payment within sixty days after receiving it from the Architect (Certified pursuant to Article 30) shall be just cause for the Contractor to give the Owner fourteen days' written notice that the Work will be suspended pending receipt of payment but that the Contract shall terminate if payment is not received within fourteen days (or a longer period stated by the Contractor) of the expiration of the fourteen day notice period.

(1) If the Work is then suspended for nonpayment, but resumed upon receipt of payment, the Contractor will be entitled to compensation as if the suspension had been by the Owner pursuant to Article 26, Paragraph B.

(2) If the Contract is then terminated for nonpayment, the Contractor will be entitled to compensation as if the termination had been by the Owner pursuant to Article 27, Paragraph B.

ARTICLE 29
PROGRESS PAYMENTS

A. FREQUENCY of PROGRESS PAYMENTS

Unless otherwise provided in the Contract Documents, the Owner will make payments to the Contractor as the Work progresses based on monthly estimates prepared and certified by the Contractor, approved and certified by the Architect, and approved by the Owner and other authorities whose approval is required.

B. SCHEDULE of VALUES

Within ten days after receiving the Notice to Proceed the Contractor shall submit to the Architect a DCM Form C-10SOV, Schedule of Values, which is a breakdown of the Contract Sum showing the value of the various parts of the Work for billing purposes. The Schedule of Values shall be printable on 8.5" × 11" and shall divide the Contract Sum into as many parts ("line items") as the Architect and Owner determine necessary to permit evaluation and to show amounts attributable to

Subcontractors. The Contractor's overhead and profit are to be proportionately distributed throughout the line items of the Schedule of Values. Upon approval, the Schedule of Values shall be used as a basis for monthly Applications for Payment, unless it is later found to be in error. Approved change order amounts shall be added to or incorporated into the Schedule of Values as mutually agreed by the Contractor and Architect.

C. APPLICATIONS for PAYMENTS

(1) Based on the approved Schedule of Values, each DCM Form C-10, Application and Certificate for Payment shall show the Contractor's estimate of the value of Work performed in each line item as of the end of the billing period. The Contractor's cost of materials and equipment not yet incorporated into the Work, but delivered and suitably stored on the site, may be considered in monthly Applications for Payment. One payment application per month may be submitted. Each DCM Form C-10, Application and Certificate for Payment shall match to the penny and be accompanied by an attached DCM Form C-10SOV, Schedule of Values.

(2) The Contractor's estimate of the value of Work performed and stored materials must represent such reasonableness as to warrant certification by the Architect to the Owner in accordance with Article 30. Each monthly Application for Payment shall be supported by such data as will substantiate the Contractor's right to payment, including without limitation copies of requisitions from subcontractors and material suppliers.

(3) If no other date is stated in the Contract Documents or agreed upon by the parties, each Application for Payment shall be submitted to the Architect on or about the first day of each month and payment shall be issued to the Contractor within thirty days after an Application for Payment is Certified pursuant to Article 30 and delivered to the Owner.

(4) The Applications for Payment of State Agency/Authority projects and Public School and College Authority (PSCA)-funded projects must be activated via the appropriate DocuSign link available from DCM's Engage Portal at https://engagealabama-rpm.facilityforce.cloud.

D. MATERIALS STORED OFF SITE

Unless otherwise provided in the Contract Documents, the Contractor's cost of materials and equipment to be incorporated into the Work, which are stored off the site, may also be considered in monthly Applications for Payment under the following conditions:

(1) the contractor has received written approval from the Architect and Owner to store the materials or equipment off site in advance of delivering the materials to the off site location;

(2) a Certificate of Insurance is furnished to the Architect evidencing that a special insurance policy, or rider to an existing policy, has been obtained by the Contractor providing all-risk property insurance coverage, specifically naming the materials or equipment stored, and naming the Owner as an additionally insured party;

(3) the Architect is provided with a detailed inventory of the stored materials or equipment and the materials or equipment are clearly marked in correlation to the inventory to facilitate inspection and verification of the presence of the materials or equipment by the Architect or Owner;

(4) the materials or equipment are properly and safely stored in a bonded warehouse, or a facility otherwise approved in advance by the Architect and Owner; and

(5) compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest.

E. RETAINAGE

(1) "Retainage" is defined as the money earned and, therefore, belonging to the Contractor (subject to final settlement of the Contract) which has been retained by the Owner conditioned on final completion and acceptance of all Work required by the Contract Documents. Retainage shall not be relied upon by Contractor (or Surety) to cover or off-set unearned monies attributable to uncompleted or uncorrected Work.

(2) In making progress payments the Owner shall retain five percent of the estimated value of Work performed and the value of the materials stored for the Work; but after retainage has been held upon fifty percent of the Contract Sum, no additional retainage will be withheld.

F. CONTRACTOR'S CERTIFICATION

(1) Each Application for Payment shall bear the Contractor's certification that, to the best of the Contractor's knowledge, information, and belief, the Work covered by the Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payments were issued and payments received from the Owner and that the current payment shown in the Application for Payment has not yet been received.

(2) By making this certification the Contractor represents to the Architect and Owner that, upon receipt of previous progress payments from the Owner, the Contractor has promptly paid each Subcontractor, in accordance with the terms of its agreement with the Subcontractor, the amount due the Subcontractor from the amount included in the progress payment on account of the Subcontractor's Work and stored materials. The Architect and Owner may advise Subcontractors and suppliers regarding percentages of completion or amounts requested and/or approved in an Application for Payment on account of the Subcontractor's Work and stored materials.

G. PAYMENT ESTABLISHES OWNERSHIP

All material and Work covered by progress payments shall become the sole property of the Owner, but the Contractor shall not be relieved from the sole responsibility for the care and protection of material and Work upon which payments have been made and for the restoration of any damaged material and Work.

ARTICLE 30
CERTIFICATION and APPROVALS for PAYMENT

A. The Architect's review, approval, and certification of Applications for Payment shall be based on the Architect's general knowledge of the Work obtained through site visits and the information provided by the Contractor with the Application. The Architect shall not be required to perform exhaustive examinations, evaluations, or estimates of the cost of completed or uncompleted Work or stored materials to verify the accuracy of amounts requested by the Contractor, but the Architect shall have the authority to adjust the Contractor's estimate when, in the Architect's reasonable opinion, such estimates are overstated or understated.

B. Within seven days after receiving the Contractor's monthly Application for Payment, or such other time as may be stated in the Contract Documents, the Architect will take one of the following actions:

(1) The Architect will approve and certify the Application as submitted and forward it to the Owner as a Certification for Payment for approval by the Owner (and other approving authorities, if any) and payment.

(2) If the Architect takes exception to any amounts claimed by the Contractor and the Contractor and Architect cannot agree on revised amounts, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to certify to the Owner, transmitting a copy of same to the Contractor.

(3) To the extent the Architect determines may be necessary to protect the Owner from loss on account of any of the causes stated in Article 31, the Architect may subtract from the Contractor's estimates and will issue a Certificate for Payment to the Owner, with a copy to the Contractor, for such amount as the Architect determines is properly due and notify the Contractor and Owner in writing of the Architect's reasons for withholding payment in whole or in part.

C. Neither the Architect's issuance of a Certificate for Payment nor the Owner's resulting progress payment shall be a representation to the Contractor that the Work in progress or completed at that time is accepted or deemed to be in conformance with the Contract Documents.

D. The Architect shall not be required to determine that the Contractor has promptly or fully paid Subcontractors and suppliers or how or for what purpose the Contractor has used monies paid under the Construction Contract. However, the Architect may, upon request and if practical, inform any Subcontractor or supplier of the amount, or percentage of completion, approved or paid to the Contractor on account of the materials supplied or the Work performed by the Subcontractor.

ARTICLE 31
PAYMENTS WITHHELD

A. The Architect may nullify or revise a previously issued Certificate for Payment prior to Owner's payment thereunder to the extent as may be necessary in the Architect's opinion to protect the Owner from loss on account of any of the following causes not discovered or fully accounted for at the time of the certification or approval of the Application for Payment:

(1) Defective Work;
(2) filed, or reasonable evidence indicating probable filing of, claims arising out of the Contract by other parties against the Contractor;
(3) the Contractor's failure to pay for labor, materials or equipment or to pay Subcontractors;
(4) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
(5) damage suffered by the Owner or another contractor caused by the Contractor, a Subcontractor, or anyone for whose acts they may be liable;
(6) reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance is insufficient to cover applicable liquidated damages; or
(7) the Contractor's persistent failure to conform to the requirements of the Contract Documents.

B. If the Owner deems it necessary to withhold payment pursuant to preceding Paragraph A, the Owner will notify the Contractor and Architect in writing of the amount to be withheld and the reason for same.

C. The Architect shall not be required to withhold payment for completed or partially completed Work for which compliance with the Contract Documents remains to be determined by Specified Inspections or Final Inspections to be performed in their proper sequence. However, if Work for which payment has been approved, certified, or made under an Application for Payment is subsequently determined to be Defective Work, the Architect shall determine an appropriate amount that will protect the Owner's interest against the Defective Work.

(1) If payment has not been made against the Application for Payment first including the Defective Work, the Architect will notify the Owner and Contractor of the amount to be withheld from the payment until the Defective Work is brought into compliance with the Contract Documents.

(2) If payment has been made against the Application for Payment first including the Defective Work, the Architect will withhold the appropriate amount from the next Application for Payment submitted after the determination of noncompliance, such amount to then be withheld until the Defective Work is brought into compliance with the Contract Documents.

D. The amount withheld will be paid with the next Application for Payment certified and approved after the condition for which the Owner has withheld payment is removed or otherwise resolved to the Owner's satisfaction.

E. The Owner shall have the right to withhold from payments due the Contractor under this Contract an amount equal to any amount which the Contractor owes the Owner under another contract.

ARTICLE 32
SUBSTANTIAL COMPLETION

A. Substantial Completion is the stage in the progress of the Work when the Work or designated portion of the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use without disruption or interference by the Contractor in completing or correcting any remaining unfinished Work ("punch list" items). Substantial Completion of the Work, or a designated portion of the Work, is not achieved until so agreed in a Certificate of Substantial Completion signed by the Contractor, Architect, Owner, and Technical Staff of the Alabama Division of Construction Management.

B. The Contractor shall notify the Architect in writing when it considers the Work, or a portion of the Work which the Owner has agreed to accept separately, to be substantially complete and ready for a Final Inspection pursuant to Article 16. In this notification the Contractor shall identify any items remaining to be completed or corrected for Final Acceptance prior to final payment.

C. Substantial Completion is achieved and a Final Inspection is appropriate only when a minimal number of punch list items exists and only a short period of time will be required to correct or complete them. Upon receipt of the Contractor's notice for a Final Inspection, the Architect will advise the Contractor in writing of any conditions of the Work which the Architect or Owner is

aware do not constitute Substantial Completion, otherwise, a Final Inspection will proceed within a reasonable time after the Contractor's notice is given. However, the Architect will not be required to prepare lengthy listings of punch list items; therefore, if the Final Inspection discloses that Substantial Completion has not been achieved, the Architect may discontinue or suspend the inspection until the Contractor does achieve Substantial Completion.

D. CERTIFICATE of SUBSTANTIAL COMPLETION

(1) When the Work or a designated portion of the Work is substantially complete, the Architect will prepare (via the appropriate DocuSign link available from DCM's Engage Portal at https://engagealabama-rpm.facilityforce.cloud) and sign a Certificate of Substantial Completion to be signed in order by the Contractor, Owner, and Alabama Division of Construction Management.

(2) When signed by all parties, the Certificate of Substantial Completion shall establish the Date of Substantial Completion which is the date upon which:

(a) the Work, or designated portion of the Work, is accepted by the Architect, Owner, and Alabama Division of Construction Management as being ready for occupancy,

(b) the Contractor's one-year and special warranties for the Work covered by the Certificate commence, unless stated otherwise in the Certificate (the one-year warranty for punch list items completed or corrected after the period allowed in the Certificate shall commence on the date of their Final Acceptance), and

(c) Owner becomes responsible for building security, maintenance, utility services, and insurance, unless stated otherwise in the Certificate.

(3) The Certificate of Substantial Completion shall set the time within which the Contractor shall finish all items on the "punch list" accompanying the Certificate. The completion of punch list items shall be a condition precedent to Final Payment.

(4) If the Work or designated portion covered by a Certificate of Substantial Completion includes roofing work, the General Contractor's (5-year) Roofing Guarantee, DCM Form C-9, must be executed by the Contractor and attached to the Certificate of Substantial Completion. If the Contract Documents specify any other roofing warranties to be provided by the roofing manufacturer, Subcontractor, or Contractor, they must also be attached to the Certificate of Substantial Completion. The Alabama Division of Construction Management will not sign the Certificate of Substantial Completion in the absence of the roofing guarantees.

E. The Date of Substantial Completion of the Work, as set in the Certificate of Substantial Completion of the Work or of the last completed portion of the Work, establishes the extent to which the Contractor is liable for Liquidated Damages, if any; however, should the Contractor fail to complete all punch list items within thirty days, or such other time as may be stated in the respective Certificate of Substantial Completion, the Contractor shall bear any expenses, including additional Architectural services and expenses, incurred by the Owner as a result of such failure to complete punch list items in a timely manner.

ARTICLE 33
OCCUPANCY or USE PRIOR to COMPLETION

A. UPON SUBSTANTIAL COMPLETION

Prior to completion of the entire Work, the Owner may occupy or begin utilizing any designated portion of the Work on the agreed Date of Substantial Completion of that portion of the Work.

B. BEFORE SUBSTANTIAL COMPLETION

(1) The Owner shall not occupy or utilize any portion of the Work before Substantial Completion of that portion has been achieved.

(2) The Owner may deliver furniture and equipment and store, or install it in place ready for occupancy and use, in any designated portion of the Work before it is substantially completed under the following conditions:

(a) The Owner's storage or installation of furniture and equipment will not unreasonably disrupt or interfere with the Contractor's completion of the designated portion of the Work.

(b) The Contractor consents to the Owner's planned action (such consent shall not be unreasonably withheld).

(c) The Owner shall be responsible for insurance coverage of the Owner's furniture and equipment, and the Contractor's liability shall not be increased.

(d) The Contractor, Architect, and Owner will jointly inspect and record the condition of the Work in the area before the Owner delivers and stores or installs furniture and equipment; the Owner will equitably compensate the Contractor for making any repairs to the Work that may subsequently be required due to the Owner's delivery and storage or installation of furniture and equipment.

(e) The Owner's delivery and storage or installation of furniture and equipment shall not be deemed an acceptance of any Work not completed in accordance with the requirements of the Contract Documents.

ARTICLE 34
FINAL PAYMENT

A. PREREQUISITES to FINAL PAYMENT

The following conditions are prerequisites to Final Payment becoming due the Contractor:

(1) Full execution of a Certificate of Substantial Completion for the Work, or each designated portion of the Work.

(2) Final Acceptance of the Work.

(3) The Contractor's completion, to the satisfaction of the Architect and Owner, of all documentary requirements of the Contract Documents; such as delivery of "as-built" documents, operating and maintenance manuals, warranties, etc.

(4) Delivery to the Owner of a final Application for Payment, prepared by the Contractor and approved and certified by the Architect. Architect prepares DCM Form B-13: Final Payment Checklist and forwards it to the Owner along with the final Application for Payment.

(5) Completion of an Advertisement for Completion pursuant to Paragraph C below.

(6) Delivery by the Contractor to the Owner through the Architect of DCM Form C-18: Contractor's Affidavit of Payment of Debts and Claims, and a Release of Claims, if any, and such other documents as may be required by Owner, satisfactory in form to the Owner pursuant to Paragraph D below.

(7) Consent of Surety to Final Payment, if any, to Contractor. This Consent of Surety is required for projects which have Payment and Performance Bonds.

(8) Delivery by the Contractor to the Architect and Owner of other documents, if any, required by the Contract Documents as prerequisites to Final Payment.

(9) See Manual of Procedures Chapter 7, Section L.7 concerning reconciliation of contract time, if any.

B. FINAL ACCEPTANCE of the WORK

"Final Acceptance of the Work" shall be achieved when all "punch list" items recorded with the Certificate(s) of Substantial Completion are accounted for by either: **(1)** their completion or correction by the Contractor and acceptance by the Architect, Owner, and DCM Project Inspector, or **(2)** their resolution under Article 18, Deductions for Uncorrected Work.

C. ADVERTISEMENT for COMPLETION

(1) If the Contract Sum is less than $100,000: Advertisement for Completion shall not apply to contractors performing contracts of less than $100,000.00 in amount. §39-1-1(g)

(2) If the Contract Sum is $100,000 or more: The Contractor, immediately after being notified by the Architect that all other requirements of the Contract have been completed, shall give public notice of completion of the Contract by having an Advertisement for Completion, similar to the sample contained in the Project Manual, published for a period of three weeks. The contractor can publish a notice in one or more of the following ways:

(a) In a newspaper of general circulation in the county or counties in which the work, or some portion thereof, has been done.

(b) On a website that is maintained by a newspaper of general circulation in the county or counties in which the work, or some portion thereof, has been done. (c) On a website utilized by the awarding authority for publishing notices.

(d) If no newspaper is published in the county in which the work was done, and if the awarding authority does not utilize a website for the purpose of publishing notices, the notice may be given by posting at the courthouse for 30 days, and proof of the posting of the notice shall be given by the awarding authority and the contractor.

Proof of publication of the notice shall be made by the contractor to the authority by whom the contract was made by affidavit of the publisher or website owner and a printed copy of the notice published. A final settlement shall not be made upon the contract until the expiration of 30 days after the completion of the notice.

D. RELEASE of CLAIMS

The Release of Claims and other documents referenced in Paragraph A(6) above are as follows:

(1) A release executed by Contractor of all claims and claims of lien against the Owner arising under and by virtue of the Contract, other than such claims of the Contractor, if any, as may have been previously made in writing and as may be specifically excepted by the Contractor from the operation of the release in stated amounts to be set forth therein.

(2) An affidavit under oath, if required, stating that so far as the Contractor has knowledge or information, there are no claims or claims of lien which have been or will be filed by any Subcontractor, Supplier or other party for labor or material for which a claim or claim of lien could be filed.

(3) A release, if required, of all claims and claims of lien made by any Subcontractor, Supplier or other party against the Owner or unpaid Contract funds held by the Owner arising under or related to the Work on the Project; provided, however, that if any Subcontractor, Supplier or others refuse to furnish a release of such claims or claims of lien, the Contractor may furnish a bond executed by Contractor and its Surety to the Owner to provide an unconditional obligation to defend, indemnify and hold harmless the Owner against any loss, cost or expense, including attorney's fees, arising out of or as a result of such claims, or claims of lien, in which event Owner may make Final Payment notwithstanding such claims or claims of lien. If Contractor and Surety fail to fulfill their obligations to Owner under the bond, the Owner shall be entitled to recover damages as a result of such failure, including all costs and reasonable attorney's fees incurred to recover such damages.

E. EFFECT of FINAL PAYMENT

(1) The making of Final Payment shall constitute a waiver of Claims by the Owner except those arising from:

- **(a)** liens, claims, security interests or encumbrances arising out of the Contract and unsettled;
- **(b)** failure of the Work to comply with the requirements of the Contract Documents;
- **(c)** terms of warranties or indemnities required by the Contract Documents, or
- **(d)** latent defects.

(2) Acceptance of Final Payment by the Contractor shall constitute a waiver of claims by Contractor except those previously made in writing, identified by Contractor as unsettled at the time of final Application for Payment, and specifically excepted from the release provided for in Paragraph D(1), above.

ARTICLE 35
CONTRACTOR'S WARRANTY

A. GENERAL WARRANTY

The Contractor warrants to the Owner and Architect that all materials and equipment furnished under the Contract will be of good quality and new, except such materials as may be expressly provided or allowed in the Contract Documents to be otherwise, and that none of the Work will be Defective Work as defined in Article 1.

B. ONE-YEAR WARRANTY

(1) If, within one year after the date of Substantial Completion of the Work or each designated portion of the Work (or otherwise as agreed upon in a mutually-executed Certificate of Substantial Completion), any of the Work is found to be Defective Work, the Contractor shall promptly upon receipt of written notice from the Owner or Architect, and without expense to either, replace or correct the Defective Work to conform to the requirements of the Contract Documents, and repair all damage to the site, the building and its contents which is the result of Defective Work or its replacement or correction.

(2) The one-year warranty for punch list items shall begin on the Date of Substantial Completion if they are completed or corrected within the time period allowed in the Certificate of Substantial Completion in which they are recorded. The one-year warranty for punch list items that are not completed or corrected within the time period allowed in the Certificate of Substantial Completion,

and other Work performed after Substantial Completion, shall begin on the date of Final Acceptance of the Work. The Contractor's correction of Work pursuant to this warranty does not extend the period of the warranty. The Contractor's one-year warranty does not apply to defects or damages due to improper or insufficient maintenance, improper operation, or wear and tear during normal usage.

(3) Upon recognizing a condition of Defective Work, the Owner shall promptly notify the Contractor of the condition. If the condition is causing damage to the building, its contents, equipment, or site, the Owner shall take reasonable actions to mitigate the damage or its continuation, if practical. If the Contractor fails to proceed promptly to comply with the terms of the warranty, or to provide the Owner with satisfactory written verification that positive action is in process, the Owner may have the Defective Work replaced or corrected and the Contractor and the Contractor's Surety shall be liable for all expense incurred.

(4) Year-end Inspection(s): An inspection of the Work, or each separately completed portion thereof, is required near the end of the Contractor's one-year warranty period(s). The inspection must be scheduled with the Owner, Architect and DCM Inspector. The subsequent delivery of the Architect's report of a Year-end Inspection will serve as confirmation that the Contractor was notified of Defective Work found within the warranty period.

(5) The Contractor's warranty of one year is in addition to, and not a limitation of, any other remedy stated herein or available to the Owner under applicable law.

C. GENERAL CONTRACTOR'S ROOFING GUARANTEE

(1) In addition to any other roof related warranties or guarantees that may be specified in the Contract Documents, the roof and associated work shall be guaranteed by the General Contractor against leaks and defects of materials and workmanship for a period of five (5) years, starting on the Date of Substantial Completion of the Project as stated in the Certificate of Substantial Completion. This guarantee for punch list items shall begin on the Date of Substantial Completion if they are completed or corrected within the time period allowed in the Certificate of Substantial Completion in which they are recorded. The guarantee for punch list items that are not completed or corrected within the time period allowed in the Certificate of Substantial Completion shall begin on the date of Final Acceptance of the Work.

(2) The "General Contractor's Roofing Guarantee" (DCM Form C-9), included in the Project Manual, shall be executed in triplicate, signed by the appropriate party and submitted to the Architect for submission with the Certificate of Substantial Completion to the Owner and the Division of Construction Management.

(3) This guarantee does not include costs which might be incurred by the General Contractor in making visits to the site requested by the Owner regarding roof problems that are due to lack of proper maintenance (keeping roof drains and/or gutters clear of debris that cause a stoppage of drainage which results in water ponding, overflowing of flashing, etc.), or damages caused by vandalism or misuse of roof areas. Should the contractor be required to return to the job to correct problems of this nature that are determined not to be related to faulty workmanship and materials in the installation of the roof, payment for actions taken by the Contractor in response to such request will be the responsibility of the Owner. A detailed written report shall be made by the General Contractor on each of these 'Service Calls' with copies to the Architect, Owner and Division of Construction Management.

D. SPECIAL WARRANTIES

(1) The Contractor shall deliver to the Owner through the Architect all special or extended warranties required by the Contract Documents from the Contractor, Subcontractors, and suppliers.

(2) The Contractor and the Contractor's Surety shall be liable to the Owner for such special warranties during the Contractor's one-year warranty; thereafter, the Contractor's obligations relative to such special warranties shall be to provide reasonable assistance to the Owner in their enforcement.

E. ASSUMPTION of GUARANTEES of OTHERS

If the Contractor disturbs, alters, or damages any work guaranteed under a separate contract, thereby voiding the guarantee of that work, the Contractor shall restore the work to a condition satisfactory to the Owner and shall also guarantee it to the same extent that it was guaranteed under the separate contract.

ARTICLE 36
INDEMNIFICATION AGREEMENT

To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Owner, Architect, Architect's consultants, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, employees, and consultants (hereinafter collectively referred to as the "Indemnitees") from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of, related to, or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including loss of use resulting therefrom, and is caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether such claim, damage, loss or expense is caused in part, or is alleged but not legally established to have been caused in whole or in part by the negligence or other fault of a party indemnified hereunder.

A. This indemnification shall extend to all claims, damages, losses and expenses for injury or damage to adjacent or neighboring property, or persons injured thereon, that arise out of, relate to, or result from performance of the Work.

B. This indemnification does not extend to the liability of the Architect, or the Architect's Consultants, agents, or employees, arising out of **(1)** the preparation or approval of maps, shop drawings, opinions, reports, surveys, field orders, Change Orders, drawings or specifications, or **(2)** the giving of or the failure to give directions or instructions, provided such giving or failure to give instructions is the primary cause of the injury or damage.

C. This indemnification does not apply to the extent of the sole negligence of the Indemnitees.

ARTICLE 37
CONTRACTOR'S and SUBCONTRACTORS' INSURANCE

(Provide entire Article 37 to Contractor's insurance representative.)

A. GENERAL

(1) RESPONSIBILITY. The Contractor shall be responsible to the Owner from the time of the signing of the Construction Contract or from the beginning of the first work, whichever shall be earlier, for all injury or damage of any kind resulting from any negligent act or omission or breach, failure or other default regarding the work by the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of who may be the owner of the property.

(2) INSURANCE PROVIDERS. Each of the insurance coverages required below shall be issued by an insurer licensed by the Insurance Commissioner to transact the business of insurance in the State of Alabama for the applicable line of insurance, and such insurer (or, for qualified self-insureds or group self-insureds, a specific excess insurer providing statutory limits) must have a Best Policyholders Rating of "A-" or better and a financial size rating of Class V or larger.

(3) NOTIFICATION ENDORSEMENT. Each policy shall be endorsed to provide that the insurance company agrees that the policy shall not be canceled, changed, allowed to lapse or allowed to expire for any reason until thirty days after the Owner has received written notice by certified mail as evidenced by return receipt or until such time as other insurance coverage providing protection equal to protection called for in the Contract Documents shall have been received, accepted and acknowledged by the Owner. Such notice shall be valid only as to the Project as shall have been designated by Project Name and Number in said notice.

(4) INSURANCE CERTIFICATES. The Contractor shall procure the insurance coverages identified below, or as otherwise required in the Contract Documents, at the Contractor's own expense, and to evidence that such insurance coverages are in effect, the Contractor shall furnish the Owner an insurance certificate(s) acceptable to the Owner and listing the Owner as the certificate holder. The insurance certificate(s) must be delivered to the Owner with the Construction Contract and Bonds for final approval and execution of the Construction Contract. The insurance certificate must provide the following:

- **(a)** Name and address of authorized agent of the insurance company
- **(b)** Name and address of insured
- **(c)** Name of insurance company or companies
- **(d)** Description of policies
- **(e)** Policy Number(s)
- **(f)** Policy Period(s)
- **(g)** Limits of liability
- **(h)** Name and address of Owner as certificate holder
- **(i)** Project Name and Number, if any
- **(j)** Signature of authorized agent of the insurance company
- **(k)** Telephone number of authorized agent of the insurance company
- **(l)** Mandatory thirty day notice of cancellation / non-renewal / change

(5) MAXIMUM DEDUCTIBLE. Self-insured retention, except for qualified self-insurers or group self-insurers, in any policy shall not exceed $25,000.00.

B. INSURANCE COVERAGES

Unless otherwise provided in the Contract Documents, the Contractor shall purchase the types of insurance coverages with liability limits not less than as follows:

(1) WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE

(a) Workers' Compensation coverage shall be provided in accordance with the statutory coverage required in Alabama. A group insurer must submit a certificate of authority from the Alabama Department of Industrial Relations approving the group insurance plan. A self-insurer must submit a certificate from the Alabama Department of Industrial Relations stating the Contractor qualifies to pay its own workers' compensation claims.

(b) Employer's Liability Insurance limits shall be at least:

.1 Bodily Injury by Accident - $1,000,000 each accident

.2 Bodily Injury by Disease - $1,000,000 each employee

(2) COMMERCIAL GENERAL LIABILITY INSURANCE

(a) Commercial General Liability Insurance, written on an ISO Occurrence Form (current edition as of the date of Advertisement for Bids) or equivalent, shall include, but need not be limited to, coverage for bodily injury and property damage arising from premises and operations liability, products and completed operations liability, blasting and explosion, collapse of structures, underground damage, personal injury liability and contractual liability. The Commercial General Liability Insurance shall provide at minimum the following limits:

Coverage	Limit
.1 General Aggregate	$ 2,000,000.00 per Project
.2 Products, Completed Operations Aggregate	$ 2,000,000.00 per Project
.3 Personal and Advertising Injury	$ 1,000,000.00 per Occurrence
.4 Each Occurrence	$ 1,000,000.00

(b) Additional Requirements for Commercial General Liability Insurance:

.1 The policy shall name the Owner, Architect, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, consultants and employees as additional insureds, state that this coverage shall be primary insurance for the additional insureds; and contain no exclusions of the additional insureds relative to job accidents.

.2 The policy must include separate per project aggregate limits.

(3) COMMERCIAL BUSINESS AUTOMOBILE LIABILITY INSURANCE

(a) Commercial Business Automobile Liability Insurance which shall include coverage for bodily injury and property damage arising from the operation of any owned, non-owned or hired automobile. The Commercial Business Automobile Liability Insurance Policy shall provide not less than $1,000,000 Combined Single Limits for each occurrence.

(b) The policy shall name the Owner, Architect, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, consultants, and employees as additional insureds.

(4) COMMERCIAL UMBRELLA OR COMMERCIAL EXCESS LIABILITY INSURANCE

(a) Commercial Umbrella or Commercial Excess Liability Insurance to provide excess coverage above the Commercial General Liability, Commercial Business Automobile

Liability and the Workers' Compensation and Employer's Liability to satisfy the minimum limits set forth herein.

(b) Minimum Combined Primary Commercial General Liability and Commercial Umbrella or Commercial Excess Limits of:

.1 $ 5,000,000 per Occurrence

.2 $ 5,000,000 Aggregate

(c) Additional Requirements for Commercial Umbrella or Commercial Excess Liability Insurance:

.1 The policy shall name the Owner, Architect, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, consultants, and employees as additional insureds.

.2 The policy must be on an "occurrence" basis.

(5) BUILDER'S RISK INSURANCE

(a) The Builder's Risk Policy shall be made payable to the Owner and Contractor, as their interests may appear. The policy amount shall be equal to 100% of the Contract Sum, written on a Causes of Loss - Special Form (current edition as of the date of Advertisement for Bids), or its equivalent. All deductibles shall be the sole responsibility of the Contractor.

(b) The policy shall be endorsed as follows:

"The following may occur without diminishing, changing, altering or otherwise affecting the coverage and protection afforded the insured under this policy:

(i) Furniture and equipment may be delivered to the insured premises and installed in place ready for use; or

(ii) Partial or complete occupancy by Owner; or

(iii) Performance of work in connection with construction operations insured by the Owner, by agents or lessees or other contractors of the Owner, or by contractors of the lessee of the Owner."

Exception: projects containing only abatement and/or only demolition do not require Builder's Risk insurance, unless required by the Owner. Note: projects containing any scope of work besides abatement and/or demolition require Builder's Risk insurance.

C. SUBCONTRACTORS' INSURANCE

(1) WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE. The Contractor shall require each Subcontractor to obtain and maintain Workers' Compensation and Employer's Liability Insurance coverages as described in preceding Paragraph B, or to be covered by the Contractor's Workers' Compensation and Employer's Liability Insurance while performing Work under the Contract.

(2) LIABILITY INSURANCE. The Contractor shall require each Subcontractor to obtain and maintain adequate General Liability, Automobile Liability, and Umbrella or Excess Liability Insurance coverages similar to those described in preceding Paragraph B. Such coverage shall be in effect at all times that a Subcontractor is performing Work under the Contract.

(3) ENFORCEMENT RESPONSIBILITY. The Contractor shall have responsibility to enforce its Subcontractors' compliance with these or similar insurance requirements; however, the Contractor shall, upon request, provide the Architect or Owner acceptable evidence of insurance for any Subcontractor.

D. TERMINATION of OBLIGATION to INSURE

Unless otherwise expressly provided in the Contract Documents, the obligation to insure as provided herein shall continue as follows:

(1) BUILDER'S RISK INSURANCE. The obligation to insure under Subparagraph B(5) shall remain in effect until the Date of Substantial Completion as shall be established in the Certificate of Substantial Completion. In the event that multiple Certificates of Substantial Completion covering designated portions of the Work are issued, Builder's Risk coverage shall remain in effect until the Date of Substantial Completion as shall be established in the last issued Certificate of Substantial Completion. However, in the case that the Work involves separate buildings, Builder's Risk coverage of each separate building may terminate on the Date of Substantial Completion as established in the Certificate of Substantial Completion issued for each building.

(2) PRODUCTS and COMPLETED OPERATIONS. The obligation to carry Products and Completed Operations coverage specified under Subparagraph B(2) shall remain in effect for two years after the Date(s) of Substantial Completion.

(3) ALL OTHER INSURANCE. The obligation to carry other insurance coverages specified under Subparagraphs B(1) through B(4) and Paragraph C shall remain in effect after the Date(s) of Substantial Completion until such time as all Work required by the Contract Documents is completed. Equal or similar insurance coverages shall remain in effect if, after completion of the Work, the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, returns to the Project to perform warranty or maintenance work pursuant to the terms of the Contract Documents.

E. WAIVERS of SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors performing construction or operations related to the Project, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss. But said waiver shall apply only to the extent the loss or damage is covered by builder's risk insurance applicable to the Work or to other property located within or adjacent to the Project, except such rights as they may have to proceeds of such insurance held by the Owner or Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors, if any, and the subcontractor, sub-subcontractors, suppliers, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The Policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to the person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. The waivers provided for in this paragraph shall not be applicable to loss or damage that occurs after final acceptance of the Work. Any provision found herein which attempts to waive or invalidate the subrogation interests of Alabama's State Insurance Fund against any party to this contract or any other person or entity is void and invalid. No such waiver is intended or made by the parties to this agreement with regard to any property insured by the State Insurance Fund.

ARTICLE 38
PERFORMANCE and PAYMENT BONDS

A. GENERAL

Upon signing and returning the Construction Contract to the Owner for final approval and execution, the Contractor shall, at the Contractor's expense, furnish to the Owner a Performance Bond and a Payment Bond (P&P Bonds), DCM Forms C-6 and C-7 as contained in the Project Manual, each in a penal sum equal to 100% of the Contract Sum. Each bond shall be on the form contained in the Project Manual, shall be executed by a surety company (Surety) acceptable to the Owner and duly authorized and qualified to make such bonds in the State of Alabama in the required amount. The P&P bonds must be signed either on the same day or after the construction contract date. Each P&P Bond shall have attached thereto a power of attorney (POA) of the signing official. The POA signature date must be the same day as the P&P Bond's signature date. All signatures must be present.

The provisions of this Article are not applicable to this Contract if the Contract Sum is less than $100,000, unless bonds are required for this Contract in the Supplemental General Conditions.

B. PERFORMANCE BOND

Through the Performance Bond, the Surety's obligation to the Owner shall be to assure the prompt and faithful performance of the Contract and Contract Change Orders. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. In case of default on the part of the Contractor, the Surety shall take charge of and complete the Work in accordance with the terms of the Performance Bond. Any reasonable expenses incurred by the Owner as a result of default on the part of the Contractor, including architectural, engineering, administrative, and legal services, shall be recoverable under the Performance Bond.

C. PAYMENT BOND

Through the Payment Bond the Surety's obligation to the Owner shall be to guarantee that the Contractor and its Subcontractors shall promptly make payment to all persons supplying labor, materials, or supplies for, or in, the prosecution of the Work, including the payment of reasonable attorneys fees incurred by successful claimants or plaintiffs in civil actions on the Bond. Any person or entity indicating that they have a claim of nonpayment under the Bond shall, upon written request, be promptly furnished a certified copy of the Bond and Construction Contract by the Contractor, Architect, Owner, or Alabama Division of Construction Management, whomever is recipient of the request.

D. CHANGE ORDERS

The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

E. EXPIRATION

The obligations of the Contractor's performance bond surety shall be coextensive with the

contractor's performance obligations under the Contract Documents; provided, however, that the surety's obligation shall expire at the end of the one-year warranty period(s) of Article 35.

ARTICLE 39
ASSIGNMENT

The Contractor shall not assign the Contract or sublet it as a whole nor assign any moneys due or to become due to the Contractor thereunder without the previous written consent of the Owner (and of the Surety, in the case of a bonded Construction Contract). As prescribed by the Public Works Law, the Contract shall in no event be assigned to an unsuccessful bidder for the Contract whose bid was rejected because the bidder was not a responsible or responsive bidder.

ARTICLE 40
CONSTRUCTION by OWNER or SEPARATE CONTRACTORS

A. OWNER'S RESERVATION of RIGHT

(1) The Owner reserves the right to self-perform, or to award separate contracts for, other portions of the Project and other Project related construction and operations on the site. The contractual conditions of such separate contracts shall be substantially similar to those of this Contract, including insurance requirements and the provisions of this Article. If the Contractor considers such actions to involve delay or additional cost under this Contract, notifications and assertion of claims shall be as provided in Article 20 and Article 23.

(2) When separate contracts are awarded, the term "Contractor" in the separate Contract Documents shall mean the Contractor who executes the respective Construction Contract.

B. COORDINATION

Unless otherwise provided in the Contract Documents, the Owner shall be responsible for coordinating the activities of the Owner's forces and separate contractors with the Work of the Contractor. The Contractor shall cooperate with the Owner and separate contractors, shall participate in reviewing and comparing their construction schedules relative to that of the Contractor when directed to do so, and shall make and adhere to any revisions to the construction schedule resulting from a joint review and mutual agreement.

C. CONDITIONS APPLICABLE to WORK PERFORMED by OWNER

Unless otherwise provided in the Contract Documents, when the Owner self-performs construction or operations related to the Project, the Owner shall be subject to the same obligations to Contractor as Contractor would have to a separate contractor under the provision of this Article 40.

D. MUTUAL RESPONSIBILITY

(1) The Contractor shall reasonably accommodate the required introduction and storage of materials and equipment and performance of activities by the Owner and separate contractors and shall connect and coordinate the Contractor's Work with theirs as required by the Contract Documents.

(2) By proceeding with an element or portion of the Work that is applied to or performed on construction by the Owner or a separate contractor, or which relies upon their operations, the Contractor accepts the condition of such construction or operations as being suitable for the Contractor's Work, except for conditions that are not reasonably discoverable by the Contractor. If the Contractor discovers any condition in such construction or operations that is not suitable for the proper performance of the Work, the Contractor shall not proceed, but shall instead promptly notify the Architect in writing of the condition discovered.

(3) The Contractor shall reimburse the Owner for any costs incurred by a separate contractor and payable by the Owner because of acts or omissions of the Contractor. Likewise, the Owner shall be responsible to the Contractor for any costs incurred by the Contractor because of the acts or omissions of a separate contractor.

(4) The Contractor shall not cut or otherwise alter construction by the Owner or a separate contractor without the written consent of the Owner and separate contractor; such consent shall not be unreasonably withheld. Likewise, the Contractor shall not unreasonably withhold its consent allowing the Owner or a separate contractor to cut or otherwise alter the Work.
(5) The Contractor shall promptly remedy any damage caused by the Contractor to the construction or property of the Owner or separate contractors**.**

ARTICLE 41
SUBCONTRACTS

A. AWARD of SUBCONTRACTS and OTHER CONTRACTS for PORTIONS of the WORK

(1) Unless otherwise provided in the Contract Documents, when delivering the executed Construction Contract, bonds, and evidence of insurance to the Architect, the Contractor shall also submit a listing of Subcontractors proposed for each principal portion of the Work and fabricators or suppliers proposed for furnishing materials or equipment fabricated to the design of the Contract Documents. This listing shall be in addition to any naming of Subcontractors, fabricators, or suppliers that may have been required in the bid process. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner, after due investigation, has reasonable objection to any Subcontractor, fabricator, or supplier proposed by the Contractor. The issuance of the Notice to Proceed in the absence of such objection by the Owner shall constitute notice that no reasonable objection to them is made.

(2) The Contractor shall not contract with a proposed Subcontractor, fabricator, or supplier to whom the Owner has made reasonable and timely objection. Except in accordance with prequalification procedures as may be contained in the Contract Documents, through specified qualifications, or on the grounds of reasonable objection, the Owner may not restrict the Contractor's selection of Subcontractors, fabricators, or suppliers.

(3) Upon the Owner's reasonable objection to a proposed Subcontractor, fabricator, or supplier, the Contractor shall promptly propose another to whom the Owner has no reasonable objection. If the proposed Subcontractor, fabricator, or supplier to whom the Owner made reasonable objection was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be equitably adjusted by Contract Change Order for any resulting difference if the Contractor has acted promptly and responsively in this procedure.

(4) The Contractor shall not change previously selected Subcontractors, fabricators, or suppliers without notifying the Architect and Owner in writing of proposed substitute Subcontractors, fabricators, or suppliers. If the Owner does not make a reasonable objection to a proposed substitute within three working days, the substitute shall be deemed approved.

B. SUBCONTRACTUAL RELATIONS

(1) The Contractor agrees to bind every Subcontractor and material supplier (and require every Subcontractor to so bind its subcontractors and material suppliers) to all the provisions of the Contract Documents as they apply to the Subcontractor's and material supplier's portion of the Work.

(2) Nothing contained in the Contract Documents shall be construed as creating any contractual relationship between any Subcontractor and the Owner, nor to create a duty of the Architect, Owner, or Director to resolve disputes between or among the Contractor or its Subcontractors and suppliers or any other duty to such Subcontractors or suppliers.

ARTICLE 42
ARCHITECT'S STATUS

A. The Architect is an independent contractor performing, with respect to this Contract, pursuant to an agreement executed between the Owner and the Architect. The Architect has prepared the Drawings and Specifications and assembled the Contract Document and is, therefore, charged with their interpretation and clarification as described in the Contract Documents. As a representative of the Owner, the Architect will endeavor to guard the Owner against variances from the requirements of the Contract Documents by the Contractor. On behalf of the Owner, the Architect will administer the Contract as described in the Contract Documents during construction and the Contractor's one-year warranty.

B. So as to maintain continuity in administration of the Contract and performance of the Work, and to facilitate complete documentation of the project record, all communications between the Contractor and Owner regarding matters of or related to the Contract shall be directed through the Architect, unless direct communication is otherwise required to provide a legal notification. Unless otherwise authorized by the Architect, communications by and with the Architect's consultants shall be through the Architect. Unless otherwise authorized by the Contractor, communications by and with Subcontractors and material suppliers shall be through the Contractor.

C. ARCHITECT'S AUTHORITY

Subject to other provisions of the Contract Documents, the following summarizes some of the authority vested in the Architect by the Owner with respect to the Construction Contract and as further described or conditioned in other Articles of these General Conditions of the Contract.

(1) The Architect is authorized to:

- **(a)** approve "minor" deviations as defined in Article 9, Submittals,
- **(b)** make "minor" changes in the Work as defined in Article 19, Changes in the Work,
- **(c)** reject or require the correction of Defective Work,
- **(d)** require the Contractor to stop the performance of Defective Work,
- **(e)** adjust an Application for Payment by the Contractor pursuant to Article 30, Certification

and Approval of payments, and
(f) issue Notices to Cure pursuant to Article 27.

(2) The Architect is not authorized to:
(a) revoke, alter, relax, or waive any requirements of the Contract Documents (other than "minor" deviations and changes) without concurrence of the Owner,
(b) finally approve or accept any portion of the Work without concurrence of the Owner,
(c) issue instructions contrary to the Contract Documents,
(d) issue Notice of Termination or otherwise terminate the Contract, or
(e) require the Contractor to stop the Work except only to avoid the performance of Defective Work.

D. LIMITATIONS of RESPONSIBILITIES

(1) The Architect shall not be responsible to Contractors or to others for supervising or coordinating the performance of the Work or for the Construction Methods or safety of the Work, unless the Contract Documents give other specific instructions concerning these matters.
(2) The Architect will not be responsible to the Contractor (nor the Owner) for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents or for acts or omissions of the Contractor, a Subcontractor, or anyone for whose acts they may be liable. However, the Architect will report to the Owner and Contractor any Defective Work recognized by the Architect.

(3) The Architect will endeavor to secure faithful performance by Owner and Contractor, and the Architect will not show partiality to either or be liable to either for results of interpretations or decisions rendered in good faith.

(4) The Contractor's remedies for additional time or expense arising out of or related to this Contract, or the breach thereof, shall be solely as provided for in the Contract Documents. The Contractor shall have no claim or cause of action against the Owner, Architect, or its consultants for any actions or failures to act, whether such claim may be in contract, tort, strict liability, or otherwise, it being the agreement of the parties that the Contractor shall make no claim against the Owner or any agents of the Owner, including the Architect or its consultants, except as may be provided for claims or disputes submitted in accordance with Article 24. The Architect and Architect's consultants shall be considered third party beneficiaries of this provision of the Contract and entitled to enforce same.

E. ARCHITECT'S DECISIONS

Decisions by the Architect shall be in writing The Architect's decisions on matters relating to aesthetic effect will be final and binding if consistent with the intent expressed in the Contract Documents. The Architect's decisions regarding disputes arising between the Contractor and Owner shall be advisory.

ARTICLE 43
CASH ALLOWANCES

A. All allowances stated in the Contract Documents shall be included in the Contract Sum. Items covered by allowances shall be supplied by the Contractor as directed by the Architect or Owner

and the Contractor shall afford the Owner the economy of obtaining competitive pricing from responsible bidders for allowance items unless other purchasing procedures are specified in the Contract Documents.

B. Unless otherwise provided in the Contract Documents:

(1) allowances shall cover the cost to the Contractor of materials and equipment delivered to the Project site and all applicable taxes, less applicable trade discounts;

(2) the Contractor's costs for unloading, storing, protecting, and handling at the site, labor, installation, overhead, profit and other expenses related to materials or equipment covered by an allowance shall be included in the Contract Sum but not in the allowances;

(3) if required, the Contract Sum shall be adjusted by Change Order to reflect the actual costs of an allowance.

C. Any selections of materials or equipment required of the Architect or Owner under an allowance shall be made in sufficient time to avoid delay of the Work.

ARTICLE 44
PERMITS, LAWS, and REGULATIONS

A. PERMITS, FEES AND NOTICES

(1) Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work which are customarily secured after award of the Construction Contract and which are in effect on the date of receipt of bids.

(2) The Contractor shall comply with and give notices required by all laws, ordinances, rules, regulations, and lawful orders of public authorities applicable to performance of the Work.

B. TAXES

Unless stated otherwise in the Contract Documents, materials incorporated into the Work are exempt from sales and use tax pursuant to Section 40-9-33, Code of Alabama, 1975 as amended. The Owner, Contractor and its subcontractors shall be responsible for complying with rules and regulations of the Sales, Use, & Business Tax Division of the Alabama Department of Revenue regarding certificates and other qualifications necessary to claim such exemption when making qualifying purchases from vendors. The Contractor shall pay all applicable taxes that are not covered by the exemption of Section 40-9-33 and which are imposed as of the date of receipt of bids, including those imposed as of the date of receipt of bids but scheduled to go into effect after that date.

C. COMPENSATION for INCREASES

The Contractor shall be compensated for additional costs incurred because of increases in tax rates imposed after the date of receipt of bids.

D. ALABAMA IMMIGRATION LAW

Per ACT 2011-535 as codified in Title 31, Chapter 13 of the Code of Alabama, 1975, as amended:

The contracting parties affirm, for the duration of the agreement, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama. Furthermore, a contracting party found to be in violation of this provision shall be deemed in breach of the agreement and shall be responsible for all damages resulting therefrom.

E. ALABAMA TRADE BOYCOTT LAW

Per Act 2016-312as codified in Title 41, Chapter 16, Article 1, of the Code of Alabama, 1975, as amended:

The contracting parties affirm, for the duration of the agreement, that they are not currently engaged in, and will not engage in, the boycott of a person or an entity based in or doing business with a jurisdiction with which this state can enjoy open trade.

EE. ALABAMA ECONOMIC BOYCOTT LAW

Per Act 2023-409 as codified in Title 41, Chapter 16, Article 1 of the Code of Alabama, 1975, as amended:

The contracting parties affirm, for the duration of the agreement, that they are not currently engaged in, and will not engage in, economic boycotts.

F. ACCOUNTING OF SALES TAX EXEMPT PROJECTS

Per Act 2013-205 as codified in Title 40, Chapter 9, Article 1, of the Code of Alabama, 1975, as amended:

In bidding the work on a tax exempt project, the bid form shall provide an accounting for the tax savings.

ARTICLE 45
ROYALTIES, PATENTS, and COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend, indemnify and hold harmless the Owner, Architect, Architect's consultants, Alabama Division of Construction Management, State Department of Education (if applicable), and their agents, employees, and consultants from and against all claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of, related to, or resulting from all suits or claims for infringement of any patent rights or copyrights arising out of the inclusion of any patented or copyrighted materials, methods, or systems selected by the Contractor and used during the execution of or incorporated into the Work. This indemnification does not apply to any suits or claims of infringement of any patent rights or copyrights arising out of any patented or copyrighted materials, methods, or systems specified in the Contract Documents. However, if the Contractor has information that a specified material, method, or system is or may constitute an

infringement of a patent or copyright, the Contractor shall be responsible for any resulting loss unless such information is promptly furnished to the Architect.

ARTICLE 46
USE of the SITE

A. The Contractor shall confine its operations at the Project site to areas permitted by the Owner and by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials, equipment, employees' vehicles, or debris. The Contractor's operations at the site shall be restricted to the sole purpose of constructing the Work, use of the site as a staging, assembly, or storage area for other business which the Contractor may undertake shall not be permitted.

B. Unless otherwise provided in the Contract Documents, temporary facilities, such as storage sheds, shops, and offices may be erected on the Project site with the approval of the Architect and Owner. Such temporary buildings and/or utilities shall remain the property of the Contractor, and be removed at the Contractor's expense upon completion of the Work, unless the Owner authorizes their abandonment without removal.

ARTICLE 47
CUTTING and PATCHING

A. The Contractor shall be responsible for all cutting, fitting, or patching that may be required to execute the Work to the results indicated in the Contract Documents or to make its parts fit together properly.

B. Any cutting, patching, or excavation by the Contractor shall be supervised and performed in a manner that will not endanger persons nor damage or endanger the Work or any fully or partially completed construction of the Owner or separate contractors.

ARTICLE 48
IN-PROGRESS and FINAL CLEANUP

A. IN-PROGRESS CLEAN-UP

(1) The Contractor shall at all times during the progress of the Work keep the premises and surrounding area free from rubbish, scrap materials and debris resulting from the Work. Trash and combustible materials shall not be allowed to accumulate inside buildings or elsewhere on the premises. At no time shall any rubbish be thrown from window openings. Burning of trash and debris on site is not permitted.

(2) The Contractor shall make provisions to minimize and confine dust and debris resulting from construction activities.

B. FINAL CLEAN-UP

(1) Before Substantial Completion or Final Acceptance is achieved, the Contractor shall have removed from the Owner's property all construction equipment, tools, and machinery; temporary structures and/or utilities including the foundations thereof (except such as the Owner permits in writing to remain); rubbish, debris, and waste materials; and all surplus materials, leaving the site clean and true to line and grade, and the Work in a safe and clean condition, ready for use and operation.

(2) In addition to the above, and unless otherwise provided in the Contract Documents, the Contractor shall be responsible for the following special cleaning for all trades as the Work is completed:

(a) Cleaning of all painted, enameled, stained, or baked enamel work: Removal of all marks, stains, finger prints and splatters from such surfaces.

(b) Cleaning of all glass: Cleaning and removing of all stickers, labels, stains, and paint from all glass, and the washing and polishing of same on interior and exterior.

(c) Cleaning or polishing of all hardware: Cleaning and polishing of all hardware.

(d) Cleaning all tile, floor finish of all kinds: Removal of all splatters, stains, paint, dirt, and dust, the washing and polishing of all floors as recommended by the manufacturer or required by the Architect.

(e) Cleaning of all manufactured articles, materials, fixtures, appliances, and equipment: Removal of all stickers, rust stains, labels, and temporary covers, and cleaning and conditioning of all manufactured articles, material, fixtures, appliances, and electrical, heating, and air conditioning equipment as recommended or directed by the manufacturers, unless otherwise required by the Architect; blowing out or flushing out of all foreign matter from all equipment, piping, tanks, pumps, fans, motors, devices, switches, panels, fixtures, boilers, sanitizing potable water systems; and freeing identification plates on all equipment of excess paint and the polishing thereof.

C. OWNER'S RIGHT to CLEAN-UP

If the Contractor fails to comply with these clean-up requirements and then fails to comply with a written directive by the Architect to clean-up the premises within a specified time, the Architect or Owner may implement appropriate clean-up measures and the cost thereof shall be deducted from any amounts due or to become due the Contractor.

ARTICLE 49
LIQUIDATED DAMAGES

A. Time is the essence of the Contract. Any delay in the completion of the Work required by the Contract Documents may cause inconvenience to the public and loss and damage to the Owner including but not limited to interest and additional administrative, architectural, inspection and supervision charges. By executing the Construction Contract, the Contractor agrees that the Contract Time is sufficient for the achievement of Substantial Completion.

B. The Contract Documents may provide in the Construction Contract or elsewhere for a certain dollar amount for which the Contractor and its Surety (if any) will be liable to the Owner as liquidated damages for each calendar day after expiration of the Contract Time that the Contractor fails to achieve Substantial Completion of the Work. If such daily liquidated damages are provided for, Owner and Contractor, and its Surety, agree that such amount is reasonable and agree to be bound thereby.

C. If a daily liquidated damage amount is not otherwise provided for in the Contract Documents, a time charge equal to six percent interest per annum on the total Contract Sum may be made against the Contractor for the entire period after expiration of the Contract Time that the Contractor fails to achieve Substantial Completion of the Work.

D. The amount of liquidated damages due under either paragraph B or C, above, may be deducted by the Owner from the moneys otherwise due the Contractor in the Final Payment, not as a penalty, but as liquidated damages sustained, or the amount may be recovered from Contractor or its Surety. If part of the Work is substantially completed within the Contract Time and part is not, the stated charge for liquidated damages shall be equitably prorated to that portion of the Work that the Contractor fails to substantially complete within the Contract Time. It is mutually understood and agreed between the parties hereto that such amount is reasonable as liquidated damages.

ARTICLE 50
USE of FOREIGN MATERIALS

A. In the performance of the Work the Contractor agrees to use materials, supplies, and products manufactured, mined, processed or otherwise produced in the United States or its territories, if same are available at reasonable and competitive prices and are not contrary to any sole source specification implemented under the Public Works Law.

B. In the performance of the Work the Contractor agrees to use iron or steel, that are made a permanent part of the structure, produced in the United States if the Contract Documents require the use of iron or steel and do not limit its supply to a sole source pursuant to the Public Works Law. If the Owner decides that the procurement of domestic steel products becomes impractical as a result of national emergency, national strike, or other cause, the Owner shall waive this restriction.

C. If domestic steel or other domestic materials, supplies, and products are not used in accordance with preceding Paragraphs A and B, the Contract Sum shall be reduced by an amount equal to any savings or benefits realized by the Contractor.

D. This Article applies only to Public Works projects financed entirely by the State of Alabama or any political subdivision of the state.

ARTICLE 51
PROJECT SIGN

A. Fully locally-funded State Agency and Public Higher Education projects: DCM Form C-15: Detail of Project Sign must be included in the project manual regardless of expected bid amount. If the awarded contract sum is $100,000.00 or more, Contractor shall furnish and erect a project sign. Other conditions besides the contract sum may warrant waiver of this requirement, but only with approval of the Technical Staff.

B. Fully locally-funded K-12 school projects: Project sign is not required unless requested by Owner; if project sign is requested by Owner, include DCM Form C-15: Detail of Project Sign in the project manual.

C. Partially or fully PSCA-funded projects: DCM Form C-15: Detail of Project Sign must be included in the project manual. Contractor shall furnish and erect a project sign for all PSCA-funded projects, regardless of the contract sum. "Alabama Public School and College Authority" as well as the local owner entity must be included as awarding authorities on the project sign of all PSCA-funded projects.

When required per the above conditions, the project sign shall be erected in a prominent location selected by the Architect and Owner and shall be maintained in good condition until completion of Work. If the Contract involves Work on multiple sites, only one project sign is required, which shall be erected on one of the sites in a location selected by the Architect and Owner. Slogan: The title of the current PSCA Act should be placed on the project sign of all PSCA-funded projects, otherwise the Awarding Authority/Owner's slogan, if any, should be used. If the Awarding Authority/Owner of a fully locally-funded project does not have a slogan, the project sign does not require a slogan.

END of
GENERAL CONDITIONS of the CONTRACT

SUPPLEMENT TO THE GENERAL CONDITIONS OF THE CONTRACT

1.1 The following supplements shall modify, delete and/or add to the General Conditions of the Contract. Where any article, paragraph or subparagraph in the General Conditions is supplemented by one of the following paragraphs, the provisions of such article, paragraph, or subparagraph shall remain in effect and the supplemental provisions shall be considered as added thereto. Where any article, paragraph or subparagraph in the General Conditions is amended, voided or superseded by any of the following paragraphs, the provisions of such article, paragraph or subparagraph not so amended, voided or superseded shall remain in effect.

A. Refer to Article 1.A; Definition:

1. Add the following to Paragraph A:

   a. This project is required to be submitted to the Alabama Division of Construction Management.

B. Refer to Article 1.B; Definition:

1. Architect: Construction documents for this project have been developed by **Lathan McKee, Architects**, 631 South Hull Street, Montgomery, Alabama, 36104, (334) 834-9933 `commissioned by the Owner.
2. Owner: **"Dekalb County Schools"**. Unless otherwise stated, all papers required to be delivered to the Owner shall be forwarded through the Architect.

C. Refer to Article 1.C; Definition:

1. DELETE this Paragraph C, in its entirety. All reference to "Commission" in the General Conditions of the Contract are to be disregarded,

D. Refer to Article 1.H; Definition:

1. DELETE this Paragraph H, in its entirety. All reference to "DCM" in the General Conditions of the Contract are to be disregarded.

E. Refer to Article 1.I; Definition:

1. DELETE this Paragraph I, in its entirety. All reference to "DCM Project Inspector" in the General Conditions of the Contract are to be disregarded.

F. Refer to Article 1.K; Definition:

1. DELETE this Paragraph K, in its entirety. All reference to "Director" in the General Conditions of the Contract are to be disregarded.

G. Refer to Article 3:

1. Add the following:

   a. **Contractor's Qualification's:** The Roofing Contract shall possess the following, or stringent, minimum qualifications: the roofing contractor must be a firm of not less than five (5) years of successful experience in installation of roof systems similar to those specified for the project and which is acceptable to or licensed by the manufacturer of the primary roofing materials.

   b. **Manufacturer's Qualifications:** In specifying acceptable manufacturers or minimum quality qualifications of manufacturers, the following, or more stringent criteria should be used: The manufacturer shall have a minimum of five (5) years of experience in the manufacture of the roofing system and must also be the **original material manufacturer** of the primary roofing material.

H. Refer to Article 6;

1. Add the following to Paragraph B:

a. The lowest bidding Contractor shall submit to the Architect within five (5) calendar days after the bid date the name(s) of the Superintendent(s) who will be in charge at the work site, along with the qualifications and experience.

b. NOTE: By submission of a Proposal the Bidder agrees that the Owner or Architect may reject a proposed Superintendent with or without a stated reason with no recourse to the Contractor.

I. Refer to Article 6;

1. Add the following to Paragraph C:

a. All labor shall be performed in the best and most workmanlike manner by persons skilled in their respective assignments or trades. Workmen whose work is unsatisfactory to the Architect or the Owner, or who are considered unfit or unskilled, or otherwise objectionable, shall be dismissed upon notice from the Architect or Owner.

J. Refer to Article 9, Paragraph D;

1. Add the following:

a. All submittals for color selections, to be made by the Architect for the entire project shall be submitted at the same time within 45 days from the “Notice to Proceed”. Piece-meal submittals for color selection will not be permitted.

b. Provide as follows unless otherwise specified:

1) All submittals shall be sent to the Architect no later than 45 calendar days from “Notice To Proceed” to: **submittals@lathanmckee.com** or though Submittal Exchange, if appliable.

2) Submittals regarding mechanical, plumbing, electrical and structural items shall be sent directly to the Engineer of record (see cover sheet of the specification for address). A digital copy of the transmittal shall be sent to the Architect at the following email address: **submittals@lathanmckee.com** or through Submittal Exchange, if applicable.

K. Refer to Article 13;

1. Add the following:

a. "If the bidder desires to substitute an "equal", he must secure written approval by the Architect of qualification to bid ten (10) days prior to date.

b. On all items specified as or equal substitutions must be submitted to the Architect ten (10) days prior to bid opening and Architect will act on substitution five (5) days prior to bids and notify all Contractors.

c. The request for substitutions are to be filled out completely and must be received prior to bid. Any subcontractor and/or material supplier that was not "approved" and their price is used at bid time will be the Contractors problem to absorb any cost associated with the use of a “non-approved material or equipment. If the "approval" is not listed in the addendum, then the "approval" is not accepted.

L. Refer to Article 15:

1. The General Contractor shall be solely responsible for all requirements under this Article.

M. Refer to Article 16, INSPECTION OF WORK:

1. Amend Paragraph “A”, General; paragraph (3) as follows:

a. “The Architect will inspect the Work as a representative of the Owner.”

2. DELETE Paragraph “D”, INSPECTIONS BY THE DCM PROJECT INSPECTOR, in its entirety.

N. Refer to Article 24, RESOLUTION OF CLAIMS AND DISPUTES:

1. Amend Paragraph “C”, GOOD FAITH EFFORT TO SETTLE as follows:

    a. “The Contractor and Owner agree that, upon the assertion of a Claim by the other, they will make a good faith effort, with the Architect’s assistance and advice, to achieve mutual resolution of the Claim. If mutually agreed, the Contractor and Owner may endeavor to resolve a Claim through mediation. If efforts to settle are not successful, the Claim shall be resolved in accordance with paragraph E below.”

2. DELETE Paragraph “D”, FINAL RESOLUTION FOR STATE FUNDED CONTRACTS, in its entirety.

3. Amend Paragraph “E”, FINAL RESOLUTION FOR LOCALLY FUNDED CONTRACTS as follows:

    a. “If the Contract is funded in whole with funds provided by a city or county board of education or other local governmental authority and the Contract Documents do not stipulate a binding alternative dispute resolution method, the final resolution of Claims and Disputes which cannot be resolved by the Contractor (or its Surety) and Owner may be by any legal remedy available to the parties. Alternatively, upon the written agreement of the Contractor (or its Surety) and the Owner, final Resolution of Claims and Disputes may be by submission to binding arbitration before a neutral arbitrator or panel.”

O. <u>Refer to Article 29, PROGRESS PAYMENTS,</u> paragraph “B”, Schedule of Values:

1. Amend Paragraph as follows:

    a. “Within ten days after receiving the Notice to Proceed the contractor shall submit to the Architect a DCM Form C-10SOV, Schedule of Values, which is a breakdown of the Contract Sum showing the value ‘**and category of Work with Subcontractor name(s)’** of the various parts of the Work for billing purposes.”

2. Add the following:

    a. The Contractor shall list the Category of Work with the Subcontractor name(s) attributable to each line item value in the column “B”, “Description of Work” line(s) of the DCM Form C-10SOV, Schedule of Values.

3. Add the following:

    a. Values shall be broken down within principal contracts in amounts not greater than $30,000, but in no case greater than 5 percent of the Contract Sum.

P. <u>Refer to Article 32, SUBSTANTIAL COMPLETION</u>

1. Add the following:

    a. All manufacturers’ warranties shall commence on the date as set forth on the Substantial Completion Form, no exceptions.

    b. Contractor shall furnish to the Architect a written letter of “notification” that all “Punch List” items have been completed prior to re-inspection.

2. Amend paragraph (4) as follows:

    a. “If the Work or designated portion covered by a Certificate of Substantial Completion includes roofing work, the General Contractor’s (5-year) Roofing Guarantee, DCM Form C-9, must be executed by the Contractor and attached to the Certificate of Substantial Completion. If the Contract Documents specify any other roofing warranties to be provided by the roofing manufacturer, Subcontractor, or Contractor, they must also be attached to the Certificate of Substantial Completion. The Architect/Owner will not sign the Certificate of Substantial Completion in the absence of the roofing guarantees.”

Q. <u>Refer to Article 35</u>, paragraph “D”, Special Warranties:

1. Change as follows:

a. The Contractor shall deliver to the Owner through the Architect all special or extended warranties required by the Contract Documents from the Contractor, Subcontractors, and suppliers.

R. Refer to Article 37:

1. The Architect shall not be liable for any damage or injury to property or any person or persons arising from the presence of/or effects of any hazardous materials or hazardous elements in any state of form in connection with the work under this Contract. All such liability shall lie with the Contractor.

S. Refer to Article 38, Performance and Payment Bonds:

1. Add Subparagraph F - Cost Submission Requirements as follows:

F. Cost Submission Requirements

The Contractor must provide the **total cost** for each of the following divisions:

- Civil
- Plumbing
- Mechanical
- Electrical

Include the **Architectural Project Name and Number** and the requested costs in **one consolidated document**. Please submit all requested information promptly to avoid delays

T. Refer to Article 44;

1. Add the following: All work on this project shall be performed in accordance with the following codes:
   a. 2010 ADA Standards For Accessible Design
   b. 2021 International Building Code
   c. 2021 International Plumbing Code
   d. 2021 International Mechanical Code
   e. 2021 International Fuel Gas Code
   f. 2021 International Fire Code
   g. 2020 National Electrical Code
   h. 2019 National Fire Alarm and Signaling Code
   i. ANSI/ASHRAE/IESNA Standard 90.1-2013 Energy Standard for Buildings Except Low-Rise Residential

U. Refer to Article 49:

1. Liquidated damages will be assessed at a rate of 6% per annum.
2. If this contract extends thirty (30) days past Schedule Completion Date, Owner shall deduct from the Contractor's final payment, a sum equal to the additional expense incurred by the Owner for the Architect for contract administration past scheduled completion date.

END OF SECTION

State of Alabama

Disclosure Statement

(Required by Act 2001-955)

ENTITY COMPLETING FORM

ADDRESS

CITY, STATE, ZIP

TELEPHONE NUMBER ( )

STATE AGENCY/DEPARTMENT THAT WILL RECEIVE GOODS, SERVICES, OR IS RESPONSIBLE FOR GRANT AWARD

ADDRESS

CITY, STATE, ZIP

TELEPHONE NUMBER ( )

This form is provided with:

☐ Contract ☐ Proposal ☐ Request for Proposal ☐ Invitation to Bid ☐ Grant Proposal

Have you or any of your partners, divisions, or any related business units previously performed work or provided goods to any State Agency/Department in the current or last fiscal year?

☐ Yes ☐ No

If yes, identify below the State Agency/Department that received the goods or services, the type(s) of goods or services previously provided, and the amount received for the provision of such goods or services.

STATE AGENCY/DEPARTMENT	TYPE OF GOODS/SERVICES	AMOUNT RECEIVED

Have you or any of your partners, divisions, or any related business units previously applied and received any grants from any State Agency/Department in the current or last fiscal year?

☐ Yes ☐ No

If yes, identify the State Agency/Department that awarded the grant, the date such grant was awarded, and the amount of the grant.

STATE AGENCY/DEPARTMENT	DATE GRANT AWARDED	AMOUNT OF GRANT

1. List below the name(s) and address(es) of all public officials/public employees with whom you, members of your immediate family, or any of your employees have a family relationship and who may directly personally benefit financially from the proposed transaction. Identify the State Department/Agency for which the public officials/public employees work. (Attach additional sheets if necessary.)

NAME OF PUBLIC OFFICIAL/EMPLOYEE	ADDRESS	STATE DEPARTMENT/AGENCY

OVER

2. List below the name(s) and address(es) of all family members of public officials/public employees with whom you, members of your immediate family, or any of your employees have a family relationship and who may directly personally benefit financially from the proposed transaction. Identify the public officials/public employees and State Department/Agency for which the public officials/public employees work. (Attach additional sheets if necessary.)

NAME OF FAMILY MEMBER	ADDRESS	NAME OF PUBLIC OFFICIAL/ PUBLIC EMPLOYEE	STATE DEPARTMENT/ AGENCY WHERE EMPLOYED

If you identified individuals in items one and/or two above, describe in detail below the direct financial benefit to be gained by the public officials, public employees, and/or their family members as the result of the contract, proposal, request for proposal, invitation to bid, or grant proposal. (Attach additional sheets if necessary.)

Describe in detail below any indirect financial benefits to be gained by any public official, public employee, and/or family members of the public official or public employee as the result of the contract, proposal, request for proposal, invitation to bid, or grant proposal. (Attach additional sheets if necessary.)

List below the name(s) and address(es) of all paid consultants and/or lobbyists utilized to obtain the contract, proposal, request for proposal, invitation to bid, or grant proposal:

NAME OF PAID CONSULTANT/LOBBYIST	ADDRESS

By signing below, I certify under oath and penalty of perjury that all statements on or attached to this form are true and correct to the best of my knowledge. I further understand that a civil penalty of ten percent (10%) of the amount of the transaction, not to exceed $10,000.00, is applied for knowingly providing incorrect or misleading information.

Signature Date

Notary's Signature Date Date Notary Expires

Act 2001-955 requires the disclosure statement to be completed and filed with all proposals, bids, contracts, or grant proposals to the State of Alabama in excess of $5,000.

STATE OF ALABAMA
DEPARTMENT OF FINANCE
REAL PROPERTY MANAGEMENT
Division of Construction Management

Kay Ivey
Governor

Bill Poole
Director of Finance

P.O. Box 301150, Montgomery, AL 36130-1150
770 Washington Avenue, Suite 444, Montgomery, AL 36104
Telephone: (334) 242-4082 Fax: (334) 242-4182

Mickey Allen
Assistant Finance Director
Real Property Management

Frank Barnes, Director
Construction Management

E-Verify Memorandum of Understanding

Instructions for inclusion in project manuals.

Per DCM's May 29, 2012 bulletin *Guidance on Act 2012-491 Amending the Alabama Immigration Law*: "Contractors (including architects and engineers) will … be required to enroll in the E-Verify program and to provide documentation of enrollment in the E-Verify program with their contracts or agreements."

Upon completing enrollment in the E-Verify program available at https://www.e-verify.gov/employers/enrolling-in-e-verify, an E-Verify Memorandum of Understanding (MOU) is issued to the enrolled business. The same E-Verify MOU can be repeatedly used until any information in the business's E-Verify user profile is updated, at which time E-Verify updates the printable Company Information section of the MOU, while the original signatory information remains the same. Typically, an E-Verify MOU is 13-18 pages long depending on business type and number of employees.

DCM requires a copy of the entire current E-Verify MOU document including the completed Department of Homeland Security – Verification Division section (with name, signature and date included) to be submitted as an attachment to each Construction Contract original and to each Agreement Between Owner and Architect original.

LATHAN · McKEE
ARCHITECTS

Supplemental E-Verify Memorandum of Understanding

Contractors (including architects and engineers) will be required to enroll in the E-Verify program and to provide documentation of enrollment in the E-Verify program with their contracts or agreements per Alabama Immigration Law.

McKee and Associates Architects requires a copy of the entire current E-Verify MOU document including the completed Department of Homeland Security – Verification Division section (with name, signature and date included) to be submitted as an attachment to each Construction Contract original and to each Agreement Between Owner and Architect original.

Refer to State of Alabama E-Verify Memorandum of Understanding Instructions (Revised August 2021) with ABC Bulletin (May 29, 2012) and Revised Alabama Immigration Law Guidance for School Boards (Revised May 2012).

ST: EXC-01
11/23

ALABAMA DEPARTMENT OF REVENUE
SALES AND USE TAX DIVISION
P.O. Box 327710 • Montgomery, AL 36132-7710

Application For
Sales and Use Tax Certificate of Exemption

FOR GOVERNMENT ENTITY PROJECT

This Certificate of Exemption will be limited to purchases which qualify for an exemption of sales and use taxes pursuant to Rule No. 810-6-3-.77

PROJECT INFORMATION:

PROJECT NAME				PROJECT OWNER'S FEIN (EXEMPT ENTITY)
STREET ADDRESS OF PROJECT (CITY AND COUNTY INCLUDED)	**CITY**	**ZIP**	**COUNTY**	

APPLICANT'S INFORMATION:

RELATION: *(CHOOSE ONE)*

☐ Government Entity ☐ Statutorily Exempt Entity ☐ General Contractor ☐ Subcontractor

APPLICANT'S LEGAL NAME				FEIN
DBA				**CONSUMER'S USE TAX ACCOUNT NUMBER**
MAILING ADDRESS: STREET	**CITY**	**STATE**	**ZIP**	**COUNTY**

CONTACT PERSON	BUSINESS TELEPHONE NUMBER
	( )

EMAIL ADDRESS

PROJECT START DATE	PROJECT END DATE

WILL THE APPLICANT HAVE ANY SUBCONTRACTORS ON THIS JOB?	NAME OF PARTY TO THE CONTRACT
☐ Yes ☐ No If yes, please attach list.	

JOB DESCRIPTION

WILL ANY POLLUTION CONTROL EXEMPTION BE APPLICABLE?	ESTIMATED POLLUTION CONTROL COST
☐ Yes ☐ No	$

TOTAL PROJECT BID AMOUNT (APPLICANT'S PORTION OF PROJECT)	LABOR COST (APPLICANT'S PORTION OF PROJECT)	MATERIAL COST (APPLICANT'S PORTION OF PROJECT)
$	$	$

REVENUE DEPARTMENT USE ONLY

PENDING DOCUMENTATION / INFORMATION:

☐ GCL ☐ SBL ☐ Contract / NTP / LOI ☐ LOS ☐ Project Dates / Breakdown of Costs

Contact Dates: _____ Received Date: _____

_____ Forwarded for Denial: _____

PROJECT NAME	PROJECT OWNER'S FEIN (EXEMPT ENTITY)

FORM OF OWNERSHIP:

☐ Individual ☐ Partnership ☐ Corporation ☐ Multi member LLC ☐ Single member LLC ☐ Government Entity

If applicant is a corporation, a copy of the certified certificate of incorporation, amended certificate of incorporation, certificate of authority, or articles of incorporation should be attached. If the applicant is a limited liability company or a limited liability partnership, a copy of the certified articles of organization should be attached.

OWNERSHIP INFORMATION:

Corporations – give name, title, home address, and Social Security Number of each officer.

Partnerships – give name, home address, Social Security Number or FEIN of each partner.

Sole Proprietorships – give name, home address, Social Security Number of owner.

LLC – give name, home address, and Social Security Number or FEIN of each member.

LLP – give name, home address, and Social Security Number or FEIN of each partner.

NAME *(PLEASE PRINT)* _____ SIGNATURE _____

TITLE _____ DATE _____

REVENUE DEPARTMENT USE ONLY

PENDING OTHER:

☐ Government Entity ☐ General Contractor ☐ Not on LOS

Contact Dates: _____ Received Date: _____

_____ Forwarded for Denial: _____

Examiner's Remarks _____

Examiner _____ Date _____

Instructions For Preparation of Form ST: EXC-01
Sales and Use Tax Certificate of Exemption for Government Entity Project

NOTE: Exemption Certificates will be issued as of the project start date or the received date of the application. If, upon receipt of the application, the project has already commenced, the certificate will be issued as of the received date of the application. Any purchases made prior to the issuance of a certificate will not be exempt.

In order to expedite the processing of your application, please include the following documentation when submitting your application:

Exempt Entity:
1. Signed Application
2. Copy of Executed/Signed Contract, Letter of Intent, Notice of Award, and/or Notice to Proceed

General Contractor:
1. Signed Application
2. Copy of Executed/Signed Contract, Letter of Intent, Notice of Award, and/or Notice to Proceed
3. List of Subcontractors
4. Alabama Board of General Contractor's License
5. State/County Business License (usually obtained through county probate office)

Subcontractor:
1. Signed Application
2. Alabama Board of General Contractor's License
3. State/County Business License (usually obtained through county probate office)
4. List of Subcontractors (if any)

General contractors and subcontractors:
- Any additions and/or deletions to the list of subcontractors working on a project must be submitted to the Department within 30 days of occurrence.
- If an extension is needed for a project, please contact the Department of Revenue at the address, number, or email listed below. Extension requests should be submitted no more than 30 days after expiration date.
- Subcontractors Project Start Date should be the date they will begin working on the project and ordering materials

The application and required documentation may be mailed, faxed, or emailed to the following:

Fax: (334) 353-7867

Email: STContractorsExempt@revenue.alabama.gov

Mailing Address: ATTN: Contractor's Exemption
Alabama Department of Revenue
Sales & Use Tax Division
Room 4303
PO Box 327710
Montgomery, AL 36132-7710

Alabama Department of Finance
Real Property Management
Division of Construction Management
770 Washington Avenue, Suite 444
Montgomery, AL 36104
(334) 242-4082, inspections@rpm.alabama.gov

DCM Form B-8
Revised October 2025

PRE-CONSTRUCTION CONFERENCE CHECKLIST

The following are recommended topics to be covered during the required Pre-Construction Conference. Contact the DCM Project Inspector via DCM's Engage Portal at least fourteen (14) days prior to scheduling the conference.

**Shall be discussed while owner is present*

	*1. Name and relationship to job of local Owner personnel
	2. Public officials involved
	3. Names of architect/engineer personnel involved
	4. Provide e-mail addresses on Pre-Construction Sign-in sheet
	5. Construction sets of plans available to contractor
	6. Verify alternates accepted, etc.
	7. Approved list of sub-contractors
	*8. Point of contact for project. Project Manager _____ Job Superintendent _____
	9. Approved cost breakdown (DCM Form C-10SOV) & Progress Schedule (DCM Form C-11)
	*10. Method of approving monthly payment requests • All State Agency, PSCA-funded University, and PSCA-funded K-12 projects: payment applications must be submitted via DocuSign PowerForm links available from DCM's Engage Portal. • Fully locally-funded University and fully locally-funded K-12 projects: submit payment applications per Owner requirements.
	*11. Time Extensions
	*12. Overall phasing of job
	13. Project limits
	14. Shop drawings, time to process
	*15. Sales tax savings (Alabama Department of Revenue)
	*16. Project sign and other job signs
	17. ADEM permit, if more than one acre of land is disturbed. • Coordinate offsite storm water drainage with the authority having jurisdiction when applicable.
	18. DCM Inspection Minimum Requirements.
	19. Advance notice for required DCM inspections The contractor will notify the architect by email of the date the project will be ready for an inspection by the Division of Construction Management. Inspections must be requested via DCM's Engage Portal 14 days in advance. When the DCM Inspector confirms the inspection date and time, the architect will send an email confirming the inspection date and time to all parties as well as a copy to inspections@rpm.alabama.gov. An Outlook calendar invite is also suggested for all inspections. Cancellations of any scheduled inspection must be received in writing no later than 48 hours prior to the scheduled inspection. If the inspection is canceled, it will be rescheduled subject to the DCM Inspector's availability. Cancellations received less than 48 hours in advance shall incur a $1,500.00 re-inspection fee. If the project is not ready for the scheduled inspection, the General Contractor shall incur a $1,500.00 re-inspection fee.

20. Pre-Construction Conference: Required Attendees: DCM Inspector, Contractor, Owner, Architect, Major Subs
    - Fully-executed construction contract and Notice to Proceed
    - Verification of permit fee payment (Exception: fully locally-funded K-12 & public four-year University capital improvement, HVAC, or roof projects with an estimated cost of $750,000.00 or Less, are exempt from DCM Fees.)
    - Fire alarm contractor and fire sprinkler contractor certification (from State Fire Marshal)
    - ADEM permit, if more than one acre of land is disturbed.
    - The General Contractor to perform and furnish all work, labor, services, supervision, materials, equipment, tools, scaffolds, appliances, insurance, taxes, and other things necessary to complete the work in strict accordance with all plans, specifications, and GENERAL CONDITIONS. The Contractor shall be liable for any omissions in contractors bid proposal or any other interpretations made by contractor. All items of Work related to each are to be provided so that no gaps, omissions, or conflicts arise that prevents a complete and functioning result.
    - Contractor's duty to coordinate work of separate contractors.

21. Pre-Construction Conference for Storm Shelter: Required Attendees: DCM Inspector, Contractor, Owner, Architect, Structural Engineer, Major Subs, Special Inspections Representative
    - The completed & signed DCM Form B-15: Owner's Statement of Responsibility for Tornado Storm Shelter (Hurricane Shelter Where Applicable) must be submitted to the DCM Inspector at Pre-Construction Conference. Must be kept with Owner's storm shelter records.
    - The completed & signed DCM Form C-17: Contractor's Statement of Responsibility for Construction of Tornado Storm Shelter (Hurricane Shelter Where Applicable) along with required Quality Assurance Plan (QAP) must be submitted to DCM Inspector at Pre-Construction Conference.
    - The completed and signed DCM Form B-14: Certification of Structural Observations from the Structural Engineer of Record must be attached to the Certificate of Substantial Completion form via DocuSign link available from DCM's Engage Portal.
    - Storm Shelter Impact-protective systems Listing and labeling: Impact-protective systems shall be listed and labeled.
      Marking: The following function and performance characteristics shall be provided on the label for each impact protective system tested:
      1. Manufacturer’s identification reference or listing number for the assembly.
      2. Type of impact-protective system, such as window assembly, door assembly shutter assembly or louver.
      3. Hazard: hurricane, tornado, or both.
      4. Missile weight and speed.
      5. Design wind pressure.
      6. Edition of ICC 500.

22. Pre-Roofing Conference: Required Attendees: DCM Inspector, Contractor, Owner, Architect, Roofing Sub, Roofing Manufacturer’s Representative
    - This conference shall be conducted by the design professional as described in Chapter 5, Section C.4 of the DCM Manual of Procedures.
    - Roofing submittals must be approved by the architect prior to pre-roofing conference.
    - Roofing manufacturer must provide documentation that roof design and roofing materials meet code requirements for wind uplift and impact resistance.
    - Copy of sample roof warranty – Note: Standard manufacturer's roofing guarantees which contain language regarding the governing of the guarantee by any state other than the State of Alabama, must be amended to exclude such language, and substituting the requirement that the Laws of the State of Alabama shall govern all such guarantees.
    - Contractor shall video existing building interior and exterior prior to roofing operations and provide copy to owner.
    - General Contractor’s Roofing Guarantee and Manufacturer’s Roofing Warrantees must be presented to DCM Inspector at Final Inspection and submitted with Certificate of Substantial Completion for all projects via DocuSign PowerForm links available from DCM’s Engage Portal.

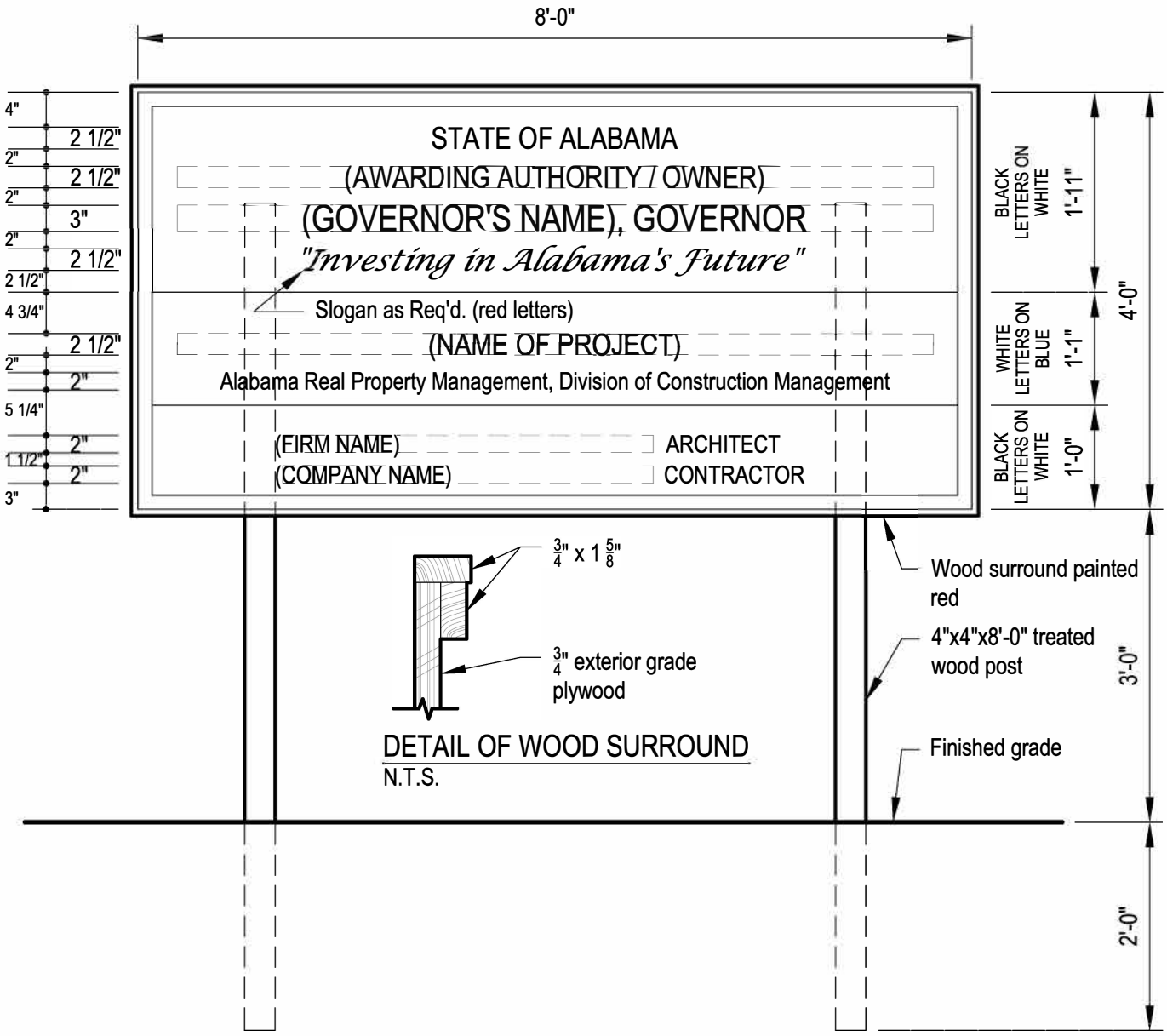
	23. Above Ceiling Inspections: Required Attendees: DCM Inspector, Contractor, Owner, Architect, MEP Engineers, Major Subs • All work must be completed except for installation of ceiling tiles, and/or hard ceilings. • Space must be conditioned. • Permanent power must be connected unless otherwise arranged with the DCM Inspector. • Grease duct must be inspected and approved by the DCM Inspector prior to fire wrapping and above-ceiling inspection.
	24. Life Safety Inspections and Final Inspection: Required Attendees: DCM Inspector, Contractor, Owner, Architect, Engineers, Major Subs, Local Fire Marshal • Fire alarm certification • Kitchen hood fire suppression system certification • General contractor's 5-year roofing guarantee (DCM Form C-9) • Roofing manufacturer's warranty • Above ground and below ground sprinkler certifications • Completed certificate of structural engineer's observations (for storm shelter) • Emergency and exit lighting tests. • Fire alarm must be monitored. • Elevator inspection completed and certificate of operation provided by the State of Alabama Department of Labor • Boiler/vessels inspection completed, and certificate of operation provided by the State of Alabama Department of Labor • Pressure test/Flush test for underground sprinkler lines (witnessed by local fire marshal, fire chief and/or DCM Inspector) • Flush/pressure test for new and/or existing fire hydrants • Must have clear egress/access and emergency (for first responders) access to building • Must have ADA access completed. • Comply with ADA requirements: plumbing fixture heights, toilet partition widths, turnaround, signage, parking lot striping and signage, etc. • Emergency Responder Radio Coverage
	25. Year-End Inspection: Required Attendees: DCM Inspector, Contractor, Owner, Architect, Engineers and/or Major Subs may be required. • Owner's list of documented warranty items • Reconciliation of user fees with DCM shall be completed prior to inspection
	26. Other inspections required before work is covered
	27. Third-party inspections/special inspections. Structural components, Roofing, Geotechnical, Commissioning, lab tests, etc.
	28. Procedure if bad soil or rock is encountered: Geotech and special inspections
	29. Inspection report distribution – weekly per Owner-Architect Agreement. All site inspections and observations are to be recorded and transmitted to the DCM Inspector via DCM's Engage Portal. The design professional must also concisely report any deficiencies encountered, problems or questions raised by the contractor, instructions or answers given to the contractor, and administrative or construction delays observed. The design professional must endeavor to write his or her reports utilizing descriptions of components and areas that are consistent with descriptions contained in the plans and specifications so that the "third-party reader" can understand what is being discussed and where it is located in the project. Photographs may be included for clarity. Keep photos to a minimum. Each report shall also be distributed by the design professional to the Owner and contractor promptly after conducting an inspection so that all parties are kept current regarding events on the project.
	30. Ready mix plant, file delivery tickets, slump tests, cylinders. Quality of concrete work; concrete testing
	31. Light gauge metal roof framing and/or wood truss framing to be inspected by the structural engineer.

	32. Record Drawings and As-Built Drawings: Contractor will maintain a set of drawings designated solely for As-Built Drawings to satisfy its closeout requirements. Contractor/Subcontractor shall, on a weekly basis, record all changes, revisions, modifications, additions, etc. to accurately reflect its completed work.
	33. Protection Of the Work: The General Contractor shall carefully secure and protect the work and all materials, equipment, or work of Sub-Contractors and others in the vicinity of the work and shall be liable for any loss or damage that results from Contractor`s failure to do so.
	*34. Use of site and existing building, access drive, signs
	*35. Conduct of contractor's personnel: No interaction with staff and/or students. No foul language, no smoking or use of tobacco products, no drugs, and no firearms on school property.
	*36. Use of existing toilets
	*37. Coordinate any utilities supplied by Owner
	*38. Coordinate outages and work in existing building with Owner
	*39. Keeping existing exit paths open
	*40. Routine job clean-up to be perform daily. Clean-up areas where work is performed including paths of access/egress utilized by Contractor's personnel and equipment. All generated waste and debris will be placed in dumpsters or other containment boxes.
	41. O.S.H.A. - Report all accidents - safety General Contractor's responsibility
	42. Contractor is reminded of obligation to comply with the Alabama Child Labor Law and E-Verify
	43. Building location relative to critical property line, easement, setback, etc.
	44. Surveyor to check foundation wall if location critical
	45. Verify sanitary outfall before committing floor level
	46. Stockpiling topsoil
	47. Protecting trees
	48. Soil Treatment, mix on site in presence of Job Superintendent
	49. What is expected of masonry work, mortar additive
	50. Problems with hollow metal - install proper fire labels
	51. Potential conflict of mechanical and electrical equipment; shop drawings
	52. Return air plenums (no combustibles)
	53. Fire damper installation issues
	54. Kraft-faced insulation is not to be installed exposed.
	55. Coordinate with local fire authority to assure access to the building for firefighting equipment during construction and before final acceptance. Provide fire extinguishers as required.
	56. Comply with fire hydrant requirement; coordinate with local Fire Authority or State Fire Marshal.
	*57. Certificate of Substantial Completion/Final Inspection All projects: Certificate must be activated via DocuSign link after final inspection and receipt of DCM Inspector's report. The correct DocuSign link is available from DCM's Engage Portal.
	58. Release of retainage – 30 days to complete punch list and closeout
	*59. Project Closeout - precedes Final Payment a. Warranties b. Operating and Maintenance Manuals c. As-built Drawings d. Other requirements

	60. Advertisement of Completion - start ad after substantial completion a. for projects less than $100,000.00, Advertisement of Completion is not required. b. for projects $100,000.00 or more, Contractor advertises for 3 weeks. The contractor can publish a notice using one or more of the following methods: • In a newspaper of general circulation in the county or counties in which the work, or some portion thereof, has been done. • On a website that is maintained by a newspaper of general circulation in the county or counties in which the work, or some portion thereof, has been done. • On a website utilized by the awarding authority for publishing notices. • If no newspaper is published in the county in which the work was done, and if the awarding authority does not utilize a website for the purpose of publishing notices, the notice may be given by posting at the courthouse for 30 days, and proof of the posting of the notice shall be given by the awarding authority and the contractor.

DETAIL OF PROJECT SIGN

N.T.S.



DETAIL OF WOOD SURROUND

N.T.S.

Notes:

1. Fully locally-funded State Agency and Public University projects: DCM Form C-15 must be included in the project manual regardless of expected bid amount. If the awarded contract sum is $100,000.00 or more, Contractor shall furnish and erect a project sign.
   Fully locally-funded K-12 school projects: Project sign is not required unless requested by Owner, if project sign is requested by Owner, include DCM Form C-15 in the project manual.
   Partially or fully PSCA-funded projects: DCM Form C-15 must be included in the project manual. Contractor shall furnish and erect a project sign for all PSCA-funded projects, regardless of contract sum. "Alabama Public School and College Authority " as well as the local owner entity must be included as awarding authorities on the project sign of all PSCA-funded projects. Exception: Alabama Community College System (ACCS) PSCA-funded projects with Notice-To-Proceeds issued after July 31, 2021 are not submitted to DCM.
   Fully locally-funded ACCS projects with Notice-To-Proceeds issued prior to August 1, 2021: DCM Form C-15 must be included in the project manual regardless of expected bid amount. If the awarded contract sum is $100,000.00 or more, Contractor shall furnish and erect a project sign.
2. Sign to be constructed of ¾" exterior grade plywood.
3. Paint with two coats best grade exterior paint before letters are painted. Option: In lieu of painted lettering on plywood, a corrugated plastic sign (displaying the same lettering, layout and colors as above) may be secured directly to the unpainted exterior grade plywood.
4. Sign shall be placed in a prominent location and easily readable from existing street or roadway.
5. Sign shall be maintained in good condition until project completion.
6. Slogan: Act 2020-167's title *"Investing In Alabama's Future"* should be placed on the project signs of all PSCA-funded projects, otherwise the Awarding Authority/Owner's slogan, if any, should be used. If the Awarding Authority/Owner of a fully locally-funded project does not have a slogan, the project sign does not require a slogan.

DCM Form C-10
Revised July 2022

DCM (BC) No. _____

PSCA Projects: PSCA No. _____

Application No. _____

Date: _____

APPLICATION and CERTIFICATE for PAYMENT

Attach DCM Form C-10SOV: Schedule of Values

TO OWNER: Entity Name: Address:	PROJECT:
FROM CONTRACTOR: Company Name & Address, which must exactly match co. name & payment address spelling as registered in State of AL Accounting & Resource System (STAARS) or AL Buys to avoid rejection: STAARS or AL Buys Vendor #:	ARCHITECT / ENGINEER: Firm Name: Address:

A. Total Original Contract	$
B. Fully Executed (fully signed) Change Order(s) Numbers __ through __	+$ _____
C. Total Contract To Date	$

1. Work Completed to Date per attached Schedule of Values *(Form C-10SOV's Column F Total)*		$
2. Materials Presently Stored *(When this amount is greater than $0.00, attach Form C-10SM: Inventory of Stored Materials, or similar list)*		+$ _____
3. Total Work Completed to Date & Materials Presently Stored *(_____% of Contract To Date)*		$
4. Less Retainage *(If Total Work Completed to Date & Materials Presently Stored (#3) is less than or equal to 50% of Total Contract to Date (C), Retainage = #3 x 0.05. Once #3 exceeds 50% of C and up until project is complete, Retainage = C x 0.025. $0 is retained on final payment application, see last bullet point below Instructions.)*	Final pay app? ☐ Yes.	−$ _____
5. Total Due		$
6. Less Total Previous Payments Billed *(Must exactly match #5 Total Due from previous payment application. # 6 is $0.00 if there is no previous payment application)*		−$ _____
7. Balance Due This Estimate		$

CONTRACTOR'S CERTIFICATION

The undersigned Contractor certifies that to the best of his knowledge, information, and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by him for Work for which previous Certificates for Payments were issued and payments received from the Owner and that current payment shown herein has not yet been received.

By: _____ Date: _____
Contractor's Signature

Name & Title _____

Sworn and subscribed before me this _____ day of _____
Day Month, Year

Seal:

_____
Notary Public's Signature

ARCHITECT'S / ENGINEER'S CERTIFICATION

In accordance with the Contract Documents, the Architect/ Engineer certifies to the Owner that, to the best of the Architect's/ Engineer's knowledge and belief, the Work has progressed to the point indicated herein, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the amount approved.

By _____
Architect's / Engineer's Signature

Name & Title _____

Date _____

INSTRUCTIONS

- PSCA-funded projects, and State Agency-owned projects: Two copies of pay. app., each with original signatures and all attachments required.
- Date of first payment application cannot precede the Notice to Proceed's Begin Date.
- Pay. app. must exactly match an attached DCM Form C-10SOV: Schedule of Values.
- A change order must be fully executed before inclusion on a payment application.
- Contractor's signature date cannot precede the payment application date.
- Contractor and Notary signee dates must match.
- Progress schedules must be included with non-final payment applications.
- One payment application per month may be submitted.
- On a final payment application, the following is required for release of retainage: all change orders must be fully executed (signed by all parties and approval authorities) and included in B., the Certificate of Substantial Completion for entire work is fully executed, and all other close-out requirements per General Conditions Article 34 are completed.

APPROVAL

_____
Owner Entity

By _____
Signature

Name & Title _____

Date _____

SCHEDULE OF VALUES (SOV)

DCM Form C-10SOV
Revised October 2021

Project:	DCM (BC) Project Number:
	PSCA Project Number, if any:
Contractor Company:	Application Number:
	Application Date:
	Period From: / Period To:

A	B	C	D	E	F	G	H	I	J
Item No.	Description of Work	Scheduled Value (including fully executed [signed by all parties] change order amounts)	Work Completed: Work Previously Completed (Previous pay app SOV's column F. D is $0 if this SOV is for first pay app.)	Work Completed: Work Completed This Period (Period as noted above)	Total Work Completed to Date (This application SOV's D + E)	Materials Presently Stored (G total greater than $0 must match C-10SM's column E total. This SOV's G amounts are not in this SOV's D nor E amounts.)	Total Work Completed to Date & Materials Presently Stored (This SOV's F + G)	Percent of Contract Completed to Date (This SOV's H / C)	Retainage (This column's Total's cell formula calculates the applicable variable rate)
1.					$ -		$ -		Retainage Variable Rate:
2.					$ -		$ -		
3.					$ -		$ -		
4.					$ -		$ -		If Total Work Completed to Date & Materials Presently Stored (H) is less than or equal to 50% of Total Scheduled Value (C), Retainage = H x 0.05.
5.					$ -		$ -		
6.					$ -		$ -		
7.					$ -		$ -		
8.					$ -		$ -		
9.					$ -		$ -		
10.					$ -		$ -		
11.					$ -		$ -		
12.					$ -		$ -		
13.					$ -		$ -		
14.					$ -		$ -		
15.					$ -		$ -		Once H exceeds 50% of C and up until project is complete, Retainage = C x 0.025.
16.					$ -		$ -		
17.					$ -		$ -		
18.					$ -		$ -		
19.					$ -		$ -		
20.					$ -		$ -		
21.					$ -		$ -		There will be no retainage on final payment application.
22.					$ -		$ -		
23.					$ -		$ -		
24.					$ -		$ -		
25.					$ -		$ -		
	TOTALS:	$ -	$ -	$ -	$ -	$ -	$ -		$ -
This pay app SOV's column totals must match amounts in this pay app Form C-10 per the following indicated Form C-10 line #s:		C.	None	None	1.	2.	3.	3.	4.

Note: If this SOV's column G: Materials Presently Stored includes any amounts other than $0, then DCM Form C-10SM: Inventory of Stored Materials with back-up receipts must be submitted as part of the payment application documentation.

INVENTORY OF STORED MATERIALS

DCM Form C-10SM
Revised October 2021

Project:	DCM (BC) No.:
	PSCA No, if any:
Contractor Company:	For Estimate No.:
	For Period Ending:

A	B	C	D	E
Description	**Materials Stored Last Period**	**Materials Purchased This Period (period noted above)**	**Materials Used This Period (period noted above)**	**Materials Presently Stored (B + C - D)**
TOTALS:				

Instructions :

· This Form C-10SM must be submitted as part of the payment application documentation when a Materials Presently Stored amount of anything greater than $0 is noted on line 2 of DCM Form C-10: Application and Certificate for Payment.

· Receipts must be provided as attachments to this form C-10SM for all amounts placed in Column C: Materials Purchased This Period.

· The total $ amount of this Form C-10SM's column E: Materials Presently Stored must match both Form C-10's line 2: Materials Presently Stored, and Form C-10SOV: Schedule of Values' total $ amount of Column G: Materials Presently Stored.

· The $ amounts in this current Form C-10SM's Column D: Materials Used This Period are amounts that must all be included in the current payment application's Form C-10SOV's Column E: Work Completed This Period.

· The $ amounts in this current Form C-10SM's Column E: Materials Presently Stored are the amounts that must be listed in the next payment application's Form C-10SM's Column B: Materials Stored Last Period.

SAMPLE PROGRESS SCHEDULE & REPORT	CONTRACTOR (Contractor may use own form in lieu of Form C-11):	DATE OF REPORT:
DCM (BC) No.:		
PSCA projects: PSCA No.:		PROCEED DATE:
PROJECT:	ARCHITECT/ENGINEER:	PROJECTED COMPLETION DATE:

	WORK DIVISION	%	AMOUNT													
1.	GENERAL REQUIREMENTS															
2.	SITEWORK															
3.	CONCRETE															
4.	MASONRY															
5.	METALS															
6.	WOOD AND PLASTIC															100%
7.	THERMAL AND MOISTURE PROTECTION															90%
8.	DOORS AND WINDOWS															80%
9.	FINISHES															70%
10.	SPECIALTIES															60%
11.	EQUIPMENT															50%
12.	FURNISHINGS															40%
13.	SPECIAL CONSTRUCTION															30%
14.	CONVEYING SYSTEMS															20%
15.	MECHANICAL															10%
16.	ELECTRICAL															0%
TOTAL ORIG. CONTRACT		100%														
ANTICIPATED DRAW IN $1,000																
ACTUAL DRAW IN $1,000																

LEGEND: ANTICIPATED ACTIVITY — ACTUAL ACTIVITY — ANTICIPATED CASH FLOW — ACTUAL CASH FLOW

USE ADDITIONAL SHEETS IF JOB IS SCHEDULED OVER 12 MONTHS.

DCM Form C-11 August 2021

TO: Alabama Department of Finance
Real Property Management
Division of Construction Management
770 Washington Avenue, Suite 444
Montgomery, AL 36104
(334) 242-4082 (ph), inspections@realproperty.alabama.gov

DCM Form B-10
August 2021

STATEMENT OF FIELD OBSERVATIONS

Date: _____

DCM (BC) #	**PSCA #**
PROJECT NAME AND LOCATION:	**OWNER ENTITY NAME & ADDRESS:** **Phone No.**
CONTRACTOR COMPANY NAME & ADDRESS: **Phone No.**	**ARCHITECTURAL/ENGINEERING FIRM NAME & ADDRESS:** **Phone No.**

PROJECT DATA ON THE DATE OF OBSERVATION: No. of Workers _____

Site Conditions _____ Weather _____

Starting Date _____ Contract Completion Date _____

Scheduled State of Completion _____% Estimated Actual Completion _____%

Contractor's Superintendent _____ Job Phone # _____

COMMENTS / DEFICIENCIES:

Signature _____ **Report No.** _____

cc: Owner, Architect/Engineer, Contractor, DCM Office (inspections@realproperty.alabama.gov)**, DCM Inspector**

Alabama Department of Finance
Real Property Management
Division of Construction Management
770 Washington Avenue, Suite 444
Montgomery, Alabama 36104
(334) 242-4082 (phone)

DCM Form B-12
Revised July 2022

CHANGE ORDER CHECKLIST

For use with DCM Form C-12 and DCM Form 9-J

WHICH FORM DO YOU USE?

Use **DCM Form C-12** for contracts of state agencies and departments and State Department of Education (SDE) projects. Also use for ACCS projects with Notice-to-Proceeds issued prior to August 1, 2021.
Use **DCM Form 9-J** for contracts of projects partially or fully Public School and College Authority (PSCA)-funded, except for ACCS projects with Notice-To-Proceeds issued after July 31, 2021. Include a completed **DCM Form B-11:** Change Order Justification with each copy of either DCM Forms C-12 or 9-J.

Verify that the following information is inserted in the spaces provided on the CONTRACT CHANGE ORDER form, or attached to the form where attachments are noted to be acceptable or obviously necessary. Do not staple forms; use clips.

1.	**CHANGE ORDER NUMBER:** Insert current change order number.
2.	**DATE:** Insert date.
3.	**DCM (BC) PROJECT NUMBER:** Insert DCM Project Number in the block provided at top of document.
4.	**CONTRACTOR** Insert name and address of the Contractor, exactly as they appear on the Construction Contract.
5.	**NAME OF PROJECT:** Under "Project", insert the complete name of the project as identified in the bid documents. If using DCM Form 9-J, insert the PSCA Project Number in the space provided.
6.	**CONTRACTOR'S PROPOSALS:** Under "TERMS", identify the change order proposals submitted by the contractor that are being addressed by the Contract Change Order. Identify these proposals by inserting their dates.
7.	**DESCRIPTION OF THE CHANGE(S) IN WORK:** Fully describe the change or changes to the original contract work for which the Construction Contract is being modified. This description should be written so that a reader of the document who is not directly involved in the project can understand what is being changed. If the space provided on the form is inadequate for such a description, use attachments and cite them.
8.	**CONTRACT AND CHANGE ORDER AMOUNTS:** Insert the applicable dollar amounts to record the original contract sum, change orders, and the currently revised contract sum.
9.	**EXTENSION OF TIME:** If the Contract Time is being extended by the Contract Change Order, insert appropriate number of **calendar days** in the space provided. If the Contract Time is not being extended, insert "NONE".
10.	**RESPONSIBILITY FOR CHANGE ORDER FUNDING - DCM Form 9-J ONLY:** The authority responsible for funding the change order is to be identified in the following sentence in the form,: "The amount of this Change Order will be the responsibility of _____." Insert whichever is appropriate: (1) "PSCA", (2) name of LEA, or (3) "PSCA" and name of LEA.
11.	**SIGNATURES:** The signature spaces for State Agency, PSCA and fully locally-funded Alabama Community College System projects are different from each other. Download the appropriate document per Owner/project type from www.dcm.alabama.gov/forms.aspx. Before submitting a Contract Change Order to DCM, the document must be signed by the contractor, surety (for additive change orders only), design professional and owner (local owner or using agency). Signature by the surety is not necessary on deductive change orders or change orders involving only extensions of time. If the cumulative change order amount exceeds 10% of the original contract amount then the Owner's legal consultant must sign DCM Form B-11: Change Order Justification.
12.	**ATTACHMENTS:** To each of the three (3) copies (with original signatures) of the Contract Change Order form, attach with clips (do not staple): a. Contractor's change order proposals and/or invoices providing a detailed breakdown of change order costs. General Contractors (GC) must include subcontractors' (sub) quotes as backup. All GC and sub quotes must be broken down by labor (hours and rates), materials including quantities and unit prices (with receipts or quotes attached), equipment whether rented or owned (with receipts or quotes attached), and Overhead & Profit (OH&P). 1. Total OH&P can be a maximum of 25% divided between GC and subs; GC can have a maximum of 15% OH&P (in which case a sub could have up to 10% OH&P). See General Conditions- Article #19. 2. Sales tax cannot be included in change orders. 3. Deductive change orders also require backup including breakdown of labor and material, and must also deduct OH&P if included in original bid. Include specification section regarding allowances. b. **POWER OF ATTORNEY** for the individual signing the Contract Change Order for the surety. c. **DCM Form B-11, CHANGE ORDER JUSTIFICATION:** completed and signed by the design professional and owner.

This form is provided solely for the purpose of inclusion in the project manual. A Construction Contract for fully locally-funded K-12 projects must be initiated via the appropriate DocuSign link from DCM's Engage Portal at https://engagealabamarpm.facilityforce.cloud by the Lead Design Professional Firm.

DCM Form C-12 (fully locally-funded K-12 school project)
revised October 2024
A Change Order is not valid without an accompanying completed Change Order Justification (DCM Form B-11).

CONTRACT CHANGE ORDER

Change Order No. _____ **Date** _____ **DCM (BC) No.** _____

TO: (*Contractor*) Co. Name: Address:	**PROJECT:**

TERMS: You are hereby authorized, subject to the provisions of your Contract for this project, to make the following changes thereto in accordance with your proposal(s) dated _____

_____.

FURNISH the necessary labor, materials, and equipment to (*Description of work to be done or changes to be made. If the description is continued in an attachment, identify the attachment below; only use an attachment if fields below become full.):*

Description continued from Page 1:

ORIGINAL CONTRACT SUM $ _____

NET TOTAL OF PREVIOUS CHANGE ORDERS $ _____

PREVIOUS REVISED CONTRACT SUM $ _____

THIS CHANGE ORDER WILL INCREASE DECREASE THE CONTRACT SUM BY $ _____

REVISED CONTRACT SUM, INCLUDING THIS CHANGE ORDER $ _____

EXTENSION OF TIME resulting from this Change Order None *or* _____ Calendar days.

The Owner does hereby certify that this Change Order was executed in accordance with the provisions of Title 39, Code of Alabama, 1975, as amended.

_____
Architectural/Engineering Firm

Recommended By _____

Name & Title _____

APPROVAL

ALABAMA STATE DEPARTMENT OF EDUCATION (SDE)

(Required for locally-funded, SDE projects.)

By _____ Date: _____
State Superintendent of Education

CONTRACTING PARTIES

_____
Contractor Company

By _____

Name & Title _____

_____
Awarding Authority/Owner Entity

By _____

Name & Title _____

CONSENT OF SURETY (for additive $ change orders only)

_____
Surety Company

By _____
(Attach current Power of Attorney)

Name & Title _____

Routing of the Construction Contract to reviewers and e-signers is automated through DocuSign. DocuSign links for fully locally-funded contract documents are available from DCM's Engage Portal at https://engagealabama-rpm.facilityforce.cloud

TO: **Alabama Department of Finance**
Real Property Management
Division of Construction Management
770 Washington Avenue, Suite 444
Montgomery, Alabama 36104
(334) 242-4082 FAX (334) 242-4182

CHANGE ORDER JUSTIFICATION

Purpose and instructions on next page.
Do not staple this form and/or attachments; use clips.

Change Order No. _____

Date: _____

DCM (BC) No. _____

(A)

PROJECT NAME & LOCATION:	OWNER ENTITY NAME & ADDRESS:
CONTRACTOR COMPANY NAME & ADDRESS:	ARCHITECTURAL / ENGINEERING FIRM NAME & ADDRESS:

(B) **DESCRIPTION OF PROPOSED CHANGE(S):** **ATTACH CONTRACTOR'S DETAILED COST PROPOSAL(s)**

AMOUNT: ☐ **ADD** ☐ **DEDUCT $_____** **TIME EXTENSION: _____ CALENDAR DAYS**

(C)

ORIGINAL CONTRACT AMOUNT		PREVIOUS C.O.'s _____ THRU _____		CONTRACT AMOUNT PRIOR TO PROPOSED CHANGE ORDER
$_____	+	$_____	=	$_____

(D) **JUSTIFICATION FOR NEED OF CHANGE(S):**

(E) **JUSTIFICATION OF CHANGE ORDER vs. COMPETITIVE BID:**

(F) **ARCHITECT / ENGINEER'S EVALUATION OF PROPOSED COST:**

(G)

CHANGE ORDER RECOMMENDED	CHANGE ORDER JUSTIFIED AND APPROVED
_____ ARCHITECTURAL / ENGINEERING FIRM NAME	_____ LOCAL OWNER ENTITY NAME
By: _____ ARCHITECT / ENGINEER'S SIGNATURE	By: _____ OWNER'S SIGNATURE
By: _____ OWNER'S PROJECT REPRESENTATIVE'S SIGNATURE	By: _____ OWNER'S LEGAL COUNSEL'S SIGNATURE

CHANGE ORDER JUSTIFICATION: PURPOSE and INSTRUCTIONS

PURPOSE

The awarding of work through an existing contract may potentially conflict with, or violate, the "Competitive Bid Laws" of the State of Alabama. **The determination of legality of Change Orders rests with the Awarding Authority and its legal advisor.** In a June 15, 1979, Opinion, the Office of the Attorney General offered guidelines for making such determinations in conjunction with considering the facts and merits of each situation. The purpose of the CHANGE ORDER JUSTIFICATION is to provide a means through which the Awarding Authority considers these guidelines and the intent of the "Competitive Bid Laws" when authorizing Change Orders. Pursuant to these guidelines, the following types of changes meet the criteria for awarding work through Change Orders in lieu of through the Competitive Bid process:

I. Minor Changes for a monetary value less than required for competitive bidding.

II. Changes for matters relatively minor and incidental to the original contract necessitated by unforeseeable circumstances arising during the course of the work.

III. Emergencies arising during the course of the work of the contract.

IV. Bid alternates provided for in the original bidding where there is no difference in price of the change order from the original best bid on the alternate.

V. Changes of relatively minor items not contemplated when the plans and specifications were prepared and the project was bid which are in the public interest and which do not exceed 10% of the contract price.

Under these guidelines the cumulative total of Change Orders, including any negotiations to bring the original contract price within the funds available, would become questionable if the total of such changes and negotiations exceed 10% of the original contract price. These guidelines are not intended to interfere with the Awarding Authority's good faith discretion to respond to specific situations in the public's best interest. If the cumulative change order amount exceeds 10% of the original contract amount then the Owner's legal consultant must sign the Change Order Justification prior to submission to the Division of Construction Management (DCM).

INSTRUCTIONS

The CHANGE ORDER JUSTIFICATION is to be prepared by the design professional, who has evaluated the fairness and reasonableness of the proposed cost of the change(s) and recommends that the proposed Change Order be executed. The fully executed Form B-11: CHANGE ORDER JUSTIFICATION must accompany the proposed DCM Form C-12: Change Order. Instructions for completing the B-11 form are:

1. Insert the proposed Change Order Number, date of the Justification, and DCM (BC) Project Number in the spaces provided in the upper right-hand corner.

2. **Section (A):** Insert the complete name and address of the PROJECT, OWNER, CONTRACTOR, AND ARCHITECT/ENGINEER.

3. **Section (B)**: Provide a complete description of the proposed changes in work, referring to and attaching revised specifications and/or drawings as appropriate. An attachment may be used if additional space is needed, but insert the proposed amount and time extension of the change(s) in the spaces provided. **Attached a copy of the contractor's detailed cost proposal.**

4. **Section (C**): Insert the Original Contract amount, the net increase or decrease of previous Change Orders, and the Current Contract amount (preceding the currently proposed Change Order).

5. **Section (D):** Explain why it is necessary, or in the public's interest, to make the proposed change(s) to the Work.

6. **Section (E)**: Explain why award of the changed work to the existing contractor instead of awarding the work under the competitive bid process is justified.

7. **Section (F)**: The design professional must state his evaluation of the reasonableness and fairness of the proposed costs based upon his review of the contractor's proposal.

8. **Section (G)**: The design professional must recommend the Change Order to the Owner by signing the document; the Owner may require such recommendation from other individuals. The Owner must sign the document indicating that they believe change order action in lieu of the competitive bid process is justified for the proposed change(s). **Review of the matter and signing of the document by the Owner's legal counsel is highly recommended. If the cumulative change order amount exceeds 10% of the original contract amount then the Owner's legal consultant must sign the Change Order Justification prior to submission to DCM.**

CHANGE PROPOSAL RECAP SHEET

Project Name : _____ Date : _____

Arch# Project Number : _____

Contractor Name : _____ Initiated By : Owner/Architect ☐

Reference Change Proposal Request Number : _____ (Check One) Contractor ☐

Subcontractor ☐

Brief Description of Proposed Change : _____

GENERAL CONTRACTOR Direct Cost Summary (Attach Supplemental Sheets as necessary)

Item / Description *	Quantity	Unit	Amount					
			Unit $	Material	Unit $	Labor	Unit $	Equipment
		Sub Totals :		$ -		$ -		$ -

Material :	$ -
Labor :	$ -
Equipment :	$ -
General Contractor Subtotal :	$ -

SUBCONTRACTOR Direct Cost Summary (Attach Supplemental Sheets as necessary)

Item / Description *	Quantity	Unit	Amount							
			Unit $	Material	Unit $	Labor	Unit $	Equipment	Unit $	Sub-sub
		Sub Totals :		$ -		$ -		$ -		$ -

Material :	$ -
Labor :	$ -
Equipment :	$ -
Sub-sub :	$ -
Subcontractor Subtotal :	$ -

UNIT PRICE Cost Summary (Attach Supplemental Sheets as necessary)

Item / Description *	Quantity	Unit	Amount	
			Unit $	Total Unit Price
		Sub Totals :		$ -

Unit Price Subtotal :	$ -

Mark-up Calculations

Subcontractors Subtotal :	$ -		
General Contractor Subtotal :	$ -		
Unit Price Subtotal :	$ -		
TOTAL Direct Cost :	$ -		
** General OH&P on Own Work :	$ -	15%	Amount not to exceed 15%, see Article 19 of the General Conditions
** Total OH&P on Sub Work :	$ -	25%	Amount not to exceed 25%, see Article 19 of the General Conditions

TOTAL COST CHANGE **$ -** Add ☐ Deduct ☐

*** **TOTAL TIME CHANGE** _____ Calendar Days (Critical paths impact only)

* Materials permanently installed in the building shall be sales tax free.

** "Overhead" shall cover the Contractor's indirect costs of the change, such as the cost of bonds, superintendent and other job office personnel, watchman, job office, job

office supplies and expenses, temporary facilities and utilities, and home office expenses.
*** Any requests for additional time are only considered if the critical path of the project is extended. Attach additional pages with explanation of how the change affects the critical path of the project.

GENERAL CONTRACTOR'S ROOFING GUARANTEE

DCM Project No. _____

Project Name & Address	Project Owner Entity(ies) Name(s) & Address(es)

General Contractor's Company Name, Address, & Telephone Number	**EFFECTIVE DATES OF GUARANTEE**
	Date of Acceptance:
	Date of Expiration:

1. The General Contractor does hereby certify that the roofing work included in this contract was installed in strict accordance with all requirements of the plans and specifications and in accordance with approved roofing manufacturers recommendations.

2. The General Contractor does hereby guarantee the roofing and associated work including but not limited to all flashing and counter flashing both composition and metal, roof decking and/or sheathing; all materials used as a roof substrate or insulation over which roof is applied; promenade decks or any other work on the surface of the roof; metal work; gravel stops and roof expansion joints to be absolutely watertight and free from all leaks, due to faulty or defective materials and workmanship for a period of five (5) years, starting on the date of substantial completion of the project. This guarantee does not include liability for damage to interior contents of building due to roof leaks, nor does it extend to any deficiency which was caused by the failure of work which the general contractor did not damage or did not accomplish or was not charged to accomplish.

3. Subject to the terms and conditions listed below, the General Contractor also guarantees that during the Guarantee Period he will, at his own cost and expense, make or cause to be made such repairs to, or replacements of said work, in accordance with the roofing manufacturers standards as are necessary to correct faulty and defective work and/or materials which may develop in the work including, but not limited to: blisters, delamination, exposed felts, ridges, wrinkles, splits, warped insulation and/or loose flashings, etc. in a manner pursuant to the total anticipated life of the roofing system and the best standards applicable to the particular roof type in value and in accordance with construction documents as are necessary to maintain said work in satisfactory condition, and further, to respond on or within three (3) calendar days upon proper notification or leaks or defects by the Owner or Architect.

A. Specifically excluded from this Guarantee are damages to the work, other parts of the building and building contents caused by: (1) lightning, windstorm, hailstorm and other unusual phenomena of the elements; and (2) fire. When the work has been damaged by any of the foregoing causes, the Guarantee shall be null and void until such damage has been repaired by the General Contractor, and until the cost and expense thereof has been paid by the Owner or by the responsible party so designated.

B. During the Guarantee Period, if the Owner allows alteration of the work by anyone other than the General Contractor, including cutting, patching and maintenance in connection with penetrations, and positioning of anything on the roof, this Guarantee shall become null and void upon the date of said alterations. If the owner engages the General Contractor to perform said alterations, the Guarantee shall not become null and void, unless the General Contractor, prior to proceeding with the said work, shall have notified the Owner in writing, showing reasonable cause for claim that said alterations would likely damage or deteriorate the work, thereby reasonably justifying a termination of this Guarantee.

C. Future building additions will not void this guarantee, except for that portion of the future addition that might affect the work under this contract at the point of connection of the roof areas, and any damage caused by such addition. If this contract is for roofing of an addition to an existing building, then this guarantee covers the work involved at the point of connection with the existing roof.

D. During the Guarantee period, if the original use of the roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray cooled surface, flooded basin, or other use of service more severe than originally specified, this Guarantee shall become null and void upon the date of said change.

E. The Owner shall promptly notify the General Contractor of observed, known or suspected leaks, defects or deterioration, and shall afford reasonable opportunity for the General Contractor to inspect the work, and to examine the evidence of such leaks, defects or deterioration.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

_____
General Contractor's Authorized Signature

_____
Typed Name and Title

TO: **Alabama Department of Finance**
Real Property Management
Division of Construction Management
770 Washington Avenue, Suite 444
Montgomery, AL 36130-1150
(334) 242-4082

DCM Form C-13
revised October 2024;
(Must be activated via DocuSign link from DCM's Engage Portal)

CERTIFICATE OF SUBSTANTIAL COMPLETION

ROUTING PROCEDURES *ON NEXT PAGE*

DCM (BC) No. _____

OWNER ENTITY NAME AND ADDRESS:	**ARCHITECTURAL / ENGINEERING FIRM NAME AND ADDRESS:**
Email to receive executed copy: _____	Email to receive executed copy: _____
CONTRACTOR COMPANY NAME AND ADDRESS:	**BONDING COMPANY NAME AND ADDRESS:**
Email to receive executed copy: _____	Email to receive executed copy: _____
PROJECT:	

Substantial Completion has been achieved for ☐ the entire Work ☐ the following portion of the Work:

_____

_____.

The **Date of Substantial Completion** of the Work covered by this certificate is established to be _____.

"Substantial Completion" means the designated Work is sufficiently complete, in accordance with the Contract Documents, such that the Owner may occupy or utilize the Work for its intended use without disruption or interference by the Contractor in completing or correcting any remaining unfinished Work. The Date of Substantial Completion is the date upon which all warranties for the designated Work commence, unless otherwise agreed and recorded herein.

Punch List: A _____ page list of items to be completed or corrected prior to the Owner's approval of Final Payment is attached hereto, but does not alter the Contractor's responsibility to complete or correct all Work in full compliance with the Contract Documents. The Contractor shall complete or correct all items on the attached list, ready for re-inspection for Final Acceptance, within 30 days after the above Date of Substantial Completion, unless another date is stated here: _____. If completed or corrected within this period, warranties of these items commence on the Date of Substantial Completion, otherwise such warranties commence on the date of Final Acceptance of each item.

Only <u>one</u> (1) originally executed substantial completion form shall be routed for signature. DCM office will mail the fully-executed original to the Owner and email copies to all parties.

RECOMMENDED BY *(signature and email address required)*:	
ARCHITECT/ENGINEER: _____	DATE: _____
CONTRACTING PARTIES:	
CONTRACTOR: _____	DATE: _____
OWNER: _____	DATE: _____
_____	DATE: _____
APPROVALS:	
DCM INSPECTOR: _____	DATE: _____
DCM CHIEF INSPECTOR: _____	DATE: _____
DCM DIRECTOR: _____	DATE: _____

CERTIFICATE OF SUBSTANTIAL COMPLETION ROUTING PROCEDURE

Only one (1) substantial completion form shall be routed for e-signatures, via DocuSign link from DCM's Engage Portal at: https://engagealabama-rpm.facilityforce.cloud

NOTICE

THE EXECUTED "GENERAL CONTRACTOR'S ROOFING GUARANTEE" (DCM Form C-9) AND ANY OTHER ROOFING WARRANTY REQUIRED BY THE CONTRACT MUST ACCOMPANY THIS CERTIFICATE TO OBTAIN DCM APPROVAL.

Also, any standard manufacturer's roofing guarantees which contain language regarding the governing of the guarantee by any state other than the State of Alabama, must be amended to exclude such language, and substituting the requirement that the Laws of the State of Alabama shall govern all such guarantees.

DCM (BC) No. _____

CERTIFICATION OF STRUCTURAL OBSERVATIONS

for

Project Name: _____

Owner Entity: _____

Contractor Company: _____

I _____, do hereby verify that I have personally conducted the visual
Design Professional
observations of the construction of the structural system for conformance to the approved construction documents for the referenced project. The visual observations of the structural systems were personally conducted by me at all significant construction stages and at the completion of the construction of the structural system. To the best of my knowledge, all structural deficiencies have been resolved except as noted below:

Signed and sealed on this date, _____, 20_____. Design Professional's Seal:

_____
Architectural / Engineering Firm

_____
Signature of Architect or Structural Engineer of Record

_____
Printed Name

Specifications: This form must be included in the project manual submitted to DCM for Final Plan Review for:

- All new public K-12 schools, awarded after July 1, 2010, with tornado storm shelters as required by Act 2010-746.
- All public K-12 additions and renovations which are required to contain tornado storm shelters by the International Building Code, Section 423.
- All private K-12 new schools, additions and renovations as required by the International Building Code, Section 423.
- All new buildings containing classrooms or dorm rooms on the grounds of all public 2-year or 4-year institutions of higher education, statewide, awarded on or after August 1, 2012, as required by Act 2012-554. Exception: Alabama Community College System (ACCS) projects with Notice-To-Proceeds issued after July 31, 2021 are not submitted to DCM.

Submittal of Form: Provide a copy of the completed form to the DCM Inspector at Final Inspection. The original completed form, signed and sealed by the architect or structural engineer of record, must be included as an attachment to the Certificate of Substantial Completion submitted to DCM for:

- All new buildings constructed on the grounds of new public K-12 schools awarded after July 1, 2010.
- All new buildings containing classrooms or dorm rooms constructed on the grounds of public 2-year or 4-year institutions of higher education awarded on or after August 1, 2012. Exception: Alabama Community College System (ACCS) projects with Notice-To-Proceeds issued after July 31, 2021 are not submitted to DCM.

FINAL PAYMENT CHECKLIST (FPC)

To be completed by the Architect/Engineer and submitted to DCM for review via the correct DocuSign link from the Engage Portal; applicable only to state agencies, partially or fully PSCA-funded and other bond-funded projects. The FPC shall include all attachments including the Contractor's Application for Final Payment. If all PSCA funds are expended prior to Final Payment, it is not a requirement to submit the Application & Certificate for Final Payment along with the supporting documentation to DCM.

(For further guidance refer to Article 34/Final Payment of DCM Form C-8: General Conditions of the Contract.)

PROJECT:	**DCM No.** _____ **PSCA No.** _____ (If applicable)

YES	N/A	Select "YES" or "N/A" as applicable.
☐	☐	Application and Certificate for Final Payment, DCM Form C-10: Attach one copy to FPC. The application must include original signatures of all parties and include all application attachments.
☐		Certificate of Substantial Completion, DCM Form C-13: Attach one fully-executed copy to FPC.
☐		Affidavit of Advertisement for Completion: Attach one copy of the affidavit of publication, including the image of the advertisement which may be based on DCM Form C-14, to the FPC. An affidavit is a legal document issued by the publisher, which must be requested from the publisher.
☐	☐	Contractor's Affidavit of Payment of Debts & Claims, DCM Form C-18: Attach one copy to FPC.
☐	☐	Contractor's Affidavit of Release of Liens, if required by Owner, DCM Form C-19: Attach one copy to the FPC.
☐	☐	Consent of Surety to Final Payment, if any, To Contractor, DCM Form C-20: Consent is required for projects with P&P Bonds. Original has been delivered to Owner. Attach one copy to FPC.
☐	☐	General Contractor's Roofing Guarantee, DCM Form C-9, and Other Specified Roofing Guarantees, if any: Attached to Certificate of Substantial Completion.
☐	☐	Contractor's One-Year Warranty: Original has been delivered to the Owner. Attach one copy to the FPC.
☐	☐	Other Warranties: All other specified original warranties has been delivered to the Owner. Attach one copy to the FPC.
☐	☐	Record Documents: Specified "As-built" plans and specifications have been delivered to the Owner.
☐		O & M Manuals: Specified instructions and O&M Manuals have been delivered to the Owner.
☐	☐	Time Extension: Over-run of Contract Time has been reconciled by: ☐ Change Order ☐ Liquidated Damages ☐ Attached explanation
☐	☐	Additional Documents or Explanations which are attached:

Submitted By: _____
Architectural / Engineering Firm

_____ Signature | _____ Printed Name and Title | _____ Date

Final Reconciliation of Fees: Between the final change order execution and the year-end inspection, report the final project cost to the Engage Portal at https://engagealabama-rpm.facilityforce.cloud (back-up is not needed unless requested by DCM). DCM will then email a Final Reconciliation of Fees Statement to the Owner. If the Final Statement shows a net payment is owed to DCM, that amount must be paid prior to scheduling the year-end inspection. If the Final Statement shows a net refund is owed then a check will be mailed to the Owner.

DCM (BC) Number: _____

PSCA Projects: PSCA Number: _____

Date of the Construction Contract: _____

Contractor's Affidavit of Payment of Debts and Claims

To Owner (*Entity name and address*)**:**	**Project** (*Same as appears in the Construction Contract*)**:**

STATE OF:

COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Construction Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

Supporting Documents Attached Hereto:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. DCM Form C-20, Consent of Surety to Final Payment, may be used for this purpose.

   Indicate attachment: ☐ Yes ☐ No

The following supporting document should be attached hereto if required by the Owner:

1. Contractor's Release of Waiver of Liens.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment supplies, to the extent required by the Owner, accompanied by the list thereof.
3. Contractor's Affidavit of Release of Liens, DCM Form C-19.

Contractor (*Insert company name and address*)**:**

By:_____
Signature of authorized representative

_____
Name and Title

Sworn to and subscribed before me this _____ day

of _____, _____.

_____
Notary Public's Signature

My commission expires: _____

Seal:

DCM (BC) Number: _____

PSCA Projects: PSCA Number: _____

Date of the Construction Contract: _____

Contractor's Affidavit of Release of Liens

To Owner (*Entity name and address*)**:**	**Project** (*Same as appears in the Construction Contract*)**:**

STATE OF:

COUNTY OF:

The undersigned hereby certifies that, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Construction Contract referenced above.

EXCEPTIONS:

Supporting Documents Attached Hereto:

1. Contractor's Release of Waiver of Liens.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment supplies, to the extent required by the Owner, accompanied by the list thereof.

Contractor (*Insert company name and address*)**:**

By: _____
Signature of authorized representative

_____
Name and Title

Sworn to and subscribed before me this _____ day

of _____, _____.

_____
Notary Public's Signature

My commission expires: _____

Seal:

DCM (BC) Number: _____

PSCA Projects: PSCA Number: _____

Date of the Construction Contract: _____

Surety's Bond Number: _____

CONSENT OF SURETY TO FINAL PAYMENT

To Owner (*Entity name and address):*	**Project** (*Same as appears in the Construction Contract*)**:**

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the

Surety (*Insert name and address of Surety*)

on bond of

Contractor (*Insert name and address of Contractor*)

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to

Owner (*Insert name and address of Entity*)**:**

as set forth in said Surety's bond.

SIGNED AND SEALED this _____ day of _____, _____.

SURETY:

_____ Seal:
Company Name

By _____
Signature of Authorized Representative

_____
Printed Name and Title

Note: Original Power of Attorney for the Surety's signatory shall be furnished with each of the original forms to be attached to each of the four (4) final payment forms.

SAMPLE FORM OF ADVERTISEMENT FOR COMPLETION

LEGAL NOTICE

In accordance with Chapter 1, Title 39, Code of Alabama, 1975, as amended, notice is hereby given

that _____,
(*Contractor Company Name*)
Contractor, has completed the Contract for ☐(Construction) ☐(Renovation) ☐(Alteration) ☐(Equipment) ☐(Improvement) of (*Name of Project*):

at _____

(*Insert location data in County or City*)
for the State of Alabama and the (County) (City) of _____, Owner(s), and have made request for final settlement of said Contract. All persons having any claim for labor, materials, or otherwise in connection with this project should immediately notify

_____

_____
(*Architect / Engineer*)

_____
(Contractor)

_____
(Business Address)

NOTE: This notice must be run for a minimum of three weeks for projects of $100,000.00 or more. For acceptable methods of advertisement, see General Conditions of the Contract, Article 34. Proof of publication of the notice shall be made by the contractor to the authority by whom the contract was made by affidavit of the publisher or website owner and a printed copy of the notice published. A final settlement shall not be made upon the contract until the expiration of 30 days after the completion of the notice.

Kay Ivey
Governor

Kelly Butler
Director of Finance

STATE OF ALABAMA
DEPARTMENT OF FINANCE
REAL PROPERTY MANAGEMENT
Division of Construction Management

P.O. Box 301150, Montgomery, AL 36130-1150
770 Washington Avenue, Suite 444, Montgomery, AL 36104
Telephone: (334) 242-4082 Fax: (334) 242-4182

Mickey Allen
Assistant Finance Director
Real Property Management

Frank Barnes, Director
Construction Management

January 19, 2021

TO: **ARCHITECTS, ENGINEERS, AND CONTRACTORS**

FROM: **MICKEY ALLEN, ASSISTANT FINANCE DIRECTOR**
ALABAMA REAL PROPERTY MANAGEMENT (RPM)

FRANK BARNES, DIRECTOR
ALABAMA DIVISION OF CONSTRUCTION MANAGEMENT (DCM)

SUBJECT: **UPDATED GUIDANCE ON FIRE ALARM CONTRACTOR PERMITS**

DCM's July 17, 2012 *Memorandum On Act 2009-657 Requiring Certification Of Fire Alarm Contractors* is superseded by this January 19, 2021 bulletin which includes updated references, terms, and details for projects under DCM's jurisdiction.

Act 2009-657, effective August 1, 2012, requires fire alarm contractors to be permitted through the State of Alabama Fire Marshal's Office. In accordance with §34-33A-9, if a fire alarm contractor is going to do work in Alabama, the contractor must deliver to the local building official a copy of their State Fire Marshal's Fire Alarm Permit. DCM requires the following:

Plan Review
For work involving fire alarm systems in Optional 65% Intermediate Plan Review submittals and in Final Plan Review submittals, the requirement for a fire alarm contractor to be permitted through the State of Alabama Fire Marshal's Office shall be included on plan notes and/or in the project manual.

Bidding
Pursuant to §34-33A-11(b), for work involving fire alarm systems, General Contractors must submit a copy of the fire alarm contractor's State Fire Marshal's Fire Alarm Permit at the same time as submission of the subcontractor and supplier list to the lead design professional, which is required within 24 hours after receipt of bids. The architect or engineer shall reject fire alarm contractors who cannot provide a copy of the required permit.

Pre-Construction Conference
For work involving fire alarm systems, General Contractors must provide a copy of the fire alarm contractor's State Fire Marshal's Fire Alarm Permit to the DCM Inspector at the pre-construction conference.

If you have any questions, please contact DCM's Plan Review Division at 334-242-4082 or planreview@realproperty.alabama.gov.

cc: Scott Pilgreen, Alabama State Fire Marshal, State of Alabama Fire Marshal's Office.

STATE OF ALABAMA
DEPARTMENT OF INSURANCE
State Fire Marshal's Office
201 Monroe Street, Suite 1790
Post Office Box 303352
Montgomery, Alabama 36130-3352
Telephone: (334) 241-4166
Facsimile: (334) 241-4158
Internet: www.firemarshal.alabama.gov

ROBERT BENTLEY
GOVERNOR

JIM L. RIDLING
COMMISSIONER

EDWARD S. PAULK
STATE FIRE MARSHAL

MAILING ADDRESS:
P.O. BOX 303352
MONTGOMERY, AL 36130-3352

OVERNIGHT ADDRESS:
201 MONROE STREET, SUITE 1790
MONTGOMERY, AL 36104
PLEASE USE FEDEX, UPS OR DHL

APPLICATION FOR STATE FIRE MARSHAL'S CERTIFIED FIRE ALARM CONTRACTOR PERMIT

PLEASE PRINT OR TYPE

In compliance with Sections 34-33A-1 to 34-33A-13, Code of Alabama, 1975, I hereby apply for a State Fire Marshal's Permit to engage in the installation, repair, alteration, maintenance, or inspection of fire alarm systems in Alabama.

CERTIFICATE HOLDER'S NAME: _____

CERTIFICATE HOLDERS SSN: _____ **DOB:** _____

NAME OF BUSINESS: _____

BUSINESS OWNER NAME: _____

BUSINESS OWNER SSN: _____ **DOB:** _____ **ARE YOU A U.S. CITIZEN? ___YES ___NO**

BUSINESS ADDRESS: _____

MAILING ADDRESS: _____

BUSINESS TELEPHONE: _____ **PERMIT TYPE: INITIAL☐ RENEWAL ☐**
Current Permit #_____

This is to certify that _____ (certificate holder) is presently employed by _____ (business) in the capacity of _____ (title) and is authorized to act for the business in all matters pertaining to the installation, repair, alteration, addition, maintenance, or inspection of fire alarm systems in the state of Alabama.

If for any reason the certificate holder terminates employment with the above business, we the undersigned, do understand that the State Fire Marshal's Office is to be notified within thirty (30) days, and that the business will have nine (9) months or until expiration of the current permit, whichever comes first, to submit an application on a new certificate holder and be issued a new permit.

I the undersigned do certify that the information provided above is true and correct. I the undersigned do understand that submission of false information is grounds for license revocation and may subject me to criminal penalties.

_____ _____
Owner/President Signature **Date** **Certificate Holder Signature** **Date**

INITIAL/RENEWAL FEE $100.00

INCLUDE FEE WHEN SUBMITTING APPLICATION. (CHECK OR MONEY ORDER MADE PAYABLE TO THE STATE FIRE MARSHAL'S FUND.)
INCLUDE COPY OF NICET CERTIFICATION CARD (CURRENT) FOR FIRE ALARM SYSTEM TECHNICIAN – LEVEL III.

CERTIFIED FIRE ALARM CONTRACTOR ATTACHMENT

1. Home address of the NICET Certificate holder:

   _____
   Street Address

   _____
   City State Zip Code

   _____
   Phone Number (this is the number you can be reached at)

2. Are you a United States Citizen? _____YES _____NO

3. I understand as the NICET Certificate holder for this company that I am licensed only by this company and no other company within the Fire Alarm Industry.

4. I understand as the NICET Certificate holder for this company that I am responsible for the layout, installation, maintenance, repair or alterations performed by this company.

_____ _____
Signature of NICET Certificate holder Date

CERTIFICATE OF ASBESTOS FREE BUILDING MATERIALS

The undersigned hereby states that all building materials incorporated, installed, and used during the construction process for the below listed project by the Contractor or its Subcontractors of any tier are 100% asbestos free. **Asbestos Free means containing 0% asbestos in any form.** Refer to Section 01600, Product Requirements.

McKee Project Name: _____

McKee Project Number: _____

CERTIFICATION: The undersigned certifies that he or she is authorized to execute contracts and legal documents on behalf of the General Contractor as legally named, that this certification is submitted in good faith without fraud or collusion with any other person, that the information indicated in this document is true and complete, and that the document is made in full legal agreement.

To: _____

(Owner / Awarding Authority of Construction Contract)

Date _____

Legal Name of General Contractor _____

General Contractor State License No. _____

(Exactly as appears on license including designation letters)

General Contractor Mailing Address _____

_____

By (Legal Signature) _____

Name & Title (print) _____

Telephone Number _____

E-Mail Address _____

SECTION 01000 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF REQUIREMENTS

A. Definition: An Alternate is an amount proposed by bidders and stated on the Proposal Form that will be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either scope of work or in products, materials, equipment, systems or installation methods described in Contract Documents.

B. Coordination: Coordinate related work and modify or adjust adjacent work as required to ensure that work affected by each accepted Alternate is complete and fully integrated into the project.

C. Notification: Immediately following award of Contract, prepare and distribute to each party involved notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates, if any.

D. Schedule: A “Schedule of Alternates” is included at the end of this section. Specification section referenced in the Schedule contain requirements for materials and methods necessary to achieve the work described under each Alternate.

E. Include as part of each Alternate, miscellaneous devices, appurtenances and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

1.3 SCHEDULE OF ALTERNATES

A. There are “NO” Alternates for this project.

PART 2 - NOT APPLICABLE

PART 3 - NOT APPLICABLE

END OF SECTION

SECTION 01010 - SCOPE OF THE WORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS AND GENERAL INFORMATION

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 specification sections apply to the work of this section.

1.2 SUMMARY

A. This Section includes the following:

1. Type of the Contract.
2. Work Under This Contract.
3. Completion Times.
4. **Division of Construction Management User Fees**.
5. Project Work Identification.
6. Owner-furnished products.
7. Supervision.
8. Contractor Use of premises.
9. Definitions.
10. Work Under Other Contracts.
11. Building and Site Construction.
12. General Issues.
13. Temporary Electrical Power and Jobsite Utilities.
14. Site Security and Insurance Requirements.
15. Protection of Work in Place.
16. Work restrictions.
17. Owner's occupancy requirements.
18. Specification formats and conventions.
19. **Site Visit Re-Inspection Fees**

B. Related Sections include the following:

1. Division 1 Section 01500 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 TYPE OF CONTRACT

A. Construction Contract (DCM Form C-5).

1.4 WORK UNDER THIS CONTRACT

A. Sealed Proposal shall be received as follows:

1. One (1) Sealed Envelope MUST include the following:

a. General Contractor’s Name and State General Contractor’s License number MUST be legible on the front of the envelope.

b. One (1) Bid Proposal for all work as indicated on drawings and specifications.

c. Unit Price Attachment Sheet MUST be included if document is included in the project manual.

d. One (1) Bid Bond or certified check.

e. One (1) Sales Tax Form.

1.5 COMPLETION TIMES

A. **All work shall be completed in 210 Calendar days from Notice to Proceed issued by owner**.

1.6 DIVISION OF CONSTRUCTION MANAGEMENT USER FEES & OTHER FEES

A. The Contractor **MUST Include** all costs for permits and fees per the General Conditions of the Contract DCM Form C-8; Article 44 “Permits, Laws and Regulations”, Paragraph A Permits, Fees and Notices Sub Paragraphs (1) and (2).

B. The Contractor shall be responsible for all “Re-Inspection Fees.” Site Visit Re-Inspection Fees: It is the contractor’s responsibility to have the project ready for site visits (inspections) when they are scheduled. If the project is not ready for the scheduled inspection and it is determined, and failed inspection requiring additional visits, by the Architect, AHJ, (Authorities Having Jurisdiction), any governmental agency or any other entity requires a re-inspection with the Architect, AHJ, or Engineer present, the contractor shall pay the Architect, Engineers or AHJ each, a re-inspection fee of $1,500.00, or other amounts (less or greater) set forth by other portions of the Contract Documents. Payments shall be made directly to the Architect, Engineer, or AHJ respectfully, five (5) days prior to the scheduled re-inspection unless other arrangements are made and agreed upon by each party in writing.

1.7 PROJECT / WORK IDENTIFICATION

A. General: Project name is as indicated in the Advertisement for Bids and as shown on the Contract Documents prepared by Lathan Mckee, 3500 Eastern Boulevard, Suite 300; Montgomery, Alabama 36116.

B. Contract Documents: Indicate the work of the Contract and related requirements and conditions that have an impact on the project. Related requirements and conditions that are indicated on the Contract Documents include, but are not limited to the following:

1. Existing site conditions and restrictions on use of the site including ingress and egress to the site.

2. Grading operations at the site.

3. The Contractor shall be responsible to secure the site during the execution of the work and provide proof of insurance including but not limited to General Liability, W/C, Auto, Equipment, etc.

C. Summary by References: Work of the Contract can be summarized by references to the Contract, General Conditions, Supplementary Conditions, the Project Manual, Technical Specification Sections, Drawings, Addenda and modifications to the Contract Documents issued subsequent to the initial printing of this Project Manual and the Drawings, and including but not necessarily limited to, printed material referenced by any of the above. It is recognized that the Work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon including weather conditions, and other forces outside the contract documents.

1.8 OWNER FURNISHED PRODUCTS

A. None

2. SUPERVISION

A. Supervision: The Contractor shall provide adequate supervision of the project to ensure proper supervision for all work.

1.9 CONTRACTOR USE OF PREMISES

A. General: During the entire cleanup period the Contractor shall have the exclusive use of the premises for cleanup operations, including full use of the site as shown on the Drawings.

B. Limitations of exclusive use of the site:

1. Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to applicable rules and regulations affecting the work while engaged in project performance. See site plan for ingress and egress to the site, or if not indicated, same shall be as designated by the Architect.
2. Keep existing public roads, driveways and entrances serving the premises clear and available at all times. Do not use these areas for parking or storage of materials. Remove dirt, mud, debris, etc., from site, sidewalks, streets, and public right-of-way as it occurs.
3. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds and or designated storage areas as indicated.
4. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.
5. The Owner, and their representatives, the Architect and their Consultants, as well as authorities having jurisdiction will require site accessibility for inspections, observations, and perhaps other purposes, related to the planned new construction. All Contractors shall assist in such accessibility, to at least the point of providing and maintaining accessible dry paths to work in progress.
6. Furnish and install by contractor temporary barricades, fencing, etc., as indicated or otherwise required, to restrict pedestrian and vehicular traffic from construction operations, including in part, Owner's staff, the public, students, children, and residents of the adjacent residential neighborhoods.
7. Construction operations shall not affect in any manner, the on-going operations of the Owner, immediately adjacent facilities, adjacent property owners or businesses, or others. Refer to Division 1 Section "Special Conditions" for additional information and requirements regarding coordination with Owner's activities, etc.
8. Construction equipment shall not come in contact with or swing over existing facilities to remain, public areas, occupied buildings, right-of-ways, etc., which are to remain.
9. All contractors and their employees shall limit any discussion of the Work of this project to the Owner's representatives named in the front of this Project Manual, Consultants employed, inspecting authorities with jurisdiction, and the Architect. In no instance shall this project be discussed with others, except as may otherwise be indicated herein.
10. Parking on-site, if any, shall be limited to the "staging areas" indicated on the Drawings, or if not indicated, as mutually agreed between the Architect and Contractor at the Pre-Construction Conference.
11. Smoking or other use of tobacco products shall not be permitted within the structure of the Building, Owner's facilities or on roofs.
12. The use or presence of alcohol and/or other debilitating substances shall not be permitted in the construction of the building and or on the project site.
13. Firearms and/or other weapons shall not be permitted on the project site.
14. The Contractor shall furnish necessary temporary toilets for all work forces on the job site.

PART 2 - SCOPE OF THE WORK

2.1 DEFINITIONS

A. The Scope of the Work of the Contract is meant to be viewed as a successor to the General Special Conditions of the Contract. Should any discrepancy or ambiguity be noted, the Scope of the Work of the Contract shall apply and the General Special Conditions of the Contract shall defer to Scope of the Work of the Contract Documents. The scope of the work shall be taken in its entirety by all contractors. In signing the contract all contractors have read and understand that the Scope of the Work and the General Special Conditions are taken in their entirety.

1. The term "Design Consultant" shall be construed to mean "Architect".
2. The terms "Owner" shall mean " Dekalb County Board of Education ".
3. **Site Visit Re-Inspection Fees**: The contractor is responsible for all Fees.

2.2 WORK UNDER OTHER CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

B. Concurrent Work: Owner will award separate contract(s) for the following construction operations at the Project site. Those operations will be conducted simultaneously with work under this Contract.

1. Work done by others or by Owner.
    a. Any items noted N.I.C.
    b. Construction Testing as defined in applicable sections of the project manual.

2.3 BUILDING AND SITE CONSTRUCTION

A. The Contractor shall maintain the entire site, provide dust control and keep the streets clean at all times and or as directed by the Architect. The Contractor shall call for and be responsible for the locating of all utilities prior to start of work. Use extreme care when working in close proximity to the existing water lines to prevent movement and damage to the water lines.

B. The Contractor shall install and or replace all fencing including furnish and install all temporary fencing as required for all work including safety barriers, signs, traffic directional signals, temporary stripping, flagman, temporary road plates and any temporary roads around any obstruction and or work being constructed. The Contractor shall make all provisions to keep the public and or temporary access roads open during the duration of the work.

C. The Contractor shall maintain & level, all temporary roads and temporary lay down and storage areas using same stone base material. Roads must have no potholes, dips, or rises and provide access to and from the site and other locations on site. The Contractor shall maintain the temporary roads used to move material on the site. Temporary roads are existing and the Contractor shall maintain these temporary roads throughout the duration of construction activity while Contractor is onsite.

D. The Contractor is responsible for all work required to install new work to include demolition preparation of surface to receive new work, dust controls and cleaning of all surfaces affected by work.

2.4 GENERAL ISSUES

A. The Contractor shall be responsible for their own on-site safety requirements within the site per OSHA regulations.

B. Only an approved company owned and insured vehicle shall be allowed on to the construction

site. Vehicles shall be clearly marked and identified with the company logo and or name.

2.5 TEMPORARY ELECTRICAL POWER AND JOBSITE UTILITIES

A. The Contractor is responsible for the all costs associated with temporary electrical requirements for performance of the work. The Contractor shall be responsible for the all costs associated with temporary water required for the performance of the work. The Contractor is responsible for all other utility costs as required for the performance of the work.

2.6 SITE SECURITY / INSURANCE REQUIREMENTS

A. The Contractor shall have care custody and control of the site. Contractor shall be responsible for the replacement of their material, equipment, and any loss of such. Contractor shall be responsible for securing all material and equipment. If there is a loss and or damage of material and equipment, that loss shall go against the Contractor's insurance coverage.

2.7 PROTECTION OF WORK IN PLACE

A. The Contractor shall protect all completed work and any rework shall be the responsibility of the contractor **at** no additional cost to the owner.

2.8 WORK RESTRICTIONS

A. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect and Owner not less than two days in advance of the proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's and Owner's written permission.

B. Nonsmoking Building: Smoking and smokeless tobacco will not be permitted within the new construction after floor slabs are poured.

2.9 OWNER'S OCCUPANCY REQUIREMENTS

A. Owner Occupancy: Owner will occupy adjacent parking lots during entire construction period. Cooperate with Owner during construction operations adjacent to or near the existing building and parking to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits, unless otherwise indicated.

B. Maintain access to existing walkways and other adjacent occupied or used facilities. Do not close or obstruct walkways or other occupied or used facilities without written permission from Owner and authorities having jurisdiction. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

C. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to place and install equipment in completed areas of building, before Substantial Completion, provided such does not interfere with completion of the Work. Such placement of equipment shall not constitute acceptance of the total Work.

2.10 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format numbering system.

1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications another Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the

   Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

   a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 3 - NOT APPLICABLE

END OF SECTION

SECTION 01011 - CONTINGENCY ALLOWANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS AND GENERAL INFORMATION

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 specification sections apply to the work of this section.

PART 2 - CONTINGENCY ALLOWANCES

2.1 BASE BID PROPOSAL

A. The General Contractor shall include the following sums:

1. **Fifty Thousand Dollars ($50,000.00)** as a contingency to cover unforeseen conditions or minor changes that are necessary to correct or supplement the work as detailed in the Contract Documents.
2. **Thirty Thousand Dollars ($30,000.00)** as a contingency to cover the costs for intercom equipment.
3. **Thirty Thousand Dollars ($30,000.00)** as a contingency to cover the costs of an emergency two-way radio system.
4. **Twenty-Five Thousand ($25,000.00)** as a contingency for the aid to construction costs from Marshall Dekalb Cooperative.

2.2 The Contractor shall include in his bid proposal(s) all costs of office, job supervision, overhead, profit, and bond on these Contingency Allowances, because no such costs will be paid to Contractor for work performed under these Contingency Allowances. Only the direct costs of performing work under this provision shall be paid under and charged against the Contingency Allowance; such cost includes costs of materials and delivery, installation labor, payroll taxes and insurance, equipment expense, and the cost of subcontracted work (subcontractor's cost may include a maximum of 15% mark-up for overhead and profit).

PART 3 – AUTHORIZATION OF CONTINGENCY ALLOWANCES

3.1 After unknown conditions are identified and examined and the scope of work and method of repair determined, or request for a proposal to cover additional work has been issued by the Owner, the Contractor shall submit a proposal for such work to the Architect for the Owner's approval. If the Owner approves of such proposal, he will issue written authorization to the Contractor to perform the work and charge the related costs to the Contingency Allowance. At the Owner's option, work performed under this provision may be ordered done on a time and material basis, in which case; the Contractor shall keep accurate records of all time and materials used and submit such records to the Architect for his approval at the end of each day's work.

3.2 An accounting of the costs charged against this Contingency Allowance shall be mutually maintained by the Contractor, Architect, and Owner throughout the course of the project. Any of this Contingency Allowance not spent shall be credited to the Owner by Change Order at close out of the project. Refer to Contingency Allowance Form attached to this Section.

3.3 Provide for payment.

A. The Contractor shall include a line item in the *Schedule of Values* entitled "Contingency Allowance". The estimated value of work completed pursuant to fully executed Contingency Allowance Authorizations may be included in the Contractor's monthly Applications for Payment. Payments under this Contingency Allowance shall not exceed the net, total of fully executed

Contingency Allowance Authorizations.

3.4 CONTINGENCY ALLOWANCE AUTHORIZATION FORM

Form to be filled in its entirety.

To: Lathan Mckee, Architects

From: _____
Company
_____
Address
_____
Contact and Email

Project: _____

_____

Project Number _____

Date: _____

Building Commission Number: _____

Authorization Number: _____

In accordance with Specification Section 01011 – CONTINGENCY ALLOWANCE, the Contractor [ ] is hereby authorized to proceed with the changes in Work as are described below and is to be paid for the performance of these changes as provided in Specification Section 01011. This Authorization shall become effective when it is signed by the Contractor and the Owner's representative and it is understood and agreed that the amount(s) stipulated below constitute full compensation for these changes in Work.

TOTAL AMOUNT OF THIS AUTHORIZATION	$

ORIGINAL AMOUNT OF THE CONTINGENCY ALLOWANCE	$
NET TOTAL OF PREVIOUS AUTHORIZATIONS	$
PREVIOUS REMAINING CONTINGENCY ALLOWANCE	$
TOTAL AMOUNT OF THIS AUTHORIZATION	$
CONTINGENCY ALLOWANCE REMAINING AFTER THIS CONTINGENCY	$

Recommended By:	Authorized By:	Accepted By:
_____	_____	_____
Architect	Owner	Contractor

END OF SECTION

SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF REQUIREMENTS:

A. Definition:

1. "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.
2. "Cutting and patching" is performed for coordination of the Work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.
3. Cutting and patching performed during the manufacture of products, or during the initial fabrication, erection or installation processes is not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".

1.3 SUBMITTALS:

A. Procedural Proposal for Cutting and Patching:

1. Where prior approval of cutting and patching is required, submit proposed procedures for this work well in advance of the time work will be performed and request approval to proceed. Include the following information, as application, in the submittal.
2. Describe nature of the work and how it is to be performed, indicating why cutting and patching cannot be avoided. Describe anticipated results of the work in terms of changes to existing work, including structural, operational and visual changes as well as other significant elements.
3. List products to be used and firms that will perform work.
4. Give dates when work is expected to be performed.
5. List utilities that will be disturbed or otherwise be affected by work, including those that will be relocated and those that work be out-of-service temporarily. Indicate how long utility service will be disrupted.
6. Approval by the Architect/Engineer to proceed with cutting and patching work does not waive the Architect/Engineer's right to later require complete removal and replacement of work found to be cut and patched in an unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. General: Except as otherwise indicated, or as directed by the Architect/Engineer, use materials for cutting and patching that are identical to specified materials. If identical materials are not available, or cannot be used, use materials that match adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

3.2 PREPARATION:

A. Temporary Support: To prevent failure provide temporary support of work to be cut.

B. Protection:

1. Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations.
2. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
3. Take precautions not to cut existing pipe, conduit or duct serving the building but scheduled to be relocated until provisions have been made to bypass them.

3.3 PERFORMANCE:

A. General: Employ skilled workmen to perform cutting and patching work. Except as otherwise indicated or as approved by the Architect/Engineer, proceed with cutting and patching at the earliest feasible time and complete work without delay.

B. Cutting:

1. Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible review proposed procedures with the original installer; comply with original installer's recommendations.
2. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to insure a neat hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

C. Patching:

1. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
2. Where feasible, inspect and test patched areas to demonstrate integrity of work.
3. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.
4. Where patch occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing patch, after patched area has received prime and base coat.
5. Patch, repair or rehang existing ceilings as necessary or called for on plans to provide an even plane surface of uniform appearance.

3.4 CLEANING:

A. Thoroughly clean areas and spaces where work is performed or used as access to work. Remove completely point, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF CUTTING AND PATCHING

SECTION 01250 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:

1. Section 01600 "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, that may or may not involve an adjustment to the Contract Sum or the Contract Time, as an Architect's Supplemental Instructions, "ASI".

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time in the form of an ASI. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. ASIs issued by Architect, if adjustments to contract sum or contract time are involved, are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.

2. Within time specified in ASI after receipt of ASI, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

b. Indicate applicable delivery charges, equipment rental, and amounts of trade discounts.

c. Include costs of labor and supervision directly attributable to the change.

d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

e. Include data as needed to validate material costs

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Include costs of labor and supervision directly attributable to the change.

5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Change Order, Architect will issue a Change Order for signatures as required.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive, “CCD”: Architect may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Construction Change Directive contains a complete description of change in the Work.

PART 2 – NOT APPLICABLE

PART 3 – NOT APPLICABLE

END OF SECTION

SECTION 01290 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. The contractor shall provide separate Schedule of Values for work on projects involving multiple locations, campuses, sites, buildings etc. and/or multiple scopes of work. Additional line items may be required within each separate Schedule of Values (i.e. separate line items for multiple buildings located on same site).

B. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
    a. Application for Payment forms with Continuation Sheets.
    b. Submittals Schedule.
    c. Contractor's Construction Schedule.
2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

C. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:
    a. Project name and location.
    b. Name of Architect.
    c. Architect's project number.
    d. Contractor's name and address.
    e. Date of submittal.
2. Submit draft of DCM Form C-11.
3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
    a. Related Specification Section or Division.
    b. Description of the Work.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.

f. Change Orders (numbers) that affect value.

g. Dollar value.

1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate listing on Application and Certificate for Payment (Standard ABC Form C-10) for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or evidence of bonded warehousing.

7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

8. Unit Costs: Provide a separate line item in the Schedule of Values for each unit cost. Line-item to show value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Progress payments shall be submitted to Architect by the 25th of the month. The period covered by each Application for Payment is one month, ending on the 23rd of the month.

C. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.

2. Include amounts of Change Orders issued before last day of construction period covered by application only after all agency approvals.

D. Transmittal: Submit 6 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.

F. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

G. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. Certificate of Substantial Completion (DCM Form C-13)
5. Form of Advertisement for Completion (DCM Form C-14)
6. Evidence that claims have been settled.
7. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
8. Final, liquidated damages settlement statement.

PART 2 – NOT APPLICABLE

PART 3 – NOT APPLICABLE

END OF SECTION

SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.
2. Submittals Schedule.
3. Daily construction reports.
4. Material location reports.
5. Field condition reports.
6. Special reports.

B. Related Sections include the following:

1. Division 1 Section 01290 "Payment Procedures" for submitting the Schedule of Values.
2. Division 1 Section 01310 "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 1 Section 01330 "Submittal Procedures" for submitting schedules and reports.
4. Division 1 Section 01322 "Photographic Documentation" for submitting construction photographs.
5. Division 1 Section 01400 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 SUBMITTALS

A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's final release or approval.

B. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

C. Daily Construction Reports: Submit two copies at weekly intervals.

D. Material Location Reports: Submit two copies at monthly intervals.

E. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

F. Special Reports: Submit two copies at time of unusual event.

G. Pre-scheduling Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Verify availability of qualified personnel needed to develop and update schedule.
2. Discuss any constraints.
3. Review time required for review of submittals and re-submittals.
4. Review requirements for tests and inspections by independent testing and inspecting agencies.
5. Review time required for completion and startup procedures.
6. Review and finalize list of construction activities to be included in schedule.
7. Review submittal requirements and procedures.
8. Review procedures for updating schedule.

1.4 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Initial Submittal: Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."

B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

3. Submittal Review Time: Include review and re-submittal times indicated in Division 1 Section 01330 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
4. Startup and Testing Time: Include not less than 14 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

D. Constraints: Include constraints and work restrictions, if any, and show how the sequence of the Work is affected.

E. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
1. Refer to Division 1 Section 01290 "Payment Procedures" for cost reporting and payment procedures.
2. Contractor shall assign cost to construction activities on the CPM schedule. Costs shall not be assigned to submittal activities unless specified otherwise but may, with Architect's approval, be assigned to fabrication and delivery activities. Costs shall be broken down within principal contracts in amounts typically not greater than $30,000, but in no case greater than 5 percent of the Contract Sum.
3. Each activity cost shall reflect an accurate value subject to approval by Architect.
4. Total cost assigned to activities shall equal the total Contract Sum.

F. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis to demonstrate the time effect, if any, of the proposed change on the overall project schedule.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Preliminary Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized, cost-and resource-loaded, time-scaled CPM network analysis diagram for the Work.
1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
   a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by Owner that may affect or be affected by Contractor's activities.
    i. Testing and commissioning.
2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, timescaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
    a. Sub-networks on separate sheets are permissible for activities clearly off the critical path.

E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Principal events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the Schedule of Values).

F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

G. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value,and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
   a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
   b. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site. **Copies of reports are to be uploaded to eBIder.**

1. List of subcontractors at Project site.
2. Approximate count of personnel at Project site by trade.
3. Equipment at Project site.
4. Material deliveries.
5. High and low temperatures and general weather conditions.
6. Accidents.
7. Meetings and significant decisions.
8. Unusual events (refer to special reports).
9. Stoppages, delays, shortages, and losses.
10. Meter readings and similar recordings.
11. Emergency procedures.
12. Orders and requests of authorities having jurisdiction.
13. Change Orders received and implemented.
14. Construction Change Directives and Architect Supplemental Interpretations (Instructions) received and implemented.
15. Services connected and disconnected.
16. Equipment or system tests and startups.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request For Interpretation (RFI). Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor must employ skilled personnel with experience in scheduling and reporting techniques or must employ a scheduling consultant. Submit qualifications and examples of previous scheduling for evaluation (and approval) by the Architect.

B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule three (3) work days before each regularly scheduled progress meeting or Contractor may update schedule at the monthly progress meeting.

1. The revised schedule should be updated immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting, no later than three days after the progress meeting.

2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.

3. As the Work progresses, indicate Actual Completion percentage for each activity.

C. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.

2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 01322 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Preconstruction digital video.
2. Periodic construction photographs.

1.3 SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each digital photograph. Indicate elevation or story of construction. Include same label information as corresponding set of photographs.

B. Digital Construction Photographs: Submit one print of each digital photographic view within seven days of taking photographs.

1. Format: Digital.
2. Identification: The following information is required on each CD submitted:
    a. Name of Project.
    b. Name of Architect.
    c. Name of Contractor.
    d. Date photograph was taken if not date stamped by camera.
    e. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
    f. Unique sequential identifier.
3. Digital Images: Submit a complete set of digital image electronic files as a Project Record document on USB Drives. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

C. Digital Video: Submit one copy of each digital video with protective sleeve or case within seven days of recording.

1. Identification: On each copy, provide an applied label with the following information:
    a. Name of Project
    b. Name of Architect.
    c. Name of Contractor.
    d. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
    e. Date digital video was recorded.
    f. Weather conditions at time of recording.
2. Transcript: To include an audio narrative with the following information as a minimum.
    a. Name of Project.
    b. Date digital video was recorded.
    c. Weather conditions at time of recording.

d. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

PART 2 - EXECUTION

2.1 CONSTRUCTION PHOTOGRAPHS

A. Film Images:

1. Date Stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.

2. Field Office Prints: Retain one set of prints of progress photographs in the field office at Project site, available at all times for reference. Identify photographs same as for those submitted to Architect.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in filename for each image.

2. Field Office Images: Maintain one set of images on USB Drives in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect.

C. Preconstruction Photographs: Before starting construction, take color, digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Flag construction limits before taking construction photographs.

2. Take eight photographs to show existing conditions adjacent to property before starting the Work.

3. Take eight photographs of existing buildings either on or adjoining property in order to accurately record physical conditions at start of construction.

4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

D. Periodic Construction Photographs: Take 12 color, digital photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

2.2 CONSTRUCTION DIGITAL VIDEO

A. Narration: Describe scenes on digital video by audio narration by microphone while video is recorded. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.

1. Confirm date and time at beginning and end of recording.

2. Begin each digital video with name of Project, Contractor's name, and Project location.

B. Preconstruction Digital Video: Before starting construction, provide digital video of the Project site and surrounding properties from different vantage points, as needed to properly record all preexisting site conditions and adjacent conditions of all roadways, drives, structures that will incur construction traffic.

1. Flag construction limits before recording construction video.

2. Show existing conditions adjacent to Project site before starting the Work.

3. Show existing buildings either on or adjoining Project site to accurately record physical conditions at the start of construction.

4. Show protection efforts by Contractor.

PART 3 – NOT APPLICABLE

END OF SECTION

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. The General Contractor shall use website software "**Submittal Exchange**" to conduct all submittal reviews in electronic format. **Paper format submittals will NOT be accepted**. All recordkeeping, date stamping, access controls, shall be **paid for by the Contractor** with access given to the entire Project Team. The software shall be capable of the following:

B. Costs:

1. The General Contractor shall include the full cost of Submittal Exchange project subscription in their proposal. **The Contractor shall cover the full cost of Submittal Exchange project subscription for the project. The Contractor contractually, shall be fully responsible for all costs required to maintain full functionality through the acceptance of ALL project closeout requirements and documents. *NO OTHER SOFTWARE WILL BE CONSIDERED.***
2. **Contact Submittal Exchange at subex-sales_ww@oracle.com or call 1-800-633-0738 to verify costs prior to bid.**
3. At the Contractor's option, training is available from **Submittal Exchange** regarding use of website and PDF submittals. Contact Submittal Exchange at 1-800-714-0024 ext. 2
4. Internet Service and Equipment Requirements:
   a. Email address and Internet access at the Contractor's main office.
   b. Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.
5. The General Contractor is responsible for maintaining and keeping Submittal Exchange active throughout the entire project, including closeout documents.

C. Procedures:

1. Shop drawing and product data submittals shall be transmitted to Architect in electronic (PDF) format using **Submittal Exchange**, a website service designed specifically for transmitting submittals between construction team members.
2. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
3. The electronic submittal process is not intended for color samples, color charts, or physical material samples.
4. Submittal Preparation – the Contractor may use any or all of the following options:
   a. Subcontractors and Suppliers provide electronic (PDF) submittals to the Contractor via the **Submittal Exchange** website.
   b. Subcontractors and Suppliers provide paper submittals to the General Contractor who electronically scans and converts to PDF format.
   c. Subcontractors and Suppliers provide paper submittals to Scanning Service which electronically scans and converts to PDF format.
5. The Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.

6. The Contractor shall transmit each submittal to Architect using the Submittal Exchange website, www.submittalexchange.com.
7. The Architect / Engineer review comments will be made available on the Submittal Exchange website for downloading. Contractor will receive email notice of completed review.
8. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the Contractor.
9. Submit paper copies of reviewed submittals at project closeout for record purposes in accordance with Section 01770 – Closeout Procedures.

D. Related Sections include the following:

1. Division 1 Section 01290 "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
2. Division 1 Section 01320 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
3. Division 1 Section 01322 "Photographic Documentation" for submitting construction photographs and construction videotapes.
4. Division 1 Section 01770 "Closeout Procedures" for submitting warranties.
5. Division 1 Section 01781 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
6. Division 1 Section 01782 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
7. Division 1 Section 01820 "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.
8. Divisions 2 through 16 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Submittals Schedule: Comply with requirements in Division 1 Section 01320 "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.

1. Initial Review: Allow **14** business days for initial review of each digital submittal. Allow

additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Re-submittal Review: Allow **10** business days for review of each re-submittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow **10** business days for initial review of each submittal.
    a. Structural, mechanical, plumbing, electrical, civil, audio/visual, sound system, and kitchen equipment components are examples of the Work that require sequential review. Architect will advise if there are others.

D. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings. Provide another area of this same size for the Architect to affix his stamp. Stamp includes the following four categories: Reviewed, Furnish as Noted, Rejected, Revise and Resubmit; the Architect will mark one or more of these categories and return submittal to Contractor.
3. Include the following information on label for processing and recording action taken:
    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.
        i. Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.D.2.01). Re-submittals shall include an alphabetic suffix after another decimal point (e.g., 06100.D.2.R1 (R2, R3 etc. if necessary).
    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Other necessary identification.

E. Deviations: Encircle or otherwise specifically identify deviations and list the deviations from the Contract Documents on submittals and list the deviations on the transmittal form accompanying submittal.

F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
1. Transmittal Form: Use AIA Document G810 or equivalent with at least the following information.
    a. Project name.
    b. Date.
    c. Destination (To:).

d. Source (From:).

e. Names of subcontractor, manufacturer, and supplier.

f. Category and type of submittal.

g. Submittal purpose and description.

h. Specification Section number and title.

i. Drawing number and detail references, as appropriate.

j. Transmittal number, numbered consecutively.

k. Submittal and transmittal distribution record.

l. Remarks.

m. Signature of transmitter.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

G. Re-submittals: Make re-submittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.

3. Resubmit submittals until they are marked "Reviewed" or "Furnished as Noted".

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Use only final submittals with mark indicating "Reviewed" or "Furnished as Noted".

PART 2 - PRODUCTS

2.1 DIGITAL ACTION SUBMITTALS

A. General: Prepare and submit Digital Action Submittals required by individual Specification Sections.

B. All submittals shall be sent to the Architect no later than 45 calendar days from “Notice To Proceed”.

1. Submittals shall be sent to **or** the following email address: **subex-sales_ww@oracle.com** or **1-800-714-0024 ext. 1**

C. Submittals regarding mechanical, plumbing, electrical and structural items shall be sent directly to the Engineer of record.

1. A digital copy of the transmittal shall be sent to the Architect at the following email address: **subex-sales_ww@oracle.com** or also at **1-800-714-0024 ext. 1**

D. Product Data: Collect information into a single digital submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each the digital submittal to show which products and options are applicable.

3. Include the following information, as applicable:

a. Manufacturer's written recommendations.

b. Manufacturer's product specifications.

c. Manufacturer's installation instructions.

d. Standard color charts.

e. Manufacturer's catalog cuts.

f. Wiring diagrams showing factory-installed wiring.

g. Printed performance curves.

h. Operational range diagrams.

i. Mill reports.

j. Standard product operation and maintenance manuals.

k. Compliance with specified referenced standards.

l. Testing by recognized testing agency.

m. Application of testing agency labels and seals.

n. Notation of coordination requirements.

4. Submit Product Data before or concurrent with Samples.

5. Number of Copies: Submit digital copy of the Product Data, unless otherwise indicated. Mark up and retain returned digital copy as a Project Record Document.

E. Digital Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Dimensions.

b. Identification of products.

c. Fabrication and installation drawings.

d. Roughing-in and setting diagrams.

e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.

f. Shopwork manufacturing instructions.

g. Templates and patterns.

h. Schedules.

i. Design calculations.

j. Compliance with specified standards.

k. Notation of coordination requirements.

l. Notation of dimensions established by field measurement.

m. Relationship to adjoining construction clearly indicated.

n. Seal and signature of professional engineer if specified.

o. Wiring Diagrams: Differentiate between manufacturer-installed and field installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Digital Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.

3. Number of Copies:

a. Submit each original digital drawing submittal (specifically prepared for the project). Do

not include MSDS documentation in any submittal. Architect will retain marked-up copy for his records and will return 1 (one) digital marked-up copy to the Contractor.

b. Submit digital copy (bound in sets) of hardware submittals, fixture schedules, manufacturers' data and all other submittals that have been prepared in an 11 inch by 17 inch or smaller format. The Architect will return 1 (one) digital copy set to the Contractor.

i. Upon receipt of his digital marked up shop drawings/submittals, the Contractor shall make as many copies for distribution as he deems necessary, however he shall retain one copy to mark-up further to show any and all construction changes that modify the submittal in any form. This document(s) shall be turned over to the Owner at the end of the Project along with the Record Documents.

F. Color code: On all digital shop drawings submittals, schedules, etc., the Contractor's marks shall be in red, the Architect's in green and the Engineer's (if any involved) in blue. All comments shall be initialed by a responsible party within each organization.

G. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.

b. Product name and name of manufacturer.

c. Sample source.

d. Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available. **Colors will not be approved until all color submittals are received by the architect.**

a. Number of Samples: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return one submittal with options selected.

b. All color submittals are due within 45 days of the Notice to Proceed.

c. The architect will be allowed 15 days from the date of the receipt of the last color submittal to approve colors.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample set and one will be returned. Mark up returned Sample set as a Project Record Sample.

i. Construct a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

ii. If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

H. Interior Color Selections: Any submittals that are associated with the aesthetics of the interior design shall not be approved until all submittals associated with the interior design are in the Architect's possession.

I. Submittals Schedule: Comply with requirements specified in Division 1 Section 01320 "Construction Progress Documentation."

J. Application for Payment: Comply with requirements specified in Division 1 Section 01290 "Payment Procedures."

K. Schedule of Values: Comply with requirements specified in Division 1 Section 01290 "Payment Procedures."

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit digital copy of each submittal, unless otherwise indicated.

2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section 01400 "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 1 Section, 01310 "Project Management and Coordination."

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

G. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

J. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer aAnd witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

K. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

L. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

M. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

N. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

O. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section 01782 "Operation and Maintenance Data."

P. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

Q. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufactures. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

R. Manufacturer's Field Reports: Prepare written information documenting factory authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.

6. Statement whether conditions, products, and installation will affect warranty.

7. Other required items indicated in individual Specification Sections.

S. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

T. Construction Photographs and Videotapes: Comply with requirements specified in Division 1 Section 01322 " Photographic Documentation."

U. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.

1. Architect will not review submittals that include MSDSs and will return the entire submittal for re-submittal.

2.3 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit one copy of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each digital submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each digital submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review digital submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each digital submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each digital submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. REVIEWED–Indicates that reviewed submittal is satisfactory.

2. REJECTED–Indicates submittal is not satisfactory and another properly prepared submittal of same or another product must be prepared and resubmitted.

3. FURNISH AS NOTED–Indicates submittal is satisfactory if the changes, modifications, notes, etc. marked by the Architect are made a part of the submittal.

4. REVISE AND RESUBMIT–Indicates although parts of the submittal are satisfactory, there are enough significant modifications that must be made to require the Contractor, subcontractor,

supplier, and/or manufacturer to provide additional essential information to his submittal and then resubmit it to the Architect.

C. Informational Submittals: Architect will review each submittal and will not return it or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections include the following:

1. Division 1 Section 01100 "Summary" for limitations on utility interruptions and other work restrictions.
2. Division 1 Section 01330 "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Division 1 Section 01700 "Execution Requirements" for progress cleaning requirements.
4. Divisions 2 through 16 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.
5. Division 2 Section 02282 "Termite Control" for pest control.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Sewer connections will not be in place for most if not all of the duration of the project. When and if the off-site sewer is installed by others and sewer piping under this contract is installed, should the contractor decide to connect to the sewer he must pay all sewer use charges until the project is turned over to the Owner.

C. Water Service: Pay water service use charges for water used by all entities for construction operations.

D. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

1.5 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.6 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use

as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

1. Minimum Requirement: One (1) 10 foot wide x 44 foot long unit required.

B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack board.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services. Sanitary Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

2. Connect temporary sanitary sewer from construction office to a submerged temporary holding tank, as directed by authorities having jurisdiction.
3. Provide erosion control structures to drain storm water from site.

B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction from existing water lines in the street. Contractor shall pay for any metering costs and associated fees required by the City Water Department.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner’s existing toilet facilities will not be permitted.

D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

F. Electric Power Service: Provide temporary electric meter power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Contractor shall be responsible for any charges associated with said service.

1. Install electric power service overhead, unless otherwise indicated.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for each field office.

1. Provide additional telephone lines for the following:
    a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.
2. At each telephone, post a list of important telephone numbers.
    a. Police and fire departments.
    b. Ambulance service.
    c. Contractor's home office.
    d. Architect's office.
    e. Engineers' offices.
    f. Owner's office.
    g. Principal subcontractors' field and home offices.
3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

I. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities, or other suitable high speed internet connection.

1. Provide DSL in primary field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area with good visibility of construction. Comply with NFPA 241.

2. Maintain support facilities until near Substantial Completion. Remove before Substantial

   Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.

2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.

D. Project Identification and Temporary Signs: Erect Project identification, General Contractor's sign, Architect's sign and other signs as approved. Install signs where directed to inform public and individuals seeking entrance to Project. Subcontractor signs are not permitted.

E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

F. Temporary Stairs: Until permanent stairs are available, provide one temporary stair between floors, located near the center of the building.

G. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Division 1 Section "Summary."

B. Temporary Erosion and Sedimentation Control: Comply with requirements specified in Division 2 02100 Section "Site Preparation."

C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking in construction areas.

2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

3. Develop and supervise an overall fire-prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Carefully remove and turn over Architect’s sign to the Architect.

2. Where area is intended for landscape development, in an area that has been used as a compacted temporary road bed, remove soil and aggregate fill that do not comply with requirements for landscaping fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section 01770 "Closeout Procedures."

END OF SECTION

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and equal products.

B. Related Sections include the following:

1. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

3. Equal Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating equal products of other named manufacturers.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.

2. Form: Tabulate information for each product under the following column headings:

a. Specification Section number and title.

b. Generic name used in the Contract Documents.

c. Proprietary name, model number, and similar designations.

d. Manufacturer's name and address.

e. Supplier's name and address.

f. Installer's name and address.

g. Projected delivery date or time span of delivery period.

h. Identification of items that require early submittal approval for scheduled delivery date.

3. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.

4. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.

B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified materials or products cannot be provided.

b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.

c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

e. Samples, where applicable or requested.

f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.

j. Cost information, including a proposal of change, if any, in the Contract Sum.

k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.

l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: Change Order.

b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

c. If Contractor’s Substitution Requests are repeatedly (i.e. 3 times) submitted incomplete, i.e., no definitive response to items “a” through “l”, the Architect will not consider any further Substitution Requests.

C. Equal Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of an equal product request. Architect will notify Contractor of approval or rejection of proposed equal product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Use product specified if Architect cannot make a decision on use of an equal product request within time allocated.

D. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section 01330 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

B. The Contractor MUST provide the Owner with a Certificate of Asbestos Free Building Materials at the end of the project certifying that all building materials incorporated, installed, and used during the construction process of the project by the Contractor or its Subcontractors of any tier are 100% asbestos free. Asbestos Free means containing 0% asbestos in any form. The Certificate of Asbestos Free Building Materials form is included in the project manual.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.

2. Store materials in a manner that will not endanger Project structure.

3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Store cementitious products and materials on elevated platforms.

5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.
9. Materials Stored Off Site: Unless otherwise provided in the Contract Documents, the

   Contractor’s cost of materials and equipment to be incorporated into the Work, which are stored off the site, may also be considered in monthly Applications for Payment under the following conditions:

   a. The contractor has received written approval from the Architect and Owner to store the materials or equipment off site in advance of delivering the materials to the off site location.
   b. A Certificate of Insurance is furnished to the Architect evidencing that a special insurance policy, or rider to an existing policy, has been obtained by the Contractor providing all-risk property insurance coverage, specifically naming the materials or equipment stored, and naming the Owner as an additionally insured party.
   c. The Architect is provided with a detailed inventory of the stored materials or equipment and the materials or equipment are clearly marked in correlation to the inventory to facilitate inspection and verification of the presence of the materials or equipment by the Architect or Owner.
   d. The materials or equipment are properly and safely stored in a bonded warehouse, or a facility otherwise approved in advance by the Architect and Owner.
   e. Compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner’s title to such materials and equipment or otherwise protect the Owner’s interest.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

   1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Warranty start for mechanical and electrical equipment being date of substantial completion.

D. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Equal Products" Article to obtain approval for use of an unnamed product.

E. Product Selection Procedures:

1. Products and Manufacturers: In particular instances there may only be a single product or manufacturer appropriate for use on the project, in which case where Specifications name a single product and manufacturer and say “no equal”, provide the named product.
2. Products and Manufacturers: When one or two products or manufacturers are specified and have the words “or approved equal”, the Contractor may propose to provide alternatives in the form of a Substitution Request which once reviewed by the Architect will be either accepted or rejected. If Substitution Request is submitted for approval 7 days prior to the receipt of bids and approved by the Architect, said approvals will be included in Addenda. Only those Substitution Requests listed as approved in Addenda may bid the project.
3. Products and Manufacturers: Where Specifications include a list of three (3) or more names of both products and manufacturers, provide one of the products listed that complies with requirements. No substitutions will be accepted.
4. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or an equal product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named.
5. Visual Matching Specification: Where Specifications require matching an established Sample, product must comply with all requirements and must match Architect's sample. Architect's decision will be final on whether a proposed product matches.
    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product
6. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

1.8 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution under the conditions set forth in this section under Product Selection Procedures, if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

B. Conditions: Architect will consider Contractor's request for substitution under the conditions set forth in this section under Product Selection Procedures and when the following conditions are satisfied. If the following conditions are not satisfied,

C. Architect will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution requires no or only very minor revisions (as determined by the Architect), to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - NOT APPLICABLE

PART 3 - NOT APPLICABLE

END OF SECTION

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. General installation of products.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Sections include the following:

1. Division 1 Section 01310 "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
2. Division 1 Section 01330 "Submittal Procedures" for submitting surveys.
3. Division 1 Section 01770 "Closeout Procedures" for submitting Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

A. Qualification Data: For professional engineer.

B. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.

C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

D. Certified Surveys: Submit two copies signed by professional engineer.

1.4 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction

indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
   a. Description of the Work.
   b. List of detrimental conditions, including substrates.
   c. List of unacceptable installation tolerances.
   d. Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

2.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents. Submit requests on RFI, "Request for Interpretation."

2.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings,

in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required

dimensions.

3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

2.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

D. Final Property Survey: Submit a final property survey certifying exact locations of site improvements including building(s), parking lots, roadways and utilities including structure elevations, top and invert, distances from property lines, and with any variation from the original civil staking and layout and utility drawings identified.

2.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling unless shown otherwise on drawings.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results.

D. Maintain conditions required for product performance until Substantial Completion.

E. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

2.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction forces.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.
1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Pre-installation Conferences: Include Owner's construction forces at pre-installation conferences covering portions of the Work that are to receive Owner's work. Attend pre-installation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

2.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste.

Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

2.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section 01400 "Quality Requirements."

2.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

2.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

PART 3 – NOT APPLICABLE

END OF SECTION

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

B. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section 01290 "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Mark the Architect’s punch-list so-as-to identify those items that are still outstanding and uncorrected at the time of submission.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

1.7 MAINTENANCE MANUALS, WARRANTIES, AND GUARANTEES:

A. Unless indicated otherwise, furnish **one (1) original and one (1) copy of each item** required by the Project Manual.

B. Furnish to Architect for review, and then to Owner, in **two (2) separate sets bound in three-ring binders**, permanently and clearly identifying the project and contents on front and edge.

C. Additionally, furnish **two (2) sets of digital copies** in latest edition of ISO/Adobe compliant "Portable Document Format" ("PDF") saved as "Read Only" on thumb drives, clearly and permanently labeled as to their contents. MINIMUM RESOLUTION shall be 300 dpi for small format documents and 600 dpi for large format documents ("large format" is defined as larger than 11" x 17"). Original documents which include color, colored markings, etc., shall be scanned and saved as color documents. Documents may be saved in a non-proprietary ISO compliant self-extracting compressed file format, and no documents shall be password protected.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for Project.

    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

    c. Remove tools, construction equipment, machinery, and surplus material from Project site.

    d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

    e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

    f. Remove labels that are not permanent.

    g. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

        i. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

    h. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

    i. Replace parts subject to unusual operating conditions.

    j. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

    k. Clean ducts, blowers, and coils if units were operated without filters during construction.

    l. Leave Project clean and ready for occupancy.

END OF SECTION

SECTION 01781 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

B. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Digital Record Drawings.
2. Digital Record Specifications.
3. Digital Record Product Data.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of digitally scanned marked-up Record Prints.

B. Record Specifications: Submit one copy of digitally scanned Project Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one digitally scanned copy of each Product Data submittal.

D. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one clean set of blue- or black-line white prints of the Contract Drawings and Shop Drawings and one copy of the project manual (specification) at the job site for the sole purpose of recording changes to the drawings and specifications.

B. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

1. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
2. Accurately record information in an understandable drawing technique.
3. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

C. Content: Types of items requiring marking include, but are not limited to, the following:

1. Dimensional changes to Drawings.
2. Revisions to details shown on Drawings.
3. Locations and depths of underground utilities.
4. Revisions to routing of piping and conduits.
5. Revisions to electrical circuitry.
6. Actual equipment locations.
7. Duct size and routing.
8. Locations of concealed internal utilities.

9. Changes made by Change Order or Construction Change Directive. (Posted on Documents.)
10. Changes made following Architect's written orders, i.e. ASIs. (Posted on Documents.)
11. Details not on the original Contract Drawings. (Posted on Documents.)
12. Field records for variable and concealed conditions.
13. Record information on the Work that is shown only schematically.
14. Changes made in response to Contractor's questions, i.e. RFIs. (Posted on Documents.)

D. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

E. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

F. Mark important additional information that was either shown schematically or omitted from original Drawings.

G. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable. Where posting is required, post on Drawing Set and in Specifications on sheets or pages adjacent to or on top of where modification applies.

H. Attachment method shall be taped at top only, so as to access original underneath.

I. Digitally scan all documents and provide on CD Rom to Architect.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications. Maintain one clean copy of the project manual (specification) at the job site for the sole purpose of recording changes to the drawings and specifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

B. Digitally scan all documents and provide on CD Rom to Architect.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

B. Maintain one clean set at the job site for the sole purpose of recording changes to the drawings and specifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications and Record Drawings where applicable.

C. Digitally scan all documents and provide on CD Rom to Architect.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours. Architect’s representative will review Record Documents with the project superintendent each month to determine to his satisfaction whether or not Record Documents are being kept up to date. Failure to do so will result in the delay of processing pay request until Record Documents are brought up to date.

END OF SECTION

SECTION 01782 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Maintenance manuals for the care and maintenance of products, materials, finishes, systems and equipment.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after finalinspection.

1. Correct or modify each manual to comply with Architect's comments. Submit three copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE

Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual,

insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.

2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.

5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard printed maintenance instructions and bulletins.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.

3. Identification and nomenclature of parts and components.

4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.

2. Troubleshooting guide.

3. Precautions against improper maintenance

4. Disassembly; component removal, repair, and replacement; and reassembly instructions.

5. Aligning, adjusting, and checking instructions.

6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.

2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service: Some equipment and products require maintenance by the manufacturer, supplier or subcontractor, i.e., an authorized service representative, as part of the warranty. The General Contractor shall ensure that said maintenance work is done and provide copies of service reports to the Owner.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.

2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.

2. Comply with requirements of Record Drawings in Division 1 Section 01781 "Project Record Documents."

G. Comply with Division 1 Section 01770 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 02070 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of demolition work is shown on drawings, as well as all items necessary to complete new work indicated on plans.

B. Schedule of Demolition Work: Demolition includes but is not limited to the following:

1. Any damage to existing facilities at the site after the Contractor takes possession shall be repaired by this Contractor at his expense.

2. Contractor shall replace grass/sod damaged during the construction. Fill in ruts caused by equipment with topsoil and grass over to match existing conditions.

3. As indicated on the Drawings.

4. All other items indicated required to be demolished to complete new work.

1.3 SUBMITTALS

A. Schedule: Submit proposed methods and operations of demolition work to Architect for review prior to start of work. Include in schedule coordination for shut-off, capping and continuation of utility services as required.

1. Provide a detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner’s on-site operations.

1.4 JOB CONDITIONS

A. Condition of Structures: Conditions existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable.

B. Explosives: Use of explosives will not be permitted.

C. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

D. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

E. Protections: Ensure safe passage of persons (night or day) around area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities and persons.

1. Erect temporary covered passageways as required by authorities having jurisdiction.

2. Provide temporary fencing as necessary to secure the limits of construction. Fencing shall be substantial to deter passage, fencing material shall be at Contractors discretion.

F. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.

G. Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.

1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

2. All electrical work to be removed, relocated or reconnected shall be performed by a licensed Electrical Contractor in accordance with the NEC and any applicable local codes and ordinances.

PART 2 – PRODUCTS [NOT APPLICABLE]

PART 3 - EXECUTION

3.1 DEMOLITION - DISPOSAL OF DEMOLISHED MATERIALS

A. General: Remove from site debris, rubbish and other materials resulting from demolition operations.

B. Burning of removed materials from demolished structures will not be permitted on site.

C. Removal: Transport materials removed from demolished structures and legally dispose of off-site, in area approved by all local authorities and ADEM.

END OF SECTION

Crossville High School Cafeteria
DOCUMENT 00010

TABLE OF CONTENTS

Section Title

MISCELLANEOUS DOCUMENTS
00010 Table of Contents

DIVISION 2 - SITE CONSTRUCTION
02055 Soils for Earthwork
02060 Aggregates for Earthwork
02300 Earthwork
02551 Natural Gas Distribution Steel
02552 Natural Gas Distribution HDPE
02630 Storm Drainage
02923 Landscape Grading
02924 Seeding

DIVISION 15 – MECHANICAL
15140 Water Piping Distribution
15150 Sewer Piping, Manholes



END OF SECTION

SECTION 02055

SOILS FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Subsoil materials.
   2. Topsoil materials.

B. Related Sections:

   1. Section 02060 - Aggregates for Earthwork.
   2. Section 02311 - Rough Grading.
   3. Section 02320 - Backfill.
   4. Section 02324 - Trenching.
   5. Section 02923 - Landscape Grading.
   6. Section 02924 - Seeding and Soil Supplements.
   7. Section 02925 - Sodding.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
   1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
   1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
   3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.3 QUALITY ASSURANCE

A. Furnish each subsoil or topsoil material from single source throughout the Work.

B. Perform Work in accordance with State of Alabama Highway Manual Latest Edition.

PART 2 PRODUCTS

2.1 SUBSOIL MATERIALS

A. Subsoil Type
   1. Excavated and re-used material. Imported borrow or local borrow.
   2. Graded.
   3. Free of lumps larger than 3 inches, rocks larger than 3 inches, and debris.

2.2 TOPSOIL MATERIALS

A. Topsoil Type :
   1. Excavated and reused material unclassified.
   2. Graded.
   3. Free of roots, rocks larger than ½ inch, subsoil, debris, large weeds and foreign matter.

B. Topsoil Type Imported:
   1. Imported borrow.
   2. Friable loam.
   3. Reasonably free of roots, rocks larger than ½ inch, subsoil, debris, large weeds, and foreign matter.

2.3 SOURCE QUALITY CONTROL

A. Testing and analysis of soil material shall be performed by contractor at contractor’s expense.

B. Testing and Analysis of Subsoil Material: Perform in accordance with AASHTO T180.

C. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D698.

D. When tests indicate materials do not meet specified requirements, change material and retest.

E. Furnish materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 EXCAVATION

A. Excavate subsoil and topsoil from areas designated. Strip topsoil to full depth of topsoil in designated areas.

B. Stockpile excavated material meeting requirements for subsoil materials and topsoil materials.

C. Remove excess excavated materials, subsoil and topsoil not intended for reuse, from site.

D. Remove excavated materials not meeting requirements for subsoil materials and topsoil materials from site.

3.2 STOCKPILING

A. Stockpile materials on site designated by Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Stockpile topsoil 10 feet high maximum.

E. Prevent intermixing of soil types or contamination.

F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

G. Contractor shall seed stock pile areas to prevent erosion from stockpiles.

H. Contractor shall place silt fencing around stock piles to further prevent erosion due to rain.

3.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

B. Leave unused materials in neat, compact stockpile only if directed by the Owner or the Engineer.

C. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 02060

AGGREGATES FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Coarse aggregate materials.
   2. Fine aggregate materials.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
   1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
   2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
   1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
   4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
   5. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Requirements for submittals.

B. Samples: Submit, in air-tight containers, 10 lb sample of each type of Type fill to testing laboratory.

C. Materials Source: Submit name of imported materials suppliers.

1.4 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

PART 2 PRODUCTS

2.1 COARSE AGGREGATE MATERIALS

A. Coarse Aggregate shall include gravel, crushed stone; free of shale, clay, friable material and debris; graded in accordance with ASTM D2487; within the following limits:

Sieve Size	Percent Passing
2 inches	100
1 inch	85-95
3/4 inch	0-15
5/8 inches	0-5
3/8 inches	0-5
No. 4	----
No. 16	----
No. 40	----
No. 200	----

B. Small Aggregate Type (Pea Gravel or Crusher Run): Natural stone; [washed,] free of clay, shale, organic matter; graded in accordance with ASTM D2487; to the following limits:
   1. Minimum Size: 1/16 inch.
   2. Maximum Size: 5/8 inch.

2.2 FINE AGGREGATE MATERIALS

A. Fine Aggregate Type (Sand): Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded in accordance with ASTM C136; within the following limits:

Sieve Size	Percent Passing
No. 4	100

No. 8	90-100
No. 16	60-85
No. 100	0 -5

2.3 SOURCE QUALITY CONTROL

A. Section 01400 - Quality Requirements: Testing and inspection services.

B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698, ASTM D1557, and ASTM C136.

C. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698, ASTM D1557, ASTM D4318, and ASTM C136.

D. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.1 EXCAVATION

A. Excavate aggregate materials from on-site locations as specified in Section 02300.

B. Stockpile excavated material meeting requirements for coarse aggregate materials and fine aggregate materials.

C. Remove excess excavated materials, coarse aggregate materials and fine aggregate materials not intended for reuse, from site.

D. Remove excavated materials not meeting requirements for coarse aggregate materials and fine aggregate materials from site.

3.2 STOCKPILING

A. Stockpile materials on site, out of the way of work in this project..

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.

D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water. Plant grass to establish vegetation and prevent erosion.

END OF SECTION

SECTION 02300

EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section includes site grading, removal of topsoil and subsoil, building excavating and trenching, backfilling, and compacting.

1.2 QUALITY ASSURANCE

A. Provide borrow material from a single source throughout the project.

B. Provide excavation work to be compliance with applicable requirements of authorities having jurisdiction.

C. Contractor shall furnish third party testing lab to conduct all soil testing required throughout project. Contractor shall pay all cost for said testing lab.

1.3 DEFINITIONS

A. Excavation: Removal of material encountered to subgrade elevations indicated and subsequent disposal or storage of materials removed. **All Excavation is UNCLASSIFIED and Owner makes no representation as to the amount of rock or any other substance in the excavation area and Contractor shall make its own determination after making inspection of the area to be excavated.**

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Topsoil: Reusable excavated, Imported, friable loam; free of subsoil, roots, grass, weeds, large stone, and foreign matter.

B. Subsoil: Imported, Excavated material, graded free of lumps larger than 3 inches, rocks larger than 3 inches, organic material, and debris.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Call Local Utility Line Information service at three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Notify Architect/Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

D. Maintain and protect existing utilities to remain.

E. Verify foundation or basement walls are braced to support surcharge forces imposed by backfilling operations.

3.2 PROTECTION OF ADJACENT WORK

A. Underpin adjacent structures which may be damaged by excavation work, including service utilities and pipe chases.

B. Grade excavation top perimeter to prevent surface water run-off into excavation or to adjacent properties.

3.3 TOPSOIL EXCAVATING

A. Do not excavate wet topsoil.

B. Excavate topsoil and stockpile in area designated on site, remove excess topsoil not being reused from site and stockpile for later use within this project.

3.4 SUBSOIL EXCAVATING

A. Do not remove wet subsoil.

B. Remove groundwater by pumping to keep excavations dry.

C. Excavate subsoil from marked areas required for building foundations, piling, construction operations, and other Work.

D. Slope banks to angle of repose or less, until shored.

E. Proof roll bearing surfaces. Fill soft spots with engineered fill and compact uniformly to 95 percent of maximum density.

F. Correct unauthorized excavation at no cost to Owner.

G. Fill over-excavated areas under structure bearing surfaces in accordance with direction by Architect/Engineer.

H. Remove excess subsoil not being reused from site.

3.5 TRENCHING

A. Excavate for storms sewer, sanitary sewer, ducts, water, gas, piping to municipal utilities' minimum requirement.

B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection. Minimum trench with shall be two times the diameter of the utility being installed minimum.

C. Hand trim excavation and leave free of loose matter. Hand trim for bell and spigot pipe joints.

D. Support pipe and conduit during placement and compaction of bedding fill.

E. Backfill trenches to required contours and elevations.

F. Place and compact fill materials as for Backfilling.

3.6 BACKFILLING

A. Backfill areas to contours and elevations. Use unfrozen and unsaturated materials free of rocks.

B. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place fill material in continuous layers and compact.

D. Employ placement method so not to disturb or damage foundations, foundation perimeter drainage, foundation dampproofing, foundation waterproofing and protective cover, or utilities in trenches.

E. Maintain optimum moisture content of backfill materials to attain required compaction density.

F. Backfill against supported foundation walls. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

G. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.

3.7 PLACING TOPSOIL

A. Place topsoil in areas where seeding, sodding, or planting is scheduled.

B. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.

C. Remove large stone, roots, grass, weeds, debris, and foreign material while spreading.

D. Lightly compact placed topsoil.

E. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.8 FIELD QUALITY CONTROL

A. Request inspection of foundations in accordance with applicable codes.

B. Perform laboratory material tests in accordance with ASTM D1557.

C. Perform in place compaction tests in accordance with the following:
1. Density Tests: ASTM D2922.

D. Frequency of Tests: As recommended by Geotechnical Engineer.

END OF SECTION

SECTION 02551

NATURAL GAS DISTRIBUTION - STEEL PIPING

PART 1 GENERAL

1.1 Summary

A. Section Includes:
1. Steel Pipe and fittings.
2. Valves.
3. Pressure regulating valves.
4. Underground & pipe markers.
5. Bedding and cover materials.

1.2 Unit Price – Measurement and Payment

A. Pipe and Fittings:
1. Basis of Measurement: By the linear foot.

B. Gas Valves:
1. Basis of Measurement: By the unit.

C. Pressure Regulating Valves:
1. Basis of Measurement: By the unit.

1.3 Submittals

A. Product Data: Provide data indicating pipe, pipe accessories and fittings, descriptive literature, materials of construction and all related product data as required by the Engineer.

B. Manufacturer's Installation Instructions: Indicate special products or procedures required to install products specified

1.4 Project Record Documents

A. Record location of pipe runs, connections, valves and related items.

B. Identify and describe discovery of uncharted utilities.

C. Submit documents under provisions of Contract Documents.

1.5 References

A. ASTM A53- Steel Pipe, Black and Hot dipped. Zinc-Coated Welded and Seamless.

B. A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

C. Department of Transportation, Office of Pipeline Safety - Bulletin 49, "Transportation of Natural and Other Gas By Pipeline: Minimum Federal Safety Standards".

D. Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT Standard Specifications).

E. Construction Standard for Excavation -OSHA (29CFR Part 1926.650.652 Subpart P).

1.6 Regulatory Requirements

A. Conform to applicable code for materials and installation of the Work of this section.

B. OSHA- Construction Standards for Excavations (29CFR Part 1926.650.652 Subpart P).

C. DOT- Bulletin 49.

D. ADOT Standard Specifications for Highway Construction.

1.7 Field Measurements

A. Verify that field measurements and elevations are as indicated.

1.8 Delivery, Storage and Handling

A. Deliver, store and handle Products to site under provisions of the Contract Documents.

B. Store and protect Products as instructed by manufacturer and in accordance with Contract Documents

1.9 Qualifications

A. **Manufacturer:** Company specializing in the manufacturing of the Products specified in this Section minimum three years documented experience.

B. **Installer:** Company specializing in the installation of the Products specified in this Section with minimum three years documented experience and a minimum of 5 successful project of similar size, complexity and cost. **Contractor shall provide all necessary OQ certifications, welding certifications, HDPE pipe fusing certifications as required to comply with DOT Bulletin 49. This documentation is required for all Contractor personnel on project and shall be filed at the office of the Engineer and the Owner.**

C. **All individuals including Contractors are required to be qualified in order to perform work on the Gas District's pipeline. Any Contractor employed by the District will be required to follow the District's Operator Qualification Plan when qualifying their employees. If necessary, the Gas District will provide a list of available approved training providers to the Contractor to choose from. The Gas District will review the Contractor's records for compliance with the Operator Qualification Rule and the Operator Qualification Plan before an individual is allowed to work on the pipeline and at random intervals to ensure continued qualification.**

D. **If Contractor elects to use explosives on this project, then the Contractor shall comply with the State of Alabama and the BATF requirements for blasting in the State of Alabama. These certifications shall be furnished to the Owner and the Engineer for their records.**

1.10 Warranty

A. Provide minimum one year warranty. Warranty period begins with date of substantial completion and Owner acceptance.

PART 2 PRODUCTS

2.1 General

A. All materials shall meet the requirements and regulations of the Department of Transportation, Office of Pipeline Safety relating to the transportation of natural gas or other gases by pipeline as set forth in DOT Bulletin 49 and related documents.

2.2 Steel Pipe and Fittings

A. Pipe:

1. All steel piping shall be domestic steel pipe.
2. 2" IPS, .188 Wall, API 5L, X42/X52 ERW-DRL Steel Pipe.
3. PE Beveled SRL. 3" IPS, .188 Wall, API 5L, X42/X52, ERW, DRL Steel Pipe.
4. PE Beveled SRL. 4" IPS, .188 Wall (and 0.237 wall for State Highway bores), API 5L, X42/X52 ERW, DRL, Steel Pipe PE Beveled SRL 6" IPS, .188 Wall, API 5L, X42/X52 ERW, DRL, Steel Pipe.

B. Service Pipe:

1. 3/4" IPS, .113 Wall, TFA 106, Grade B, Seamless, Steel Pipe, Butt Weld Single Length, Epoxy

C. PE Beveled SRL. 1" IPS, .133 Wall, TFA 106, Grade B, Seamless, Steel Pipe, Butt Weld Single Length, Epoxy, PE Beveled SRF. Buried Fittings(Tees, Bends, Etc.): shall be butt-welded, carbon steel, ASTM A234, Grade WPB,

D. Tapping/Stopper Fittings: Tapping/Stopper fittings with o-ring sealed cast steel (ANSI A216 GR.WCB) completion plug and equalizing valve. Class 300 flange (ANSI B16.5). Maximum working pressure 720 psi at 100° F. Welded bottom-out and standard line stopper fittings, by pass stoppers, steel wedge stoppers and all related items for positive line shut off and hot tap shall be **Mueller No. H-17261 for 4-inch piping bottom out** and **Mueller H-17281 for 6" piping bottom out,** ~~stopper fitting shall be Mueller H-17256.~~

E. Fittings: All fittings shall be Y52 fittings for X52 Steel Piping.

2.3 Pipe Supports

1. All pipe supports shall conform to the details shown on the Drawings and shall be located as shown on the Drawings or as required to prevent additional stress on piping.

2.4 Pipeline Identification and Location

A. Line Markers – All piping

Thermoplastic polymer oval line markers, 3.5" outside diameter, 72" long, solid color (yellow), decal with the general wording "**Caution - Natural Gas Pipeline**" Owner's name and phone number to be included. The

post provides simple 360-degree visibility. Line markers as manufactured by Rhino Markers, Carsonite or approved equal. Color and complete wording for line markers is to be approved by the Engineer. Distance for line markers is one every 500 linear feet or line of site.

B. Non- Detectable Marking Tape – For Steel Piping

1. Tape: Plastic (Ultra-high Molecular Weight Polyethylene); minimum 4.0 mil (0.004 inch) overall thickness; minimum 10.64 pounds/inch width; alkaline and corrosion resistant; minimum 10.64 pounds/inch tensile break strength.

2. Detectable Core: None

3. Lettering: tape shall be inscribed with permanent, corrosion resistant, 1-1/2 inch tall black letters, repeated every 20 to 36 inches as follows: **“CAUTION GAS LINE BELOW”**

4. Manufacturer: The non-detectable marking tape shall be the **"SHIELDTEC"** as manufactured by **Thor Enterprises, Inc., Sun Prairie, WI,** or approved equal.

2.5 Casing Pipe

A. Casing pipe shall be steel, API 5LX, Grade X-42 with welded field joints. Casing wall thickness shall be min. 0.250 inches for all sizes thirty-six (36) inches and smaller and shall conform to State of Alabama Highway Department Section 862 for larger diameters.

B. Carrier pipe shall be installed with casing end seals to prevent corrosion within the annular space of the carrier pipe and the casing pipe. The end seals shall be constructed of solid synthetic rubber connected by corrosion resistant bolts and nuts. End seals shall be 400 Series as manufactured by Link-Seal or approved equal.

C. Casing vent pipe shall be 2-inch bare steel, as shown on casing vent detail. Vent pipe exterior shall be coated in accordance with Paragraph COATINGS.

D. Casing vent pipe shall be terminated toward the ground using two 90 degree elbows or one 180- degree bend. Casing vent pipes shall be extended to the **back** of the right of way or as directed by the Owner and Engineer.

E. The approximate locations and lengths of encasements are shown on the Drawings for bidding information, but the exact location and length of encasement will be determined by the appropriate highway department and/or permits.

2.6 Insulation- Carrier pipe shall be electrically isolated from the casing pipe by casing insulators. Insulators shall be injection molded, polyethylene type as manufactured by **PSI** or an approved equivalent. Insulators shall be spaced a maximum of 10 feet apart.

2.7 Test Stations

A. Test stations shall **be Finklet/FinkPlate test stations** as manufactured by **Cott Manufacturing Co.** or approved equal.

B. Test leads shall be 10 AWG.

2.8 Coatings for Corrosion Protection

A. Epoxy Coated(Shop Coat) Steel Pipe

1. All buried steel pipe shall be shop coated with fusion bonded epoxy coating prior to delivery to project site.

2. Coating shall be applied over full length of pipe to within 1-1/2 inch of pipe ends.

3. Coating shall be the **Scotch Kote 6233** Fusion Bonded Epoxy Coating as manufactured by **3M Company**, St. Paul, MS, or equal.

4. Field repair and touch up construction shall be by hot melt patch compound furnished by coating manufacturer and compatible with epoxy coating for scratches and disturbed areas smaller than one square inch.

5. **Coating shall be a minimum thickness of 15 mils for 4" steel piping**. Engineer may provide a coatings inspector to visit plant during application of coatings.

6. All buried piping installed by boring under paved roads without casing, shall be shop coated with an epoxy based polymer concrete coating (Powercrete Coating) in addition to the fusion bonded epoxy coating prior to delivery to the project site.

7. **Polymer Concrete, Powercrete**, **coating shall be a minimum of 40 mils thick for steel piping.**

8. Polymer Concrete Coating shall be Powercrete epoxy based polymer concrete coating as manufactured by **Power Lone Star Inc.**

9. **Powercrete Coated Piping for bores and creek crossings shall require the use of 1 pound F1 Powercrete kit to coat the girth welds. Girth welds shall be sand blasted just prior to installation of F1 kit.**

10. Hot wrap coating shall be as manufactured by **Tapecoat**, or approved equal.

11. Shrink sleeves shall be installed on every welded joint as manufactured by **Canusa, Raychem**, or an approved equal. Not required on Powercrete coated piping when F1 kits are used to cover girth welds.

12. Rock shield shall be installed when rocks are exposed that could damage the pipe coating as it is lowered into the trench. Rock shield

shall be as manufactured by **Tuff-N-Nuff Industries, Ltd**. Rock shield shall be installed via "cigarette wrapped" and it is generally recommended to allow overlap to be in the 6 o'clock position to insure double protection along the bottom of the pipe. Affix rock shield using tape, plastic wire ties or an appropriate non-metallic strapping. Pipeline shall be backfilled immediately following the installation of rock shield.

13. Exposed bare steel piping shall be coated as follows:

    1. Primer- **Induron** Perma-Clean II Primer or approved equal. Coating thickness not less than 5 mils DFT.

    2. Intermediate Coat- **Induron** Perma-Clean II Semi-Gloss or equal. Coating thickness not less than 5 mils DFT.

    3. Finish Coat- **Induron** Indurethane 500 Clear or equal. Coating thickness not less than 3-5 mils DFT.

B. Field Applied Tape Coating

1. Cold applied 2" tape wrap with no primer required, all weather installation, designed specifically for buried steel gas lines and fittings, bonded to any mill coating.

2. Coating shall be as **Tape Coat H35 Gray** manufactured by the **Tape Coat Co.** or approved equal.

C. Tape for Buried Steel Fittings

1. All buried valves, fittings, and related items shall be wrapped with underground wax tape as manufactured by **Trenton #1 Wax Tape** for below ground use, or approved equal.

D. Tape for Exposed Steel Fittings and Piping

1. All exposed fittings, piping and related items shall be wrapped with wax tape as manufactured by **Trenton #2 Wax Tape** for above ground use, or approved equal.

2.9 Valve Types and Related Items

A. Steel Ball Valves

1. Inline Valves: Carbon steel body, ASTM A53, Grade A, full port, weld ends ASTM A53 Grade A, **285 psig** or Class 150, solid polished stainless steel

ball, 1/4 turn operation, Carbonized Teflon seats.

2. Sidetap Valves: Carbon steel body, ASTM A53, Grade A, full port, weld by weld ASTM A53 Grade A, **285 psig** or Class 150, solid polished stainless steel ball, 1/4 turn operation, Carbonized Teflon seats.

3. Valve must meet Code of Federal Regulations, Title 49, Part 192, API 6D, and ASME Boiler and Pressure Vessel Code, Section IX.

B. Valve Box

1. **Standard, cast iron adjustable, screw type, dome base, buffalo type, three piece, 5 1/4" shaft.** Lid shall be cast iron with "GAS" cast into the lid. Valve box and lid shall be as manufactured by **Opelika Foundry** or approved equal. Contractor shall be responsible to ensure adequate length of valve box is provided to reach final grade.

C. Valve Markers

1. Fiberglass stakes, 4" wide, 66" long, solid color (yellow), decal with the general wording **"Caution - Natural Gas Pipeline**." Owner's name and phone number shall be included. Color and complete wording to be approved by the Engineer. Valve Marker as manufactured by **Carsonite** or approved equal.

2.10 Gas Service Tap/Farm Tap

A. Service Valve Tee: Service valve tee with forged steel body (ANSI C1029), steel completion cap (ANSI C1029), 3/8" heat treated steel perforator tip, weld inlet and outlet, 1440 psi maximum working pressure. Service valve tee shall be **Mueller Autoperf Tee No. H-18102** as manufactured by **Mueller Company** or approved equal.

B. Anodeless Service Riser: Anodeless, preformed, coated, butt weld connection steel riser as manufactured by **Perfection Company** or approved equal.

C. Curb Valve Tee: Forged steel body (ANSI C1029), steel completion cap (ANSI C1029), 314 stainless steel stem, welded inlet and outlet, ductile iron handle, 1440 psi maximum working pressure. Curb valve tee shall be **Mueller No-Blo A-105** as manufactured by **Mueller Company** or approved equal.

D. Pressure Regulator: Direct operated pressure reducing regulator with internal relief and open throat, 1/8” orifice, outlet pressure 15-40 psi, Pressure regulator shall be **Fisher Pressure Regulator Model No. 627R** as manufactured by **Fisher Controls International** or approved equal.

PART 3 EXECUTION

3.1 General

A. All trenching, welding, installation, pipe laying, testing, backfill, and all related installation procedures must be in accordance with CFR 49 Part 192 – “Transportation of Natural or Other Gas by Pipeline: Minimum Federal Safety Standards”, ASME Code for Pressure Piping B31.8, and OSHA Construction Standards. **ALL EXCAVATION IS UNCLASSIFIED.**

B. Contractor shall cover all ditches daily, prior to leaving project, before sunset.

3.2 Installation – STEEL PIPING

A. Excavate pipe trench in accordance with drawing details. Hand trim as required for placement of pipe.

B. Trenches shall be of sufficient width to ensure proper bedding, haunching, compaction and backfill under and around pipe in order to facilitate pipe laying, future maintenance and protect the installed pipe in both earth and rock excavation conditions.

3.3 Examination

A. Verify that trench cut is ready to receive Work and excavations, dimensions and elevations are as shown on Drawings.

3.4 Preparation

A. Hand trim excavations to required elevations as required.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

C. In general, all lines should be run parallel or perpendicular to the center line of the adjacent roadway or building. Coordinate with Engineer.

3.5 Line-Up and Welding

A. Line-Up

1. Immediately preceding the lining-up operation, and not before, the Contractor shall remove from the pipe ends any protective caps which may be present, and thoroughly swab and clean the pipe interior.

2. The pipe shall be lined up in a true and workmanlike manner, using standard steel line-up clamps.

3. During necessary shifting, pipe shall be carried, not dragged, into position. Ditch cross-skids shall be not less than 4 inch face.

B. **All welding shall follow the proper welding procedures for pipe type and thicknesses being installed. The welder is responsible for insuring these procedures are followed.**

C. All electric welding is to be done using coated electrodes, giving a fully shielded arc. The brand and type of electrode must be approved by the Engineer.

D. Before any welding, the Contractor must first insure that the welding gap does not exceed 1/16 inch and that the pipe and all joints have been thoroughly wire-brushed, cleaned and swabbed.

E. All beads are to be thoroughly cleaned by wire-brushing and, if necessary, by chipping before the application of the next bead. The first beads of all roll welds shall be run with 1/8 inch rods; second and third beads with 5/32 inch rods. Tie-in or position welds shall be made with 1/8 inch rods for the first bead; second and third beads with 5/32 inch rods.

F. Welding machines of a capacity of 250 or 600 amp, under normal conditions, shall be used.

G. All welds shall be marked with the individual stamp of the welder doing the work.

H. The line will be welded by the conventional method of roll welding as many sections of the pipe as practicable, and later joining these roll welded sections by position welds over the ditch, or by such method as the Engineer may approve.

I. Welding Qualification Certificate: The Contractor shall provide a certificate to the Engineer, prior to any welding operations, indicating to the satisfaction of the Engineer that the welders to be employed on the project are qualified in accordance with the DOT Pipeline Safety Regulations. Any change of welders on the job shall require a similar certificate prior to the employment and use of the new welder on the project.

J. All welds shall be free of cracks, lack of penetration, burn-through and other obvious defects and must present a neat, workmanlike appearance. Undercutting adjacent to the final bend on the outside of the pipe shall not exceed 1/32 inch in depth, and there shall not be more than 2 inches of undercutting in 12 inch length of weld.

1. Any line smaller than 1-1/3 inches shall be blown out with air to remove any dust and small particles. These lines shall be pigged only if required be the Owner or Engineer.

2. Equipment utilized in cleaning the pipeline shall not contaminate the interior of the pipeline with any type of water, oil, lubricant, debris, or any other foreign material.

K. Protection of Welded Sections of Pipe

1. If it shall be necessary to stop work for any reason before the sections are welded together, suitable protection must be placed on the

ends of the pipe so that they may be kept fully free of obstructions.

2. At any time during the progress of construction, a final tie-in is discontinued, the exposed ends must be closed in a manner acceptable to the Engineer.

3. The pipeline must be delivered to the Owner ready for operation entirely, free from water, dirt, or other obstructions.

3.6 Corrosion Protection

A. Epoxy Coating

1. Prior to laying pipeline, all steel pipe be inspected by the Contractor to insure that the epoxy shop coat has not been damaged.

2. Any broken or damaged coating will be field repaired with a hot melt patch compound as recommended by the epoxy coating manufacturer.

3. A high voltage holiday detector shall be used over the pipeline after completion of welding, shrink sleeve installation, and pipe patching prior to lowering into the ditch. All holidays found shall be repaired in accordance with the coating manufacturer's specification and to the satisfaction of the Engineer. The voltage for the Holiday Detector Test shall be a minimum of 100 volts per mil or as required by manufacturer.

4. **Contractor shall provide documentation showing holiday detector has been calibrated and currently operates at the correct voltage for the specified pipe coating thickness.**

5. Provide working voltmeter onsite to spot check holiday detector's voltage at Engineer's request.

6. All welds shall be covered with a shrink sleeve.

7. All buried valves, fittings, and related items shall be wrapped with underground wax tape as manufactured by Trenton #1 Wax Tape for below ground use, or approved equal.

8. Test station leads shall be 10 AWG, Thermite welded to pipe.

B. Paint

1. All above ground exposed steel pipe and fittings shall be brush painted with primer and two coats of the rust inhibitive paint as recommended by the manufacturer.

2. Surface preparation shall be as recommended by manufacturer.

3. Finish coat color to be determined by the Owner.

3.7 Installation of Buried Pipe

A. All buried pipe shall be prepared as hereinbefore specified and shall be laid on the prepared sub-grade and bedded to ensure uniform bearing. No pipe shall be laid in water or when, in the opinion of the Engineer, trench conditions are unsuitable.

B. Belt slings shall be used for lowering the pipe into the ditch.

C. Contractor shall verify the location of all underground utilities prior to excavation.

D. Piping on Highway right-of-way shall be installed according to Alabama Department of Transportation specifications and approved permits.

E. Piping shall be installed at a minimum depth of 36 inches below ground level.

F. Piping shall be separated by a minimum of 24 inches from other underground utilities and structures.

G. Rock shield shall be installed when backfill, free of rocks, that could damage the pipe coating cannot be obtained.

H. Pipeline markers shall be installed at all road crossings and where necessary along the pipeline to provide adequate visibility.

I. All trenches shall be covered daily. No trenches shall be left open overnight or through the weekend.

J. When the pipe laying is not in progress, including the noon hours, the open ends of pipe shall be closed and no trench water, animals, or foreign material shall be permitted to enter the pipe.

3.8 Horizontal Directional Drilling (HDD) Procedures

A. Several days prior to the drill, a pre-construction meeting at the jobsite shall be arranged by the drilling superintendent with all parties involved with the directional drill, including the general contractor, ALDOT, Owner, Engineer, local one call services, and all other adjacent utility company personnel to discuss plans for installing the directionally drilled crossing.

B. The drilling contractor shall survey and stake a preplanned proposed drill route. A line of site, or a well-established set of points from the entry to the exit point, shall be established by the survey crew. Coil points shall be surveyed, staked and recorded for the guidance system.

C. The drilling contractor shall prepare and submit to the Gas District's Engineer a written plan and procedure for the installation of the drilled crossing complete with plan/profile information. No work shall be performed until after the written plan has been approved by the Engineer.

D. After the written plan has been approved by the Engineer, the location site shall be cleared, and the drilling rig and support equipment shall be brought in and set up. The drilling equipment shall consist of an adequately-sized push/pull directional drill rig, complete with pumps, cleaning systems, drill pipe and support equipment. All equipment shall be placed in a safe, neat manner near the drill rig.

E. After set up of the drill rig and support equipment has been completed a guided probe shall be installed in a non-magnetic drill collar with a predetermined calculation in the azimuth. A jetting assembly shall then be attached to the collar with a 1.5 degree bend for steering capabilities. The steering and tracking system shall be non-magnetically influenced and shall be accurate within 2% of the drill depth.

F. In the event that the jetting assembly can no longer penetrate at an acceptable rate, a down hole motor shall be used to penetrate hardened clay, sand and rock formations.

G. Work shall commence when a planned route has been established providing a safe radius and direction for the carrier pipeline. All obstacles, such as previously drilled gas or electric lines shall be plotted on the profile and identified to ensure maximum clearances before drilling. During the pilot drill phase of the operation, drilling personnel have a constant read out of probe location. A survey is taken approximately every 15 feet and plotted by hand on a visual profile, and calculated by computer with tensor software provided by the contractor.

H. A high yield bentonite solution shall be mixed in a tank for the drilling process. The slurry shall be used for lubrication, solid removal, hole support, and cooling of the down hole tools. As slurry is recirculated in the hole during drilling process, shakers and an assortment of hydro-cyclones shall be used to clean slurry to less than 5% of sands and solids.

I. Upon completion of the pilot bore, the down hole assembly shall be removed, and a swivel shall be attached to the drill pipe on the exit side. A dozer or track hoe shall then be attached to the swivel and shall assist in the pre-ream operation. If conditions prevail, a cutter shall be placed on the rig side and

pulled toward exit side by the dozer or track hoe. This push ream type process will allow the drilling slurry with cuttings to flow back to the drilling rig where it can be cleaned and recirculated. If a push type ream cannot be used, a conventional pull ream shall be applied where cuttings are pumped from the exit side back to the drill rig for cleaning and recirculating. During the reaming process, cutters shall be pulled through the drill hole in stages until the drill path has been opened to 1.5 times the diameter of the pull pipe or 12 inches larger than the outside diameter of pull pipe, depending on the drill superintendent's recommendations. The reaming speed shall be adjusted to allow 20% solids removal from the drill hole. All solids shall be removed in an environmentally acceptable manner and disposed off site by the drilling contractor.

J. Once the reams are completed, the superintendent shall decide if a swab pass is necessary to refortify the drill hole. For the pull back operation, a reamer 6 to 8 inches larger than the carrier pipe is attached to the drill string with a swivel attached to the line pipe pull head. The line pipe shall be positioned on rollers and cradles, which shall hold the correct angle of the over bend. Additional support equipment may be used during pull back operation. Right of Way pits or frac tanks shall be on site to contain drilling slurry that is displaced by carrier pipe during pull back operation. Also, the contractor shall have crews to assist in the buoyancy control, coating inspection and repair for carrier pipelines.

K. In the event of a fissure in any portion of the drilling procedure, all work shall be halted. Inspectors shall be notified and contractors shall contain slurry by hay bales, silt fences and berms. The slurry shall be pumped to frac tanks, depending on the condition and location of the fissure. Pumps shall then be used to deliver slurry back to recycling equipment at rig side. In the event of a large release of bentonite into a body of water, tributary curtains shall be used to isolate the spill area. Drilling fluids shall then be pumped back to containment devices. Banks shall be washed with high volume water flow devices and restored to its original environment condition prior to the restart of drilling operations. With down hole sealers being applied, the pipe string shall be tripped back to the point that a full flow of returns are obtained and the entry location.

L. Exit side shall be handled in the same manner with frac tanks and pumps for in-advertent returns. After completion of product line pull back, drilling contractor shall supply an as-built drawing within 10 days.

M. Highway and Railroad Crossings
   1. All pipe lines crossing under highways and railroads shall be cased and vented as seen on drawings. The method of construction and protective measures required shall fully comply with all requirements of the Alabama State Highway Department, County having jurisdiction and railroad owner.
   2. Casing pipe shall be coated with a coal tar base primer.

3. Casing pipe shall conform to the requirements of ASTM Specification Al39, Grade B. Minimum thickness of pipe shall be as listed below, unless otherwise noted on the Plans or in the Proposal.

Casing Pipe Size	Grade	Minimum Wall Thickness
1-1/2" O.D.	B	0.145"
2-3/8" O.D.	B	0.154"
4-1/2" O.D.	B	0.237"
6-518" 0.D.	B	0.250"
8-518" O.D.	B	0.375"

4. Vent piping shall be 2 inch, standard-weight, welded steel pipe. The vent pipes shall be welded to the casing.
5. Carrier pipe shall be installed in casing using WmSeal bushings, centering cradles and insulators, as manufactured by T. D. Williamson, Inc., Tulsa, Oklahoma, or approved equal. Seals shall be Type U. Insulators shall be "Concentric-Support" type insulators. One 3-way cradle and seal shall be installed at each end and the following number of insulators:

Length Of Casing	No. Of Insulators
Less than 40 feet	2
40 to 60 feet	4
60 to 80 feet	6
80 to 100 feet	8
100 to 120 feet	10
For longer casing	Add 1 insulator for every additional 12 feet

3.9 Cleaning and Testing Welded Steel Pipe

A. Make sure pressure and leakage tests are completed on all newly laid pipe. The Contractor shall coordinate with the Engineer at least 24 hours in advance for scheduling pressure tests. No pressure tests shall be scheduled such that they would be completed on weekends or State recognized holidays. The Contractor shall provide all necessary equipment and material, make all taps in the pipe as required, and conduct the tests. The Engineer will monitor and witness the tests before the installed pipe is approved. **Pressure tests must be completed and approved by the Engineer before acceptance by the Owner. Pressure tests completed without Engineer/Owner present, will not be accepted. Any associated costs with retesting shall be the Contractor's responsibility.**

B. Test Pressure: Each section of pipe shall be slowly filled with air to at least 50% of the test pressure. Nitrogen shall be added until a test pressure of 1.5

times the MAOP of the system is reached **(for this project the test pressure shall be 375 psi).** The minimum test pressure shall be in accordance with CFR 49 Part 192, Subpart J. **The test duration shall be for a continuous period of 24 hours**. During this period, no loss of pressure shall be observed. The Contractor shall provide both an oil filled pressure gauge, and a chart recorder for the duration of the pressure test. Chart recorder shall be eight-inch diameter recorder or larger.

C. Pressure testing shall be performed according to CFR 49 Part 192 and ASME Code B31.8.

D. All piping shall be cleaned with a brush pig (steel) matching the inside diameter of the pipe. The piping shall be cleaned several times with the brush pig to the satisfaction of the Engineer that the inside of the pipe is free of any dirt, debris, or other foreign objects.

E. Following the brush pig cleanings, the contractor shall utilize the use of polyurethane or polyethylene type pigs several times to the satisfaction of the Engineer to ensure that no foreign debris and/or water is remaining within the piping.

F. Equipment: CONTRACTOR shall provide and use the following equipment for the pressure test and pigging:
1. Pneumatic compressor, separator-dryer and chiller system capable of providing oil-free, dry, cool, air and equipped with one or more full capacity, safety-relief valves set at a pressure of not more than 105 percent of the required test pressure.
2. Pressure gauges of suitable sizes, and a pressure chart recorder for the duration of the test. Chart recorder shall be for minimum 8 inch diameter charts.

G. Connecting welds to the existing system shall be leak tested with a soap and water solution or other approved method at the pipelines operating pressure.

H. In the event the Engineer is not satisfied with the test or test results, field nondestructive testing of the connecting welds may be required, and all costs incurred will be the responsibility of the Contractor.

I. Any welds that do not pass the strength test for any reason shall be repaired and re-tested to the satisfaction of the Engineer. All costs incurred will be the responsibility of the Contractor.

J. Records shall be made of each piping system installation during the test. See below records that shall be recorded:

A. Test Date

B. Identification of piping segments being tested.

C. Test pressure, and chart of pressure recording.

D. Certification by the CONTRACTOR and signed acknowledgement by ENGINEER.

E. The ENGINEER shall be notified prior to commencement of the testing procedure. 24 HOURS NOTICE SHALL BE GIVEN TO THE ENGINEER.

3.10 Test Failure

A. The following steps shall be performed when a pipe segment fails the test described above.

1. The pipe and all fusions shall be inspected for cracks, pinholes, or perforations.

2. All blocked risers and capped ends shall be inspected for leaks.

3. Leaks shall be located and/or verified by applying a soapy water solution and observing soap bubble formation.

B. All pipe and fused joint leaks shall be repaired by cutting out the leaking area and refusing the pipe.

3.11 Purging

A. Purging the pipeline of air shall be performed in accordance with CFR 49 Part 192.629. If directed by the Engineer, the line shall be cleaned with a compatible pig matching the inside diameter of the pipe. The line shall be cleaned several times to the satisfaction of the Engineer **until the inside of the pipe is free of any dirt, debris, or other foreign objects.**

B. Precautions should be taken to prevent forming an explosive mixture when introducing gas into the pipeline.

C. The gas shall be introduced at a moderately rapid and continuous flow into one end of the pipeline and the air shall be vented out the other end of the

pipeline. The gas flow shall be continued without interruption until the vented gas is free of air.

D. A vent stack shall be installed at the remote end of the pipeline to be purged. The stack should be at least ten feet above ground level and directed away from sources of ignition, such as power lines, combustion engines, furnaces, etc.

E. The diameter of the vent pipe shall be less than the diameter of the pipeline to be purged to maintain a positive pressure in the piping.

3.11 Tapping, Stopping, and Tie-ins

A. Precautions should be taken during tapping, stopping, and tie-in procedures to insure the safety of the general public and operating personnel, and to prevent damage to equipment and surrounding property.

B. All tapping operations and equipment must be in compliance with CFR 49 Parts 192.151 and 192.627.

C. Tapping equipment and fittings shall be designed for the operating pressure of the existing piping.

D. Pressure gauges should be installed when necessary at key points to monitor pressures throughout the tie-in operation.

F. All tapping, stopping, and tie-ins to existing piping shall be performed in the presence of the **Engineer and the Owner**.

3.12 Operator Qualification

A. **All individuals including Contractors are required to be qualified in order to perform work on the Gas District's pipeline. Any Contractor employed by the District will be required to follow the District's Operator Qualification Plan when qualifying their employees. If necessary, the Gas District will provide a list of available approved training providers to the Contractor to choose from. The Gas District will review the Contractor's records for compliance with the Operator Qualification Rule and the Operator Qualification Plan before an individual is allowed to work on the pipeline and at random intervals to ensure continued qualification.**

B. The CONTRACTOR shall submit to the OWNER prior to construction, written qualification documentation stating that the personnel performing covered tasks on the constructed pipeline have been qualified according to CFR 49 Part 192 Subpart N.

C. The written documentation shall include the following:

1. Identification of qualified individual(s).

2. Identification of covered tasks the individual is qualified to perform.

3. Date(s) of current qualification.

4. Qualification method(s).

D. The OWNER shall review and approve or disapprove the qualification documentation prior to commencing work.

E. Contractor shall employ personnel qualified for the following tasks:

1. Backhoe Operation

2. Excavation Safety

3. Purging and Testing

4. Hot tap pipelines under pressure

5. Installation of test stations

6. Recognize Emergency Situations
7. Installing Steel mains and services
8. Pipeline pigging
9. Plastic Pipe Fusion (butt, socket, saddle, and electrofusion)
10. Pipeline Crossings

END OF SECTION

SECTION 02552

NATURAL GAS DISTRIBUTION HDPE PIPING

PART 1 GENERAL

1.1 Summary

A. Section Includes:
1. Pipe and fittings.
2. Valves.
3. Underground pipe markers.
4. Bedding and cover materials.

1.2 Unit Price – Measurement and Payment

A. Pipe and Fittings:
1. Basis of Measurement: By the linear foot.

B. Gas Valves:
1. Basis of Measurement: By the unit.

C. Pressure Regulating Valves:
1. Basis of Measurement: By the unit.

1.3 Submittals

A. Product Data: Provide data indicating pipe, pipe accessories and fittings, descriptive literature, materials of construction and all related product data as required by the Engineer.

B. Manufacturer's Installation Instructions: Indicate special products or procedures required to install products specified

1.4 Project Record Documents

A. Record location of pipe runs, connections, valves and related items.

B. Identify and describe discovery of uncharted utilities.

C. Submit documents under provisions of Contract Documents.

1.5 References

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. Use of the most recent version is required.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A. ASTM D 1248 Specification for Polyethylene Plastics Molding and Extrusion Materials

ASTM D 2513 Specification for Thermoplastic Gas Pressure Pipe Tubing and Fittings

ASTM D 2774 Practice for Underground Installation of Thermoplastic Pressure Piping

ASTM D 3350 Specification for Polyethylene Plastics Pipe and Fittings Materials

1.6 Regulatory Requirements

A. Conform to applicable code for materials and installation of the Work of this section.

B. OSHA- Construction Standards for Excavations (29CFR Part 1926.650.652 Subpart P).

C. DOT- Bulletin 49.

D. ADOT Standard Specifications for Highway Construction.

1.7 Field Measurements

A. Verify that field measurements and elevations are as indicated.

1.8 Delivery, Storage and Handling

A. Deliver, store and handle Products to site under provisions of the Contract Documents.

B. Store and protect Products as instructed by manufacturer and in accordance with Contract Documents

1.9 Qualifications

A. **Manufacturer:** Company specializing in the manufacturing of the Products specified in this Section minimum three years documented experience.

B. **Installer:** Company specializing in the installation of the Products specified in this Section with minimum three years documented experience of gas line and gas service experience. **Contractor shall provide all necessary OQ certifications, welding certifications, HDPE pipe fusing certifications as required to comply with DOT Bulletin 49. This documentation is required for all Contractor personnel on project to shall be filed at the office of the Engineer and the Owner.**

C. **All individuals including Contractors are required to be qualified in order to perform work on the Gas District's pipeline. Any Contractor employed by the District will be required to follow the District's Operator Qualification Plan when qualifying their employees. If necessary, the Gas District will provide a list of available approved training providers to the Contractor to choose from. The Gas District will review the Contractor's records for compliance with the Operator Qualification Rule and the Operator Qualification Plan before an individual is allowed to work on the pipeline and at random intervals to ensure continued qualification.**

D. **If Contractor elects to use explosives on this project, then the Contractor shall comply with the State of Alabama and the BATF requirements for blasting in the State of Alabama. These certifications shall be furnished to the Owner and the Engineer for their records.**

1.10 Warranty

A. Provide minimum one- year warranty. Warranty period begins with date of substantial completion and Owner acceptance.

PART 2 PRODUCTS

2.1 General

A. All materials shall meet the requirements and regulations of the Department of Transportation, Office of Pipeline Safety relating to the transportation of natural gas or other gases by pipeline as set forth in DOT Bulletin 49 and related documents.

2.2 High Density Polyethylene (HDPE) PIPE

1. All HDPE pipe shall be Standard Dimension Rating (SDR) 11 high density polyethylene pipe with four yellow stripes evenly spaced. All

HDPE piping shall be manufactured using a PE 3408/4710 type resin (PE 3408/4710 type resin for all fittings), or approved equal. Fittings shall be the same size and resin as the adjoining piping.

2. Pipe shall be extruded from a Type III, Class C, Category 5, Grade P34 compound as described in ASTM D 1248. It shall be classified as cell 345434C according to ASTM D 3350 and have the material designation of PE 3408. The pipe shall be manufactured to meet the requirements of ASTM D 2513. Manufacturer's literature shall be adhered to when "manufacturer's recommendations" are specified. All pipe and fittings shall be provided by one manufacturer. Acceptable manufacturers include Plexco, DriscoPlex, or approved equal.

3. Marking of Materials - All pipe and fittings shall be marked per the requirements of 49 CFR 192.63.

2.3 High Density Polyethylene 90 – Degree Elbows

1. 90º turns shall be constructed using 3X radius elbows. All fittings shall be PE 3408 to match HDPE pipe specifications.

2.4 Backup Rings for Flanges

1. Flanges for HDPE pipe shall have STAINLESS STEEL back-up rings with a minimum thickness of 1-inch, as manufactured by **Improved Piping Products** (925-254-0962), Inc., of Orinda, California or approved equal.

2.5 Pipe Supports

1. All pipe supports shall conform to the details shown on the Drawings and shall be located as shown on the Drawings

2.6 Pipeline Identification and Location

A. Locator Tape and Wire – For HDPE Piping - **Both tape and wire shall be installed with HDPE piping.**

1. Tape: Plastic (Ultra-high Molecular Weight Polyethylene); minimum 4.0 mil (0.004 inch) overall thickness; minimum 10.64 pounds/inch width; alkaline and corrosion resistant; minimum 10.64 pounds/inch tensile break strength.

2. Detectable Core: Yes

3. Color: The tape shall be color bonded. Coordinate color of tape with the Engineer.

4. Lettering: tape shall be inscribed with permanent, corrosion resistant, 1-1/2 inch tall black letters, repeated every 20 to 36 inches as follows: **"CAUTION GAS LINE BELOW"**.

5. Manufacturer: The detectable marking tape shall be as manufactured by **Terra Tape** (800-231-2417) or approved equal.

6. Tracer wire shall be 12 AWG, solid. Tracer wire connectors shall be used when connecting tracer wire ends. **Contractor shall use a PRO-TRACE® TW Connector (Yellow) (Part No: 73901) rated for direct burial use filled with silicone sealant to prevent corrosion at connection points.** Drivable ½ lb magnesium anodes shall be installed on the tracer wire every 1000 LF.

B. Line Markers – All piping

Thermoplastic polymer oval line markers, 3.5" outside diameter, 72" long, solid color (yellow), decal with the general wording "Caution - Natural Gas Pipeline" Owner's name and phone number to be included. The post provides simple 360-degree visibility. Line markers as manufactured by Rhino Markers, Carsonite or approved equal. Color and complete wording for line markers is to be approved by the Engineer. Distance for line markers is one every 500 linear feet or line of site.

2.7 Casing Pipe

A. Casing pipe shall be steel, API 5LX, Grade X-42 with welded field joints. Casing wall thickness shall be min. 0.250 inches for all sizes thirty-six (36) inches and smaller and shall conform to State of Alabama Highway Department Section 862 for larger diameters.

B. Carrier pipe shall be installed with pipe supports and casing end seals to prevent corrosion within the annular space of the carrier pipe and the casing pipe. The end seals shall be constructed of solid synthetic rubber connected by corrosion resistant bolts and nuts. End seals shall be 400 Series as manufactured by Link-Seal or approved equal.

C. Casing vent pipe shall be 2-inch bare steel, as shown on casing vent detail,

and as described herein. Vent pipe exterior above grade, shall be coated in accordance with Paragraph COATINGS.

D. Casing vent pipe shall be terminated toward the ground using two 90 degree elbows or one 180- degree bend. Casing vents shall be extended to the back of the right of way.

E. The approximate locations and lengths of encasements are shown on the Drawings for bidding information, but the exact location and length of encasement will be determined by the appropriate highway department.

2.8 Insulation- Carrier pipe shall be electrically isolated from the casing pipe by casing insulators. Insulators shall be injection molded, polyethylene type as manufactured by **PSI** or an approved equivalent. Insulators shall be spaced a maximum of 10 feet apart.

2.9 Rock Shield

A. Rock shield shall be installed when rocks are exposed that could damage the pipe coating as it is lowered into the trench. Rock shield shall be as manufactured by **Tuff-N-Nuff Industries, Ltd**. Rock shield shall be installed via “cigarette wrapped” and it is generally recommended to allow overlap to be in the 6 o’clock position to insure double protection along the bottom of the pipe. Affix rock shield using tape, plastic wire ties or an appropriate non-metallic strapping. Pipeline shall be backfilled immediately following the installation of rock shield.

2.10 Valve Types and Related Items

A. Plastic Ball Valves

1. Ball valves shall be constructed of high density polyethylene (PE 3408) SDR 11 with a full port opening. Valve shall be **Polytec** as manufactured by **Kerotest**, or approved equal.

B. Valve Box

1. **Standard, cast iron adjustable, screw type, dome base, buffalo type, three piece, 5 1/4" shaft.** Lid shall be cast iron with "GAS" cast into the lid. Valve box and lid shall be as manufactured by **Opelika Foundry** or approved equal. For deep bury valves, Contractor shall used cast iron adjustable extension to extend lid to grade.

C. Valve Markers

1. Fiberglass stakes, 4" wide, 66" long, solid color, decal with the general wording **"Caution - Natural Gas Pipeline**." Fiberglass

stakes, 4" wide, 66" long, solid color, decal with the general wording "**Caution - Natural Gas Pipeline**." Owner's name and phone number to be included. Color and complete wording to be approved by the Engineer. Valve Marker as manufactured by **Carsonite** or approved equal.

2.11 Gas Service Tap

A. Service Valve Tee/ Riser Assembly: AII service valve tee /riser assemblies shall be connected to the main line by buttweld heat fusion method(no internal heat fusion). Backfilling, bonding wire and warning tape for services shall be the same as previously specified. Service tee/ riser assembly shall be as manufactured by Perfection Corporation, Gas Meter or approved equal.

PART 3 EXECUTION

3.1 General

A. All trenching, fusing, installation, pipe laying, testing, backfill, and all related installation procedures must be in accordance with CFR 49 Part 192 – “Transportation of Natural or Other Gas by Pipeline: Minimum Federal Safety Standards”, ASME Code for Pressure Piping B31.8, and OSHA Construction Standards.

3.2 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

A. Pipe shall be stored or stacked so as to prevent damage by marring, crushing, or piercing. Maximum stacking height shall be limited to 6 feet

B. Pipe and pipe fittings shall be handled carefully in loading and unloading.

C. Pipe and pipe fittings shall not be dropped or dumped.

D. HDPE pipe shall not be bent more than the minimum radius recommended by the manufacturer for type, grade, and SDR. Care shall be taken to avoid imposing strains that will overstress or buckle the HDPE piping or impose excessive stress on the joints.

3.3 HDPE Pipe Joining

A. D.O.T. Regulations require that each joint in a gas piping system must be made in accordance with written procedures that have been proved by test or experience to produce strong gastight joints (49 CFR, Part 192, §192.273(b)).

B. D.O.T. Regulations require that written procedures for butt fusion, saddle fusion, and socket fusion joining of polyethylene gas piping must be qualified before use by subjecting specimen joints to required test procedures (CFR 49, Part 192, §192.283(a)).

C. D.O.T. Regulations require that all persons who make joints in polyethylene gas piping must be qualified under the operator's written procedures (CFR 49, Part 192, & §192.285(a)). ·

D. D.O.T. Regulations require that the gas system operator must ensure that all persons who make or inspect joints are qualified (CFR 49, Part 192, §192.285(d) & §192.287).

E. Only one method shall be utilized to join HDPE pipe: heat fusion.

1. Mechanical Joining shall be accomplished with HDPE flange adapters, neoprene gaskets, and stainless steel back-up flanges, and shall be used only where shown on the Drawings. See Drawing details for installation.

2. Heat Fusion joints shall be made in accordance with manufacturer's step by step procedures and recommendations. Fusion equipment and a trained operator shall be provided by the CONTRACTOR. Pipe fusion equipment shall be of the size and nature to adequately weld all pipe sizes and fittings necessary to complete the project. Branch saddle fusions shall be made in accordance with manufacturer's recommendations and step-by-step procedures. Branch saddle fusion equipment will be of the size to facilitate saddle fusion within the pipe trench. Heat fusion shall be performed outside of the trench whenever practical. Before heat fusing pipe, each length shall be inspected for the presence of dirt, sand, mud, shavings, and other debris. Any foreign material shall be completely removed. At the end of each day, all open ends of fused pipe shall be capped or otherwise covered to prevent entry by animals or debris. Fusions shall be initialed with paint stick by fuser.

3. As per the manufacturer’s instructions, no fusion shall be performed in precipitation unless a shelter is provided.

3.4 Installation of HDPE Pipe

A. Pipe installation shall comply with the requirements of ASTM D 2321, PPI TR-31/9-79, and the manufacturer's recommendations.

B. Lengths of fused pipe to be handled as one segment shall not exceed 500 LF. When using coil pipe, the Contractor shall use a line tamer for uncoiling HDPE piping. Contractor shall carefully follow manufacturer recommendations for uncoiling and applying adequate pressures for rerounding HDPE piping.

C. The ENGINEER or OWNER shall be notified prior to any pipe being installed in the trench in order for him/her to inspect the following items:

1. Butt and saddle fusions.

2. Pipe integrity.
3. Trench excavation for rocks and foreign material.
4. Proper Backfilling
5. Proper trench slope (where applicable).
6. Trench contour to ensure the pipe will have uniform and continuous support.

D. Any irregularities found by the ENGINEER or OWNER during this inspection must be corrected before lowering the pipe into the trench. Pipe shall be allowed sufficient time to adjust to trench temperature prior to any testing, segment tie-ins, and/or backfilling.

E. Tie-ins shall be made out of the trench whenever possible. When tie-ins are to be made in the trench, a bell hole shall be excavated large enough to ensure an adequate and safe work area.

F. All HDPE below grade piping shall be **marked with both locator wire and warning tape**.

G. All excavated trenches, bore pits, etc. shall be covered daily. No trenches shall be left open overnight or through the weekend.

3.5 Services

A. Service tubing shall be same specifications as for larger HDPE piping. Service tubing minimum depth of bury shall be 24 inches deep. Acceptable method for joining shall be heat fusion.

B. Each service riser at the house cock, shall be capped until Gas District comes to install meter bar and meter.

C. After installation of service riser and house cock, the house cock shall be locked by Contractor with pin lock. Pin locks shall be provided by the Gas District.

D. Contractor shall make hand drawings of piping routing across properties and furnish said drawing to the Owner for their records. Drawings shall include dimensions locating service tubing.

3.6 Valve and Fitting Installation:

A. Contractor shall set valves and fittings and join to pipe as shown on the Drawings and Construction Standards.

B. Contractor shall install a valve box for every valve. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the operating nut of the valve. The box cover shall be flush with the surface

of the finished grade or as directed by the Engineer. Contractor shall place #57 stone beneath valve and compact in place, then stack 4"*8"*16" solid CMU blocks on each side of piping to provide resting place for valve box such that no load can be transferred to valve or piping.

3.7 HDPE Cleaning and Testing – **Engineer shall be present for all pigging and testing of piping.**

A. All piping shall be cleaned with a pig matching the inside diameter of the pipe. Contractor shall coordinate with the Engineer to schedule pigging of pipe segments. The Engineer shall present during pigging. The piping shall be cleaned several times with the pig to the satisfaction of the Engineer that the inside of the pipe is free of any dirt, debris, water or any other foreign objects. If water is encountered the Contractor shall coordinate with Engineer on a method for water removal. Any measures taken for removal of foreign debris and/or water from a gas line shall be at the Contractor's expense.

B. All testing shall be coordinated with the Owner's representative or the Engineer. No testing shall be started on Friday or when the test would come off on weekends or holidays. Any testing not scheduled, and witnessed by Engineer/Owner shall not be accepted and any cost to retest shall be at the Contractor's expense. Contractor shall provide a minimum of 24 hours notice to the Engineer and Owner that a line segment is ready for testing.

C. All HDPE piping shall be air tested per 49 CFR 192.513 and as described herein to detect any leaks in the piping. The CONTRACTOR shall be responsible for locating, uncovering, any leaks detected during testing, making repairs, and retesting.

D. All installed pipes shall be subject to air test pressure of **100 psi** for a period of 24 hours, air temperature being introduced to piping shall not exceed 100 F**. DURING THIS PERIOD, NO LOSS OF PRESSURE SHALL BE OBSERVED OR ACCEPTED**.

E. All service lines shall be tested for a minimum of one hour at a test pressure of 100 psi. Contractor shall provide gauges for witnessing by the Engineer and the Owner.

F. Any section of pipe that fails the pressure testing shall be checked by the CONTRACTOR and corrective measures taken. The test shall be repeated, at no cost to the OWNER, until test meets the requirements specified.

G. No pipe installation will be accepted unless and until it meets the pressure test requirements.

H. Equipment: CONTRACTOR shall provide and use the following equipment for the pressure test and pigging:

1. Pneumatic compressor separator-dryer and chiller system capable of providing oil-free, dry, cool, air and equipped with one or more full capacity, safety-relief valves set at a pressure of not more than 105 percent of the required test pressure.

2. Pressure gauges of suitable sizes, and a pressure chart recorder for the duration of the test. Chart recorder shall be for minimum 8 inch diameter charts.

I. Test Procedure

1. Periodic testing shall be performed using accurately calibrated instruments and oil-free, dry air. Tests shall be performed on piping after the piping has been completely installed. All parts of the piping system shall be subjected to the test pressure. During this period, no loss of pressure shall be observed. CONTRACTOR shall recognize the hazards associated with air testing and shall take all necessary precautions to protect test personnel. All piping to be tested shall be secured to prevent damage to adjacent piping and equipment in the event of a joint failure. Any appurtenant instruments or devices that could be damaged by the test shall be removed from the piping or suitably isolated prior to applying the test.

2. Records shall be made of each piping system installation during the test. See below records that shall be recorded:

A. Test Date

B. Identification of piping segments being tested.

C. Test pressure, and chart of pressure recording.

D. Certification by the CONTRACTOR and signed acknowledgement by ENGINEER.

E. The ENGINEER shall be notified prior to commencement of the testing procedure. **24 HOURS NOTICE SHALL BE GIVEN TO THE ENGINEER.**

3.8 Test Failure

A. The following steps shall be performed when a pipe segment fails the test described above.

1. The pipe and all fusions shall be inspected for cracks, pinholes, or perforations.

2. All blocked risers and capped ends shall be inspected for leaks.

3. Leaks shall be located and/or verified by applying a soapy water solution and observing soap bubble formation.

B. All pipe and fused joint leaks shall be repaired by cutting out the leaking area and refusing the pipe.

3.9 Purging

A. Purging the pipeline of air shall be performed in accordance with CFR 49 Part 192.629. If directed by the Engineer, the line shall be cleaned with a compatible pig matching the inside diameter of the pipe. The line shall be cleaned several times to the satisfaction of the Engineer until the inside of the pipe is free of any dirt, debris, or other foreign objects.

B. Precautions should be taken to prevent forming an explosive mixture when introducing gas into the pipeline.

C. The gas shall be introduced at a moderately rapid and continuous flow into one end of the pipeline and the air shall be vented out the other end of the pipeline. The gas flow shall be continued without interruption until the vented gas is free of air.

D. A vent stack shall be installed at the remote end of the pipeline to be purged. The stack should be at least ten feet above ground level and directed away from sources of ignition, such as power lines, combustion engines, furnaces, etc.

E. The diameter of the vent pipe shall be less than the diameter of the pipeline to be purged to maintain a positive pressure in the piping.

3.11 Tapping, Stopping, and Tie-ins

A. Precautions should be taken during tapping, stopping, and tie-in procedures to insure the safety of the general public and operating personnel, and to prevent damage to equipment and surrounding property.

B. All tapping operations and equipment must be in compliance with CFR 49 Parts 192.151 and 192.627.

C. Tapping equipment and fittings shall be designed for the operating pressure of the existing piping.

D. Pressure gauges should be installed when necessary at key points to monitor pressures throughout the tie-in operation.

F. All tapping, stopping, and tie-ins to existing piping shall be performed in the presence of the **Engineer and the Owner**.

3.10 Operator Qualification

A. **All individuals including Contractors are required to be qualified in order to perform work on the Gas District's pipeline. Any Contractor employed by the District will be required to follow the District's Operator Qualification Plan when qualifying their employees. If necessary, the Gas District will provide a list of available approved training providers to the Contractor to choose from. The Gas District will review the Contractor's records for compliance with the Operator Qualification Rule and the Operator Qualification Plan before an individual is allowed to work on the pipeline and at random intervals to ensure continued qualification.**

B. The CONTRACTOR shall submit to the OWNER prior to construction, written qualification documentation stating that the personnel performing covered tasks on the constructed pipeline have been qualified according to CFR 49 Part 192 Subpart N.

C. The written documentation shall include the following:

1. Identification of qualified individual(s).

2. Identification of covered tasks the individual is qualified to perform.

3. Date(s) of current qualification.

4. Qualification method(s).

D. The OWNER shall review and approve or disapprove the qualification documentation prior to commencing work.

E. Contractor shall employ personnel qualified for the following tasks:

1. Backhoe Operation

2. Excavation Safety
3. Purging and Testing
4. Hot tap pipelines under pressure
5. Installation of test stations
6. Recognize Emergency Situations
7. Installing Steel mains and services
8. Pipeline pigging
9. Plastic Pipe Fusion (butt, socket, saddle, and electrofusion)
10. Pipeline Crossings

END OF SECTION

SECTION 02630

STORM DRAINAGE

****
This section includes building storm drain piping from sewer pipe termination outside building, usually 5 feet and storm drainage of paved and landscaped areas of Project site, to discharge system or method. This section describes drainage by gravity, not by pressure.

Manufacturers listed in this section were identified as representative and not as an endorsement for meeting this specification. For additional product information, visit 4Specs at www.4specs.com, ARCAT at www.arcat.com, First Source at www.reedfirstsource.com, SpecSource at www.specsource.com, and Sweets Network at products.construction.com.

This section includes performance, proprietary, and descriptive type specifications. Edit to avoid conflicting requirements.
This section relies extensively on SpecText II Section 01001.

Contact the SpecText Support Center at supportcenter@spectext.com to submit comments or suggestions for improvements to this specification. Visit the SpecText web site at www.spectext.com for current product announcements.
****

PART 1 GENERAL

1.1 SUMMARY

A. Section includes site storm sewerage drainage piping, fittings and accessories, and bedding; connection of drainage system to catch basins, plant area drains, and paved area drainage.

1.2 SUBMITTALS

****
Only request submittals needed to verify compliance with Project requirements.
****

A. Product Data: Submit data indicating pipe, and pipe accessories, along with manholes and inlet boxes.

B. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.

C. Manufacturer's Certificate: Certify that product meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with State of Alabama Highways standards.

PART 2 PRODUCTS

2.1 STORM DRAINAGE

A. Sewer Pipe Materials:

****
Cast iron soil pipe is normally used for durability, longevity, resistance to corrosion, acids, gases, and resistance to induced subsoil loads; is available in 5 and 10 foot lengths and diameters ranging from 2 to 15 inches. Pipe ends are usually bell and spigot but can be specified with plain end for mechanical clamp and gasket joint.
****

1. Ductile Iron Pipe: ASTM A74,pressure class type type, inside nominal diameter of as seen on drawings, bell and spigot end.
2. Ductile Iron Pipe Joint Device:shall be rubber gasket joint devices.

3. Reinforced Concrete Pipe: ASTM C76, mesh reinforcement; inside nominal diameter of as seen on drawings, bell and spigot.
4. Reinforced Concrete Pipe Joint Device: ASTM C443, rubber compression gasket joint.
5. Plastic Pipe: ASTM D2729, polyvinyl chloride (PVC) material; inside nominal diameter of, bell and spigot solvent sealed joint end.

****** [OR] ******

6. Plastic Pipe: ASTM D3034, SDR 21, Poly (Vinyl Chloride) (PVC) material; inside nominal diameter of as seen on drawings bell and spigot style rubber ring sealed gasket joint.
   a. Fittings: PVC.
   b. Joints: ASTM F477, elastomeric gaskets.

B. Trace Wire: Magnetic detectable conductor, [clear] [brightly colored] plastic covering, imprinted with "[Storm Sewer Service] [_____]" in large letters.

****
The next two articles describe catch basins and cleanouts associated with sewage drain pipe systems including cast-in-place or precast concrete shaft construction. Built-up masonry shaft and shaft top construction can be edited into this section when required. Reference relevant masonry sections as appropriate.
****

2.2 CATCH BASINS AND PLANT AREA DRAINS

A. Lid and Frame: Cast iron construction, hinged lid, manufactured by ADS, Inc or Neenah Foundary or American Cast Iron Products, etc.:
   1. Lid Design Checkerboard grill.
   2. Nominal Lid and Frame Size: [24”x 24”] inch.

B. Shaft Construction and Concentric Cone Top Section: Reinforced precast Concrete pipe sections, lipped male/female dry joints, manufactured by Sherman Dixie Concrete

2.3 BEDDING AND COVER MATERIALS

****
Select bedding and cover material type for Project conditions. When more than one type is required, edit the following paragraph as necessary.
****

A. Bedding and cover shall be #57 stone or #5 washed stone.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

****
Correction material selection depends on type of subsoil, percolation characteristics, compaction requirements; and soils report recommendations.
****

A. Hand trim excavations to required elevations. Correct over excavation with washed stone aggregate.

B. Remove large stones or other hard matter capable of damaging piping or impeding consistent backfilling or compaction.

3.3 BEDDING

A. Excavate pipe trench in accordance with Section 02300 Earthwork for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 to 8 inches of washed stone compacted depth.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

****
Refer to geotechnical report for subsoil capability to support piping and compaction of fill requirements. Use ASTM D2321 to specify installation of plastic pipe.
Coordinate reference standard and manufacturer's instructions to avoid conflicts.
****

A. Install pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.

B. Place pipe on minimum 4 to 6 inches deep bed of washed stone aggregate.

****
Ensure drainage system is shown on design drawings including location of coarse and fine aggregate in relation to pipe and pipe bedding, dimensions of cut trench width, and details of connections to other work.
****

C. Lay pipe to slope gradients noted on drawings with maximum variation from indicated slope of 1/8 inch in 10 feet.

D. Install aggregate at sides [and over top of pipe]. [Install top cover to minimum compacted thickness of 12 inches, compact to 95 percent.

E. Do not displace or damage pipe when compacting.

F. Connect to building, collection or sump pits, municipal storm sewer system, manholes, through installed sleeves.

****
Use the following paragraph for non-metallic pipe.
****

G. Install trace wire continuous buried 6 inches below finish grade, above pipe line.

3.5 INSTALLATION - CATCH BASINS AND CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place Cast-In-Place Concrete base pad or install prefab base section, with provision for storm sewer pipe end sections.

C. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.

D. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.

E. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.6 FIELD QUALITY CONTROL

A. Request inspection prior to and immediately after placing aggregate cover over pipe.

****
Determine which test standards referenced in the following paragraph are appropriate for Project requirements. Consult geotechnical report.

Select compaction test method appropriate to fill materials being utilized and Project requirements.

AASHTO T180 in paragraph below is very similar to ASTM D1557.
****

B. Compaction testing will be performed in accordance with industry standards.

C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

D. Frequency of Tests: one per pipe section.

E. Infiltration Test: Test in accordance with ASTM C969.

F. Deflection Test: Test in accordance with industry standards.

G. Pressure Test: Test in accordance with ASTM C924 and ASTM C1103, depending on pipe size.

H. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
   1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
   2. Correct damaged or displaced pipe. Repeat tests for corrected sections of pipe.

END OF SECTION

SECTION 02923

LANDSCAPE GRADING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Final grade topsoil for finish landscaping.

1.2 QUALITY ASSURANCE

A. Furnish each topsoil material from single source throughout the Work.

PART 2 PRODUCTS

2.1 MATERIAL

A. Topsoil: Fill Type as specified in Section 02930.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify building and trench backfilling have been inspected.

C. Verify substrate base has been contoured and compacted.

3.2 PREPARATION

A. Protect landscaping and other features remaining as final Work.

B. Protect existing structures, fences, sidewalks, utilities, paving, and curbs.

3.3 SUBSTRATE PREPARATION

A. Eliminate uneven areas and low spots.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove contaminated subsoil.

C. Scarify surface to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.4 PLACING TOPSOIL

A. Place topsoil in areas where seeding, sodding, planting is required to nominal depth of 4” inches. Place topsoil during dry weather.

B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.

C. Remove roots, weeds, rocks, and foreign material while spreading.

D. Manually spread topsoil close to plant material, building to prevent damage.

E. Lightly compact placed topsoil.

F. Remove surplus subsoil and topsoil from site.

G. Leave stockpile area and site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 02924

SEEDING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fertilizing.
   2. Seeding.
   3. Hydroseeding.
   4. Mulching.
   5. Maintenance.

1.2 REFERENCES

A. ASTM International:
   1. ASTM C602 - Standard Specification for Agricultural Liming Materials.

1.3 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.4 SUBMITTALS

A. Product Data: Submit data for seed mix, fertilizer, mulch, and other accessories.

1.5 QUALITY ASSURANCE

A. Provide seed mixture in containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging.

1.6 QUALIFICATIONS

A. Seed Supplier: Company specializing in manufacturing Products specified in this section with minimum three years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.8 MAINTENANCE SERVICE

A. Maintain seeded areas immediately after placement [until grass is well established and exhibits vigorous growing condition for two cuttings.

PART 2 PRODUCTS

2.1 SEED MIXTURE

A. Suppliers:
   1. Pennington
   2. Scotts
   3. Kentucky 31

B. Seed Mixture:

Kentucky 31	30 percent
Annual Rye	35 percent
Creeping Red Fescue	15 percent
Unhulled Bermuda	20 percent

2.2 ACCESSORIES

A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Chopped cornstalks are not acceptable.

B. Fertilizer: Commercial grade; recommended for grass; of proportion necessary to eliminate deficiencies of topsoil ,as indicated in analysis to the following proportions: Nitrogen 13 percent, phosphoric acid 13 percent, soluble potash 13 percent.

C. Lime: ASTM C602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.

D. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.

E. Erosion Fabric: Jute matting, open weave when required to prevent erosion.

F. Stakes: Softwood lumber, chisel pointed.

G. String: Inorganic fiber.

2.3 SOURCE QUALITY CONTROL

A. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of testing.

B. Testing is not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify prepared soil base is ready to receive the Work of this section.

3.2 FERTILIZING

A. Apply lime at application rate recommended by soil analysis.

B. Apply fertilizer at application rate recommended by soil analysis.

C. Apply after smooth raking of topsoil and prior to roller compaction.

D. Do not apply fertilizer at same time or with same machine used to apply seed.

E. Mix fertilizer thoroughly into upper 2 inches of topsoil.

F. Lightly water soil to aid dissipation of fertilizer. Irrigate top level of soil uniformly.

3.3 SEEDING

A. Apply seed at rate of 3 lbs per 1000 sq ft evenly in two intersecting directions. Rake in lightly.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Do not sow immediately following rain, when ground is too dry, or when winds are over 12 mph.

D. Immediately following seeding [and compacting], apply mulch to thickness of 1/8 inches. Maintain clear of shrubs and trees.

E. Apply water with fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

3.4 HYDROSEEDING

A. Apply fertilizer, mulch and seeded slurry with hydraulic seeder at rate of recommended by the manufacturer.

B. After application, apply water with fine spray immediately after each area has been hydroseeded. Saturate to 4 inches of soil and maintain moisture levels two to four inches.

3.5 SEED PROTECTION

A. Cover seeded slopes where grade is 4:1 or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.

B. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Overlap edges and ends of adjacent rolls minimum 12 inches. Backfill trench and rake smooth, level with adjacent soil.

C. Secure outside edges and overlaps at 36 inch intervals with stakes.

D. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.

E. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

3.6 MAINTENANCE

A. Mow grass at regular intervals to maintain at maximum height of 3.5 inches. Do not cut more than 1/3 of grass blade at each mowing. Perform first mowing when seedlings are 40 percent higher than desired height.

B. Neatly trim edges and hand clip where necessary.

C. Immediately remove clippings after mowing and trimming. Do not let clippings lay in clumps.

D. Water to prevent grass and soil from drying out.

E. Roll surface to remove minor depressions or irregularities.

F. Control growth of weeds. Apply herbicides. Remedy damage resulting from improper use of herbicides.

G. Immediately reseed areas showing bare spots.

H. Repair washouts or gullies.

I. Protect seeded areas with warning signs during maintenance period.

END OF SECTION

SECTION 02910 - SODDING AND TOPSOIL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sod:

1. Provide strongly rooted **419 Bermuda Sod**
2. Sod shall be not less than 2 years old and free of weeds and undesirable native grasses.
3. Only provide sod capable of growth and development when planted (viable, not dormant).
4. Provide machine cut sod of a uniform minimum soil thickness of 5/8 inch, plus thickness of top growth and thatch. Sod pieces to be consistent in size and shape.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Sodding shall be restricted to those as instructed or recommended by the local Cooperative Extension Agent except when special instructions to the contrary are issued in writing by the Architect.

1. The Contractor shall furnish, in writing to the Architect, those recommendations of the Extension Agent before proceeding with any operations.
2. Grassing also shall comply with State of Alabama Highway Department specifications, latest Edition.
3. Contractor shall water and maintain newly grassed areas until acceptable stand of grass is established and approved by the Architect.

B. Preparation of Subgrade Soil:

1. The subgrade soil in those areas to be sodded whether shown or not shown on the plans shall be loosened to a minimum depth of 3 inches and graded to remove all ridges and depressions so that it will be, after settlement everywhere parallel to and at the proper level to provide finished grades specified.
2. All stones over 1" in dimension, sticks, rubbish and other extraneous matter shall be removed during this operation.

C. Topsoil:

1. Contractor shall furnish and spread layer of topsoil over all areas.

   Topsoil shall be spread in loose layers to provide finished grades specified and shall have an equal depth of not less than 4" over the site after natural settlement and light rolling.

D. All areas shall be carefully graded and raked to accurate specified grades and uniform slopes following topsoil spreading. The surface, when finished and settled shall conform to required grades and shall be free from hollows and other inequalities, from stones over 1" in diameter, sticks and other debris, and shall be satisfactory to the Architect.

E. Initial fertilization of sodded area prior to sodding and following preparation, commercial fertilizer 4-10-10 or 4-12-12 shall be applied on all grass areas at the uniform rate of 20 pounds per 1,000 square feet each.

3.2 SODDING

A. Prepare all areas to receive sod.

B. **The Contractor shall fully sod all graded and disturbed areas, including the Contractors staging area and all areas disturbed by vehicular construction traffic, whether shown on plans or not.**

3.3 TOPSOIL

A. General:

1. Provide topsoil of natural, friable, fertile, fine loamy, soil possessing the characteristics of representative top soils in the vicinity which produces a heavy growth; free from subsoil, weeds, litter, clods, stiff clay, stones, stumps, roots, trash, toxic substances or any other material which may be harmful to plant growth or hinder planting operations.

2. The topsoil shall not be in a muddy or frozen condition. Topsoil shall be that material stripped and stockpiled, or as required to provide 4" of coverage.

3. The topsoil shall have a pH range of 5.9 to 7.0.

4. Limestone or aluminum sulfate (or acceptable substitute) may be used to adjust the pH of the topsoil to an acceptable level.

END OF SECTION

SECTION 15140

WATER PIPING DISTRIBUTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Water piping, buried beyond 5 feet of building.
2. Water piping, within 5 feet of building.
3. Domestic water piping, above grade.
4. Unions and flanges.
5. Valves.
6. Pipe hangers and supports.
7. Pressure gages.
8. Pressure gage taps.
9. Hose bibs.
10. Hydrants.
11. Backflow preventers.
12. Base-mounted pumps.
13. Underground pipe markers.
14. Bedding and cover materials.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI Z21.22 - Relief Valves for Hot Water Supply Systems.

B. American Society of Mechanical Engineers:
1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
3. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
4. ASME B31.9 - Building Services Piping.
5. ASME B40.1 - Gauges - Pressure Indicating Dial Type - Elastic Element.
6. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.
7. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

C. American Society of Sanitary Engineering:
1. ASSE 1010 - Performance Requirements for Water Hammer Arresters.
2. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers.

3. ASSE 1012 - Performance Requirements for Backflow Preventer with Intermediate Atmospheric Vent.
4. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers.
5. ASSE 1019 - Performance Requirements for Vacuum Breaker Wall Hydrants, Freeze Resistant, Automatic Draining Type.
6. ASSE 5013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers (RP) and Reduced Pressure Fire Protection Principle Backflow Preventers (RFP).
7. ASSE 5015 - Performance Requirements for Testing Double Check Backflow Prevention Assemblies (DC) and Double Check Fire Protection Backflow Prevention Assemblies (RPDF).

D. ASTM International:
1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
3. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
4. ASTM A536 - Standard Specification for Ductile Iron Castings.
5. ASTM B32 - Standard Specification for Solder Metal.
6. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
7. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.
8. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedule 40, 80, and 120.
9. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
10. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameters.
11. ASTM D2241 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
12. ASTM D2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.
13. ASTM D2464 - Standard Specification for Threaded Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80.
14. ASTM D2466 - Standard Specification for Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.
15. ASTM D2467 - Standard Specification for Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80.
16. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

17. ASTM D2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
18. ASTM D2661 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.
19. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly Vinyl Chloride Plastic Hot- and Cold-Water Distribution Systems.
20. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and Fittings.
21. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
22. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
23. ASTM D 3311 - Standard Specification for Drain, Waste, and Vent (DWV) Plastic Fittings Patterns.
24. ASTM E1 - Standard Specification for ASTM Thermometers.
25. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.
26. ASTM F437 - Standard Specification for Threaded Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 80.
27. ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 40.
28. ASTM F439 - Standard Specification for Socket-Type Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 80.
29. ASTM F441/F441M - Standard Specification for Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe, Schedules 40 and 80.
30. ASTM F442/F442M - Standard Specification for Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe (SDR-PR).
31. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe and Fittings.
32. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
33. ASTM F 891 - Standard Specification for Coextruded Poly Vinyl Chloride (PVC) Plastic Pipe With a Cellular Core.
34. ASTM F1281 - Standard Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe.
35. ASTM F1282 - Standard Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe.
36. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

E. American Welding Society:
   1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

F. American Water Works Association:

1. AWWA C104 - American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. AWWA C105 - American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids.
4. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
6. AWWA C651 - Disinfecting Water Mains.
7. AWWA C700 - Cold-Water Meters - Displacement Type, Bronze Main Case.
8. AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.
9. AWWA C702 - Cold-Water Meters - Compound Type.
10. AWWA C706 - Direct-Reading, Remote-Registration Systems for Cold-Water Meters.
11. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution.
12. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. through 3 in., for Water Service.
13. AWWA C950 - Fiberglass Pressure Pipe.
14. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

G. Manufacturers Standardization Society of the Valve and Fittings Industry:
   1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
   2. MSS SP 67 - Butterfly Valves.
   3. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
   4. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
   5. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
   6. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
   7. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
   8. MSS SP 85 - Cast Iron Globe & Angle Valves, Flanged and Threaded.
   9. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
   10. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

H. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

I. Plumbing and Drainage Institute:
   1. PDI WH201 - Water Hammer Arrester Standard.

J. Underwriters Laboratories Inc.:
   1. UL 393 - Indicating Pressure Gauges for Fire-Protection Service.
   2. UL 404 - Gauges, Indicating Pressure, for Compressed Gas Service.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data:
   1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturer's catalog information.
   2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
   3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
   4. Domestic Water Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.
   5. Pumps: Submit pump type, capacity, certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Submit installation instructions for pumps, valves and accessories.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 01700 - Execution Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of valves and equipment.

C. Operation and Maintenance Data: Submit spare parts list, exploded assembly views and recommended maintenance intervals.

1.5 QUALITY ASSURANCE

A. For drinking water service, provide valves complying with NSF 61.

B. Perform Work in accordance with State of Alabama Public Work's and Owners standard and compliant with ADEM Drinking Water Division Standards.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project].

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01600 - Product Requirements: Product storage and handling requirements.

B. Accept valves and equipment on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Product Requirements.

B. Do not install underground piping when bedding is wet or frozen.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 WATER PIPING

A. Ductile Iron Pipe: AWWA C151. Pressure Class 350 Ductile Iron Piping.
   1. Fittings: AWWA C110 or AWWA C153, ductile iron, standard thickness.
   2. Fittings shall be rated for same pressure as adjoining piping unless otherwise approved by Engineer.
   3. Joints: AWWA C111, rubber gasket with rods.
   4. Restrained Joint Piping shall use **American, McWane, US Pipe or approved equal.**

5. Manufacturers for Ductile Iron Pipe: **American, McWane, US Pipe or approved equal.**

B. PVC Pipe: **SDR-17 for 250 psig** pressure rating, polyvinyl chloride (PVC) material. **All PVC Piping shall be Pressure Class 250.**
   1. Fittings: AWWA C110, or AWWA C153, ductile iron, standard thickness.
   2. Fittings shall be rated for same pressure as adjoining piping unless otherwise approved by Engineer.
   3. Manufacturers for PVC Piping: Vulcan, North American, or equal.

2.2 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING OR STRUCTURE

A. Ductile Iron Pipe: AWWA C151
   1. Fittings: AWWA C110 or AWWA C153, ductile iron, standard thickness.
   2. Fittings shall be rated for same pressure as adjoining piping unless otherwise approved by Engineer.

2.3 WATER PIPING, ABOVE GRADE

A. Ductile Iron Pipe: AWWA C151
   1. Fittings: AWWA C110, ductile iron, standard thickness.
   2. Joints: Restrained Joint or flanged see drawings
   3. Restrained Joint Piping shall use **American, McWane, US Pipe or approved equal.**

2.4 GATE VALVES

A. Manufacturers:
   1. M & H or Mueller, or approved equal.

B. [GL-1] 2 inches and Smaller: MSS SP 80, Class 250, cast body threaded, threaded bonnet, 2” operating nut, Buna-N composition disc, threaded ends. Manufactured by Kenedy, no exception.

C. [GL-2] 2-1/2 inches and Larger: MSS SP 85, Class 150, ductile iron body, bronze trim, hand wheel, outside screw and yoke, flanged ends. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor. For buried valves, valves shall have mechanical ends and 2” operating nut. Valves shall be rated for a **minimum of 250 psi** unless otherwise stated.

D. Tapping valves shall comply with standard gate valve requirements and shall be equipped with stainless steel tapping saddle as manufactured by Ford Model FTSS with removable bolts, rated for 250 psi working pressure for pipe sizes 4” – 12”. For pipe sizes larger than 12” model shall be a MJTS. The MJTS shall be

rated for 305 psi working pressure. Tapping saddles shall as manufactured by Ford, or ROMAC (ROMAC Model SST III or STS420).

E. Valve Markers
1. Valve markers shall be made with UV-stable RhinoPoly®, 3" wide minimum, triangular post, 72" long, solid color (Blue), decal with the general wording **"Caution - Waterline**." Owner's name and phone number shall be included. Color and complete wording to be approved by the Engineer. The triangular profile combined with the internal Flex PLUS™ rod for the most durable marker. Marker shall be equipped with the Patented TriGrip Anchor™ for locking post into ground. Valve Marker shall be a Triveiw® as manufactured by **Rhino** or approved equal. Every 1000 feet, at every road bore or line of site, the Contractor shall install a Triview Ultimate Locate Post, with the standard 11-hole terminal board, two external terminals, one external lug, grounded plate, aluminum plate, copper ground lug at bottom of the post, removable cap that locks in place, 360-degree visibility as manufactured by Rhino, no equal.

F. Valve Box
1. Valves boxes shall be 51/4” Plastic valve boxes, with cast iron lid and top rim. Cast iron shall be permanently bonded to the ABS Plastic top section, ABS plastic top sections and bottom sections shall be screw together for adjustment to the right height. Cast iron lid shall be stamped “WATER”. All parts shall manufactured in the United States of America by Bingham & Taylor or approved equal.

2.5 BUTTERFLY VALVES

A. Manufacturers:
1. M & H, no equal.

B. [BF-1] 2-1/2 inches and Larger: MSS SP 67, Class 250 for above grade piping.
1. Body: Cast or ductile iron, wafer, or lug ends, stainless steel stem, extended neck.
2. Disc: Elastomer coated ductile iron.
3. Seat: Resilient replaceable EPDM or Buna N.
4. Handle and Operator: 10 position lever handle. Hand-wheel and gear drive. Furnish gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

C. [BF-2] 2-1/2 inches and Larger: MSS SP 67, Class 250 for buried piping.
1. Body: Cast or ductile iron, mechanical joint ends.
2. Disc: Elastomer coated ductile iron.
3. Seat: Resilient replaceable EPDM or Buna N.

4. Operator shall be 2” operating nut for buried valves.

D. Valves shall be rated for a **minimum of 250 psi** unless otherwise stated.

E. Valve Markers
1. Valve markers shall be made with UV-stable RhinoPoly®, 3" wide minimum, triangular post, 72" long, solid color (Blue), decal with the general wording **"Caution - Waterline**." Owner's name and phone number shall be included. Color and complete wording to be approved by the Engineer. The triangular profile combined with the internal Flex PLUS™ rod for the most durable marker. Marker shall be equipped with the Patented TriGrip Anchor™ for locking post into ground. Valve Marker shall be a Triveiw® as manufactured by **Rhino** or approved equal. Every 1000 feet, line of site, or at every road bore, the Contractor shall install a Triview Ultimate Locate Post, with the standard 11-hole terminal board, two external terminals, one external lug, grounded plate, aluminum plate, copper ground lug at bottom of the post, removable cap that locks in place, 360-degree visibility as manufactured by Rhino, no equal.

F. Valve Box
1. Valves boxes shall be 51/4” Plastic valve boxes, with cast iron lid and top rim. Cast iron shall be permanently bonded to the ABS Plastic top section, ABS plastic top sections and bottom sections shall be screw together for adjustment to the right height. Cast iron lid shall be stamped “WATER”. All parts shall manufactured in the United States of America by Bingham & Taylor or approved equal.

2.6 Air Release Valves

A. Manufactures:
1. ClaVal
2. Valmatic

B. ARV - Air release valves shall be for potable water service. For potable water the Air Release Valve shall be rated for 250 psi water service and shall be equal to an Valmatic with one way valve. Air release valves shall be installed in jumbo meter box and be equipped with in line 2” ball valve (Ball Valve shall have female by female threaded) shut off for future service. Air Release Valve assemblies shall be marked with ARV markers equal to a Rhino Triview Valve Marker, blue in color, with the correct label for the Owner.

2.7 FIRE HYDRANTS

A. Manufacturers:

1. M&H or Mueller.

B. Fire Hydrants shall be Class 150, 3-way, ductile iron construction, 5-1/4" main valve opening, equipped with minimum 2 each 2-1/2" hose connections and one each 4-1/2" pumper/steamer nozzle connection, Fire Hydrants shall conform with AWWA C502 standards. Hydrants shall be designed for mechanical joint connections unless otherwise shown or approved by the Engineer. Hydrants shall be equipped with safety or break-away flanges. The length of the hydrant shall be appropriate for the condition shown on the drawings. Hydrants shall be painted **red** above ground line. Hydrants shall be powder coated on interior and exterior.

C. Flushing Hydrants shall be Class 150, ductile iron construction, 2-1/4" main valve opening with one 2-1/2" hose connection. Flushing hydrants shall be manufactured by **M&H or Mueller.** Hydrants shall be painted **red** above ground line.

2.8 Service Assemblies

A. **Backflow Preventers**: Comply with AWWA C510; Bronze body, with bronze internal parts and stainless steel springs. Backflow preventer shall comply with ADEM cross connection regulators, rated for 150 psi and be ¾". They shall be manufactured by **Watts or AY McDonald** dual check valve with ¾" female meter swivel inlet by ¾" female NPT outlet.

B. **Meters** shall conform to AWWA C700 ¾" size to 1" size, ultrasonic type, straight reading in gallons, with separate leak indicator. Meters shall have wired output with a Nicor Connector. **Contact the water department for brand, model and sizing requirements. Normally use Badger for ¾ inch meters and Neptune or Octave for the 2" and 4" meters.**

C. **Service clamps** for PVC piping shall be a Ford, with corporation thread. Service clamps for C900 or Ductile Iron piping shall be Ford, for 2" tap , for ¾" and 1" service shall be direct tap to ductile iron. For services on 2" PEX use a ROMAC SS service saddle with spring washers equal to a ROMAC 306H-2.13.

D. **Corporation stops** shall comply with AWWA C800, of brass construction and shall be a **Ford ball type with pac nut for ¾" service and 1" service,** corp shall have CC thread pattern, for use with pex tubing.

E. **Curb Stops** shall comply with AWWA C800 and of brass construction. Curb stops shall have lock out wing and be capable 360 degree rotation. Curb stop shall be a **Ford type with pac nut**. For high pressure areas it shall be a **Ford ball type with pac nut.**

F. **Meter Boxes** shall be jumbo plastic two piece boxes rectangular in shape for 1" and smaller services. The box lid shall be a plastic top with a cast iron reader lid. Jumbo box as manufactured by **Carson Brooks Jumbo Meter Box 1220-12-6.**

G. **Service Tubing** for all services 2" and smaller shall be HDPE, DR 9, PE 4710 RESIN, municipal water service tubing, rated 250 psi.

2.9 BACKFLOW PREVENTERS

A. Reduced Pressure Backflow Preventers:
   1. Comply with ASSE 1013.
   2. Bronze body, with bronze internal parts and stainless steel springs.
   3. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

B. Double Check Valve Assemblies: Comply with ASSE 1015 or AWWA C510; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

2.10 UNDERGROUND PIPE MARKERS

A. Trace Wire: Magnetic detectable conductor, brightly blue colored plastic covering, wire shall be a single continuous strand #14 gage wire minimum. Wire shall be a minimum of 12 inches above pipe line. Wire shall be used on all buried piping, **ductile iron and PVC piping**. Wire shall be looped up into valve boxes for connection to line locators and connected to the line markers as specified. Wire shall be as manufactured by Pro-Trace, equal to Pro-Trace HF-CCS PE45 or approved equal. Wires shall be connected to each other, via crimp connectors with gel filling equal to **Pro-Trace TW Connector**, or approved equal. The wire connector shall be a Sealed Wire Connection System for use in Damp, Wet, Raintight, Watertight, Submersible and Direct Bury Locations. Wire connectors shall be blue in color.

2.11 Above Grade Line Markers with locating terminals

1. Line Markers shall be installed every 1000 feet, road bores or line of site. Line markers shall be made with UV-stable RhinoPoly®, 3" wide minimum,

triangular post, 72" long, solid color (Blue), decal with the general wording **"Caution - Waterline**." Owner's name and phone number shall be included. Color and complete wording to be approved by the Engineer. The triangular profile combined with the internal Flex PLUS™ rod for the most durable marker. Marker shall be equipped with the Patented TriGrip Anchor™ for locking post into ground. Line/Valve Marker shall be a Triveiw® Ultimate Locate Post as manufactured by **Rhino** or approved equal. Line markers shall have self- grounded prewired locating post with an eleven hole terminal board with two external terminals, removal cap that locks into place, and a copper ground lug at the bottom of the post.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. [Bevel plain end ferrous pipe.]

B. Remove scale and dirt, on inside and outside, before assembly.

3.3 INSTALLATION - METERS

A. Install positive displacement meters in accordance with AWWA M6, with isolating valves on inlet and outlet.

B. Install Work in accordance with Water Department Standards. See detail in drawings.

3.4 INSTALLATION - HANGERS AND SUPPORTS

A. Inserts:
1. Provide inserts for placement in concrete forms.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

B. Pipe Hangers and Supports:
   1. Install in accordance with ASTM F708 and MSS SP 89.
   2. Install in accordance with requirements of Approved Alabama Department of Transportation Highway Permit.
   3. Support horizontal piping with minimum of two supports per joint of pipe.
   4. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   5. Place hangers within 12 inches of each horizontal elbow.
   6. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   7. Support vertical piping at every 8 feet. Support riser piping independently of connected horizontal piping.

3.5 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection to existing piping system size, location, and invert are as indicated on Drawings.

B. Establish elevations of buried piping with not less than 30” of cover on County Right of ways and not less than 36” cover on all State right of ways.

C. Establish minimum separation of 5’ from other services.

D. Remove scale and dirt on inside of piping before assembly.

E. Excavate pipe trench.

F. Install pipe to elevation.

G. Install pipe on prepared bedding.

H. Route pipe in straight line.

I. Install pipe to allow for expansion and contraction without stressing pipe or joints.

J. Install valves at locations indicated on Drawings in accordance with this Section.

K. Install wire continuous buried 12 inches below finish grade, minimum 12 inches above pipe line. Wire shall be looped up into valve boxes for future connection to line locators

L. Pipe Cover and Backfilling:
   1. Backfill trench free of any rocks taking care to remove any rocks or foreign debris greater than 2” in diameter.
   2. Maintain optimum moisture content of fill material to attain required compaction density.

3. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
4. Do not use wheeled or tracked vehicles for tamping.
5. See detail on drawings for cover requirements.

3.6 INSTALLATION - ABOVE GROUND PIPING

A. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

B. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

C. Install domestic water piping in accordance with ASME B31.9.

D. Install gate, ball, or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.7 INSTALLATION - SERVICE CONNECTIONS

A. Provide new water service complete with approved reduced pressure, double check, back-flow preventer with water meter.

B. Provide sleeve in wall for service main and support at wall with reinforced-concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.

3.8 FIELD QUALITY CONTROL – Pressure Testing

A. Pressure test system to 1.5 times the working pressure at the point of testing, not to exceed the pipeline or valve pressure rating in any part thereof the test segment. Any segments not passing shall be repaired and re-tested at the contractor's expense. **Pressure test segments shall not exceed 10,000 LF unless otherwise approved by the Engineer. Twenty-four-hour (24 hr) notice is required prior to performing any testing. Pressure testing is permitted Monday – Friday, 7am- 5pm. No pressure testing shall be permitted on weekends or any State recognized Holidays.**

B. After completion of pipeline installation, including backfill, and all related appurtenances including service taps, fill piping with water, opening hydrants or other outlets necessary as to expel entrapped air from pipe segment being tested. When necessary provide corporation cocks as to expel air when the pipeline is being filled with water.

C. The contractor shall provide all equipment required to perform leakage and hydrostatic testing. Included but not limited to water storage tanks, water

metering devices, pumps, piping, calibrated pressure gauges, and chart recorders. The recording pressure gage shall be a minimum 10-inch diameter circular chart recorder, 24-hour type, and shall be used throughout the entire test period. The maximum allowable pressure range of the chart shall not exceed 250 psi. The pressure chart shall be maintained as project records and shall be signed by the Engineer and the Contractor. The original pressure chart shall be furnished to the Engineer immediately following each pressure test. Hydrostatic testing procedures as required by ADEM Guidelines, AWWA C600 and AWWA C605 shall apply except as specifically modified herein.

D. **All pipe being tested shall be performed in the presence of the Engineer. The test shall be minimum 6-hour duration.**

E. **The maximum pressure loss shall not exceed 5 pounds per square inch over the entire test period for the segment of pipe being tested.**

F. The contractor shall furnish at the Engineers request gage calibration information demonstrating equipment accuracy.

G. Examine any exposed fittings, piping, valves, hydrants, and joints for leaks during the hydrostatic pressure test. Repair or replace any damaged or defective fittings, piping, valves, hydrants, and/or joints immediately.

H. Allowable Leakage is defined as the quantity of water that must be applied into a pipe to maintain pressure with-in 5 psi of the test pressure after the pipe has been filled and all air has been expelled. The maximum allowable leakage during the 6-hour test shall be based on the following:

$$L = \frac{SD\sqrt{P}}{C}$$

L = allowable, in gallons per hour

S = length of pipe being tested, in feet

D = nominal diameter of pipe, in inches

P = average test pressure during leakage test, in pounds per square inch

C = 133,200

I. **A section of pipe passes the hydrostatic test if the pressure drop is 5 psi or less at the end of the 6-hour test and the leakage is less than the allowable calculated from the formula above.**

3.9 CLEANING

A. Prior to starting work, verify system is complete, flushed and clean.

B. Inject disinfectant, free chlorine in liquid, powder and tablet or gas form, throughout system to obtain residual from 50 to 80 mg/L.

C. Bleed water from outlets to obtain distribution and test for disinfectant residual at minimum 15 percent of outlets.

D. Maintain disinfectant in system for 24 hours.

E. When final disinfectant residual tests less than 25 mg/L, repeat treatment.

F. Flush disinfectant from system until residual concentration is equal to incoming water or 1.0 mg/L.

G. Contractor shall take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

H. Contractor shall be responsible for delivery of sample results to the Owner or the Engineer along with pressure charts.

END OF SECTION

DC Gas Office
1401 Main Street
Centre, Alabama

SECTION 15150

GRAVITY SEWER, MANHOLES AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. This section covers the work necessary to furnish and install, complete, the gravity sewer, manholes and service laterals specified herein in order to complete the gravity sewer and laterals, including connections to existing facilities.

1.2 GENERAL

A. Like items of material provided thereunder shall be the end products of one manufacturer.

1.3 SUBMITTALS

A. Shop Drawings: Furnish the following:

1. Precast Manhole Base Sections: Details of construction.
2. Manhole steps.

B. Quality Control Submittals: Furnish the following:

1. Precast Manhole Sections: Manufacturer's results of tests performed on representative sections to be furnished.
2. Certified load test data for manhole steps.

PART 2 PRODUCTS

2.1 CARBON STEEL PIPE, AND FITTINGS

A. Pipe shall be carbon steel, seamless or electric resistance welded, ASTM A53, Grade B or ASTM A106, Grade B. Pipe wall thickness for two (2)-inch and smaller shall be Schedule 80, pipe wall thickness for 2½ inch and larger shall be Schedule 40 with wall thickness 0.375 inches. Pipe shall have an epoxy coating system inside and out as manufactured by Tnemec. Coatings shall be submitted with piping for approval.

B. Joints for two (2)-inch and smaller shall be threaded, all joints 2½-inch and larger shall be butt welded where required for connections to equipment.

2.02 DUCTILE IRON PIPE

A. Ductile iron pipe shall be centrifugally cast, Grade 60-42-10 iron, ANSI A21.51, AWWA C150, cement-mortar lined and seal coated in accordance with AWWA C110, Thickness Class 50.

B. Joints shall be flanged unless shown or required otherwise.

2.3 PVC PIPE

A. Polyvinyl chloride (PVC) pipe shall comply with ASTM D3034-81 for PVC materials and ASTM F679, minimum pipe stiffness 115 psi at 5% deflection, and shall meet the extra strength minimum of Standard Diameter Ratio 35. PVC pipe shall be supplied in lengths not less than 20 feet.

B. Joints shall be push-on type spigot and bell with integral bell homogeneous with the pipe. Gaskets shall be rubber meeting the requirements of ASTM F477 and D3212 and shall be locked in to the bell groove.

C. The pipe classes shown below shall be defined according to the Standard Pipe Diameter Ratio (SDR) as defined by ASTM D2241. Pipe class will be shown on the plans.

1. Class 160 pipe: SDR 26
2. Class 200 pipe: SDR 21
3. Class 250 pipe: SDR 17
4. Gravity sewer pipe: SDR 35

D. PVC pipe shall be as manufactured by North American Pipe Corporation, or equal.

2.4 TRENCH STABILIZATION MATERIAL

A. Trench stabilization material shall be three-inch minus river-run or pit-run gravel, crushed gravel, or crushed rock; free from clay balls, roots, and organic matter; well-graded from coarse to fine, with less than 8 percent by weight passing the 1/4-inch sieve.

2.5 GRANULAR PIPE BASE AND PIPE ZONE MATERIAL

A. Granular pipe base and pipe zone shall be Natural stone; washed, free of clay. Shale, organic matter; graded in accordance with ASTM C136 to meet the requirements of AHD Std. Spec., Section 801, Size No. 6 or No. 57, stone may be used if approved by the Engineer.

2.6 GRANULAR FILL

A. Granular fill shall be natural sand or sand gravel, free from dirt, clay balls, and organic material, well graded from coarse to fine, containing sufficient finer material for proper compaction, and less than 20 percent by weight passing the No. 200 sieve.

2.7 CONCRETE

A. Concrete shall have 4,000 psi compressive strength at 28 days. Portland cement shall conform to ASTM C150, Type II.

2.8 MORTAR/GROUT

A. Mortar shall be standard premixed meeting ASTM C387, or proportion 1 part portland cement to 2 parts clean, well-graded sand which will pass a 1/8-inch screen.

B. Admixtures: May be included but do not exceed the following percentages of weight of cement:

1. Hydrated Lime: 10 percent.
2. Diatomaceous Earth or Other Inert Material: 5 percent.

C. Consistency:

1. Tongue-and-Groove Type Manhole Joint: Such that mortar will readily adhere.
2. Confined Groove (Keylock) Manhole Joint: Such that excess mortar will be forced out of groove and support is not provided for section being placed.

2.9 PRECAST MANHOLE RISER SECTIONS

A. Minimum 48 inches in diameter, conforming to ASTM C478 and the following:

1. Minimum Wall Thickness: 5” inches.
2. Provide eccentric cones for manholes. Cones shall have same wall thickness and reinforcement as riser section.
3. Top and bottom of sections shall be parallel.
4. Manhole Steps: Cast in sections by the manufacturer.
5. Joints: Tongue-and-groove or confined groove with mastic. Confined Oring with rubber gaskets meeting ASTM C443.
6. Manhole couplings or flexible boots or sleeves either cast in or grouted into manhole wall for watertight seal on manhole-pipe connection.

B. Source Tests:

1. Prior to delivery of any size precast manhole section to job site, conduct yard tests at point of manufacture.
2. Precast sections to be tested will be selected at random from stockpiled material to be supplied for the job.
3. All test specimens shall be mat-tested and meet the permeability test requirements of ASTM C14.

2.10 PRECAST BASE SECTIONS AND BASES

A. Acceptable as an option if approved by ENGINEER.

B. Base Sections: Base slab integral with sidewalls.

C. Base Slab: Minimum 6 inches thick with No. 4 reinforcing bars, 8-inch centers, both directions in center of slab. Tie reinforcing steel to wall steel.

2.11 MANHOLE EXTENSIONS

A. Concrete Grade Rings for Extensions: Maximum 6 inches high with a minimum of one No. 2 reinforcing bar centered in the ring.

2.12 PREFORMED PLASTIC MANHOLE GASKETS

A. May be provided in lieu of mortar type joints.

B. Conform to requirements of Federal Specification SS-S-00210.

C. Manufacturers:

1. Hamilton Kent Manufacturing Co., Box 178, Kent, OH 44240, Kent-Seal
   No. 2.
2. K. T. Snyder Co., Inc., Central National Bank Bldg., Houston TX 77002,
   Ram-Nek.

2.13 MANHOLE STEPS

A. Shall be PSI-PF, manufactured by M.A. Industries Inc., Kelly & Dividend Dr., Peachtree City, GA 30269, or equal.

B. Design: Provide certification that steps are capable of withstanding the vertical and horizontal load test specified in ASTM C478.

2.14 MANHOLE FRAMES AND COVERS

A. Shall be 24-inch clear opening as manufactured by Neenah Foundry R-1916-F. Frames shall have 4-1” anchor bolt holes for bolting to concrete manhole. Frames shall be watertight with bolted lids. The word SEWER in raised 2” letters shall be cast in lid.

2.15 PIPE AND FITTINGS FOR SERVICE LATERALS

A. Unless otherwise shown or directed, all existing houses shall be connected to new sewer mains. All lateral connections shall be 4-inch nominal diameter comprised of the same material as the sewer main. Bedding and backfill requirements shall be the same as specified herein for the sewer mains.

B. Except by permission of the ENGINEER, long-radius bends shall be used at all changes in direction. Pipe and fittings for individual service connections shall be of one type of material throughout.

PART 3 EXECUTION

3.1 WELDING STEEL PIPE

A. General: In accordance with the latest edition of Section IX, ASME Boiler and Pressure Vessel Code.

B. Welding Procedure Specifications:

1. Qualify all welding procedure specifications prior to fabrication in accordance with the ASME Boiler and Pressure Vessel Code, Section IX.
2. Identify all welding procedure Specifications by number and reference the procedure number on all fabrication Drawings.

C. Welding and Welding Operators:

1. Qualify all welders and welding operators prior to fabrication in accordance with ASME Broiler and Pressure Vessel Code, Section IX.
2. Include qualifications for all welding positions to be employed in the fabrication.

D. Materials:

1. Use welding products within the limits recommended by their manufacturers.
2. Keep electrodes, filler wires, and fluxes clean, dry, and properly stored according to manufacturer's recommendations. Do not use electrodes, filler wires, or fluxes that are damp, greasy, or oxidized.
3. Do not use backing rings.
4. Consumable inserts may be used if included in the qualified welding procedure specification. Match the chemistry of the consumable insert with the base metal and weld metal chemistry.

3.2 FABRICATION OF STEEL PIPE

A. End Preparation:

1. Machine shaping of pipe ends is the preferred method.
2. Oxygen or arc cutting is acceptable only if the cut is smooth and true and all slag is removed either by chipping or grinding.
3. Beveled Ends for Butt Welding: Meet the requirements of ANSI B16.25.

B. Cleaning: After completion of shop or field fabrication and after erection, clean all piping inside and outside to remove all loose scale, weld spatter, dirt, loose debris, and foreign material.

C. Alignment and Spacing:

1. Align ends to be joined within existing commercial tolerances on diameters, wall thickness, and out-of-roundness.
2. Root Opening of the Joint: As stated in the welding procedure Specification.

3.3 CORROSION PROTECTION

A. Install coating as specified.

3.4 EXAMINATION, INSPECTION, AND TESTING OF STEEL WELDING

A. Required Examinations:

1. Perform examination in accordance with the ANSI Code for Pressure Piping B31.3 (Piping Code).

2. Perform examination for every pipe thickness and for each welding procedure, progressively, for all piping covered by this Section.

3.5 PIPE PREPARATION AND HANDLING - GENERAL

A. Each pipe and fitting shall be carefully inspected before the exposed pipe or fitting is installed. The interior and exterior protective coating shall be inspected, and all damaged areas patched in the field with material similar to the original. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.

B. Use proper implements, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe. Do not drop or dump pipe.

C. Care shall be taken not to damage linings when handling pipe.

3.6 CUTTING PIPE

A. Cut pipe with milling type cutter, rolling pipe cutter, or abrasive saw cutter. Do not flame cut.

B. Dress cut ends of pipe in accordance with the type of joint to be made. Dress cut ends of mechanical joint pipe to remove sharp edges or projections, which may damage the rubber gasket. Dress cut ends of push-on joint pipe by beveling, as recommended by the pipe manufacturer. Dress cut ends of pipe for flanged coupling adapters as recommended by the manufacturer.

3.7 FABRICATION OF FLANGED PIPE - GENERAL

A. Flanged ductile iron pipe and steel pipe shall be fabricated in the shop, not in the field, and delivered to the job site with flanges in place and properly faced. Threaded flanges shall be individually fitted and machine tightened

on matching threaded pipe by the manufacturer. Flanges for ductile iron shall be faced after fabrication in accordance with ANSI A21.15/AWWA C115.

3.8 JOINTING PIPE - GENERAL

A. Flanged: Prior to connecting flanged pipe, the faces of the flanges shall be thoroughly cleaned of all oil, grease, and foreign material. The rubber gaskets shall be checked for proper fit and thoroughly cleaned. Care shall be taken to assure proper seating of the flange gasket. Bolts shall be tightened so the pressure on the gasket is uniform. Torque-limiting wrenches shall be used to ensure uniform bearing insofar as possible. If joints leak, the gaskets shall be removed and reset and bolts re-tightened.

3.9 TRENCH EXCAVATION AND BACKFILL

A. General:

1. Trenches for mains shall be excavated in the locations shown on the plans or as directed by the ENGINEER.
2. All trees, telephone and power poles along the line of work shall be protected. Where clearing or partial clearing of the right-of-way is necessary, complete before the start of trenching. Cut trees and brush as near to the ground surface as practicable, remove all stumps, and remove for disposal. Do not remove trees over 2 inches in diameter unless they are within 4 feet of the pipe centerline, without permission from the ENGINEER. Protect from damage all privately owned shrubs or plants unless approved by the ENGINEER. If necessary for protection, remove and replace trees, shrubs, or plants by balling the root system and placing in stockpiled topsoil, watering as required. Should any tree, shrub, or plant that has been disturbed as a result of its removal, or otherwise damaged by the CONTRACTOR, die within 6 months from the time it was disturbed or damaged, it shall be replaced in kind and size by the CONTRACTOR.
3. Cut all bituminous and concrete pavements, curbs and sidewalks before excavation of the trenches with an approved pavement saw, hydrohammer, or approved pavement cutter. Pavement and concrete materials removed shall be hauled from the site and not used for trench backfill. No driveway or road shall be inaccessible at the end of the day's work and all street crossings shall be backfilled and opened to traffic each day.

4. All excess excavation not required or suitable for backfill or filling shall become property of the CONTRACTOR and shall be disposed of off the site.

B. Trench Excavation:

1. Trench widths shall be as required to properly install the mains, but not less than 24 inches wide. The trench depths shall be as shown on the drawings.
2. At all times provide and maintain ample means and devices to promptly remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipe laying, during the laying of the pipe, and until backfill at the pipe zone has been completed.

C. Trench Backfill:

1. Provide imported granular pipe base material under gravity sewer pipe for full width of trench. Minimum depth of base shall be 4 inches unless otherwise directed by the ENGINEER.
2. The pipe zone shall be considered to include the full width of the excavated trench from the bottom of the pipe to the top of the pipe. Particular attention must be given to this area to ensure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of the pipe zone. Pipe zone material shall be the same material used for the pipe base. This material shall be placed, in a manner approved by the ENGINEER, simultaneously on both sides of pipe in lifts not to exceed 4 inches. Backfill in the pipe zone shall be compacted by approved mechanical tamping methods. The minimum required compaction shall be 95 percent relative compaction, as determined by ASTM D 1557, latest edition.
3. The CONTRACTOR may backfill the trenches before air testing, but is responsible for locating and repairing all leaks until a satisfactory test is completed.
4. When backfill is placed mechanically, push the backfill material onto the slope of the backfill previously placed and allow to slide down into the trench. Do not push backfill into the trench in such a way as to permit free fall of the material until at least 2 feet of cover is provided over the top of the pipe. Under no circumstances allow sharp, heavy pieces of material to drop directly onto the pipe or the tamped material around the pipe. Do not use backfill material of consolidated masses larger than 1/2 cubic foot.
5. Backfill trenches beneath roads, paving and sidewalks by placing previously specified imported granular material in 6-inch lifts and compacting each lift with mechanical tampers or vibratory

compactors to at least 95 percent of the relative maximum compaction as determined by AASHTO T99.

6. Backfill trenches in other areas by placing material in loose lifts as described herein before and leave the backfill material neatly mounded so that after normal settlement the finished surface will meet the existing grade.
7. Any excess or deficiency of backfill material which becomes apparent after settlement and within the warranty period shall be corrected by regrading, disposal of excess material, and adding additional material where required.
8. Any settlement noted in backfill, fill, or in structures built over the backfill or fill within the 1-year warranty period in accordance with the General Conditions will be considered to be caused by improper compaction methods and shall be corrected at no cost to the OWNER. Structures damaged by settlement shall be restored to their original condition by the CONTRACTOR at no cost to the OWNER.

3.10 PIPE INSTALLATION

A. Handling Material: Provide and use proper implements, tools, and facilities for the safe and proper prosecution of the work. Lower all pipe, fittings, and appurtenances into the trench, piece by piece, by means of a crane, slings, or other suitable means and in such a manner as to prevent damage to the pipeline materials and protective coatings and linings. Do not drop or dump pipeline materials into the trench.

B. Cleaning Pipe and Fittings: Remove all dirt, blisters, lumps, and excess coating from the bell and spigot ends of each pipe. Wipe the outside of the spigot and the inside of the bell until joints are clean, dry, and free from oil and grease before the pipe is laid.

C. Cutting Pipe: Cut pipe in a neat and workmanlike manner without damaging the pipe or lining and so as to leave a smooth end at right angles to the axis of the pipe or leaving a beveled end as recommended by the manufacturer. Dress cut ends to remove sharp edges or projections, which may damage the rubber gasket.

D. Laying Pipe: Lay pipe with bell end facing upgrade. Pipelines intended to be straight shall not deviate from the straight line at any joint in excess of 1 inch.

E. Joining Push-On Joint Pipe: Lay and join pipe in strict accordance with the manufacturer's recommendations. Provide all special tools and devices, such as special jacks, chokers, and similar items required for the installation. Lubricant for the pipe shall be furnished by the pipe

manufacturer. Place sufficient amount of pipe zone material to secure the pipe from movement before the next joint is installed. Provide bell holes at each joint so that the joint can be assembled properly while maintaining uniform pipe support

F. Joining Mechanical Joint Pipe and Fittings: Install in accordance with manufacturer's recommendations. After cleaning ends and gasket, slip the gland and gasket on the plain end, lubricating if necessary to facilitate sliding the gasket into place. Guide the end of the pipe into the bell of the pipe previously laid, locating the spigot centrally in the bell. Place the gasket into position and insert the bolts in the holes. When tightening bolts, bring the gland up toward the flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. Tighten all nuts progressively at a time. Do not over stress bolts to compensate for poor alignment. If effective sealing is not attained at the maximum torque, disassemble the joint and reassemble after cleaning.

G. Installation of Lateral Connection Tees or Wyes: Install tee or wye fittings in accordance with the Sewer Service Connection Details shown on the Drawings. Provide all tees with caps or plugs, as specified. Provide a minimum 2-foot wide compacted gravel base under tees installed in trenches less than 12 feet deep.

H. Line and Grade:

1. Laterals: Minimum slope for laterals shall be 1/4 inch per foot.
2. Sewer Mains: Do not deviate from line or grade, as established by the ENGINEER, more than 0.05% for grade, provided that such variation does not result in a level or reverse sloping invert. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible variation in pipe wall thickness. Establish line and grade for pipe by the use of lasers or by transferring the cut from the offset stakes to batter boards set in the trench at maximum intervals of 25 feet. Match the existing line and grade of the manhole to manhole section being replaced. Maintain a minimum of three sets of batter boards with string line ahead of the pipe laying at all times. If batter boards in the trench prove impractical because of trench conditions, submit other methods of grade and alignment control the ENGINEER for approval. Hand-grade base to proper grade ahead of pipe laying. Base shall provide a firm, unyielding support along entire pipe length.

3.11 HIGHWAY & ROAD UNDERCROSSINGS

A. Open Cut Undercrossings: Complete trench excavation and backfill for open-cut undercrossings as hereinbefore specified under Trench Excavation and Backfill.

B. Pavement Replacement: As specified in accordance with the Alabama Department of Transportation Standard Specifications for Highway Construction, latest edition.

C. Casing Installation:

A. Casing pipe shall be steel, ASTM A139, Grade B with welded field joints. Casing wall thickness shall be min. 0.188 inches for all sizes thirty-six (36) inches and smaller and shall conform to State of Alabama Highway Department Section 862 for larger diameters. Casing pipe shall be shop coated with primer internally and externally, and final coated with bituminous paint on the exterior.

B. Carrier pipe shall be supported inside the casing with pressure-treated timbers, sized as shown on the Drawings. Straps for pipe supports shall be ½ inch wide stainless steel bands, or equal.

C. The approximate locations and lengths of encasements are shown on the Drawings for bidding information, but the exact location and length of encasement will be determined by the appropriate highway department.

3.12 LATERAL CONNECTIONS

A. Laterals shall be laid to the property line with a minimum cover of 3 feet at the locations shown on the Drawings.

B. Trenching and backfilling for services shall be as hereinbefore specified.

C. Maximum deflection permissible with any one fitting shall not exceed 45 degrees and shall be accomplished with long-radius curves or bends. Short-radius elbows or curves will not be permitted, except by permission of the ENGINEER or where shown on the Drawings.

D. Provide ends of all service connection lines and fittings with standard watertight plugs, caps, and stopper, suitably braced to prevent blowoff during internal hydrostatic or air testing.

3.13 LOW PRESSURE AIR TEST

B. General: Make pressure and leakage tests on all newly laid pipe after cleaning. The CONTRACTOR shall provide all necessary equipment and material, and conduct the tests. The ENGINEER will monitor and witness the tests before the installed pipe is approved. Pressure tests must be completed before payment is made for that section of pipe.

C. Air Test:

1. The test shall be conducted between each two adjacent manholes. All sewer sections within the installed system shall be tested.
2. All wyes, tees, or end of slide sewer stubs shall be plugged with flexible-joint caps, or acceptable alternate, securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable, and their removal shall provide a socket suitable for making a flexible-jointed lateral connection or extension.
3. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 pounds/square inch greater than the average back pressure of any ground water that may submerge the pipe. At least 2 minutes shall be allowed for temperature stabilization before proceeding further. If piping is not below ground water, 5 psi may be applied and maintained for minimum times shown in after the 2 minute stabilization period.
4. The pipeline shall be considered to have passed the low pressure air test if the time required for the low pressure exfiltration pressure drops from 3.5 psi to 3.0 psi, (in excess of back pressure from ground water submerging the pipe) shall not be less than that shown in the following table.
5. Air Pressure Adjustment for Pipeline below Groundwater:
   The air pressure correction, which must be added to the 3.5 psig normal test starting pressure, shall be calculated by dividing the average vertical height in feet of ground water above the invert of the sewer pipe to be tested by 2.31. The result gives the air pressure correction in pounds per square inch to be added. (For example, if the average vertical height of groundwater above the pipe invert is 2.8 feet, the additional air pressure required would equal 2.8 divided by 2.31 or 1.2 psig. This would require a minimum starting pressure of 3.5 plus 1.2 or 4.7 psig). In not case should the starting pressure exceed 9.0 psig.
6. The pipeline will be considered to have passed the low pressure air test if the time required for the internal air pressure to drop not more than .5 psi is equal to or greater than that shown in the following table:

PIPE SIZE (Inches)	MINIMUM TIME (Minutes)
4” Pipe	2.5
6” Pipe	4.0

8” Pipe	5.0
10” Pipe	6.5
12” Pipe	7.5
15” Pipe	9.5
18” Pipe	11.5

Note: For pipe size not indicated minimum time in minutes = pipe size (inches) x .625.

C. Correction of Excessive Leakage: Should any test of pipe disclose leakage greater than that allowed, locate and repair the defective joints or pipe until the leakage of a subsequent test is within the specified allowance.

3.14 GRASSING

A. All disturbed areas within rights-of-way shall be seeded in accordance with Section 652 of the State of Alabama Highway Department Standard Specifications, latest edition.

3.15 MANHOLE BASE

A. Use approved precast manhole base with first manhole section integral with base.

B. If material in bottom of trench is unsuitable for supporting manhole, excavate below the base as directed by ENGINEER, and backfill to required grade with trench stabilization material, as hereinbefore specified.

3.16 PLACING PRECAST MANHOLE SECTIONS

A. Section Installation:
1. Thoroughly clean ends of sections to be joined.
2. Place mastic on groove of lower section.
3. Set next section in-place.
4. Rub seam joints inside & out with non shrink grout (hydraulic cement).
5. Fill all lift holes inside & out with non shrink grout (hydraulic cement).
6. Completed Manholes: Rigid and watertight.

B. Preformed Plastic Gaskets: If used in lieu of mortar joints, install in accordance with manufacturer’s instructions and the following:

1. Carefully inspect precast manhole sections to be joined.

2. Do not use sections with chips or cracks in the tongue.
3. Use only pipe primer furnished by gasket manufacturer.
4. Install gasket material in accordance with manufacturer's instructions.
5. Completed Manholes: Rigid and watertight.

C. Rubber Gasketed Joints: Install in accordance with manufacturer's instructions.

3.17 MANHOLE INVERT

A. Construct as shown with smooth transitions to ensure an unobstructed flow through manhole. Remove sharp edges or rough sections which tend to obstruct flow.

3.18 DROP ASSEMBLIES

A. Construct drop assemblies as shown, at locations shown.

3.19 FLEXIBLE JOINTS

A. Provide joints in all pipe not more than 1-1/2 feet from manhole walls. Lay pipes entering manholes on compacted granular fill extending to undisturbed earth.

B. Where last joint of the line laid up to manhole is between 1-1/2 and 6 feet from manhole wall, provide a flexible joint in the manhole wall.

C. Shorten pipes laid out of manhole to ensure first joint is no more than 1-1/2 feet from manhole base.

3.20 MANHOLE EXTENSIONS

A. Install extensions as shown, to height not exceeding 12 inches.

B. Lay grade rings in mortar with sides plumb and tops level. Seal joints with mortar as specified for manhole sections, and make watertight.

3.21 MANHOLE FRAMES AND COVERS

A. Install on top of manholes to positively prevent infiltration of surface or groundwater into manholes.

B. Frame to bolt onto top of manhole. Surface of concrete manhole top to be coated with mastic prior to seating & bolting of frame.

C. Set tops of covers flush with surface of adjoining pavement or ground surface, unless otherwise shown or directed.

D. At locations shown, install exterior manhole frame to structure seals in accordance with manufacturer's instructions.

3.22 FIELD QUALITY CONTROL

A. Hydrostatic Testing of Manholes:

1. When, in ENGINEER'S opinion, the groundwater table is too low to permit visual detection of leaks, hydrostatically test all project manholes.
2. Procedure: Plug inlets and outlets and fill manhole with water to height determined by ENGINEER.
3. A manhole may be filled 24 hours prior to time of testing, if desired, to permit normal absorption into the pipe walls to take place.
4. Leakage in each manhole shall not exceed 0.1 gallon per hour per foot of head above the invert.
5. Repair manholes that do not meet the leakage test, or do not meet specified requirements form visual inspection.
6. If more than 25 percent of the manholes tested fail the hydrostatic test, test all or as many manholes as ENGINEER deems necessary.

3.23 NEGATIVE AIR PRESSURE (VACUUM) TEST

A. General

1. The test method as outlined in ASTM C1244 shall be followed.
2. The contractor shall furnish all facilities, equipment and personnel as required to conduct the vacuum test.
3. The test shall be conducted after the manhole installation.
4. The contractor shall furnish evidence to the engineer that all test equipment is in proper working order.
5. The test shall be conducted in the presence of the Engineer.

B. Preparation

1. All pipes entering the manhole shall be temporarily plugged.
2. Care shall be taken to securely brace plugs as to prevent them from being drawn into the manhole during the test.

C. Procedure

1. The test head shall be placed at the top of the manhole.

2. A vacuum of 10 inches of mercury shall be drawn on the manhole.
3. The time shall be measured for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury.
4. The manhole shall pass if the time required for the vacuum reading to drop from 10 inches to 9 inches of mercury meets or exceeds the values listed.
5. If the manhole fails the vacuum test, the Contractor shall make all necessary repairs to the manhole and shall retest the manhole.

MINIMUM VACUUM TEST TIMES (SECONDS) FOR MANHOLES BASED ON DIAMETER AND DEPTH

MANHOLE DIAMETER (INCHES)

Manhole Depth (FT.)	48	60	72	96	120
8	17	26	33	45	57
10	21	33	41	54	67
12	25	39	49	63	77
14	30	46	57	72	87
16	34	52	65	81	97
18	38	57	73	90	107
20	42	65	81	99	117
22	46	72	89	108	127
24	51	78	97	117	137
26	55	85	105	126	147
28	59	91	113	135	157
30	63	98	121	144	167

Test times for manholes less than 8 feet shall be the same as indicated for the 8 feet depth manholes.

3.24 MANHOLE COATING

A. Coat the interior of designated manholes on the Drawings with coal tar epoxy as manufactured by Sherwin Williams, or equal.

END OF SECTION

SECTION 02925 - ORNAMENTAL PRIVACY FENCE SYSTEMS & GATES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Privacy Grade.

B. Privacy gates and related hardware (including panic hardware).

C. Concrete foundations for posts.

1.2 RELATED WORK

A. Section 03310, Concrete

1.3 SYSTEM DESCRIPTION

A. The Contractor shall supply and install a total Industrial Ornamental Steel Privacy Fencing System. The system shall include all components (i.e., pickets, posts, rails, gates and hardware) required.

1.4 DELEGATED DESIGN FOR FOUNDATIONS OF FENCE POSTS:

A. Installer of Ornamental fences and gates shall employ a professional engineer, licensed in the state of Alabama, to provide engineering design for the post foundations based on local conditions, and to affix their professional seal to the shop drawings for the foundations.

1.5 REFERENCES

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.

C. ASTM D523 - Test Method for Specular Gloss.

D. ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.

E. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.

F. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.

G. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

H. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

I. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.

J. ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.7 SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product specified.

1. Include preparation instructions and recommendations.
2. Include storage and handling requirements and recommendations.
3. Include manufacturer’s installation instructions.

B. Shop Drawings: Elevations of fencing panels, spacing of components, hardware, and gates. Provide foundations for fence post shop drawings stamped by professional engineer.

C. Samples for Initial Selection: For each product and finish specified, sets of color chips representing manufacturer's full range of available colors.

D. Samples for Verification: For each fence material and for each color specified representing each color specified.

1. Provide samples: 24 inches square of replica of fencing panel.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Experienced with type of construction involved with specified materials and per manufacturer's instructions.

C. Mockups: Build mockups to verify selections made under sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation

1. Include 6-foot length of fence complying with requirements.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Transport, handle, store and protect fencing components so they are in undamaged condition when installed.

B. Store fencing components in manufacturer's unopened packaging to protect surfaces until ready for installation.

C. Store fencing components off the ground in a dry, protected, covered and secure area.

1.10 FIELD CONDITIONS

A. Install fencing components only when weather conditions are in comply with manufacturer's installation instructions.

1.11 WARRANTY

A. Manufacturer's Warranty: Provide warranty that manufacturer agrees to repair or replace products or components that fail in materials or workmanship within the specified warranty period. Manufacturer also warrants that the powder coated finish will not chip, crack, or flake.

1. Warranty Period: Limited lifetime warranty - 30 years from date of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Privacy Fence and Gates:

1. Barrette Outdoor Living: 2401 Corporate Blvd, Brooksville, FL 34604. Toll Free: (877) 258-6448. Phone: (352) 754-8555. Fax: (354) 544-8442. Email: info@alumi-guard.com. Web: www.alumi-guard.com
2. Catalyst Fence Solutions, Atlanta, GA, phone 888-549-7350
3. Parallel Architectural Products, Englewood, CO, phone 866-472-7255

B. Exit Bar Kits

1. DAC Industries.
2. Lockey USA
3. Detex

C. Equal products of other manufacturers may be used in the work provided, such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 MATERIALS

A. Aluminum, General: Provide alloys and tempers with not less than the strength and durability properties of alloy and temper designated in paragraphs below for each aluminum form required.

1. Extrusions: ASTM B 221.

a. Posts and Channels: Alloy 6005-T5.
b. Slats: Alloy 6005-T5.
c. Clip Lock: Alloy 6005-T5

2. Plate and Sheet: ASTM B 209, Alloy 6061-T6.

3. Castings: ASTM B 26, Alloy ADC12.

B. Fasteners: Screws of ASTM A 276, 410 stainless steel with heads painted to match fencing color.

C. Accessories: As required by conditions, post caps, wall brackets, scrolls, finials, and other miscellaneous hardware fabricated of aluminum.

D. Retain one of the following two paragraphs for post foundations.

E. Concrete: Types specified in Division 03 Section “Cast-in-Place Concrete.”

F. Concrete: ASTM C 94, Option A; minimum 3,000 psi strength at 28 days.

G. Swing Gate Exit Bar Kit (Black Color): DAC Industries. Model 10045-B Premium Exit Bar Kit Detex Advantex (Basis of Design & Quality). Includes Stainless Steel Exit Bar, adjustable mounting plate, adjustable receiver bracket for latch post, Lock Box for entry from outside of gate and key cylinder with 2 keys.

2.3 ORNAMENTAL FENCING

A. Privacy Grade Fencing:

1. Aluminum Channel: 2 inches tall by 1 inch wide; with top thickness 0.100 inch and .100-inch side wall thickness; according to ASTM F 2957.

2. Slats: 5 inches wide by .050 inch thick; according to ASTM F 2957.

B. Style:

1. Board on Board

2. Shadowbox

C. Grade: Privacy.

1. Panel Length Inside Posts: Nominal 68 inches.

D. Posts:

1. 6 inches square with 0.250 in. wall thickness.

E. Fence Panel Height:

1. 96 inches.

F. Privacy Gates: Provide to match style specified.

1. Construction: 2 in. x 2 in. by .125 in. wall, welded square frame gates.

2. Height: 96 inches

3. Opening Width:

a. Double 48” walk gates with standard hardware in a 96” wide opening. Field verify prior to fabrication.

4. Hardware:

a. Self-closing hinges.

b. Lever latch - single sided or double sided (coordinate to ensure workability and functionality with Swing Gate Exit Bar Kit)
c. Drop-rod for one leaf of double gates.
d. Single hole lock box.

2.4 FABRICATION

A. Punch channels (horizontal rails) to allow slats to be installed on the side(s) of the rail. The number of channels vary with the style, height, and strength as determined by manufacturer.

B. Fasten slats to channels with specified screws on the side(s) of the channel.

C. Punched posts to allow the clips to be attached with specified screws. Affix post caps to top of posts.

D. Fabricate gates using same components as for fencing. Walk through gates shall have adjustable self-closing hinges and shall be self-latching.

2.5 FINISH

A. Super-Durable Polyester Powder Coating: High performance polyester, medium glass, applied to over 2.0 mil thickness complying with AAMA 2604 with the following performance characteristics:

1. Meet or exceed 3,000-hour salt spray test according to ASTM B 117.
2. Meet or exceed a H-2H pencil hardness according to ASTM D 3363.
3. Meet or exceed a 5B rating on the ASTM D 3359 adhesion test.

B. Color: To be selected by Owner from Manufacturer's Standard Colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions:

1. Examine substrates to receive decorative metal fences and associated work for compliance with requirements and other conditions affecting performance.
2. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents.
3. Starting work within a particular area will be construed as acceptance of surface conditions.

3.2 PREPARATION

1. Prepare the grade and remove surface irregularities, if any, which may cause interference with installation of decorative metal fences.

3.3 INSTALLATION

1. Install decorative metal fences according to manufacturer's installation instructions.
2. Excavate holes for posts to diameter and spacing indicated without disturbing underlying materials.
3. Center and align posts in excavated holes to required depth. Place concrete around posts and vibrate or tamp for consolidation. Recheck vertical and top alignment of posts, verify they are plumb and level. Make necessary corrections if needed before concrete hardens.
4. For surface mounted on hard surfaces, set posts and fasten to surface using corrosion resistant anchors. Avoid mounting over expansion or control joints.
5. Horizontal rails to be snapped onto the clip locks on posts and fasten with specified screws.
6. Support gates from gate posts. Avoid attaching hinged side of gate to building wall.

7. Install gates plumb, level and secure for full opening without interference. For double gates, install drop rod. Adjust hardware for smooth operation.

3.4 ERECTION TOLERANCES

1. Maximum Variation from Plumb: 1/4 inch.
2. Maximum Offset from Indicated Position: 1 inch.
3. Minimum Distance from Property Line: 6 inches.

3.5 CLEANING

1. Clean decorative metal fences with mild detergent and rinse with clean water.
2. Remove mortar from decorative metal fences using a 10 percent solution of muriatic acid followed immediately by several rinses of clean water.

3.6 ADJUSTING

1. Touch-up paint scratched surfaces using paint pens supplied by manufacturers that match fence color.

END OF SECTION

SECTION 02930 - TEMPORARY CHAIN LINK FENCING & GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Erection and maintenance of temporary chain link fencing and gates.

B. Refer to Section 01010, contractor to provide temporary fence layout and location of fence and gates.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.3 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

a. Product Data: Include construction details, material descriptions, dimensions of individual components, and finishes for chain link fences and gates.

i. Fence, gate posts, rails, and fittings.

ii. Chain link fabric.

iii. Gates and hardware.

2. Test Reports: Field test result for compliance of installation of chain link fence and gates.

B. Informational Submittals:

1. Manufacturer’s recommended installation instructions.

2. Evidence of Supplier and installer qualifications.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

1.5 SCHEDULING AND SEQUENCING

A. Install temporary fence and gates prior to beginning demolition work and/or new construction work

B. Complete necessary Site preparation and grading before installing chain link fence and gates.

PART 2 - PRODUCTS

2.1 MANUFACTURERE - Galvanized Steel Fencing: The following manufacturers’ products have been used to establish minimum standards for materials, workmanship and function:

A. Master Halco

B. Merchants Metal

C. Stephens Pipe and Steel, LLC.

D. Eagle Fences

E. Equal products of other manufacturers may be used in the work provided, such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 TEMPORARY CHAIN LINK FENCING

A. Unless otherwise indicated, type of temporary chain link fencing shall be as follows:

1. New materials or previously used salvaged chain link fencing in good condition.

2. Height: 8’-0” (minimum) unless otherwise indicated on drawings.
3. Posts: 2” min. galvanized steel pipe of diameter to provide rigidity. Post shall be suitable for setting in concrete footings.
4. Fencing Fabric: 2” diamond woven galvanized steel wire mesh. Provide in continuous lengths to be wire tied to fence posts or prefabricated into modular pipe-framed fence panels.
5. Privacy Fabric: Temporary fencing shall be outfitted with privacy fabric.
    a. Color: Green
    b. Material Requirement: Polythylene, 4.9 oz/sq. yd., Burst Strength: 210 psi

B. Gates: Provide personnel and vehicle gates of the quantity and size indicated on the Drawings or required for functional access to site.
1. Fabricate of same material as used for fencing.
2. Vehicle gates:
    a. Minimum width: 20 feet to allow access for emergency vehicles.
    b. Capable of manual operation by one person.

PART 3 - EXECUTION

3.1 GENERAL- TEMPORARY CHAIN LINK FENCING

A. Installation of temporary fencing shall not deter or hinder access to existing and new hose connections and fire hydrants.
1. Maintain 3 feet diameter clear space around fire hydrants.
2. Where fire hydrant or hose connection is blocked by fencing, provide access gate.

B. Access: Provide gates for personnel, delivery of materials, and access by emergency vehicles.

C. Field verify gate locations with Architect.

3.2 INSTALLATION - FENCE

A. Chain link posts:
1. Post spacing shall be 12’ maximum if using prefabricated panels and 10’ maximum if wire tying mesh to posts.
2. End, Corner and Line posts shall be set in concrete **OR** post driven.
3. Gate posts: Use concrete footings and brace to provide rigidity for accommodating size of gate. Gate posts MUST be set in concrete.

B. Fabric: Leave approximately 2” between finish grade and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.

C. Gates: Install with required hardware.

D. Wire Ties: 11 gage galvanized steel.

E. Tension Wire: 7 gage, galvanized coated coil spring wire, metal and finish to match fabric.

F. Concrete: Provide concrete consisting of portland cement, ASTM C 150, aggregates ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28 day compressive strength of 3,000 psi using at least 4 sacks of cement per cu. yd., 1” maximum size aggregate, maximum 3” slump.

3.3 INSTALLATION - GATES

A. Chain link gates:

1. Fabricate perimeter frames of gates from metal and finish to match fence framework. Assemble gate frames by welding or with special fittings and rivets for rigid connections, providing security against removal or breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware and accessories. Space frame members maximum of 8’ apart unless otherwise indicated.
2. Provide same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges and at top and bottom edges. Attach stretcher bars to gate frame at not more than 15” o.c.
3. Install diagonal cross-bracing consisting of 3/8” diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.

B. Gate Hardware: Provide hardware and accessories for each gate, galvanized per ASMT A 153, and in accordance with the following.

1. Hinges: Size and material to suit gate size, non-lift off type, offset to permit 180 degree gate opening. Provide 1½ pair hinges for each leaf over 6’ nominal height.
2. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.
3. Keeper: Provide keeper for vehicle gates, which automatically engages gate leaf and holds it in open position until manually released.
4. Double Gates: Provide gate stops for double gates, consisting of mushroom type flush plate with anchors, set in concrete, and designed to engage center drop rod or plunger bar. Include locking device and padlock eyes as integral part of latch, permitting both gate leaves to be locked with single padlock.

3.4 MAINTENANCE

A. Maintain fencing in good condition. If damaged, Contractor shall immediately repair at no additional cost to owner.

3.5 FIELD QUALITY CONTROL

A. Post and Fabric Testing: Test fabric tension and line post rigidity according to ASTM F1916.

B. Gate Tests:

1. Prior to acceptance of installed gates, demonstrate proper operation of gates under each possible open and close condition specified.
2. Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range.
3. Confirm that latches and locks engage accurately and securely without forcing and binding.

3.6 CLEANUP

A. Remove excess fencing materials, soil, concrete and any other debris from Site which resulted from installation of fences and/or gates.

END OF SECTION

SECTION 02931 - VINYL COATED CHAIN LINK FENCES AND GATES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of chain link fences and gates is indicated on drawings.

1.3 SECTION INCLUDES

A. Fence framework, fabric, and accessories.

B. Excavation for post bases; concrete foundation for posts gate assemblies.

C. Manual swing gates and related hardware.

1.4 REFERENCES

A. ANSI/ASTM A123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A116 - Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.

C. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

D. ASTM A569 - Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality.

E. ASTM C94 - Ready-mixed Concrete.

1.5 SYTEM DESCRIPTION

A. **Fence Height**: As indicated on drawings, otherwise 4 feet.

B. **Fence Length**: As indicated on drawings.

C. **Location**: As indicated on drawings.

D. Intervals not exceeding 10 feet on center in straight runs and 8 feet on center curves.

1.6 SUBMITTALS

A. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

B. Qualifications:

C. Manufacturer: Company specializing in manufacturing the products specified in this Section to have minimum three years documented experience.

1.7 FIELD MEASUREMENTS

A. Verify that field measurements are as shown on Drawings prior to installation.

PART 2 - PRODUCTS

2.1 MANUFACTURER: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

A. Fence System:

1. Master-Halco, Inc
2. Merchants Metals
3. Stephens Pipe and Steel, LLC.
4. Equal products of other manufacturers may be used in the work provided, such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

B. Fence Framework:

1. Allied Tube: Product SS 40.
2. Century Tube: Product CMT 40.

C. Chain Link Fabric:

1. Merchants Metals.
2. Cargill.

D. Padlocks:

1. Yale.
2. Master.
3. Sargent.

2.2 MATERIALS & COMPONENTS

A. Framing Materials: Round SS 40, steel pipe, vinyl coated per ASTM F1234 outside. Post to have tops to exclude moisture.

B. Fabric: 9 gage fused bonded fabric shall have PVC coating of 7 to 12 mils per ASTM F668 Class 2B.

C. Swing Gates: Size as shown on Drawings covered with chain link fabric. Gates shall be complete with industrial type, fixed pin, 180 degree hinges and drop latches with padlock left in proper operating condition.

D. Padlocks: Industrial grade and shall be keyed alike, and as Owner's existing locks, when more than one is required.

E. Components:

1. Line Posts: 2.0 inch outside diameter.
2. Corner and Terminal Posts: 3.0 inch outside diameter.
3. Swing Gate Posts: 3.0 inch minimum outside diameter for less than 6 foot gate leaf. 4.0 inch minimum outside diameter for 6 foot gate leaf or greater or outside diameter as required by design. Posts shall be of sufficient diameter and weight to prevent deflection or gate sagging.
4. Top and Bottom Rail: 1-5/8 inch diameter, plain end, sleeve coupled with 0.111 inch wall thickness. Provide Mid-Rails at fences and gates in excess of 5 feet in height.
5. Swing Gate Frame: 1-5/8 inch minimum diameter welded or fitting type fabrication. Welded fabrication shall be vinyl coated after weld connections are made. The frame components shall be of sufficient diameter, weight and design to avoid sagging and allow easy operation.
6. Fabric: 2 inch vinyl coated diamond mesh interwoven wire, 9 gage thick, top selvage twisted tight, bottom selvage knuckle end closed.
7. Tension Wire: 7 gage thick steel, single strand, vinyl coated.
8. Tie Wire: Aluminum alloy steel wire, vinyl coated.
9. Security or fence containing privacy slats specify 9 gauge core (0.148) (3.76 mm) steel Galvanized Before Weave (GBW) with preformed power fastened wire ties and preformed hog rings having minimum zinc coating 1.20 oz/ft² (366 g/m²) per ASTM F626.

F. Accessories:

1. Caps: Cast steel vinyl coated; sized to post diameter, set screw retainer.
2. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel, vinyl coated.

3. Swing Gate Hardware: Fork latch with gravity drop, center gate stop and drop rod; three 180 degree gate hinges per leaf and hardware for padlock.

G. Finishes:

1. Components: Vinyl coated to ASTM F123, 10-14 mil coating.
2. Hardware: Vinyl coated.
3. Accessories: Same finish as fabric.
4. Color: Shall be selected by Architect and Owner.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ANSI/ASTM F567 and manufacturer's instructions.

B. Set all posts plumb, in concrete footings with top of footing 1 inch above finish grade. Slope top of concrete for water runoff.

C. Line Post Footing Depth Below Finish Grade: Minimum three feet (18 inches in solid rock) and not less than 12 inches in diameter.

D. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: Minimum three feet (18 inches in solid rock) and not less than 12 inches in diameter.

E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate posts.

F. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

G. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

H. Position bottom of fabric 2 inches above finished grade.

I. Fasten fabric to top, bottom and mid- rails, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

J. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips. Install bottom tension wire stretched taut between terminal posts.

K. Do not swing gate from building wall; provide gate posts.

L. Install gates with fabric to match fence. Install three hinges per leaf, latch, catches, drop bolt, foot bolts and sockets, torsion spring, retainer and locking clamp.

M. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

N. Clean all excess grout, concrete, grease, paint, etc., from fence.

O. Erection Tolerances:

1. Maximum Variation From Plumb: 1/4 inch.
2. Maximum Offset From True Position: 1 inch.
3. Components shall not infringe adjacent property lines.

3.2 SCHEDULE

A. Fence and gate location(s) as indicated on Drawings.

B. Fence and gate size(s) as indicated in this section, otherwise as indicated on drawings.

END OF SECTION

SECTION 03310 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of concrete work is shown on drawings.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:

1. ACL 301 "Specifications for Structural Concrete for Buildings".
2. ACI 318 "Building Code Requirements for Reinforced Concrete"
3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

B. Concrete Testing Service: The **Owner** will engage and pay a testing laboratory to perform material evaluation tests.

C. Materials and installed work may require retesting, as directed by Architect, at anytime during progress of work. Provide free access to material stockpiles and facilities. Retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.4 SUBMITTALS

A. Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joints systems, curing compounds, dry-shake finish materials and others as requested by Architect.

B. Shop Drawings Reinforcements: Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement.

C. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

B. Use plywood complying with U. S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

C. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two (2) edges and one (1) side for tight fit.

D. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed, unless otherwise noted.

B. Steel Wire: ASTM A 82, plain, cold-drawn, steel.

C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

D. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications, unless otherwise acceptable.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

2. For exposed to view concrete surfaces, where legs of supports are in contact with forms, provide support with legs which are plastic protected (CRSI, Class I) or stainless steel protected (CRSI, Class 3).

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type 1, unless otherwise acceptable to Architect.

1. Use one brand of cement throughout project, unless otherwise acceptable to Architect.

B. Normal Weight Aggregate: ASTM C 33, and as herein specified. Provide aggregate from a single source for all concrete.

1. Do not use fine or coarse aggregates containing spalling-causing deleterious substances.

C. Water: Drinkable.

D. Air-Entraining Admixture: ASTM C 260.

1. MANUFACTURERS: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

a. Air-Mix, Evclid Chemical Co.

b. Sika-Ai", Sika Corp.

c. Darex AEA, W. R. Grace

d. Equal products of other manufacturers may be used in the work, provide such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

E. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E, and containing not more than 0.1% chloride ions.

1. MANUFACTURERS: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

a. Accelguard 80; Euclid Chemical Company

b. Pozzolith High Gally; Master Builders

c. Equal products of other manufacturers may be used in the work, provide such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

F. Water-Reducing, Retarding Admixture: ASTM C 494, Type D, and contain not more than 0.1% chloride ions.

1. MANUFACTURERS: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

a. Edoco 20006; Edoco Technical Products

b. Pozzolith 300-R; Master Builders

c. Eucon Retarder 75; Euclid Chemical Company

d. Daratard; W. R. Grace

e. Plastiment; Sika Chemical Company

f. Equal products of other manufacturers may be used in the work, provide such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

G. Certification: Provide admixture manufacturer's written certification that chloride ion content complies with specified requirements.

H. Calcium chloride or admixtures containing more than 0.1% chloride ions are not permitted.

2.4 RELATED MATERIALS

A. Moisture Barrier: Provide moisture barrier cover over prepared base material where indicated. Use only materials which are resistant to decay when tested in accordance with ASTM E 154, as follows:

1. Polyethylene sheet not less than 10 mils thick.

B. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

C. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

1. Waterproof paper

2. Polyethylene film.

3. Polyethylene-coated burlap.

D. Liquid Membrane Forming Curing Compound: Liquid type membrane forming curing compound complying with ASTM C 309, Type 1-D, Class A unless other type acceptable to Architect. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal. Equal to "Kure-N-Seal" - 30; Sonneborn-Contech

1. MANUFACTURERS: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

a. Master Builders

b. Euclid Chemical Company

c. A.C. Horn

d. The Burke Company

e. Equal products of other manufacturers may be used in the work, provide such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

E. Bonding Compound: Polyvinyl acetate or acrylic base, re-wettable type.

1. MANUFACTURERS: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

a. Welcrete; Larsen Products

b. EucoWeld; Euclid Chemical Company

c. Hornweld; A. C. Horn

d. Sonocrete; Sonneborn-Contech

e. Acrylic Bondcrete; The Burke Company

f. Equal products of other manufacturers may be used in the work, provide such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

F. Epoxy Adhesive: ASTM C 881, two component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suit project requirements.

1. MANUFACTURERS: The following manufacturers' products have been used establish minimum standards for materials, workmanship and function:

a. Epoxtite; A. C. Horn

b. Sikadur Hi-Mod; Sika Chemical Corporation

c. Euco Epoxy 463 or 615; Euclid Chemical Company

d. Patch and Bond Epoxy; The Burke Company

e. Sure-Poxy; Kaufman Products, Inc.

f. Equal products of other manufacturers may be used in the work, provide such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

G. Subfloor Patching and Leveling**:** The following manufacturers' products have been used establish minimum standards for materials, workmanship and function:

1. MANUFACTURERS: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

a. Ardex K-15; Ardex Engineered Cements 400 Ardex Park Drive Aliquippa, PA 15001; (724) 203-5000

b. Equal products of other manufacturers may be used in the work, provide such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

PART 3 - EXECUTION

3.1 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Architect.

B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect.

C. Design mixes to provide normal weight concrete as indicated on drawings and schedules.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

E. Admixtures:

1. Use water-reducing admixture in all concrete for ease of placement and workability.

2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 degrees F.

3. Use air-entraining admixture in all concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of 6% with a tolerance of plus-or-minus 1-1/2%.

F. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps, slabs and sloping surfaces: 3" to 5".

2. Reinforced foundation systems: 2" to 5".

3. Other concrete: 3" to 5".

3.2 CONCRETE MIXES

A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified.

1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.

2. When air temperature is between 85 degrees F and 90 degrees, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

3.3 FORMS

A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.

B. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

C. Construct forms to sizes, shapes, lines and dimensions shown and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, off-sets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses and the like, to prevent swelling and for easy removal.

E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set time to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

F. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

G. Form Ties: Factory-fabricated, adjustable-length, removable, or snap-off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.

1. Unless otherwise indicated, provide ties so portion remaining within concrete after removal is 1" inside concrete and will not leave holes larger than 1" diameter in concrete surface.

H. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement is required to eliminate mortar leaks and maintain proper alignment.

3.4 PLACING REINFORCEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing

Reinforcing Bars" for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by formwork, construction or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers as required.

D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.5 JOINTS

A. Construction Joints: Locate and install construction joints as indicated, or if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect.

1. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints.

B. Isolation Joints in Slabs-On-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs on ground and vertical surfaces, such as column pedestals, and elsewhere as indicated.

1. Joint filler and sealant materials are specified in Division-7 sections of these specifications.

C. Construction Joints in Slabs-On-Ground: Construct construction joints in slabs-on-ground to form panels of patterns no larger than 600 square feet and as shown and as detailed. An alternative control joint detail may be inserts 1/8" to 1/4" wide x 1/4 of slab depth.

1. Form contraction joints by inserting premolded plastic, hardboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris, fill groove with joint sealant.

2. Joint sealant material is specified in Division-7 sections of these specifications.

3.6 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface.

1. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3.7 PREPARATION OF FORM SURFACES

A. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.

B. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

C. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.8 CONCRETE PLACEMENT

A. Replacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

1. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

B. General: Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete", and as herein specified.

1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams of planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24"

and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Bring slab surfaces to correct level with straightedge and strike-off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3. Maintain reinforcing in proper position during concrete placement operations.

E. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

1. When air temperature has fallen to or is expected to fall below 40 degrees F uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F. and not more than 80 degrees F at point of placement.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not place concrete when air temperature has fallen to or is expected to fall below 35° F.Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

F. Hot Weather Placing:

1. When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACE 305 and as herein specified.

2. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Mixing water may be chilled, or chopped ice may be used to control

temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.

3. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
4. Fog spray forms, reinforcing steel and subgrade just before concrete is placed.
5. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.9 FINISH OF FORMED SURFACES

A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

B. Smooth Form Finish: For formed concrete surfaces or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete such as waterproofing, dampproofing. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

C. Smooth Rubbed Finish: For formed concrete surfaces exposed to view provide smooth rubbed finish, not later than one day after form removal.

1. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 MONOLITHIC SLAB FINISHES

A. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155/E 1155M for randomly trafficked floor surfaces:

1. Specified overall values of flatness, F(F) 38: and levelness, F(L) 25: with minimum local values of flatness, F(F) 19: levelness, F(L) 13: for slabs on grade.

B. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo and other bonded applied cementious finish flooring material, and as otherwise indicated.

C. Slope surface uniformly to drains where required. After leveling, roughen surfaces before final set, with stiff brushes, brooms or rakes.

D. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other

finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing membrane or elastic roofing, or sand-bend terrazzo, and as otherwise indicated.

1. After screeding consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

E. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint or other thin film finish coating system.

1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance. Grind smooth surface defects which would telegraph through applied floor covering system.

F. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps and elsewhere as indicated.

1. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.11 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than 7 days.

2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least seven (7) days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.

1. Provide moisture curing by one of the following methods or by a combination of the following methods:

a. Keep concrete surface continuously wet by covering with water.

b. Continuous water-fog spray.

c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

C. Provide moisture-cover curing as follows:

1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

D. Provide curing and sealing compound to interior slabs with resilient flooring, carpet over cushion, or left exposed; and to exterior slabs, walks, and curbs as follows:

1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within two hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.

E. Do not use membrane curing compounds on surface which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, damp-proofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting and other coatings and finish materials, unless otherwise acceptable to Architect.

F. Curing Formed Surfaces: Cure formed concrete surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

G. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.

H. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

I. Sealer and Dust-proofer: Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

3.12 REMOVAL OF FORMS

A. Formwork not supporting weight of concrete, such as sides of walls, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F for twenty-four (24) hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided cutting and protection operations are maintained.

B. Formwork supporting weight of concrete, may not be removed in less than fourteen (14) days and until concrete has attained design minimum compressive strength of in place concrete by testing field-cured specimens representative of concrete location in members.

C. Form facing material may be removed four (4) days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.13 RE-USE OF FORMS

A. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

3.14 MISCELLANEOUS CONCRETE ITEMS

A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

D. Reinforced Masonry: Provide concrete grout for reinforced masonry, masonry lintels and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

3.15 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms when acceptable to Architect.

1. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

2. For exposed to view surfaces, blend white portland cement and standard portland cement so that when dry, patching mortar will match color surrounding. Provide test areas at

inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

C. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.

1. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets and other objectionable conditions.

2. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

3. Correct low areas in unformed surfaces during, or immediately after, completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.

4. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and exposed reinforcing steel with at least 3/4" clearance all around.

5. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

6. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than seventy-two (72) hours.

7. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.

8. Repair methods not specified above may be used, subject to acceptance of Architect.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. The Owner will employ and pay for a testing laboratory to perform tests and to submit test reports. The Contractor shall notify testing agency 24 hours in advance of requirements.

B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Architect.

C. The Owner shall maintain equipment on site to cast cylinders, perform slump and air tests, and field cure specimens. Should the project testing agency be absent from the site, the Contractor will be responsible for performing the field tests below.

D. Sampling Fresh Concrete: ASTM C 172, except as modified for slump to comply with ASTM C 94.

1. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
2. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below, and when 80 degrees F. and above; and each time a set of compression test specimens made.
3. Compression Test Specimen: ASTM C 31; one set of four (4) standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

E. Compressive Strength Tests: ASTM C 39; one set for each day's pour plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at seven (7) days, two specimen tested at twenty-eight (28) days, and one specimen retained in reserve for later testing if required. Minimum compressive strength of concrete shall be 3,000 psi at 28 days unless otherwise indicated.

1. When frequency of testing will provide less than five (5) strength tests for a given class of concrete, conduct testing from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.
2. When total quantity of a given class of concrete is less than 50 cu. yds., strength test may be waived by Architect if, in his judgment, adequate evidence of satisfactory strength is provided.
3. When strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
4. Test results shall be reported in writing to Architect and Contractor within twenty-four (24) hours that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at twenty-eight (28) days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

F. Nondestructive Testing: Impact hammer, sonoscope, or other non- destructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

G. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

1. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

END OF SECTION

SECTION 03950 - CONCRETE SEALER

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exposed concrete slabs where concrete sealer is indicated.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: Submit four samples of concrete sealer over concrete, 6 by 6 inches sample.

C. Manufacturer Certificates: Signed by manufacturers certifying that concrete sealer comply with requirements.

D. Qualification Data: For Installer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for assemblies.

F. Warranty: Special warranty specified in this Section.

G. Maintenance data.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer with minimum five years documented experience.

1.4 PROJECT CONDITIONS

A. Limitations: Proceed with application only when the following existing substrate conditions permit sealer to be applied according to manufacturers' written instructions and warranty requirements:
   1. Ambient temperature is above 40 deg F.
   2. Concrete surfaces and mortar have cured for more than 28 days.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree to repair or replace materials that fail to maintain water repellency within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE SEALER

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
   1. Products:
      a. Curecrete Distribution Inc.; Ashford Formula.
      b. Burke by Edoco; Titan Hard.

c. ChemMasters; Chemisil Plus.
d. Euclid Chemical Company (The); Euco Diamond Hard.

2. Flammability: Self extinguishing.
3. Finish: Non slip finish. Coefficient of friction: 0.6 wet, 0.8 dry.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrate of substances that might interfere with penetration or performance of concrete sealer.
   1. Concrete: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of concrete sealer.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATION

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of concrete sealer and to instruct Applicator on the product and application method to be used.

B. Concrete Sealer: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
   1. Do not apply to concrete that is less than number of days' old recommended by sealer manufacturer in writing.
   2. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

C. Apply on horizontal surfaces of indicated interior exposed concrete slabs not receiving other finishes.

3.3 CLEANING

A. Immediately clean concrete sealer from adjoining surfaces and surfaces soiled or damaged by concrete sealer application as work progresses. Repair damage caused by concrete sealer application. Comply with manufacturer's written cleaning instructions.

END OF SECTION

SECTION 04200 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of each type of masonry work is indicated on drawings and schedule.

B. Types of masonry work required include.

1. Concrete unit masonry.

2. Brick masonry.

1.3 QUALITY ASSURANCE

A. Fire Performance Characteristics: Where indicated, provide materials and construction which are identical to those of assemblies whose fire endurance has been determined by testing in compliance with ASTM E 119 by a recognized testing and inspecting organization or by another means, as acceptable to authority having jurisdiction.

B. Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

C. Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

D. Samples: Submit the following samples:

1. Unit masonry samples for each type of exposed masonry unit required; include in each set the full range of exposed color and texture to be expected in completed work.

2. Include size variation data verifying that actual range of sizes for brick falls within ASTM C652 dimension tolerances for brick where modular dimensioning is indicated. The grade shall be SW and the type HBS.

E. Field Constructed Mock-Up Panel: Prepare mock-up panel for the following types of masonry. Purpose of mock-up is further verification of selections made for color and finish under sample submittals and establishing standard of quality for aesthetic effects expected in completed work. Build mock-up panel to comply with the following requirements:

1. Locate mock-up panel on site where directed by the Architect.

2. Build mock-up panel of typical exterior masonry wall, approximately 4’-0” long by 4’-0” high, showing all typical components, connections, attachments to building structure and methods of installation.

3. Retain mock-up panel during construction as standard for judging completed masonry work. When directed, demolish mock-up panel and remove from site.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes. Store masonry units off the ground.

C. Store cementitious materials off the ground, under cover and in dry location.

D. Store aggregates where grading and other required characteristics can be maintained.

E. Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

1.5 PROJECT CONDITIONS

A. Protection of Work: During erection, cover top of walls with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.

B. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

C. Do not apply uniform floor or roof loading for at least 24 hours after building masonry walls or columns.

D. Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry.

E. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

F. Protect sills, ledges and projections from droppings of mortar.

G. Environmental Protection:

1. Maintain air temperature and materials to a minimum of 40 degrees F and a maximum of 90 degrees F prior to and during masonry work
2. Do not lay masonry units which are wet or frozen.
3. Remove masonry damaged by freezing conditions.

H. For clay masonry units with initial rates of absorption (suction) which require them to be wetted before laying, comply with the following requirements.

1. For units with surface temperatures above 32°F wet with water heated to above 70°F.
2. For units with surface temperatures below 32°F wet with water heated to above 130°F.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.

1. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.
2. Provide bullnose units for outside corners, except where indicated as square-edged.

B. Concrete Block: Provide units complying with characteristics indicated below for Grade, Type, face size, exposed face and under each form of block included, for weight classification.

1. Grade N
2. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8” high x thickness indicated.
3. Type I: moisture-controlled units.
4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
5. Hollow Loadbearing Block: ASTM C 90 and as follows:
   a. Weight Classification: Lightweight
6. All CMU sills shall be bullnose concrete block, unless another material is indicated on the drawings. If the sills are indicated to receive another material (ie: Solid Surface fabrication, wood, etc.) placed on top of the CMU sill, the CMU sill shall be straight edged concrete block units.

2.2 BRICK MADE FROM CLAY OR SHALE

A. MANUFACTURERS: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. ACME Brick Company, Montgomery, AL
2. Boral Bricks, Phenix City, Al
3. Henry Brick Company, Selma, AL
4. Equal products of other manufacturers may be used in the work provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

B. General: Comply with referenced standards and other requirements indicated below applicable to each form of brick required.

C. Provide special molded shapes where indicated and for application requiring brick of form, size and finish on exposed surfaces which cannot be produced from standard brick sizes by sawing.

D. For sills, caps and similar applications resulting in exposure of brick surfaces which otherwise would be concealed from view, provide uncored or unfrogged units with all exposed surfaces finished.

E. Facing Brick: Submit samples for approval of equals prior to bids. Eased edge brick shall not be allowed.

F. BRICK ALLOWANCES

1. *Face Brick* shall have a value of **$450.00 dollars per thousand** (Allowances shall be for material only, based on actual number of bricks purchased for the project. Installation, profit, overhead, shipping and taxes shall be included in the Contractors Bid Proposal). If Architect chooses brick of lesser value after Bid Process, Contractor shall issue a deductive Change Order for the difference.
2. *Accent Brick* shall have a value of **$450.00 dollars per thousand** (Allowances shall be for material only, based on actual number of bricks purchased for the project. Installation, profit, overhead, shipping and taxes shall be included in the Contractors Bid Proposal). If Architect chooses brick of lesser value after Bid Process, Contractor shall issue a deductive Change Order for the difference.

2.3 MORTAR AND GROUT MATERIALS

A. MANUFACTURERS: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Atlas
2. Citadel
3. Lone Star
4. Magnolia
5. Equal products of other manufacturers may be used in the work provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

B. Masonry Cement: ASTM C 91.

1. Type S for CMU walls
2. Type N for Exterior Face and Accent brick – color pigment.

C. ALLOWANCES:

1. *Face and Accent Brick* to have a valve of **$17.00 dollars per bag**. (Allowances shall be for material only, based on actual number of bags purchased for the project. Installation, profit, overhead, shipping and taxes shall be included in the Contractors Bid Proposal). If Architect

chooses mortar of lesser value after Bid Process, Contractor shall issue a deductive Change Order for the difference.

D. Hydrated Lime: ASTM C 207, Type S.

E. Aggregate for Mortar: ASTM C 144, except for joints less than 1/4" use aggregate graded with 100% passing the No. 16 sieve.

F. Water: Clean and potable.

2.4 JOINT REINFORCEMENT, TIES AND ANCHORING DEVICES

A. MANUFACTURERS: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Dur-O-Wall, Inc.
2. Heckman Building Products, Inc.
3. Masonry Reinforcing Corp. of America.
4. National Wire Products Corp.
5. Equal products of other manufacturers may be used in the work provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

B. Materials: Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie and anchor for size and other characteristics.

C. Use individual galvanized steel metal ties installed in horizontal joints to bond wythes together

only where wood or metal stud backup occurs. Provide ties as shown, but not less than one metal tie for 4 sq. ft. of wall area spaced not to exceed 24" o.c. horizontally and vertically. Stagger ties in alternate courses. Provide additional ties within 1'-0" of all openings and space not more than 3'-0" apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24" o.c. vertically.

D. Hot-Dip Galvanized Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 123, Class B-2 (1.5 oz. per sq. ft. of wire surface) for zinc coating applied after prefabrication into units.

E. Application: Use where indicated.

F. Joint Reinforcement: Provide truss-type, welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10', with prefabricated corner and tee units, and complying with requirements indicated below:

1. Width: Fabricate joint reinforcement in units with widths of approximately 2" less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior and 1/2" else- where.

2.5 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet.
2. Provide splice plates at joints of formed, smooth metal flashing.
3. Fabricate through-wall metal flashing embedded in masonry from, with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate through-wall flashing with drip edge where indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees.

6. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 3/8 inch to form a stop for retaining sealant backer rod.
7. Fabricate metal drip edges and sealant stops for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least 3 inches into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam will shed water.
8. Metal Drip Edges: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees.
9. Metal Flashing Terminations: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 3/8 inch to form a stop for retaining sealant backer rod.
10. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

B. Flexible Flashing: For flashing not exposed to the exterior, use one of the following, unless otherwise indicated:
1. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy as follows:
a. Monolithic Sheet: Elastomeric thermoplastic flashing, 0.040 inch thick.
b. Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch thick coating of rubberized-asphalt adhesive.
c. Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch thick coating of rubberized-asphalt adhesive. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately 1-1/2 inches from edge.
d. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
2. EPDM Flashing: Sheet flashing product made from ethylene-propylene-dieneterpolymer, complying with ASTM D 4637, 0.040 inch thick.

C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

D. MANUFACTURERS: The following manufacturers' products have been used to establish minimum standards for materials, workmanship, and function:
1. Vinyl Sheet Flashing: (Thickness: 20 mils)
a. Vi-Seal Plastic Flashing; Afco Products, Inc.
b. BFG Vinyl Water Barrier; B.F. Goodrich Co.
c. Nuflex; Sandell Manufacturing Co., Inc.
d. Wascosea"; York Manufacturing, Inc.
e. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. See drawings for locations of all required control joints.

B. Non-Metallic Expansion Joint Strips: Pre-molded, flexible cellular neoprene rubber filler strips complying with ASTM D 1056, Grade RE41E1, capable of compression up to 35%, of width and thickness indicated.

C. Premolded Control Joint Strips: Material as indicated below designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

1. Polyvinyl chloride complying with ASTM D 2287, General Purpose Grade, Designation PVC-63506.

D. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.7 MASONRY CLEANERS

A. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2 cup dry measure) and laundry detergent (1/2 cup dry measure) dissolved in one gallon of water.

2.8 MORTAR AND GROUT MIXES

A. General: Do not add admixtures including air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

B. Mixing: Combine and thoroughly mix cementitious, water and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated.

1. For Exterior Brick, use Type N mortar, equal to Flamingo, Blue Circle or Lehigh.

2. For Other Masonry Units use Type S mortar without coloring pigment.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Wetting Clay Brick: Wet brick made from clay or shale which have ASTM C 67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods which ensure each clay masonry unit being nearly saturated but surface dry when laid.

B. Do not wet concrete masonry units.

C. Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.

D. Thickness: Build cavity and composite walls, floors and other masonry construction to the full thickness shown. Build single wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness indicated.

E. Build chases and recesses as shown or required for the work of other trades. Provide not less than 8" of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.

F. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.

G. Cut masonry units using motor-given saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible.

1. Use wet cutting saws to cut concrete masonry units.

3.2 LAYING MASONRY WALLS

A. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and wherever possible at other locations.

B. Coursing and Bonding:

1. **All CMU shall be Stack Bond unless otherwise indicated on structural drawings.**

C. Stopping and Resuming Work: Rack back 1/2-unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.

D. Built-in Work: As the work progresses, build-in items specified under this and other sections of these specifications. Fill in solidly with masonry around built-in items.

1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

3.3 MORTAR BEDDING AND JOINTING

A. Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

B. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

C. Maintain joint width shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.

D. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.

E. Tool all exposed joints, except where otherwise indicated, slightly concave using a jointer larger than joint thickness, unless otherwise indicated.

F. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

3.4 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

A. Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes. Install at not more than 16" o.c. vertically.

B. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.

1. For horizontally reinforced masonry, provide continuity at corners with prefabricated "L" units, in addition to masonry bonding.

C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as shown below:

1. At juncture of interior partitions and exterior walls, rake and caulk vertical joint.

2. Provide metal ties as shown below.

3. Provide individual metal ties at not more than 16" o.c. vertically.

4. Provide continuity with horizontal joint reinforcement using prefabricated "T" units.

D. Intersecting Load-bearing Walls: If carried up separately, block or tooth vertical joint with 8" maximum offsets and provide rigid steel anchors spaced not more than 4'-0" o.c. vertically, or omit blocking and provide rigid steel anchors at not more than 2'-0" o.c. vertically. Form anchors of galvanized steel not less than 1-1/2" x 1/4" x 2'-0" long with ends turned up not less than 2" or with cross-pins. If used with hollow masonry units, embed ends in mortar-filled cores.

E. Non-bearing Interior Partitions: Build full height of story to underside of roof structure above, unless otherwise shown.

3.5 CAVITY WALLS

A. Keep cavity clean of mortar droppings and other materials during construction. Strike joints facing cavity flush.

B. Tie exterior wythe to new back-up with continuous horizontal joint reinforcing, installed in mortar joints at not more than 16" o.c. vertically.

C. Provide weep holes (Open Head Joints) in exterior wythe of cavity wall located as directed on the drawings, spaced 32" o.c., unless otherwise indicated.

3.6 CAVITY WALL INSULATION

A. On units of plastic insulation, install small pads of adhesive spaced approximately 1'-0" o.c. both ways on inside face. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Fill all cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.7 HORIZONTAL JOINT REINFORCEMENT

A. General: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of walls, 1/2" elsewhere. Lap reinforcing a minimum of 6".

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Reinforce walls with continuous horizontal joint reinforcing unless specifically noted to be omitted.

D. Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcement placed in 2 horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'-0" beyond jambs of the opening except at control joints.

1. In addition to wall reinforcement, provide additional reinforcement at openings as required to comply with the above.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Provide vertical and horizontal expansion, control and isolation joints in masonry where shown. Build-in related items as the masonry work progresses.

3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block size units are shown without structural steel or other supporting lintels. Provide formed-in-place masonry lintels. Temporarily support formed-in-place lintels.

C. Provide minimum bearing of 8" at each jamb, unless otherwise indicated.

3.10 FLASHING OF MASONRY WORK

A. General: Provide concealed flashing in masonry work at, or above shelf angles, lintels, ledges and other obstructions to the down- ward flow of water in the wall so as to divert such water to the exterior. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar. Extend flashings through exterior face of masonry and turn down to form drip.

B. Extend flashing the full length of lintels and shelf angles and minimum of 4" into masonry each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4", and through the inner wythe to within 1/2" of the interior face of the wall in exposed work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2". At heads and sills turn up ends not less than 2" to form a pan.

C. Interlock end joints of deformed metal flashings by over-lapping deformations not less than 1-1/2" and seal lap with elastic sealant.

D. Install flashing to comply with manufacturer's instructions.

E. Provide weep holes (open head joints) in the head joints of the first course of masonry immediately above concealed flashings. Space weep holes 32" o.c., unless otherwise indicated.

3.11 REPAIR, POINTING AND CLEANING

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point- up all joints including corners, openings and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.

C. Final Cleaning: After mortar is thoroughly set and cured, clean masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.

2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

3. Protect adjacent non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.

4. Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clean water.

5. Use bucket and brush hand cleaning method described in BIA "Technical Note No. 10 Revised" to clean brick masonry made from clay or shale, except use masonry cleaner indicated below.

   a. Detergent

6. Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins.

END OF SECTION

SECTION 05210 - STEEL JOISTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of steel joists is shown on drawings, including basic layout and type of joists required.

1.3 QUALITY ASSURANCE

Provide joists fabricated in compliance with the following, and as herein specified.

A. SJI "Standard Specifications, Load Tables and Weight Tables" for:

1. K - Series Open Web Steel Joists.

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with the AWS "Standard Qualification Procedure".

C. Joists welded in place are subject to inspection and testing. Expense of removing and replacing any portion of steel joists for testing purposes will be born by Owner if welds are found to be satisfactory. Remove and replace work found to be defective and provide new acceptable work.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of joist and accessories. Include manufacturer's certification that joists comply with SJI "Specifications".

B. Shop Drawings: Submit detailed drawings showing layout of joist units, special connections, jointing and accessories. Include mark, number, type, location and spacing of joists and bridging.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle steel joists as recommended in SJI "Specifications". Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Comply with SJI "Specifications".

B. High-Strength Threaded Fasteners: ASTM A 325 or A 490 heavy hexagon structural bolts with nuts and hardened washers.

C. Steel Prime Paint: Manufacturer's standard.

2.2 FABRICATION

A. General: Fabricate steel joists in accordance with SJI "Specification".

B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.

C. Extended Ends: Provide extended ends on joists where shown, complying with manufacturer's standards and requirements of applicable SJI "Specifications" and load tables.

D. Ceiling Extensions: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide either an extended bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support ceiling construction. Extend ends to within 1/2" of finished wall surface unless otherwise indicated.

E. Bridging: Provide horizontal and cross bridging, complying with SJI "Specifications", and as shown on structural drawings.

1. Provide bridging anchors for ends of bridging lines terminating at walls or beams.

F. End Anchorage: Provide end anchorages to secure joists to adjacent construction, complying with SJI "Specifications", unless otherwise indicated.

G. Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.

1. Apply one shop coat of primer paint to steel joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

PART 3 - EXECUTION

3.1 INSPECTION

A. Erector shall examine areas and conditions under which steel joists are to be installed and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Erector.

3.2 ERECTION

A. Place and secure steel joists in accordance with SJI "Specifications", final shop drawings, and as herein specified.

B. Anchors: Furnish weld plates and other devices to be built into concrete and masonry construction.

1. Refer to Division-3 sections for installation of anchors set in concrete.

C. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.

1. Provide temporary bridging, connections, and anchors to ensure lateral stability during construction.

D. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams. Connect cross bridging at intersection of bridging members.

E. Fastening Joists:

1. Field weld joists to supporting steel framework in accordance with SJI "Specifications" for type of joists used. Coordinate welding sequence and procedure with placing of joists.

F. Touch-Up Painting: After joist installation, paint field bolt heads and nuts, and welded areas, abraded or rusty surfaces on joists and steel supporting members. Wire brush surfaces and clean with solvent before painting. Use same type of paint as used for shop painting.

END OF SECTION

SECTION 05310 - STEEL DECKING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal form deck.

B. Corro form (Cement Fiber Decking)

C. Bearing plates and angles.

D. Stud shear connectors.

1.2 RELATED REQUIREMENTS

A. Section 05120 - Structural Steel Framing: Support framing for openings larger than 18 inches and shear stud connectors.

B. Section 05210 - Steel Joist Framing: Placement of embedded steel anchors for bearing plates and joist seats in cast-in-place concrete.

1.3 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

B. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2013.

C. ASTM A510/A510M - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel; 2013.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

E. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

G. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.

H. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2017.

I. ICC-ES AC43 - Acceptance Criteria for Steel Deck Roof and Floor Systems; 2016.

J. ICC-ES AC70 - Acceptance Criteria for Fasteners Power Driven into Concrete, Steel and Masonry Elements; 2016.

K. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks; 2007.

L. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

M. UL (FRD) - Fire Resistance Directory; Current Edition.

1.4 QUALITY ASSURANCE

A. Design deck layout, spans, fastening, and joints under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

B. Field Quality Control:

1. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

2. Field welds will be subject to inspection.

3. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

4. Remove and replace work that does not comply with specified requirements.

5. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Cut plastic wrap to encourage ventilation.

B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Steel Deck:

1. Canam Steel Corporation/United Steel Deck; www.canam-construction.com/en/construction-products/steel-deck/
2. Cordeck, Inc; www.cordeck.com
3. Nucor-Vulcraft Group; www.vulcraft.com/#sle.
4. CSI; www.versa-roof.com
5. Epic Metals Corporation; www.epicmetals.com
6. Substitutions: See Section 01600 - Product Requirements.

2.2 STEEL DECK

A. All Deck Types: Select and design metal deck in accordance with SDI Design Manual.

1. Calculate to structural working stress design and structural properties specified.
2. Maximum Lateral Deflection of Diaphragms: 1/500 of the height of the wall.

B. Acoustical Roof Deck: Non-composite type, steel sheet with plain vertical flute faces perforated with 1/8 inch (3 mm) diameter holes staggered 3/8 inch (10 mm) on center:

1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
2. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.
3. Minimum Base Metal Thickness: 22 gage, 0.0299 inch (0.76 mm).
4. Nominal Height: As indicated on drawings. Otherwise, 1-1/2 inch (38 mm).
5. Profile: Fluted; SDI NR.
6. Formed Sheet Width: As indicated on drawings. Otherwise, 24 inch (600 mm).
7. Side Joints: Lapped, welded.
8. End Joints: Lapped, welded.
9. Fire Resistance Classification: Comply with UL (FRD) Assembly Number if fire rated assembly is required.

C. Roof Deck: Non-composite type, fluted steel sheet:

1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
2. Primer: Shop coat of manufacturer’s standard primer paint over cleaned and phosphatized substrate.
3. Minimum Base Metal Thickness: As indicated on drawings. Otherwise, 22 gage, 0.0299 inch (0.76 mm).
4. Nominal Height: As indicated on drawings. Otherwise 1-1/2 inch. (38 mm).
5. Profile: Fluted; SDI NR.

6. Formed Sheet Width: As Indicated on drawings.
7. Side Joints: Lock seam or Mechanically Fastened.
8. End Joints: Lapped, welded.
9. Fire Resistance Classification: Comply with UL (FRD) Assembly Number if fire rated assembly is required.

D. Composite Floor Deck: Fluted steel sheet embossed to interlock with concrete:
1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
2. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.
3. Span Design: Double.
4. Minimum Base Metal Thickness: As indicated on drawings. Otherwise, 22 gage, 0.0299 inch (0.76 mm).
5. Nominal Height: As indicated on drawings. Otherwise, 1-1/2 inches (38 mm).
6. Profile: Fluted; SDI NR.
7. Formed Sheet Width: As indicated on drawings. Otherwise,24 inch (600 mm).
8. Side Joints: Lock seam.
9. End Joints: Lapped, welded.
10. Fire Resistance Classification Comply with UL (FRD) Assembly Number if fire rated assembly is required.

E. Cellular Floor Deck: Composite floor deck equipped with bottom flat sheet.
1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
2. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.
3. Span Design: Multiple.
4. Minimum Base Metal Thickness: As indicated on drawings. Otherwise, 22 gage, 0.0299 inch (0.76 mm).
5. Nominal Height: As indicated on drawings. Otherwise, 1-1/2 inches (38 mm).
6. Formed Sheet Width: As indicated on drawings. Otherwise, 24 inch (600 mm).
7. Side Joints: Lapped, welded.
8. End Joints: Lapped, welded.
9. Fire Resistance Classification: Comply with UL (FRD) Assembly Number if fire rated assembly is required.

F. Metal Form Deck: Corrugated Steel Sheet, with provision for ventilation of concrete:
1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
2. Primer: Shop coat of manufacturer’s standard primer paint over cleaned and phosphatized substrate.
3. Minimum Base Metal Thickness: As indicated on drawings. Otherwise, 22 gage, 0.0299 inch (0.76 mm).
4. Nominal Height: As indicated on drawings. Otherwise 1-1/2 inch. (38 mm).
5. Formed Sheet Width: As Indicated on drawings.

6. Side Joints: Lapped, welded.
7. End Joints: Lapped, welded.

2.3 ACCESSORY MATERIALS

A. Bearing Plates and Angles: ASTM A36/A36M steel, galvanized per ASTM A123/A123M.

B. Stud Shear Connectors: Made from ASTM A108 Grade 1015 bars.

C. Welding Materials: AWS D1.1/D1.1M.

D. Fasteners: Galvanized hardened steel, self tapping.

E. Powder Actuated Mechanical Fasteners: Steel; with knurled shank and forged ballistic point. Comply with applicable requirements of ICC-ES AC70.

1. Design Requirements: Provide number and type of fasteners that comply with the applicable requirements of SDI (DM) design method for roof deck and floor deck applications and ICC-ES AC43.
2. Material: Steel; ASTM A510/A510M, Grade 1077.
    a. Hardness: Rockwell C 54.5, minimum.
    b. Tensile Strength: 285 kips per square inch, minimum.
    c. Shear Strength: 175 kips per square inch, minimum.
    d. Washers:
        i. Steel Bar Joist Framing Applications: 0.472 inch diameter, minimum.
        ii. Exposed Roof Deck Applications: 0.591 inch diameter, minimum.
    e. Corrosion Resistance:
        i. Steel Bar Joist Framing Applications: ASTM B633, SC1, Type III zinc electroplate.

F. Mechanical Fasteners: Steel; hex washer head, self-drilling, self-tapping.

1. Design Requirements for Sidelap Connections: Provide number and type of fasteners that comply with the applicable requirements of SDI (DM)SDI design method for roof deck and floor deck applications and ICC-ES AC43.
2. Fasteners for Steel Roof Decks Protected with Waterproofing Membrane: ASTM B633, SC1, Type III zinc electroplate.
3. Fasteners for Exposed Steel Roof Deck Application: Manufacturer's standard stainless steel with bonded neoprene washer.

G. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.

H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.

I. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the deck.

2.4 FABRICATED DECK ACCESSORIES

A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gage, 0.0299 inch (0.76 mm) thick sheet steel; of profile and size as indicated; finished same as deck.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.

B. On concrete and masonry surfaces provide minimum 4inch (100 mm) bearing.

C. On Steel supports provide minimum 1-1/2 inch (38 mm) bearing.

D. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute and at each transverse flute using methods specified.

1. Welding: Use fusion welds through weld washers.

2. Place and secure special deep fluted sections for integral concrete bridging.

E. Clinch lock seam side laps.

F. At mechanically fastened male/female side laps fasten at 24 inches on center maximum.

G. Drive mechanical sidelap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.

H. At welded male/female side laps weld at 18 inches on center maximum.

I. Weld deck in accordance with AWS D1.3/D1.3M.

J. At deck openings from 6 inches to 18 inches in size, provide 2 by 2 by 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.

K. At deck openings greater than 18 inches in size, provide steel angle reinforcement. as specified in Section 05500.

L. Where deck (other than cellular deck electrical raceway) changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.

M. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary without distortion.

N. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.

O. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.

P. Place metal cant strips in position and fusion weld.

Q. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

R. Position floor drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

S. Weld stud shear connectors through steel deck to structural members below.

T. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

SECTION 05500 - MISCELLANEOUS STEEL AND METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Definition: Metal fabrications include items made from iron and steel shapes, plates bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere.

B. Extent of metal fabrications is indicated on drawings and schedules.

C. Types of work in this section include metal fabrications for:

1. Rough hardware.
2. Nosing.
3. Loose bearing and leveling plates.
4. Loose steel lintels.
5. Miscellaneous framing and supports.
6. Miscellaneous steel trim.
7. Shelf angles.
8. Pipe Bollards.

1.3 QUALITY ASSURANCE

A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.

B. Shop Drawings: Submit shop drawings for fabrication and erection of metal fabrications. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.

1. Where materials or fabrications are indicated to comply with certain requirements for design loadings, include structural computations, material properties and other information needed for structural analysis.

C. Samples: Submit 2 sets of representative samples of materials and finished products as may be requested by Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

A. FERROUS METALS

1. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
2. Steel Structural, Shapes and Bars: ASTM A 36, wide flange, ASTM A572, fyz50ks.
3. Steel Tubing: Hot-rolled, ASTM A 500. FY=46KSI

4. Structural Steel Sheet: Hot-rolled, ASTM A 570; or cold-rolled ASTM A 611, Class 1; of grade required for design loading.
5. Galvanized Structural Steel Sheet: ASTM A 446, of grade required for design loading. Coating designation as indicated, or if not indicated, G90.
6. Steel Pipe: ASTM A 53; Type and grade (if applicable) as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (schedule 40), unless otherwise indicated.
7. Gray Iron Castings: ASTM A 48, Class 30.
8. Malleable Iron Castings: ASTM A 47, grade as selected by fabricator.
9. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
10. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A 153.
11. Non-Shrink Non-Metallic Grout: Pre-mixed, factory-packaged, non- staining, non-corrosive, non-gaseous grout complying with CE CRD-C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

B. FASTENERS

1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
2. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.
3. Lag Bolts: Square head type, FS FF-B-561.
4. Machine Screws: Cadmium plated steel, FS FF-S-92.
5. Wood Screws: Flat head carbon steel, FS FF-S-111.
6. Plain Washers: Round, carbon steel, FS FF-W-92.
7. Masonry Anchorage Devices: Expansion shields, FS FF-S-325.
8. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.
9. Lock Washers: Helical spring type carbon steel, FS FF-W-84.

C. PAINT:

1. Shop Primer for Ferrous Metal: Manufacturer's or Fabricator's standard, fast-curing, lead-free, "universal" primer; selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure; complying with performance requirements of FS TT-P-645.
2. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, complying with the Military Specifications MIL-P-21035 (Ships) or SSPC-Paint-20.

D. CONCRETE FILL:

1. Concrete Materials and Properties: Comply with requirements of Division-3 section "Concrete Work" for normal weight, ready-mix concrete with minimum 28-day compressive strength of 3000 psi, and W/C ratio of 0.58 maximum, unless higher strengths indicated.
2. Non-Slip Aggregate Finish: Factory-graded, packaged material containing fused aluminum oxide grits or crushed emery as abrasive aggregate; rust-proof and non-glazing; unaffected by freezing, moisture or cleaning materials.

2.2 FABRICATION - GENERAL

A. Workmanship: Use materials of size and thickness indicated, or if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions

indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of work.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

C. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts.

E. Provide for anchorage of type indicated, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

F. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

G. Galvanizing: Provide a zinc coating for those items indicated or specified to be galvanized, as follows:

1. ASTM A153 for galvanizing iron and steel hardware.

2. ASTM A 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 1/8" thick and heavier.

3. ASTM A386 for galvanizing assembled steel products.

H. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

I. Shop Painting:

1. Apply shop primer to surfaces of metal fabrications except those which are galvanized or as indicated to be embedded in concrete or masonry, unless otherwise indicated, and in compliance with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

a. Stripe paint all edges, corners, crevices, bolts, welds and sharp edges.

J. Surface Preparation: Prepare ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP6 "Commercial Blast cleaning".

2. Interior (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning".

2.3 ROUGH HARDWARE

A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division-6 sections.

B. Fabricate items to sizes, shapes and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.4 LOOSE STEEL LINTELS

A. Provide loose structural steel lintels for openings and recesses in masonry walls and partitions as shown and scheduled. Weld adjoining members together to form a single unit where indicated. Provide not less than 8" bearing at each side of openings, unless otherwise indicated. All steel lintels shall be hot-dipped galvanized steel.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.

B. Fabricate miscellaneous units to sizes, shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise indicated, fabricate from structural steel shapes, plates and steel bars of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.

C. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

1. Except as otherwise indicated, space anchors 24" o.c. and provide minimum anchor units of 1-1/4" x 1/4" x 8" steel straps.

2.6 IMPACT BOLLARDS

A. Provide concrete filled steel pipe bollards as indicated on drawings as follows:

1. Unless otherwise indicated, bollards are to be 4” Schedule 40 steel pipe.

2. Locate bollards as indicated on drawings. Install bollards such that they are vertically aligned and plumb so they do not appear to lean from any direction.

3. Install pipe to depth and heights as indicated on drawings.

4. Pipe to be bedded and filled with concrete with hand-formed domed cap, as indicated on drawings.

5. Prime and Paint pipe bollards. Color to be selected by architect.

PART 3 - EXECUTION

3.1 PREPARATION

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

B. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION - GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

B. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plus, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete masonry or similar construction.

1. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

C. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.

D. Setting Loose Plates: Clean concrete and masonry bearing surfaces of any bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

1. Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut-off flush with the edge of the bearing plate before packing with grout. Use metallic non-shrink grout in concealed locations where not exposed to moisture; use non-metallic non-shrink grout in exposed locations, unless otherwise indicated.

3.3 ADJUST AND CLEAN

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting.

B. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

C. For galvanized surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 05510 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Section specifies steel stairs with railings.

1. Closed riser stairs with concrete filled treads and platforms.

1.3 RELATED WORK

A. Concrete fill for treads and platforms: Section 03310, Cast In-Place Concrete.

B. Wall handrails and railings for other than steel stairs: Section 05521, Pipe And Tube Railings.

C. Requirements for shop painting: Section 09900, Painting.

1.4 SUBMITTALS

A. Shop Drawings: Show design, fabrication details, installation, connections, material, and size of members.

1.5 APPLICATION PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation.

1. American Society for Testing and Materials (ASTM):
    a. A36/A36M-04, Structural Steel
    b. A47-99 (R2004), Ferritic Malleable Iron Castings
    c. A48-03, Gray Iron Castings
    d. A53-04, Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless
    e. A307-04, Carbon Steel Bolts and Studs, 60000 psi Tensile Strength
    f. A653/653M-04, Steel Sheet, Zinc Coated (Galvanized) or Zinc Alloy Coated (Galvannealed) by the Hot-Dip Process
    g. A563-04, Carbon and Alloy Steel Nuts
    h. A1008-04, Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low-Alloy
    i. A786/A786M-00., Rolled Steel Floor Plates
    j. A1011-04, Steel, Sheet and Strip, Strip, Hot-Rolled Carbon, Structural, High-Strength, Low-Alloy
2. American Welding Society (AWS):
    a. D1.1-00., Structural Welding Code-Steel
    b. D1.3-98, Structural Welding Code-Sheet Steel
3. The National Association of Architectural Metal Manufactures (NAAMM) Manuals:
    a. Metal Bar Gratings (ANSI/NAAMM MBG 531-93)
    b. 2nd Edition-1985, Pipe Railing Manual, Including Round Tube
4. American Iron and Steel Institute (AISI):
    a. Specification for the Design of Cold-Formed Steel Structural Members

PART 2 – PRODUCTS

2.1 DESIGN CRITERIA

A. Design stairs to support a live load of 500 kg/m2 (100 pounds per square foot).

B. Structural design, fabrication and assembly in accordance with requirements of NAAMM Metal Stairs Manual, except as otherwise specified or shown.

C. Design Grating treads in accordance with NAAMM Metal Bar Grating Manual.

D. Design pipe railings in accordance with NAAMM Pipe Railing Manual for 900 N (200 pounds) in any direction at any point.

2.2 MATERIALS

A. Steel Pipe: ASTM A53, Standard Weight, zinc coated.

B. Sheet Steel: ASTM A1008.

C. Structural Steel: ASTM A36.

D. Steel Floor Plate: ASTM 786.

E. Steel Decking: Form from zinc coated steel conforming to ASTM A446, with properties conforming to AISI Specification for the Design of Cold-Formed Steel Structural Members.

F. Steel Plate: ASTM A1011.

G. Iron Castings: ASTM A48, Class 30.

H. Malleable Iron Castings: ASTM A47.

2.3 FABRICATION GENERAL

A. Fasteners:

1. Conceal bolts and screws wherever possible.
2. Use countersunk heads on exposed bolts and screws with ends of bolts and screws dressed flush after nuts are set.

B. Welding:

1. Structural steel, AWS D1.1 and sheet steel, AWS D1.3.
2. Where possible, locate welds on unexposed side.
3. Grind exposed welds smooth and true to contour of welded member.
4. Remove welding splatter.

C. Remove sharp edges and burrs.

D. Fit stringers to head channel and close ends with steel plates welded in place where shown.

E. Fit face stringer to newel post by tenoning into newel post, or by notching and fitting face stringer to side of newel where shown.

F. Shop Prime Painting: Prepare surface and apply primer as specified for ferrous metals in Section 09900, Painting.

G. Provide guard railings not less than 1060 mm (42-inches) high.

2.4 RAILINGS

A. Fabricate railings, including handrails, from steel pipe with flush.

1. Connections may be standard fittings designed for welding, or coped or mitered pipe with full welds.
2. Wall handrails are provided under Section 05521, Pipe And Tube Railings.

B. Return ends of handrail to wall and close free end.

C. Provide standard terminal castings where fastened to newel.

D. Space intermediate posts not over six feet on center between end post or newel post.

E. Fabricate handrail brackets from cast malleable iron.

F. Provide standard terminal fittings at ends of post and rails.

2.5 CLOSED RISER STAIRS

A. Provide treads, risers, platforms, railings, stringers, headers and other supporting members.

B. Fabricate pans for treads and platforms, and risers from sheet steel.

C. Form risers with sanitary cove.

D. Fabricate stringers, headers, and other supporting members from structural steel.

E. Construct newel posts of steel tubing having wall thickness not less than 5 mm (3/16-inch), with forged steel caps and drops.

PART 3 - EXECUTION

3.1 STAIR INSTALLATION

A. Provide hangers and struts required to support the loads imposed.

B. Perform job site welding and bolting as specified for shop fabrication.

C. Set stairs and other members in position and secure to structure as shown.

D. Install stairs plumb, level and true to line.

E. Provide steel closure plate to fill any gap between the stringer and surrounding shaft wall.

F. Weld and finish with prime and paint finish of adjoining steel.

3.2 RAILING INSTALLATION

A. Install standard terminal fittings at ends of posts and rails.

B. Secure brackets, posts and rails to steel by welds, and to masonry or concrete with expansion sleeves and bolts, except secure posts at concrete by setting in sleeves filled with commercial non-shrink grout.

C. Set rails horizontal or parallel to rake of stairs to within 3 mm in 3650 mm (1/8-inch in 12 feet).

D. Set posts plumb and aligned to within 3 mm in 3650 mm (1/8-inch in 12 feet).

3.3 FIELD PRIME PAINTING

A. When installation is complete, clean field welds and surrounding areas to bright metal, and coat with same primer paint used for shop priming.

B. Touch-up abraded areas with same primer paint used for shop priming.

C. Touch up abraded galvanized areas with zinc rich paint as specified in Section 09900, Painting.

END OF SECTION

SECTION 05540 - METAL STUDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Types of work include:

1. Light-gage metal support system for installation of gypsum and other materials.

1.3 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where gypsum drywall systems with fire- resistance ratings are indicated, provide materials and installations which are identical with those of applicable assemblies tested per ASTM E 119 by fire testing laboratories acceptable to authorities having jurisdiction.

1. Provide fire-resistance rated assemblies identical to those indicated by reference to GA File No.'s. in GA "Fire Resistance Design Manual" or to design designations in UL "Fire Resistance Directory" or in listing of other testing and agencies acceptable to authorities having jurisdiction.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications and installation instructions, including other data as may be required to show compliance with these specifications.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

B. Store material inside under cover and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Alabama Metal Industries Corp.
2. Bostick Steel Framing Co.
3. Ceco Corp.
4. Dale Industries, Inc.
5. Marinoware, Inc.

B. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect not less than Ten (10) days prior to scheduled bid opening.

2.2 METAL FRAMING

A. Fabrication: Fabricate metal framing components of commercial quality steel sheet with a minimum yield paint of 33,000 psi; ASTM A446, A570 or A611.

B. Finish: Provide galvanized finish to metal framing components complying with ASTM A525 for minimum G60 coating.

C. "C"-Shape Studs and Resilient Channels. Provide as follows:

1. Manufacturer's standard 22 gauge at all interior gypsum board locations, size to be as noted on the drawings.

2. Gauge at all exterior locations to be 18 gauge at exterior walls or as noted on the Structural Drawings, size to be as noted on the drawings.

3. Resilient hat channels,18 gauge, size as noted on the drawings.

D. Fastenings: Attach components by welding, bolting, or screw fastenings, as standard with manufacturers.

2.3 INSTALLATION

A. Manufacturer's Instructions: Install metal framing systems in accordance with manufacturer's printed or written instructions and recommendations, unless otherwise indicated.

B. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 24" o.c. spacing for nail or power-driven fasteners, or 16" o.c. for other types of attachment. Provide fasteners at corners and ends of tracks.

1. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

2. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.

3. Install supplementary framing, blocking and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.

C. Installation of Wall Stud System: Secure studs to top and bottom runner tracks by either welding or screw fastening at both inside and outside flanges.

1. Frame wall openings larger than 2'-0" square with double stud at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure stud system wall opening frame in manner indicated.

2. Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of stud system.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Space framing member 24" o.c., unless noted otherwise on the drawings or by UL Classification.

B. Install auxiliary framing at termination of drywall work, and at openings for light fixtures and similar work, as required for support of both the drywall construction and other work indicated for support thereon.

C. Supplementary Supports:

1. Install supplementary framing, blocking and bracing at terminations in the work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar work to comply with details indicated or if not otherwise indicated, to comply with applicable published recommendations of gypsum board manufacturer, or if not available, of

"Gypsum Construction Handbook" published by United States Gypsum Co.

2. Isolate stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
3. Extend supplementary supports to the structural support system.
4. Frame openings to comply with details indicated or if not otherwise indicated, to comply with applicable published recommendations of gypsum board manufacturer, or if not available, of "Gypsum Construction Handbook" published by United States Gypsum Co. Attach vertical studs at jambs directly to frames; install runner track section (for jack studs) at head and secure to jamb studs.
5. Erect thermal insulation vertically. Until gypsum board is installed hold insulation in place with 18-gage tie wire or by an equally acceptable method.

END OF SECTION

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this section.

1.2 SCOPE OF WORK

A. Provide the wood products necessary to complete the roofing work in accordance with the specifications and drawings.

B. Related work specified elsewhere:

1. Division 7 Section "Membrane Roofing"
2. Division 7 Section "Sheet Metal Flashing And Trim."

1.3 REFERENCES

A. ASTM D – 1079 Terminology Relating to Roofing, Waterproofing, and Bituminous Materials

B. Lumber Standards: American Softwood Lumber Standard PS 20-70 by the U.S. Department of Commerce.

C. ASTM E – 108 Test Methods for Fire Test of Roof Coverings

D. FM - Factory Mutual

E. NRCA - National Roofing Contractors Association

F. UL- Underwriters Laboratories

G. WH - Warnock Hersey

1.4 SUBMITTALS

A. Provide submittals for lumber or plywood materials upon request.

1.5 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Use experienced installers.

B. Lumber Standards: Comply with American Softwood Lumber Standard PS 20-70 by the U.S. Department of Commerce.

C. Factory Marking: Mark each piece of lumber or plywood to indicate type, grade, agency providing inspection service.

D. Size and Shape: Dress lumber 4 sides (S4S) and work to shapes and patterns shown. Nominal sizes shown and specified refer to undressed lumber dimensions. Detailed dimensions show actual lumber size required.

1.6 DELIVERY STORAGE AND HANDLING

A. Time delivery and installation of carpentry work to avoid delaying other trades whose work is dependent on or affected by the carpentry work. Keep materials dry during delivery and storage

B. Store lumber and plywood in stacks with provisions for air circulation within stacks. Protect bottom of stacks against contact with damp or wet surfaces.

C. Protect exposed materials against water and wind. Remove damaged or unsuitable material from the job site.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide nailers, wood blocking and plywood as necessary to complete roofing work as directed by governing codes, roof manufacturer, and this specification.

2.2 DESCRIPTION

A. Construction Lumber: Treated Standard Grade Douglas Fir, Western Larch, Western Hemlock (WWPA or WCLB) or No. 2 dimension Southern Pine (SPIB).

B. Bucks, Nailers, Blocking, Etc.: Treated No. 2 common grade of any WWPA or WCLA species or No. 2 Southern Pine(SPIB).

C. Anchorage and Fastenings: Proper type, size material and finish for each application.

D. Quality: Sound, seasoned, well manufactured materials of longest practical lengths and sizes to minimize joints. Free from warp which cannot be easily corrected by anchoring and attachment. Discard material with defects which would impair quality of work.

2.3 RELATED MATERIALS

A. Fasteners: Use fasteners as dictated by Factory Mutual Wind Uplift requirements of Data Loss Sheet 1-49.

B. Roof Membranes: Follow provisions in Section for Membrane Roofing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify measurements and dimensions shown before proceeding with carpentry work.

B. Examine supporting structure and conditions under which carpentry work is to be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

C. Correlate location of nailers, blocking and similar supports for attached work.

D. Scribe and cope as required for accurate fit of carpentry work to other work.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Provide nailers, blocking and sleepers where shown on the drawings and details, or required for attachment of other work. Coordinate with locations of other work involved; refer to shop specifications of such work.

B. Attach to substrate securely as required to support applied loading. Countersink bolts and nuts flush with surfaces.

C. Securely attach wood nailers to substrates in accordance with Factory Mutual Loss Prevention Data Sheet 1-49 and as required by recognized standards.

D. Provide washers under bolt heads and nuts in contact with wood.

E. Do not wax or lubricate fasteners that depend on friction for holding power.

F. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish material. Make tight connections between members. Install fasteners without splitting of wood; predrill as required. Do not drive threaded friction type fasteners; turn into \place. Tighten bolts and lag screws at installation and retighten as required for tight connections prior to closing in or at completion of work.

END OF SECTION

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Definition: Finish carpentry includes carpentry work which is exposed to view, is non-structural, and which is not specified as part of other sections. Types of finish carpentry work in this section include:

1. Exterior Finish Carpentry-Exterior Wood Treads, Risers, Railings and Decking, Stairs, Landings and Ramps

1.3 SUBMITTALS

A. Product Data: Indicate Product description including product information and compliance with specified performance requirements.

B. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with section 01600. Indicate plans, sections, dimensions, component sizes, edge details, fabrication details, attachment provisions, sizes of furring, blocking, including concealed blocking and coordination requirements with adjacent work. Show locations and sizes of cutouts and holes for receptacles and other items installed in the specified product.

C. Samples: Submit samples in accordance with Section 01300. Submit minimum 2’ x 2’ samples.

1. Cut sample and seam together for representation of inconspicuous seam. Indicate full range of pattern variation. Approved samples will be retained as standards for work.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect finish carpentry materials during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Do not deliver finish carpentry materials, until operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, finish carpentry materials must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

PART 2 - PRODUCTS

2.1 MATERIALS - EXTERIOR

A. Exterior Stairs, Landings and Ramps

1. Exterior Treads: minimum 5/4-inch, kiln-dried, pressure-preservative-treated (Southern pine, B & B finish boards minimum) stepping with half-round nosing.

2. Exterior Risers: minimum 3/4-inch kiln-dried, pressure-preservative-treated Southern pine, B & B finish boards minimum.

3. Exterior Railings & Balusters: minimum Clear, kiln-dried, pressure-preservative-treated southern pine minimum.

4. Top Rails: Tubular steel (See Drawings)

2.2 FABRICATION

A. Nominal sizes are indicated, except as shown by detailed dimensions. Provide dressed or worked and dressed lumber, as applicable, manufactured to the actual sizes as required by PS 20 or to actual sizes and pattern as shown, unless otherwise indicated.

B. Moisture Content of Softwood Lumber: Provide kiln-dried (KD) lumber having a moisture content from time of manufacture until time of installation not greater than values required by the applicable grading rules of the respective grading and inspecting agency for the species and product indicated.

C. Fasteners and Anchorages: Provide nails, screws and other anchoring devices of the proper type, size, material and finish for application indicated to provide secure attachment, concealed where possible, and complying with applicable Federal Specifications.

1. Where finish carpentry is exposed on exterior or in areas of high relative humidity, provide fasteners and anchorages with a hot-dipped zinc coating (ASTM A 153).

D. Inspect each piece of lumber and plywood or each unit of finish carpentry after drying; do not use twisted, warped, bowed or otherwise damaged or defective wood.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition wood materials to average prevailing humidity conditions in installation areas prior to installing.

B. Back-prime lumber for finish exposed on the exterior or to moisture and high relative humidity on the interior. Comply with requirements of section on painting within Division 9 for primers and their application.

3.2 INSTALLATION

A. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacturer with respect to surfaces, sizes or patterns.

B. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8” in 8’-0” for plumb and level countertops; and with 1/16” maximum offset in flush adjoining and 1/8” maximum offsets in revealed adjoining surfaces.

C. Scribe and cut work to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

D. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, to produce tight fitting joints with full surface contact throughout length of joint. Use scarf joints for end-to-end joints.

E. Anchor finish carpentry work to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nail for exposed nailings, countersunk and filled flush with finished surface, and matching final finish where transparent is indicated.

3.3 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

A. Repair damaged and defective finish carpentry work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

B. Clean finish carpentry work on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.

C. Refer to Division 9 for final finishing of installed finish carpentry work.

D. Protection: Installer of finish carpentry work shall advise Contractor of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

END OF SECTION

SECTION 07200 - INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections shall apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of insulation work is shown on drawings and indicated by provisions of this section.

B. Applications of insulation specified in this section include the following:

1. Sound Attenuation at interior stud walls.
2. Sound Attenuation above acoustical ceilings – at partition walls.
3. Cavity Wall Insulation.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications and installation instructions for each type of insulation and vapor barrier material required.

1.4 PRODUCT HANDLING

A. General Protection: Protect insulations from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

PART 2 - PRODUCTS

2.1 BATT INSULATION

A. MANUFACTURERS:

1. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function.
   a. Certain-Teed Products Corp.; Valley Forge, PA
   b. Manville Bldg. Materials Corp.; Denver, CO.
   c. Owens-Corning Fiberglass Corp.; Toledo, OH.
2. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

B. MATERIALS:

1. Mineral/Glass Fiber Blanket/Batt Insulation (M/GFB-Ins): Inorganic (nonasbestos) fibers formed into resilient flexible blankets or semi-rigid batts; FS HH-1-521. Manufacturer's standard lengths and widths as required to coordinate with spaces to be insulated.
2. Exterior Walls: Provide foil faced (FSK ASTM 84 – non-flammable) batts at all exterior walls that will have no interior wall covering applied.
   a. Thickness: 6” Batts will have a minimum R19
3. Exterior Walls: Provide unfaced batts at all exterior wall applications that receive interior wall coverings (ie: sheetrock, plywood, etc.).
   a. Thickness: 3 ½” Batts will have a minimum R13
4. Interior Stud Walls: Provide unfaced Sound Attenuation batts at interior stud partitions.
   a. Thickness: 3 ½” (nominal), unfaced batts.

5. Above Ceilings: Provide unfaced batts at exposed wood framed roof areas between the trusses at the bottom cord or joists that will receive interior coverings at the bottom of the system (ie: sheetrock, plywood, concrete, etc.).
    a. Thickness: R-Factor: 38 (minimum)
6. Above Ceilings Contractor Option: Provide Granulated Loose fill insulation conforming to Federal Spec. Hh-1-1030, Type I, Class B, in attic area above the air barrier. Labeling shall include the data above as well as the recommended installation density. Provide insulation baffles. This option MUST include insulation baffles as specified below.
    a. Thickness: R-Factor: 38 (minimum)
    b. Provide and install Insulation Baffles equal to Owens Corning Raft-R-Mate Attic Rafter Vents with Air Stop/Insulation Block. Extruded Polystyrene; Air Channel Depth, 1.5”; Net Free Air Flow, 22.3 sq.in.; Dimension to fit between rafters. Install per manufacturer’s instructions.

2.2 CAVITY WALL INSULATION - POLYSTYRENE

A. MANUFACTURERS:
1. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function.
    a. Styrofoam SM/SB; Dow Chemical USA.
    b. Foamular 250; UC Industries.
    c. Certifoam, Minnesota Diversified Products, Inc.
2. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

B. MATERIALS:
1. Extruded Polystyrene Board Insulation: Rigid cellular polystyrene thermal insulation with closed cells and integral high density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C 578, Type IV; 5-year aged
2. All Cavity Walls: Provide rigid thermal insulation at the cavity space.
    a. 1" thick, unless otherwise indicated.
3. Adhesive:
    a. Type recommended by insulation board manufacturer for application indicated.

2.3 CMU FILLED CELL WALL INSULATION

A. MANUFACTURERS:
1. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function.
    a. Core-Fill 500, as manufactured by Tailored Chemical Products, Inc., Hickory, NC. Phone: (800) 627-1687: www.core-fill500.com.
    b. R501, as manufactured by PolyMaster, Inc.", Knoxville, TN. Phone: (800) 580-3626.
    c. Core Foam Masonry Foam Insulaton by cfiFOAM, Inc., Knoxville, TN. Phone: (800) 656-3626.
2. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

B. MATERIALS:
1. Insulation: Aminoplast foam for injection application.

a. Thermal Resistivity: **R/inch equal to R-4.4/inch** @ 75 degrees F mean when tested per either ASTM C-177 or ASTM C518.

b. Water Vapor Transmission: Average ≤15 perms when tested per ASTM E 96/E96M.

c. Potential Heat: ≤7700 Btu/lb. when tested per NFPA 259.

d. Cured Density: ≤1.0 lb/ft3 (dry) when tested per ASTM D 1622.

e. Surface Burning Characteristics: Class A - Flame Spread ≤25, Smoke Developed ≤450 per ASTM E 84.

C. INSTALLATION:

1. Fill **masonry cells** with foam insulation from exterior face of building.

2. Foam Insulation at exterior concrete block wall **cells**:

a. Fill **cells** of concrete masonry with amino-plast foam insulation. Holes for filling cells of masonry shall be drilled at horizontal masonry joint on the exterior side of exposed masonry walls and re-grouted.

b. Installed insulation value: **R-10**.

3. Reference Standards:

a. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2004.

b. ASTM C518 - 01 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2001.

c. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2004a.

d. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2008.

e. ASTM D 2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2006.

f. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008.

g. ASTM E 96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2005.

h. NFPA 259 - Standard Test Method for Potential Heat of Building Materials

4. **NOTE: Both Cavity Wall Insulation and CMU Filled Cell Wall Insulation is required at all exterior CMU walls.**

2.4 METAL BUILDING WALL INSULATION – SIMPLE SAVER SYSTEM

A. MANUFACTURERS:

1. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function.

a. Thermal Design, Inc., Simple Saver System, Madison, NE

2. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

B. References:

1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM E 96 - Standard Test Method for Water Vapor Transmission of Materials in Sheet Form (Procedure B).

3. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
4. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
5. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
6. ASTM C 1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

C. Design Requirements:

1. Insulating system shall have a continuous vapor barrier inside of building purlins, girts, and insulation to provide complete isolation from inside conditioned air.

D. MATERIALS:

1. Simple Saver System consists of Batt Insulation, Roof Insulation, Wall Insulation, Vapor Barrier Liner Fabric, Thermal Breaks, Straps, and other devices and components in a insulation system.
2. Batt Insulation: ASTM C 991 Type 1; preformed formaldehyde-free glass fiber batt conforming to the following:
    a. Equal to purlin/girt spacing by manufacturer's standard lengths.
    b. Unfaced.
3. Wall Insulation: Formaldehyde-free fiberglass blanket or batt complying with ASTM C 991 Type 1, ASTM E 136 and ASTM E 84 with a thermal resistance and thickness as follows:
    a. **R-25,** U Factor U-0.040.
4. Vapor Barrier Liner Fabric: Syseal® type woven, reinforced, high-density polyethylene yarns coated on both sides with a continuous white or colored polyethylene coatings, as follows:
    a. Product complies with ASTM C 1136, Types I through Type VI.
    b. Perm rating: 0.02 for fabric and for seams in accordance with ASTM E 96.
    c. Flame/Smoke Properties: 1) 25/50 in accordance with ASTM E 84. 2) Self-extinguishes with field test using matches or butane lighter.
    d. Ultra violet radiation inhibitor to minimum UVMAX® rating of 8.
    e. Size and seaming: Manufactured in large custom pieces by extrusion welding from roll goods and fabricated to substantially fit defined building area with minimum practicable job site sealing.
    f. Provide with factory double, extrusion welded seams. Stapled seams or heat-melted seams are not acceptable due to degradation of fabric.
    g. Factory-folded to allow for rapid installation.
    h. Color: To be selected by Architect after bid date from manufactures standards.
5. Vapor Barrier Lap Sealant:
    a. Solvent-based, Simple Saver polyethylene fabric adhesive.
6. Vapor Barrier Tape:
    a. Double-sided sealant tape 3/4 inch (19 mm) wide by 1/32 inch (.79 mm) thick.
7. Vapor Barrier Patch Tape:
    a. Single-sided, adhesive backed sealant tape 3 inches (76 mm) wide made from same material as Syseal® type liner fabric.
8. **Thermal Breaks:**
    a. Provide thermal blocks/breaks at all roof to purlin connections points.

b. 1/8 inch (3 mm) thick by 3 inch (76 mm) wide white, closed-cell polyethylene

c. foam with pre-applied adhesive film and peel-off backing.

d. Polystyrene Snap-R snap-on thermal blocks.

9. Straps:
   a. 100 KSI minimum yield tempered, high-tensile-strength steel.
   b. Size: Not less than 0.020 inch (0.50 mm) thick by 1 inch (25 mm) by continuous length.
   c. Galvanized, primed, and painted to match specified finish color on the exposed side.
   d. Color: As selected from manufactures standards
10. Primed and painted to match specified finish color on the exposed side.
11. High-tensile-strength stainless steel.
    a. Woven polyester plastic. As selected from manufactures standards
12. Fasteners:
    a. For light gage steel: #12 by 3/4 (19 mm) inch plated Tek 2 type screws with sealing washer, painted to match specified color.
    b. For heavy gage steel: #12 by 1-1/2 inch (38 mm) plated Tek 4 type screws with sealing washer, painted to match specified color.
    c. For wood, concrete, other materials: As recommended by manufacturer.
13. Wall Insulation Hangers:
    a. Fast-R preformed rigid hangers, 32 inch (813 mm) long galvanized steel strips with barbed arrows every 8 inches (203 mm) along its length.

E. INSTALLATION:
1. General:
   a. Install pre-engineered building insulation system in accordance with manufacturer's installation instructions and the approved shop drawings.
   b. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   c. Install in exterior spaces without gaps or voids. Do not compress insulation.
   d. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
   e. Fit insulation tight in spaces and tight to exterior side of the sealed liner fabric and around mechanical and electrical services within plane of insulation.
2. Roof Insulation Installation:
   a. Straps:
      i. Cut straps to length and install in the pattern and spacings indicated on shop drawings.
      ii. Tension straps to required value.
   b. Vapor Barrier Fabric:

      Install vapor barrier fabric in large one-piece custom fabricated pieces to substantially fit defined building areas with minimum practicable job site sealing.
      i. Position pre-folded fabric on the strap platform along one eave purlin.
      ii. Clamp the two bottom corners at the eave and also centered on the bay.
      iii. Pull the other end of the pleat-folded fabric across the building width on the strap platform, pausing only at the ridge to fasten the straps and fabric in position where

plane of roof changes and to release temporary fasteners on the opposite ridge purlins.

iv. Once positioned, install fasteners from the bottom side at each strap/purlins intersection.

v. Trim edges and seal along the rafters.

vi. All seams must be completely sealed and stapled seams not acceptable.

c. Insulation:

i. Unpack, and shake to a thickness exceeding the specified thickness.

ii. Ensure that cavities are filled completely with insulation.

iii. Place on the vapor barrier liner fabric without voids or gaps.

iv. Place top layer of insulation over and perpendicular to the purlins without voids or gaps, as roof sheathing is applied.

v. Place thermal block on top of purlins or bottom of purlins for retrofit work if no other thermal break exists.

vi. Place new insulation between purlins at the required thickness for the R-value specified.

d. Seal vapor barrier fabric to the wall fabric and elsewhere as required to provide a continuous vapor barrier.

3. Wall Insulation Installation:

a. Install thermal break to exterior surface of girts as wall sheathing is applied.

b. Install self-sticking foam thermal break to interior surface of girts prior to installation of insulation.

c. Position and secure Fast-R hangers to girts on the inside face of the wall sheathing.

d. Cut insulation to required lengths to fit vertically between girts.

e. Fluff the insulation to the full-specified thickness.

f. Neatly position in place and secure to Fast-R hangers.

g. Ensure that cavities are filled completely with insulation.

4. Vapor Barrier Fabric:

a. Install vapor barrier fabric in large one-piece custom fabricated pieces to substantially fit defined building areas with minimum practicable job site sealing.

b. Apply the vapor barrier fabric by clamping it in position over eave strap and installing fasteners through the eave strap into each roof strap, permanently clamping the wall fabric between them.

c. Once in position, draw the vapor barrier fabric down over the column flanges to the base angle and install vertical straps along each column and 5 feet 0 inches on center, maximum, fastening to each girt to retain system permanently in place.

d. All seams must be completely sealed and stapled seams not acceptable.

5. Seal wall fabric to the roof fabric, to the base angle and up the columns to provide a continuous vapor barrier.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

A. Installer must examine substrates and conditions under which insulation work is to be performed and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with insulation work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

B. Clean substrates of substances harmful to insulations or vapor barriers, including removal of projections which might puncture vapor barriers.

C. Close off openings in cavities to receive poured-in-place and insulation, sufficiently to prevent escape of insulation. Provide bronze or stainless steel screen (inside) where openings must be maintained for drainage or ventilation.

3.2 INSTALLATION

A. General: Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.

B. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

3.3 CAVITY WALL INSULATION

A. On units of plastic insulation, install small pads of adhesive spaced approximately 1'-0" o.c. both ways on inside face. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Fill all cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.4 PROTECTION

A. General: Protect installed insulation and vapor barriers from harmful weather exposures and from possible physical abuses, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure. Installer shall advise Contractor of exposure hazards, including possible sources of deterioration and fire hazards.

END OF SECTION

SECTION 07600 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of each type of flashing and sheet metal work is indicated on drawings and by provisions of this section.

B. Types of work specified in this section include the following:

1. Eave Strip/Drip Edge
2. Fascia
3. Soffit
4. Gutters
5. Downspouts

C. Integral masonry flashings are specified as masonry work in sections of Division 4.

1.3 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

E. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007, with Editorial Revision (2012).

F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007, with Editorial Revision (2012).

G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.4 SUBMITTALS

A. Product Data; Flashing, Sheet Metal, Accessories: Submit manufacturer's product data, installation instructions and general recommendations for each specified sheet material and fabricated product.

1.5 JOB CONDITIONS

A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage thick base metal, shop pre-coated with PVDF (Polyvinylidene Fluoride) coating.

B. Finish: The exposed finish on all exposed metals and similar items shall consist of a 70% KYNAR 500® resin base coating applied to a cleaned, pretreated and primed surface. The dry film

thickness of the exterior coating shall not be less than .90 mil minimum, inclusive primer. The interior color finish shall consist of a backer coat with a dry film thickness of 0.5 mil. A low gloss finish is required to minimize the appearance of oil canning,

a. Colors: As selected by Architect after Bid Date, from manufacturer's standard colors including white.

2.2 GUTTERS

A. Gutters: Provide flat shapes, no rolled formed stiffeners or ribbed allowed. Form gutters in "continuous" sections not less than 8 feet in length, complete with end pieces, outlet tubes and other special pieces as may be required. Join sections with riveted and soldered or sealed joints. Provide expansion-type slip joint at center of runs.

1. Furnish gutter supports spaced at 36" on center constructed of same metal as gutters.

B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage thick base metal, shop pre-coated with PVDF (Polyvinylidene Fluoride) coating.

C. Finish: The exposed finish on all exposed metals and similar items shall consist of a 70% KYNAR 500® resin base coating applied to a cleaned, pretreated and primed surface. The dry film thickness of the exterior coating shall not be less than .90 mil minimum, inclusive primer. The interior color finish shall consist of a backer coat with a dry film thickness of 0.5 mil. A low gloss finish is required to minimize the appearance of oil canning,

a. Colors: As selected by Architect after Bid Date, from manufacturer's standard colors including white.

2.3 DOWNSPOUTS

A. Downspouts: Form downspouts in sections approximately 10 feet long **(no corrugated sections)**, complete with elbows and offsets. Join sections with not less than 1-1/2" telescoping joints. Provide fasteners, designed to securely hold downspouts not less than 1" away from walls; locate fasteners at top and bottom and equally spaced at approximately 5 feet on center in between.

B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage thick base metal, shop pre-coated with PVDF (Polyvinylidene Fluoride) coating.

C. Finish: The exposed finish on all exposed metals and similar items shall consist of a 70% KYNAR 500® resin base coating applied to a cleaned, pretreated and primed surface. The dry film thickness of the exterior coating shall not be less than .90 mil minimum, inclusive primer. The interior color finish shall consist of a backer coat with a dry film thickness of 0.5 mil. A low gloss

finish is required to minimize the appearance of oil canning,

a. Colors: As selected by Architect after Bid Date, from manufacturer's standard colors including white.

2.4 METAL SOFFIT SYSTEM – STEEL SOFFIT

A. Manufacturer: The following manufacturers' products have been used to establish minimum standard for materials, workmanship and function:

1. PAC-CLAD (Basis of Design); www.pac-clad.com: 1005 Tonne Road, Elk Grove Village, IL 60007; Ph: 800-PAC-CLAD

2. MBCI Manufacturing; www.mbci.com; 2280 Monier Avenue, Lithia Springs, Georgia, 30122; Phone: 844.2506 or 770.729.4772.

3. Morin / A Kingspan Group Company; www.kingspan.com/us/en-us/product-groups/metal-roof-wall-systems; 1975 Eidson Drive, Florida, 32724; Phone: 860.584.0900 or 800.640.9501

B. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

C. MATERIALS - FORMED METAL SOFFIT PANELS

1. **PAC-CLAD Flush Profile, Concealed Fastener Metal Soffit Panels**: Structural metal panels consisting of formed metal sheet with vertical panel edges and flat pan, with flush joints between panels, field assembled with nested lapped edges, and attached to supports using concealed fasteners.
    a. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, structural quality, Grade 50, Coating Class AZ50 (Grade 340, Coating Class AZM150), prepainted by the coil-coating process per ASTM A755/A755M.
        i. Nominal Thickness: 24 gauge (Standard) coated thickness, with smooth surface.
        ii. Panel Width: 12 inches.
        iii. Panel Thickness: 1 inch.
        iv. Flush Narrow (Vented) Panels as indicated on drawings.
        v. Flush Solid (Non-Vented) Panels as indicated on drawings.
2. Finish: The exposed finish on all exposed metals and similar items shall consist of a 70% KYNAR 500® resin base coating applied to a cleaned, pretreated and primed surface. The dry film thickness of the exterior coating shall not be less than .90 mil minimum, inclusive primer. The interior color finish shall consist of a backer coat with a dry film thickness of 0.5 mil. A low gloss finish is required to minimize the appearance of oil canning.
    a. Colors: As selected by Architect after Bid Date, from manufacturer's standard colors including white.

2.5 METAL SOFFIT SYSTEM – ALUMINUM SOFFIT

A. Manufacturers: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:
    1. Ply Gem/Mastic Aluminum Soffit (Basis of Design)
    2. Alside Aluminum Soffits
    3. Kaycan Aluminum
    4. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

B. Materials:
    1. Perforated Aluminum Soffit for ventilation
        a. Envoy V-Groove by PlyGem/Mastic
        b. 15 sq. in/Lin. ft..
        c. Alumalure 2000 finish
        d. .019" thick
        e. 12" exposure or as indicated on drawings.

2.6 MISCELLANEOUS MATERIALS & ACCESSORIES

A. Solder:
    1. For use with steel or copper, provide 50 - 50 tin/lead solder (ASTM B 32), with rosin flux.
    2. For use with stainless steel: Provide 60 - 40 tin/lead solder (ASTM B 32), with acid-chloride type flux, except use rosin flux over tinned surfaces.

B. Fasteners: Same metal as flashing/sheet metal or, other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

C. Bituminous Coating: FS TT-C-494 or SSPC - Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

D. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, non- drying, nonmigrating sealant.

E. Epoxy Seam Sealer: 2-part noncrossive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.

F. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/ weather-resistant seaming and adhesive application of flashing sheet.

G. Paper Slip Sheet: 5-lb. rosin-sized building paper.

H. Polyethylene Underlayment: 6-mil carbonated polyethylene film; FS L-P-512.

I. Reglets: Metal or plastic units of type and profile indicated, compatible with flashing indicated, noncrossive.

J. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed,

noncrossive, size and gage required for performance.

K. Roofing Cement: Must be compatible with materials with which it comes in contact.

L. Provide precast concrete splashblock sloped away from building, approximately 12-inches wide x 24-inches long x 2-inches thick x 3-inches high, with 3-raised edges and one “open” end turned toward building – at locations where downspouts would otherwise drain on grade or paving.

1. Provide 1-preformed metal pan with corrugated bottom and properly hemmed edges (minimum 12” x 24”) at each downspout which drains onto a roof below.

2.9 FABRICATED UNITS

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be

used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 2" deep, filled with mastic sealant (concealed within joints).

D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual".

1. Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.

B. Underlayment: Where aluminum is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of polyethylene underlayment.

C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.

D. Install reglets to receive counter-flashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division-3 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division-4 sections.

1. Install counter-flashing in reglets, either by snap-in seal arrangement, or by wedging in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

3.2 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

B. Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

END OF SECTION

SECTION 07900 - JOINT SEALERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. The extent of each form and type of joint sealer is indicated on drawings and by provisions of this section.

B. The applications for joint sealers as work of this section include the following:

1. Joints (Interior).
2. Joints (Exterior).
3. Flashing Joints.
4. Interior wall/ceiling joints.

C. General Performance: Except as otherwise indicated, joint sealers are required to establish and maintain airtight and waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicted for each application. Failures of installed sealers to comply with this requirement will be recognized as failures of materials and workmanship.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications, handling/installation/curing instructions, and performance tested data sheets for each elastomeric product required.

1.4 JOB CONDITIONS

A. Weather Conditions: Do not proceed with installation of liquid sealants under unfavorable weather conditions. Install elastomeric sealants when temperature by manufacturer for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. General: Manufacturers listed in this article include those known to produce the indicated category of prime joint sealant material, either as a nominally pure generic product or as an equivalent-performance modification thereof or proprietary product.

B. Manufacturers: The following manufacturer's products have been used to establish minimum standards for materials, workmanship and function:

1. Acrylic Emulsion Latex Sealants:
   a. Bostik.
   b. Pecora Corp.
   c. Sonneborn Building Products.
   d. Tremco, Inc.
2. Polyurethane Sealants:
   a. Bostik.
   b. Master Builders.
   c. Pecora Corp.
   d. Sonneborn Building Products.
   e. Tremco, Inc.

3. Butyl Sealants:
    a. Bostik.
    b. TEC Incorporated.
    c. Tremco, Inc.
4. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 MATERIALS

A. NOTE: The use of silicone sealants shall not be used at any exterior conditions.

B. General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component. (Silicone sealant shall not be used at exterior conditions).
    1. Color: Standard colors matching finished surfaces.
    2. Applications: Use for:
        a. Control, expansion, and soft joints in masonry, stone or concrete.
        b. Joints between concrete and other materials.
        c. Joints between metal frames and other materials.
        d. Other exterior joints for which no other sealant is indicated.

C. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
    1. Applications: Use for:
        a. Concealed sealant bead in sheet metal work.

D. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, single component, paintable.
    1. Color: Standard colors matching finished surfaces.
    2. Applications: Use for:
        a. Interior wall and ceiling control joints.
        b. Joints between door and window frames and wall surfaces.
        c. Other interior joints for which no other type of sealant is indicated.

E. Acoustical Sealant: Butyl or acrylic sealant; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, nonskinning.
    1. Applications: Use for concealed locations only:
        a. Sealant bead between top stud runner and structure and between bottom stud track and floor or wall.

F. Paving Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Class 25, Uses T, M and A; single component.
    1. Color: Standard color matching finished surfaces.
    2. Applications: Use for:
        a. Joints in sidewalks and paving, either vehicular or pedestrian.
        b. Isolation joints and control joints in slabs on grade.

G. Bituminous and Fiber Joint Filler (BtmF-JF) provide resilient and non-extruding type premolded bituminous-impregnated fiberboard units complying with ASTM D 1751; FS HH-F-341, Type I; or AASHTO M213.

H. Miscellaneous Materials:

1. Joint Primer/Sealer: Provide type of joint primer/sealer recommended by sealant manufacturer for joint surfaces to be primed or sealed.

2. Bond Breaker Tape (BB-Tp): Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.

3. Sealant Backer Rod (S-BR): provide compressible rod stock of polyethylene foam, polyurethane foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other recommended by sealant manufacturer for back-up of and compatibility with sealant. Where used with hot-applied sealant, provide heat-resistant type which will not be deteriorated by sealant application temperature as indicated.

   a. Rod Size to Joint Width: Size of all backer rod width shall be 2 times the width of joint/gap to be sealed.

PART 3 - EXECUTION

3.1 INSPECTION

A. Installer must examine substrate, (joint surfaces) and conditions under which joint sealer work is to be performed and must notify Prime Contractor of unsatisfactory conditions.

3.2 JOINT PREPARATION

A. Clean joint surfaces immediately before installation of gaskets, sealants or caulking compounds. Remove dirt, insecure coatings, moisture and other substrate which could interfere with seal of gasket or bond of sealant of caulking compound. Etch concrete and masonry joint surfaces as recommended by sealant manufacturer. Roughen vitreous and glazed joint surfaces as recommended by sealant manufacturer.

B. Prime or seal joint surfaces where indicated, and where recommended by sealant manufacturer. Confine primer/sealer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION

A. Comply with manufacturer's printed instructions except where more stringent requirements are shown on specified, and except where manufacturer's technical representative directs otherwise.

B. Set joint filler units at depth or position in joint as indicated to coordinate with other work, including installation of bond breakers, backer rods and sealant. Do not leave voids or gaps between ends of joint filler units.

C. Install sealant backer rod for liquid-applied sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for application indicated.

D. Install bond breaker tape where indicated and where required by manufacturer's recommendations to ensure that liquid-applied sealants will perform as intended.

E. Employ only proven installation techniques, which will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.

F. Install sealant to depths as shown or, if not shown, as recommended by sealant manufacturer but within the following general limitations, measured at center (thin) section of beads;

G. For normal moving joints sealed with elastomeric sealants but not subject to traffic, fill joints to a depth equal to 50% of joint width, but neither more than 1/2" deep nor less than 1/4" deep.

H. Spillage: Do not allow sealants or compounds to overflow from confines of joints, or to spill onto adjoining work, or to migrate into voids of exposed finishes. Clean adjoining surfaces by whatever

means may be necessary to eliminate evidence of spillage.

I. Recess exposed edges of gaskets and exposed joint fillers slightly behind adjoining surfaces, unless otherwise shown, so that compressed units will not protrude from joints.

J. Bond ends of gaskets together with adhesive of “weld” by other means as recommended by manufacturer to ensure continuous watertight and airtight performance. Miter-cut and bond ends at corners unless molded corner units are provided.

3.4 CURE AND PROTECTION

A. Cure sealants and caulking compounds in compliance with manufacturer’s instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability. Advise Prime Contractor of procedures required for cure and protection of joint sealers during construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at time of substantial completion. Cure and protect sealants in manner which will minimize increases in modulus of elasticity and other accelerated aging effects. Replace or restore sealants which are damaged or deteriorated during construction period.

END OF SECTION

SECTION 08100 - STEEL DOORS AND FRAMES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 SUMMARY

A. This Section includes:

1. Steel Doors
2. Steel Frames.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 4 Section "Unit Masonry" for building anchors into and grouting frames in masonry construction.
2. Division 8 Section " Wood Doors" for solid-core wood doors installed in steel frames.
3. Division 8 Section "Finish Hardware" for door hardware and weatherstripping.
4. Division 8 Section "Glazing" for glass in steel doors and sidelights.
5. Division 9 Section "Gypsum Board Assemblies".
6. Division 9 Section "Painting".

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.

C. Shop Drawings showing fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

D. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.

1. Indicate coordination of glazing frames and stops with glass and glazing requirements.

E. Samples for initial selection in the form of manufacturer's color charts showing the full range of colors available for factory-finished doors and frames.

F. Samples for verification of each type of exposed finish required, prepared on Samples not less than 3 by 5 inches (75 by 125 mm) and of same thickness and material indicated for final unit of Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

G. Oversize Construction Certification: For door assemblies required to be fire rated and exceeding limitations of labeled assemblies, submit certification of a testing agency acceptable to authorities having jurisdiction that each door and frame assembly has been constructed to conform to design, materials, and construction equivalent to requirements for labeled construction.

1.4 QUALITY ASSURANCE

A. Provide doors and frames complying with ANSI/SDI 100 "Recommended Specifications for Standard Steel Doors and Frames" and as specified.

B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E 152, and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors conform to all standard construction requirements of tested and labeled fire-rated door assemblies except for size.

2. Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch- (100-mm-) high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to promote air circulation.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Pioneer Industries

2. Rocky Mountain Metals, Inc.

3. Republic Doors & Frames/Allegion

4. Steelcraft - Allegion

2.2 MATERIALS

A. Hot-Rolled Steel Sheets and Strip: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A 569 (ASTM A 569M).

B. Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366 (ASTM A 366M), commercial quality, or ASTM A 620 (ASTM A 620M)

C. Galvannealed Steel Sheets: Galvannealed Steel Sheet: ASTM A 653/ A 653M, commercial quality, hot dipped. Coating Thickness: A60 coating.

D. Supports and Anchors: Fabricated from not less than 0.0478-inch- (1.2-mm-) thick steel sheet; 0.0516-inch- (1.3-mm-) thick galvanized steel where used with galvanized steel frames.

E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A 153, Class C or D as applicable.

2.3 DOORS

A. Steel Doors: Provide 1-3/4-inch- (44-mm-) thick doors of materials and ANSI/SDI 100 grades and models specified below, or as indicated on Drawings or schedules:

1. Interior Doors: Grade 2, heavy-duty, Model 1, visible edge seam design, 18 gauge / minimum 0.0478-inch thick cold-rolled steel sheet faces.

2. Exterior Doors: Grade 3, heavy-duty, Model 1, visible edge seam design, 16 gauge / minimum 0.0635-inch thick A60 galvannealed steel sheet faces.

B. Door Louvers: Provide louvers according to SDI 111C for interior doors where indicated, with blades or baffles formed of 0.0239-inch- (0.6-mm-) thick cold-rolled steel sheet set into minimum 0.0359-inch- (0.9-mm-) thick steel frame.

1. Sight-Proof Louvers: Stationary louvers constructed with inverted V- shaped or Y-shaped blades.

C. Low Profile Lite Kits: All lite kits must be minimum 18 ga. cold rolled steel, mitered and welded corners, welded reinforcing clips at corners, counter-sunk mounting screw- holes.

2.4 FRAMES

A. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, according to ANSI/SDI 100, and of types and styles as shown on Drawings and schedules.

B. Conceal fastenings, unless otherwise indicated. Fabricate frames as follows:

1. Fabricate frames with mitered or coped and face welded corners.

2. Interior Frames: 16 gage cold rolled steel

3. Exterior Frames: 14 gage A60 galvannealed steel.

C. Door Silencers: Except on weather stripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.

D. Plaster Guards: Provide minimum 0.0179-inch- (0.45-mm-) thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

E. Grout: When required in masonry construction, as specified in Division 4 Section "Unit Masonry."

2.5 FABRICATION

A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.

1. Internal Construction: One of the following manufacturer's standard core materials according to SDI standards:

a. Interior Doors: 3/4" Cell Honeycomb

b. Exterior Doors: Insulated Polystyrene

2. Clearances:

a. Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between non-fire-rated pairs of doors.

b. Not more than 3/4 inch (19 mm) at bottom.

c. Fire Doors: Provide clearances according to NFPA 80.

3. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."

B. Galvannealed Steel Doors, Panels, and Frames: For the following locations, fabricate doors, panels, and frames from galvannealed steel sheet according to SDI 112.

1. At exterior locations.

2. Where indicated.

C. Close top and bottom edges of doors flush as an integral part of door construction or by addition of minimum 0.0635-inch- (1.6-mm-) thick galvanized steel channels, with channel webs placed even with top and bottom edges. Seal joints in top edges of doors against water penetration.

D. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

E. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.

1. Unless otherwise indicated, provide thermal-rated assemblies with U- value rating of 0.41 Btu/sq. ft. x h x deg F (2.33 W/sq. m x K) or better

F. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier.

G. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.

1. For concealed overhead door closers, provide space, cutouts, reinforcing, and provisions for fastening in top rail of doors or head of frames, as applicable.

H. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

I. Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

J. Glazing Stops: Minimum 0.0359-inch- (0.9-mm-) thick steel or 0.040-inch- (1-mm-) thick aluminum.

1. Provide non-removable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.

2. Provide screw-applied, removable, glazing beads on inside of glass, louvers, and other panels in doors.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

B. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes. Apply primers and organic finishes to doors and frames after fabrication.

2.7 GALVANIZED STEEL SHEET FINISHES

A. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC- Paint 20.

B. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.

1. Shop Primer: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.

2.8 STEEL SHEET FINISHES

A. Surface Preparation: Solvent-clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel to comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).

B. Pretreatment: Immediately after surface preparation, apply a conversion coating of type suited to organic coating applied over it.

C. Factory Priming for Field-Painted Finish: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.

2. In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.

3. At existing concrete or masonry construction, install at least 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.

4. Install fire-rated frames according to NFPA 80.

A. Door Installation: Fit hollow-metal doors accurately in frames, within clearances specified in ANSI/SDI 100.

1. Fire-Rated Doors: Install with clearances specified in NFPA 80.

2. Smoke-Control Doors: Comply with NFPA 105.

3.2 ADJUSTING AND CLEANING

A. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION

SECTION 08211 - WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 SUMMARY

A. This Section includes the following:

1. Solid core doors with wood veneer faces.
2. Factory finishing of flush wood doors.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.

C. Shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for veneer matching and factory finishing and other pertinent data.

1. For factory-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.

D. Samples for initial selection in the form of color charts consisting of actual materials in small sections for the following:

1. Faces of factory-finished doors with transparent finish. Show the full range of colors available for stained finishes.
2. Faces of factory-finished doors with opaque finish. Show the full range of colors available.

E. Samples for verification in the form and size indicated below:

1. Corner sections of doors approximately 12 inches (300 mm) square with door faces and edgings representing the typical range of color and grain for each species of veneer and solid lumber required. Finish sample with same materials proposed for factory-finished doors.

1.4 QUALITY ASSURANCE

A. Quality Standard: Comply with the following standard:

1. NWWDA Quality Standard: I.S.1-A, "Architectural Wood Flush Doors," of the National Wood Window and Door Association.
2. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute for grade of door, core, construction, finish, and other requirements.

B. Fire-Rated Wood Doors: Provide wood doors that comply with NFPA 80; are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152; and are labeled and listed by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction.

1. Oversized Fire-Rated Wood Doors: For door assemblies exceeding sizes of tested assemblies, provide manufacturer's certificate stating that doors conform to all standard construction requirements of tested and labeled fire-door assemblies except for size.
2. Temperature Rise Rating: At stairwell enclosures, provide doors that have a temperature rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.

3. Temperature Rise Rating: At stairwell enclosures, provide doors that have a temperature rise rating of 250 deg F (139 deg C) maximum in 30 minutes of fire exposure.

C. Single-Source Responsibility: Obtain doors from one source and by a single manufacturer.

1.5 DELIVERY, STORAGE & HANDLING

A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's instructions.

1. Comply with Technical Bulletin 420-R for delivery, storage, and handling of doors.

B. Identify each door with individual opening numbers as designated on shop drawings, using temporary, removable, or concealed markings.

1.6 PROJECT CONDITIONS

A. Conditioning: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. General Warranty: Door manufacturer's warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch (6.35 mm) in a 42-by-84-inch (1067-by-2134-mm) section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span, or do not conform to tolerance limitations of referenced quality standards.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.

2. Warranty shall be in effect during the following period of time after date of Substantial Completion.

a. Solid Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering doors that may be incorporated in the Work (No other Manufacturer to be used unless prior approved by addenda)

B. Manufacturer: Subject to compliance with requirements, provide doors by one of the following:

1. Oshkosh Door Company; 2501 Universal Street, P.O. Box 2468, Oshkosh, WI 54904; Ph.: 920.233.6161; www.oshkoshdoor.com.

2. VT Industries; 1000 Industrial Park, P.O. Box 490, Holstein, IA 51025; Ph.: 712.368.4381; www.vtindustries.com.

3. Haley Brothers, Inc.; 6291 Orangethorpe Ave., Buena Park, CA 90620; Ph.: 714.670.2112; www.haleybros.com.

2.2 INTERIOR FLUSH WOOD DOORS

A. Solid Core Doors for Transparent Finish: Comply with the following requirements:

1. Faces: Plain Sliced White Birch, Book/Run Matching

2. Grade: Premium "A"

3. Construction: 5 ply, Hot Pressed
4. Core: Particleboard Core to meet or exceed ANSI/A208.1 for 1-LD-1 or 1-LD-2 door core
5. Bonding: Stiles and rails bonded to core, then entire unit abrasive planed before veneering.
6. Pair Matching: Required at all pairs of doors.

B. Fire-Rated Solid Core Doors: Comply with the following requirements:

1. Faces and Grade: Provide faces and grade to match non-fire-rated doors in same area of building, unless otherwise indicated.
2. Construction: Manufacturer's standard core construction as required to provide fire-resistance rating indicated.
3. Edge Construction: Provide manufacturer's standard laminated-edge construction for improved screw-holding capability and split resistance compatible hardwood
4. Pairs: Furnish formed-steel edges and astragals for pairs of fire-rated doors, unless otherwise indicated.
5. Pairs: Provide fire-rated pairs with fire-retardant stiles that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.

2.3 FABRICATION

A. Fabricate flush wood doors to comply with following requirements:

1. In sizes indicated for job-site fitting.
2. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels:
    a. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-resistance-rated doors.
3. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, DHI A115-W series standards, and hardware templates.
    a. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory machining.
    b. Metal Astragals: Pre-machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

B. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Louvers: Factory install louvers in prepared openings.

2.4 SHOP PRIMING

A. Transparent Finish: Shop-seal faces and edges of doors for transparent finish with stain (if required), other required pretreatments, and first coat of finish as specified.

2.5 FACTORY FINISHING

A. General: Comply with referenced quality standard's requirements for factory finishing.

B. Finish wood doors at factory.

C. Transparent Finish: Comply with requirements indicated for grade, finish system, staining effect, and sheen.

1. Grade: Premium.
2. Finish: AWI System TR-6 or better in Factory standard color as directed by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine installed door frames prior to hanging door:

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.

2. Reject doors with defects.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation see Division 8 Section "Door Hardware."

B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and referenced quality standard and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to requirements of NFPA 80.

C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Fitting Clearances for Non-Fire-Rated Doors: Provide 1/8 inch (3.2 mm) at jambs and heads, 1/16 inch (1.6 mm) per leaf at meeting stiles for pairs of doors, and 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch (6.4-mm) clearance from bottom of door to top of threshold.

2. Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.

3. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

4. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish after installation, if fitting or machining is required at the job site.

3.3 ADJUSTING AND PROTECTION

A. Operation: Re-hang or replace doors that do not swing or operate freely.

B. Finished Doors: Refinish or replace doors damaged during installation.

C. Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 08310 COILING COUNTER DOOR

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. COILING STEEL COUNTER DOOR – POWDER COAT FINISH

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

B. Section 05500 - Metal Fabrications: Support framing and framed opening.

1.3 REFERENCES

A. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

C. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

D. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

E. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

G. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

H. NEMA MG 1 - Motors and Generators.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

C. Preparation instructions and recommendations.

D. Storage and handling requirements and recommendations.

E. Details of construction and fabrication.

F. Installation methods.

G. Shop Drawings: Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent construction.

H. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.

I. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Furnish each overhead coiling counter door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.

B. Furnish overhead coiling counter door units by one manufacturer for entire project.

C. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.

D. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

F. Install in areas designated by Architect.

G. Do not proceed with remaining work until workmanship and installation is approved by Architect.

H. Refinish mock-up area as required to produce acceptable work.

I. Anchorages: Furnish all anchoring devices and provide setting drawings, templates, instructions and directions for installation of anchoring devices. Coordinate delivery with other work to avoid delay.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 COORDINATION

A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

1.9 WARRANTY

A. Warranty: Manufacturer’s limited door warranty for 2 years for all parts and components.

B. Manufacturer’s 2 year limited warranty for PowderGuard Premium Powder Coat Finish.

C. Manufacturer’s 4 year limited warranty for PowderGuard Zinc Powder Coat Finish.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Overhead Door Corporation, 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com; E-mail: info@overheaddoor.com.

B. Raynor; 1101 East River Road, Dixon, IL 61021-0448; www.raynor.com: PH: 815.285.7144.

C. Cookson; 1901 South Litchfield Road, Goodyear, AZ 85338; www.cooksondoor.com: PH: 800.294.4358

2.2 OVERHEAD COILING STEEL COUNTER DOORS

A. Galvanized Steel Counter Doors: Overhead Door Corporation, 650 Series.

1. Wall Mounting Condition:

   a. As indicated on drawings.

2. Curtain: Interlocking slats, Type F-158 fabricated of 22 gauge galvanized steel. Endlocks attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.

3. Finish:

   a. Slats and hood galvanized steel in accordance with ASTM A 653 with rust-inhibitive, roll

coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester (powder coated) top coat.

i. Powder coat: PowderGuard Premium: Weather resistant polyester powder coat color as selected by the Architect.

b. Non-galvanized exposed ferrous surfaces for guides, bottom bar and head plates shall receive one coat of rust-inhibitive primer.

4. Bottom Bar:
   a. Steel tubular locking bottom bar with weatherstrip.
5. Guides: Extruded aluminum.
   a. Finish: PowderGuard Zinc Finish for guides, bottom bar and head plate.
6. Brackets: Steel plate to support counterbalance, curtain and hood.
7. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel.
8. Hood: Provided with intermediate support brackets as required and fabricated of:
   a. Galvanized steel.
9. Operation:
   a. Manual push up.
12. Locking:
   a. Two point dead locks with mortise cylinder/s.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

F. Install perimeter trim and closures.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION

SECTION 08330 - COILING DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Insulated Coiling Overhead Doors.

1.2 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Support framing and framed opening.

B. Section 08700 - Door Hardware: Product Requirements for cylinder core and keys.

1.3 REFERENCES

A. ANSI/DASMA 108 - American National Standards Institute Standard Method For Testing Sectional Garage Doors And Rolling Doors: Determination Of Structural Performance Under Uniform Static Air Pressure Difference.

B. NFRC 102 - Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.

C. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.

D. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

E. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

F. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

G. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

H. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Overhead coiling service doors:

1. Wind Loads: Design door assembly to withstand wind/suction load of 20 psf (958 Pa) without damage to door or assembly components in conformance with ASTM E 330.

2. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.

B. Overhead coiling insulated doors:

1. Wind Loads: Design door assembly to withstand wind/suction load of 20 psf (958 Pa) without damage to door or assembly components in conformance with ASTM E 330.

2. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.

C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.5 SUBMITTALS

A. Submit under provisions of Section 01600.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.
3. Details of construction and fabrication.
4. Installation instructions.

C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

G. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALITY ASSURANCE

A. Furnish each coiling door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.

B. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.

C. Installer Qualifications: Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.
4. Anchorages: Furnish all anchoring devices and provide setting drawings, templates, instructions and directions for installation of anchoring devices. Coordinate delivery with other work to avoid delay.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 COORDINATION

A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

A. Warranty: Manufacturer’s limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for 3 years or 20,000 cycles, whichever occurs first.

B. Warranty: Manufacturer's limited door system warranty for 2 years for all parts and components.

C. PowderGuard Finish

1. PowderGuard Max: Applied to curtain, guides, bottom bar, headplates: Manufacturer's limited Max Finish warranty for 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: info@overheaddoor.com.

B. Raynor; 1101 East River Road, Dixon, IL 61021-0448; www.raynor.com; PH: 815.285.7144.

C. Cookson; 1901 South Litchfield Road, Goodyear, AZ 85338; www.cooksondoor.com; PH: 800.294.4358

D. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 INSULATED COILING OVERHEAD DOORS

A. Overhead Coiling Stormtite Insulated Service Doors: Overhead Door Corporation Model 625.

1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.

a. Flat profile type F-265i for doors up to 40 feet (12.19 m) wide.

b. Front slat fabricated of:

i. 24 gauge galvanized steel.

c. Back slat fabricated of:

i. 24 gauge galvanized steel.

d. Slat cavity filled with CFC-free foamed-in-place, polyurethane insulation.

i. R-Value: 7.7, U-Value: 0.13.

ii. Sound Rating: STC-21.

2. Performance:

a. Through Curtain Sound Rating: Sound Rating: STC-28 (STC-30+ with HZ noise generator) as per ASTM E 90.

b. Installed System Sound Rating: STC-21 as per ASTM E 90.

c. U-factor: 0.91 NFRC test report, maximum U-factor of no higher than 1.00.

d. Air Infiltration: Meets ASHRAE 90.1 & IECC 2012/2015 C402.4.3 Air leakage <1.00 cfm/ft2.

3. Slats and Hood Finish:

a. Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.

i. Powder Coat:

1) PowderGuard Max powder coat, color as selected by Architect.

ii. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.

4. Weatherseals:

a. Vinyl bottom seal, exterior guide and internal hood seals.

b. Interior guide weatherseal.

c. Lintel weatherseal.

d. Air Infiltration Package, IECC 2012/2015 listed; product to meet C402.4.3 2012 Air leakage <1.00 cfm/ft2.

i. Air infiltration perimeter seal package includes: guide cover, guide cap, dual brushexterior guide seal, 4 inch finned lintel brush seal and vinyl bottom seal.

5. Bottom Bar:

a. Two galvanized steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.

6. Guides: Three structural steel angles.

7. Brackets:

a. Galvanized steel to support counterbalance, curtain and hood.

8. Finish; Bottom Bar, Guides, Headplate and Brackets:

a. Finish: PowderGuard Max powder color as selected by the Architect.

9. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.

10. Hood: Provide with internal hood baffle weatherseal.

a. 24 gauge galvanized steel with intermediate supports as required.

11. Manual Operation:

a. Chain hoist.

b. Crank Operation

12. Windload Design:

a. Standard windload shall be 20 PSF.

13. Locking:

a. Chain keeper locks for chain hoist operation.

b. Interior slide bolt lock for electric operation with interlock switch.

c. Cylinder lock for electric operation with interlock switch.

14. Wall Mounting Condition:

a. As indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

F. Install perimeter trim and closures.

G. Instruct Owner’s personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION

SECTION 08380 – TRAFFIC DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of traffic doors is shown on drawings.

B. Provide complete operating assemblies including doors, hardware, frames, operators and installation accessories.

1.3 QUALITY ASSURANCE

A. Furnish each traffic door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.

B. Insert and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of units. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of traffic door and frame. Include operating instructions and maintenance information.

B. Shop Drawings: Show fabrication and installation details of traffic doors and frames. Include plans, elevations, sections, details and attachments to other Work.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Chase Doors, (Basis of Design) Cincinnati, OH, Model SD 2000.
2. Eliason Doors
3. Carlson Doors.

B. Equal products of other manufacturers may be used in the work provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 TRAFFIC DOORS AND FRAMES – MATERIALS

A. Doors shall be constructed of .063" thick tempered aluminum alloy, satin anodized finish on both sides.

B. Panels shall be manufactured with a formed triangular leading edge and back edge spine.

C. Stainless steel Chase "E" series adjustable gravity close hardware system with panel mounted hinge body, and stainless steel jamb mounting bracket. Hinge cover is stainless steel.

D. Bottom hinge assembly shall be 5/8" diameter stainless steel pin with panel mounted saddle bracket and shall include hardware for floor and jamb mount installation.

E. Window shall be 9" x 14" shatter resistant acrylic, set in black rubber molding. All windows shall be factory installed and sealed. Window shall be centered 60" from the floor.

F. Aluminum Lower Hinge Guards to be 3” x 9", 5” x 18" high.

G. Impact Plates shall be 30” galvanized on both sides.

H. Frames: Tubular Steel by door manufacturer

2.3 FABRICATION

A. General: Provide traffic door assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names or roughness.

2.4 WARRANTY

A. 2 years from the date of installation.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install special doors complete with necessary hardware and accessories in accordance with final shop drawings, manufacturer's instructions and as specified herein.

B. All assemblies must be installed plumb, level and properly aligned.

C. Upon completion of installation, lubricate, test and adjust doors to operate easily, free from warp, twist or distortion.

D. Coordinate installation of bollards and/or wall stops with architectural drawings.

END OF SECTION

SECTION 08410 - ALUMINUM STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of aluminum entrances and storefronts is indicated on drawings and schedules.

B. Types of aluminum entrances required include the following:

1. Frames for exterior entrances
2. Frames for Exterior Glazed Windows.
3. Storefront type framing system for exterior applications.
4. Interior and Exterior Storefront Doors.

C. Glazing: Refer to “Glass and Glazing” section of Division 8 for glazing requirements for aluminum entrances and storefronts specified herein to be factory pre-glazed.

1.3 SYSTEM PERFORMANCES

A. General: Provide exterior entrance and storefront assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below as demonstrated by testing manufacturer’s corresponding stock systems according to test methods designated. System shall be of design styles indicated. System components and accessories shall be from the same manufacturer, to the maximum extent possible.

B. Thermal Movement: Allow for expansion and contraction resulting from ambient temperature range of 120 degree F.

C. Wind Loading: Provide capacity to withstand loading indicated below, tested per ASTM E 330.

1. Uniform pressure of 20 psf inward and 20 psf outward.

D. Transmission Characteristics of Fixed Framing: Comply with requirements indicated below for transmission characteristics and test methods.

1. Air and Water Leakages: Air infiltration of not more than 0.06 CFM per sq. ft. of fixed area per ASTM E 283 and no uncontrolled water penetration per ASTM E 331 at pressure differential of 6.24 psf (excluding operable door edges).
2. Condensation Resistance: Not less than 51 CRF per AAMA 1502.7.
3. Thermal Transmittance: U-value of not more than 0.65 Btu/(hr x sf x degree F) per AAMA 1503.1.

E. Transmission Characteristics of Entrances: Provide entrance doors with jamb and head frames which comply with requirements indicated below for transmission characteristics and test methods.

1. Air Leakage: Air infiltration per linear foot of perimeter crack of not more than 0.50 CFM for single doors and 1.0 CFM for pairs of doors per ASTM E 283 at pressure differential of 1.567 psf.
2. Condensation Resistance: Not less than 48 CRF per AAMA 1502.7.
3. Thermal Transmittance: U-value of not more than 0.93 Btu/(hr x sf x degree F) per AAMA 1503.1.

1.4 QUALITY ASSURANCE

A. Drawings: Plans, elevations and details show spacings of members as well as profile and similar dimensional requirements of aluminum entrances and storefront work. Minor deviations will be accepted in order to utilize manufacturer's standard products when, in Architect's sole judgment, such deviations do not materially detract from design concept or intended performances.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, standard details, and installation recommendations for components of aluminum entrances and storefronts required for project, including test reports certifying that products have been tested and comply with performance requirements.

B. Samples: Submit samples of each type and color of aluminum finish on 12" long sections of extrusions or formed shapes and on 6" square sheets. Where normal color and texture variations are to be expected, include 2 or more units in each set of samples showing limits of such variations.

PART 2 - PRODUCTS

2.1 ALUMINUM DOORS, FRAMES & STOREFRONTS

A. Manufacturers: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Kawneer North America
2. Tubelite, Inc.
3. Coral Industries, Inc./Coral Architectural Products
4. YKK AP America, Inc.
5. Oldcastle
6. Record

B. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 MATERIALS AND ACCESSORIES

A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B 221 for extrusion, ASTM B 209 for sheet/plate.

B. Fasteners: Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components.

1. Do not use exposed fasteners except where unavoidable for application of hardware. Match finish of adjoining metal.
2. Provide Phillips flat-head machine screws for exposed fasteners.

C. Concealed Flashing: Dead-soft stainless steel, 26 gauge minimum, or extruded aluminum, 0.062" minimum, of an alloy and type selected by manufacturer for compatibility with other components.

D. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise, non-magnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.

E. Concrete/Masonry Inserts: Cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.

F. Bituminous Coatings: Cold-applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.

G. Compression Weatherstripping: Manufacturer's standard replaceable stripping of either molded

neoprene gaskets complying with ASTM D 2000 or molded PVC gaskets complying with ASTM D 2287.

H. Sliding Weatherstripping: Manufacturer's standard replaceable stripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.

I. Glass and Glazing Materials: Provide glass and glazing materials which comply with requirements of "Glass and Glazing" section of these specifications.

2.3 HARDWARE

A. General: Hardware shall comply with requirements of the "Americans with Disabilities Act". Refer to hardware section of Division 8 for requirements for hardware items other than those indicated herein to be provided by manufacturer of aluminum entrances.

1. Push/Pull Handles: CO-9 design, by Kawneer. Finish as per the Door Schedule.

2. All other hardware shall be as per Section 08700, Finish Hardware.

2.4 FRAMING

A. Types:

1. Storefront type framing system for insulated exterior applications:

a. Framing system shall be equal to TriFab Versaglaze 451, by Kawneer.

2. Storefront type framing system for non-insulated interior applications:

a. Framing system shall be equal to TriFab Versaglaze 450, by Kawneer.

B. General:

1. Support Members: Extruded aluminum alloy 6063-T6 or 6061-T6 complying with ASTM B-221.

2. Flashing/Closures: Formed aluminum 5005-H34 alloy, min. thickness .040", complying with ASTM B-209.

3. Cap System: Manufacturer's standard cap glazing system consisting of rectangular (rafter) and beveled (horizontal) glazing gaps which will secure all sides of each light of glass against negative and positive loads.

4. Fasteners: A300 stainless steel.

5. Sealant: Silicone (FS TT-S-0015 43A and TT-S-0023 o.c.)

2.5 FABRICATION

A. Sizes and Profiles: Required sizes for door and frame units, including profile requirements, are indicated on drawings. Any variable dimensions are indicated, together with maximum and minimum dimensions required to achieve design requirements and coordination with other work.

B. Prefabrication: To greatest extent possible, complete fabrication, assembly, finishing, hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.

1. Preglaze door and frame units to greatest extent possible, in coordination with installation and hardware requirements.

2. Do not drill and tap for surface-mounted hardware items until time of installation at project site.

3. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work in manner which prevents damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.

C. Welding: Comply with AWS recommendations to avoid discoloration; grind exposed welds smooth and restore mechanical finish.

D. Reinforcing: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator which will prevent corrosion.

E. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

F. Fasteners: Conceal fasteners wherever possible.

G. Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops; at other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.

1. Provide EPDM/vinyl blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.

2.6 STOREFRONT FRAMING SYSTEM

A. General: Provide inside-outside matched center glazed system with provisions for glass replacement. Shop-fabricate and preassemble frame components where possible.

2.7 ALUMINUM DOOR FRAMES

A. Fabricate tubular and channel frame assemblies, as indicated, with either welded or mechanical joints in accordance with manufacturer's standards, reinforced as necessary to support required loads.

2.8 STILE-AND-RAIL TYPE ALUMINUM DOORS

A. Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts, or fabricate with structurally welded joints, at manufacturer's option.

B. Design:

1. Provide doors equal to Model 500 by Kawneer, wide stile design with 8" high horizontal crossrail.

C. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of door stiles and rails. Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for non-removal.

2.9 FINISHES

A. Baked Enamel Finish: Premium color selection equal to Kawneer #22 Stock Permafluor Architectural Coating (Hylar 5000 or Kynar 500), factory applied and oven baked for a topcoat thickness of 1.0 - 1.3 mils.

1. Color to be selected by Architect after bid date from manufacturer standards

2. Color selections MUST include "White".

PART 3 - EXECUTION

3.1 PREPARATION

A. Field Measurement: Wherever possible, take field measurements prior to preparation of shop drawings and fabrication, to ensure proper fitting of work.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of aluminum entrances.

B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Anchor securely in place, separating aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.

C. Drill and tap frames and apply surface-mounted hardware items, complying with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

D. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealants, fillers, and gaskets.

E. Refer to "Glass and Glazing" section of Division 8 for installation of glass and spandrel panels indicated to be glazed into framing, and not preglazed by manufacturer.

3.3 ADJUST AND CLEAN:

A. Adjust operating hardware to function properly, without binding, and to prevent tight fit at contact points and weatherstripping.

B. Clean completed systems, inside and out, promptly after erection and installation of glass and sealants. Remove excess glazing and joint sealants, dirt, and other substances from aluminum surfaces.

C. Institute protective measures and other precautions required to assure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION

SECTION 08700 - FINISH HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. This Section includes the following:

1. Hinges.
2. Key control system.
3. Lock cylinders and keys.
4. Lock and latch sets.
5. Bolts.
6. Exit devices.
7. Push/pull units.
8. Closers.
9. Overhead holders.
10. Miscellaneous door control devices.
11. Door trim units.
12. Protection plates.
13. Weather-stripping for exterior doors.
14. Sound stripping for interior doors.
15. Astragals or meeting seals on pairs of doors.
16. Thresholds.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 8 Section "Standard Steel Doors and Frames" for silencers integral with hollow metal frames.
2. Division 8 Section "Flush Wood Doors" for factory pre-fitting and factory pre-machining of doors for door hardware.
3. Division 8 Section "Aluminum Entrances and Storefronts" for aluminum entrance door hardware, except cylinders.

1.3 HARDWARE ALLOWANCE

A. Allowance of $1,800.00 for Certified AHC (Architectural Hardware Consultant) – document of certification from DHI must be provided) to visit job site upon substantial completion as directed by Architect. A written report will be required for the Owner, Architect, and Contractor

1.4 QUALITY ASSURANCE

A. Door hardware supplier's responsibilities shall be as follows:

1. Submittals: Submit through Contractor required product data, final hardware schedule; separate keying schedule, and samples as specified in this Section, unless otherwise indicated.
2. **Hardware Review Meeting**: Hardware Supplier shall attend a scheduled “Hardware Review Meeting” with the Contractor, Owner and Architect representative. All Hardware products,

hardware installation locations, finishes, color selections, ratings and keying is to be reviewed and discussed. The Hardware Supplier understands the Hardware Submittal is not deemed "Fully Approved" until the Owner has completed their review and given "Approval".

3. Construction Schedule: Inform Contractor promptly of estimated times and dates that will be required to process submittals, to furnish templates, to deliver hardware, and to perform other work associated with furnishing door hardware for purposes of including this data in construction schedule. Comply with this schedule.

4. Coordination and Templates: Assist Contractor as required to coordinate hardware with other work in respect to both fabrication and installation. Furnish Contractor with templates and deliver hardware to proper locations.

5. Product Handling: Package, identify, deliver, and inventory door hardware specified in this Section.

6. Discrepancies: Based on requirements indicated in Contract Documents in effect at time of door hardware selection, furnish types, finishes, and quantities of door hardware, including fasteners, and Owner's maintenance tools required to comply with specified requirements and as needed to install and maintain hardware. Furnish or replace any items of door hardware resulting from shortages and incorrect items at no cost to the Owner or Contractor. Obtain signed receipts from Contractor for all delivered materials.

B. Contractor's responsibilities shall be as follows:

1. Submittals: Coordinate and process submittals for door hardware in same manner as submittals for other work.

2. **Hardware Review Meeting**: Contractor is to schedule and attend a "Hardware Review Meeting" with the Owner, Hardware Supplier and Architect Representative. All Hardware products, hardware installation locations, finishes, color selections, ratings and keying is to be reviewed and discussed. The Contractor understands the Hardware Submittal is not deemed "Fully Approved" until the Owner has completed their review and given "Approval".

3. Construction Schedule: Cooperate with door hardware supplier in establishing scheduled dates for submittals and delivery of templates and door hardware. Incorporate in construction schedule the times and dates related to furnishing hardware by door hardware supplier.

4. Coordination: Coordinate door hardware with other Work. Furnish hardware supplier or manufacturer with shop drawings of other work where required or requested. Verify completeness and suitability of hardware with supplier.

5. Product Handling: Provide secure lock-up for hardware delivered to the site. Inventory hardware jointly with representative of hardware supplier and issue signed receipts for all delivered materials.

6. Installation Information: The general types and approximate quantities of hardware required for this Project are indicated at the end of this Section in order to establish Contractor's costs for installation and other work not included in allowance.

7. No adjustments in Contract sum will be made for costs other than those covered by the allowances for subsequent increases or decreases in quantity of one or more hardware types that do not exceed 5 percent.

1.5 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.

B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Upon return of the reviewed finish hardware schedule, arrange for a meeting with the Owner and representatives of Architect. A keying schedule will be established and submitted to the Architect and Owner. After review, the keying schedule will be returned to representatives of Finish Hardware Supplier so that permanent cylinders and keys can be prepared on a timely basis.

1.6 QUALITY ASSURANCE

A. Substitutions: All substitution requests must be submitted before bidding and within the procedures and time frame as outlined in Division 1, General Requirements. Approval of products is at the discretion of the architect and his hardware consultant.

B. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.

C. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for a minimum of 10 years, for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced " Certified "architectural hardware consultant (AHC)" as recognized by the Door and hardware Institute (DHI). All submittals shall be signed by an AHC who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.

D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.

1.7 PRODUCT HANDLING

A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.8 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 HINGES:

A. MANUFACTURERES

1. Ives
2. Stanley
3. Bommer

B. MATERIAL:

1. Provide only template produced units, typically Ives 5BB1 series.
2. Provide Phillips flat-head or machine screws for installation of units, except furnish Phillips flat-head wood screws for installation of units into wood. Finish screw heads to match surface of hinges or pivots.
3. Hinge pins, except as noted, are to be provided as follows:
   a. Steel Hinges: Steel pins
   b. Non-ferrous Hinges: Stainless steel pins
   c. Exterior Doors: Use Non-Removable Pins
   d. Interior Doors: Non-rising pins
   e. Electric Hinges: Non-removable pins
4. Tips shall be flat button and matching plug, finished to match leaves.
5. Provide number of hinges indicated but not less than three (3) hinges for door leaf of 90” or less in height and one additional hinge for each 30” of additional height.
6. Provide ball bearing hinges of the type and weight suggested by the hinge manufacturer for each type of door application.

2.2 LOCK CYLINERS AND KEYING:

A. MANUFACTURERES

1. Match Existing

B. MATERIAL

1. Existing System: Grandmaster key the locks to the Owner’s existing grand master key system, with a new sub master key for the project. Cylinders shall be standard 6-pin or small/large format interchangeable core as required to integrate with the owner’s existing master key system. Match owner’s existing keyway. Key as directed by the owner.
2. Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster), either new or integrated into Owner’s existing system.
3. Provide temporary construction key system for use by the general contractor. At the completion of the project, the General Contractor shall void construction key system or remove all construction cores and install permanent cores.
4. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
5. Comply with Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
6. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, “DO NOT DUPLICATE”. Stamp all permanent cores in a concealed location with the assigned key set symbol.
7. Key Material: Provide keys of nickel silver only.

8. Key Quantity: Furnish (3) change keys for each lock, (5) master keys for each master system, (5) grandmaster keys for each grandmaster system, (12) construction master keys. (2) construction control keys.
    a. Furnish one extra blank for each lock.
    b. Furnish construction master keys to General Contractor.
    c. Deliver keys to Owner.

2.3 LOCKSETS AND LATCHSETS

A. MANUFACTURERES

1. Schlage L9000 Series, 17A design
2. Corbin ML2000 Series, PSA Design
3. Falcon MA Series, QG Design

B. MATERIAL

1. Locksets and latch-sets of all manufacturers must conform to the requirements of Sub paragraphs 2 and be approved by the Architect.
2. Mortise Lock Type
    a. Locksets and latch sets must conform to ANSI A156.2 Series 1000, Operational Grade 1, and be UL Listed.

2.4 EXIT DEVICES

A. MANUFACTURERES

1. Von Duprin 35A/98 Series
2. Sargent 19-43-GL-80 Series
3. Detex 10 Series

B. MATERIAL

1. All exit devices for non-fire rated doors, fire rated doors and ICC500 rated Tornado doors shall be of the same manufacturer and provided in same finish design as locksets.
2. Provide sex nuts and bolts for attachment of surface applied items to doors.
3. Devices shall be UL listed. Devices for fire rated openings shall bear factory installed UL markings that indicate approval for fire rated openings.
4. All exit devices shall be touch-bar type design.
5. All exit devices shall comply with ANSI A156.3, Grade 1.
6. Exit device lever trim shall be equal to Von Duprin break away vandal resistant #996L.
7. All exit devices shall be equipped with flush end caps.
8. All exit devices shall be equipped with guarded (deadlocking) latch bolts.
9. Security Indicators for “Keyed Cylinder Dogging” - Provide Von Duprin “CDSI”, dogging indicator provides an at-a-glance verification of the status of the door from inside of the room. Visible “LOCKED” and “UNLOCKED” indicators show whether the device is undogged or dogged.
10. Security Indicators for “-2SI-Classroom Exit Device Locking Lever Trim”. The “-2SI” Security Indicator provides an at-a-glance verification of the LOCKED/UNLOCKED status of the door from inside of the room. Facility staff to be able to lock/unlock outside exit device lever trim from classroom side of door, avoiding corridor exposure.
11. Outdoor Defense (“OUT” option) – Provide exit devices designed to safeguard against moisture, temperature variations, and corrosion in exterior applications. Product testing to include: Temperature Range: -31°F (-35°C) to 151°F (66°C), evaluated per UL294 Section 81 Variable Ambient Test, Evaluated per UL1034 Section 34.2 Variable Ambient Test. Moisture Resistance: Rain Tested at 4.8 gallons per minute, Per UL294 section 79, Per UL1034 section 53; Corrosion Resistance: Salt Fog Tested per UL294 Section 83.2 Salt Spray (5% salt concentration), UL1034 Section 52 Salt Spray Corrosion Test (20% salt concentration).
12. Plastic touch pads or plastic covered touch pads will not be accepted.

13. All exit devices and exit device strikes shall be installed using manufacturer's supplied fasteners. Substitution of manufacturer's fasteners will not be allowed.
14. ICC500 rated exit devices are to be compatible with the specified Tornado-Resistant Assemblies specified in specification Section 083490.

2.5 CLOSERS

A. MANUFACTURERES

1. LCN 4000 Series
2. Corbin DC8000 Series
3. Norton 9500 Series

B. MATERIAL

1. Size of units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather and anticipated frequency of use.
   a. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.
   b. Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units, ANSI opening force and delayed action closing.
2. Closers are to be fully hydraulic, rack and pinion action with high strength cast iron cylinders and one piece forged steel pistons. Closer Piston diameter shall be minimum 1½". Hydraulic regulation to be controlled by tamper-proof, non-critical screw values, adjustable with a hex by tamper-proof, non-critical screw valves, adjustable with a hex wrench. Separate adjustments for back check, general speed, and latch speed. Where detailed in the door hardware sets, provide delayed action feature to delay closing up to one minute for maximum opening to approximately 75. Back check shall be properly located for protection of the door, frame and applied hardware.
3. All door closers shall comply with ANSI A156.4 Grade 1 and meet the standards of ANSI A117.1 for barrier-free accessibility.
4. Provide closers with full metal covers.
5. Provide sex nuts and bolts for attachment of surface applied items to doors.

2.6 OVERHEAD STOPS AND HOLDERS

A. MANUFACTURERES

1. Glynn Johnson
2. Sargent
3. Rixson

B. MATERIAL

1. Conform to ANSI A156.8 Grade 1.

2.7 PUSH/PULLS & PROTECTION PLATES

A. MANUFACTURERES

1. Ives
2. Trimco
3. Burns

B. MATERIAL

1. Provide manufacturers standard exposed fasteners for installation, through bolted for matched pairs, but not of single units.
2. Provide 16 gauge minimum thickness for plates.

3. Where specified in the schedule, push/pulls shall have an antimicrobial coating.

2.8 THRESHOLDS, WEATHERSTRIPPING & GASKETING

A. MANUFACTURERES

1. Zero
2. National Guard
3. Pemko

B. MATERIAL

1. Provide continuous weather-stripping at each edge of every exterior door leaf, except as otherwise indicated.
2. Provide type, size and profile shown as scheduled.
3. Provide non-corrosive fasteners as recommended by manufacturer for application indicated. Do not specify adhesive backed weather-strip or gasket material.
4. Where replaceable seal strips are scheduled, provide only those units where resilient or flexible seal strip is easily replaceable from stocks maintained by manufacturer.
5. Proved standard metal threshold unit of type, size and profile shown as scheduled.

2.9 FINISHES

A. Hardware finishes shall conform to ANSI and shall be as listed below for aluminum, FRP, hollow metal and wood doors:
B. Finishes Table:

Butt Hinges	630, Satin Stainless Steel
Continuous Geared Aluminum Hinges	628 Clear Anodized Aluminum, except at aluminum storefront doors, provide custom anodized or custom Kynar paint finish as required to match the specified door finish.
Flush Bolts	626 Satin Chrome Plated
Locksets	626 Satin Chrome Plated
Exit Devices	US26D Satin Chrome Plated, with 630 touch pad
Door Closers	689 Powder Coat Aluminum
Push Plates	630 Satin Stainless Steel
Pull Plates	630 Satin Stainless Steel
Protective Plates	630 Satin Stainless Steel
Door Stops	626 Satin Chrome Plated
Overhead Holders	630 Satin Stainless Steel
Thresholds	628, clear anodized aluminum
Adhesive Backed Weather Seals	Dark Bronze or Black

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install each hardware item in compliance with manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted of finished in another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, reinstall each item.

1. Do not install surface mounted items until finishes have been completed on the substrate.

B. Conform to ANSI A117.1 for positioning requirements for the handicapped.

3.2 PROTECTION AND CLEANING

A. After installation, clean metal surfaces on both interior and exterior of all mortar, paint and other contaminants. After cleaning, protect work against damage.

3.3 FINAL ADJUSTMENT

A. Whenever hardware is installed more than one month prior to occupancy or acceptance, return during the week prior to acceptance or occupancy and make a final inspection and adjustment of all hardware items in such space or area.

3.4 SCHEDULE

HARDWARE SET: 01

DOOR NUMBER:
A105d

EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	PANIC HARDWARE	CDSI-98-NL-990NL-299-SNB	VON
2	CYLINDER/CORE	AS REQUIRED	
1	SURFACE CLOSER	4040XP SCUSH MC TBWMS	LCN
1	ARMOR PLATE	8400 34″ X 1 ½″ LDW B-CS	IVE
1	THRESHOLD (SOLID)	656A-V3-226	ZER
1	DOOR SWEEP	8198AA	ZER
1	GASKETING	8144S-BK	ZER
1	OVERHEAD DRIP CAP	142A (AS REQ'D)	ZER

HARDWARE SET: 02

DOOR NUMBER:
A105e

EACH TO HAVE:

2	CONT. HINGE	224XY	IVE
1	KEYED REMOVABLE MULLION	KR4954	VON
1	WALL MOUNT MULLION STORAGE KIT	MT54 SP28	VON
1	PANIC HARDWARE	CDSI-98-NL-99DT-299-SNB	VON
1	PANIC HARDWARE	CDSI-98-NL-990NL-299-SNB	VON
4	CYLINDER/CORE	AS REQUIRED	
2	SURFACE CLOSERS	4040XP SCUSH MC TBWMS	LCN
2	ARMOR PLATES	8400 34″ X 1 ½″ LDW B-CS	IVE
1	VIEWER	DS2000-AL (WWW.DOORSCOPES.COM)	DSC
1	THRESHOLD (SOLID)	656A-V3-226	ZER
2	DOOR SWEEP	8198AA	ZER
1	GASKETING	8144S-BK	ZER
1	OVERHEAD DRIP CAP	142A (AS REQ'D)	ZER

HARDWARE SET: 03

DOOR NUMBER:
A108a

EACH TO HAVE:

2	CONT. HINGE	224XY	IVE
1	KEYED REMOVABLE MULLION	KR4954	VON
1	WALL MOUNT MULLION STORAGE KIT	MT54 SP28	VON
1	PANIC HARDWARE	98-EO-990EO-299-SNB	VON
1	PANIC HARDWARE	98-NL-990NL-299-SNB	VON
2	CYLINDER/CORE	AS REQUIRED	
2	SURFACE CLOSER	4040XP SCUSH MC TBWMS	LCN
1	THRESHOLD (SOLID)	65A	ZER
2	DOOR SWEEP	8198AA	ZER
1	GASKETING	8144S-BK	ZER
1	OVERHEAD DRIP CAP	142A (AS REQ'D)	ZER

HARDWARE SET: 04

DOOR NUMBER:
A108c

EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	STOREROOM LOCK	L9480L	SCH
1	CYLINDER/CORE	AS REQUIRED	
1	SURFACE CLOSER	4040XP CUSH MC TBWMS	LCN
1	GASKETING	8144S-BK	ZER
1	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A	ZER

HARDWARE SET: 05

DOOR NUMBER:
A104 A106

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	CLASSROOM LOCK	L9070L	SCH
1	CYLINDER/CORE	AS REQUIRED	
1	MOP PLATE	8400 6″ X 2″ LDW B-CS	IVE
1	MOP PLATE	8400 6″ X 1″ LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE
3	SILENCERS	SR64	IVE

HARDWARE SET: 06

DOOR NUMBER:
A112

EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	CLASSROOM LOCK	L9070L	SCH
1	CYLINDER/CORE	AS REQUIRED	
1	SURFACE CLOSER	4040XP EDA MC TBWMS	LCN
1	ARMOR PLATE	8400 36″ X 1 ½″ LDW B-CS	IVE
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	CONCEALED OH STOP	100S	GLY
3	SILENCERS	SR64	IVE

HARDWARE SET: 07

DOOR NUMBER:
A102 A108b

EACH TO HAVE:

6	HINGE	5BB1 4.5 X 4.5	IVE
2	FLUSH BOLTS	458-12	IVE
1	DUST PROOF STRIKE	DP2	IVE
1	CLASSROOM LOCK	L9070L	SCH
1	CYLINDER/CORE	AS REQUIRED	
2	MOP PLATE	8400 6″ X 2″ LDW B-CS	IVE
2	MOP PLATE	8400 6″ X 1″ LDW B-CS	IVE
2	SURFACE OVERHEAD STOPS	90S SNB	GLY
2	SILENCERS	SR64	IVE

HARDWARE SET: 08

DOOR NUMBER:
A107

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	OFFICE LOCKSET	L9050L	SCH
1	CYLINDER/CORE	AS REQUIRED	
1	KICK PLATE	8400 8″ X 2″ LDW B-CS	IVE
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: 09

DOOR NUMBER:
A105a A105c

EACH TO HAVE:

3	HINGE	5BB1HW 5 X 4.5	IVE
1	DEADBOLT	L460L	SCH
1	CYLINDER/CORE	AS REQUIRED	
1	PUSH/PULL PLATE	1820 3.5″ X 16.5″ (TRIMCO)	TRI
1	PULL PLATE	8303 8" 4" X 16"	IVE
1	SURFACE CLOSER	4040XP EDA MC TBWMS	LCN
1	ARMOR PLATE	8400 36″ X 1 ½″ LDW B-CS	IVE
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	CONCEALED OH STOP	100S	GLY

HARDWARE SET: 10 (DOUBLE ACTING, CENTER HUNG, RADIUS EDGE WOOD DOOR)

DOOR NUMBER:
A105b

EACH TO HAVE:

2	CENTER PIVOT SETS	7255	IVE
1	FLUSH BOLT (TOP)	458-12	IVE
1	DEADBOLT	L460L	SCH
1	CYLINDER/CORE	AS REQUIRED	
2	PUSH/PULL PLATES	1820 3.5″ X 16.5″ (TRIMCO)	TRI
2	CONCEALED CLOSERS WITH BUMPER TRACK STOP	6030B	LCN
2	ARMOR PLATES	8400 36″ X 1 ½″ LDW B-CS	IVE

HARDWARE SET: 11

DOOR NUMBER:
A113 A115

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5	IVE
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	OH STOP	90S	GLY
1	SURFACE CLOSER	4040XP RW/PA MC TBWMS	LCN
1	KICK PLATE	8400 8″ X 2″ LDW B-CS	IVE
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE

HARDWARE SET: 12

DOOR NUMBER:
A105g A105h A105i A105j A105f

ALL HARDWARE PROVIDED BY DOOR SUPPLIER/MFG

HARDWARE SET: 13

DOOR NUMBER:
A103c A111

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5	IVE
1	PRIVACY W/DEADBOLT	L9440 L583-363 OS-OCC	SCH
1	SURFACE CLOSER	4040XP SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 8″ X 2″ LDW B-CS	IVE
1	MOP PLATE	8400 6″ X 1″ LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: 14

DOOR NUMBER:
A103b

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 622	IVE
1	ENTRY LOCKSET	L9456L IS-LOC 622 BLACK X 626	SCH
1	CYLINDER/CORE	AS REQUIRED	
1	SURFACE CLOSER	4040XP SCUSH MC TBWMS 622	LCN
1	KICK PLATE	8400 8″ X 2″ LDW B-CS	IVE
3	SILENCERS	SR64	IVE

HARDWARE SET: 15

DOOR NUMBER:
A101c

EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	PANIC HARDWARE	CDSI-98-NL-990NL-299-SNB	VON
2	CYLINDER/CORE	AS REQUIRED	
1	SURFACE CLOSER	4040XP EDA MC TBWMS (TEMPLATE FOR 180 DEGREE SWING SO DOOR CAN MAKE CONTACT W/ WALL MOUNT DR HOLDER)	LCN
1	KICK PLATE	8400 8″ X 1 ½″ LDW B-CS	IVE
1	MOP PLATE	8400 6″ X 1″ LDW B-CS	IVE
1	WALL STOP/HOLDER	FS495	IVE
3	SILENCERS	SR64	IVE

HARDWARE SET: 16

DOOR NUMBER:
EXTERIOR
GATE (PAIR)

EACH TO HAVE:

8	SELF CLOSING HINGES	PROVIDED BY GATE MFG/SUPPLIER	
1	CENTER MULLION	PROVIDED BY GATE MFG/SUPPLIER	
1	PANIC HARDWARE	OUT-CD-35A-EO-WH299-SNB	VON
1	PANIC HARDWARE	OUT-CD-35A-NL-OP-388-WH-299-SNB	VON
3	CYLINDER/CORE	AS REQUIRED	
2	STRAIGHT PULLS	8103EZHD-0	IVE

HARDWARE SET: AL-01

DOOR NUMBER:
A101a A101d A114

EACH TO HAVE:

2	CONT. HINGE	112XY	IVE
1	REMOVABLE MULLION	KR4954 STAB	VON
1	PANIC HARDWARE	CDSI-35A-EO-299	VON
1	PANIC HARDWARE	CDSI-35A-NL-OP-299	VON
3	SFIC MORTISE CYL.	80-132	SCH
1	SFIC RIM CYLINDER	80-159	SCH
4	CYLINDER/CORE	AS REQUIRED	
2	SPECIAL OFFSET PULLS	8190EZHD-18-O MOUNT	IVE
2	OH STOP	100S	GLY
2	SURFACE CLOSER	4021 TBWMS	LCN
2	MOUNTING PLATE	4020-18G	LCN
1	MULLION SEAL	139N	ZER
1	THRESHOLD	65A	ZER
1	WEATHER SEALS	PROVIDED BY FRAME/DOOR SUPPLIER	

COORDINATE HARDWARE WITH ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.
BALANCE OF HARDWARE BY ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.

HARDWARE SET: AL-02

DOOR NUMBER:
A101b

EACH TO HAVE:

2	CONT. HINGE	112XY	IVE
1	REMOVABLE MULLION	KR4954 STAB	VON
1	PANIC HARDWARE	CDSI-35A-EO-299	VON
1	PANIC HARDWARE	CDSI-35A-NL-OP-299	VON
3	SFIC MORTISE CYL.	80-132	SCH
1	SFIC RIM CYLINDER	80-159	SCH
4	CYLINDER/CORE	AS REQUIRED	
2	SPECIAL OFFSET PULLS	8190EZHD-18-O MOUNT	IVE
2	OH STOP	100S	GLY
2	SURFACE CLOSER	4021 TBWMS	LCN
2	MOUNTING PLATE	4020-18G	LCN
1	MULLION SEAL	139N	ZER
1	WEATHER SEALS	PROVIDED BY FRAME/DOOR SUPPLIER	

COORDINATE HARDWARE WITH ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.
BALANCE OF HARDWARE BY ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.

END OF SECTION

SECTION 08800 – GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glass for windows
2. Glass for doors
3. Glass for interior borrowed lites
4. Glass for storefront framing.
5. Glazing sealants and accessories.

1.2 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass as defined in referenced glazing publications.

B. Glass Fabricators: Firms that produce the fabricated glass products. Fabrication processes include cutting, heat processing, insulating, spandrel, laminating and other as fabrication activities defined in referenced glazing publications.

1.3 REFERANCE STANDARDS

A. American Society of Test and Material (ASTM)

1. ASTM C1036: Standard Specification for Flat Glass
2. ASTM C1048: Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass
3. ASTM C1172: Standard Specification for Laminated Architectural Flat Glass
4. ASTM C1376: Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.
5. ASTM E119: Standard Test Methods for Fire Tests of Building Construction and Materials
6. ASTM E1886: Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
7. ASTM E1996: Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
8. ASTM E 2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation

B. American National Standards Institute (ANSI)

1. ANSI z97.1: For Safety Glazing Materials Used In Buildings - Safety Performance Specifications And Methods Of Test

C. Consumer Products Safety Commission

1. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials

D. International Code Council

1. ICC 500: ICC/NSSA Standard for the Design and Construction of Storm Shelters

E. Underwriters Laboratory (UL)

1. UL 263: Standard for Fire Tests of Building Construction and Material
2. UL 9: Standard for Fire test of Window Assemblies
3. UL 10B: Standard for Fire Tests of Door Assemblies

4. UL 10C: Standard for Positive Pressure Fire Tests of Door Assemblies

F. National Fire Protection Association (NFPA)

1. NFPA 80: Standard for Fire Doors and Other Opening Protectives
2. NFPA 257: Standard on Fire Test for Window and Glass Block Assemblies
3. NFPA 252: Standard Methods of Fire Test of Door Assemblies

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product provide performance characteristics, certificates of compliance, installation instructions, and cleaning and maintenance instructions.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12” x 12” inches (300 mm) square. For each type of sealant/gasket exposed to view; 12” length sample. Install sealant/gasket sample between two strips of materials representative of adjoining framing system in color.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Preconstruction adhesion and compatibility test report.

1.7 QUALITY ASSURANCE

A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

B. Single Source Responsibility: Provide materials obtained from one source for each type of glass and glazing product indicated

1.8 PRECONSTRUCTION TESTING

Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials form effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

1.10 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes. Install glazing sealants only when temperatures are in middle third of manufacturer's recommended installation temperature range.

1.11 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Five (5) years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Approved Manufacturers: Subject to compliance with requirements, provide AGC Glass North America, Inc or approved equal product by one of the following:

1. Vitro Architectural Glass (Basis of Design)
2. Guardian Glass.

B. Approved Fabricators: Subject to compliance with requirements

1. American Insulated Glass
2. OldCastle Building Envelope
3. Trulite Glass and Aluminum Solutions
4. Tristar Glass

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer to design glazing. A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the 2021 International Building Code and ASTM E 1300.

1. Design Wind Pressures: As indicated on Drawings.
2. Design Snow Loads: As indicated on Drawings.

C. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 7.3 computer program, expressed as Btu/sq. ft. x h x deg F.

2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBNL's WINDOW 7.3 computer program.

3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: “Laminated Glazing Reference Manual", "Glazing Manual", and “Sealant Manual”.

2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."

3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."

4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

F. Heat-Treated Float Glass: Where heat treated float glass is required or indicated provide glass in accordance to ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2. For uncoated glass, comply with requirements for Condition A.

3. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

B. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.

Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

D. Sputtered Coated Low-Emissivity Clear Vision Glass, ASTM C 1376, Kind CV (coated vision glass), coated by sputtered process, ASTM C 1036, Type I, Class I (clear) or Class 2 (tinted) as indicated, Quality-Q3.

E. Pyrolytic Coated Low-Emissivity Clear Vision Glass, ASTM C 1376, Kind CO (coated overhead glass), coated by pyrolytic process, ASTM C 1036, Type I, Class I (clear) or Class 2 as indicated, Quality-Q3.

F. Ceramic-Coated Vision Glass: ASTM C 1048, Condition C, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in GANA's "Engineering Standards Manual."

G. Reflective-Coated Vision Glass: ASTM C 1376.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seals.

a. Primary Seal: Polyisobutylene

b. Secondary Seal: Two-part Silicone

2. Spacer: Manufacturer's standard spacer material and construction

a. Color: As select by architect from fabricators full range of colors

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Corning Corporation.

b. GE Construction Sealants; Momentive Performance Materials Inc.

c. May National Associates, Inc.; a subsidiary of Sika Corporation.

d. Pecora Corporation.

e. Sika Corporation.

f. Tremco Incorporated.

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corporation-Construction Systems.

b. Dow Corning Corporation.

c. GE Construction Sealants; Momentive Performance Materials Inc.

d. May National Associates, Inc.; a subsidiary of Sika Corporation.

e. Pecora Corporation.

f. Polymeric Systems, Inc.

g. Sika Corporation.

h. Tremco Incorporated.

D. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bostik, Inc.

b. Dow Corning Corporation.

c. GE Construction Sealants; Momentive Performance Materials Inc.

d. May National Associates, Inc.; a subsidiary of Sika Corporation.

e. Polymeric Systems, Inc.

f. Schnee-Morehead, Inc., an ITW company.

g. Sika Corporation.

h. Tremco Incorporated.

E. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corporation-Construction Systems.

b. Bostik, Inc.

c. Dow Corning Corporation.

d. GE Construction Sealants; Momentive Performance Materials Inc.

e. May National Associates, Inc.; a subsidiary of Sika Corporation.

f. Pecora Corporation.

g. Polymeric Systems, Inc.

h. Schnee-Morehead, Inc., an ITW company.

i. Sika Corporation.

j. Tremco Incorporated.

F. Glazing Compounds for Fire-rated Glazing Materials

1. Glazing Compound: DAP 33 putty

2. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S;

3. Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:

a. Dow Corning 795 - Dow Corning Corp.

b. Silglaze-II 2800 - General Electric Co.

c. Spectrem 2 - Tremco Inc

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

C. Fire-rated Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Non-Fire Rated Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

C. Fire-rated Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Apply heel bead of elastomeric sealant where indicated.

F. Center glass lites in openings on setting block and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape where indicated.

3.3 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

B. Remove and replace glass that is damaged during construction period.

C. Wash glass on both faces not more than 4 days prior to date scheduled for inspection intended to establish date of substantial completion in each area of the project. Wash glass with methods as recommended by glass manufacturer.

3.6 INSULATING GLASS SCHEDULE

A. Glass Type [**IG-3**]: **Solarban 70** Tinted Low-E insulating glass.

1. Basis-of-Design Product: Vitro Architectural Glass.
2. Overall Unit Thickness: 1 inch (25 mm).
3. Minimum Thickness of Each Glass Lite: 6 mm.
4. Outdoor Lite: Tinted fully tempered float glass.
5. Tint Color: Pure Grey, Bronze or Forest Green.
   a. Color to be selected by Architect after Bid Date.
6. Interspace Content: Air.
7. Indoor Lite: Clear fully tempered float glass.
8. Low-E Coating: Sputtered on second surface
9. Winter Nighttime U-Factor: .29 maximum.
10. Summer Daytime U-Factor: .27 maximum.
11. Visible Light Transmittance:
    a. Pure Grey -36 percent minimum.
    b. Bronze -39 percent minimum.
    c. Forest Green -48 percent minimum.
12. Solar Heat Gain Coefficient:
    a. Pure Grey -.25 maximum.
    b. Bronze -.25 maximum.
    c. Forest Green -.25 maximum.
13. Safety glazing required.

END OF SECTION

SECTION 09250 - GYPSUM DRYWALL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Types of work include:

1. Gypsum drywall at walls and ceilings.

2. Drywall finishing (joint tape-and-compound treatment).

1.3 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where gypsum drywall systems with fire- resistance ratings are indicated, provide materials and installations which are identical with those of applicable assemblies tested per ASTM E 119 by fire testing laboratories acceptable to authorities having jurisdiction.

1. Provide fire-resistance rated assemblies identical to those indicated by reference to GA File No.'s. in GA "Fire Resistance Design Manual" (latest edition) or UL fire resistance listings or in listing of other testing and agencies acceptable to authorities having jurisdiction.

B. Gypsum Board Terminology Standard: GA-505 by Gypsum Association.

C. Single-Source Responsibility: Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications and installation instructions for each gypsum drywall component, including other data as may be required to show compliance with these specifications.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

B. Store material inside under cover and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.

C. Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal corner beads and trim from being bent or damaged.

1.6 PROJECT CONDITIONS

A. Environmental Requirements, General: Comply with requirements of referenced gypsum board application standards and recommendations of gypsum board manufacturer, for environmental conditions before, during and after application of gypsum board.

B. Cold Weather Protection: When ambient outdoor temperatures are below 55 degrees F maintain continuous, uniform, comfortable building working temperatures of not less than 55 degrees F for a minimum period of 48 hours prior to, during and following application of gypsum board and joint treatment materials or bonding of adhesives.

C. Ventilation: Ventilate building spaces as required to remove water in excess of that required for drying of joint treatment material immediately after its application. Avoid drafts during dry, hot weather to prevent too rapid drying.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Gypsum Board and Related Products:

a. Georgia-Pacific Corp.

b. Gold Bond Building Products Div., National Gypsum Co.

c. United States Gypsum Co.

d. CertainTeed Corporation

e. Lafarge North America

B. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 MATERIALS

A. Gypsum Wallboard: ASTM C1396/C1396M, of types, edge configuration and thickness indicated below; in maximum lengths available to minimize end-to-end butt joints.

1. Provide Type “X” fire-resistant at all locations unless otherwise where identified by a UL Listing or Classification or as denoted on the drawings.

2. Provide Type “MR” moisture resistant gypsum board complying with ASTM C1396 where gypsum board is shown at all wet areas (Restrooms, etc.) install 5/8” moisture resistant gypsum board at all wet walls where plumbing fixtures are shown.

3. Thickness: 5/8" unless otherwise indicated.

4. Edges: Manufacturer's standard.

2.3 TRIM ACCESSORIES

A. General: Provide manufacturer's standard trim accessories of types indicated for drywall work, formed of galvanized steel unless otherwise indicated, with either knurled and perforated or expanded flanges for nailing or stapling, and beaded for concealment of flanges in joint compound. Provide corner beads, L-type edge trim-beads, U-type edge trim-beads, special L-kerf-type edge trim-beads, and one-piece control joint beads.

B. Non-Beaded Trim: Non-beaded trim shall not be used, except with specific approval by the Architect.

2.4 JOINT TREATMENT MATERIALS

A. General: ASTM C 475; type recommended by the manufacturer for the application indicated, except as otherwise indicated.

B. Joint Tape: Paper reinforcing tape.

C. Joint Compound: Ready-mixed vinyl-type for interior use.

1. Grade: A single multi-purpose grade, for entire application.

2.5 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum drywall work of the type and grade recommended by the manufacturer of the gypsum board.

B. Gypsum Board Screws: Comply with ASTM C 646.

C. Gypsum Board Nails: Comply with ASTM C 514.

D. Concealed Acoustical Sealant: Nondrying, nonhardening, nonskinning, nonstaining, nonbleeding, gunnable sealant for concealed applications per ASTM C 919.

E. Exposed Acoustical Sealant: Nonoxidizing, skinnable, paintable, gunnable sealant for exposed applications per ASTM C 919.

F. Water-Resistant Adhesive: Type I organic adhesive for ceramic tile complying with ANSI A136.1.

PART 3 - EXECUTION

3.1 GENERAL GYPSUM BOARD INSTALLATION REQUIREMENTS

A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA 216.

B. Locate exposed end-butt joints as far from center of walls possible, and stagger not less than 1'-0" in alternate courses of board.

C. Install wall/partition boards vertically to avoid end-butt joints wherever possible.

D. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16" open space between boards. Do not force into place.

E. Locate all edge and end joints over supports. Stagger vertical joints over different studs on opposite sides of partitions.

F. Attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.

G. Form control joints and expansion joints with space between edges of boards, prepared to receive trim accessories.

H. Cover both faces of stud framing with gypsum board in concealed spaces (above ceilings, etc.), except in chase walls which are braced internally.

1. Except where concealed application is required for sound, fire, air or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. area and may be limited to not less than 75% of full coverage.

I. Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4" to 1/2" space and trim edge with J-type semi-finishing edge trim. Seal joints with acoustical sealant.

J. Space fasteners in gypsum boards in accordance with referenced standards and manufacturer's recommendations, except as otherwise indicated.

3.2 METHODS OF GYPSUM DRYWALL APPLICATION

A. Single-Layer Application: Install gypsum wallboard.

B. On partitions/walls apply gypsum board vertically unless otherwise indicated and provide sheet lengths which will minimize end joints.

3.3 INSTALLATION OF DRYWALL TRIM ACCESSORIES

A. General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges by nailing or stapling in accordance with manufacturer's instructions and recommendations.

B. Install metal corner beads at external corners of drywall work.

C. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed, and except where plastic trim is indicated. Provide type with face flange to receive joint compound except where semi-finishing type is indicated. Install L-type trim where work is tightly abutted to other work and install special kerf-type where other work is kerfed to receive long leg of L-type trim. Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).

D. Install semi-finishing trim where indicated, and where exterior gypsum board edges are not covered by applied moldings or indicated to receive trim with face flanges covered with joint compound.

E. Control Joint Spacing: Provide horizontal and/or vertical control joints at a maximum spacing of 24'-0" o.c., unless otherwise indicated on the drawings or directed by the Architect. For panels exceeding 24'-0" in any direction, provide at least one control joint.

F. Intermediate Control Joints: Where a wall, furring, or panel dimension exceeds 24'-0" but does

not exceed 48'-0", install a control joint at the midpoint of that dimension.

G. Install H-molding in exterior gypsum drywall work where control joints are indicated.

3.4 FINISHING OF DRYWALL

A. General: Apply treatment at gypsum board joints (both directions), flanges of trim accessories, penetrations, fastener heads, surface defects and elsewhere as required to prepare work for decoration. Prefill open joints and rounded or beveled edges, if any, using type of compound recommended by manufacturer.

1. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.
2. Apply joint compound in 3 coats (not including prefill of openings in base), and sand between last 2 coats and after last coat.
3. Tape and finish gypsum board in accordance with ASTM C 840, GA 214 and GA 216.
4. Provide joint, fastener depression, and corner treatment. Do not use fiber glass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only. Provide treatment for water-resistant gypsum board as recommended by the gypsum board manufacturer.
5. Where gypsum surfaces are to be finished to Level 5 in accordance with GA 214, apply a thin skim coat of joint compound to the entire gypsum board surface, after the two-coat joint and fastener treatment is complete and dry.
6. **All Exposed gypsum board surfaces** shall be finished to a minimum **Level 4** in accordance with GA 214.
7. Plenum areas above ceilings shall be finished to **Level 1** in accordance with GA 214.
8. Water resistant gypsum backing board, ASTM C 1396, to receive ceramic tile shall be finished to **Level 2** in accordance with GA 214.
9. Walls and ceilings to receive a heavy-grade wall covering or heave textured finish before painting shall be finished to **Level 3** in accordance with GA 214.

B. Partial Finishing: Omit third coat and sanding on concealed drywall work which is indicated for drywall finishing or which requires finishing to achieve fire-resistance rating, sound rating or to act as air or smoke barrier.

C. Refer to section on painting in Division 9 for decorative finishes to be applied to drywall work.

3.5 PROTECTION OF WORK

A. Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures gypsum drywall work being without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 09301 - PORCELAIN TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Definition: Tile includes ceramic surfacing units made from clay or other ceramic materials.

B. Extent of tile work is indicated on drawings and schedules.

C. Types of tile work in this section include the following:

1. Wall Tile.
2. Floor Tile.
3. Wainscot Accent Tile.
4. Wainscot Tile Cap.
5. Base.
6. Stone Thresholds.

D. Portland cement plaster scratch coat on wall surfaces indicated to receive tile is work of this section.

E. Sealing expansion and other joints in tile work with elastomeric joint sealers is work of this section.

1.3 QUALITY ASSURANCE

A. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.

B. Mock-Up: Contractor shall provide mock-up panels for evaluation of materials, surface preparation techniques and application workmanship.

1. Mock-up panel shall be no less than 4’-0” x 4’-0” panel as follows:
   a. One (1) panel per room, per surface. (i.e. 1 panel for wall surface and 1 panel for floor surface for each room of different selection).
   b. Mock-up panels shall be marked identifying room location and product manufacturer, type, style, size and color information.
   c. Do not proceed with work until materials, workmanship, color, and sheen are approved by Architect.
   d. Provide additional mock-up panels as required to produce acceptable work.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical information and installation instructions for materials required, except bulk materials.

B. Samples for Selection Purposes: Submit manufacturer's color charts consisting of actual tiles

or sections of tile showing full range of colors, textures and patterns available for each type of tile indicated. Include samples of grout and accessories involving color selection.

1.5 PRODUCT HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter or other causes.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.

C. Maintain temperatures at not less than 50 degrees F in tiled areas during installation and for 7 days after completion, unless higher temperatures required by referenced installation standard or manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Porcelain Tile:

a. StonePeak (Basis of Design)

b. American Olean Tile Co.

c. Marazzi

B. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 PRODUCTS, GENERAL

A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types and grades of tile indicated.

1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.

B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with installation products and materials indicated.

C. Colors, Textures and Patterns: For tile and other products requiring selection of colors, surface textures or other appearance characteristics, provide products to match characteristics indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standards.

1. Provide tile trim and accessories which match color and finish of adjoining flat tile.

D. Mounting: Where factory-mounted tile is required provide back- or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.

1. Where tile is indicated for installation on exteriors or in wet areas, do not use back or edge-mounted tile assemblies unless tile manufacturer specifies that this type of mounting is suitable for these kinds of use and has been successfully used on other projects.

2.3 TILE PRODUCTS

A. Provide tile complying with the following requirements:

1. Manufacturer/Series:

a. StonePeak “Simply Modern” Collection.

2. Type:

a. Porcelain

3. Wearing Surface for Floors:

a. "stable, firm and slip resistant", (exceeds 0.60 on the ASTM C-1028 test, wet and dry).

4. Nominal Thickness:

a. 3/8"

5. Nominal Facial Dimensions as follows:
    a. Floor Tile
        1. **12" x 24" Floor Tile** - "Simply Modern" Series, Unglazed, with 1/4" grout joints.
    b. Wall Tile
        1. **12" x 24" Wall Tile** – "Simply Modern" Series, Unglazed, with 1/4" grout joints.
        2. **4" x 12" "Adamas" Series Wall Tile Accent Band – 3 layers high located 6'-0" AFF.** Glazed, with 1/8" grout joints.
    c. Base:
        1. **6" x 12" Coved Base** – "Schluter Dilex" Series.
    d. Wainscot Cap:
        1. **3" x 12" Bullnose** – "Simply Modern" Series.
6. Face: Plain with cushion edges.

B. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:
1. Size:
    a. As indicated, coordinated with sizes and coursing of adjoining flat tile, where applicable.
2. Shapes:
    a. Selected from manufacturer's standard shapes.
3. External Corners for Portland Cement Mortar Installations:
    a. Bullnose shape with a radius of not less than 3/4" unless otherwise indicated.
4. Internal Corners:
    a. Field-butted square corners, except use internal cove and cap angle pieces designed to member with stretcher shapes.

2.4 STONE THRESHOLDS

A. General: Provide stone which is uniform in color and finish, fabricated to sizes and profiles indicated or required to provide transition between tile surfaces and adjoining finished floor surfaces.

B. Marble Thresholds: Provide marble thresholds complying with ASTM C 503 requirements for exterior use and abrasion resistant for uses subject to heavy foot traffic.
1. Provide white, bonded marble complying with MIA Group "A" requirements for soundness.

2.5 SETTING MATERIALS

A. Portland Cement Mortar Installation Materials: Provide materials to comply with ANSI A108.1 as required for installation method designated, unless otherwise indicated.

2.6 GROUTING MATERIALS – FLOOR & WALL

A. High Performance Epoxy grout that offers color uniformity, durability and stain resistance with extraordinary ease of use.
1. Laticrete "Spectralock Pro Grout".
2. Color to be selected by architect after the bid date from manufacturer standards

B. Epoxy grout is to be installed per manufacturer's instructions.

2.7 MISCELLANEOUS MATERIALS

A. Single-Component Sealants: ASTM C 920, Type S, Grade NS, use NT (for use in joints in non-traffic areas).

B. Two-Component Sealants: ASTM C 920, Type M, Grade P, Class 25, use T (for use in joints subject to pedestrian traffic).

C. Tile Cleaner: Product specifically acceptable to manufacturer of tile and grout manufacturer for application indicated and as recommended by National Tile Promotion Federation, 112 North Alfred St., Alexanderia, VA 22134 or Ceramic Tile Institute, 700 N. Virgil Ave., Los Angeles, CA 90029.

2.8 TILE BACKING PANELS

A. Fiber-Cement Backer Board: ASTM C1288, in maximum lengths available to minimize end-to-end butt joints.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation.

b. Custom Building Products.

c. James Hardie Building Products, Inc.

2. Thickness: 1/2 inch (12.7 mm) unless otherwise indicated on drawings.

B. Install panels and treat joints in accordance with ANSI A108.11, APA guidelines, and manufacturer's written instructions for type of application indicated

2.9 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch (0.2-mm) nominal thickness.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Schluter Systems L.P.

b. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

C. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

1. Allow waterproof membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine surfaces to receive tile work and conditions under which tile will be installed. Do not proceed with tile work until surfaces and conditions comply with requirements indicated in referenced tile installation standard.

3.2 PRE-INSTALLATION CONFERENCE

A. A pre-installation conference is required before any tiling materials are installed. This conference shall be conducted by a representative of the Architect and attended by the General Contractor and Tile Contractor. Provide at least 72 hours advance notice to participants prior to convening pre-installation conference.

B. The pre-installation conference is intended to clarify demolition and application requirements for work to be completed before tiling operations can begin. This would include a detailed review of the specifications, plans, finish schedules and approved shop drawings, submittal data, samples and mock-ups. If this pre-installation conference cannot be satisfactorily concluded without further inspection and investigation by any of the parties present, it shall be reconvened at the earliest possible time to avoid delay of the work. In no case should the work proceed without inspection of all tiling areas and substantial agreement on all requirements.

C. The following are to be accomplished during the conference:

1. To review all requirements listed in the specifications and resolve any questions or conflicts that may arise.
2. To establish trade-related job schedules.
3. To establish tiling schedule and work methods that will prevent progress of other trades.
4. Require that all surface preparations and conditions be complete prior to installing tile work.
5. To establish those areas on the job site that will be designated as work and storage areas for tiling operations.
6. To establish acceptable methods of protecting the finished tile surfaces if any trades must travel across or work on, above or around any areas of the finished tile work.

D. The Architect shall prepare a written report indicating actions taken and decisions made at this pre-installation conference. This report shall be made a part of the project record and copies furnished to the General Contractor and the Owner.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: Comply with applicable parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile".

B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated or, if not otherwise indicated, as applicable to installation conditions shown.

C. Setting beds:

1. Floor tile: Thinset.
2. Wall tile: Thinset.

D. Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.

E. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures and other penetrations so that plates, collars, or covers overlap tile.

F. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise shown.

1. For tile mounted in sheets make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.

G. Lay out tile wainscots to next full tile beyond dimensions indicated.

H. Expansion Joints: Locate expansion joints and other sealant filled joints, including control, contraction and isolation joints, where indicated, or if not indicated, at spacing and locations recommended in TCA "Handbook for Ceramic Tile Installation", and approved by Architect.

1. Prepare joints and apply sealants to comply with requirements of referenced standards and sealant manufacturer.

I. Grout tile to comply with referenced installation standards, using grout materials indicated.

3.4 FLOOR INSTALLATION METHODS

A. Porcelain Tile: Install tile to comply with requirements indicated below for setting bed methods, TCA installation methods related to types of subfloor construction, and grout types:

1. Concrete Subfloors, Interior: TCA F113 with isolation membrane equal to Nobleseal CIS.

B. Grout:

1. High Performance Epoxy grout is to be installed per manufacturer's instructions.

C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile unless otherwise indicated.

D. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood or other flooring which finishes flush with top of tile.

3.5 WALL TILE INSTALLATION METHODS

A. Install types of tile designated for wall application to comply with requirements indicated below for setting bed methods, TCA installation methods related to subsurface wall conditions, and grout types:

1. Solid Backing, Interior: TCA W221 in wet areas and W213 or W223 25

a. applicable in other areas.

B. Grout:

1. High Performance Epoxy grout is to be installed per manufacturer's instructions.

3.6 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Unglazed tile shall be cleaned with non-acid solutions only recommended by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of tile cleaning. Flush surface with clean water after cleaning.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work.

C. Protection: When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage and wear.

D. Prohibit foot and wheel traffic from using tiled floors for at least 7 days after grouting is completed. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.7 EXTRA STOCK

A. Deliver stock of maintenance materials to Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.

1. Tile Flooring: Furnish not less than one box for each type, color, pattern and size installed.

END OF SECTION

SECTION 09302 – CERAMIC TILE

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

DESCRIPTION OF WORK:

Definition: Tile includes ceramic surfacing units made from clay or other ceramic materials.

Extent of tile work is indicated on drawings and schedules.

Types of tile work in this section include the following:

1. Porcelain Ceramic Floor Tile (Unglazed).
2. Glazed Ceramic Wall and Base Tile.
3. Stone thresholds.

Portland cement plaster scratch coat on wall surfaces indicated to receive tile is work of this section.

Sealing expansion and other joints in tile work with elastomeric joint sealers is work of this section.

QUALITY ASSURANCE:

Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.

Mock-Up: Contractor shall provide mock-up panels for evaluation of materials, surface preparation techniques and application workmanship.

A. Mock-up panel shall be no less than 4’-0” x 4’-0” panel as follows:

    1. One (1) panel per room, per surface. (i.e. 1 panel for wall surface and 1 panel for floor surface for each room of different selection).
    2. Mock-up panels shall be marked identifying room location and product manufacturer, type, style, size and color information.
    3. Do not proceed with work until materials, workmanship, color, and sheen are approved by Architect.
    4. Provide additional mock-up panels as required to produce acceptable work.

SUBMITTALS:

Product Data: Submit manufacturer's technical information and installation instructions for materials required, except bulk materials.

Samples for Selection Purposes: Submit manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures and patterns available for each type of tile indicated. Include samples of grout and accessories involving color selection.

PRODUCT HANDLING:

Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter or other causes.

PROJECT CONDITIONS:
Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.

Maintain temperatures at not less than 50 degrees F in tiled areas during installation and for 7 days after completion, unless higher temperatures required by referenced installation standard or manufacturer's instructions.

PART 2 - PRODUCTS

Manufacturers: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

Unglazed Ceramic Mosaic Tile:

1. American Olean Tile Co.
2. Dal-Tile Corporation
3. Mid-State Tile Company
4. Crossville Ceramics
5. Interceramic Tile Company

Glazed Wall and Base Tile:

1. American Olean Tile Company
2. Dal-Tile Corporation
3. Florida Tile
4. InterCeramic Tile Company

Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

PRODUCTS, GENERAL:

ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types and grades of tile indicated.

1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.

ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with installation products and materials indicated.

Colors, Textures and Patterns: For tile and other products requiring selection of colors, surface textures or other appearance characteristics, provide products to match characteristics indicated or, if not otherwise indicated, as selected by Architect.

1. Provide tile trim and accessories which match color and finish of adjoining flat tile.

Mounting: Where factory-mounted tile is required provide back- or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.

1. Where tile is indicated for installation on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies that this type of mounting is suitable for these kinds of use and has been successfully used on other projects.

TILE PRODUCTS:

A. Unglazed Ceramic Mosaic Floor Tile: Provide factory-mounted flat tile complying with the following requirements:
   1. Field and Accent Colors:
      a. Tile shall have a value as listed below. If the Architect chooses tile of lesser value after Bid Process, the Contractor shall issue a deductive Change Order for the difference. All allowances shall be for material only. Installation, profit and overhead shall be included in the Contractors Bid Proposal.

   2. Type:
      a. Natural Clay or Porcelain.

   3. Wearing Surface:
      a. Smooth.

   4. Nominal Thickness:
      a. 1/4"

   5. Face:
      a. Plain with cushion edges.

   6. Nominal Facial Dimensions:

      a. Floor Tile

         1. **2" x 2" Floor Tile** – Shall have a value of **$3.00** dollars per square foot (this allowance shall be for material only).

B. Glazed Ceramic Wall and Base Tile: Provide flat tile complying with the following requirements:

   1. Field and Accent Colors:

      a. Tile shall have a value as listed below. If the Architect chooses tile of lesser value after Bid Process, the Contractor shall issue a deductive Change Order for the difference. All allowances shall be for material only. Installation, profit and overhead shall be included in the Contractors Bid Proposal.
   2. Type:
      a. Natural Clay or Porcelain.

   3. Wearing Surface:
      a. Smooth.

   4. Nominal Thickness:
      a. 1/4"

   5. Face:
      a. Plain with cushion edges.

   6. Nominal Facial Dimensions:

      a. Wall Tile

         1. **4" x 4" Wall Tile** – Shall have a value of **$3.00** dollars per square foot (this allowance shall be for material only).

         2. **4" x 4" Wall Tile (Accent Bands – 2 layers high located 6'-0" AFF)** Accent - Glazed. Shall have a valve of **$4.00** dollars per square foot (this allowance shall be for material only).

b. Base:

3. **4" x 6", coved**, and have a valve of **$4.00 dollars per linear foot** (this allowance shall be for material only).

Trim Units for Ceramic Mosaic Tile: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:

1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile, where applicable.
2. Shapes: As follows, selected from manufacturer's standard shapes.
3. Base for Portland Cement Mortar Installation: Coved.
4. Wainscot Cap for Portland Cement Mortar Installations: Bullnose cap.
5. External Corners for Portland Cement Mortar Installations: Bullnose shape with a radius of not less than 3/4" unless otherwise indicated.
6. Internal Corners: Field-butted square corners, except use internal cove and cap angle pieces designed to member with stretcher shapes.

STONE THRESHOLDS:

General: Provide stone which is uniform in color and finish, fabricated to sizes and profiles indicated or required to provide transition between tile surfaces and adjoining finished floor surfaces.

Marble Thresholds: Provide marble thresholds complying with ASTM C 503 requirements for exterior use and abrasion resistant for uses subject to heavy foot traffic.

1. Provide white, bonded marble complying with MIA Group "A" requirements for soundness.

SETTING MATERIALS:

Portland Cement Mortar Installation Materials: Provide materials to comply with ANSI A108.1 as required for installation method designated, unless otherwise indicated.

GROUTING MATERIALS:

A. High Performance Epoxy grout that offers color uniformity, durability and stain resistance with extraordinary ease of use.

1. Laticrete "Spectralock Pro Grout".
2. Color to be selected by architect.

B. Epoxy grout is to be installed per manufacturer's instructions.

MISCELLANEOUS MATERIALS:

Single-Component Sealants: ASTM C 920, Type S, Grade NS, use NT (for use in joints in non-traffic areas).

Two-Component Sealants: ASTM C 920, Type M, Grade P, Class 25, use T (for use in joints subject to pedestrian traffic).

Tile Cleaner: Product specifically acceptable to manufacturer of tile and grout manufacturer for application indicated and as recommended by National Tile Promotion Federation, 112 North Alfred St., Alexanderia, VA 22134 or Ceramic Tile Institute, 700 N. Virgil Ave., Los Angeles, CA 90029.

PART 3 - EXECUTION

INSPECTION:

Examine surfaces to receive tile work and conditions under which tile will be installed. Do not proceed with tile work until surfaces and conditions comply with requirements indicated in referenced tile installation standard.

PRE-INSTALLATION CONFERENCE:

A pre-installation conference is required before any tiling materials are installed. This conference shall be conducted by a representative of the Architect and attended by the General Contractor and Tile Contractor. Provide at least 72 hours advance notice to participants prior to convening pre-installation conference.

The pre-installation conference is intended to clarify demolition and application requirements for work to be completed before tiling operations can begin. This would include a detailed review of the specifications, plans, finish schedules and approved shop drawings, submittal data, samples and mock-ups. If this pre-installation conference cannot be satisfactorily concluded without further inspection and investigation by any of the parties present, it shall be reconvened at the earliest possible time to avoid delay of the work. In no case should the work proceed without inspection of all tiling areas and substantial agreement on all requirements.

The following are to be accomplished during the conference:

1. To review all requirements listed in the specifications and resolve any questions or conflicts that may arise.
2. To establish trade-related job schedules.
3. To establish tiling schedule and work methods that will prevent progress of other trades.
4. Require that all surface preparations and conditions be complete prior to installing tile work.
5. To establish those areas on the job site that will be designated as work and storage areas for tiling operations.
6. To establish acceptable methods of protecting the finished tile surfaces if any trades must travel across or work on, above or around any areas of the finished tile work.

The Architect shall prepare a written report indicating actions taken and decisions made at this pre-installation conference. This report shall be made a part of the project record and copies furnished to the General Contractor and the Owner.

INSTALLATION, GENERAL:

ANSI Tile Installation Standard: Comply with applicable parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile".

TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated or, if not otherwise indicated, as applicable to installation conditions shown.

Setting beds for ceramic tile floors shall be thickset, 1-1/4”. Wall tile shall be installed on thinset.

Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.

Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures and other penetrations so that plates, collars, or covers overlap tile.

Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise shown.

1. For tile mounted in sheets make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.

Lay out tile wainscots to next full tile beyond dimensions indicated.

Expansion Joints: Locate expansion joints and other sealant filled joints, including control, contraction and isolation joints, where indicated, or if not indicated, at spacing and locations recommended in TCA "Handbook for Ceramic Tile Installation", and approved by Architect.

1. Prepare joints and apply sealants to comply with requirements of referenced standards and sealant manufacturer.

Grout tile to comply with referenced installation standards, using grout materials indicated.

FLOOR INSTALLATION METHODS:

Ceramic Mosaic Tile: Install tile to comply with requirements indicated below for setting bed methods, TCA installation methods related to types of subfloor construction, and grout types:

1. Concrete Subfloors, Interior: TCA F113 with isolation membrane equal to Nobleseal CIS.
2. Grout:
   A. High Performance Epoxy grout that offers color uniformity, durability and stain resistance with extraordinary ease of use.

      1. Laticrete “Spectralock Pro Grout”.
      2. Color to be selected by architect.

   B. Epoxy grout is to be installed per manufacturer’s instructions.

Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile unless otherwise indicated.

Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood or other flooring which finishes flush with top of tile.

WALL TILE INSTALLATION METHODS:

Install types of tile designated for wall application to comply with requirements indicated below for setting bed methods, TCA installation methods related to subsurface wall conditions, and grout types:

1. Solid Backing, Interior: TCA W221 in wet areas and W213 or W223 25 applicable in other areas.
2. Grout

   A. High Performance Epoxy grout that offers color uniformity, durability and stain resistance with extraordinary ease of use.

      1. Laticrete “Spectralock Pro Grout”.
      2. Color to be selected by architect.

   B. Epoxy grout is to be installed per manufacturer’s instructions.

CLEANING AND PROTECTION:

Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Unglazed tile shall be cleaned with non-acid solutions only recommended by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal

surfaces, cast iron and vitreous plumbing fixtures from effects of tile cleaning. Flush surface with clean water after cleaning.

Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work.

Protection: When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage and wear.

Prohibit foot and wheel traffic from using tiled floors for at least 7 days after grouting is completed.

Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

EXTRA STOCK:

Deliver stock of maintenance materials to Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.

1. Tile Flooring: Furnish not less than one box for each type, color, pattern and size installed.

END OF SECTION

SECTION 09510 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this section.

1.2 SUMMARY

A. Extent of acoustical ceilings specified in this section include the following:

1. Acoustical lay-in panel ceilings in an exposed suspended metal grid system.

SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

1. Full size sample of each acoustical panel type, pattern and color.
2. Set of 12" long samples of exposed runners and moldings for each color and system type required.

B. Certificates: Submit certificates from manufacturers of acoustical ceiling units and suspension systems attesting that their products comply with specification requirements.

1.3 QUALITY ASSURANCE

A. Fire Performance Characteristics: Provide acoustical ceiling components that are identical to those tested for the following fire performance characteristics, according to ASTM test method indicated, by UL or other testing and inspecting agency accept- able to authorities having jurisdiction. Identify acoustical ceiling components with appropriate marking of applicable testing and inspecting agency.

1. Surface Burning Characteristics: As follows, tested per ASTM E 84.
2. Flame Spread: 25 or less.
3. Smoke Developed: 50 or less.

B. Fire Resistance Ratings: As indicated by reference to design designation in UL "Fire Resistance Directory" for floor, roof or beam assemblies in which acoustical ceilings function as a fire protective membrane; tested per ASTM E 119. Provide protection materials for lighting fixtures and air ducts to comply with requirements indicated for rated assembly.

C. Coordination of Work: Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition system (if any).

D. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.5 PROJECT CONDITIONS

A. Space Enclosures: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete

and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. USG Interiors, LLC. (Basis of Design) | www.usg.com | Ph: 1.800.950.3839
2. Certainteed Corporation | www.certainteed.com | Ph: 1.800.233.8990
3. Armstrong World Industries Inc. | www.armstrongceilings.com | Ph: 877.276.7876

B. Equal products of other manufacturers may be used in the work provide such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 GENERAL ACOUSTICAL CEILING TILE UNITS

A. Standard for Acoustical Ceiling Tile Units: Provide manufacturer's standard units of configuration indicated which are prepared for mounting method designated and which comply with FS SS-S-118 requirements, including those indicated by reference to type, form, pattern, grade (NRC or NIC' as applicable), light reflectance coefficient (LR), edge detail, and joint detail (if any).

1. Mounting Method for Measuring NRC: No. 7 (mechanically mounted on special metal support), FS SS-S-118; or Type E-400 mounting as per ASTM E 795.

B. Sound Attenuation Performance: Provide acoustical ceiling units with ratings for ceiling sound transmission class (STC) of range indicated as determined according to AMA 1-II "Ceiling Sound Transmission Test by Two-Room Method" with ceilings continuous at partitions and supported by a metal suspension system of type appropriate for ceiling unit of configuration indicated (concealed for tile, exposed for panels).

C. Colors, Textures and Patterns: Provide products to match appearance characteristics indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors, surface textures, and patterns available for acoustical ceiling units and exposed metal suspension system members of quality designated.

2.3 ACOUSTICAL TILES

A. **Acoustical Panel Type: Vinyl Covered Ceiling Panels**

1. USG “Sheetrock Brand Clean Room Lay-In Gypsum Panels”.
2. Classification: Provide ceiling panels complying with ASTM E 1264 for type, form and pattern as follows:
    a. Type XX, mineral based with membrane faced overlay. Vinyl face, back and sides covered gypsum ceiling panels.
    b. Form: Not Applicable
    c. Pattern: Smooth
3. Color: Flat White 050.
4. LR: Not less than 0.77
5. NRC: Not less than: N/A
6. CAC: Not less than 35
7. Edge / Joint Detail:
    a. Square (Typical if not indicated on drawings).
    b. SLT Beveled Reveal (Only if indicated on drawings).
8. Panel Thickness: 1/2 inch (12.7 mm).

9. Modular Size: 24 by 24 inches (610 by 610 mm).
10. Recycled Content: 80%.
11. Panel Features: Washable, scrubbable, soil and impact resistant finish. Meets USDA/FSIS guidelines for use in food processing areas.
12. Clean room performance: Acceptable in applications up to Class 100 Clean rooms.
13. ClimaPlus™ 30 year limited system warranty. Contains a broad spectrum antimicrobial additive on the face and back of the panel that provides resistance against the growth of mold and mildew. Includes sag resistance performance.
14. Suspension Grid/Width: USG Donn ZXLA; 15/16”.

B. **Acoustical Panel Type: Lay-In Acoustical Ceiling Panels**

1. USG “Radar” Acoustical Panels
2. Classification: Provide ceiling panels complying with ASTM E 1264 for type, form and pattern as follows:
    a. Type III, mineral base with painted finish
    b. Form: 2, water felted.
    c. Pattern: Perforated, small holes and light texture.
3. Color: Flat White 050.
4. LR: Not less than 0.84
5. NRC: Not less than 0.45
6. CAC: Not less than 33
7. Edge / Joint Detail:
    a. SQ Square (Typical if not indicated on drawings).
    b. SLT Beveled Reveal (Only if indicated on drawings).
8. Panel Thickness: 5/8 inch (15.8mm).
9. Modular Size: 24 by 24 inches (600 by 600 mm).
10. Recycled Content: Up to 59%.
11. Panel Features:
    a. Biobased product that is USDA certified.
    b. Abuse Resistant, high durability and can be cleaned easily with a soft brush & vacummed.
12. ClimaPlus™ 30 year limited system warranty. Contains a broad spectrum antimicrobial additive on the face and back of the panel that provides resistance against the growth of mold and mildew. Includes sag resistance performance.
13. Suspension Grid/Width: USG Donn DX; 15/16” (24mm).

2.4 METAL SUSPENSION SYSTEMS

A. **USG Donn Brand DX/DXL 15/16” Acoustical Suspension System**

1. Narrow Face, Capped, Double Web, Cold Rolled Steel Suspension System: Main and Cross Tees as defined by ASTM C635, commercial quality pretreated and painted hot-dipped galvanized cold-rolled steel, exposed surfaces prefinished in manufacturer's standard corrosion resistant enamel paint finish
2. Structural Classification: Intermediate Duty.

3. Tee Profile: Narrow Face 15/16” (22mm) wide.
4. Color: White

2.5 SEALANT

A. Acoustical Sealant: Resilient, non-staining, non-shrinking, non-hardening, non-skinning, non-drying, non-sag sealant intended for interior sealing of concealed construction joints.

B. Manufacturers: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. BA-98; Pecora Corp.
2. Tremco Acoustical Sealant; Tremco
3. Equal products of other manufacturers may be used in the work provided such products have been approved by the Architect, not less than Ten (10) days prior to schedule bid opening.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.

1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Coordinate ceiling layout with lighting layout. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans.

3.2 INSTALLATION

A. General: Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire-resistance rating requirements as indicated, and CISCA standards applicable to work.

B. Arrange acoustical units and orient directionally-patterned units (if any) in manner shown by reflected ceiling plans.

C. Install suspension systems to comply with ASTM C 636, with hangers supported only from building structural members.

1. Locate hangers within 6" inches from each end and spaced 4'-0" along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8" n 12'-0".
2. Locate hangers on all 4 corners of the ceiling grid where a projector is installed

D. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperature.

E. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum which are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal force by bracing, counter-splaying or other equally effective means.

F. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.

G. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.

H. Screw-attached moldings to substrate at intervals not over 16" o.c. and not more than 3" from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12'-0". Miter corners accurately and connect securely.

I. Install acoustical panels in coordination with suspension system with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.

J. Install hold-down clips on panels, within 10’-0"' of exterior door openings, where panels are other than horizontal, and in areas where required by governing regulations or for fire-resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.

3.3 EXTRA STOCK

A. Deliver stock of maintenance materials to Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.

1. Ceiling Tile: Furnish not less than one box for each type, color, pattern and size installed.

END OF SECTION

SECTION 09550 - WOOD FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes Wood Flooring at the following locations:

1. Wood flooring for Stage.

B. Related Sections include the following:

1. Section 03300, Concrete; Substrates.
2. Section 07260, Under Slab Vapor Barrier

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Supplier shall be a firm established in the field. See requirements.

1. Installer's Responsibilities: Installer shall be a company exhibiting a minimum of ten (10) years continuous experience in the wood and theatrical flooring field and approved by the manufacturer. Submit a list of at least five completed projects of similar magnitude and complexity where this specific flooring system was installed. Include owner references with this submittal.
2. Maintenance Literature: Submit Three copies of Care and Maintenance of wood floors.
3. Certification: If required by the owner, manufacturer shall provide certification that all materials meet grade, quality and treatment if applicable.

B. Guarantee: Manufacturer hereby warrants the floor system material specified herein to be free from manufacturing defects for a period of (1) one year. This warranty is in lieu of all other warranties, expressed or implied, including but not limited to any warranty of merchantability or fitness for a particular purpose, and any other obligation on the part of the manufacturer. In the event of the breach of any warranty, the liability of manufacturer shall be limited to repair or replacing the floor material and system components supplied by manufacturer and proven to be defective in manufacture, and shall not include any other damages, either direct or consequential.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood-flooring materials in unopened cartons or bundles.

B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet work is complete and dry.

C. Store wood-flooring materials in a dry, warm, well-ventilated, weather-tight location.

D. Move wood flooring into spaces where it will be installed at least seven days before installation.

1.6 PROJECT CONDITIONS

A. Conditioning: Maintain relative humidity conditions planned for building occupants, but not greater or less than the relative humidity range recommended by MFMA, and an ambient temperature between 55 and 80 deg F in spaces to receive wood flooring for at least seven days before installation, during installation, and for at least seven days after installation. After post-installation period, maintain relative humidity conditions and ambient temperature planned for building occupants.

1. Open sealed packages to allow wood flooring to acclimatize.

2. Do not install flooring until it adjusts to the relative humidity of and is at the same temperature as the space where it is to be installed. Relative humidity of 35-50% is to be maintained.
3. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by flooring and finish manufacturer, but not less than 10 days.
4. Materials shall not be delivered to the jobsite until all masonry, painting, plastering, tilework, is complete.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Manufacturer's products shall meet all NOFMA and MFMA flooring guidelines to establish minimum standards for materials, workmanship and function and must meet all requirements called out in the specifications.

2.2 MATERIALS

A. Membrane: 6 mil polyethylene sheeting.

B. Subfloor Layer: 3/4" x 48" x 96" CDX plywood. Exterior grade Fir on SYP.

C. Subfloor fasteners: Steel anchors shall be air-actuated pins designed and recommended by the manufacturer to anchor the subfloor to the concrete substrate.

D. Flooring fasteners – Powernail or equal floor cleats or staples, as recommended by the flooring manufacturer.

E. Stage flooring – White Oak, Select, ¾"" x 2-1/4" in random lengths.

F. All flooring to be tongue & grooved and kiln-dried.

2.3 FINISHING MATERIALS

A. Floor Finish - Bona MFMA-Approved finish or approved equal.

1. Stain: Penetrating Stain. Color to be selected by Architect.
2. Finish: Polyurethane. Sheen to be selelcted by Architect.

2.4 ACCESSORY MATERIALS

A. Expansion joint cover at edge of all wood and concrete: Pemko 271-A or equal. Aluminum 5" width. Equal approved by the flooring manufacturer may also be used.

B. Perimeter base: As indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect existing floor for proper dryness and tolerance and report any discrepancies to the owner in writing.

B. All work required to put the existing floor in acceptable order shall be the responsibility of this contractor.

C. Subfloor shall be provided to the contractor free of all equipment and broom cleaned.

3.2 INSTALLATION

A. Install polyethylene sheeting over entire area with edges overlapped and edges turned up 3" at walls and vertical obstruction.

B. Subfloor: "Fasten plywood subfloor shall be installed in accordance with manufacturer's guidelines. Plywood to be installed in a 45 degree angle or perpendicular to the long direction of the finish flooring.

C. Machine nail strip flooring to plywood subfloor in straight lay pattern. All end joints shall be driven up tightly and proper spacing allowed for humidity changes affecting the floor. Flooring contractor shall be allowed to incorporate spacer joints in the floor to insure adequate expansion and to adjust for pattern creep.

D. Provide 1-1/2" expansion voids at all walls and vertical obstructions.

3.3 **SANDING AND FINISHING**

A. Allow installed flooring to acclimate to ambient conditions for at least 10 days before sanding.

B. Sand floor using coarse, medium, and fine paper. After sanding, run 100 grit screen over entire floor with rotary sander.

C. Clean floor to remove all dust and debris prior to sealing wood.

D. Finish: Apply one coat of oil-modified sealer. Let dry and apply three additional coats of oil-modified finish. Allow to dry before use.

E. Install vented rubber base at all walls with screws or adhesive. Use pre-formed outside corners and neatly miter all inside corners.

3.4 **PROTECTION**

A. General Contractor shall protect wood flooring during remainder of construction period to allow finish to cure and to ensure that flooring and finish are without damage or deterioration at time of Substantial Completion and acceptance by owner.

END OF SECTION

SECTION 09650 - RUBBER BASE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Extent of rubber base is shown on drawings and in schedules.

1.2 QUALITY ASSURANCE

A. Manufacturer: Provide each type of rubber base as produced by a single manufacturer, including recommended, adhesives.

1. Wherever possible, provide required rubber base produced by a single manufacturer.

1.3 SUBMITTALS

A. Product Data: Submit 2 copies of manufacturer's technical data and installation instructions for each type of rubber base.

B. Samples: Submit, for verification purposes, samples of each type, color, and pattern of rubber base,

1.4 JOB CONDITIONS

A. Maintain minimum temperature of 65°F in spaces to receive rubber base for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Store rubber base materials in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 55°F in areas where work is completed.

B. Install after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Armstrong World Industries, Inc.
2. Flexco
3. Roppe Corporation

B. Equal products of other manufacturers may be used in the work provide such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 MATERIALS

A. Colors and Patterns: As selected by Architect from manufacturer's standards.

B. Wall Base: Provide rubber base complying with FS SS-W-40, Type II, with matching end stops and pre-formed or molded corner units and as follows:

1. Height: 4"
2. Thickness: 1/8"
3. Style: Standard Top-Set Cove
4. Finish: Matte

PART 3 - EXECUTION

3.1 INSTALLATION

A. Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed

corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

1. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

B. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed.

3.2 CLEANING AND PROTECTION

A. Remove any excess adhesive or other surface blemishes, using neutral type cleaners as recommended by flooring manufacturer. Protect installed flooring with heavy Kraft paper or other covering.

B. Finishing: After completion of project and just prior to final inspection of work, thoroughly clean floors and accessories.

C. Apply polish and buff, with type of polish, number of coats, and buffing procedures in compliance with flooring manufacturer's instructions.

END OF SECTION

SECTION 09651 – LUXURY VINYL TILE FLOORING (LVT)

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Luxury Vinyl Tile flooring and accessories as indicated on drawings and in schedules.

1.2 RELATED REQUIREMENTS

A. Section 09650 – Rubber Base.

1.3 QUALITY ASSURANCE

A. Manufacturer: Provide each type of Luxury Vinyl Tile flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants and leveling compounds.

1. Wherever possible, provide required Luxury Vinyl Tile flooring and accessories produced by a single manufacturer.

1.4 SUBMITTALS

A. Product Data: Submit 2 copies of manufacturer's technical data and installation instructions for each type of Luxury Vinyl Tile flooring and accessory.

B. Samples: Submit, for verification purposes, samples of each type, color, and pattern of Luxury Vinyl Tile, including accessories, required, indicating full range of color and pattern variation.

1.5 JOB CONDITIONS

A. Store Luxury Vinyl Tile flooring products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by the manufacture, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

B. Maintain minimum temperature of 65°F in spaces to receive Luxury Vinyl Plank Tile flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Store Luxury Vinyl Tile materials in spaces where they will be installed for at least 48 hours before beginning installation.

C. Maintain the ambient relative humidity between 40% and 60% during installation.

D. Until Substantial Completion, maintain ambient temperatures within range recommended by the manufacture but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

E. Install Luxury Vinyl Tile flooring and accessories after other finishing operations, including painting, have been completed. Do not install Luxury Vinyl Tile Flooring over concrete slabs until the latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by manufacturer's recommended bond and moisture test.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Mannington Commercial, 1844 U.S. Highway 41 S.E. Calhoun, GA 30701; PH: 800.241.2262; www.manningtoncommercial.com.

B. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 MATERIALS

A. LVT: “Spacia” Collection; “Abstract” Series

1. Construction High Performance Luxury Vinyl Tile flooring
2. Class / ASTM F 1700 Class III Printed Film Vinyl Tile, Type B (embossed)
3. Wear layer Thickness 20 mil or 0.020" (0.5 mm) Quantum Guard Elite
4. Overall Thickness 4.0 mm or nominal
5. Nominal Dimensions: 4" wide x 36" long
6. Backing Class Commercial Grade
7. Installation Glue Down
8. Slip Resistance / ASTM D 2047 >0.65 (wet/dry)
9. Warranty: 15 year limited commercial wear warranty.
10. Colors as selected by the Owner.

B. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

C. Leveling Compound: ProSpec Feather Edge**,** premium, polymer modified, rapid setting, trowelable underlayment that results in a very smooth, ultra thin finish or as recommended by the flooring manufacture.

D. Surfaces must be solid, completely clean, free of oil, gypsum compounds, wax, grease, sealers, curing compounds, asphalt, paint, dirt, loose surface material and any contaminants that act as a bond breaker. Weak concrete surfaces must be cleaned down to solid sound concrete by mechanical means. Acid etching or chemical cleaning is not acceptable. Remove all dirt by vacuuming. All subfloors must be clean, dry and at least 40º F (4º C) prior to applying ProSpec Feather Edge.

E. Installation: ProSpec Feather Edge will accept standard floor coverings such as VCT, vinyl sheet goods, tile and carpeting in approximately 15-30 minutes after placement.

F. Materials: Extruded rubber accessories as required (i.e. nosings, reducer strip.)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufactures written instructions to ensure adhesion of Luxury Vinyl Tile Flooring.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate paint, coatings and other substances that are incompatible with adhesives or contain soap, wax, oil, solvents, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Mechanically remove contamination on the substrate that may cause damage to the resilient flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., must not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.
4. Prepare Substrates according to ASTM F 710 including the following:

Moisture Testing: Perform tests recommended by manufacturer. Proceed withinstallation only after substrates pass testing.

i. Perform anhydrous calcium chloride test, ASTM F 1869.Results must not exceed 5 lbs. Moisture Vapor Emission Rate per 1,000 sq. ft. in 24 hours.

or

ii. Perform relative humidity test using in situ probes, ASTM F 2170. Results must not exceed 80%.

a. A pH test for alkalinity must be conducted. Results should range between 7 and 9. If the test results are not within the acceptable range of 7 to 9, the installation must not proceed until the problem has been corrected.

b. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.

B. Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Floor covering shall not be installed over expansion joints.

D. Do not install resilient products until they are the same temperature as the space where they are to be installed.

E. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient tile flooring.

1. Install with manufactures adhesive specified for the site conditions and follow adhesive label for proper use.

2. Follow manufactures recommendation and lay tiles so graining follows the same direction.

3. Roll the flooring in both directions using a 100 pound three-section roller.

B. Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room area of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, from wall to wall and under all casework or other fixed equipment. Where construction joints in concrete slab occur, lay tile joint with construction joint.

C. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, cracked, chipped, ordeformed tiles are not acceptable.

1. Lay each color of tile with grain running in basket weave pattern.

D. Adhere tile flooring to substrates using full spread of adhesive applied in compliance with flooring manufacturer's directions.

E. Accessories: Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

1. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

F. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.

2. Sweep and vacuum surfaces thoroughly.

3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. No heavy traffic, rolling loads, or furniture placement for 72 hours after installation.

E. Cover resilient products until Substantial Completion.

F. Wait 72 hours after installation before performing initial cleaning.

G. A regular maintenance program must be started after the initial cleaning.

3.5 EXTRA STOCK

A. Deliver stock of maintenance materials to Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.

1. Flooring: Furnish not less than one box for each type, color, pattern and size installed.

END OF SECTION

SECTION 09672 - RESINOUS FLOORING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes one resinous flooring system, one with urethane body.

1. Application Method: Notched Squeegee.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.

B. Samples for Verification: For each resinous flooring system required, 5 inches (150 mm) square, applied to a rigid backing.

C. Product Schedule: Use resinous flooring designations indicated in Part 2 and room designations indicated on Drawings in product schedule.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

E. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. No request for substitution shall be considered that would change the generic type of floor system specified (i.e. epoxy based flake broadcast with urethane mortar base). Equivalent materials of other manufactures may be substituted only on approval of Architect or Engineer. Request for substitution will only be considered only if submitted 10 days prior to bid date. Request will be subject to specification requirements described in this section.

B. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.

1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

2. Contractor shall have completed at least 10 projects of similar size and complexity.

C. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer, with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

D. Manufacturer Field Technical Service Representatives: Resinous flooring manufacture shall retain the services of Field Technical Service Representatives who are trained specifically on installing the system to be used on the project.

1. Field Technical Services Representatives shall be employed by the system manufacture to assist in the quality assurance and quality control process of the installation and shall be available to perform field problem solving issues with the installer.

E. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Apply full-thickness mockups on 48-inch- (1200-mm-) square floor area selected by Architect.

2. Include 48-inch (1200-mm) length of integral cove base.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Pre-installation Conference:

1. General contractor shall arrange a meeting not less than thirty days prior to starting work.
2. Attendance:
   a. General Contractor
   b. Architect/Owner's Representative.
   c. Manufacturer/Installer's Representative.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

B. Store materials to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects. Store material per product data sheet.

C. All materials used shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors. No on site weighing or volumetric measurements allowed.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

1. Maintain material and substrate temperature between 65 and 85 deg F (18 and 30 deg C) during resinous flooring application and for not less than 24 hours after application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

D. Concrete substrate shall be properly cured. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring

1.7 WARRANTY

A. Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of (1) one full years from date of installation, or provide a joint and several warranty signed on a single document by material manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of (1) one full year from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Stonhard, Inc.; Stongard MR®. - Basis of Design.
2. Tarkett, Inc.; **www.tarkettna.com**

3. Milliken, Inc.; **www.milliken.com**

B. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 RESINOUS FLOORING

A. Products: Subject to compliance with requirements:

1. Stonhard, Inc.; Stongard MR®. - BasIs of Design.

B. System Characteristics:

1. Color and Pattern: Select by Architect from manufactures standards
2. Wearing Surface: Texture TBD
3. Integral Cove Base: 4 inch typical. 6 inch at all wet areas including but not limited to Kitchens and Toilet Areas.
4. Overall System Thickness:40 mils.

C. System Components: Manufacturer's standard components that are compatible with each other and as follows:

1. Primer Coat:
   a. Material Basis: Stonhard Standard Primer.
   b. Resin: Two (2) Component Epoxy.
   c. Formulation Description: 100 percent solids.
   d. Application Method: Squeegee back roller.
   e. Number of Coats: (1) one.
2. Primer Coat 2:
   a. Material Basis: Stonhard SL Primer.
   b. Resin: Three (3) Component Epoxy with 90 grit silica.
   c. Formulation Description: 100 percent solids.
   d. Application Method: Squeegee back roll onto wet standard primer.
   e. Number of Coats: (1) one.
3. Body Coat(s):
   a. Material Basis: Stonproof ME7.
   b. Resin: Urethane Membrane.
   c. Formulation Description: 100% Solids eleastomeric.
   d. Application Method: Notched Trowel Screed.
   e. Number of Coats: One.
4. Topcoat: Stonkote G54, general service sealing.
   a. Material Basis: Stonkote G54.
   b. Resin: Epoxy
   c. Formulation Description: 100% solids, epoxy.
   d. Type: Pigmented.
   e. Finish: Standard
   f. Number of Coats: one

D. Note: Components listed above are the basis of design intent; all bids will be compared to this standard including resin chemistry, color, wearing surface, thickness, and installation procedures, including number of coats. Contractor shall be required to comply with all the requirements of the Specifications and all of the components required by the Specifications, whether or not such products are specifically listed above.

E. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:

1. Elongation: 200% per ASTM D 412.
2. Tensile Strength: 1,200 psi per ASTM D 412.
3. Hardness: 70, Shore D per ASTM D 2240.
4. Abrasion Resistance: 0.06 gm per ASTM D-4060, CS-17
5. Water Absorption: 0.1% per ASTM C-413

2.3 ACCESSORY MATERIALS

A. Patching, Leveling and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated. No Single component or cementitious materials.

B. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.

PART 3 – EXECUTION

3.1 PREPARATION

A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean and dry substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1. Mechanically prepare substrates as follows:
   a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup or Diamond Grind with a dust free system.
2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
3. Verify that concrete substrates meet the following requirements.
   a. Perform in situ probe test, ASTM F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 80 percent.
   b. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 6 lb of water/1000 sq. ft. of slab in 24 hours.
   c. Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions. Resinous materials only.

D. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

3.2 APPLICATION

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
    a. Apply joint sealant to comply with manufacturer's written recommendations.

B. Apply primer where required by resinous system, over prepared substrate at manufacturer's recommended spreading rate.

C. Membrane Base: Mix and apply membrane base over fully cured primer using manufacturer's specially designed squeegees and rollers

D. Apply topcoat(s) in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer.

3.3 TERMINATIONS

A. Chase edges to “lock” the coating system into the concrete substrate along lines of termination.

B. Penetration Treatment: Lap and seal coating onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.

C. Trenches: Continue coating system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.

D. Treat floor drains by chasing the coating to lock in place at point of termination.

3.4 JOINTS AND CRACKS

A. Treat control joints to bridge potential cracks and to maintain monolithic protection.

B. Treat cold joints and construction joints and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.

C. Vertical and horizontal contraction and expansion joints are treated by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.5 FIELD QUALITY CONTROL

A. Material Sampling: Owner may at any time and any numbers of times during resinous flooring application require material samples for testing for compliance with requirements.

1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
3. If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

3.6 CLEANING, PROTECTING, AND CURING

A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 24 hours.

B. Protect resinous flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General Contractor is responsible for protection and cleaning of surfaces after final coats.

C. Cleaning: Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer. General Contractor is responsible for cleaning prior to inspection.

END OF SECTION

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of painting work is indicated on drawings and schedules, and as herein specified including accent painting.

B. Work includes painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated.

1. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatments specified under other sections of work.

C. Work includes field painting of exposed bare and covered pipes, conduits and ducts (including color coding), and of hangers, exposed steel and iron work, and conduits and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated.

D. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

E. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will select these from standard colors or finishes available.

F. Following categories of work are not included as part of field-applied finish work.

1. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as (but not limited to) metal toilet enclosures, prefinished partition systems, acoustic materials, elevator entrance doors and frames, elevator equipment, and finished mechanical and electrical equipment, including light fixtures, switchgear and distribution cabinets.

2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.

3. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.

4. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting.

G. Following categories of work are included under other sections of these specifications.

1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, metal fabrications, hollow metal work and similar items.

2. Unless otherwise specified, shop priming of fabricated components such as shop-fabricated or factory-built mechanical and electrical equipment or accessories is included under other sections of these specifications.

H. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer and use only within recommended limits.

B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.

B. Samples: Prior to beginning work, Architect will furnish color chips for surfaces to be painted. Use representative colors when preparing samples for review. Submit samples for Architect's re- view of color and texture only.

C. Provide a listing of material and application for each coat of each finish sample. Provide a 4' x 4' sample application of each color paint for Architect's approval prior to final ordering of product. Sample application shall be applied in an inconspicuous place, satisfactory to the Architect.

1.5 DELIVERY AND STORAGE

A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

1. Name or title of material.
2. Fed. Spec. number, if applicable.
3. Manufacturer's stock number and date of manufacturer.
4. Manufacturer's name.
5. Contents by volume, for major pigment and vehicle constituents.
6. Thinning instructions.
7. Application instructions.
8. Color name and number.

B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.

1. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.6 JOB CONDITIONS

A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 degree F and 90 degrees F, unless otherwise permitted by paint manufacturer's printed instructions.

B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degree F and 95 degree F, unless otherwise permitted by paint manufacturer's printed instructions.

C. Do not apply paint in snow, rain, fog or mist, or when relative humidity exceeds 85% or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.

1. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following manufacturers are listed as acceptable substitutions to the establish minimum standards. Sherwin Williams Products are listed as the standard of product performance and quality.

1. Sherwin Williams Paint Company (SW)
2. Benjamin Moore and Co. (Moore).
3. Pittsburgh Paints (PPG).

B. Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 MATERIALS

A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

1. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.
2. Federal Specifications establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.
3. Manufacturer's products which comply with coating qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when acceptable to Architect. Furnish material data and manufacturer's certificate of performance to Architect for any proposed substitutions.

B. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.

PART 3 – EXECUTION

3.1 INSPECTION

A. **Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator. If work is begun before satisfactory conditions are met, then it shall be the Applicators' responsibility for the finish surfaces conditions.**

B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.2 SURFACE PREPARATION

A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.

1. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.

3. Contractor MUST remove ALL foreign matter/material not pertinent to new paint from all surfaces before application of any new paint. Foreign matter/material includes, but is not limited to, flaking paint, tape, tacks, nails, poster gum, adhesives of any kind etc.

4. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.

B. Cementitious Materials: Prepare cementitious surfaces of concrete, concrete block, cement plaster and cement-asbestos board to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.

1. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

2. Clean concrete floor surfaces schedules to be painted with a commercial solution of muriatic acid, or other etching cleaner. Flush floor with clean water to neutralize acid and allow to dry before painting.

C. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.

2. When transparent finish is required, use spar varnish for backpriming.

3. Backprime all exposed exterior wood. Backprime paneling on interior partitions only where masonry, plaster, or other wet wall construction occurs on backside.

4. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.

D. Ferrous Metals: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.

1. Touch-up shop-applied prime coats wherever damaged or bare. Clean and touch-up with same type shop primer.

E. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent.

3.3 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with manufacturer's directions.

B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

C. Stir materials before application to produce a mixture of uniform density and stir as required during application. Do not stir surface film into material. If film exists, remove film and strain paint material.

3.4 APPLICATION

A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied. Paint colors, surface treatments, and finishes, are indicated in "schedules" of the contract documents.

1. Provide finish coats which are compatible with prime paints used.

2. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness not less than specified thickness.
3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
4. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
5. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
6. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.
7. Sand lightly between each succeeding enamel or varnish coat.
8. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.

B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss adhesion of the undercoat.

C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

D. Prime Coats: Apply prime coat where required to be painted or finished, and which has not been primed coated by others.
1. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

E. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

F. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
1. Provide satin finish for final coats, unless otherwise indicated.

G. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.5 FIELD QUALITY CONTROL

A. The right is reserved by Owner to invoke the following material testing procedure at any time, and any number of times during period of field painting:
1. Engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.
2. Testing laboratory will perform appropriate tests for any or all of following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated

weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative materials analysis.

B. If test results show that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove non-complying paint; pay for testing; repaint surfaces coated with rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible.

3.6 CLEAN-UP AND PROTECTION

A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each day.

B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

C. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

1. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

D. At completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

3.7 EXTRA STOCK

A. Deliver stock of maintenance materials to Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.

1. Paint: Furnish not less than one gallon for each type and color, applied.

3.8 EXTERIOR PAINT SCHEDULE

A. GENERAL

1. Paint all new roof penetrations at roof areas, including roof attic ventilators and exhaust fan housings.
2. General: Provide the following paint systems for the various substrates, as indicated.

B. EXTERIOR METALS

1. Zinc-Coated Metal.
   a. Alkyd Gloss Enamel Finish.
      i. 2 Coats over primer, with total dry film thickness not less than 2.5 mils.
      ii. 1st Coat: S-W Pro Industrial Pro-Cryl® Universal Acrylic Primer, B66-01310 Series (5.0-10.0 mils wet, 1.9-3.8 mils dry per coat).
      iii. 2nd Coat: S-W Industrial Enamel, Gloss Finish, B54 Series.
      iv. 3rd Coat: S-W Industrial Enamel, Gloss Finish, B54 Series, (2-4 mils dry per coat).
   b. *(Contractor Option)* Waterbased Alkyd Gloss Enamel Finish.
      i. 2 Coats over primer, with total dry film thickness not less than 2.5 mils.
      ii. 1st Coat: S-W Pro Industrial Pro-Cryl® Universal Acrylic Primer, B66-01310 Series (5.0-10.0 mils wet, 1.9-3.8 mils dry per coat).
      iii. 2nd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel, Gloss Finish, B53 Series.

iv. 3rd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel, Gloss Finish, B53 Series, (1.4 – 1.7 mils dry per coat).

2. Ferrous Metal.

a. Alkyd Gloss Enamel Finish.

i. 2 Finish Coats over primer, with total dry film thickness not less than 6.0 mils.

ii. 1st Coat: S-W Pro Industrial Pro-Cryl® Universal Acrylic Primer, B66-01310 Series (5.0-10.0 mils wet, 1.9-3.8 mils dry per coat).

iii. 2nd Coat: S-W Industrial Enamel, Gloss Finish, B54 Series.

iv. 3rd Coat: S-W Industrial Enamel, Gloss Finish, B54 Series, (2-4 mils dry per coat).

b. *(Contractor Option)* Waterbased Alkyd Gloss Enamel Finish.

i. 2 Finish Coats over primer, with total dry film thickness not less than 6.0 mils.

ii. 1st Coat: S-W Pro Industrial Pro-Cryl® Universal Acrylic Primer, B66-01310 Series (5.0-10.0 mils wet, 1.9-3.8 mils dry per coat).

iii. 2nd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel, Gloss Finish, B53 Series.

iv. 3rd Coat: S-W Pro Industrial Water-based Alkyd Urethane Enamel, Gloss Finish, B53 Series, (1.4 – 1.7 mils dry per coat).

C. EXTERIOR CMU

1. Masonry Materials

a. Elastomeric Paint Finish.

i. Prepare surface

ii. Apply masonry bonding and primer.

iii. Complete and apply painting coat

a. 2 Finish Coats over primer, with total dry film thickness not less than 6.0 mils

i. 1st Coat: Exterior Elastomeric Masonry & Brick SikaWall-4090 Acrylic

(9.0-9.5 mils wet, 16 mils dry per coat).

ii. 2nd Coat: Exterior Elastomeric Masonry & Brick SikaWall-4090 Acrylic

iii. 3rd Coat: Exterior Elastomeric Masonry & Brick SikaWall-4090 Acrylic

3.9 INTERIOR PAINT SCHEDULE

A. **GENERAL**

1. Provide the following paint systems for the various substrates, as indicated on drawings, schedules and specifications.

2. Paint all exposed metals (steel framing, mechanical ducts, conduit, etc.) unless otherwise indicated on drawings.

3. Painter shall identify all fire and smoke partitions above lay in ceilings as follows: Wording shall be “FIRE AND SMOKE BARRIERS - PROTECT ALL OPENINGS” (4” high), to be applied every 8’- 0” on center.

B. **INTERIOR METALS**

1. Structural Steel / Metal Building Components.

a. Epoxy Egshel Finish.

i. 2 coats over primer with total dry film thickness not less than 6.0 mils.

ii. 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66W01310 (5 – 10 mils wet, 1.9 – 3.8 mils dry per coat).

iii. 2nd Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy EgShel Finish, B73-360 Series (5.0 – 12.0 mils wet, 2.0 – 5.0 mils dry per coat).

iv. 3rd Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy EgShel Finish, B73-360 Series (5.0 – 12.0 mils wet, 2.0 – 5.0 mils dry per coat).

2. Zinc-Coated Metal

a. Alkyd Gloss Enamel Finish.

i. 2 Coats over primer, with total dry film thickness not less than 6.0 mils.

ii. 1st Coat: S-W Pro Industrial Pro-Cryl® Universal Acrylic Primer, B66-01310 Series (5.0-10.0 mils wet, 1.9-3.8 mils dry per coat) .

iii. 2nd Coat: S-W Industrial Enamel, Gloss Finish, B54 Series.

iv. 3rd Coat: S-W Industrial Enamel, Gloss Finish, B54 Series, (2-4 mils dry per coat).

b. *(Contractor Option)* Waterbased Alkyd Gloss Enamel Finish.

i. 2 Coats over primer, with total dry film thickness not less than 6.0 mils.

ii. 1st Coat: S-W Pro Industrial Pro-Cryl® Universal Acrylic Primer, B66-01310 Series (5.0-10.0 mils wet, 1.9-3.8 mils dry per coat).

iii. 2nd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel, Gloss Finish, B53 Series.

iv. 3rd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel, Gloss Finish, B53 Series, (1.4 – 1.7 mils dry per coat).

3. Ferrous Metal

a. Alkyd Gloss Enamel Finish.

i. 2 Finish Coats over primer, with total dry film thickness not less than 6.0 mils.

ii. 1st Coat: S-W Pro Industrial Pro-Cryl® Universal Acrylic Primer, B66-01310 Series (5.0-10.0 mils wet, 1.9-3.8 mils dry per coat).

iii. 2nd Coat: S-W Industrial Enamel, Gloss Finish, B54 Series.

iv. 3rd Coat: S-W Industrial Enamel, Gloss Finish, B54 Series, (2-4 mils dry per coat).

b. *(Contractor Option)* Waterbased Alkyd Gloss Enamel Finish..

i. 2 Finish Coats over primer, with total dry film thickness not less than 6.0 mils.

ii. 1st Coat: S-W Pro Industrial Pro-Cryl® Universal Acrylic Primer, B66-01310 Series (5.0-10.0 mils wet, 1.9-3.8 mils dry per coat).

iii. 2nd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel, Gloss Finish, B53 Series.

iv. 3rd Coat: S-W Pro Industrial Water-based Alkyd Urethane Enamel, Gloss Finish, B53 Series, (1.4 – 1.7 mils dry per coat).

C. **INTERIOR MASONRY UNITS**

1. Concrete Masonry Units (CMU).

a. Latex Semi-Gloss Enamel Finish

i. 2 Finish coats over filled surface with total dry film thickness of not less than 11.4 mils.

ii. 1st Coat: S-W Pro Industrial Heavy Duty Block Filler, B42W00150 (16.0 – 21.0 mils wet, 8.0 - 10.5 mils dry per coat).

iii. 2nd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31W12651 Series.

iv. 3rd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31W12651 Series (4 mils wet, 1.5 mils dry per coat).

v. Locations: Typical at all CMU unless otherwise indicated in the schedule.

b. Epoxy - Pre-Catalyzed Waterbased Semi-Gloss Finish.

i. 2 Finish coats over filled surface with total dry film thickness of not less than 11.4 mils.

ii. 1st Coat: S-W Pro Industrial Heavy Duty Block Filler, B42W00150 (16.0 – 21.0 mils wet, 8.0 - 10.5 mils dry per coat).

iii. 2nd Coat: S-W Pro Industrial® Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46-01151 Series (4 mils wet, 1.4 mils dry per coat).

iv. 3rd Coat: S-W Pro Industrial® Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46-01151 Series (4 mils wet, 1.4 mils dry per coat).

v. Locations: All Wet Areas in Athletic Facilities.

c. Epoxy – Catalyzed Waterbased EgShel Finish.

i. 2 Finish coats over filled surface with total dry film thickness not less than 14.0 mils.

ii. 1st Coat: S-W Pro Industrial Heavy Duty Block Filler, B42W00150 (16.0 – 21.0 mils wet, 8.0 - 10.5 mils dry per coat).

iii. 2nd Coat: S-W Pro Industrial Catalyzed Waterbased Epoxy EgShel Finish, B73-360 Series.

iv. 3rd Coat: S-W Pro Industrial Catalyzed Waterbased Epoxy EgShel Finish, B73-360 Series (5.0 – 12.0 mils wet, 2.0 – 5.0 mils dry per coat).

v. Locations:

1. All Showers Areas.

2. Kitchens / Cafeterias / Servicing / Dining / Kitchen Storage / Dishwashing / Freezer-Coolers.

3. FACS.

2. Existing Concrete Masonry Units (CMU).

a. If existing concrete block walls are covered with an enamel paint finish, the following shall be used:

i. 1st Coat: S-W Extreme Bond Primer, B51W00150 (3.1 mils wet, .9 mils dry).

ii. 2nd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31W12651 Series.

iii. 3rd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31W12651 Series (4 mils wet, 1.5 mils dry per coat) .

b. If the existing concrete block walls are covered with a latex paint finish, the following shall be used:

i. 1st Coat: S-W ProMar 200 Zero VOC Latex Primer, B28W02600 (4 mils wet, 1.0 mils dry).

ii. 2nd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31W12651 Series.

iii. 3rd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31W12651 Series (4 mils wet, 1.5 mils dry per coat.

D. **INTERIOR WOODWORK**

1. Painted Woodwork.
    a. Interior Semi-Gloss Acrylic Latex with dry film thickness not less than 3.8 mils.
        i. 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W02600 (4 mils wet, 1.0 mils dry).
        ii. 2nd Coat: S-W ProMar 200 Zero VOC Interior Latex Semi-Gloss Finish, B31W02651 Series.
        iii. 3rd Coat: S-W ProMar 200 Zero VOC Interior Latex Semi-Gloss Finish, B31W02651 Series (4 mils wet, 1.5 mils dry per coat).
2. Stained Woodwork
    a. Stained Varnish Rubbed Finish: 3 Finish Coats over stain plus filler on open grain wood.
        i. 1st Coat: S-W MinWax Performance Series Tintable Interior Stain 550 VOC, (450-550 sq ft/gal) Available in 250 VOC Version.
        ii. 2nd Coat: S-W MinWax Performance Series Fast-Dry Varnish.
        iii. 3rd Coat: S-W MinWax Performance Series Fast-Dry Varnish (600-700 sq ft/gal) (available in Gloss, Semi-Gloss, Satin)
3. Wall Panels (Wood and Acoustical).
    a. Interior Semi-Gloss Finish Acrylic Latex with dry film thickness not less than 3.8 mils.
        i. 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W02600(4 mils wet, 1.0 mils dry)
        ii. 2nd Coat: S-W ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31W02651 Series
        iii. 3rd Coat: S-W ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31W02651 Series (4 mils wet, 1.5 mils dry per coat)

END OF SECTION

SECTION 10160 - TOILET PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of toilet partitions is indicated on drawings.

B. Types of toilet partitions and screens required include the following:

1. Solid phenolic with fused surface laminate, floor-supported, overhead-braced.

C. Toilet accessories are specified elsewhere in Division 10.

1.3 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to ensure proper fitting of work. However, allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay work.

B. Coordination: Furnish inserts and anchorages which must be built into other work for installation of toilet partitions and related work; coordinate delivery with other work to avoid delay.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings, and accessories.

B. Shop Drawings: Submit shop drawings for fabrication and erection of toilet partition assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.

C. Samples: Submit full range of color samples for each type of unit required. Submit 6" square samples of each color and finish on same substrate to be used in work, for color selections.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Bobrick Washroom Equipment, Inc, 200 Commerce Drive, Clifton Park NY 12065-1350; Ph.: 518.877.7444; www.bobrick.com.

2. General Partitions Mfg. Corp., 1702 Peninsula Drive, Erie, PA 16505-4243; Ph.: 814.833.1154; www.generalpartitions.com.

3. ASI Global Partitions; 900 Clary Connector, Eastonollee, GA 30538; Ph.: 706.827.2700; www.asi-globalpartitions.com.

4. ASI Accurate Partitions; 160 Tower Drive; Burr Ridge, IL 60527; Phone: 708.442.6800; www.asi-accuratepartitions.com.

5. Bradley Partitions; W142N9101 Fountain Boulevard, Menomonee Falls, WI 53051; Ph.: 1.800.272.3539; www.bradleycorp.com.

6. PSiSC - A Division of CSiSC; 9031 Farrow Road, Columbia, SC 29203; Ph.: 803.252.3020 Extension 106; www.psisc.com.

7. Metpar; 95 State Street, Westbury, NY 11590; Ph: 516.333.2600; www.metpar.com.

B. Equal products of other manufacturers may be used in the work, provided such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 MATERIALS

A. General: Provide materials which have been selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are not acceptable.

B. Materials: Doors, panels and pilasters are composed of compressed cellulose fibers impregnated with resins. The surface laminate is fused to the resin-impregnated core. All edges are machined and finished smooth with beveled edge. Material will not delaminate even under extreme conditions. Materials are non-absorbent, impact and graffiti resistant. Materials are impervious to steam, soaps and detergents and will not mildew.

C. Panels: Shall be 1/2” thick with eased edges uniformly machined to a 1/16” radius. Panels are 58” high and anchored to walls with 18 gauge stainless steel continuous brackets and continuous stainless steel brackets at panel to pilaster locations.

D. Doors: Shall be 3/4” thick with eased edges uniformly machined to a 1/16” radius. Doors are 58” high and mounted to pilasters with continuous stainless steel surface mounted hinge. Pre-threaded inserts are to be provided for all door hardware. Each door is furnished with one coat hook/bumper, slide latches, stops and pulls (for outswing doors) to be made of stainless steel. Door hardware shall allow for lift up emergency access.

E. Pilasters: Shall be 3/4” thick with eased edges uniformly machined to a 1/16” radius. Pilasters are 83” high (or as indicated on the drawings) and anchored to panels and walls with continuous stainless steel brackets. The pilasters contain no less than two level adjusting bolts on the bottom and attach to the floor with two 3/4“ expansion bolts and are braced at the top with aluminum headrail.

F. Stainless Steel Pilaster Shoes: Shall be 3” high, and constructed of 20-gauge stainless steel. Pilaster shoes are bolted onto pilaster with stainless steel, tamper resistant sex bolts and screws.

G. Latches and Keepers: Shall be fabricated from stainless steel with a satin finish. Latch is mounted onto door with 1/4“ stainless steel torx head bolts pre-threaded inserts and acts as the stop for inswing doors. Keepers are mounted on the pilasters with stainless steel toex head screws.

H. Headrail: Shall be made of heavy-duty extruded aluminum (6463-T5 alloy) with bright-dip anodized finish. Headrail is anti-grip and attaches to the top of the pilasters with stainless steel, tamper resistant torx screws. Headrail is attached to the adjacent wall construction with a stainless steel headrail bracket.

I. Headrail Bracket: Shall be made of 16 gauge stainless steel and is attached to the adjacent wall construction with #14 x 1½” stainless steel phillips-head screws and plastic anchors.

J. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel with pinhead, torx screws and bolts.

2.3 FABRICATION

A. General: Furnish standard doors, panels, screens, and pilasters fabricated for partition system, unless otherwise indicated. Furnish units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated.

B. Door Dimensions: Unless otherwise indicated, furnish 24" wide inswinging doors for ordinary toilet stalls and 32" wide (clear opening) outswinging doors at stalls equipped for use by handicapped.

C. Overhead-Braced Partitions: Furnish stainless steel supports and leveling bolts at pilasters, as recommended by manufacturer to suit floor conditions. Make provisions for setting and securing continuous aluminum overhead-bracing tube at top of each pilaster. Furnish shoe at each pilaster to conceal supports and leveling mechanism.

D. Floor-Supported Partitions: furnish galvanized steel anchorage devices, complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters, to permit structural connection at floor. Furnish shoe at each pilaster to conceal anchorage.

E. Floor-Supported Over-Head Braced Screens: Furnish pilasters not less than 3/4" in thickness, panels and pilasters of same construction and finish as toilet partitions. Furnish galvanized steel anchorage devices, complete with threaded rods, lock washers, and leveling adjusting nuts at pilasters, to permit structural connection to floor. Furnish shoe at pilaster to conceal anchorage.

F. Accessories: Furnish units with chromium-plated finish, unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's recommended procedures and installation sequences. Install partitions rigid, straight, plumb, and level.

B. Provide clearances of not more than 1/2" between pilasters and panels, and not more than 1" between panels and walls. Secure panels to walls with full length stainless steel brackets. Secure panels to pilasters with not less than two stirrup brackets located to align with stirrup brackets at wall. Secure panels in position with manufacturer's recommended anchoring devices.

C. Overhead-Braced Partitions and Screens: Secure pilasters to floor and level, plumb, and tighten installation with devices furnished. Secure overhead-brace to each pilaster with not less than two fasteners. Hang doors and adjust so that tops of doors are parallel with overhead-brace when doors are in closed position.

D. Floor-Supported Partitions: Set pilaster units with anchorages having not less than 2" penetration into structural floor, unless otherwise recommended by partition manufacturer. Level, plumb and tighten installation with devices furnished. Hang doors and adjust so that tops of doors are level with tops partition when doors are in closed position.

E. Screens: Attach with concealed anchoring devices, as recommended by manufacturer to suit supporting structure. Set units to provide support and to resist lateral impact.

F. Accessories: Mount accessories to partition units in accordance with manufacturer's instructions.

3.2 ADJUST AND CLEAN

A. Hardware Adjustment: Adjust and lubricate hardware for proper operation. Set hinges on inswinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on outswinging doors (and entrance swing doors) to return to fully closed position.

B. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION

SECTION 10200 - LOUVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of louvers and vents is indicated on drawings, including indications of sizes and locations.

1. Fixed Wall Louvers.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.

C. Vertical Louver: Louver with vertical blades; i.e., the axes of the blades are vertical.

D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

E. Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets for each product and assembly specified.

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Cleaning methods.

C. Shop Drawings: For units and accessories. Include plans; elevations; sections; and details showing profiles, angles, and spacing of elements. Show unit dimensions related to wall openings and adjacent construction; free area for each size indicated for louvers; profiles of frames at jambs, heads, and sills; and anchorage details and locations.

1. Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

2. For installed products indicated to comply with design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Product Certificates:

1. Air Performance: Certificates signed by Air Movement and Control Association International Inc (AMCA) certifying that the manufacturer's stock units are tested in accordance with AMCA Standard 500 and are licensed to bear the AMCA Certified Ratings Seal in accordance with AMCA Standard 511.

2. Water Penetration: Certificates signed by Air Movement and Control Association International Inc (AMCA) certifying that the manufacturer's stock units are tested in accordance with AMCA Standard 500 and are licensed to bear the AMCA Certified Ratings Seal in accordance with AMCA Standard 511.

3. Weather Louver Effectiveness: Certificates signed by Air Movement and Control Association International Inc (AMCA) certifying that the manufacturer's stock units are tested in accordance with AMCA Standard 500-L99, Section 8.3.2 - Wind Driven Rain Water Penetration Test, and are licensed to bear the AMCA Certified Ratings Seal in accordance

with AMCA Standard 511.

4. Provide AMCA Certification - Water, Air for louvers as scheduled.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Selection Samples: Two complete color charts showing the full range of colors available for units with factory-applied color finishes.

G. Samples for Verification: For each finish specified, two samples representing actual finishes specified; prepared on Samples of same thickness and material indicated for final Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years manufacturing similar products. The manufacturer shall have implemented a program for the management of quality objectives, continual improvement, and monitoring of customer satisfaction to assure that customer needs and expectations are met.

B. Installer Qualifications: Minimum 2 years experience installing similar louvers.

C. Professional Engineer Qualifications: A professional engineer legally qualified to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of products that are similar to those indicated for this Project in material, design, and extent.

D. Source Limitations: Obtain products through one source from a single manufacturer where alike in one or more respects regarding type, design, or factory-applied color finish.

E. Welding Standards: As follows:

1. Comply with AWS D1.2, "Structural Welding Code - Aluminum."

2. Comply with AWS D1.3, "Structural Welding Code - Sheet Steel."

F. AMCA Standard 500-L: Air performance, water penetration and air leakage ratings shall be determined in accordance with Air Movement and Control Association International Inc (AMCA) Standard 500, "Laboratory Methods of Testing Louvers for Rating."

G. SMACNA Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" recommendations for fabrication, construction details, and installation procedures.

1.6 SEQUENCING AND SCHEDULING

A. Field Measurements: Verify openings and adjacent construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

2. Coordinate Setting Drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.8 WARRANTY

A. Manufacturer shall provide standard limited warranty for louver systems for a period of five years (60 months) from date of installation, no more than 60 months after shipment from manufacturing plant. When notified in writing from the Owner of a manufacturing defect, manufacturer shall promptly correct deficiencies without direct financial cost to the Owner.

B. Manufacturer shall provide 20 year limited warranty for fluoropolymer-based finish on extruded aluminum substrates.

1. Finish coating shall not peel, blister, chip, crack or check.
2. Chalking, fading or erosion of finish when measured by the following tests:
    a. Finish coating shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D4214.
    b. Finish coating shall not change color or fade in excess of 5 NBS units as determined by ASTM D2244 and ASTM D822.
    c. Finish coating shall not erode at a rate in excess of 10%/ 5 year as determined by Florida test sample.

C. Manufacturer shall provide a 5 year limited warranty for Class I and a 3 year limited warranty for Class II anodized finish on extruded aluminum substrates.

1. Seller warrants the Finish under normal atmospheric conditions.
    a. Will not crack, craze, flake or blister
    b. Will not change or fade more than (5) Delta-E Hunter units as determined by ASTM method D-2244
    c. Will not chalk in excess of ASTM D-4214-07 number (8) rating, determined by the procedure outlined in ASTMD-4214-07 specification test.
2. Any forming or welding must be done prior to finishing. Post forming or welding will void the warranty.
3. This Warranty applies only if the anodized aluminum product is installed in strict accordance with Seller's recommended practices and maintained in accordance with AAMA (American Architectural Manufacturers Association) publication number 609 and 610-09 ("Cleaning and Maintenance Guide for Architecturally Finished Aluminum").

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following manufacturers' products have been used to established minimum standards for materials, workmanship and functions:

1. Reliable Architectural Products (Basis of Design) |1300 Enterprise Road, Geneva, Alabama 36340 | PH: 334.684.3621 or 800.624.3914 | www.reliablelouvers.com.
2. Ruskin Company | 3900 Dr. Greaves Rd. Grandview, MO 64030 | PH: 816.761.7476 | www.ruskin.com.
3. The Airolite Company, LLC. | Ph:715.841.8757 | www.airolite.com.
4. Air Performance Louvers LLC. | 159 Genco Drive, Hartford, AL 36344 | Ph: 334.588.0191 or 588.0070 | www.airperformancellc.com.
5. Equal products of other manufacturers may be used in the work provided such products have been approved by the Architect not less than Ten (10) days prior to scheduled bid opening.

2.2 STATIONARY BLADE LOUVER

A. Model 4375Z125 as manufactured by Reliable Louver Company

B. Fabrication:

1. Design: Stationary non- drainable louver with drain gutters in head frame with downspouts in the jambs and mullions with all welded construction. Hidden vertical supports to allow unlimited continuous line appearance. Steeply angled integral sill.
2. Frame:
   a. Frame Depth: 4 inches (102 mm).
   b. Wall Thickness: .081 inch (2.1 mm) nominal.
   c. Material: Extruded aluminum, Alloy 6063-T6.
3. Blades:

   Style: Non- Drainable: 37.5 degrees at 5-3/32 inches (129 mm)
   a. Wall Thickness: 0.081 inch (2.1 mm), nominal.
   b. Material: Extruded aluminum, Alloy 6063 T6.
4. Minimum Assembly Size: 12 inches wide by 12 inches high (305 mm x 305 mm).
5. Maximum Factory Assembly Size: Single sections shall not exceed 120 inches wide by 90 inches high (3048 mm x 2286 mm) or 90 inches wide by 120 inches high (2286 mm x 3048). Louvers larger than the maximum single size shall be require field assembly of smaller sections.
6. Recycled Content: 18% post-consumer. 55% pre-consumer, post-industrial, total 73% by weight.

C. Performance Data:
1. Based on testing 44 inch x 62 inch) size unit in accordance with AMCA 500.
2. Free Area: 54 percent, nominal.
3. Free Area Size: 8.58 square feet (0.79 m2).
4. Maximum Recommended Air Flow through Free Area: 803 feet per minute (4.08 m/s).
5. Air Flow: 6890 cubic feet per minute (3.25 m^3/s).
6. Maximum Pressure Drop (Intake): 0.15 inches w.g. (0.035 kPa).
7. Water Penetration: Maximum of 0.01 ounces per square foot (3.1 g/m2) of free area at an air flow of 803 feet per minute (4.08 m/s) free area velocity when tested for 15 minutes.

D. Design Windload: Per Code.

E. Louvers shall be factory engineered to withstand the specified seismic loads.
1. Minimum design loads shall be calculated to comply with ASCE – 7, or local requirements of Authority Having Jurisdiction (AHJ).

2.3 ACCESSORIES

A. Bird Screen: Install insect screens on intake louvers and bird screens on exhaust louvers. Do not install insect screens on HVAC intake louvers.
1. Aluminum: Aluminum, 5/8 inches by 0.040 inch (16 mm by 1 mm), expanded and flattened.
2. Frame: Removable. Re-wireable.

B. Insect Screens: Install insect screens on intake louvers and bird screens on exhaust louvers. Do not install insect screens on HVAC intake louvers.
1. Aluminum: 18-16 mesh, mill finish, .011 inch (0.3 mm) wire.
2. Frame: Aluminum.

C. Extended Sills:
1. Extruded aluminum, Alloy 6063-T6. Minimum nominal thickness 0.060 inch (1.5 mm).

2. Formed aluminum, Alloy 3003. Minimum nominal thickness 0.081 inch (2.1 mm).

D. Visible Mullions: Manufacturer's standard horizontal or vertical visible mullions for architectural accent as indicated on drawings.

2.4 FINISHES

A. Finish: 70 percent PVDF: Finish shall be applied at 1.2 mil total dry film thickness.

1. Coating shall conform to AAMA 2605. Apply coating following cleaning and pretreatment. Cleaning: AA-C12C42R1X.

a. Standard 2-coat.

2. 20-year finish warranty.

B. Color: Color to be selected by Architect.

2.5 MATERIALS, GENERAL

A. Fastenings: Use same material as items fastened, unless otherwise indicated. Fasteners for exterior applications may be hot-dip galvanized, stainless steel or aluminum. Provide types, gages and lengths to suit unit installation conditions. Use Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

B. Anchors and Inserts: Use metal anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required.

C. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

2.6 FABRICATION, GENERAL

A. Provide louvers and accessories of design, materials, sizes, depth, arrangement, and metal thicknesses indicated, or if not indicated, as required for optimum performance with respect to airflow; water penetration; air leakage where applicable (for adjustable units, if any); strength; durability; and uniform appearance.

B. Fabricate frames including integral sills to suit adjacent construction with tolerances for installation, including application of sealants in joints between louvers and adjoining work.

C. Include supports, anchorages, and accessories required for complete assembly.

D. Provide sill extensions and loose sills made of same material as louvers, where indicated, or required for drainage to exterior and to prevent water penetrating to interior.

E. Maintain equal blade spacing, including separation between blades and frames at head and sill to produce uniform appearance.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Prepare substrates and openings using methods recommended by manufacturer for achieving best result for substrates under project conditions.

B. Do not proceed with installation until substrates and nailers have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

C. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

1. Locate and place units level, plumb, and at indicated alignment with adjacent work.

2. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws

where required to protect metal surfaces and to make a weathertight connection.

3. Form closely fitted joints with exposed connections accurately located and secured.
4. Provide perimeter reveals and openings of uniform width for sealants and joint fillers as indicated on Drawings.
5. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
6. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

B. Install concealed gaskets, flashings, joint fillers, and insulation, as installation progresses, where weathertight joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during installation.

3.3 ADJUSTING, CLEANING AND PROTECTION

A. Test operation of adjustable louvers and adjust as needed to produce fully functioning units that comply with requirements.

B. Protect products from damage until completion of project. Use temporary protective coverings where needed and approved by manufacturer. Remove protective covering at the time of Substantial Completion.

C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 10410 - IDENTIFYING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Types of identifying devices specified in this section include the following:

1. Room Signs (See Door Schedule)

B. Note to the Contractor: If the Contract Sum (as awarded) is $100,000.00 or more, the Contractor shall furnish and erect a project sign and interior plaques as shown in “Detail of Project Sign” (DCM Form C-15) and “Plaque Detail” bound in the Project Manual at the end of “General Conditions”. The project sign shall be erected in a prominent location selected by the Architect and Owner and shall be maintained in good condition until completion of Work.

C. Extent of signs is indicated on the drawings.

1.3 QUALITY ASSURANCE

A. Drawings and Specifications are based on one manufacturer's standard products. Another standard system of a similar and equivalent nature may be acceptable when the differences do not materially detract from the design concept or intended performance as judged solely by the Architect.

B. General Contractor is responsible for verifying signage requirements and correct wording, names etc. with Owner and Architect before ordering.

1.4 SUBMITTALS

A. Shop Drawings: Submit shop drawings for each type of device. Include large scale sections of typical members and other components. Provide dimensioned elevations. Show anchorages, grounds and reinforcement and indicate finishes.

PART 2 - PRODUCTS

2.1 ROOM SIGNS

A. MANUFACTURER:

1. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function.

a. ASI Sign Systems, Inc., 8181 Jetstar Drive, Suite 100, Irving, TX 75063; www.asisignage.com; 1-800-274-7732

b. Best Sign Systems, www.bestsigns.com; 1202 N. Park Avenue, Montrose, CO 81401-3171, Phone (970) 249-2378 or 1-800-235-2378; Fax (970) 249-0223

c. Leeds Architectural Letters of Alabama Inc, www.leedsletters.com; P.O. Box 40, Leeds, AL 35094; Phone (205) 699-5271; Fax (205) 699-3342

d. Bayuk Graphic Systems, Inc., www.bayukgraphics.com; 5005 Old Lincoln Highway Parkesburg, PA 19365; Phone: (717)-442-0274; Fax: (717)-442-1289

e. Mohawk Sign Systems; www.mohawksign.com; 5 Dandreano Dr, Amsterdam, NY 12010; Ph. 518.842.5303.

2. Substitutions: Equal products of other manufacturers may be used in the work, provided such products have been approved by the Architect, not less than Ten (10) days prior to scheduled bid opening.

B. MATERIALS:

1. Provide 6" x 8" high laminated plastic with raised lettering complying with the Americans with Disabilities Act (ADA).
2. All Signs MUST include 1” Slide In Window Slot.
3. Color to be selected by the Architect after bid date from manufacturer standards.
4. Use International Symbols of accessibility for identifying facilities as accessible.
5. Letters and numerals shall be raised 1/32 in (0.8 mm) minimum, upper case, sans serif or simple serif type and shall be accompanied with Grade 2 Braille.
6. Raised characters shall be at least 5/8 in (16 mm) high, but no higher than 2 in (50 mm).
7. Pictograms shall be accompanied by the equivalent verbal description placed directly below the pictogram. The border dimension of the pictogram shall be 6 in (152 mm) minimum in height.
8. **See Door Schedule. If not shown provide 20 letter characters per room sign.**
9. **The Supplier will be required to meet with the Owner for exact wording for all room signs before preparation of the shop drawing submittal to the Architect for approval.)**
10. Tactile characters on signs shall be located 48 inches (1220 mm) minimum above the finish floor or ground surface, measured from the baseline of the lowest tactile character and 60 inches (1525 mm) maximum above the finish floor or ground surface, measured from the baseline of the highest tactile character.
    a. Where a tactile sign is provided at a door, the sign shall be located alongside the door at the latch side.
    b. Where a tactile sign is provided at double doors with one active leaf, the sign shall be located on the inactive leaf.
    c. Where a tactile sign is provided at double doors with two active leafs, the sign shall be located to the right of the right hand door.
    d. Where there is no wall space at the latch side of a single door or at the right side of double doors, signs shall be located on the nearest adjacent wall.
    e. Signs containing tactile characters shall be located so that a clear floor space of 18 inches (455 mm) minimum by 18 inches (455 mm) minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position. Mounting devices shall be concealed.

2.2 PROJECT SIGN

A. MATERIALS

1. Refer to *Detail of Project Sign (DCM Form C-15, August 2021)* at the front end of the project manual.

B. Wording on the project sign shall read as follow.

STATE OF ALABAMA

THE DEKALB COUNTY BOARD OF EDUCATION
MR. KELLY ARMSTRONG, PRESIDENT
MR. RANDY PEPPERS, VICE PRESIDENT
MR. MONTY DARWIN, BOARD MEMBER
MR. ROBERT ELLIOT, BOARD MEMBER
MRS. CAROL HIETT, BOARD MEMBER
MR. WAYNE LYLES, SUPERINTENDENT

Cafeteria Addition
Crossville High School for
Dekalb County Board of Education
Crossville, Alabama

Alabama Real Property Management, Division of Construction Management

LATHAN MCKEE, ARCHITECTS

(COMPANY NAME), CONTRACTOR

2.3 FABRICATION

A. General: Fabricate signs to comply with requirements indicated including, dimensions, design details, quality, thickness and finish of materials. Use materials and shapes of sufficient thickness, with reinforcing, if needed, to produce sufficient flatness, free of “oil canning”, and to impart sufficient strength for size, design and application indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units plumb and level, in locations and with mounting shown. Securely attach to the supporting structure with concealed fasteners, in accordance with the manufacturer's installation instructions.

3.2 CLEANING AND PROTECTION

A. At completion of the installation, clean surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION

SECTION 10500 - LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Products in this section include the following:

1. KD Metal Lockers - Staff Wardrobe

1.3 QUALITY ASSURANCE

A. Uniformity: Provide each type of metal locker as produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.

B. **Imported Manufactured/Fabricated Lockers will not be accepted**.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for metal locker units.

B. Samples: Submit color samples on squares of same metal to be used for fabrication of lockers.

C. Shop Drawings: Submit shop drawings for metal lockers, verifying dimensions affecting locker installations. Show lockers in detail, method of installation, fillers, trim, base, and accessories. Include locker numbering sequence information.

1.5 JOB CONDITIONS

A. Do not deliver metal lockers until building is ready for locker installation. Protect from damage during delivery, handling, storage and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. List Industries Inc., Superior (Basis of Design); 401 Jim Moran Blvd., Deerfield Beach, Florida 33442; www.listindustries.com; PH: 1.800.776.1342.
2. Penco; 1820 Stonhenge Drive, Greenville, NC 27858; www.pencoproducts.com; PH: 800.562.1000.
3. De Bourgh Manufacturing Co. | 27505 Otero Ave. La Junta, CO 81050 | Ph: 800.328.8829 | www.debourgh.com.
4. Tennsco Corp. | 201 Tennsco Drive, Dickson, TN 37055 | PH: 866.446.8686 | www.tennsco.com.
5. Lyon; 420 N. Main Street, Montgomery, IL 60538; www.lyonworkspace.com.; PH: 800.433.8488.

2.2 MATERIALS

A. Superior Classic KD Lockers (Standard Knock-Down Construction)

1. **Construction**: Fabricate lockers square, rigid and without warp, with metal faces flat and free from dents or distortion. Make all exposed metal edges safe to touch. Weld frame members together to form rigid, one-piece structure. Weld, bolt, or rivet other joints and connections as standard with manufacturer. Grind exposed welds flush. Do not expose bolts or rivet heads on fronts of locker doors or frames except for fastening of number plates and recessed

handle.

2. **Frames**: Fabricate of 16 gauge (minimum) channels, with integral continuous door stop/strike formed on both latch and hinge side vertical members. Cross frame members of 16 gauge channel shapes, including intermediate cross frame members on double and triple tier (frames with doors over 18" high) lockers shall be securely welded to the vertical framing members to ensure rigidity. Rubber bumpers shall be provided to cushion door closing.
3. **Finishing**: All locker parts to be cleaned and coated after fabrication with a seven stage zinc/iron phosphate solution to inhibit corrosion, followed by a coat of high grade custom blend powder electrostatically sprayed and baked at 350 degrees Fahrenheit for a minimum of 20 minutes to provide a tough durable finish. Color to be selected from manufacturer's standard list of colors. Interior components to be painted #729 Parchment. Two-Tone Color Combination: Shall be at no additional cost with the locker frame and trim chosen from one color and the doors may be one of any other color chosen from manufacturers standard selection.
4. **Wardrobe Doors**: Doors 20" high and over to be fabricated from single sheet prime 16 gauge (18 gauge for doors 9" wide as well as Two-Person and Duplex doors) with single bends at top and bottom and double bends at the sides. The channel formed by the double bend at the latch side is designed to fully conceal the lock bar. Doors shall be louvered.
5. **Box Doors:** Doors 18" high and under to be fabricated from single sheet prime 18 gauge with single bends at top, bottom and sides. Doors shall include a combination friction catch door pull. Padlock Strike Plates are optional. Doors shall be fabricated to accept a built-in combination lock or padlock. Doors with projecting spring latches shall not be acceptable. Doors shall be louvered.
6. **Ventilation**: Provide stamped, louvered vents in door face not less than 6 louver openings top and bottom.
7. **Door Hinges:** All doors shall include a 16 gauge continuous piano hinge welded to the door and riveted to the frame. All doors to be right hand, side hinged.
8. **Stainless Steel Recessed Locker Handle:** All wardrobe doors shall have recessed, not less than 304 stainless steel, deep drawn handle shaped to receive a padlock or built-in combination lock. The recess pan shall be deep enough to have the lock be flush with the outer door face. Box doors shall be equipped with a combination friction catch door pull as stated above.
9. **Latch Assembly**: The latching mechanism for wardrobe doors shall be finger lift control type constructed of 14 gauge (minimum) steel with a nylon cover that has a generous finger pull. Spring activated nylon slide latches shall be completely enclosed in the lock channel allowing doors to close with the lock in the locked position. Locking devise shall be designed for use with either built-in combination locks or padlocks. Latch hooks shall be securely welded to the vertical frame channel on the strike side to engage the nylon slide latches. Three latch hooks for doors 48" and higher, two latch hooks for doors under 48" high.
10. **Body**: Fabricate back and sides of 24 gauge (minimum) sheet steel, with double flanged connections extending full height. Form top, bottom and intermediate tier dividers of 24 gauge (minimum) sheet steel with single return bends at all sides. Bolt top and bottom as well as horizontal tier dividers of wardrobe openings to front horizontal frame members at not less than one place in addition to side panels. Form hat shelves at 60” and 72” high single tier lockers of 24 gauge (minimum) sheet-steel with single bends at sides and back and a double bend at front.
11. **Locks (If required):** Shall be master-keyed to one system for the entire project. (See lock use chart for suggested lock application)
12. **Equipment:** Furnish each locker with the following items, unless otherwise shown:
    a. **Single tier lockers:** Openings 60” and 72” shall include one hat shelf, one double prong ceiling hook and a minimum of two single prong hooks.

b. **Double tier lockers:** Openings 30” and 36” high shall include one double prong ceiling hook and a minimum of two single prong hooks.

c. **Triple tier lockers:** Openings 20” and 24” high shall include one double prong ceiling hook only.

d. **Box lockers:** No hooks

13. **Number Plates**: Manufacturer's standard etched, embossed, or stamped, non-ferrous metal number plates with numerals not less than 3/8" high. Number lockers in sequence as directed by Architect. Attach plates to each locker door, near top, centered, with at least 2 fasteners of same finish as number plate.

14. **Continuous Sloping Tops:** Not less than 20-gage sheet steel, approximately 25 degree pitch, in lengths as long as practicable but not less than 4 lockers. Provide closures at ends. Finish to match lockers. Provide tops only at staff lockers located in kitchen.

15. **Separators:** Provide horizontal dividers of not less than 16-gage sheet steel between doors of multiple-tier lockers, to ensure rigidity.

16. **Filler Panels**: Provide filler panels where indicated, of not less than 18-gage steel sheet, factory-fabricated and finished to match locker units.

17. **Warranty:** Superior KD lockers are covered against all defects in materials and workmanship excluding finish, damage resulting from deliberate destruction and vandalism under this section for a period of Two years.

2.3 LOCKER SCHEDULE

A. **Location:** All locker locations as indicated on drawings.

B. **Size:** 12” wide x 12” depth x 72” height

PART 3 - EXECUTION

3.1 PREPARATION

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication of special components, when possible, to ensure proper fitting of work. However, allow for adjustment and fitting of trim and filler panels wherever taking of field measurements before fabrication might delay work.

3.2 INSTALLATION

A. Install metal lockers at locations shown in accordance with manufacturer's instructions for plumb, level, rigid, and flush installation.

B. Space fastenings about 48" o.c., unless otherwise recommended by manufacturer, and apply

C. through back-up reinforcing plates where necessary to avoid metal distortion; conceal fasteners insofar as possible.

D. Install trim, concrete base, sloping top units, and metal filler panels where indicated, using concealed fasteners to provide flush, hairline joints against adjacent surfaces.

E. Provide concrete base for all interior lockers.

3.3 ADJUST AND CLEAN

A. Adjust doors and latches to operate easily without binding. Verify that integral locking devices are operating properly.

B. Touch up marred finishes but replace units which cannot be restored to factory-finished appearance. Use only materials and procedures recommended of furnished by locker manufacturer.

END OF SECTION

SECTION 10531 - ALUMINUM HANGER ROD CANOPY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. The work covered by this section shall include furnishing and installing aluminum hanger rod canopy, with decking and fascia material. The canopy shall consist of structural aluminum panels bound by a framework of fascia which also acts as a water collecting gutter. All components shall be as required to support design loads in accordance with engineering prints and calculations provided by the manufacturer.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings, and accessories.

B. Shop Drawings: Submit shop drawings for fabrication and erection of assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.

C. Samples: Submit full range of color samples for each type of unit required.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following except as otherwise indicated.

1. International Building Code, latest addition with amendments, if any. AWS (American Welding Society) standards for structural aluminum welding.

B. Manufacturer: Obtain aluminum covered walkway system from only one (1) manufacturer, although several may be indicated as offering products complying with requirements.

C. Installer Qualification: Firm with not less than three (3) years experience in installation of aluminum walkway covers of type, quantity and installation methods similar to work of this section.

D. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to insure proper fitting of work. However, allow for adjustments within specified tolerations wherever taking of field measurements before fabrication might delay work.

E. Shop Assembly: Pre-assemble units in shop to greatest extent possible and disassemble as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

F. Coordination: Furnish inserts and anchorages which must be built into other work for installation of rod canopy’s and related work; coordinate delivery with other work to avoid delay.

1.5 PERFORMANCE REQUIREMENTS

A. System Performance: Provide aluminum covered walkway system that has been designed, produced, fabricated and installed to withstand normal temperature changes as well as live loading, dead loading and wind loading in compliance with Standard Building Code requirements for geographic area in which work is located and as follows:

B. The system shall be designed by a registered Engineer in the State of Alabama, certifying the system meets all wind, foundation and all other applicable loads and requirements set forth by local or state building requirements.

1. Live Load:

a. 30 p.s.f. minimum.

2. Structural design for wind forces:

a. Comply with ASCE 7-16

3. Design Wind Velocity:

a. 130 m.p.h.

4. Importance Factor:

a. 1.1.

5. Stability Criteria:

a. 2015 International Building Code

C. Sizes shown on drawings are to be considered minimum.

D. Structure shall be capable of sustaining severe icing, hail, hurricane force winds and supporting a concentrated load such as being walked upon.

PART 2 - PRODUCT

2.1 MANUFACTURERS

A. The following manufacturers products have been used to establish minimum requirements for materials, workmanship, and function:

1. Tennessee Valley Metals, Inc. **(Basis of Design and Standard or Quality) |** 190 Industrial Park Road, Oneonta, Alabama 35121 | (205) 274-9500 | www.tvmetals.com.

2. Dittmer Architectural Aluminum | 1006 Shepherd Road, Winter Springs, Florida 32708 |(800) 822-1755; (407) 699-1755 | www.dittdeck.com; info@dittdeck.com.

3. Superior Mason Products LLC. | 116 Citation Court, Birmingham, Alabama 35209 |(877) 445-1200 | www.superiormetalproducts.com; canopysales@superior-mason.com.

4. Mitchell Metals | 1761 McCoba Dr. SE Suite B, Smyrna, Georgia 30080 | (770) 285-5875 | www.mitchellmetals.net; sales@mitchellmetals.net.

5. Gulf South Metals | 17869 Samantha Drive, Foley, Alabama 36535 | (251) 943-6443; www.gulfsouthmetals.com; info@gulfsouthmetals.com.

6. Equal products of other manufacturers may be used in the work, provided such products have been approved, by the Architect, not less than Ten (10) days prior to scheduled bid opening.

2.2 MATERIALS

A. All aluminum extrusions shall be alloy 6063 heat treated to a T-6 temper.

B. Standard finish for all components shall be satin anodize 204-R1 meeting Aluminum Association Specification AA-M-10C-22A-21.

C. Fasteners:

1. Deck Screws (rivets not permitted): Type 18-8 non-magnetic stainless steel sealed with a neoprene "O" ring beneath 5/8" outside dimension, conical washer.

2. Fascia Rivets: Size 3/16" by 1/2" grip range aluminum rivets with aluminum mandrel.

3. Bolts: All bolts, nuts and washers to be 18-8 non-magnetic stainless steel.

4. Tek Screws: not permitted

2.3 WARRANTY

A. Manufacturer shall warrant the entire system against defects in labor and materials for a period of one (1) year commencing on the date of substantial completion as established in Division One of these specifications.

B. Intention of this warranty is the manufacturer will come onto the jobsite and do all necessary to effect corrections of any deficiencies.

C. Prima Facie Evidence of defects in labor and material may include but is not limited to, one or more of the following:

1. Moisture leaks
2. Metal failure including excessive deflection
3. Fastener failure
4. Finish failure

2.4 FABRICATION

A. Comply with indicated profiles, dimensioned requirements and structural requirements.

B. Use sections true to details with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture, free from defects impairing strength and durability.

C. All welding do be done by heli-arc process.

D. Bents shall consist of shop welded one piece units. When size of bents do not permit shipment as a welded unit, concealed mechanical joints may be used.

E. Mechanical joints shall consist of stainless steel bolts with a minimum of two (2) bolts per fastening. Bolts and nuts shall be installed in a concealed manner utilizing 1/2" thick by 1 1/2" aluminum bolt bars welded to structural members. All such mechanical joints must be detailed on shop drawings showing all locations.

F. Roof Deck: Flush deck extruded aluminum shapes, interlocking self-flashing sections. Shop fabricate to lengths and panels widths required for field assembly. Depth of sections to comply with structural requirements. Provide shop induced camber in deck units with spans greater than 16'- 0" to offset dead load deflections. Welded dams are to be used at non-draining ends of deck.

G. Expansion joints, design structure for thermal expansion and contraction. Provide expansion joints as required.

H. Exposed rivets used to fasten bottom of fascia to deck to have finish to match fascia.

I. Apply a shop applied dip-coat of clear acrylic enamel to each column end terminating in concrete to insulate from electrolytic reaction. Column ends shall be pierced to "key" grout to bent for maximum uplift protection.

J. Finish: Provide enameled finish on all components from manufacturers standards selected by Architect, fascia and related components designed for optimum performance in exterior installations under all environmental conditions. The finish shall be applied in accordance with and conform to, or exceed the Painted Sheet "Quality Standards" and recommended ASTM, Military and/or Federal Test Methods specified by the Aluminum Association in their publication "Aluminum Standards & Data" 1972-1973. Finishes shall be updated as necessary to conform to future editions of this publication.

K. Component Accessories: Roof Brackets, Flashing, etc., shall be of similar materials and finishes as specified for prime components. Each part and its use is described in the engineering prints and calculations provided by the manufacturer. Each part shall be used as specified in the aforementioned prints. Posts shall be used as specified.

L. Hanger rod shall be galvanized steel pipe with finish to match other components.

M. Hardware: All bolts, nuts, washers, and screws used in joining the members of the canopy together shall be stainless steel up to 1/4" diameter nominal size. Any hardware 1/4" diameter and larger shall be hot dip galvanized to withstand 200 hours salt spray test of maximum resistance to rust and corrosion.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle covered walkway system components as recommended by manufacturer. Handle and store in a manner to avoid deforming members and to avoid

excessive stresses.

3.2 EXAMINATION

A. Examine adjacent work for conditions that would prevent quality installation of system.

B. Do not proceed until defects are corrected.

C. Installations:

1. Installed units shall have the following minimum pitch for water drainage of the roof.
2. Minimum pitch for all panels and fascia - Up to 10' - 1/8th/ft.
3. Installed unit shall be properly caulked with a suitable, high quality material where needed and where specified.
4. Installed unit shall meet local building code requirements and conform to the engineering prints provided by manufacturer.

3.3 FIELD DIMENSIONS

A. General contractor shall field confirm bent locations, dimensions and elevations shown on shop drawings prior to fabrication.

3.4 CLEANING AND PROTECTION

A. Damaged Units: Replace roof deck panels and other components of the work which have been damaged or have deteriorated beyond successful minor repair.

B. Cleaning: Remove protective coverings at time in project construction sequence which will afford greatest protection of work. Clean finished surfaces as recommended by manufacturer. Maintain in a clean condition during construction.

END OF SECTION

SECTION 10800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 GENERAL

A. Drawings and general provisions of contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 RELATED DOCUMENTS

A. Section 06100, Rough Framing for Blocking

1.3 DESCRIPTION OF WORK

B. Extent of each type of toilet accessory is indicated on drawings and schedules.

C. NOTE: Prior to placing any orders for items within this section, the General Contractor is responsible for verifying all toilet accessories with the Owner. Should the owner choose to provide/supply any of these toilet accessories, the General Contractor shall issue a deductive Change Order for material only. The General Contractor will maintain responsibility for installation.

D. Toilet Accessories **Furnished and Installed by the Contractor** as follows:

1. Soap Dispensers
2. Toilet Tissue Dispensers
3. Paper Towel Dispensers
4. Grab Bars

1.4 QUALITY ASSURANCE

A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.

B. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

C. Products: Provide products of same manufacturer for each type of accessory unit and for units exposed in same areas, unless other- wise acceptable to Architect.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for each toilet accessory.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. The following manufacturer's products have been used to establish minimum standards for materials, workmanship and function.

1. Soap Dispensers:

Wall Mounted over each sink

a. Approved Products:

i. Bobrick #B-2112

ii. ASI #0345

iii. Bradley #6562

2. Toilet Tissue Dispensers:

a. Roll Type: (One each water closet)

b. Approved Products:

i. Bradley #5425

ii. ASI #0040

3. Paper Towel Dispensers:

a. Roll Type

b. Surface Mounted

c. Approved Products:

i. Bobrick #B72860

4. Grab Bars:

a. Where shown on Plans with Safety-Grip Finish.

b. Approved Products:

i. Bradley Corporation #8122

ii. Series ASI # 3800P

iii. Bobrick #B6806.99

B. Equal products of other manufacturers may be used in the work provided such products have been approved by the Architect not less than Ten (10) days prior to scheduled bid opening.

2.2 MATERIALS, GENERAL

A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gage minimum, unless otherwise indicated.

B. Mirror Units: Mirror glass shall be FS DD-G-451, Type I, Class I, Quality q2, 1/4" thick, with silver coating, copper protective coating, and non-metallic paint coating complying with FS DD-M-411. Mirror shall be provided in stainless steel frames.

C. Fasteners: Screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed.

2.3 FABRICATION

A. General: Stamped names or labels on exposed faces of toilet accessory units are not permitted, except where otherwise indicated; in obtrusive labels on surfaces not exposed to view are acceptable. Where locks are required for a particular type of toilet accessory, provide same keying throughout project.

B. Furnish two keys for each lock.

C. Surface Mounted Toilet Accessories General: Except where other- wise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

D. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all welded construction, without mitered corners. Hang doors or access panels with full-length stainless steel piano hinge. Provide anchorage which is fully concealed when unit is closed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install toilet accessory units in accordance with manufacturer's instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations and at heights indicated.

3.2 ADJUSTING AND CLEANING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish all exposed surfaces after removing labels and protective coatings.

END OF SECTION

SECTION 11 40 00 – FOOD SERVICE EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. All General Provisions and Sections of the Project Manual, including the AIA General Conditions and Supplementary Conditions & General Requirements; all bidding documents including the Architectural Specifications, Itemized Specifications, Bidding Requirements, Conditions of the Contract, the Contract Documents, all drawings, all Addenda issued and all applicable Divisions of the Architect's Project Manual apply to all the work specified under this Section. Bidder shall examine all other sections and all other drawings including mechanical and electrical drawings for discrepancies and/or conflicts. It is the responsibility of Food Service Equipment Bidder to obtain access to these Project Manuals and drawings.

B. Each Bidder shall examine the bidding documents carefully and, not later than five (5) days prior to the date for receipt of bids, shall make written request to the Architect for the intent or true meaning of any part of the Contract Documents, or for interpretation or correction of any ambiguity, inconsistency, conflict, discrepancy, omission and/or error that he may discover. Any interpretation, clarification, information, amendment and/or correction is issued as a written Addendum by the Architect. Only a written interpretation or correction by Addendum is binding. No bidder shall rely upon any interpretation or correction given by any other method. Architect will not be responsible for oral interpretations or instructions. Addenda are incorporated, by reference, into the contract. Failure by any bidder to receive any addendum shall not relieve the bidder of any obligation and it is the sole responsibility of each bidder to insure that he has received all addenda. Bidder shall familiarize himself with the site, a complete set of Drawings and Specifications and planned conditions and service connections; his failure to do so shall in no way relieve him of responsibility and no claims for extras shall be allowed in his behalf for failure to do so. Each bidder by submitting his Proposal represents that he has read and understands all the provisions of the Project Manual. Should discrepancies and/or conflicts be discovered after the work has started, the Contractor shall report them to the Architect immediately, and no work connected with the discrepancies and/or conflicts shall be undertaken; or if underway, such work shall be stopped immediately until the Contractor and the Architect agree on the clarification thereof.

C. If there is any conflict within or between any of the Bidding Documents involving the quality or quantity of work required, it is the intention of the Contract that the work of highest quality, greatest quantity, and greatest expense shown or specified shall be furnished. Whether or not the word "all" is used in the specification, coverage is intended to be complete, except where partial coverage is specifically and expressly noted. In all cases where an item is referred to in the singular number, it is intended that the reference shall apply to as many such items as are required to complete the work.

D. Each bidder shall visit the site of the Work and/or review all applicable project drawings. Each bidder shall fully inform himself prior to bidding of the conditions and limitations under which the Work is to be performed. He shall include in his bid a sum to cover all costs in order to perform the Work as related to the conditions and limitations. No allowance will be made to any bidder because of lack of such examining knowledge. The submission of a bid will be construed as conclusive evidence that the bidder has made such examination.

1.3 PROJECT FORMS

A. Forms used on this Project (not inclusive) are AIA documents outlined in the Architectural specifications.

B. Within forty-eight (48) hours after written or verbal notification from the Architect or his authorized representative has been received by the General Contractor/Food Service Equipment Contractor, an itemized cost for the food service equipment shall be submitted to the Architect and his Food Service Consultant. With the itemized cost, the Food Service Equipment Contractor is required to identify each items manufacturer and model number as based on the itemized equipment specifications and all addenda. Any applicable bond amounts are entered separately.

1.4 BIDDER RESPONSIBILITY

A. Bidders shall carefully examine the contract and conditions therein affecting work and procedure prior to submitting bids for which contract will be binding.

B. Bonding and Insurance requirements are given in another section of the Project Manual.

C. Instructions for completion of Schedule of Value, Payment Request, etc., are found in a preceding section and are the standard AIA procedure as modified by the Architect.

D. In addition to the progress schedule required by the AIA General Conditions, the Food Service Equipment Contractor also submits his proposed scheme of work for approval, describing proposed sequences of work from beginning to completion of the Work and their correlation with the Owner's specific requirements. Equipment is not delivered, removed from the crates, set-in-place until as a minimum all painting has been completed; ceilings, hood and ventilation duct work are in place; floor is acid cleaned (IF APPROPRIATE); all rough-in connections are in place. Site must be ready for final connections.

1.5 SCOPE OF WORK

A. The work covered by this Section includes the following:

1. Furnishes all food service equipment shown, including all labor, materials, tools and equipment necessary for the complete installation of kitchen equipment and refrigeration in a first-class manner, including all work incidental thereto in accordance with the drawings and these specifications.
2. Provide superintendent who, shall be devoted full time to this project during installation, shall be available to the other trades for verification of connection location, "etc." as needed, and shall direct, coordinate and supervise all work associated with this Section and inspects all equipment provided under this Section.
3. Provide equipment with threaded outlets for type of connections as standardized by Food Service Equipment Manufacturers for other contractors to make final steam, plumbing, electric and ventilating connections.
4. Provide all labor and material necessary to adequately insulate and seal any and all penetrations in Food Service Equipment. All penetrations are to be insulated and sealed properly to prevent condensation on inside of boxes.
5. Erect the equipment at the site in full compliance with all current local, state and Federal rules, regulations and codes.
6. Attend construction meetings and any other scheduled meetings as necessary to maintain coordination related to this Section.
7. Provide coordination of Food Service Equipment shop drawings, submittal data and installation activities, as required and identified in Division 1 Section ”Project Management and Coordination”
8. All labor is to be performed in the best and most workmanlike manner. The standards of the work required are of such grade as will bring first class results. Materials and/or workmanship not in compliance with the drawings and specifications or are improperly installed shall be removed and replaced with no change in contract price or other cost to the Owner.

9. Cleans up all debris resulting from the work of this Section immediately upon completion of installation and removes same from premises.
10. Field verify all measurements on-site (including shelving); verify the placement of pipes, sleeves, hood, pant-leg duct, drains, power, and walk-in wood breaker strip locations prior to the pouring of the floor slab or, if in an existing facility, prior to the installation of such services. Any modification necessary to the equipment because of the location of service connections must be brought to the attention of the Architect immediately for approval if the modifications require design changes. Measurements shown on drawings are approximate and are for estimating purposes only. Verify all electrical and mechanical requirements for all new, existing and future equipment with all appropriate trades, consultants, and engineers. Supplier of Food Service Equipment must examine roughed-in mechanical and electrical services. Notify the General Contractor in writing of unsatisfactory locations and dimensions of other work, and of unsatisfactory conditions for proper installation of Food Service Equipment. Do not proceed with fabrication or installation until unsatisfactory dimensions and conditions have been corrected. Any costs related to the failure of performing this function will not be borne by the Owner.
11. Verify all plug types and lengths of all cord and plug sets on equipment for which it is supplied. All cord sets are to contain an equipment grounding conductor and be furnished with caps or plugs listed or recognized by Underwriter's Laboratories.
12. Confer with the General Contractor on all measurements, location and measurement of recesses and openings, verification of all connection requirements, etc.; coordinate with the General Contractor the scheduling and transfer of all pertinent information (measurements, drawings, connection data, etc.,) to other trades who will be involved in the work associated with this Section.

B. Related Sections include the following:
1. Division 1 Section “Submittal Procedures” for submittal preparation and coordination.
2. Division 1 Section “Project Management and Coordination”.
3. Division 22 for Plumbing/Piping Work
4. Division 23 for Ventilation Work requirements.
5. Division 26 for Electrical requirements

1.2 DEFINITIONS

A. The term "Complete Installation" means the delivery of all kitchen equipment and refrigeration, with transportation and trucking charged prepaid to the building site, removal from crates, assembled, set in place, leveled, ready for final connection, re-leveled, calibrated, started-up and adjusted, cleaned, demonstrated, with Owner Training complete. All equipment to be cleaned using cleaners approved by and as recommended by the manufacturers to a condition of sanitation ready and acceptable for intended food service use. Equipment is cleaned just prior to Owner's acceptance.

B. Work denoted as "Furnished By Others” (F.B.O.) or "By Other Trades" in Part 3, Equipment Schedule, in this Section will be furnished and installed under other Sections.

C. Any reference to “standard” in Part 3, Equipment Schedule, in this Section is to be supplied whether or not it is identified as standard by the manufacturer.

D. GENERAL COORDINATION NOTE:

Utility sizes, connections and locations are based on the Food Service Drawings and Specified Equipment in Section 11 40 00. Alternates are listed BUT it is the responsibility of the Food Service Contractor to compare utilities between manufacturer specified, prime specification, and alternates listed. If alternate equipment is submitted for approval to the Architect by the awarded bidder and is different than prime specifications and has different utilities; it is the General Contractor and Food Service Contractor responsibility for these changes and/or costs. There will not be ANY change orders approved after the bid for substitutions and/or cost associated with substitutions. This is a non-negotiable statement.

1.3 PERMITS AND LICENSES

A. Pay all costs for permits, licenses, and fees, which are required for the work associated with this Section, and which may arise incidental to fulfilling of these specifications.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Upon demand, provide evidence satisfactory to the Architect and Owner of having successfully completed Food Service Equipment projects of a size comparable to this one, and having sufficient experience in the work called for to assure completion of this project in a satisfactory manner. If requested, submit as a minimum the following information to the Architect within five days of receipt of request: Number of years in Food Service Equipment Industry; Key organizational personnel; Credit rating for this contract; Total amount of work under other contracts this date; Certificate of Licensing from State Licensing Board of General Contractors; past experience in the work called for to assure completion of the work in a satisfactory manner including names of projects, project contract amounts, scope of projects, names, addresses and telephone numbers of references of projects. If requested, submit evidence of sufficient financial resources for completion of this project.

2. The following Food Service Contractors are pre-approved for this project.

Birmingham Restaurant Supply, Inc. (BRESCO) 205.252.0076 / 800.344.2455
estimating@brescoinc.com
Mobile Fixture 251-342-0455/ Josh Sessions cell 251-422-7863
Joss.sessions@mobilefixture.com
Singler/H & R Division Office: 228-865-9095 Cortney Bates Cell: 601-502-4108
cbates@singerequipment.com
Dykes Restaurant 256-799-7029 / Billy Lynch cell 256-658-9609
blynch@dykesfoodservice.com

B. Custom Equipment Fabricators:
1. It is required that all fabricated equipment such as food serving units, tables, sinks, counter tops, etc., described in the following specifications, other than by name and catalog numbers, be manufactured by an equipment fabricator who has the plant, personnel, and engineering facilities to properly design, detail and manufacture high quality food service equipment. All work in the above category shall be completed by one manufacturer with standard unit assembly and uniform design and finish.

1.5 SUBMITTALS

A. Submittal booklets, electronic, shall contain the following information:

Within 30 days after notice to proceed, and prior to equipment purchase, submit one (1) bound set and PDF copies on THUMB DRIVE of manufacturer's specification and data sheets, describing articles and equipment, as specified, for approval. Illustrations need not be manufacturer's original literature sheets. Each submittal must include manufacturer's literature for each item and a type written specification sheet showing item number, quality to be furnished, manufacturer's name, model number and list optional finishes and accessories to be supplied. In addition, show plumbing and electrical characteristics and/or BTU rating and indicate if electrical cord and plug will be furnished. Material shall be assembled in order by item number as specified herein and brochure shall be complete and include all items. After approval, FSEC to provide six (6) bound sets to General Contractor for distribution to Owner, Architect and Engineers.

B. Shop Drawings, electronic, are required for the following:

1. All custom fabricated equipment including walk-in cooler/freezer, stainless steel fabrication and serving line units, dimensioned and drawn at a minimum scale of 3/4" to the foot, with necessary cross sections at a minimum scale of 1½" to the foot, showing complete detail for each item of specially fabricated equipment. Indicate name of manufacturer.
2. Separate mechanical and electrical rough-in drawings with dimensions showing rough-in locations and final connections for each piece of equipment with each connection shown giving size, height and an explanation with each connection cross-referenced to the specification sheets or shop drawings. Rough-in shall be drawn at a minimum scale of ¼" to the foot. Above finished floor dimensions are required. All electrical connections are to be water tight or located at a height to prevent water from entering. Coordinate height of rough-ins so as not to interfere with the sealing of tables, over shelves and sinks to the walls, etc., as well as at heights for the convenience of the operator. Verify heights required and coordinate with the other trades as required.
3. Service connections located under the exhaust hood must be located to provide the capture space as shown on the enlarged kitchen plan. Space between the backs of the equipment or between the backs of the equipment and wall must be maintained as shown when locating the service connection under the hood. For serving line units, location of floor drains and electrical outlets must be coordinated with the location of drains and cord and plugs on the units.
4. All convenience outlets and convenience drains are to be included on the electrical and mechanical rough-in dimensioned drawings.
5. Dedicated electrical service for computer is required in the manager's office. See electrical, mechanical and plumbing drawings for numbers and locations.
6. Exposed conduit, surface mounted disconnects, surface mounted panel boxes and surface mounted equipment control panels are not permitted unless indicated otherwise or with the permission of the Architect.
7. Provide dimensioned details, sections or elevations for all wall openings for equipment such as pass-thrus, dish machine, chutes, etc.; for all wall or floor recesses for equipment such as walk-in cooler/freezer, floor troughs, wash down system junction boxes and remote stations, waste system control panels, etc. All cross sections, elevations and details are to be drawn at a minimum scale of 1½" to the foot.
8. Provide a dimensioned food service equipment layout separate from the dimensioned electrical and mechanical rough-in drawings showing the placement of all equipment, including the ventilation hood. An itemized equipment schedule is to be included.
9. Provide an electrical and mechanical schedule identified by Item number and description showing the exact electrical and mechanical characteristics required for each item, including comments concerning final connections and interconnections. Power/fuel requirements, water/drainage requirements and similar information are to be included.
10. All drawings are to be based upon the food service equipment layout and itemized specifications. Drawings will include accurately dimensioned layouts and locations for all masonry bases, if required or called for, and will include accurately dimensioned details and locations of any special wall openings that are required for equipment extending through walls.
11. All rough-in connections located in walls are to be dimensioned to avoid any cove tile, stainless steel bases, shelves, table, counter tops, and backsplashes.

C. Submittal requirements are as specified in Division 1 Section “Submittal Procedures”

1.6 MATERIAL AND WORKMANSHIP

A. Unless otherwise specified or shown on drawings, all material is to be new, of best quality, perfect and without flaws, and delivered upon completion in an undamaged condition.

B. All workmanship is required to be the best of its respective kind. All labor to be performed in a thorough workmanlike manner by qualified, efficient and skilled mechanics.

C. Equipment will be inspected after delivery and any equipment found not to be in accordance with specifications, drawings and/or approved shop drawings will be rejected and shall be replaced with the approved equipment ,with associated cost borne by the Contractor. Any defects found during inspection must be remedied to the satisfaction of the Owner and Architect.

1.7 STANDARDS

A. All equipment shall be constructed in strict compliance with the standards of the National Sanitation Foundation (NSF) and in full compliance with the Public Health Regulations of the State in which installation is made. Each piece of equipment must bear "Seal of Approval" label of the National Sanitation Foundation, if applicable.

B. Dish machines must conform to the latest adopted standards, and electrical and gas cooking and warming equipment must conform to the latest adopted standards, as established by the National Sanitation Foundation, Ann Arbor, Michigan.

C. ANSI Standards: Comply with applicable ANSI standards for electric powered and gas burning appliances, for piping to compressed gas cylinders, and for plumbing fittings including vacuum breakers and air gaps to prevent back siphonage in water piping.

D. NFPA Codes: Comply with the latest adopted NFPA Codes, "National Electrical Code", "Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment'", and "National Fuel Gas Code".

E. ASME Boiler Code: Construct steam generating and closed steam heated equipment to comply with the latest adopted ASME Boiler and Pressure Vessel Codes.

F. All electrical equipment is U.L. Approved and Listed.

G. All gas equipment is AGA Approved and Listed.

1.8 COMPLIANCE WITH LAWS AND CODE REGULATIONS

A. Nothing in the Contract Documents shall be construed to conflict with any local, state or federal laws or regulations governing the installation or any part of the work to be performed under this Contract, and all requirements shall be in accordance therewith, without any additional cost to the Owner.

1.9 INSPECTION OF WORK

A. The Owner, Architect, or their duly authorized representative shall have free access to the work covered by these specifications for the purpose of observation, in the shop, in storage and at the job site, of the work for conformance with the Contract Documents. Nonconforming work and/or equipment shall be corrected when

1.10 WAREHOUSING

A. Because of the possibility of damage to the kitchen equipment, it is not shipped directly to the job site. It is shipped to the Food Service Equipment Contractor's warehouse and delivered and removed from crates by him. The one exception to this is the fabricated equipment which may be shipped at a time when the building is ready to receive it and which may be delivered direct to the job site. The delivery time is coordinated with the General Contractor to arrive at a time when it will not interfere with the operation of other contractors, but in time for the various tradesmen to make their final connections.

B. Stored materials must be stored in an insured warehouse by the Food Service Equipment Contractor. The Food Service Equipment Contractor is totally responsible for stored equipment.

C. Receipt, unloading, removal from crates, etc., is the sole responsibility of the Food Service Equipment Contractor.

1.11 ROYALTIES AND PATENTS

Food Service Equipment Contractor pays all fees and royalties for patented articles used under this specification.

1.12 WORK BY OTHER TRADES

B. The work to be provided under other Sections includes roughing-in to points indicated on the mechanical, plumbing and electrical plans, final connections from rough-in point to various pieces of Food Service Equipment requiring such connections, final connection between various pieces of equipment or within pieces of equipment as required, and the supplying of all necessary materials, tools and labor for this work.

C. Electrical Work performed under Division 26 includes the following:
1. Interior wiring and/or control wiring in walk-in cooling equipment, wiring for lights in walk-in cooler/freezer units, sink heaters and ice cream makers.
2. Electrical connections to compressors, blower coils, controls, lights, etc.
3. Install all conduit and wiring for rough-in, final and inter-connections and makes all final connections within, between, and to Food Service Equipment.
4. Wiring for lights in walk-in refrigeration equipment shall be run through conduit installed on the ceiling inside the boxes and not on the top of the boxes. See Installation Instructions, this Section for description of fasteners and use of mastic.
5. Provide any sleeves required for power, controls or alarms.
6. Furnish and install all disconnect switches, safety cut-outs, control panels, fuse boxes, or other electrical controls, fittings, and connections.
7. Install motor starters and switches, which are furnished with Food Service Equipment.
8. Install all cord and plugs, which are furnished loose with Food Service Equipment.
9. Coordinate the installation of electrical components for Food Service Equipment so as to be in compliance with related local codes and regulations.
10. Note that all electrical work related to this Section shall be in compliance with the requirements for WET LOCATION unless otherwise noted.

D. Plumbing/Piping Work performed under Division 22 includes the following:
1. Provide rough-in and make all final connections including all materials and labor for gas, water and waste within, between and to the Food Service Equipment.
2. Install all faucets, lever waste drains, hose reels with mixing valves and gas pressure regulators, which are furnished with Food Service Equipment.
3. Plumbing connections to compressors, blower coils.
4. Provide any sleeves required for installation of refrigeration tubing or other piping.
5. Piping extensions from fixtures to floor drains and floor sinks for walk-in refrigeration.
6. Flush all lines free of foreign matter before connecting fixtures.
7. Provides water supply piping, traps, check valves, water pressure reducing valves, vacuum breakers, tail pieces and fittings, waste piping, floor drains, gas pressure regulators, shut-off valves, and all other necessary fittings.
8. Provide back flow prevention devices required by regulatory codes and/or the Public Health Department, and install any back flow prevention devices supplied by the Food Service Equipment
9. Provide half drain covers on floor drains or floor sinks for free flowing drain connections where required to prevent water from splashing on surrounding floor and/or equipment.

E. Ventilation Work performed under Division 23 includes the following:

1. Furnishes and installs necessary ventilation facilities of sufficient capacity to operate the equipment.
2. Furnishes and installs required vent ducts and transitions, and exhaust hood fans, and connects to equipment.
3. Note the ventilator shown in drawings is approximated size of ventilator capture area only.

F. General Work performed under Divisions 3 through 9
1. Provide a finished floor that is level unless noted otherwise in the Itemized Specifications or on the enlarged Food Service Equipment drawing. Floors are not pitched to drains because of the extensive use of mobile equipment. Leveling of the floor surface in the serving area, under Pass-Thru Refrigerated and Heated Cabinets, under the hood and in the walk-in Cooler/Freezer recess is critical. Equipment in the serving area are equipped with casters and cannot be leveled except by the floor and will not lock together if the floor is not level.
2. Provides all openings and penetrations in walls, ceilings, roofs, etc., for the food service equipment as required and finishes such openings as specified on the Construction Documents

1.13 ENVIROMENTAL PROTECTION
A. It is the intent of these specifications to exclude all substances which are potentially hazardous.
B. The Food Service Contractor is to be aware of this intent and verify though his suppliers and manufacturers that all materials and products provided for this facility are free of know environmental hazardous substances including formaldehyde and asbestos related materials. No such materials shall be installed, even on a temporary basis in any location of the project.

PART 2 - PRODUCTS

2.1 EQUIPMENT MANUFACTURERS

A. Manufacturers: The equipment specified in Part 3, Equipment Schedule, shall be construed as a **basis-of-design** product and as such sets forth not only quality, standard/optional features but also equipment connection requirements. Acceptable equipment manufacturers shall be listed on a per equipment item basis. Due to the variations of equipment connection requirements from manufacturer to manufacturer the Food Service Equipment Contractor shall be responsible for the following when providing a listed acceptable equipment manufacturer other than the basis-of-design product.
1. Food Service Contractor shall make the General Contractor aware of any differences in connection requirements, including but not limited to the following:
a. Electrical amperage.
b. Waste connections and volume.
c. Water (hot and cold) connections and volume.
d. Exhaust connections and volume.
2. The Food Service Contractor shall provide, at no additional cost to the Owner, any equipment characteristic consider as a standard on the basis-of-design product but considered as an optional characteristic on the listed acceptable equipment manufacturer.

2.2 FABRICATED EQUIPMENT

A. The material used in manufacturing equipment shall be as hereafter specified. Material that is not definitely specified shall be of the best quality used for its specified or intended purposes. All materials shall be new and free from all defects and imperfections. All fabricated equipment in this specification shall be custom built by a fabricator who has a complete factory with suitable equipment, personnel, and engineering facilities to properly design, detail, and manufacture the highest quality of food service equipment. All fabricated equipment shall conform to the current standards of the National Sanitation Foundation (NSF), Ann Arbor, Michigan. All fabricated equipment shall bear the NSF seal applied before delivery to the job site.

B. Where not defined in Itemized Specifications all General Specifications and Sections take precedent.

C. Deviations or changes from the General Specifications for Fabricated Equipment are found in Itemized Specifications.

D. Where units cannot be fully shop fabricated; fabrication shop shall complete fabrication work at project site.

E. Food Service Equipment Contractor is required to make all field measurements and dimensions and deliver and install all fabricated equipment. Measurements are made wall to wall. Fabricator to allow ¼" for fit.

F. Electrical Specifications
   1. Motors up to and including ½ H.P. are wired to 110, 115, or 120 volts, single phase. Motors over ½ H.P. are wired for 208 or 220 volts, three phase, unless otherwise noted on Architect's plans or in the Itemized Specifications.
   2. Heating Elements having a connected load up to and including 1,000 watts are wired for 110 or 220 volts, single phase. Any heating element over 1,000 watts or any combination of heating elements within one fixture totaling more than 1,000 watts is wired for 208 or 220 volts, single phase, unless otherwise noted on Architect's plans or in the Itemized Specifications. All units are wired to a single master switch.
   3. Provide 480 volt, three phase power where called for in the Itemized Specifications or as noted on Electrical drawings.

G. Switches and Controls
   1. The Food Service Equipment Contractor supplies for each motor driven appliance or electrically heated unit, a suitable control switch or starter of proper type in accordance with Underwriter's Code. Controls that are mounted on vertical surfaces of fabricated fixtures are set into recessed die stamped stainless steel cups or otherwise indented to prevent damage.
   2. All internal wiring for fabricated equipment items, including all electrical devices, wiring controls, switches, etc., built into or forming an integral part of these items are furnished and installed by Food Service Equipment Fabricator in his factory with all items wired completely to a junction box within the fixture ready for final connection to building lines. All receptacles are grounding type listed by Underwriters Laboratories and approved by National Electrical Code. A standard three-prong plug to fit "U" slot grounding type receptacles is provided for all equipment operating off a 110 or 120 volt single phase A.C. electrical outlet. A three-wire cord of suitable length is provided for this equipment as well. All cord sets are to contain an equipment grounding conductor and be furnished with caps or plugs listed by Underwriter's Laboratories.

H. Faucets, Valves, and Fittings
   1. Food Service Equipment Contractor furnishes all faucets and lever waste drains. Sinks are fitted with faucets as called for under each item or as separate item listed as faucets. All special faucets for kettles, pre-wash, etc., are listed under Itemized Specifications.
   2. Faucets are properly tagged with item numbers and delivered to Plumbing Contractor on job for installation. Mounting of faucets to fixtures is responsibility of Plumbing Contractor. Lever waste drains are installed into bottom of sinks by Food Service Equipment Contractor.
   3. Faucets and hose and spray units with a mixing valve shall be provided with internal spring checks to prevent cross flow of water. If mixing faucet is attached to hose and spray unit with back flow prevention device, the faucet may have to be modified with a spring check spindle and/or check valves provided to prevent cross flow of water. Back flow prevention devices must be compatible with base unit and meet Public Health Code. It is the responsibility of the Food Service Equipment Contractor to verify the Public Health requirements and supply back flow prevention devices accordingly.
   4. All other fittings, such as stops, shut-offs, trap valves, etc., furnished and installed by Plumbing Contractor.

5. Openings for faucets and spray units are located by the Fabricator to prevent handles from hitting splash when in the fully open position.

I. Non-Corrodible Alloy
1. Non-Corrodible alloy, or stainless steel, specified hereafter are Type 304 stainless steel, having a standard analysis of 18% chrome and 8% nickel and .08% carbon steel.
2. All gauges, where specified, are United States Standard gauges. All exposed surfaces are given a #4 finish 180 grit. Where manufacturing process and welding disturb the original finish, it is carefully reground, polished and restored to match balance of surface. All gauges, not specified, are United States Type 304, 18-8, 14 gauge stainless steel.

J. Galvanized
1. Where galvanized iron is specified, tight coat galvanized Copper Bearing is furnished in largest possible sheets with as few joints as necessary. The sheets are of an approved grade, re-rolled for smoothness.
2. Paint with hammertone grey enamel which meets U.S.D.A. criteria unless specified otherwise. Underbracing is not painted with hammertone grey enamel.

K. Welding
1. All welding of stainless steel, whether specified or implied, is accomplished by the heli-arc method using stainless steel rod of the same composition as the parts welded. Welds are ground smooth and polished to the original finish of the metal, with the grain uniform to the grain of the original sheet. The stainless steel welds are free of pits, flaws, discolorations, and peened to remove flux and impurities. Where the grinding and polishing have destroyed the grain, restore and blend to obliterate all traces of welding. Welds are ground back to the surface of the original metal and sealed. Acetylene welding will not be accepted. Solder will not be accepted. Shop seams and corners in stainless steel tops shall be welded, ground smooth and polished.
2. All welds of galvanized metal on dish tables and sinks shall be ground smooth and sandblasted and sprayed with molten zinc at 1200 Fahrenheit to a .004 thickness. Tinning of welds is not acceptable.

L. Pipe Stands and Frames
1. All pipe stands for work tables, open base tables, dish tables, sinks and drainboards are constructed of 1-5/8" O.D. stainless steel tubing (16 gauge, type 304) or as indicated in the Itemized Specifications. All stringers and cross bracing are of same material as legs. All joints between legs and cross braces are notched, welded and ground smoothly. Legs fitted at top with fully enclosed stainless steel gussets welded to angle underbracing and stud bolted to top. Legs are attached without the use of bolts and are spaced on maximum of 4' to 5' centers.
2. Crossrails are supplied between each leg. Legs anchored to closed gussets at top only and without crossrails are not acceptable. Constructed of 1-5/8" O.D. stainless steel tubing (16 gauge, type 304).
3. All crossrails are 12" O. A. above floor, or as called for by local health authorities. Verify that height of crossrails does not interfere with service connections.

M. Bracing
1. Bracing is 12 gauge 1" X 4" X 1" galvanized iron channels and 12 gauge 1½" X 1½" X 1/8" galvanized iron angles. See Table Top section for attachment. Amount of bracing provided is as required to reinforce to prevent noticeable deflection. Tops of work tables, dish tables, enclosed base tables, serving counters and drainboards are braced. Clear silicon caulking manufactured to with stand 400° F. temperature water is applied at seam between bracing and tops.
2. Exposed underbracing is 14 gauge, type 304 stainless steel.

N. Sound Deadening
1. Furnish sound deadening pads to break metal to metal contact between bracing and tops on all work tables, dish tables, sinks, drainboards, enclosed base tables and serving counters except where noted otherwise.

2. Furnish sound deadening pads on underside of all sinks including pre-wash and disposal sinks, dish tables, drainboards, and underside of all tables between bracing.
3. Double walled sliding and swing doors are fitted with sound deadening insulation between the walls.

O. Feet
1. All pipe legs are fitted with sanitary die stamped stainless steel bullet shaped feet, fully enclosed with a slightly rounded bottom to protect the floor. Top of these feet are fitted with a male threaded stem to fit into the end of pipe legs hereinabove specified and provide a total adjustment of 1". Stem is extra long so threads are not exposed. Bottom of pipe leg is finished off smoothly and overlap stem to provide sanitary fitting and prevent accumulation of grease or other debris at this joint.
2. Cabinet type fixtures are mounted on 6" high die stamped sanitary one piece stainless steel legs and adjustable feet not less than 3" in diameter at top. Bottom adjusting member to telescope up into inside of upper member and match adjuster on open base units. Legs are fitted with a male threaded stem and have an adjustment of 1" on the 6" high legs. The upper part is stamped in a neat design with flared inverted shoulder, welded to stainless steel base plate designed for anchoring to channel braces below cabinet type fixtures.

P. Table Tops (Metal)
1. Metal table tops are made of 14 gauge stainless steel. See Itemized Specifications for description of edge. Shop seams and corners are welded, ground smooth and polished. Working tops are reinforced on the underside with a framework of 12 gauge 1" x 4" x 1" galvanized iron channel and 1½" x 1½" x 1/8" galvanized iron angles as required. All horizontal and vertical cove corners on a ¼" or larger radius. Height of table top is 34".
2. Tops are reinforced so there will be no noticeable deflections, with reinforcements stud welded to underside of top. Rivets or bolts used through the top are not accepted. Reinforced with 12 gauge 1" x 4" x 1" galvanized iron channel and 1½ " x 1½" x 1/8" galvanized iron angles. Bracing is stud bolted to underside of top with cadmium plated lock nuts. Sound deadening pads are applied to break metal to metal contact between all bracing and underside of top.
3. Field joints are provided in tops where necessary, located for practical construction and consistent with sizes convenient for shipping and accessibility into buildings. See section entitled "Field Joints" for description of these joints.
4. See Itemized Specifications for description of edge.

Q. Dish Table Tops
1. Tops of dish tables are constructed of 14 gauge stainless steel with all free edges turned up 3" and finished with 1½" diameter sanitary rolled rim. Sides and back adjacent to walls or higher fixtures are coved up 8", returned 2½" on a 45° angle, turned straight back 3/4" and straight down ½" along wall edges to an overall height of 10". Table is attached to wall with 12" stainless steel strips (Z clips). All interior horizontal and vertical corners are coved on a ¼" or larger radius. Outside radius of rolled rim corners is concentric with inside cove. Top is reinforced, braced and sound deadened the same as Table Top.
2. Dish Table Tops are mounted on tubular stainless steel legs and adjustable feet with connecting rails the same as specified for pipe stands and frames.
3. Ends of splash are closed. Free corners of tops are spherical.
4. Legs are fitted with adjustable stainless steel bullet feet as described under feet.
5. Field joints are provided in tops where necessary, located for practical construction and consistent with sizes convenient for shipping and accessibility into buildings. See section entitled "Field Joints" for description.

R. Drawers
1. Drawer housing is fully enclosed and is made entirely from 18 gauge 304 stainless steel including any reinforcements, 24" X 24" X 8", or as called for in Itemized Specifications.
2. Internal drawer slide assembly is removable. Drawer slide assembly is stainless steel full extension drawer slides with stainless steel bearing wheels and screws: Standard-Keil 1452 series or Component Hardware Group Inc. S52 series.

3. Drawer face is of 14 gauge stainless steel. Face equipped with an integral handle across the entire top of the drawer.
4. Drawer pan is die drawn with fully coved corners from one piece of 18 gauge 304 stainless steel, 20" X 20" X 5" deep or as called for in the Itemized Specifications. Top edges to flange out 1½". Interior horizontal corners of the pan are rounded on a 1" radius and interior vertical corners of the pan on a 2" radius. The use of solder or other material to fill in these corners is not acceptable.
5. Apply 1/8" mastic sealant between drawer flange and work surface.
6. Tier of drawers is constructed in same manner as single drawer.
7. Drawers over 5" deep provided with drain hole and cap in front.
8. Each drawer mounted on a mobile unit contains (2) concealed magnetic latches with a minimum release tension of twenty pounds located at rear of drawer.
9. Single drawer and top drawer in tier of drawers are fabricated with a trough protector (gutter) to prevent entry of moisture.

S. Undershelves
1. The undershelves on open base tables are solid removable type of 16 gauge stainless steel.
2. Shelf is made in removable sections with rolled down edges on sides which overlap pipe crossrails where they abut same.
3. Abutting sections of shelves are turned down 1" straight.
4. Shelves are notched to legs of table.
5. Size of shelf is fabricated in sections for easy handling and for sending through dish machine.

T. Elevated Shelves
1. Elevated shelves constructed of 14 gauge stainless steel.
2. Shelf is mounted on 16 gauge 1-5/8" O.D. stainless steel tubular supports. Shelf is 12" wide unless stated otherwise; height is 18" and shelf is supported by cantilever supports mounted through the splash and into gusset welded to table bracing. Gusset fitted with set screw.
3. Three supports are required for shelves four to eight feet in length. One additional support is required for each additional three feet over eight feet in length as a minimum.
4. Front and sides have a marine edge. Back side is turned up 90° 2", returned ½" on a 45° angle, turned straight back 5/8", straight down 5/8" and hemmed. Shelf backsplash is capped at both ends. When elevated shelf is attached to a wall, 12" stainless steel "Z" clips and clear silicon caulking that will withstand 190° F. temperature water are used in order for shelf to be attached to wall. Elevated shelf on mobile units is never attached to wall regardless of location.
5. A minimum of ½" of insulation is required to separate heat lamps and shelf when lamp is installed underneath shelf.

U. Sinks
1. Sinks are of the size called for, constructed of 14 gauge stainless steel, type 304 (18-8), #4 finish. Backs, bottoms and fronts shall be formed of one continuous sheet with ends welded in place. Compartment sinks have double wall partitions of same material as sink.
2. Vertical and horizontal corners, including partition, are coved ½" or larger radius, electrically welded, ground smooth and polished.
3. Top edges of sinks at front and ends, except where fitted with integral type drainboards, are furnished with a 1½" die formed integral sanitary roll rim.
4. Across back of sinks, unless otherwise specified, there will be a 10" high backsplash at walls. When sink adjoins side walls, unless otherwise specified, there will be a 10" high sidesplash. Back and sides, where applicable, are coved up 8", returned 2½" on a 45° angle, turned straight back 3/4" and straight down ½" along wall edges to an overall height of 10". Sink attached to wall with 12" stainless steel strip (Z clips). Faucet holes are provided in backsplash 4" down from top. Faucet holes are centered over single compartment sinks and centered over partitions on multi-compartment sinks. Where roll terminates into backsplash the roll is fully welded and polished thereto. Ends of splash are fully enclosed, integrally welded, finished and polished and fully sealed by welding to meet NSF requirements unless specified otherwise. Sinks not adjacent to wall are equipped with backsplash that is fully enclosed, integrally welded, finished and polished and fully sealed by welding. Access openings are provided by the fabricator in the top and bottom of the

enclosed backsplash for piping for faucets and vacuum breakers. Rubber grommets are supplied to seal between the piping and the edge of the openings to prevent corrosion between dissimilar metals.

5. Sinks are 37" high to top of roll, 34" AFF to deck and 14" deep from top of roll to bottom of compartment unless specified otherwise.
6. Bottom of each compartment is die-stamped with tapered grooves at least ¼" deep at drain depression. Each compartment is provided with 2" lever type drain. Drain is fitted with rod lever for opening and closing drain. Each rod handle is suitably braced to bottom of sink with 16 gauge stainless steel bracket. All other components are nickel plated to match stainless steel. Drain is equipped with solid stainless steel handle assembly. Strainers are flat type made of stainless steel and snap-in. Drains have positive sealing action with heavy wall cast bronze body and self-centering face flanges.
7. Bodies are mounted on 1-5/8" O.D. tubing legs of 16 gauge stainlesssteel and fitted with stainless steel bullet type adjustable feet. Legs are mounted with 16 gauge stainless steel fully enclosed gussets fully welded to the sink bottom. See Pipe Stands and Frames and Feet sections.
8. Crossrails are 1-5/8" O.D. stainless steel tubing located 12" from floor; running front to back on legs forming a "H" frame unless specified otherwise. See Pipe Stands and Frames section. Locate crossrails to the front of the sink compartments. Coordinate height of crossrails and location of legs to avoid interference with sink heater controls.
9. All three-compartment sinks with drainboards longer than 27" to have six (6) legs unless specified otherwise. All three-compartment sinks with drainboards 27" or shorter to have four (4) legs mounted underneath sink body at corners. All drainboards longer than 27" require legs. If sink heater is specified for three-compartment sink with drainboards longer than 27", crossrail is located in front of drainboard adjacent to sink heater and rear of drainboard opposite of sink heater. If sink heater is not specified for three-compartment sink with drainboards longer than 27", crossrails are located at rear of drainboards.
10. In compartment with a sink heater, move the sink drain toward the side opposite the heater.
11. All three compartment sinks have 24" X 27" compartments with an overall width of 31¼" unless specified otherwise. Compartment size must accommodate 18" X 26" sheet pans for total immersion.
12. Overall length and width is noted in the Itemized Specifications.
13. Bracing and sound deadening are the same as for table top.
14. Sound deadening pads are furnished on underside of sink compartments and drainboards.
15. Coordinate with Plumbing Contractor for location of faucet and vacuum breaker and provide knock-outs for same.
16. Provide rubber grommets for openings through which plumbing lines are routed to prevent dissimilar metal from touching. Label and deliver to Plumbing Contractor for installation.

V. Sink Inserts

1. Sink inserts are fabricated with no visible seams, size as called for, and constructed of 14 gauge stainless steel.
2. Sinks are welded integral with counter tops with no lap between.
3. Corners, partitions, bottoms and drains, sound deadening, etc., as specified under section entitled "Sinks".

W. Sink Drainboards

1. Drainboards are constructed of same material as sinks and welded integral to same. Drainboards to have 1½" high rims with die formed integral rolled edges to match sink edges. Horizontal and vertical corners are coved on a ¼" or larger radius, electrically welded, ground and polished to a #4 finish. Solder filling of these corners is not acceptable. Drainboards are pitched to properly drain into sink. (Minimum pitch in top of drainboards is 1/8" per foot from end of drainboard to sink compartments).
2. Across backs and ends against walls or high fixtures, drainboards have a 10" high backsplash and sidesplash, when applicable, to match splash of sink compartment. Backsplash and sidesplash, when applicable, are welded integral with splash of sink compartment with ends fully enclosed, integrally welded, finished and polished and fully sealed by welding. Attached to wall with 12"

stainless steel "Z" clips. See description for exposed backsplashes and sidesplashes this Section for specifications for drainboards not attached to wall.

3. Sink and drainboards are constructed so that the rolled rims on drainboards are continuous and at the same height of 34". Where drainboards are longer than 27" in length, they are supported on pipe legs of same material as used for sink legs and cross braced above the floor with pipe rail. See Pipe Stands and Frames section.
4. Drainboard underbracing is 1½" x 1½" x 1/8" 14 gauge, type 304 stainless steel stud bolted to top. Sound deadening pads applied between angles and top and on underside between angles.

X. Edges
1. Marine edge.
2. Bull nose marine edge.
3. Bull nose edge.
4. Inverted rolled rim.
5. Standard table edge.
6. Flat turndown edge.
7. Standard roll rim edge.
8. Rolled table edge.

Y. Back, Sidesplashes
1. Back and sidesplashes cove up per drawings and specifications, return 2½" on a 45° angle, turn straight back 3/4" and turn straight down ½". If adjacent to wall and non-mobile, attach to wall with 12" stainless steel strip (Z clips).
2. Sides of sidesplashes and ends of sidesplashes are fully enclosed, integrally welded, finished and polished and fully sealed by welding to the top to meet NSF requirements unless specified otherwise. Use of silicon cannot be used to seal sidesplash on the outside but is one continuous piece. Sidesplash adjacent to wall is coved up 8", returned 2½" on a 45° angle, turned straight back 3/4" and turned straight down ½" to an overall height of 10" and attached to wall with 12" stainless steel strip (Z clips). End is fully enclosed, integrally welded, finished and polished and fully sealed by welding to the top.
3. Ends of backsplash are fully enclosed, integrally welded, finished and polished and fully sealed by welding to the top to meet NSF requirements unless specified otherwise.
4. Backsplash and sidesplashes for mobile equipment or equipment not adjacent to wall are fully enclosed, integrally welded, finished and polished and fully sealed by welding to the top and sides to meet NSF requirements unless specified otherwise. Use of silicon cannot be used to seal splashes on the outside but is one continuous piece. Access openings are required in fully enclosed backsplash by the fabricator through the top and bottom of the backsplash for equipment requiring piping for faucet and vacuum breaker. When applicable, removable 16 gauge, Type 304, 18-8 stainless steel enclosure panel (skirt) is supplied and installed at back of equipment below backsplash to cover exposed electrical and plumbing connections. Equipment attached to wall with "Z" clips does not have an enclosed backsplash but backsplash is turned down next to wall ½". End is fully enclosed, integrally welded, finished and polished and fully sealed by welding to the top.
5. All fully enclosed backsplashes and sidesplashes extend down to counter or table top or below in order to cover all underbracing.
6. In instances where backsplashes and sidesplashes are attached to the walls and are not fully enclosed, exposed underbracing is 14 gauge, type 304 stainless steel.

Z. Casters
1. All casters are 5” with brake unless specified otherwise.

AA. Field Joints
1. Field joints are located for practical construction, consistent with sizes convenient for shipping and accessibility into building.
2. Field joints in tops are carefully sheared so they can be tightly butted and joined together to form an integral unit to match balance of equipment.

3. Field joints and butte joints are heli-arc welded, ground and polished smoothly. These joints are made by the approved fabricator.

BB. Refrigeration Service
1. Refrigeration service includes start-up and all parts; service, parts, mileage, transportation and labor warranty for one year from the date of final acceptance by the Owner and a five year non-prorated compressor replacement warranty from the date of final acceptance by the Owner.

CC. Painting
1. All fixtures, unless made of stainless steel, are finished with hammertone grey paint of the highest quality, air-dried and applied in accordance with the manufacturer's direction.

DD. Joints, Finishes and Trim Strips
1. All equipment is formed of one piece of material wherever possible, with due regard to shipping and erection.
2. All joints, where necessary, are homogeneously welded by electric fusion metal arc, using welding rod of same composition as material being welded, ground smooth and polished to an invisible joint to match adjoining surfaces.

EE. Definition
1. "Fully" is defined as continuously. Stainless steel gussets are fully (continuously) welded.

FF. Sealing
1. Any gaps or crevices such as the seam between under bracing and top are fully (continuously) sealed with sealant as described in this Section.
2. Supply and install rubber grommets for all openings through which dissimilar metals pass such as piping for disposal vacuum breaker in soiled dish table.

GG. Coordination
1. Provide copy of specification sheet or shop drawing for integral equipment such as dish machine, waste system, disposal, booster heater, etc. to fabricator for use in preparing submittal drawings.

HH. Approved Fabricators
1. Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are:
Atlanta Custom Fabricators
Low Temp Industries
Advance Tabco

2.3 GENERAL MANUFACTURING NOTES FOR ALL EQUIPMENT

A. Water inlets are located above positive water level to prevent syphoning of liquids into the water system. Wherever conditions require a water inlet placed below the water level, Food Service Equipment Contractor supplies suitable type of vacuum breaker or back flow prevention device for the fixture to form part of same to prevent siphoning; labels and delivers to Plumbing Contractor for installation. Food Service Equipment supplier is required to furnish back flow prevention device as required by the Public Health Department for any piece of equipment supplied. It is noted that Public Health Departments usually require back flow prevention device on water inlet for Convection Combo type units. All back flow prevention devices must be acceptable to the Public Health Department.

B. Food Service Equipment Contractor supplies all faucets, spray and hose units with mixing valves and cross flow prevention devices if supply through unit is hot and cold water and all hose and spray units with back flow prevention devices. Face for all spray units is stainless steel. See description of Faucets, Valves and Fittings this section. Parts are labeled and delivered to Plumbing Contractor for installation.

C. Suitable pipe slots are provided through all undershelves to accommodate necessary service lines. These slots are proper size and are neatly made with turned up edges on all four sides to eliminate cutting or defacing of equipment on job. Cabinet bases are provided with an inner panel duct at ends or rear of cabinet to allow enclosed vertical and horizontal pipe space to conceal the vertical and horizontal piping.

D. All hardware, including that used for refrigerators, is heavy-duty cast type and arranged for locking device. Mounting screws are stainless steel or non-corrosive. Hardware is specifically selected for the particular use to which each piece is intended. Mastic required between non-similar metals to prevent rusting.

PART 3 - EXECUTION

3.1 EQUIPMENT DELIVERY

A. Equipment is not to be delivered, removed from crates, set-in-place for final connections until as a minimum all painting has been completed; ceilings, hood and ventilation duct work are in place; floor is cleaned; and all rough-in connections are in place. Site must be ready for final connections

3.2 INSTALLATION

A. Where there are gaps or spaces over 1/8" between walls and equipment, at tops of backsplashes, between adjoining pieces of equipment, etc., necessary trim strips are furnished for the proper finishing in installation. Necessary measurements for trim strips are taken during the time of installation in order to afford proper fit. Wall trim is made generally from 22 gauge Type 304, 18-8 stainless steel, broke to provide a tight fit. Trim is attached to backsplash (metal) with adhesive. Exposed fasteners may not be used to attach trim to metal backsplashes. In all other instances stainless steel fasteners may be used to attach trim to walls and equipment if equipment finish is stainless steel. Non-corrosive fasteners are required if equipment finish is not stainless steel. Fasteners supplied and installed by other contractors to attach conduit and other materials to the Food Service Equipment must meet the preceding specifications. Trim is sealed to wall and equipment with clear silicon caulking; see installation requirements this Section.

B. Install closure plates and strips where required, of same material as equipment with joints coordinated with units of equipment. Joints are sealed with clear silicon caulking; see description of caulking types, this Section.

C. Install insulation where indicated by industry standards and sealants and gaskets all around each unit and penetration or as required to make joints air-tight, waterproof, vermin-proof and sanitary for cleaning purposes. In general, clear silicon caulking is the sealant. In general, make sealed joints not less than 1/8" wide and stuff with backer rod to shape sealant bead properly, at ¼" depth. Shape exposed surfaces of sealant slightly concave, with edges flush with faces of material at joint. Anchor gaskets mechanically or with adhesives to prevent displacement.

D. Conduit seal-offs required for penetrations into walk-in cooler/freezer.

E. Mastic is required between fasteners and equipment or trim and equipment when non-similar metals are used to prevent rusting through electrolysis. Rubber grommets are required where plumbing lines and connections penetrate splashes to prevent corrosion. Food Service Equipment Contractor supplies, labels and delivers rubber grommets to Plumbing Contractor for installation.

F. All single or multiple compartment sinks and tables with single or multiple compartment sinks are attached to the wall with 12" stainless steel strips (Z clips) and sealed with clear silicon caulking if located adjacent to wall.

G. Top shelf on all shelving and shelving/platform units unless noted otherwise is installed even with the top of the posts.

H. Air curtain devices shall be adjusted to regulate the velocity and volume of air at the air outlet for the purpose intended.

I. One hundred percent clear silicon caulking approved for use with food and rated to withstand temperatures up to 400° F. is used when caulking comes in contact with 190° F. water. General Electric sealant SCS 1000 and SCS 1200 and Component Hardware Silicone Sealer are the standards.

J. Caulking required with glass, copper, mill finish aluminum, galvanized steel, many plastics, stone, concrete and masonry finishes and rated to withstand temperatures up to 400° F. is General Electric sealants, Silglaze N or Gesil N depending upon the cure time required and the color specified. These sealants are only used with non-food contact surfaces. Examples: Floor level, trim at dish room openings and pass-thru openings.

K. Light fixtures over the door frames of walk-in refrigeration boxes are installed at a height sufficient to accommodate installation of strip curtains, if specified.

L. All thermometers, timers, thermostats for all equipment is tested and calibrated to proper operating conditions.

M. The equipment under the hood is positioned to allow for proper capture. Refer to drawings. Food Service Equipment Contractor is responsible for coordinating with all other contractors the proper locations of service connections under the hood to maintain floor space for equipment and the space in front of and behind or between the equipment under the hood as shown on the Food Service Equipment (Kitchen) Plan.

N. Food Service Equipment Contractor is responsible for coordinating the placement of the hood to maintain working aisle spaces.

O. If sprinkler heads are installed inside walk-in cooler/freezer box, Food Service Equipment Contractor is responsible for insulating and sealing penetrations properly to prevent condensation and ice formation.

3.3 QUALITY AND GUARANTEE

A. All equipment is guaranteed by the Food Service Equipment Contractor to be free from defects in workmanship and/or material for a period of one (1) year from the date of substantial completion of same by the Architect and Owner. This guarantee covers replacement of defective material at Food Service Equipment Contractor's expense, including parts, mileage, service, transportation and labor, but it does not cover any cost whatsoever for replacement of parts or work made necessary by carelessness or misuse of equipment. All Refrigeration units have a five (5) year non-prorated replacement warranty on the compressor from the date of substantial completion of same by the Architect and Owner. Extended warranties are specified in the Itemized Equipment Specifications, this Section.

3.4 TESTING AND START-UP INSTRUCTIONS

A. After all utility connections to equipment have been made by other contractors, Food Service Equipment Contractor starts-up, adjusts, levels and calibrates all equipment. Calibrate all thermometers, timers, and thermostats. After start-up and adjustment Food Service Equipment Contractor conducts final test of equipment before requesting first inspection by Architect and his Food Service Equipment Consultant.

B. Delay start-ups of food service equipment until service lines have been tested, balanced, and adjusted for pressure, voltage and similar considerations, and until water and steam lines have been cleaned and treated for sanitation by other Contractors.

C. Test each item of operational equipment to demonstrate that it is operating properly, and that controls and safety devices are functioning. Repair or replace equipment which is found defective in its operation, including units which are below capacity or operating with excessive noise or vibration.

D. Walk-in Cooler/Freezer refrigeration systems to be run ***five consecutive*** days prior to equipment demonstrations.

E. Provide a training program by a Serve Safe certified culinary chef and/or factory representative to consist of one (1) 6 hour day at startup showing all equipment and how it works with demonstrations. Provide training as follow up in another one (1) 4 hour day program within 45 days of start of school. Trainer shall monitor employees and demonstrate how to properly use equipment with live cooking. Service provided shall include abbreviated classes in Serve Safe and HACCP, and the proper method for receiving and storing product. Training to consist of a total of eight (8) hours. Notify GC and Architect of scheduled dates, time and name of Chef with contact info.

F. Contractor shall issue a letter, signed by all sub-contractors involved and co-signed by Owner's representative stating that CNP staff have been satisfactorily instructed in the use of the equipment.

3.5 MANUALS FOR OWNER-UPDATE 10.30.2024

A. Food Service Equipment Contractor, upon completion of work, to deliver to the Architect's Food Service Consultant for review three (3) thumb drives with all operation manuals in alphabetical order for all mechanically operated equipment i.e. cooking equipment, serving line operations and dishwashers. (hard copies of these manuals is no longer required).

B. Food Service Equipment Contractor, upon completion of work, to deliver to the Architect's Food Service Consultant for review three (3) sets of the following:
   1. Warranty statement indicating date of start-up for equipment. Note if equipment has more than the standard one (1) year warranty and if so what is the warranty period.
   2. Names and addresses of manufacturers supplying the equipment.
   3. List of authorized service agencies including name, address and telephone number.
   4. Service information organized in a chart format, alphabetically by manufacturer, item description, manufacturer, model, electrical and mechanical characteristics, and serial number.
   5. As built shop drawings for all custom equipment.
   6. Floor plan, plumbing and electrical rough-in drawings and equipment schedule marked as built. Show any variations from the original drawings.

C. Organize and assemble all information into three individual hardback vinyl loose-leaf binders. Binder to include two pocket folders for folded sheet information. Mark the appropriate identification on both the front and spine of each binder. Binder for site has identification as such on the front and spine.

D. Organize drawing sheets into manageable sets, bind with durable paper cover sheets and print suitable titles, dates and other identification on cover of each set.

E. Manuals are assembled and ready to use during demonstration and training.

F. After review and approval of manuals by the Architect, manuals are transferred to Owner or Owner's representative.

3.6 GENERAL OPERATING AND MAINTENANCE INSTRUCTIONS

A. Food Service Equipment Contractor shall furnish qualified representatives to instruct and demonstrate to the Owner's Personnel, at project site, the proper operation, care and maintenance of all equipment involved including the care of finished surfaces. The dates and times of the demonstration shall be coordinated with the Owner's Personnel. Food items supplied by the Owner are prepared during training by the food service employees utilizing the equipment. Food Service Equipment Contractor identifies to the Owner the food items and supplies required for training at least one week before the scheduled training date. All equipment to be demonstrated must be fully operable before training; all final connections must be made and start-up and adjustment completed.

B. It is noted that for the purposes of scheduling that all contractors must be completed with their work within the kitchen and or serving area prior to equipment demonstration and training.

C. As part of this instruction, provide a review of the information assembled in the Operation and Maintenance Manuals and the following items which are not inclusive:
   1. Maintenance Manuals
   2. Operation Manuals
   3. Tools
   4. Spare parts and materials
   5. Lubricants
   6. Fuels
   7. Identification system
   8. Control sequences
   9. Hazards
   10. Cleaning

D. For operational equipment also demonstrate:
   1. Start-up
   2. Shut-down
   3. Emergency operations
   4. Safety
   5. Effective energy utilization

E. Review maintenance and operations in relation with applicable warranties.

F. The Food Service Equipment Contractor shall provide a qualified representative to be on site during demonstration and training of all equipment.

G. Provide one copy of an operation and maintenance video for each piece of equipment, if available. Videos become the property of the Owner.

H. Submit written documentation, signed by the personnel receiving instruction, that training was received with the date it was given. Submit written documentation that keys were transmitted to Owner.

3.7 FINAL CLEANING

A. General: Provide final cleaning of all equipment both inside and outside. Comply with manufacturers' instructions for cleaning operations. Final cleaning of the food service equipment by the Food Service Equipment Contractor is not scheduled until all contractors other than Food Service Equipment Contractor have completed their work. Food Service Equipment Contractor and General Contractor shall coordinate timing of the final cleaning to allow sufficient time for the Food Service Equipment Contractor to complete his final adjustments; to schedule inspection by the Architect and his Food Service Consultant; and to schedule training of the Food Service employees. The preceding must occur before training is scheduled and Owner occupies the kitchen.

B. Remove protective coverings and labels which are not required as permanent labels.

C. Clean glazed materials, including glass shelves and sneeze guards, to a polished condition, removing substances which are noticeable as vision-obscuring materials. Replace any broken glass.

E. Clean exposed exterior and interior hard-surfaced finishes, including metals, painted surfaces, plastics, special coatings, and similar surfaces, to a dirt-free condition, free of dust, stains, films and similar noticeable distracting substances. Restore reflective surfaces to their original reflective condition.

F. Replace work which cannot be successfully restored.

G. Polish exposed metal surfaces and touch-up painted surfaces.

H. Boil out fryers.

I. Clean the interior and exterior of all the food service equipment to a condition of sanitation ready and acceptable for intended food service use.

J. It is the sole responsibility of Food Service Equipment Contractor to protect all food service equipment with coverings, to maintain clean status of equipment between cleaning and occupancy. Protective coverings are removed immediately before Owner occupies the area.

K. Cleaning is completed by General and Food Service Equipment Contractors before requesting first inspection by Architect and his Food Service Equipment Consultant.

3.8 PREREQUISITES TO SUBSTANTIAL COMPLETION

A. Complete the requirements included in this Section.

B. Submit Operation and Maintenance Manuals to Architect for review.

C. Submit Record Document for Architect/General Contractor.

D. Deliver physical items such as unattached accessories to Owner.

E. Transmit keys to Owner. Each key is labeled by description and Item Number.

F. Complete start-up, adjustment, leveling and calibration of all equipment.

G. Conduct final test of equipment.

H. Complete final cleaning requirements.

I. Complete operating and training requirements.

J. Request first inspection by Architect.

K. From receipt of written first inspection report prepared by Architect, Food Service Equipment Contractor has ninety days to complete corrections. Notification of receipt is made to Architect by Food Service Equipment Contractor. At the end of the ninety day period, if final inspection by Architect has not been scheduled by the Food Service Equipment Contractor, AIA procedures for correction of the deficiencies by others at the expense of the Food Service Equipment Contractor may be initiated.

3.9 PREREQUISITES TO FINAL ACCEPTANCE

A. Submit to Architect copy of Architect's first and/or prior inspection report of itemized work to be completed or corrected, stating that each item has been corrected or otherwise resolved for acceptance. At same time, request a final inspection by Architect.

3.10 RECORD DOCUMENT SUBMITTAL

A. Record documents shall include the following:
   1. Provide one (1) set of as-built shop drawings including floor plan, dimensioned electrical and mechanical rough-in drawings and equipment schedule; as-built shop drawings showing elevations, cross-sections, and details of all custom equipment as provided with the submittals. Give particular attention to concealed work which would be difficult to measure and record at a later date. Note any deviations from the original drawings and specifications. Note related change order numbers where applicable.

B. Submit directly to Architect and/or General Contractor as required.

3.11 EQUIPMENT SCHEDULE

Substitutions by any bidder wishing to supply alternate equipment other than that specified shall follow the requirements listed in the Invitation to Bid.

Bidders recommending such substitutions are cautioned to examine mechanical and electrical plans and conditions of building to determine if such substitutions will require changes in mechanical or electrical connections which have already been planned. If proposed substitutions require such changes, bidder shall be responsible for any cost involved.

Any bidder wishing to supply alternate equipment other than that specified must submit a written request for substitution to the OWNER ten (10) days prior to the Bid Date for approval or disapproval. The request must be accompanied by the name of the manufacturer and model, a complete description of the proposed substitution, drawings, catalog cuts, specifications, performance and test data, samples, of applicable, and all information necessary for an evaluation. A statement describing any changes in materials, equipment, or work that incorporation of the substitute would require must be included. A detailed description of the manner in which the proposed substitution conforms and/or varies from the item specified must also be provided. If approved an addendum will be issued.

ITEM 1 AIR CURTAIN QTY: 1
MANUFACTURER: BERNER
MODEL: SLC07-1072A
ELECTRICAL: REFERENCE PROJECT DRAWINGS FOR ELECTRICAL REQUIRMENTS.
Description:
General Contractor to provide knock-out in door frame for wiring to micro switch in order for control wiring to be run in conduit concealed in wall above door. Food Service Contactor to coordinate with door supplier. See detail
Accessories:
1. Air curtain to be ordered with 505CRD163SJT-03B 3’ Cord and plug factory mounted.
2. Automatic door switch, plunger type for automatic on/off control model 9503SD020-P.
3. Supply 66ZPR000DMB-AZ-007-WP Z wall bracket, adjustable depth, white powder coated finish.
4. Supply 66ADS000DMB mounting bracket for plunger switch used with manual swing doors.

APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: MARS

ITEM 2 DRY STORAGE ROOM SHELVING QTY: 1-LOT
MANUFACTURER: METRO

MODEL: METROMAX 4
QTY: 1-LOT
DESCRIPTION: DRY STORAGE SHELVING

Metro, Model MetroMax® 4, 4-Tier Stationary Shelving Unit
All-polymer corrosion proof shelving with removable open grid or solid shelf mat section. Shelf mats, beams, and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and robust corner with complete 360° capture of the wedge and post ensure stability, strength, and structural integrity. Stationary units have a maximum capacity of 2,000 lbs. evenly distributed. NSF Listed for all environments.

Each Unit to Consist of Sizes and Quantities as Drawn
4 ea MX74P 74” H Polymer Shelf Posts
3 ea MAX4-****G Shelf with Grid Mat
1 ea MAX4-****F Shelf with Solid Mat

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: AMCO and ULINE

ITEM 3: CAN RACK QTY: 2
MANUFACTURER: NEW AGE
MODEL: 97294
Description:
First In, First Out Can Rack, stationary design, with sloped glides for automatic can retrieval, holds (156) #10 cans, front edge turned up, welded alloy construction, adjustable feet, NSF, Made in USA, (standard factory lead time)Accessories:
Accessories:
1. 0118 adjustable glide feet.

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: KELMAX and ADVANCE

ITEM 4: HEAVY DUTY TWO TIER SHELVING QTY: 1-LOT
HEAVY DUTY
MANUFACTURER: NEW AGE
MODEL: SEE BELOW
Description:
TWO tier shelving units with bottom shelf 8” above finished floor and shelving spaced evenly with top shelf even with top of posts.
2 EACH PER UNIT 24XXTB Dimensions: XX(w) x 24(d)
"Adjust-A-Shelf" T-Bar Series Shelf, XX"W x 24"D, all welded aluminum construction, 1500 lbs. capacity, NSF, Made in USA, (standard factory lead time)
4 EACH PER UNIT Model 48P Post, 48"H, marked in 2" increments, aluminum finish, NSF, Made in USA, (standard factory lead time)
4 EACH PER UNIT Model 0116 Adjustable Foot, 1-5/16" dia., upright, (standard factory lead time)
Lifetime guarantee against rust & corrosion. Lifetime guarantee against worksmanship and material defects.

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: WINHOLT AND CHOICE

ITEM 5 FLOOR CLEANING MACHINE QTY: 2
MANUFACTURER: NILFISK
MODEL: FANG15B
Description:
Viper Fang 15B 15”, 3.5 gallon, battery micro scrubber, 15” brush, 20” squeegee assembly, 5-amp Charger, two AGM 33 a/h batteries. www.nilfisk.com

ITEM 6 CHEMICAL STORAGE ROOM SHELVING QTY: 1-LOT
MANUFACTURER: METRO
MODEL: METROMAX 4
QTY: 1-LOT
DESCRIPTION: CHEMICAL ROOM SHELVING

Metro, Model MetroMax® 4, 4-Tier Stationary Shelving Unit
All-polymer corrosion proof shelving with removable open grid or solid shelf mat section. Shelf mats, beams, and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and robust corner with complete 360° capture of the wedge and post ensure stability, strength, and structural integrity. Stationary units have a maximum capacity of 2,000 lbs. evenly distributed. NSF Listed for all environments.

Each Unit to Consist of Sizes and Quantities as Drawn
4 ea MX74P 74" H Polymer Shelf Posts
3 ea MAX4-****G Shelf with Grid Mat
1 ea MAX4-****F Shelf with Solid Mat

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: AMCO and ULINE

ITEM 7 WASHER QTY: 1
MANUFACTURER: GE
MODEL: GTW335ASNWW – White OR MOST UP TO DATE SIMULAR MODEL
ELECTRICAL: REFERENCE PROJECT DRAWINGS FOR ELECTRICAL REQUIRMENTS.
Description:

Deep Clean Cycle – Achieve the ultimate deep clean for your toughest laundry loads with 67% more cleaning power than the most commonly used cycle*. *Colors, Normal cycle
Capacity – Wash large items and do laundry less often with a large 4.2 cubic feet of capacity.
Water Level/Load Size – Take the guesswork out of choosing the right water level with PreciseFill or manually select any water level for maximum cleaning performance.
Deep Rinse – Ensure clothes are thoroughly rinsed free of detergent, fabric softener and other additives.
Heavy-Duty Agitator – Thoroughly clean every load thanks to a powerful washing motion.
Stainless Steel Basket – Long-lasting, durable stainless steel resists rust and won't chip, peel or snag clothes.
Made in America – This appliance is made in America and contains 70 to 90% U.S. content.
11 Wash Cycles – Choose from 11 wash cycles that accommodate every load type.
6 Water Temperatures – Pick the water temperature you prefer and wash your way.
700 RPM Spin Speed – Efficiently remove water and minimize drying time with a fast spin speed.
Bleach and Fabric Softener Dispensers – Improve results with dispensers that automatically release bleach and fabric softener at the optimal point during the wash cycle.
Cycle Status Lights – Easily track your wash cycle with lights that indicate fill, soak, wash, rinse or spin status with just a glance.

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: WHIRLPOOL and SAMSUNG

ITEM 7.1 DRYER QTY: 1
MANUFACTURER: GE
MODEL: GTD33EASKWW – White OR MOST UP TO DATE MODEL
ELECTRICAL: REFERENCE PROJECT DRAWINGS FOR ELECTRICAL REQUIRMENTS.
Description:

Aluminized alloy drum – Improves energy efficiency and resists corrosion
3 heat selections – Offer a choice of drying temperatures for personalized fabric care.
Up to 120 ft. venting capability – Provides flexible installation
Auto Dry – For clothes that come out feeling and looking great, this setting monitors air temperature to set the optimal drying time
Rotary electromechanical controls – Make it simple to set cycles
Up-front lint filter – Makes cleaning out lint easy
Reverse-a-door – Door opening can be reversed to meet laundry room needs

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: WHIRLPOOL and SAMSUNG

ITEM 8 WALL SHELVING QTY: 2
MANUFACTURER: CUSTOM FABRICATORS

MODEL: CUSTOM
Description: Dimensions: 13.5(h) x 60(w) x 15(d)
Shelf, wall-mounted, 60"W x 15"D, 1-5/8" bullnose front edge, 1-1/2"H rear up-turn, 16/304 satin finish stainless steel, NSF
Accessories:

- Weld support brackets to wall shelf for 15" deep wall shelves

MUST BE OVER THE LENGTH OF THE WASHER AND DRYER-CONFIRM EXACT LENGTH TO FIT.
MOUNT AT 54” AFF AND 66” AFF.
Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Atlanta Custom Fabricators, Commercial Stainless Fabricators, Marietta, GA. Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco.

ITEM 9 MOP SINK QTY: 2 NIC (NOT IN CONTRACT)
BY OTHER TRADES

ITEM 9.1: SERVICE FAUCET QTY: 2
MANUFACTURER: T & S BRASS
MODEL: B-0655-BSTP
Description:
Service Sink Faucet, 8" centers-adjustable from 7-3/4" to 8-1/4", 5-1/8" clearance wall to center line of faucet, 11-5/8" from wall to center of outlet, polished chrome-plated finish, with built in screwdriver stops
Accessories:
B-0230-K (2 EACH)
Installation Kit, (2) 1/2" NPT nipples, lock nuts & washers, (2) short "Ell" 1/2" NPT female x male

ITEM 10: MOP AND BROOM HANGER QTY: 4
MANUFACTURER: ADVANCE TABCO
MODEL: K242
Description:
Holds three mops/brooms
Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco.

ITEM 11 CARTS QTY: 7 (3 SHOWN ON PLANS)
MANUFACTURER: RUBBERMAID
2 EACH: MODEL: FG9T6700BLA
Description:
Utility Cart, 40-1/4"L x 25-5/8"W x 27-3/8"H, 500 lb. capacity, (2) shelves, open base, polyethylene exterior, (2) fixed and (2) swivel 4" casters, assembly required, black, Made in USA (THESE ARE FOR USE AT THE SERVING LINES-SHOWN ON PLANS
2 EACH: MODEL: FG342488BLA
Description:
Utility Cart, 33-5/8"L x 18-5/8"W x 37-3/4"H, 200 lb. capacity, (3) shelves, smooth surface, handles, open sides, plastic construction, brushed aluminum uprights, (4) 4" swivel casters, assembly required, black, HACCP
1 EACH: MODEL: FG452500BLA
Description:
Flat Shelf Utility Cart, 43-7/8"L x 25-5/8"W x 33-5/16"H, 500 lb. capacity per shelf, (2) shelves, open base, polyethylene exterior, (4) 5" thermoplastic rubber (TPR) casters, assembly required, black, Made in USA
1 EACH: MODEL: FG440300BLA
Description:

Platform Truck, heavy duty, 36 x 24", 1000 lb. capacity, slide locking latches, molded-in tie-downs slots, textured deck surface, deck channels, retainer clips on handle, powder coated steel handle/frame, (2) fixed and (2) swivel 5" TPR casters, Duramold™ resin and metal composite construction, black, Made in USA

1 EACH: MODEL: FG443600BLA

Description:

Platform Truck, heavy duty, 48" x 24", 2000 lbs. capacity, slide locking latches, molded-in tie-downs slots, textured deck surface, deck channels, retainer clips on handle, powder coated steel handle/frame, (2) fixed and (2) swivel 8" TPR casters, Duramold™ resin and metal composite construction, black, Made in USA

APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: CARLISLE and CAMBRO

ITEM 12 WALK IN COOLER/FREEZER QTY: 1-LOT

MANUFACTURER: THERMOKOOL

MODEL: CUSTOM

ELECTRICAL: REFERENCE PROJECT DRAWINGS FOR ELECTRICAL REQUIRMENTS.

Description and Accessories:

Refrigerant:

Cooler: Meet CFC reduction regulations

Freezer: Meet CFC reduction regulations

Size: Nominal 8’-6” high

Verify overall box dimensions with drawings, reference Architectural drawings for wall dimensions.

Door swings and positions must be as shown on the drawing.

All specifications apply to cooler and freezer unless indicated otherwise.

The THERMO-KOOL prefabricated modular construction. It shall be designed and constructed to allow fast and easy field assembly, disassembly, relocation and enlargement by the addition of like modular panels. Walk-in shall be designed and constructed as shown on plan. Overall size of walk-in shall be CUSTOM to fit exact job site requirements. 8’-6” height outside dimensions for walk in is standard unless otherwise noted in the detailed specification per school. See all drawings for special instructions.

PANEL CONSTRUCTION:

Wall and ceiling panel widths shall be within 1” increments up to 46” wide. Corner panels shall be 90 degree angle, 12” x 12”. All panels shall be interchangeable with like panels for fast and easy assembly.

Partition panel placement shall be within 1” increments to meet shelving space requirements.

All panels shall consist of metal pans formed to precise dimensions. Metal finish to be as specified. Insulation shall be “foamed-in-place” urethane to bond permanently to complete inner surfaces of both interior and exterior metal pans to form strong rigid unit. Panels shall not have internal wood or metal support, framing, straps, or other non-insulating members. Each panel shall be 100% urethane foam insulation exclusive of metal pans. Perimeter structure shall be formed of DURATHANE, high density urethane insulation forming tongues and grooves to assure vapor and airtight joints and to prevent pre-installation damage and deterioration of exposed urethane surfaces.

Construction shall be as approved by the National Sanitation Foundation. Unit shall bear the NSF® Seal of Approval affixed to the interior of a door panel.

Floor is recessed. Coordinate recess depth so that the walk-in box flooring is no more than a ¼” above finished floor of the kitchen. Floor of walk-in cooler/freezer is not covered with kitchen finish floor system.

Common Wall Partition:

When specified or shown on drawing, walk-in shall be divided into compartments by use of insulated panels. Panels shall be constructed in accordance with specifications for all panels. Partitions in standard locations shall be foam tongue and groove construction secured in place by com-lock fasteners. All partition panels shall have foamed-in-place thermal breakers to prevent condensation and heat transfer between compartments of different temperatures.

WARRANTY:
MANUFACTURER MUST PROVIDE ONE YEAR PARTS AND LABOR FOR ALL COMPONENTS OF WALK IN COOLER AND FREEZER.
Panels shall be covered by a Ten-Year Factory Warranty.
Compressor shall have a one year parts and labor warranty with an additional four years for parts for compressor.

INSULATION:

Insulation shall be 4" or 5" thick rigid, zero ozone depleting HFC 134a blown Class I urethane foam classified according to UL 723 (ASTM-E-84) as tested by Underwriters Laboratories, Inc. The core material has a flame spread of 25 or less and a smoke density of 250.

The urethane foam is foamed-in-place to bond to inner surfaces of metal pans having an average thermal conductivity (K factor) of 0.13 BTU/hr./sq. ft. per degrees /Fahrenheit/inch. As tested in accordance with ASTM C 518-2004, the R factor for coolers at temperatures of 55 F° is greater than 29.0 for 4" thick and greater than 36.0 for 5" thick panels; for freezers at temperatures of 20 F° the R factor is greater than 32.0 for 4" thick and greater than 40.0 for 5" thick panels.
(R-value of R-25 for Coolers and R-32 for Freezers required to meet 2009 Energy Code)

The prefabricated urethane foamed panels shall be supplied with a Class I fire hazard classification according to UL 723 (ASTM-E-84) as tested by Underwriters Laboratories, Inc. Panels shall have a flame spread rating of 25 or less and bear a certifying Underwriters Laboratories, Inc. label.

This rating is not intended to reflect hazards presented by this or any other material under actual fire conditions

METAL FINISHES:

INTERIOR WALLS are .040 stucco Aluminum.
INTERIOR CEILING is .040 stucco Aluminum with white baked-on enamel finish.
INTERIOR FLOOR is 1/8" Aluminum Diamond Tread Plate.
EXPOSED EXTERIOR WALLS including door section .040 stucco Aluminum.

PANEL LOCKING ASSEMBLIES:

Assembly of walk-in shall be accomplished by "Insta-Loks" consisting of cam-action hook arm assembly set in one panel and a self-aligning, self-centering, pin assembly set in the matching panel. All vertical joints must have a minimum of three Insta-loks. Rotation of the cam-action hook arm shall pull and lock panels together to form airtight, vapor proof joints. No metal straps or connecting rods shall be used inside the panels. Rotation of the cam-locks shall be operated from inside the walk-in through access ports that are sealed with vinyl snap-in closures.

PANEL GASKETS:

NSF listed double-bead vinyl gasket shall be applied to the tongue side of all panels, on both interior and exterior. Gaskets shall be impervious to stains, grease, oils, mildew, sunlight, etc.

ENTRANCE DOOR AND FRAME:

Walk-in compartment shall be equipped with total of TWO (2) each 34" x 76" hinged-type, flush-mounted entrance door mounted in a nominal 4', 5' or 6' frame and located in exact location as shown on drawing. Door placement shall be within 1" increments to meet shelving space and job site requirements. Door shall be manufactured to accommodate floor construction. Door and frame shall be listed by Underwriters Laboratories and bear the UL Seal of Approval and be equipped with the following:

Door shall be equipped with a one-piece perimeter PVC accordion type removable gasket with magnetic core at the top and along the side perimeter of the door. An adjustable wiper gasket shall be mounted along the bottom edge of the door.

Latch shall be break-a-way type with cylinder lock and inside safety release handle so the door can be opened from the inside even if locked. A positive action hydraulic door closer (required to meet 2009 Energy Code) shall be included to ensure gentle closing action of door to opening and to ensure positive closing of door. The latch shall be of high pressure zinc die cast with highly polished chrome finish.

TWO hinges shall be nine inch modified strap, cam-lift, self-closing design with door lift off capability of high-pressure zinc die cast with highly polished chrome finish. (a spring loaded hinge required to meet 2009 Energy Code) KASON model 1346 adjustable hinges are required.

Door frame shall consist of heavy reinforced steel “U” channel frame to encompass entire perimeter of opening, foamed-in-place to give extra support and rigidity to frame and to prevent racking, distortion, warping and twisting. A backup must be welded for added strength.

An armored anti-sweat heater cable shall be run in a breaker strip located behind a removable heavy gauge stainless steel trim for easy access to heater cable. Heater cable shall be run under threshold consisting of heavy reinforcement “U” channel breaker strip and heavy gauge stainless steel threshold.
(A second back up heater cable is to be installed).
The warmer cables shall provide sufficient heat to prevent condensate or frost formation. Door heater has a thermostat that cuts off when it reaches a temperature of 50°F.

Door shall be equipped with contemporary design, heavy-duty, pull handle. Pull handle shall have a cylinder lock built into the handle. Latch shall be provided with inside safety release to prevent accidental or malicious entrapment in walk-in. Latch has brushed satin chrome finish. Two (2) keys are provided for lock

Door section shall be provided with an operating toggle switch and pilot light mounted on the exterior side of the door frame. (Weathertight switches also available for outdoor walk-in applications.) An incandescent vapor proof light and face mounted inlet box shall be mounted on the interior side of the door frame for 115 volt, 60 cycle, 1 phase A.C. service (Energy Efficient and Motion Sensor Lighting available for Energy Savings). All wiring shall be in concealed rigid conduit. A 2-1/2” diameter chrome face, flush mount, dual reading, adjustable dial thermometer shall be provided on exterior of door section to provide temperature reading of -40 degrees C to +150 degrees C.

AIR DOORS:

Supply air doors (MARS or Berner) with plunger type control in both door panels with adequate backing as required.

POWER BOX SUPPLY

Power supply box for all lights, heated vent, air curtain electrical receptacle, air curtain micro-switch, heated window (frame and glass), door heater and sill heater is pre-wired and mounted on top near door section by manufacturer. Electrical Contractor supplies and installs power wiring to power supply box. Wiring for lights; door and sill heaters; heated viewport; heated vent (freezer); air curtain receptacle; and air curtain micro-switch must be identified. Design power supply box such that power can be terminated for service while allowing other accessories to continue to function. Each of the electrical components (heated view port, heated vent, door and sill heaters, lights, air curtain receptacle, air curtain micro-switch) is wired to a 4" x 4" junction box which is foamed in place in the center of the jamb. A short piece of PVC electrical conduit is installed out of the junction box to the top of the foam rail of the jamb for the walk-in. The conduit shall have a coupling on it in order to be mated up with the conduit coming through the ceiling panel

out of the wiring box located on the top of the ceiling. After the walk-in is set-up, the wires are fed from the junction box through the conduit into the power supply box for final termination per the wiring schedule. Walk-in manufacturer pre-wires for incoming power source for air curtain inside front panel with recessed receptacle (115/60/1) foamed in place and located on front of box near top of air curtain. Incoming power connection for air curtain to be located in power supply box on top of each compartment.

TREADBRITE KICKPLATES:

Door shall have aluminum diamond treadbrite kickplates 48” high on the interior and exterior. Diamond tread kickplates shall be mounted with adhesive and sealed with silicone. No external fasteners such as screws or pop rivets shall be applied as fastening for the diamond tread kickplates.

LED LIGHT FIXTURES:

LED light fixtures shall be provided in quantity as required. (Energy efficient lighting required to meet 2009 Energy Code.) Must have switch with pilot light.
Contractor must furnish CORRECT LED BULBS as required Freezer.
Food Service Equipment Contractor shall install fixtures for Electrical Contractor to wire to junction box provided by manufacturer. LED light fixtures are mounted to ceiling panels where shown on the drawings and are connected to a three-way light switch with dual pilot light. Pilot light glows continuously inside and is on outside of box only when lights are on. Light switch is mounted on exterior and interior door section. Electrical service required is 120 volt, 60 cycle, 1-phase. Electrical Contractor provides and installs conduit and wiring on inside ceiling of boxes. See Installation Instructions this section for additional requirements.

HEATED PRESSURE RELIEF VENT:
Walk Ins shall be equipped with a two-way heated pressure relief vent to equalize pressure between the interior and exterior caused by defrost cycles and opening of door. Electrical service to be 115v/60/1 phase.

FLOOR CONSTRUCTION:
THERMO-KOOL DURA-FLOOR: For additional stationary floor load strength of up to 12,000 lbs. per square foot THERMO-KOOL’s DURA-FLOOR shall be provided which shall consist of an interior surface of foamed-in-place 1/8”
Aluminum Treadplate with high density urethane support structures foamed-in place on interior of floor panel and firmly attached to a foamed-in-place plywood subfloor.

TRIM AND ENCLOSURES:

Supply 1/8” treadplate wainscot on all exposed exteriors to match doors.
Cove base is required around all exposed sides.
Supply minimum of five (5)” high cove base on exposed walls of same material walk in exterior panels are made. Cove base shall be mounted with adhesive and sealed with BUTYL RUBBER SEALANT, 368, on top and bottom to control moisture from seeping under the walk ins. No external fasteners such as screws or pop rivets shall be applied as fastening for the cove base.
NOTE: Mount cove base then wainscot over the base so that it is the same height at the treadplate on doors.
Supply and install trim made from material with same finish as exposed exterior where walk-in cooler/freezer is adjacent to walls; seal to walls and boxes for rodent, dirt and moisture protection. Attach trim to box and wall with non-corrosive fasteners and seal to wall and box with clear silicon caulking. Extend trim to height of dropped ceiling, or enclosure panel.
Enclosure Panel:
Supply and install enclosure (made from material with same finish as exposed exterior) panel or ceiling trim if height of box is lower than height of dropped ceiling. Enclosure panel to extend below seam between ceiling and wall panels of the walk-in. Attach panel to

box with non-corrosive fasteners and seal to ceiling and box with clear silicon caulking. See Part 3, Installation Instructions, for type of clear silicon caulking to use.
Supply stainless steel hat channels to cover exposed control and refrigeration lines along building.

THRESHOLD:

A heavy gauge stainless steel threshold plate shall be provided with each door section.
THRESHOLD TO NOT EXCEED 15% ANGLE ON INTERIOR OR EXTERIOR

ALARM:

Walk-in shall be equipped with audio-visual alarm(s) that activate when temperature rises above desired setting. Alarm sensor is to be located in the return air stream of evaporator coil. Control panel shall be located at front of walk-in or at other pre-specified location. When temperature rises above predetermined setting a red light and buzzer activates.(Model (1) Thermo-Kool TK4700 walk-in monitor system with TK4 panic switch, motion detector, battery backups, dry contacts and thermostatically controlled heater wires).

REFRIGERATION:

Condensing units shall be factory assembled and UL approved. The condenser shall be air-cooled. Refrigerant for medium and low temperature systems shall be R448A

LLT42 (2 Systems) One temperature sensor is standard per unit. Additional sensors ordered as a separate line item. n Setup for 115V input control power (customizable to other control power) n NEMA 4 enclosure with viewing window n Box temperature adjustable from -30˚ F to 70˚ F n Ambient temperature: 15˚ F to 140˚ F n Relative humidity: < 90% and non-condensing n Alarm contacts: 240V 8A n Battery life:10 year (program/data protection)

1 1/4 HP, Remote Pre Assembled Refrig. System Model RFON150E4AEANT 208-230/60/3 Medium Temperature, base, weather hood, winter controls, Scroll, Air-cooled, R454A (9.3 Compressor RLA) w/ leak detection with RAL6A113ADARSF 115/60/1 coil (1.6 amps) with Dual Speed EC motor and EcoNet 2.0 with Sporlan SER.
Accessories: 1 ea A2L SSOV and CSOV Mitigation Valves (Shipped Loose For Field Install).

2 EACH 5 HP, Remote Pre Assembled Refrig. System Model RFON500L4AEANT 208-230/60/3 Low Temperature, base, weather hood, winter controls, Scroll, Air-cooled, R454A, No Defrost Provisions (17 Compressor RLA) w/ leak detection with RAL6E237DDARSF 208-230/60/1 coil (2.5 fan amps, 24.1 heater amps) with Dual Speed EC motor and EcoNet 2.0 with Sporlan SER.
Accessories: 2 ea A2L SSOV and CSOV Mitigation Valves (Shipped Loose For Field Install). 1 ea Redundant Systems.
3EA Compressor warranties

Evaporators shall be forced air type with air flow parallel to the walk-in ceiling. Evaporators shall be a standard low profile series. (Electronically Comutated Motors required to meet 2009 Energy Code). All evaporator coil components shall be housed in heavy gauge aluminum housing. Units shall have drain pan with drain pipe connection.

Condensing unit voltage to be as specified by job site requirements.

Units shall have drain pan with drain pipe connection. Evaporators shall be equipped with an automatic electric defrost system including coil heaters, time clock, fan delay control, drain line heaters and liquid line solenoid.

The basic components shall be supplied for Remote Preassembled and shall include condensing unit, evaporator coil, control kit (pressure control, thermostat, liquid line drier, sight glass, suction line vibration eliminator, expansion valve and evaporator coil mounting kit), defrost timer, fan delay control and liquid line solenoid suction accumulator, and quick response controller (QRC). All parts shall be factory mounted.

Provide factory mounted suction accumulators-field installed will not be accepted.

Remote Preassembled the system requires tubing, electrical hook-up, drain line and refrigerant charge supplied by qualified refrigeration, electrical and plumbing contractors.

A low ambient kit and weatherproof housing shall be supplied with condensing units. The low ambient kit shall consist of a crankcase heater and headmaster valve.

NOTE: Supply single point electrical connection for all accessories with labeled wiring through door panels to top of wall in, in foamed in place conduit.

Copeland compressor/condensing units and Bohn or Russell evaporator coils are required.
All work and materials are in full accordance with Local and/or State ordinances.

INSTALLATION INSTRUCTIONS:

Electrical Contractor will supply and run conduit and power wiring to cooler condensing unit and conduit and power wiring to freezer evaporator coil.
Electrical Contractor will supply and run conduit and control wiring from all coils to refrigeration control system. .
Electrical Contractor to supply conduit and wiring and make connections to and supply boxes provided and installed by the manufacturer for all lights, heated windows, door and sill heaters. Lights are not mounted by the factory. Food Service Equipment Contractor or approved installer to mount additional lights located on ceiling after walk-in box has been erected. Conduit and wiring for lights are supplied and installed by Electrical Contractor on the inside ceiling of the box. Electrical Contractor to provide conduit suitable for moist conditions. Conduit seal-offs are required for all electrical connections. All fasteners, etc., must be non-corrosive and mastic provided between dissimilar metals to prevent rusting.

Food Service Equipment Contractor to supply and install refrigeration lines. Food Service Equipment Contractor is responsible for determining length of lines needed.
Condensation drain lines are supplied and installed by Food Service Equipment Contractor or approved installer.
Condensate heat tape shall be 208/1 and supplied by Food Service Equipment Contractor and wired into freezer evaporator by Electrical Contractor.

Installation will be performed by the Food Service Equipment Contractor or an approved professional refrigeration company with experience in the installation of walk-in Cooler/Freezer refrigeration systems.

The installation includes, but is not limited to the following:
Building the box.
Setting the compressor/condensing unit assemblies.
Hanging the evaporator coils - verify locations.
Installation of all accessories unless indicated otherwise.
Installation of all refrigeration lines which includes supplying, running and connecting.
Installation of the drain lines - Verify locations; supply and install tubing.
Food Service Equipment Contractor seals and insulates all penetrations in the walk-in, regardless of who makes the penetration. Conduit seal-offs are required for all electrical connections and are supplied by the Electrical Contractor. Insulation and sealing is required between conduit and wiring and inside conduit where any type of connection or penetration is made. Food Service Equipment Contractor is responsible for informing and coordinating the use of conduit seal-offs by other contractors and for providing proper insulation and sealing for all other penetrations when conduit seal-offs cannot be used.
Perform start-up, test, check, and adjust all components and accessories and pull to proper operating temperatures. Walk-in Cooler/Freezer refrigeration systems to run for five

consecutive days prior to equipment demonstrations.
Calibrate thermometers, etc.
Box is to be cleaned before refrigeration is started up. Cleaning includes all inside and outside surfaces.
Hard copper is required for entire job. All refrigerant piping is ACR copper tubing, hard drawn. Wrought copper sweat fittings are used on the hard-drawn tubing. Slope suction line down in direction of flow 1/8" per foot. Where vertical risers of more than 5 feet occur in a suction line, the riser is trapped at the bottom.
Refrigeration system is set for four defrost cycles as a minimum (two defrost cycles for cooler) with each cycle in defrost 30 minutes as a minimum. Defrost times are set at times other than the initial arrival of the employees or periods of heavy usage during the morning and are identified in the Operation and Maintenance Manuals. Training on re-setting defrost times is provided to Owner during training.
System is ready for use when the Owner is prepared to occupy the operation.

General Contractor Information:

Steel reinforced concrete pad for walk-in box is prepared and supplied by General Contractor. See Food Service Equipment Contractor's supplied drawings and shop drawings for dimensions. Pad area must be transit level and trowel smooth and capable of sustaining weight of box and contents.
RECESSED TO BE DETERMINED BY TILE AND GROUT THICKNESS IN KITCHEN PLEASE CONFIRM WITH GENERAL CONTRACTOR.
Roof curbs (if required) are to be Food Service Equipment Contractor provided and install by the General Contractor.
All penetrations, including but not limited to, roof, wall and floor are provided by the General Contractor. Verification by the General Contractor with the Food Service Equipment Contractor as to location and size is required.
Sprinkler heads inside or over units must be loaded with a dry fire suppression substance.
Plumbing lines (supply, waste, drain, roof drain, sewer, condensation, slurry, etc.) cannot be routed over walk-in boxes.

WARRANTIES:
One-year parts, service, labor, mileage, time and transportation warranty on all parts supplied and all work performed.
Five-year non-prorated replacement warranty for the compressor/ condensing unit assemblies.
Five-year service and parts warranty.
APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: ARTIC AIR, BALLY AND KOLPAK

ITEM 13 COOLER SHELVING STATIONARY QTY: 1-LOT
MANUFACTURER: METRO
MODEL: METROMAX 4
QTY: 1-LOT
DESCRIPTION: COOLER SHELVING

Metro, Model MetroMax® 4, 4-Tier Stationary Shelving Unit
All-polymer corrosion proof shelving with removable open grid or solid shelf mat section. Shelf mats, beams, and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and robust corner with complete 360° capture of the wedge and post ensure stability, strength, and structural integrity. Stationary units have a maximum capacity of 2,000 lbs. evenly distributed. NSF Listed for all environments.

Each Unit to Consist of Sizes and Quantities as Drawn
4 ea MX74P 74" H Polymer Shelf Posts
3 ea MAX4-****G Shelf with Grid Mat
1 ea MAX4-****F Shelf with Solid Mat

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: AMCO and ULINE

ITEM 14: COOLER SHELVING MOBILE QTY: 1-LOT
MANUFACTURER: METRO
MODEL: METROMAX 4
QTY: 1-LOT
DESCRIPTION: COOLER MOBILE SHELVING

Metro, Model MetroMax 4®, 3-Tier Mobile Shelving Unit
All-polymer corrosion proof shelving with removable open grid or solid shelf mat section. Shelf mats, beams, and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and robust corner with complete 360° capture of the wedge and post ensure stability, strength, and structural integrity. Stationary units have a maximum capacity of 2,000 lbs. evenly distributed. Mobile units offer a maximum total unit load of 900 lbs. NSF Listed for all environments.

Each Unit to Consist of Sizes and Quantities as Drawn
4 ea MX63UP 63” H Polymer Mobile Shelf Posts
2 ea MAX4-****G Shelf with Grid Mat
1 ea MAX4-****F Shelf with Solid Mat
2 ea 5PCX Polymer Casters
2 ea 5PCBX Polymer Casters with Brake

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: AMCO and ULINE
****SPECIAL NOTE: LOCATION OF MOBILE SHELVING IS TO ALLOW SERVICE TO THE COILS-IF COIL LOCATION ON SITE IS DIFFERENT THAN WHAT IS SHOWN ON FS DRAWINGS PLEASE REVISE LAYOUT TO ACCOMADATE THESE CHANGES IN THE FIELD****

ITEM 15: HEAVY DUTY THREE TIER SHELVING QTY: 1-LOT
HEAVY DUTY
MANUFACTURER: NEW AGE
MODEL: SEE BELOW
Description:
THREE tier shelving units with bottom shelf 8” above finished floor and shelving spaced evenly with top shelf even with top of posts.
3 EACH PER UNIT 24XXTB Dimensions: XX(w) x 20(d)
"Adjust-A-Shelf" T-Bar Series Shelf, XX"W x 20"D, all welded aluminum construction, 1500 lbs. capacity, NSF, Made in USA, (standard factory lead time)
4 EACH PER UNIT Model 54P Post, 48"H, marked in 2" increments, aluminum finish, NSF, Made in USA, (standard factory lead time)
4 EACH PER UNIT Model 0116 Adjustable Foot, 1-5/16" dia., upright, (standard factory lead time)
Lifetime guarantee against rust & corrosion. Lifetime guarantee against worksmanship and material defects.
APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: WINHOLT AND CHOICE

ITEM 16 FREEZER SHELVING STATIONARY QTY: 1-LOT
MANUFACTURER: METRO
MODEL: METROMAX 4
QTY: 1-LOT
DESCRIPTION: FREEZER SHELVING

Metro, Model MetroMax® 4, 4-Tier Stationary Shelving Unit
All-polymer corrosion proof shelving with removable open grid or solid shelf mat section. Shelf mats, beams, and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and robust corner with complete 360° capture of the wedge and post ensure stability, strength, and structural integrity. Stationary units have a maximum capacity of 2,000 lbs. evenly distributed. NSF Listed for all environments.

Each Unit to Consist of Sizes and Quantities as Drawn
4 ea MX74P 74” H Polymer Shelf Posts
3 ea MAX4-****G Shelf with Grid Mat
1 ea MAX4-****F Shelf with Solid Mat

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: AMCO and ULINE

ITEM 17: FREEZER SHELVING MOBILE QTY: 1-LOT
MANUFACTURER: METRO
MODEL: METROMAX 4
QTY: 1-LOT
DESCRIPTION: FREEZER MOBILE SHELVING

Metro, Model MetroMax 4®, 3-Tier Mobile Shelving Unit
All-polymer corrosion proof shelving with removable open grid or solid shelf mat section. Shelf mats, beams, and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and robust corner with complete 360° capture of the wedge and post ensure stability, strength, and structural integrity. Stationary units have a maximum capacity of 2,000 lbs. evenly distributed. Mobile units offer a maximum total unit load of 900 lbs. NSF Listed for all environments.

Each Unit to Consist of Sizes and Quantities as Drawn
4 ea MX63UP 63” H Polymer Mobile Shelf Posts
2 ea MAX4-****G Shelf with Grid Mat
1 ea MAX4-****F Shelf with Solid Mat
2 ea 5PCX Polymer Casters
2 ea 5PCBX Polymer Casters with Brake

****SPECIAL NOTE: LOCATION OF MOBILE SHELVING IS TO ALLOW SERVICE TO THE COILS-IF COIL LOCATION ON SITE IS DIFFERENT THAN WHAT IS SHOWN ON FS DRAWINGS PLEASE REVISE LAYOUT TO ACCOMADATE THESE CHANGES IN THE FIELD****

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: AMCO and ULINE

ITEM 18 60” X 30” WORKTABLE QTY: 1
MANUFACTURER: CUSTOM FABRICATORS
MODEL: CUSTOM
Description:
Work Tables, 60"W x 30"D x 41"H, 14/300 stainless steel top, backsplash, legs, undershelf & adjustable bullet feet, NSF
Accessories:
- 1 EA: Drawer, 20"W x 20"D x 5"H, roller bearing slides & stainless steel drop in pan, stainless steel construction, NSF SEE FS100 FOR LOCATIONS & AMOUNT.
- Casters, 5"H, (2) with brake (set of 4)
- SD: Sound Deadening.
- Dimensions: 20(h) x 60(w) x 12(d)
  Shelf, cantilevered, 60"W x 12"D, 2" turn up at rear and both sides, 16/300 stainless steel construction, NSF Model MOD 2" with bull nose edging on front: SEE FS100 FOR LOCATION.

Fabricators which are pre-approved for construction of stainless-steel custom fabrication (serving line equipment excluded) are: Atlanta Custom Fabricators, Commercial Stainless Fabricators, Marietta, GA. Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco

ITEM 19 EQUIPMENT STAND QTY: 1
MANUFACTURER: F.W.E.
MODEL: OTR-15-MSWT

Description:

Equipment Stand with Wing Table, mobile, 25-1/2"W, (15) slides, fixed 1-1/2" OC, (15) 18" x 26" pan stand & (2) 18" x 26" pan wing table capacity, up to 500 lb weight capacity, pitched center drain, open base with undershelf, stainless steel construction, (4) 5" swivel polyurethane locking casters, NSF

ITEM 20 FOOD PROCESSOR QTY: 1
MANUFACTURER: HOBART
MODEL: FS-250-1B
Description:

Food Processor, angled continuous feed design, full-size hopper, 17 lb per/min production capacity, 420 rpm, stainless steel cutting surfaces, planetary gear transmission, triple safety interlocks, aluminum housing, rubber feet, 15PLTSS-6PACK, 120/60/1, 3/4 HP, 8.0 amps, UL, NSF

Accessories:
Plate Racks (2 EACH)-hold 3 plates for processor.

ITEM 21 PREP TABLE WITH SINKS QTY 1
MANUFACTURER: CUSTOM FABRICATORS
MODEL: CUSTOM
Description:

Work Table 96"W x 30"D x 41"H, 14/300 stainless steel top, backsplash, legs, undershelf & adjustable bullet feet, NSF WITH PROVISION FOR ITEM # 22 DISPOSER AND CONTROL PANEL. (VEGETABLE PREP SINK)

See drawing FS-500 for location of sinks, drawer, shelf and undershelves.

Accessories:

1. MARINE EDGE
2. 2 ea Sink Bowl, fabricated, 1 ea 20"W x 20" front-to-back x 14" deep bowl and 1 ea 20"W x 20" front-to-back x 7.25” deep bowl, 16/201 stainless steel construction
3. Model Lever Drain, twist handle, includes handle bracket, 2" drain (Provided and installed by ACF)
4. Sink Cover, fits 20" x 20" sink bowl, 1/2" poly construction
5. Holder for sink cover on right side of table
6. Drawer, 20"W x 20"D x 5"H, roller bearing slides & stainless steel drop in pan, stainless steel construction, NSF
7. Higher Backsplash-to be 8”
8. Bullet Foot, stainless steel
9. Sound Deadening
10. SS panel for installation of disposer control panel.

Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Atlanta Custom Fabricators, Commercial Stainless Fabricators, Marietta, GA. Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco

ITEM 21.1 PRE-RINSE FAUCET WITH ADD A FAUCET QTY 1-LOT
MANUFACTURER: T & S BRASS
MODEL: B-0133-ADF10-B
Description:

Easy Install Pre-Rinse Unit, with wall bracket, wall mount base, 8" centers, 44" flexible hose with overhead spring body & B-0107 spray valve, 18" riser, add-on faucet with 10" swing nozzle, lever handles, 1/2" NPT female inlets, quarter-turn Eterna cartridges, low leaf

Accessories:

1. T&S Brass Model B-0230-K Installation Kit, (2) 1/2" NPT nipples, lock nuts & washers, (2) short "Ell" 1/2" NPT female x male

ITEM 22 DISPOSER WITH CONTROL PACKAGE QTY: 1
MANUFACTURER: SALVAJOR
MODEL: 300-SA-6-MRSSLD
ELECTRICAL: Reference Project drawings for electrical requirements.
Description:

Disposer, Sink Assembly, 6-1/2" sink collar, 3 Hp motor, start/stop push button manual reversing MRSS control, includes fixed nozzle, chrome plated vacuum breaker, solenoid valve, sink stopper & flow control, heat treated aluminum alloy housing, single support leg, UL, CSA, CE (**Effective 6-1-17 all MRSS control panel dimensions will be 9-1/4" x 10-1/4" x 5-7/16"**)

Accessories:

1. Model MRSS-LD Start/Stop Push Button, manual reversing control with safety line disconnect, NEMA 4 stainless steel enclosure (**Effective 6-1-17 all MRSS control panel dimensions will be 9-1/4" x 10-1/4" x 5-7/16"**)
2. 1 ea Model 980104 Mounting bracket for RSS, MSS, MSS-LD, MRSS, MRSS-LD

APPROVED ALTERNATES INSINKERATOR AND HOBART

ITEM 23 PREP TABLE WITH SINK QTY 2
MANUFACTURER: CUSTOM FABRICATORS
MODEL: CUSTOM
Description:

90"W x 30"D x 41"H, 14/300 stainless steel top, backsplash, legs, undershelf & adjustable bullet feet, NSF
114"W x 30"D x 41"H, 14/300 stainless steel top, backsplash, legs, undershelf & adjustable bullet feet, NSF
See drawing FS-500 for location of sinks, drawer, shelf and undershelves.

Accessories:

1. MARINE EDGE
2. Sink Bowl, fabricated, 1 ea 20"W x 20" front-to-back x 14" deep bowl stainless steel construction
3. Lever Drain, twist handle, includes handle bracket, 2" drain (Provided and by ACF)
4. Sink Cover, fits 20" x 20" sink bowl, 1/2" poly construction
5. Side holder for sink cover on right side of table
6. Drawer, 20"W x 20"D x 5"H, roller bearing slides & stainless steel drop in pan, stainless steel construction, NSF
7. Higher Backsplash-to be 8”
8. Bullet Foot, stainless steel
9. Sound Deadening
10. Model 3CTS-12 Shelf, cantilevered, 36"W x 12"D, 2" rear up turn, 16/300 stainless steel construction, NSF FOR 6’ SINK TABLE

Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Atlanta Custom Fabricators, Commercial Stainless Fabricators, Marietta, GA. Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco

ITEM 23.1 PRE-RINSE FAUCET WITH ADD A FAUCET QTY 2
MANUFACTURER: T & S BRASS
MODEL: B-0133-ADF10-B
Description:

Easy Install Pre-Rinse Unit, with wall bracket, wall mount base, 8" centers, 44" flexible hose with overhead spring body & B-0107 spray valve, 18" riser, add-on faucet with 10" swing nozzle, lever handles, 1/2" NPT female inlets, quarter-turn Eterna cartridges, low leaf

Accessories:

2. T&S Brass Model B-0230-K Installation Kit, (2) 1/2" NPT nipples, lock nuts & washers, (2) short "Ell" 1/2" NPT female x male

ITEM 24 SPARE NUMBER

ITEM 25 HAND SINK QTY: 7
MANUFACTURERE: Advance Tabco
MODEL: 7-PS-59

Description:
Hand Sink, wall mounted, 14" wide x 10" front-to-back x 5" deep bowl, Deep Drawn™ sink bowl, 20 gauge 304 stainless steel, welded 7-3/4"H side splashes, heavy duty splash mounted gooseneck faucet, knee valve, basket drain, keyhole wall mount bracket, NSF, cCSAus
Accessories:
1. 7 ea Model 7-PS-10 P-trap, heavy duty, 1-1/2", 17 gauge
BK RESOURCES IS APPROVED ALTERNATE

ITEM 26 WASTE CONTAINERS QTY: 7 (3 SHOWN)
MANUFACTURER: RUBBERMAID
MODEL: FG353600GRAY
Description:
BRUTE® Container, square, without lid, 40 gallon, 23-1/2"D x 28-3/4"H, nesting handles, rounded corners & smooth contours, plastic construction, gray , NSF, Made in USA
Accessories:
7 ea Model FG353900GRAY BRUTE® Container Lid, square, 24"D x 2"H, for 3536 container, tight- fitting, gray , NSF, Made in USA
7 ea Model FG353000BLA BRUTE® Dolly, square, 17-1/4"D x 6-1/4"H, for 3526 and 3536 containers, 250 lb. capacity, black, NSF, Made in USA
VERIFY AT LEASE TWO TRASH CANS MUST FIT UNDER SOILED DISHTABLE
APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: CARLISLE AND CAMBRO

ITEM 27 72” X 30” WORKTABLE QTY: 1
MANUFACTURER: CUSTOM FABRICATORS
MODEL: CUSTOM
Description:
Work Table, 72"W x 30"D x 41"H, 14/300 stainless steel top, 8” backsplash, SS legs, SS undershelf & adjustable bullet feet, NSF
Accessories:
- 1 EA: Drawer, 20"W x 20"D x 5"H, roller bearing slides & stainless steel drop in pan, stainless steel construction, NSF SEE FS100 FOR LOCATIONS & AMOUNT.
- Sound Deadening.
- CASTERS/TWO WITH BRAKES

Fabricators which are pre-approved for construction of stainless-steel custom fabrication (serving line equipment excluded) are: Atlanta Custom Fabricators, Commercial Stainless Fabricators, Marietta, GA. Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco

ITEM 28 SPARE NUMBER

ITEM 29 HOT WATER DISPENSER QTY: 1
MANUFACTURER: HATCO
MODEL: AWD-12
ELECTRICAL: Reference Project drawings for electrical requirements.
Description:
Atmospheric Hot Water Dispenser, countertop design, 12-gallon capacity, automatic fill, pushbutton portion control, low water cut-off, electronic temp. control with digital display, red & white granite powder coated body, stainless steel tank, shelf & base
Accessories:
1. Model AWD-PLUMB 3 ft. rubber drain hose with 10 ft. 1/4" inlet tubing
2. Model AWD-FILTER Water filtration system with 10' of 1/4" tubing & fittings
APPROVED ALTERNATES BLOOMFIELD AND BUNN

ITEM 30 MIXER QTY: 1
MANUFACTURER: HOBART

MODEL: HL200-1STD
ELECTRICAL: Reference Project drawings for electrical requirements.
Description:

TRANSMISSION: Gear-driven. Gears are constant mesh heat-treated hardened alloy steel along with anti-friction ball bearings. Grease lubricants furnished to all gears and shafts.
Three Fixed Speeds plus Stir Speed
Shift-on-the-Fly™ Controls
Soft start Agitation Technology
Magnetic contactor with thermal overload protec-tion. Internally sealed “Start-Stop” push buttons. A 15-minute SmartTimer™ is standard. SmartTimer™ includes Automatic Time Recall, which remembers the last time set for each speed.
Ergonomic Swing-Out Bowl
Stainless Steel Bowl Guard
Hobart Quick Release™ agitators allow for simple installation and removal from agitator shaft
BOWL GUARD: Heavy-duty stainless steel wire front and solid rear portion. Front portion of guard rotates easily to add ingredients and install or remove agitator. It detaches in seconds for cleaning in dishwasher or sink. Rear portion of guard can be quickly cleaned in position. Guard must be in closed position before mixer will operate. Bowl support interlock provides further protection.
BOWL LIFT: Ergonomic style, hand crank operated, self-locking in top and bottom position.
FINISH: Metallic Gray Hybrid Powder Coat finish.
ATTACHMENT HUB: Comes with front-mounted Hobart standard #12 taper attachment hub for use with Hobart #12 size attachments.

Accessories:

1. Stainless steel bowl
2. Aluminum "B" beater
3. Stainless steel "D" wire whip
4. Aluminum "ED" spiral dough arm
5. TABLEHW-HL2012 Mixer Table; 27”W x 32”D x 26”H, the top shelf is drilled for mounting an HL120 or HL200 mixer, includes 4 posts for storing attachments, a lower shelf for additional storage, & (4) locking 5” diameter wheels

ITEM 31 MICROWAVE QTY: 1
MANUFACTURER: PANASONIC
MODEL: NE-1054F
Description:
1000 watt microwave.

ITEM 32-33 SPARE NUMBER

ITEM 34 PAN RACKS QTY: 7
MANUFACTURER: NEW AGE
4 EACH MODEL 1655:
Description:

Mobile pan rack with 13 adjustable aluminum guides, bottom pans slides are welded in place. 4 ½” OC for 12 x 20 to 18 x 26 pans, 1 ½” centers, end loading, 5” platform swivel casters, NSF, MADE IN USA.
Lifetime warranty against rust and corrosion, 5 year workmanship and material defects warranty.

Accessories:

1. PS Pan Stop, aluminum strap welded to rear of unit (MUST BE FACTORY INSTALLED)

3 EACH MODEL 7331:
Description:

Bun pan rack, full height, open sides, with angle glides on 3” centers, capacity 20-18” x 26” sheet pans, all welded construction, end loading, 5” platform, NSF, MADE IN USA.
Lifetime warranty against rust and corrosion, 5 year workmanship and material defects warranty.

Accessories:

1. PS Pan Stop, aluminum strap welded to rear of unit (MUST BE FACTORY INSTALLED)

2. Provide SIX (6) vinyl rack covers for size rack specified. Provide covers as manufactured by Berner Corp. or Coverall, Division of Worcester Slitting and Manufacturing. Provide full height window on panel that rises.

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: CHANNEL and CHOICE

ITEM 35-39 SPARE NUMBERS

ITEM 40 FULL SIZE MOBILE HEATED CABINET QTY: 2
MANUFACTURER: F.W.E.
MODEL: MTU-12
Dimensions: 69(h) x 29.75(w) x 32.25(d)
Heated Cabinet, mobile, (12) pair universal tray slides, (12) 18" x 26" or (24) 12" x 20" pan capacity 4-1/2" OC, adjustable on 1-1/2" increments, insulated, moisture-temp system, electronic controls, insulated, removable water reservoir, (1) flush mounted door, stainless steel interior & exterior, 5" casters (2) rigid & (2) swivel with brakes, NSF, cULus, IPX4, ENERGY STAR®
1 ea Two year limited parts & one year labor warranty, standard
1 ea Element Upgrade
1 ea 120v/50/60/1-ph, 18.0 amps, 2150 watts, NEMA 5-20P, standard (US)

ITEM 41 EXHAUST HOOD QTY: 1-LOT
NOT IN CONTRACT BY OTHER TRADES

ITEM 41.1 UTILITY DISTRIBUTION SYSTEM (UDS) QTY: 1
MANUFACTURER: CAPTIVEAIRE
MODEL: CUSTOM
ELECTRICAL: Reference Project drawings for electrical requirements.
Description:

A Utility Distribution System shall provided be as indicated on drawings. Systems shall have two vertical risers, one on each end, with one dedicated to electrical and the other to plumbing. The horizontal distribution raceway between the risers shall be separated into electrical and plumbing compartments and each shall be completely enclosed and water tight with removable access panels. The risers and raceway shall be constructed of 16 gauge, type 304 stainless steel, #4 finish. A circuit protected dual convenience outlet shall be provided on each riser. Service connections shall be located behind easily removable access panels.

Approvals: Unit(s) shall be ETL Listed to US and Canadian Standards, ETL Sanitation Listed, AGA and MA approved.
General Construction and Features

- Electrical Riser: Main power connection shall be made to the main circuit breaker which has a shunt trip and is mounted in the electrical riser.
- Wireway systems: Electrical power shall be fed through a main circuit breaker to a distribution panel which contains individual branch breakers. Each appliance is fed from the individual breakers which are wired to each receptacle located along the raceway.
- Plumbing Riser: The plumbing riser shall house manual (quarter-turn) shut-off valves for each incoming main supply line located in the UDS. The plumbing manifolds shall be provided with stub-outs along the raceway for the individual plumbing connections. Each stub-out shall be equipped with a manual (quarter-turn) shut-off valve.
- Expandability: All electrical systems are designed for additional capacity for future expansion or upgrade of connected appliances.
- Wireway: Electrical distribution panel located in the riser shall be equipped with branch circuit breakers and sized for expansion.
- Serviceability and Accessibility: Lift out doors shall provide easy access to risers without moving cooking equipment, in most cases. Removable panels provided along the length of the raceway shall allow access to either plumbing or electrical compartments.
- Electric Outlets and Cord Sets: All outlets shall provide moisture resistant covers and have been sized per NEMA standards. Each is supplied with a matching cord and plug set if these are not already supplied by

the equipment manufacturer. Twist-lock sets are standard in island applications. All 120V, single phase 15 and 20 amp receptacles are DCO-GFI.

- Main Disconnect: One point disconnect through a main circuit breaker equipped with a 120 VAC rated shunt trip provided in the riser.
- Gas Solenoid Valve: Electrical or Mechanical. Electrical valves shall be provided with a manual reset button and time delay relay to prevent pilot lights from going out in momentary power outages.
- Shunt Trip: Shall be provided with each main breaker.
- Appliance Protection: Each electrical outlet connection shall be protected with an individual circuit breaker.

Electrical

- Wireway Systems: The electrical system shall consist of a main circuit breaker which feeds power to a distribution panel located in the electrical riser containing individual branch breakers. Each appliance is fed from the individual breakers which are wired to each receptacle located along the raceway and shall be completely isolated from the plumbing supply manifolds. The main circuit breaker shall be equipped with a built-in 120 VAC rated shunt trip and shall be located in the electrical riser requiring a single point incoming connection. Terminal block connections shall be provided for field interconnection between the shunt trip and the fire protection system for power shut-off in the event of a fire. All outlets shall be equipped with grounding type receptacles having specific NEMA polarized configurations and located on the under side (Model UDI) or front side (Model UDW) of the raceway at each equipment location. Outlets are matched to the cord and plug sets supplied with equipment. On the Model UDI, all 120V, single phase 15 and 20 AMP receptacles are DCO-GFI. Twist lock cord and plug sets are provided for equipment supplied without cords. On the Model UDW, straight blade cord and plug sets are provided for equipment supplied without cords.
- Main Circuit Breaker: 120/208/3 50 AMP

Plumbing

- The plumbing compartment shall be completely isolated from the electrical with all piping labeled.
- Hot and cold water and steam supply and return manifolds shall be insulated.
- All incoming service connections shall be provided with 1/4 shut-off valve. Each branch connection shall be provided with 1/4 shut-off valve, with color coded hoses, and located at each equipment location.
- Color coded quick disconnect hoses are provided for connection to equipment.
- Hot and cold water piping, including branch connections, shall be type "L" copper tubing. All fittings will be copper sweat soldered (95-5 type).
- Gas and steam piping, including branch connections, shall be threaded black iron. There shall be a drip tee on the incoming gas end. The gas manifold shall be furnished with either an electrical or mechanical gas valve which shall be field interlocked with the fire protection system to shut off fuel sources in the event of a fire. Electrical gas valves shall be furnished with a manual gas reset button and time delay relay to prevent pilot lights from going out in momentary power outages, located in the UDS riser.
- Gas manifolds are sized for an inlet pressure of 7" WC for natural gas or 11" WC for LP.

Gas Equipment

All gas equipment shall conform to local-Code requirements

- Manifold (looped): 3/4" to 3" IPS
- 1/4 turn manual shut-off valve on manifold
- Quick disconnect hoses: 1/4" to 1-1/4", up to 6' long
- Quick disconnect fittings: 1/4" to 1-1/4" with 1/4 shut-off valves

Hot and Cold Water-

- Manifold: 3/4"
- 1/4 turn manual shut-off valve on manifold
- Quick disconnect hoses: 1/4" to 1", up to 6' long
- Quick disconnect fittings: 1/4" to 1" with 1/4 shut-off valves

Options

- Remote Status Indicator Panel: Lighted panel indicates status of receptacles in wireway system.
- Electric Outlets & Cord Sets: Water tight pin and sleeve outlets and cords.
- Light & Fan Switches located in riser.
- Hood Control Panel built into riser.
- Swivel Connectors for gas equipment.

- Plumbing Fixtures: Pre-plumbed and installed faucets, mixing valves, hose reels, water filtration systems.YES THERE WILL BE ONE REQUIRED TO BE INCLUDED IN THE UDS. SEE ITEM 50 COMBINATION OVENS WITH WATER FILTER
- Cable Restraints: Available for mobile equipment.
- Temperature/Pressure Gauges for hot/cold water main.

Factory Tested
Unit(s) shall be operated, tested and set at the factory using job-site conditions for electrical and gas input. All operating and safety controls shall be tested and set at the factory.
Service and Parts
The supplier shall furnish gas piping schematics, as built wiring connection and control-circuit diagrams, dimension sheets and a full description of the unit(s). Service manuals showing service and maintenance requirements, shall be provided with each unit.

ITEM 42 SPARE NUMBER

ITEM 43 40 GALLON TILTING SKILLET, GAS QTY: 1
MANUFACTURE: CLEVELAND
MODEL: SGL40T1
Dimensions: 39(h) x 49.88(w) x 41(d)
Description
PowerPan™ Tilting Skillet, gas, 40-gallon capacity, bead blasted cooking surface, 10° tilt cooking feature, with easy manual hand tilt, spring-assisted cover with vent, gallon & liter markings, stainless steel construction with open leg frame, 200,000 BTU, CE, NSF

1 ea	1-year parts & labor warranty, standard
1 ea	Extended Warranty, not to exceed 36 months from date of installation (K-12 Schools only)
1 ea	10 Year Pan warranty (K-12 Schools only)
1 ea	Performance start-up included at customer request after equipment is installed (Free Water Quality Check included) (contact Cleveland Sales Representative for details)
1 ea	Natural Gas
1 ea	120v/60/1-ph, 1.4 amps, NEMA 5-15P, standard
1 ea	Standard controls, temperature control dial, LED ON indicator light, main power switch with standard and high power setting, standard
1 ea	Model PT2 Power Tilt, with hand tilt override
1 ea	Model TD2SK 2" tangent draw-off valve, front mounted left side
1 ea	Model PCS Pan Carrier, for floor models
1 ea	Model PRSS H/C Pre-Rinse Spray Head with hose (P/N B-0113)
1 ea	Model FBST1 Faucet Bracket for T1 series floor model skillets
1 ea	Model FSSK Food Strainer, 30 & 40 gallon, for braising pans

**SPECIAL NOTE: FSC MUST SUPPLY INLINE VACCUM BREAKER AS CODE REQUIRES
Model FL FOOTKIT 4 Flanged Feet, for all BPM & BPP models (set of 4)
APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: VULCAN AND GROEN

ITEM 44-45 SPARE NUMBER

ITEM 46 DOUBLE STACK CONVECTION OVENS, GAS QTY: 1 STACKS
MANUFACTURE: BLODGETT
MODEL: DFG-100 DBL
Description:
Dimensions: 70.63(h) x 38.25(w) x 36.88(d)
Convection Oven, gas, double-deck, standard depth, capacity (5) 18" x 26" pans per compartment, (SSD) solid state digital controls, 2-speed fans, interior light, simultaneous operated doors with glass, stainless steel front, sides & top, 6" stainless steel legs, flue connector, (2) 1/2 HP, 55,000 BTU each, cETL, NSF, CE
3 year parts, 2 year labor and 2 additional year door warranty (parts only), standard
1 year additional labor only warranty (per section) (MUST be purchased at time of original equipment order)
Start-Up option to all the convection and deck ovens (Does not included assembly or installation of any components)

Natural gas
115v/60/1-ph, 6.0 amps, 1/2 hp, 2-wire with ground, NEMA 5-15P (per deck), standard
Model SSD Top Oven: Solid State digital with Pulse Plus® and Cook & Hold, standard
Model SSD Bottom Oven: Solid State digital with Pulse Plus® and Cook & Hold, standard
Draft diverter
6" legs, adjustable, stainless steel (set), standard

ITEM 47 SPARE NUMBER

ITEM 48 FLOOR TROUGH QTY: 1
MANUFACTURER: IMC/TEDD7
MODEL: ASFT-1836-SG
Description:
Dimensions: 12.25(h) x 36(w) x 18(d)
ASFT Anti-Spill Floor Trough, 36"W x 18"D, 6" deep receptacle, (1) 4" OD tailpiece, stainless steel beehive strainer, 14/304 stainless steel, brushed satin finish, (SG) subway grating, NSF, Made in USA
Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco.

ITEM 48.1 FLOOR TROUGH QTY: 1
MANUFACTURER: IMC/TEDD7
MODEL: ASFT-1236-SG
Description:
Dimensions: 12.25(h) x 96(w) x 12(d)
ASFT Anti-Spill Floor Trough, 96"W x 12"D, 6" deep receptacle, (2) 4" OD tailpiece, stainless steel beehive strainer, 14/304 stainless steel, brushed satin finish, (SG) subway grating, NSF, Made in USA
Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco.

ITEM 49 COMBINATION OVENS QTY: 3 STACK
MANUFACTURER:
MODEL: CHEF-62G DOUBLES
Dimensions: 41.02(w) x 41.06(d)
Chef'sCombi 62G, Gas 6-level full-size(GN 2/1) capacity (6) 18" x 26" full-size sheet or (12) 12" x 20" steam pan. All-in-one multifunctional cooking equipment with customizable CombiOS interface, CombiClimateControl, AutoClimate, CombiGuide, MenuMix, & CombiCare. Advanced technologies for premium cooking results with powerful heating, humidity sensor-controlled climate regulation, high-performance dehumidification, controlled even heat distribution and humidifying function. Multi-point food probe, (3) wire racks, retractable sprayer, Ethernet & WiFi enabled, steam generator combi oven, 112,601 BTU, IPX5, cULus, NSF
Model CHEFSCOMBI WARRANTY 2 years limited parts & labor warranty, standard
Model CHEFSCOMBI NOTE NOTE: Water is a customer supplied utility just like Gas & Electric to the equipment. Proper Water Filtration based on customer water quality is essential to meet the equipment water spec requirements. Verify type of filtration needed based on performing a cold water analysis from the customer site. A suitable Water Treatment System & regular filter replacements coupled with routine cleaning/deliming is required.
Model CHEFSCOMBI NOTE 2 NOTE 2: End-User Information (REQUIRED) End-user contact information is required at the time of order to support communication for the Chef'sCombi equipment. This includes the end-user's contact name, email address, business name, and location. Collecting this information enables direct communication for important software updates, maintenance reminders (such as chemical reordering and filter replacements), and access to new features, accessories, and best practices. This process helps ensure optimal equipment performance, reduces downtime, and enhances the overall customer ownership experience.
Model CHEF-VCC Chef Assistance Program, a Vulcan Certified Chef conducts 4 hours/location specialized application training with personnel, no charge

	Model INSTALL-CP-COMBIDUO Certified Plus Installation of first combi duo unit (Stacked): Hobart Service installation includes delivery, set in place, and all connections of unit. Pricing is based on one unit being installed in a location within 100 miles round trip of Hobart Service branch location. Additional charges may apply for locations greater than 100 miles round trip. Removal and disposal of existing unit is a seperate charge and me be selected as an additional price. Vulcan water filtration system is recommended to be installed wiht the Vulcan combi oven. (Non Discountable NET Pricing)
	Model INSTALL-CP-COMBIDUO2 Installation of second combi duo unit (Stacked): Hobart Service installation includes delivery, set in place, and all connections of unit. Pricing is based on second unit being installed same day and time, same location. Additional charges may apply for locations greater than 100 miles round trip. Removal and disposal of existing unit is a seperate charge and me be selected as an additional price. Vulcan water filtration system is recommended to be installed wiht the Vulcan combi oven. (Non-Discountable NET Pricing)
	Model COMBICERTPLUS-SITESURVEY Pre installation site survey will be completed at no additional cost when Certified Plus instllation is purchased. Pre installation site survey will be completed for up to two units at the same location on the same day. Site survery to be completed within a mimimum of two weeks of equipment installation. Survey is for a single-trip and within 100 miles round trip of a Hobart Service branch location. Additional charges greater than 100 miles round trip may apply. (Non-Discountable NET Pricing)
	Model INSTALL-STARTUP Unit commissioned to assure operational start up by trained technician
	Model INSTALL-WATERFILTERDUO Installation of Vulcan water filtration CB15K/CB30K or Scaleblocker system to combi duo (stacked) Includes removal and disposal of old filter: Hobart Service to install water filtration within 5 feet of new equipment. Note: water filter must be installed in an area with access to replace cartridge and clear of any open flames and heat source. (Filter installation can only be selected with Certified Plus or Certified Installation.) (Non-Discountable NET Pricing)$500.00
	Model INSTALL-WATERFILTERDUO2 Installation of Vulcan water filtration CB15K/CB30K or Scaleblocker system to second combi duo (stacked) up to 4 ovens. Includes removal and disposal of old filter: Hobart Service to install water filtration within 5 feet of new equipment. Note: water filter must be installed in an area with access to replace cartridge and clear of any open flames and heat source. (Filter installation can only be selected with Certified Plus or Certified Installation.) (Non-Discountable NET Pricing)
	Model CHEF-62G-120 (VICS62G-81) 120v/60/1-ph, 0.6kW, 5.8 amps
	Model INS-GAS Installation Kit For Gas Chef'sCombi Ovens, Natural or LP gas (Non-Discountable NET Pricing)
3 ea	Model CHEF-STACK2G Stacking connection kit, gas, full, with standard right hinges (62 or 102 gas models) - Must choose a stacking support frame to complete kit.
3 cs	Model CHEF-TAB Cleaner Tab - bucket (100) - for use inside the oven as part of the CombiCare cleaning cycles of quick, light, medium, & strong (Non-Discountable NET Pricing)
3 cs	Model CHEF-STICK Care Stick - bucket (100) - for use in the front descaling box as part of the CombiCare descaling cycle (Non-Discountable NET Pricing)
3 ea	Model CHEF-USBPROBE USB Food Probe 3pts - Diameter 0.13"
3 ea	Model CB30K-SYSTEM Single Hollow Carbon Filter System, with 30,000 gallon capacity, for chlorine & chloramine reduction, sediment, bad tastes & odors, total organic compounds, tannins & trihalomethanes, ANSI/NSF 42 & 53
3 ea	Model CB30K-PMKIT PM Kit for CK30K-SYSTEM (Cartridge Replacement) 30,000 gallon rated capacity (00-847487-2PMK)
3 ea	Model SMF620 SYSTEM SCALEBLOCKER™ Water Treatment, field installed by others at job site
6 ea	Model CHEF-DC Chef'sCombi Drain Connection kit. Includes four elbows 45° and two straight 30" quick connect 1 1/2" drain tubing
3 ea	Model VRACK-62 (3) Standard Grab-and-Go Racks for 62 sized Vulcan Combi, for use with 18" x 26" full sheet pans
9 ea	Model VRACK-62 (3) Extra Grab-and-Go Racks for 62 sized Vulcan Combi, for use with 18" x 26" full sheet pans (Non-Discountable NET Pricing)

24 ea Model PIZZATRAY Pizza and baking tray
24 ea Model FRYBASKET Frying basket coated with DURAPEK
24 ea Model PERFTRAY2.1 Perforated baking tray 20"x24" full size 62/102 combi ovens

ITEM 50 SPARE NUMBER

ITEM 51 SINGLE DOOR PASS THRU HEATED CABINET QTY: 2
MANUFACTURER: TRAULSEN
MODEL: RHF132WP-FHG Dimensions: 83.25(h) x 29.88(w) x 39(d)
Spec-Line Heated Cabinet, Pass-thru, one-section, stainless steel exterior and interior, standard depth cabinet, full-height glass doors, with EZ-Clean Gaskets, (3) clear coated adjustable shelves per section, microprocessor controls, 6' adjustable stainless steel legs, cETLus, ETL-Sanitation
6 ea 6-year parts & labor, standard. Visit www.traulsen.com for details
6 ea 208/115v/60/1-ph, 7.7 amps, standard
6 ea Thermometer side door: hinging to be determined
Door hinging to be determined-SEE DRAWINGS
Accessories:
1. PER CABINET: 10 UNIVERSAL TRAYSLIDES PER SECTION
2. GLASS DOORS ON KITCHEN SIDE ONLY
APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: VICTORY

ITEM 52 TWO SECTION PASS THRU REFRIGERATED CABINET QTY: 2
MANUFACTURER: TRAULSEN
MODEL: RHT232WPUT-FHG
Dimensions: 83.25(h) x 37.94(d)
Description:
Spec-Line Refrigerator, Pass-thru Display, TWO-section, self-contained refrigeration, StayClear™ Condenser, variable speed compressor, stainless steel exterior and interior, standard depth, wide full-height glass door on both sides with EZ-Clean Gaskets, interior lights, (3) adjustable wire shelves per section, microprocessor controls, 6" adjustable stainless steel legs, R-290 Hydrocarbon refrigerant, 1/2 hP, cETLus, ETL-Sanitation, ENERGY STAR®
3 ea 6-year parts & labor and 7 year compressor, standard. Visit www.traulsen.com for details
3 ea 115v/60/1-ph, 8.3 amps, cord with NEMA 5-15P, standard
Door hinging to be determined-SEE DRAWINGS
Accessories:
1. PER CABINET: 10 UNIVERSAL TRAYSLIDES PER SECTION
2. GLASS DOORS KITCHEN SIDE ONLY
APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: VICTORY

ITEM 53 SPARE NUMBER

ITEM 54-56 SERVING COUNTERS QTY: 1-LOT
MANUFACTURER: DUKE
MODEL: CUSTOM
- Continuous piece ‘fully enclosed base’ style construction with utility chase within counter. All electrical conduit and plumbing to be located within utility chase as required. Utility chase to be fully accessible from operator side of counter with electrical to be located removable stainless steel panels.
- Serving Counter to be certified using Underwriters Laboratory (UL) Assembly Listing E253182 and must comply with UL 197 and NSF/Ansi Standard.
- Counters must be UL labeled per the manufacturer.
- CounterCraft Connected Control System powered by Duke Sous Chef Technology. Touchscreen digital controls with secure Bluetooth Mesh connectivity. All compatible appliances controllable from the touchscreen control and/or the Duke Sous Chef Mobile application.
- 14 gauge stainless steel counter top extended to act as trayslide with #8 high polished edges, turndown at all free sides. Located at 34" a.f.f.

- Counter front to consist of removable plastic laminate clad millwork decor panels, stainless steel body reveal between panels. Color selection by owner/architect.
- Fully welded angle iron frame utilizing 1.5" x 1.5" x 1/8" galvanized angle. Welds to be ground smooth and sprayed with silver enamel paint. Angle Iron to be framed around each cutout for drop-in-equipment. Angle iron to run front-to-back and at each mullion. 1/2" sound deadening tape to be applied to top of angle iron frame prior to installation of countertop.
- All stainless steel fabrication to be fully welded. Butt or knuckle joints will not be accepted.
- Tops must be fully re-grained for a consistent appearance. All radius edges of turn down to have a minimum 3/8" #8 finish.
- Stainless steel internal shelving compartments, fully enclosed back, sides, and top. Removable rear access panels, removable top panel, coved corners All internal stainless steel fabrication to be fully welded.
- All electrical to be interconnected to load center. Electrical to be located in electrical conduit pipe, flex conduit to be kept to a minimum. Exposed flex conduit will not be accepted. All wiring to be numbered at all junctions, per circuit. Wiring diagram to be provided at each load center door. All receptacles mounted in the counter to be recess mounted and labeled.
- Electrical to accommodate POS system. Provide data lines as required for POS system.
- One (1) lot custom CounterCraft breath guards, optimized for use with CounterCraft Connected Control System, stainless steel 1.25" square posts with #8 high polish accents, posts extend through the top securing to angle iron frame within counter body, 3/8" tempered glass front panel and serving shelf, glass to have high polish profiled edges with rounded corners, dual tier over hot food and cold food section, includes heat (located over waterless hot food wells) and LED lights, NSF compliant.
- Two (2) each drop-in Glass Overshelf HotFrost Shelf, optimized for use with CounterCraft Connected Control System, HOT ONLY CAPABILITY, sized for use with two (2) 18x26 sheet pans, all stainless steel construction, unit located in intermediate shelf of breath guard per plans.
- Ten (10) each drop-in waterless hot food well, optimized for use with CounterCraft Connected Control System, stainless steel construction, easy lift out for easy access and fast service, no drain connection required, includes removable non-stick pan liner to easy facilitate cleaning. Recessed 1" below counter top to accommodate sheet pans.
- Two (2) each drop-in Glass Overshelf HotFrost Shelf, optimized for use with CounterCraft Connected Control System, FROST ONLY CAPABILITY, sized for use with two (2) 18x26 sheet pans, all stainless steel construction, unit located in intermediate shelf of breath guard per plans.
- Two (2) each cold pan, optimized for use with CounterCraft Connected Control System, (5) pan size, top mount, electronic temperature control, pan support bars for full-size pans, condenser unit (can be rotated), sight glass, service valves, dryer/filter, insulated with drain, aluminized steel housing, s/s bezel, 1/4hp, UL, NSF7.
- One (1) custom stainless steel dual-sided, single-tier condiment display with recessed pans. Sized for two (2) 6" deep stainless steel full size pans. One pan per side, two pans total. Pans to run long side to customer.
- Two (2) stainless steel full size pans, 6" deep recessed in counter top. Located under the custom stainless steel condiment display.
- Four (4) full size 6" deep stainless steel pans.
- Two (2) integral cashier station with utility / cashier drawer mounted to the underside of the countertop.
- Provide louvered doors at compressor compartments located on operator side of counter.
- Two (2) dedicated electrical outlet for milk cooler, recessed in end panels.
- Stainless steel legs with adjustable bullet feet.
- Stainless steel removable kickplate.
- CounterCraft delivery and onsite assembly services required.

ITEM 59 SPARE NUMBER

ITEM 60 DISPLAY CASE, REFRIGERATED, SELF-SERVE QTY: 3
MANUFACTUER: Structural Concepts
MODEL: MD485R
Dimensions: 85.5(h) x 50.25(w) x 37.12(d)
Description
Fusion® Self-Service Refrigerated Display Case, 50-1/4"W x 37-1/8"D x 85-1/2"H, open reach-in front, LED top & shelf lights, self-contained refrigeration, stainless steel rear exterior, powder coated silversan black, ETL-

Sanitation
3 ea Warranty: 1 year parts & labor warranty, standard
3 ea Exterior Color: Laminate standard color 909-58 Black
3 ea Model GRAIN DIRECTION Standard laminate grain directions (when applicable):
- Front Panels (Upper Header and Lower Panels): Horizontal grain direction
- End Panels: Vertical grain direction
- Blend & Reveal Cases Only: Horizontal grain direction on front and end panels
3 ea Interior Color: Powder coated SCC Standard Silversan Black (FDA compliant)
3 ea Lower Front Panel Color: Powder coated SCC Standard Silversan Black (FDA compliant), standard
3 ea Base Support: Casters (self-cont.), standard
3 ea Bumper Front: 1" Boston bumper (specify color), standard
3 ea Bumper Front: 1" Boston bumper - Black, standard
3 ea Bumper Left End: None, standard
3 ea Bumper Right End: None, standard
3 ea End Panel Left: Full end panel, standard
3 ea End Panel Right: Full end panel, standard
3 ea Flat header (*Standard flat configuration)
3 ea Price Tag Molding: None, standard
3 ea Rear doors: Rear Doors: Solid rear swinging door(s) with lock
3 ea Shelving: (5) Lighted solid shelves, standard
3 ea Lights: LED 3500K with frost lens, standard
3 ea Electrical Connection: 6' NEMA 6-30P, 208-240v/60/1-ph straight blade power cord, standard
3 ea Refrigeration: Breeze self-contained refrigeration, standard
3 ea Thermometer: Digital fahrenheit thermometer, standard
3 ea Vinyl Graphics: None, standard
3 ea Night curtain, retractable, non-locking

ITEM 61-71 SPARE NUMBERS

ITEM 72: ICE MACHINE AND BIN QTY: 1
MANUFACTURER: HOSHIZAKI
MODEL: F-450MAJ-C
ELECTRICAL: Reference Project drawings for electrical requirements.
Description:
Dimensions: 22(h) x 22(w) x 27.38(d)
Ice Maker, Cubelet-Style, 22"W, air-cooled, self-contained condenser, production capacity up to 412 lb/24 hours at 70°/50° (316 lb AHRI certified at 90°/70°), stainless steel finish, compressed cubelet style ice, Advanced CleanCycle24™, R-404A refrigerant, 115v/60/1-ph, 10.8 amps, NSF, UL
Warranty: 3-Year parts & labor on entire machine
Warranty: 5-Year parts on compressor & air-cooled condenser
Accessories:
1 ea Model B-300SF Ice Bin, 22"W, top-hinged front-opening door, 300-lb ice storage capacity, for top-mounted ice maker, stainless steel exterior, 6" painted flange legs included, protected with H-GUARD Plus Antimicrobial Agent, ETL, ETL-Sanitation
Warranty: 3-Year parts & labor for bin
1 ea Model H9320-51 Water Filtration System, single configuration, 18.4" H (manifold & cartridge)
1 ea Warranty: 1-Year on entire water filtration system & replaceable elements, standard
APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: SCOTSMAN AND MANITOWAC

ITEM 72.1: FILTER FOR ICE MACHINE QTY: 1
MANUFACTURER: HOSHIZAKI/EVERPURE
MODEL: H9320-51 and 9795-80
Description:
Water Filtration System, single configuration, 18.4" H (manifold & cartridge)

Pre-Filter System, E-10 Prefilter, NSF
Accessories:
1. Supply 2 ea replace filters and pre-filter

ITEM 73 SPARE NUMBER

ITEM 74 ICE MACHINE AND DISPENSER QTY: 2
MANUFACTURER: HOSHIZAKI
MODEL: DCM-271-BAH
ELECTRICAL: Reference Project drawings for electrical requirements.
Description:
Dimensions: 31.75(h) x 16.63(w) x 24.25(d)
Ice Maker/Water Dispenser, Cubelet-Style, air-cooled, self-contained condenser, production capacity up to 257 lb/24 hours at 70°/50° (196 lb AHRI certified at 90°/70°), 10 lb built-in storage capacity, counter model, (2) sets of LED touch buttons (upper and lower), 10-1/4" cup clearance, protected with H-GUARD Plus Antimicrobial Agent, R-404A refrigerant, 4" legs, 115v/60/1-ph, 8.5 amps, cord & NEMA 5-15P, NSF, UL, ADA Compliant
Warranty: 3-Year parts & labor on entire machine
Warranty: 5-Year parts on compressor, air-cooled condenser
Accessories:
1. Model LP-4 LEG Leg Package, (4) x 4" stainless steel legs
APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: MANITOWAC

ITEM 74.1 FILTER FOR ICE MACHINE QTY: 2
MANUFACTURER: HOSHIZAKI/EVERPURE
MODEL: H9320-51 and 9795-80
Description:
Water Filtration System, single configuration, 18.4" H (manifold & cartridge)
Pre-Filter System, E-10 Prefilter, NSF
Accessories:
1. Supply 2 ea replace filters and pre-filter

ITEM 75 BEVERAGE COUNTER QTY 2
MANUFACTURER: DUKE
MODEL: CUSTOM
ELECTRICAL: Reference Project drawings for electrical requirements.
Description:
- Continuous piece ‘fully enclosed base’ style construction with utility chase within counter. All electrical conduit and plumbing to be located within utility chase as required. Utility chase to be fully accessible from operator side of counter with electrical and plumbing to be located removable stainless steel panels.
- 14 gauge stainless steel counter top with #8 high polished edges, turndown at all free sides, 4" splash where required. Located at 34" a.f.f.
- Counter front to consist of plastic laminate clad millwork doors, stainless steel body reveal between panels. Color selection by owner/architect.
- Fully welded angle iron frame utilizing 1.5" x 1.5” x 1/8" galvanized angle. Welds to be ground smooth and sprayed with silver enamel paint. Angle Iron to be framed around each cutout for drop-in-equipment. Angle iron to run front-to-back and at each mullion. 1/2" sound deadening tape to be applied to top of angle iron frame prior to installation of countertop.
- All stainless steel fabrication to be fully welded. Butt or knuckle joints will not be accepted.
- Tops must be fully re-grained for a consistent appearance. All radius edges of turn down to have a minimum 3/8" #8 finish.
- Stainless steel internal shelving compartments, fully enclosed back, sides, and top. Removable rear access panels, removable top panel, coved corners All internal stainless steel fabrication to be fully welded.
- Stainless steel legs with adjustable bullet feet.
- Stainless steel removable kickplate.
- CounterCraft delivery and onsite assembly services required.

ITEM 76 TRAY DRYING RACKS QTY: 4
MANUFACTURER: METRO
MODEL: MAX4-PR48VX4
Description:

MetroMax® 4 Mobile Drying Rack Unit, 48"W x 24"D x 68"H, 4-tier, for trays/cutting boards/sheet pans & steam pans, includes: (4) open shelf frames, (4) 63" mobile posts, (2) cutting board/tray drying racks, (2) pan racks, (4) polymer swivel casters (2 with brakes), built in Microban® antimicrobial product protection, NSF

ITEM 77 SOILED DISHTABLE “L” SHAPED QTY: 1
MANUFACTURER: CUSTOM FABRICATORS
MODEL: SEE DRAWING
Dimensions: SEE DRAWING FS100
Description:

Soiled Dishtable, corner design, " end to corner, L-shaped, left to right operation, WITH LANDING LEDGE THROUGH ROLL DOWN DOOR OPENING, 20" x 20" x 8"D pre-rinse sink, 14/300 stainless steel top, stainless steel H-frame legs, NSF

DISPOSER PROVSION AND PANEL FOR CONTROLS ITEM 79
14/300 stainless steel construction
Capped and Finished Endspalsh, 30" front-to-back, includes end splash
8” Backsplash
Extra Faucet Holes (Set) MODIFIED LOCATION
Landing Ledge
Raised Rolled Edge
Scrap Block, 6-1/2" dia., rubber
Model BF-S Bullet Foot, stainless steel
Model SD Sound Deadening (priced per linear foot)

Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Atlanta Custom Fabricators, Commercial Stainless Fabrication, Marietta, GA, Low Temp Manufacturing, Jonesboro, GA., and Advance Tabco.

ITEM 78 HOSE REEL QTY: 1
MANUFACTURER: FISHER
MODEL: 29851
Description:

Hose Reel Assembly, closed reel rinse wall mounted with spray valve, powder coated steel construction, 30 feet of 3/8”ID, 3 ply hose, working pressure of 200 psi, withstands 160° F water temperature, ½” NPT Female garden hose inlet

Accessories:

1. Model 28231 Reel Rinse Installation Kit, wall-mounted

APPROVED ALERNATES IF MATCH THE DETAILED SPECIFICATIONS: T AND S BRASS

ITEM 79 DISPOSAL SYSTEM QTY:1
MANUFACTURER: SALVAJOR
MODEL: 500-SA-3-ARSS-LD-PP
Descriiption:
Disposer, Sink Assembly, 3-1/2" sink collar, 5 Hp motor, start/stop push button, drain/flush/time delay, automatic reversing & water saving with safety line disconnect ARSS-LD control, pp-type control with mounted solenoid valve with flow control & pressure switch, includes fixed nozzle, chrome plated vacuum breaker, sink stopper & flow control, heat treated aluminum alloy housing, single support leg, UL, CE
1 ea 208v/60/3-ph, 13.8 amps
1 ea Model 980105 Mounting bracket for ARSS-2, ARSS, ARSS-LD & WSP

1 ea Model DP Stainless steel dejamming prong

ITEM 80 DISHMACHINE QTY: 1
MANUFACTURER: HOBART
MODEL: CL66-DWR+BUILDUP
ELECTRICAL: Reference Project drawings for electrical requirements.
WATER AND WASTE: Reference Project drawings for all requirements.
Description:
Dimensions: 68.5(h) x 44.75(w) x 31.25(d)
Conveyor Dishwasher, single tank with power scrapper; Drain Water Energy Recovery with factory-installed drain water tempering kit; (202) racks/hour, .45 gallon/rack, Complete Delime with Booster Guard, Touch Screen Controls with diagnostics, troubleshooting, and SmartConnect App, capless wash arms, NSF Pot & Pan mode, pumped rinse, insulated hinged doors, cULus, NSF, ENERGY STAR®, Free factory startup for installations within a 100 mile radius of a Hobart service office; installation beyond 100 miles will be charged at the quoted rate by the local Hobart service office
Accessories and Options to be included:
1 ea Standard warranty - 1-Year parts, labor & travel time during normal working hours within the USA
1 ea Model CL66DWR-HTE15K Electric tank heat 15kW
1 ea Model CL66DWR-ELE0CD 480v/60/3-ph
Single point connection standard (field convertible to dual point)
1 ea Model CL66DWR-HGTSTD Standard Height 19.5”H x 22”W opening, fits full-sized sheet pan, horizontal
1 ea Model CL66DWR-ERH18K With 18 kW Booster (default)
1 ea Model CL66DWR-DIR0RL RIGHT TO LEFT operation
1 ea NOTE: For water of 3-grains of hardness or more, Hobart suggests adding a water softener.
2 ea Model VNTHD/E-ADJ E-series vent hood domestic (adjustable)
8 ea Model DISHRAK-PEG20 Peg Rack
3 ea Model DISHRAK-COM20 Combination Rack
3 ea Model RACK-HOTEL Hotel Pan Rack, holds (2) 12” x 20” x 4” deep hotel / steam pans; fits standard height openings of CLEN units
3 ea Model BUNPAN-RACK Rack, bun pan
3 ea Model SHTPAN-RACK Rack, 6 sheet pan
1 ea Model PRESREG-1/20BR 1/2" brass pressure regulator
2 ea Model 1/2INSHK-ABSRBR Water Shock Absorber Kit (2 required - 1 each incoming hot and cold water lines)
1 ea Model TBLLIM-CL Table limit switch for CL & CLEN series
1 ea Model CURTAIN-KITSTD KIT CURT'N SPLASH Standard E-SERIES
1 ea Model CL66EN-BASFETSTD Standard feet
1 ea WS40 Water Softening System, 2,527 grains/lb capacity, 5 gallons regeneration volume, & salt alarm, holds 1 bag of salt
2 ea BAGS OF SALT
INSTALLATION OF HOBART DISH MACHINE AND WATER SOFTENER
Description:
CL66 WITH ALL ACCESSORIES. EQUIPMENT TO BE DELIVERED, UNCRATE AND SET IN PLACE BY FOOD SERVICE DEALER AND HOBART SERVICE SHALL SUPPLY FINAL CONNECTIONS.
UTILITY CONNECT: Hobart Service will complete all final utility connections including electrical, water and drains. All properly sized utilities MUST BE located at the final connection with-in 4 feet of the point by the GENERAL CONTRACTOR.
SUPPLIES Electrical/Plumbing misc/supplies are to be included by Hobart Service including any vacuum breakers required by code.
DEMO: Demonstration of proper use and care by a factory authorized sales representative.
START UP: Start up and adjust dish machine by Hobart Service
WARRANTY: Warranty on the machine to be extended to 18 months from date of startup - Dish machine ONLY; this does not include any other accessory, only the dishmachine.

ITEM 81 PANT LEG DUCT QTY: 1
MANUFACTURER: CUSTOM FABRICATORS
MODEL: CUSTOM
Description:
S/S Pant Leg Duct with Trim Collar for Dish Machines exceeding 66", 16/300 S/S

ITEM 82: CLEAN DISHTABLE QTY: 1
MANUFACTURER: CUSTOM FABRICATORS
MODEL: CUSTOM
Description:
Clean Dishtable, straight design, 102"W, right to left operation, 14/300 stainless steel top, stainless steel H-frame legs, NSF
Accessories:
1. Tubular Undershelf, 1-5/8" dia. tubular stainless steel construction (priced per foot)
2. Bullet Foot, stainless steel
3. Sound Deadening
4. Removable undershelf

Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Atlanta Custom Fabricators, Commercial Stainless Fabrication, Marietta, GA, Low Temp Manufacturing, Jonesboro, GA., and Advance Tabco.

ITEM 83 AMBIENT TRAY DRYER QTY: 1
MANUFACTURER: SAN-AIRE INDUSTRIES
MODEL: PD-100-M
ELECTRICAL: Reference Project drawings for electrical requirements.
UTILITIES REQUIRED:
ELECTRICAL: 120v/60/1, 4.33amps, 500w, cord with NEMA 5-15P
Description:
PowerDry™ Kitchenware Dryer, Electric, lighted on/off rocker switch, (2) 20" x 6" x 3/8" removable aluminum filter, 826 CFM blower, adjustable air distribution louver, stainless steel housing, UL, CUL, NSF
Accessories
1. Wall mounted bracket
2. Model FILTERX4 (SAN206) Filter Set, 6" x 20" x 3/8", washable, for PD-100M/100MCORR/100F, set of 4
3. Model RD-101 RapiDrain™ Kitchenware Drainer, stainless steel construction, 1" x 3/16" flat bar with openings for water flow, 3/8" round rod cross bars, 16 ga. formed ends, 1-1/2" 90° lip
4. Model RD-101-E RapiDrain™ Kitchenware Drainer Extension, stainless steel construction, 1" x 3/16" flat bar with openings for water flow, 3/8" round rod cross bars, 16 ga. formed ends

ITEM 84 SINK HEATEER QTY: 1
MANUFACTURER: HATCO
MODEL: 3CS-9-208-3-QS
Dimensions: 12.63(h) x 6.75(w) x 16.88(d)
Description:
Sink Heater, electric, undersink design, electric operation, stainless steel front, for over 21" square sink area, 9kW, 208v/60/3 delta, NSF, cULus, Made in USA

ITEM 85: THREE COMPARTMENT SINK QTY: 1
MANUFACTURER: ADVANCE TABCO
MODEL: 94-83-60-36RL-FAB-X
Description:
Dimensions: 45(h) x 139(w) x 36(d)
Regaline Sink, 3-compartment, with left & right-hand drainboards, 28" front-to-back x 20"W sink compartments, 14" deep, with 11"H backsplash, stainless steel legs with adjustable left-to-right and front

cross rails, 36" drainboards, 1" adjustable bullet feet, 14 gauge 304 stainless steel, overall 36" F/B x 139" L/R, NSF

Accessories:

3 ea Model K-40 Lever Drain, all stainless steel, 2"

3 ea Model K-4 Support Bracket, for lever waste drain handle, (1) support required for each lever drain

Supply 3' of removable undershelf on both sides under the drainboards for rack and chemical storage.

6 ft Model FAB-X Undershelf, stainless steel, (per linear foot)-

6 ft Model TA-94 16 gauge 304 stainless steel undershelf upgrade (per linear foot)

PROVIDE PROVISION FOR ITEM 94 HATCO SINK HEATER MODEL 3CS-9-208-3-QS

Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Atlanta Custom Fabricators, Commercial Stainless Fabrication, Marietta, GA, Low Temp Manufacturing, Jonesboro, GA., and Advance Tabco.

ITEM 86: FAUCET & PRE-RINSE W/ADD A FAUCET QTY: 2

MANUFACTURER: FISHER

MODEL: SEE BELOW

Description:

1. Fisher Model 34460
   Pre-Rinse Unit, spring style, backsplash mount, 8" centers, 16" riser, 36" hose, 1.15 GPM Ultra-Spray™ PLUS spray valve with built-in spray handle clip & dish guard bumper, lever handles with color coded indexes, add-on faucet with 12" swing spout, includes wall bracket, 1/2" NPT male inlets, brass, ADA Compliant
2. Model 3253 Faucet, wall mount, 8" adjustable centers, 12" swing spout, lever handles with color coded indexes, 1/2" NPT female inlets, brass, ADA Compliant
   1 year warranty against defects in materials or workmanship, standard

APPROVED ALTERNATE IF MATCH DETAILED SPECIFICATIONS: T & S BRASS

ITEM 87 STAINLESS STEEL WALL PANELS (DISHROOM) QTY: 2-LOT

MANUFACTURER: APPROVED FABRICATORS

MODEL: CUSTOM

Description:

1. Provide and install Type 304, 18-8, 22 gauge stainless steel panels on walls as shown on drawings.
2. Attach panels to masonry partitions with mastic cement (liquid nail) and stainless steel fasteners appropriate for wall type.
3. Caulk around panel edges and butt joints with clear silicon sealant.
4. Reference drawing FS501.

ITEM 88 SAFETY LADDER QTY: 1

MANUFACTURER: ULINE

MODEL: H-3834*

Description:

Safety angel 50 degree incline with 4 each, 24" wide expanded metal steps, 450lb capacity; with 4" diameter casters, 2 swivel-spring loaded and 2 rigid.

Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco.

ITEM 89 STAINLESS STEEL WALL CAP QTY: 2

SEE FS501 FOR DETAILS

MANUFACTURE: APPROVED FABRICATORS

MODEL: CUSTOM

Size: Size and shape as shown on drawings. Cap to be approximate length and width of CMU walls. Cap to be one piece all welded construction.

Description:

1. Cap to be constructed of 16 gauge stainless steel with 3" square turn down on all sides.
2. All corners to be fully welded, ground and polished.
3. Full perimeter #7 hi-lite finish around the top of the wall cap.
4. Cap to be one piece all welded construction.
5. Seal to wall with clear silicon sealant.

ITEM 90A SMART WALL SHELVING QTY: 2-LOT

DOUBLE SET UP OVER PREP AREA DOUBLE QUANITIES BELOW

1 ea	Metro Model WG2436K4 Dimensions: 36(w) x 24(d) SmartWall Wire Grid, 36" x 24", Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, NSF
1 kt	Model SWGB2 Quick Ship - SmartWall Grid Mounting Bracket Kit for Direct Wall Mount; type 304 Stainless Steel, kit consists of (6) brackets to connect grid to the wall, (1) required per grid
3 ea	Model PGHK6K4 Quick Ship - SmartWall Prong Hook, 6", Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection
1 ea	Model H209K4 Quick Ship - SmartWall Storage Basket, 13-3/8"W x 5"D x 7"H, Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, NSF
1 ea	Model IWA-12K4 SmartWall Large Utensil Holder, 10-3/8"W x 10-1/2"D, Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protectionepoxy finish
1 ea	Model GBHHK4-S Glove Box Holder, horizontal, (1) box capacity, Metroseal 4 Gray
2 ea	Model HK25C Quick Ship - SmartWall Snap-On Hook, 3-1/2"H, chrome, style B - large, multi-purpose

All Items to be packaged together, separate from any other items and marked with the Item number

ITEM 90B SMART WALL SHELVING QTY: 1-LOT

Description:

Smart Wall G3 MetroSeal™ Gray

Provide the following 11’-0” Unit on Tall Wall:

1 ea SW40K4	Wall Track
2 ea SW56K4	Wall Track
6 ea SWU45K4	Uprights
6 ea SWS18K4	18” Shelf Supports
6 ea SWS14K4	14” Shelf Supports
2 ea WG1848K4	18” x 48” Grid
1 ea WG1836K4	18” x 36” Grid
2 ea1848NK4	18” x 48” Metroseal Shelves
1 ea1836NK4	18” x 36” Metroseal Shelves
2 ea 1448NK4	14” x 48” Metroseal Shelves
1 ea 1436NK4	14” x 36” Metroseal Shelves

Accessories:

8) HK26C	Double Hooks
18) PGHK6K4	Pronged Hooks
5) H210K4	Wire Basket
6) PBA-GSDK4	Light-Duty Shelf

All Items to be packaged together, separate from any other items and marked with the Item number
Below is a sample layout for the accessories for this set up.



ITEM 91 SPARE NUMBER

ITEM 92 SS PICTURE FRAME FOR PASS THRU UNITS QTY: 2-LOT
MANUFACTURER: APPROVED FABICATORS
MODEL: CUSTOM
Description:

Provide and install 22 gauge, Type 304, 18-8 stainless steel picture frame with 3” overlay on all sides on customer and operator sides to seal any gaps between units and wall cap. Corners must be welded and ground smooth. Trim is sealed to boxes with clear silicon caulking. Use clear silicon caulking described in this section under Installation. Purpose of trim and caulking is to provide a complete seal between the wall cap and boxes and to close crevices against dirt and vermin. Reference page FS-500 for detail (SPECIAL NOTE: IF OWNER PERFERS GAP BETWEEN WALL AND TRIM A SPACE OF THREE INCHES IS REQUIRED FOR CLEANING-

ITEM 93 SS PICTURE FRAME FOR DISHROOM QTY: 1-LOT
MANUFACTURER: APPROVED FABICATORS
MODEL: CUSTOM
Description:

Provide and install 22 gauge, Type 304, 18-8 stainless steel picture frame with 3” overlay on all sides on customer and operator sides to seal any gaps between units and wall cap. Corners must be welded and ground smooth. Trim is sealed to boxes with clear silicon caulking. Use clear silicon caulking described in this section under Installation. Purpose of trim and caulking is to provide a complete seal between the wall cap and boxes and to close crevices against dirt and vermin.

ITEM 94: CAN OPENER QTY: 2 (NOT SHOWN)

MANUFACTURER: EDLUND
MODEL:270/115V
Dimensions: 11.5(h) x 6.75(w) x 10(d)
Can Opener, electric, for heavy volume, 2-speed motor, knife and gear assemblies that are removable for cleaning, recommended for up to 200 cans per day, cULus, CE, NSF certified, 115v/60/1-ph, 1.5 amp
1 ea 3 year limited warranty, standard
MODEL:1S
Can Opener, manual, #1™ with stainless steel base (for cans up to 11" tall) "Old Reliable"™
1 ea 1 year limited warranty, standard
1 ea Model ST-93 Rustproof Can Opener Cleaning Tool, stainless steel bristles and stainless scraper

ITEM 95 TRAY CARTS-NOT SHOWN ON PLANS QTY: 4 (NOT SHOWN)
MANUFACTURER: METRO
MODEL: SSD16
Description
Polymer Dish & Tray Cart, side-load, 38-15/16" x 31-7/8" x 20", holds up to (60) dishes or (80) trays per column, recessed handles, vinyl dust/splash cover, 5" neoprene swivel casters (2 with brakes) polymer construction, Microban® antimicrobial product protection, NSF

ITEM 96 STAINLESS STEEL WALL PANELS (DINING ROOM) QTY: 1-LOT
MANUFACTURER: APPROVED FABRICATORS
MODEL: CUSTOM
Description:

1. Provide and install Type 304, 18-8, 22 gauge stainless steel panels on walls as shown on drawings.
2. Attach panels to masonry partitions with mastic cement (liquid nail) and stainless steel fasteners appropriate for wall type.
3. Caulk around panel edges and butt joints with clear silicon sealant.
4. Reference drawing FS501.

END OF SECTION 11 40 00

SECTION 11614 - STAGE CURTAINS & ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes stage curtains, draw-curtain tracks, and **curtain** rigging **accessories to be included in Base Bid. Any reference to "rigging" in this section is to be understood as "curtain rigging".**

B. Related Sections:

1. Section 055000 "Metal Fabrications" for steel framing and supports for stage-curtain systems.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design **curtain** rigging, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: **Curtain** Rigging shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Design Loads: Weight of curtains and **curtain** rigging.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.[For draw-curtain machines, include rated capacities, operating characteristics, and electrical characteristics.]

B. Shop Drawings: Show fabrication and installation details for stage curtains. Include plans, elevations, sections, details, attachments to other work, and the following:

1. Operating clearances.
2. Requirements for supporting curtains, track, and equipment. Verify capacity of each track and rigging component to support loads.
3. Locations of equipment components, switches, and controls. Differentiate between manufacturer-installed and field-installed wiring.
4. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: For each type of stage curtain indicated. Include color charts showing the full range of colors, textures, and patterns available, together with a 12 square-inch Sample (any color) of each type of fabric.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified [Installer].

B. Product Certificates: For the following, from manufacturer:

1. Fabric: Provide name of flame-retardant chemical used, identification of applicator, treatment method, application date, allowable life span for treatment, and details of any restrictions and limitations.
2. **Curtain** Rigging: Compliance of suspended [battens and] tracks with requirements.

C. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For stage curtains and **curtain** rigging to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of stage curtains.

B. Fire-Test-Response Characteristics: Provide stage curtains with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Flame-Resistance Ratings: Passes NFPA 701 Small Scale, NFPA 701 – Test Method #1,California Title 19, NFPA 260A/UFAC Class 1, State of California – F-59901

a. Permanently attach label to each fabric of curtain assembly indicating whether fabric is inherently and permanently flame resistant.

b. Permanently attach a 1-square foot piece of fabric from the same dye lot to the back of the curtain to be used as an IFR test strip.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Preinstallation Conference: Conduct conference at Project site to coordinate curtain and stage lighting location.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings and construction contiguous with stage curtains and **curtain** rigging by field measurements before fabrication.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of rigging equipment that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, faulty operation of rigging equipment.

2. Warranty Period: One year from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 CURTAIN FABRICS

A. General: Provide fabrics inherently and permanently flame resistant to comply with requirements indicated. Provide fabrics of each type and color from same dye lot.

2.2 CURTAIN FABRICATION

A. General: Affix permanent label, stating compliance with requirements of authorities having jurisdiction, in accessible location on curtain not visible to audience. Provide vertical seams unless otherwise indicated. Arrange vertical seams so they do not fall on faces of pleats. Do not use fabric cuts less than one-half width.

1. Vertical Hems: Provide vertical hems not less than 2 inches wide, with not less than a 1-inch tuck, and machine sew , with no selvage material visible from front of curtain. Sew open ends of hems closed.

2. Leading Edge Turnbacks: Provide turnbacks formed by folding back not less than 12 inches of face fabric, with not less than a 1-inch tuck.

3. Top Hems: Reinforce top hems by double-stitching 3-1/2-inch- wide, inherently flame retardant synthetic webbing for Poly fabrics.

4. Heavy jute webbing for Cotton fabrics to top edge on back side of curtain with not less than 2 inches of face fabric turned under.

5. Flat Curtains: Provide zero percent fullness in curtains.

6. Pleats: Provide 50 percent fullness in curtains, exclusive of turnbacks and hems, 3-inch box pleats and grommets on 12-inch centers and secured with a 2 1/8" S-hook or a tie line, whichever is appropriate for installation.
7. Pleats: Provide 100 percent fullness in curtains, exclusive of turnbacks and hems, 6-inch box pleats and grommets on 12-inch centers and secured with a 2 1/8" S-hook or a tie line, whichever is appropriate for installation. Grommets: Brass, No. 3 or No. 4.
    a. Black Curtains: Provide brass grommets with black finish.
    b. Flat Curtains: Place 12 inches o.c. and 1 inch from corner of curtain; for ties, snap hooks, or S-hooks.
8. Bottom Hems: For flat curtains without fullness.
    a. Provide a 6-inch lined hem with a pocket that allows the sliding of a ½" pipe stiffener into the bottom of the curtain, and provide a concealing flap of same fabric in front of pocket and made 2 inches longer than the bottom edge of the pocket.
9. Bottom Hems: For curtains with fullness.
    a. For curtains that do not hang to the floor, provide hems not less than 3 inches deep. Sew open ends of hems closed.
    b. For floor-length curtains, provide hems not less than 6 inches deep with manufacturer's standard ribbon weight sewn above the finished bottom edge of curtain. Sew open ends of hems closed.
10. Velour Curtains: Fabricate with the fabric nap down.
11. Lining: Provide lining for each curtain in same fullness as face fabric and finished 2 inches shorter than face fabric. Sew or otherwise securely attach lining to top hem of face fabric. Attach lining to face fabric along [bottom and]side seams with 4-inch- long strips of heavy woven cotton tape.[Sew lining to bottom edge of curtain allowing sufficient lining fabric for tucking to prevent shrinkage.

B. Scrim: Fabricate from scrim curtain fabric, sewn flat. Provide a continuous 6-inch pipe pocket at bottom with a 6-inch flap of same fabric in front of pocket. Provide double-stitched, 3-1/2-inch[inherently flame retardant synthetic] [jute]webbing at top with not less than No. 2 brass grommets spaced at 12 inches o.c. and 1 inch from corner of curtain. Provide not less than a 2-inch double-folded side hem and a 4-inch bottom hem.

C. Drop: Fabricate from muslin fabric, sewn flat, with either horizontal or vertical seams to suit project and selvage to the rear. Provide 6-inch pipe pocket at bottom with a 6-inch flap of same fabric in front of pocket. Provide double-stitched, 3-1/2-inch [inherently flame retardant synthetic] [jute]webbing at top with not less than No. 2 brass grommets spaced at 12 inches o.c. and 1 inch from corner of curtain. Provide not less than a 2-inch double-folded side hem and a 4-inch bottom hem.

D. S-Hooks: [Track] Manufacturer's standard heavy-duty plated-wire hooks, not less than [2 inches] <Insert dimension> long.

E. Tie Lines: No. 4 or No. 4-1/2 cord or braided soft cotton tape, black or white to best match curtain; not less than 5/8 inch wide by 36 inches long, [threaded through grommets] [sewn to top hem of curtain].

F. Snap Hooks: Track manufacturer's standard heavy-duty hooks, sewn to top edge of curtain, blind sewn to top hem of curtain, attached to top hem with nylon strap secured by rivets or by cross-stitch machine.

2.3 STEEL-CURTAIN TRACK

A. Steel Track: Fabricate of roll-formed, galvanized, commercial-quality, zinc-coated steel sheet; complying with ASTM A 653/A 653M; G60 coating designation with continuous bottom slot and with each half of track in one continuous piece [black paint finish].

1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
    a. Automatic Devices Company; Silent Steel 280 series.
    b. H & H Specialties Inc.; 400 series.
2. Thickness: [0.064 inch] [0.079 inch].

B. Suspended Track: NPS 1-1/2 steel pipe stiffener (backbone) for supporting suspended tracks when rigging points are over 5 feet on centers.

C. Clamp and Bracket Hangers: Manufacturer's recommended steel clamps and brackets of sufficient strength required to support loads for attaching track to overhead support.

D. Track Lap Clamp: Metal to match track channel for attaching double-sectioned track at center overlap.

E. Fold Guide (If designated in curtain schedule): Equip carriers with rear-fold or backpack guide and rubber spacers to permit offstage curtain folding (stacking); sized for use with operating line if any.

F. Heavy-Duty Track System: Equip track with heavy-duty components. Provide end stops for track.
1. Curtain Carriers: Standard carriers of molded nylon with a pair of nylon-tired ball-bearing wheels riveted parallel to body. Equip carriers with rubber or neoprene bumpers to reduce noise, and heavy-duty, plated-steel swivel eye and manufacturer's standard trim chain for attaching curtain snap or S-hook. Provide quantity of curtain carriers sufficient for track length, to suit curtain fabrication.
    a. Master Curtain Carriers: One master carrier, for each leading curtain edge, of plated steel with two pairs of nylon-tired ball-bearing wheels and with two line guides per carrier.
2. End Pulleys and Floor Block: One dead-end, single-wheel pulley; one live-end, double-wheel pulley; and one adjustable, floor block; each with not less than 5-inch molded-nylon- or glass-filled-nylon-tired ball-bearing sheaves enclosed in steel housings. Provide pulleys with steel housing finished to match track and with bracket for securing off-stage curtain end. Provide an adjustable floor block to maintain proper tension on operating line with steel housing painted black.

2.4 DRAW-CURTAIN MACHINE

A. General: Provide track mounted operating machine of size and capacity recommended and provided by track manufacturer for curtain specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, and remote controls. Coordinate wiring requirements and electrical characteristics with building electrical system.
1. Products: Subject to compliance with requirements, provide one of the following:
    a. Automatic Devices Company; Silver Service Model No. 2928
    b. H & H Specialties Inc.; Model 463

B. Operator Type: Track Mounted Motors, Traction Drive

C. Operator Type: Track Mounted Limit Switches, Fully closed and fully opened preset stops.

D. Motor Characteristics: Curtain machine shall be fully automatic type equipped with a 1/2 HP fixed speed AC motor directly driving a right-angle gear reduction unit, on the output shaft of which shall be mounted a dual N-grooved drive wheel. Cable tension shall be provided by an integral adjustable tension pulley. Drive wheel shall deliver a fixed cable speed of 90 feet per minute. Mechanism shall include magnetic contactor to provide reversing action at any point along the travel and shall include three-button control switches, one mounted on the machine's control box and one for use as a remote control. Control switch wiring shall be accomplished through a low voltage system running from the machine control box to the remote control switch station. Track mounted limit switches shall provide stop signals to machine for full open and full close positions.

Machine shall be equipped with disconnect switch, overload protective circuit breaker and control protective circuit breaker. The entire machine shall be mounted on a heavy steel base designed to be attached to end of curtain track and supported from the building structure.

1. Voltage: 120 V.
2. Horsepower: 1/2
3. Enclosure: Manufacturer's standard

E. Remote-Control Station: Provide momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

1. Provide key-operated switches, keyed alike, with one key per switch plus one extra key (If designated in rigging schedule).

2.5 CURTAIN RIGGING

A. Curtain Battens: Fabricate battens from steel pipe with a minimum number of joints. As necessary for required lengths, connect pipe with a drive-fit pipe sleeve not less than 18 inches long, and secure with four flush rivets, plug welds, or 3/8" thru- bolts with loc-nuts, two perpendicular each side of splice. Shop-paint completed pipe battens with black paint and with a 1-inch- wide yellow stripe at the center of each.

1. Steel Pipe: ASTM A 53/A 53M, Grade A, standard weight (Schedule 40), black, NPS
2. 1-1/2" ID nominal diameter unless otherwise indicated.

B. Supports, Clamps, and Anchors: Sheet steel in manufacturer's standard thicknesses.

1. Drop Forged Anchor Shackles to meet Federal Specifications RR-271D Type IVA. Size, Working Load Limit and Trademark permanently marked on all shackles.
2. Drop Forged Turnbuckles to meet or exceed federal Specifications FF-T791b, Type 1m Form 1 – Class 5, and ASTM F-1145

C. Inserts, Bolts, Rivets, and Fasteners: Manufacturer's standard corrosion-resistant units.

D. JR Clancy Alpha Chain™ •

1. 7 mm (0.275") black alloy chain for rigging. Black chain eliminates glare and reflection. • Grade 63 hardened alloy chain meeting OSHA requirements for sling usage OSHA 1910.184(e)(5). • Used with standard 1/4" (6.35 mm) hardware. • Marked with JRC on every link. • Date code on every 10th link for traceability. • 3,250 lb. (1,474 kg) working loading limit based on the manufacturer's 4:1 safety factor.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with installer present, for compliance with requirements for supporting members, blocking, installation tolerances, clearances, and other conditions affecting performance of stage-curtain work. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install stage-curtain system according to track manufacturer's and curtain fabricator's written instructions.

3.3 BATTEN INSTALLATION

A. Install battens by suspending at heights indicated with trim and support spaced to support load, but do not exceed 10 feet o.c.

1. Trim Chain and Support Cables: Secure chain or cables directly to structure with devices that are secure and appropriate with equal or greater WLL (Working Live Load) rating and that are not subject to deterioration or failure with age or elevated temperatures.
2. Attach other wire rope cable end to battens with pipe clamps, turnbuckles moused to prevent loosening.
3. Trim Chain and Support: Secure chain with load-rated terminations.

3.4 TRACK INSTALLATION

A. Batten-Hung Tracks or Tracks with Pipe Backbones: Install track to pipe batten with manufacturer's recommended track clamp hangers at spacing according to manufacturer's written instructions. Do not exceed 72 inch spacing between supports:

B. Install track for center-parting curtains with not less than 24-inch overlap of track sections at center, supported by special lap clamps.

3.5 CURTAIN INSTALLATION

A. Track Hung: Secure curtains to track carriers with S-hooks.

B. Batten Hung: Secure curtains to pipe battens with 36 inch tie lines.

3.6 DRAW-CURTAIN-MACHINE INSTALLATION

A. Install track mounted draw-curtain machines by securely mounting to track according to manufacturer's written instructions.

B. All electrical work for motor connections will be the responsibility of the EC.

3.7 DEMONSTRATION AND TRAINING

A. Engage a factory-authorized service representative to demonstrate, train owner's designated personnel to adjust, operate, and maintain stage curtains, draw-curtain machines and tracks.

END OF SECTION

SECTION 13120 - PRE-ENGINEERED BUILDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specifications sections apply to work specified in this Section.

1.2 SUMMARY

A. Extent of pre-engineered buildings work is shown on drawings.

B. Building Type: The pre-engineered building system shown is a single story, rigid frame type metal building of the nominal length, width, eave height and roof pitch indicated.

1. Manufacturer's standard components may be used, providing components, accessories, and complete structure conform to architectural design appearance shown and to specified requirements.
2. Concrete floor and foundations and installation of anchor bolts are specified in a Division 3 section. Provide anchor bolts (including sizes and lengths) and anchor bolt plan to Contractor for work by others.
3. Sealants and caulking are specified in Division 7 section.
4. Blanket Insulation under roof and inside walls as indicated on drawings and specified in this section.
5. Prefinished Metal Roof Panels as indicated on drawings and specified in this section.
6. Interior and Exterior Wall Panels as indicated on drawings and specified in this section.
7. Provide prefinished facia, vented/non-vented soffit systems, flashing, drip edge, trim, gutters and downspouts as indicated on drawings and specified in Section 07600, Flashing and Sheet Metal.

1.3 DESCRIPTION

A. Provide all materials, labor, equipment and services, and perform all operations in connection with the furnishing and installing of pre-engineered building, in accordance with the drawings and specifications, including, but not limited to, the following:

1. Metal Framing Components
2. Metal Building Accessories
3. Preformed Metal Roofing
4. Metal Wall Panels
5. Roof & Wall Insulation
6. Flashing, Gutters and Downspouts
7. Workmanship
8. Inspection of Surfaces
9. Protection
10. Delivery, Samples and Shop Drawings
11. Guarantee and Warranty

1.4 SUBMITTALS

A. **Any deviation (deletions, additions or revisions thereof) from the requirements of the Contract Documents contained in a Submittal shall be clearly identified as a "Deviation from Contract Requirements" (or by similar language) within the Submittal in 'RED' and, in a letter transmitting the Submittal to the Architect, the Supplier and Contractor shall direct the Architect's attention to, and request specific approval of, the specific deviations. Otherwise, the Architect's approval of a Submittal does not constitute approval of any deviation from the requirements of the Contract Documents contained in the Submittal. Should any deviation be found at a later date, the Supplier and Contractor shall bear the responsibility and cost of all corrections required.**

B. Product Data: Submit manufacturer's product information, specifications and installation instructions for building components and accessories. Submit sample warranty.

C. Shop Drawings: Submit complete erection drawings showing anchor bolts settings, sidewall, endwall, and roof framing, transverse cross sections, covering and trim details, and accessory installation details to clearly indicate proper assembly of building components.

   1. **The shop drawings *MUST* be submitted as an "overlay" drawing to the Architectural drawings.**
   2. **The Contractor/supplier *MUST* provide the "overlay" drawings *including* the Architectural drawings in the complete submittal.**
   3. **The "overlay" drawings must be submitted in 'RED' with the Architectural drawings in 'BLACK'.**

D. Samples: The contractor shall submit samples for review as required thru-out this specification section. Samples will be used to evaluate the quality of the finished product/system.

E. Certification: Submit written Certification and all structural calculations prepared and signed by a Professional Engineer, registered to practice in the State where building is to be erected, verifying that building design meets indicated loading requirements and codes of authorities having jurisdiction. Calculations shall clearly show all loads used for the design of each member. All column reactions at the foundation shall be provided for verification of the foundation design.

1.5 QUALITY ASSURANCE

A. Design Criteria:

   1. **All items below shall be designed within the architectural design furring spaces. Refer to submittal requirements above for deviations made from the requirements of the Contract Documents.**
   2. Structural Framing: Design primary and secondary structural members and exterior covering materials for applicable loads and combinations of loads in accordance with the Metal Building Manufacturers Association's (MBMA) "Design Practices Manual".
   3. Structural Steel: For design of structural steel members, comply with requirements of the American Institute of Steel Construction's (AISC) "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" for design requirements and allowable stresses.
   4. Light Gage Steel: For design of light gage steel members, comply with requirements of the American Iron and Steel Institute's (AISI) "Specification for the Design of Cold Formed Steel Structural Members" and "Design of Light Gage Steel Diaphragms" for design requirements and allowable stresses.
   5. Welded Connections: Comply with requirements of the American Welding Society's (AWS) "Standard Code for Arc and Gas Welding in Building Construction" for welding procedures.

6. Impact Resistance: Roof coverings installed on low-slope roofs (roof slope <2:12) shall resist impact damage based on the results of tests conducted in accordance with ASTM D 3746, ASTM D 4272, CGSB 37-GP-52M or the “Resistance to Foot Traffic Test “ FM 4470.

B. Design Loads: Building shall meet all applicable Codes.

1. Basic design loads include live load, wind load and up-lift, in addition to the dead load. Minimum acceptable design loads and deflection criteria are shown on the drawings.

2. Design each member to withstand stresses resulting from combinations of loads that produce the maximum allowable stresses in that member as prescribed in MBMA's "Design Practices Manual".

C. Manufacturer's Qualifications: Provide pre-engineered metal buildings as produced by a manufacturer with not less than 5 years successful experience in the fabrication of pre-engineered metal buildings of the type and quality required. Manufacturer will be a member of the MBMA.

D. Erector's Qualifications: Pre-engineered building shall be erected by a firm that has not less than 5 years successful experience in the erection of pre-engineered buildings similar to those required for this project, and that has been licensed by the manufacturer of the building system.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver and store prefabricated components, sheets, panels and other manufactured items so they will not be damaged or deformed.

B. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight ventilated covering. Store metal sheets or panels so that water accumulations will drain freely. Do not store sheets or panels in contact with other materials which might cause staining.

1.7 WARRANTIES

A. The Contractor Must provide ALL Warranties as indicated thru-out this specification section.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. ACI Building Systems
2. American Buildings Company
3. Bigbee Steel Buildings, Inc.
4. Butler Buildings Company
5. Ceco Building Systems
6. Nucor Building Systems
7. Varco-Pruden Building System
8. Whirlwind Steel
9. Ascent Buildings
10. Vulcan Steel

2.2 MATERIALS

A. Hot-Rolled Structural Shapes: Comply with requirements of ASTM A36 or A529.

B. Tubing or Pipe: Comply with requirements of ASTM A500, Grade B, ASTM A501, or A53.

C. Members Fabricated from Plate or Bar Stock: Provide 42,000 psi minimum yield strength. Comply with requirements of ASTM A529, A570 or A572.

D. Members Fabricated by Cold Forming: Comply with requirements of ASTM A607, Grade 50.

E. Bolts for Structural Framing: Comply with requirements of ASTM A307 or A325 as necessary for design loads and connection details.

2.3 PRIMARY FRAMING

A. Rigid Frames shall be fabricated from hot-rolled structural steel. Provide built-up "I-beam" shape rigid frames consisting of either tapered or parallel flange beams and straight columns. Provide frames factory welded and shop painted. Furnish frames complete with attachment plates, bearing plates and splice members. Factory drill frames for bolted field assembly.

1. Provide length of span and spacing of frames indicated. Slight variations in length of span and frame spacing may be acceptable if necessary to meet manufacturer's standard, and if approved by the Architect.

2. Provide rigid frames at endwalls where indicated.

B. End Wall Columns: Provide factory welded, shop painted endwall columns built-up "I" shape welded plate.

C. Wind Bracing: Provide horizontal and adjustable wind bracing at roof only using diagonal cables or threaded steel rods; comply with requirements of ASTM A36 or A572, Grade D.

2.4 SECONDARY FRAMING

A. The spacing of all purlins as shown on the drawings is diagrammatic, therefore, the Registered Professional Engineer for the Pre-Engineered Building shall be responsible for the design of the roof structure to support the framing to meet all state, federal and local code restrictions and structural requirements set forth by the structural engineer. It shall be the responsibility of the Pre-Engineered Building manufacture to coordinate with the Bidding Contractor the amount of erection required for the roof framing before bidding.

B. Provide not less than 16-ga. shop painted rolled formed sections for the following secondary framing members unless shown otherwise on structural contract drawings.

1. Purlins.

2. Eave struts.

3. Endwall rafters.

4. Flange bracing.

5. Sag bracing.

C. Provide not less than 14-ga. cold-formed galvanized steel sections for the following secondary framing members:

1. Base channels.

2. Sill angles.

3. Endwall structural members (except columns and beams).

4. Purlin spacers.

D. Bolts: Provide ASTM A307 bolts, at secondary structural connections. Provide zinc-plated or cadmium-plated bolts when structural framing components are in direct contact with roofing and siding panels. Primary structural connections to be made with ASTM A325 bolts.

E. Shop Painting: Clean surfaces to be primed of loose mill scale, rust, dirt, oil, grease, and other matter precluding paint bond. Follow procedures of SSPC-SP3 for power tool cleaning, SSPC-SP7 for brush-off blast cleaning, and SSPC-SPI for solvent cleaning.

1. Prime structural steel primary and secondary framing members. See Structural Steel 05500 page 3 - Structural Steel Prime Paint and page 5 - Shop Painting.
2. Prime galvanized members, after phosphoric acid pretreatment with manufacturer's standard zinc dust-zinc oxide primer.

2.5 PREFORMED METAL ROOFING

A. Description of Work

1. The work under this section consists of all preformed metal roofing, underlayment, ridge vent system, sheet metal, roof drainage accessories and all related items necessary to complete the roofing system work indicated on the drawings and herein specified including but not limited to the following:
   a. Formed Roof Panels for Standing Seam Installation
   b. Workmanship
   c. Inspection of Surfaces
   d. Protection
   e. Delivery, Samples and Shop Drawings

B. Quality Assurance

1. The Contractor shall engage the services of a Professional Roof Consultant. The Consultant must hold a minimum title of Registered Roof Observer (RRO) through the International Institute of Building Enclosure Consultants (IIBEC) and provide evidence of adequate insurance as required below. The Consultant should perform three (3) inspections during the installation of each new roof system type (1 – Start up inspection; 2 – Interim inspection; 3 – Final inspection). The Consultant must document all site visits with photographs and written reports. All reports shall be forwarded to the Architect with documentation of the roofing progress and any deficiencies noted during the inspections. Upon completion of all punch list items, the Consultant should provide a letter of roof completion advising the new roof systems meet and/or exceed the project requirements. ***(Note: Although the contractor will be paying the roof consultant from their proceeds, the roof consultant will be considered an agent of the owner and architect throughout the project and will perform the required inspections on behalf of the owner and architect. The above specification shall be applied to individual facilities when multiple site locations are included in the project.)***
   a. Roof Consultant Insurance Requirements:
      i. Gen. Liability - $1,000,000 each occurrence - $2,000,000 General Aggregate / Auto. Liability - $1,000,000 / Umbrella Liability. - $1,000,000 / Workers Compensation - $1,000,000 per statute / Professional Liability - $1,000,000
   b. Approved Roof Consulting Firm:
      i. Roof Asset Management, Inc. | David Lee, RRO, CIT, FAA-107 | 4950 Woodfield Drive, Millbrook, Alabama 36054 | (334) 590-7999.
      ii. Substitutions: Roof consulting firms must be pre-approved by the Architect. Requests for a substituting firm must be submitted “In writing” 10 (Ten) days prior to the bid opening.

2. Performance Test Standards: Provide preformed panel systems which have been pretested and certified by manufacturer to provide specified resistance to air and water infiltration and structural deflection and failure when installed as indicated and when tested in accordance with AAMA 501, "Methods of Test for Metal Curtain Walls".
3. Field Measurements: Where possible, prior to fabrication of prefabricated panels, take field measurements of structure or substrates to receive panel system. Allow for trimming panel units where final dimensions cannot be established prior to fabrication.
4. Impact Resistance: Roof coverings installed on low-slope roofs (roof slope <2:12) shall resist impact damage based on the results of tests conducted in accordance with ASTM D 3746, ASTM D 4272, CGSB 37-GP-52M or the “Resistance to Foot Traffic Test “FM 4470.
5. Compatibility: Provide products which are recommended by manufacturers to be fully compatible with indicated substrates or provide separation materials as required to eliminate contact between incompatible materials.

C. Submittals
1. Product Data: Submit manufacturer's product specifications, standard details, certified product test results, installation instructions and general recommendations, as applicable to materials and finishes for each component and for total system of preformed panels.
2. Samples: Submit 2 samples 12" square, of each exposed finish material.
3. Shop Drawings: Submit small-scale layouts of panels on roofs, and large-scale details of edge conditions, joints, corners, custom profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory and field assembly work.

D. Roofer’s Qualifications
1. Installation of the metal roofing and roof related accessories shall be performed by ***Certified / Preferred Roofers*** authorized by the manufacturer as trained and qualified to erect the manufacturer's product.
2. The Contractor shall submit a letter from the manufacturer of the metal roofing system, certifying the date of certification from the Manufacturer and the dates and year the Roofing Contractor attended school, prior to full certification that this Roofing Contractor is a certified roofer.

E. Roofing Warranties and Guarantee
1. Weather Tightness Warranty
   a. The entire installation (sub-framing, clips, panels, fasteners, rakes, eave, ridge, valley flashing conditions, roof to wall conditions as-well-as all materials specified as supplied by the manufacturer) shall be guaranteed weather tight for a minimum of **Twenty (20) years (NO Dollar Limit NDL)**. Provide written warranty, signed by metal roofing manufacturer and his authorized installer, agreeing to replace/repair defective materials and workmanship during the warranty period, certified by the third-party inspection firm as stated under QUALITY ASSURANCE. This warranty shall be identified as neither Non-Depreciating, Non-Pro-Rated, nor have exclusions that identify, valleys, curbs, and flashings. The warranty shall be signed by the Manufacture of the roofing materials and the authorized installer.
2. Manufacturer’s Warranty
   a. Manufacturer’s roofing warranties which contain language regarding the governing of the warranty by any state other than the State of Alabama, must be amended to exclude such language, and substituting the requirement that the Laws of the State of Alabama shall govern all such warranties.

b. Roof Panels: Durability of the metallic coated and unpainted roof panels due to rupture, structural failure or perforation shall be warranted for a period of **Twenty (20) years** by the manufacturer.

c. Color Finish:

i. The exterior color finish for painted panels shall be warranted by the Manufacturer for **Twenty-five (25) years** against blistering, peeling, cracking, flaking, chalking and shipping.

ii. Excessive color change and chalking shall be warranted for **Twenty-five (25) years**.

1) Color change shall not exceed 5 NBS units per ASTM D2244.68T, chalking shall not be less than a rating of 6 (white) or 8 (other colors) per ASTM D-659.

d. The roofing manufacture shall be required to provide documentation certifying that the roof design provided complies with the performance requirements as set forth in IBC Chapter 15, Section 1504. The documentation shall be attached to the roof warranty at the close out of the project.

3. Contractor's Roofing Guarantee

a. Contractor shall furnish Contractors 5 Year Alabama Division of Construction Management Roofing Guarantee. This roofing guarantee is included in the front end documentation of this project manual.

4. All roof warranties/guarantees shall be provided to the Owner, by the Contractor at the Final Inspection to obtain the Substantial Completion.

F. Materials

1. All materials shall be from a single source.

2. **Standing Seam II** with Kynar 500 Finish by American Buildings Company/A Nucor Company.

a. Standing seam roof panel shall have a configuration consisting of 2 inch high vertical rib spaced on 16 inch centers. The panel shall have flush horizontal and vertical surfaces to facilitate sealing at terminations. Panel configurations which create voids requiring supple metal closure devices shall not be considered acceptable. Panels shall be joined at the sidelap with an interlocking seam mechanically locked by a seaming machine after installation. The female panel seam shall have a factory applied sealant, in compliance with UL90.

b. The panel shall be **24 gauge (minimum)** commercially pure aluminum coated steel meeting military specification MIL-C-4174A Type II, Galvalume or G90 galvanized. Minimum yield strength shall be 80,000 PSI.

c. Deviations in appearance from the quality standard manufacturer's panel must be approved by the owner before acceptance.

d. Changes in framing or variations in loading to the existing structure caused by alternate roof systems shall be subject to review and all costs for any modifications shall be the responsibility of the General Contractor.

e. System Description: The roof system is a concealed fastener interlocking standing seam system. ***Panel must not be roll formed on site, nor use a portable roll former whereby the contractor manufactures the panel versus a single sourced manufacturer providing the finished materials with a single sourced warranty***.

f. Roof panels shall be standing seam interlocking design and secured to the supports with

a concealed structural fastening system. UL certification must appear on the panel if so requested.

g. The concealed attachment system shall eliminate all through penetration of the exposed roofing surface into structural supports and allow the roof covering to move independently of any differential thermal movement by the framing system.

h. The panel to structural clip shall be designed to provide +/- one inch of thermal movement. It shall incorporate a self centered feature to assure one inch of movement in both directions.

i. The standing seam shall have integral male and female interlocking ribs with a factory applied, non-hardening sealant, and the seams shall be continuously locked or crimped together by mechanical means during installation.

j. Roof panels shall be fastened to the support framing members with a concealed clip or backing device of steel having a protective metallic coating. Through penetration of the roofing surface by exposed fasteners shall occur only for non-structural connection at panel termination and roof perimeter flashing location.

k. Panel termination and perimeter flashing (attached to roof panels) shall be sealed with sealants recommended by the manufacturer.

l. Required closures shall be metal. Non-metal closures shall not be acceptable.

m. Provide thermal blocks at all roof to purlin connection points/deck supports.

G. Metal Finishes

1. General: Apply coating either before or after forming and fabricating panels, as required by coating process and as required for maximum coating performance capability. Protect coating promptly after application and cure, by application of strippable film or removable adhesive cover and retain until installation has been completed.

2. Color Finish on Roof Panels and Trim: *(Applies to Metal Wall Panels, Flashings, Facia, Metal Building Accessories, Gutters and Downspouts)*

a. Panels shall have a factory color finish on the exposed side. The exposed finish shall consist of a 70% KYNAR 500® resin base coating applied to a cleaned, pretreated and primed surface. The dry film thickness of the exterior coating shall not be less than .90 mil minimum, inclusive primer. The interior color finish shall consist of a backer coat with a dry film thickness of 0.5 mil. A low gloss finish is required to minimize the appearance of oil canning.

b. Color of the exterior roof panels and trim shall be selected from manufactures standard color pallet After Bid Date.

c. The exterior color finish shall meet or exceed the performance requirements specified below.

i. Paint Color Test:

1) Test: Film Thickness; Test Method: ASTM D-1005; Performance: 0.2 mil primer 0.8-0.9 mil topcoat

2) Test: 60° @ under 10 low gloss; Test Method: ASTM D-523; Performance: 25-35

3) Test: IR Reflectivity; Test Method: ASTM D-4803-97; Performance: Must meet 25% Minimum (exceeds)

4) Test: Pencil Hardness; Test Method: ASTM D-3363; Performance: HB-H

5) Test: Flexibility, T-Bend; Test Method: ASTM D-4145; Performance: 2-T Galvalume Steel

6) Test: Adhesion; Test Method: ASTM D-3359; Performance: No adhesion Loss

7) Test: Reverse Impact; Test Method: ASTM D-2794; Performance: No cracking or loss of adhesion

8) Test: Abrasion, Falling Sand; Test Method: ASTM D-968; Performance: 65-85 1/mil

9) Test: Mortar Resistance; Test Method: ASTM C-267; Performance: No effect

10) Test: Detergent Resistance; Test Method: ASTM D-2248 3% 72 hrs. @ 100°F; Performance: No effect

11) Test: Acid Pollutants; Test Method: ASTM D-1308 10% Muriatic Acid (15 min) 20% Muriatic Acid (15 min); Performance: No effect, AAMA 605.2 <5units color change

12) Test: Acid Rain Test; Test Method: Kesternich; Performance: 15 cycles minimum, no objectionable color change

13) Test: Alkali Resistance; Test Method: 20% Sodium Hydroxide (1hr); Performance: No effect

14) Test: Salt Spray Resistance 5% @ 95° F; Test Method: ASTM B-117; Performance: 1000 hrs Galvalume steel

15) Test: Humidity Resistance 100% @ 100° F; Test Method: ASTM D-2247; Performance: Passes 1000 hrs Galvalume Steel

16) Test: South Florida exposure; Test Method: ASTM D-2244; Performance: <5 units color change

17) Test: UVB (313 bulbs); Test Method: ASTM G-53; Performance: Passes 3000 hrs

18) Test: Chalk Resistance; Test Method: ASTM D-4214; Performance: Rating of 8 min

1. Colors must meet the following: The solar reflectance for a steep-sloped roof must be a minimum of 25%, dropping no less than to 15% after three years. Low sloped roofs (below 2:12) must be a minimum of 65% dropping to no less than 50% after three years.

H. Roof Panels

1. General: Provide roofing sheets formed to the general profile or configuration indicated. All roof panels shall be full length, no end laps allowed.
2. Zinc-Coated Steel Sheets: Provide structural quality hot-dip galvanized steel sheets, complying with requirements of ASTM A446, Grade C, with G90 coating complying with ASTM A525.
3. Aluminum Coated Steel Sheets: Provide drawing quality aluminum coated steel sheets, complying with requirements of ASTM A463, with T1-40 coating.
    a. Metal thickness not less than 24 ga. (0.0179”).
4. Accessories: Provide the following sheet metal accessories factory formed of the same material and finish as the roofing and siding.
    a. Flashings.

b. Fillers.

c. Metal expansion joints.

d. Facias

e. Ridge covers.

f. Cover exposed structural and secondary members at exterior.

5. Fasteners:

a. Provide self-tapping screws, bolts, nuts, self-locking rivets, self-locking bolts, end welded studs, and other suitable fasteners as standard with the manufacturer designed to withstand design loads.

b. Provide metal-backed neoprene washers under heads of fasteners bearing on weather side of panels.

c. Use stainless steel fasteners for exterior application and galvanized or cadmium plated fasteners for interior applications.

d. Locate and space fastenings in true vertical and horizontal alignment. Use proper type fastening tools to obtain controlled uniform compression for positive seal without rupture of neoprene washer.

e. Provide fasteners with heads matching color of roofing sheets by means of plastic caps or factory-applied coating.

6. Flexible Closure Strips: Provide closed-cell, expanded cellular rubber, self-extinguishing flexible closure strips. Cut or premold closure strips to match corrugation configuration of roofing and siding sheets. Provide closure strips where indicated or necessary to ensure weathertight construction.

7. Sealing Tape: Provide pressure sensitive 100 percent solids isobutylene tripolymer compound sealing tape with release paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape not less than 1/2" wide and 1/8" thick.

8. Joint Sealants: Provide one-part elastomeric polyurethane polysulfide or silicone rubber sealant as recommended by the building manufacturer.

I. Miscellaneous Materials

1. Internal Panel Framing: Manufacturer's standard.

2. Fasteners: Manufacturer's standard noncorrosive types, with exterior heads gasketed.

3. Accessories: Except as indicated as work of another specification section, provide components required for a complete roofing/siding system, including:

a. Trim, Copings, Fascias, Gravel stops, Mullions, Sills, Corner Units, Ridge Closures, Clips, Seam Covers, Battens, Flashings, Gutters, Downspouts, Louvers, Sealants, Gaskets, Fillers, Closure Strips, All similar items.

i. Match materials/finishes of preformed panels.

4. Bituminous Coating: Cold-applied asphalt mastic, SSPC paint 12, compounded for 15 mil dry film thickness per coat.

J. PRE-ROOFING CONFERENCE

1. A pre-roofing conference is required before any roofing materials are installed. This conference shall be conducted by a representative of the Architect and attended by representatives of the Owner, Division of Construction Management Inspector, General

Contractor, Roofing Contractor, Sheet Metal Contractor, Roof Deck Manufacturer (if applicable), and the Roofing Materials Manufacturer (if warranty is required of this manufacturer). If equipment of substantial size is to be placed on the roof, the Mechanical Contractor must also attend this meeting. Provide at least 72 hours advance notice to participants prior to convening pre-roofing conference.

2. The pre-roofing conference is intended to clarify demolition and application requirements for work to be completed before roofing operations can begin. This would include a detailed review of the specifications, roof plans, roof deck information, flashing details, and approved shop drawings, submittal data, and samples. If conflict exists between the specifications and the Manufacturer's requirements, this shall be resolved. If this pre-roofing conference cannot be satisfactorily concluded without further inspection and investigation by any of the parties present, it shall be reconvened at the earliest possible time to avoid delay of the work. In no case should the work proceed without inspection of all roof deck areas and substantial agreement on all points.
3. The following are to be accomplished during the conference:
    a. To review all Factory Mutual and Underwriters Laboratories requirements listed in the specifications and resolve any questions or conflicts that may arise.
    b. To establish trade-related job schedules, including the installation of roof-mounted mechanical equipment.
    c. To establish roofing schedule and work methods that will prevent roof damage.
    d. Require that all roof penetrations and walls be in place prior to installing the roof.
    e. To establish those areas on the job site that will be designated as work and storage areas for roofing operations.
    f. To establish weather and working temperature conditions to which all parties must agree.
    g. To establish acceptable methods of protecting the finished roof if any trades must travel across or work on or above any areas of the finished roof.
4. The Architect shall prepare a written report indicating actions taken and decisions made at this pre-roofing conference. This report shall be made a part of the project record and copies furnished the General Contractor, the Owner, the Division of Construction Management, and the Division of Construction Management Inspector.

K. Installation

1. General: Comply with panel fabricator's and material manufacturer's instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the work securely in place, with provisions for thermal/structural movement.
    a. Install panels with concealed fasteners.
2. Installation Tolerances: Shim and align panel units within installed tolerance of 1/4" in 20'-0" on level/plumb/slope and location/line as indicated, and within 1/8" offset of adjoining faces and of alignment of matching profiles.
3. Joint Sealers: Install gaskets, joint fillers and sealants where indicated and where required for weatherproof performance of panel systems. Provide types of gaskets and sealants/fillers indicated or, if not otherwise indicated, types recommended by panel manufacturer.
4. Refer to other sections of these specifications for product and installation requirements applicable to indicated joint sealers.

5. Water shall be prevented from entering the building during the work. This shall involve keeping penetrations sealed, planning the work to reroof sections and sealing new to old or other precautionary and effective safeguards.

2.6 METAL WALL PANELS

A. Description of Work

1. Extent of each type of preformed wall panels/siding is indicated on the drawings and by provisions of this section. Preformed wall panels/siding is hereby defined to include panels which are structurally capable of spanning between supports spaced as indicated.
2. Types of materials required include the following:
    a. Exterior Wall Panel
    b. Workmanship
    c. Inspection of Surfaces
    d. Protection
    e. Delivery, Samples and Shop Drawings

B. Quality Assurance

1. Performance Test Standards: Provide preformed panel systems which have been pretested and certified by manufacturer to provide specified resistance to air and water infiltration and structural deflection and failure when installed as indicated and when tested in accordance with AAMA 501, "Methods of Test for Metal Curtain Walls".
2. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum of five years of experience in manufacture of similar products in successful use in similar applications.
3. Field Measurements: Where possible, prior to fabrication of prefabricated panels, take field measurements of structure or substrates to receive panel system. Allow for trimming panel units where final dimensions cannot be established prior to fabrication.

C. Submittals

1. Product Data: Submit manufacturer's product specifications, standard details, certified product test results, installation instructions and general recommendations, as applicable to materials and finishes for each component and for total system of preformed panels.
2. Samples: Submit 2 samples 12" square, of each exposed finish material.
3. Shop Drawings: Submit small-scale layouts of panels, and large-scale details of edge conditions, joints, corners, custom profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory and field assembly work.

D. Materials - **EXTERIOR PANELS / INTERIOR PANELS**

1. **“Architectural” (Reverse Rib)** Panel by American Buildings Company/A Nucor Company.

a. The panel shall have major ribs 1 ¼” high. Spaces 12” on center for an even shadowed appearance. The panels are to be reinforced between the ribs for added strength. Each panel shall provide 36” net coverage in width.

b. Panels shall conform to one of the following:

I. Panel material as specified shall be 24 gage zinc-coated(galvanized) steel, coating designation G90, conforming to the requirements of ASTM A 653, Grade 80. Minimum yield strength shall be 80,000 psi.

c. Fasteners for Wall Panels:

I. Shall be manufacturer's fastener with hex washer head, cadmium or zinc plated.

II. Shall be assembled with an EPDM washer.

III. The fasteners shall be color coordinated with a premium coating system which protects against corrosion and weathering.

d. Metal Finishes

i. General: Apply coating either before or after forming and fabricating panels, as required by coating process and as required for maximum coating performance capability.

ii. Protect coating promptly after application and cure, by application of strippable film or removable adhesive cover, and retain until installation has been completed.

iii. Durability: Provide coating which has been field tested under normal range of weathering conditions for minimum of 20 years without significant peel, blister, flake, chip, crack or check in finish, and without chalking in excess of 8 (ASTM D 659), and without fading in excess of 5 NBS units.

iv. Color Finish on All Trim and All Wall Panels: Panels shall have a factory color finish on the exposed side. The exposed finish shall consist of a 70% KYNAR 500 resin base coating applied to a cleaned, pretreated and primed surface. The dry film thickness of the exterior coating shall not be less than 0.8 mil. exclusive of the primer. The interior color finish shall consist of a backer coat with a dry film thickness of 0.5 mil. The color finish shall meet or exceed the performance requirements specified in Section 2.5 paragraph G above.

1) Provide all trims, fasteners, sealants to match selected colors.

2) Color of the panels shall be selected by the Architect from manufactures Standard Color pallet After Bid Date.

v. Internal Panel Framing: Manufacturer's standard.

vi. Fasteners: Manufacturer's standard noncorrosive types, with exterior heads gasketed.

E. Wall Panel Fabrication

1. General: Fabricate and finish panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, and as required to fulfill indicated performance requirements which have been demonstrated by factory testing. Comply with indicated profiles and dimensional requirements, and with structural requirements.

2. Metal Gages: Thicknesses required for structural performances, but not less than manufacturer's recommended minimums for profiles and applications indicated, and not less than 22 gauge.

3. Required Performances: Fabricate panels and other components of wall system for the following installed performances.

4. Water Penetration: No significant, uncontrolled leakage at 4 lbs. per sq. ft. pressure with spray test.

5. Air Infiltration: 0.02 cfm per sq. ft. for gross roof/wall areas, with 4 lbs. per sq. ft. differential pressure.

6. Sound Transmission: STC rating of 28.
7. Sound Absorption, Interior Surfaces: Coefficient of 0.75.
8. Apply bituminous coating or other permanent separation materials on concealed panel surfaces where panels would otherwise be in direct contact with substrate materials which are noncompatible or could result in corrosion or deterioration of either material or finishes.
9. Fabricate panel joints with captive gaskets or separator strips, which provide a tight seal and prevent metal-to-metal contact in a manner which will minimize noise from movements within panel system.
10. Condensation: Fabricate panels for control of condensation, including vapor inclusion of seals and provisions for breathing, venting, weeping and draining.

F. Wall Panel Installation

1. General: Comply with panel fabricator's and material manufacturer's instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the work securely in place, with provisions for thermal/structural movement.
2. Install panels with concealed fasteners.
3. Installation Tolerances: Shim and align panel units within installed tolerance of 1/4" in 20'-0" on level/plumb/slope and location/line as indicated, and within 1/8" offset of adjoining faces and of alignment of matching profiles.
4. Joint Sealers: Install gaskets, joint fillers and sealants where indicated and where required for weatherproof performance of panel systems. Provide types of gaskets and sealants/fillers indicated or, if not otherwise indicated, types recommended by panel manufacturer.
5. Refer to other sections of these specifications for product and installation requirements applicable to indicated joint sealers.
6. Joint Sealers: Refer to other sections of these specifications for post-installation requirements on joint sealers; not work of this section.

2.7 FASCIA, SOFFIT, FLASHING, DRIP EDGE, TRIM, GUTTERS AND DOWNSPOUTS

A. Facia, Soffit, Flashings, Drip Edge and Trims

1. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage thick base metal, shop pre-coated with PVDF (Polyvinylidene Fluoride) coating.
2. Finish: The exposed finish on all exposed metals and similar items shall consist of a 70% KYNAR 500® resin base coating applied to a cleaned, pretreated and primed surface. The dry film thickness of the exterior coating shall not be less than .90 mil minimum, inclusive primer. The interior color finish shall consist of a backer coat with a dry film thickness of 0.5 mil. A low gloss finish is required to minimize the appearance of oil canning,
    a. Colors: As selected by Architect after Bid Date, from manufacturer’s standard colors including white.

B. Gutters

1. Gutters: Provide flat shapes, no rolled formed stiffeners or ribbed allowed. Form gutters in “continuous” sections not less than 8 feet in length, complete with end pieces, outlet tubes and other special pieces as may be required. Join sections with riveted and soldered or sealed joints. Provide expansion-type slip joint at center of runs.
    a. Furnish gutter supports spaced at 36” on center constructed of same metal as gutters.

2. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage thick base metal, shop pre-coated with PVDF (Polyvinylidene Fluoride) coating.

3. Finish: The exposed finish on all exposed metals and similar items shall consist of a 70% KYNAR 500® resin base coating applied to a cleaned, pretreated and primed surface. The dry film thickness of the exterior coating shall not be less than .90 mil minimum, inclusive primer. The interior color finish shall consist of a backer coat with a dry film thickness of 0.5 mil. A low gloss finish is required to minimize the appearance of oil canning,

a. Colors: As selected by Architect after Bid Date, from manufacturer's standard colors including white.

C. Downspouts

1. Downspouts: Form downspouts in sections approximately 10 feet long **(no corrugated sections)**, complete with elbows and offsets. Join sections with not less than 1-1/2" telescoping joints. Provide fasteners, designed to securely hold downspouts not less than 1" away from walls; locate fasteners at top and bottom and equally spaced at approximately 5 feet on center in between.

2. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage thick base metal, shop pre-coated with PVDF (Polyvinylidene Fluoride) coating.

3. Finish: The exposed finish on all exposed metals and similar items shall consist of a 70% KYNAR 500® resin base coating applied to a cleaned, pretreated and primed surface. The dry film thickness of the exterior coating shall not be less than .90 mil minimum, inclusive primer. The interior color finish shall consist of a backer coat with a dry film thickness of 0.5 mil. A low gloss finish is required to minimize the appearance of oil canning,

a. Colors: As selected by Architect after Bid Date, from manufacturer's standard colors including white.

2.8 METAL BUILDING INSULATION

A. See Section 07200 – Insulation.

1. Thermal Breaks:

a. Provide thermal blocks/breaks at all roof to purlin connections points.

b. 1/8 inch (3 mm) thick by 3 inch (76 mm) wide white, closed-cell polyethylene foam with pre-applied adhesive film and peel-off backing.

c. Polystyrene Snap-R snap-on thermal blocks.

2.9 FABRICATION

A. General: Design prefabricated components and necessary field connections required for erection to permit easy assembly and disassembly. Fabricate components in such a manner that once assembled, they may be disassembled, repackaged and reassembled with a minimum amount of labor.

1. Clearly and legibly mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams and instruction manuals.

B. Structural Framing: Shop fabricate structural framing components to the indicated size and section complete with base plates, bearing plates and other plates required for erection, welded in place. Provide required holes for anchoring or connections either shop drilled or punched to template dimensions.

1. Shop Connections: Provide power riveted, bolted or welded shop connections.

2. Field Connections: Provide bolted field connections.

PART 3 - EXECUTION

3.1 ERECTION

A. Framing: Erect structural framing true to line, level and plumb, rigid and secure. Level base plates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use a non-shrinking grout to obtain uniform bearing and to maintain a level base line elevation. Moist cure grout for not less than 7 days after placement.

B. Purlins and Girts: Provide rake or gable purlins with tight fitting closure channels and fascias. Locate and space wall girts to suit door and window arrangements and heights. Secure purlins and girts to structural framing and hold rigidly to a straight line by sag rods.

C. Bracing: Provide Temporary Cross Bracing as required for full height of bays. Temporary cross bracing shall be removed upon completion of final cross bracing.

D. Final Cross Bracing shall be as shown and described on the Structural Drawings. The Contractor shall furnish and install cross bracing as directed by the Structural Engineer – no exceptions. Portal frames are not permitted.

E. Framed Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical or electrical work. Securely attach to building structural frame.

END OF SECTION

SECTION 13670 - EXTRUDED ALUMINUM WALKWAY COVER (FLAT CANOPY)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. **Flat Canopy**: The work covered by this section shall include design, fabrication and installation of a complete Flat Extruded Aluminum Canopy System (roll formed not acceptable) with decking and fascia in accordance with the drawings and this specification. The canopy shall consist of structural aluminum panels bound by a framework of fascia which also acts as a water collecting gutter. All components shall be as required to support design loads in accordance with engineering prints and calculations provided by the manufacturer. Sizes shown on the drawings are for diagrammatical purposes only. Water shall drain from deck into the beams and out at grade level of columns through drain holes.

B. **Pitched Canopy**: The work covered by this section shall include design, fabrication and installation of a complete Pitched Extruded Aluminum Canopy System (roll formed not acceptable) with welded drain beams, trusses, decking, facia and roof panels in accordance with the drawings and this specification. All components shall be as required to support design loads in accordance with engineering prints and calculations provided by the manufacturer. Sizes shown on the drawings are for diagrammatical purposes only. Water shall drain from deck into the beams and onto adjacent roofs of flat canopies.

C. The extent of aluminum walkway covers is shown on the drawings and as specified herein.

1.3 REFERENCES

A. Aluminum Design Manual 2000, Specifications & Guidelines for Aluminum Structures.

B. ASCE 7, Minimum Design Loads for Buildings and Other Structures.

C. American Architectural Manufacturers Association (AAMA)

D. American Society for Testing and Materials (ASTM)

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product information, specifications and installation instructions for components and accessories.

B. Shop Drawings: Submit complete erection drawings showing attachment system, column and gutter beam framing, transverse cross sections, covering and trim details, and optional installation details to clearly indicate proper assembly of components, sealed by a State Registered Structural Engineer in the state in which the work is being performed.

C. Certification: Submit written Certification prepared and signed by a State Registered Structural Engineer verifying that framing design will safely resist wind uplift as computed by ANSI A58.1, IV=150, Exposure C, as well as meet indicated loading requirements of the Standard Building Code, latest edition as referenced in State Requirements for Educational Facilities 1999 and wind loading requirements of ANSI/ASCE 7-98, live and dead loads and other load requirements.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following except as otherwise indicated.

1. International Building Code, latest addition with amendments, if any.

   AWS (American Welding Society) standards for structural aluminum welding.

B. Manufacturer: Obtain aluminum covered walkway system from only one (1) manufacturer, although several may be indicated as offering products complying with requirements.

C. Installer Qualification: Firm with not less than three (3) years experience in installation of aluminum walkway covers of type, quantity and installation methods similar to work of this section.

D. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to insure proper fitting of work. However, allow for adjustments within specified tolerations wherever taking of field measurements before fabrication might delay work.

E. Shop Assembly: Pre-assemble units in shop to greatest extent possible and disassemble as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

F. Coordination: Coordinate work of this section with work of other sections which interface with covered walkway system (sidewalks, curbs, building fascias, etc.).

1.6 PERFORMANCE REQUIREMENTS

A. System Performance: Provide aluminum covered walkway system that has been designed, produced, fabricated and installed to withstand normal temperature changes as well as live loading, dead loading and wind loading in compliance with Standard Building Code requirements for geographic area in which work is located and as follows:

B. The system shall be designed by a registered Engineer in the State of Alabama, certifying the system meets all wind, foundation and all other applicable loads and requirements set forth by local or state building requirements.

1. Live Load: 30 p.s.f. minimum
2. Structural design for wind forces: Comply with ANSI A58.1-1982
3. Design Wind Velocity: **120.p.h.**
4. Importance Factor: 1.1.
5. Stability Criteria: International Building Code 2015

C. Sizes shown on drawings are to be considered minimum.

D. Roof structure shall be capable of sustaining severe icing, hail, hurricane force winds and supporting a concentrated load such as being walked upon.

PART 2 – PRODUCT

2.1 MANUFACTURERS

A. The following manufacturers products have been used to establish minimum requirements for materials, workmanship, and function:

1. Extruded Aluminum Walkway Cover System.
   a. Tennessee Valley Metals, Inc. **(Basis of Design and Standard of Quality) |** 190 Industrial Park Road, Oneonta, Alabama 35121 | (205) 274-9500 | www.tvmetals.com.
   b. Dittmer Architectural Aluminum | 1006 Shepherd Road | Winter Springs, Florida 32708| (800) 822-1755; (407) 699-1755 | www.dittdeck.com | info@dittdeck.com.
   c. Superior Mason Products LLC. | 116 Citation Court, Birmingham, Alabama 35209| (877) 445-1200 | www.superiormetalproducts.com | canopysales@superior-mason.com.
   d. Mitchell Metals | 1761 McCoba Dr. SE Suite B, Smyrna, Georgia 30080 | (770) 285-5875; | www.mitchellmetals.net | sales@mitchellmetals.net.
   e. Gulf South Metals | 17869 Samantha Drive, Foley, Alabama 36535 | (251) 943-6443; | www.gulfsouthmetals.com | info@gulfsouthmetals.com.

B. Equal products of other manufacturers may be used in the work, provided such products have been approved, by the Architect, not less than ten (10) days prior to scheduled bid opening.

2.2 MATERIALS

A. General: All aluminum extrusions shall be alloy 6063 heat treated to a T-6 temper.

B. Columns: Columns shall be radius-cornered tubular extrusion of size shown on drawings with cutout and internal diverter for drainage where indicated. Circular downspout opening in column is not acceptable. Provide a small weep hole at the bottom of all non-draining columns to allow for

1. Column size shall be **6" x 6"** at Flat Canopy.

C. Beams (when used): Beams shall be tubular extrusions of size and shape shown on drawings (open-top tubular extrusions of size and shape shown on drawings with top edges thickened for strength as necessary).

1. Beam Size shall be as indicated on drawings.

D. Deck Construction: Deck shall be manufactured of extruded modules that interlock in a self-flashing manner. Interlocking joints shall be positively fastened at 18" O.C. creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Deck shall be assembled with sufficient camber to offset dead load deflection.

E. Fascia: Fascia shall be manufacturer's standard shape.

1. Facia size(s) shall be as indicated on drawings.

F. Drainage: Water shall drain internally from deck to fascia to beams (when used) to columns, for discharge out of rain diverters at or below ground level as indicated on architectural drawings.

G. Flashing: Flashing shall be .032" aluminum (min.). All thru-wall flashing is completed by others.

H. Arches: Arches for barrel vault protective covers shall be sharp-cornered tubular extrusions of size shown in drawings.

I. Fasteners:

1. Deck Screws (rivets not permitted): Type 18-8 non-magnetic stainless steel sealed with a neoprene "O" ring beneath 5/8" outside dimension, conical washer.

2. Fascia Rivets: Size 3/16" by 1/2" grip range aluminum rivets with aluminum mandrel.

3. Bolts: All bolts, nuts and washers to be 18-8 non-magnetic stainless steel.

4. Tek Screws: not permitted

2.3 FINISHES

A. Standard:

1. Factory baked enamel finish, AAMA 603.8.

a. Color to be selected by Architect after bid date from manufactures standards.

b. Standard Color Selection must include "White".

2.4 WARRANTY

A. Manufacturer shall warrant the entire system against defects in labor and materials for a period of one (1) year commencing on the date of substantial completion as established in Division One of these specifications.

B. Intention of this warranty is the manufacturer will come onto the jobsite and do all necessary to effect corrections of any deficiencies.

C. Prima Facie Evidence of defects in labor and material may include but is not limited to, one or more of the following:

1. Moisture leaks

2. Metal failure including excessive deflection

3. Fastener failure

4. Finish failure

2.5 FABRICATION

A. Comply with indicated profiles, dimensioned requirements and structural requirements.

B. Use sections true to details with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture, free from defects impairing strength and durability.

C. All welding to be done by heli-arc process.

D. Bents shall consist of shop welded one piece units. When size of bents do not permit shipment as a welded unit, concealed mechanical joints may be used.

E. Mechanical joints shall consist of stainless steel bolts with a minimum of two (2) bolts per fastening. Bolts and nuts shall be installed in a concealed manner utilizing 1/2" thick by 1 1/2" aluminum bolt bars welded to structural members. All such mechanical joints must be detailed on shop drawings showing all locations.

F. Roof Deck: Flush deck extruded aluminum shapes, interlocking self-flashing sections. Shop fabricate to lengths and panels widths required for field assembly. Depth of sections to comply with structural requirements. Provide shop induced camber in deck units with spans greater than 16'- 0" to offset dead load deflections. Welded dams are to be used at non-draining ends of deck.

G. Expansion joints, design structure for thermal expansion and contraction. Provide expansion joints as required.

H. Exposed rivets used to fasten bottom of fascia to deck to have finish to match fascia.

I. Apply a shop applied dip-coat of clear acrylic enamel to each column end terminating in concrete to insulate from electrolytic reaction. Column ends shall be pierced to "key" grout to bent for maximum uplift protection.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle covered walkway system components as recommended by manufacturer. Handle and store in a manner to avoid deforming members and to avoid excessive stresses.

3.2 EXAMINATION

A. Examine adjacent work for conditions that would prevent quality installation of system.

B. Do not proceed until defects are corrected.

3.3 FIELD DIMENSIONS

A. General contractor shall field confirm all existing locations, dimensions and elevations shown on shop drawings prior to fabrication.

3.4 INSTALLATION

A. Install roof deck sections, accessories and related flashing in accordance with manufacturer's instructions. Provide roof slope for rain drainage without ponding water. Align and anchor roof deck units to structural support frames.

B. Assemble all components in a neat, workmanlike manner.

3.5 FLASHING

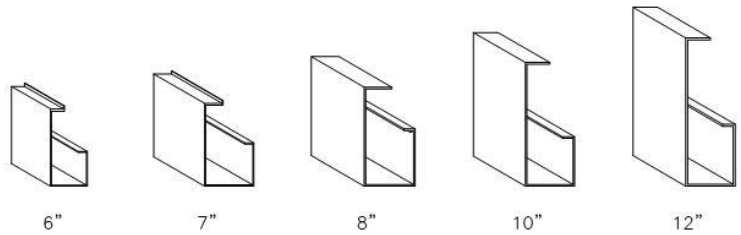
A. Flashings: Flashings required between covered walkway system and adjoining structures are not work of this section. Refer to "Flashing and Sheet Metals", Section 07600.

3.6 CLEANING AND PROTECTION

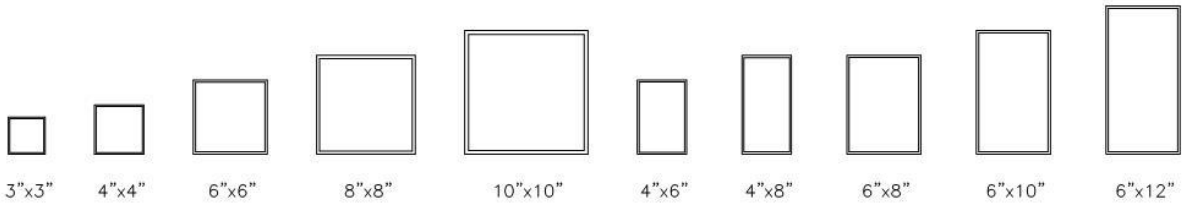
A. Damaged Units: Replace roof deck panels and other components of the work which have been damaged or have deteriorated beyond successful minor repair.

B. Cleaning: Remove protective coverings at time in project construction sequence which will afford greatest protection of work. Clean finished surfaces as recommended by manufacturer. Maintain in a clean condition during construction.

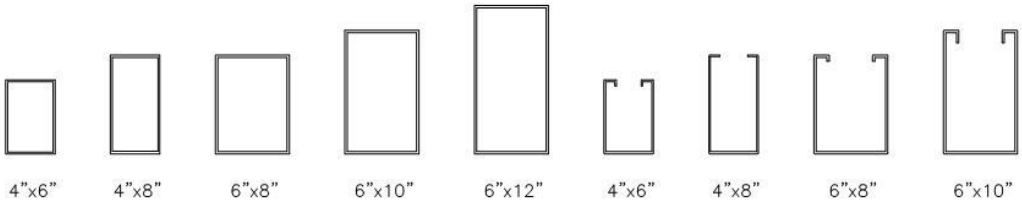
END OF SECTION



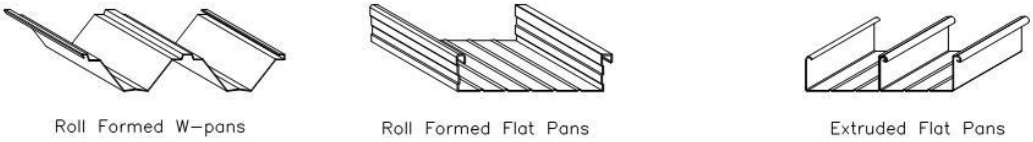
FASCIA OPTIONS

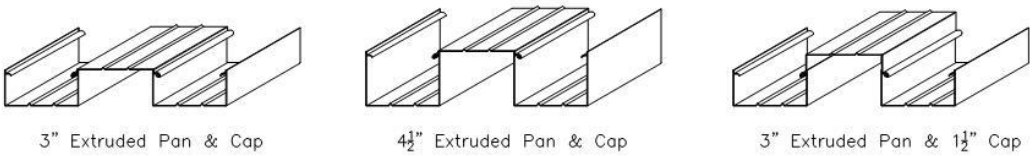


COLUMN OPTIONS



BEAM OPTIONS



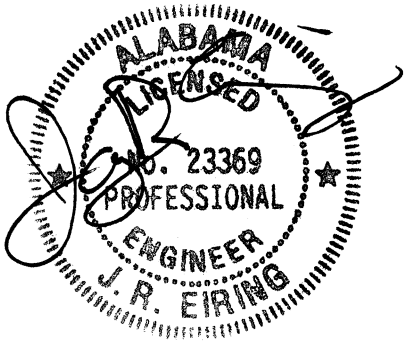


DECK OPTIONS

Cafeteria Addition
Crossville High School for
Dekalb County Board of Education
Crossville, Alabama
LATHAN MCKEE PROJECT NO.: 26-032-00
ZEA PROJECT NO. 26-79

These specifications sections were prepared by and under the direct supervision of the Engineer of Record for this project.

Division 15 – MECHANICAL
15010 Mechanical General Provisions
15400 Plumbing
15700 Heating, Ventilating & Air Conditioning



July 2, 2026

SECTION 15010

GENERAL MECHANICAL PROVISIONS

PART 1. GENERAL

1.1. **General Requirements:** Bidders and Contractors must treat all Division 15 contract documents with the highest level of care and precision. Thoroughly and completely review all specifications, plans, drawings and related construction documents before submitting a bid or proceeding with work. **Pay special attention to all submittal requirements, as they are strictly enforced**. Incomplete, incorrectly formatted, or improperly submitted submittals will not be accepted and may result in rejection, delays or other ramifications, including potential default or additional costs borne solely by the Contractor.

Bidders must thoroughly review all contract documents during the bidding period. Any missing information, ambiguities, conflicts, discrepancies, or other issues that could affect accurate pricing must be promptly brought to the Architect's attention in writing before the bid due date. This allows all questions to be clarified, and any necessary corrections made prior to bidding. Failure to identify and resolve such issues before submitting a bid will obligate the Contractor to furnish and complete the work, including any disputed or omitted items, using the specified materials and methods, and the Architect and Engineer's requirements, at no additional cost to the Owner or the Owner's Design Professionals, as directed by the Owner's Design Professionals.

Failure to raise such issues in writing prior to bid submission is non-waivable. By submitting a bid, the Contractor accepts full responsibility for furnishing and completing all work, including any disputed, omitted, or conflicting items, using the specified materials, methods and quality standards, at no additional cost to the Owner or the Owner's Design Professionals. The Owner's Design Professionals will direct resolution of any such issues, and the Contractor will have no claim for extra time or compensation.

No materials or products containing asbestos, formaldehyde, polychlorinated biphenyls (PCBs), lead, mercury, or any other hazardous substances are permitted if they exceed the strict limits mandated by OSHA, LEED, EPA, or other applicable regulations. This prohibition is absolute; non-compliance will result in immediate rejection of materials, required removal/replacement at the Contractor's sole expense and potential further penalties.

Only manufacturers and products explicitly named in the specifications may be used without prior approval. Any proposed use of unlisted manufacturers or substitutions requires written approval submitted through the Architect, to the Engineer and must be obtained at least seven (7) calendar days prior to the bid due date, following the exact procedures outlined in Division 1.

When proposing substitutions, the Contractor must include a separate recap/summary sheet at the front of the submittal clearly stating, in writing, all differences (performance, dimensions, features, warranties, etc.) between the proposed item and the specified one. Failure to provide this explicit written disclosure

makes the Contractor fully responsible for replacing the substituted item(s) at no cost to the Owner if any discrepancies are later discovered, regardless of prior approval submittal.

The Contractor is solely responsible for securing and paying for all required permits, fees, inspections, utility connections and related costs. No consideration or adjustment will be given after bid opening for any alleged misunderstanding of these requirements, the specifications, plans, utility needs, or associated fees.

Division 1's requirements apply in full to the entire project. Throughout the contract documents (specifications, Codes and Drawings), terms such as "provide," "furnish," "include," or "install" mean the Contractor must furnish, install, connect, test and make fully operational and ready for use the item or system as specified and required, with no exceptions.

All advisory provisions listed in the Codes referenced in the Contract Documents must be considered as mandatory. In the event of any conflict between applicable Codes, Standards, Listings, Contract Drawings or the Contract Specifications and drawings, the most stringent requirement governs. The respective Contractor must provide, install and comply with whichever imposes the strictest requirement, highest standard and the greatest obligation. No exceptions or leniency will be granted. These requirements are intentionally strict to ensure project quality, regulatory compliance, fairness in bidding and protection of the Owner's interests. Non-compliance carries significant risk of financial responsibility, schedule impacts and potential contract default. Bidders and Contractors assume these obligations fully upon participation or award.

1.2. **Spare Parts:** Manufacturer of any equipment specified must have a wholesale outlet for readily available replacement parts in the nearest major USA city.

1.3. **Codes and Standards and Listings:** Unless otherwise specified elsewhere in the Contract Documents, the Contractor must comply with the current editions (as of the date of the Contract) of all publications referenced in these specifications, plus all applicable federal, state and local codes, standards, ordinances and regulations enforced by the State of Alabama and the authority having jurisdiction (AHJ). In the case of any conflict between the Contract Documents (including Drawings and Specifications) and any applicable codes, standards or regulations, the Contractor must provide and install the Work in accordance with the most stringent requirement. This requirement specifically includes, without limitation, the following (or their most current State-adopted editions/amendments).

Alabama State Building Code (and all companion codes), as the State Building Code and enforced by the Division of Construction Management (DCM), Alabama Department of Finance. The 2021 International Building Code was adopted on July 1, 2022, with exceptions as noted below and amended March 17, 2025, with portions of the 2024 International Building Code and Companion Codes includes the following:

- 2021 – International Existing Building Code
- 2021 – International Plumbing Code
- 2021 – International Fuel Gas Code
- 2021 – International Mechanical Code (with the exceptions listed on the DCM

website)
- 2020 – National Electrical Code (NFPA 70)
- 2021 – International Fire Code (with exceptions listed on the DCM website at https://dcm.alabama.gov/bldg_code.aspx.
- ANSI/ASHRAE/IES Standard 90.1 – 2013 (Energy Standard for Buildings except Low-Rise Residential Buildings) with exceptions permitted to 6.5.1-Economizers.
- All locally adopted and enforced building, mechanical, plumbing, gas, fire, electrical and energy Codes of the AHJ (city or county) where the project is located.

All current editions of the Codes and Standards published by the following organizations:

- National Fire Protection Association (NFPA)
- American Society of Mechanical Engineers (ASME)
- Occupational Safety and Health Administration (OSHA)
- International Code Council (ICC) including the International Building Code (IBC), International Energy Conservation Code (IECC), International Fuel Gas Code (IFGC) and International Fire Code (IFC)
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- ASTM International (ASTM)
- American National Standards Institute (ANSI)
- Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
- Americans with Disabilities Act (ADA) and ADA Standards for Accessible Design
- ICC A117.1 — Standard for Accessible and Usable Buildings and Facilities
- U.S. Department of Energy regulations and all other applicable federal requirements
- All applicable local ordinances and codes of the AHJ

All equipment and listed products must bear a label from one of the following Nationally Recognized Testing Laboratories (NRTL):

- Underwriters Laboratories Inc. (UL)
- Canadian Standards Association (CSA)
- ETL (Intertek).

All electrical components and assemblies must also comply with the applicable sections of the Code of Federal Regulations (CFR).

In the event of any conflict between the Contract Drawings, these specifications, or any referenced Code, Standard, or Listing requirement, the most stringent requirement must govern and be provided.

All "advisory" or "recommended" provisions (including any use of the words "should," "may," shall, or similar) appearing in any referenced Code, Standard, or regulation must be interpreted as mandatory ("must").

1.4. **Buy American:** Manufacturers of all products, materials, equipment, components and systems specified in Division 15 must comply with the Buy American Act and the American Recovery and Reinvestment Act of 2009 (ARRA) and 2025 Code of Alabama Title 39 - Public Works, Chapter 3 - Use of Domestic Products and Resident Workmen for Public Works, Improvements, Etc.

Exceptions to these requirements will be permitted only where the specified items are proven to be unavailable from domestic U.S. sources. Examples of items that may qualify for exception include variable refrigerant flow (VRF) equipment and certain porcelain plumbing products. Any request for exception must be submitted in writing to the Architect/Engineer for prior approval and must include supporting documentation demonstrating that no suitable domestic product is available. Where three (3) or more U.S. manufacturers can furnish products that meet or exceed the requirements of the Contract Documents, only domestic (U.S. manufactured) products must be provided.

During the submittal phase, the respective manufacturer must provide a conformance letter on the manufacturer's official company letterhead. The letter must be signed by an Officer of the Manufacturer's Board of Directors and must explicitly certify full compliance with the Buy American Act and ARRA. Failure to include this conformance letter with the submittal will result in immediate rejection of the submittal without review.

1.5. **Permits and Inspections:** The Contractor must obtain all permits, licenses and approvals required to perform the Work, pay all associated fees and schedule and coordinate all inspections mandated by the Authority Having Jurisdiction (AHJ), all state and local government inspectors and any other Governing Authorities that may visit or inspect the project site.

The Contractor must submit the original certificates of inspection and approvals issued by all Governing Authorities to the Architect. These certificates and approvals must be incorporated into the Project Closeout Documents for the Plumbing, Fire Protection and HVAC systems.

The Contractor must furnish any additional materials, parts, equipment, methods, or modifications to the Work as required by any Governing Authority's inspections, regulations, or directives.

All deficiencies identified by any Code Official, Governmental Inspector, or other representative of a Governing Authority must be corrected promptly by the Contractor at no additional cost to the Owner or the Owner's Project Design Professionals.

1.6. **Site Visits:** It is the Contractor's responsibility to have the job ready for site visits when they are scheduled. If the project is not ready for the requested site visit and the Architect, the Engineer, any governmental agency or any other entity requires a re-inspection with the Engineer present, the Contractor must pay Zgouvas, Eiring & Associates a re-inspection fee of $2,000. The payment must be made directly to Zgouvas, Eiring & Associates 5 days prior to the scheduled re-inspection.

Before requesting the final site visit, the General Contractor must provide the

Mechanical Engineer and the Architect with a copy of the Mechanical Engineer's above ceiling corrected punch list. The corrected list must be signed and verified by the Mechanical and Plumbing Subcontractors' respective supervisors and the General Contractor to confirm that all items have been resolved. **If any item marked as complete is found to be uncorrected during the final site visit, the site visit will be considered a failure, and a reinspection fee will be imposed.**

The Contractor is urged to carefully review the extensive requirements of Paragraph "Identification" in this Section 15010 of the specifications and note that certain identification is required to be completed before certain site visits. There are specific identification requirements prior to the above ceiling and final site visits, respectively, that are mandatory. The State of Alabama Department of Construction Management (DCM) will cancel on-site, the site visit if not completed as specified. Failure to comply with this provision will be cause for cancellation of the site visit and a fee imposed for the additional site visit, with all costs of the additional site visit to be borne by the Contractor.

1.7. **Drawings and Specifications:** The Architect and Engineer will interpret the meaning of the drawings and specifications and will reject all work and materials, which in their judgment, is not in full accordance therewith. Where doubt arises as to the meaning of the plans and specifications, obtain the Architect's decision, in writing, before proceeding with parts affected; otherwise assume liability for damage to other work and for making necessary corrections to work in question.

All drawings are diagrammatic and are intended to quantify the materials specified and indicate their intended relationship with each other. The drawings and specifications are complementary, and work shown, but not specified, or specified, but not shown, must be the same as though required by both.

Bidders must thoroughly review all contract documents during the bidding period. Any missing information, ambiguities, conflicts, discrepancies, or other issues that could affect accurate pricing must be promptly brought to the Architect's attention in writing before the bid due date. This allows all questions to be clarified, and any necessary corrections made prior to bidding. Failure to identify and resolve such issues before submitting a bid will obligate the Contractor to furnish and complete the work, including any disputed or omitted items, using the specified materials and methods, at no additional cost to the Owner or the Owner's Design Professionals, as directed by the Owner's Design Professionals.

Bidders must visit the site and become acquainted with all job conditions that may affect the work shown on the plans. Report to the Architect, prior to bid, any new or existing conditions that require modifications to accomplish the installation of all items. Provide for required adjustments to complete the intent of the work. No consideration will be given after bid opening for alleged misunderstanding regarding new or existing job conditions, utility connections, permits, fees, construction documents, etc.

DO NOT SCALE the Plumbing, Fire Protection and HVAC drawings. In the interest of clearness, the work is not always shown to scale or exact location. Refer to Architectural drawings for dimensions and verify scale shown on the drawings. The various scales used on the drawings do not allow for all fittings, offsets and

accessories that may be required to complete the work. Check all measurements, location of pipe, all required and specified appurtenances for duct and piping, ducts and equipment with the architectural and electrical drawings and layout work to fit in with ceiling grids, lighting and other parts. All wiring, piping, ductwork, etc., must be concealed unless specified or noted otherwise. Adjust in the field as required to provide the optimum result to facilitate ease of service, efficient operation and best appearance.

1.8. **Conflicts, Coordination and Changes:** If interferences or conflicts occur, the Architect must decide which equipment must be relocated regardless of which was first installed. In the interest of avoiding such conflicts, each Sub-Contractor who is using common space, etc., must coordinate his work with all other trades and other parts of his own work. If during this coordination, it is discovered that necessary or desirable changes are required to be made, advise the Architect and secure his decision in writing prior to proceeding. Do not fabricate or install any items, equipment, etc. until all coordination has been accomplished.

Coordinate the location of all Division 15 work with Division 16. Do not run piping, ductwork and similar Division 15 work in NEC dedicated service areas for electrical equipment, including above panel boards, starters, communication panels, control panels, telephone backboards, data panels and similar electrical elements.

1.9. **Coordination Drawings:** The Contractor must comply with all procedures set forth in Division 1. Prior to commencing any work, the Contractor must submit detailed shop drawings for review and coordination. These shop drawings must clearly indicate the proposed arrangement of all equipment, piping, ducts, floor drains, electrical power requirements, equipment maintenance and service access provisions and all associated controls.

As a minimum, the shop drawings must include detailed layouts identifying potential conflicts in areas such as plumbing risers, HVAC ductwork, piping routes, equipment rooms, limited ceiling spaces and any other congested or critical locations. Refer to subsequent specification sections for any additional specific submittal requirements.

The Contractor must fully coordinate the submission of all shop drawings and must promptly refer any questionable or conflicting locations to the Architect/Engineer for resolution prior to any fabrication or installation. Work must not proceed until the shop drawings have been reviewed and accepted by the Architect/Engineer.

Failure to coordinate all items or to correct non-conforming installed work must be performed by the Contractor at no additional cost to the Owner or the Owner's Project Design Professionals.

Failure to submit the required shop drawings must render the Contractor solely responsible for any and all modifications necessary to facilitate the proper installation, maintenance, access and operation of all systems.

1.10. **Maintenance, Replacement and Service Access:** The Contractor must locate all equipment as shown on the Drawings. The Contractor must install all equipment, valves, controllers, actuators, manual dampers, motorized dampers, air vents, cleanouts, smoke detectors, fire dampers, smoke dampers, fans and any other items

requiring maintenance, service, or replacement access in strict accordance with the maintenance, service and replacement access requirements specified by the Manufacturer of each respective item. All such items must be installed to provide maximum safety as well as convenient and adequate access for service, replacement and maintenance.

To ensure proper maintenance access, all piping containing valves, all equipment and any other items that may require maintenance, service, or replacement must be located no more than 12 inches above the finished ceiling and no more than 14'-0" above the finished floor in areas without ceilings.

The Contractor must coordinate any questionable access, clearance, or location issues that could conflict with the above requirements with the Engineer or the Architect's field representative prior to installing any item. Failure to perform this coordination will result in any required relocation, modification, or correction being performed by the Contractor at the Contractor's sole expense.

1.11. **Warranty:** Refer to Division 1. Additionally, guarantee in writing to make good without cost any defects in materials and workmanship for one year following the date of substantial completion of the project as determined by the Architect. Provide free maintenance and service during the guarantee period.

Refer to other Division 15 Sections for additional detailed warranty requirements.

1.12. **Submittal Data:** Within 25 days of contract award, all Contractors must submit a complete submittal for review of **all** specified items proposed including a detailed schedule of materials, means and methods, equipment, etc... Failure to submit any specified items will result in rejection of non-compliant materials, equipment, means and methods, etc. when discovered, with replacement costs borne solely by the Contractor. The Architect and/or Engineer's review of submittals does not absolve the Contractor of full responsibility for strict compliance with all contract documents.

A recap/summary sheet must be inserted at the beginning of each tabbed section to summarize the contents of each respective tabbed section. The recap/summary sheet must include all items that have been changed or removed due to Project cost constraints, addendums, or Value Engineering (VE).

Variations from the specifications, plans and all value engineered (VE) items for the items submitted for review must be explicitly indicated immediately after the submittal cover page otherwise, it will be assumed the product will conform to the plans and specifications in all respects.

Failure to include items changed or removed due to Project cost constraints, addendums or VE items that require an additional review by the Engineer will require the Contractor to reimburse the Engineer a minimum of $700 for the effort involved to review the corrected, proper submittal.

Where substitutions are proposed, unless the Contractor states in writing, on a separate recap/summary sheet in front of the respective submittal, the differences of the substituted equipment or material, he must be responsible to replace such items any time discrepancies are found.

Submittals must include catalog data, scheduled capacities, fan curves, sound data, materials and methods of installation, various components of various assemblies, etc.

The General Contractor must review and stamp all submittals prior to submitting them to the Architect. Submittals provided without the General Contractor's review will be automatically rejected and a possible re-review fee of $700 imposed.

Only ONE complete submittal will be accepted for each specification section. Do not submit plumbing fixtures separately without the remaining Section 15400 items submittal. If a partial or incomplete submittal is provided, it will be automatically rejected and a possible re-review fee of $700 imposed. If the Contractor provides a submittal for review and then provides additional items for review after the initial submittal was submitted, a $700 review fee **will** be imposed. The objective is to provide one complete submittal as specified hereinbefore. **Providing submittals piecemeal is not allowed.**

All submittals must be separately bound by specification Section (HVAC, Fire Protection and Plumbing) in pdf format. Submittals must be electronically indexed and tabbed. Refer to the Architectural General Conditions and Division 1 for the format required by the Architect.

A cover sheet must be provided in front of the submittal package which states, as a minimum, the Project name and location, the name of the Owner, the Architectural firm, the Engineering firm, **the Engineer's Project number,** located within the Engineer's logo in the bottom right corner of the HVAC, Fire Protection and Plumbing plans and this specification section, the General Contractor, the Mechanical Contractor for mechanical submittals, Fire Protection Contractor for fire protection submittals and Plumbing Contractor for plumbing submittals and each Contractors' point of contact, with phone number, as applicable for the respective trade's submittal. The respective Contractor's contact phone number is requested in an effort to obtain submittal clarifications which otherwise may be cause for rejection by the Engineer.

Submittals must include specifications section numbers and related sub-paragraph numbers, materials used, methods of installation, product manufacturer, equipment capacities, etc. HVAC equipment items must follow the identical tabular format, category by category, nomenclature, etc., as shown on the HVAC equipment schedules. As a minimum, the recap/summary sheet must indicate the submitted values compared to each of the specified values. **Failure to provide the submittals in the format specified will be cause for immediate rejection without review.** If there is any doubt as to the format required for the HVAC equipment summary sheet, contact ZEA and an example will be provided. Plumbing and Fire Protection submittals must follow the identical procedure specified for the Mechanical Contractor.

1.13. **Submittal Rejection and Resubmittal:** The Contractor must carefully review the submittal data requirements specified above. Pay particular attention to specific items within the specifications that are cause for immediate rejection when submittals are not provided to the Engineer as requested or specified. If the Engineer requests

submittals for items not provided and the items are not included in the resubmittal, the resubmittal will be automatically rejected without review and a rereview fee imposed.

When submittals are rejected, **DO NOT** return a copy of the rejected submittal with the Engineer's review stamp or notations. Provide a clean submittal with a recap sheet in the front of the resubmittal addressing each of the Engineer's comments.

Any submittal that requires a review before the Engineer receives a complete submittal, a request for additional submittals, or portions thereof that are rejected TWICE and resubmitted a third, fourth, etc. time for review will require the Contractor to reimburse the Engineer each time for his effort. The minimum fee for each re-review is $700.

1.14. **Site and Existing Conditions:** Bidders must visit the site and become acquainted with all job conditions that may affect the work shown on the plans. Report to the Architect, prior to bid, any new or existing conditions that require modifications to accomplish the installation of all items. Provide for required adjustments to complete the intent of the work. No consideration will be given after bid opening for the alleged misunderstanding regarding new or existing job conditions, utility connections, permits, fees, etc.

1.15. **Line Locators:** The Contractor must, prior to commencing any excavation, trenching, boring or other subsurface operations, arrange and coordinate with the Owner, all applicable public and private utility companies and a qualified professional line-locating firm to thoroughly identify, describe, mark and locate all existing underground utilities, piping, conduits, cables, structures and other items that may be impacted by the construction activities. This requirement applies to all work associated with HVAC, plumbing and fire protection systems, including but not limited to water lines, sanitary and storm sewers, gas lines, fire protection mains and services, condensate lines, electrical conduits serving mechanical equipment, communication lines and any other subsurface installations.

The Contractor must obtain accurate utility locations using acceptable methods (paint markings, flags, stakes, or electronic markers as appropriate) and must not proceed with any excavation, trenching, or subsurface work until all utilities have been properly located, field-marked and independently verified by the Contractor. The Contractor must maintain all utility markings in a legible condition throughout the duration of the work and must exercise extreme care to protect all located utilities during construction operations.

Failure to comply with these requirements will render the Contractor solely responsible and liable for all costs associated with any damage incurred, including repair, replacement, restoration, service interruptions, fines, penalties, consequential damages and project delays, at no additional cost to the Owner or the Owner's Project Design Professionals.

1.16. **Phasing:** Interrupt existing services only at times approved by the Architect and the Owner. The General Contractor must make a written request to the Architect and the Owner for permission to interrupt services at the facility. The request must be provided with a minimum of seven (7) days prior to the desired date of the

interruption. Hold interruptions to a minimum in duration and frequency.

1.17. **Contractor Requested Electronic Drawing Files:** Not available.

1.18. **Record Documents:** The Contractor must prepare and submit Record Documents in strict accordance with the requirements set forth in the General Conditions and Supplemental Conditions of the Contract and these specifications.

Each Contractor must maintain an accurate and continuous record of all changes made during construction. Prior to commencement of any backfilling operations, the respective Contractor must take precise as-built measurements of all installed work, including all depths, inverts, elevations and locations. It is not acceptable to rely on or reference off-line locations. Definitive, field-verified measurements must be taken for each individual service line, pipe, conduit or underground installation entering and leaving the facility.

The location of all buried piping and underground utilities must be accurately shown on the Record Documents and dimensioned from permanent fixed points (such as building corners, column lines, or other established benchmarks). The Plumbing Contractor and the Fire Protection Contractor must perform the as-built documentation described above for all their respective underground work.

The Plumbing Contractor must clearly indicate on the Record Documents the exact location of all cleanouts, dielectric unions and valve numbers cross-referenced to the specified valve chart.

The Mechanical Contractor must provide identical as-built documentation requirements for all underground mechanical services shown on the Contract Drawings, including but not limited to condensate lines and any other buried mechanical piping or conduits.

The respective Contractor must complete the Record Documents by utilizing the As-Built mark-ups maintained in the General Contractor's construction site office. All field changes, deviations and additional information must be transferred onto a complete set of reproducible copies of the original Contract Drawings.

The final Record Document set must be clearly labeled "Record Documents" in the Title Block of each drawing sheet. The drawings must not contain clouds, revision triangles or any other graphic indications of changes. The Contractor must submit one complete hard-copy set of the corrected reproducible Record Documents to the Architect for final review and incorporation into the Owner's project records.

Additionally, the Contractor must furnish a complete electronic set of all Record Documents in PDF format on CD-R media (or other Owner-approved digital format). One copy of the CD-R must be included in the Owner's Operating and Maintenance Manuals as specified in Section 15400 (Plumbing) and Section 15700 (Heating, Ventilating and Air Conditioning). The Contractor is solely responsible for accurately documenting and showing all deviations from the original Contract Drawings. This responsibility includes, but is not limited to, all addenda, change orders, value engineering items, RFI responses, field observations, site visit reports, test results and any other modifications or clarifications that occurred during construction. All

such information must be incorporated into the Record Documents by the respective Contractor.

PART 2. MISCELLANEOUS REQUIREMENTS TO BE COORDINATED WITH OTHER TRADES

2.1. **Foundations and Supports: "Sammy" bolts are prohibited.** The Mechanical, Fire Protection and Plumbing Contractor, as applicable, must provide foundations, support, etc. not specified under other Divisions and as required to mount all items in a safe, professional and structurally sound manner. The respective Contractor must provide all supplemental steel between various types of structural members, including between bar joists, purloins, wood trusses, miscellaneous structural items, etc. as required for the item(s) proper support. All supports and related components and assemblies must be sized for a minimum of 300% (3 times) the anticipated load carried by the respective item.

Where the Contractor has doubt as to proper supporting requirements, he must consult with and seek the guidance of, the Architect and the project Structural Engineer for resolution. Consult all contract documents pertaining to other trades to determine extent of their work.

Concrete pads for outside equipment are specified under other Sections. Concrete work must meet the requirements of Division 3. The respective Contractor must provide all concrete pads not indicated or specified on the Architectural, Civil or Structural plans. Refer to the various equipment specifications for requirements in the absence of requirements by the various disciplines and provide as specified.

2.2. **Pipe Sleeves - General:** All penetrations of interior walls, partitions, floors and similar construction, whether above the ceiling or exposed to view, must be provided with minimum 10-gauge galvanized steel sleeves installed as work progresses and sized to maintain adequate annular space for proper firestopping. PVC or other non-metallic materials are prohibited unless explicitly specified elsewhere.

Copper and other metallic piping must not come into direct contact with concrete or masonry per IPC Section 305.1 and must be continuously protected with a minimum 0.008-inch (8 mil) plastic sheathing that permits free pipe movement.

Every penetration through partitions extending to the structure above must include a complete UL Listed firestop/sleeve assembly in accordance with UL 1479, regardless of partition rating. All non-rated partitions that do not extend to the structure above must utilize 10-gauge galvanized sleeves packed with mineral wool insulation and sealed on both sides with material matching the penetrated assembly, with escutcheons provided in exposed areas. See plan details for additional requirements.

Refrigerant and condensate drainage piping penetrating exterior walls (not through the roof) must use Schedule 40 PVC sleeves 1 inch larger in diameter than the piping plus covering, neatly saw-cut flush, sealed watertight and vermin-proof and painted to match the building exterior. Spray foam is prohibited. See below for requirements of refrigerant and condensate piping penetrations of metal building perimeter penetrations.

All wiring must be installed in conduit (not sleeves) with protective grommets at both ends. Outdoor HVAC control wiring must terminate in conduit above the ceiling in an accessible location. No piping and wiring is allowed to share any sleeve or firestop assembly. Each pipe, conduit, or wire must have its own dedicated sleeve. Split sleeves are prohibited.

2.3. **Pipe Sleeve Assemblies:** Each penetration of a partition that extends to the deck or structure above must include a complete UL Listed firestopping/sleeve assembly, regardless of whether the partition or floor is fire-rated or non-rated. All firestop systems must be UL Listed and labeled in accordance with UL 1479 (Fire Tests of Penetration Firestop Systems) and shall meet the hourly fire-resistance rating required by the applicable code and Contract Documents. When the partition or floor is not assigned a fire rating by the Architect, the minimum firestop assembly requirement must be 1 hour.

2.4. **Exterior Wall Penetrations for Refrigerant and Condensate Piping:** Sleeves for refrigerant piping and condensate drainage piping passing through exterior walls or exterior partitions (but not through the roof) must be Schedule 40 solid wall PVC pipe sized 1 inch larger in diameter than the piping plus its covering. The sleeve must be neatly saw-cut flush with the exterior wall face, filled with mineral wool insulation, then sealed watertight and vermin-proof with silicon sealant and the exposed assembly painted to match the building exterior unless otherwise specified. Spray foam is not an approved sealant. Routing both refrigerant suction and liquid lines through a single sleeve in an exterior wall is acceptable only in this specific instance and then sealed as specified above.

2.5. **Floor and Foundation Penetrations:** All floor sleeves (except in slab-on-grade) must be cast-in-place Schedule 40 steel pipe. Floor sleeves in overhead concrete foundations must terminate 2 inches above the finished floor or housekeeping pad (as applicable) and must be finished flush with the underside of the concrete foundation above. Thereafter seal on both sides of the sleeve as specified above.

Any pipe passing through a below-grade foundation wall must be protected by either a relieving arch or a cast-in-place pipe sleeve. The sleeve must be two nominal pipe sizes larger than the pipe it carries (example: an 8-inch sleeve for a 6-inch uninsulated pipe). Piping through foundation walls must be structurally isolated from any loading transferred by the foundation. The annular space between pipe and sleeve must be filled with compatible backing material. The joint between the pipe and concrete or masonry wall must be sealed with a sealant that is compatible with the damp-proofing/waterproofing materials specified in the Architectural sections.

2.6. **Wiring and Conduit Penetrations:** All wiring required to penetrate any exterior wall, interior partition, floor, or similar construction must be installed in conduit (not sleeves), fitted with protective grommets at both conduit ends and subsequently sealed weathertight with silicon sealant.

Outdoor control wiring for HVAC equipment must be installed in conduit to a point above the ceiling in an accessible location, with a grommet installed at the conduit termination to prevent abrasion of the control wiring. Wiring must not be routed through any sleeve or firestop assembly that contains piping. Multiple wires, pipes or

other items must not share a single sleeve or firestop assembly. Each conduit, pipe, wire or similar item must be provided its own dedicated assembly as specified.

2.7. **Firestopping:** Provide assemblies to form a specific U.L. or ASTM tested and listed system with minimum 10 ga. sleeve and appropriate UL/ASTM listing that maintains the required or specified integrity of the fire barrier and non-fire barrier to stop the passage of fire, gases, smoke and water. The through penetration firestop systems and firestop devices must be tested and listed in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed or a minimum of 1-hour protection for non-rated assemblies. The assembly or device must prevent passage of fire, smoke, gases and water through openings and prevent transmission of sound and vibration from the penetrating element to the structure. Penetrations involving insulated piping must be a tested and listed firestop system not requiring removal of insulation and in accordance with ASTM E 814 or UL 1479.

Wherever pipes, conduit, ducts, etc. penetrate any type of interior construction that extends to the underside of the structure/deck above it, regardless of whether the wall, partition or floor is a rated assembly or not, the space between the penetrating member and the building construction must be sealed with an ASTM E814 or UL 1479 listed, approved and labeled factory fabricated firestop assembly or device as specified above.

Where partitions are not indicated as fire rated, the firestopping assembly used must provide a minimum of one-hour resistance.

Where walls or partitions do not extend to the structure above, a factory fabricated firestopping assembly is not required. Instead, provide a 16 ga. galvanized sleeve or conduit (for wiring) and pack the respective sleeve or conduit as specified above.

At each through penetration, attach identification labels on both sides, in location where label will be visible to anyone seeking to remove penetrating items or firestopping. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Provide metal labels in areas used as return air plenums. Use metallic mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Additionally, secure to the wall with metal thumbtack at each corner of the label. Labels must be Hilti Firestop Identification Labels 00339611, 3M Sticker 98040056289 or approved equivalent. Firestop identification labels must include the following information on labels:

1. The words: "*Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage*."
2. Contractor's name, address and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

All fire stop material employed on the project must be the same brand throughout. The firestopping assemblies must be manufactured by Hilti, 3M, USG or other pre-approved Manufacturer.

2.8. **Access Panels and Doors:** Do not locate serviceable items above inaccessible, hard ceilings without written approval from the Architect. Coordinate all items' locations with the Architectural ceiling plans before installing any items. Furnish access panels and doors required to the General Contractor for installation for access to valves, controllers, actuators, manual dampers, motorized dampers, air vents, cleanouts, smoke detectors, fire dampers, smoke dampers, fans and any other items requiring maintenance access. Refer to Section 15700, Paragraph Access Doors and Panels for access' required in ductwork.

Doors/panels must be suitable for location and finish involved, 16" x 16" unless otherwise indicated, required or specified to permit removal of equipment and provide acceptable maintenance access.

Access panels and doors must be fire rated where rated assemblies are penetrated. Access panels and doors for items located outdoors or in damp environments must be weatherproof.

Access panels and doors must be manufactured by Milcor, Philip Carey, Zurn, Mifab or approved equivalent. The Architect must approve the use of and type of, panels and doors to be installed in areas that are exposed to view or in finished areas. Exposed access panels and doors must be factory cleaned and primed for painting in the field. Colors, materials and methods must be selected by the Architect. Refer to Architectural Section, Painting, for additional information.

Where device occurs above a lift-out acoustical ceiling panel, provide engraved plastic labels of type specified in Part "Identification Requirements" below.

In addition to identification of items above the ceiling, provide engraved plastic labels below the item, on the ceiling grid. Engraved plastic labels must match ceiling grid size (width), color and be neatly glued to the ceiling grid adjacent to the ceiling tile that should be removed for access to the item. The label must have engraved on it the item being identified and its designation as shown on the plans, valve chart, equipment or item designation, etc. Refer to Part "Identification Requirements" below for additional requirements.

2.9. **Cutting and Patching:** All openings must be laid out. Furnish detailed layout shop drawings to other trades in advance of their work. Failure to furnish layout shop drawings to the General Contractor must make the applicable Mechanical/Plumbing/Fire Protection Contractor responsible to rebuild openings as directed by the Architect. Where openings have not been laid out or built in, or they occur in existing partitions, floors, etc., they must be core drilled or saw cut large enough to allow all penetrating items with or without insulation to continue uninterrupted, with clearances specified.

Piping and duct within walls or behind walls must be installed before wall is erected otherwise, walls, floors, ceilings, etc., affected must be reworked by the trade which

erected it at the expense of the respective Contractor. Chasing and cutting new work is not allowed without written permission from the Architect.

2.10. **Duct and Miscellaneous Items Painting and Finishes:** Painting of ducts, piping, piping insulation, grilles, diffusers and other surfaces in finished areas is specified in Architectural Section "Painting" or similar section. Refer to those sections for requirements. If not specified in other sections, paint items with two coats of paint as directed by the Architect. Where the Architectural specifications require items to be painted, the Contractor must furnish it with a Manufacturer provided, factory applied prime coat.

Where factory finished items are marred, scratched, or damaged, replace the item, or upon approval from the Architect or Owner, refinish or touch-up as required or specified to bring to a like new condition.

All paint and coatings must have a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84. Also, see Part "Identification Requirements" below for additional requirements.

PART 3. TRENCHING, EXCAVATION & BACKFILLING

3.1. **Excavation:** Keep excavation free from water by pumping if necessary. Ensure that walls and footings and adjacent loadbearing soils are not disturbed in any way, except where lines must cross under a footing. Where a line must pass under a footing, make crossing with the smallest possible trench to accommodate the pipe. Where a line must pass adjacent to and below the bottom of a column footing, or the corner of a continuous footing, backfill the trench with concrete up to the level of the footing bottom, for a distance away from the footing equal to the depth of the fill.

3.2. **Trenching and Bedding of Piping:** Buried piping must be supported throughout its entire length. Where trenches are excavated, such that the bottom of the trench forms the bed for the pipe, solid and continuous load-bearing support must be provided between joints. Bell holes, hub holes and coupling holes must be provided at points where the pipe is joined. Such pipe must not be supported on blocks to grade. In instances where the material manufacturer’s installation instructions are more restrictive than those prescribed by Codes, the material must be installed in accordance with the more restrictive requirement.

3.3. **Over-Excavation:** Where trenches are excavated below the installation level of the pipe such that the bottom of the trench does not form the bed for the pipe, the trench must be backfilled to the installation level of the bottom of the pipe with sand or fine gravel placed in layers not greater than 6 inches in depth. Such backfill must be compacted after each placement.

3.4. **Rock Removal:** Where rock is encountered in trenching, the rock must be removed to not less than 3 inches below the installation level of the bottom of the pipe and the trench must be backfilled to the installation level of the bottom of the pipe with sand tamped in place so as to provide uniform load-bearing support for the pipe between joints. The pipe, including the joints, must not rest on rock at any point.

3.5. **Soft Load-Bearing Materials**: If soft materials of poor load-bearing quality are found at the bottom of the trench, stabilization must be achieved by over excavating not less than two pipe diameters and backfilling to the installation level of the bottom of the pipe with fine gravel, crushed stone or a concrete foundation. The concrete foundation must be bedded with sand tamped into place so as to provide uniform load-bearing support for the pipe between joints.

3.6. **Backfilling:** Backfill within the building and under paved areas must meet compaction requirements established under Division 2. Backfill must be free from discarded construction material and debris. Loose earth free from rocks, broken concrete and frozen chunks must be placed in the trench in 6-inch layers and tamped in place until the crown of the pipe is covered by 12 inches of tamped earth. The backfill under and beside the pipe must be compacted for pipe support. Backfill must be brought up evenly on both sides of the pipe so that the pipe remains aligned. In instances where the manufacturer's instructions for materials are more restrictive than those prescribed by the Codes, the material must be installed in accordance with the more restrictive requirement.

3.7. **Protection of Footings:** Trenching installed parallel to footings and walls must not extend into the bearing plane of a footing or wall. The upper boundary of the bearing plane is a line that extends downward, at an angle of 45 degrees from the horizontal, from the outside bottom edge of the footing or wall.

3.8. **Shoring, Sub-Soil Assumptions and Data, Work Around Trees and Surplus Earth:** Refer to Section "Earthwork".

3.9. **Broken Pavement:** In public streets, sidewalks, right of ways, etc., backfill and repair to satisfaction of authorities having jurisdiction.

PART 4. PIPE SUPPORTS, PIPE HANGERS AND MISCELLANEOUS SUPPORTS

4.1. **General: Below requirements do not apply to refrigerant piping, nor condensate drain piping.** Refer to Part "Pipe Insulation and Miscellaneous Insulation Work" for AP Armaflex material and installation methods specification for refrigerant piping and condensate drainage piping support requirements. Refer to the plan details and these specifications for various piping support requirements.

"Sammy" bolts are prohibited. Provide factory fabricated galvanized pipe hangers and supports for all piping, complete with properly sized bolts, washers, clamps, etc. and with coatings and finishes specified below and all as required for a complete and safely functioning installation. Material items, methods and general requirements not covered in this specification must be provided in strict accordance with current edition of Manufacturer's Standardization Society Specification MSS SP-58 and Manufacturer's Published Product Information.

All hangers, supports, related components and assemblies must be sized for a minimum of 300% (3 times) the anticipated load carried by the respective item. Where the Contractor has doubt as to proper supporting requirements, he must consult with and seek the guidance of, the Architect and the project Structural Engineer for resolution.

Where in contact with bare copper pipe provide same assembly except it must be copper, continuous-thread rod, nuts and washers made of copper-coated steel.

Hangers must be manufactured by Elcen Metal Products Co., Fee & Mason Mfg. Co., ITT Grinnell Corp, B-Line Systems or preapproved equivalent.

4.2. **Coatings and Finishes:** Pipe hangers, Unistrut pipe supports and duct Unistrut support assemblies of galvanized, zinc and similarly coated items are considered to **NOT** be coated. All must be painted, powder coated, epoxy coated or plastic coated. Hanger rods and associated bolts and clamps on Unistrut assemblies are not required to be painted or coated.

All piping, hangers, fittings, etc. must be clean and rust free when it is installed. Before installation, it must be checked, upended and swabbed. All rust or dirt from materials in storage or from lying on the ground must be removed. Any dirty piping installed must be cleaned. Any rusted piping must have the rust removed, etched and primed for painting as recommended by the respective piping manufacturer and then painted with two coats of black, compatible, rustproof enamel paint. Do not use spray paint. The paint must comply with the requirements of ASTM E84 for flame spread and smoke development.

All damaged or rusted steel pipe and fittings, all roof drains, all uncoated cast iron pipe and all hangers, Unistrut and other support assemblies, must be cleaned, primed and painted with two coats of compatible black enamel paint as specified below. Any rusted items must have the rust removed, then etched and primed for painting as recommended by the respective manufacturer. After prepping the surfaces, then paint with two coats of compatible black, rustproof enamel paint. Do not use spray paint.

All paint and coatings must have a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84. See Part "Identification Requirements" below for additional requirements.

In lieu of painted surfaces as specified hereinbefore, the Contractor may provide factory fabricated hangers and Unistrut assemblies with rust resistant powder coating, epoxy coating or plastic coating. All paints/coatings/finishes must meet or exceed a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84.

4.3. **Hangers at Typical Single Suspended Horizontal Pipe:** Where multiple pipes are shown adjacent to each other on the plans, provide a Unistrut assembly as shown on the plan details. Do not use multiple, single pipe assemblies.

Single pipe assemblies must be galvanized adjustable clevis or split-ring type equal to MSS 58 and 59, Type 1. Refer to Coatings and Finishes above for additional requirements. See other specifications and plan details for additional requirements. See part “Hanger Rods” below for limitations on use of clevis hangers.

Do not use clevis hangers for refrigerant piping. See refrigerant piping support requirements in Section 15700, Refrigerant Piping and Accessories.

Where in contact with bare copper pipe provide same assembly except it must be copper, continuous-thread rod, nuts and washers made of copper-coated steel.

4.4. **Manifolds and Parallel Runs:** Where multiple pipes are shown adjacent to each other on the plans, provide a Unistrut assembly as shown on the plan details. Do not use multiple, single pipe assemblies.

As specified above, the Contractor must provide a Unistrut system complete with fittings, clamps and accessories required and specified. Horizontal and vertical mounted piping must all be secured to each Unistrut hanger assembly. Refer to the plan details and specifications for requirements.

Refer to Coatings and Finishes above for additional requirements. Refer to "Hanger Rods" below for locations that require a Unistrut assembly. Furnish for review proposed system components.

Where in contact with bare copper pipe provide same assembly except it must be copper, continuous-thread rod, nuts and washers made of copper-coated steel.

Unistrut assemblies must also be provided for refrigerant piping. Refer to Section 15700, Refrigerant Piping and Accessories for requirements.

4.5. **Spacing:** Install supports as required or specified to prevent sags, bends or vibration. Provide additional building supports and attachments where support is required or specified for additional concentrated loads, including valves, in-line pumps, flange guides, strainers, expansion joints and at all changes in direction of piping.

At no-hub pipe, support as specified below for cast iron piping.

In all cases, provide on all sides of and within 12 inches of, all elbows, take-off fittings, joints, valves, any change in direction of item supported, at ends of branches over 5 feet long and on centers not exceeding the following:

Piping Material	Pipe Size	Maximum Spacing
Copper Piping/Tubing (Water And Condensate Drainage)	1-1/4" & less	6 ft. Horizontal 8 ft. Vertical
	1-1/2" & larger	8 ft. Horizontal 8 ft. Vertical
Refrigerant Piping	All	8 ft. Horizontal 6 ft. Vertical
Cast Iron Piping	All	4 ft. Horizontal 12 ft. Vertical
Steel Natural Gas Piping	1/2" to 1"	6 ft. Horizontal 6 ft. Vertical
	1-1/4" & larger	10 ft. Horizontal

		8 ft. Vertical

Where horizontal cast iron pipe is installed in 10ft. lengths, spacing must be increased to 9 ft. In addition to specified cast iron support requirements, provide additional support for cast iron pipe within 6” of each fitting on all sides of the fitting.

PVC	All	4 ft. Horizontal 8 ft. Vertical

Where vertically installed piping is provided, a guide must be installed midway between the specified/required vertical supports, at the base of each riser and at each floor. Such guides must prevent pipe movement in a direction perpendicular to the axis of the pipe.

4.6. **Protection of Physical Damage for Piping:** In concealed locations where piping is installed through holes or notches in studs, joists, rafters or similar type members, the pipe must be protected by shield plates and grommets. Protective steel shield plates having a minimum thickness of 0.0575 inch (16 gage) must cover the area of the pipe where the member is notched, drilled or bored and must extend not less than 2 inches above sole plates and below top plates.

4.7. **Hanger Rods:** Must be mild steel, hot dipped galvanized, threaded as required. Rods must be selected as specified hereinbefore. Use not smaller than 3/8” rods for pipe 2” and under, 1/2” rods for pipes 2 1/2” through 4", 3/4” rods for 5” through 12” and 1” rods for piping over 12”. Support rods with threaded Underwriters listed inserts, expansion shields or beam clamps must be all galvanized. Beam clamps must be equal to Elcen Fig. 34 or 36 with rod and eye end.

Where in contact with bare copper pipe provide same assembly except it must be copper, continuous-thread rod, nuts and washers made of copper-coated steel.

At bar joists, support from bottom chord at panel points. For piping over 6” provide supplemental steel angle supports and welding to span 3 joists when running parallel to joists and welded angle between two panel points for piping running perpendicular to joists. Concrete inserts must be equal to Grinnell Figure 282.

Wherever piping hanger support rods heights exceed 36” length from top of the supported item to the structure above, Contractor must provide a Unistrut support assembly and bracing of the assembly with minimum 1”x1”x1/4” angle iron or as required for the weight of the supported item, whichever is greater and anchor to structure above to prevent swaying. Assembly must be welded at the connection to Unistrut and building structural assembly. Follow welding procedures set forth in the structural division of the specifications.

4.8. **Bracing:** Where hanger rods heights exceed 36”, provide sway bracing as specified above in “Hanger Rods”. Bracing must be provided at each Unistrut assembly and attached to the building structural system.

4.9. **Approved Equivalents:** By Grinnell, Elcen, Stockham or Crane will be accepted.

PART 5. IDENTIFICATION REQUIREMENTS

5.1. **<u>Identification:</u> All of the above ceiling identification specified must be completed prior to the above ceiling site visit. All remaining identification must be completed prior to the final site visit.**

The State of Alabama Department of Construction Management (DCM) will cancel on-site, the site visit if not completed as specified. Failure to comply with this provision will be cause for cancellation of the site visit and a fee imposed for the additional site visit, with all costs of the additional site visit to be borne by the Contractor.

All identification must follow the nomenclature used on the plans.

All equipment, equipment access points, smoke detectors, smoke dampers, fire dampers, equipment filter access locations, access panels, motor starters, disconnects, thermostats, humidistats, sensors, valves, trap primers, control systems components, switches, all air handling equipment access doors and any other items or devices which cannot be readily identified by the Architect, Engineer or Owner and his personnel, must be provided with engraved laminated plastic nameplates, as described below.

All filter access locations' identification must include the size and number of filters required for each specific piece of equipment.

Identify all access openings/panels/doors to indicate item for which access is provided. Ex. Motorized damper, fire damper, smoke detector, filters, valves, coils, etc. Additionally, add the following to each access identifier: "***ACCESS - DO NOT BLOCK***."

All above ceiling identification must have a corresponding engraved plastic label identifier neatly attached to the ceiling grid below the aforementioned equipment, item, valve, access door, etc. Attach to the ceiling grid with permanent adhesive. The engraved plastic labels background must match ceiling grid color with contrasting black or red letters as desired by the Architect. The label must have engraved on it the item being identified and its designation as shown on the plans, valve chart, etc.

Engraved equipment designation and numbers must be as shown on the Mechanical and Plumbing drawings on the upper half of tag, leaving lower half of tag for future engraving by Owner. Where equipment is typed (HP-A, HP-B, EF-A, etc.) rather than numbered (HP-1, HP-2, EF-1, etc.) the tag must include the room number(s) of the area served. Room numbers must be designated by the Owner. In absence of Owner's room numbers, numbers must be as indicated on the architectural plans.

Identify all piping, including refrigerant suction lines, refrigerant liquid lines, refrigerant hot gas reheat coil lines, condensate drainage piping located in concealed areas above ceilings and exposed to view in finished spaces, all water piping, fire sprinkler piping, air piping, all acid resistant piping, jacket of all insulated pipe and all pipe exposed to view and/or accessible through removable ceilings, attics, access panels, etc... Sanitary vent piping above the ceiling, in chases and similar areas and condensate drainage piping on the floor in mechanical rooms or located on the roof,

are not required to be identified. See subsequent part below for special requirements for refrigerant piping identification.

Identification must be visible from all sides of the piping, bear name of pipe contents and show direction of flow. Install identification within 12” of all flanges, valves, fittings, elbows, change in piping direction, at each branch take-off, both sides of floor and wall penetrations and along all straight runs of pipe not further apart than 15 feet. In the case of gas/air systems, the identification must also indicate pressure of the pipe contents.

Piping identification must be provided over every space, including small areas (closets, storage rooms, etc.) above accessible ceilings. All piping identification must be installed such that the Owner or maintenance personnel can remove any ceiling tile and visually identify any overhead piping with the specified identification markers.

Pipe labels must be factory fabricated, flat wrap-around markers that completely surround the pipe. The markers’ colors, designations, etc., must comply with IBC/IPC/IMC requirements, ANSI/ASME Standard A13.1 and ANSI Z535.1, current editions. Markers must be Seton "Snap-Around" or Seton “Strap-Around” pipeline markers, Marking Services Inc (MSI) Series MS-970, Kolbi Pipe Marker Co., Brimar or approved equivalent. **Stick-on, painted, stenciled, handwritten or any non-factory fabricated type identification is not allowed.**

Fit all Plumbing dielectric unions, all gas valves and plumbing valves (except equipment service valves and sprinkler valves) with a custom laser engraved brass valve tag at each valve and dielectric union and include on the specified valve chart. Tag must be 1-1/2 inches in diameter, 18-gauge polished brass tags with 3/16-inch chain hole and 1/4-inch-high stamped, black-filled service designation. All gas valve identification must indicate gas pressure, including the entering and leaving side of all gas pressure regulators, as applicable. Number tags in sequence, starting with number 1; prefix the number with “P” for plumbing items. After numbering plumbing valves, also indicate valve numbers on the record/as-built drawings.

Provide a custom laser engraved brass valve tag at each gas regulator identifying inlet and discharge gas pressure and pipe contents. Tag must be 1-1/2 inches diameter, 18-gauge polished brass tags with 3/16-inch chain hole and 1/4 inch high stamped, black-filled service designation.

Provide a custom laser engraved brass valve tag identifying gas pressure main on house side of the meter. Tag must be 1-1/2 inches diameter, 18-gauge polished brass tags with 3/16-inch chain hole and 1/4 inch high stamped, black-filled service designation.

Provide a valve chart laminated and framed which indicates all the valve numbers and location of each valve and dielectric union and type of service of each valve (Cold water, hot water, hot water circulating, air, etc.). Locate a valve chart in each water heater room and each janitor closet. Permanently attach each chart to the wall as directed by the Architect. All valves’ numbers must also be shown on the Record drawings. Include a copy of the valve chart and the record drawings with the valves and dielectric union identification in the Owner’s Operation and Maintenance Manuals.

In addition to valves identification specified above, provide an engraved laminated label, of the type specified above and glue to the ceiling tile grid below the valve for each valve concealed from view. Where there is more than one valve located within a span of eight (8) feet, above the ceiling, it is not necessary to provide multiple identifiers on the ceiling grid. It will be acceptable to place a single identifier on the ceiling grid reading as, “Water Valves”. Each valve above the ceiling is still required to have its own individual valve tag and identified on the specified valve chart. Example: Over the toilets ceiling, there may be multiple shut-off valves to each individual fixture instead of to a bank of fixtures. Where there are multiple valves for each fixture, the Contractor may attach a single identifier on the ceiling grid that states, “Water Valves”, or similar description. Thereafter, each individual valve above the ceiling still requires its own engraved valve brass tag as originally specified. The intent is to NOT have multiple individual identifiers for each valve exposed to view on the ceiling grid and thereby creating an undesirable appearance.

Access openings/panels/doors to all items requiring access must be permanently identified on the exterior of the access panel and on the ceiling grid below by a label having letters not less than 3/4” in height and reading: ***“XXX – DO NOT OBSTRUCT ACCESS“*** where “XXX” is the item requiring access.

Permanently affixed warning labels must be attached to all equipment, inside the facility and outside of the facility, on a highly visible location on the equipment or adjacent to disconnect for the equipment, which can be automatically started. The warning label must read as follows: ***“CAUTION!! This equipment is operating under automatic control and may start or stop at any time without warning. Place disconnect switch in the “OFF” position before servicing or attempting to work on equipment.”***

Permanently affixed warning labels must be attached to all motor starters and all control panels which are connected to multiple power sources utilizing separate disconnect switches. The warning labels must read as follows: ***“THIS EQUIPMENT IS FED FROM MORE THAN ONE POWER SOURCE WITH SEPARATE DISCONNECTS. DISCONNECT ALL POWER SOURCES BEFORE SERVICING OR WORKING ON THIS ITEM”***

Provide signage on each access point to the UV-C lights and on each side of the unit. Signage materials and methods must be as specified below, white letters with red background. Do not use the UV-C Manufacturer stick-on provided signage.

Warning signage must read as follows: ***“DANGER!! UV-C LIGHT SOURCE! UV-C RADIATION CAN CAUSE SEVERE BURNS OF THE SKIN AND EYE INJURIES. DISCONNECT POWER BEFORE SERVICING UNIT OR UV-C LIGHTING!”***

Labels must be Norplex-Micarta stock meeting ASTM D709, a minimum of 3" x 3" x 1/8” thick, laminated plastic labels (larger if needed) with engraved, all caps, 3/8” high, 1/8” stroke letters for thermostats, CO2 sensors and similar control devices in the finished space and 6" x 4" x 1/8” thick, laminated plastic labels (larger if needed) 3/4" high x 1/4” stroke numerals and all capital letters to identify all items furnished under Division 15 specifications, to include all warning signage, access panels, equipment and all other items above the finished ceiling requiring identification.

Labels may be smaller but must be legible. The intent is to provide proper identification without it being aesthetically undesirable. If there is any doubt about appearance, coordinate with the Architect's field representative before proceeding.

Labels attached to the ceiling grid must be the same width as the ceiling grid to which it is attached. Properly adjust lettering height to fit within the smaller width label. Labels color on the ceiling grid must match the ceiling grid and be provided with contrasting black or red letters as desired by the Architect.

All items above the ceiling or in mechanical rooms, attics, mezzanines and similar type spaces must be red with white lettering.

Where the tag, label or marker occurs in a plenum (return air) space, the material employed must carry a Class A Flame Spread Rating per ASTM E84. If the material does not meet the Class A Flame Spread Rating per ASTM E84, provide custom laser engraved, 0.029" thickness, red, 316 Stainless Steel with white letters. Sizes, letter heights, etc. and colors must be as specified for the laminated plastic labels specified hereinbefore.

All piping exposed to view in unoccupied finished spaces, mechanical rooms, plumbing chases, housekeeping and similar spaces and jacket of insulated piping exposed to view in mechanical rooms, janitor/housekeeping and similar type spaces must be painted with two coats of compatible enamel paint in accordance with IBC/IPC/IMC color requirements and ANSI Standard A13.1, current edition. Do not use spray paint. After piping is painted, identify with pipe markers, valves tags, etc. as specified hereinbefore.

Exposed piping and the jacket of insulated piping in occupied finished spaces must be painted with two coats of compatible enamel paint, with color selected by the Architect.

Painting of the jacket of the insulated piping is not required where a protective aluminum jacket is specified and provided. Provide identification markers as specified hereinbefore on piping with aluminum jacket. Refer to Sections 15400 and Section 15700 for piping requiring aluminum jacket.

5.2. **<u>Refrigerant Piping Identification:</u> All refrigerant piping must be identified**. The pipe identification must be located at intervals not exceeding 15 feet on the refrigerant piping or pipe insulation. Provide piping identification over every space, including small areas (closets, storage rooms, etc.) above accessible ceilings. All piping identification must be provided such that the Owner or maintenance personnel can remove any ceiling tile and visually identify any overhead refrigerant piping with the specified identification markers. Identification must be green with white lettering and with a minimum lettering height of 1".

IMC 1109.2.7 requires that the identification must indicate the refrigerant designation and safety group classification (A2L, etc.) and the type of refrigerant used (R-454B, etc.) in the piping system. For Group A2, A3, B2 and B3 refrigerants, the identification must also include the following statement: "***DANGER - Risk of Fire or Explosion. Flammable Refrigerant***." For any Group B refrigerant, the identification must also include the following statement: "***DANGER - Toxic Refrigerant***."

Basic identification for all refrigerant lines to and from all of the various split systems must be identified as specified above. Refrigerant piping identification must use the nomenclature on the plans for the specific unit it identifies. Where equipment is typed (CCHP-A, DHP-A, PHP-A, etc.) the piping identification must include the room number of the space the respective unit serves or the room number of the mechanical room the unit is located in. Ex. An CCHP-A that serves Classroom 102A must be identified as "*Refrigerant Suction Line CCHP-A Rm. 102A*" and "*Refrigerant Liquid Line CCHP-A Room 102A*" as required.

Due to the complexity of the required identification, the piping may require multiple, side by side identification wrap arounds.

Custom factory fabricated refrigerant piping labels are required. Stick-on, painted, stenciled, handwritten or any non-factory fabricated type identification is not allowed.

PART 6. MISCELLANEOUS REQUIREMENTS

6.1. **Materials and Equipment:** New and of best quality in every respect. Pipe and fittings must conform to the ASTM Standard designated for pipe of each material. Equipment must bear Underwriters Laboratories Inc. (UL) listing label, Canadian Standards Association (CSA) listing label or ETL approved rating.

All electrical components and products must also comply with the respective Code of Federal Regulations (CFR). All pressure vessels must be constructed and tested in accordance with applicable ASME Codes and must bear ASME stamps unless specified otherwise. Minimum pressure rating must satisfy job conditions.

Only manufacturers and products explicitly named in the specifications may be used without prior approval. Any proposed use of unlisted manufacturers or substitutions requires written approval submitted through the Architect, to the Engineer and must be obtained at least seven (7) calendar days prior to the bid due date, following the exact procedures outlined in Division 1.

Where units of the same class of equipment are required or specified, these units must be products of a single manufacturer, however, the component parts of each unit need not be. All major equipment must be provided by the same manufacturer throughout the project. No mix matching of equipment Manufacturers is allowed unless specified otherwise.

Architect must select all colors where a choice exists.

No materials or products that contain asbestos, formaldehyde, lead or mercury, in excess of limits mandated and defined by OSHA, LEED and the EPA, must be utilized.

Where conflicts occur between a Code, Standard, Listing and the contract drawings or contract specifications, the most stringent requirements must govern and be applied.

6.2. **Workmanship:** Workmanship must be first class, premium and in accordance with superior practice. Work must be carried out by experienced mechanics and must present a neat and professional appearance. Exact location of pipe, duct, equipment, etc., must be determined in field, considering work of other trades. Do not attach any items to other trades' assemblies. Items must be separately attached to the building structural system. Except in unfinished areas and where specifically indicated on the plans or approved in writing, ductwork, piping, conduit, wiring and similar items must be concealed in the construction.

Aboveground piping must run parallel with the lines of the building, unless otherwise indicated. Branch pipes from water service lines must be taken from top or side of main, using crossover fittings required by structural or installation conditions. Refer to the plan details and other specification sections for gas piping and compressed air piping take-off requirements. Supply pipes, valves and fittings must be kept a sufficient distance from other work and other services to permit not less than 1 inch between finished covering on the different services. Bare and insulated lines must not bear directly against building structural elements so as to transmit sound to the structure or to prevent flexible movement of the lines.

Lines required to be sloped have the right of way over those not required to be sloped. Lines whose elevations cannot be changed have the right of way over lines whose elevations can be changed. Lines and equipment whose locations are dimensioned have precedence over lines and equipment not dimensioned.

Pipe must be clean, cut clean, properly reamed, threaded or soldered, erected plumb and secure. Make changes in pipe size by reducing fittings without the use of bushings. Install all items in accordance with manufacturer's recommendations. Absolute coordination is required with the other Contractors on the project before proceeding with installation of any system or item.

At all stages of installation, protect pipe openings, floor drains, hub drains, fixtures, ductwork, condenser coils and equipment against the entrance of foreign materials and from damage by the elements, mortar, concrete, paint, etc. Plugs of rags, wool, cotton, waste or similar materials are not acceptable.

If air moving equipment must be used during construction, temporary filtration media with a Minimum Efficiency Reporting Value (MERV) of 11 must be installed at each return air grille, return air register, exhaust grille, exhaust register and unit return air inlet. ALL open portions of ductwork and equipment must be covered with a self-adhesive film (not Visqueen) or airtight sheet metal caps to prevent the intrusion of contaminants.

All equipment openings, duct openings, duct take-offs, etc., must be protected immediately after the tap, take-off, opening, etc. has been fabricated in the field. In effect, there must be no ductwork or equipment opening that is exposed to the ambient air. The material must be a minimum of 3 mils thick and have a minimum tensile strength of 10 psi. It must be waterproof and recyclable. Material must be DuroDyne Dyn-O-Wrap or approved equivalent.

Where bare sheet metal is delivered unassembled to the job site, all ductwork must

be covered and protected with Visqueen. After fabricating the duct in the field, the interior bare metal must be wiped clean with a clean damp cloth before installing in the field. After installation, the duct must be protected as specified above. Any ductwork discovered to be unprotected as specified is subject to immediate rejection for use on this project.

6.3. **Testing Documentation:** Throughout the Division 15 specifications, there are various tests required and specified. Provide the Architect written certification and results of all tests specified, including those indicating failure. The absence of written testing certification and results will be considered the same as if testing was never done. Include all testing documentation in the Bound and Framed Instructions.

6.4. **Factory Finishes:** Furnish to the Architect, color cards for standard and premium colors available. The Architect must select color where choices exist. Provide Manufacturer's standard color where color choices are not available. Coordinate all color selections with appropriate Architectural specification sections.

6.5. **Expansion:** Provide for expansion and contraction of all piping, ductwork, etc. and make proper provisions so that excessive strain will not occur on piping, ductwork or other parts. Provide flexible connections for all piping and ductwork at all building expansion joints.

6.6. **Safety Provisions:** Provide covers or guards on all hot, moving, projecting items and at any other location that could be construed by the Engineer, Owner or Architect as a hazard. Provide full size expanded metal grilles over all exhaust/relief air assemblies on all packaged equipment to protect against any intrusion to motorized dampers, gravity backdraft dampers, etc.

6.7. **Cleaning and Adjusting:** Upon completion of work, clear all drains, traps, fixtures, ducts and pipe. Adjust all valves, remove rubbish and leave work in clean and excellent operating condition. Clean and polish all floor drains, floor and wall cleanouts, wall hydrants and any other exposed metal objects.

Install final permanent type filters only after cleaning of building is completed.

6.8. **Escutcheons:** Where pipes pass through cabinets, walls and ceilings of finished rooms provide one-piece, cast-brass type with polished, chrome-plated finish and setscrew fastener or stainless steel type securely fastened in place. Do not use split ring type escutcheons.

Pack penetrations with mineral wool insulation, seal with firestopping compound and install escutcheons to prevent passage of fire, smoke and vermin.

6.9. **Delivery and Storage:** All equipment and materials delivered and placed in storage must be protected from the weather, humidity and temperature variations, dirt and dust and other contaminants. See Section 15700 and this Section 15010 for additional requirements for ductwork and equipment.

6.10. **Dielectric Isolation:** Provide dielectric isolation where dissimilar metals are joined, at supports, etc. For pipe sizes 2" through 6", copper piping flanges must be drilled to ANSI B 16.5 150/125 Standard and powder coated, with an EPDM insulator adhered

to the plate steel flange protruding inside of the steel flange to prevent contact with the copper flange adapter. The copper component of the flange adapter must be Third Party Classified by Underwriters Laboratories, Inc. Minimum working pressure must be 300 psi at 272°F.

6.11. **Miscellaneous Bonding/Grounding of Metallic Items:** Wherever any bare metallic piping, conduit, structural elements or any other metallic assembly is in contact with externally insulated duct or bare sheet metal duct, bonding/grounding must be provided. The Contractor must provide 1/2" thickness, unslit AP Armaflex insulation of sufficient inside tubular diameter to snuggly and completely cover the respective metallic item. The insulation must extend the full length of the affected area. Where channel shapes are used, orient the open side of the Unistrut assembly down. Materials that are not supported by Unistrut, sheet Armaflex may be used provided it is properly attached to the duct or affected items. Refer to Section 15700, Part "Pipe and Miscellaneous Insulation Work" for AP Armaflex material specification.

END OF SECTION

SECTION 15400

PLUMBING

PART 1. GENERAL & MISCELLANEOUS

1.1. **General Provisions:** Section 15010 is applicable in full hereto. No building materials or products that contain asbestos, formaldehyde, polychlorinated biphenyl (PCB), lead or mercury, in excess of limits mandated and defined by OSHA, LEED and the EPA, must be utilized.

Do not fabricate, or install, any pipe or equipment until all coordination has been accomplished. Refer to Section 15010 for coordination requirements.

1.2. **Qualifications:** The Plumbing Contractor and the required third party Insulation Contractor must be properly licensed and established at the location of the work and must maintain adequate local service facilities. They must have had previous experience in the satisfactory installation of at least six (6) systems of this type, size, complexity and scope.

1.3. **General Scope:** The Plumbing Contractor must furnish and install all equipment, materials and labor required to provide a complete and fully operating plumbing system, even though every item may not be specifically indicated on the drawings or specified. The Contractor must refer to the architectural drawings to verify all plumbing fixture locations and mounting heights. All ADA compliant fixtures must be mounted in accordance with current ADA requirements and as directed by the Architect.

All advisory provisions listed in the Codes referenced in the Contract Documents must be considered mandatory. In the event of any conflict between applicable Codes, Standards, Listings, Contract Drawings or the Contract Specifications, the most stringent requirements govern. The Contractor must provide, install and comply with whichever imposes the strictest requirement, highest standard and greatest obligation. No exceptions or leniency will be granted. These requirements are intentionally strict to ensure project quality, regulatory compliance, fairness in bidding and protection of the Owner's interests. Non-compliance carries significant risk of financial responsibility, schedule impacts and potential contract default. Bidders and Contractors assume these obligations fully upon participation or award.

Bidders must thoroughly review all contract documents during the bidding period. Any missing information, ambiguities, conflicts, discrepancies, or other issues that could affect accurate pricing must be promptly brought to the Architect's attention in writing before the bid due date. This allows all questions to be clarified, and any necessary corrections made prior to bidding. Failure to identify and resolve such issues before submitting a bid will obligate the Contractor to furnish and complete the work, including any disputed or omitted items, using the specified materials and methods, and the Architect and Engineer's requirements, at no additional cost to the Owner or the Owner's Design Professionals, as directed by the Owner's Design Professionals.

Plumbing items must not be attached to assemblies belonging to other trades. All items must be independently and separately attached to the building's structural system.

The Plumbing Contractor must not install any piping insulation. All piping insulation work must be performed by an independent, licensed and experienced third party third party Insulation Subcontractor whose principal business is the sale and installation of insulation materials. Insulation must be installed in strict accordance with the manufacturer's recommendations and these specifications.

Manufacturers or products not specifically named in the specifications require prior approval, which must be requested at least seven (7) days prior to the bid date and submitted through the Architect in accordance with Division 1 and Section 15010.

Where units of the same class of equipment are required or specified, these units must be products of a single manufacturer, however, the component parts of each unit need not be. All equipment must be provided by the same manufacturer throughout the project. No mix matching of equipment Manufacturers is allowed unless specified otherwise.

Piping systems must be routed as directly as possible, installed straight and true to line and grade, properly supported and free of sags or unnecessary bends. Runs must form right angles and run parallel with building lines. Piping must be located as high as practical and grouped in parallel runs spaced as closely together as practical.

All penetrations through floors and partitions must be built-in as construction progresses. Where required penetrations in new construction were not built-in as required by the specifications, the Contractor must core drill or saw cut openings sufficiently large enough to accommodate all piping, conduits, firestopping assemblies, related items, etc. without interruption and to allow proper firestopping as required by Code and these specifications.

Reconstruction and repair of any demolished or modified items must be performed as directed by the Architect. The Plumbing Contractor must coordinate all demolition, repair and rebuilding work with the General Contractor prior to bidding to ensure proper installation of carriers, piping and associated items.

Prior to installation, all piping must be inspected, upended and thoroughly swabbed clean. All piping must be clean and free of rust at the time of installation. Any dirt or rust resulting from storage or ground contact must be removed. Any piping installed with dirt must be cleaned. Rusted piping must have all rust removed, followed by etching and priming as recommended by the pipe manufacturer and then painted with two coats of black, compatible, rust-inhibiting enamel paint. The use of spray paint is not permitted. Refer to the gas piping section for specific painting requirements. All paint must comply with ASTM E84 for flame spread and smoke developed indices.

Prior to commencement of any backfilling operations, the Plumbing Contractor must take accurate as-built measurements, including all depths and inverts. Centerline locations alone are insufficient. Definitive measurements must be recorded for each line entering and leaving the building. **The location of all buried piping must be shown on the record (as-built) drawings and dimensioned from permanent fixed points.**

Refer to Section 15010 for additional requirements.

1.4. **Contractor Requested Electronic Drawing Files:** Not available.

1.5. **Site Visits:** It is the Contractor's responsibility to have the job ready for site visits when they are scheduled. If the project is not ready for the requested site visit and the Architect, the Engineer, any governmental agency or any other entity requires an additional site visit with the Engineer present, the Contractor must pay Zgouvas, Eiring & Associates a re-visit fee of $2,000. The payment must be made directly to Zgouvas, Eiring & Associates 5 days prior to the scheduled site visit.

Before requesting the final site visit, the General Contractor must provide the Mechanical Engineer and the Architect with a copy of the Mechanical Engineer's above ceiling corrected punch list. The corrected list must be signed and verified by the Plumbing Subcontractors' respective supervisors and the General Contractor to confirm that all items have been resolved. **If any item marked as corrected/complete is found to be uncorrected/incomplete during the final site visit, the site visit will be considered a failure, and a reinspection fee will be imposed.**

The Contractor is urged to carefully review the extensive requirements of Part "Identification" in Section 15010 of the specifications and note that certain identification is required to be completed before certain site visits. There are specific identification requirements prior to the above ceiling and final site visits, respectively, that are mandatory. The State of Alabama Department of Construction Management (DCM) will cancel on-site, the site visit if not completed as specified. Failure to comply with this provision will be cause for cancellation of the site visit and a fee imposed for the additional site visit, with all costs of the additional site visit to be borne by the Contractor.

1.6. **Governmental Inspections:** The Plumbing Contractor must arrange and pay for the State of Alabama Boiler and Pressure Vessel Safety Division/Inspection Divisions, Elevators/Boilers Inspector to visit job site to inspect water heater and/or boiler installation and air compressor installation. The Plumbing Contractor must obtain written approval, certification, tags and Certificate for Potable Water Heater (PWH) and air compressor as required. **This inspection must be accomplished prior to the final site visit; to include the tagging of the equipment with the inspection tag, else DCM will cancel the site visit and impose a reinspection fee.**

Correct all deficiencies required by the Inspector without additional cost to the Owner or the Owner's Project Design Professionals, using materials and methods, as directed by, State of Alabama Boiler and Pressure Vessel Safety Division/Inspection Divisions and Elevators/Boilers inspector as required.

1.7. **Record Documents:** Provide in such detail, as is set forth under General and Supplemental Conditions and in Section 15010. **Prior to commencement of any backfilling operations, the Plumbing Contractor must take accurate as-built measurements, including all depths and inverts. Centerline locations alone are insufficient. Definitive measurements must be recorded for each line entering and leaving the building. The location of all buried piping must be shown on the record (as-built) drawings and dimensioned from permanent fixed points. Also, show locations of all dielectric unions and all valve numbers on the record documents.**

1.8. **Buy American:** Manufacturers of all products, materials, equipment, components and systems specified in Division 15 must comply with the Buy American Act and the

American Recovery and Reinvestment Act of 2009 (ARRA) and 2025 Code of Alabama Title 39 - Public Works, Chapter 3 - Use of Domestic Products and Resident Workmen for Public Works, Improvements, Etc.

Exceptions to these requirements will be permitted only where the specified items are proven to be unavailable from domestic U.S. sources. Examples of items that may qualify for exception include variable refrigerant flow (VRF) equipment and certain porcelain plumbing products. Any request for exception must be submitted in writing to the Architect/Engineer for prior approval and must include supporting documentation demonstrating that no suitable domestic product is available. Where three (3) or more U.S. manufacturers can furnish products that meet or exceed the requirements of the Contract Documents, only domestic (U.S. manufactured) products must be provided.

During the submittal phase, the respective manufacturer must provide a conformance letter on the manufacturer's official company letterhead. The letter must be signed by an Officer of the Manufacturer's Board of Directors and must explicitly certify full compliance with the Buy American Act and ARRA. Failure to include this conformance letter with the submittal will result in immediate rejection of the submittal without review.

1.9. **Access Panels and Doors in Finished Areas:** Do not locate serviceable items above inaccessible, hard ceilings or in partitions without written approval from the Architect. Coordinate all items locations with the Architectural plans before installing any items. Furnish access panels and doors to the General Contractor for installation wherever required for access or maintenance to any items including but not limited to valves, controllers, actuators, trap primer assemblies, water hammer arrestors, air vents, cleanouts, etc.

Access panels/doors in finished areas or areas exposed to view must be suitable for wall or ceiling finish involved, 24" x 24" unless otherwise indicated or as required to permit removal of equipment and provide acceptable maintenance access. Access panels and doors must be fire rated where rated assemblies are penetrated.

Access panels and doors must be manufactured by Milcor, Elmdor, Zurn, Mifab or approved equivalent. The Architect must approve the use of and type of all panels and doors to be installed in areas that are exposed to view or in finished areas.

Access panels/doors exposed to view and in finished spaces must be factory cleaned and primed for painting in the field. Colors must be selected by the Architect. Refer to Architectural Section, Painting, for additional information.

For detention and similar institutional type facilities, refer to Section 1122 for type of access panels/doors required.

Refer to Section 15010, Part Access Panels and Doors for additional requirements.

1.10. **Warranty:** Guarantee work as set forth in Section 15010 and Division 1. Guarantee in writing to make good without cost any defects in materials and workmanship for one year following the date of substantial completion of the project as determined by the Architect, unless specified otherwise. Flush valves and faucets must be provided with a complete replacement, including labor and a five year guarantee in the event of failure.

Provide free maintenance and service during the guarantee period. Refer to other parts for additional requirements and extended warranty requirements.

1.11. **Miscellaneous:** Bidders must visit the site and become acquainted with all job conditions that may affect the work shown on the plans. Report to the Architect, prior to bid, any new or existing conditions that require modifications to accomplish the installation of all items. Provide for required adjustments to complete the intent of the work. No consideration will be given after bid opening for alleged misunderstanding regarding new or existing job conditions, utility connections, permits, fees, construction documents, etc.

The Contractor must carefully examine the contract documents during the bidding phase. Any missing information, clarifications, etc. in the contract documents that is required to provide accurate pricing must be brought to the attention of the Architect, **prior to bid date**, so all may be clarified and/or corrected. Failure to identify and resolve any issue prior to bid must require the Contractor to provide said items, complete, without additional cost to the Owner or the Owner's Project Design Professionals, using materials and methods specified by and as directed by the Owner's Design Professionals.

Refer to Section 15010 for additional requirements.

1.12. **Spare Parts:** Manufacturer of any equipment specified must have a wholesale outlet for readily available replacement parts in the nearest major USA city.

1.13. **Electrical Work:** All electric power wiring required for installation of equipment under this Section is specified under the Electrical Division. The Plumbing Contractor must furnish and install all controls and control wiring as specified or required to properly complete the installation. Control conduit is specified under the Electrical Division or shown on electrical drawings; all other control conduit must be provided under this Section of the work.

All control conduit, power wiring, relays, transformers, contactors, etc. which are required and are not shown on the electrical drawings or specified in the Electrical Division of the specifications, must be provided under this Plumbing Section.

Coordinate all requirements with the Electrical Sub-Contractor prior to bid. Electrical work performed under this Section must meet the requirements set forth in the Electrical Division and the National Electric Code (NEC), current edition.

1.14. **Submittals:** Refer to Section 15010 for **strict requirements** and, especially as it applies to format, project cost constraints, addendums and Value Engineering (VE) items. **Only ONE complete submittal will be accepted for review.** Do not submit plumbing fixtures separately without the remaining required plumbing items. Providing submittals piecemeal is not allowed. If a partial or incomplete submittal is provided, it is cause for immediate rejection.

1.15. **Identification:** The Contractor is urged to carefully review the extensive requirements of Part "Identification" in Section 15010 of the specifications and note that certain identification is required to be completed before certain site visits. **There are specific identification requirements prior to the above ceiling and final site visits, respectively, that are mandatory. The State of Alabama Department of Construction Management (DCM) will cancel on-site, the site visit if not**

completed as specified. Failure to comply with this provision will be cause for cancellation of the site visit and a fee imposed for the additional site visit, with all costs of the additional site visit to be borne by the Contractor.

1.16. **Firestopping:** Refer to Section 15010, Part 2, "Miscellaneous Requirements to be Coordinated with Other Trades", Paragraph "Firestopping". **Note that Division 15 firestopping specifications require firestopping of all penetrations regardless of wall/ceiling/floor construction. Refer to Division 1 regarding additional requirements.** Where there is a conflict between Division 1 specifications and Division 15 specifications, the most stringent requirements must govern, are applicable and must be provided.

1.17. **Motors:** All furnished motors must be designed, manufactured and tested in accordance with the current applicable standards of NEMA, ANSI, IEEE and ASTM. As a minimum requirement, all motors must conform to the current applicable sections of NEMA Standard No. MG-1. Motors must meet or exceed The Consortium for Energy Efficiency (CEE) Premium Efficiency full load efficiencies. All motors must be listed under the UL recognized component file as applicable. All motors must be suitable for installation according to the requirements of NEC. Motors must be wound for the specified voltage and a 1.5 service factor, 1750 RPM open drip proof construction unless otherwise shown or specified. Premium efficient motors must be **warranted for 36 months** from the date of substantial completion of the project, as determined by the Architect.

All motors must be provided with overload protection and phase protection on all legs. Do not run motors until correct overload elements are installed in starters, as applicable.

All motors serving outdoor equipment exposed to weather must have TEFC motors meeting the requirements set forth previously.

Motors must be manufactured by Regal Rexnord Corporation, Emerson Electric, Franklin Electric, AMETEK, Inc, Baldor Electric Company/ABB, Nidec Corporation, Siemens AG or ABB Group.

1.18. **Fusing:** Provide factory installed fuses in all equipment requiring fusing for branch circuit protection.

1.19. **Operating and Maintenance Manuals: Two weeks before the final site visit**, furnish three complete sets of operating and maintenance instructions, bound in hard cover, indexed and tabbed.

The Contractor must also provide this information in digital Adobe Acrobat PDF format, on a CD-R CD. The PDF file must be provided with an embedded index for each specified item. The index must appear in the left hand window of the opened document so that the Owner or his maintenance personnel can "click" on the indexed item and move immediately to that specific item.

Minimum requirements for the Operating and Maintenance Manuals must be as follows:

a. The first page of the bound instructions must be a listing of:

1. The Owner/Project Title.
2. The Architect and Architect's Job Number.
3. The Engineer and Engineer's Job Number found in the Engineer's logo in the bottom right corner of the Plumbing Plans and in the footer of this specification section.
4. The General Contractor and Contact Information.
5. The Plumbing Subcontractor and Contact Information.

b. Second page must be a Table of Contents listing all products in the order which appear in the specifications and label the tab accordingly. Include all "P" numbers for fixtures, water heater numbers, valves, floor drains, etc.
c. The third page must be a summary page that lists each item with its respective warranty listed, including all extended warranties.
d. All warranty card information must be filled in by the Plumbing Contractor; Serial numbers, Model Numbers, etc. all as required for proper warranty registration. The warranty registration date must be the date of substantial completion as determined by the Architect.
e. Provide copies of all filled in warranty cards.
f. Provide a local source of supply for parts and replacement, including names and telephone numbers of parts suppliers.
g. Provide a general maintenance summary section. Section must be a list of each piece of equipment or device using the designations as shown on the plans and the routine maintenance procedures based on the respective manufacturer's recommended intervals. As a minimum, maintenance must be grouped and individually tabbed to indicate maintenance operations required:

    1. Once a month
    2. Quarterly
    3. Once every six months
    4. Once a year

h. Provide drawings of system controls and wiring diagrams and condensed operating instructions. Include hard copy in binder and digital copy on CD in PDF format. All components must be numbered and identified on the diagram. Laminate, frame under plastic and mount in each mechanical/water heater room(s) in an optimally viewed location for the respective equipment.
i. Provide written results of all specified tests.
j. Copies of all Site Visit Reports including Contractor's written response that items listed were corrected.
k. Copies of all certificates of all site visits, comments and approvals from all Governing Authorities, to include all Boiler and Pressure Vessel inspections by the Authority Having Jurisdiction, as applicable.
l. Provide domestic water samples testing and results specified.
m. Provide a copy of the valve chart required in Section 15010, Part Identification. Include all dielectric unions on chart.
n. Provide copy of Section 15010 and 15400 Specifications.
o. Provide a copy of all shop drawings/submittals.
p. Provide record drawings of the Plumbing drawings, in hard copy and PDF format on CD. Refer to Section 15010, Part 1, General, Paragraph, Record Drawings for detailed requirements. Prior to commencement of any backfilling operations, the Plumbing Contractor must take accurate as-built measurements, including all depths and inverts. Centerline locations alone are insufficient. Definitive measurements must be recorded for each line entering and leaving the building.

The location of all buried piping must be shown on the record (as-built) drawings and dimensioned from permanent fixed points. Also, show locations of all dielectric unions, cleanouts and all valve numbers on the record documents.

PART 2. TESTS

2.1. **General: Do not test when freezing conditions exist or are anticipated. Test when freezing conditions have subsided.** Perform all tests in the presence of the Architect. Refer to Division One for Fuel, water and power required, therefore. In absence of specific testing procedure comply with code requirements and/or nationally acceptable industry standards. Furnish written reports of all tests results specified to Architect.

Once the tests are conducted as specified below, seal any leaks discovered and then repeat the testing process until all tests are successfully completed and the systems are fully verified.

2.2. **Drainage and Vent System Pretest: Do not test PVC or any non-metallic piping with compressed air.** A water test must be applied to the drainage system in its entirety. All openings in the pipe must be tightly closed and sealed airtight with cast iron or PVC caps as applicable for the pipe installed, except the highest opening. Then, the system must be filled with water to the point of overflow.

If the system is tested in sections, each opening must be tightly closed and sealed airtight with PVC or cast iron caps as applicable for the pipe installed, except the highest openings of the section under test. Each section must then be filled with water. Sections must not be tested with less than a 10-foot head of water. In testing successive sections, not less than the upper 10 feet of the next preceding section must be tested so that no joint or pipe in the building, except the uppermost 10 feet of the system, must have been submitted to a test of less than a 10-foot head of water.

Test pressure must be held for not less than 8 hours. Check all portions for leaks. Correct all leaks and retest. The system must then be tight at all points.

Do not test when freezing conditions exist or are anticipated. Test when freezing conditions have subsided.

2.3. **Drainage and Vent System Final Test: Do not test PVC or any non-metallic piping with compressed air.** A smoke test must be utilized as a final test. It must be made by filling all traps with water and then introducing into the entire system a pungent, thick smoke produced by one or more smoke machines as required to achieve the specified pressure. **Do not test when freezing conditions exist or are anticipated. Test when freezing conditions have subsided.**

When the smoke appears at stack openings on the roof, the stack openings must be sealed airtight with PVC or cast iron caps and a pressure equivalent to a 1-inch water column must be held for a test period of not less than 8-hours. Check all piping visually for smoke leakage and odors and correct all leaks.

The final test of the completed drainage and vent systems must be visual and in sufficient detail to determine compliance with the provisions of the International Plumbing Code.

2.4. **Water Supply System Test:** Test and secure acceptance of entire system before the piping is insulated or otherwise concealed. **Do not test when freezing conditions exist or are anticipated. Test when freezing conditions have subsided.**

Disconnect and cap all outlets to all plumbing fixtures and all other equipment not designed for the full test pressure. Fill the system with water and prove tight under a water pressure not less than the working pressure of the system; or, for piping systems other than plastic, by an air test of not less than 50 psi. This pressure must be held for not less than 10 hours without a loss of pressure.

The water utilized for the test must be obtained from a clean potable source of supply. All piping throughout must be airtight under test. Water piping must remain under normal water pressure during construction except when freezing weather is expected.

2.5. **Natural Gas Piping System:** Test before equipment, appliances, etc. are connected. The test pressure to be used must be not less than 1-1/2 times (1.5x) the proposed maximum working pressure, but not less than 3 psig, irrespective of design pressure.

Where the test pressure exceeds 125 psig, the test pressure must not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe. The test duration must be not less than 1/2 hour for each 500 cubic feet of pipe volume or fraction thereof.

When testing a system having a volume of less than 10 cubic feet, the test duration must be not less than 8 hours and no more than 24 hours. The piping system must withstand the test pressure specified without showing any evidence of leakage or other defects.

The leakage must be located by means of an approved gas detector or a noncorrosive leak detection fluid. Where leakage or other defects are located, the affected portion of the piping system must be repaired or replaced and retested. The purging of piping systems must be in accordance with the provisions of IFGC 2021, Sections 406.7.1.1 through 406.7.1.4.

2.6. **Fixtures:** Test for soundness, stability of support and satisfactory operation.

PART 3. SANITARY PIPING

3.1. **General Scope:** Provide a system of soil, waste and vent piping connecting all plumbing fixtures, equipment, etc. to the house sewer, with consolidated vent connections extending through the building roof, all as shown on the drawings and as required for complete installation. All piping must be concealed below grade, within walls, chases, above ceilings, etc., unless specifically noted otherwise. Waste and vent piping must be sloped in accordance with the applicable codes.

The Plumbing Contractor is responsible for and must consider pipe-grading requirements when coordinating pipe routing for the project. The Contractor must determine inverts/connection points in the field based on the shop drawings of the sanitary system submitted. Coordination is required with the Civil Contractor before proceeding.

Note that IPC 704.1 requires all drainage piping upstream of a grease interceptor to be sloped at 1/4" per foot (2% slope).

Do not begin work until the elevation of the final connection point is verified and grading of entire system can be determined (even if final connection is specified under another Section.)

Do not route the sewer line in the same trench as the domestic water line. Maintain a minimum of six (6) feet of separation between the two utilities.

Each pipe length and each pipe fitting, trap, fixture, material and device utilized in the plumbing system must bear the identification of the manufacturer and any markings required by the applicable referenced standards.

Rework existing waste roughing as required to facilitate renovation work as applicable.

3.2. **Utility Connection:** Utility connection is specified under Division 2. Connect to temporarily capped main as indicated on the plumbing plans.

3.3. **Utility Connection:** Arrange with local authorities to make connection to the city sewer main as indicated and pay all costs.

3.3. **Soil, Waste and Vent Piping Underground, Inside the Building Walls, All Piping Associated with a Grease Trap, Commercial Dishwasher, Steam Kettles, Commercial Washer/Extractor, Any Equipment or Item Whose Discharge Into the Sanitary System is Greater than 125°F and to Points Outside the Building as Indicated:** Provide service weight hub-and spigot cast iron soil pipe and fittings for underground service and hubless for above ground service, meeting ASTM A-74 for hub and spigot and ASTM A-888 for hubless, coated inside and out. The pipe exposed within the building must be uncoated outside, primed and left clean for painting. Fittings to receive screwed pipe arms must be recessed drainage type. Soil and waste pipe must have long sweeping connections. All cast iron soil pipe and fittings must be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

Joints for hubless pipe and fittings must be equivalent to MG couplings meeting ASTM A-48 and ASTM C-564, or Anaco Husky SD 4000, super-duty, shielded couplings of Type 304 AISI stainless steel, meeting ASTM C1540 and Factory Mutual 1680, Class 1 and vulcanized virgin compound in which the primary elastomer is neoprene conforming to ASTM C-564. Equivalent by Ideal Tridon Heavy Duty HD (Green) or Charlotte Pipe Heavy Duty HD (Green) are acceptable.

Cast iron pipe serving kitchens must be manufactured in USA, pH resistant, epoxy coated piping consisting of reamed interior surface prior to coating, ASTM C564 rubber gaskets (hub & spigot piping), zinc phosphate pretreatment layer, high performance cathodic epoxy coating (both pipe and fittings). Coating Performance: Pipe and Fitting Coatings must pass the following performance specifications per EN 877:

a. 350 hours of salt spray testing
b. Resistance to wastewater for 30 days at 73°F
c. Chemical resistance from pH 2 to pH 12 for 30 days at 73°F
d. Resistance to hot water for 24 hours at 203°F

Kitchen waste pipe and fittings shall be equal to Charlotte Pipe “Edge”, Tyler Pipe’s DuRa Pipe or pre-approved equivalent.

Option: Contractor may use solid wall PVC Schedule 40 DWV pipe and fittings meeting ASTM Standard D2665 and ASTM Standard D1785 for above ground service and underground service with the following exceptions. Use cast iron as specified hereinbefore or PVDF (Polyvinylidene Fluoride) piping and fittings in areas used as return air plenums, return air platforms, commercial dishwasher, steam kettles, areas shown on the plans and any equipment or item whose discharge into the sanitary system is greater than 125°F and when passing through or within a fire rated assembly.

Piping and fittings above and below the floor must be solid wall PVC Schedule 40 DWV pipe and fittings, cast iron pipe and fittings as specified above or PVDF pipe and fittings as specified below and with exceptions as noted.

THE USE OF “CELLCORE” OR “FOAMCORE” TYPE PIPING IS EXPRESSLY FORBIDDEN.

PVDF piping and fittings, where specified and required, must be Orion Super Blue PVDF (Polyvinylidene Fluoride) or equivalent products manufactured by Enfield, Zurn, GEO or Fisher. The PVDF material must conform to ASTM D3222 ASTM F1673, ASTM E-84 and UL 723. Pipe must be marked with its UL Classification to indicate compliance with UL723 (ASTM E84). All fittings must meet or exceed Schedule 40 dimensions.

All vents through roof, regardless of type provided, must be cast iron pipe (minimum 10” both sides of the roof). Secure the cast iron VTR to structure with heavy gauge 1-hole strap. **THE CAST IRON PIPING THROUGH THE ROOF DOES NOT APPLY TO GAS FIRED APPLIANCES.** Vents through the roof for gas appliances must be as specified for the appliance in its respective specification section.

All floor drains and hub drains must have Zurn Z1000, or equivalent by other specified manufacturers, cast iron deep seal p-trap with trap primer and required connections.

3.4. **Laying Out Work:** Vents from any fixture, when connected to a vent line serving other fixtures, must be extended at least 6 inches above flood level rim of highest of such fixtures to prevent use of vent lines as a waste. Make changes in direction by appropriate use of 45-degree Y's, 1/2 Y's, or long sweeping 1/4, 1/6, 1/8 or 1/16 bends. Sanitary T's or short 1/4 bends may be used on vertical stacks or drainage lines where change in direction of flow is from horizontal to vertical; except that long-radiused, double TY's must be used when two fixtures are installed back-to-back with common drain. Do not use double sanitary Tees. Straight Tees, Ells and Crosses may be used on vent lines. Make no change in direction of flow greater than 90 degrees. Where different sizes of drainage pipe or fittings are connected, use standard increasers and reducers of proper size. Do not reduce the size of drainage piping in direction of flow. Drilling and tapping of house drains, soil, waste or vent pipes and use of saddle hubs and bands are prohibited. Route all vent lines high as possible while maintaining proper slope. All plumbing vents **through the roof, regardless of type provided and EXCEPT FOR NATURAL GAS FIRED EQUIPMENT VENTS, must be cast iron and located a minimum of 10’-0” away from all outside air intakes**. Coordinate all plumbing vent locations with the HVAC plans prior to routing vent piping through the

roof.

3.5. **Protection of Physical Damage for Piping:** In concealed locations where piping is installed through holes or notches in studs, joists, rafters or similar type members, the pipe must be protected by shield plates and plastic grommets. Protective steel shield plates having a minimum thickness of 0.0575 inch (16 gage) must cover the area of the pipe where the member is notched, drilled or bored and must extend not less than 2 inches above sole plates and below top plates.

3.6. **Grading:** Uniform and not less than 1/8" PLF for pipe 3" and over and not less than 1/4" PLF for piping less than 3".

3.7. **Grease Piping Grading:** Note that IPC 704.1 requires all drainage piping upstream of a grease interceptor to be sloped at 1/4" per foot (2% slope).

3.8. **Hangers and Supports:** Refer to Section 15010, Part Piping and Supports below and plan details for requirements.

3.9. **Roof Flashing:** Roof penetrations are to be flashed by the roofing Contractor, using materials as recommended by the roofing manufacturer and approved by the Architect. Roof penetrations of existing roofs must be provided by the roofing Contractor that holds the warranty of the existing roof. Coordinate work with Roofing Contractor. Offset vents as required to clear gravel guards and flashing courses. Extend vents to 10" above roof level.

3.10. **Waste Arms:** Type K copper or IPS brass pipe typical. Alloy steel or IPS brass pipe at urinals.

3.11. **Escutcheons:** Where pipes pass through cabinets, walls and ceilings of finished rooms provide one-piece, cast-brass type with polished, chrome-plated finish and setscrew fastener or stainless steel type securely fastened in place. Pack penetrations with mineral wool insulation, seal with firestopping compound and install escutcheons to prevent passage of fire, smoke and vermin. Do not use split ring type escutcheons.

3.12. **Test Fittings:** Not shown on the drawings. Provide where required for partial tests.

PART 4. DRAINAGE SPECIALTIES

4.1. **Manufacturers:** Except as noted, catalog numbers are from J.R. Smith and/or Zurn. Equivalents by Josam, Sioux Chief or MIFAB will be considered.

4.2. **Cleanouts:** Provide in sanitary piping at all changes in direction, at ends of branches, at intervals not exceeding 40 feet on straight runs and elsewhere as shown. Cleanouts must be fully opening type and completely accessible without obstruction. Size same as lines in which they occur, but not larger than 4 inches. Tees and extensions must be of same weight as soil pipe. Plugs must be countersunk or raised head type with lead-free seals. Coordinate with plan details and specifications and provide as required. Provide flashing clamps and flashing flanges in all areas where cleanouts are accessible from floor below or above, as applicable. All cleanouts must be with bronze plugs and cover as shown on the plan details and specified below, regardless of pipe type provided (cast iron or PVC).

Extreme care must be taken when roughing in cleanouts in each wall mounted lavatory and hand sink. Cleanouts must be located within the specified Lav Shield piping cover when possible. All cleanouts must be roughed in high enough to clear the Architectural base molding without cutting the base molding.

All cleanouts must be indicated on the record/as-built drawings.

In Tile Floors: J.R. Smith 4052L, Zurn Model ZN1400-T-BP, adjustable, cast iron body with bronze plug and satin finished square scoriated nickel bronze top. Where soft tile occurs, provide 4172L, Zurn ZN1400-TX-BP, recessed square nickel bronze cover.

In Concrete Floors: J.R. Smith 4238L, Zurn Model Z1400-BP, adjustable head, cast iron head and ferrule with bronze plug, round loose-set scoriated tractor cover.

In Outside Lines: J.R. Smith 4262L-NB, Zurn Model Z1474-N-BP, cast iron head and ferrule with bronze plug. Terminate cleanout within 8” of finish grade at grade in 18”x18”x12” deep concrete pad with tooled edges or flush in pavement as applicable. Provide with loose set scoriated bronze tractor cover as shown on the plan details.

In Accessible Unfinished Spaces: J.R. Smith 4400 or 4511-S, Zurn Model ZS1468, cast iron with bronze plug, as appropriate.

In Finished Walls: J.R. Smith 4530S, Zurn Model Z1446-BP cast iron cleanout tee with bronze plug and 16 ga., 304 stainless steel, flat, wall plate cover. Where distance from plug to finish wall exceeds 4 inches provide extension from sanitary tee to bring plug within 2 inches of the stainless steel cleanout cover. rough in all wall cleanouts such that stainless steel cover occurs above the Architectural base. Do not cut Architectural base.

In Terrazzo Floors: J.R. Smith 4192L, Zurn Model ZN1400-Z-BP, adjustable cast iron head and ferrule, bronze plug and round nickel bronze cover and rim.

In Carpeted Floors: J.R. Smith 4032L-X, Zurn Model ZN1400-CM-BP, adjustable head, cast iron, round polished bronze top with carpet clamping device.

4.3. **Typical Drains:** Size outlets same as pipe to which they connect. Install temporary closures during construction. **Each drain connected to sanitary sewer must have Zurn Z1000 or equivalent by other specified manufacturers, cast iron deep seal p-trap with trap primer and required connections.** Provide trap primer connections on all floor drains as specified.

Where drains occur above finished spaces, furnish with clamping collar to secure waterproof membrane.

Floor Drain (FD): J.R. Smith Series 2005B-05, Zurn Models ZN415-5S-P, J.R. Smith 2005B-06, ZN415-6S-P, J.R. Smith 2005B-08, ZN415-8S-P (as required) two-piece cast iron drains with gasketed outlet and adjustable nickel bronze strainer and rim. Strainer tops for 2" drains 5" x 5" (ZN415-5S-P), for 3" drains 6" x 6" (ZN415-6S-P), for 4" drains 8" x 8" (ZN415-8S-P). Provide PO5 trap primer connection as indicated on the plans.

Mechanical Room Drain (MFD): J.R. Smith Series 2005, Zurn Model Z541 with trap primer connection, cast iron body drain with adjustable strainer head, gasketed outlet, P05 trap primer connection, sediment bucket and cast-iron grate.

Hub Drain (HD): Provide hub drains of the size(s) shown on the drawings. Each drain must include a hub inlet and trap primer to maintain the water seal in the associated P-trap. PVC hub drains must be Schedule 40 solid wall PVC (no foam/cellular core) conforming to ASTM D1785 and ASTM D2665 as specified.

Where hub drains are located in a return air plenum or pass through a return air platform, they must be cast iron and insulated with 1" thickness Armaflex as specified in Part Piping Insulation. **PVC is not allowed in a return air plenum or return air platform.** Cast Iron must be as specified hereinbefore.

Dishwasher / 2 & 3 Compartment Sink Floor Sink (KFS): J.R. Smith No. 3200, Zurn Series ZN1926, with 3/4 nickel bronze strainer clamp, grid and rim, aluminum dome strainer, clamp and acid-resistant porcelain enamel interior finish. Provide deep seal cast iron p-trap and open portion of grate as required for number of discharge pipes. Grate and sink lip must be flush in finish floor to avoid tripping hazard.

Kitchen Area Floor Sink (FS): J.R. Series 3120, Zurn ZN1901, with nickel bronze strainer clamp, grid and rim, aluminum dome, acid-resisting enameled inside finish. Provide 3/4 grate for sinks receiving single waste and no grate when under equipment. Provide deep seal cast iron p-trap. Floor sink lip and grate must be flush in finished floor to avoid tripping hazard.

Kitchen Area Floor Drains (KFD): J.R. Smith Series 3100, Zurn ZN1910 with nickel bronze top flush in finish floor, aluminum dome strainer, acid-resisting porcelain enamel finish inside and clamp. **All floor drains must have cast iron deep seal p-traps.**

Area Drain (AD): J.R. Smith Series 2250L, Zurn Model Z545-87 cast iron drain with gasketed outlet, sediment bucket and cast iron grate.

PART 5. WATER PIPING

6.1. **General Scope:** Connect to water main as indicated and extend to all plumbing fixtures, wall hydrants, trap primers, water heaters, ice machines, etc.; and to special equipment and all other plumbing items as indicated or required.

Piping systems must be sloped to drain points. Drain points are not shown on the plans. They must be determined in the field based on the actual system installed. The Contractor must grade pipe upward from source to facilitate drainage and air relief.

Where low points are required because of long runs or where sections may be valved off, provide with 3/4" globe valve and hose nipple for drainage at low point.

All piping must be concealed below grade, within walls, chases, above ceilings, etc., unless specifically noted otherwise.

Refer to Section 15010 for hanger rods, hangers, spacing, firestopping, sleeves, uni-strut support assembly, etc., requirements.

6.2. **General Workmanship:** Cut water piping accurately to measurements established at site and work into place without springing or forcing, clearing all openings, finished ceilings, etc.

All piping not in an accessible attic or similar spaces that contain valves and other items which may require maintenance or service access must be located no more than 12” above the finished ceiling. Piping located in attics must be supported such that maintenance access can be accomplished without the use of a ladder.

In finished spaces where water piping is exposed to view, route piping high as possible. Where valves or other items requiring service or maintenance are shown in piping of finished areas and exposed to view, the piping must be installed high as possible, except where a valve or other item requiring maintenance and service is shown in the line, the item must be no more than 14’-0” above the finish floor. Provide a drop, offset, etc., as required to maintain maximum service height of 14’-0” above the finished floor.

Route all piping through previously built-in sleeves/firestopping assembly as specified in Section 15010. Avoid excessive cutting or other weakening of the building structure. Make changes in direction and size with fittings. Cap or plug open pipe ends during installation to keep out foreign material. Make connections carefully to ensure unrestricted flow, eliminate air pockets and to permit complete drainage of the systems.

Supply piping to fixtures, faucets, hydrants and flush valves must be anchored to prevent movement.

Install all buried piping with at least 36" of earth cover. Do not route the water line in the same trench with the sewer/sanitary piping. Maintain a minimum of six (6) feet of separation between the two utilities.

Uninsulated pipes passing through concrete or cinder block walls and floors, or other corrosive material must be protected against external corrosion by a protective sheathing or wrapping that will withstand any reaction from the lime and acid of concrete, cinder block or other corrosive material. Sheathing or wrapping must allow for movement including expansion and contraction of piping. The wall thickness of the sheathing material must be not less than 0.125 inch thickness. The protective wrapping/sheathing is not an alternative where sleeves are specified and required. Coordinate requirement with Section 15010 sleeves/firestopping specifications and provide as specified.

All piping below slab-on-grade construction must be installed in plastic jacket equivalent to Plasti-Sleeve, as manufactured by Plastic Products Co. of Stanton, California.

6.3. **Protection of Physical Damage for Piping:** In concealed locations where piping is installed through holes or notches in studs, joists, rafters or similar type members, the pipe must be protected by shield plates and plastic grommets. Protective steel shield plates having a minimum thickness of 0.0575 inch (16 gage) must cover the area of the pipe where the member is notched, drilled or bored and must extend not less than 2 inches above sole plates and below top plates.

6.4. **<u>Freeze Protection</u>: Do not install piping or any device in spaces subject to freezing.** All water piping must be routed within the building insulation envelope unless specifically noted otherwise. Route all overhead water piping and water piping within masonry and non-masonry walls within the building insulation envelope.

All overhead piping must be located between the architectural air barrier at the bottom of the structure and the finished ceiling. Do not route overhead piping in the attic where it can be located between the architectural air barrier and the finished ceiling.

All water piping shown to be located in exterior perimeter masonry walls must be insulated before being routed within the cells of the masonry block. If block is to be cut to allow for the installation of the insulated piping it must be in strict accordance with the procedures required by the Structural Engineer and the Architect. **Do not allow masonry block cells that contain water piping to be filled with concrete.**

Piping located in exterior stud walls must be located on the warm side of the insulation.

6.5. **<u>Water Piping Insulation:</u>** Refer to Part Pipe Insulation for requirements.

6.6. **<u>Grading</u>:** The Contractor must consider pipe-grading requirements when coordinating pipe routing for the project. All piping must be carefully installed to eliminate traps and pockets in pressurized lines. Where air pockets and traps cannot be avoided, provide valved hose connections for water traps and valved automatic air vents for air traps. The pipe slope must be maintained throughout the project.

Pressurized plumbing piping systems must be sloped to drain points. Drain points are not shown on the plans. They must be determined in the field based on the actual system installed. The Contractor must grade pipe upward from source to facilitate drainage and air relief. Where low points are required because of long runs or where sections may be valved off, provide with 3/4" globe valve and hose nipple for drainage at low point. **Make all connections to risers and fixtures from top or sides of mains. Do not make take-offs from bottom of mains.**

6.7. **<u>Nipples</u>:** Of same material as pipe in which they are installed. Provide extra strength when unthreaded portion is less than 1 inch long. Steel nipples are not allowed.

6.8. **<u>Escutcheons:</u>** Where pipes pass through cabinets, walls and ceilings of finished rooms provide one-piece, cast-brass type with polished, chrome-plated finish and setscrew fastener or stainless steel type securely fastened in place. Pack penetrations with mineral wool insulation, seal with firestopping compound and install escutcheons to prevent passage of fire, smoke and vermin. Do not use split ring type escutcheons.

6.9. **<u>Piping and Fittings</u>: ProPress or similar type joints and fittings are not allowed.** Typical lines to be of copper tubing meeting ASTM B-88, Type L hard above ground and Type K soft below ground. Cut copper pipe square and ream to remove burrs. Clean fitting socket and pipe ends with sand cloth, No. 00 cleaning pads or wire brush. No acids must be used to clean either pipe or fittings or as a flux in sweating joints. Make up joints with sweat fittings of wrought copper and 0.25% of the total wetted surface area, lead free compliant solder complying with ASTM B-32 and the

Safe Drinking Water Act. Surfaces must be prepared for soldering as required by ASTM B828. Do not make joints or branch connections below a slab on grade.

6.10. **Hangers and Supports:** Refer to Section 15010, this Section 15400 and plan details for requirements.

6.11. **House Supply Connection:** Utility connection at street, meter installation, etc. is specified under Division 2. Connect to temporarily capped main as indicated. Where shut-off valve is indicated outdoors on the plumbing plans, provide a concrete or steel valve box with hinged medium duty, traffic rated cover, minimum 16x16, larger as required for proper access to valve. Provide valve extension as required so that top of valve handle is within 8" of top of hinged cover.

6.12. **Water Pressure:** Supply system is designed for static pressure of 50 to 75 psi. Gauge the city water supply adjacent to building to verify that pressure is within those limits. Submit report in writing. Provide a water pressure reducing valve, if required, to meet designed water pressure. See Water Piping Specialties for pressure reducing valve specification.

6.13. **Disinfection:** New potable water systems must be purged of deleterious matter and disinfected prior to utilization. The method to be followed must be as prescribed by the health authority or water purveyor having jurisdiction or, in the absence of a prescribed method, the procedure described in AWWA C651 or as described in this section below.

The potable water piping system must be flushed with clean, potable water until dirty water does not appear at the points of the outlet. The system or part thereof must be filled with a water/chlorine solution containing not less than 50 parts per million of chlorine and the system or part thereof must be valved off and allowed to stand for 24 hours; or the system or part thereof must be filled with a water/chlorine solution containing not less than 200 parts per million of chlorine and allowed to stand for 3 hours. Following the required standing time, the system must be flushed with clean potable water until the chlorine is purged from the system.

Upon completion of the disinfection procedure, the Plumbing Contractor must engage the services of the Alabama Department of Public Health Clinical Laboratories or a certified, licensed, testing laboratory to provide a lead and bacteriological water analysis to include a standard heterotrophic plate count (HPC), microbial, bacterial, pathogens and coliform count.

Test a minimum of two (2) samples of domestic water from two (2) separate locations within the facility. Where the project has multiple buildings, the requirement must be two (2) samples for EACH building. If multiple buildings are finalized and turned over for the Owner's use and tested portion of the system is interrupted to plumb in remaining buildings, all water must be re-tested after each building release.

In addition to the two (2) locations required for testing, the supply line serving a food cleaning area sink must also be tested, thereby requiring a total of three (3) test locations.

Test locations must be selected by the Architect and must be noted on the Testing Laboratory's report. Test each sample for Coliform Present, Fecal Present, E. Coli and lead present.

If the test results for any building or portion thereof indicates positive results for Total, Fecal, or E. Coli coliform per 100 ml respectively, or an HPC greater than 500 CFU/mL, or lead maximum contaminant level goal (MCLG) greater than zero, the Contractor must disinfect the system in its entirety, as specified above and obtain new test results as outlined hereinbefore until levels are reached as required by AWWA C651. If maximum contaminant level goal (MCLG) of lead is greater than zero, immediately notify the Architect in writing and furnish copy of test results.

Prior to the final site visit, the Contractor must provide to the Architect the certified test results on the testing facility letterhead. The report must indicate the name of the project, the locations from where the samples were taken, the testing laboratory findings and written indication whether the water is safe for consumption. **No Certificate of Occupancy will be provided to the Owner without the required lab results indicating the potable water system is safe for consumption.**

6.14. **System Drainage:** Provide valves and hose nipple to allow for drainage of all risers and other system low points.

PART 7. WATER PIPING SPECIALTIES

7.1. **General:** All specialties in potable water distribution must be certified for lead free compliant design as required by Code, Regulations and Standards.

All specialties/valves must be bronze or heat-treated DZR, CW511L brass, lead free compliant, AB 1953 compliant, NSF/ANSI 61 compliant and must be the product of one American Manufacturer and must meet the Buy American Act 41, USC 10a-10d as specified hereinbefore. Valves must have MSS SP-25, MSS SP-80 listings as applicable. Provide extended operators for all valves installed in insulated piping. Seal the opening where the stem, nipple, etc., penetrates the insulation as required to maintain the continuity of the insulation and vapor barrier.

All valves must be identified. Refer to Section 15010, Part Identification Requirements. Provide a custom laser engraved brass valve tag at each valve. Tag must be 1-1/2 inches diameter, 18-gauge polished brass tags with 3/16-inch chain hole and 1/4 inch high stamped, black-filled service designation. Number tags in sequence, starting with number 1; prefix the number with “P” for plumbing items. After numbering plumbing valves, also indicate valve numbers on the record/as-built drawings. Refer to Section 15010, Part Identification for detailed requirements and provide all as specified.

Valves must be Nibco, Jomar, Watts, Apollo, Kitz, Hammond/Milwaukee, Matco-Norca or Mueller. Nibco and Jomar units are the basis of design unless specified otherwise.

7.2. **Unions:** 150 psi rated; WOG pattern, cast brass ground-joint type in copper pipe. Unions in steel pipe must be malleable iron, WOG female pattern brass seat, ground joint, 150 psi type. Provide in all sizes of threaded pipe and in sweat-jointed pipe over 1 inch, to facilitate easy repairs. In such lines, install at all inlets and outlets of all devices and equipment, adjacent to water heaters, pumps, tanks, etc. into which piping is terminated; and on each side of valves, cocks, strainers, etc. and other devices that occur in piping runs.

7.3. **Dielectric Unions:** Provide dielectric unions between ferrous and non-ferrous piping as required, including piping and water heater stubs where different and stainless-steel water hammer arrestors. Dielectric unions must be constructed using lead free compliant materials as required by all Governmental Agencies, Codes and Standards and must comply with ASTM 1545. Dielectric unions must be Watts Series LF or equivalent by Mueller or Matco Norca. Where dielectric unions are installed, they must be provided with factory fabricated brass tag. 1-1/2 inches diameter, 18-gauge polished brass tags with 3/16-inch chain hole and 1/4 inch high stamped, black-filled service designation. Indicate valve tags on the record drawings. **Contractor must provide a ball valve on the respective piping containing the union as required to allow for proper maintenance of the union.**

7.4. **Valves and Valve Extensions/Standoffs:** Provide as specified, including all fixtures or equipment not furnished with stops. Arrange and install valves to be readily accessible for servicing. All valves must be bronze or heat-treated CW511L brass, lead free compliant, AB 1953 compliant and must be the product of one American Manufacturer and must meet the Buy American Act 41, USC 10a-10d as specified hereinbefore. Nibco and Jomar units are basis of design.

All valves require extensions/standoffs, regardless of the situation. Provide minimum of 2" height extension, higher as required by the insulation thickness. All handles must comply with UL 2043 and must be UL listed for installation in return air plenums. Valve extensions must be provided by the valve manufacturer and must have blowout-proof stems. Valve extensions must be Matco-Norca (for Matco-Norca valves) P759EXT, Nibco Series RG (for Nibco valves) or similar type extensions for the other specified valve manufacturers and constructed of all brass or stainless steel.

7.5. **Globe Valves:** Nibco T-235-LF, threaded, bronze type with replaceable disc, 150 WSP.

7.6. **Check Valves:** Y-pattern swing type, threaded (ANSI B1.20.1), all lead-free bronze body, rated 300 WOG / Class 150 WSP, manufactured in accordance with MSS SP-80 and certified to NSF/ANSI 61 and NSF/ANSI 372 and must be Jomar T-511G, NIBCO T-413-Y-LF or approved equivalent.

7.7. **Ball Valves:** Valves must be Jomar T or S-200CSSG EH, Nibco T or S-585-70-LF or equivalent, cast bronze, ASTM B584 Alloy C84400, two-piece, full-port chrome plated ASTM B124 Alloy C37700 or ASTM B16 Alloy C36000 ball material with threaded or soldered/sweated construction, RPTFE seats, silicon bronze ASTM B371 Alloy C69300 or ASTM B99 Alloy C65100, 600 psi CWP rating, 150 psi SWP, minimum 350°F temperature rating and 2" minimum valve extension to bring valve handle beyond insulation. Valves must comply with NSF/ANSI 61/372-8, ANSI Z1157 and Standard MSS SP-110.

7.8. **Strainers:** Watts Series LF77SI, lead free, Wye-Pattern, 125 WSP, 400 psi WOG, sediment separators with a 20-mesh, 304 stainless-steel screens.

7.9. **Exterior Wall Hydrants (WH):** Encased, Ecolotrol, lead-free compliant, non-freeze automatic draining wall hydrant for flush installation. Hydrant must have integral backflow preventer with anti-siphon type, copper casing, all-bronze interior components with 1/2 turn long-life ceramic disc cartridge, combination 3/4" female

solder and 3/4" male pipe thread inlet connection, 3/4" male hose connection', with type 304 stainless steel housing with locking hinged cover stamped "WATER" and operating key. Hydrant housing must fit within one standard modular masonry course. Install approximately 32 inches above finished grade.

Provide one extra stock spare hydrant repair kit and one extra stock spare cartridge removal tool for EACH wall hydrant.

Seal all interior joints, seams, gasket seams/closures including around the hydrant box flange with an appropriate sealant recommended by a sealant manufacturer. Wall hydrant must be JR Smith 5519 QT, Zurn Z1320XL-EZ or approved equivalent by Woodford.

7.10. **Water Hammer Arrestors (Shock Absorbers):** Certified by the American Society of Sanitary Engineers and in compliance with current edition of ASSE 1010, ANSI A112.26.1M, Plumbing and Drainage Institute Standard PDI-WH201, heavy-duty construction and designed for a minimum 150-PSI working pressure. Arrestors must consist of a Type 304 stainless steel casing and piston. The device must be pre-charged and sealed at the factory. Install on both hot and cold water branch lines in an upright position as close as possible to the valve or valves being served.

Arrestors must be installed at all solenoids, remote operated or quick closing valves and at each electric water cooler, each plumbing fixture or battery of plumbing fixtures. Type, location and size must be as recommended by the arrestor Manufacturer. Plumbing Contractor must provide a dielectric union at connection of this device to the copper water piping.

Arrestors must be Zurn Z1700, J.R. Smith Hydrotrol Series 5005-5050, Watts Series SS, Sioux Chief Series 660-G2B or MIFAB Series WHB.

7.11. **Automatic Trap Primer Units Where Water Closets Occur:** Trap primers must comply with the International Plumbing Code and local codes and must be served from the water closet flush valve tube assembly as shown on the plans. Provide trap primer line from flush tube to each floor drain, hub drain, etc. as shown, specified or required by Code. Water saver type trap primers that attach to lavatory p-traps or any other type of assemblies that use grey water are not allowed.

Trap primers must be Sloan VBF-72-A1, Zurn P6000-TPO or equivalent.

7.12. **Pressure-Reducing Valve and Strainer:** Verify water pressure at site prior to ordering. Device may not be required. If required, provide Zurn/Wilkins 500XL-YSBR or equivalent to Apollo or Watts. Provide full size valved bypass around PRV, two pressure gauges, a hose bibb, valve and union on each side of PRV. Provide if required to meet designed water pressure (not to exceed 70 psi).

PART 8. PIPE HANGERS AND SUPPORTS

8.1. **General: "Sammy" bolts are prohibited.** Refer to Section 15010, this Section 15400, plan details and Pipe Insulation requirements below.

8.2. **Coatings and Finishes:** Pipe hangers, Unistrut pipe supports and Unistrut support assemblies of galvanized, zinc and similarly coated items are considered to **NOT** be

coated. All must be painted, powder coated, epoxy coated or plastic coated. Hanger rods and associated bolts and clamps on Unistrut assemblies are not required to be painted or coated.

All damaged or rusted steel pipe, all uncoated cast iron pipe and all hangers, Unistrut and other support assemblies, must be cleaned, primed and painted with two coats of compatible black enamel paint as specified below. Any rusted items must have the rust removed, then etched and primed for painting as recommended by the respective manufacturer. After prepping the surfaces, then paint with two coats of compatible black, rustproof enamel paint. Do not use spray paint.

All paint and coatings must have a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84. See specification section, Part "Identification" for detailed requirements.

In lieu of painted surfaces as specified hereinbefore, the Contractor may provide factory fabricated hangers and Unistrut assemblies with rust resistant powder coating, epoxy coating or plastic coating. All paints/coatings/finishes must meet or exceed a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84.

PART 9. NATURAL GAS DISTRIBUTION SYSTEM

9.1. **General Scope:** Make house supply connection as indicated and extend to all gas fired equipment as well as other locations shown. Refer to Section 15010, Part Identification and this Part for identification of gas piping and painting. Refer to Section 15010 for support requirements.

9.2. **Utility Connection:** Arrange with the local Gas Company for service, with meter and regulator to be located as shown on the plans. Meter and all piping upstream of meter/regulator by Gas Company. Verify gas company pressure that is available at the site and provide meter/regulator assembly as required. Pay for all costs in connection with the installation. Provide main cut-off valve and a dielectric insulating union in service lines to building.

9.3. **General Installation:** Any damaged gas piping, fittings, etc., must be replaced. Installation must be in accordance with the local gas code, requirements of the local utility company, AGA, International Fuel Gas Code and NFPA Standard 54. Brazed or welded joints and fittings must be provided as specified. **Flare joint/fittings and press type joint/fittings systems are forbidden and must not be used.**

Cut the pipe accurately to measurements established at site and work into place without springing or forcing. Avoid running through solid walls or floors. Route through previously built in sleeves/firestopping assembly and avoid excessive cutting or other weakening of the structure. Ream all pipes to remove burrs. Make changes in direction and size with fittings. **Make take-offs from top or sides of mains, not from bottoms**. Cap or plug open pipe ends during installation to keep out foreign material. Lay out and grade work (1/4” in 15 feet min.) to avoid trapped lines, where unavoidable provide 4-inch drip leg with removable cap at low point. Provide complete system testing per NFPA 54. Provide combination stop valve and insulating union at each point piping drops to underground or rises above grade from underground.

Gas piping must enter and exit the installation at a point above grade. When passing through an outside wall, the piping must also be protected against corrosion by coating or wrapping with an inert material. The annular space between the pipe and the wall must be sealed air and watertight. See below for required mechanical sleeve seal.

Piping installed outdoors must be elevated not less than 4 inches above the ground and as required for proper maintenance and access to the dirt leg.

Piping installed above ground and outdoors must be securely supported and located where it will be protected from physical damage.

Where gas piping is located within a framing member and is less than 2 inches from the framing member face to which wall, ceiling or floor membranes will be attached, the piping must be protected by shield plates and plastic grommets that cover the full opening, width and length of the piping. Where the piping is located outside of a framing member and is located less than 2 inches from the nearest edge of the face of the framing member to which the membrane will be attached, the piping must be protected by shield plates and plastic grommets that cover the full opening, width and length of the piping. Shield plates must be of steel material having a thickness of not less than 0.0575 inch (16 gage).

All gas pipe, tubing and fittings must be clear and free from cutting burrs, defects in structure or threading. Piping must be thoroughly brushed and chip and scale blown. Defects in pipe, tubing and fittings must not be repaired. Defective pipe, tubing and fittings must be replaced.

Metallic pipe and fitting threads must be taper pipe threads and must comply with ANSI/ASME B1.20.1, Pipe Threads, General Purpose, Inch. Pipe with threads that are stripped, chipped, corroded, or otherwise damaged must not be used. Where a weld opens during the operation of cutting or threading, that portion of the pipe must not be used.

Provide unions and hangers same as specified under Water Piping Specialties except AGA rated for natural gas. Refer to Section 15010 and plan details for pipe hangers, supports, assemblies, rods and uni-strut requirements.

9.4. **Gas Piping Mechanical Sleeve Seals:** Must be a modular sealing element unit, designed for field assembly, to fill the annular space between the pipe and sleeve. The sealing element must be EPDM interlocking links shaped to fit surface of the pipe. Include type and number required for pipe material and size of pipe and sleeve. Sleeve must be provided with carbon steel pressure plates and stainless steel connecting nuts and bolts of the length required to properly secure the pressure plates to the sealing elements. Provide a minimum of one nut and bolt for each sealing element. Manufacturers must be Advance Product and Systems, Calpico, Metraflex Company or Pipeline Seal and Insulator.

9.5. **Interior and Above Grade Piping:** ASTM A53/A53M, Type as required by welding method, Grade B, seamless or ERW, Schedule 40 black steel pipe with ASME B16.3, Class 150 black malleable iron screwed fittings for 2” and smaller. Gas piping to the emergency generator must be ANSI B16.25/ASME B16.9 butt-weld. Welders must be American Welding Society (AWS) certified. **Welders must submit a current AWS**

certificate and must affix his/her AWS Certificate number and identification adjacent to each weld made.

9.6. **Electrical Bonding and Grounding for Gas Pipe and Tubing:** Each above ground portion of a gas piping system must be electrically continuous and bonded to an effective ground fault current path. Provide bonding in strict accordance with NFPA 70, Section 250. Bonding of gas piping systems is electrical work and must be provided by a qualified licensed Electrical Contractor who is recognized by the Authority Having Jurisdiction as capable of doing such work. Points of connection must comply with the current edition of NFPA 70, the National Electric Code. **It is the responsibility of the Plumbing Contractor to engage a qualified, licensed Electrical Contractor to provide the bonding and grounding as specified.** Allow as required and provide as specified.

9.7. **Lines Installed Under Slab or In Any Unventilated Areas or Spaces:** Gas piping must not penetrate building foundation walls at any point below grade. Gas piping must enter and exit a building at a point above grade. The annular space between the pipe and the wall must be sealed air and watertight. Gas piping concealed in walls, chases, below slab on grade, or any unventilated area or spaces must be installed in welded Schedule 40 steel piping with airtight joints and vented to the outside atmosphere through the roof. Suitable internal spacers must be provided. Inaccessible piping must be all-welded connections. Socket type weld fittings may be used for gas piping within the steel enclosure. Termination point of vented steel piping must be 24" above the roof with a gooseneck and must be located a minimum of 10'-0" clear from all outside air intakes.

9.8. **Gas Valve and Connections:** Provide gas shutoff valves as follows based on pipe size. All valves must be suitable for natural gas service and must comply with NFPA 54 (National Fuel Gas Code), applicable local amendments, state gas codes and authority having jurisdiction requirements.

9.9. **Gas Valves 2" NPS:** Provide a 2-piece, full-port, threaded-connection ball valve, 600 WOG minimum, FM Approved, UL Listed and CSA certified for use in natural gas systems. Valves must conform to ANSI Z21.15 (0.5 psig), CGA 3.16 (125 psig), ASME B16.33 (125 psig), ANSI B1.20.1 and MSS SP-110.

Valves must have a triple sealing stem with two FKM O-rings, PTFE G300 seats and packing, C38500 brass packing gland and steel, Geomet plated handle and handle nut.

The valve must be Jomar Series T-100NE, Apollo 80-100 Series, NIBCO T-585-70-UL Series or Watts B-6000 Series. Jomar is the basis of design.

9.10. **Gas Pressure Regulators:** Provide a regulator at each gas fired appliance/device. Regulators must be standard service type gas regulators for indoor or outdoor use as applicable, meeting project and Local Gas Company requirements with automatic safety shut-off valves, overpressure protection device (OPD) as required or specified, leak/vent limiting device, cast iron body with automatic safety shut-off valves, aluminum orifice and chromate covered casting, e-coated or primed with enamel topcoat and tamper proof seals.

Line gas pressure regulators must be listed as complying with ANSI Z21.80/CSA 6.22. All regulators provided on systems with inlet pressure greater than 2 psi must be provided with over pressure device (OPD). Regulators installed on the exterior of the building must be approved for outdoor installation. Verify supply (inlet) pressure at the project site prior to selecting regulators.

ALL gas pressure regulators with OPD must be vented directly outdoors. The vent piping for the atmospheric side of diaphragms in line pressure regulators, gas appliance regulators and gas pressure limit controls must comply with NFPA 54 Section 5.14 (or equivalent IFGC Section 410.3 / 1208.8) and must be sized strictly in accordance with the specific device manufacturer's installation instructions. Gas vent piping must not be smaller than the vent connection on the pressure regulating device. Do not reduce the size of the vent pipe size from the regulator. Vent piping serving relief vents and combination relief and breather vents must be routed independently/separately to the outdoors and must serve only a single device vent. The vent line must be independent of other vent piping, must not be connected to any bleed lines, appliance vents or common manifolds.

Where the manufacturer's instructions specify upsizing due to equivalent length of run, number of fittings, or relief-flow capacity, the vent piping must be increased by one nominal pipe size for each increment of equivalent length, including allowances for elbows and other fittings, so that full relief capacity is maintained without imposing excessive backpressure on the regulator diaphragm.

Vent material must be Type K or Type L copper tubing and comply with ASTM B88 or ASTM B280, as applicable. Vent termination must be on the outside wall of the facility and a minimum of six (6) feet distance from any window, door, louver, gas appliance vent and any source of heat or ignition. The vent termination device must be designed to prevent the entry of insects, water and foreign objects. It must be weather resistant with stainless steel body and screen, insulating unions and other accessories required for a complete and functional installation. Assembly must be equal to IMAC Systems Inc., threaded 90-degree angle vent or approved equivalent.

Provide a custom laser engraved brass valve tag at each regulator identifying inlet and discharge gas pressure and pipe contents. Tag must be 1-1/2 inches diameter, 18-gauge polished brass tags with 3/16-inch chain hole and 1/4 inch high stamped, black-filled service designation.

During the submittal phase, the Contractor must provide to the Engineer a letter from the local gas company attesting to the maximum pressure drift to the facility downstream of the local gas company's meter/regulator assembly. If the local gas company states that pressure will exceed 2 psi on **any** occasion, for **any** period of time, the regulator furnished at each appliance within the facility must be Maxitrol Series 325-5L with OPD or equivalent by Sensus, Emerson/Fisher, Security or American as required by job conditions. If the required letter is not provided, the contractor must provide the gas regulator with OPD as specified above.

9.11. **Shutoff Valve:** Main gas shutoff valve controlling the gas piping system must be as specified above, rated for outdoor use as required, easily accessible for operation and must be installed in each service line as indicated or required and protected from physical damage.

Provide a custom laser engraved brass valve tag identifying gas pressure main on house side of the meter. Tag must be 1-1/2 inches diameter, 18-gauge polished brass tags with 3/16-inch chain hole and 1/4 inch high stamped, black-filled service designation.

9.12. **Gas Pipe Painting and Identification:** Gas piping identification must be provided as specified in Section 15010, Part Identification, except intervals must be a maximum of 12 feet for straight runs of piping.

All exterior and interior gas piping, fittings, etc., must be clean and rust free when installed. All exterior and interior gas piping exposed to view in finished and unfinished areas must be painted. Gas piping and fittings concealed above the ceiling or in partitions are not required to be painted unless rusted. Where any piping or fittings are rusted, all rust must be removed from the piping and then pre-treated with acidic etching primer specifically manufactured for the piping installed. **Apply two coats of the base and finish** rustproof enamel paint. Rusted portions of gas piping, fittings, etc., in attic and other concealed areas must be painted black after prepping for paint.

Color for piping in all mechanical rooms and similar locations where the piping is exposed must comply with IBC/IPC/IMC requirements and ANSI Standard A13.1, current edition. After gas piping is painted, identify with pipe markers as specified hereinbefore.

Provide a custom laser-engraved brass valve tag at each valve identifying gas pressure and pipe contents. Tag must be 1-1/2 inches diameter, 18-gauge polished brass tags with 3/16-inch chain hole and 1/4-inch-high stamped, black-filled service designation. Refer to Section 15010, Part Identification for detailed requirements.

PART 10. PIPE INSULATION

10.1. **General: The Plumbing Contractor must not install the piping insulation.** All piping insulation work must be provided by an independent third party licensed and experienced Insulation Subcontractor whose primary business is the sale and installation of insulation materials in accordance with insulation manufacturers' requirements and these specifications.

The Insulation Subcontractor must provide a complete insulation submittal on his company letterhead detailing materials and methods as specified. **The Plumbing submittal will be automatically rejected** and not reviewed without a submittal from the required Insulation Subcontractor**.**

Where a conflict exists between these specifications and the Manufacturer's recommendations, the strictest installation must be provided.

Piping must be clean; dry and pressure tested before covering is applied. Size pipe hangers to fit insulated pipe size. **No installation of pipe hangers for insulated piping will be allowed to be in contact with piping or penetrate the piping insulation. Piping insulation must be continuous through partitions sleeve/firestop assembly and must not be cut away for installation of clamps, valves, fittings, etc.** Refer to details on plans, Section 15010, "Pipe Hangers and Supports", plan details and below for additional requirements.

Insulate all hot and cold water piping except that below grade and excluding plated brass fixture connections. All piping must be routed within the building insulation envelope to prevent freezing. Insulate all p-traps and related piping located in return air plenums, return air platforms, all horizontal overhead drain lines, including p-traps and drain sumps from mechanical room floor drains, ice machine drains, cooler drains, condensate drainage piping, hub drains and other condensate receiving drains, as specified below.

Insulate rainwater drainage system as noted in that Part.

Cover fittings, valves and flanges with insulation material as hereinafter specified to same thickness as adjacent pipe covering except screwed unions and other specifically mentioned items. Neatly bevel covering edges adjacent to unions, valves and other points of termination and seal insulation. All insulation materials (including coatings, mastics, jackets and adhesives) must have a composite flame spread rating not to exceed of 25/50 rule as determined by ASTM E-84, NFPA 255 and UL 723.

Fiberglass piping insulation Manufacturers must be Owens Corning SSL II with ASJ Max Fiberglas, Johns Manville Micro-Lok HP Ultra or Knauf Pipe Insulation with ASJ+. Owens-Corning is the basis of design.

10.2. **Installation of Fiberglass Insulation:** No installation of pipe hangers for insulated piping will be allowed to be in contact with piping or penetrate the piping insulation. Refer to details on plans for additional requirements. Size the hanger loops to fit **over** insulation. Insulate with Owens Corning SSL II with ASJ Max Fiberglas, Johns Manville Micro-Lok HP Ultra or Knauf Pipe Insulation with ASJ+ pipe insulation, thickness as shown below, thermal conductivity of k= 0.23 Btu-in/hr-ft2-ºF at 75ºF mean temperature and minimum 3.5 pcf to 5.5 pcf density (size dependent). Insulation must comply with ASTM C547 (Type I), ASTM C411, ASTM C585, ASTM C795, ASTM C335/C1045, ASTM E96, ASTM C1136 (Types I, II, VII, X – jacket, ASTM C795, NFPA 90A and 90B and be UL Labeled for Flame Spread Index of 25 or less and Smoke Developed Index of 50.

Adhere SSL by removing release paper after the insulation is installed on pipe and sealing the lap starting in the center of each section, working towards ends. Lap must be pressurized by rubbing with a plastic sealing tool. Install 5” butt strips in the same manner at the joint between sections and at 5’-0” on center. Staple jacket flaps and premolded PVC fittings with nominal 3/4” wide stainless steel or Monel outward-clinching insulation staples on 12" centers. PVC covers must be stapled on both sides of the fitting. Insulation staples must have a retarder coating or covered with 4” width 3M Venture Tape Film Faced ASJ Facing Tape, Series 106FXP adhesive tape or vapor barrier mastic that conceals the entire staple. Thereafter, neatly seal the entire jacket flap with vapor retarding sealant. Neatly bevel and seal all insulation at all unions to allow for the proper operation of the union without damaging the insulation.

Sealant must be water based, LEED, UL 723 (ASTM E84), ASTM C731/C732 Standard Test Method for Extrudability, ASTM E96 Water Vapor Permeance and ASTM D5590 Antifungal. The sealant must be Vimasco 739 (Brush Seal), Childers Chil-Perm CP-34 or Foster 30-65.

Insulate all fittings and elbows with premolded fiberglass fittings containing 3lb. density **rigid** polyisocyanurate pipe insulation of equal thickness as the adjacent piping with PVC covering and UL Labeled for Flame Spread Index of 25 or less and Smoke Developed Index of 50.

Cold Water/Domestic Water Insulation Thickness

All pipe sizes 1" thickness

Hot Water/Domestic Hot Water Insulation Thickness

For pipe sizes up to 1-1/4" – 1.0" thickness.
For pipe sizes 1-1/2" to 6" – 1.5" thickness.

10.3. **Insulation for Piping Within Concrete Block Walls:** Do not use fiberglass insulation within concrete block walls. Insulate with 1" or 1.5" thickness insulation for the respective piping as specified above. Insulation must be black, flexible foamed, elastomeric, closed cell pipe insulation with a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84. It must be GreenGuard certified tubular insulation with Microban antimicrobial protection. Insulation must have a 'k' factor of not more than 0.26 at 90°F mean temperature and a water vapor transmission rate of 0.05 perm-inches or less. Slip insulation onto pipe prior to installation. **Slit insulation and longitudinal cutting of the insulation is prohibited. Slip insulation onto pipe prior to erecting. Do not stretch or bend insulation at any turn, tee, etc.** Insulate sweat/brazed fittings with miter-cut pieces of insulation as recommended in AP Armaflex installation instructions or, provide factory fabricated, made to order prefabricated fittings for tees, elbows, unions, etc. the same size as on adjacent piping as manufactured by AP Armaflex, Aeroflex Aerofit, K-Flex Insul-Tube or Aerocell.

10.4. **Fiberglass Insulation Fittings:** Insulate with Fiberglas insulation mitered to fit snugly or with PVC covers with integral, 3lb. to 4lb. density **rigid** polyisocyanurate pipe insulation or rigid fiberglass of the same thickness as the adjacent pipe insulation. After installing the insulation and PVC covers, staple, seal, etc. as specified above. Do install sealant over PVC covers. Install cover, staple, seal PVC cover to the pipe insulation with 3M Venture Tape Film Faced ASJ Facing Tape Series 106FXP and then neatly cover the tape joints with the specified sealant.

Sealant must be water based, LEED, UL 723 (ASTM E84), ASTM C731/C732 Standard Test Method for Extrudability, ASTM E96 Water Vapor Permeance and ASTM D5590 Antifungal. The sealant must be Vimasco 739 (Brush Seal), Childers Chil-Perm CP-34 or Foster 30-65.

In lieu of premolded PVC covers at elbows and fittings that contain rigid polyisocyanurate pipe insulation as specified hereinbefore, Contractor may, at his option, miter the specified fiberglass insulation, delete the requirement for the taped joint and PVC covers and then seal joints as specified hereinbefore.

Loose insulation within premolded covers is not allowed. Insulation must be as specified above or mitered.

Premolded PVC covers must have a flame spread index of 0-25 and a smoke developed index of 0-50 when tested in accordance with ASTM E84.

10.5. **Insulation Exposed Ends:** Finish open ends of sectional covering by rounding off with cement and sizing with fiberglass cloth jacket around the pipe and finish with mastic cement as specified above.

Neatly bevel and seal all insulation at all unions and valves to allow for the proper operation of the union and valve without damaging the insulation.

10.6. **Partitions and Floors:** Refer to Section 15010 Pipe Sleeves and Firestopping. In any case, insulation must extend through floors, partitions and walls and firestopped. Note that Section 15010, Firestopping, requires firestopping of all penetrations, regardless of rating. Refer to Section 15010, Firestopping, for specifics and additional requirements.

10.7. **Aluminum Jacket:** All insulated piping exposed to view in kitchen and related spaces and all insulated piping in finished areas where insulation could be damaged must be covered with a preformed, 18 ga., .04" thick, smooth finish, 3003 and 3105 series aluminum jackets conforming to ASTM B-209 standards. Fittings must be 18 ga., .04" thick, die shaped and smooth finish, Type 1100 aluminum jacket meeting ASTM C585. Provide 1/2" wide, 18 ga., .04" thick, Type 3003 aluminum bands on maximum 24" centers but not less than two bands per jacket section. Locate longitudinal lap of aluminum jacket on bottom for all horizontal piping. Seal jacket lap and make watertight with silicone caulk any portion of the aluminum jacket exposed to exterior ambient conditions. The aluminum jacket must extend and terminate a minimum of 12" inside the respective indoor space. Seal the penetration and ends of piping insulation weather tight. **VentureClad or similar product is prohibited**.

10.8. **Underground Hot Water Piping:** Insulate with 2" thickness, UL fire and smoke rated unslit, black, flexible foamed, elastomeric, closed cell pipe insulation by AP Armaflex, K-Flex Insul-Tube or Aerocel AC EPDM. It must be GreenGuard certified tubular insulation with Microban antimicrobial protection. Insulation must have a 'k' factor of not more than 0.256 at 90°F mean temperature, water absorption percent by volume of 0.2 and a water vapor transmission rate of 0.05 perm-inches or less.

Slip insulation onto pipe prior to erecting. Longitudinal cutting of the insulation is prohibited.

Seal all butt joints of insulation with AP Armaflex BLV, Black, low VOC, liquid, air-drying contact adhesive. Do not use aerosol adhesive. After gluing joints, wrap all joints with 2" wide, 1/8" thick AP Armaflex self-adhering tape.

10.9. **Electric Water Coolers:** Insulate drain connections and traps with 1/8" thick insulating tape by AP Armaflex, K-Flex or Aerocel AC EPDM or 1/2" thick fiberglass insulation as specified for piping insulation.

10.10. **Unistrut Support Saddle Requirements:** For all horizontally or vertically installed piping, provide a Unistrut assembly with a factory fabricated pre-formed, pre-insulated saddle assembly consisting of an integral hot dipped G-90, ASTM A653 compliant galvanized saddle per table below. Do not use loose saddles. The assembly must be a 360-degree section of 3.0 PCF density, non-compressive, rigid phenolic foam insulation up to 3" nominal pipe size (NPS), 4.0 PCF density

polyisocyanurate foam insulation for piping 3-1/2” NPS to 10” NPS and 6.0 PCF density, non-compressive rigid phenolic or polyisocyanurate for piping greater than 10” NPS. For IPS 6" and above provide an additional load distribution plate of all point loaded Unistrut or trapeze hangers. Insulation and ASJ+ jacketing must extend a minimum of 2” beyond the shield to allow for sealing the 2" wide ASJ+ butt strip tape.

The 3.0 PCF and 4.0 PCF polyisocyanurate foam pipe insulation must have a K factor of 0.19 Btu·in/hr·sq. ft/°F at a mean temperature of 75°F. The 6.0 PCF foam pipe insulation must have a K factor of 0.20 Btu·in/hr·sq. ft/°F when tested to the ASTM C518 standard. The entire assembly must be ASTM D1621, ASTM C209, ASTM E96, ASTM D2856 compliant.

Each assembly must have a 6-mil thickness, industrial grade vapor retarder film in compliance with ASTM D-374 and 0.01 perm rating in compliance with ASTM E-96. The assembly must also be provided with an insulation lock joint longitudinal seam. The insulation jacket must have a hazard rating not to exceed 25 flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E-84, NFPA 255 and UL 723. Insulation thickness required must be same as the adjacent fiberglass insulation as specified above.

Installation must be in strict accordance with the Manufacturer’s requirements. After installation, install 3” zero perm butt strips at the joint between insulation sections where fiberglass insulation and the polyisocyanurate insulation butt together. Staple insulation jacket flaps and seal staples as specified above for fiberglass insulation.

Each assembly must have a genuine “Quick-Inspect” sticker applied at the bottom of each saddle for easy jobsite verification by the Engineer or Inspector. **Failure to provide the sticker on each assembly will be cause for immediate rejection of the installation.**

Refer to the plan details for additional requirements.

The assembly must be Buckaroos Model 3300E-LT or equivalent by Thermal Pipe Shields, Inc, Pipe Shields, Inc. Carpenter & Paterson, Inc., Clement Support Services, Piping Technology and Products Inc., Bergen Pipe Supports, Insulation Components or VEP/ASC Engineered Solutions. Buckaroos Model 3300E-LT is the basis of design.

Unistrut Saddle Requirements

Nominal Pipe Size	Insulation Length	Saddle Length	Saddle Gauge
1/2” - 3”	6”	4”	22 Ga.
3-1/2” - 4”	6”	4”	20 Ga.

10.11. **Clevis Hanger Saddle Requirements:** For a single pipe suspended with a single clevis hanger assembly, provide same insulated saddle assembly as specified above for the Unistrut assembly. Do not use multiple side by side single saddle assemblies. Multiple pipe assemblies require a Unistrut assembly as shown on the plans. Refer to Section 15010 and the plan details for additional requirements.

10.12. **Painting:** Paint exposed insulation that is not covered with aluminum jacket after insulation is completed as specified in Section 15010.

10.13. **Identification:** Refer to Section 15010, Part Identification for identification of piping systems.

PART 11. NATURAL GAS FIRED CONDENSING TYPE WATER HEATER

11.1. **General:** Water heaters must be A.O. Smith Model BTHA Series Cyclone Mxi and must bear an ASME stamp. Equivalents by Rheem Triton SS, Bradford-White or Lochinvar will be acceptable. Water heaters must be provided with outputs, BACnet card, and any other items required for monitoring by the specified BAS. Coordinate BAS requirements with specified BAS Manufacturer in Section 15920 and provide all as required for proper interface.

Water heaters must be seamless glass lined steel tank construction in which the glass coating is applied to the water-side surfaces of the tank after the tank has been assembled and welded. The condensing flue coil must be coated on the flue gas side with acid resistant glass lining designed for use in condensing heaters. The water heater tank warranty must be a minimum of 3 years.

Each water heater must be provided with Manufacturer furnished commercial grade condensate neutralizing kit, neutralizing agent anti-scale system and all required accessories. If an acid neutralizing device is factory installed within the water heater, a separate device is not required.

Condensate piping from the combustion chamber of the condensing type of water heater to the neutralizing device must be solid wall Schedule 80 CPVC acid resistant piping. CPVC pipe must be manufactured from virgin rigid CPVC (chlorinated polyvinyl chloride) vinyl compounds with a cell class of 24448, as identified in ASTM D 1784.

CPVC Schedule 80 pipe must be Iron Pipe Size (IPS) conforming to ASTM F 441. Pipe must conform to NSF International Standard 61 and 14.

CPVC piping installation must comply with the latest installation instructions published by piping manufacturer and must conform to all applicable plumbing, fire and building code requirements. Solvent cement joints must be made in a two-step process with primer conforming to ASTM F 656 and solvent cement conforming to ASTM F 493. The system must be protected from chemical agents, fire-stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with CPVC compounds.

Piping from discharge of neutralizing device to drain must be Type L hard copper tubing with wrot copper solder joint fittings as specified hereinbefore.

The heater must be suitable for venting with the venting/combustion air system specified below for the job conditions and in sizes recommended by the water heater Manufacturer. The heater must be suitable for sealed combustion direct venting and terminated through the wall or roof as shown on the plans. The heater must be factory assembled and tested. The power burner must be of a design that requires no

special calibrations on start-up. **The heater must be approved for 0" clearances to combustibles.**

The control must be an integrated solid-state temperature and ignition control device with integral diagnostics, LED fault display capability and digital display of temperature settings.

The tanks must be foam insulated and equipped with an ASME rated temperature pressure relief valve. The water heater must bear an ASME stamp, be UL listed and exceed the minimum efficiency requirements of ASHRAE/IES 90.1.b-1991.

11.2. **Vent / Combustion Air System: ASTM Standard D2665 PVC, ASTM Standard D1785, CPVC pipe nor any materials other than is specified below are allowed for use in venting/combustion air assembly.** The system and each of its components must be a zero clearance to combustibles, factory fabricated, single solid wall, ETL listed to UL 1738, flame resistant polypropylene with integrated gaskets or ETL listed to UL 1738 piping and solvent weld cement. It must be designed for use in conjunction with Category II, or Category IV condensing gas fired appliances, rated for a maximum continuous flue gas temperature of 149°F and listed for maximum positive pressure rating of 20" W.C.

The vent system must be continuous from the appliance's flue outlet and combustion air inlet to the concentric vent termination outside the building. All systems components must be by the assembly manufacturer. Furnish horizontal and vertical supports, roof or wall penetrations, terminations, appliance connectors, fittings, spacers, bird screen, etc. and other manufacturer required items must be UL listed and provided by the vent Manufacturer. All systems components must include a factory-installed gasket in their female-end to render the vent air and watertight when the male/female ends are connected together as per the vent Manufacturer's instructions. All pipe, fittings, terminations and solvent weld cement must be third party marked as listed to UL 1738 and assembled to the Manufacturer's instructions.

Provide a test port section immediately above the appliance for testing the flue gases, horizontal drain tee at location specified by the assembly Manufacturer, stainless steel flashing with PPs-gray or ETL listed to UL 1738 UV protected end pipe and bird screen. All items furnished that extend through the roof must adhere to roofing manufacturer's requirements so as not to void the roofing warranty. Vent systems requiring field installed sealants or compounds are not acceptable unless specifically required by the vent system manufacturer.

The vent layout must be designed and installed in compliance with assembly manufacturer's installation instructions, the water heater manufacturer requirements, the vent assembly's UL listing and all applicable local codes. The assembly and its required components must be selected by the vent manufacturer. Furnish for review a Manufacturer approved diagram for each venting system required for this project.

All items furnished that extend through the roof must adhere to roofing manufacturer's requirements so as not to void the roofing warranty.

Each gas fired appliance requires its own assembly. Do not combine multiple vents into a single vent. The venting system must be approved for use by the appliance Manufacturer.

DIFFERENT MANUFACTURERS HAVE DIFFERENT JOINT SYSTEMS AND ADHESIVES. DO NOT MIX PIPE, FITTINGS OR JOINING METHODS FROM DIFFERENT MANUFACTURERS. JOINING METHODS MUST BE AS REQUIRED BY THE SPECIFIC SYSTEM MANUFACTURER.

Note that the specified requirement for the cast iron vent through the roof is NOT applicable to condensing type water heaters.

At the point where the products of combustion (exhaust) vent pipe (not the combustion air pipe) enters the attic, it must be insulated with 1/2" thickness UL fire and smoke rated unslit, black, flexible foamed, elastomeric, closed cell pipe insulation to the point where the combined assembly is joined prior to exiting the building. Insulation by AP Armaflex, K-Flex Insul-Tube or Aerocel AC EPDM. Installation materials and methods must be the same as refrigerant piping.

Where vents pass through insulated assemblies, an insulation shield constructed of steel having a minimum thickness of 0.0187 inch (26 gage) must be installed to provide clearance between the vent and the insulation material. The clearance must be not less than the clearance to combustibles specified by the vent manufacturer's installation instructions. Where vents pass through attic space, the shield must terminate not less than 2 inches above the insulation materials and must be secured in place to prevent displacement. Insulation shields provided as part of a listed vent system must be installed in accordance with the manufacturer's instructions.

In concealed locations, where a vent is installed through holes or notches in studs, joists, rafters or similar members less than 1-1/2 inches from the nearest edge of the member, the vent must be protected by shield plates and plastic grommets. Protective steel shield plates having a minimum thickness of 0.0575 inch (16 gage) must cover the area of the vent where the member is notched or bored and must extend not less than 4 inches above sole plates, below top plates and to each side of a stud, joist or rafter.

The system must be Centrotherm Commercial SW, IPEX System 1738 PVC or DuraVent PolyPro. Centrotherm is the basis of design.

11.3. **Condensing Water Heater Products of Combustion (Exhaust) Vent (Not Combustion Air):** At the point where the products of combustion (exhaust) vent pipe (not the combustion air pipe) enters the attic, to the point where the combined combustion air/products of combustion vent assembly is joined prior to exiting the building, it must be insulated with 1/2" thickness, UL fire and smoke rated, black, flexible foamed, elastomeric, closed cell pipe insulation. It must be GreenGuard certified tubular insulation with Microban antimicrobial protection. Insulation must have a 'k' factor of not more than 0.25 at 75°F mean temperature and a water vapor transmission rate of 0.05 perm-inches or less. Insulation must be AP Armaflex, K-Flex Insul-Tube, Aeroflex or Aerocel AC EPDM.

Slip insulation onto pipe prior to erecting. Longitudal cutting of the insulation is prohibited. Do not stretch or bend insulation. Insulate factory fabricated, made to order prefabricated fittings for tees, elbows, unions, fittings, etc. the same size as on adjacent piping as manufactured by AP Armaflex, Aeroflex Aerofit, K-Flex or Aerocell.

Make up fitting covers from Armaflex with an inside diameter large enough to overlap the insulation on the pipe next to the fitting. Fitting cover must be long enough to

overlap the pipe insulation with a minimum of one inch on each side. Glue the 1” overlap and seal to the adjacent pipe insulation with same liquid adhesive and tape specified hereinbefore. Seal all butt joints with AP Armaflex BLV, Black, low VOC, air-drying liquid contact adhesive. Do not use aerosol adhesive. After gluing joints, wrap joint with 2” wide, 1/8” thick AP Armaflex self-adhering tape.

11.4. **Relief Valve:** The relief valve must comply with ANSI Z21.22 and CSA/ASME rated temperature and pressure relief valve on the water heater with copper relief line piped as indicated on the plans. Temperature and pressure relief valves, or combinations thereof devices must bear the label of an approved agency and must have a temperature setting of not more than 210°F and a pressure setting not exceeding the tank or water heater manufacturer’s rated working pressure or 150 psi, whichever is less. The relieving capacity of each pressure relief valve and each temperature relief valve must equal or exceed the heat input to the water heater or storage tank. Do not pipe/connect relief discharge line and auxiliary drain pan lines together. The manufacturers must be Watts, Apollo or McDonnell and Miller.

11.5. **Acid Dilution Kit:** Manufacturer must provide an acid dilution kit with the water heater to dilute the combustion gases acidic condensate prior to piping condensate to the drain. If an acid neutralizing device is factory installed within the water heater, a separate device is not required.

Condensate piping from the combustion chamber to the neutralizing device must be Schedule 80 CPVC acid resistant piping. CPVC pipe must be manufactured from virgin rigid CPVC (chlorinated polyvinyl chloride) vinyl compounds with a cell class of 24448, as identified in ASTM D 1784.

CPVC Schedule 80 pipe must be Iron Pipe Size (IPS) conforming to ASTM F 441. Pipe must conform to NSF International Standard 61 and 14.

CPVC piping installation must comply with the latest installation instructions published by piping manufacturer and must conform to all applicable plumbing, fire and building code requirements. Solvent cement joints must be made in a two-step process with primer conforming to ASTM F 656 and solvent cement conforming to ASTM F 493. The system must be protected from chemical agents, fire-stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with CPVC compounds.

Piping from discharge of neutralizing device to drain must be Type L hard copper tubing with wrot copper solder joint fittings.

11.6. **Expansion Tank:** Provide diaphragm type with NSF liner, designed for 150 psig working pressure and must bear an ASME stamp. Tank must have minimum acceptance as recommended by the water heater manufacturer. Expansion tank must be supported at the wall by a HoldRite QS-U Quick Strap with 1/2" wide, 0.025” thick, 200/410 stainless steel bands and 16 Ga. galvanized steel bracket of required capacity and load rating for the expansion tank shown on the plans or approved equivalent.

11.7. **Auxiliary Drain Pan:** Provide 2” deep, 18 ga. (0.05” thickness) galvanized steel or 18 ga. (0.05”) thickness stainless steel auxiliary drain pans with seamless, welded or brazed watertight joints. Width of pan must provide minimum of 3” clearance between water heater and inside face of the pan. Provide 3/4” copper drain line in the side of

the pan to floor drain with dielectric separation. Do not pipe relief discharge line and auxiliary drain pan lines together. Auxiliary pan must be manufactured by Killarney Metals, an approved equivalent or a shop fabricated pan with construction specified above and with welded or soldered joints. **Factory manufactured pans that do not meet the specified requirements above are not allowed.**

11.8. **Circulating Pump:** Furnish and install, as shown on the plans, an all lead-free bronze (0.25% or less lead content of all wetted surfaces) or stainless steel construction, stainless steel flanges, pipe-mounted centrifugal pump with high efficiency ECM motor with algorithm to automatically adjust speed, flow and operation based on the actual requirements of the system. The pump must be ETL or UL listed and be NSF 372 compliant.

Provide a strap-on aquastat equal to Honeywell L606A for insertion into the immersion well and wire to control the pump through a 7-day program clock, which must be programmed to the Owner's requested operating schedule. Clock must be equivalent to Tork EWZ-201C with automatic daylight savings time adjustment, automatic leap year compensation and minimum 4-day battery or super capacitor back-up power. Provide all required control wiring, power wiring and connections as required for proper operation as specified.

Pump power must be as shown on the electrical plans. The pump must be Taco 0026e-SF2, Armstrong Series Compass H or equivalent by B&G or Grundfos. Taco 0026e-SF2 is the basis of design.

11.9. **Inspections:** The Plumbing Contractor must arrange and pay for the State of Alabama Boiler and Pressure Vessel Safety Division/Inspection Divisions, Elevators/Boilers Inspector to visit job site to inspect water heater and/or boiler installation and obtain written approval, certification and Certificate for Potable Water Heater (PWH) as required. Correct all deficiencies required by the Inspector without additional cost to the Owner or the Owner's Project Design Professionals, using materials and methods, as directed by, State of Alabama Boiler and Pressure Vessel Safety Division/Inspection Divisions and Elevators/Boilers inspector as required.

11.10. **Miscellaneous:** Heaters must be placed on 4" concrete housekeeping pad with rounded corners.

PART 12. FIXTURES SUPPORTS AND CONNECTIONS

12.1. **General:** Verify exact size and location of water, vents, waste and supply connections from approved rough-in drawings and/or catalog data sheets. Allow for modifications required by the shop drawings without additional cost to the Owner or the Owner's Project Design Professionals.

All fixtures including lavatories, urinals, water closets, electric water coolers, etc., must be securely fastened to the walls or floor. **Coordinate all mounting heights and fixture types required with Architectural plans prior to rough-in and ordering fixtures. All ADA fixtures must be mounted as required by current ADA requirements.**

Demolish and modify existing roof, walls, floors, partitions and ceilings as required to accomplish the required work. Remove existing carriers, existing water and waste,

sawcut floors, walls, partitions, ceilings, etc., as shown and as required to install new piping or reconnecting to existing waste and water rough-in. Do not reuse existing items. All items must be new. All roofing work must be provided by the roofing Contractor. Roofing work required for existing roofs must be by the roofing Contractor that provided warranty.

All penetrations of floors and partitions are required to be built-in as work progresses. All penetrations of new construction that were not built-in as required by these specifications and all existing floors, walls and partitions must be core drilled or sawcut large enough to allow all conduits, piping, firestopping assemblies, etc., to continue uninterrupted and to provide proper firestopping of the penetration as required to install new items as shown and/or specified.

Reconstruction and repair of the demolished/modified items must be as directed by the Architect. Coordinate demolition and repairing/rebuilding of items with General Contractor prior to bid to allow for installation of carriers, piping, etc., as applicable.

12.2. **Wall Mounted Fixtures:** All fixtures specified with carriers must be supported and installed with carriers. All fixtures specified without carriers must be supported as specified below.

Support all wall mounted fixtures that are specified without carriers using 1/4” thick 6” high plates full length and width of fixture, mounted behind wall. Where fixtures are back to back on a solid wall, mount with bolts from fixture hanger to fixture hanger. Do not use toggle bolts or expansion bolts unless noted on the plans or specified.

Where fixtures are mounted on solid (single wythe) walls finished both sides, install fixtures with plated toggle bolts.

Where fixtures are mounted on wood or light gauge steel studs, employ pressure treated blocking of 2” x 12” nominal size well secured into stud line with non-corrosive, dielectric separation fasteners. Fit behind stud flanges, using especially placed studs as required.

Demolish and modify all existing walls, partitions, ceilings and saw cut all floors as required to install new items as shown and/or specified. Reconstruction and repair of the demolished/modified items above must be as directed by the Architect. Coordinate demolition and repairing/rebuilding of items with General Contractor prior to bid to allow for installation of carriers, piping, etc., as applicable.

12.3. **Floor Connections:** Provide cast iron or galvanized malleable iron floor flanges at least 3/16" thick, screwed or caulked to cast iron drainage pipe. PVC floor flanges may be used where PVC piping is provided. Bolt the connection and make tight to fixture with plumbing fixture setting compound, wax setting ring or polyethylene gasket flange. Offset flanges for water closets are not allowed.

12.4. **Water Supply Connections:** Provide rigid, lead-free brass nipple from water riser to fixture stop valve threaded connections. Steel pipe is unacceptable. Exposed portion of nipple must be chromium plated. Stops’ risers must be lead-free, threaded with chrome over copper pipe. Quick connect fittings and braided supplies are not allowed.

12.5. **Waste Arms to Fixtures:** As specified hereinbefore. Where copper or brass pipe is specified, all joints downstream from the trap must be brazed joints.

PART 13. SCHEDULED FIXTURES AND MISCELLANEOUS ITEMS

13.1. **Acceptable Manufacturers:** American Standard, Zurn, Elkay, Kohler and Toto catalogs.

Where three (3) Manufacturers are listed for fixtures below, use only those Manufacturers. Manufacturers not mentioned in the specifications require prior approval, seven (7) days prior to bid date. Follow procedures set forth in Division 1 of the specifications. Where substitutions are proposed, unless the Contractor states in writing, on a separate recap/summary sheet in front of the respective submittal, the differences of the substituted equipment or material, he must be responsible to replace such items any time discrepancies are found. All prior approvals must be submitted through the Architect.

Architect must select all colors where choices exist.

13.2. **Fixture Trim:** Exposed metal parts to be of heavy weight polished brass, heavily chromium plated, of best quality as regularly furnished by the plumbing fixture manufacturer. Provide stop valve in supply to all fixtures and equipment.

13.3. **Compliance with Americans Disabilities Act:** All fixtures, faucets, flush valves, etc., specified or shown to be ADA type must be manufactured and installed in complete compliance with the current requirements of the Americans Disabilities Act and ICC A117.1 Standard for Accessible and Usable Buildings and Facilities

13.4. **Guarantee:** Guarantee in writing to make good without cost any defects in materials and workmanship for one (1) year. **ALL** flush valves and faucets must be provided with a five (5) year, full replacement warranty, including labor.

Warranty/guarantee must start on the date of substantial completion of the project as determined by the Architect. Provide free maintenance and service during the first 12 months of the guarantee period.

13.5. **Scheduled Items:**

P – 1 Water Closet: American Standard Madera 3451.001 EverClean, Kohler Welcomme Ultra K-96053, Zurn Model Z5655-BWL1-AM or Toto CT725CUFG-#01, floor mounted, 15” high vitreous china, siphon jet, elongated bowl with 1-1/2” top spud, fully glazed trapway, china bolt caps, 1.6 GPF Zurn Z6000AV-WS1, Sloan Royal 111-1.6 or equivalent flush valve by Kohler or Toto with trap primer connection on flush tube where shown on the plans, Bemis 1655SSCT white open-front seat with self-sustaining stainless steel check hinge and hardware with Sta-Tite locking system or equivalent by Zurn, Church or Beneke, Zurn Z5972-COMB closet bolt and wax ring kit, china bolt caps and all other items required for a complete and functional installation. Provide YJ chrome plated split-ring wall bracket for supply pipe.

P – 2 ADA Water Closet: American Standard Madera 3461.160, EverClean, Zurn Model Z5665-BWL1-AM, Kohler Highcliff Ultra K-96057 or Toto CT725CUFG-#01 17” high vitreous china, siphon jet, fully glazed trapway, elongated bowl with 1-

1/2” top spud, 1.6 GPF Zurn Z6000AV-WS1, Sloan Royal 111-1.6 or equivalent flush valve by Kohler or Toto with trap primer connection on flush tube where shown on the plans, Bemis 1655SSCT white open-front seat with self-sustaining stainless steel check hinge and hardware with Sta-Tite locking system or equivalent by Zurn, Church or Beneke, Zurn Z5972-COMB closet bolt and wax ring kit, china bolt caps and all other items required for a complete and functional installation. Provide chrome plated YJ split-ring wall bracket for supply pipe. Coordinate flush valve installation with grab bar. Flush valve control/handle must be mounted for use from the wide side of the toilet stall.

P – 3 Urinal: American Standard Allbrook 6550.001, Zurn Model Z5755, Kohler Bardon K-4991 or Toto CT725CUF#01 vitreous china siphon jet, 3/4” top spud, flushing rim urinal, vandal resistant, stainless steel outlet strainer, china bolt caps, 1.0 GPF Zurn Z6003-AV-WS1, Sloan Royal 186-1 or equivalent flush valve by Kohler or Toto with vacuum breaker and Zurn Series Z-1222 or equivalent carrier by J.R. Smith or Sioux Chief. Strainers for Zurn urinals must be Zurn Z5755-STR. Provide chrome plated YJ split-ring wall bracket for supply pipe. Refer to Architectural plans for mounting heights. Fixtures designated by the Architect as ADA/handicapped must be mounted at current ADA requirements.

P – ADA Lavatory (wall hung/china): American Standard Lucerne 0355.012, Zurn Model Z5364, Kohler Kingston K-2005, 20” x 18” wall hung vitreous china lavatory complete with Zurn Z81000-XL-17M, single control, solid cast brass, polished chrome plated faucet, 1.5 GPM vandal resistant, pressure compensating aerator, McGuire #LF2167, Zurn Z8803-XL-LRLK-PC or equivalent by Brasscraft or Dearborn Brass offset drain, Nibco 1/2” supplies with full turn wheel handles and stops, McGuire #155WC, Zurn Z8746-PC, Brasscraft or Dearborn Brass offset drain, McGuire 8872, Brasscraft, Zurn or Dearborn Brass p-trap and heavy-duty floor supported JR Smith Series 0710, Zurn Z1231EZ or equivalent chair carrier with concealed arms by Sioux Chief. Where lavatory manufacturer drain outlet complies with ADA requirements, offset drains are not required. Supplies must be lead-free, AB 1953 certified by recognized authority and bear manufacturer and testing mark. Refer to Architectural plans for mounting heights. Fixtures designated by the Architect as ADA/handicapped must be mounted at current ADA requirements.

Provide lead-free mixing valve (ASSE 1070) with tempered water line to faucet. Mixing valve must be provided with wall bracket, dual check valves and 40-mesh stainless steel screen. Mixing valve must be Watts LFUSG-B-SC-M2, Leonard 170D-LF, Symmons 8210CK, Cash Acme or Zurn-Wilkins ZW3870XLT. The entire assembly must comply with ADA and ANSI standards.

Provide for each fixture an ADA compliant, heavy-duty, impact-resistant, stain-resistant and chemical-resistant rigid vinyl vandal-resistant enclosure with vandal resistant fasteners that shield all piping, electronic faucet components (as applicable), mixing valves and instantaneous water heaters. If plans indicate an instantaneous water heater to be installed at the lavatory, the Contractor must contact the Lav Shield Manufacturer for guidance on the required installation. **Do not install Lav Shield until Engineer has inspected the piping installation.**

The Lav Shield must contain an antimicrobial additive that resists fungal and bacterial growth. The Lav Shield must comply with ASME A112.18.9-2001, ADA article 4.19.4 (606.5), ANSI A117.1, BOCA P 1203.4 and other required State and Local regulations. The Lav Shield must be provided in standard white finish for the exact

fixture specified or custom color, fit to field Lav Shield in the color selected by the Architect. Furnish standard **and** custom color chart to Architect for selection. Lav Shield must be manufactured by Zurn Model Z6900-VG, Truebro/IPS corporation or approved equivalent.

P – 4 ADA Lavatory: American Standard Aqualyn 0476.028, Zurn Model Z5114 or Kohler Pennington K-2196, ADA compliant, 20" x 17" vitreous china oval self-rimming lavatory with Zurn Z81000-XL-17M single control solid cast brass, polished chrome plated faucet, 1.5 GPM vandal resistant, pressure compensating aerator and Zurn Z8743-PC grid drain, McGuire #LF2165, Z8802-XL-LRLK-PC or equivalent by Nibco or Brasscraft supplies with full turn wheel handles and stops, McGuire 8872C, Zurn Z8700-8-PC, Brasscraft or Dearborn Brass 1-1/4", 17 ga., chrome plated cast brass, offset drain, seamless tubular wall bend, p-trap with neoprene gasketed cleanout and cast brass, chrome plated slip nuts and 17 ga. chrome wall escutcheon. Supplies must be lead-free, AB 1953 certified by recognized authority and bear manufacturer and testing mark. Provide lead-free mixing valve (ASSE 1070) with tempered water line to faucet. Mixing valve must be provided with wall bracket, dual check valves and 40-mesh stainless steel screen. Mixing valve must be Watts LFUSG-B-SC-M2, Leonard 170D-LF, Symmons 8210CK, Cash Acme or Zurn-Wilkins ZW3870XLT.

Insulate supplies, trap and drain with premolded ADA compliant protectors with internal fasteners as Manufactured by Truebro Lav Guard 2, Oatey/Dearborn or McGuire Pro-Wrap only. Verify cabinet slope with Architectural plans, prior to ordering and provide as required.

P – 5 Mop Basin: American Standard 7741.000 Florwell, Zurn Model Z5850-D3-RG-HH-MH-WG or Kohler K-6710-0 acid resisting enameled cast iron corner model floor type service sink, complete with American Standard 8354.112, Zurn Z843M1-XL or T&S Brass B-0665-CR-BSTRK wall mounted faucet with offset shanks and integral stops, levered vandal resistant handles, vacuum breaker, integral check valves, adjustable wall brace, pail hook, 3/4" hose thread on spout, four foot rubber hose and wall bracket for spout hose mounted approximately 4" above the mop sink stainless steel backsplash, Bradley 9933 combination utility shelf/broom holder and utility shelf constructed of 18 ga. 304 stainless steel with 16 ga. stainless steel gussets and hooks, 7745.811 rim guard, strainer for 3" screw connection, 304 stainless steel wall guards and silicone sealant at all points where wall guard meets the basin, wall and floor.

P – 6 Bi-Level Vandal Resistant ADA Indoor Electric Water Cooler with Bottle Filler: Elkay # LVRCTL8WSPRO, bi-level, vandal resistant ADA cooler, refrigerated stainless steel high-capacity lead reduction filtered, wall mounted, electronic bottle filler sensor, ADA and ICC A117.1 compliant with cane apron, stainless steel cabinet and receptor, safety bubbler and 5-year warranty on refrigeration system. It must provide 8 gal/hr. of filtered water at 50°F based on 80ºF inlet water and 90ºF ambient temperature, per ASHRAE 18 testing. Unit must be certified to UL 399 and CAN/CSA C22.2 No. 120 and NSF/ANSI 42, 53, 61 & 372 for lead free compliant design. Unit must be provided with top access filter change wrapper filter from the front of the cooler.

Furnish with 1-1/4" McGuire, Dearborn Brass, Brasscraft or Zurn rough brass p-trap, 17-gauge brass tailpiece and waste with wheel stop valve, concealed Elkay MLP200

or equivalent by Zurn or J.R. Smith bi-level floor mounted support, related floor support plates and base as required for applicable wall construction.

Refer to Architectural plans for mounting heights. Fixtures designated by the Architect as ADA/handicapped must be mounted at current ADA requirements.

Equivalent units by Halsey Taylor or Oasis will be considered.

Provide three (3) extra stock FL10 Water Sentry Plus Replacement Filters for each set of coolers shown on the plans, 6,000-gallon filter tested and certified to NSF 42 and 53 under manufacturer's name to reduce lead, Class 1 particulates and chlorine taste and odor certified to NSF 42, NSF 53, NSF-401 and NSF 372 at greater than stated product flow rate for each bi-level water cooler provided. Upon completion of the project, turn over replacement filters to Architect for transfer to Owner.

P – 7 Washing Machine Connection Box: Sioux Chief Series 696R no lead, washing machine connection box with 2-inch trapped standpipe drain, quarter turn, Watts Duo-Cloz, lead-free bronze or brass valve, water hammer arrester, bottom supplies and fire rated if required. Box and faceplate must be 20 ga., powder coated galvanized steel. Each unit must include a frame and a debris cover for protection during rough-in. Equivalents by Guy Gray, Oatey, SharkBite or LSP will be acceptable.

P - 8 Mixing Type Wall Hydrant: ZURN Z1325-VB "Vari-Temp" combination hot and cold water, non-freeze, encased wall hydrant for flush installation. Complete with bronze casing, all bronze interior parts, non-turning operating rods with free-floating compression closure valves, replaceable bronze seat and seat washer and combination 3/4" female or 1" male straight IP inlet and vacuum breaker and with nickel bronze box with operating key lock and "WATER" cast on cover. Zurn Wilkins Model 40XL2 single in-line check valves to be provided on both supply line inlets.

PART 14. MISCELLANEOUS EQUIPMENT FURNISHED UNDER OTHER SECTIONS

14.1. **General:** Equipment indicated hereunder is to be furnished and set in place under another Section of the Specifications (or is to be so provided under a separate contract). Verify exact size and location of water, vents, waste, supply and gas connections from approved rough-in drawings and/or catalog data sheets. Allow for modifications required by the shop drawings without additional cost to the Owner or the Owner's Project Design Professionals.

All multi-compartment sink waste must be piped indirectly and individually to the specified waste receptor. Do not combine waste lines from each sink compartment into a single waste discharge line. Indirect waste piping that exceeds 30 inches in developed length measured horizontally or, 54 inches in total developed length, must be trapped.

All water and gas connections must be complete with stop valves.

Prior to bid, coordinate furnishing and installation of the dual shut-off, quick disconnect flexible hoses for gas and water from the utility distribution system (UDS) to each piece of equipment with food service plans and specifications.

Coordinate all requirements with Food Service plans and specifications and provide all items as required for a complete installation.

14.2. **Kitchen Equipment:** Rough in, provide fittings and make connections for scheduled items as required for a complete installation ready for operation.

Dishwasher: Provide Type PV rigid Brasscraft angle supplies with stops, waste fittings, reduced pressure backflow preventer, floor sink, air gap, one PDI Symbol-B shock absorber and other fittings and accessories required for a complete installation.

Garbage Disposer: Provide cold water supply with stop valve, PDI Symbol "C" shock absorber, elevated vacuum breaker, 2" cast brass p-trap with cleanout. Make all required connections per manufacturer's recommendations.

Ice Machines: Provide cold water supply with stop, PDI Symbol "A" shock absorber and ASSE 1012 backflow preventer equivalent to Watts Model LF-9D. Pipe the vent discharge line with copper from vent outlet to floor sink or another safe place of disposal. Provide copper condensate drain line to floor sink with 45° or 90° discharge fitting as required for optimal drainage.

Insulate condensate drain line with 1/2" thick insulation as specified below. Glue all joints with liquid adhesive. Do not use spray adhesive. After glue has dried, tape all joints with 2" wide, 1/8" thickness insulating tape. Anchor the condensate piping to floor with Unistrut assembly and clamps.

Insulated lines must use Wesanco Series Cush-A-Therm ZSI UX with specified rigid insulation thickness for the required pipe size, gold electro-galvanized channel clamp assembly and required hardware or equivalent by ArmaFix Eco Light, Aerofix by Aeroflex. Wesanco Series Cush-A-Therm ZSI UX is the basis of design.

Insulation, liquid adhesive and insulating tape must be AP Armaflex, K-Flex Insul-Tube, Aeroflex or Aerocel AC EPDM.

Serving Table: Floor sink as specified hereinbefore. Provide cold water supplies with stops and PDI Symbol "A" shock absorber as required.

Gas Cooking Equipment: Rough-in gas piping and make connections. Provide brass lubricated plug valve in line to each separate item. Install automatic cut-off valve (see Automatic Extinguisher Section) in supply line if not furnished with UDS.

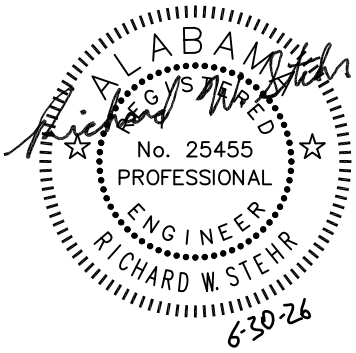
Steam Kettle: Provide water supply with stop, gas connection with cock; pipe all drains and relief valves to floor sink.

END OF SECTION

Cafeteria Addition
at
Crossville High School
for
Dekalb County Board of Education

These specifications sections were prepared by and under the direct supervision of the Engineer of Record for this project.

Division 15 – MECHANICAL
15500 Sprinkler System



July 30, 2026

SECTION 15500 - SPRINKLER SYSTEM

PART 1 – GENERAL

1. General Provisions: Section 15010 is applicable in full hereto.

2. Qualifications of Contractor: The systems shall be installed by an approved contractor regularly engaged in the installation of automatic sprinkler systems with satisfactory experience in at least 3 equivalent projects.

3. Scope: Furnish all labor, material, equipment, design, service and supervision for and incidental to the installation of wet-pipe and dry-pipe fire sprinkler systems complete and as specified herein. The systems shall be installed complete, satisfactorily tested, and fully operational. The entire building shall be completely sprinklered. All areas shall be designed for hazard required to meet International Building Code, NFPA 13 and Local Codes.

The work includes, but is not necessarily limited to, the following:

-Extension of underground fire line from 5'-0" outside the building to 1'-0" above finished floor in the building, including all necessary excavation, trench work, flushing, hydrostatic testing, backfill, and repair of pavement, sidewalks, etc.

-Installation of main wet and dry system sprinkler risers including control valves, check valves, gauges, compressors, drains, fire department connection(s), main water-flow switches and valve tamper switches.

-Installation of all other piping, fittings, hangers, seismic bracing (where required), corrosion prevention equipment, sprinklers, valves, drains, sleeves, escutcheons, devices, and accessories required for complete system installations.

4. Codes and Standards: All work shall be in accordance with local, state, and federal laws, codes, rules, regulations, and standards applicable to this particular class of work, including the lawful requirements of the City Fire Department; the State of Alabama Fire Marshal; the Owner's Insurance Underwriter; and National Fire Protection Association Standards No.13 and No.24 latest editions. If any part of the plans or specifications conflicts with these laws, secure clarification before the work is started. The specifications outlined in this section shall be followed where they are in excess of the minimum requirements of the above-mentioned authorities.

5. Site Inspection: Bidders shall visit the site of the work before submitting bids, and satisfy themselves as to the nature and scope of the work to be done. The submission

of a bid shall be taken as evidence that the bidder is aware of all existing conditions. Later claims for labor, materials, or equipment required for any difficulties encountered shall not be recognized.

6. Shop Drawings and Equipment Submittals: Contractor shall employ the services of an Alabama licensed professional engineer that is qualified by education and/or experience to be in responsible charge of the preparation of fire sprinkler system shop drawings, hydraulic calculations and seismic bracing calculations (where seismic bracing calculations are applicable). Shop drawings, hydraulic calculations and seismic bracing calculations shall bear the seal and signature of the Alabama licensed professional engineer in responsible charge prior to submitting for review. Engineer in responsible charge shall perform site observations where required by authorities having jurisdiction.

Within forty-five days of contract award, submit one set of shop drawings submittals in electronic format (PDF) to the Project Architect for approval. At the same time, also submit drawings to the Owner's Insurance Underwriter (where applicable) and local authorities having jurisdiction. Make all modifications and/or additions necessary to meet the requirements of these authorities. There will be no extra cost to the Owner for any changes necessary. Submit letters of approval (or prints of drawings with approval affixed) before any work is begun.

Contractor shall provide Alabama Fire Marshal’s Office permit number, NICET certification number and Alabama Department of Finance Division of Construction Management project number on all shop drawings

Shop drawings (minimum 1/8" scale) shall show in detail dimensioned piping, sprinkler heads, valves, alarms, drains, underground piping, etc. Outline all ductwork, lights, and other obstructions on shop drawings to show proper coordination and installation of all sprinkler work. As the work progresses, the drawings shall be coordinated with other trades and dimensions at the site verified. Drawings shall be revised as required by conditions at no additional cost to the Owner.

Submittals shall include at minimum a schematic site plan showing relative location and routing of underground piping to point of hydrant flow test. Schematic need not be to scale, but material type, pipe size, distances, valves, backflow preventer pits, fire department connections and hydraulic reference nodes shall be shown.

Submit equipment submittals of all materials proposed for use in work, giving name of manufacturer, trade name, catalog number, and all information hereinafter requested.

7. Layout of Heads: Within practical limits, locate ceiling heads symmetrically about at least one axis of the room or space. Lay out heads so that they do not occur in the same ceiling board as light fixtures, HVAC diffusers, etc. The centerline of each head shall be centered in the suspended ceiling grid.

8. As-Built Drawings: Upon completion of the work, Contractor shall provide a set of reproducible transparencies corrected to show all changes and noted "as-built drawings".

9. Materials, Equipment and Workmanship: Material and equipment shall be the standard catalogued products of manufacturers regularly engaged in the manufacture of such products. Similar types and items of equipment shall be produced by the same manufacturer.

All materials and equipment used in installation of fire protection systems shall be listed as approved by Underwriter's Laboratories, Inc., list of approved equipment, Factory Mutual (FM), and shall be the latest design of the manufacturer.

All materials and equipment shall be installed in strict accordance with NFPA Standards. Except as noted, all piping in finished areas shall be concealed above ceilings, in walls, and in pipe chases indicated on Architectural Drawings. All vertical piping between floors shall occur only in pipe chases or stair enclosures. Locate risers near the rear or side walls so that access to the chase is impeded as little as possible. Locate vertical piping in stairs outside of the path of egress and in accordance with ADA requirements. Maintain minimum space required for repairs to other piping. Install all exposed piping in unfinished areas as high as possible.

10. Coordination: Piping shall be offset, relocated or resized or additional piping shall be furnished and installed as necessary to provide space for other trades. Coordination of the sprinkler work with all other trades is the responsibility of this Contractor, and all changes shall meet approval of specified agencies. The Architect assumes no responsibility for coordination by approval of shop drawings. No extra charges will be approved for any changes required for coordination of sprinkler work with other trades, nor for changes required by NFPA, or code requirements. No ceiling heights shall be lowered because of limitation of space for mechanical equipment.

11. Identification Signs: Provide at all control, drain and test valves, signs of approved design identifying function and noting special cautions, all as is required by NFPA and by the authorities having jurisdiction. Provide and affix to the outside of doors to rooms where sprinkler and standpipe control valves are located suitable signs making note of such valve locations. Submit for Architect's review and approval a list of all signs, noting sizes, materials, nomenclature and colors.

12. Equipment Nameplates: Each item of equipment is to be identified by a permanently attached nameplate made of brass or other corrosion-resistant metal with incised letters and bearing the following information:

Manufacturer's name and address
Serial and model numbers
Rated capacity
Temperature, pressure or other limitations

13. Corrosion Control: For all dry-pipe and preaction systems, provide a vapor corrosion inhibitor system on the compressed air line supply to the dry system(s). Vapor corrosion inhibitor system shall have replaceable cartridges that do not require dismantling of air supply piping.

14. Service and Maintenance Manuals: Furnish at each riser, bound manual containing for each piece of equipment the following materials:

Manufacturer's descriptive literature
Maintenance instructions
Parts list

Where fire pumps or preaction/deluge system cabinets are provided, include as-installed control diagrams, including color coded wiring diagrams for all electrical motor controller connections and interlock connections.

PART 2 – PRODUCTS

1. Interior Piping: Interior piping shall be Schedule 40 or schedule 10 black steel, ASTM A-120, A-53 or ASTM A-135, in accordance with NFPA standards for wet systems. All exterior or dry system piping and fittings shall be hot-dipped galvanized.

2. Underground piping: Underground piping shall be ductile iron, Class 50, cement-lined, centrifugally cast in metal or sand-lined molds, meeting the requirements of AWWA C-151. Joints shall be rubber-gasket, slip-joint or mechanical-joint type. Underground pipe and fittings shall be restrained in accordance with NFPA 24 requirements.

3. Interior fittings: Fittings for above-ground piping shall be threaded, flanged, shop-welded or grooved.

Threaded fittings shall be Class 125 cast iron or Class 150 malleable iron in accordance with ANSI B16.3 and hot-dipped galvanized for dry system in accordance with ASTM A-153.

Flanged fittings shall be cast iron, short body, Class 125, black (painted for dry system), and in accordance with ANSI B16.1. Gaskets shall be full face of 1/8” minimum thickness red sheet rubber. Flange bolts shall be hexagon head machine bolts with heavy semi-finished hexagon head nuts, cadmium plated,

having dimensions in accordance with ANSI B18.2.

Shop-welded fittings shall be steel standard weight, black (galvanized for dry system), in accordance with ANSI B16.9, ANSI B16.25, ASTM A234, ANSI B16.5, or ANSI B16.11.

Grooved couplings and mechanical fittings shall be malleable or ductile iron, 175 psi minimum working pressure. Gasket material shall be butyl rubber.

4. Underground fittings: Underground fittings shall be cast iron, Class 150, mechanical-joint type, in accordance with AWWA C110 and C111.

5. Hangers: Per NFPA 13. Provide supports where required. Attach to structural steel with malleable iron beam clamps with cup-pointed set screws and locknuts; attach to concrete slabs of 3" or greater thickness with pre-drilled drop-in expansion anchors. Powder-driven studs will not be permitted. Toggle hangers may be used for 2" and smaller branch lines subject to the limitations outlined in NFPA-13; if used, hanger spacing shall be limited to 10'-0". Where strut channel is used for trapeze hangers, the model of strut employed shall meet or exceed the requirements for section modulus in NFPA 13.

6. Seismic Bracing: Refer to structural design documents for information regarding overall seismic design category for the building. Where the seismic design category is identified as C, D, E, or F on the structural design documents, provide seismic bracing for the fire protection system piping in accordance with the 2019 edition of NFPA 13. Seismic Bracing of fire protection piping is not required for seismic design categories A or B.

7. Drains: Provide drain valves on the system in accordance with NFPA 13 requirements and drain lines throughout the system to permit complete system drainage. Provide sprinkler system test pipes and flushing connections required by NFPA 13. Provide additional test/drain valves where indicated on the contract drawings and/or as required by state or local authorities. Discharge locations of all drain and test lines shall be subject to specific approval.

8. Valves: Gate valves, 2" and smaller, shall be bronze body, 175 psi working pressure, threaded ends, wedge disc, OS&Y pattern. Gate Valves, 2 ½" and larger, shall be iron body, 175 psi working pressure, flanged ends, solid wedge or double disc, OS&Y pattern. Butterfly valves listed and approved for fire service with built-in tamper switches may also be furnished.

All valves controlling fire protection system shall be furnished with tamper switches – including post indicator valves and valves in backflow preventer pits or enclosures located outside the building.

Check valves, 2 ½" and larger shall be iron body, bronze-mounted, 175 psi working pressure, flanged ends, rubber-faced disc.

9. Alarm Valves: Provide U.L. listed flanged or grooved type for vertical riser complete with necessary test and drain facilities. Alarm valve shall be installed complete with gauges, retard chamber and trim piping. Where shutoff valve is installed in water motor gong test line, provide tamper switch on valve. Coordinate with electrical / fire alarm for connection to fire alarm system.

10. Automatic Air Vent: provide at least one automatic air vent near the top of the system piping for each wet sprinkler system in accordance with NFPA 13 requirements.

11. Pressure relief valve: provide ½" pressure relief valve piped to drain to exterior for each wet sprinkler system in accordance with NFPA 13 requirements.

12. Auxiliary antifreeze system: Provide auxiliary antifreeze system to supply sprinkler system piping where included in the scope of work and shown on the drawings in accordance with NFPA 13 requirements. Provide listed reduced pressure zone (RPZ) backflow preventer with expansion chamber to isolate from supply system. Provide testing isolation valve and hose valve for testing backflow preventer. Provide drain valves required by NFPA 13. Provide fill cup at highest point of antifreeze piping. Provide air gap and drain piping for RPZ backflow preventer to discharge at exterior location or where shown on drawings. Antifreeze system shall meet the requirements of NFPA 13

Installing contractor shall be responsible for sealing antifreeze system piping penetrations in outside walls.

Provide pre-mixed antifreeze solution specifically designed for use in automatic sprinkler system piping connected to potable water supply. Pre-mixed solution shall be U.L. listed.

13. Fire Department Connection: Refer to Civil division documents for location and arrangement of the Fire Department Connection. Connection shall be 2-way, polished brass, free standing with polished brass plugs and chains. Threads shall match local Fire Department. Provide polished brass escutcheon lettered "Auto-Sprinkler". FDC location and arrangement shall meet the requirements of the local Fire Department.

14. Sprinkler Heads: Typical heads shall be of the approved automatic spray-type, upright, pendant, or horizontal sidewall. Heads in finished areas shall be white painted; heads in unfinished areas may be bronze. Temperature rating shall be as conditions require. Unless otherwise noted, types shall conform to the following requirements:

a. In all areas with finished ceilings, sprinklers shall be white pendant with 1/2" white recessed escutcheon; or white horizontal sidewall with 1/2" white recessed escutcheon.
b. Provide brass upright sprinklers in areas without finished ceilings.
c. Sprinklers in areas subject to damage shall be installed with head guards.
d. All sprinklers shall be listed as quick response.
e. Sprinklers in NFPA 13 Ordinary Hazard areas may be standard response where quick response type suitable for the space are not available.
f. Pendent sprinklers installed on dry-pipe systems shall be factory pressurized dry-pendent type.
g. Provide special sprinklers as may be indicated on the contract drawings.

15. Tamper Switches: Tamper switches shall be OS&Y type, butterfly type, or indicator post type as required, containing one SPDT circuit switch set to operate within two revolutions of the valve control wheel or when the stem has moved no more than one-fifth of the distance from its normal position. Switch shall have a minimum rated capacity of one amp 125 volt A.C. - .25 amp 24 volt D.C. The unit shall be arranged to cause a switch operation if the housing cover is removed or if the unit is removed from its mounting. Mounting shall not interfere with the normal operation of the valve.

16. Flow Switches: Provide U.L. listed and Factory Mutual approved flow switch at the system riser(s) or other location(s) indicated on the drawings. Provide adjustable retard type set for 20 to 30 seconds with SPDT auxiliary contacts. Flow switch shall be Notifier, Potter Signal, or System Sensor. Electrical/Fire Alarm contractor to provide wiring to central station alarm system under Division 16.

17. Backflow Preventer: Refer to Civil division and Site Utilities drawings for location and arrangement of the backflow preventer for the required sprinkler systems. Identify the size, brand and model of backflow preventer on the sprinkler shop drawings and include the associated pressure loss for the specific backflow preventer in the hydraulic calculations.

Where backflow preventer is not provided under Civil division, provide and install a double check detector assembly (DCDA) at each underground fire service entrance stub-in inside the building upstream of any sprinkler system risers.

18. Hose valves for forward flow testing: where no fire hydrants or other means of forward flow testing are located downstream of the backflow preventer, furnish 2-

1/2”Fire Department hose valves at the sprinkler system riser or manifold. Provide one fire hose valve for each 250 gpm of the maximum flow demand for the system.
.

PART 3 – EXECUTION

1. Field Supervision: The sprinkler contractor shall have a responsible representative of his organization at the site of the work for coordinating this sprinkler installation with other trades as early as is required by the progress of the work. Details of proposed departures due to field conditions and/or requirements of local codes must be approved in writing.

2. Flushing and Sterilization: All sections of the fire protection systems, including building sprinkler and standpipe systems, and all site piping, are to be thoroughly flushed at flow rates and for a period of time as described in NFPA 13 and NFPA 24. After flushing, all piping is to be treated with a biocide specifically designed to combat microbiologically influenced corrosion (MIC). Follow manufacturer’s specific instructions for the treatment procedure. Provide complete documentation of the MIC treatment to Owner upon completion with recommendations for future maintenance of the system.

3. Tests: All Sections of the sprinkler system are to be hydrostatically tested at not less than 200 psi for two hours. Test pressure is to be maintained by a small capacity pump to minimize water damage in the event of a break. Tests are to conform to requirements of NFPA 13, 14, and 24 where applicable with leakage from underground piping not to exceed the quantities therein listed. Perform all tests in the presence of the Architect and
authorities having jurisdiction. Records of all tests are to be made available for Owner's inspection as required. Repair defects disclosed by tests, replace defective materials as required. Contractor shall provide all labor and materials required for the tests, and assume all costs, including those for the repair of damage caused to other work, including the work of other trades. Tests are to be performed only at such times that the ambient temperature throughout the test period will be high enough to prevent freeze-up in any portion of the system and to assure complete drainage afterward. Flushing of piping shall be performed in accordance with NFPA 13, 14 and 24 requirements.

4. Acceptance: The operation of the equipment and the fire protection installation by the Owner does not constitute an acceptance of the work. The final acceptance is to be made after the Contractor has adjusted his equipment, demonstrated that it fulfills the requirements of the Specifications and Drawings, and has furnished all the required certificates.

5. Guarantee and Service: Guarantee in writing to maintain and service the entire

installation for a period of one year from the date of final acceptance of the installation. Consult General Conditions for detailed requirements.

6. Protection during construction: Materials shall be protected during the construction period from corrosion, exposure to the elements and physical damage as required by NFPA Standards, the general conditions of the contract and local authorities.

7. Inspection contract proposal: At the conclusion of the project, installing contractor shall furnish an inspection, testing and maintenance contract proposal to the Owner. The contract proposal shall cover the systems installed and shall be based on the requirements contained in NFPA 25. The contract proposal shall include separate pricing for quarterly, semi-annual and annual inspection options.

8. General Workmanship: Cut accurately to measurement established at site and work into place without springing or forcing, properly clearing all windows, doors and other openings. Route thru previously built in sleeves. Ream all pipes to remove burrs. Make changes in direction and size with fittings (no bushings will be allowed). Cap or plug open pipe ends during installation to keep out foreign material.

Make connections carefully to insure unrestricted circulation and to permit complete drainage of the systems.

Provide valved drain lines throughout the sprinkler system to permit complete system drainage. Provide sprinkler system test pipes and flushing connections. Provide at least one automatic air vent for each wet-system near the high point of the system as required by NFPA 13. All of the above shall be as shown on drawings and/or as required by NFPA and the local authorities. All test and drain connections intended to flow water under pressure shall discharge to the exterior of the building. Drains intended to discharge water at atmospheric pressure may be routed to floor drains or service sinks as approved by Architect.

Refer to, and carefully check the installation against all architectural drawings and details, and note where walls, ceilings, beams and pipe shafts are furred or enclosed. Refer to and check with the contract drawings for the heating, ventilation, plumbing and electrical work and other work of mechanical trades.

Install all piping to be concealed in ceiling or wall construction so as not to cause delay to other work, and to allow ample time for the necessary tests and approval. All piping in areas with dropped ceilings unless otherwise noted on plans shall be concealed above ceilings.

Hang all horizontal piping runs from the structure above, and locate as close as possible to the bottom of HVAC ducts, so as to attain the maximum headroom.

Install swing joints or expansion loops wherever necessary to allow for pipe expansion. Securely anchor pipes connected to expansion loops as required for proper operation.

Covered Loading docks and similar exterior canopies used for temporary storage or handling of combustibles shall be provided with automatic sprinkler protection in accordance with NFPA 13 requirements. Provide auxiliary dry-pipe system or dry-type sprinklers to protect areas subject to freezing.

Take care to prevent contact between pipes and building structure which could cause noises upon pipe expansion and contraction.

9. Joining of Pipe and Fittings: Join Schedule 40 black (galvanized) steel pipe by threaded joints in accordance with ANSI B2.1, by flanged joints, by shop-welded joints in accordance with the requirements of AWS D10.9, Level AR-3, or by mechanical grooved couplings. Grooves on schedule 40 pipe shall be rolled or cut and they shall be dimensionally compatible with the coupling. Pipe end preparation for the grooved couplings shall be in accordance with the manufacturer's recommendations.

Join schedule 10 black (galvanized) steel pipe by shop-welded joints as outlined above, or by roll grooved couplings as outlined above. Do not thread or use cut grooves on schedule 10 pipe.

10. Freeze Protection: Pipes or risers that pass through unheated spaces in or under the Building shall be protected from freezing in accordance with the applicable methods outlined in NFPA13.

11. Excavation and Backfill: As specified in Section 15010.

12. Sleeves and Escutcheons: As specified in Section 15010.

13. Clean-up: At regular intervals remove all refuse and debris accumulated from the system installation.

END OF SECTION 15500

SECTION 15700

HEATING, VENTILATING AND AIR CONDITIONING

PART 1. GENERAL

1.1. **General Provisions:** Section 15010 is applicable in full hereto. No materials or products that contain asbestos, formaldehyde, polychlorinated biphenyl (PCB), lead or mercury, in excess of limits mandated and defined by OSHA, LEED and the EPA, must be utilized.

Do not fabricate any duct or install any pipe or equipment until all coordination has been accomplished. Refer to Section 15010 for coordination requirements.

Manufacturers not mentioned in the specifications require prior approval, seven (7) days prior to bid date. Follow procedures set forth in Division 1 of the specifications. All prior approvals must be submitted through the Architect.

1.2. **Qualifications:** The Mechanical Contractor and the required third party external duct Insulation Contractor must be properly licensed and established at the location of the work and must maintain adequate local service facilities. They must have had previous experience in the satisfactory installation of at least six (6) systems of this type, size, complexity and scope. Each Contractor must have an adequate service facility to provide complete service and maintenance of the facility within 100 miles of the installation.

1.3. **General Scope:** The Mechanical Contractor must furnish and install all equipment, materials and labor required to provide a complete and fully operating mechanical system, even though every item may not be specifically indicated on the drawings or specified.

All advisory provisions listed in the Codes referenced in the Contract Documents must be considered mandatory. In the event of any conflict between applicable Codes, Standards, Listings, Contract Drawings or the Contract Specifications, the most stringent requirements govern. The Contractor must provide, install and comply with whichever imposes the strictest requirement, highest standard and greatest obligation. No exceptions or leniency will be granted. These requirements are intentionally strict to ensure project quality, regulatory compliance, fairness in bidding and protection of the Owner's interests. Non-compliance carries significant risk of financial responsibility, schedule impacts and potential contract default. Bidders and Contractors assume these obligations fully upon participation or award.

Bidders must thoroughly review all contract documents during the bidding period. Any missing information, ambiguities, conflicts, discrepancies, or other issues that could affect accurate pricing must be promptly brought to the Architect's attention in writing before the bid due date. This allows all questions to be clarified, and any necessary corrections made prior to bidding. Failure to identify and resolve such issues before submitting a bid will obligate the Contractor to furnish and complete the work, including any disputed or omitted items, using the specified materials and methods, and the Architect and Engineer's requirements, at no additional cost to the Owner or the Owner's Design Professionals, as directed by the Owner's Design Professionals.

Refer to Section 15010 for additional requirements.

Mechanical items must not be attached to assemblies belonging to other trades. All items must be independently and separately attached to the building's structural system.

The Mechanical Contractor must not install any external duct insulation. All external duct insulation work must be performed by an independent, licensed and experienced third party third party Insulation Subcontractor whose principal business is the sale and installation of insulation materials. Insulation must be installed in strict accordance with the manufacturer's recommendations and these specifications.

Manufacturers or products not specifically named in the specifications require prior approval, which must be requested at least seven (7) days prior to the bid date and submitted through the Architect in accordance with Division 1 and Section 15010.

All penetrations through floors and partitions must be built-in as construction progresses. Where required penetrations in new construction were not built-in as required by the specifications, the Contractor must core drill or saw cut openings sufficiently large enough to accommodate all duct, piping, conduits, firestopping assemblies, related items, etc. without interruption and to allow proper firestopping as required by Code and these specifications.

Prior to installation, all piping must be inspected, upended and thoroughly swabbed clean. All piping must be clean and free of rust at the time of installation. Any dirt or rust resulting from storage or ground contact must be removed. Any piping installed with dirt must be cleaned. Rusted piping must have all rust removed, followed by etching and priming as recommended by the pipe manufacturer and then painted with two coats of black, compatible, rust-inhibiting enamel paint. The use of spray paint is not permitted. Refer to the gas piping section for specific painting requirements. All paint must comply with ASTM E84 for flame spread and smoke developed indices.

Prior to commencement of any backfilling operations, the Mechanical Contractor must take accurate as-built measurements, including all depths and inverts. Centerline locations alone are insufficient. Definitive measurements must be recorded for each underground line entering and leaving the building. **The location of all buried piping must be shown on the record (as-built) drawings and dimensioned from permanent fixed points.**

Architect must select all colors where a choice exists.

1.4. **Contractor Requested Electronic Drawing Files:** Not available.

1.5. **Site Visits:** It is the Contractor's responsibility to have the job ready for site visits when they are scheduled. If the project is not ready for the requested site visit and the Architect, the Engineer, any governmental agency or any other entity requires an additional site visit with the Engineer present, the Contractor must pay Zgouvas, Eiring & Associates a re-visit fee of $2,000. The payment must be made directly to Zgouvas, Eiring & Associates 5 days prior to the scheduled site visit.

Before requesting the final site visit, the General Contractor must provide the Mechanical Engineer and the Architect with a copy of the Mechanical Engineer's above ceiling corrected punch list. The corrected list must be signed and verified by the Mechanical Subcontractors' respective supervisors and the General Contractor to confirm that all items have been resolved. **If any item marked as**

corrected/complete is found to be uncorrected/incomplete during the final site visit, the site visit will be considered a failure, and a reinspection fee will be imposed.

The Contractor is urged to carefully review the extensive requirements of Paragraph Identification and Refrigerant Piping Identification in Section 15010 of the specifications. Note that certain identification is required to be completed before certain site visits. There are specific identification requirements prior to the above ceiling and final site visits, respectively, that are mandatory. The State of Alabama Department of Construction Management (DCM) will cancel on-site, the site visit if not completed as specified. Failure to comply with this provision will be cause for cancellation of the site visit and a fee imposed for the additional site visit, with all costs of the additional site visit to be borne by the Contractor.

1.6. **Record Documents:** Provide in such detail, as is set forth under General and Supplemental Conditions and in Section 15010.

1.7. **Access Panels and Doors in Finished Areas:** Do not locate serviceable items above inaccessible, hard ceilings or in partitions without written approval from the Architect. Coordinate all items locations with the Architectural plans before installing any items. Furnish access panels and doors to the General Contractor for installation wherever required for access to any items requiring maintenance.

Access panels/doors in finished areas or areas exposed to view must be suitable for wall or ceiling finish involved, 24" x 24" unless otherwise indicated or as required to permit removal of equipment and provide acceptable maintenance access. Access panels and doors must be fire rated where rated assemblies are penetrated.

Access panels and doors must be manufactured by Milcor, Elmdor, Zurn, Mifab or approved equivalent. The Architect must approve the use of and type of all panels and doors to be installed in areas that are exposed to view or in finished areas.

Exposed access panels and doors must be factory cleaned and primed for painting in the field. Colors, materials and methods must be as directed by the Architect. Refer to Architectural Section, Painting, for additional information.

For detention and similar institutional type facilities, refer to Section 1122 for type of access panels/doors required.

Refer to Section 15010, Part Access Panels and Doors for additional requirements.

1.8. **Access Panels/Doors for Miscellaneous Areas:** Refer to Section 15010 and above for access doors required for equipment, valves, etc. in exposed/finished locations.

Provide double wall access door in the side of the duct for each fire damper, motorized damper, on each side of duct mounted coils and duct heaters, smoke detectors and elsewhere indicated, specified or required for proper maintenance. Size and position to provide maximum access to all items with minimum 12”x12”.

Typical doors must be double metal faced, 22 ga. steel door panels and 22 ga. frame, internally insulated same as duct (1” minimum) fiberglass insulation, neoprene gasket seal and full length plated steel piano hinges with cam lock. Provide access panels/doors with cam locks only, where hinged access panels/doors cannot be completely opened without obstruction. When access panels/doors are provided with

cam locks only, they must be provided with factory installed safety chain. Access panels/doors must be rated for the anticipated duct pressure, plus 1". All access doors located outside must be airtight and weatherproof.

Hinged access doors must be Ruskin Series ADH22. Removable access doors/panels with cam locks must be Ruskin Series ADC22 with minimum of two cam locks and factory installed safety chain. Nailor Industries Model 08SCL/Model 08SH, Kees ADH/ADC, Greenheck HAD or Pottorff Series HAD/CAD will be acceptable.

For ducts 10" round and smaller, access doors must be flush mounted, flat oval, 1" insulated, low leakage, 20 ga. steel door panels and frame, except with two large hand knobs or cam locks with factory installed safety chain and equivalent to Ruskin Model ADR1 for round ducts or equivalent by Nailor, Greenheck, Kees or Pottorff.

Hinged access doors for round ductwork over 10" must be flush mounted, flat oval, 1" insulated, low leakage, 20 ga. steel door panels and frame, except with two large hand knobs or cam locks with factory installed safety chain and equivalent to Ruskin Model ADR2 for round ducts 12" round up to and including 16" round duct. Nailor Series 0800, Pottorff Series DMR, Greenheck RAD or equivalent by Kees will be acceptable.

Refer to other sections for access doors required in kitchen hood exhaust ducts, moisture-laden ductwork, medium/high pressure, high velocity ductwork, etc.

Refer to Section 15010 for additional access door/panel requirements including Section 15010, Part Identification for identification requirements.

1.9. **Buy American:** Manufacturers of all products, materials, equipment, components and systems specified in Division 15 must comply with the Buy American Act and the American Recovery and Reinvestment Act of 2009 (ARRA) and 2025 Code of Alabama Title 39 - Public Works, Chapter 3 - Use of Domestic Products and Resident Workmen for Public Works, Improvements, Etc.

Exceptions to these requirements will be permitted only where the specified items are proven to be unavailable from domestic U.S. sources. Examples of items that may qualify for exception include variable refrigerant flow (VRF) equipment. Any request for exception must be submitted in writing to the Architect/Engineer for prior approval and must include supporting documentation demonstrating that no suitable domestic product is available. Where three (3) or more U.S. manufacturers can furnish products that meet or exceed the requirements of the Contract Documents, only domestic (U.S. manufactured) products must be provided.

During the submittal phase, the respective manufacturer must provide a conformance letter on the manufacturer's official company letterhead. The letter must be signed by an Officer of the Manufacturer's Board of Directors and must explicitly certify full compliance with the Buy American Act and ARRA. Failure to include this conformance letter with the submittal will result in immediate rejection of the submittal without review.

1.10. **Miscellaneous:** Bidders must visit the site and become acquainted with all job conditions that may affect the work shown on the plans. Report to the Architect, prior to bid, any new or existing conditions that require modifications to accomplish the installation of all items. Provide for required adjustments to complete the intent of the work. No consideration will be given after bid opening for alleged misunderstanding

regarding new or existing job conditions, utility connections, permits, fees, construction documents, etc.

The Contractor must carefully examine the contract documents during the bidding phase. Any missing information, clarifications, etc. in the contract documents that is required to obtain accurate pricing must be brought to the attention of the Architect, **prior to bid date**, so all may be clarified and/or corrected. Failure to identify and resolve any issue prior to bid must require the Contractor to provide said items, complete, without additional cost to the Owner or the Owner's Project Design Professionals, using materials and methods specified by and as directed by, the Owner's Design Professionals.

Refer to Section 15010 for additional requirements.

1.11. **Identification:** The Contractor is urged to carefully review the extensive requirements of Part Identification in Section 15010 of the specifications and note that certain identification is required to be completed before certain site visits**.** There are specific identification requirements prior to the above ceiling and final site visits, respectively, that are mandatory.

1.12. **Painting and Colors:** Furnish to the Architect, color cards for standard and premium colors available. **The Architect must select color where choices exist**. Refer to the Architectural Painting Section of the specifications for additional requirements.

1.13. **Coatings and Finishes:** Pipe hangers, Unistrut pipe supports and duct Unistrut support assemblies of galvanized, zinc and similarly coated items are considered to **NOT** be coated. All must be painted, powder coated, epoxy coated or plastic coated. Hanger rods and associated bolts and clamps on Unistrut assemblies are not required to be painted or coated.

All damaged or rusted steel pipe and all hangers, Unistrut and other support assemblies must be cleaned, primed and painted with two coats of compatible black enamel paint as specified below. Any rusted items must have the rust removed, then etched and primed for painting as recommended by the respective manufacturer. After prepping the surfaces, then paint with two coats of compatible black, rustproof enamel paint. Do not use spray paint.

All paint and coatings must have a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84. See specification Section 15010, Part Identification for detailed requirements.

In lieu of painted surfaces as specified hereinbefore, the Contractor may provide factory fabricated hangers and Unistrut assemblies with rust resistant powder coating, epoxy coating or plastic coating. All paints/coatings/finishes must meet or exceed a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84. Refer to Section 15010 for additional requirements.

1.14. **Safety Provisions:** Provide covers or guards on all hot, moving and projecting items that may be deemed by the Engineer, Architect or Owner to be a hazard to occupants of the building or to service personnel. Provide full size expanded metal grilles over all exhaust/relief air assemblies on all packaged equipment to protect against any intrusion to motorized dampers, gravity backdraft dampers, etc.

1.15. **Spare Parts:** Manufacturer of any equipment specified must have a wholesale outlet for readily available replacement parts in the nearest major USA city.

1.16. **Submittals:** Refer to Section 15010 for **strict requirements** and, especially as it applies to format, project cost constraints, addendums and Value Engineering (VE) items.

Only ONE complete submittal will be accepted. Providing submittals piecemeal is not allowed. If a partial or incomplete submittal is provided, it will be cause for immediate rejection.

1.17. **Firestopping:** Refer to Section 15010, Part 2, "Miscellaneous Requirements to be Coordinated with Other Trades", Paragraph "Firestopping". **Note that Division 15 firestopping specifications require firestopping of all penetrations regardless of wall/ceiling/floor construction. Refer to Division 1 regarding additional requirements.** Where there is a conflict between Division 1 specifications and Division 15 specifications, the most stringent requirements must govern, are applicable and must be provided.

1.18. **Service, Charges, Lubrication, Filters, etc.**: During the guarantee period, the Contractor must furnish all labor, materials, tools and equipment necessary to provide comprehensive service and preventive maintenance for all equipment and systems installed under this Contract, in accordance with the manufacturer's recommendations, applicable industry standards (such as ASHRAE guidelines) and the reviewed Operating and Maintenance manuals.

As a minimum, quarterly service calls must be performed by qualified, factory-trained technicians, with a detailed written service report (including checklists, findings, measurements and corrective actions taken) must be submitted to the Owner and the Architect after each visit. Failure to submit the required detailed service report to the Owner and the Architect after any quarterly service visit will be considered as the specified maintenance not having been provided. In such cases, the Contractor must re-perform the complete quarterly service as specified, at no additional cost to the Owner and subsequently extend the specified warranty an additional quarter. The final quarterly service call must be scheduled no later than two weeks prior to the year-end site visit. Each quarterly service visit must include, but not be limited to, the following:

- Changing of all replaceable filters.
- Cleaning of all washable filters.
- Lubrication of all motors, bearings and moving parts in accordance with manufacturer recommendations.
- Calibration and adjustment of all controls, thermostats, valves, dampers and associated equipment.
- Inspection for refrigerant leaks, verification of charge levels and adjustment to maintain the manufacturer's specified full operating charge.
- Changing of all drive belts, pulleys, drives and other consumable items as required per manufacturer's recommended schedule.
- Thorough cleaning of evaporator and condenser coils, condensate drains and pans, fans and equipment interiors/exteriors.
- Inspection and tightening of all electrical connections, testing of safety controls and devices and verification of proper system operation (including checks for abnormal noise, vibration, or performance issues).

- Recording of key operating parameters (voltages, amperages, pressures, temperatures, etc.) to confirm system efficiency and compliance with design conditions.

Any deficiencies identified during these services must be corrected promptly at no additional cost to the Owner. All maintenance activities must be documented and coordinated with the Owner to minimize disruption. Provide the Owner and the Architect a complete report of all quarterly maintenance provided.

1.19. **Operating and Maintenance Manuals: Two weeks before the final site visit**, furnish three complete sets of operating and maintenance instructions, bound in hard cover, indexed and tabbed.

The Contractor must also provide this information in digital Adobe Acrobat PDF format, on a CD-R CD. The PDF file must be provided with an embedded index for each specified item. The index must appear in the left hand window of the opened document so that the Owner or his maintenance personnel can “click” on the indexed item and move immediately to that specific item.

Minimum requirements for the Operating and Maintenance Manuals must be as follows:

a. The first page of the bound instructions must be a listing of:

    1. The Owner/Project Title.
    2. The Architect and Architect’s Job Number.
    3. The Engineer and Engineer’s Job Number (Found in the Engineer’s Logo in the Bottom Right Corner of the Mechanical Plans and in the footer of this specification section).
    4. The General Contractor and Contact Information.
    5. The Mechanical Subcontractor and Contact Information.

b. Second page must be a Table of Contents listing all products in the order which appear in the specifications and label the tab accordingly. Include all equipment using nomenclature shown on the Mechanical plans, UV-C lights and similar devices, control valves, motorized dampers, fire dampers, etc.
c. The third page must be a summary page that lists each item with its respective warranty, including all extended warranties.
d. All warranty card information must be filled in by the Mechanical Contractor; Serial numbers, Model Numbers, etc. all as required for proper warranty registration. The warranty registration date must be the date of substantial completion as determined by the Architect.
e. Provide copies of all filled in warranty cards.
f. Provide a local source of supply for parts and replacement, including names and telephone numbers of parts suppliers.
g. Provide a general maintenance summary section. Section must be a list of each piece of equipment or device using the designations as shown on the plans and the routine maintenance procedures based on the respective manufacturer’s recommended intervals. As a minimum, maintenance must be grouped and individually tabbed to indicate maintenance operations required:

    1. Once a month
    2. Quarterly
    3. Once every six months

4. Once a year

h. Provide copy of the results of all specified tests.
i. Copy of Test and Balance Report.
j. Copies of all the Mechanical Engineer's Site Visit Reports including Contractor's written response that items listed were corrected.
k. Copies of all certificates of all site visits, comments and approvals from all Governing Authorities.
l. Provide copy of all Division 15 Specifications except Section 15400.
m. Provide a copy of all shop drawings/submittals.
n. Provide drawings of system control and wiring diagrams, condensed operating instructions, specified sequences of operation. Include hard copy in binder and digital copy on CD in PDF format. All components must be numbered and identified on the diagram. Laminate, frame under plastic and mount in each mechanical room in an optimally viewed location.
o. Provide record drawings of the Mechanical drawings, in hard copy and PDF format on CD. Refer to Section 15010, Part 1, General, Paragraph, Record Drawings for detailed requirements.

1.20. **Warranty:** Guarantee work as set forth in Section 15010 and Division 1. Guarantee in writing to make good without cost any defects in materials and workmanship for one year following the date of substantial completion of the project, as determined by the Architect and unless specified otherwise a 5-year warranty on all air conditioning compressors. Provide free maintenance and service during the guarantee period to **include furnishing and replacing of filters and the cleaning of all washable filters.** Refer to other parts for additional requirements and extended warranty requirements.

PART 2. ELECTRICAL WORK AND EQUIPMENT

2.1. **Power:** All power wiring required for installation of equipment is specified under the Electrical Division. Electrical equipment must be compatible with the electrical power shown on electrical drawings. **The Contractor must verify all voltage and power requirements with the Electrical Contractor, Electrical plans and at the project site, prior to ordering equipment.**

2.2. **Motors:** All furnished motors must be new, of current manufacture and designed, manufactured and tested in strict accordance with the latest applicable standards of NEMA, ANSI, IEEE, ASTM, UL, CSA and the National Electrical Code (NEC/NFPA 70). As a minimum, all motors must conform to the current applicable sections of NEMA Standard MG 1.

All motor ratings, efficiencies, torque, horsepower, service factor, temperature rise, bearing life and performance characteristics specified herein must be fully achieved at a base frequency of 60 Hz or lower. Motors must not rely on operation above 60 Hz to meet any specified performance criteria, nor shall the capability to operate above 60 Hz be used to satisfy the minimum requirements of this Section. This requirement applies to all motors, including those intended for use with variable frequency drives (VFDs).

Motors must meet or exceed the full-load efficiency values of the Consortium for Energy Efficiency (CEE) Premium Efficiency™ program (or equivalent NEMA Premium efficiency levels). All motors 1 HP and larger must be premium efficiency type. All motors with a scheduled capacity of less than 1 HP must be electronically commutated motor (ECM)

type as required by ASHRAE 90.1 and must achieve a minimum motor efficiency of 70% when rated in accordance with DOE 10 CFR 431.Premium-efficiency motors must be warranted by the manufacturer for a minimum of 36 months from the date of Substantial Completion of the project, as determined by the Architect.

All motors must be listed by Underwriters Laboratories (UL), Canadian Standards Association (CSA), or other Nationally Recognized Testing Laboratories (NRTL) as applicable and must be suitable for installation and operation in accordance with the requirements of the NEC. Motors must be wound for the specified voltage, phase and frequency. Unless otherwise indicated or specified, motors must have a minimum 1.5 service factor, 1750 RPM speed, open drip-proof (ODP) construction and Class F insulation with Class B temperature rise.

Bearings must be heavy-duty, grease-lubricated ball bearings with a minimum L10 (B-10) rated fatigue life of 150,000 hours for direct-coupled applications and 50,000 hours for belted applications. Belted bearing life ratings must be calculated in accordance with NEMA MG 1 based on the actual radial loads and pulley sizes. Motor loading must not exceed 100% of the motor's nominal horsepower rating.

Routine factory testing must be performed in accordance with IEEE Standard 112, Method B (latest edition) and as described in NEMA MG 1, Article 12.55.

Where shown, specified, or required for the application, furnish increment-wound motors suitable for two-step starting. All motors must be provided with properly sized overload protection and phase loss protection on all three legs. Motors must not be operated until the correct overload elements or settings are installed in the starters. Replacement or adjustment of overload elements to match the motors actually furnished must be included in the work of this Section.

All motors serving outdoor equipment or equipment exposed to weather must be totally enclosed fan-cooled (TEFC) type while still meeting or exceeding all other requirements stated herein.

Approved manufacturers: Regal Rexnord Corporation, Emerson Electric, Franklin Electric, AMETEK, Inc., Baldor Electric Company/ABB, Nidec Corporation, Siemens AG, or ABB Group.

2.3. **Fusing:** Provide factory installed fuses in all equipment requiring fusing for branch circuit protection.

2.4. **Motor Starters:** All motor starters furnished under this Section must be new, of current manufacture and designed, manufactured and tested in strict accordance with the latest applicable standards of NEMA ICS 2, UL 508A and the National Electrical Code (NEC/NFPA 70). As a minimum, all motor starters must conform to the current applicable sections of NEMA ICS 2.

Motor starters must be furnished under this Section. Installation of field-mounted starters is specified under the Electrical Division, except for those that are specified to be factory-assembled with the equipment.

Starters must be listed by Underwriters Laboratories (UL), Canadian Standards Association (CSA), or other Nationally Recognized Testing Laboratories (NRTL) as applicable. Where required for interlocks or control circuits, starters must include a built-in step-down control power transformer.

Motors intended for use with variable frequency drives (VFDs) must be designed and rated in accordance with NEMA MG 1, Part 30.

All motor starters must be wall-mounted at an accessible height from the floor and must be readily accessible for operation and maintenance. Mounting on equipment or Unistrut-type frames is not acceptable.

Provide for each motor or group of motors requiring a single point of control (and not controlled from a motor control center), a suitable motor controller complete with all devices necessary to function as specified for the respective motor(s).

Provide overload protection in each ungrounded conductor for every motor 1/8 HP and larger. Overload protection must be manual reset type unless otherwise indicated. The overload protective device must be integral with the motor starter or controller.

Unless otherwise indicated, furnish pilot lights on all remote starters. Provide "Hand-Off-Auto" selector switches and required auxiliary contacts on all starters.

Auxiliary control devices connected into the control circuit must not bypass any safety controls (motor overload protective devices, high-pressure cutouts, low-pressure cutouts, or other safety devices).

Motor starters must not be operated until the correct overload elements or settings are installed in the starters. Replacement or adjustment of overload elements to match the motors actually furnished must be included in the work of this Section.

Approved manufacturers are GE Vernova, Siemens AG, Schneider Electric, ABB Group, Rockwell Automation, Eaton Corporation, Danfoss A/S, Yaskawa Electric Corporation, Emerson Electric, or Fuji Electric.

2.5. **Equipment Protection**: All fan motors, indoor units, outdoor units, condensing units, packaged units and associated equipment must be provided with surge protection and phase/voltage protection. All surge and phase/voltage protection devices must be new, of current manufacture and designed, manufactured and tested in strict accordance with the latest applicable standards of UL 1449 (for surge protective devices), ANSI/IEEE C62.41, UL, CSA and the National Electrical Code (NEC/NFPA 70). This protection must, at a minimum, safeguard the equipment against:

- Voltage unbalance
- Overvoltage
- Undervoltage
- Phase loss
- Phase reversal
- Incorrect phase sequencing
- Rapid short cycling.

Where available from the equipment manufacturer, the specified protection must be factory-installed by the equipment manufacturer. When such protection is not provided by the equipment manufacturer, the Contractor must furnish and install the following:

- For all three-phase equipment: ICM Controls Model 450A Plus+ or approved equivalent.
- For all single-phase equipment 1/8 HP and larger: ICM Controls Model ICM 492 or approved equivalent.

The Contractor must coordinate with the Owner's maintenance personnel and properly program all adjustable and programmable settings in the protection devices according to the Owner's operational requirements and within the device's capabilities.

Phase and voltage protection is not required on equipment controlled by a variable frequency drive (VFD) when the specified protection functions are inherent within the VFD controller furnished.

2.6. **Controls:** All HVAC controls cabling and wiring must be plenum rated and in EMT conduit (no "whips") or on J-hooks. Above accessible lay-in ceilings, control wiring must be installed on J-Hook assemblies. Above all hard, inaccessible ceilings, in all mechanical rooms and in areas with exposed structure (no ceilings), controls wiring must be in conduit. Do not attach any wiring, cabling or conduits to refrigerant piping.

Do not route control wiring through sleeves containing piping. Do not route any control wiring through or within any ductwork. **All wiring penetrating any exterior wall, interior partition, floor and similar construction must be in conduit with protective grommets on the conduit ends. HVAC outdoor control wiring must terminate above the ceiling in an accessible location. Through base control wiring/conduit is not allowed.**

EMT control conduit must be as specified in the Electrical Division of the specifications and/or as shown on electrical drawings. Minimum HVAC Controls conduit size must be 3/4" in size. All control conduit, power, relays, contactors, transformers, wiring, etc., required for a complete functional system as specified, shown on the plans, or as required to accomplish the specified sequences of operation, which is not shown or specified by the Electrical Division, must be furnished and installed by the HVAC Controls Contractor. This must include all power, interlock control wiring between the various components of the heating, ventilating and air conditioning system, lighting interlocks and all smoke detection system electrical wiring.

Electrical work performed under this Section must conform to requirements set forth in the Electrical Division(s) of the specifications. All wiring must be in accordance with the National Electrical Code and all State and local codes. Coordinate all requirements with the Electrical Sub-Contractor prior to bid and provide all as required.

All thermostat and humidistat boxes must be mounted 46" A.F.F. to the center of the box (ADA height). Where wall mounted CO_2 Sensors are indicated, they must be mounted 58" A.F.F to the center of the box. All wall mounted devices must be provided with hinged, locking metal covers with rounded edges. All equipment

requiring wall mounted devices that use occupancy sensors must be provided with clear plastic hinged locking covers.

Provide drawings of system control and wiring diagrams, condensed operating instructions and specified sequences of operation. Include hard copy in Operating and Maintenance Manuals binder and digital copy on CD in PDF format. All components must be numbered and identified on the diagram. Laminate, frame under plastic and mount in each mechanical room in an optimally viewed location.

All work must be provided by an approved, independent HVAC Controls Contractor whose primary business is the installation and servicing of HVAC controls systems. refer to Section 15920, HVAC Controls (BAS) for additional detailed requirements. where these specifications and the Section 15920, HVAC Controls (BAS) conflict, the strictest application must be provided.

2.7. **Controls and Instrumentation Cable:** Instrumentation cable must be minimum AWG as recommended by the equipment Manufacturer or the HVAC controls system Manufacturer. The most stringent cable requirement must be provided. All wiring, cabling, conduit, connections, etc., must be plenum rated and rated for use at temperatures and conditions expected in the location of mounting. Do not attach any wiring, cabling or conduits to refrigerant piping.

2.8. **Wiring Diagrams:** Furnish to the Electrical Contractor for the specific makes and models of electric-motor operating equipment to be installed. **The Contractor must verify all voltage and power requirements with the Electrical Contractor, Electrical plans and at the project site, prior to ordering equipment.**

2.9. **Modifications:** The cost of any modifications of the electrical power wiring, breakers and/or control wiring conduit, etc. that is required for any items specified in Section 15700, or Section 15920, HVAC Controls (BAS) having electrical power requirements differing from those shown on the electrical drawings and/or as specified, must be the responsibility of the Mechanical Contractor.

PART 3. VIBRATION AND NOISE CONTROL

3.1. **General:** Elimination of objectionable vibration and noise is the responsibility of the Contractor, who must provide all foundations, spring isolators, flexible connections, air chambers, curbs, etc. required thereby. Pay special attention to vibration problems at year end site visit and correct all deficiencies noted.

All items of mechanical equipment must be properly isolated from the structure by means of the Engineer's approved vibration absorbing accessories, foundations or supports.

3.2. **Packaged Rooftop Heat Pump Units and Packaged Rooftop Heating and Air Conditioning Units:** All equipment and curbs must be installed level and plumb. Provide factory fabricated equipment with spring vibration isolators as required to properly mount units to roof structure. **Coordinate this requirement with the Architect and Roofing Contractor prior to bid.** The assembly (packaged unit attached to curb) must be furnished and installed by the Contractor to withstand the minimum wind loads prescribed in IBC Section 1609 and IMC 301.12. Coordinate all requirements with the Structural Engineer prior to installation. Frame must be steel, with adjustable spring vibration isolators designed to mate the bottom perimeter of

the equipment, to receive the roof flashing and to form a weatherproof duct connection and entry into the conditioned space. It must have pressure treated wood nailers to receive the roof flashing and be completely insulated. The top of all roof curbs must be level with pitch built into curb when deck slopes 3/8 of an inch per foot or more. Coordinate with architectural and structural plans for required slope. Do not route power through the curb. Coordinate requirement with the electrical plans and electrical Contractor and provide as specified. **Do not route power or control wiring and conduit through the curb.** Coordinate roof curb and interface in the building roofing system and verify minimum net height to be as required by Code and the Architect. Coordinate all curb requirements with the roofing Contractor and provide as recommended so as not to void roofing warranty. See plan details for additional requirements.

3.3. **Sound Levels:** Sound levels caused by operation of pumps, fans, air handling systems, etc., whether generated within rooms or transmitted to rooms through ducts, walls or floors, pipes, etc., must not exceed specified NC rating at any point within room not more than 6 feet from an air outlet in accordance with ASHRAE octave band method. Offices, classrooms, conference rooms, libraries and similar spaces must have maximum NC-25; kitchens, corridors, cafeterias and lobbies, NC-35; toilets, NC-40.

PART 4. TESTING, START-UP, BALANCING, ETC.

4.1. **General:** Conduct tests upon completion of the heating, ventilation and air conditioning installations and at times as designated by the Architect. Furnish written reports to the Architect of all tests results. Provide copies of all test results in the Bound and Framed Instructions specified hereinbefore. Furnish all necessary personnel, test instruments, power, fuel, etc., as required to complete the specified requirements.

4.2. **Refrigerant Piping Testing:** The Mechanical Contractor must provide two tests for the refrigerant piping installation. The medium used for pressure testing the refrigerant system must be oxygen-free nitrogen, helium or argon. Oxygen, air, combustible gases and mixtures containing such gases must not be used as a test medium. Systems erected on the premises with tubing not exceeding 5/8 inch outside diameter must be allowed to use the refrigerant identified on the nameplate label or marking as the test medium.

The refrigerant piping system must be tested as a whole, or separate tests must be conducted for the low-pressure side and high-pressure side of the piping system. The refrigerant piping system must be tested in accordance with both of the following methods:

Test 1: The system must be pressurized for a period of not less than 60 minutes to not less than the lower of the design pressures or the setting of the pressure relief device(s). The design pressures for testing must be the pressure listed on the label nameplate of the condensing unit, compressor, compressor unit, pressure vessel or other system component with a nameplate. Additional test gas must not be added to the system after the start of the pressure test. The system must not show loss of pressure on the test pressure measuring device during the pressure test for a minimum 24 hours.

Test 2: A vacuum of 500 microns must be achieved. After achieving a vacuum, the system must be isolated from the vacuum pump. The system pressure must not rise above 1,500 microns for a period of not less than 60 minutes.

Where using refrigerant as a test medium as specified above, the test pressure must be not less than the saturation dew point pressure at 77°F.

As required by IMC 1110.8, the installation Contractor must issue on his company letterhead, to the Local Code Official and the Authority Having Jurisdiction, a certificate of testing for all systems containing 55 pounds or more of refrigerant. The certificate must give the unit number as shown on the plans, the test date, name of the refrigerant, test medium and the field test pressure applied to the high pressure side and the low-pressure side of the system. The certification of the test must be signed by the installation Contractor.

4.3. **Ductwork for Systems Less Than 2,000 CFM:** The Mechanical Contractor must test all supply, return, relief and outside air, exhaust ducts, plenums and casings and make substantially airtight before covering with external insulation or concealing masonry. Substantially airtight must be construed to mean that no air leakage is noticeable to the senses of touch or sound at joints.

4.4. **Ductwork for Systems 2,000 CFM or Greater:** The Mechanical Contractor must test all supply, return, relief and outside air, exhaust ducts, plenums and casings and make airtight before covering with external insulation or concealing in masonry. Test supply ductwork under the positive pressure for the respective system. Test return and exhaust ducts, plenum and casing under a positive pressure of 0.75“WG. The maximum allowable leakage must be 10%. Vacuum clean ducts, plenums, casings and coils. Demonstrate operation of fire dampers before testing and starting. Check that flexible connections are installed in folds (not pulled tight) and not transmitting vibration.

4.5. **Type I Kitchen Hood Exhaust Ductwork Testing:** The Mechanical Contractor must test the kitchen hood exhaust ductwork. Two tests must be performed as outlined below.

A smoke machine must be provided to generate a non-corrosive effluent at the bottom of the duct system; whereby natural upwards drafts will pull the smoke to the top of the duct system. **DO NOT USE SMOKE BOMBS.** Once the smoke has reached the top of the duct run, cap the duct securely and inspect all joints for leakage. Upon detection of smoke leakage, weld all leakage points and re-test the entire system.

Additionally, a light test must be performed to determine that all welded joints are liquid/air tight. The light test must be performed by passing a lamp having a power rating of not less than 150 watts or 1,800 lumens LED light through the entire section of ductwork to be tested. The lamp must be open so as to emit light equally in all directions perpendicular to the duct walls. The test must be performed for the entire duct system, including the hood-to-duct connection. The ductwork may be tested in sections, provided that every joint is tested.

4.6. **Type II Dishwasher Exhaust Ductwork:** The Mechanical Contractor must test the dishwasher ductwork. A light test must be performed to determine that all brazed joints are liquid tight. The light test must be performed by passing a lamp having a power rating of not less than 150 watts incandescent or 1,800 lumens LED light

through the entire section of ductwork to be tested. The lamp must be open so as to emit light equally in all directions perpendicular to the duct walls. The test must be performed for the entire duct system, including the hood-to-duct connection. The ductwork may be tested in sections, provided that every joint is tested.

4.7. **Testing of all Fire Dampers:** The Mechanical Contractor, with assistance from the Testing and Balancing Contractor, must test all fire and smoke dampers and verify installation of access panels to each damper. Test all fire dampers by cutting/releasing holding mechanism and verify that dampers close properly. Install new fusible links after testing each fire damper. Test activation of smoke dampers and required interlocks with smoke. Certify in writing that all dampers have been checked and perform correctly.

4.8. **Testing of Smoke Detectors:** The Mechanical Contractor must attend the testing of all smoke detectors which are a part of the mechanical system. A smoke machine is required to be used for testing the smoke detectors. Anything other than a smoke machine is not allowed. Coordinate the provision of the smoke machine three days prior to the day of testing with the Electrical/Fire Alarm Contractors and provide as required. **If a smoke machine is not present at the time of testing, DCM and/or the Engineer, as applicable, will cancel on-site, the site visit and a reinspection fee imposed, with all costs of the re-inspection to be borne by the Contractor.**

The Mechanical Contractor must provide an access door/panel, watertight where required, adjacent to each smoke detector to allow for maintenance and visual inspection. Access panels must be as specified hereinbefore.

4.9. **Domestic Water Circulating System:** The Testing and Balancing Contractor must test and adjust domestic water recirculation system to ensure hot water circulation in all mains. Provide flow rate of pump and determined head.

4.10. **Performance Tests:** After cleaning, balancing and testing are completed as specified, test each system as a whole to see that all items perform as integral parts of the system and that temperatures and conditions are evenly controlled throughout the building. Verify all sequences of operation and submit report. Make corrections and adjustments as necessary to produce the indicated conditions.

All work must be performed by an independent test and balancing agency whose primary business is the testing and balancing of heating and air conditioning systems and its related components. The Test and Balancing Contractor must hold a current NEBB or AABC certification. Proof of certification must be provided at the submittal stage.

The test must cover a period of not less than three days and must demonstrate that the entire system is functioning properly. Provide the following:

Date of testing, space temperature and humidity, outdoor air temperature (DB & WB), air temperature entering condenser coil; and load amperes for all motors. Also, provide CFM readings at all grilles, registers and diffusers and entering and leaving air temperatures at each evaporator coil.

Provide a typed list indicating job setting of all automatic controls. Include settings of thermostats, humidity controls, CO_2 sensors, safety controls, minimum damper settings, fire-safety thermostats, pressure controls, temperature controls and other similar items. Tabulate to show type of control, location, setting and

function. Verify that all safety settings and limits are appropriate and comply with current safety Codes and Regulations for the respective system.

After building is occupied, adjust as requested by Owner.

4.11. **Balancing:** The Testing and Balancing Contractor must check airflow at all supply air, return air and exhaust air devices, all diffusers and outside air intakes with a recently calibrated direct-reading velocity instrument. Adjust systems to deliver, supply air, return air, outside air and exhaust air quantities to within 10 percent of the indicated amounts. Provide instruments and otherwise assist the Architect in checking balancing at final site visit.

4.12. **Settings:** Contractor must permanently mark the settings of all valves, dampers and other adjustment devices in a manner that will allow the settings to be restored. If a balancing device is provided with a memory stop, it must permit the closing and reopening of the device to its balanced position.

4.13. **Unit Protection Verification:** The Test and Balance Contractor, with cooperation from the Mechanical Contractor, must verify that all phase protection specified has been installed where specified and installed per the Manufacturer's requirements. The verification of this requirement must be furnished in tabular form with findings included in the test and balance report. The summary must list all equipment specified to have the protection, verification that the device is installed per the Manufacturer's recommendation and has been programmed to the Owner's requirements.

4.14. **Test Data:** The Testing and Balancing Contractor must submit typewritten report as specified above. Include schedules of readings taken during the testing and balancing operations and a line diagram or plan of the system indicating specified quantities and final balanced quantities **seven (7) days prior to final site visit**. **The Alabama Department of Construction Management (DCM) will cancel on-site, the site visit if the test and balance report has not been submitted as specified.** Failure to comply with this provision will be cause for cancellation of the site visit and a reinspection fee imposed, with all costs of the re-inspection to be borne by the Contractor. No final site visit must be made without this data. Report the required or specified reading, the first reading taken and final balanced reading for the following items:

Fans: Size, type, fan motor speed in rpm, outlet velocity in fpm, static pressure inches water, air quantity in cfm and motor load in amperes.

Air Handling Equipment: Size, type, fan speed in rpm, outlet velocity in fpm, external static pressure inches water, total static pressure inches water, air quantity cfm and motor load in amperes.

All Air Outlets and Inlets: Size, velocity in fpm and air quantity in cfm.

Coils: CFM, size, face velocity in fpm; air temperature entering coil and air temperature leaving coil, wet-bulb and dry-bulb degrees F.

Refrigerant Hot Gas Reheat Coils: The Mechanical Contractor, with assistance from the Testing and Balancing Contractor, must adjust the humidistat so that the hot gas reheat coil valve opens. Verify modulation of the coil valve. Provide coil size, face

velocity in fpm; air temperature entering coil and air temperature leaving coil, wet-bulb and dry-bulb degrees F.

Ducts: Size, velocity in fpm and air quantity in cfm.

Heat Pumps Auxiliary Heaters: Provide heater capacity (KW), amperage loads and number of stages of heat and/or verify SCR control as applicable.

Electric Duct Heaters: Size, face velocity in fpm, air temperature entering and leaving air temperatures and load amperes. Provide verification that SCR control is properly set up and operates correctly.

Air Cooled Condenser Sections of All Outdoor Units: Air temperature entering condenser coil; refrigerant suction temperature and pressure at compressor and evaporator coil; condensing temperature and pressure and load amperes for all motors.

Kitchen Hood and Related Fans: CFM, size, face velocity at exhaust entry into filters with filters installed and with filters removed, CFM to A/C and make-up air plenum for each run out and exhaust CFM at each hood collar. Include duct and collar pressure drops.

4.15. **Control Settings:** In cooperation with the HVAC Controls Contractor and/or the Mechanical Contractor as required, must calibrate, adjust and verify sequences of operation and the control systems, including the refrigerant hot gas reheat coils, to show that the requirements of these specifications have been met.

Verify all specified sequences of operation and provide report.

Provide a tabulation of setting on all controls indicating set point and throttling range, etc. after controls and systems have been finally adjusted. Include settings on safety controls and cutouts. Verify that all safety settings and limits are appropriate and comply with current safety Codes and Regulations for the respective system. Provide a typed list indicating job setting of all automatic controls. Include settings of thermostats, humidity controls, CO_2 sensors, safety controls, minimum damper settings, fire-safety thermostats, pressure controls, temperature controls and other similar items. Tabulate to show type of control, location, setting and function. Verify that all safety settings and limits are appropriate and comply with current safety Codes and Regulations for the respective system.

4.16. **Seasonal Adjustments:** At the beginning of the first heating season adjust and balance operating phases and repeat at the beginning of the first cooling season or vice versa as requested by the Architect or Owner.

4.17. **Notification:** Notify the Architect one week prior to all testing. The Contractor must provide all testing equipment and must furnish written reports to Architect of all tests results. Additionally, provide copies in the Bound and Framed Instructions specified hereinbefore.

PART 5. SHEET METAL DUCT WORK (LOW VELOCITY 2" S.P.)

5.1. **General Scope:** Provide as shown and as required for the air conditioning, heating and ventilation systems. Make changes in dimensions, offsets or crossovers as

necessary to clear piping, lights and structural members and to maintain scheduled headroom. Provide all accessories required. Refer to architectural drawings and specifications.

All exposed internally lined or double wall ductwork must be provided with paint grip finish or must be primed in the field to receive paint. Refer to Architectural section "Painting" for painting of exposed ductwork. In case of the absence of painting requirements in the aforementioned Specification Section(s), the interior and exterior of ductwork visible from any finished space must be cleaned, primed and painted with two coats of paint as directed by the Architect.

Ductwork visible through all grilles, registers, diffusers, ceilings, etc. must be painted flat black with paint having a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84.

5.2. **Protection of Interior of Duct from Debris:** ALL open portions of ductwork must be covered with a self-adhesive film or airtight sheet metal caps to prevent the intrusion of contaminates. All duct taps, duct take-offs, etc., must be protected immediately after the tap, take-off, etc. has been fabricated in the field. When sections of sheet metal are delivered to the facility for fabrication in the field, which cannot be protected with the specified material, the sheet metal must be covered with Visqueen. Prior to erecting the same, ductwork must be manually cleaned to remove all dust, dirt and construction debris. All ductwork must be erected clean.

After each section of ductwork is erected, immediately protect all openings as specified herein before. In effect, there must be no ductwork opening that is exposed to the ambient air. The material must be a minimum 3-mil thickness and have a minimum tensile strength of 10 psi. It must be UV resistant, waterproof and recyclable. Material must be DuroDyne Dyn-O-Wrap or approved equivalent. **Any ductwork discovered to be unprotected as specified is subject to immediate rejection for use on this project.**

5.3. **Protection of Interior Ductwork and Equipment When Any Air Moving Equipment is Operating During Construction and Prior to Owner's Occupancy:** It is the Mechanical Contractor's responsibility to ensure the inside of each air handling unit and associated air distribution system is kept clean and not allow construction dust to infiltrate the system. Should the system become contaminated as determined by Architect, Engineer or Owner, the Mechanical Contractor must be responsible for cleaning.

If air moving equipment must be used during construction, temporary filtration media with a Minimum Efficiency Reporting Value (MERV) of 8, as determined by ASHRAE 52.2 and must be installed at each return air grille, return air register, exhaust grille, exhaust register and unit return air inlet.

The General Contractor must make a written request to the Architect for permission to temporarily operate any equipment during construction. The request must be made a minimum of seven (7) days prior to the desired date of the interruption. Do not operate any equipment without the Architect's written approval.

5.4. **Sizes:** Take measurements at job and fit work into available space. Report to the Architect any unworkable conditions encountered and alter layout or duct sizes as directed without additional cost to the Owner or the Owner's Project Design Professionals. Unless otherwise approved, conform to dimensions indicated. Duct

dimensions shown indicate NET FREE AREA after installation of duct liner; increase sizes indicated to allow, therefore.

5.5. **Sheet Metal:** ARMCO, or equal, prime quality, G-90 galvanized sheet steel conforming to ASTM A653. Unless indicated otherwise on the plans, gauges must be as recommended in SMACNA "Duct Construction Standards", 4th Edition, 2020 **but in no case must be less than listed in the table below for the respective duct largest dimension or diameter**. **No 26 gauge ductwork is allowed unless specified otherwise.**

4 to 18 inches	24 ga.
19 to 30 inches	22 ga.
31 to 42 inches	20 ga.
43 to 84 inches	18 ga.
Over 84”	16 ga.

For stainless steel or aluminum ductwork, duct gauges must be as defined in SMACNA HVAC Duct Construction Standards - Metal and Flexible, 4th Edition (2020), Chapters 2 and 3, Tables 2-1 through 2-33 for stainless steel ductwork. No 26 ga. ductwork is allowed. Minimum required gauge is 24.

5.6. **Acceptable Manufacturers:** McGill Airflow, Southeastern Metals (SEMCO), Hamlin Sheet Metal, ECCO Manufacturing, Conklin, Spiral Systems Inc, Hranec or Eastern Sheet Metal, Inc.

5.7. **General Fabrication:** Construct and erect in a skillful manner, meeting requirement of the current SMACNA "HVAC Duct Construction Standards”, 4th Edition, 2020 for 2” static pressure unless noted or specified otherwise. **Where conflicts occur between current SMACNA requirements and the contract drawings or these specifications, the most stringent requirements must apply. In general, the heaviest gauge metal and the strictest installation/fabrication methods must be provided.**

Form straight and smooth on the inside, with joints neatly finished. Make up in sections of such length that mechanic can reach through the open end to seal insulation at previous joint. Assemble and anchor to be completely free from vibration and drumming under all conditions of operation.

Make takeoffs at round and rectangular ducts with factory fabricated round-to-rectangular and rectangular-to-round transitions as applicable.

Do not make any supply, return or exhaust air branch takeoffs from the bottom or top of the respective supply, return or exhaust air main ducts. All take-offs must be made from the sides of ducts unless absolutely necessary.

All rectangular ductwork traverse joints over 23” must be made with all metal DuctMate joints system manufactured by DuctMate Industries, Inc., Quikduc Transverse Duct Connection Systems or Duro Dyne Dyn-O-Mate. DuctMate system must be installed in strict accordance with current SMACNA and Manufacturer's recommendations and instructions.

Where ductwork penetrates non-rated partitions above the ceiling or insulation support/attic air barriers, draft stops and similar partitions, the openings must be sized as required for duct and insulation, plus 2” and sealed as specified below.

Provide duct supports as specified within 12” of each side of the partition penetrated. **DO NOT ALLOW DUCT TO REST ON PARTITION WALLS**.

Demolish and modify existing roof, walls, floors, partitions and ceilings as required to accomplish the required work. Remove existing ductwork, valves, hangers, supports, existing piping, etc. and saw cut or core drill new and existing floors, walls, partitions, ceilings, etc., as required to install new piping, duct, etc. Do not reuse any existing hangers, supports, valves, piping, duct, etc. All items must be new. All roofing work must be provided by the roofing Contractor. Roofing work required for existing roofs must be by the roofing Contractor that provided warranty.

All penetrations of new floors and partitions are required to be built-in as work progresses. All penetrations of new construction that were not built-in as required by these specifications and all new penetrations of existing floors, walls and partitions must be core drilled or sawcut large enough to allow all conduits, piping, ductwork, firestopping assemblies, etc., to continue uninterrupted and to provide proper firestopping of the penetration as required to install new items as shown and/or specified.

Coordinate demolition, installation, penetrations and repairing/rebuilding of items with General Contractor. Reconstruction and repair of the new/demolished/modified items must be as directed by the Architect and these specifications.

Where duct penetration occurs at non-rated assemblies, the gap around the penetration must be 2”. Any penetration larger than 2” must be neatly filled to the 2” mark using the same materials used to construct the penetrated assembly. Thereafter, any penetration between the assembly and the duct must be filled with fire resistant mineral wool insulation and sealed on both sides of the assembly with a fire stopping compound to prevent the passage of smoke and fire. After sealing, provide a 2" wide, 16 gauge galvanized steel closure plate around the penetration on each side of the assembly. Closure plates must fit snugly to the duct and must be secured to the wall. All ductwork and closure plates that are exposed to view in finished areas must be primed and painted as directed by the Architect. **Do not install closure plates until Engineer or Architect has verified the proper sealing of the penetration. If closure plates are installed prior to the Architect’s or Engineer’s inspection, the contractor must remove them to verify proper sealing as specified above.**

Where penetration occurs at rated assemblies, provide appropriate fire damper and install as specified and detailed.

Provide additional supports to raise ductwork off any metallic item above the ceiling. Wherever any bare metallic piping, conduits and metallic structural members are in contact with externally insulated duct or bare sheet metal duct, there must be dielectric separation provided. The Contractor must provide 3/4” thickness, **unslit** AP Armaflex insulation of sufficient inside tubular diameter to snuggly and completely cover the respective metallic item. The insulation must extend the full length of the affected area plus 6” on both sides. Refer to Part “Pipe Insulation and Miscellaneous Insulation Work” in this division for AP Armaflex material specification. The use of Rubatex insulation between piping and the ductwork will only be allowed when providing the proper supports is not an option.

Refer to Paragraph “Hangers and Supports” in this Section 15700 for additional requirements.

5.8. **Cross-Joints, Seams, Stiffening and Sealing:** Join and stiffen with combination of joint types, connectors and structural angles that are a minimum of two gauges heavier than the duct for the sizes shown as recommended in current SMACNA "HVAC Duct Construction Standards", 4th Edition, 2020. **Cross break all flat areas over 35 inches wide.** Install internal ends of slip joints in the direction of flow.

All transverse joints with long dimension over 23" must be made with all metal DuctMate joints system manufactured by DuctMate Industries, Inc., Quikduc Transverse Duct Connection Systems or Dyn-O-Mate with roll-formed flanges, corner pieces, gasket and cleat. The system used must be installed in strict accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, 4th Edition (2020) and Manufacturer's recommendations and instructions.

Make all cross joints and all branch, grille and diffuser take-offs, except DuctMate joints, air tight by applying fibrated, low VOC, LEED v4 (UL 2818) compliant duct sealer. Sealer must meet and pass UL 181B-M, ASTM G21 (fungus resistant), ASTM D5590, NFPA 90A/90B and EPA/NSF/ANSI regulations. Sealer must meet the requirements for the pressure classification of the ductwork installed.

The sealant must be Hardcast Iron Grip 601, Duro Dyne Duro Seal EDS-RS, Design Polymerics DP1020 or United McGill Uni-Mastic 181.

5.9. **Branch Ducts to Diffusers:** Round runouts to diffusers, up to and including 14” round, must be 24 ga., G-60 galvanized, DuctMate Series GreenSeam +Snap Lock pipe with factory sealed longitudinal and transverse gaskets. Gasket for GreenSeam +Snap Lock pipe must contain antioxidants, fungicides, adhesion promoters, zero VOCs and must meet or exceed ASTM E-84 test requirements. 16” round to 20” round runouts must be 24 ga. and equal to DuctMate Series Reeves Lock Pipe, G-60 galvanized pipe.

5.10. **Branch Duct Take-Off:** Provide at all points where branch ducts take off from trunks and where ducts divide. Refer to details on the drawings. Damper must be minimum 22 Ga., G-90 Galvanized steel with 2” build out. Body must be a minimum of 24 Ga., G-90, galvanized steel with 4” W.G. construction. Fitting must have 1” flange with corner clips, pre-punched mounting holes and adhesive coated gasket. Take-off must be Flexmaster LDS, BO3, GSI HETO, HTS2, Elgen HETO or Crown 3300-DS2.

5.11. **Turns and Transitions:** Fabricate turns with an inside radius equal to width of duct. At 90-degree turns, Contractor may substitute square elbows, with standard factory-made, multiple, double-blade constructed vanes. Vanes must be a double wall, true airfoil contour with smoothly rounded entry nose with extended trailing edge. Vanes must be formed from a single piece of 26 ga., hot dipped galvanized steel and must be 3” radiused vanes on 2.4” centers. Vanes must be provided with two (2) tie rods and continuous internal tubes for stiffening and rigidity. Maximum pressure drop must be .06” W.G. at 1500 FPM. Generated sound power level must not exceed 54 decibels in band 4 at 2000 FPM (24”x24” duct size). **Single wall turning vanes are not allowed.** Vanes must be manufactured by Aero/Dyne Series HEP, Duro Dyne HTV/DHV, DuctMate, Hamlin Sheetmetal or Spiral Systems Inc. Avoid abrupt changes in shape, with a slope of 4:1, the minimum allowed.

5.12. **Fire Dampers:** Provide dynamic type fire dampers where shown on drawings and in each penetration of rated assemblies, firewalls, floors and other fire barriers in accordance with NFPA Code 90A. Penetrations through barriers with fire resistance

ratings less than 3 hours must be protected by 1-1/2 hour rated fire dampers in accordance with UL 555. Penetrations through barriers with fire resistance ratings of 3 hours or more must be protected by 3 hour rated fire dampers. Install in such manner that fusible links can be replaced. Employ UL listed links rated at 165°F (212°F within 10 feet of a heating coil). Dampers must be classified as dynamic closure to 2000 fpm and 4 inches w.g. static pressure.

All fire dampers must have 100% free opening with no part of the blade stack or damper frame in the air stream. Installation must be in accordance with the applicable conditions of the UL listing, for which shop drawings must be submitted for review.

Typical fire dampers must be dynamic type, UL labeled, 304 stainless steel with required hardware, minimum 1-1/2 hour rated, (higher where required), with Type B, 304 stainless steel wrapped around low resistance constant force or 301 stainless steel spring clip type frame and blades with 16 ga. factory sleeves and angles.

Fire dampers that are greater than 36”x24” must have minimum 14 ga. sleeves and angles.

Install in accordance with all applicable conditions of the UL listing, for which data sheets must be submitted for review. At internally insulated ducts, size dampers for gross duct size, so that liner butts into damper frame surround.

At typical ducts, provide 16 ga. sleeves as specified above that are secured in the opening with fire damper gauge thickness “Fast Angles” on both sides of the fire damper location and around all four sides of the penetration.

Size structural openings so that space between sleeve and floor, wall, etc., is not less than 1/8” per linear foot of duct or more than 1/2”. Secure ducts to sleeve with strictest requirements per detail, UL listing and current SMACNA requirements. After installation test by releasing the holding mechanism. Verify proper closure of each fire damper. After testing, replace holding mechanism.

Ductwork in fire-rated floor-ceiling or roof-ceiling assembly system with air ducts that pierce the ceiling of the assembly must be constructed in conformance with designs in UL Fire Resistance Directory. In general, ducts must be encased in fire rated material.

Manufacturer must be Ruskin Series DIBD2SS/DIBD23SS as applicable. Greenheck Series SSDFD-150/SSDFD-350, Nailor Series D0120/D0520 with stainless steel option, Pottorff VFD-10D-B/VFD-30D-B with stainless steel option or Air Balance D19B/D319B with stainless steel option. Ruskin is the basis of design.

5.13. **Motorized Dampers Used with Automatic Controls:** See Controls at the end of this Section 15700.

5.14. **Volume Dampers:** For round ducts less than 12” diameter and rectangular ducts less than 12” in height in either dimension: Class 1A leakage, single leaf, blade constructed with 20-gauge galvanized metal frame and locking type control quadrant, single center U-bolt and pivot rod extending through opposite side of duct with brass bushing at both ends. Dampers must be manufactured by Ruskin MD-35, United Enertech MD-105, Greenheck MBD-10, Nailor 1820 or Pottorff CBD-01.

5.15. **Volume Dampers:** For round ducts greater than or equal to 12" diameter or rectangular ducts greater than or equal to 12" height in either direction, provide opposed blade, airfoil blades of 16 ga.-galvanized steel mounted in steel frames by 3/8" steel trunnions riding in brass bushing with dual U-bolts. Blade width must not exceed 10 inches, and individual blade length must not exceed 48 inches. Extend one trunnion to permit operation from outside the duct. Provide manually operated dampers with cadmium plated steel locking quadrant. Dampers opening to the outside must have felt edges. Dampers must be manufactured by Ruskin MD-35, United Enertech MD-105, Greenheck MBD-15, Nailor 1120 or Pottorff CBD-01.

5.16. **Stand-Off Mounting Brackets:** Locking-type quadrant operators for dampers, when installed on ducts to be externally insulated, must be provided with standoff mounting brackets, bases and adapters as required to provide clearance between the duct surface and the operator not less than 2" greater than the thickness of the insulation. Standoff mounting items must be integral with the operator or standard accessory of the damper Manufacturer as specified above.

5.17. **Duct Instrument Test Holes:** Provide for each system four test holes (two in supply duct and two in return air plenum) at opposite ends near air handling units with screwed caps. For duct mounted coils and electric duct heaters provide one on each side of the coil or duct heater.

5.18. **Flexible Canvas Connections and Bonding Jumpers:** Install so that the cloth is in folds (not drawn tight). Connect all ducts to air handling equipment and fans, except dome type fans, with preassembled flexible connection. Fabric width must be 6" for all air handling equipment. Ceiling mounted exhaust fans and VAV terminal units may be 4" width.

Connectors for all air handling equipment must be a factory fabricated and assembled unit with 6" dual fabric, heavy duty, 20 oz/sq. yd polyester/polyester fabric with flame resistant coating and mildew resistant per ASTM G-21. The assembly must comply with NFPA 701, NFPA 90A, NFPA 90B and ASTM E-84. The unit must be constructed of a minimum of 24 ga. galvanized steel meeting ASTM A-653-94-G60. Metal to fabric connectors must be double locked, airtight and waterproof to 10" W.C. positive pressure and 10" W.C. negative pressure. The assembly must be DuctMate PROflex with power lock connection or approved equivalent by DuroDyne.

Flexible connections for ceiling exhaust fans must be preassembled flexible connection of 29 ounce fire-resistant, neoprene coated glass fiber cloth equal to Ventfabrics "Ventglas" (4" fabric width) and manufactured by Ventfabrics, Wiremold or Thermaflex.

Externally insulate all flexible connectors to prevent condensation with 2" thickness external duct insulation as specified later in this section. **Do not insulate flexible connectors until the installation of the below specified bonding jumper has been verified.**

Prior to insulating the canvas connector, provide copper jumpers across all flexible connectors taking care that jumpers do not bind flexible connections. Provide compression lug and grounding connector screwed into the duct with one (1) screw, on both side of the flexible connector. Bonding wire must be minimum shielded 12 AWG.

5.19. **Miscellaneous Bonding/Grounding of Metallic Items:** Wherever any bare metallic piping, conduit, structural elements or any other metallic assembly is in contact with externally insulated duct or bare sheet metal duct, bonding/grounding must be provided. The Contractor must provide 1/2" thickness, unslit AP Armaflex insulation of sufficient inside tubular diameter to snuggly and completely cover the respective metallic item. The insulation must extend the full length of the affected area. Where channel shapes are used, orient the open side of the Unistrut assembly down. Materials that are not supported by Unistrut, sheet Armaflex, must be used provided it is properly attached to the duct or affected items. Refer to Part "Pipe Insulation and Miscellaneous Insulation Work" for AP Armaflex material and installation methods specification.

5.20. **Register and Grille Connections:** Where take-offs are in the side of a duct, clinch lock short tee sections onto trunk. Install collars with slip joints and 3/4" flange at outlet end. At sheetrock and other hard surfaces, set the collars exactly flush with surface.

Install boots above lay-in ceilings simultaneously with ceiling work.

At return air, relief air and exhaust air grilles 36" or more in either dimension, collars must be 1" x 2" x 1/8 inch steel angle frames with corners mitered, welded and ground smooth. Frames in the ceiling must be independently suspended from the ceiling structure, or the duct must have special reinforcing to prevent sagging of the boot.

The interior of all ductwork visible through grilles and diffusers must be painted flat black with paint having a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84.

5.21. **Hangers and Supports:** **Duct hangers must NOT penetrate the external insulation vapor barrier. All duct hanger materials must be external of the insulation materials, insulation jacket and vapor barriers. All vapor barriers must be continuous and without penetrations.** All supports, assemblies, related components, attachments and required appurtenances must be sized for a minimum of 300% (3 times) the anticipated load carried by the respective assembly. Where the Contractor has doubts about proper supporting requirements, he must consult with and seek the guidance of the Architect and the Structural Engineer.

Where duct supports are specified to be a Unistrut assembly, the Unistrut must be painted, powder coated, epoxy or plastic, same as specified above and in Section 15010, Part 4, Para. Coatings and Finishes. Duct Unistrut support assemblies of galvanized, zinc and similarly coated items are considered to **NOT** be coated. All must be painted, powder coated, epoxy or plastic coated. Hanger rods and associated bolts and clamps on Unistrut assemblies are not required to be painted.

All paint and coatings must have a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84.

"Sammy" bolts are prohibited. Contractor must provide supplemental steel between structural purloins, bar joists, etc., for duct support as required to meet support spacing specified. Supplemental steel must be welded in place as directed and specified by the Structural Engineer. Support small (less than 40 united (w+h) inches) horizontal ducts without external insulation with 1-1/4" x 20 ga. band hangers.

Provide in pairs close to each transverse joint and in no case more than six feet apart. Bands must be turned 3” under the lower corner of ductwork and fastened with one (1) self-tapping screw into the bottom of the duct surface. Bands must be attached up the sides of the ductwork at a maximum of 6” intervals and in the bottom of the duct. Seal all screws with duct sealer as specified for ductwork.

Support vertical runs larger than 40 united (w + h) inches with structural brackets with welded joints.

Support all non-externally insulated horizontal ducts larger than or equal to 40 united (w+h) inches on trapeze type hanger assembly same as specified below for externally insulated duct except without AP Armaflex surround on the Unistrut. Install inserts or clamps as required to accommodate overhead construction. Spacing must not exceed 6 feet.

All 14” or less concealed round ducts with external insulation must be provided with band hangers and saddles. Suspend ducts, at six (6) foot intervals with 8” long, 3” wide, 22 gauge galvanized metal saddles hung from structure with 22 gauge, 1” wide straps. Bands must pass completely under and around round ducts. Loop strap under duct and attach to strap with two (2) galvanized bolts. Thereafter, loop top end of hanger over steel structural members above and fasten with two (2) galvanized bolts. Where concrete joists occur overhead, secure straps to side of joist with galvanized expansion or ramset bolts. Where flat concrete surface occurs overhead, secure with ramset or expansion bolt fasteners. See other Specification Sections in the Contract Documents for limitations on use of power driven fasteners.

All concealed and externally insulated rigid round metal ducts greater than or equal to 16”, all externally insulated rectangular ductwork, all externally insulated square ductwork and all externally insulated flat oval ductwork that is specified to have external insulation with a vapor sealed facing **must be supported with trapeze hangers consisting of Unistrut, threaded rods and inserts or clamps as required to accommodate overhead construction.** Threaded rods must be of size required to provide support of 300% (3x) the anticipated load of the assembly. Trapeze hanger assembly spacing must not exceed 8 feet. Hanger rods must not be in contact with external duct insulation nor metal duct work.

Where ducts are specified to have external insulation with a vapor sealed facing, support duct on trapeze hangers consisting of a Unistrut assembly with threaded rods.

On externally insulated ducts, install 3/4” thickness, **unslit** AP Armaflex insulation of sufficient inside tubular diameter to slide over the Unistrut support, completely cover and snuggly fit to the bottom horizontal Unistrut duct support. The AP Armaflex insulation must extend the full width of the insulated/uninsulated duct plus a minimum of 6”, each side. Space hanger rods a minimum of 6” (maximum of 12”) from the sides of the ductwork to permit the duct to be placed within the trapeze hanger assembly without being in contact with the externally insulated ductwork or bare metal ductwork. Where channel type Unistrut shapes are used, orient the open side, down. Refer to Part “Pipe Insulation and Miscellaneous Insulation Work” for AP Armaflex material and installation methods specification.

All concealed internally insulated round ducts must be supported as specified above for externally insulated ductwork except without insulation saddle. Coordinate exposed duct support requirements with plan details.

Wherever any duct hanger support exceeds 36” length from the top of the supported duct to the structure above, do not use band hangers. The Contractor must provide a Unistrut support assembly and provide bracing of the assembly with minimum 1”x1”x1/4” angle iron, all as required for minimum 300% (3x) the weight of the assembly supported and to prevent swaying of the duct work. Weld angle iron to or attach to the Unistrut assembly and then attach to the overhead structure. The entire support/bracing/sway bracing assembly must be as directed by the Architect and the Structural Engineer.

Where the ducts rise at the outside walls, the Contractor must provide a welded chair assembly, required support, attachments and, related and required appurtenances. The duct riser at the outside wall must maintain a distance between the wall and the finished insulated assembly as required to insulate the back side of the ductwork.

Where trapeze type hangers or DuctMate is used to support exposed ductwork in finished areas, the width of the support must not exceed the duct width by more than six (6) inches on either side of the duct.

5.22. **Range Hood Exhaust Ducts:** Factory fabricated grease duct is not allowed. Ducts for hoods over cooking equipment used in processes producing smoke or grease-laden vapors must be constructed of 14 ga. carbon steel with welded joints and installed in accordance with NFPA Standard No. 96. Exposed ducts must be constructed of 16 ga. stainless steel with welded joints and brushed finish. All ducts must be installed without forming dips or traps. All seams, joints, penetrations and duct-to-hood collar connections must have a liquid tight continuous external weld. Butt welded connections are prohibited.

Duct to exhaust fan connections must be flanged and gasketed at the base of the fan for vertical discharge fans; must be flanged, gasketed and bolted to the inlet of the fan for side-inlet utility fans; and must be flanged, gasketed and bolted to the inlet and outlet of the fan for in-line fans. Gasket and sealing materials must be rated for continuous duty at a temperature of not less than 1,500ºF. Connections must be as required by NFPA 96.

Duct systems serving the Type I hood must be constructed and installed so that grease cannot collect in any portion thereof. The system must slope not less than 1/4 unit vertically in 12 units horizontal (2-percent slope) toward the hood and installed in accordance with IMC Section 506.3.7.1. Where horizontal ducts exceed 75 feet in length, the slope must be not less than 1 unit vertical in 12 units horizontal (8.3-percent slope). Exhaust outlets that terminate above the roof must have the discharge opening located not less than 40 inches above the roof surface. If not easily accessible from a 10 ft. stepladder, openings on grease duct systems must be provided with safe access and a work platform. Refer to Architectural plans as applicable.

Support systems for horizontal grease duct systems 20 inches and larger in any cross-sectional dimension must be designed for the weight of the ductwork plus 800 pounds at any point in the duct systems. Bolts, screws, rivets and other mechanical fasteners must not penetrate duct walls.

An access door must be provided at each change in direction of the duct and 10 feet on center maximum spacing for purposes of inspection and cleaning. Access doors must be at the sides and large enough to permit cleaning.

In horizontal sections, the lower edge of the opening must not be less than 1-1/2" from the edges of the duct. Access doors serving horizontal sections of grease ducts must be spaced not more than 15 feet apart. Access doors must be located not more than 10 feet from changes in direction that are greater than 45 degrees. Access doors must have opening dimensions of not less than 18 inches by 12 inches. Where such dimensions preclude installation; the opening must be not less than 12 inches on one side and of sufficient length to provide access for cleaning and maintenance. Access doors must be provided within 24 inches of all horizontal discharge exhaust fans. For hoods with dampers in the exhaust or supply collar, an access panel for cleaning and inspection must be provided in the duct within 18 inches of the damper.

Access doors must be constructed of the same material and thickness as the duct and must be grease tight when in place. Access doors must have a gasket or sealant that is rated for 1500ºF and must be grease tight. Fasteners, such as bolts, weld studs, latches, or wing nuts, used to secure the access panels must be carbon steel or stainless steel and must not penetrate duct walls. Access doors must be listed in UL 1978, hinged, black iron, weld on, DuctMate Ultimate Door II or approved equivalent.

All access doors must be neatly and clearly identified using plastic label of type specified under Part Identification in specification Section 15010. The sign must be 2" smaller than the access door and must be inscribed with the following: "ACCESS PANEL – DO NOT OBSTRUCT".

5.23. **Miscellaneous Kitchen Exhaust Ducts:** Concealed ductwork serving hoods or grilles over moisture producing equipment such as dishwashers, must be not less than 16 gauge, 304 stainless steel with welded, liquid tight joints. Grade all horizontal ducts so that condensate will drain toward hood. Exposed duct must be fabricated of 16 Ga. 304 stainless steel with brushed finish and brazed liquid tight.

5.24. **Flexible Air Ducts:** Flexible air duct must be factory made and composed of an inner duct of woven and coated fiberglass providing an air seal and permanently bonded to coated steel wire helix, a fiberglass insulating blanket and low permeability outer vapor barrier of fiberglass reinforced metallized film laminate. R-value must be a minimum R=8 per ASTM C-518.

Duct must be rated for a maximum pressure of 16" (4-10 in. ID) or 10" (12-16 in. ID) water column positive and 2" water column maximum negative pressure and 5000 FPM maximum velocity and Listed by Underwriters Laboratories, Inc., under UL Standard 181 as a Class 1 air duct and complying with NFPA Standards 90A and 90B. Duct must have a maximum flame spread of 25 and a maximum smoke developed rating of 50.

Flexible duct length must not exceed six (6) feet. Supply each duct with 1/2" wide, 200 Series **stainless steel worm gear driver and stainless steel band** at take-off fitting and supply fixture connections equal to Thermaflex Snaplock clamp. Zip tying is not allowed.

Suspend ducts, at three (3) foot intervals with 8" long, 3" wide, 22 gauge galvanized metal saddles hung from structure with 22 gauge 1" wide straps. Loop strap under duct and attach to strap with two (2) galvanized bolts. Thereafter, loop top end of hanger over steel structural members above and fasten with two (2) galvanized bolts. Branch duct connectors for connecting round low velocity branches to rectangular

low velocity trunks must be factory fabricated rectangular to round or round to rectangular (as applicable) take-off fittings as detailed on the drawings with damper and standoff mounting bracket.

Provide a full size radiused, 90 degree galvanized sheet metal elbow transition piece from flexible duct connection to each diffuser boot/neck. Where conditions in the field do not allow for 90 degree elbow, a 45 degree full size radiused elbow must be used. Note that this provision to use a 45 degree full radiused elbow must not be used when a 90 degree elbow can be otherwise provided. Elbow gauge must be as specified hereinbefore in Part, "Sheet Metal Ductwork" for respective duct size.

Seal all joint connections as specified.

The flexible duct must be GreenGuard Level 4 certified, Thermaflex M-KE, ATCO UPC #031 or Flexmaster Type 1M.

PART 6. CLOTHES DRYER VENT/EXHAUST

6.1. **General:** Provide as shown on the plan and related details.

6.2. **Residential Dryers:** Must have a smooth interior finish and must be constructed of galvanized steel with a minimum 0.028-inch (No. 24 gage) thick with cap and backdraft damper. The exhaust duct size must be 4 inches nominal in diameter. Furnish submittal of the venting materials for review.

6.3. **Residential Dryer Vent/Exhaust Wall Cap:** Must be 4" round, Seiho Model SFB-P, all aluminum with backdraft damper and anodized finish. Equivalent unit by Broan or Luxury Metals will be acceptable.

6.4. **Exhaust Penetrations:** Where a clothes dryer exhaust duct penetrates a wall or ceiling membrane, the annular space must be sealed with fire caulk approved for use with dryer vent/exhaust assemblies or dryer vent Manufacturer approved thimble assembly.

PART 7. DUCT INSULATION WORK (EXTERNAL)

7.1. **General: The Mechanical Contractor must not install external duct insulation.** All external duct insulation work must be provided by an independent third party licensed and experienced Insulation Subcontractor whose primary business is the sale and installation of insulation materials in accordance with insulation manufacturers' requirements and these specifications.

The Insulation Subcontractor must provide a complete insulation submittal on his company letterhead detailing materials and methods as specified. **The Mechanical/HVAC submittal will be automatically rejected** and not reviewed without a submittal from the required Insulation Subcontractor.

Where a conflict exists between these specifications and the Manufacturer's requirements, the strictest installation must be provided.

The finished insulation system must provide complete thermal barrier throughout the equipment and air distribution system, including effective and durable vapor barriers and vapor stops for any system or condition potentially subject to condensation. An insulation system must be provided to prevent condensation or potential thereof, to prevent the transmission of water vapor into the insulation system (vapor barriers) and to prevent transmission of water vapor within the insulation system should vapor barrier compromises occur during operation and/or maintenance of the building (vapor stops).

The duct must be clean, dry, sealed and pressure tested before covering is applied. Cover flexible connections with insulation material as hereinafter specified to same thickness as adjacent duct. Install insulation with longitudinal seams at top and bottom of horizontal runs. Install multiple layers of insulation with longitudinal and end seams staggered. All insulation materials, coatings and mastics must be fire resistive per NFPA Pamphlet No. 90, ASTM C 411, must be UL listed and must have a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84, NFPA No. 255 or UL 723.

Refer to Section Sheet Metal Ductwork, Paragraph “Hangers and Supports” in this Section 15700 for additional requirements and for miscellaneous insulating requirements for externally insulated ductwork.

7.2. **Material:** Provide GreenGuard certified glass fiber duct insulation with reinforced foil kraft laminate jacket, formaldehyde-free.

All **supply air and return air ducts** located in the attic, mechanical mezzanine or outside the building insulation envelope must be provided with a total of 3.5” thickness external insulation, in addition to the specified acoustical liner. The first layer must be **1.5” thickness, 0.75 lb. density, without reinforced foil kraft laminate jacket** and with characteristics specified above. The second layer must be **2” thickness, 1.5 lb. density, with reinforced foil kraft laminate jacket** and with characteristics specified below. When using this requirement, the insulation sub-Contractor may use bare stainless steel wire or a single strip of FSK tape to hold the butt joints of the first layer together until the second layer of insulation is installed. After application of the FSK tape, the entire surface of the FSK tape must be covered with fiberglass cloth and mastic and must overlap both edges of the FSK tape by a minimum of 2”.

OPTION: In lieu of providing two layers of insulation for supply and return air ducts as specified above, the Contractor may substitute one layer of 4.25” thickness, 0.75 lb. density **with reinforced foil kraft laminate jacket** with characteristics specified below.

All **supply air** and **return air** ductwork located above the ceiling within the building insulation envelope and below the ASHRAE required air barrier, in chases and other similar areas, but not in the attic, or outside the building insulation envelope or in the mechanical mezzanine, must be provided with **2” thickness, 1.5lb. density, duct wrap with reinforced foil kraft laminate jacket** as specified below. Note that this requirement does not apply to ductwork that is exposed to view in finished areas. Refer to internal duct insulation requirements for duct exposed to view in finished areas.

All **outside air** and **exhaust air** ductwork must be provided with **1.5” thickness, .75lb. density, with reinforced foil kraft laminate jacket** as specified below. Note

that this requirement does not apply to ductwork that is exposed to view in finished areas. Refer to internal duct insulation requirements for duct exposed to view in finished areas.

Thermal conductivity for **1.5" thickness** per ASTM C-518, **0.75 lb. density** must be not less than k=0.27 BTU·in/(hr·ft²·°F) and minimum installed R=4.2 at 75°F mean temperature with test based on material thickness compressed 25%.

Thermal conductivity for **2" thickness** per ASTM C-518, at its rated thickness and **1.5 lb. density** must be not less than k=0.24 BTU·in/(hr·ft²·°F) and minimum installed R=6.3 at 75°F mean temperature with test based on material thickness compressed 25%.

Thermal conductivity for **4.25" thickness** per ASTM C-518, **0.75 lb. density** must be not less than k=0.27 BTU·in/(hr·ft²·°F) and minimum installed R=12.0 at 75°F mean temperature with test based on material thickness compressed 25%.

See "Duct Insulation (Internal)" for internal acoustical insulation required in addition to the external insulation specified hereinbefore.

7.3. **Thickness:** Toilet/shower and janitor closet/housekeeping exhaust ducts, louver and brick vent plenums, back panels of ceiling diffusers, ceiling return air, ceiling relief air and ceiling exhaust air registers and grilles and outside air ducts: 1.5" thickness, 3/4 lb. density with reinforced foil kraft laminate jacket. All other locations: Minimum 2.0" thickness and density specified above with reinforced foil kraft laminate jacket. Coordinate with variations specified above for additional layers or 4.25" thickness and provide as required.

See limits of acoustic insulation in Part Duct Insulation Work (Internal) below. Where duct board is specified within the mechanical rooms, external duct wrap insulation is not required.

7.4. **Manufacturer:** Johns-Manville Micro-Lite EQ, Type 150 or Type 75 with thickness and density as specified above. Equivalent material from Knauf, Schuller, Owens Corning or CertainTeed will be accepted.

7.5. **Ducts to be Insulated Externally:** Supply air and return air ducts including ducts with acoustical liner, outside air ducts, kitchen hood make-up air ducts, make-up air ducts, toilet/shower/housekeeping/janitor closet areas exhaust ducts, louver and brick vent plenums, dishwasher and other moisture/vapor laden exhaust ducts, short branch duct collar connections to grilles, registers and diffusers, 24" upstream and downstream of each electric duct heater, all flexible canvas connectors and exterior rim/cone/panel of all ceiling diffusers, ceiling exhaust grilles and registers and ceiling return registers and grilles.

See Part "Duct Insulation Work (Internal)" for sound attenuating insulation requirements of externally insulated ductwork.

Do not externally insulate flexible canvas connectors until installation of the specified bonding jumper has been verified by the Engineer or the Authority having jurisdiction. If insulated at the time of the site visit, the insulation will have to be removed to verify the proper installation.

7.6. **Application:** Sheet metal duct must be clean, dry and tightly sealed at all joints and seams before applying duct wrap. Installation must be in strict accordance with the Manufacturers recommendations and these specifications. Adhere insulation to sheet metal with a brush or roller in manufacturer recommended workable sections with a water based, LEED compliant, low VOC liquid, not spray, insulation bonding adhesive. Wrap insulation tightly on the ductwork with all circumferential joints butted and longitudinal joints overlapped a minimum of 2". The 2" flange of the facing must be secured using 9/16" flare-door staples applied 6" on center and taped as specified hereinafter. On longitudinal joints, the overlap must be secured using 9/16" flare-door staples applied 6" on center and taped as specified hereinafter. For rectangular ducts wider than 23", additionally support insulation with weld pins and speed clips 18" on center with a minimum of two pins and washers for each section.

The liquid adhesive must be UL-723, ASTM E-84, NFPA 90A and 90B, LEED and ASTM C916 compliant, low VOC, moisture and mildew-resistant with suitability for high-humidity environments. The liquid adhesive must be Design Polymerics DP 2502, Foster 85-60, Vimasco 727 or Childers Chil-Quik CP-127.

Stop and point insulation around access doors and damper operators to allow operation without disturbing duct wrapping. Insulate standing seams and stiffeners that protrude through the insulation with 2" thick, faced, flexible blanket insulation.

Vapor seal all seams, joints, pin penetrations, other breaks, circumferential and longitudinal joints with reinforcing mesh and coat with vapor barrier facing. Mesh must be **4" wide pre-sized glass cloth** adhered and finished with two (2) coats of UL 181A-M compliant for sheet metal and duct board applications and UL 181B-M compliant for flexible ducts and flexible connectors. The sealant must be McGill United Duct sealer, Hardcast Seal-Tack, Vimasco No 749 Vapor-Blok or CHIL-PERM WB CP-35, vapor barrier coating as required to completely cover the mesh. Fiberglass cloth must be Great Lakes Textiles Style GL1658, 20x10 thread count per square inch, 0.004-inch thickness and 1.60 oz. /sq. yd., Childers Chil Glas #10 glass mesh, Foster Mast-A-Fab polyester mesh or equivalent product by 3M. **No FSK or any metallic tape will be allowed. Where FSK tape is discovered or used, the entire surface of the FSK tape must be covered with fiberglass cloth and mastic and must overlap both edges of the FSK tape by a minimum of 2"**.

Any externally insulated duct with metallic vapor barrier that is in contact with metallic piping, conduits or metallic structural members must be provided with a section of Rubatex insulation between ductwork and the metallic member. Rubatex must be 3/4" thickness, AP Armaflex insulation of sufficient inside tubular diameter to slide over, completely cover and snuggly fit the contacted item. The insulation must extend the full width of the duct plus a minimum of 6", each side of the duct. Refer to Part "Pipe Insulation and Miscellaneous Insulation Work" for AP Armaflex material and installation methods specification. The use of AP Armaflex insulation between piping and ductwork will only be allowed when raising the effected duct is not an option.

7.7. **Insulation Pins and Washers: The use of adhesives for attaching pins and washers to the ductwork is prohibited.** Pins must be cupped-head, capacitor-discharge-weld pins, zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135 inch diameter shank, length to suit depth of insulation specified with integral 1-1/2 inch galvanized carbon-steel washer. Insulation retaining washers must be self-locking type formed from 0.016-inch thick galvanized steel with beveled edge

sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

7.8. **Kitchen Hood Exhaust Ducts:** Prior to insulating kitchen hood, a light test and a smoke test must be accomplished by the Mechanical Contractor. Refer to Section "Testing", hereinbefore, for the required procedure. The Code Authority having jurisdiction requires his witnessing of this testing prior to insulating the respective ductwork. **Insulation must not be installed until the Code Authority having jurisdiction has accepted the installation.**

Upon acceptance of the light test and the smoke test by the Code Authority having Jurisdiction, install a zero clearance, single layer fire resistant wrap for grease duct, consisting of an inorganic blanket encapsulated with a scrim-reinforced foil. The wrap must be a single layer, non-asbestos type and contain a safe fiber construction to provide a zero clearance to combustibles, 2-hour fire resistive rating. The wrap must have been tested and passed in accordance with ASTM C 411, ASTM C 518, ASTM E 84, ASTM E 119, ASTM E 136 and ASTM E 814. Internal surface burning characteristics (ASTM E 84) for the foil encapsulated blanket must be Flame Spread: 0, Smoke Developed: 0, Blanket Flame Spread: 0, Smoke Developed: 0 and must comply with the requirements of NFPA 96, Uniform Mechanical Code, International Mechanical Code and Uniform Building Code. The entire installation must be in strict accordance with the Manufacturer's recommendation and the U.L. label. Material must be 3M Fire Barrier Duct Wrap 15A or approved equivalent. Provide hinged metal encased double wall with insulation access doors at duct cleaning access doors. Install insulated access doors over the 14 gauge duct access doors. Access doors must be DuctMate Ultimate Door II, weld on, or approved equivalent.

7.9. **Ducts From Outdoor Packaged Equipment to Point Inside Building:** Must be insulated externally (in addition to duct liner) with 2" thickness, 4.25 lb. density, R=9.1 duct board equal to Owens-Corning Series 815 Spin-Glas. Protect external insulation with open weave glass or polyester cloth by Johns-Manville Duramesh, Childers Chil Glas #10 or Foster Mast-A-Fab, embedded between two 1/8" coats of Foster 60-91 (gray) Monolar Mastic or Childers Encacel X-1 (gray). After insulating, cover all ductwork with 24 ga. cross-broken or beaded prefinished Kynar 500 sheet metal and slope to drain away from the building and to sides of ductwork with so as not to discharge rainwater to the supply and return air connections of the unit. Provide a trough as required. Sheet metal cover must be cross broken or beaded. The Architect must select color.

PART 8. DUCT INSULATION WORK (INTERNAL)

8.1. **General:** All work by experienced applicators in accordance with Manufacturer's recommendations and these specifications. Where a conflict exists between these specifications and the Manufacturer's recommendations, the strictest installation must be provided.

Duct liner, mastics and materials must comply with all requirements and other building code requirements. All insulation materials (coatings and mastics) must be fire resistive per NFPA Pamphlet No. 90A and 90B and must be UL listed and must have a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84. Liner materials must conform to the performance based ASTM C1071, which includes ASTM C518 Thermal Conductivity, ASTM C411 Temperature Resistance, ASTM C665

Corrosiveness, ASTM E84 Surface Burning Characteristics, ASTM C1338 Fungi Resistance, ASTM C1304 Odor Emissions and ASTM C1104 Moisture Vapor Sorption.

8.2. **Material:** Liner must be a GreenGuard certified, low VOC, Type I liner as defined by ASTM C1071 and characteristics complying with ASTM E 84, UL 723, NFPA 255, NFPA 259 and ASHRAE 62. It must have an acrylic coating formulated with an immobilized, EPA registered, protective agent to protect against growth of fungi and bacteria as required by ASTM C1071 and tests conducted in accordance with ASTM C 1338, ASTM G21 and ASTM G 22. It must not support microbial growth and have glass fibers bonded with a thermosetting resin. The airstream surface must be protected with a reinforced coating with flexible glass cloth reinforcement. The liner must have a reinforced factory applied edge coating and operate in an environment of a maximum of 250°F and maximum of 6,000 fpm air velocity. Thermal conductivity per ASTM C-518, at its rated thickness, must be not less than k=0.16 BTU·in/(hr·ft²·°F) and R=6.3 at 75 F mean temperature in accordance with ASTM C18. Sound absorption coefficients for the liner must be per ASTM C 423 and ASTM E 795 test methods and the table below. **Furnish sound characteristics for review with the material submittal.**

Sound Absorption Coefficient at Frequency

Thickness (In)	(Cycles per Second) 125	250	500	1000	2000	4000	NRC
1.5	0.10	0.47	0.85	1.01	1.02	0.99	0.80
2.0	0.25	0.66	1.00	1.05	1.02	1.01	0.95

8.3. **Manufacturer:** Must be Johns Manville Linacoustic RC or equivalent material by Schuller, Knauf, Pittsburgh, CSG, Owens Corning or CertainTeed.

8.4. **Thickness:** 1.5 inches thickness. Relief air and transfer air (jumper and ATD) ducts 2.0" thickness.

8.5. **Ducts and Equipment to be Insulated Internally:** Return air transfer air (jumper and ATD) ducts and relief air ducts. **Do not install internal duct liner within 24" of the entering or leaving side of an electric duct heater**. Refer to Part Duct Insulation Work (External) for requirements.

8.6. **Acoustical Duct Lining:** Line the first ten (10) linear feet of all single wall, supply air, return air and outside air ducts downstream of all heat pumps packaged units and transfer air (jumper and ATD) ducts with insulation equal to Johns Manville Linacoustic RC and **2.0" thickness.** Sound absorption characteristics must be as specified above.

8.7. **Application:** Sheet metal duct must be clean, dry and tightly sealed at all joints and seams before applying duct installation. Installation must be in strict accordance with the Manufacturers recommendations and these specifications. Adhere insulation to sheet metal with a brush or roller in manufacturer recommended workable sections with a water based, LEED compliant, low VOC liquid, not spray, insulation bonding adhesive. Adhere insulation to the manufacturer's recommended workable section of the sheet metal surface prior to breaking the sheet metal. Cutting of the insulation and then adhering the insulation to the sheet metal is prohibited.

Insulation joints must be straight and smooth and must be buttered with the specified adhesive to prevent erosion and improve airflow. The product must have a factory applied edge coating to assure sealing of transverse edges per SMACNA HVAC Duct Construction Standards - Metal and Flexible, 4th Edition (2020) and NAIMA installation standards.

After adhering the duct insulation to the sheet metal, secure all insulation on ducts with weld pins and clip type fasteners. Pins must be welded to the sheet metal. Do not use adhesive. Fasteners must be located within 3 inches of the upstream and downstream edges of each liner section. Fasteners are required within 4 inches of all longitudinal edges and 6 inches of corners, with a maximum 12-inch spacing longitudinally and 18-inch spacing transversely. In general, provide spacing as required by SMACNA HVAC Duct Construction Standards - Metal and Flexible (4th Edition, 2020.

The liquid adhesive must be a premium, water-based, brush/roller applicable adhesive designed for bonding fibrous insulation (e.g., fiberglass duct liner) to the interior of HVAC ductwork. It must be UL-723, ASTM E-84, NFPA 90A and 90B, LEED and ASTM C916 compliant, low VOC, moisture and mildew-resistant with suitability for high-humidity environments. Spray type adhesives are not allowed.

Sealing exposed potions of the insulation joints and damage to the liner must be repaired using the specified adhesive products following recommendations provided by the Manufacturer of the adhesive.

Adhesive must be Design Polymerics DP 2502 Duct Liner and Insulation Adhesive, Childers Chil-Quik CP-127 or Foster Quick-Tack 85-60 Duct Liner Adhesive.

8.8. **Insulation Pins and Washers: The use of adhesives for attaching pins and washers to the ductwork is prohibited.** Pins must be cupped-head, capacitor-discharge-weld pins, zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135 inch diameter shank, length to suit depth of insulation specified with integral 1-1/2 inch galvanized carbon-steel washer. Insulation retaining washers must be self-locking type formed from 0.016-inch thick galvanized steel with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

8.9. **Metal Nosings: All exposed leading and trailing edges must be secured with sheet metal nosings to protect insulation edges**. Metal nosings must be securely installed over all transversely oriented liner edges facing the airstream at forward and rear discharge towards coils, dampers, ducts, plenums, changes of insulation thicknesses of adjoining insulation, any exposed insulation ends and at any point where lined duct is preceded by unlined duct. See detail on the plans. All remaining miscellaneous exposed edges must be sealed/coated. There must be no exposed fiberglass insulation.

PART 9. ZERO CLEARANCE GREASE DUCT FIRE PROTECTION INSULATION

9.1. **General:** Prior to insulating kitchen hood exhaust ducts, a light test and a smoke test must be provided by the Mechanical Contractor. Refer to Section “Testing”, hereinbefore, for the required procedure. The Code Authority having jurisdiction will require his witnessing of this testing prior to insulating the respective ductwork. Insulation must not be installed until the Code Authority having jurisdiction has

accepted the installation. Upon acceptance of the light test and the smoke test by the Code Authority having Jurisdiction, install a zero clearance, single layer fire resistant wrap for grease duct, consisting of an inorganic blanket encapsulated with a scrim-reinforced foil. Provide two hour rated duct enclosure classified by UL for all grease-laden ductwork. System must be 3M "Fire Master" Duct Wrap or approved equivalent. Install per UL Label.

9.2. **Description:** Provide a refractory ceramic, non-asbestos fiber blanket encapsulated with scrim-reinforced foil as an enclosure for kitchen exhaust duct and rated air ductwork. Enclosure must protect both internal and external conditions.

9.3. **Test Data:** Enclosure must be UL listed for two-hour grease duct enclosures. Enclosure must be tested to ASTM E119 time/temperature curve, tested to UL 1978 internal grease fire at zero clearance to combustible materials, tested to ASTM E84/UL723 flammability test of flame spread of 5 and smoke spread of 5 and tested to ASTM E814/UL1479 duct penetration protection.

9.4. **Installation:** Do not install any insulation until a light test and smoke test have been performed and the installation has been accepted by the Code Authority having jurisdiction. Refer to Section "Testing" hereinbefore for testing requirements.

Complete installation must be per insulation's current UL listing instructions. General installation must include a two-layer wrap construction applied directly to duct. A 3" perimeter and longitudinal overlap must be provided. For spans over 24", insulation pins must be used to prevent sagging. Install hangers and access doors per Manufacturer's recommendations. Use carbon steel or stainless steel banding.

Provide metal encased double wall with insulation access doors at duct cleaning access points. Install insulated access doors over the 14 gauge duct access doors. Access doors must be DuctMate Ultimate Door II, weld on, or approved equivalent.

PART 10. REGISTERS, GRILLES AND DIFFUSERS

10.1. **General:** All grilles, registers and diffusers must be product of a single Manufacturer with baked enamel finish and standard **or** custom color as selected by the Architect. Architect may require painting of the diffusers, grilles, registers, etc., in the field. Where field painting is required, diffusers, grilles and registers must be factory primed for painting in the field. Refer to Architectural Section "Painting", coordinate requirements and provide finish as required.

Where lay-in ceilings occur, all specified items must have integral 2' x 2' or 2' x 4' aluminum modular lay-in ceiling panel with finish to match diffuser. Refer to Architectural reflected ceiling plan, check ceiling suspension system, wall and ceiling finishes and provide for proper interface as required.

All ceiling grilles, registers and diffusers not in integral lay-in metal panels and installed in gypsum board or other hard surfaces must be mounted with aluminum-countersunk screws with finish to match respective items.

Where ceiling mounted devices are installed in hard ceilings, provide appropriate trim ring as required such that screws are not visible in the face of the device. Flat countersunk screws are only allowed when concealing them is not an option.

All ceiling diffusers, ceiling return air registers and grilles, ceiling exhaust grilles and registers and ceiling mounted relief air grilles back panels must be insulated with 1" thickness, foil backed insulation and securely attached. Contractor must furnish the item with factory furnished insulation from the item Manufacturer. Factory provided insulation must be attached as shown on the plan details.

All grilles, registers and diffusers must be ADC or approved equivalent Agency certified.

10.2. **Square Ceiling Diffusers with Round Neck:** Titus Model TMSA-AA, Price ASCDA, removable core type, aluminum construction, with baked enamel standard or custom finish color selected by the Architect, designed for four-way diffusion complete with Titus AG-85, Price VCR8E steel butterfly blade damper. Diffuser face must be 24" x 24" with type frame to interface with ceiling system. Use lay-in type frame where lay-in ceilings occur.

10.3. **Food Service/Kitchen Areas:** Titus Series PMC, Price Series PDN, diffuser must have a flush aluminum face with steel back pan, hinged, removable and perforated face screen with quick release spring latches, aluminum opposed blade damper and equalizing grid with baked enamel standard or custom finish color selected by the Architect. The diffuser must also be provided with a louvered, adjustable steel pattern controller in the inlet neck of the diffuser and be field adjustable for the deflection pattern indicated on the plans. Diffuser face must be 24" x 24" with type frame as required to interface with ceiling system.

10.4. **Wall Supply Air Registers:** Titus Model 300 RL-HD heavy duty steel supply grilles with front blades parallel to the long dimension of the grille. Construction must be of steel with a 1-1/4" wide border on all sides and a minimum border 18 gauge and auxiliary mounting frame/trim ring for all sizes up to 48x48. Mounting frame/trim rings are not required where the registers are attached to exposed ductwork. Screw holes must be countersunk for a neat appearance. Corners must be welded with full penetration resistance welds. Front deflection blades must be 14-gauge steel, adjustable from 0°- 40° and spaced on 1/2" centers. Rear deflection blades must be 26-gauge steel spaced on 3/4" centers. Provide each wall grille with opposed-blade volume damper which must be constructed of heavy gauge steel. Damper must be operable from the face of the grille with a screwdriver.

The finish must be an anodic acrylic paint, baked at 315° F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint must pass a 250-hour ASTM D870 Water Immersion Test. The paint must also pass the ASTM D2794 Reverse Impact Cracking Test with a 50-inch pound force applied.

The grille must have baked enamel standard or custom finish color selected by the Architect.

10.5. **Wall Supply Air Grilles:** Titus Model 300 RL-HD, same as wall supply air registers, except without dampers.

10.6. **Wall Return Air and Wall Exhaust Air Registers:** Titus Model 33R-PF, Price Model 91-L-D-A-VCS3 gymnasium heavy duty steel register with 38 degree deflection 14 ga. blades, support bars on 6" centers, Allen key operated aluminum opposed blade

damper and auxiliary mounting frame for all 48” or less in size, with baked enamel standard or custom finish color selected by the Architect.

10.7. **Wall Return Air / Wall Exhaust Air & Double Face Wall Grilles:** Same as wall return air registers except without dampers.

10.8. **Ceiling Mounted Exhaust Air and Return Air Registers:** Titus Model 50-F-0-5-D-25, Price Model 80DAL-F-SW-A all-aluminum fabricated egg-crate type, Allen key operated aluminum opposed blade damper and lay-in type frame with baked enamel standard or custom finish color selected by the Architect.

10.9. **Ceiling Mounted Return Air or Relief Air Grilles and Air Transfer (Jumper Duct) Grilles:** Same as return air registers except without dampers.

10.10. **Brick Vents for Exhaust Fan Discharge:** Extruded aluminum, Reliable RBV, Greenheck BVE, Cook BV, Ruskin BV or United Enertech BE brick and block vent with 1/4” mesh removable aluminum bird screen, integral water stop and 40% minimum free area with Kynar finish. The finish must be factory paint color to be selected by the Architect.

10.11. **Manufacturers:** Equivalents by Titus, Price, Metalaire and Krueger will be accepted. Titus and Price are basis of design.

PART 11. CONDENSATE DRAINAGE PIPING

11.1. **General:** Cut accurately to measurements established at site and work into place without springing or forcing, properly clearing all building features. Arrange and install piping systems sizes as shown, as close as practical, straight, properly supported and run as directly as possible forming right angles or running parallel with building lines, true to line and grade, free of sags and bends. Locate piping as high as practical and in parallel groups as close together as practical. Route through previously built-in sleeves and avoid cutting or other weakening of the structure. Ream all pipes to remove burs. Make changes in direction and size with fittings. Bushings are prohibited. Cap or plug open pipe ends during installation to keep out foreign material.

Before installation, piping must be checked, upended, swabbed and all dirt from storage or from lying on the ground must be removed. **All piping must be clean when it is installed.**

Make all connections to equipment using screwed unions. Install unions in all piping connections to each piece of equipment, including traps, pumps, coils, etc. **Per IMC 307.2.5, condensate drain lines must be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.** Refer to plan details for detailed requirements of the assembly.

All piping must be concealed within walls, chases, above ceilings, etc., unless specifically noted otherwise.

11.2. **Condensate Drain Piping and Drain Piping from All Drain Pans to Floor Drains; Hub Drains and Other Miscellaneous Condensate Receivers:** Interior condensate drainage piping material must be Type L hard copper tubing with wrot copper solder

joint fittings with 45° or 90° offset fittings. ProPress or similar type fittings/joints are not allowed.

Outdoor condensate drainage piping must be Schedule 80 solid wall PVC pipe conforming to ASTM Standard D1785. Schedule 80 fittings must be injection mold and must conform to ASTM D 2464. Pipe and fittings must be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a cell class of 12454 as identified in ASTM D 1784. PVC Schedule 80 pipe must be Iron Pipe Size (IPS) conforming to ASTM D 1785. Injection molded PVC Schedule 80 fittings must conform to ASTM D 2467. PVC Schedule 80 threaded fittings, where specified, must conform to ASTM D 2464. Pipe and fittings must be manufactured as a system and be the product of one manufacturer. All pipe and fittings must conform to NSF International Standard 61 and the health effects portion of NSF Standard 14. Installation must comply with the latest installation instructions published by the piping manufacturer and must conform to all applicable plumbing, fire and building code requirements. Solvent cement joints must be made in a two-step process with a primer meeting ASTM F 656 and a medium- or heavy-bodied solvent cement conforming to ASTM D 2564. The system must be protected from chemical agents, fire-stopping materials, thread sealant, plasticized vinyl products or other aggressive chemical agents not compatible with PVC compounds. The system must be hydrostatically tested after installation as specified hereinbefore. All Schedule 80 piping and fittings must have factory applied UV protective coating and tested for sunlight resistance according to UL 651 requirements.

All cooling coils and evaporator coils horizontal condensate drainage piping must be sloped a minimum of 1/8” per foot. The condensate drain line size must be full size of unit condensate outlet and in no case, less than 3/4 inch.

The condensate drainage assembly must be made up of materials specified above. The assembly must consist of p-trap, unions, air bleeder/open vent with 1/8” screen over open portion, etc., as required by the equipment Manufacturer. **Running p-traps are not allowed.**

Ductless mini-split equipment that produces condensate must be provided with an inline check valve located in the drain line or a trap as required by IMC 307.2.4.1.

In absence of the Manufacturer’s requirements, condensate drainage assembly must be as shown on the plans. **Per IMC 307.2.5, condensate drain lines must be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.** Refer to the details on the plans and the requirements below for unions required in the condensate piping.

Install a UL 508 and UL 2043 (as applicable) conforming electric switch in the secondary drain line of each condensate producing piece of equipment. The switch must automatically shut off the equipment served in the event the primary drain line becomes restricted. If a Building Automation System (BAS) is part of the project, the electric switch must also alarm to the BAS operator console. Coordinate the requirement with the BAS Contractor and provide as required.

11.3. **Auxiliary Drain Piping from Auxiliary Drain Pans under Equipment Located in Concealed Areas:** Contractor must also provide a 3/4” drain line of materials specified above in the **bottom** of the drain pan with a 3/4” brass, hose end connection (hose bibb) to provide manual, gravity draining of the auxiliary pan after the monitoring device has been reset.

Install a UL 508 and UL 2043 (as applicable) conforming electric water level monitoring device in the auxiliary drain pan to automatically shut off the equipment served in the event the primary drain line becomes restricted. The water level monitoring device must also alarm to the BAS operator console. Coordinate all requirements with Section 15920, HVAC Controls (BAS) contractor and provide as required for proper interface. See detail on plans for additional information.

11.4. **Copper Joints:** Make assemblies with tin-antimony (95-5) solder and non-corrosive flux (this does not apply to refrigerant piping). Clean and polish the tube and the inside of the fittings, using No. 60 steel wool. Apply flux and place fitting on the tube. Heat joint evenly but take care not to overheat fitting. Apply solder until a solder line shows completely around the joint. Remove surplus solder and allow joint to cool. **ProPress or similar type fittings/joints are not allowed.**

11.5. **Escutcheons:** Where pipes pass through cabinets, walls and ceilings of finished rooms provide one-piece, cast-brass type with polished, chrome-plated finish and setscrew fastener or stainless steel type securely fastened in place. Pack penetrations with mineral wool insulation, seal with firestopping compound and install escutcheons to prevent passage of fire, smoke and vermin. Do not use split ring type escutcheons.

11.6. **Unions:** Unions must be of the following types:

Copper Lines: Ground joint, copper to copper.

Schedule 80 PVC: Solid wall PVC schedule 80 DWV pipe and fittings as specified hereinbefore.

Dielectric Unions: Provide where copper pipe joins to steel pipe, EPCO or approved equivalent. Contractor must provide a globe valve on each side of each dielectric union to allow for replacement of the union.

11.7. **Expansion:** Provide for expansion and contraction of all piping and make proper provisions so that there must be no undue strain on any pipe or equipment.

11.8. **Sleeves:** Refer to Section 15010, Pipe Sleeves.

PART 12. REFRIGERANT PIPING AND ACCESSORIES

12.1. **General:** All refrigerant piping must be identified. **Note that refrigerant piping will require custom identification.** Refer to Section 15010, Part Identification for requirements.

12.2. **Refrigerant Piping Sleeves:** Refer to Section 15010 and plan details and provide sleeves, firestopping and escutcheons as specified for typical piping. Sleeves for pipe passing through exterior walls that contain refrigerant piping must be Schedule 80, ASTM D1785 PVC pipe, 1/2" larger in diameter than piping and piping covering. Refer to Section 15010 and below for requirements.

Coordinate wall sleeve sizes required for refrigerant piping with insulation and aluminum jacket requirements. Piping within wall cavities must be seamless with no joints.

Note that all liquid, suction and hot gas reheat coils refrigerant piping must be insulated as specified from point of connection to condensing unit to a point inside the wall. Do not install more than two pipes through each wall sleeve.

12.3. **Protection of Physical Damage for Piping:** In concealed locations where piping is installed through holes or notches in studs, joists, rafters or similar type members, the pipe must be protected by shield plates and plastic grommets. Protective steel shield plates having a minimum thickness of 0.0575 inch (16 gage) must cover the area of the pipe where the member is notched, drilled or bored and must extend not less than 2 inches above sole plates and below top plates.

12.4. **Piping Diagram:** System must be complete and sized to conform to current ACRMA standards, except that refrigerant suction risers must be sized for a gas velocity not less than 2000 fpm.

Various Manufacturers of heat pump mini-split systems have different reasons for the use of loops, traps, accumulators, receivers, etc., in piping arrangements, therefore, submit for review, the air conditioning equipment Manufacturer's recommended, dimensioned plan view and isometric piping diagram proposed for use for each system, showing all valves, loops, pipe sizes and all appurtenances, required for the proper operation of the respective system.

Submit catalog data and Manufacturer's ratings for all valves, catch-alls, etc. with diagram for each system. Identify all items for respective system and list capacities, pressure drops, etc. Secure approval of the heating and air conditioning equipment and compressor Manufacturer before submitting for review.

Failure to provide the Manufacturers' approved diagram(s) must make the Mechanical Contractor responsible for all required changes to the piping system and equipment without additional cost to the Owner or his Design Professionals should the installation not be as required by the Manufacturers.

Refrigerant piping support spacing must be a maximum of eight (8) feet horizontally and six (6) feet vertically. Cut accurately to measurements established at site and work into place without springing or forcing, properly clearing all building features. Arrange and install piping systems, as close as practical, straight, properly supported and run as directly as possible forming right angles or running parallel with building lines, true to line and grade, **free of sags and bends**. Locate piping as high as practical and in parallel groups as close together as practical. Route through previously built-in sleeves and avoid cutting or other weakening of the structure.

Refrigerant piping for all outdoor units mounted slab on grade must enter the building at the respective building finish floor or crawl space level and at a maximum of 12" above finish floor of the facility. The Contractor must coordinate the final refrigerant piping entrance into the building with the Architect's Field Representative prior to installing any refrigerant piping.

All refrigerant piping, including mini-split, must be ACR - ASTM B 280, Type L hard drawn, ACR copper refrigerant tubing with ASME B16.22 wrot copper fittings and unions with solder joints of 95-5 tin antimony. **Coiled copper and precharged line sets are NOT allowed unless specifically noted or specified.** All offsets and changes in direction must be made with 90º or 45° elbows.

Where refrigerant piping is shown rising in the wall cavity and requires modifications to the block wall due to the size of the piping and insulated assembly, the block must be neatly saw cut. Provide reinforcing to the affected portions of the wall as indicated on the structural drawings and details, the same as required at window and door openings. See the structural drawings for specifics. Extreme coordination is required prior to the erection of the structural slab and wall. Coordinate with the General Contractor.

12.5. **Refrigerant Piping Testing:** Two tests are required. The medium used for pressure testing the refrigerant system must be oxygen-free nitrogen, helium or argon. Oxygen, air, combustible gases and mixtures containing such gases must not be used as a test medium. Systems erected on the premises with tubing not exceeding 5/8 inch outside diameter must be allowed to use the refrigerant identified on the nameplate label or marking as the test medium.

The refrigerant piping system must be tested as a whole, or separate tests must be conducted for the low-pressure side and high-pressure side of the piping system. The refrigerant piping system must be tested in accordance with both of the following methods:

Test 1: The system must be pressurized for a period of not less than 60 minutes to not less than the lower of the design pressures or the setting of the pressure relief device(s). The design pressures for testing must be the pressure listed on the label nameplate of the condensing unit, compressor, compressor unit, pressure vessel or other system component with a nameplate. Additional test gas must not be added to the system after the start of the pressure test. The system must not show loss of pressure on the test pressure measuring device during the pressure test for a minimum of 24 hours.

Test 2: A vacuum of 500 microns must be achieved. After achieving a vacuum, the system must be isolated from the vacuum pump. The system pressure must not rise above 1,500 microns for a period of not less than 60 minutes.

Where using refrigerant as a test medium as specified above, the test pressure must be not less than the saturation dew point pressure at 77°F.

12.6. **Joints: Brazed joints only. Flare joints nor press connect type joining systems are allowed.** Brazed Joints (Nitrogenized ACR Hard Drawn Copper – ASTM B280,) with joints made according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

Joint surfaces must be cleaned. An approved flux must be applied where required by the braze filler metal Manufacturer. The piping being brazed must be purged of air to remove the oxygen and filled with oxygen-free nitrogen, helium or argon. The piping system must be prepurged with an inert gas for a minimum time corresponding to five volume changes through the piping system prior to brazing. The pre-purge rate must be at a minimum velocity of 100 feet per minute. The inert gas must be directly connected to the tube system being brazed to prevent the entrainment of ambient air.

After the pre-purge, the inert gas supply must be maintained through the piping during the brazing operation at a minimum pressure of 1.0 psi and a maximum pressure of 3.0 psi. The joint must be brazed with a filler metal conforming to American Welding Society Publication AWS A5.8, Current Edition.

Piping within wall cavities and other inaccessible areas must be seamless with no joints.

12.7. **Solenoid Valves (Where Required):** Comply with AHRI 760 and UL 429; listed and labeled by a Nationally Recognized Testing Laboratory (NRTL). Install in liquid refrigerant connection to the evaporators. Valves must be designed for the operating pressure and capacity as listed in the Manufacturer's catalog with a pressure drop not exceeding 2 psi and must be sufficient for the requirements of the installation. Install in horizontal runs with body vertical.

12.8. **Expansion Valves (Where Required):** AHRI 750 compliant, steel shell with ductile-iron cover, stainless-steel screws and neoprene gaskets properly sized diaphragm or bellows type, with external superheat adjustment set for 10 degrees F. superheat. Install in the liquid refrigerant supply lines to the evaporators. Expansion valves up to and including 7-1/2 tons capacity must be Sporlan Type "S" or approved equivalent. Expansion valves over 7-1/2 ton capacity must be Sporlan Type "O" or approved equivalent. Install Sporlan full size catch-all filter-drier ahead of valve.

12.9. **Refrigerant Service Valves:** Provide for the proper service of the equipment. Per IMC 1101.9, all refrigerant circuit access ports located outdoors must be fitted with color coded, all brass and locking tamper resistant caps. This requirement does not apply to refrigerant circuit access ports on equipment installed in controlled areas such as on roofs with locked access hatches or doors.

The locking caps must be red or red banded color code for the refrigerant used. Caps must be Novent Series 8668 for R-454B refrigerant with 86698 NV Multikey unlocking mechanism for R-454B refrigerant or equivalent by JB Industries Series Shield and DiversiTech Series Sentry. Provide Owner with minimum of six (6) spare keys.

12.10. **Refrigerant Filter Drier (Catch-All):** AHRI Standard 710 compliant (Performance Rating of Liquid-Line Driers; ratings determined in accordance with ASHRAE Standard 63.1), Parker Sporlan Catch-All series with molded porous core multi-desiccant blend (or approved equivalent). Filter driers up to and including 10-ton nominal capacity must be sealed type. Filter driers over 10-ton nominal capacity must be replaceable core type. Units must have minimum surface filtering area, water capacity, acid removal capacity and refrigerant flow capacity not less than that shown in the current edition of Parker Sporlan Bulletin 40-10 (or successor bulletin) under sizes recommended for "field replacement or field built-up systems."

Filter driers must be UL Listed per UL 207 and CSA Certified per CSA C22.2 No. 140.3 ("Refrigerant-Containing Components and Accessories, Nonelectrical"), rated for the maximum working pressure of the system (minimum 650 psig unless a higher system design pressure governs) and approved by the manufacturer as fully compatible with the specific refrigerant(s), lubricant type and system chemistry. Compatibility must be confirmed in the manufacturer's current published data, refrigerant compatibility listings and Bulletin 40-10, including all low-GWP HFC/HFO blends and A2L refrigerants (such as R-32, R-454A, R-454B) where used in the project.

Careful attention must be given to providing the correct type of filter drier as it pertains to the type of equipment, refrigerant and operating conditions of the respective system. Install in accordance with manufacturer instructions with flow direction arrow aligned with refrigerant flow.

12.11. **Refrigerant Piping Identification: Custom factory fabricated refrigerant piping labels are required. Stick-on, painted, stenciled or handwritten identification is not allowed.** The Contractor is urged to carefully review the extensive requirements of Part Identification in Section 15010 of the specifications and in particular the custom labels and installation requirements prior to certain site visits**.**

12.12. **Miscellaneous Requirements:** Taping or zip tying of liquid lines to suction lines is not allowed. Coordinate wall sleeve sizes required for refrigerant piping with insulation and aluminum jacket requirements.

PART 13. PIPE HANGERS AND SUPPORTS

13.1. **General:** Refer to Section 15010 for sleeve/firestopping requirements. **This pipe hanger and support section does not apply to refrigerant piping or condensate drainage piping.** Refer to Part "Pipe Insulation and Miscellaneous Insulation Work" for AP Armaflex material and installation methods specification for refrigerant piping and condensate drainage piping support requirements.

13.2. **Painting of Hangers and Supports:** Galvanized, zinc similar coated items are considered to **NOT** be coated. All must be painted, powder coated, epoxy coated or plastic coated. Hanger rods and associated bolts, nor clamps on Unistrut assemblies are required to be painted. All non-galvanized and galvanized ferrous metal parts of hangers, piping and related items in mechanical rooms, crawl space, above ceilings, Unistrut and other assemblies used for supporting ducts (except hanger straps and threaded rods), including black steel pipe, uncoated cast iron pipe, hangers, brackets, etc. must be coated.

All finishes and coatings must have a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84. See specification Section 15010, Part Identification for detailed requirements.

PART 14. PIPE INSULATION AND MISCELLANEOUS INSULATION WORK

14.1. **General:** All work by experienced applicators in accordance with Manufacturer's recommendations and these specifications. Where the specified installation conflicts with the Manufacturers recommendations, the strictest application must be provided.

Piping must be clean; dry and pressure tested before covering is applied. Size pipe hangers to fit over insulated pipe size. **Hangers and supports must not be in contact with bare pipe and must not penetrate the vapor barrier**.

Cover fittings, valves and flanges with insulation material as hereinafter specified to same thickness as adjacent pipe covering except screwed unions in hot and chilled piping and other specifically mentioned items. Neatly bevel covering edges or use prefabricated fittings as specified, adjacent to unions and other points of termination.

All insulation materials including coatings and mastics must have a composite rating for insulation, jacket or facing, including adhesives, not to exceed 25 flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E-84, NFPA 255 and UL 723.

All piping must be provided with sleeves/firestopping assemblies. Refer to Section 15010 for sleeve and firestopping requirements.

14.2. **Refrigerant Suction Lines, All Exterior Refrigerant Piping Including Liquid Lines and Mini-Split System Liquid Lines:** Preinsulated refrigerant piping is not allowed unless insulation meets the requirements specified below. Coiled nor precharged line sets are allowed unless noted or specified otherwise. Refer to other portions of this specification for refrigerant piping requirements. All liquid lines located outdoors must be insulated and installed within the specified aluminum jacket with the insulated refrigerant suction line. i.e., one aluminum jacket for both insulated pipes. Refer to aluminum jacket requirements below for additional information.

Insulate with 1" thickness, UL fire and smoke rated unslit, black, flexible foamed, elastomeric, closed cell pipe insulation by AP Armaflex, Aeroflex Aerofit, K-Flex Insul-Tube or Aerocell AC EPDM. It must be GreenGuard certified tubular insulation with Microban antimicrobial protection. Insulation must have a 'k' factor of not more than 0.256 at 90°F mean temperature, water absorption percent by volume of 0.2 and a water vapor transmission rate of 0.05 perm-inches or less.

Slip insulation onto pipe prior to erecting. Longitudinal cutting of the insulation is prohibited. Do not miter, stretch or bend insulation at any turn, tee, etc. Insulate with factory fabricated fittings for tees, elbows, unions, etc., the same size as on adjacent piping and manufactured by AP Armaflex, Aeroflex Aerofit, K-Flex Insul-Tube or Aerocell.

On piping with screwed fittings, make up fitting covers from Armaflex with an inside diameter large enough to overlap the insulation on the pipe next to the fitting. Fitting cover must be long enough to overlap the pipe insulation with a minimum of one inch on each side.

Seal all butt joints of insulation and all butt joints at the specified refrigerant piping clamp with AP Armaflex BLV, Black, low VOC, liquid, air-drying contact adhesive. Do not use aerosol adhesive. After gluing joints, wrap all joints with 2" wide, 1/8" thick AP Armaflex self-adhering tape.

All insulated piping must be continuous without cutting at clamp/support assemblies. All interior refrigerant liquid lines which are not required to be insulated by the equipment Manufacturer must not be insulated except, they must be provided with insulated cushion clamp insert and attached to the Unistrut assemble as specified below.

Note that Various Manufacturers of mini-split systems require the insulating of refrigerant liquid lines. When required by the Manufacturer, they must be insulated using materials specified above and in thickness required by the respective Manufacturer. Where the mini-split system Manufacturer requires less than 1" insulation, install thickness recommended with materials specified above using methods specified below.

14.3. **Condensate Drain Lines Insulation:** To include discharge lines on all equipment specified with or provided with air conditioning condensate drainage pumps. Insulate with 3/4" thickness, UL fire and smoke rated unslit, black, flexible foamed, elastomeric, closed cell pipe insulation and factory fabricated fittings as specified above by AP Armaflex, K-Flex Insul-Tube or Aerocel AC EPDM. It must be GreenGuard certified tubular insulation with Microban antimicrobial protection.

Insulation must have a 'k' factor of not more than 0.256 at 90°F mean temperature, water absorption percent by volume of 0.2 and a water vapor transmission rate of 0.05 perm-inches or less. See below for clamp and pipe supports assembly.

14.4. **Refrigerant Pipe Supports and Clamp Assembly: Do not use clevis hangers for refrigerant piping.** Refrigerant piping supports must be provided with an insulated piping clamp assembly attached to a Unistrut assembly. The Unistrut assembly must support the horizontal and vertical refrigerant piping on intervals not exceeding 8 feet. Provide dielectric separation between dissimilar metals. Support piping so that no vibration will be transmitted to the building structure.

The insulated piping clamp assembly must be provided at each Unistrut hanger for each insulated liquid line, each insulated hot gas reheat coil line and each insulated suction line. The insulated clamp must provide a crush resistant airtight seal and must consist of a rigid, closed cell, foam insulation to support tubing and absorb vibration. The outer cover must consist of a rubber coating that seals the cushion completely after installation. Clamps must be steel with electrodichromate finish. The rated assembly temperature range must be -50ºF to +250ºF. It must be self-extinguishing as tested under ASTM D 635.

After installing the device, glue each butt joint and tape each joint with 2" wide, 1/8" thick AP Armaflex self-adhering tape.

Insulated lines must use Wesanco Series Cush-A-Therm ZSI UX with specified rigid insulation thickness for the required pipe size, gold electro-galvanized channel clamp assembly and required hardware or equivalent by ArmaFix Eco Light or Aerofix by Aeroflex. Wesanco ZSI Series Cush-A-Therm UX is the basis of design.

Uninsulated liquid lines must be attached to the support assembly with cushion clamps. Clamps must be Wesanco ZSI Series Cush-A-Clamp gold electro-galvanized channel clamp assembly with thermoplastic elastomer and required hardware or equivalent.

For units on concrete pad, support piping with rustproof coated, 1-1/2" x 1-1/2" x 1/8" galvanized steel angle supports anchored to pad with stainless steel base plate, bolts and clamp assembly. The above specified clamp assembly is not required on exterior refrigerant piping that is covered with an aluminum jacket. Anchor aluminum jacket to support assembly.

14.5. **Interior Condensate Drain Lines Pipe Supports and Clamp Assembly: Do not use clevis hangers for condensate drainage piping.** Condensate drain line support, including discharge lines on all equipment specified with or provided with air conditioning condensate drainage pumps, must be provided with an insulated piping clamp assembly on a Unistrut assembly. The Unistrut assembly must support the horizontal and vertical condensate drainage piping on intervals not exceeding 8 feet. Provide dielectric separation between dissimilar metals. Support piping so that no vibration will be transmitted to the building structure.

The insulated clamp must provide a crush resistant airtight seal and must consist of a rigid, closed cell, foam insulation to support the tubing. The outer cover must consist of a rubber coating that seals the cushion completely after installation to prevent condensation. Clamps must be steel with electrodichromate finish. The assembly must be self-extinguishing as tested under ASTM D 635.

After installing device, glue each butt joint with liquid adhesive and tape each joint with 2” wide, 1/8” thick AP Armaflex self-adhering tape. Spray adhesive is not allowed.

Support piping with rustproof coated, 1-1/2” x 1-1/2” x 1/8” galvanized steel angle supports anchored to the floor/wall with steel base plate and bolts. Condensate drainage piping must be attached to the support with the insulation assembly specified above. Insulate using same methods and materials as specified for refrigerant piping (small, chilled water piping) except 3/4” thickness.

Combustion chamber condensate drain lines from high efficiency gas fired furnaces are not required to be insulated.

Insulated condensate drain lines must use Wesanco Series Cush-A-Therm ZSI UX with specified rigid insulation thickness for the required pipe size, gold electro-galvanized channel clamp assembly and required hardware or equivalent by ArmaFix Eco Light, Aerofix by Aeroflex. Wesanco Series Cush-A-Therm ZSI UX is the basis of design.

14.6. **Refrigerant Piping and Condensate Drainage Piping Aluminum Jacket:** All insulated exterior refrigerant piping and all insulated condensate drainage piping terminating in janitor sink, floor sink and hub drains in finished areas and any location that would subject the piping insulation to damage must be covered with an aluminum jacket.

Where refrigerant piping rises within the wall cavity to above the ceiling, attic or similar space, the aluminum jacket must terminate within the exterior wall cavity and sealed weather tight to the sleeve in the wall. Where the refrigerant piping extends from the outside, directly into the mechanical room, the aluminum jacket must terminate a minimum of 8” into the space and sealed weather tight on both sides of the wall and sleeve.

The aluminum jacket must be 18 ga., .04” thick, **smooth finish**, 3003 and 3105 series aluminum conforming to ASTM B-209 standards. Fittings must be 18 ga., .04” thick, die shaped and **smooth finish**, Type 1100 aluminum jacket meeting ASTM C585. Provide 1/2" wide, 18 ga., .04” thick, Type 3003 aluminum bands on maximum 24" centers but not less than two bands per jacket section. **Venture Clad or similar product is prohibited.**

Do not install aluminum jacket until refrigerant piping insulation installation has been inspected by the Engineer.

14.7. **Painting and Identifying:** Paint and identify after installation is completed as specified in Section 15010, Part Identification. Where piping is specified with an aluminum jacket, painting is not required.

Provide identification on the insulation covering indicating unions, strainers and check valves. Refer to Section 15010, Part Identification and note special refrigerant piping identification requirements. **Custom factory fabricated refrigerant piping labels are required. Stick-on, painted, stenciled or handwritten identification is not allowed.**

The Contractor is urged to carefully review the extensive requirements of Part Identification in Section 15010 of the specifications and note that certain identification is required to be completed before certain site visits**.**

14.8. **Submittal Data:** Submit for review complete data on materials and application methods proposed.

14.9. **Manufacturers:** Approved equivalents by Pittsburgh Corning, CertainTeed, Baldwin-Ehret-Hill, Manville, Owens Corning, Armstrong Childers and 3M Company will be accepted.

PART 15. VENTILATION

15.1. **General:** All fans must be furnished completely with ducts, grilles, curbs and required accessories. All fans exhausting shower/bath/tub/dishwashing areas and similar moisture laden areas must be provided with aluminum wheels. All other fan wheels must be steel. No plastic or non-metallic wheels are allowed unless specified otherwise.

Furnish sound absorbing curbs required to obtain noise levels specified. Curbs must be insulated with minimum R=8 rigid insulation with galvanized covering with continuous welded joints. See Part “Vibration and Noise Control” for additional requirements.

Provide for all fans to be interlocked with air handling units a “hand” – “auto” – “off” switch.

All fans must be certified in accordance with AMCA/ANSI Standards 210 and ANSI/ASHRAE 51. Fans wheels must be balanced in accordance with AMCA Standard 204-05. Fans must be listed at UL 705 and must bear the UL Label. Furnish for review capacity and sound power ratings.

All motors 1/2 HP and smaller must have built-in overload protection.

All motors with scheduled capacity of less than 1 HP must be ECM type as required by ASHRAE 90.1 and with minimum motor efficiency of 70% when rated in accordance with DOE 10 CFR 431.

All motors must also be premium efficiency type. Refer to Section Motors for additional requirements.

Scheduled static pressures are external to curbs.

15.2. **Power:** Contractor must verify all voltage and power requirements with Electrical Contractor, Electrical plans and at the site, prior to ordering equipment.

15.3. **Ceiling Mounted Cabinet Fans:** Penn Ventilator Company Model Zephyr, Series Z-3H thru Z-15H with RA right angle arrangement or TDA arrangement as shown on the plans, or approved equivalent, complete with all accessories, including unit mounted solid state speed control switch, factory baked enamel white metal ceiling grille, metal flanged inlet and outlet connections, acoustically insulated metal housing, direct drive, ECM motors, internally isolated centrifugal fan, integral backdraft damper and terminal cap, cast aluminum brick vent, or soffit grille as shown

on the plans. Fan wheel must be steel or aluminum. No polypropylene, plastic, polycarbonate or other non-metallic wheels are allowed. Fan must be supported from the structure with 1/4" hanger rods, rubber in shear vibration isolators and Manufacturer furnished bracket for attaching rods to the fan and structure above. Refer to the plan details for additional requirements.

15.4. **Dishwasher and Kitchen Hood Exhaust Fans: By the Hood Manufacturer**. Fans must be hinged, centrifugal vertical up-blast or horizontal discharge as shown on the plans, powered exhausters with premium efficiency motor designed specifically for kitchen hood exhaust systems manufactured by Captive Aire, Series "DU", or approved equivalent by the hood Manufacturer.

Fans must be belt or direct driven as shown in the fan schedule and must have permanently lubricated and sealed flanged bearings rated for L50 life in excess of 200,000 hours at maximum cataloged operating speed. Fans must meet UL 762 listed for grease exhaust and temperatures to 400°F. Exhaust fan motors must be located outside of the airstream.

Fans serving Type I hoods and Type II hoods must be hinged, supplied with a flexible weatherproof electrical cable to permit inspection and cleaning and must be equipped with a means of restraint to limit the swing of the fan on its hinge. See plans for required discharge arrangement. Housing must be of mill finish spun aluminum construction **and be provided with a factory installed cleanout port to provide a means of cleaning the fan blades.**

The motor compartment must incorporate Pyrotrol heat shield and Garlock shaft seal for belt driven units. Belt driven motors must be provided with factory installed automatic belt tensioner and lubrication lines extended to the outside of the fan casing.

Fans must be provided with a roof or wall curb as shown on the plans and a hinged base with integral stops. Exhaust outlets that terminate above the roof must have the discharge opening located not less than 40 inches above the roof surface. Coordinate roof curb requirement to obtain minimum discharge height requirement.

A drainage port and extension tube with Grease Terminator 2 capture device, or approved similar device, must also be provided. **Provide integral 4" tubing cleanout on the fan housing to facilitate cleaning of the fan blades.** Drainage port and grease capture device are not required for the kiln fan.

Other accessories must include moisture proof curb to comply with NFPA 96, forced motor cooling and integral residue trough to meet NFPA Standard 96 requirements and disconnect switch.

Dishwasher exhaust fans must be factory fabricated, all aluminum construction with stainless steel fasteners with same accessories and construction specified for the DU fans above. The roof curb must have built-in slope to provide level top. Curbs furnished must be moisture and rust resistant (aluminum or stainless steel) and adhere to roofing Manufacturer's requirements so as not to void the roofing warranty.

Fans shown as wall mounted must be provided with Manufacturer furnished hinged curb, supplemental angle iron, frames, rings, curbs, etc. as required for mounting on exterior wall for horizontal discharge. Coordinate all requirements with building Structural Plans and the Structural Engineer and provide as required.

Kiln fans must be provided with high temperature bearings.

15.5. **Cabinet In-Line Centrifugal Fans (SAF):** Loren-Cook Series SQND-EC, SQND or SQNB, high pressure as required, in-line centrifugal type exhaust or supply air fan as shown on the Fan Schedule. Fan must have 18 ga. galvanized steel cabinet with integral duct collars, bolted access doors on 3-sides which are sealed with closed cell neoprene gasketing, disconnect switch, centrifugal, backward inclined extruded aluminum fan wheel and cast aluminum hub, supports for ceiling suspension, permanently lubricated drip proof, premium efficiency motor, gravity or motorized type dampers as shown on the plan details and Manufacturer furnished VFD (NOT a speed controller) if indicated or specified.

Bearings must be heavy duty, L50 life in excess of 200,000 hours at maximum cataloged operating speed. Bearings must be regreaseable ball type with extended fittings in a pillow block cast iron housing. Coordinate fan arrangement required (top, side and bottom) at the site, prior to ordering fan.

Supply air fans must be provided with 1" thickness aluminum, washable, low pressure drop filters. Tool free access is required for all supply air fan filters. If accessing the filter requires removing the fan housing panel, the Contractor must provide a separate and dedicated flat filter housing section located at the supply fan inlet and external to the fan. The filter housing must be galvanized with stainless steel hinges and equipped with tool free access (e.g., large thumb screws or knurled knobs). Manufacturer furnished internal filters are only acceptable if they allow tool-free access to the filter housing only, without removing the main fan panel. **The Contractor is responsible for quarterly filter cleaning during the guarantee period.**

15.6. **Acceptable Manufacturers:** Cook, Greenheck, Penn Barry. Cook is the basis of design.

PART 16. PAD MOUNTED PACKAGED OUTDOOR HEAT PUMP UNITS (PHP)

16.1. **General Description:** One-piece, high efficiency, combination air-to-air heat pump cooling system and auxiliary electric resistance heating system, premium efficiency motors, powered exhaust and powered relief, complete with automatic controls, primary and secondary condensate drainage stub outs for condensate drainage, removable stainless steel IAQ drain pan, factory installed refrigerant monitors and related safeties, condensate line overflow switch in the condensate line and in the auxiliary drain pan, wired to shut down the unit upon detection of condensate in the auxiliary drain pan or obstruction in the condensate drain line and with outputs to alarm to BAS operators console, evaporator coil capillary bulb frostat and powered GFI convenience outlet. All equipment (condenser/compressors) scheduled cooling capacities are based on 95°F ambient temperature. Unit must be provided with color touchscreen interface with USB port to indicate data trending, historical alarm messages, real-time sensor measurements, on board system setpoints and customized reports. The unit must be designed for direct, side handling of the conditioned air as shown on the plans. Any unit with arrangement different than shown on the plans requires prior approval from the Architect and the Engineer. The equipment must be shipped completely assembled, pre-charged, piped and wired internally ready for field connections. Units must have heavy-duty metal condenser

coil hail guards. The entire unit must be factory wired for single point power connection.

All equipment and curbs must be installed level and plumb.

Each unit is specified to be provided with UV-C lights. The unit Manufacturer must coordinate with the UV-C Manufacturer the placement of the UV-C lights within the unit. UV-C lights must be placed in number and location as required by the UV-C device Manufacturer for maximum irradiance. The HVAC unit Manufacturer must provide equipment such that any part subjected to irradiance from the UV lamp system must be shielded from the UV-C light or constructed of a material that is capable of withstanding UV-C exposure levels expected in provided product without degradation.

The Contractor must verify all voltage and power requirements with the Electrical Contractor, Electrical plans and at the project site, prior to ordering equipment.

16.2. **Quality Control:** The Manufacturer must perform a factory test run of the equipment prior to shipment to verify operational performance as specified and shown on the plans. Certified test results must be included with the complete equipment documentation provided to the Contractor and Owner upon delivery to the project site and included in the Owner's Operating and Maintenance Manuals.

16.3. **Refrigerant Leak Detection System (LDS):** A Leak Detection System (LDS) must be provided in any system that has more than 3.91 lbs. of an A2L refrigerant charge, per safety standard UL 60335-2-40 which consists of one or more refrigerant detection sensors. Equipment with R-454B and charge amounts less than or equal to 3.91 lbs. per circuit, does not require a refrigerant leak detection system or any circulation airflow or ventilation airflow mitigation strategies. **The LDS must be factory-installed for all units.**

When the LDS detects a leak in units with charge amounts greater than 3.91 lbs. per circuit, the following mitigation actions must be automatically initiated until the refrigerant has not been detected for at least 5 minutes:

a. Unit must automatically revert to its outside air economizer mode to deliver 100% outside air in tandem with its associated powered exhaust/relief.
b. The compressor(s) operation must automatically and instantly cease/shutdown.
c. Associated auxiliary electric heat must be instantly and automatically disabled.

16.4. **Testing of Refrigerant Leak Detection System:** The Alabama Department of Construction Management (DCM) requires that the unit manufacturer must provide a factory-trained mechanic, employed by the unit Manufacturer, not a sales representative, onsite the day of the final site visit to test the refrigerant monitoring system and verify proper operation, shutdown, safeties, etc. as required. No beneficial occupancy, substantial completion or certificate of occupancy will be granted by DCM without this testing. Failure to comply with this provision will be cause for cancellation of the site visit and a reinspection fee imposed, with all costs of the re-inspection to be borne by the Contractor.

16.5. **Pad Mounted Supports:** Units shown on finished grade must be provided with factory base rail and anchored to the concrete pad. Concrete pads are specified under Division 2. Where concrete pads are not specified or not shown elsewhere, the Mechanical Contractor must provide a minimum 4" thickness, 5,000-psi concrete pad with rounded edges and corners. Pad must extend a minimum of 12" around three (3) sides of the unit and terminate at the building outside wall. Provide a strip of asphalt expansion joint between the concrete pad and the building exterior wall. Expansion joint must be full width by full depth of concrete pad, 1" thickness, non-absorbing, self-sealing, ASTM D 994 compliant and manufactured by W.R. Meadows Inc. or approved equivalent. All equipment and curbs must be installed level and plumb.

16.6. **Economizer Package:** All units must be provided with a 100% outside air economizer. The economizer must be provided complete with all controls, powered exhaust, powered relief and air mixing damper assembly consisting of an enthalpy controller, fresh air, recirculated air and exhaust air dampers and protective guard over relief/exhaust unit discharge. The fresh air intake section must be equipped with 1" thick, washable air filters. The assembly must be mounted within the confine of the unit casing. The system must be interlocked so that when the room thermostat calls for cooling or heating the outside air dampers will return to minimum position.

16.7. **Cooling System:** Total certified cooling capacity must not be less than indicated in the Equipment Schedule with low ambient head pressure controls to 40°F. All compressors must operate with full factory furnished charge of ASHRAE Safety Classification A2L, R-454B refrigerant. Coils must be of non-ferrous construction with aluminum fins mechanically bonded to seamless copper tubes. Condenser coils must have sub-cooling rows. The compressors must be resiliently mounted; have built-in 3-mode crankshaft lubrication, crankcase heater, discharge temperature limiter, current and temperature sensing motor overloads and five-year guarantee. The system must be protected by high and low pressure switches, a five minute compressor timed off cycle controller, head pressure controls, reversing valves, accumulator, defrost control system, locking refrigerant charging valves, etc. as required for complete installation. Compressors over 10-ton capacity must have oil failure switches.

All units must be provided with multiple compressors, or 2-stage compressors as required by ASHRAE 90.1. Units with more than one compressor must have complete separate/independent refrigerant circuits to the evaporator. Where dual compressors are required for Manufacturer approved use of the hot gas reheat coil, dual compressors must be provided in lieu of a single, two-stage compressor.

16.8. **Refrigerant Service Valves:** Provide for the proper service of the equipment. Per IMC 1101.9, all refrigerant circuit access ports located outdoors must be fitted with color coded, all brass and locking tamper resistant caps. This requirement does not apply to refrigerant circuit access ports on equipment installed in controlled areas such as on roofs with locked access hatches or doors.

The locking caps must be red or red banded color code for the refrigerant used. Caps must be Novent Series 8668 for R-454B refrigerant with 86698 NV Multikey unlocking mechanism for R-454B refrigerant or equivalent by JB Industries Series Shield and DiversiTech Series Sentry. Provide Owner with minimum of six (6) spare keys.

16.9. **Hot Gas Reheat Coil:** Each unit must be provided with a factory installed (not third party installed) refrigerant hot gas reheat coil with reheat coil valve and located in the reheat position. The coil must be of sufficient size to reheat all of the air supply. Provide, complete, with all necessary valves, controls, etc., as required for a

complete and properly functioning installation. Provide manual isolation valves for each hot gas and liquid lines. Furnish for review air conditioning equipment Manufacturer approved refrigerant piping and controls diagram and statement by the air conditioning Manufacturer on company letterhead that use of the hot gas reheat coil with the equipment is acceptable to the Manufacturer and will not affect any warranty or guarantee. **Equipment submittal will not be reviewed without a Manufacturers' approved diagram and referenced statement**. Minimum reheat capacity for supply air must be 10ºF. Maximum coil pressure drop is 0.10" static pressure.

Units with a specified cooling capacity of less than 40 MBH must use the auxiliary resistance heater for reheat. Where the auxiliary resistance heater is specified for maintaining space temperature during dehumidification, the auxiliary resistance heater must be provided in a minimum of two stages.

16.10. **Auxiliary Electric Heating System:** The electric heater with all components built in at the factory must carry the UL label. Each coil must have double thermal protection, consisting of a thermal overload Klixon device and heat limiters in the power legs, current sensing relay, transformer and timer delay relay. Provide primary fusing, branch circuit fusing per UL and NEC requirements. If backup contactors are used as secondary thermal overload protection in lieu of the fused elements, these contactors must be built in and prewired at the factory. The resistance wire used in each coil must be 80% nickel and 20% chromium with no iron content. Wire must be supported by ceramic bushings, mounted in galvanized steel frame on not more than 4" centers.

16.11. **PHP-A Fans and Motors:** Supply fan must be a direct driven plenum fan with backward curved fan wheel with an external rotor direct drive variable speed motor, not 2-speed. Supply fan speed adjustments must be made using the control user interface, mobile application and BAS, if included in this project.

Fan must be provided with fan fail indication. The indication must be registered at the on-board user interface, mobile service application and BAS, if included in this project.

Fan motors must be premium efficiency, true variable speed (not 2-speed), direct driven and thermally protected.

All motors with scheduled capacity of less than 1 HP must be ECM type as required by ASHRAE 90.1 and with minimum motor efficiency of 70% when rated in accordance with DOE 10 CFR 431.

All motor ratings, efficiencies, torque, horsepower, service factor, temperature rise, bearing life and performance characteristics specified herein must be fully achieved at a base frequency of 60 Hz or lower. Motors must not rely on operation above 60 Hz to meet any specified performance criteria, nor shall the capability to operate above 60 Hz be used to satisfy the minimum requirements of this Section. This requirement applies to all motors, including those intended for use with variable frequency drives (VFDs).

Provide all necessary controls to operate the unit based on maintaining two temperature setpoints: discharge air and zone temperature. During single zone vav cooling, the unit will maintain zone cooling setpoint by modulating the supply fan speed more or less to meet zone load demand; and the unit will maintain discharge temperature to the discharge cooling setpoint by modulating economizer if available and staging dx cooling.

External static pressure indicated on the plans is estimated. The equipment Manufacturer must provide additional belt sheaves for all belt driven equipment and/or motors, as applicable and as required, to match field conditions for the ductwork as installed.

Condenser fans must be direct driven. All motors must have inherent protection devices on all legs.

16.12. **PHP-B Fans and Motors:** Supply air fans must be multi-speed, centrifugal type with premium efficiency motors and permanently lubricated ball bearings.

All units with scheduled cooling capacity of 300,000 BTUH or less must be provided with direct drive plenum fan with a backward-curved fan wheel and an external rotor direct drive variable speed indoor motor.

External static pressure indicated on the plans is estimated. The equipment Manufacturer must provide motors as required, to match field conditions for the ductwork as installed.

Condenser fans must be direct driven. All motors must have inherent protection devices on all legs.

All motor ratings, efficiencies, torque, horsepower, service factor, temperature rise, bearing life and performance characteristics specified herein must be fully achieved at a base frequency of 60 Hz or lower. Motors must not rely on operation above 60 Hz to meet any specified performance criteria, nor shall the capability to operate above 60 Hz be used to satisfy the minimum requirements of this Section. This requirement applies to all motors, including those intended for use with variable frequency drives (VFDs).

16.13. **Ultraviolet (UV-C) Lights:** Mechanical Contractor is responsible for wiring the devices and providing power for the UV-C lights if not shown on the Electrical plans. Air handling units must be provided with power supply and connections within the unit cabinet for powering the UV-C lights. Mechanical Contractor must be responsible for circuitry to UV-C lighting. UV-C lighting must cycle on and off with the fan or operate continuously as recommended by the UV-C lighting Manufacturer.

Comply with UL / C-UL or ETL for Ultraviolet Fixturing. Store UV-C Fixturing in a clean, dry place and protect from weather, construction traffic and construction debris. UV-C products supplier must provide proof of 100% inbound and outbound testing of equipment. The UV-C Power supply must have been tested, listed and labeled as compliant with UL, CSA and CE. The plenum wiring loom must meet UL Subject 13 and UL 1581, Article 725 of the NEC and meet UL VW-1 material ratings. There must be a metallic Loom cladding and it must be UL recognized DXUZ2 and constructed of flexible galvanized steel and cover the entire Loom. Each lamp must contain no more than 5 milligrams of mercury consistent with current environmental practices. Lamp Watts must be printed on all lamps, no exceptions. Lamps must not produce ozone and must be hermetically sealed within a layer of UV-C transmissible FEP to protect against lamp breakage and to contain lamp contents should breakage occur.

Lamps must be installed in sufficient quantity and in such a manner to provide an equal distribution of UV-C energy. When installed, the UV-C energy produced must

be of the lowest possible reflected and shadowed-losses and must produce 360-degree UV-C irradiance from the lamps within the UV cavity. Lamp Watts must be printed on all lamps, no exceptions. Each lamp must contain less than 5 milligrams of mercury, consistent with current environmental practices. Lamp useful life must be a minimum of 9,000 hours with no more than a 15% output loss at the end of the lamp's life (12 months of continuous use). Lamps must be constructed with UV-C resistant bases and must not produce ozone. Lamps must produce the specified output in moving air of up to 1000 fpm and temperatures of 0-200°F. Lamps must be hermetically sealed within a layer of UV-C transmissible FEP to provide protection against lamp breakage and to ensure Lamp contents from a broken Lamp are contained.

Fixture modeling must be included in the submittal and must contain the necessary calculations to demonstrate that a minimum of 6 lamp watts, as recommended by ASHRAE, are distributed equally to each square foot of coil surface area to achieve a minimum of 100 microwatts per square centimeter equally distributed to the surfaces at the plenum sides, top and bottom. All calculations are to be at 55 degrees F and 500 fpm air velocity, no exceptions.

The power supply housing must be capable of installation within the air stream, secondary compartment or NEMA enclosure. Lamps must be mounted to irradiate the intended surfaces as well as all of the available line of sight airstream through proper placement, 360° irradiation and incident angle reflection.

To protect personnel, all unit access panels and doors to the UV-C assembly and/or within view of the UV-C assembly must include mechanical interlock switches to ensure that the UV-C assembly automatically de-energizes when any equipment access is opened. All UV-C devices must fit and be installed within the unit cabinet. **Devices must be hardwired and UL labeled for the installation. Plug-in devices are not allowed per NEC.** The assembly must be powered by 120v circuit or as required by the AC unit Manufacturer. Coordinate requirement and provide as required.

Provide warning signage on each access point to the UV-C lights and on each side of the unit. Signage materials, methods and colors must be as specified in Section 15010, Part Identification. Signage must read as follows: "***DANGER!! UV-C LIGHT SOURCE! DISCONNECT POWER BEFORE SERVICING UNIT OR UV-C LIGHTING!***" Do not use stick-on signage provided by the UV-C Manufacturer.

16.14. **Frame and Casings:** The frame must be of welded construction. The casing must be constructed of galvanized hinged panels with hinged latching handles and baked on outdoor acrylic finish. The cabinet bottom must be insulated with Styrofoam; cabinet panels must be insulated with 1" fiberglass. All components, wiring and inspection areas must be completely accessible through hinged panels with locking door handles. Unit must be provided with a unit Manufacturer furnished heavy-duty metal condenser coil hail guard.

16.15. **Filters:** Provide 2" thick, MERV 11, pleated, disposable type filters for each filter location equal to Farr Series 30/30 and filter access section. All filters must be common industry standard size filters that are readily available and do not have to be fabricated. Cutting and taping of filter segments to make a proper filter is prohibited. **The Mechanical Contractor must be responsible for quarterly filter cleaning of the outside air intake filter and quarterly replacement of the return air filters**

during the guarantee period. The Mechanical Contractor must inscribe onto the disposable filters' casing the date filters were installed/replaced.

16.16. **Indoor Thermostat:** The Manufacturer must provide a combination 7-day programmable, two-stage heating automatic changeover heat pump thermostat. The thermostat must have an outdoor thermistor to compensate for thermostat droop, emergency heat switch with indicator light and auxiliary heat light. Thermostat must have sub-base fan switch for "On-Auto" selection and manual "Heat-Cool" switch. The thermostat must be hardwired and be provided with battery backup. Coordinate the thermostat with specified sequence of operation and provide as required.

Provide hinged metal guard with rounded corners, lock and key for each thermostat.

16.17. **Outdoor Thermostat:** Provide an outdoor thermostat for control of the second stage of electrical heater.

16.18. **Humidistat:** Humidistat is specified in "Automatic Controls" at the end of this 15700 Specification. At his option, the Unit Manufacturer may substitute a combined thermostat/humidistat. Verify with the Controls Sub-Contractor that the furnished thermostat/humidistat will perform all sequences of operation else provide separate devices as specified.

16.19. **CO2 Sensors:** Where demand ventilation is specified, the system must be provided with a separate CO2 sensor of the type specified at the end of this Section 15700. Combination devices are not allowed due to the required mounting height of the CO2 sensor.

16.20. **Unit Protection:** All equipment must also be provided with equipment manufacturer factory installed surge protection and phase protection to insure against voltage unbalance, over/under voltage, phase loss, reversal, incorrect sequencing and rapid short cycling. Where manufacturer factory installed devices are not available, protection must be provided for all 3-phase equipment utilizing ICM Controls Model 450 A Plus+ or equivalent. All single phase equipment with horsepower greater than or equal to 1/8 HP must be provided with protection utilizing ICM Controls Model ICM 492 or equivalent. Where phase protection device cannot be mounted within the respective equipment, provide a NEMA 4x or NEMA enclosure appropriate for the installation. The Contractor must consult with the Owner's maintenance personnel and set up all programmable options based on the Owner's requirements, within the device's capabilities.

16.21. **Smoke Detectors:** See Controls at the end of this Section.

16.22. **Factory Start-Up Service:** The Contractor must provide a factory-trained mechanic, employed by the unit Manufacturer and not a sales representative, to check out all equipment, including hot gas reheat coils and UV-C lights and furnish written report indicating equipment is installed in strict accordance with Manufacturer's recommendations. Also, provide temperature, pressure and amp readings taken during testing to substantiate unit performance including the range of the refrigerant hot gas reheat coil valve as applicable.

16.23. **Warranty:** General warranties are specified in Section "General Mechanical Provisions". The Mechanical Contractor and equipment Manufacturer must provide a non-prorated, total of five years replacement warranty for this equipment, to include all parts and components, belts, lubricants, compressors, refrigerant, etc., all labor

and shipping of the items required to return the installation to its original operating condition.

The Mechanical Contractor must be responsible for any parts, labor, etc. as specified above that is not provided by the equipment Manufacturer.

The Contractor and/or the Manufacturer must respond within 24 hours upon notification that there has been a failure under the terms of the specified warranty. "Respond" must mean having a Manufacturer certified technician onsite to evaluate the extent of the needed repairs/replacement and ordering of all items required for repair/replacement.

Shipping of the replacement compressor and any other related unit parts must be via maximum 2-day delivery if the unit is inoperable or cannot maintain a minimum indoor temperature of 78ºF to the affected facility.

The warranty period must begin on the date of substantial completion of the installation, as determined by the Architect, and must continue for the full product warranty period specified above.

16.24. **Manufacturers:** Trane Series WHK. Trane is the basis of design. Equivalents by Carrier or Lennox will be considered.

PART 17. WALL MOUNTED DUCTLESS SPLIT HEAT PUMP SYSTEM UNIT (DHP)

17.1. **General:** Provide ductless, wall mounted, split system type heat pump unit, equal to Trane/Mitsubishi Electric Series NTXWST/NTXSST for units with specified cooling capacity up to 9 MBH and TPKA/TRUZ units with specified cooling capacity of 12 MBH to 36 MBH complete with all accessories including wall hung evaporator blower unit, pad mounted outdoor condensing unit operating with full factory furnished charge of ASHRAE Safety Classification A2L, R-454B refrigerant, factory installed refrigerant monitor and related safeties, lockable refrigerant charging valves, filter frame, washable filter, fixed, wall mounted, hardwired 7-day programmable, microprocessor electronic thermostat and control module, metal, hinged locking thermostat guard, adjustable discharge louvers, factory installed heavy duty condensate pump (if drainage indicated on plumbing and mechanical plan is not gravity type), low ambient indoor coil thermistor, low ambient control to 14º F, outdoor microprocessor control, heavy duty metal condenser coil hail guard, sweat/brazed connection fittings from the Manufacturer's factory and other accessories required for a complete functional installation. Flare connections are not allowed unless **specifically** required by the Manufacturer. Refer to Part Condensate Drainage Piping of this specification for drainage requirements. Compressors must be warranted for 5 years. Where the indoor unit is powered by the outdoor unit, wiring must be installed as specified in Division 16.

All condensate and refrigerant piping that cannot be concealed in the walls in finished spaces must be provided with Mitsubishi Line-Hide Linset Cover System. Note that this provision must not be used to cover piping that can be otherwise concealed.

17.2. **Refrigerant Service Valves:** Provide for the proper service of the equipment. Per IMC 1101.9, all refrigerant circuit access ports located outdoors must be fitted with color coded, all brass and locking tamper resistant caps. This requirement does not

apply to refrigerant circuit access ports on equipment installed in controlled areas such as on roofs with locked access hatches or doors.

The locking caps must be red or red banded color code for the refrigerant used. Caps must be Novent Series 8668 for R-454B refrigerant with 86698 NV Multikey unlocking mechanism for R-454B refrigerant or equivalent by JB Industries Series Shield and DiversiTech Series Sentry. Provide Owner with minimum of six (6) spare keys.

17.3. **Refrigerant Piping:** Coiled line sets and preinsulated line sets are not allowed. See other parts of 15700 for piping and insulation requirements. The Equipment Manufacturer must size all refrigerant piping per ASME B31.5 (Refrigeration Piping and Heat Transfer Components), ASHRAE Standard 15 (Safety Standard for Refrigeration Systems) and all applicable codes and standards.

The Manufacturer and Contractor must furnish all required accessories and auxiliaries for a complete installation in accordance with the drawings and specified sequence of operation. The Contractor must submit a manufacturer approved refrigerant piping diagram prior to installation. Failure to provide the approved diagram must make the Manufacturer and Contractor solely responsible for correcting any resulting issues at no additional cost to the Owner. Refer to Section Refrigerant Piping and Accessories for additional requirements. **Piping connections must be brazed/sweat connections** from the Manufacturer's factory. Flare connections are not allowed unless **specifically** required by the Manufacturer. Refer to Section Refrigerant Piping and Accessories for additional requirements.

17.4. **Condensate Pump:** Where gravity drainage is not indicated on the plans, condensate pumps for all indoor units must be Blue Diamond, Series MaxiBlue or approved equivalent. The pump must be thermally protected, up to 3.7 GPH flow rate, 23 ft. head, 15 ft. suction, self-priming, powered by the indoor unit and maximum 21-db sound level. The pump must be provided with mounting feet, extension cables and multi-tank configuration as required. Mechanical Contractor to coordinate power requirements for pump, prior to bid and provide as required.

17.5. **Condensate Drainage:** Refer to Part Condensate Drainage Piping of this specification for drainage requirements. Note that ductless mini-split equipment that produces condensate must be provided with an inline check valve located in the drain line or a trap as required by IMC 307.2.4.1.

17.6. **Power Wiring Connection:** Coordinate wiring requirements (separate power for each indoor and outdoor unit or indoor unit powered by outdoor unit) with the equipment manufacturer and provide as required.

Where the indoor unit is powered by the outdoor unit, the contractor must provide and install a specialized Type MC Mini-Split cable (Southwire EZ-IN or approved equivalent) for all interconnecting power and control wiring between indoor and outdoor HVAC units. Cable must consist of four (4) stranded Class B compressed copper conductors. Each conductor must be insulated with heat-resistant Polyvinyl Chloride (PVC) and a protective Nylon sheath (Type THHN/THWN). The assembly must be protected by a 25/50 smoke/flame rated lightweight, interlocking aluminum armor and finished with a sunlight-resistant, flame-retardant and moisture-resistant black PVC outer jacket. Cable must be UL listed for 600V, rated for 195°F dry and 170°F wet locations and approved for direct burial and installation without conduit in both indoor and outdoor environments. Installation must comply with NFPA 70

(National Electrical Code) Article 330. Coordinate furnishing and installation of the cable requirement with the electrical contractor prior to ordering/installing the cable.

17.7. **Indoor Thermostat:** The manufacturer must provide a combination 7-day programmable, two-stage heating automatic changeover heat pump thermostat. The thermostat must have outdoor thermistor to compensate for thermostat droop, emergency heat switch with indicator light and auxiliary heat light. Thermostat must have sub-base fan switch for “On-Auto” selection and manual “Heat-Cool” switch. The thermostat must be hardwired and be provided with battery backup. Coordinate the thermostat with specified sequence of operation and provide as required.

Provide hinged metal guard with rounded corners, lock and key for each thermostat.

Refer to Section 15920 Building HVAC Controls System (BAS) for additional requirements. Coordinate and provide complete interface as required.

17.8. **Pad Mounted Supports:** The concrete pad is specified under Division 2 for all units mounted on grade. Where concrete pads are not specified or shown, the Mechanical Contractor must provide a minimum 4” thickness, 5,000 psi concrete pad with rounded edges and corners. Pad must extend a minimum of 12” around three (3) sides of the unit and terminate at the building outside wall. Provide a strip of asphalt expansion joint between the concrete pad and the building exterior wall. Expansion joint must be 1” thickness, non-absorbing, self-sealing, ASTM D 994 compliant and manufactured by W.R. Meadows Inc or equivalent. All equipment and curbs must be installed level and plumb.

17.9. **Unit Protection:** All equipment must also be provided with equipment manufacturer factory installed surge protection and phase protection to insure against voltage unbalance, over/under voltage, phase loss, reversal, incorrect sequencing and rapid short cycling. Where manufacturer factory installed devices are not available, protection must be provided for all single phase equipment with horsepower greater than or equal to 1/8 HP utilizing ICM Controls Model ICM 492 or equivalent. Where phase protection device cannot be mounted within the respective equipment, provide a NEMA 4x or NEMA enclosure appropriate for the installation. The Contractor must consult with the Owner's maintenance personnel and set up all programmable options based on the Owner's requirements, within the device's capabilities.

17.10. **Warranty:** General warranties are specified in Section "General Mechanical Provisions". The Mechanical Contractor and equipment Manufacturer must provide a non-prorated, total of five years replacement warranty for this equipment, to include all parts and components, belts, lubricants, compressors, refrigerant, etc., all labor and shipping of the items required to return the installation to its original operating condition.

The Mechanical Contractor must be responsible for any parts, labor, etc. as specified above that is not provided by the equipment Manufacturer.

The Contractor and/or the Manufacturer must respond within 24 hours upon notification that there has been a failure under the terms of the specified warranty. "Respond" must mean having a Manufacturer certified technician onsite to evaluate the extent of the needed repairs/replacement and ordering of all items required for repair/replacement.

Shipping of the replacement compressor and any other related unit parts must be via maximum 2-day delivery if the unit is inoperable or cannot maintain a minimum indoor temperature of 78ºF to the affected facility.

The warranty period must begin on the date of substantial completion of the installation, as determined by the Architect and must continue for the full product warranty period specified above.

17.11. **Manufacturers:** Trane or equivalent by Mitsubishi, Lennox, LG or Carrier. **Trane is the basis of Design.**

PART 18. SPLIT SYSTEM CASSETTE TYPE HEAT PUMP (CCHP)

18.1. **General:** The heat pump air conditioning system must be equal to Trane/Mitsubishi Electric Series PLA/RUZ split system operating full factory furnished charge of ASHRAE Safety Classification A2L, R-454B refrigerant. The system must consist of a slim silhouette; compact ceiling mounted packaged evaporator section and matching slim line outdoor unit with lockable refrigerant charging valves, factory installed refrigerant monitors and related safeties, refrigerant piping sweat/brazed connections from the Manufacturer, wall mounted, hardwired 7-day programmable thermostat with clear plastic locking cover, occupancy sensor with override, outside air connection (if shown on the plans) and supply air connection (if shown on the plans). whenever possible, the unit must fit within a nominal 2'x2' lay-in ceiling grid. Flare connections are not allowed unless **specifically** required by the Manufacturer. The units must be listed by Electrical Laboratories (ETL) and/or Underwriters Lab (UL) and bear the ETL and/or UL label. All wiring in accordance with the National Electrical Code (N.E.C.). The units must be rated in accordance with ARI Standard 240 and bear the ARI label. All units must be provided with phase protection.

All condensate and refrigerant piping that cannot be concealed in the walls in finished spaces must be provided with Mitsubishi Line-Hide Linset Cover System. Note that this provision must not be used to cover piping that can be otherwise concealed.

18.2. **Refrigerant Service Valves:** Provide for the proper service of the equipment. Per IMC 1101.9, all refrigerant circuit access ports located outdoors must be fitted with color coded, all brass and locking tamper resistant caps. This requirement does not apply to refrigerant circuit access ports on equipment installed in controlled areas such as on roofs with locked access hatches or doors.

The locking caps must be red or red banded color code for the refrigerant used. Caps must be Novent Series 8668 for R-454B refrigerant with 86698 NV Multikey unlocking mechanism for R-454B refrigerant or equivalent by JB Industries Series Shield and DiversiTech Series Sentry. Provide Owner with minimum of six (6) spare keys.

18.3. **Occupancy Sensor:** Provide I-see Sensor' occupancy sensor.

18.4. **Refrigerant Piping:** Coiled line sets and preinsulated line sets are not allowed. See other parts of 15700 for piping and insulation requirements. The Equipment Manufacturer must size all refrigerant piping per ASME B31.5 (Refrigeration Piping and Heat Transfer Components), ASHRAE Standard 15 (Safety Standard for Refrigeration Systems) and all applicable codes and standards. The Manufacturer and Contractor must furnish all required accessories and auxiliaries for a complete installation in accordance with the drawings and specified sequence of operation.

The Contractor must submit a manufacturer approved refrigerant piping diagram prior to installation. Failure to provide the approved diagram must make the Manufacturer and Contractor solely responsible for correcting any resulting issues at no additional cost to the Owner. Refer to Section Refrigerant Piping and Accessories for additional requirements. **Piping connections must be brazed/sweat connections** from the Manufacturer's factory. Flare connections are not allowed unless **specifically** required by the Manufacturer. Refer to Section Refrigerant Piping and Accessories for additional requirements.

18.5. **Description:** Capacities and characteristics must be as specified on the drawings. The indoor unit must be factory assembled and wired. The casing must be galvanized sheet metal with insulation. Whenever possible, the unit must fit within a nominal 2'x2' ceiling grid. Coordinate unit type required with previously specified requirements of outside air/supply air duct connections required by the plans. The evaporator fan must be a high performance, fan direct driven by a single motor. The fan must be statically and dynamically balanced and run on permanently lubricated bearings. The indoor unit must have an adjustable air outlet system with 4-way deflection airflow. Return air must be filtered with factory furnished filter. The coil must be of nonferrous construction with smooth plate fins bonded to copper tubing. All tube joints must be brazed with phos-copper or silver alloy and provided with appropriate **piping connections for brazed/sweat connections from the Manufacturer's factory**. Flare connections are not allowed unless **specifically** required by the Manufacturer. The coil must be pressure tested at the factory. A condensate pan and auxiliary drain pan must be provided and extend under the coil and piping.

Unit must be provided with sensor to shutdown unit and sound alarm if condensate line becomes obstructed. Provide output contacts to show alarm at BAS system Operator Console. Coordinate with BAS Contractor and provide as required for proper interface.

The control system must consist of low voltage room thermostat to control heating and cooling. Provide clear plastic thermostat guard with lock and key.

18.6. **Condensate Drainage:** Refer to Part Condensate Drainage Piping of this specification for drainage requirements. Note that ductless mini-split equipment that produces condensate must be provided with an inline check valve located in the drain line or a trap as required by IMC 307.2.4.1.

18.7. **Outdoor Unit:** Must be completely factory assembled, piped and wired. The unit must be furnished with one (1) direct drive, propeller type fan arranged for horizontal or vertical. The motors must have inherent protection, be of the permanently lubricated type and resiliently mounted for quiet operation. The compressor must be of the high-performance rotary type with crankcase heater, accumulator and internal thermal overloads. The refrigeration system must be equipped with high-pressure switch. Refrigerant flow from the condenser must be controlled by means of a capillary tube. The condenser coil must be of nonferrous construction with smooth plate fins bonded to copper tubing. The coil must be protected with smooth plate fins bonded to copper tubing. The condenser coil must be protected with an integral heavy-duty metal hail guard. The unit must be controlled by the microprocessor located in the indoor matching unit. A built-in, low-ambient controller must allow cooling to 0 degrees F outdoor temperature.

18.8. **Power Wiring Connection:** Coordinate wiring requirements (separate power for each indoor and outdoor unit or indoor unit powered by outdoor unit) with the equipment manufacturer and provide as required.

Where the indoor unit is powered by the outdoor unit, the contractor must provide and install a specialized Type MC Mini-Split cable (Southwire EZ-IN or approved equivalent) for all interconnecting power and control wiring between indoor and outdoor HVAC units. Cable must consist of four (4) stranded Class B compressed copper conductors. Each conductor must be insulated with heat-resistant Polyvinyl Chloride (PVC) and a protective Nylon sheath (Type THHN/THWN). The assembly must be protected by a 25/50 smoke/flame rated lightweight, interlocking aluminum armor and finished with a sunlight-resistant, flame-retardant and moisture-resistant black PVC outer jacket. Cable must be UL listed for 600V, rated for 195°F dry and 170°F wet locations and approved for direct burial and installation without conduit in both indoor and outdoor environments. Installation must comply with NFPA 70 (National Electrical Code) Article 330. Coordinate furnishing and installation of the cable requirement with the electrical contractor prior to ordering/installing the cable.

18.9. **Indoor Thermostat:** The manufacturer must provide a combination 7-day programmable, two-stage heating automatic changeover heat pump thermostat. The thermostat must have outdoor thermistor to compensate for thermostat droop, emergency heat switch with indicator light and auxiliary heat light. Thermostat must have sub-base fan switch for “On-Auto” selection and manual “Heat-Cool” switch. The thermostat must be hardwired and be provided with battery backup. Coordinate the thermostat with specified sequence of operation and provide as required.

Provide hinged metal guard with rounded corners, lock and key for each thermostat.

Refer to Section 15920 Building HVAC Controls System (BAS) for additional requirements.

18.10. **Pad Mounted Supports:** Units mounted on finished grade must be provided with concrete pad. Concrete pads are specified under Division 2. Where concrete pads are not specified or shown elsewhere, the Mechanical Contractor must provide a minimum 4” thickness, 5,000-psi concrete pad with rounded edges and corners. Pad must extend a minimum of 12” around three (3) sides of the unit and terminate at the building outside wall. Provide a strip of asphalt expansion joint between the concrete pad and the building exterior wall. Expansion joint must be 1” thickness, non-absorbing, self-sealing, ASTM D 994 compliant and manufactured by W.R. Meadows Inc or equivalent.

18.11. **Unit Protection:** All equipment must also be provided with equipment manufacturer factory installed surge protection and phase protection to insure against voltage unbalance, over/under voltage, phase loss, reversal, incorrect sequencing and rapid short cycling. Where manufacturer factory installed devices are not available, protection must be provided for all single phase equipment with horsepower greater than or equal to 1/8 HP utilizing ICM Controls Model ICM 492 or equivalent. Where phase protection device cannot be mounted within the respective equipment, provide a NEMA 4x or NEMA enclosure appropriate for the installation. The Contractor must consult with the Owner's maintenance personnel and set up all programmable options based on the Owner's requirements, within the device's capabilities.

18.12. **Warranty:** General warranties are specified in Section "General Mechanical Provisions". The Mechanical Contractor and equipment Manufacturer must provide a

non-prorated, total of five years replacement warranty for this equipment, to include all parts and components, belts, lubricants, compressors, refrigerant, etc., all labor and shipping of the items required to return the installation to its original operating condition.

The Mechanical Contractor must be responsible for any parts, labor, etc. as specified above that is not provided by the equipment Manufacturer.

The Contractor and/or the Manufacturer must respond within 24 hours upon notification that there has been a failure under the terms of the specified warranty. "Respond" must mean having a Manufacturer certified technician onsite to evaluate the extent of the needed repairs/replacement and ordering of all items required for repair/replacement.

Shipping of the replacement compressor and any other related unit parts must be via maximum 2-day delivery if the unit is inoperable or cannot maintain a minimum indoor temperature of 78ºF to the affected facility.

The warranty period must begin on the date of substantial completion of the installation, as determined by the Architect and must continue for the full product warranty period specified above.

18.13. **Manufacturers:** Trane or equivalent by Mitsubishi, Lennox, LG or Carrier. **Trane is the basis of Design.**

PART 19. ELECTRIC DUCT HEATERS

19.1. **General**: Electric duct heaters must be open grid, flanged type. The coil with all components must be built in at the factory and carry a UL label. Each coil must have double thermal protection, consisting of a thermal overload Klixon device and heat limiters in the power legs. If back up contactors are used as secondary thermal overload protection in lieu of the fused elements, these contactors must be built-in and prewired at the factory. Each heater must be factory wired for single power connection.

The heater coil must be provided with SCR control for maximum efficiency. All coils must be factory fused and pre-wired as required to meet the latest National Electric Code. Each coil terminal box must be factory insulated to prevent condensation.

Resistance wire used in each coil must be 80% nickel and 20% chromium with no iron content. Wire must be supported by ceramic bushings, mounted in a galvanized steel frame on not more than 4'' centers.

19.2. **Accessories**: Control box with factory built-in transformers; un-fused safety disconnect; factory mounted; pre-wired, pressure-type air flow switch field adjustable from 0.07" to 5.0" WG pressure-type air flow switch. Under no circumstances must a sail switch be allowed.

19.3. **Installation**: Complete installation must comply with the Manufacturers' installation instructions, UL listing requirements, NEC and local codes. Locate and arrange for easy access and service.

19.4. **Acceptable Manufacturers:** Brasch, Indeeco, Tutco or Chromalox. Brasch is the basis of design.

PART 20. ELECTRIC UNIT HEATERS

20.1. **General:** Heaters must be UL listed, have integral safety controls, control transformer, circuit breaker and all required accessories for a complete and functional installation. Capacities must be as scheduled on the plans. All heaters must be installed in accordance with the Manufacturer's recommendations.

Heaters must be securely mounted to building structure. Provide any additional structural framing necessary for proper heater installation. Unit heaters must be provided with single point power connections (fan and heater).

The Contractor must verify all voltage and power requirements with the Electrical Contractor, Electrical plans and at the project site, prior to ordering equipment.

See below for the basis of design units. Equivalents by Trane, Reznor, Modine, Markel, Chromalox or Indeeco will be considered.

20.2. **Propeller Type:** Heater must be horizontal (vertical) discharge type, complete with integral controls, remote 24-volt thermostat, control transformer and circuit breaker. The Basis of design is Trane model UHEC.

PART 21. KITCHEN HOOD

21.1. **General:** Kitchen hood Manufacturer and UDS Manufacturer must be the same as applicable for the project. The hood(s) must be ETL-listed to standard UL710, ULC710 and ULC-S646 when installed in accordance with the Manufacturer's installation instructions and National Fire Protection Association Standard, NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations and constructed in compliance with NSF/ANSI Standard 2. The hood(s) must be UL/ETL listed as an exhaust hood without exhaust damper, UL/ETL Sanitation Listed and built in accordance with NFPA 96. The hood(s) UL/ETL label must indicate the hood(s) temperature rating(s) and minimum CFM rating(s).

All seams, joints and penetrations of the hood enclosure to the lower outermost perimeter which directs and captures grease-laden vapor and exhaust gases, must have a liquid-tight continuous external weld in accordance with NFPA 96. All seams must be welded and have stainless steel on exposed surfaces. Corners of hood must be factory ground with rounded corner and polished #4 final finish.

Provide full size field wrapper from top of hood to above the ceiling. Field wrapper must be factory fabricated and completely match the specified hood construction and finish specified. The field wrapper must be furnished by the Hood Manufacturer. See below for additional requirements.

The kitchen exhaust hood systems must operate during the cooking operation. The hood exhaust rate must comply with the listing of the hood. The exhaust fan serving a Type I hood must have automatic controls that activate the fan when any appliance that requires the Type I hood is turned on, or a means of interlock must be provided

that must prevent operation of such appliances when the exhaust fan is not turned on. Where one or more temperature or radiant energy sensors are used to activate a Type I hood exhaust fan, the fan must activate not more than 10 minutes after the first appliance served by that hood has been turned on. A method of interlocking between an exhaust hood system and appliances equipped with standing pilot burners must not cause the pilot burners to be extinguished. A method of interlocking between an exhaust hood system and cooking appliances must not involve or depend on any component of a fire extinguishing system. Hood must be provided with those controls as factory installed items.

Provide factory-installed controls and exhaust duct sensors as required to start fan hood exhaust and make-up air fans and to enable the exhaust fan(s) to automatically run and the make-up air fan(s)/unit(s) shut down during a fire condition. i.e., when the fire suppression system is engaged.

Provide factory mounted LCD based user interface to control hood fans, indicate real-time status of fans, lights and gas valve, audible alerts for failures or issues with the system.

The hood(s) must be Type I Classification, complete factory-built package and manufactured by Captive Aire Series ND2 wall canopy style hood, ND-2WI single island hood or NDI Series double island V-bank hood and provided with factory insulated, ceiling mounted PSP and/or AC-PSP options as shown and scheduled on the drawings. See plans and equipment schedule for requirements.

The Manufacturer must furnish for review, complete submittal drawings in PDF format, including hood section view(s), hood plan view(s), fire protection, etc. as required to perform a proper review.

21.2. **Hood(s) Construction:** Hood(s) must be factory fabricated; double wall insulated to eliminate condensation and increase rigidity on wide sizes. The insulation must have a flexural modulus of 475 EI, meet UL 181 requirements and be in accordance with NFPA 90A and 90B. Hood construction must be 100%, 18 ga., 100% Type 304 stainless steel with #4 polished finish and 16 ga. Type 304 stainless steel hood top. No galvanized steel must be used in the construction of the hood.

Hood(s) must be equipped with full dimension hanging bracket(s) Unistrut to allow for various hood mounting locations. Hood lengths greater than 12’ must be provided with additional hangers and required hardware. Wall mounted hoods must be provided with wall hanging brackets.

Hood(s) exhaust collars must be minimum 4” tall with 1” flange. The grease drain system must be an enclosed integral part of the hood back and have slopes with an exposed and fully removable 1 pint grease cup to facilitate cleaning. The hood(s) must have an integral baffle to direct grease laden vapors toward the exhaust filter bank (ND2).

21.3. **Filters:** Hood(s) must be furnished with UL/ETL Listed, stainless steel Captrate Solo filters with hook, with particulate capture efficiency of 85% at 9 microns, 76% efficient at 5 microns and in size and quantity required by the Manufacturer.

21.4. **Lighting:** Hood(s), PSP and AC-PSP plenums must be provided with U.L. Listed, prewired, round, recessed, natural, 4K integral LED lights.

21.5. **Thermostatic Controls:** The Electrical Package must thermostatically activate the exhaust fans for an exhaust hood whenever elevated temperatures are sensed in the exhaust system. This must meet the requirements of IMC 507.2.1.1 by providing a thermostat(s) mounted in the duct or hood riser to sense increased exhaust temperatures. Controls must be listed by ETL (UL 508A). The control enclosure must be rated NEMA 1 and listed for installation inside of the exhaust hood utility cabinet. The control enclosure must be constructed of stainless steel.

Temperature probes(s) located in the duct riser must be constructed of Stainless Steel. Once the duct temperature reaches the activation point, the exhaust fans must be activated. The controls also provide hysteresis to prevent cycling of the fans after the cooking appliances have been turned off and the heat in the exhaust system is reduced. The hysteresis must be factory set to 2 degrees and will keep the exhaust running until the temperature falls 2 degrees below the activation set point. A hysteresis timer must also keep the fans running for at least 30 min after being activated by the temperature rise.

The activation and hysteresis settings must be field adjusted on the LCD interface located inside the control enclosure to meet application needs. The panel must be factory configured to shut down supply fans, turn on the exhaust fans and turn off the hood lights in a fire condition.

21.6. **Side Panels, End Panels, Standoffs, Backsplash and Field Wrapper:** All hoods must be provided with back standoff, full/complete backsplash and stainless steel field wrapper of same construction and finish as the hood from top of hood to above ceiling.

Coordinate all power and control wiring with the Electrical Contractor and provide as required for proper interface with lighting, switches, fuel shut-off devices, controls, fire suppression system, fire alarm system, UDS system (if applicable), etc., for system operation as specified.

21.7. **Utility Cabinet:** Utility cabinet must be UL/ETL listed for integral side mount on the hood unless it is shown remotely on the plans. It must be fabricated with the same material as the hood. The hood must be provided with a fully integrated package that is pre-engineered for optimum performance. The cabinet must house the factory pre-piped UL Listed fire suppression system and ETL Listed, pre-wired electrical controls. The pre-wire package must contain light switches, lighted fan control switches and internal factory wiring and components (starters, relays, etc.) to reduce field wiring requirements.

21.8. **Ductwork:** Refer to Part Sheet Metal Ductwork for requirements. Factory prefabricated ductwork is not allowed.

21.9. **Fire Suppression System:** The system must be installed and serviced by personnel trained by the Manufacturer. The system must protect cooking appliances by utilizing dedicated appliance protection and overlapping appliance protection. It must be located in a matching stainless steel cabinet integral with the hood. It must be a pre-engineered type with a fixed nozzle agent distribution network. Distribution piping must be stainless steel pipe conforming to ASTM A120, A53, or A106. The system must be of automatic detection and actuation with local and remote manual actuation. It must be an Underwriters Laboratories, Inc. Standard 300 and Standard 1254 listed R-102, NFPA 96 and NFPA 17A compliant, wet chemical agent system designed for flame knockdown and foam securement of grease related fires. The wet

agent must be a formulated, aqueous solution of organic salts with a pH range between 7.7 – 8.7, designed for flame knockdown and foam securement of grease-related fires.

The system must be capable of suppressing fires in all areas associated with cooking equipment, ventilating equipment including hoods, ducts, plenums, filters, fryers, griddles, range tops; upright, natural charcoal, or any other appliance provided under the hood.

The system must be the pre-engineered type, having minimum and maximum guidelines established by the Manufacturer and listed by Underwriters Laboratories, Inc. (UL).

Provide accessories as required for proper interface to the fire alarm system and energizing the gas shut-off valve.

The regulated release mechanism must be compatible with a fusible link detection system. The fusible link must be selected and installed according to the operating temperature in the ventilating system. The fusible link must be supported by a bracket/linkage assembly.

Provide manual activation switch(s) where shown on the plans. Manual activation switch(s) must be ADA compliant and mounted at ADA compliant height (46" to center of the device) and must be uniquely different to distinguish between the kitchen hood fire suppression system activation and a normal fire alarm pull station. The manual release must have a sign indicating the method of operation. Sign must be same type as specified in Section 15010, Identification. Signage must read as follows**: "*UPON A FIRE UNDER THE KITCHEN HOOD, PULL HANDLE AND LEAVE THE BUILDING IMMEDIATELY.*"**

Provide accessories as required for proper interface to the fire alarm control system and energizing the mechanical gas shut-off valve or gas valve in the Utility Distribution System (UDS).

21.10. **Fuel Shut-Off Device:** Furnish electric type gas shut-off valve to Plumbing Contractor for installation in gas supply to range line. Connect valve to operate automatically upon activation of extinguishing system. Coordinate location of valve with other trades and secure approval of valve location from Architect before installing. Coordinate requirement with Food Service Specifications and utility distribution system (UDS) and provide as required.

21.11. **Safety Sign:** Provide on each side of the hood(s) a sign stating, "***This hood is protected by an automatic fire extinguisher system. When activated, chemical will cause breathing difficulty and reduce visibility. Personnel must evacuate immediately***." The signs must be red phenolic plastic 10" x 4" x 1/8", with 3/8" high white engraved lettering and neatly glued to each side of the hood.

21.12. **Fire Suppression System Test:** Test and demonstrate to the Owner, Owner's designated personnel, the Authority having jurisdiction and Architect the actual operation of the system. Testing must also be as required by the Authority having jurisdiction. Furnish written acknowledgement to the Architect that this has been accomplished.

21.13. **Miscellaneous Requirements:** Where a utility distribution system (UDS) is specified by Food Service specifications and plans, coordinate the requirements of the utility hoses from UDS to the equipment. Hood Manufacturer must be responsible for providing all utility hoses if not provided by the UDS Manufacturer. Provide hose, connectors, fittings, etc., as required for each piece of equipment shown on the plans. Also, provide one spare set of hoses for cold water, hot water and gas for Owner's future use. UDS manufacturer and the hood manufacturer must be the same. No mix matching allowed.

21.14. **Certification:** The installer must be trained and certified by the Manufacturer for the installation of the hood. The hood supplier must inspect the installation and provide written certification to the authority having jurisdiction and the Architect that the installation agrees with the terms of its UL and NFPA listing and the Manufacturer's instructions. **The State of Alabama Department of Construction Management (DCM) is requiring the hood Manufacturer to have an individual present at the final site visit.**

21.15. **Warranty:** All hoods must be warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 2 years from the date of substantial completion as determined by the Architect.

21.16. **NOTICE: The State of Alabama Department of Construction Management (DCM) requires that the hood Manufacturer have an individual present at the pre-testing of the hood and the final site visit. This is a mandatory requirement. If there is not a certified, factory trained technician at the pre-testing and final site visit, the inspection will be cancelled, and a reinspection fee will be charged to the Mechanical Contractor.**

PART 22. AUTOMATIC CONTROLS

22.1. **General:** The facility is being served by a campus wide HVAC Controls System (BAS). Refer to Section 15920, HVAC Controls (BAS) for additional requirements. Where this specification and Section 15920 conflict, the strictest requirement must be provided. Coordinate all requirements with mechanical contractor and provide as required for proper interface.

Furnish and install a complete system of automatic temperature controls, as specified herein, as shown on the Drawings and as required for a complete installation. All temperature control equipment must be of electric type. All specified Sequences of Operation are subject to all equipment built-in safety requirements. Equipment and safety requirements must not be overridden.

22.2. **Submittals:** The temperature control Contractor must submit a complete set of temperature control diagrams with written "sequence of operation" and factory-printed specification data sheets covering each control device proposed to be used for Engineer's review prior to installation of any equipment or part of system. Submittal data must include a schedule of all devices to be installed.

22.3. **Installation:** By trained and experienced mechanics. All work must be provided by the approved, independent HVAC Controls Contractor whose primary business is the installation and service of HVAC controls systems.

22.4. **Identification:** Provide permanent nameplates for all control components and for all motor starters. Nameplates must be engraved laminated plastic with sufficiently large letters to be legible under normal operating conditions. Refer to Section 15010, Part Identification for additional requirements, nameplate materials, etc.

22.5. **Conduit, Controls Wiring and Instrumentation Cable:** The HVAC Controls Contractor must be responsible for the furnishing and installation of a complete and functional system as specified, shown on the plans and as required to accomplish the specified sequences of operation.

All HVAC control cabling and wiring must be in EMT conduit (no “whips”) or on J-hooks. Above accessible lay-in ceilings, control wiring must be installed on J-Hook assemblies. Above all hard, inaccessible ceilings, in all mechanical rooms and in areas with exposed structure (no ceilings), controls wiring must be in conduit. Do not attach any wiring, cabling or conduits to refrigerant piping.

Do not route control wiring through sleeves containing piping. Do not route control wiring through sleeves containing piping. **All control wiring penetrating any exterior wall, interior partition, floor and similar construction must be in EMT conduit. Through base control wiring/conduit is not allowed.** EMT control conduit must be as specified in the Electrical Division of the specifications and/or as shown on electrical drawings. Minimum HVAC Controls conduit size must be 3/4” in size. All control conduit, power, relays, contactors, transformers, wiring, etc., required for a complete functional system as specified, shown on the plans, or as required to accomplish the specified sequences of operation, which is not shown or specified by the Electrical Division, must be furnished and installed by the HVAC Controls Contractor. This must include all power, interlock control wiring between the various components of the heating, ventilating and air conditioning system, lighting interlocks and all smoke detection system electrical wiring.

Instrumentation cable must be minimum AWG as specified or heavier AWG as recommended by the controls system Manufacturer.

All thermostat and humidistat boxes must be mounted 46” A.F.F. to the center of the box (ADA height). Where wall mounted CO_2 Sensors are indicated, they must be mounted 58” A.F.F to the center of the box.

22.6. **Space Thermostats:** Space thermostats must be 7-day programmable, microprocessor based, low voltage type with “Heating - Cooling” and fan “On-Off-Auto” switches sub-base. Coordinate thermostat requirements and options with Mechanical Contractor and provide as required to accomplish specified sequence of operation. Each thermostat must have a building power supply with transformer and battery back-up power.

Provide hinged metal guard with rounded corners, lock and key for each thermostat.

All thermostat boxes must be mounted 46” A.F.F. to the center of the box (ADA height). All thermostat boxes in walls or partitions must be sealed/caulked to prevent the passage of air and smoke through the device.

22.7. **Air Flow Measuring Station:** Provide one mill finish 6063 aluminum probe(s) and remote transmitter(s) as required for the duct shown on the plans. Probes must have an integral 304 stainless steel mounting bracket for insertion mounting. Provide up to 2 sensing nodes per measurement location as required for the opening size and

published sensor density tables to achieve an installed airflow accuracy of ±3% of reading between 0 and 2,000 fpm over a temperature range of -20°F to 160°F and a humidity range between 0 and 100% RH (non-condensing). Temperature accuracy must be better than ±0.15°F. The airflow rate and temperature, airflow alarm and system status alarm must be visible on the transmitters display. Coordinate power requirements and provide all as required. The airflow measuring station must be EBTRON EF-x1000-T (ELF) Series 1000 and as required for the volume with all required accessories for a complete and functional system as specified. Equivalent devices by Trane, Honeywell and Veris will be considered. Coordinate all compatibility requirements with the specified carbon dioxide sensor and provide as required to accomplish the specified sequence of operation.

22.8. **Carbon Dioxide Sensors:** Must be of the non-dispersive infrared type (NDIR) diffusion sampling, repeatable to +/- 8 PPM with a measurement range 0 – 2000 PPM and be user adjustable. It must have the following accuracy: from 0-1500 PPM +/- 75 PPM; +/- 5% with an operating range of 32 degrees F to 130 degrees F with a response time of less than 90 seconds.

Sensors must be provided with all options, inputs and outputs required to control the motorized return air and outside air dampers to accomplish the specified Sequence of Operation. Duct mounted sensors must be mounted where shown on the plans. Wall mounted sensors must be mounted 58” A.F.F to the center of the box.

Duct mounted sensors must be Veris Industries Series CDE or approved equivalent by Johnson Controls or Honeywell. Wall mounted sensors must be Veris Industries Series CWE or approved equivalent by Ebtron, Trane, Honeywell will be considered. Coordinate all compatibility requirements with the specified air flow measuring station and provide as required to accomplish the specified sequence of operation.

Provide metal guards as specified for thermostats.

22.9. **Humidistats:** Heavy-duty industrial type. Provide metal guard as specified for thermostats.

All humidistat boxes must be mounted 46” A.F.F. to the center of the box (ADA height). All humidistat boxes in walls or partitions must be sealed/caulked to prevent the passage of air and smoke through the device. At his option, the unit Manufacturer/Controls Sub-Contractor may provide a combined thermostat/humidistat device. Coordinate requirement with the equipment manufacturer prior to bidding and provide as required.

22.10. **Smoke Detectors:** The Mechanical Contractor must coordinate the placement of smoke detectors with the Electrical Contractor. Smoke detectors operating on photoelectric principles must be furnished by the Electrical Contractor and installed where shown on the Mechanical plans by the Electrical Contractor. The Electrical Contractor must wire the detectors, and the Mechanical Contractor must coordinate to verify shutdown of the respective unit upon smoke detection. Provide required interlocks, wiring, relays, etc., to stop the unit upon detection of smoke by the smoke detectors. Coordinate work with Electrical Contractor and provide all as required.

The Mechanical Contractor must provide an access door/panel, watertight where required, adjacent to each smoke detector to allow for maintenance and visual inspection. Access panels must be as specified hereinbefore.

22.11. **Condensate Drainage:** Refer to Part Condensate Drainage Piping of this specification for drainage requirements.

22.12. **Motorized Control Dampers:** Equal to Ruskin Series CD-50, Pottorff CD-52, Greenheck VCD-43, United Enertech CD-110 or Nailor 2020, galvanized steel frame, Class 1A (less than or equal to 3 cfm/sq.ft. at 1" w.g.) leakage, extruded aluminum airfoil, opposed blade dampers, stainless steel or synthetic bearings with heavy-duty Belimo actuator and 24-volt actuators. The dampers must be labeled by an approved agency when tested in accordance with AMCA 500D.

Coordinate power requirements with electrical Contractor and provide as required. Damper motors must be located outside of the air stream. Provide weatherproof construction for outdoor installation of dampers and weatherproof enclosure.

22.13. **Typical Packaged Heat Pump (PHP) Unit Systems with Demand Control Ventilation Sequence of Operation:** Units without demand control ventilation are similar. The control circuit for each unit must be energized by its respective 7-day programmable thermostat. Occupied and unoccupied schedules must be programmed by the Controls/Mechanical Contractor as desired by the Owner.

The thermostat must be used to control heating and cooling. Provide for each heat pump unit an adjustable outdoor thermostat and wire to control the second stage of the auxiliary electric resistance heater.

Upon a call for the occupied schedule, the outside air damper must open to its minimum scheduled outside air setpoint and the respective indoor/outdoor unit must start. Upon shutdown of the indoor/outdoor, the motorized outside air damper must close.

Upon a call for the unoccupied schedule, the outside air damper must remain closed and the unit must start.

A wall mounted or duct mounted CO_2 sensor, monitoring CO_2 levels in the space or return air duct, must modulate the outside air damper, motorized relief air damper (as applicable) and return air dampers, in sequence, as required to maintain CO_2 levels at a maximum of 700 PPM (adj). Refer to the equipment schedules for the minimum CO_2 scheduled outside air setpoint and the maximum CO_2 scheduled outside air setpoint. Upon satisfaction of the CO_2 sensor, the outside air, relief air and return air dampers must return to their minimum scheduled setpoint and normal sequence of operation. Refer to the plans for location of the CO2 sensor type required. Contractor must provide a controller, wiring, relays, etc. as required to operate the various systems per the specified sequence of operation.

Provide a space humidistat to override the cooling thermostat to provide for dehumidification.

During dehumidification, the heat pump unit reversing valve must be locked out to prevent switching to the heating mode and the compressor must be commanded on for cooling. The space thermostat must then modulate the refrigerant hot gas reheat coil valve to maintain the required space temperature.

The Mechanical Contractor must coordinate the placement of smoke detectors with the Electrical Contractor. Smoke detectors operating on photoelectric principles must be furnished by the Electrical Contractor and installed where shown on the

Mechanical plans by the Electrical Contractor. The Electrical Contractor must wire the detectors, and the Mechanical Contractor must coordinate to verify shutdown of the respective unit upon smoke detection. Provide required interlocks, wiring, relays, etc., to stop the unit upon detection of smoke by the smoke detectors. Coordinate work with Electrical Contractor and provide all as required.

The Mechanical Contractor must provide an access door/panel, watertight where required, adjacent to each smoke detector to allow for maintenance and visual inspection. Access panels must be as specified hereinbefore.

22.14. **Packaged Heat Pump (PHP) Unit Economizer Cycle:** Units are specified with factory mounted enthalpy-based economizer. The sequence of operation is pre-programmed based on ASHRAE requirements. The Controls Sub-Contractor must verify factory plug and play settings for the region of the installation as required. Refer to equipment specifications and coordinate for proper interface as required.

22.15. **Exhaust Fan (EF) & Supply Air Fans Controls:** Where indicated provide room thermostat or wall switch to control the respective fan and intake damper operation to maintain space temperature. Also, provide interlock wiring from each exhaust fan to the respective motorized damper motor to operate damper anytime fan is started.

Provide interlocks for certain fans as noted on fan schedule, including lighting interlocks if not shown on electrical.

22.16. **Typical Unit Heaters:** Each unit must be started by the BAS. The space thermostat must control heater contactors and the fan as required to maintain space temperature.

Provide hinged metal guard with rounded corners, lock and key for each thermostat.

All unit heaters must be provided with an outdoor temperature sensor on the north facing wall and wired to each unit heater to lock out the heater anytime the outdoor temperature is above 55ºF (adj.).

22.17. **Electric Duct Heater:** Provide a low voltage room thermostat or duct temperature sensor, as shown on the plans, to control the SCR duct heater contactors and maintain setpoint temperature. Provide interlock with the respective indoor unit fan motor and the heater Manufacturer furnished duct pressure switch specified hereinbefore. Upon satisfaction of the temperature sensor setpoint, the SCR heater must disengage subject to the heater safeties.

Provide hinged metal guard with rounded corners, lock and key for each thermostat.

All duct heaters not used for humidity control must be provided with an outdoor temperature sensor on the north facing wall and wired to each heater to lock out the heater anytime the outdoor temperature is above 55ºF (adj.).

22.18. **Kitchen Hoods:** Coordinate all power and interlock wiring required with the Mechanical and Electrical Contractors and provide as required for proper functioning and operation of the hoods, hoods lighting, fire suppression, utility distribution system (UDS), etc. and provide as required for complete and functional system.

22.19. **Time Delay Controls:** Provide time delay control systems as required to stage units starting to prevent more than three units from starting at the same time.

22.20. **Miscellaneous Controls:** Provide all other miscellaneous controls, wiring, dampers, valves, etc., as required for a complete functional control system.

22.21. **Service and Guarantee:** After completion of the installation, adjust all control equipment and place the complete system in operation subject to the review of the Engineer. Guarantee the control system to be free of defects and adequate to provide required control functions for a period of one year after acceptance of project. Provide free service and maintenance during the guarantee period.

END OF SECTION

Division 16



Prepared by Kenneth R. Gunn Jr., P.E.

SECTION 16100
ELECTRICAL

PART 1 - GENERAL

1.01. RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections apply to work specified in this section.

1.02. QUALIFICATIONS OF ELECTRICAL CONTRACTORS:

A. Electrical contractor must be properly established as an electrical contractor by the State of Alabama. Electrical contractor shall have had previous experience in the satisfactory installation of at least three systems of this type and size in the State of Alabama.

1.03. CODES, PERMITS AND INSPECTIONS:

A. Comply with applicable laws of the community, with latest edition of National Electrical Code (NEC), NFC 70, and the International Building Code(IBCC) or the edition adopted by the local authority having jurisdiction, where not in conflict with those laws, and with the service rules of the local utility company.

B. Obtain and pay for all permits and deposits and arrange for inspections as required.

C. After completion of the work, submit certificate of final inspection and approval from the local electrical inspector, certifying that the installation complies with all regulations governing same.

1.04. MATERIALS:

A. All materials shall be new, and UL approved where a standard has been established.

B. Manufacturers' names and model numbers shown on the plans and in the specifications are given to indicate the type and general quality of items to be provided. Equal products by other manufacturers will be accepted.

C. Material substitutions will be considered only when evidence of equality and suitability, satisfactory to the Architect/Engineer has been presented in writing, with samples if requested by the Architect/Engineer. All prior approvals must have the approval of the engineer of record at the offices of Gunn and Associates, P.C. located at 3102 Highway 14, Millbrook, AL 36054, Phone: 334-285-1273

D. All proposed substitutions shall be approved in writing at least ten (10) days prior to the bid date.

E. It shall be understood that the Architect/Engineer has the authority to reject any material or equipment used which is not specified or approved, or showing defects of manufacture or workmanship, before or after such material or equipment is installed.

1.05. WORKMANSHIP:

A. Execute all work so as to present a neat and workmanlike appearance when completed.

1.06. DESCRIPTION OF WORK:

A. Furnish all labor and materials required to complete the electrical work indicated on the drawings or herein specified. Major work included in Section 16 shall be:

B. Prior to bid it is the contractor's responsibility to re-affirm with the power company the service requirements to the facility as indicated on the electrical drawings. If any changes or additions to the service lateral installation indicated on the drawings is required by the utility company the contractor shall include the cost of these changes in his/her bid. Additionally, any/all charges for electrical service to the facility (aid-to-construction) by the utility company shall be included in the contractor's bid price.

C. Remove or relocate all electrical or electronic services located on or crossing through the project property, either above or below grade, which would obstruct the construction of the project or conflict in any manner with the complete project or any code pertaining thereto.

D. Furnish and install a complete electrical light and power system including but not limited to the connection of all meters, switchboards, panelboards, circuit breakers, power outlets, convenience outlets, lighting fixtures, switches, and/or other equipment forming part of the electrical system.

E. Connect all electrical equipment whether furnished by this contractor or by others.

F. Furnish and install all disconnect switches not included as an integral part of equipment.

G. Furnish and install a complete Lighting Control System.

H. Furnish and install a complete Fire Alarm System compliant with applicable provisions of the International Building Code (IBC) and the National Fire Protection Association (NFPA) Standard No. 72.

I. Complete the alterations, additions, and renovations to the electrical system in the existing building as specified herein or as shown on the drawings.

J. Procure and pay for permits and certifications as required by local and state ordinances and Fire Underwriters certificate of inspection.

K. Visit the site and determine conditions that affect this contract. Failure to do so will in no way relieve the Contractor of his responsibility under his contract.

L. Submit to the Architect a certificate of final inspection from local and/or state inspection authorities.

M. Establish and maintain temporary electrical services for construction purposes.

1.07. DRAWINGS AND SPECIFICATIONS:

A. This Contractor shall examine drawings and Specifications relating to the work of all trades and become fully informed as to the extent and character of work required and its relation to all other work in the project prior to submission of bid and prior to the start of any construction.

B. Drawings and Specifications shall be considered as complementary each to the other. What is called for by one shall be as binding as if called for by both. Where conflicts occur, secure clarification from the Architect in advance of bidding; otherwise incorporate the more stringent conditions into the bid price.

C. Omissions from the drawings and specifications or the mis-description of details of work which are evidently necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such omissions and details of work; they shall be performed as if fully and correctly set forth and described in the drawings and specifications.

D. The drawings indicate diagrammatically the extent, general character, and the approximate location of the work to be performed. In the interest of clearness, the work is not always shown to scale or exact location. Check all measurements, locations of conduit, fixtures, outlets, and equipment with the detailed architectural, structural, and mechanical drawings, and lay out work so as to fit in with ceiling grids, ductwork, sprinkler piping and heads, and other parts. Take finished dimensions at the job site in preference to using scale dimensions.

E. Where the work is indicated but with minor details omitted, furnish and install the work complete so as to perform its intended functions.

F. Where doubt arises as to the meaning of the plans and specifications, obtain the Architect's decision before proceeding with parts affected; otherwise assume liability for damage to other work and for making necessary corrections to work in question.

G. Except as noted above, make no changes in or deviations from the work as shown or specified except on written order of the Architect.

1.08. EXISTING CONDITIONS:

A. Before submitting a bid, visit the site and ascertain all existing conditions.

B. Make such adjustments in work as are required by the actual conditions encountered.

C. No consideration will be given after bid opening for alleged misunderstandings regarding utility connections, integration of work with existing system, or other existing conditions.

1.09. SUBMITTALS:

A. Follow procedure outlined in Division 1.

B. Submittals shall be bound together and shall include a coversheet indicating the following:
   1. Project name
   2. Trade contractor's name
   3. Supplier's name
   4. Name and phone number of supplier's contact person
   5. A list of each item submitted with manufacturers' names and model numbers.

C. Within 20 days of award of contract and prior to beginning any work on the project submit six (6) copies of manufacturer's drawings/data sheets for the following items to the Engineer for review:
   1. Conductors
   2. Cable Pulling tensions. Provide cable pull tension calculations (lateral and longitudinal) on all underground cable runs over 150 feet for cables sized #1 and larger. Provide one line diagram indicating pulling tensions on each run and number and size of each pull box along anticipated route. Calculations shall include changes in direction or elevation of feeder runs.
   3. Wiring Devices
   4. Conduit Wrapping Tape
   5. Switchboards
   6. Panelboards
   7. Power system breaker coordination. Submit proper breaker settings recommendations with breaker coordination study.
   8. Contractor shall coordinate with mechanical/plumbing shop drawings prior to submitting power package to engineer. Adjust overcurrent devices accordingley.
   9. Disconnect Switches
   10. Fire Stopping
   11. Lighting Control System: Include conduit and cable layout, terminal to terminal wiring showing color code and wire numbers, and complete technical data on each system component. Furnish the Owner one set of as built drawings at completion of the project. Coordinate with lighting control riser on drawings for further shop drawings requirements.
   12. Lighting Fixtures (include photometric data for each fixture)
   13. Fixture Support Equipment
   14. Lighting Standards (Poles)
   15. Secondary Surge Arresters
   16. Transient Voltage Surge Suppressors(Surge Protective Devices)
   17. **Fire Alarm System: The fire alarm shop drawings shall bear the approval of the fire protection provider to ensure all supervisory valves and flow switches are being monitored by the fire alarm system. Coordinate with fire protection provider prior to bid and provide monitoring for all supervisory valves and flow switches for entire building. Coordinate with sprinkler system designer and provide additional heat detection (if required) and associated circuiting in elevator shafts and equipment rooms to comply with applicable sections of NFPA and ANSI A17.1. Bid accordingly. Include conduit and cable layout, battery calculations, terminal to terminal wiring showing color code and wire numbers, and complete technical data on each system component. Additionally, the contractor or his/her fire alarm system vendor shall provide audibility calculations indicating compliance with all applicable provisions of NFPA 72 and the IBC. The contract drawings indicate a**

minimum design required to comply with applicable codes. However, since devices vary from manufacturer to manufacturer the contractor shall be responsible for furnishing any/all additional devices as required to provide audibility and visibility levels that comply with applicable sections of NFPA 72 and IBC. Furnish the Owner one set of as built drawings at completion of the project. **Provide a copy of the fire alarm contractor's State Fire Marshal's Permit with the submittals for approval.**

18. **Fire Alarm Submittals: Alabama DCM projects will be required to provide a courtesy set of approved fire alarm submittals to the local fire department for their records. Not for review, but only for their records.**
19. J-Hooks

D. Submit samples upon request.

E. The Contractor is responsible for verifying all quantities and for verifying and coordinating dimensional data with the available space for items other than the basis of design.

F. **Provide a ½"= 1'- 0" scale drawing of all electrical rooms containing more than a single panelboard section or containing a panelboard and other electrical and/or mechanical equipment. These drawings shall be submitted along with equipment data sheets. Note we will no longer review submittals that does not have this information. Any delay will be the responsibility of the contractor for not submitting these drawings of the electrical rooms. Power submittals will be returned rejected without these drawings.**

G. The contractor shall review and approve or make appropriate notations on each item prior to submittal to the architect. Submittals without contractor's approval will be rejected.

H. Submittal reviews will be performed up to two times to review material submitted by contractor. Gunn & Associates will charge a review fee of a $1,000 to review submittals starting the third time submitted. If contractor needs Gunn & Associates, P.C. to perform another review of material after submittals have been submitted and approved to change manufacturers. A review cost of $1,000 per review. Payment must be received by Gunn & Associates prior to scheduling any additional reviews.

1.10. COORDINATION OF SERVICE WITH OTHER TRADES:

A. It shall be the responsibility of the Electrical Contractor to coordinate the electrical service characteristics to each piece of electrically operated equipment with all trades providing electrically operated equipment.

B. Within ten (10) working days of notification to proceed with construction from the Architect, the Electrical Contractor shall notify, in writing, all trades providing electrically operated equipment the characteristic of the electrical power being supplied to each piece of electrically operated equipment.

C. A copy of this notification shall be provided to the General Contractor and the Architect.

D. Be informed as to equipment being furnished by other trades, but not liable for added cost incurred by equipment substitutions made by others which require excess electrical wiring or equipment above that indicated on drawings or specified.

E. The contractor providing the equipment shall be responsible for the additional costs.

1.11. PROGRESS OF WORK:

A. Schedule work as necessary to cooperate with other trades, Do not delay other trades. Maintain necessary competent mechanics and supervision to provide an orderly progression of the work.

1.12. PROTECTION OF PERSONS AND PROPERTY DURING CONSTRUCTION:

A. Take all precautions necessary to provide safety and protection to persons and the protection of materials and property.

B. Protect items of equipment from stains, corrosion, scratches, and any other damage or dirt, whether in storage, at job site or installed. No damaged or dirty equipment, lenses, or reflectors will be accepted.

C. Live panelboards, outlets, switches, motor control equipment, junction boxes, etc., shall be protected against contact of live parts and conductors by personnel.

1.13. CLEANING UP:

A. During the progress of work, keep the Owner's premised in a neat and orderly condition, free from accumulation of debris resulting from this work. At the completion of the work, remove all material, scrap, etc. not a part of this Contract.

1.14. AS-BUILT DRAWINGS, AND OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Prior to the Final Acceptance Inspection the Contractor shall turn over to the Architect one set of reproducible "as built" drawings, including corrected fire alarm system shop drawings, three (3) sets of all equipment catalogs and maintenance data, manufacturers' warranties, and three (3) sets of shop drawings on all equipment.

1.15. TESTING:

A. Upon completion of the work, conduct a thorough test in the presence of Architect or his representative, and demonstrate that all systems are in perfect working condition.

1.16. INSPECTIONS:

A. The contractor shall have all systems ready for operation and an electrician available to remove panel fronts, coverplates, fixture doors, etc., at the final inspection and any other scheduled inspections.

B. It is the contractor's responsibility to have the job ready for inspections when they are scheduled. We will perform inspections as required by our contract. If project is not ready during inspection and requires a re-inspection by Gunn & Associates, then the contractor shall pay Gunn & Associates, P.C. for the re-inspection. The payment shall be made directly to Gunn & Associates, P.C. in the amount to be determined by engineer. Not to exceed $1,500 for single re-inspection fee. Payment must be received by Gunn & Associates prior to scheduling re-inspection.

C. Inspections for Temporary or Permanent Power required by any utility companies are not in our scope of work. If contractor needs Gunn & Associates, P.C. to perform inspections, contractor must include an inspection cost of $1,000 per inspection in their base bid. Payment must be received by Gunn & Associates prior to scheduling inspection.

1.17. DEMONSTRATION:

A. By on-off, stop-start operation, demonstrate to the Owner or his representative, the use, working, resetting, and adjusting of each and every system. Submit statement initialed by the Owner that such demonstration has been made.

1.18. WARRANTY:

A. Warrant the entire electrical system in proper working order. Replace, without additional charge, all work or material that may develop defects (ordinary wear and tear or damage resulting from improper handling excepted) within a period of one year from date of final to general contractor. Provide the owner with two bound copies of all manufacturers' warranties.

B. Data and Telecommunications system cabling shall be warranted for a minimum of 15 years.

1.19. TEMPORARY SYSTEMS:

A. The Electrical Contractor shall be responsible for furnishing and installing equipment and materials necessary for providing electrical power and lighting where needed for the construction of the project.

B. Electrical Contractor will be responsible for paying for and providing temporary construction power and lighting for entire job site. Coordinate with local jurisdictions and utility companies and pay all fees necessary to get temporary power to the job site. General Contractor shall be responsible for all monthly utility cost for duration of project or date of substantial completion.

1.20. SERVICE INTERRUPTION CLEARANCE WITH OWNER:

A. Before submitting a proposal, check with the Owner concerning interruption of service to the existing electrical systems. No interruption shall be made except at such time and for such duration as approved by the Owner. The Contractor's bid shall include all necessary over-time and weekend work.

1.21. DEFINITIONS:

"AWG" - American Wire Gauge
"ADA" – Americans with Disabilities Act
"As required" - Any and all items required to complete the installation of an item so as to perform its intended function.
"Circuiting" - Conductors, raceways, raceway fittings, and associated hardware.
"EMT" – Electrical Metallic Tubing, "thin wall"
"IBC" – International Building Code
"Install" - furnish, install, and make all necessary connections to and/or for the item(s) indicated or specified.
"NEC" - National Electrical Code, ANSI/NFPA 70, latest edition or the edition adopted by the authority having jurisdiction.
"Necessary" - Any and all items required to complete the installation of an item so as to perform its intended function.
"NEMA"- National Electrical Manufacturers' Association
"NFPA" - National Fire Protection Association
"PVC Conduit" – Rigid Nonmetallic Polyvinyl Chloride conduit
"RGS Conduit" – Rigid galvanized steel conduit
"UL" - Underwriters' Laboratories, Inc.

PART 2 - MATERIALS

2.01. GENERAL:

A. This section includes all basic materials for raceways, fittings, busways, conductors, panelboards, switchboards, lighting fixtures and accessories, etc., as required for a complete installation.

B. All materials shall be new and listed by the Underwriters Laboratories. Material substitutions will be considered only when evidence of equality and suitability, satisfactory to the Architect has been presented in writing, with samples if requested by the Architect.

C. It shall be understood that the Architect/Engineer has the authority to reject any material or equipment used which is not specified or approved, or showing defects of manufacture or workmanship, before or after such material or equipment is installed.

2.02. CONDUITS:

A. Rigid Metal (Galvanized Steel-RGS) Conduit: Rigid metal conduit shall be mild steel piping, galvanized inside and outside, and conform to ASA Specification 080.1 and Underwriters' Laboratories Specifications. By Sprang, Republic, Wheatland, Triangle or Pittsburgh.

B. ***Conduit systems are subject to system color identification the complete length for the conduit system for the system they contain and as identified by these specifications:***

a. ***Red Conduit Systems – Fire Alarm & Life Safety systems. Red conduit systems will be utilized for all life safety, fire alarm systems & as directed by design documents.***

C. Intermediate Metal Conduit (IMC): IMC shall be hot dipped galvanized inside and outside and manufactured in accordance with U.L. Standard #6 or #1242. By Allied or approved equal.

D. Electrical Metallic Tubing (EMT): EMT shall be high grade steel electro-galvanized outside and lacquer or enamel coating inside and conform to ASA Specifications 080.1 and Underwriters' Laboratories Specifications. By Sprang, Republic, Wheatland, Triangle or Pittsburgh.

E. Rigid Nonmetallic Conduit (PVC): PVC conduit where exposed shall be high impact Schedule 80; below grand and below or in slab PVC shall be of high impact Schedule 40 PVC and shall conform to Underwriters' Laboratories Standard UL-651. By Carlon, Kraley Pittsburgh, R.G. Sloan or Southwestern.

F. Rigid Aluminum: Rigid Aluminum conduit shall be manufactured from 6063, t-1 aluminum alloy and shall meet the requirements of Federal Spec. WW-C-540c and ANSI C80.5 and shall be U.L. listed in accordance with UL-6. Equal to products by V.A.W. of America.

2.03. COUPLINGS, FITTINGS, AND CONNECTORS:

A. RGS & IMC: By Appleton, Crouse-Hinds, Efcor, O-Z/Gedney, Raco, or Republic.

B. EMT: EMT fittings shall be all steel type setscrew or insulated throat compression type. Pressure indented or slip fit type will not be accepted. All connectors to be insulated. By Appleton, Efcor, Raco Steel City, or Thomas & Betts.

C. PVC: PVC fittings shall be of high impact PVC Schedule 40 or Schedule 80 to match the installed conduit. Joints shall be made with PVC solvent cement as recommended by manufacturer. By Pittsburgh, R.G. Sloan or Carlon.

D. Rigid Aluminum: Fittings used with Rigid Aluminum conduit shall be formed of the same alloy as the conduit or shall be copper free cast aluminum unless specifically indicated otherwise.

2.04. CONDUIT BODIES:

A. Conduit bodies shall be malleable iron except in kitchen, dishwashing, and waste water treatment areas conduit bodies shall be copper free cast aluminum with stamped aluminum covers.

B. Covers shall be screw retained with wedge nut or threaded body. Covers on bodies installed outdoors shall be approved and rated for installation outdoors.

C. Bodies shall comply with NEC 370 and 373.

D. RGS & IMC: By Appleton, Crouse-Hinds, Efcor, O-Z/Gedney, Raco, or Republic.

E. Conduit cannot be used as ground. Provide separate insulated green grounding wire.

2.05. BUSHINGS:

A. Bushings up to and including 1” shall have a tapered throat.

B. Bushings 1-1/4" and larger shall be the insulating type.

C. Grounding bushings shall be specification grade insulated grounding type bushings with tin plated copper grounding saddles and shall be equal to O-Z/Gedney Type BLG or HBLG.

D. Bushings shall be zinc plated malleable iron or copper free cast aluminum.

E. Bushings for terminating Data, Telecommunications, control, CATV, and similar conduits above ceilings and at backboards may be PVC or Polyethylene insulating bushings equal to those manufactured by Arlington Industries and Bridgeport Fittings.

2.06. EXPANSION FITTINGS:

A. Conduit Expansion Joints shall be UL Listed.

B. Expansion joints in rigid metal conduits shall consist of a threaded malleable iron body, pressure bushing, watertight packing, pressure ring, gasket, insulating bushing, and external grounding jumper, and shall be equal to O-Z Gedney Type AX with Type BJ bonding jumper.

C. Expansion joints for EMT conduit shall be same as above with additional EMT couplings and connectors and shall be equal to O-Z Gedney Type TX with Type BJ bonding jumper.

D. Expansion joints in PVC conduit shall be equal to Carlon Series E945.

E. Expansion joints shall provide a minimum of 4” of conduit movement.

2.07. BELOW GRADE THRU WALL WATER SEALS:

A. Thru wall water seals for conduits penetrating exterior below grade concrete walls shall be seal systems by O-Z/Gedney or The Metraflex Company.

B. Thru wall water seals for conduits penetrating exterior below grade concrete walls shall be Metraseal thru wall water seals by The Metraflex Company.

2.08. CONDUIT ACCESSORIES:

A. Conduit clamps and supports for metallic conduit shall be galvanized steel by Efcor, Steel City, or Mineralac. Conduit fittings by Appleton, Crouse-Hinds, O-Z/Gedney, Pyle-National or approved equal.

B. Conduit clamps and supports for nonmetallic conduit shall be nonmetallic high impact PVC by Carlon, Pittsburg, or Sloan.

C. Conduit clamps for aluminum conduits shall be stainless steel or cast copper free aluminum with stainless steel fasteners.

2.09. FLEXIBLE CONDUIT:

A. Liqudtight flexible metal conduit:
   1. Neoprene-jacketed liquidtight flexible metal conduit.
   2. Equal to Anaconda Sealtite.

2.10. ELECTRICAL TAPES:

A. General use electrical tape shall be 8 mil (.008”) thick, minimum, premium grade, pressure sensitive, flame retardant, vinyl electrical tape meeting UL 510, ASTM-D-3005, and MIL-I-24391C. The tape shall be equal to 3M No. 88 or Plymouth Premium 85 CW.

B. Rubber tape used as primary tape shall be a 30 mil (.030”) thick, minimum self-amalgamating, low voltage rubber tape rated for use through 600 V. Rubber tape shall be equal to 3M No. 2150 or Plymouth 122 Rubber Tape.

C. Electrical filler tape shall be a 125 mil (.125”) thick, minimum, self-amalgamating, low voltage insulating compound rated for use through 5 kV. Filler tape shall be equal to 3M SCOTCHFILL or Plymouth 125 Electrical Filler Tape.

2.11. PIPE WRAPPING TAPE:

A. Pipe wrapping tape shall be a 10 mil (.010”) thick, minimum, pressure sensitive, vinyl tape manufactured for pipe wrapping applications.

B. The tape shall be UV, bacteria, and fungus resistant.

C. The manufacturer’s name and tape type shall be printed on the back of the tape.

D. Pipe wrapping tape shall be equal to Plymouth Rubber Co. PLYWRAP 11, or 3M No. 50.

2.12. WIRE NUTS:

A. Wire nuts for conductor splicing shall be winged type connectors with a square, plated steel spring and flame-retardant thermoplastic shell.

B. The connector shall be rated for the number and size conductors being connected.

C. The Wire Nuts shall be rated for 105^{o}C. And UL 486C listed.

D. Wire nuts shall be equal to connectors by Ideal/Buchanan, 3M/Scotch, or T & B,

2.13. SPLIT BOLT CONNECTORS:

A. Split bolt connectors for splicing conductors shall be UL 486A listed, shall be tin plated copper, and shall have a hexagonal head and nut.

B. Split bolt connectors for conductors sized AWG #4 and larger shall have a serrated spacer bar between conductors.

C. Split bolt connectors for splicing conductors AWG #12 through #6 shall be equal to Ilsco Type SEL and Type SK for AWG #4 and larger conductors.

2.14. MULTI-TAP CONNECTORS:

A. Multi-tap connectors shall be insulated type

B. Multi-tap connectors shall be rated for the conductor sizes indicated on the drawings.

C. The connectors shall be provided for the number of conductors indicated, including any future taps shown, plus a minimum of one additional tap.

D. Multi-tap connectors shall be equal to Ilsco Type PCT or Type PED-CP.

2.15. WATERPROOF WIRE JOINTS:

A. Splices made below grade shall be made connectors, UL listed as waterproof, for below grade applications.

B. Waterproof Twist On Connectors for Up to2#6 W/1#12 tap Conductors: Single piece wire nut pre-filled with silicone sealant. Sealant shall be rated for 45-400 degrees F. Connectors shall have same insulation rating as conductors. Sizes shall be available for connecting up to 2 #6 w1#12 tap conductors. Connectors shall be UL listed as waterproof for below grade applications and equal to Ideal Buchannan B-Cap Twist and Seal Wire Connectors, King Safety Products, Tyco/Raychem GelCap SL, or equal.

C. Waterproof Stub Splice Kit for up to #2/0 Conductors: Kit containing connector block, outer waterproof sleeve, and lubricant. Sleeve shall have same insulation rating as conductors. Kit shall be rated for feeder wire sizes #14 through #2/0 and tap wire sizes of #14 through #6. Connectors shall be UL listed as waterproof for below grade applications and equal to Tyco/Raychem GelCap SL.

D. Waterproof In-line Splice Kit for up to #2/0 Conductors: Kit containing connector block, outer waterproof sleeve, and lubricant. Sleeve shall have same insulation rating as conductors. Kit shall be rated for wire sizes #6 through #350 kcm. Connectors shall be equal to Tyco/Raychem GTAP.

E. Waterproof Splice Kit for Conductors above #2/0: Kit containing connector block, outer waterproof sleeve, and lubricant. Sleeve shall have same insulation rating as conductors. Kit shall be rated for wire sizes #14 through #2/0. Connectors shall be equal to Tyco/Raychem GHFC.

2.16. PLASTIC MARKING TAPE FOR MARKING UNDERGROUND CABLES AND CONDUITS:

A. Plastic marking tape shall be acid and alkali-resistant polyethylene film, 6 inches wide with minimum thickness of 0.004 inch.

B. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise.

C. The tape shall be manufactured with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep.

D. The tape shall be of a type specifically manufactured for marking and locating underground utilities.

E. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion.

F. Tape color shall be as specified in the table below and shall bear a continuous printed inscription describing the specific utility.

Red:	Electric
Orange:	Data, Telephone, Television,

2.17. FIRE STOPPING:

A. Fire sealant shall be intumescent caulk, putty, sheet and/or wrap/strip as required to attain the proper rating.
B. Caulk shall be equal to 3M CP25 N/S and/or S/L.
C. Putty shall be equal to 3M Fire Barrier Moldable Putty.
D. Sheet equal to 3M CS195.
E. Wrap/strip equal to 3M FS195.
F. Equal products by Dow Corning, Hilti, and Metacaulk will be accepted.

2.18. JUNCTION BOXES (THRU 4-11/16"):

A. Sheet Metal: To be standard type with knockouts made of hot dipped galvanized steel, By Steel City, Raco, Appleton or approved equal.
B. Cast: To be type FS, FD, JB, GS or SEH as required for application.

2.19. JUNCTION AND PULL BOXES (LARGER THAN 4-11/16"):

A. Shall be cast metal for all below grade exterior use and where indicated on plans. All other shall be oil tight, JIC boxes not less than 16 gauge, equal to Hoffman type "CH" boxes.

2.20. PULL BOXES:

A. Galvanized sheet metal screw-cover type with UL label as produced by Austin, B & C Metal Stamping Company, E-Box, Hoffman, Wiegmann, or approved equal.

2.21. JUNCTION AND TERMINAL BOXES FOR AUXILIARY SYSTEMS:

A. Junction boxes for auxiliary system circuiting splicing shall be formed of galvanized steel.
B. Boxes shall have hinged front, locking door(s).
C. Metal back plates shall be provided for mounting terminal strips or other devices.
D. Screw terminal strips shall be provided with a minimum of 25 percent spare terminals.
E. Boxes shall be sized to accommodate the terminal blocks and conductors, providing code required bending space.
F. Boxes for auxiliary systems shall be manufactured by Austin, E-Box, Hoffman, or Wiegmann.
G. Provide complete back boxes for all surface mounted devices. Back box shall have knockout on top and bottom as needed. Surface mounted junction boxes with devices mounted to it will not be accepted. Wiremold boxes will be accepted.

2.22. AUXILIARY GUTTERS (WIRING TROUGHS):

A. Gutters shall be of sizes shown and/or required by the NEC (whichever is larger), constructed of code gauge, galvanized sheet steel, painted ANSI 61 gray.
B. Gutters shall be UL listed and shall be of NEMA 3R construction in wet or damp locations or shall be as indicated on the drawings.
C. Gutters shall be as produced by Austin, B & C Metal Stamping Company, E-Box, Hoffman, Wiegmann, or approved equal.

2.23. STRUT SYSTEM FOR SUPPORT OF ELECTRICAL EQUIPMENT:

A. Strut shall be 1-5/8” except where heavier strut is required to support the load, for rigidity, or where specifically indicated otherwise.
B. Cold-formed steel, ASTM A 570 or A 446 GR A.
C. Stainless Steel Strut: Type 304, ASTM A 240.
D. Hot Dipped Galvanized Steel Strut: Zinc coated after manufacturing operations are complete, ASTM A 123 or A 153
E. Electro-galvanized Steel Strut: Electrolytically zinc coated, ASTM B 633 Type III SC 1.
F. Fittings: Same material as strut, ASTM A 575, A 576, A 36, A 635, or A 240.

G. Zinc Primer: As recommended by strut manufacturer.

H. Strut Systems shall be as manufactured by B-Line, Erico, Globe, Kindorf, MasterStrut, Power Strut, T&B SuperStrut, or Unistrut.

2.24. OUTLET BOXES:

A. General: Except as noted, boxes shall be standard hot dipped galvanized steel at least 1-1/2" deep, of metal at least 1/16" thick; sized to accommodate devices and conductors per NEC Article 370; product of Appleton, National, Steel City, or approved equal.

B. Ceiling and Wall Bracket Outlets: 4" octagonal boxes with plaster rings appropriate for finish surface.

C. Typical boxes (for switches, receptacles and auxiliary systems):
   1. All junction boxes shall be recessed within the confines of the walls unless otherwise noted. Junction boxes shall be accessible by means of a coverplate or a standard junction box cover whichever is appropriate for the installation.
   2. 4" square boxes ganged as required. Box volume shall be in accordance with NEC Section 370 – provide extensions as required.
   3. Furnish with 3/4" plaster rings where employed in plaster, 1" tile covers where used in ceramic tile, 1" plaster rings where set in exposed concrete, and otherwise appropriate for surface and construction.
   4. Use 4-11/16” square, 2-1/8” deep boxes where more than 10 conductors enter the boxes. Provide extensions as required to provide volume per NEC.
   5. Where existing walls are furred out with shallow hatch channel and sheet rock then the contractor will be required to use a shallow junction as required.
   6. All exposed junction boxes for receptacles, communications devices, switches, and fire alarm devices shall be provided with back boxes. Do not use standard stamped steel junction boxes when exposed. No exposed edges of devices plates will be allowed. No knockouts on the side of the box. Boxes shall be similar to Wiremold 500 & 700 Series or FS boxes. The wall plates will not be allowed to have overlap plates.

D. Boxes in Exposed (or Thin-Coat Plastered) Masonry: Where conduit connections permit, employ solid flush-type, square-cornered, masonry boxes with turned-in device holders; otherwise employ typical box with 1-1/2" square-cut tile cover.

E. Boxes used with Exposed Conduit: 4" square utility boxes.

F. Exterior Boxes: Galvanized cast-metal boxes, Crouse-Hinds Type FS or FD as appropriate. Make weatherproof with gasketed covers. Equal products by Appleton, Killark, O-Z/Gedney or approved equal will be accepted.

G. Exterior Boxes: All receptacle boxes shall be recessed unless specifically called out not to be. This includes exterior receptacles in all masonry type walls including but not limited to Pre-cast, Brick, Block, etc.

H. Boxes used with Recessed Lighting Fixtures: Provide a 4" square box with blank cover.

I. Boxes in Dry Wall Construction: Sectional type switch boxes at least 2-1/2" deep may be used instead of typical box (but not where dry wall finish is applied over masonry back-up and not where multi- gang devices occur).

J. Boxes installed exposed in kitchen and dishwashing areas shall be copper free cast aluminum with gasketed cast coverplates, without lift cover, unless specifically indicated otherwise on the drawings.

K. All junction boxes shall be mounted in accessible locations. Provide access panels as needed in hard or detention surfaces to access.

2.25. CONDUCTORS AND CABLES:

A. Power Conductors
   1. The ungrounded conductors (phase) and the grounded conductor (neutral) of each voltage system being installed shall be phase identified the full length of the conductor with the

color characteristics manufactured in the insulation of cable from the cable manufacturer. Required color cable will then be installed for the specific voltage system as identified in these specifications.

2. All conductors shall be copper with not less than 98% conductivity and with current carrying capacities per N.E.C. for 60°C. for sizes through #1 AWG and 75°C for conductors #1/0 and above.
3. All conductors shall have manufacturer's name, type insulation, and conductor size imprinted on jacket at regular intervals.
4. Conductors of size #10 and smaller shall be solid copper conductors with 600-volt type THHN or THWN insulation.
5. Conductors of size #8 and larger shall be stranded copper conductors with 600-volt type THHN or THWN insulation.
6. All motor branch circuits, HVAC, and plumbing equipment shall be stranded copper conductors with 600-volt type RHH-RHW insulation.
7. All conductors installed in conduit below grade shall be rated for wet location.
8. Manufacturer: Conductors shall be products of GE, Triangle, Phelps- Dodge, Anaconda, Rome, Habirshaw, General Cable, or approved equal.
9. Fixture Wire:
   a. Conductors feeding into fixtures, other than fluorescent fixtures, of 300 watts or less shall be #14, 200°C., type SF-2, for fixtures of more than 300 watts #12, 200 °C., type SF-2 shall be used.
   b. Conductors pulled through fluorescent fixtures shall have Type TFN or TFFN fixture wire, rated 90oC.
   c. Conductors shall be by Dodge, Anaconda, Rome General Cable or Southwire.

B. Control and Signal Wire: Conductor type TFF, minimum size #16 copper and fully color-coded, shall be used. Conductors shall be by Anaconda, Houston Wire & Cable, General Cable, Phelps Dodge, Rome, or Southwire.

2.26. WIRING DEVICES:

A. General: Manufacturer's and catalog numbers listed are used to establish style, type and quality. Unless otherwise indicated on drawings, all wiring devices shall be UL listed, side-wired specification grade.

B. Manufacturers: Equal devices by Hubbell, Leviton, Eaton and P & S will be accepted. All devices shall have plaster ears.

C. Wall switches: 120/277V, 20A, AC, flush enclosed, quiet type switches with thermoplastic body and polycarbonate toggles. Switches shall meet Federal Specification WS-896. Switches shall be, Hubbell 1200 series, Leviton 1200 series, Eaton AH1200 series or P & S PS20AC series single pole, 2-pole, 3-way, or 4-way as required.

D. Duplex receptacles (general purpose): 125V/20A flush duplex back and side wired hard use specification grade receptacles, NEMA 5-20R configuration, with nylon face and body, grounding terminal and break-off fins for converting to 2-circuit use. Receptacles shall meet Federal Specification WC-596. Color to match wall switches. Equal to P & S 5362, Hubbell CR20, Eaton 5362 or Leviton 5362.

E. Tamper Resistant Duplex receptacles, 125V/20A flush duplex, hospital grade, tamper resistant receptacles, NEMA 5-20R configuration, with nylon face and body, grounding terminal. Receptacles shall meet Federal Specification WC-596. Color to match wall switches. Equal to P & S TR62-H, Eaton TR8300 or Hubbell HBL8300SGDuplex combination 125/250-volt receptacles: receptacles shall be 20 amp, combination 125 volt (NEMA 5-20R)/250-volt (NEMA 6-20R) grounding receptacles.

F. Isolated Ground Receptacles: 125V/20A, NEMA 5-20R configuration, equal to Hubbell #IG5362, Eaton AHIG5362, Leviton #5362-1g, or P & S IG6300. IG receptacles shall be same color as general-purpose receptacles with an orange triangle on the face – fully orange colored receptacles shall not be acceptable.

G. Ground Fault Circuit Interrupt Receptacles: 125V/20-amp ground fault circuit interrupting receptacle for personnel protection, NEMA 5-20R configuration, Equal to Hubbell #GF5362, Leviton #6599, Eaton SGF20 or P & S 2091. Each GFCI symbol on drawing indicates a GFCI type receptacle. Do not through-wire non-GFCI receptacles from GFCI receptacles where ground fault protection is required. All exterior receptacles shall be ground fault interrupting type with weatherproof coverplates.

H. Faceless Ground Fault Circuit Interrupter: 125V, 20-amp ground fault circuit interrupter UL listed for personnel protection, equal to Hubbell GFR5350 Series, Leviton 6490, Eaton SGFD20 or Pass & Seymour Series 2081.

I. Single Receptacles: Flush Bakelite receptacles with side wiring and grounding terminal, voltage, amperage, and configuration as required for circuit indicated.

J. Each single or multi outlet receptacle, other than straight blade, 15 or 20 amp, 120 volts, NEMA 5-15R or NEMA 5-20R, shall be provided with matching cord plugs.

K. Plugs for kitchen equipment to be plugged into wall mounted straight blade receptacles shall be angled type.

L. Wiring devices shall be of color as directed by Architect. Devices must be available in ivory, brown, black, white, and gray. Devices connected to the emergency generator shall be red in color.

M. All receptacles shall be tamper-proof type receptacles where required by the National Electrical Code.

N. Pin and Sleeve Devices:
   1. Pin and Sleeve Devices shall be watertight plugs and receptacles of the ratings shown on the legend and/or schedules.
   2. Devices shall be listed to UL Standard 498 and UL Classified ro IEC Standards 309-1 and 309-2.
   3. Devices shall be furnished as matching plugs and receptacles with cast aluminum angled backbox.
   4. Devices shall be manufactured by Hubbell, Leviton, Eaton or P&S.

2.27. DEVICE PLATES:

A. Type appropriate for the associated wiring device, equal to Sierra Stainless Steel Smoothline. Device plates shall be of color as directed by Architect. Devices must be available in ivory, brown, black, white, and stainless steel. Provide single plate of proper gang where more than one device occurs (do not gang dimmers with rocker switches).

B. Damp Location: 20 amp,125 and 250-volt receptacles - Covers shall be weatherproof when plugs are not installed, provide cast aluminum weatherproof coverplates with single lift cover and gasket equal to Hubbell CWP26H.

C. Wet Locations, 20 amp, 125 and 250-volt receptacles: Covers shall be weatherproof In-Use covers, rated NEMA 3R when in use and shall be constructed of cast aluminum with sealing gasket. Covers shall be equal to products by Hubbell, Leviton, Steel City, T & B, and Taymac.

D. Coverplates for exposed cast aluminum boxes in kitchen and dishwashing areas shall be cast coverplates, without lift cover, unless specifically indicated otherwise on the drawings.

E. Color: Wiring device cover plates shall be of color as indicated on drawings or directed by Architect. Devices must be available in ivory, brown, black, white, gray, and stainless steel.

F. Jumbo and Mini-Jumbo plates will not be accepted.

2.28. OCCUPANCY SENSORS AND ACCESSORIES FOR LIGHTING CONTROL:

A. Occupancy sensors shall be totally passive in nature, in that the sensors shall not emit of interfere with any other electronic device, or human characteristic. Sensors shall be dual technology, i.e.: Passive Infrared (PIR) and Microphonic.

B. PIR shall initiate an “on” condition and the PIR or microphones shall maintain the load “on”.

C. Upon detection of human activity by the detector the lights shall come on and a time delay shall be initiated to maintain the lights on for a pre-set time period. The time delay shall be factory set and field adjustable from 30 seconds to 20 minutes.

D. All devices shall be factory warranted for 5 years.

E. All sensors shall be low voltage, 12 to 24 volts and shall work in conjunction with remote power packs.

F. Occupancy sensors shall be as shown on drawings.

2.29. GROUNDING:

A. Ground Rods shall be ¾" x 10' copperclad steel.

B. All grounding conductors shall be copper.

2.30. LIGHTING FIXTURES

A. General:
1. All Lighting Fixtures shall be UL labeled.
2. Fixtures installed in fire rated ceilings or ceiling assemblies shall be rated for installation in fire rated ceilings.
3. Furnish fixtures complete with lamps, ballasts and internal wiring factory installed.
4. Fixtures shall be furnished as specified herein and as shown on the fixture schedule on the plans. Catalog numbers shown are for basic units; furnish all fixtures complete with flexible connections, trim, plaster frames, and all other appurtenances necessary to the installation.
5. Substitutions: Reference to a specific manufacturer's product is made to establish a standard of quality and design, and to give a general description of the basic type desired. Equal products by the listed manufacturers will be accepted subject to the Engineer's approval.
6. It shall be the responsibility of the contractor to verify the exact type ceiling, type fixture mounting and trim, and recessing depth of all recessed fixtures prior to purchasing any fixtures.
7. Stems on stem mounted fixtures shall be approved ball aligner type, swivel 30 degrees from vertical with swivel below canopy. Paint stems the same color as the fixture trim. Stems in unfinished areas may be unpainted conduit.
8. High and low bay fixtures shall be equipped with safety chains. Every suspended fixture in Gymnasium shall have safety chains.
9. Fixtures installed on the exterior of buildings, on poles, or on pedestals shall be rated for wet location installation.
10. All lighting fixtures installed in gymnasiums, hangars or similar use areas shall be provided with wire guard.

B. Emergency and Exit lighting Fixtures shall be equipped with a Self-testing module which shall perform the following functions:
1. Continuous monitoring of charger operation and battery voltage with visual indication of normal operation and of malfunction.
2. Monthly discharge cycling of battery with monitoring of transfer circuit function, battery capacity and emergency lamp operation with visual indication of malfunction. The battery capacity test may be conducted by using a synthetic load.
3. Manual test switch to simulate a discharge test cycle.
4. Modules shall have low voltage battery disconnect (LVD) and brownout protection circuit.
5. All lighting fixtures and exit signs shown as emergency on drawings shall be provided with a minimum 1100 lumen emergency battery ballast capable of 90 minutes of illumination. No exceptions.

C. Lamps: Type and Lumen Output as scheduled.
1. LED bulb shape shall comply with ANSI C79.1. Lamp base shall comply with ANSI C81.61.

2. Minimum CRI of LED lamps shall be 80 with a color temperature as shown on drawings.
3. Rated life of all LED lamping shall me a minimum of 50,000 hours failure to 75% of lamp output.
4. LED lamping shall be capable of dimming from 100% to 0%.

2.31. LIGHTING STANDARDS:

A. Lighting Standards (Poles) shall be as specified on light fixture schedule anchor base poles rated for sustained winds' for the wind chart of this specific job's location and a 1.3 gust factor.

B. Poles shall be of the length required to provide the scheduled fixture mounting height.

C. Poles shall be factory predrilled for arm and fixture mounting.

D. Hand holes shall be provided at the base end of the pole for wiring access. Handholes shall be a minimum of 3" x 5" with gasketed, weatherproof covers and stainless-steel mounting hardware.

E. A grounding lug shall be provided inside the handhole.

F. The poles shall be furnished with a dark bronze, corrosion resistant finish, applied after fabrication.

G. The base plate shall be furnished with slotted holes for pole alignment.

H. A base cover shall be furnished with the pole with matching finish.

I. Anchor bolts shall be 36" long.

J. Contractor shall include concrete bases for all exterior pole mounted and grade mounted lighting.

2.32. PANELBOARDS:

A. General: All panelboards shall be dead front type manufactured and installed in accordance with UL and NEMA standards and shall carry a UL label. Ampacity, service voltage, and configuration shall be as indicated on drawings. Panelboards shall be clearly marked with ampacity, voltage, and maximum short current ratings.

B. Manufacturer: Panelboards shall be as manufactured by Cutler-Hammer, Square D, or Siemens.

C. Enclosure:
1. Panelboard enclosures shall be as indicated on drawings.
2. Unless otherwise indicated, all boxes shall be constructed of galvanized (or equivalent rust-resistant) sheet steel with hinged front trim.
3. Fronts shall be door in door with two lockable latches to open door, lock, and latch. All panelboard locks shall be keyed alike. Piano hinges with screw latches will not be permitted.
4. Fronts shall be finished with gray baked enamel over a rust-inhibiting phosphatized coating.
5. All dual section panels shall be equal in size. Sub-Feed circuit breakers will not be allowed to feed second section.
6. Sub-Feed circuit breakers feeding additional panels or equipment shall be branch mounted.
7. Provide permanent numbering of the panelboards. Stickers are not considered permanent.
8. Any panelboard schedule that indicates more than 42 circuits shall be provided in two equally sized panelboards.
9. Main circuit breakers shall be centered mounted. Main breaker cannot be mounted on buss bars with other circuit breakers.

D. Buss Assembly:
1. Bussing shall be copper.
2. The buss assembly A.I.C. shall be rated as indicated on drawings. Ratings shall be established by heat rise tests, in accordance with UL Standard 67.

3. All bussing shall accept bolt on circuit breakers.
4. Current carrying parts of all bussing shall be plated. In lighting and receptacle panels, bussing shall be designed for connection to the branch circuit breakers in the phase sequence format. Distribution panelboards shall be fully bussed.
5. Ground bars shall be provided in all panelboards.
6. Neutral bar shall be fully sized with lugs suitable for incoming and outgoing conductors.
7. Provide insulated ground buss where indicated on the panelboard schedules.

E. Circuit Breakers:
1. Circuit breakers shall be quick-make, quick-break, thermal magnetic, molded case, bolt on type.
2. Circuit Breakers shall be numbered and arranged as indicated on the panelboard schedules and/or single line wiring diagrams. Numbers shall be permanently attached to trim.
3. SWD Circuit Breakers: Single pole circuit breakers rated 15 and 20 amperes and intended to switch 277 volts or less fluorescent lighting loads shall be UL rated for switching duty and shall be marked "SWD".
4. HACR Circuit Breakers: Circuit breakers 60 amperes or below, 240 volts, 1-, 2-, or 3-pole, intended to protect multi-motor and combination-load installations involved in heating, air conditioning, and refrigerating equipment shall be UL listed as HACR type and shall be marked "Listed HACR Type."
5. Circuit breakers serving fire alarm systems, dedicated emergency/exit lighting circuits, and area of rescue communications systems shall be equipped with a screw-on, mechanical handle blocking device which locks the circuit breaker in the "ON" position.
6. Circuit breakers serving circuits in residential bedrooms shall be Arc Fault Interrupting(AFI) type circuit breakers and shall be UL 1699 listed.

F. Directories:
1. Each panelboard shall be equipped with a metal directory frame with a clear cover welded to the inside of the door.

G. Equipment Short Circuit Rating: Short Circuit Interrupting Ratings shall be as indicated on the plans and schedules. Unless specifically indicated otherwise all rating are "Fully Rated" capacities. Where no rating is given, the contractor shall verify the available short current with the serving utility and provide equipment rated accordingly.

H. Lighting panelboard cans shall be a maximum of 20" wide and 5 ¾" deep. Cans of multi-section panelboards shall be the same size.

I. Provide nameplate as called out on drawings.

J. All circuit breakers 1200-amp and up shall comply with NEC Article 240.87 Arc Energy Reduction.

K. All flush mounted panel shall be provided with six (6) ¾" conduit stubbed up above accessible ceiling.

L. Any circuit breaker serving an elevator shall be shunt trip type with auxiliary contacts.

2.33. DISTRIBUTION PANELBOARDS:

A. Furnish and install distribution and power panelboards as indicated in the panelboard schedule(s) or single line wiring diagrams and where shown on the plans.

B. Panelboards shall be dead front, safety type equipped with thermal magnetic, molded case circuit breakers with trip ratings as indicated on the schedule(s).

C. Panelboard bussing shall be copper.

D. Panelboard buss structure and main lugs or main breaker(s) shall have the fault current ratings as indicated on the drawings. Ratings shall be established by heat rise tests conducted according to UL Standard UL67.

E. Circuit breakers shall be equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other.

F. Main circuit breakers shall be centered mounted. Main breaker cannot be mounted on buss bars with other circuit breakers.

G. An engraved phenolic label shall be permanently attached to the front of the panelboard adjacent to each circuit breaker identifying the load served by the circuit breaker.

H. Automatic tripping shall be clearly shown by the breaker handle taking a position between ON and OFF when the breaker is automatically tripped.

I. Provisions for additional breakers shall be such that no additional connectors or hardware will be required to add breakers.

J. The panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel shall be as specified in UL Standards. End walls shall be removable. The size of wiring gutters shall be in accordance with the National Electrical Code, NEMA, and UL Standards for panelboards.

K. Cabinets shall be equipped with four-piece fronts.

L. The panelboard interior assembly shall be dead front with panelboard front removed.

M. Main lugs or main breaker shall be barriered on live sides.

N. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the buss structure opposite the mains shall be barriered.

O. Circuit breakers serving Fire Alarm Systems, Security Systems, and/or Emergency/Exit lights shall be equipped with mechanical, screw-on type, locking devices. These devices shall not be padlock type devices.

P. Panelboards shall be listed by Underwriters' Laboratories and to bear UL label. Panelboards shall be rated for use as Service Entrance Equipment where required by the National Electrical Code. Panelboards shall be by Cutler-Hammer, Square D, or Siemens.

Q. Provide nameplate as called out on drawings.

R. Any circuit breaker serving an elevator shall be shunt trip type with auxiliary contacts.

S. All circuit breakers 1200-amp and up shall comply with NEC Article 240.87 Arc Energy Reduction.

T. All flush mounted panel shall be provided with six (6) ¾” conduit stubbed up above accessible ceiling.

U. All service entrance main circuit breakers shall be 100% rated.

2.34. SWITCHBOARDS:

A. Construction.

1. The Switchard shall consist of the required number of vertical sections, bolted together to form a rigid assembly. Provide ventilators located on the top of the switchgear over the breaker and bus compartments to ensure adequate ventilation within the enclosure.
2. Each vertical steel unit, forming part of the switchgear line-up, shall be a self-contained housing having one or more individual breaker or instrument compartments, a centralized bus compartment, and a rear cabling compartment.
3. The switchgear shall be suitable for use as service entrance equipment and be labeled in accordance with UL requirements.

B. Bussing

1. Switchboard buss structure and main lugs or main breaker(s) shall have the fault current ratings as indicated on the drawings. Ratings shall be established by heat rise tests conducted according to UL Standard UL67.
2. All bus bars shall be tin-plated copper. Main horizontal bus bars shall be mounted with all three phases arranged in the same vertical plane. Bus sizing shall be based on ANSI

standard temperature rise criteria of 65 degrees C over a 40 degrees C ambient (outside the enclosure).

3. Provide a full capacity neutral bus.
4. A copper ground bus shall be furnished firmly secured to each vertical section structure and shall extend the entire length of the switchgear. The ground bus short time withstand rating shall meet that of the largest circuit breaker within the assembly.
5. All hardware used on conductors shall be high-tensile strength and zinc plated. All bus joints shall be provided with Belleville-type washers.

C. Wiring/Terminations
   1. A termination system shall be provided such that no additional cable bracing, tying or lashing is required to maintain the short circuit withstand ratings of the assembly through 200 kA.
   2. Lugs shall be provided in the incoming line section for connection of the main grounding conductor. Additional lugs for connection of other grounding conductors shall be provided as indicated on the drawings.

D. An engraved phenolic label shall be permanently attached to the front of the switchboard adjacent to each circuit breaker identifying the load served by the circuit breaker.

E. Automatic tripping shall be clearly shown by the breaker handle taking a position between ON and OFF when the breaker is automatically tripped.

F. Provisions for additional breakers shall be such that no additional connectors or hardware will be required to add breakers.

G. Circuit breakers shall be provided with the ratings indicated on the drawings.

H. Any circuit breaker serving an elevator shall be shunt trip type with auxiliary contacts.

I. Switchboards shall be listed by Underwriters' Laboratories and to bear UL label.

J. Switchboards shall be rated for use as Service Entrance Equipment where required by the National Electrical Code.

K. All circuit breakers 1200-amp and up shall comply with NEC Article 240.87 Arc Energy Reduction.

L. Switchboards shall be by Cutler-Hammer, Square D, or Siemens.

M. Provide electronic metering on the main for voltage, amps, kVA, & KW.

N. All service entrance main circuit breakers shall be 100% rated.

2.35. SAFETY SWITCHES:

A. Furnish and install safety switches as indicated on the drawings.

B. Switches installed on 277/480 volts systems shall be rated for 600 volts and those installed on 120/208 volt or 120/240-volt systems shall be rated for 240 volts.

C. Switches shall be NEMA Heavy Duty Type HD and Underwriters' Laboratory listed. Safety switches shall be Cutler Hammer, Siemens, or Square D.

D. General Duty disconnects will not be accepted.

E. Enclosures for switches mounted outdoors shall be NEMA 3R or as indicated on the plans.

F. Enclosures for switches installed in kitchen and dishwashing areas shall be NEMA 4X stainless steel or as indicated on the plans.

G. All safety switches for equipment with remote controls shall be equipped with a control circuit disconnect interlock.

H. Switches shall be lockable in the “ON” and in the “OFF” positions.

I. Provide each disconnect with a nameplate that indicates equipment name, voltage/phase, and feed from location.

J. Provide keyed brass locks on all disconnects that is located on the exterior of the building or in any area that is accessible to children or the public. All the brass locks shall be keyed the same and turn over 10 sets of keys to the owner at substantial completion.

K. Disconnect locations shown on drawings is diagrammatically shown. Disconnects shall be coordinated with other trades and placed in the optimal locations to serve equipment and shall be installed in the least obtrusive location. Disconnects will have to be moved at the cost of the contractor when there is conflicts with NEC clearances, access to space, or servicing of equipment. Architect/Engineer will have final judgment of proper location.

L. Disconnects serving an elevator shall be NEMA 3R and provided with auxiliary contacts.

2.36. MANUAL MOTOR STARTERS (TUMBLER SWITCH TYPE WITH OVERLOAD PROTECTION):

A. Starting and thermal overload protection for single phase motors 1/8 Hp to 1 HP shall be provided by manual motor starters with overload units rated as required by the specific motor to be served.

B. Switches installed for site disconnect switches shall be equipped with padlocking provisions.

C. Starters shall be by Cutler Hammer, General Electric, or Siemens with NEMA Type 1 enclosure or NEMA Type 3R enclosure where installed outdoors.

2.37. TRANSIENT VOLTAGE SURGE PROTECTORS (SURGE PROTECTIVE DEVICES):

A. Provide transient voltage surge protectors (Surge Protective Devices) where indicated on the plans. At a minimum provide on all service entrance panelboards/switchboards and any panelboard/switchboards on the secondary side of a dry-type transformer.

B. Service Entrance Panelboards and at Subpanel Protectors shall be listed and labeled and components recognized in accordance with UL 1283 and UL 1449 Second Edition, including highest fault current of Section 37.3.

C. All devices shall meet or exceed the following:
   1. NEMA LS 1-1992.
   2. Minimum surge current capability, single pulse rated, per mode:
      a. Service Entrance – 100 kA (200 kA per phase)
      a. Distribution and branch panelboards – 80 kA (160 kA per phase)
   3. UL 1449, Second Edition, Listed and Labeled, and Recognized Component Suppressed Voltage Ratings shall not exceed (1.2x50□s, 6kV open circuit and 8x20□s, 500A short circuit test wave forms at end of 6" lead):

Voltage	L-N	L-G	N-G	L-L
208Y/120v	400	400	330	700
480Y/277V	800	800	800	1500

   4. Testing shall be done at the end of 6" leads with the complete unit including any fuses and all other components making up the unit.

D. The devices shall have a minimum EMI/RFI filtering of –50dB at 100kHz with an insertion ratio of 50:1 using MIL-STD-220A methodology.

E. Devices shall utilize MOV's of 25 mm diameter or larger, shall have pilot lights visible on the outside of the enclosure to indicate device operating condition, and shall provide contacts for remote monitoring of device condition.

F. Devices shall be modular in design with individual module fusing and thermal protection.

G. Devices shall incorporate visual alarm signals that indicate the failure of a single MOV and total loss of protection.

H. Wye connected devices shall provide L-L, L-N, L-G, and N-G surge diversion with L-N/L-G bonded at service entrance devices. Delta connected devices shall provide L-L and L-G protection.

I. Data Line Surge Protectors: Data Line Surge Protectors shall be UL 497B listed and labeled. The units shall be heavy duty devices utilizing a combination of silicone diodes and gas tube technology to provide surge protection.

J. All devices shall have a minimum warranty period of five years, incorporating unlimited replacement of suppressor parts if they fail during the warranty period.

K. Transient voltage surge suppressors shall be manufactured by AC Data Systems, Advanced Protection Technologies, Current Technologies, Cutler-Hammer, General Electric, Joslyn, Liebert, or MCG.

2.38. SECONDARY SURGE ARRESTERS:

A. Secondary surge arresters shall be UL listed under UL Classification (Lightning Protection) Surge Arresters (OWHX).

B. Surge arresters shall be rated at same voltage and phase configuration as service.

C. Arresters shall be equal to Cooper Power Systems ASZH Series, Cutler-Hammer, GE Tranquell, Joslyn Electronic Systems, Leviton models as required to match the voltage of the system served.

2.39. FUSES:

A. General: Fuses shall be UL listed time delay types with a minimum interrupting rating of 100,000 amps symmetrical.

B. 200 amps and below: Provide Class RK-5 current limiting, time delay, rejection type as manufactured by Busman Manufacturing, Ferraz Shawmut, or Littlefuse.

C. 201 to 600 amps: Class RK-1, current limiting, time delay, rejection type as manufactured by Bussman, Ferraz Shawmut, or Littlefuse.

D. Above 600 amps: Class L current limiting, time delay, as manufactured by Busman Manufacturing, Ferraz Shawmut, or Littlefuse.

2.40. LABELING:

A. Provide laminated plastic nameplates for each panelboard, equipment enclosure, relay, switch, and device.

B. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic 0.125-inch thick, white with black center core.

C. Provide red laminated plastic label with white center core where indicated.

D. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core.

E. Minimum size of nameplates shall beone by 2.5 inches.

F. Lettering shall be a minimum of 0.25-inch high normal block style.

G. See Panelboard details for proper labeling of all panelboards.

2.41. PHOTOCELLS, TIME SWITCHES AND CONTACTORS:

A. Photocells: Units shall have 1" diameter, hermetically sealed, cadmium sulfide sensing cell with 3-prong NEMA locking plug, rated for wet locations. Units shall have built-in time delay. Units shall be equal to Tork 5231 of correct voltage to match load or use with matching receptacle equal to Tork 2421.

B. Time switches:
   1. Unless otherwise indicated on drawings, time switches shall be 24-hour electromechanical type having synchronous motor drive with two single pole double throw contacts rated 20 amps minimum.
   2. Unit shall have spring back up, with automatic rewind, capable of providing 16 hours minimum of reserve power upon electric power failure.

3. Units shall be furnished in an enclosure, NEMA 1 indoor and NEMA 3 outdoors. Enclosures shall be flush mount unless otherwise indicated on drawings.
4. Units shall be Tork 7120L, or equal by Paragon or Sangamo.
5. Time switch(es) shall be digital, seven day format, two channel time switches with 9v lithium battery 30 day back-up and with metal indoor enclosure. The controllers shall be equal to Tork #DW200A-Y.

C. Contactors: Units shall be electrically held or electrically operated mechanically held, as indicated on drawings, and shall be recommended by manufacturer for type of load served.

D. Contacts shall double-break type of same ampere rating as line side circuit wiring.

E. Contacts shall be field-convertible to normally open or normally closed.

F. Contactor coils shall be encapsulated. Electrically held contactors shall have continuously rated coils. Mechanically held contactors shall be equipped with coil-clearing contacts to energize coils only when switching.

G. Units shall be furnished in an enclosure, NEMA 1 indoor and NEMA 3 outdoors.

H. Units shall be equal to GE CR460 series in NEMA 1 or NEMA 3R enclosure as indicated.

2.42. FIRE ALARM SYSTEM (ADDRESSABLE):

A. General: The contractor shall furnish and install a complete power limited automatic and manual fire alarm system, as specified herein and indicated on the drawings. The system shall include a central control panel, power supply, signal initiating devices, audible and visual alarm devices, provisions for connection of remote monitoring, a wiring system, and all necessary devices required to provide a complete operating system. The system shall comply with the applicable provisions of the National Fire Protection Association Standard Number 72 and meet all requirements of the local authorities having jurisdiction. The Underwriter's Laboratories, Incorporated, or approved by the Factory Mutual Laboratories shall list all equipment and devices. The equipment shall be EST. No deviation will be considered unless submittals are received and approved in writing, not less than ten days prior to bid date.

B. Fire Alarm Document Box: The contractor shall furnish and install a fire alarm document enclosure as mandated by NFPA 72 Chapter 7.7.2.1. The system records documents box shall be constructed of 18 gauge cold rolled steel. It shall have a red powder coat epoxy finish. The cover shall be permanently screened with 1" high lettering and read "FIRE ALARM DOCUMENTS" with white indelible ink. The access door shall be locked with a ¾" barrel lock which is keyed the same as the manufacturer's fire alarm panel. The enclosure shall supply 4 mounting holes to securely fasten to the wall. Inside the enclosure will accommodate standard 8.5" x 11" manuals and loose document records that may be placed in a three-ring binder. All documents & software will be protected within the enclosure. A legend sheet will be permanently attached to the door for system required documentation, key contacts, and system information. The fire alarm document will have securely mounted inside the enclosure a minimum of 4 Gigabyte digital flash memory drive with a standard USB type B connector for uploading and downloading electronic information. The drive shall not be accessible without tools to any person who gains access to the enclosure. The enclosure shall also provide 2 Key ring holders with a location to mount standard business type cards for key contact personnel. The password to the fire alarm programming shall be provided to the owner in the fire alarm document box. The password must be provided, fire alarm contractors that refuse to give password will not be accepted. Contractor will be responsible for replacing the entire fire alarm system at their cost and cost of delaying the project if password is not provided.

C. Control Panel: The control panel shall be an addressable type panel capable of handling up to 256 devices, with 60-hour minimum standby battery. The panel shall provide for the connection of alarm circuits as indicated and shall include the following features.
1. The fire alarm panel shall detect the operation of any initiating device, indicate by annunciator lamps the area of the alarm condition, and operate all alarm auxiliary devices.

2. A pilot light shall normally be on, indicating that the system is receiving power from the building service supply. A failure of the building service supply shall cause the lights to go out.
3. A trouble light and trouble buzzer, operating together, shall signal any trouble condition. Failure of the building service supply, disarrangement in the system wiring, or alarm condition shall cause that trouble light to come on and the trouble buzzer to sound. A self restoring silencing switch shall be provided to silence the trouble buzzer, which shall be arranged so the trouble light will remain on until the system is restored to normal.
4. All notification signals shall be automatically locked in at the control panel until the operating device is returned to its normal condition, and the panel is manually reset. A switch shall be provided on the control panel for silencing the notification devices. The manual reset switch and the alarm-silencing switch shall be of the self-restoring type, which cannot be left in the abnormal position.
5. The control panel shall provide relay contacts, of quantity as shown on the drawings, for control of heating, ventilation and air conditioning equipment. Such contacts shall be connected to air conditioning equipment, as indicated on drawings, for shutdown of individual units. Unit shutdown shall be initiated by duct-mounted smoke detectors unless otherwise indicated. Operation of any initiating device shall open all control contacts and release all mechanically held doors.
6. The control panel shall be equipped with a front mounted Drill switch.
7. Metal oxide varistors (MOV's) shall be provided on the system power supply and the municipal connection circuit to provide transient suppression protection to the control panel.
8. Power Supply: The power supply shall be 24 Volt DC, filtered and regulated, and shall provide sufficient power for all system functions. The fire alarm system main power supply shall operate at 120 Volt AC obtained from the building service. The 120-volt AC main power shall be converted to low voltage direct current for system operation. The system shall operate on 24 volts DC with trickle charged batteries provided as an emergency source of supply for operating the system in the event of interruption of main power. A changeover relay in the control panel shall transfer to standby power automatically upon main power failure and automatically reconnect to main power upon restoration.
9. **Fiber Optic Cards. The control panel and all remote nodes shall be equipped with fiber optic, node-to-node capabilities at time of installation. Fiber Optic Transmission Cards shall be equal to EST Model SMXLO. All buildings shall be connected via fiber. No copper connections will be permitted.**
10. **In existing building, all panels, annunciators, and other items shall be converted/upgraded to new panels with fiber nodes to allow for fiber only connection of new building(s). Once project is completed the system shall be a fully functional code compliant system. No allowances will be made for changes due lack of knowledge of existing system and what will be required to upgrade to fiber optic connected panel after the bid. Contractor shall verify number of annunicators and all other equipment to be replaced prior to bid.**

D. Manual Stations: Manual Fire alarm stations shall be an addressable double acting, semi-flush mounted type. Stations with two sets of contacts will not be acceptable.

E. Smoke Detectors: Smoke detectors shall be addressable photoelectric type with base.

F. Heat Detectors: Addressable 135 degree/rate of rise type with base.

G. Duct Mounted Smoke Detectors: Duct detectors shall be addressable photoelectric type with sampling tube.

H. Contractor shall be responsible for coordinating prior to bid with mechanical drawings to confirm all duct mounted smoke detector locations and quantities. Contractor shall include in their base bid price the cost of all additional duct mounted smoke detectors and circuitry needed for locations.

I. Duct Detector Remote Test Station: Test stations shall be keyed with indicator light.

J. Audible/Visual Notification Devices: Audible/visual notification devices shall be four wire, horn/strobe units capable of 90 dB audible output, 100 candela-second output, shall be ADA compliant. Devices using incandescent lamps will not be acceptable.

K. Visual Notification Devices: Visual notification devices shall be strobe units capable of 100 candela-second visual output, shall be ADA compliant. Devices using incandescent lamps will not be acceptable.

L. Voice Control Panel: The Voice Control Panel shall play a digitally recorded message or microphone input for evacuation instructions. The unit shall be installed next to the FACP, shall be equipped with emergency battery power, and shall provide a minimum of 75 watts of amplification.

M. Remote Microphone Panel: Remote Microphone Panels shall have a keyswitch control and shall be supervised.

N. Remote Amplifier: Remote amplifiers shall be 120 watt with battery backup.

O. Speaker/Visual Notification Devices: Speaker/Visual Notification devices shall be semi-flush, wall mounted, combination strobe/speaker assemblies with a minimum strobe output of 100 candella-second equal to Notifier #E70-24110W-FR for wall installation or Notifier #E70-W for speaker only ceiling installations.

P. Interface Relay:
   1. Provide addressable control modules equal to Notifier #CMX-2 or interface relays equal to Notifier #MR-101/CR as required for interface of the Fire Alarm System with HVAC shut down, door holders, kitchen hood fire suppression system, and fan shut down, and any other locations required for proper interface and operation of systems.
   2. A control module or interface relay shall be provided for each duct mounted smoke detector and shall be the point of interface between the Fire Alarm System and the HVAC Control System.
   3. Contacts shall be rated for 10 A at 120 V.

Q. Flow and Tamper switch Monitoring: Individual Addressable Module.

R. Annunciator Panel: Provide and install an annunciator that provides an audible and visual indication of an alarm or trouble condition for each zone, an alarm silence switch, and a key operated test and reset switch.

S. Auxiliary Remote Power Supplies/Notification Appliance Circuit Extenders (NAC Panels):
   1. Provide auxiliary power supplies and/or NAC Panels where required for notification devices, door holders, annunciators, or for other devices requiring supplemental power.
   2. Remote power supplies shall include a filtered and regulated 24 VDC output, provisions for automatic transfer to battery back-up in case of primary power failure, and batteries sized for 60 hours of operation.

T. Wire Guards: Wire guards shall be made of 3/16” minimum steel wire with a corrosion resistant coating equipped with integral mounting rings. Provide wire guards for all devices located in gymnasium.

U. All devices installed on the exterior shall be weatherproof.

V. All A/V devices in gymnasium at bleachers or any other facility with bleachers shall mount the fire alarm devices 80” above top of bleachers.

W. **Provide fiber optic interface/network cards in fire alarm and control panels for the school campus. Provide fiber optic cable as required by manufacturer to connect the main school building panel and the cafeteria panel. Fiber optic link shall allow full communications between the two fire alarm and control panels. Provide necessary electronic modules, equipment, cables and programming for communications between the all fire alarm panels.**

2.43. CONCRETE:

A. Concrete for electrical requirements shall be:
   1. Composed of fine aggregate (sand), coarse aggregate (graded from three-sixteenth (3/16) inch to one (1) inch), Portland cement, and water proportioned and mixed so as to produce a plastic, workable mixture.
   2. Aggregates shall be free from detrimental amounts of dirt, vegetable matter, soft fragments, or other foreign substances.
   3. Water shall be fresh, clean, and free from salts, alkali, organic matter, and other impurities.
   4. Concrete shall have a minimum 3000 psi ultimate twenty-eight day compressive strength and a maximum three (3) inch slump.

PART 3 - EXECUTION

3.01. GENERAL:

A. This section includes the installation of the complete electrical system.

3.02. ELECTRICAL SYSTEM DEMOLITION:

A. Before any new work begins the Contractor shall determine and document in writing to the satisfaction of the Engineer the condition of existing electrical work and auxiliary systems that are to remain in service. After the new work begins any existing electrical work or systems that are found to be inoperative or defective and not so documented shall be repaired or replaced by the Contractor at no additional cost to the Owner.

B. Existing electrical equipment and materials to be reused shall be tested and repaired as required and installed for first class operation.

C. General: The manner-in-which the remaining portions of the electrical system are terminated, supported and generally maintained for permanent use shall comply with all applicable regulations of the National Electrical Code, applicable NFPA codes and any local codes.

D. Refer carefully to construction drawings prior to commencing with demolition to determine the intent of demolition. Contact the Engineer if there appears to be any conflict between the demolition and construction drawings.

E. See "Renovation" Section regarding modification and relocation of circuits.

F. Phasing: Phasing shall be as coordinated by the General Contractor.

G. Work in Occupied Areas: Coordinate work carefully with General Contractor to provide minimum disruption to occupied portions of project. Provide minimum of 24 hours advance notice to Owner of demolition activities that will affect Owner's normal operation.

H. Protections: Take necessary measures as required for protection of the Owner's personnel and the general-public, as well as Owner's property. Provide temporary barricades, partitions, bracing, and weather protection as needed. Remove all temporary protections at completion of work.

I. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. Maintain portable fire suppression equipment during flame-cutting operations.

J. System Protection: Protect and maintain all portions of existing system not indicated for demolition, including but not limited to light fixtures, panelboards and circuits.

K. Fire Protection: Coordinate with general contractor to ensure that all penetrations of fire-rated decks and partitions are properly sealed.

L. Removal of Circuits: All circuits indicated for removal shall be entirely removed, including raceway, back to take-off point or as far as possible without chasing (unless chasing is indicated). Where it is not possible to remove conduit, all conductors shall be removed and the conduit shall be permanently capped. Floor outlets indicated for removal shall be entirely removed, including outlet box, and capped below floor level (minimum 4" below floor level if in slab).

M. Where floor slab is damaged in the course of demolition, it shall be permanently repaired as soon as practicable.

N. Leave existing branch circuits and feeders which run through reworked areas and serve existing equipment to remain in service, continuous and uninterrupted.

O. Where service interruptions are required, obtain approval for interruptions in writing from Architect 14 days prior to interruption. Submit schedule of work to be performed and the time required to accomplish work with request for interruption.

P. Disposition of Material: Where electrical equipment is indicated for removal and not indicated for re-use, the owner shall have the option of taking possession of the equipment, the Contractor shall deliver any such material to a local site designated by the owner. The Contractor shall be responsible for disposing of all other materials in accordance with applicable codes and laws.

3.03. ELECTRICAL SYSTEM RENOVATION:

A. General: Provide renovations as indicated on drawings and specified herein as required for a complete, operational system, even though every item is not indicated.
   1. This Section is intended to serve as a supplement to the applicable sections within this Division, and in no way relieves the contractor from the requirements of any other Section.
   2. All renovations shall comply with all applicable regulations of the National Electric Code, applicable NFPA codes and any local codes

B. Materials and workmanship: Execute all work presenting a neat and workmanlike appearance when completed. Except where otherwise indicated, all materials shall be new, UL approved where a standard has been established. Where specific means and methods for affecting renovations are not covered in drawings and specifications, the contractor shall exercise prudent judgment in following accepted practices.

C. Modifications: All major deviations from the drawings and specifications shall be approved in writing by the Engineer.

D. Inspection:
   1. Inspect all existing electrical system components which are accessible, including fixtures, wiring devices, raceway and panelboards.
   2. Perform minor repairs to loose or damaged connections, damaged or missing supports, replacement of broken devices, replacement of missing plates and junction box covers and other visible damage or disrepair.
   3. Report major damage to Engineer.

E. Renovation Services: In addition to the scope of work indicated on the drawings and specified herein, it shall be the responsibility of this Division to provide minor modification and repair services made necessary to electrical system components through the normal course of renovation. Such services shall include but not be limited to minor repair or relocation of branch circuits necessitated by the work of other trades, as coordinated by the General Contractor.

F. Penetrations: Coordinate penetrations of existing walls, decks, and roofs required for electrical system with General Contractor. Do not cut structural members without the prior consent of Structural Engineer.

G. Raceway.
   a. Unless specifically indicated otherwise, existing raceway may not be used.
   b. Where existing raceway is indicated for possible re-use, it shall be the responsibility of this Division to verify that the condition and configuration of the raceway is in compliance with the NEC.

H. Panelboards: Where new circuits are run to an existing panelboard, thoroughly inspect the panelboard for any indications of arcing, overheating, or other damage. Report damage to the Engineer. Unless specifically allowed, tandem circuit breakers shall not be utilized.

I. Clearing of Neutral Faults: Any and all neutral faults to ground on existing system shall be corrected.

J. Service Ground: Visually inspect existing service ground electrode system for damage and code compliance. Check continuity from panel to each electrode with a meter. Make repairs as required.

K. Lighting Fixtures: Where existing lighting fixtures are indicated for re-use, they shall be thoroughly cleaned and re-lamped, no exceptions. Where existing lighting fixtures are indicated for replacement, it shall be the responsibility of this Division to verify the compatibility of new fixtures with existing ceiling type, existing penetrations, available support, and other existing conditions prior to submittal of fixtures. Any variances or required modifications shall be clearly indicated on the fixture submittal.

L. Backfilling, Grading, and Sodding:
   1. Restore surface features, including vegetation, at areas disturbed by Work of this Section.
   2. Reestablish original grades, unless otherwise indicated.
   3. If sod has been removed, replace it as soon as possible after backfilling is completed.
   4. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition.
   5. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Division 2 Section "Landscaping." Maintain restored surfaces.
   6. Restore disturbed paving as indicated.

3.04. ELECTRICAL SERVICE:

A. General: Arrange with local electric Utility Company for service to be brought to the building, and for installation of meter. Provide all material and labor not supplied by Utility Company so as to produce a complete installation meeting the Utility regulations.

B. Service requirements: It is the responsibility of this Section, prior to bid, to reaffirm with the Utility Companies involved, that locations, arrangement, Power Company voltage, phase, metering required, and connections to utility service are in accordance with their regulations and requirements. If their requirements are at variance with these drawings and specifications, contract price shall include an additional cost necessary to meet those regulations without extra cost to Owner after bids are accepted.

C. Notify Architect of any changes required before proceeding with work.

D. Fees and deposits:
   1. The Electrical Contractor shall be responsible for verification and payment of all utility fees associated with installation of the electrical service.
   2. The Owner shall pay the cost of establishing an electrical service account and permanent meter deposit.

E. Metering: Obtain metering equipment from Utility Company and install in compliance with the Utility Company's requirements. The Electrical Contractor shall provide and install all necessary metering raceways, fittings, supports, connectors and ground conductor necessary for a complete installation. Provide 100# pull wire in all metering conduits.

F. Main Service Equipment: Provide UL approved service entrance components as indicated on drawings or specified herein.

G. Provide a full-size copy of the AS-BUILT Power Riser Diagram framed behind plexiglass screwed to the wall near service entrance in main electrical room.

H. Service lateral or feeder: Extend lateral or feeder of the size shown on drawings from service equipment to the point of service as indicated (verify exact location with Utility Company).
   1. For Overhead Service, provide and install service entrance fitting on conduit and leave sufficient slack conductor for connection to utility feeder 10' above finish grade, 12' above drive and 18' above street.

2. For Underground Service, provide and install underground conduit to utility riser, as directed by Utility Company. Conduit shall be of size and quantity as indicated on drawings. Provide 480# polypropylene pull line in each empty conduit.
3. For Underground Service, provide and install transformer pad, primary underground conduit to utility riser as directed by Utility Company, underground secondary conduit, and secondary conductors. Conduit shall be of size and quantity as indicated on drawings. Provide spare 4" conduit in transformer pad extending 2' beyond edge of pad with PVC cap. Provide 480# polypropylene pull line in each empty conduit.
4. On service transformers with multiple taps, it shall be the responsibility of this section to coordinate tap selection with the electric utility to insure the proper nominal voltage.

3.05. GROUNDING:

A. Bond the neutral conductor and various conductive materials in the building per NEC Article 250.

B. Grounding Electrode System: A bare copper grounding conductor shall be bonded to grounding electrodes as specified below. This conductor shall serve as ground for system neutral and for building equipment bonding. Where conductor is #6, or smaller, or is subject to injury, it shall be run in conduit, Schedule 80 PVC or Rigid Galvanized to which the conductor shall be bonded at both ends.
   1. Grounding electrodes shall be as follows:
      a. Cold water piping, if metal and in direct contact with the earth for 10 feet or more, at the point of entry into the building. Attach ground conductor to cold water piping with UL approved bronze clamp.
      b. Building structural steel, if present and accessible.
      c. Grounding electrode shall be attached with exothermic weld connection or irreversible crimp type connector similar to Burndy YGHR connectors. Crimps must be made with Burndy tool approved by the manufacturer for setting irreversible crimp connections.
      d. Foundation reinforcing bar system. Coordinate with General Contractor to provide turned up re-bar (sleeved) near service point for attachment of grounding electrode above grade. Grounding electrode shall be attached with UL approved exothermic weld connector.
      e. Driven ground rod(s).
         1) Three 3/4" x 10' copper weld rods shall be driven into the ground at the lowest point adjacent to the building, spaced a minimum of 10' apart.
         2) Ground rods shall be driven to 12” below grade.
      f. Grounding electrode shall be attached with exothermic weld connection or irreversible crimp type connector similar to Burndy YGHR connectors. Crimps must be made with Burndy tool approved by the manufacturer for setting irreversible crimp connections.
      g. Existing grounding electrode system. If an existing electrical service is in place, it must be bonded to the new grounding electrode system.

C. Connections to grounding rods, building structure, counterpoise, and conductor junctions shall be made by exothermic weld unless specifically noted otherwise.

D. Electric system (neutral) ground: The current carrying neutral leg of the wiring system shall be of insulated conductor and shall be connected to the grounding electrode conductor only via the neutral connection at the service equipment. Each branch circuit or multi-outlet branch circuit shall be provided with a dedicated neutral conductor.

E. Equipment grounding conductors:
   1. An equipment grounding conductor (copper with green insulation except where bare copper is used) shall be provided in all wiring raceways.
   2. Sizes shall be in accordance with NEC 250.
   3. The equipment grounding conductor shall originate in the same panelboard, panelboard section, as the circuit conductors.

4. The equipment grounding conductor bonding the sections of multi-section panelboards shall be sized per NEC 250.
5. The equipment grounding conductor is not included in number of branch circuit conductors indicated on the drawings.

F. Computer backboard ground: provide a minimum #6 bare, solid copper grounding conductor from the electrical service grounding connection to the CBB. Leave six (6) feet minimum of free conductor. Install the conductor in PVC conduit where inside the building.

G. Metal Lighting poles: Provide a grounding electrode at poles supporting outdoor lighting fixtures in addition to installing a separate equipment grounding conductor with supply branch-circuit conductors.

H. Grounding electrode resistance shall be less than 15 ohms. The resistance of the grounding electrode shall be tested by the Fall of Potential Method.

I. Lighting Standards (Poles): Install 10' driven ground rod at each pole. On non-metallic poles, ground metallic components of lighting unit and foundations. Connect fixtures to grounding system with No. 6 AWG conductor.

J. Each grounding conductors at the service entrance ground bus bar shall be provided with a brass round identifying tag. Tag shall indicate where ground wire is terminated.

3.06. EXCAVATION, CUTTING AND BACKFILLING:

A. Provide cutting and patching, under the supervision of the General Contractor, as required for the work in Section 16.

B. Locate all existing below grade and/or below floor utilities prior to beginning any site excavation or cutting of existing floor slabs. The Contractor shall repair any damage to existing utilities or systems.

C. Saw cut existing concrete slabs and asphalt paving.

D. Trenching:
1. Dig trenches true to line, with a flat, even bottom.
2. Width of the trench shall provide not less than 3 inches clearance from the conduit to each side of the trench.
3. Ensure that foundation walls and footings and adjacent load bearing soils are not disturbed in any way.
4. Conduits shall be installed below footings where possible. Where a line passes under a footing, make crossing with the smallest possible trench to accommodate the conduits/sleeves.
5. Where a line must pass adjacent to and below the bottom of a column footing, or the corner of a continuous footing, backfill the trench with concrete up to the level of the footing bottom, for a distance away from the footing equal to the depth of the fill.
6. Keep excavation free from water, by pumping if necessary.
7. Where rock, soft spots, or sharp-edged materials are encountered, excavate the bottom for an additional 3 inches, fill and tamp level to proper elevation with sand or earth free from particles that would be retained on a ¼-inch sieve.
8. Remove and relocate existing obstructions as directed.
9. The Contractor shall be responsible for the repair and/or replacement of any damage to existing utilities, structure, or finishes.
10. Coordinate work with other trades as work progresses so cutting and patching will be minimal.
11. Refer to Section "Earthwork" for shoring, sub-soil assumptions and data, work around trees, surplus earth, etc.

E. See Section 16100, "Conduit Installation, Below grade and below slab conduit installation", for installation of conduits in trenches.

F. Backfilling:

1. Immediately after inspection, cover conduits with 3” of compacted sand or earth free from particles that would be retained on a 1/4inch sieve. Do not to disturb the alignment or joints of the conduits.
2. Carefully backfill with 4” of earth free from clods, brick, etc., firmly puddling and tamping.
3. Thereafter, puddle and tamp every vertical 4” for hand tamping or 8” for heavy duty mechanical tamping.
4. Backfill shall meet the compaction requirements set forth in Division 2.
5. Backfilling Beneath Slabs and Pavement: Trenches beneath future slabs or pavement, including but not limited to buildings, drives, parking areas, sidewalks, playground surfaces, and equipment pads, shall be backfilled, from 3” above top of conduits to final grade, with crushed aggregate, AHD 825, type B, compacted in 4” layers to 100% ASTM 698.
6. Install marking tape above conduits at 12 inches below grade.

3.07. SLEEVES, INSERTS, AND SUPPORTS:

A. Provide and install No. 16 gauge galvanized steel or iron sleeves in all walls, floors, ceilings, and partitions. Sleeves shall have no more than 1/2" clearance around pipes and insulation.

B. The contractor shall furnish to other responsible trades all sleeves, inserts, anchors and other required items which are to be built in by other trades for securing of all hangers or other supports by the Contractor.

C. The contractor shall assume all responsibility for the placing and sizing of all sleeves, inserts, etc., and shall either directly supervise or give explicit instructions to other trades for their installation.

D. The contractor shall seal all conduits through floors, smoke partitions, and floor partitions, with a sealant approved for the application.

E. All sleeves through sound barrier walls and partitions shall be sealed with mineral wool.

F. Through the floor conduit penetrations shall be sealed watertight.

G. Furnish and install steel angles and channels as required for mounting and bracing heavy equipment and conduits. Steel shall be securely bolted or welded to structure and equipment bolted to the steel framework. Obtain the approval of the Architect prior to welding.

3.08. BELOW GRADE THRU WALL WATER SEALS:

A. Each conduit penetrating exterior, below grade, cast cncrete walls shall have the annular space aroung the conduit sealed with an approved Thru Wall Water Seal System.

B. Where the system includes water seal thru wall sleeves, the Electrical shall provide properly sized sleeves to the contractor responsible for constructing the walls and shall be responsible for the proper location of each sleeve.

C. Where openings are to be core drilled, the Electrical Contractor shall be responsible for the core drilling and for coordinating proper sizing and location of each opening.

3.09. FIRE STOPPING:

A. The Electrical Contractor shall be responsible for firestopping of all penetrations of fire rated partitions made by any and all lighting, power, and auxiliary circuiting, sleeves and/or equipment.

B. The Electrical Contractor shall submit manufacturers’ UL System drawings for the systems to be utilized. The systems shall be compatible with the partition ratings as indicated on the Architectural drawings and in accordance with details on the Electrical drawings.

C. Penetrations of fire rated partitions shall be sealed with an approved fire sealant resulting in the completed penetration having the same fire rating as the partition.

D. The installation shall be in accordance with the manufacturer's UL system detail and installation instructions to attain the required fire partition rating.

E. Empty sleeves through 1 and 2 hour rated partitions shall be plugged with mineral wool.

F. Sleeves through 4 hour rated partitions shall be plugged with mineral wool and fire stopping material.

3.10. ROOF PENETRATIONS:

A. Furnish roof flashing for all equipment, installed under Section 16, which penetrates through the roof. Flashing shall be approved by the Architect prior to installation.

3.11. CONDUIT INSTALLATION:

A. Conduits shall be as follows:
   1. Overhead Service Entrance - Rigid Galvanized Steel (RGS) Conduit or IMC.
   2. Underground Service Laterals: Schedule 40 rigid PVC in horizontal runs with rigid galvanized steel elbows turning up to vertical RGS.
   3. Where subject to moisture or mechanical injury - RGS conduit.
   4. ALL conduits exposed to moisture or subject to mechanical damage shall be RGS. Where conduit exits building, the changeover from EMT to rigid shall be inside exterior wall.
   5. In open shop and industrial installations RGS shall be run to 10' A.F.F.
   6. All conduit exposed on the outside of the building envelope shall be Rigid Galvanized Steel (RGS) conduit. This includes all conduits on and/or under canopies or awnings.
   7. In concrete or solid masonry – RGS conduit
   8. Above furred spaces or in cells of hollow masonry - EMT
   9. Concealed inside drywall construction walls and above lay-in ceilings – EMT.
   10. Exposed conduits:
      a. Conduits installed exposed in shop, warehouse, and manufacturing areas shall be RGS up to 12' A.F.F. Conduits in such spaces above 12' A.F.F. may be EMT unless indicated otherwise on the drawings.
      b. Exposed indoors in non-hazardous unfinished areas not subject to physical damage - EMT
      c. Exposed in kitchen and dishwashing areas: Rigid aluminum.
   11. Branch circuits in slab (3/4" and larger) - PVC. Turn up through slab with RGS ells - no exceptions. Extend rigid turn-ups 2" minimum above finish floor level.
   12. Circuits beneath building vapor barrier - PVC. Turn up through slab with RGS ells - no exceptions. All elbows 45^{o} and greater shall be RGS. Extend RGS turn-ups 2" minimum above finish floor level.
   13. Below Grade – PVC with RGS, or rigid aluminum where applicable, elbows turning up to vertical. All below grade elbows 45^{o} and greater shall be RGS.
   14. Motor, HVAC equipment, and vibrating equipment connections - flexible metal conduit, liquid tight flexible metal conduit outdoors, in kitchen and dishwashing area, or in other wet areas. Liquidtight flexible nonmetallic conduit shall be used only where specifically indicated.
   15. IMC may be used where RGS is indicated.

B. Conduit sizes:
   1. Unless specifically indicated otherwise herein or on the drawings, the minimum conduit size shall be 3/4".
      a. All conduits installed below grade or below slab shall be ¾" minimum.
      b. The minimum size for flexible lighting fixture "whips" shall be 3/8" and the maximum length shall be 6 feet. Lighting fixture "whips" shall be defined as flexible conduits with conductors feeding one or more recessed lighting fixtures installed in suspended, lay-in, acoustical ceiling systems from a single junction box.
      c. ½" conduit may be for final connections to equipment or fixtures where conduit is less than three (3) feet in length and is extended from a junction box or from a ¾" conduit stub up.
   2. Conduits shall be sized in accordance with the National Electrical Code as adopted by the local authority having jurisdiction or as amended to date, except where a larger size is indicated on the drawings or specified herein.

C. Layout:
   1. Generally, follow the conduit layout shown on the drawings. However, the layout is diagrammatic only and must be adjusted for structural conditions, built-in equipment and other factors. Offsets are not indicated and must be furnished as required.
   2. Install all conduits concealed except in equipment rooms and where exposed runs are specifically indicated.
   3. Install conduit runs to avoid proximity to steam or hot water pipes. In no place shall a conduit be run within 6" of such pipes except where crossings are unavoidable, then conduit shall be kept at least 1" from the covering of the pipe crossed.
   4. Eliminate trapped runs insofar as possible.
   5. Do not chase new work, but instead build in conduit as work progresses.
   6. Do not run conduit in cavity of exterior walls.
   7. Run concealed conduits in direct line with long sweep bends and offsets where practicable.
   8. Install exposed conduit with runs parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings, with right-angle turns consisting of cast-metal fittings or symmetrical bends.
   9. Where conduits are indicated exposed overhead, runs down to wall outlets shall be concealed in wall.

D. Conduit Installation:
   1. Securely fasten conduits to all sheet metal outlets, cabinets, junction and pull boxes with locknuts and bushings, taking care to see that stout mechanical and solid electrical connections are obtained.
   2. All conduits shall have bushings with smooth beveled throats installed at both ends prior to installing conductors. Split bushings around conductors shall be taken to indicate that the conductors were pulled into conduit without the proper bushings installed and a basis for requiring the replacing of the conductors.
   3. Conduits entering service enclosures (panelboards, disconnect switches, switchboards, motor control centers, etc. used as service entrance equipment) shall be provided with specification grade, insulating, grounding type bushings. Grounding bushing shall be bonded together and bonded to the service grounding buss.
   4. Support:
      a. Raceways shall be securely and rigidly supported to the building structure in a neat and workmanlike manner, and wherever possible, parallel runs or horizontal conduit shall be grouped together on adjustable trapeze hangers.
      b. Support shall be provided at appropriate intervals not exceeding eight (8) feet with straps, hangers, and brackets specifically designed for the application.
      c. Channels shall be 1 inch for 18-inch wide trapeze, 1-3/8 inch for 24 to 30 inch, and 1-5/8 inch for over 30-inch wide trapeze.
      d. Perforated steel straphangers, “butterfly clips”, or tie-wire supports are not acceptable.
      e. Conduits shall not be supported from ceiling support wires.
      f. Conduit shall not be supported from mechanical system ducts or piping.
      g. Conduits installed along wall surfaces shall be supported with galvanized steel brackets specifically designed for conduits and sized for the conduit used.
      h. PVC conduits shall be supported per the NEC with PVC or stainless clamps and stainless-steel hardware.
      h. Attach to supporting devices with screws, bolts, expansion sleeves or other workmanlike means appropriate to the surface.
      i. In stud walls, anchors shall be completely rattle proof.
      j. For conduits in damp and wet locations, use stainless steel clamps and stand-offs, or galvanized malleable or cast-iron clamps and spacers.
      k. All mounting hardware for aluminum conduit shall be stainless steel.
      l. Surface mounted conduits installed in kitchen and dishwashing areas shall be supported off walls approximately 3/16”.

5. Thread rigid conduits so that the ends meet in couplings; cut ends square, ream smooth and draw up tight.
6. All field cut threads shall be cleaned with a solvent such as mineral spirits and painted with two coats of galvanize primer.
7. Cap conduit ends to keep out water and trash during construction.
8. Field made bends:
   a. Avoid field-made bends where possible, but where necessary, use a proper hickey or conduit-bending machine.
   b. Field made bends in PVC conduit shall be made with a heated PVC conduit bender.
   c. Make no bends with radius less than six times the conduit diameter, nor more than 90 degrees.
9. Make changes in direction with pull boxes, symmetrical bends and/or cast-metal fittings.
10. Total bends in any conduit run shall not exceed the equivalent of four, quarter (90°) bends for a total of 360°, per NEC, between pull boxes.
11. Replace any crushed or deformed conduits.
12. Conduits passing through roofs shall be in place before roof is installed.
13. Conduits installed in concrete/grout filled CMU walls shall be Rigid steel or IMC conduits installed field wrapped with 0.010 inch-thick pipe-wrapping plastic tape applied with a 50 percent overlay. Painted on coating shall not be acceptable.
14. Where conduits pass through or across building expansion joints, provide hot-dipped galvanized expansion fittings with bonding jumpers.
15. Ensure that all penetrations of firewalls are sealed per NEC and IBCC.
16. Right and left couplings shall not be used; conduit couplings of the Erikson type shall be used at location requiring such joints.
17. Paint all conduits exposed in finished spaces. Paint shall consist of one coat of zinc rich primer plus two top-coats of water-based latex paint, color to match adjacent finishes. Verify colors and paint system with Architect.
18. All conduit runs entering the building from outdoors shall be sealed against moisture migration and condensation by filling with insulating type foam.
19. All conduits passing through walls of coolers or freezers shall have seal fitting installed on the outside of the cooler/freezer wall and within 3” of the wall. Fitting shall be sealed per manufacturer’s recommendations.
20. All conduits exposed to water shall have flexible conduits with a drip curve in conduit to keep from allowing water run into enclosure and provide a Myers hub connector to the enclosure.
21. Install telephone, data, intercom, and signal system raceways, 2-inch trade size and smaller, in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements, in addition to requirements above.

E. Below grade and below slab conduit installation:
   1. See Section 16100, “Excavation, Cutting, and Backfilling” for trenching and backfilling requirements.
   2. Rigid steel or IMC conduits installed below slab-on-grade or in the earth shall be field wrapped with 0.010 inch thick pipe-wrapping plastic tape applied with a 50 percent overlay, or shall have a factory-applied polyvinyl chloride, plastic resin, or epoxy coating system. Painted on coatings shall not be acceptable. Wrap shall extend a minimum of 1” above slabs or 3” above finished grade where there is no slab. Alternate methods must be approved by Engineer prior to bids.
   3. Top of the conduit shall be not less than 30 inches below grade.
   4. Run conduit in straight lines except where a change of direction is necessary.
   5. Conduits stubbed up from below grade or slab into exterior walls shall be turned toward the interior of the building below slab fill perpendicular to the wall. Conduits shall not be turned out toward the exterior unless specifically indicated to do so.
   6. Placing of conduits below slab on grade:

a. Conduits 1-1/4” and larger shall be installed a minimum of 12” below the bottom of slab in the clay/sand fill below any gravel fill material.
b. Conduits 1” and smaller may be installed in the porous/gravel fill below the vapor barrier.

7. Multiple Conduits:
   a. Separate multiple conduits by a minimum distance of 2-1/2 inches horizontally and 3 inches vertically, except that light and power conduits shall be separated from control, signal, and telephone conduits by a minimum distance of 3 inches horizontally and vertically.
   b. Where multiple layers of conduits are to be placed in a trench, each layer shall be placed in the trench, straight and parallel, clear fill material (see Excavation, Cutting, and Backfilling) placed and tamped in place to provide the specified spacing, and each subsequent layer placed in the same manner.
   c. Stagger the joints of the conduits by rows and layers to strengthen the conduit assembly.
   d. Conduits shall not be placed haphazardly in the trench.
8. Where conduits pass through footings or foundation walls:
   a. Conduits roughed in beneath slab shall exit the foundation perpendicular to the building spaced approximately 3" apart. Conduits shall be arranged in a single horizontal row where practical.
   b. Secure approval from the Architect and Structural Engineer prior to penetrating any footing or foundation wall.
   c. Schedule 40 PVC sleeves shall be cast in the footings or foundation wall for the conduits to pass through.
   d. Multiple sleeves shall have 3” clearance, vertically and horizontally, between the sleeves unless directed otherwise by the Architect and/or Structural Engineer.
9. Where PVC conduit is installed below grade a PVC to rigid metallic conduit coupling shall be installed in the horizontal run and a rigid galvanized steel conduit elbow installed to turn up to above grade. Where above grade conduits are indicated to be rigid aluminum the elbow turning up to vertical shall be rigid aluminum.
10. Rigid aluminum conduit shall be wrapped same as RGS through concrete from 2” each side of the concrete.
11. Rigid galvanized conduit shall extend a minimum of 6” above the finished floor level.
12. In hazardous areas the coupling shall be below grade and a single section of conduit installed up to 18” A.F.F. to accept the required seal fitting.
13. Wiring shall be extended in rigid threaded conduit to equipment, except that where required, flexible conduit may be used from 6 inches above the floor to the served equipment.
14. Conduits shall exit concrete slabs vertically.
    a. Where adequate support cannot be obtained by wiring to reinforcing steel, obtain support with solid iron stakes (which may be driven through membrane) cut off flush with slab after pouring.
    b. At turn-ups of adjacent runs of exposed conduit, obtain alignment by wiring members to a temporary horizontal member.
15. Empty or spare conduit stub-ups shall be capped with a threaded cap.
16. Encasement Under Roads, Structures, and at other locations indicated on the drawings:
    a. Under roads, paved areas, railroad tracks, and other locations indicated on the plans install conduits in concrete encasement of rectangular cross-section providing a minimum of 3-inch concrete cover around ducts.
    c. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assemblies shall consist of base spacers, intermediate spacers, and top spacers to provide a completely enclosed and locked-in conduit assembly.

d. Install #4 rebar at each corner of the encasement and at not more than 18” on center vertically and horizontally on the sides of the encasement. #4 rebar hoops shall be installed at not more than 18” on center along the length of the encasement.
e. Concrete encasement shall extend at least 5 feet beyond the edges of paved areas and roads, and 12 feet beyond the rails on each side of railroad tracks.

17. Conduits to be installed under existing paved areas, which are not to be disturbed, and under roads and railroad tracks, shall be installed through a zinc coated, rigid steel, sleeve, jacked into place.
18. Conduits installed between handholes, manholes or other accessible areas shall have a minimum slope of 3 inches in each 100 feet away from buildings and toward manholes and other necessary drainage points.
19. The contractor shall provide properly rated and sized junction and pull boxes as required on all underground conduit runs 150 feet and greater so as to minimize pulling tensions on cables to be installed in conduits. In no case shall pull or junction boxes be further than 300 feet apart. Provide pulling tension calculations on all underground runs over 200 feet as required in Paragraph 1.09 Submittals.

F. Conduit Installation in concrete slabs:
1. Conduit installed in concrete slabs shall be rigid steel or IMC. Rigid steel or IMC conduits installed in slabs-on-grade shall be field wrapped with 0.010 inch-thick pipe-wrapping plastic tape applied with a 50 percent overlay, or shall have a factory-applied polyvinyl chloride, plastic resin, or epoxy coating system. Painted on coatings shall not be acceptable.
2. At slabs on grade, conduit, 3/4" maximum, may be run in the slab; larger conduit shall be run below slab.
3. Where adequate support cannot be obtained by wiring to reinforcing steel, obtain support with solid iron stakes (which may be driven through membrane) cut off flush with slab after pouring.
4. At turn-ups of adjacent runs of exposed conduit, obtain alignment by wiring members to a temporary horizontal member.

G. Flexible conduit:
1. At motor or equipment connections:
a. The maximum length allowable for flexible conduit shall be 36 inches except at lighting fixtures.
b. Flexible conduit installed outdoors shall be installed so as to provide an 8 inch minimum drip loop as measured from the lowest end of the conduit.
2. At lighting fixture connections provide flexible steel conduit by one of the manufacturers named for rigid.
a. Maximum length allowable shall be 72 inches.
b. Support flexible conduit such that it does not contact the ceiling system, ductwork, or other equipment above the ceiling. The conduit shall not be attached to a ceiling or ceiling support system.
c. All fixture whips shall be supported within 12” of outlet/junction boxes with single hole clamps.

H. Empty conduit:
1. Install a #14 galvanized fish wire or polypropylene pull cord with 14-inch free ends in all empty power and/or auxiliary conduits.
2. All conduits indicated to be terminated above the ceiling shall have an elbow turned out above the ceiling and shall be terminated with an insulating bushing.
3. Empty conduits stubbed out of buildings below grade:
a. Empty conduits stubbed out of buildings below grade shall extend 5 feet outside of the building foundation.
b. Install a 12”x 12”x 6” concrete marker at grade, above the end of the conduits, with “ELEC” inscribed on top.

f. Note on as-built drawings the exact location where empty conduit(s) are stubbed out below grade to the building exterior. Indicate conduit sizes and number of each size.
g. The contractor shall provide properly rated and sized junction and pull boxes as required on all underground conduit runs 150 feet and greater. In no case shall pull or junction boxes be further than 200 feet apart.

I. Conduit entries into enclosures, panelboards, and wiring troughs:
1. Layout conduit entries carefully to allow clearances for the number and sizes of conduits, electrical equipment, and future expansion.
2. In sheet metal equipment use Greenlee Knock-Out punch, or equal, to cut holes for conduit installation. Do not drill holes or cut holes out with snips or torch.
3. In cast enclosures and boxes drill conduit openings with correct size drill for tight fit.

J. **All junction box covers above the ceiling shall be labeled to which circuits or systems they contain**.

3.12. CONDUIT BODIES:

A. Conduit bodies shall be sized in accordance with NEC 370, and 373.
1. Conduit bodies for conductor sizes AWG #4 and larger shall be mogul type bodies sized in accordance with NEC 370-28.
2. Conduit bodies for conductor sizes AWG #6 and smaller shall be sized in accordance with NEC 370-16(c).

3.13. JUNCTION AND PULL BOXES:

A. Junction and pull boxes shall be sized per NEC to accommodate the installed number and size of conductors and conduits.

B. Boxes shall be securely fastened in place.

C. Boxes serving lighting fixtures installed in accessible, suspended ceilings:
1. Provide number of boxes as required to maintain fixture whips within the 6’ maximum length.
2. Generally, attach to underside of structure above, in accessible location, to accommodate a maximum 6' flexible conduit connection to each fixture or fixture run.
3. Where the structure above is more than 18” above the ceiling the boxes shall be supported within 18 inches of the ceiling with all thread rod and/or strut.

D. Install galvanized steel utility box plates, by box manufacturer, at exposed conduit fittings or boxes.

E. **All junction box covers above the ceiling shall be labeled to which circuits or systems they contain**.

3.14. WIRE AND CABLE INSTALLATION:

A. No conductor shall be smaller than #12 except where so designated on the drawings or specified elsewhere.

B. Multiwire lighting branch circuits shall be used where indicated.

C. Wiring devices shall be connected such that each device can be removed without interrupting the neutral or equipment grounding conductors serving other outlets on the same circuit(s).

D. Joints and splices in wire shall be made with solderless connectors and covered so that insulation is equal to conductor insulation. Wire nuts shall not be used for conductor #8 and larger.

E. No splices shall be pulled into conduit.

F. Both conductors and conduit shall be continuous from outlet to outlet.

G. No conductor shall be pulled into the conduit until the conduit is cleaned of all foreign matter.

H. When installing parallel conductors, it is mandatory that all conductors making up the feeder be exactly the same length, the same size, and type of conductor with the same insulation. Each

group of conductors making up a phase or neutral must be bonded together at both ends in an approved manner.

I. MC cable or Romex cable will note be accepted unless specifically called for on drawings.

J. Wiring thru light fixtures and receptacles will not be accepted.

3.15. AUXILIARY GUTTERS (WIRING TROUGHS):

A. Auxiliary Gutters shall be sized per NEC to accommodate the installed number, size, and orientation of conductors and conduits.

B. Conductors serving a gutter shall be extended without reduction in size, for the entire length of the gutter.

C. All taps and splices shall be made with insulated multi-tap connectors.

3.16. CIRCUITS AND BRANCH CIRCUITS:

A. Outlets shall be connected to branch circuits as indicated on the drawings by circuit number adjacent to outlet symbols, and no more outlets than are indicated shall be connected to a circuit.

3.17. WIRE JOINTS:

A. Except for motor circuits, wire joints for #8 and smaller wire shall be made with twist on connectors.

B. Wire joints and splices for motor circuits, for conductors #6 and larger, and for smaller conductors where other connectors are not rated for the number of conductors involved shall be made with split bolt connectors rated for the applicable conductor size, number of conductors, and conductor material.
   1. Properly tape and insulate all joints to attain the same insulation rating as the cable insulation.
   2. Splices for #6 through #1 shall have a minimum or two (2) layers of rubber tape covered by a minimum of three (3) layers of electrical tape.
   3. Splices for #1/0 and larger conductors shall have a minimum of two (2) layers of electrical filler tape covered by a minimum of three (3) layers of electrical tape.

C. Splices in control conductors shall be avoided as much as possible. Stranded control conductor up to #12 may be connected or spliced with hand crimped type compression connectors. The connectors shall be of the proper size for the conductors being connected.

D. Splices and joints made with mechanical/hydraulic type compression connectors:
   1. Connections and splices shall be made with connectors rated for the applicable conductor size and conductor material.
   2. Dies used shall leave the die number embossed in the connector. The Contractor shall provide the Engineer with the Manufacturer’s connector and die chart prior to final inspection.

E. Taps and splices in auxiliary gutters/troughs shall be made with insulated multi-tap connectors.

F. Wire joints and splices made below grade shall be made with UL listed waterproof connectors, wire nuts, or splice kits.

G. All joints and splices shall be made in junction boxes, wiring troughs, or conduit bodies sized per NEC.

H. All connections to switchboards, panelboards, transformers, generators, ATS, or any other type electrical distribution type equipment shall be compression type fittings. Mechanical fittings will not be accepted in these applications.

3.18. STRUT SYSTEM FOR SUPPORT OF ELECTRICAL EQUIPMENT:

A. Strut Systems: Strut shall be utilized to rack exposed piping vertically or horizontally on walls and across slabs (where applicable). Strut may be utilized to support piping above ceilings, for support of equipment, and elsewhere as deemed appropriate.

1. Strut in conditioned spaces and above accessible ceilings shall be electro-galvanized.
2. Strut installed outdoors, in mechanical rooms, and in other unconditioned spaces shall be hot-dipped galvanized.
3. Strut installed in waste-water treatment facilities, kitchens, dishwashing spaces, and labs shall be stainless steel.
4. Strut fittings and hardware, including anchors, shall be same material as strut.
5. Saw cut strut square, 6” minimum lengths. Strut on continuous runs of pipe shall be same length. File or grind burrs from saw cuts.
6. After installation, electro-galvanized and hot-dipped galvanized strut shall be painted with two coats of zinc primer.

3.19. OUTLET BOX INSTALLATION:

A. General: The drawings indicate approximate locations only; determine the exact location at the building in view of all structural and architectural conditions. Obtain Architect's verification of final locations.

B. Outlet boxes shall be sized per NEC to accommodate the installed number and size of conductors, wiring devices, and conduits.

C. Ceiling and Wall Bracket Outlets: 4" octagonal boxes with plaster rings appropriate for finish surface.

D. Typical boxes (for switches, receptacles and auxiliary systems): 4" square boxes ganged as required. Furnish with 3/4" plaster rings where employed in plaster, 1" tile covers where used in ceramic tile, 1" plaster rings where set in exposed concrete, and otherwise appropriate for surface and construction.

E. Boxes in Exposed (or Thin-Coat Plastered) Masonry: Where conduit connections permit, employ solid flush-type, square-cornered, masonry boxes with turned-in device holders; otherwise employ typical box with 1-1/2" square-cut tile cover. .

F. Multiple Outlet Floor Boxes:
1. Verify the exact location of the floor boxes with the Architect prior to rough-in.
2. Set the boxes in accordance with the manufacturer’s instructions.
3. Boxes shall be set so that the box is flush with the finished floor; the boxes shall not cause a rise or fall in the floor.
4. The power outlets shall be connected to the circuits indicated by the numbers next to the symbol.
5. For Data outlets, install a 1” C. to above the nearest corridor ceiling.

G. Boxes used with Exposed Conduit: 4" square utility boxes.

H. Exterior Boxes: Cast-metal boxes, Crouse-Hinds Type FS or FD as appropriate. Make weatherproof with gasketed covers. Equal products by Appleton, Killark, O-Z/Gedney, or approved equal will be accepted.

I. Boxes used with Recessed Lighting Fixtures in suspended acoustical tile ceilings:
1. Provide a 4" square box with blank cover adjacent to each fixture or fixture group.
2. Install a flexible metal conduit fixture-”whip” from the box to the fixtures. The “whip” shall not be longer than 72”.
3. Attach the box to the underside of the structure above, in an accessible location, not more than 18” above the lay-in ceiling.
4. Where structure is more than 18” above the ceiling, the boxes shall be supported from all-thread rods, strut, or a combination of rod and strut.

J. Boxes in Dry Wall Construction:
1. Outlet boxes shall be securely fastened in place.
2. Outlet boxes installed in metal stud construction shall be supported by brackets screwed to studs. Clip on brackets shall not be accepted.

a. Where a single outlet box is installed adjacent to a stud, brackets may attach to a single stud with a brace against the back of the opposite wall. Use a bracket equal to Caddy Fasteners “H” Series.
b. Where outlets do not fall next to a stud or where more than one outlet is installed between studs use a metal bracket attached to both studs. Brackets shall be equal to Caddy Fasteners “SGB", “TSGB”, or “RBS” series brackets.
c. Outlet boxes three gangs and wider shall be supported with support member screwed to the two adjacent studs. Brackets equal to Caddy Fasteners SGB or TSGB brackets may be used.

K. Sectional type switch boxes at least 2-1/2" deep may be used instead of typical box (but not where dry wall finish is applied over masonry back-up and not where multi- gang devices occur).

L. Outlets in unfinished masonry walls may be slightly adjusted upward or downward to suit masonry courses, provided outlets are mounted at uniform heights throughout the installation.

M. Coordinate installation of outlet boxes in masonry walls with the masonry contractor to insure that boxes are flush with face of wall and grouted smooth around boxes such that covers, fixtures or devices install flush on face of wall.

N. Where outlets at different levels are shown adjacent, install in one vertical line where possible. Avoid conflict with wainscot caps, splash backs and upper cabinets by adjusting height slightly up or down as directed.

O. Back to back boxes shall be staggered with at least 3 inches between boxes.

P. Back to back boxes in fire rated partitions shall have a minimum of 24” horizontal and/or vertical separation between them.

Q. Backs of boxes three gang and larger installed in fire rated partitions shall be wrapped with self adhesive fire stopping tape.

R. Locate switch outlets on the lock side of doors and so that the first switch in a single or gang installation is approximately 6" to 10" from the doorjamb. Verify door swings on Architectural Drawings.

S. Dimmers shall be ganged together in accordance with the manufacturer’s instructions where appropriate but shall not be ganged with toggle switches.

T. Coordinate carefully with appropriate trades the size and orientation (vertical, horizontal) of outlet boxes for thermostats, data outlets, fire alarm equipment, security equipment, and other control and communications outlets.

U. Mounting Heights:

Confirm all mounting height with local codes and authorities prior to bid and adjust as required:

Switches, generally	48" A.F.F. to top of outlet
Safety switches	Center of Switch 48" A.F.F. or as required.
Receptacles, generally	16" A.F.F. to bottom of outlet
Receptacles over counters	Bottom of outlet 6” above countertops or 2” above backsplashes
Computer Outlets	16" A.F.F. to bottom of outlet
Wall mounted exit and emergency lights	Bottom of fixture 7’- 6” A.F.F. or 12” below Ceiling whichever is lower
Thermostat	Top of outlet 48" A.F.F. or as noted by mechanical drawings.
Electric Water Coolers	Coordinate location with plumbing contractor to locate the receptacle(s) concealed within the EWC enclosure per manufacturer’s installation instructions.

V. Install blank coverplates on all unused power and auxiliary outlet boxes. Blank coverplates shall match other cover plates installed in the facility.

W. Furnish blank plates, matching those on the other outlets in the same area, on TV outlets and other outlets installed for future use.

3.20. WIRING DEVICES:

A. Install wall devices vertically' unless otherwise noted, so that all devices of any given height will align exactly.

B. Where boxes are not flush or square with the finished wall surface install wiring devices utilizing a leveler and retainer equal to Caddy #RLC or Steel City #SSF-SR.

C. Plates shall be plumb and true with all four edges contacting wall surface.

D. Mount receptacles with grounding terminals down.

E. Do not install devices until plastering or other type wall covering has been completed; install ahead of painting work but protect from paint spatter.

F. Use screw terminal connections only.

G. Do not gang dimmer switches with toggle switches.

H. Each single or multi outlet receptacle, other than straight blade, 15 or 20 amp, 120 volts, NEMA 5-15R or NEMA 5-20R, shall be provided with matching cord plugs and a minimum of 8 feet of Type SOW cable matching the receptacle size and configuration.

I. Pin and sleeve plugs for food service equipment shall be provided with a Type SOW cable connected to the equipment and plug of sufficient length to reach from the equipment to the plug with a minimum of 18" slack cork. Minimum length shall be 6 feet from equipment to plug.

J. Provide "Kellums" type grips at the plug, cord connector, and for overhead support on all overhead cord connector drops.

3.21. OCCUPANCY SENSORS AND ASSOCIATED DEVICES FOR LIGHTING CONTROL:

A. Occupancy sensors and associated devices and circuiting shall be installed in strict accordance with the manufacturer's instructions.

B. Wall, corner mounted sensors shall be mounted as close to the ceiling as possible on the manufacturer'' corner mounting bracket.

C. Power packs shall be mounted above the ceiling. Power packs shall be installed utilizing two(2) 4" x 4" x 2-1/8" deep boxes joined together using the nipple on the powerpack in accordance with the manufacturer's instructions. One of the boxes shall contain the power pack and control wiring and the other shall contain the power wiring.

D. All control and power circuiting shall be in EMT conduit. Where the devices are not equipped with conduit connections the conduit shall be brought up as close as possible to the device and terminated with insulating bushings.

3.22. ELECTRICALLY POWERED EQUIPMENT AND CONTROLS:

A. Provide and install power circuits for all electrically powered equipment and controls.

B. Heating, Ventilating, and Air Conditioning Control Wiring and Conduit:

1. The electrical contractor shall be responsible for installing outlet boxes for flush mounted HVAC system thermostats in dry wall or masonry wall construction and, where called for on the plans, for surface mounted metallic raceway in finished areas. Extend ¾" conduit from the outlet to above nearest accessible ceiling and terminate horizontally. Refer to the Mechanical/HVAC plans for thermostat locations and coordinate exact type outlet required and orientation with the Mechanical/HVAC contractor.
2. The Mechanical Contractor shall be responsible for the installation of all outlets and conduit for surface mounted devices in unfinished areas such as shops, warehouses, industrial facilities, etc.
3. The mechanical contractor shall furnish and install all low and line voltage control wiring required for the temperature control and/or ventilation systems.

C. Where Fire Alarm system duct mounted smoke detectors and HVAC shut down interface relays are provided, the Electrical contractor shall provide wiring from the smoke detectors to the HVAC shut down interface relay. All circuiting from the shut down relay to the HVAC controls and/or starters shall be provided and installed by the Mechanical/Controls contractor.

D. The mechanical contractor shall furnish all motor starters for the temperature control and/or ventilation equipment unless otherwise indicated on the electrical plans or elsewhere in these electrical specifications. The electrical contractor shall install all motor starters, except for equipment with factory installed starters, for the temperature control and/or ventilation equipment.

E. Where exhaust fans are supplied with field installed speed controllers, the Electrical Contractor shall provide all necessary circuiting to the fan/speed controller and between the fan and the speed controller.

3.23. DISCONNECTING MEANS:

A. Where required by the National Electrical Code and/or other applicable codes or authorities, or where indicated on the electrical plans, the electrical contractor shall furnish and install an approved disconnecting means for all electrically powered equipment and/or controllers for such equipment whether the disconnecting means is or is not shown on the electrical plans.
   1. The location, rating, and enclosure for the disconnecting means shall be as required by the National Electrical Code and/or other applicable codes or authorities.
   2. Manual motor starters with thermal overload protection may be used in lieu of safety switches for individual motors under 1 horsepower.
   3. Motor rated switches may be used for the disconnecting means when supplied of correct voltage, phase, amperage rating, and enclosure type.
   4. The disconnecting means shall be as manufactured by General Electric, Cutler Hammer, or Siemens. Square D will not be accepted.

B. Where the disconnecting means shown on the electrical plans has a rating greater than the required code rating, the greater rating device shall be installed.

C. An approved horsepower rated fusible safety switch shall be installed where the circuit overcurrent protection does not provide overload protection for the equipment served and where required to meet the equipment's listing requirements.

D. Motor rated switches may be used as service disconnect switches when supplied with a pad-lockable, handle locking guard.

E. Install an engraved phenolic nameplate on the front of each switch enclosure identifying the equipment served by the safety switch and source of power (i.e., panel name and circuit number). Plates shall be white with black lettering. The plates shall be permanently installed with stainless steel screws or stainless-steel rivets.

F. All disconnects installed in public areas or in areas readily accessible to the public shall be lockable and shall be furnished with a brass lock. Provide 10 keys for each lock. All disconnect locks furnished on the project shall be keyed alike.

3.24. LIGHTING FIXTURES:

A. The installation and support of all lighting fixtures shall be the responsibility of the Electrical Contractor.

B. Lay out work as shown, and to provide attractive and efficient arrangement.

C. Install fixtures level, plumb, and true with ceiling and walls, and in alignment with adjacent lighting fixtures.

D. Provide adequate and substantial supports for fixtures in accordance with manufacturers' directions and as specified herein.

E. A Re-lock system will not be accepted for installing lights.

F. Wire grid mounted luminaries individually to junction boxes with flexible conduit not more than 6 feet in length. Individual flexible connections shall be 2 #14 and 1 #14 ground THHN in 3/8" flexible conduit. Ground wire shall be bonded at each end.

G. Light fixtures with center baskets shall have all fixtures in a room installed with the center baskets oriented in the same direction.

H. Fixtures mounted in inverted “T” grids:
   1. For round fixtures or fixtures smaller in size than the ceiling grid, provide a minimum of two wires per fixture located within 4 inches of each corner of the ceiling grid in which the fixture is located. Do not support fixtures by ceiling acoustical panels. Fixtures shall be supported independent of the ceiling system or shall be supported by at least two metal channels spanning the grid system, and secured to, the ceiling tees. One support wire shall be attached to the center of the fixture or to each of the metal channels.
   2. Surface mounted fixtures:
      a. Surface mounted fixtures installed on lay-in ceiling systems shall be supported independent of the ceiling system form the building structure with a minimum of two (2) 3/8”, minimum, all-thread rods.
      b. Install nuts and washers on inside and outside of the fixture housing to provide a rigid installation.
      c. Provide cross bracing as required such that fixtures have no lateral movement.

I. All stems on lighting fixtures shall be installed as follows: (except fixtures with slide grip hangers) first and last stem in row in first knockout from end of fixture. One stem shall be installed between each two fixtures, stem shall center joint, where fixtures join, and attach by use of "jointing plates". Nipples with lock nuts and bushings shall connect all fixtures in continuous rows other than recessed grid type.

J. All suspended lighting fixtures shall be provided with chain or cable sway bracing to keep fixtures from swinging.

K. Fixtures installed in fire rated assemblies shall be tented in accordance with the specified assembly.

L. Means shall be provided to keep insulation 4” minimum away from fixtures not rated for direct contact with insulation.

M. Prior to final inspection clean fixtures and lamps with a soft cloth or sponge and detergent (not soap) solution.

N. All lighting fixtures installed in gymnasiums, hangars, high bay or similar use areas shall be equipped with wire guards.

O. All emergency and exit lights designated on drawings shall be provided with an 1100-lumen battery ballast.

P. All light fixtures shall be supported to the structure independent of the ceiling system on two opposite sides. Support wires shall be different color from ceiling support wires. Engage all ceiling mounting clips. If light fixture is not provided with grid support clips, then the contractor will be responsible to support the fixture on all four sides with support wires. See “Typical Lay-In Luminaire Detail” on drawings for further requirements.

3.25. PANELBOARDS AND SWITCHBOARDS:

A. Panelboards and switchboards shall be installed where shown on the drawings.

B. Ratings and configurations shall be as scheduled and/or indicated on the drawings.

C. The Electrical Contractor shall coordinate installation of equipment in Electrical and Electrical/Mechanical spaces with other trades such that Code required clearances and working space around the electrical equipment is maintained.

D. Conduit termination:
   1. In general use panelboards with blank ends, without knockouts.

2. Layout conduit entries carefully to allow clearances for drywall or CMU wall thickness, and to accommodate the number and sizes of home run conduits and specified spare conduits.
3. Use Greenlee Knock-Out punch, or equal, to cut holes in panelboard ends and/or sides for conduit installation. Do not drill holes or cut holes out with snips or torch.

E. Phase arrangement in panelboards shall be per the NEC, phase A, B, C from front to back, top to bottom, or left to right as viewed from the front.

F. In Delta connected systems the “high” leg shall be the B phase and shall be clearly marked with an orange outer finish.

G. Multi-Section Panelboards:
1. Sub-feed conductors shall be the same size as the conductors feeding the main section.
2. Circuiting originating in one section shall not pass through another section.
3. Circuit conductors and grounding conductors shall originate in the same panelboard section.
4. A separate isolated grounding conductor shall be installed from the main section to the sub-feed section(s).
5. Where the panelboard is rated for service entrance equipment the sub-feed section shall have a separate isolated ground buss fed from the main section ground buss.

H. Labeling:
1. Each panelboard shall have an engraved phenolic plate permanently installed on the front of the panel with the panel name, current rating, and voltage rating.
2. Where there is more than one nominal voltage system the panel shall also have an engraved phenolic plate describing the means of identification used to identify the phase and system of each ungrounded conductor of the system served by the panel.
3. Plates shall be white with black lettering.
4. Panelboard circuit numbers shall be as indicated on the panelboard schedules.

3.26. PHOTOELECTRIC CELLS, TIMERS, AND CONTACTORS FOR LIGHTING CONTROL:

A. Install time clocks where accessible.

B. Install photoelectric cells so that lighting fixtures do not affect the cell.

C. Adjust time clock(s) and photoelectric cells as required for proper operation.

3.27. IDENTIFICATION AND LABELING:

A. Feeder Designation:
1. Non-ferrous identifying tags or pressure sensitive labels shall be securely fastened to all cables, feeders, and power circuits in vaults, pull boxes, manholes, switch gear and at termination of cables. Tags or labels shall be stamped or printed to correspond with markings on drawings so that feeder or cable number and phase can be readily identified.
2. Where there is more than one nominal voltage system, each ungrounded system conductor shall be identified by phase and system wherever accessible per NEC. The means of identification shall be permanently posted at each branch-circuit panelboard.

B. Color Coding of Conductors:
1. The ungrounded (phase) conductors and the grounded (neutral) conductors of each voltage system shall be identified by the following color coding method:
   a. 120/240 Volts, Single Phase, 3 Wire:
      1) Grounded (Neutral) Conductor --- White
      2) Ungrounded (Phase) Conductors --- Red, Black
   a. 120/240 Volts, Three Phase, 4 wire:
      1) Grounded (Neutral) Conductor --- White
      2) Ungrounded (Phase) Conductors --- Red, Orange, Black
   b. 120/208 Volts, 3 Phase, 4 Wire:
      1) Grounded (neutral) Conductor --- White
      2) Ungrounded (phase) Conductors --- Black, Blue, Red

c. 277/480 Volts, 3 Phase, 4 Wire:
    1) Grounded (neutral) Conductor --- Gray
    2) Ungrounded (phase) Conductors --- Brown, Orange, Yellow
2. Green shall be used for equipment grounding conductors only.
3. The insulation color shall be visible for the entire length of wire.

C. Panelboard:
1. Each Lighting and Power Panelboard shall contain a typed circuit directory listing all circuit breakers and the load served by each.
2. Panelboard directories shall be typewritten and shall include adequate descriptions for proper identification of individual circuits. Do not write in or on panelboards.
3. On Distribution panelboards, provide and install an engraved laminated label for each circuit, indicating circuit's number and load served.
4. Each panelboard shall have an engraved phenolic plate permanently installed on the front of the panel with the panel name, current rating, and voltage rating.
5. Where there is more than one nominal voltage system each panelboard shall have an engraved phenolic plate describing the means of identification used to identify each phase, neutral, and grounding conductors of the system served by the panelboard per NEC.
6. Plates shall be white with black lettering.

D. Wall Switches: Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on the wall plate.

E. Receptacles: Install a label on the face of the coverplate and tags or wire markers inside the outlet box identifying the panelboard and circuit number from which the outlet is served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of coverplate- black print on clear tape on light colored or stainless-steel plates and white print on clear tape on dark colored plates. Embossed tape labels will not be accepted. Use durable wire markers or tags within outlet boxes.

G. Disconnect Switches:
1. Install an engraved phenolic nameplate on the front of each switch enclosure identifying the equipment served by the safety switch and source of power (i.e., panel name and circuit number).
2. Plates shall be white with black lettering.
3. The plates shall be permanently installed with stainless steel screws or stainless-steel rivets. Plates installed with glue or other adhesives will not be accepted.
4. Where motor rated switches are used as service disconnect switches, labeling shall be as described for receptacles.

H. Junction boxes: Identify circuits enclosed in concealed junction boxes on the cover with permanent marking pen.
1. For power and lighting circuits indicate panelboard of origin and panelboard circuit number(s).
2. For auxiliary systems circuiting indicate the system and zone served.

I. Service disconnects:
1. An additional engraved sign shall be permanently attached next to panelboard circuit breakers, on enclosed circuit breaker enclosures, and/or on disconnect switches used as service disconnects to identify each main service disconnect.
2. The sign shall be red with white lettering a minimum of ½" high.
3. Where multiple main disconnects are utilized the labels shall identify each as one of a group, i.e., "Service Disconnect 1 of 3", etc. where there are three service disconnects.

3.28. FIRE ALARM SYSTEM:

A. The installation shall be by a Certified Fire Alarm Contractor who has qualified and received a permit from the State Fire Marshal, with an NICET Level III on staff.

B. All wiring shall be in accordance with the National Electric Code and the local code having jurisdiction.

C. Unless otherwise specified, minimum wire size shall be 14 gauge for AC and power supply connections, 14 gauge for audible alarm and auxiliary circuits, and 18 gauge for signal initiating circuits. Diagrams shall be provided for device and power wiring. Color coding and permanent numbering shall be used as recommended be the equipment supplier.

D. All system wiring shall be installed in metal raceway in accordance with Section "Raceways".

E. Junction boxes shall have covers painted red with the letters "FA" stenciled on the cover in 2" high white letters.

F. Auxiliary Remote Power Supplies/Notification Appliance Circuit Extender (NAC panel):
   1. Power supplies shall be sized at 133% of proposed load. Fire Alarm submittals shall include power supply capacity and loading data.
   2. Remote power supplies shall be supervised by the FACP.
   3. The power supplies shall be installed, accessible, below ceiling, in electrical rooms or where indicated on the drawings.

G. Provide circuiting as required for the interface with the kitchen hood fire suppression system and the fire alarm system.

H. Where air handler shut down is controlled from the fire alarm system, the fire alarm system installer shall provide circuiting as required between the Duct Mounted Smoke Detectors and the HVAC interface/shut down relays. Circuiting connecting the relay output contacts to the HVAC control system shall be provided and installed by the Mechanical/Controls contractor.

I. Each air handling unit shall be a separate fire alarm initiating zone.

J. Install wire guards on all smoke detectors and notification devices installed in gymnasiums or similar use areas.

K. Final connections to the Fire Alarm Control Panel **and Voice Panel** shall be made by a factory certified, NICET Level III, technician.

L. A factory-trained representative of the manufacturer shall supervise connections and final testing of this system and shall complete a Certificate of Completion per NFPA 72. The Certificate of Completion shall be completely filled out and copies delivered to the Owner, Architect, and Engineer prior to the final inspection.

M. On completion of the acceptance tests, the Owner or his representative shall be instructed in the operation and testing of the system.

N. **At the acceptance tests, contractor shall provide engineer with smoke detector diagnostic reports for all smoke detectors. All smoke detectors more than 10% dirty shall be either cleaned or replaced until test show value less than 10%.**

O. The fire alarm system shall be warranted free from defects in workmanship and materials, under normal use and service, for a period of one year from the date of acceptance or beneficial occupancy, whichever is earlier. Any equipment shown to be defective in workmanship or material shall be repaired, replaced, or adjusted free of charge.

P. Identification and labeling:
   1. Provide a framed building drawing identifying each zone and/or building area.
   2. Each building zone on the Fire Alarm Control panel shall relate to the building drawing in a manner that will direct the fire department to the area of a fire.
   3. On addressable systems each addressable device shall be given a name displayed on the control panel readout that will direct the fire department to the area of the fire, i.e. – South End of Zone(Building) 5; AHU-1 – Mechanical Room 201 – Building 2. Any room number reference shall be to final room numbers assigned to rooms on completion of construction.
   4. Building drawing, schedule of zones, and device identification schedule shall be submitted to the Engineer for approval prior to final inspection and acceptance.

5. On addressable systems the contactor shall label each device with an alpha-numeric identifier that is unique to that device. This identifier shall correspond to the identifier programmed in the fire alarm control panel such that maintenance personnel may quickly and readily identify the device.

3.29. SECONDARY SURGE ARRESTERS:

A. Secondary surge arresters shall be installed in strict accordance with the manufacturer's recommendations.

B. Arrester may be mounted to the side of a surface mounted panelboard or trough. If such a surface is not available, the arrester shall be mounted on a bracket in its own flush mount enclosure located immediately adjacent to the service panel. Ensure that all leads are attached per manufacturer's recommendations. Excess lead length shall be cut off prior to making connections.

3.30. CONCRETE:

A. The Electrical Contractor shall be responsible for placing concrete for electrical equipment pads, lighting standard bases, electrical equipment supports, and at other locations as indicated on the electrical drawings and/or specified herein.

B. This Contractor shall be responsible for size, location, and orientation of the pads, bases, etc. Any required additions or modifications to concrete due to incorrect size, location, or orientation shall be the responsibility of this contractor.

C. Concrete shall be cured for a period of not less than seven (7) days prior to setting poles, transformers, switchgear, motor control centers, or other pad mounted equipment.

D. Forms shall be completely removed after concrete has cured and prior to setting equipment.

E. A smooth wood float finish shall be given to exposed, unformed concrete.

F. Honeycombed, or otherwise defective areas of concrete shall be repaired by patching with cement mortar.

3.31. FOOD SERVICE AND KITCHEN EQUIPMENT:

A. Provide and install all power and control circuiting required for complete connection and operation of all food service and kitchen equipment.

B. Install all control and power equipment shipped loose with food service and kitchen equipment.

C. Provide and install all interconnecting circuiting between equipment and controls.

D. Contractor must coordinate all voltage, phase, and overcurrent protection characteristics with the electrical drawings prior to releasing any power equipment. Adjust circuit breaker, disconnect, and feeder sizes as required to properly feed and protect equipment. Any wrong size feeder or overcurrent protection discovered at the completion of construction because the coordination was not completed up front will be the sole responsibility of the electrical contractor to fix and meet the National Electrical Code.

3.32. SPARE MATERIAL:

A. Provide two exit signs and 50 feet of circuiting in conduit for each device complete with all labor and material for installation in a location as directed by the engineer or architect.

B. Provide two emergency wall packs and 50 feet of circuiting in conduit for each device complete with all labor and material for installation in a location as directed by the engineer or architect.

C. Provide six type NEMA 5-20R receptacles complete with 75 feet of circuiting in conduit . For each device provide complete with all additional labor and materials for installation in a location as directed by the architect or engineer.

D. Provide four duplex communications outlets complete with all labor, material, cabling and conduit necessary to install outlet 300 feet from the nearest communications IDF closet and

terminate outlet cables on patch panels in rack. Outlets to be installed in a location as directed by architect or engineer.

E. Provide two occupnacy sensor wall switches and their installation.

F. Provide two marked time wall switches and their installation.

G. Provide one of each type of fire alarm notification devices (speaker/strobe units, strobe only units) and 75 feet of circuiting in conduit for each device complete with all labor, programming, and material for installation in a location as directed by the engineer or architect.

H. Provide two of each type of CO detector and 150 feet of circuiting in conduit for each device complete with all labor and material for installation in a location as directed by the engineer or architect.

I. Provide two of each type of fire alarm heat detector devices and 75 feet of circuiting in conduit for each device complete with all labor, programming, and material for installation in a location as directed by the engineer or architect.

J. Provide two of each type of initiating device (pull station, zone module, duct detector, smoke detector) and 75 feet of circuiting in conduit for each device complete with all labor and material for installation in a location as directed by the engineer or architect.

K. Provide one spare set of fuses for each size and type fuse used.

3.33. EQUIPMENT TOUCHUP AND PAINTING:

A. Clean damaged and disturbed areas on all painted surfaces of enclosures, cabinets, and equipment, sand smooth, and apply primer, intermediate, and finish coats of paint to suit the degree of damage at each location. Paint shall be the manufacturer’s supplied touch up paint or a matching paint. Prep all surfaces to be painted by removing all rust, dirt, oil, and any other material that might inhibit good paint adhesion by mechanical means and/or with solvents.

B. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.

C. Repair damage to galvanized finishes with two coats of zinc-rich paint recommended by manufacturer.
   1. Paint cut ends.
   2. Paint all drilled and punched holes.
   3. Paint all knicks and scratches.
   4. Paint all field cut conduit threads.

D. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 16231

PACKAGED ENGINE GENERATOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes packaged engine-generator sets for standby power supply with the following features:

1. Natural Gas engine.
2. Unit-mounted cooling system.
3. Outdoor sound-attenuated enclosure.

B. Related Sections include the following:

1. Division 16 Section "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine-generator sets.

1.3 DEFINITIONS

A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.4 SUBMITTALS

A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:

1. Thermal damage curve for generator.
2. Time-current characteristic curves for generator protective device.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.

2. Design Calculations: Signed and sealed by a qualified professional engineer. Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
3. Vibration Isolation Base Details: Signed and sealed by a qualified professional engineer. Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include base weights.
4. Wiring Diagrams: Power, signal, and control wiring.

C. Qualification Data: For installer and manufacturer.

D. Source quality-control test reports.

1. Factory certified summary of prototype-unit test report.
2. Factory certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
3. Factory certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
4. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
5. Report of sound generation.
6. Report of exhaust emissions showing compliance with applicable regulations.
7. Certified Torsional Vibration Compatibility: Comply with NFPA 110.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals. Include the following:

1. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

G. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.
2. Engineering Responsibility: Preparation of data for vibration isolators and seismic restraints of engine skid mounts, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 150 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.

C. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Comply with ASME B15.1.

F. Comply with NFPA 37.

G. Comply with NFPA 70.

H. Comply with NFPA 99.

I. Comply with NFPA 110 requirements for Level 1 emergency power supply system.

J. Comply with UL 2200.

K. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

L. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: 5 to 40 deg C.
2. Relative Humidity: 0 to 95 percent.
3. Altitude: Sea level to 1000 feet (300 m).

1.7 COORDINATION

A. Coordinate size and location of concrete bases for package engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 36 months full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment. Provide oil and filter change for system at least once a year for the full 3- years. At a minimum include three oil changes.

1.10 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:

1. Caterpillar; Engine Div.
2. Kohler Co.; Generator Division.
3. Onan/Cummins Power Generation; Industrial Business Group.
4. Generac
5. Taylor

2.2 ENGINE-GENERATOR SET

A. Factory-assembled and -tested, engine-generator set.

B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.

C. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated on the contract drawings.
2. Output Connections: Three-phase, four wire.

3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

D. Generator-Set Performance:

1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
7. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
8. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.3 ENGINE

A. Fuel: Natural Gas

B. Rated Engine Speed: 1800 rpm.

C. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm (11.4 m/s).

D. Lubrication System: The following items are mounted on engine or skid:

1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

E. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity.

F. Governor: Adjustable isochronous, with speed sensing.

G. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.

1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.

    a. Rating: 50-psig (345-kPa) maximum working pressure with coolant at 180 deg F (82 deg C), and noncollapsible under vacuum.
    b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

H. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.

1. Minimum sound attenuation of 25 dB at 500 Hz.
2. Sound level measured at a distance of 10 feet (3 m) from exhaust discharge after installation is complete shall be 85 dBA or less.

I. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

J. Starting System: 24-V electric, with negative ground.

1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.
2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
3. Cranking Cycle: As required by NFPA 110 for system level specified.
4. Battery: Adequate capacity within ambient temperature range specified in Part 1 "Project Conditions" Article to provide specified cranking cycle at least three times without recharging.
5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in Part 1 "Project Conditions" Article. Include accessories required to support and fasten batteries in place.
7. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
8. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:

    a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.

b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.4 CONTROL AND MONITORING

A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.

B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.

C. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration.

D. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, and the following:

1. AC voltmeter.
2. AC ammeter.
3. AC frequency meter.
4. DC voltmeter (alternator battery charging).
5. Engine-coolant temperature gage.
6. Engine lubricating-oil pressure gage.
7. Running-time meter.
8. Ammeter-voltmeter, phase-selector switch(es).
9. Generator-voltage adjusting rheostat.
10. Generator overload.

E. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

F. Common Remote Audible Alarm: Signal the occurrence of any events listed below without differentiating between event types. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset.

1. Engine high-temperature shutdown.
2. Lube-oil, low-pressure shutdown.
3. Overspeed shutdown.
4. Overcrank shutdown.
5. Remote emergency-stop shutdown.
6. Engine high-temperature prealarm.
7. Lube-oil, low-pressure prealarm.
8. Low coolant level.
9. Control switch not in auto position.
10. Battery-charger malfunction alarm.
11. Battery low-voltage alarm.

G. Remote Alarm Annunciator: Comply with NFPA 99. An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

2.5 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with NEMA AB 1 and UL 489.

1. Tripping Characteristic: Designed specifically for generator protection.
2. Trip Rating: Matched to generator rating.
3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
4. Mounting: Adjacent to or integrated with control and monitoring panel.

B. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other generator-set protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector shall perform the following functions:

1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
2. Under single or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the generator set.
4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

C. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

2.6 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

C. Electrical Insulation: Class H or Class F.

D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.

E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

F. Enclosure: Dripproof.

G. Instrument Transformers: Mounted within generator enclosure.

H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.

1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.

I. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

J. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

K. Subtransient Reactance: 12 percent, maximum.

2.7 OUTDOOR GENERATOR-SET ENCLOSURE

A. Description: Vandal-resistant, sound-attenuating (critical), weatherproof aluminum housing, wind resistant up to 120 mph (160 km/h). Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

B. Description: Prefabricated or pre-engineered walk-in enclosure with the following features:

1. Construction: Painted-steel meeting 2000hrs salt spray test.
2. Structural Design and Anchorage: Comply with ASCE 7 for wind loads.
3. Space Heater: Thermostatically controlled and sized to prevent condensation.
4. Louvers: Equipped with bird screen and filter arranged to permit air circulation when engine is not running while excluding exterior dust, birds, and rodents.
5. Hinged Doors: With padlocking provisions.
6. Ventilation: Louvers equipped with bird screen and filter arranged to permit air circulation while excluding exterior dust, birds, and rodents.
7. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine-generator-set components.
8. Muffler Location: External to enclosure.

C. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.

1. Louvers: Fixed-engine, cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.

D. Convenience Outlets: Factory wired, GFCI. Arrange for external electrical connection.

E. Contractor shall be responsible for 120 volt power for interior lighting and receptacle loads. Indicate panel and circuit number of lights and outlets on shop drawings.

2.8 MOTORS

A. General requirements for motors are specified in Division 15 Section "Motors."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 16 Sections.

2.9 VIBRATION ISOLATION DEVICES

A. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.

1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
2. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.10 FINISHES

A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.11 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.

B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
2. Full load run.
3. Maximum power.
4. Voltage regulation.
5. Transient and steady-state governing.
6. Single-step load pickup.
7. Safety shutdown.
8. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
9. Report factory test results within 10 days of completion of test.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.

B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.

B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

C. Install packaged engine generator with restrained spring isolators having a minimum deflection of 1 inch (25 mm) on 4-inch- (100-mm-) high concrete base. Secure sets to anchor bolts installed in concrete bases. Concrete base construction is specified in Division 16 Section "Electrical Supports and Seismic Restraints."

D. Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping shall be same diameter as muffler outlet. Flexible connectors and steel piping materials and installation requirements are specified in Division 15.

1. Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe with welded joints. Flexible connectors and piping materials and installation requirements are specified in Division 15.

E. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.3 CONNECTIONS

A. Piping installation requirements are specified in Division 15 Sections. Drawings indicate general arrangement of piping and specialties.

B. Connect natural gas fuel supply as required. Provide minimum pressure at inlet of engine to provide proper supply of natural gas to engine without starving. Provide cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.

C. Connect cooling-system water piping to engine-generator set with flexible connectors.

D. Connect engine exhaust pipe to engine with flexible connector.

E. Connect fuel piping to engines with a ball valve and flexible connector.

F. Ground equipment according to Division 16 Section 16000.

G. Connect wiring according to Division 16 Section 16000.

3.4 IDENTIFICATION

A. Identify system components according to Division 16 Section 16000.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
c. Verify acceptance of charge for each element of the battery after discharge.
d. Verify that measurements are within manufacturer's specifications.

4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
6. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg (120 kPa). Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
7. Exhaust Emissions Test: Comply with applicable government test criteria.
8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
9. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.
10. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four locations on the property line identified by the engineer, and compare measured levels with required values.

D. Coordinate tests with tests for transfer switches and run them concurrently.

E. Test instruments shall have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Make calibration records available for examination on request.

F. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

G. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

H. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

I. Remove and replace malfunctioning units and reinspect as specified above.

J. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

K. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION 16231

SECTION 16415

TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes transfer switches rated 600 V and less, including the following:

1. Automatic transfer switches.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.

1. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.

C. Qualification Data: For manufacturer.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1. Features and operating sequences, both automatic and manual.
2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.

B. Source Limitations: Obtain automatic transfer switches through one source from a single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NEMA ICS 1.

E. Comply with NFPA 70.

F. Comply with NFPA 99.

G. Comply with NFPA 110.

H. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:

1. Notify Architect no fewer than two days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Architect's written permission.

1.6 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Contactor Transfer Switches:
   a. Caterpillar; Engine Div.
   b. Emerson; ASCO Power Technologies, LP.
   c. Kohler Power Systems; Generator Division.
   d. Onan/Cummins Power Generation; Industrial Business Group.
   e. Russelectric, Inc.
   f. Generac

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

B. Main Circuit Breaker: Provide transfer switch with main circuit breaker with size as indicated on drawings. Main circuit breaker shall be U.L. listed for service entrance and shall be minimum AIC rating of 42,000 amperes. AIC rating can be lowered if available AIC rating is confirmed with local utility company and submitted to engineer for approval.

C. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.

D. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

E. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

F. Electrical Operation: Accomplish by a non-fused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.

G. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
2. Switch Action: Double throw; mechanically held in both directions.
3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.

H. Neutral Terminal. Solid neutral shall be provided with service entrance rating and with removable bonding jumper between neutral and ground.

I. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.

J. Battery Charger: For generator starting batteries. See Generator Specifications.

K. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Division 16 Section "Electrical Identification."

1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.

2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.

L. Enclosures: General-purpose NEMA 250, Type 3R, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.3 AUTOMATIC TRANSFER SWITCHES

A. Comply with Level 1 equipment according to NFPA 110.

B. UL Listed for Service Entrance.

C. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

D. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

E. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.

F. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.

G. Digital Communication Interface: Capable of interfacing with a remote annunciator or annunciator and control panel.

H. Transfer Switches Based on Molded-Case-Switch Components: Comply with NEMA AB 1, UL 489, and UL 869A.

I. In-Phase Monitor: Factory-wired, internal relay controls transfer so it occurs only when the two sources are synchronized in phase. Relay compares phase relationship and frequency difference between normal and emergency sources and initiates transfer when both sources are within 15 electrical degrees, and only if transfer can be completed within 60 electrical degrees. Transfer is initiated only if both sources are within 2 Hz of nominal frequency and 70 percent or more of nominal voltage.

J. Motor Disconnect and Timing Relay: Controls designate starters so they disconnect motors before transfer and reconnect them selectively at an adjustable time interval after transfer. Control connection to motor starters is through wiring external to automatic transfer switch. Time delay for reconnecting individual motor loads is adjustable between 1 and 60 seconds, and settings are as indicated. Relay contacts handling motor-control circuit inrush and seal currents are rated for actual currents to be encountered.

K. Programmed Neutral Switch Position: Switch operator has a programmed neutral position arranged to provide a midpoint between the two working switch positions, with an intentional, time-controlled pause at midpoint during transfer. Pause is adjustable from 0.5 to 30 seconds minimum and factory set for 0.5 second, unless otherwise indicated. Time delay occurs for both transfer directions. Pause is disabled unless both sources are live.

L. Automatic Transfer-Switch Features:

1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
5. Test Switch: Simulate normal-source failure.
6. Switch-Position Pilot Lights: Indicate source to which load is connected.
7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

    a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
    b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."

8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
11. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

    a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
    b. Push-button programming control with digital display of settings.
    c. Integral battery operation of time switch when normal control power is not available.

2.4 SOURCE QUALITY CONTROL

A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Floor-Mounting Switch: Anchor to exterior pad by bolting.

1. Concrete Bases: 4 inches (100 mm) high, reinforced, with chamfered edges. Extend base no more than 4 inches (100 mm) in all directions beyond the maximum dimensions of switch, unless otherwise indicated or unless required for seismic support. Construct concrete bases according to Division 16 Section "Electrical Supports and Seismic Restraints."

B. Identify components according to Division 16 Section "Electrical Identification."

C. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.2 CONNECTIONS

A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

B. Ground equipment according to Division 16000 Grounding.

C. Connect wiring according to Division 16000 Conductors and Cables.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installation, including connections, and to assist in testing.
2. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

    a. Check for electrical continuity of circuits and for short circuits.
    b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
    c. Verify that manual transfer warnings are properly placed.

d. Perform manual transfer operation.

5. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.

    a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
    b. Simulate loss of phase-to-ground voltage for each phase of normal source.
    c. Verify time-delay settings.
    d. Verify pickup and dropout voltages by data readout or inspection of control settings.
    e. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.
    f. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

6. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.

    a. Verify grounding connections and locations and ratings of sensors.

C. Coordinate tests with tests of generator and run them concurrently.

D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

E. Remove and replace malfunctioning units and retest as specified above.

F. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.

1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.
2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
3. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below.

B. Coordinate this training with that for generator equipment.

END OF SECTION 16415

SECTION 16715

STRUCTURED CABLING SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. General Requirements/Provisions shall be considered a part of this section and shall have the same force as if printed herein full. In addition, all information related to communications infrastructure that is documented in the architectural, structural, mechanical, and electrical drawings/documents shall be considered as part of the communications documents.

1.02 QUALITY ASSURANCE

A. Specifications, Standards and Codes: All work shall be in accordance with the following:

1. The current edition of the National Electrical Code (NFPA 70)
2. American National Standards Institute (ANSI)
3. National Electrical Manufacturers Association (NEMA)
4. Telecommunications Industries Association (TIA)
5. Electronic Industries Association (EIA)
6. Institute of Electrical & Electronics Engineers (IEEE)
7. Underwriters Laboratories (UL)
8. American Standards Association (ASA)
9. Federal Communications Commission (FCC)
10. Occupational Safety and Health Administration (OSHA)
11. American Society of Testing Material (ASTM)
12. Americans with Disabilities Act (ADA)
13. Local city and county ordinances governing electrical work
14. In the event of conflicts, the more stringent provisions shall apply.

1.03 SCOPE

A. The work under this section of the specifications shall include furnishing labor, material and equipment required to provide a complete installation of the work indicated on the drawings or as specified herein.

B. All material required to provide a fully operational system but not specifically mentioned or shown on the drawings, shall be furnished and installed without any additional charge.

C. The drawings and specifications are complementary to each other and what is called for by one shall be as binding as if called for by both. If a discrepancy exists between the drawings and specifications, the more stringent shall be included, and the engineer shall be notified of the discrepancy.

D. All structured cabling that is routed thru underground conduits shall be outside plant rated.

1.04 WORK INCLUDED

The Communications Infrastructure installed and work performed under this Division of the Specifications shall include but are not limited to the following:

A. Data Cabling Infrastructure
B. Audio Video Cabling Infrastructure System
C. Wireless Access System Cabling

D. Communications raceways, cable tray, ladder rack, racks and equipment mounting backboards
E. Grounding and Bonding

1.05 DEFINITIONS

A. Terms: The following definitions of terms supplement those of the General Requirements and are applicable to Division 27 - Communications:
B. Provide: As used herein shall mean “furnish, install and test (if applicable) complete.”
C. Infrastructure: As used herein shall mean cable, conduit, raceway, cable tray or j-hooks with all required boxes, fittings, connectors, and accessories; completely installed.
D. Work: As used herein shall be understood to mean the materials completely installed, including the labor involved.

1.06 DRAWINGS

A. Drawings are diagrammatic and show the arrangement and location of pathways, outlets, support structures and equipment. The contractor shall carefully investigate the structural and finish conditions affecting his work and arrange his work accordingly. Should conditions on the job make it necessary to make adjustments to pathways or materials, the contractor shall advise the engineer in writing for approval before proceeding with such work.
B. Materials, equipment or labor not specifically indicated but required to form a complete system shall be provided. Drawings and Specifications do not indicate every item of material, equipment, or labor required to produce a complete and properly operating installation.
C. The right is reserved to make reasonable changes in locations of equipment indicated on drawings prior to rough-in without increase in contract cost.
D. The contractor shall not reduce the size or number of conduit runs indicated on the drawings without the written approval of the Engineer.
E. Any work installed contrary to contract drawings shall be subject to change as directed by the Engineer, and no extra compensation will be allowed for making these changes.
F. The location of equipment, support structures, outlets, and similar devices shown on the drawings are approximate only. Do not scale drawings. Obtain layout dimensions for equipment from Architectural plans unless indicated on communications plans.
G. Verify the ceiling type, ceiling suspension systems, and clearance above ceilings prior to ordering cabling and associated hardware. Notify the engineer of any discrepancies.
H. Review all architectural drawings for modular furniture layouts.

1.07 SUBMITTALS

A. Submit for approval, manufacture specifications of all materials, equipment and systems to be furnished. Work shall not proceed without the Engineer’s approval of the submitted items. Three (3) copies of the following shall be submitted:

1. Submittal specification sheets for individual items for equipment assemblies that consist of more than one item or component shall be submitted. Each specification sheet shall be reviewed and sealed by contractors RCDD. Partial or incomplete submittals will not be considered, reviewed or stored, and such submittals will not be returned except at the request and expense of the contractor.
2. Contractor shall generate shop drawings. Modify reviewed and accepted shop drawings to include revisions based upon completion of work. Submit shop drawings with record drawings on hard copy. Additionally, provide one electronic copy of shop drawings in both AutoCad format (.dwg file) and Visio format(.vsdx

file). Failure to submit electronic file with drawings will be grounds for immediate rejection.

3. Shop drawings shall include equipment racks, patch panels, termination blocks, connection details, rack mounting details and any other details not included in the construction drawings. All Submittal drawings shall be prepared and sealed by the contractors RCDD for approval.

B. Any materials and equipment listed that are not in accordance with specification requirements may be rejected.

C. The approval of material, equipment, systems and shop drawings is a general approval subject to the drawings, specifications and verification of all measurements at the job. Approval does not relieve the Contractor from the responsibility of shop drawing errors. The contractor shall carefully check and correct all shop drawings prior to submission for approval.

1.08 QUALITY ASSURANCE

A. Equipment and materials required for installation under these Specifications shall be the current model and new (less than one [1] year from the date of manufacture), unused and without blemish or defect.

B. Equipment shall bear labels attesting to Underwriters Laboratories, where subject to label service. Manufacturers of equipment and materials pertinent to these items shall have been engaged in the manufacture of said equipment a minimum of three (3) years and be able to furnish proof of their ability by submitting affidavits and descriptive data about their product including size and magnitude comparable to requirements specified herein.

1.09 CONTRACTOR QUALIFICATIONS

A. The contractor shall have total responsibility for the coordination and installation of the work shown and described in the drawings and specifications. The contractor shall be a company specializing in the design, fabrication and installation of integrated communications systems.

B. Communication systems specified shall be installed under the direction of a qualified Contractor. Qualification requirements shall include submittal by the contractor to the engineer of the following:

1. List of five [5] previous projects of this scope, size and nature; including names and sizes of projects, description of work, time of completion and names of contact persons for reference.

2. Certification of contractor’s manufacturer-authorization to provide material, perform installation and provide a minimum 25 year manufactures warranty for work to be performed under this contract. <u>This must be provided with submittals for approval.</u>

C. Contractor must have a Registered Communications Distribution Designer (RCDD) on staff. This individual must be a W-2 employee of data contractor. Various types RCDD contractors are not allowed for this project.

D. Submit copy of contractor’s RCDD Certificate and resume for verification and approval at time of submittal.

E. All submittal documentation shall be prepared, sealed and signed by the contractors RCDD for approval.

F. Contractor shall have a certified BICSI Technician present at all times during the installation and/or testing of the entire Structured Cabling System.

G. Contractor must have an office regularly staffed on a daily basis with certified service and installation technicians within a 100 mile radius of the project site.

1.10 COORDINATION WITH OTHER TRADES

A. The Contractor shall coordinate communications work with that of other sections as required ensuring that the entire communications work will be carried out in an orderly, complete and coordinated fashion.

1.11 PERMITS

A. Obtain all permits and inspections for the installation of this work and pay all charges incident thereto. Deliver to the Owner all certificates of said inspection issued by authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. Where equipment is identified by manufacturer and catalog number, it shall be as the base of requirements for quality and performance. Where manufacturers for equipment are identified by name, the Contractor may submit for approval, similar equipment of other manufacturers as substitution. The Engineer's decision as to whether the submitted equipment is acceptable shall be final and binding.
B. All changes necessary to accommodate the substituted equipment shall be made at the contractor's expense, and shall be as approved by the Engineer. Detailed drawings indicating the required changes shall be submitted for approval at the time the substitution is requested.
C. If substitutions are made in lieu of devices specified; form, dimension, design and profile shall be submitted to the Engineer for approval.
D. Submit request for approval of substitute materials in writing to the Engineer at least ten (10) days prior to bid opening for review.

2.02 MATERIALS

A. All materials used in this work shall be new and shall bear the inspection label of Underwriters' Laboratories Inc. or certification by other recognized laboratory.
B. The published standards and requirements of the Telecommunications Industries Association (TIA), National Electrical Manufacturers Association (NEMA), the American National Standard Institute (ANSI), the Institute of Electrical and Electronic Engineers (IEEE), and the American Society of Testing Materials (ASTM), are made a part of these Specifications and shall apply wherever applicable.
C. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts are available.
D. When more than one unit of the same class of equipment or material is required, such units shall be the products of a single manufacturer or partner manufacturers that offer a certified solution.
E. Components shall be compatible with each other and with the total assembly for the intended service.

PART 3 - EXECUTION

3.01 EXAMINATION OF CONDITIONS

A. Prior to the start of work, the Contractor shall carefully inspect the installed work of other trades and verify that such work is complete to the point where installation may properly commence. Start of work indicates acceptance of conditions.

B. Install equipment in accordance with applicable codes and regulations, the original design and the referenced standards.
C. In the event of a discrepancy, immediately notify the engineer in writing.
D. Do not proceed with installation until unsatisfactory conditions and discrepancies have been fully resolved.

3.02 PROTECTION OF SYSTEMS AND EQUIPMENT

A. Protect materials and equipment from damage during storage at the site and throughout the construction period. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, theft, moisture, extreme temperature and rain.
B. During installation, equipment shall be protected against entry of foreign matter on the inside and be vacuum cleaned both inside and outside before testing, operating or painting.
C. As determined by the engineer, damaged equipment shall be fully repaired or shall be removed and replaced with new equipment to fully comply with requirements of the contract documents.
D. Damaged paint on any equipment or material shall be repainted to the same quality of paint, color, finish and workmanship as used by the manufacturer.

3.03 ACCESS TO EQUIPMENT

A. Equipment shall be installed in a location and manner that will allow convenient access for maintenance and inspection.
B. Working spaces shall be not less than specified in the National Electrical Code (NEC) for voltages specified.
C. Where the engineer determines that the contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled, one time only, as directed by the engineer, at no additional cost to the Owner. “Conveniently accessible” is defined as being capable of being reached without the use of ladders or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping and duct work.

3.04 CLEANING

A. During construction, and prior to Owner acceptance of the building, remove from the premises and dispose of all packing material and debris caused by communications work.
B. Remove dust and debris from interiors and exteriors of all communications equipment.

3.05 COMPLETION

A. General: Upon completion of the work, remove excess debris, materials, equipment, apparatus, tools and similar items. Leave the premises clean, neat and orderly.
B. Results Expected: Systems shall be complete and operational and controls shall be set and calibrated. Testing, start-up and cleaning work shall be complete.
C. Maintenance Materials: Special tools for proper operation and maintenance of the equipment provided under this specification shall be delivered to the Owner.

PART 4 – HORIZONTAL CABLING

4.01 APPROVED PRODUCTS

A. Approved Horizontal Copper Cable Manufacturer(s)

1. Berk-Tek
2. Systimax (Uniprise Not Excepted)
3. Nexans

4.02 HORIZONTAL COPPER CABLE

A. Category 6 Balanced Twisted Pair Cable

1. The horizontal balanced twisted pair cable shall meet or exceed the Category 6 transmission characteristics per issue of ANSI/TIA-568-C.2.
2. Cable jacket shall be CMR or CMP rated (according to the space it occupies).
3. All Category 6 cabling shall be equal to Berk-Tek LANmark-1000 Category 6 cabling
4. Jacket color shall be:
   A. As detailed in drawing chart.

4.03 HORIZONTAL CABLES

A. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.
B. A plastic or nylon pull cord with a minimum test rating of 90 Kg (200 lb.) shall be co-installed with all cable installed in any conduit.
C. Cable raceways shall not be filled greater than the ANSI/TIA-569-B maximum fill for the particular raceway type.
D. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
E. Riser rated cable shall be installed in metallic conduit when installed in a plenum space.
F. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.
G. The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturer's requirements.
H. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60 inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids, conduit, pipes, duct work or panels.
I. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.
J. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes or other control devices.
K. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the Contractor shall install appropriate carriers from the building structure to support the cabling.
L. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Owner.
M. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA-568-C.2 document, manufacturer's recommendations and best industry practices.
N. Leave a minimum of 12" of slack for twisted pair cables at the outlet. Cables shall be

coiled in the outlet box, surface-mount box or modular furniture raceway if adequate space is present to house the cable coil without exceeding the manufacturers bend radius. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

O. Cables shall be neatly bundled and dressed to their respective termination device. Each terminating device shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

P. Each cable shall be clearly labeled on the cable jacket behind the termination device at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

PART 5 – BACKBONE FIBER OPTIC CABLING

5.01 APPROVED PRODUCTS

A. Approved Optical Fiber Backbone Cable (Inside Plant) Manufacturer(s)

1. Berk-Tek
   a) 6 Strand OS2 Interlocked Armored Plenum Rated
2. Systimax (Uniprise Not Excepted)
3. Nexans

B. Approved Optical Fiber Backbone Cable (Outside Plant) Manufacturer(s)

1. Berk-Tek
   a) 12 Strand OS2 OSP Part #OPD012AB0403
   b) 24 Strand OS2 OSP Part #OPDD12B024AB0403
2. Systimax (Uniprise Not Excepted)
3. Nexans

C. Approved Optical Splice Cassettes Manufacturer(s)

1. Leviton
   a) Splice Cassette OS2 Part #SPLCS-12L
   b) Splice Cassette OS2/APC Part #SPLCS-12V
2. Systimax (Uniprise Not Excepted)
3. Nexans

5.02 OPTICAL FIBER BACKBONE CABLE (INSIDE PLANT)

A. Indoor 8.3/125-micron, Single mode Optical Fiber Non Conductive (OFNR) Loose Tube cable (OS2)

1. Generic Characteristics
   A. The indoor optical fiber cable shall be available with up to twelve 250-micron fibers placed in a color-coded sub-unit bundle with aramid strength elements.
   B. The indoor optical fiber cable shall meet or exceed the performance criteria found in ANSI/TIA-568-C.3.
   C. The indoor optical fiber cable shall have sequential length marking printed on the cable jacket.

5.03 OPTICAL FIBER BACKBONE CABLE (OUTSIDE PLANT)

A. Outdoor 8.3/125-micron, Single mode Optical Fiber Non Conductive (OFNR) Loose Tube cable (OS2)

1. Generic Characteristics
   A. The indoor/outdoor optical fiber cable with up to twelve 250-micron coated fibers placed in a color-coded sub-unit bundle with moisture-blocking gel.
   B. The indoor/outdoor optical fiber cable shall meet or exceed the performance criteria found in ANSI/TIA-568-C.3.
   C. The indoor/outdoor optical fiber cable shall have sequential length markings printed on the cable jacket.
   D. All singlemode fibers shall be pigtail spliced into a rack mounted optical fiber enclosure or wall-mounted enclosure.
   E. The loss of fiber shall not exceed 0.5 dB per kilometer @ 1550 nm and 0.5 dB per kilometer @ 1310 nm.

5.04 OPTICAL FIBER PIGTAIL ASSEMBLIES

A. Singlemode Fiber Connectivity

1. The optical fiber pigtail assemblies shall be factory terminated LC for installation onto singlemode 8.3/125-micron fiber.
2. The optical fiber pigtail connectors shall meet or exceed the performance criteria found in ANSI/TIA-568-C.3.
3. The optical fiber pigtail connectors shall be compatible with 900-micron buffered fibers or 250-micron loose-tube fibers.
4. All singlemode fiber pigtail assemblies shall be installed by fusion splicing method only (No Exceptions).
5. Pigtails shall be factory terminated to a color-coded 900-micron buffer tube 3 meters in length. All fiber enclosure shall be equipped with slack storage splice trays that shall be used for housing all pigtail-splicing.
6. The fusion splice loss of each pigtail connector shall not exceed 0.05 dB.
7. The optical fiber adapter module that occupies the faceplate shall be equipped with zirconia ceramic sleeve.
8. Singlemode fiber connector boot color shall be Blue for OS2 and Green for OS2/APC.

5.05 FIBER OPTIC ENCLOSURE SPLICE TRAYS

A. Splice Tray

1. Splice trays shall be capable of housing a maximum of 24 strands of fiber. No more than 24 stands of fiber shall be installed in each splice tray.
2. All splice trays, seals and hardware shall be from the same manufacturer as the rack or wall mount fiber optic enclosure.
3. Splice trays shall utilize heat-shrink seals.

5.06 BACKBONE FIBER OPTIC CABLES (INSIDE PLANT)

A. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C.1, manufacturer's recommendations and best industry practices.
B. Backbone cables shall be installed separately from horizontal distribution cables
C. A plastic or nylon pull cord with a minimum test rating of 90 Kg (200 lb.) shall be co-installed with all cable installed in any conduit.

D. Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits
E. Exposed cables must be OFCP rated if installed in an air return plenum. Riser rated cables shall be installed in metallic conduit if installed in an air return plenum.
F. Where backbone cables and distribution cables are installed in a cable tray or wire way, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.
G. Leave 10' of slack on each end of fiber backbone cable.
H. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.
I. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.
J. Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.
K. The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturer's requirements.
L. Each optical fiber cable shall be individually attached to the respective enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.
M. Each optical fiber cable shall be clearly labeled at the entrance to the enclosure. Cables labeled within the bundle shall not be acceptable.
N. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.
O. A maximum of 24 strands of fiber shall be spliced in each tray
P. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

5.07 BACKBONE FIBER OPTIC CABLES (OUTSIDE PLANT)

A. All OSP cables brought to the Entrance Facilities shall have 15ft of slack coiled and secured to the wall in the proximity of the fiber enclosure.
B. All cables shall be tagged and identified within each hand-hole/maintenance hole.
C. Place initial cables in bottom conduits to facilitate easy subsequent cable placement.
D. Place leader guard in the duct before placing cable to prevent damaging the cable sheath on the sharp edge of the duct.
E. Ventilate maintenance where gas has been detected before entering the maintenance hole.
F. To ensure that the optical fiber cable's qualities and characteristics are not degraded during installation, excessive pulling tensions and short bending radii will not be allowed. The maximum pulling tension is 600 lbs. The minimum bending radius for cable under tension is 20 times the outside diameter of the cable and for cable at rest is 10 times the outside diameter of the cable.
G. A 600 lb. break-away swivel, along with a slip clutch capstan winch that shows the dynamometer (pulling tension) reading, shall be used at all times during pulling.
H. Reels shall be continuously manned during cable installation.
I. Cable coils shall have at least two points of support on the optical fiber racking system.
J. When mounting the optical fiber slack coils, the minimum bend radius shall not be exceeded; this radius is equal to 10 times the outside diameter of the cable in a static application and 20 times the outside diameter in a dynamic application. At any time during the entire handling process of the optical fiber cable, as much care as possible should be maintained and all the manufacturer's recommendations should be followed.

5.08 OPTICAL FIBER CONNECTIVITY / SPLICING

A. Optical fiber pigtails shall be installed as per the requirements specified by the manufacturer's installation guidelines.
B. All splicing shall be of the fusion type made under Light Injection and Detection Mode. The Contractor shall provide certified and experienced personnel for splicing.
C. Contractor's tools and equipment shall be in excellent working order. Any worn or improperly working tools shall be discarded and not used on this project. All fusion splicers shall be calibrated and labeled according to the manufacturer's specifications. Contractor shall submit certification of calibration for the fusion splicers to the Engineer.

PART 6 – FACEPLATES AND CONNECTORS

6.01 APPROVED PRODUCTS

A. Approved Copper Connectivity Manufacturer(s)

1. Leviton
2. Systimax (Uniprise Not Excepted)
3. Nexans

B. Approved Faceplate Manufacturer(s)

1. Leviton
2. Systimax (Uniprise Not Excepted)
3. Siemon

6.02 AUDIO VISUAL APPROVED PRODUCTS

A. Approved Faceplate Module Manufacture(s)

1. Quiktron Rapid Run
2. Extron
3. Or Approved Equal

B. Approved Faceplate Modules

1. HDMI Module: Quiktron Part #42419
2. USB Transmitter Module: Extron Part #60-1252-13
3. USB Receiver Module: Extron Part #60-1252-73

6.03 COPPER CONNECTIVITY

A. Voice/Data Jacks

1. Category 6, 8-Position, 8-Contact (8P8C) Modular Jack
   A. The connector module shall meet or exceed the Category 6E performance criteria per ANSI/TIA-568-C.2.
   B. The eight-position connector module shall accommodate six-position modular plug modular cords without damage to either the cord or the module.
   C. The connector module shall be designed for use at the work area (WA), communications room (TR) and/or equipment room (ER) without modification.
   D. The connector module shall be available in both the T568A and T568B wiring configurations within the same module.

E. The connector module shall have an insulation displacement connection featuring insulation slicing of 22 to 24 AWG plastic-insulated solid copper conductors forming a gas-tight connection.

6.04 FACEPLATES

A. Faceplates

1. The faceplate housing the connector modules shall have no visible mounting screws.
2. The faceplate shall have a labeling capability using built-in labeling windows, to facilitate outlet identification and ease network management.
3. The faceplate shall provide flexibility in configuring multimedia workstation outlets that respond to present or future network application needs.
4. Each faceplate shall have a minimum of (4) ports per each outlet location. Each unpopulated port shall have a blank module installed that matches the color of the faceplate.
5. Faceplates shall be stainless steel unless noted otherwise. All faceplates shall match electrical outlet covers. Verify color and size of each faceplate prior to ordering.

6.05 COPPER CONNECTIVITY

A. Modular jacks shall be installed in accordance with manufacturer's recommendations and installation guides, and best industry practices.
B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).
C. All outlet locations shall have color-coded 8P8C modular jacks installed. No cable shall be left unterminated.

6.06 FACEPLATES

A. Blank inserts shall be installed where ports are not used.
B. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation.
C. Faceplates shall be installed straight and level.
D. Faceplates shall be installed at the same heights as electrical outlets.

PART 7 – PATCH PANELS AND FIBER OPTIC ENCLOSURES

7.01 APPROVED PRODUCTS

A. Approved Patch Panel Manufacturer(s)

1. Leviton
   a) 24 Port Patch Panel Part #49255-L24
   b) 48 Port Patch Panel Part #49255-L48
2. Systimax (Uniprise Not Excepted)
3. Nexans

B. Approved Optical Fiber Enclosure Manufacturer(s)

1. Leviton
   a) 1RU Rack Mount Fiber Enclosure Part #5R1UH-S03
   b) 2RU Rack Mount Fiber Enclosure Part #5R1UH-S06

c) 4RU Rack Mount Fiber Enclosure Part #5R1UH-S12

2. Systimax (Uniprise Not Excepted)
3. Nexans

C. Approved Termination Block Manufacturer(s)

1. Leviton
2. Systimax (Uniprise Not Excepted)
3. Nexans
4. Siemon

D. Category 6 Patch Panel

1. The Category 6 patch panel shall be compatible with 19" equipment racks, cabinets or wall mount brackets.
2. The Category 6 patch panels shall be 24 or 48 port unloaded patch panels.
3. The Category 6 patch panels shall be sized to accommodate one port for each cable installed plus 25% spare capacity for future growth. All ports shall be filled with a removable 8-position color coded modular jacks for each system. No port shall be left empty or blank.
4. The Category 6 patch panel shall be equipped with removable 8-position modular jacks color coded for each system and shall allow for termination of both T568A and T568B wiring schemes.
5. Cabling shall not occupy the same patch panel. All cabling for each system shall be installed in separate patch panels with color coded modular jacks to match as specified.
6. The Category 6 patch panel shall be equipped with front labeling windows to facilitate port identification.
7. The connector module shall meet or exceed the Category 6 performance criteria per ANSI/TIA-568-C.2.

7.02 OPTICAL FIBER PANELS/ENCLOSURES

A. Rack Mount Optical Fiber Enclosure

1. The rack mount optical fiber enclosure shall be equipped with a sliding drawer to access fibers.
2. The rack mount optical fiber enclosure shall be capable of terminating tight-buffered or loose tube optical fiber cable.
3. The rack mount optical fiber enclosure shall provide for bend radius control throughout the panel as well as storage space for slack cabling.
4. The panel/enclosure shall meet or exceed the performance criteria per ANSI/TIA-568-C.3.
5. The rack mount optical fiber panel/enclosure shall be equipped with optical fiber cassettes.
   A. The optical fiber adapter panels shall accommodate either multimode or singlemode terminated optical fiber.
   B. The optical fiber adapter panels shall be compatible with LC OM4, OS2, and OS2/APC connectors.
   C. Single-mode adaptors shall be blue or green in color and equipped with zirconia ceramic sleeves.

7.03 PATCH PANELS

A. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C.1, manufacturer's recommendations and best industry practice.
B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).
C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
D. Cables shall be neatly bundled and dressed to their respective patch panel. Each patch panel shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
E. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

7.04 OPTICAL FIBER PANELS/ENCLOSURES

A. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C.1, manufacturer's recommendations and best industry practices.
B. Each cable shall be individually attached to the respective splice enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.
C. Bend radius of the optic fiber cable in the enclosure shall not exceed 10 times the outside diameter of the cable.
D. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.
E. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.
F. A maximum of 24 strands of fiber shall be spliced in each tray
G. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

PART 8 – PATCH CORDS

8.01 APPROVED PRODUCTS

A. Approved Copper Patch Cord Manufacturer(s)

1. Leviton
2. Systimax (Uniprise Not Excepted)
3. Nexans

B. Approved Fiber Patch Cord Manufacturer(s)

1. Leviton
2. Systimax (Uniprise Not Excepted)
3. Nexans

8.02 COPPER PATCH CORDS

A. Category 6 Patch Cords

1. Copper patch cords shall be installed as per the requirements specified by the manufacturer's installation guidelines.
2. The Category 6 patch cord shall be 4-pair, with 24 AWG solid or stranded copper conductors and 8-position modular plug.

3. The Category 6 modular cord cable shall be UL Listed as Type CMR.
4. The Category 6 patch cord shall meet or exceed the requirements of ANSI/TIA-568-C.2.
5. Lengths shall be 3', 5', 7' and/or 10' as required by the Owner.
6. Provide one patch cord for every cable installed that will be utilized for patching between patch panel and switches. Verify length and color with Owner prior to ordering.
7. Provide one patch cord for every cable installed at each work area outlet. Verify length and color with Owner prior to ordering.

8.03 FIBER PATCH CORDS

A. Singlemode Fiber Patch Cords

1. 8.3/125-micron singlemode fiber patch cord:
   A. Fiber patch cords shall be installed as per the requirements specified by the manufacturer's installation guidelines.
   B. The 8.3/125-micron fiber used in the singlemode fiber patch cord shall have a maximum attenuation of 1.0 dB/km @ 1310 nm and 1.0 dB/km @ 1550 nm.
   C. The optical fiber cord connector shall have a maximum insertion loss of 0.5 dB and a reflectance of -30 dB.
   D. The 8.3/125-micron singlemode fiber patch cord shall meet or exceed the requirements of ANSI/TIA-568-C.3.
   E. The optical fiber cord connector shall be LC to LC duplex.
   F. The singlemode fiber patch cord assembly shall be dual zip jacketed yellow in color.
   G. Lengths shall be 1m, 2m, and/or 3m as required by the application. Verify length with Owner prior to ordering.
   H. Provide a minimum of (3) OS2 LC to LC fiber optic patch cords per each IDF and a minimum of (12) OS2 LC to LC fiber optic patch cords in the MDF. Verify length with Owner prior to ordering.
   I. Provide a minimum of (2) OS2/APC LC to SC fiber optic patch cords per each IDF requiring fiber terminated with OS2/APC fiber connectors and a minimum of (4) OS2/APC LC to SC fiber optic patch cords in the MDF. Verify length with Owner prior to ordering.

PART 9 – EQUIPMNET RACKS AND ENCLOSURES

9.01 APPROVED PRODUCTS

A. Approved Equipment Rack/Cabinet Manufacturer(s)

1. Chatsworth Products, Inc.
   a) 2-Post Floor Mounted Equipment Racks Part #48353-703
   b) 4-Post Adjustable Server Rack Part #15213-703
2. Hoffman
3. Eaton
4. Middle Atlantic

9.02 EQUIPMENT RACKS/CABINETS

A. Equipment Racks

1. The equipment rack shall be constructed of high strength, lightweight aluminum.

2. The vertical rails of the equipment rack shall be equipped with the EIA hole pattern.
3. 2 Post rack shall be: 7'H x 19"W floor mounted. Vertical channels shall be drilled and taped.
4. 4 Post rack shall be: 7’H with adjustable depth of 26-inches to 38-inches. Vertical channels shall have square punched mounting holes. Provide additional equipment mounting hardware, per each rack installed, to owner upon completion of the installation.
5. Provide a minimum of (50) 12X24 cage nuts with (50) 12X24 rack screws per each 4-Post rack and a minimum of (50) 12X24 rack screws per each 2-Post or wall mount rack provided/installed.
6. Rack color shall be black.

9.03 EQUIPMENT RACKS/CABINETS

A. Equipment racks shall be securely attached to the concrete floor using minimum 3/8" hardware or as required by local codes.
B. Equipment racks shall be installed as per the requirements specified by the manufacturer's installation guidelines.
C. Equipment racks shall be placed with a minimum of 36-inch clearance from each of the corresponding walls: front, rear and one side of the rack or as indicated on Drawings.
D. All equipment racks shall be grounded to the telecommunications ground bus bar.
E. Mounting screws not used for installing patch panels and other hardware shall be bagged and left with the rack or turned over to the owner upon completion of the installation.

9.04 BACKBOARDS

A. Backboards shall be 3/4" void free plywood. Size of backboard shall be 4' x 8' mounted vertically 18” A.F.F. unless otherwise noted differently on Drawings. Backboards shall be painted with two (2) coats of gray fire-retardant paint.

PART 10 – CABLE MANAGEMENT AND LADDER RACK

10.01 APPROVED PRODUCTS

A. Approved Horizontal Cable Management Manufacturer(s)

1. Chatsworth Products, Inc.
   a) 2RU Horizontal Cable Manager Part #35441-702
2. Leviton
   a) 2RU Horizontal Cable Manager Part #492RU-HFR
3. Systimax (Uniprise Not Excepted)

B. Approved Vertical Cable Management Manufacturer(s)

1. Chatsworth Products, Inc.
   a) 6” Vertical Cable Manager Part #35521-703
   b) 8” Vertical Cable Manager Part #35522-703
2. Leviton
   a) 6” Vertical Cable Manager Part #4980L-VFR
   b) 8” Vertical Cable Manager Part #8980L-VFR
3. Systimax (Uniprise Not Excepted)

C. Approved Ladder Rack System Manufacturer(s)

1. Chatsworth Products, Inc.
   a) 12” Ladder Rack Part #11275-712
   b) 18” Ladder Rack Part #11275-718
2. Hoffman
3. Middle Atlantic

D. Approved Tie Wrap/Velcro Strap Manufacturer(s)

1. Leviton
2. Or Approved Equal

10.02 CABLE MANAGEMENT - HORIZONTAL

A. Horizontal Cable Management

1. The horizontal wire manager shall be compatible with 19-inch equipment racks, cabinets or wall mount brackets.
2. The horizontal cable manager shall be double-sided to provide support/management for patch cords at the front of the panel and support/management of cables at the rear of the panel.
3. The horizontal cable manager shall be equipped with removable front and covers
4. The horizontal cable manager shall be 2 rack-units in height, installed above and below each patch panel and each switch as indicated on drawings.
5. Horizontal cable managers shall be black.

10.03 CABLE MANAGEMENT - VERTICAL

A. Vertical Cable Management

1. The vertical cable manger shall be 80” high double-sided, installed on both sides of all racks.
2. The vertical cable manager shall provide support/management for patch cords at the front of the rack and support/management of cables at the rear of the rack.
3. Vertical cable managers shall be installed on both sides of a single equipment rack. Where two (2) or more racks are positioned in a row, vertical cable managers shall be installed between each rack and each end of the row.
4. The vertical cable manager shall be a minimum width of 6".
5. Vertical cable manager color shall be black.

10.04 LADDER RACK

A. Ladder Rack System

1. See Drawings for ladder rack system details.
2. The ladder rack system shall be securely mounted with hardware (triangle brackets, top mounting plates, junction splice kits, butt splice kits, end caps, radius drop kits, etc.) designed for use with ladder rack systems per manufactures recommendations.
3. Ladder rack shall be 12” or 18” wide as indicated on drawings.
4. End caps shall be installed on the exposed ends of the ladder racks and channel supports. Protective covers shall be installed on threaded rods that come in contact with cabling plant.
5. All sections of ladder rack shall be properly grounded to the corresponding telecommunications ground bus bar in each communications room.

6. Ladder Rack System color shall be black.

10.05 TIE WRAPS AND VELCRO STRAPS

A. Tie Wraps and Velcro Straps

1. Tie wraps/Velcro straps installed in air handling spaces must be plenum rated.
2. Backbone cables shall be fastened to support structures with tie wraps/Velcro straps.
3. Horizontal cables shall be fastened to support structures with Velcro straps.
   A. Tie Wraps shall be plenum rated red in color.
   B. Velcro Strap color shall be black.
4. Tie wraps/Velcro straps shall be installed around cables at intervals of 12" minimum.
5. Tie wraps shall secure cables to ladder racks using an “X” pattern.
6. Do not over-cinch cables.

10.06 D-RINGS

A. D-rings

1. D-Rings shall be used on backboards to support cables, patch cords and cross-connect wire.
2. D-Rings shall be made of high-strength, fire-retardant material with rounded edges to prevent damage to cable and wire insulation.
3. Provide D-Rings of appropriate size and quantity for proper cable management and support as required.
4. D-Rings shall be installed on 3/4" backboard, straight and level.

10.07 LADDER RACKS

A. Ladder rack system shall be installed straight, level and perpendicular to walls and ceiling slabs.
B. Ladder racks shall be supported at 4' intervals maximum.
C. Provide all hardware, accessories, fasteners, anchors, threaded rods and support channels required to provide a complete ladder rack system.
D. Provide ladder rack system at minimum on (2) adjacent walls in each communications room or as indicated on drawings.
E. See Drawings for ladder rack system details.

PART 11 – PATHWAYS

11.01 APPROVED PRODUCTS

A. Innerduct Conduit Manufacturer(s)

1. MaxCell
   a) 3-Cell Part #MXC4003XX
2. Carlon
   a) Plenum-Gard Flexible Conduit Part #CG4X4C-XXX
3. Or Approved Equal

B. Approved Cable Tray System Manufacturer(s)
1. Hoffman Quick Tray Pro Part #QTP4X18
2. Wire Basket Tray Part #WBT4X18

3. Or Approved Equal

C. Approved Cable Hanger Manufacturer(s)

1. Erico Products – Caddy HP Series
2. Hoffman
3. Or Approved Equal

D. Innerduct/Inner-Conduit Channel

1. Innerduct shall be corrugated PVC equipped with mule tape.
2. Inner-conduit channel (MaxCell) shall be 3-cell with each cell equipped with mule tape. Provide a minimum of (2) (Max Cell) 3-cell fabric duct per each underground conduit as indicated on drawings.
3. See Drawings for innerduct/inner-conduit channel (MaxCell) details.

11.02 COMMUNICATIONS OUTLET BOXES

A. Outlet boxes and device covers shall be galvanized steel not less than 1/16" thick.
B. The dimensions of the outlet box shall be 4" x 4" square with a minimum depth of 2-1/8".
C. Outlet boxes shall be equipped with single gang device covers. Where installed in plaster, gypsum board, etc., covers shall be raised to compensate for the thickness of the wall finish.
D. Where outlet boxes are to be empty for future use, blank cover plates shall be used.

11.03 CABLE TRAY

A. Cable Tray System

1. Cable tray shall be aluminum construction.
2. Cable tray cross members shall be factory welded at 12" intervals maximum.
3. Cable tray shall be equipped with one (1) or two (2) support rails that run the length of each segment.
4. End caps shall be installed on the exposed ends of the cable tray, channel supports and bolts. Protective covers shall be installed on threaded rods that come in contact with cabling plant.
5. Wall mount cable tray used in limited clearance areas shall be hook style and constructed of aluminum.
6. Provide all cable tray hardware accessory assemblies required to properly install cable tray system per manufactures requirements.
7. See Drawings for cable tray dimensions.

11.04 CABLE HANGERS

A. J-Hooks

1. J-hooks shall provide sufficient width to comply with required bend radii of high-performance cables. J-hook shall be cULus Listed.
2. J-hooks shall have flared edges to prevent damage while installing cables.
3. J-hooks sized 1 5/16" and larger shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable and reusable and be suitable for use in air handling spaces.

11.05 CABLE TRAY SYSTEM

A. Install trays in accordance with recognized industry practices, to ensure that the cable tray equipment complies with requirements of the NEC.
B. All open trays shall be installed a minimum of six (6) inches away from any light fixture.
C. Provide external grounding strap at expansion joints, sleeves, crossover and other locations where tray continuity is interrupted.
D. Support all pathways from building structure. Do not support pathways from ductwork, piping or equipment hangers.
E. Install cable tray level and straight.
F. Provide all hardware, accessories, fasteners, anchors, threaded rods and support channels required to provide a complete cable tray system.
G. Cable trays shall not be used to house both low voltage and power cables unless cables are separated by a grounded physical barrier.
H. Cable tray system shall be grounded in accordance with ANSI/TIA-607-B.

11.06 CABLE HANGERS

A. Installation and configuration shall conform to the requirements of ANSI/TIA-568-C.0, ANSI/TIA-568-C.1 & ANSI/TIA-569-B, NFPA 70 (National Electrical Code), applicable local codes, and to the manufacturer's installation instructions.
B. Install cables using techniques, practices, and methods that are consistent with Category 6 or higher requirements and that supports Category 6 or higher performance of completed and linked signal paths, end to end.
C. Install cables without damaging conductors, shield, or jacket.
D. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer.
E. Pull cables without exceeding cable manufacturer's recommended pulling tensions. Use pulling means that will not damage media.
F. Do not exceed load ratings specified by manufacturer.
G. Adjustable non-continuous support sling shall have a static load limit of 100 lbs.
H. To avoid electromagnetic interference (EMI), pathways shall provide minimum clearances of four feet from motors or transformers, one foot from conduit and cables used for electrical power distribution, and five inches from fluorescent lighting. Pathways shall cross perpendicular to fluorescent lighting and electrical power cables or conduits.

PART 12 – GROUNDING AND BONDING

12.01 APPROVED PRODUCTS

A. Approved Grounding Lug Manufacturer(s)

1. Harger
   a) 2 Hole Compression Lugs Part #GECLB62A
2. Hoffman
   a) 2 Hole Compression Lugs Part #DGCL61
3. Or Approved Equal

B. Approved Grounding Busbar Manufactures(s)

1. Harger
   a) Wall Mount TMGB Ground Bar Part #GBI14412TMGB
   b) Wall Mount TGB Ground Bar Part #GBI14212TGB
   c) Rack Mount Ground Bar Part #RGBHKIT14119.25
2. Hoffman
3. Or Approved Equal

C. Approved OSP Cable Shield Bond Connector Manufacturer(s)

1. 3M
   a) Shield Bond Connector Part #4460-S
2. Or Approved Equal

12.02 GROUNDING CONDUCTORS

A. Grounding Conductor

1. Construction shall be Type THHN copper conductors, insulated with heat and moisture resistant PVC over which a UL listed jacket is applied.
2. Jacket color shall be green.

12.03 GROUNDING LUGS

A. Grounding Lugs and Hardware

1. Grounding lugs shall be 2-hole compression type irreversible. Stainless steel bolts and washers shall be used to install lugs to equipment and grounding bus bars.

12.04 GROUNDING BUSBARS

A. Grounding Busbar

1. The grounding busbar shall be made of 1/4" thick solid copper.
2. The grounding busbar shall be installed with minimum clearance, 1" offsets and 1-1/2" insulators.
3. The grounding busbar shall accommodate 2-hole compression lugs.
4. The grounding busbar shall meet or exceed ANSI/TIA-607-B requirements.

12.05 GROUNDING

A. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all communications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor. The TBB shall be installed independent of the building's electrical and building ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA-607-B Telecommunications Bonding and Ground Standard.

B. The main entrance facility/equipment room (EF/ER or MDF) in each building shall be equipped with a telecommunications main grounding busbar (TMGB). Each telecommunications room (TR or IDF) shall be provided with a telecommunications ground busbar (TGB). The TMGB shall be connected to the building electrical entrance grounding facility.

C. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the EF, ER, or TR shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression lugs.

D. All wires used for communications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with green tape. All cables and busbars shall be identified and labeled in accordance with the ANSI/TIA-606-A.

PART 13 - LABELING

13.01 LABELING REQUIREMENTS

A. Labeling shall be done in accordance with the recommendations made in the ANSI/TIA-606-A document, manufacturer's recommendations and best industry practices.
B. All spaces, pathways, outlets, cables, termination hardware, grounding system and equipment shall be labeled with machine-generated labels.
C. All labels shall be clear with black text.
D. All cables shall be labeled with machine generated, wrap around labels. Handwritten labels will not be accepted.
E. A total of three (3) labels per horizontal cable are required at the following intervals: 6" from outlet; 18" from outlet' 12" from termination block/patch panel.
F. Labeling scheme shall be alphanumeric. Verify labeling scheme requirements with Owner prior to installation.

PART 14 - TESTING

14.01 TESTING REQUIREMENTS

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA-568-C.0, ANSI/TIA-568-C.1 and/or ANSI/TIA-1152. All conductors/strands of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors/strands in all cables installed.

B. Copper Testing

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category 6 performance. Horizontal balanced twisted pair cabling shall be tested using a level IIe, III, or IV test unit for category 6 performance compliance.
2. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. The test shall be recorded as pass/fail as indicated by the test unit and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.
3. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA-568-C.2 Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.

C. Fiber Testing

1. All fiber testing shall be performed on all fibers in the completed end-to-end

system. There shall be no splices unless clearly defined in the RFP and/or Drawings. These tests also include continuity checking of each fiber.

2. Singlemode

A. Test the optical fiber cable bi-directionally with an OTDR and uni-directionally with a power meter/light source. Fiber must be tested at both 1310nm and 1550nm. Maximum attenuation dB/Km @ 1310nm/1550nm shall be 0.5/0.5 for outside plant and 1.0/1.0 for inside plant. Maximum attenuation per connector pair shall be .75 dB. Attenuation testing shall be performed with a stable launch condition using one-meter or two-meter jumpers to attach the test equipment to the cable plant. The light source shall be left in place after calibration and the power meter moved to the far end to take measurements. Test set-up and performance shall be conducted in accordance with ANSI/TIA-568-C.3 and to the manufacturer's application guides.

B. All fiber optic stands shall be tested utilizing the “Method B” one jumper reference.

D. Test Results

1. Test documentation shall be provided on disk as part of the as-built package. The disk shall be clearly marked on the outside front cover with the words “Project Test Documentation,” the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair (or strand) and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle will be required on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.
2. The field test equipment shall meet the requirements of ANSI/TIA-568-C.2, ANSI/TIA-568-C.3, and/or ANSI/TIA-1152.
3. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. Alternately, the Contractor may furnish this information in electronic form (CD). These CDs shall contain the electronic equivalent of the test results as defined by the Specification and be of a format readable from Microsoft Word.
4. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

PART 15 – DOCUMENTATION, AS-BUILTS, TRAINING AND RECORDS

15.01 DOCUMENTATION & AS-BUILTS

A. As-Built record documentation for communications work shall include:

1. Cable routing and identification
2. System function diagrams
3. Manufacturers' description literature for equipment
4. Connection and programming schedules as appropriate

5. Equipment material list including quantities
6. Spare parts list with quantities if required.
7. Details not on original Contract Documents
8. Test results
9. Warranties
10. Release of liens

B. The Contractor shall provide and maintain at the site a set of prints which shall accurately show the actual installation of all work under this section, indicating any variation from contract drawings, including changes in pathways, sizes, locations and dimensions. All changes shall be clearly and completely indicated as the work progresses.

C. Progress prints shall be available for inspection by the Owner or any of his representatives and may be used to determine the progress of communications infrastructure work.

D. At the completion of the work, prepare a new set of as-built drawings, of the work as actually noted on the marked-up prints, including the dimensioned location of all pathways.

E. Furnish as-built drawings and documentation to the Project Manager. As-built drawings shall be generated in AutoCad 2006 or later and Visio formats. Submit as-built drawings electronically on C.D. and hard copy.

15.02 OPERATIONS AND MAINTENANCE MANUAL

A. After completion of the work, the Contractor shall furnish and deliver to the Engineer three (3) copies of a complete Operations & Maintenance Manual. A system wiring diagram shall be furnished for each separate system.

B. The manual shall be subdivided into separate sections with tab dividers to identify subsystems of the integrated system. Reference appropriate Specification sections.

C. Provide the following additional information for each electronic system. Information shall be edited for this project where applicable.

1. Point-to-point diagrams, cabling diagrams, construction details and cabling labeling details

15.03 TRAINING

A. The Contractor shall be responsible for training of facility personnel. Training shall take place after occupancy and before acceptance and shall include programs for on-site operations and maintenance of technology and communications systems. Training shall be held at the Owner's site and shall be of sufficient duration and depth to ensure that the trained personnel can operate the installed systems and can perform usual and customary maintenance actions.

15.04 WARRANTY

A. General

1. All equipment is to be new and warranted free of faulty workmanship and damage.
2. Replacement of defective equipment and materials and repair of faulty workmanship within 24 hours of notification, except emergency conditions (system failures), which must be placed back in service within eight (8) hours of notification, all at no cost to the Owner.
3. The minimum warranty provisions specified shall not diminish the terms of individual equipment manufacturer's warranties.

B. Voice & Data Structured Cabling

1. Manufacturer(s) shall provide a minimum 25-year warranty for components used in the installed Structured Cabling System. Defective and/or improperly installed products shall be replaced and/or correctly installed at no cost to the Owner.
2. Contractor shall provide a 1 year material, labor and workmanship warranty on all products installed under this contract against any defects. Defective and/or improperly installed products shall be replaced and/or correctly installed at no cost to the Owner.

END OF SECTION