

Phoenix V Atrium Settlement Project Update and Slab Recommendations

Prepared for:

Phoenix V Owner's Association

Phoenix V Condominiums
24400 Perdido Beach Blvd.
Orange Beach, Alabama 36561



Project No: 22-1101-0172

9/30/2022



thompson
ENGINEERING



September 30, 2022

Phoenix V Condominiums

24400 Perdido Beach Blvd.

Orange Beach, AL 36561

Via Email: edl@coastlinemgmt.net

Attention: Mr. Ed Lipinsky

Subject: **Atrium Settlement Project Update and Slab Recommendations**
Phoenix V Condominiums, Orange Beach, AL
Thompson Project No.: 22-1101-0172

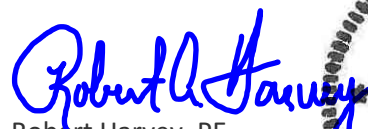
Dear Mr. Lipinsky:

Pursuant to your request, Thompson Engineering has performed a site visit condition assessment and structural analyses of the existing atrium structure at the Phoenix V Condominium in Orange Beach, AL. The purpose of this evaluation was to determine a mitigation plan to arrest the settlement of the building's atrium structure. Please find enclosed the Phoenix V Atrium Settlement Project Update and Slab Recommendations.

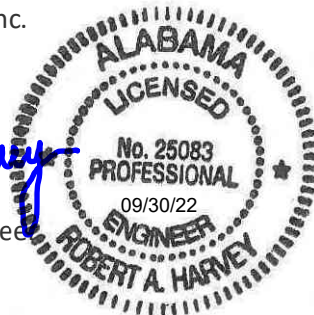
Thompson Engineering appreciates the opportunity to provide our professional services to the Phoenix V Owner's Association. If there are any questions regarding the report including our recommendations or if additional information is required, please feel free to call.

Respectfully,

Thompson Engineering, Inc.



Robert Harvey, PE
Principal Structural Engineer



Jared Blount, EI
Associate Engineer

Alabama | Florida | Georgia | Louisiana | Mississippi | North Carolina | Tennessee | Texas

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1. Background

Thompson Engineering was contracted to perform a site visit condition assessment and atrium settlement mitigate plan for the Phoenix V Condominium in Orange Beach, Alabama. The scope of work entailed design of the vertical support of the building's atrium columns and provision of recommendations regarding the floor slab. The condominium is located approximately 1.5 miles west of SR-161 on the beach along Perdido Beach Blvd. The steel framed atrium on the north side of the building is experiencing settlement due to loss of supporting soils beneath the spread footings that support the steel columns and the concrete slab on grade. Robert Harvey, PE and Jared Blount, EI of Thompson Engineering performed the site visit condition assessment on July 28, 2022.

2. Structural Evaluation

The purpose of the site visit condition assessment was to record elevation readings throughout the building's atrium structure to determine the extent of settlement that has occurred throughout the atrium. The amount of settlement measured throughout the atrium at the time of the site visit varied from 0" to 3.2".

The site visit also provided opportunity to field verify existing atrium structural member sizes and locations. The survey validated the information provided in the building plans. This information was used for the structural analysis.

An analytical model was built for the building's atrium existing conditions using RISA-3D structural analysis software. The purpose of the model was to determine the stresses in the atrium's supporting steel members as a result of the settlement and to determine the loads that the new pile support system will need to carry. RISA-3D is a 3D finite element structural analysis software that is used to perform structural analyses. For this project, the as-built model was created representing the condition of the atrium structure as originally designed and built. The software then allows for input of an "enforced displacement" of the support locations. The field settlement at the column base locations provided the input for the "enforced displacement" values in the structural model.

The model was initially analyzed for the original conditions to validate the original design. The structure was determined to be adequate and well within allowable stress limits for the structural framing members of the atrium. Following the initial analysis, the "enforced displacement" at the bases of the columns were applied to the structural model. The results of the analysis showed that one of the columns is currently 23% overstressed due to settlement as shown as the column in red in **Figure 1**. It is apparent from the results of the model that the overstress is a result of the displacement or settlement of the column in combination with the fact that the overstressed column is also part of a very short frame that ties into the elevator shaft. The short length of the span does not allow as much displacement as the other longer spans resulting in overstressing at that location specifically. The model was finally run with a reduced displacement of 1" (representing jacking the column 1") which assured that all of the atrium members were within allowable stress limits following jacking of the single overstressed column.

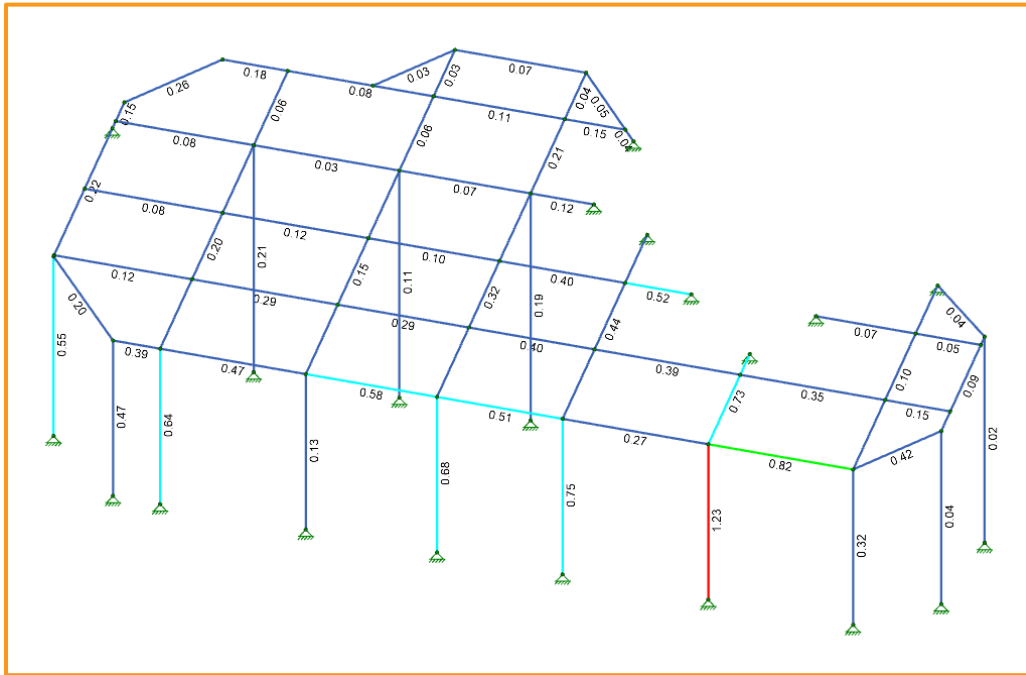


Figure 1 - 3D Analytical Model from RISA-3D

3. Structural Design and Recommendations

Thompson Engineering has prepared a mitigation plan to arrest the settlement of the building's atrium structure. The plan includes adding helical piles underneath the existing concrete spread footings. The repair plan will also include a detail to jack the current overstressed column up to a point where the stresses within the column are within an allowable range. To repair the concrete slab on grade, Thompson recommends demolishing the existing concrete slab, bringing in and compacting fill material to replace the material that was lost and either:

- Reconstruct the concrete slab on grade with a defined control joint (in the tile as well) to help prevent widespread cracking of the concrete slab and tile should the slab settle if support soils are lost in the future
- OR
- Constructing a structural concrete slab that is supported by helical piles that would prevent slab settlement if support soils are lost in the future. Design of this system was not included in this scope of work.
 - Due to the cost of the work, mud-jacking or raising of the slab with urethane injection is not a preferred method for this project. This is primarily because the quality control is very easy to obtain with traditional demolition of a slab-on-grade and replacement vs. injection or pumping methods that when complete still have the same original slab and tile that need to be repaired.

4. Conclusion

Thompson has completed the analysis phase of this project and design of the repair for the Phoenix V atrium structure. We appreciate this opportunity to be of service to you on this project. Should you have any questions or need further assistance, please do not hesitate to call on us.