



Consulting Structural Engineers

March 11, 2021

Mr. Henry Angelino, General Manager
Coronado Cays Homeowners Association
505 Grand Caribe Causeway
Coronado, CA 92118

Subject: Structural Investigation
Montego Village Parking Garage, Coronado Cays
Coronado, California

Dear Mr. Angelino:

At your request, and in accordance with our agreement dated January 25, 2021, we have conducted a limited structural investigation of the concrete parking structure and tennis deck located in the Montego Village development. The purpose of our investigation was to provide a second opinion regarding damage visible to the raised concrete structural slab of the parking structure and provide preliminary recommendations for repair or replacement of the structure.

Property Description

The property is located at the north end of the Coronado Cays development, east of Silver Strand Boulevard in Coronado, California. Originally constructed in approximately 1981, the deck supports two tennis courts and provides covered parking below. The structure is specified to have an eight-inch-thick raised post-tensioned concrete deck supported by 16-inch square reinforced concrete columns. There are concrete masonry walls at various locations around the perimeter of the garage which are not structurally attached to the concrete deck. The structural drawings that we have do not indicate who the engineer-of-record was for the building. The drawings were signed and sealed by Robert J. Marvick, Registered Building Designer No. 424. Back in the early 1980's it was not uncommon for structural engineers to provide "calcs and sketches" to the architect (or in in this case the building designer) at which point all the drafting would be done by the architect who would in turn sign and seal the documents. That may have been what occurred on this project. According to the notes on the structural drawings and the dates of approval, it appears that the building was intended to be designed and constructed under the 1976 Uniform Building Code.

Investigation

During our investigation, we reviewed the following documents which were provided to us:

- Original structural plans, *"Proposed Parking Structure for Signal-Landmark, Coronado Cays,"* dated as follows:
 - Delta 3: B.D. January 28, 1981, unsigned, reviewed by Coronado Building Department January 28, 1981.
 - Delta 3: B.D. January 28, 1981, unsigned with redmarks by unknown persons.
 - Delta 3: Post Revision February 24, 1981, unsigned.
 - Delta 2: Building Department Corrections, August 13, 1979, signed and sealed by Robert J. Marvick, AIBD, and approved by Coronado Building Department January 18, 1980.
 - Delta 2: Building Department Corrections, August 13, 1979, unsigned.
- "Post Tensioned Slab,"* Sheet PT-1 dated July 15, 1980 with a City of Coronado Approval date of February 20, 1981, signed and sealed by Richard V. Stage, SE No. 1217.
- Reports by Dunn Savoie Inc., entitled *"Coronado Cays - Tennis Topped Parking Garage Recommendations,"* stamped and signed by Rhett M. Savoie, P.E., dated January 29, 2021 and February 3, 2021.
- Testing report titled *"Concrete Testing Report, Parking Structure, 2 Montego Court, Coronado, CA,"* by Leighton and Associates, Inc., stamped and signed by Nick Tracy, P.E. and Mike Jensen, CEG, dated January 15, 2021.

Our office also performed two site visits to observe the damage to the structure. We discussed testing and repair methodologies for damaged concrete with engineers from Structural Technologies, LLC on multiple occasions. Structural Technologies also provided rough-order-of-magnitude opinions of probable construction costs for possible repairs to the structure and for the option of replacing the existing structure with a new concrete structure.

Observations

Two site visits were performed by our office. On January 19, 2021, Carl H. Josephson, S.E. performed a preliminary visit to the site. On February 10, 2021, William A. Miller, S.E. visited the site, along with Gaetano Bologna, P.E., of Structural Technologies, and performed a visual, non-invasive walkthrough of the structure to observe and document the readily visible distress in the concrete and testing locations previously inspected by Dunn Savoie's office.

The distress observed in the structure during the site visits was in the form of concrete cracks and some limited spalling. At the top surface, there were numerous cracks which ran in various directions predominantly above the locations where the concrete support columns were located below. Also, at locations where concrete had been previously removed, post-tension tendons and reinforcing near the

top surface were observed with heavy corrosion. Some of the post-tension tendons were broken and the corrosion of the reinforcing bars resulted in significant reduction in the cross-sectional area. The concrete cover at the top of the slab was less than one inch. This appears to be in accordance with the original structural plans which specified a clear cover at the top of the slab of $\frac{3}{4}$ ". This dimension is allowed by code when concrete is not exposed to weather and this is typically only specified in this situation if the top of the slab is to be waterproofed. However, it does not appear that waterproofing was ever installed on the slab. Water staining was observed where water had ponded at low areas of the deck. At one of these locations, deflections in excess of $\frac{3}{4}$ " were measured. Noticeable sagging was also observed at the spans along the perimeter of the garage.

At the bottom side of the concrete deck, linear cracks near the mid-span between the columns were observed with some areas of efflorescence and a few small areas of concrete spalling. Efflorescence indicates that some water is passing through the slab at the cracks. At one location at the perimeter, the tendon anchors and tendon tails were exposed and had heavy corrosion.

In the report by Dunn Savoie, it was discussed that an attempt was made by a concrete repair company, ALS Reinforcing Steel, Inc., to repair a portion of the slab and some broken tendons. During the repair, additional tendons broke and the work was halted in fear of damaging further tendons.

Conclusions & Recommendations

We have not been able to determine the design intent for the original lateral resisting system. It appears to either rely on cantilevered concrete columns or a "frame" system that was made up of both the columns and the post-tensioned slab. Based on the age of the structure and given the significant changes to the building codes since the structure was originally designed and constructed, as best we can tell without reviewing the original structural calculations, the original design does not comply with current building code seismic requirements.

In the Leighton Consulting report, several items stood out---the reduced concrete strength and high levels of chlorides in the top two to three inches of the concrete deck. An average concrete compressive strength of 2,650 psi was found, which is less than the originally specified concrete strength of 4,000 psi. It was surprising to us and to the other consultants that we talked to that the concrete breaks were so low. If we were to inspect the garage deck further, we would have undertaken a broader and more robust testing program to develop a better and more comprehensive understanding of the concrete strengths throughout the building.

High levels of chlorides in the concrete, in the presence of moisture, have been found to increase the corrosion rates for metals embedded in concrete. The chloride levels that were reported in the Tourney Consulting Group report, included in the Leighton report, clearly showed the highest concentrations at the top of the slab, decreasing with depth in the slab. This indicates that the chlorides were from an environmental source as opposed to being cast into the concrete during construction. The chloride levels at the top of the slab were extremely high and will need to be addressed. We observed significant

distress to the concrete due to corrosion of the reinforcing steel and post-tension tendons. In addition, the corrosion has resulted in the reduction in the strength capacity of the reinforcing steel and likely the concrete as well. The parking structure does not have the strength to remain in place in its current condition. We do not have an estimate on the current life of the structure without any remediation, but the upper deck of the garage should not be used and be considered off-limits to the public. It is only a matter of time before the strength capacity of the structural deck is reduced such that it will no longer support its own weight. We do not see this as an imminent occurrence, as it may be a matter of a year or it may be several years. Even with additional data from more testing, it would be very hard to provide a narrow estimate.

We discussed with Structural Technologies options to either remediate the existing structure in its current condition or construct a new similar concrete structure, and what the construction costs for each may entail. Below we discuss three remedy options for consideration: a) remove the existing structure and construct a new similar concrete parking structure, b) perform additional testing and repair the existing structure, and c) remove the existing structure and construct light-framed garages.

- a) *New Parking Structure:* As part of our discussions with Structural Technologies we asked if they could provide an opinion of probable construction costs for the replacement of the garage with a similarly configured concrete structure. Structural reached out to several contractors familiar with building concrete parking structures and received back a rough-order-of-magnitude opinion of probable construction cost from only one contractor. The opinion they received was that the cost would likely be between about \$2 million to \$3 million. This did not include the cost to remove the existing structure.
- b) *Repair the Existing Structure:* Further testing would need to be performed to confirm and supplement the testing previously completed and to determine the extent of the damage to the concrete deck, the post-tensioning tendons, and reinforcing, and ultimately whether repairs could even be economically undertaken. We estimate that the costs for an additional testing program would range between about \$20,000 to \$30,000. Based on the current information provided and the work performed to-date, Structural Technologies opinion is that the probable costs to repair the existing structure (if it is even possible) would likely be between \$1 million to \$1.5 million. Additionally, the extent of repairs could encompass a large enough portion of the structure that, to get a permit, the city building department may require that the building be retrofitted to comply with current building code requirements. This could significantly increase the costs of repair.
- c) *Remove Existing Structure:* The costs for this option will vary greatly depending on what is ultimately constructed to replace the existing structure. A new light-framed structure could vary from steel-framed shade covers to enclosed wood or light-gauge steel-framed garages. Whether or not this option is available may depend on whether Coronado Cays is required by the city to maintain a tennis court on the property at this location.

Uncertainties and Limitations

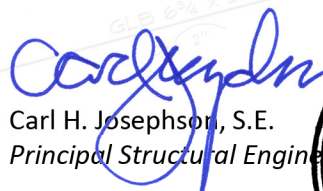
Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineers practicing in the structural field in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This letter is intended to present our finding from a limited investigation of observed conditions within readily accessible areas of the site and analyzed within the scope of work and time frame defined by the client. During the investigation, we did not have access to the original calculations or soils reports for the structure. We did not perform any destructive or invasive testing of any portion of the buildings.

The conclusions and recommendations that are contained in this report may be subject to change as more information becomes available and more work is performed. This letter has been prepared for the client to be used solely in the evaluation of the subject property as previously described. This letter has not been prepared for use by other parties and may not contain sufficient information for purposes of other parties or uses other than those stated. Any opinions of probable construction costs that are provided in this report are for planning purposes only and are rough estimates at best. Care should be taken when using these numbers and it may be necessary to further verify the accuracy of these opinions.

We appreciate the opportunity to be of service. Please feel free to call us if you have any questions or require any clarification regarding items that were discussed in this report.

Sincerely,

JOSEPHSON-WERDOWATZ & ASSOCIATES, INC.


Carl H. Josephson, S.E.
Principal Structural Engineer



3/11/2021


William A. Miller, S.E.
Senior Associate Engineer



3/11/2021

cc: Jon Epsten, Esq., Epsten, APC