KARINS ENGINEERING

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Sarasota, FL 34236
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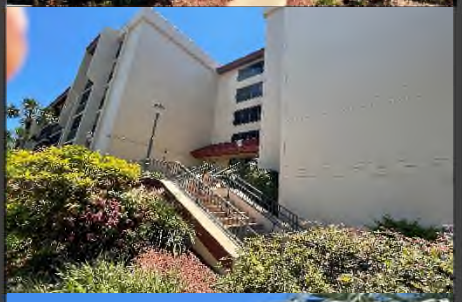
Existing Building Assessment Report



KEG Project 22RS-0193
August 31st, 2022

Project for:

Promenades East Condominium Association, Inc.
21405 Olean Boulevard
Port Charlotte, FL 33952

THIS ITEM HAS BEEN DIGITALLY SIGNED & SEALED BY DAVID G. KARINS, PE ON THE DATE ADJACENT TO THE SEAL

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August 31st, 2022

Mr. Terry Owens
Promenades East Condominium Association, Inc.
21405 Olean Boulevard
Port Charlotte, FL 33952

RE: *Promenades East Existing Condition Survey*
21405 Olean Boulevard, Port Charlotte, FL 33952
KEG File# 22RS-0193

Via Email: promeast@comcast.net

Dear Mr. Owens and Members of the Board:

Karins Engineering Group, Inc. (KEG) agreed to render professional engineering services in connection with a building envelope and structural component existing condition survey at **Promenades East Condominiums, Inc.,** located at **21405 Olean Boulevard, Port Charlotte, FL 33952**, (hereinafter called the "Project" and the "Client"). Per the executed agreement dated March 4th, 2022, KEG made multiple site visits to Promenades East on April 5th, 7th, 14th, 15th, 26th and May 2nd, 16th 2022, to complete a limited condition observation and evaluation of the building conditions and construction, as it relates to the building envelope and related structural components that were readily accessible.

Our observations are intended to identify significant deficiencies, problems or on-going maintenance concerns that are visible at the time of our observations; the intent of our review was to ascertain the general condition of these components and to make recommendations for appropriate repair and protection. This included an inspection from the exterior ground, roof, balconies, and parking garage areas that were readily accessible.

This structural inspection is for the sole purpose of identifying structural deficiencies of the building or structure that pose an immediate threat to life, safety, or where failure of a critical component is imminent. This structural inspection shall be for the purpose of determining the structural condition of the building or structure to the extent reasonably possible of any part, material, or assembly of a building or structure which affects the safety of such building or structure and/or which supports any dead or designed live load.

Neither our observations nor this report is intended to address hidden defects, mechanical, electrical, architectural, code compliance, or other areas of the building not specifically mentioned herein. Our investigation was not intended to be exhaustive or to detect deficiencies except as specifically mentioned herein. Due to the limited scope of this investigation, we cannot attest to the structure's compliance with applicable building codes and/or accepted construction techniques, except as noted herein. KEG did not attempt to verify the adequacy of the original design or supplant the responsibility of the Engineer of Record.

Figure 1 - Aerial View of Promenades East from Google Earth Outlined in Red

NOTE:

At the time of the writing of this report, Charlotte County has no in-force policy requiring inspections on buildings over the age of 40 years.

EXECUTIVE SUMMARY

Promenades East located just walking distance from downtown Port Charlotte, Florida. Promenades East is approximately 15.4 miles from the Gulf of Mexico. Promenades East is a community of 147 unit condo association offering an assortment of beautiful styles, varying sizes and affordable prices located in beautiful Port Charlotte, Florida. The grounds have lush landscaping, an Olympic sized pool, a 5-person hot tub, parking garage and a clubhouse with a full kitchen. The six floor main building has two elevators, a full fire sprinkler system, a backup generator, and a security/entry system.

It is the understanding of KEG that the building's main construction is comprised of conventionally reinforced steel columns with post tensioned lift slabs used between floors. The foundation for the building towers appears to institute the use of spread footings. The ground floor consists of a traditional 4-inch slab-on-grade while the elevated floors are comprised of 8-inch post tensioned lift slabs supported by steel collars and reinforced concrete columns. Additionally, masonry shear walls and steel cross bracings are utilized in the structure to resist in-plane lateral forces. The exterior walls of the building envelope are constructed using infill CMU (Concrete Masonry Unit) block.

Based on the scope of the inspection and for the areas that were able to be assessed, within a reasonable degree of engineering certainty, we have not observed any conditions that would compromise the safety of the building for its intended use and occupancy. We reserve the right to amend our opinion should new information be brought to our attention.

GENERAL INFORMATION

KEG visited Promenades East on April 5th, 7th, 14th, 15th, 26th and May 2nd, 16th 2022. During our visits, KEG observed the following building components with the help of maintenance:

- Exterior Grounds
- Roof assembly systems
- Unit Balconies
- Parking Garage

KEG's visit was observational only. No destructive testing was undertaking during the tenure of our time at Promenades East. KEG **did not** observe the following:

- Major mechanical components beyond obvious deterioration
- Major plumbing components beyond obvious deterioration and present leaks
- Doors and windows beyond visual inspection.
- Exterior inspection of exterior finish beyond a ground floor level and unit balconies
- Foundations or groundwork including pile caps
- Major drainage systems

KEG was provided with building plans for review during the making of this report. These plans are not known to be as-built drawings. KEG did not review every subsection of the drawings. No attempts to pull public records were made. Historical documents were provided by the client at the time of this report. Updates to this edition can be made if further information is provided.

SCOPE OF STRUCTURAL INSPECTION:

1) Concrete Systems, Columns and Beams
2) Roofing Systems
3) Exterior Finishes
4) Windows and Doors
5) Life Safety
6) Balconies
7) Parking Garage

KEG did not find it necessary to demolish any areas for further investigation.

REFERENCES AND CONTACTS:

KEG reviewed the following documents and discussed the making of this report with the following contacts:

Documents:

- Robert Wade & Associates
  Architects and Urban Planners
  520 Brickell Key Drive
  Suite 201
  Miami, Florida 33131

Contacts:

- Terry Owens – Property Manager

OBSERVATIONS

1. Concrete Systems, Columns and Beams

A. Concrete Systems

As previously mentioned, the elevated floors and roof structures at Promenades East appears to consist of reinforced 8-inch post tensioned concrete lift slabs. This form of construction can be observed throughout the building envelope and identified in the provided plans. The foundation and accompanying systems were not observed or investigated at Promenades East as these areas were not easily accessible for observation. It should be noted that KEG did not observe any signs of distress, such as excessive settling, at the accessible components related to the foundation.

In most cases, steel rebar can be culprit of premature concrete deterioration when saline water particles are introduced to reinforcing steel housed inside structural members. This triggers the ferrous metal corrosion process. As a result, the reinforcing steel increases in volume, causing expansion within the concrete, such as cracking, spalling, or flaking. Areas of spalling and cracking were observed at select areas during our time at Promenades East.

Figure 1 – Spalling at the parking garage ceiling East side near clubhouse

Figure 2 – Spalling on balcony slab edge

Figure 3 – crack repair needed near front entrance of Promenades East

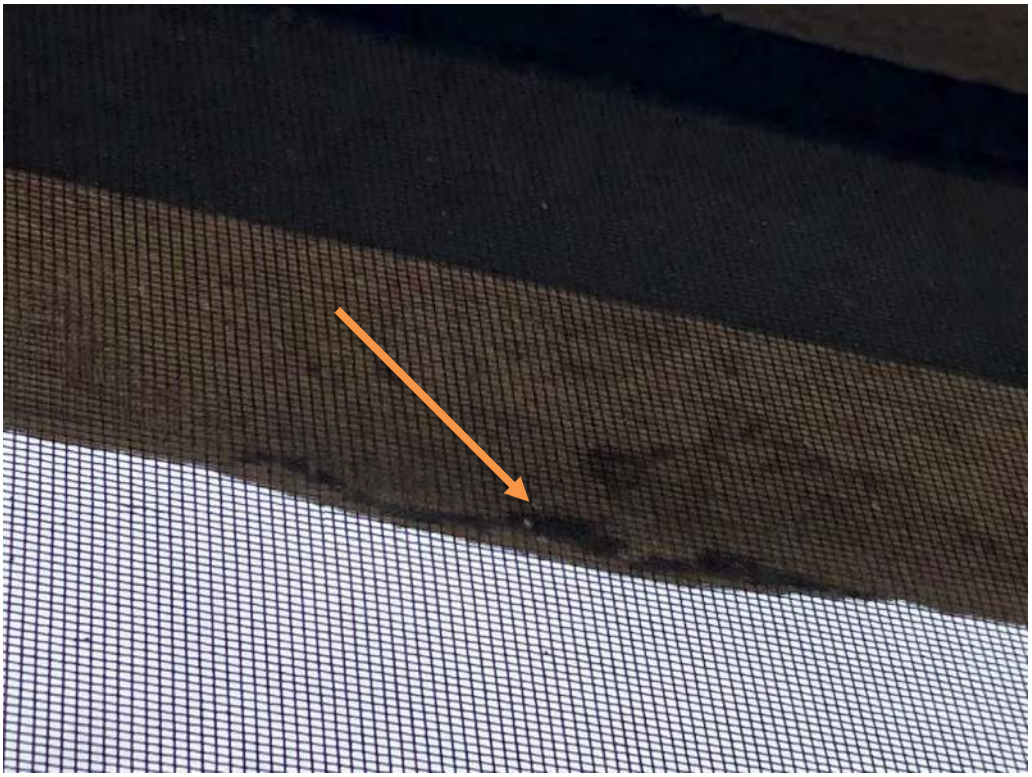

Figure 4 – Concrete spalling observed – Unit 224

Figure 5 – Spalling on balcony slab edge

B. Reinforced Concrete Columns

Reinforced concrete columns are employed throughout the building structure and support the vertical loads within the structure. In most cases, columns are concealed behind stucco, gypsum board, and other exterior/interior finishes. Due to the limited scope of this observation, Karins did not perform any destructive investigation to observe what was behind any exterior/interior finishes. Instead, development of cracks and stucco delamination were inspected to identify any areas of concern.

In select areas, stucco cracks and spalls were found in select units as well as on the exterior of the building's envelope. Such areas observed provide evidence that some areas of the building are susceptible to water intrusion. Such areas are advised to be sealed, repaired, or repainted to prevent such intrusions. Areas, where accessible, were sounded to identify if "hollowing" was identified. The following photos were taken to document the existing condition of reinforced columns below:

Figure 6 – Typical column found in the parking garage

Figure 7 – Stucco delamination identified at exterior column

Figure 8 – Identified spalling at column near secure entrance

Figure 9 - Identified spalling in parking garage

Figure 10 – Stucco crack on balcony wall Unit 533

CMU (Concrete Masonry Unit) block walls were implemented along the exterior of the building and were also found encasing the staircase systems and elevator/ storage rooms. Few areas around the exterior and service rooms were observed to have “stair stepping” cracks found along these locations. These cracks are not an immediate structural issue and typically form due to long-term settling, shrinkage, and expansion. While not an immediate threat to the buildings structure, the expansion of theses cracks can become wider due to a potential source for water intrusion. At a minimum, KEG recommends sealing these cracks to prevent costly concrete repairs in the future. The following figures exemplify a sampling of existing conditions identified.

Figure 11 – Typical CMU wall found in parking garage

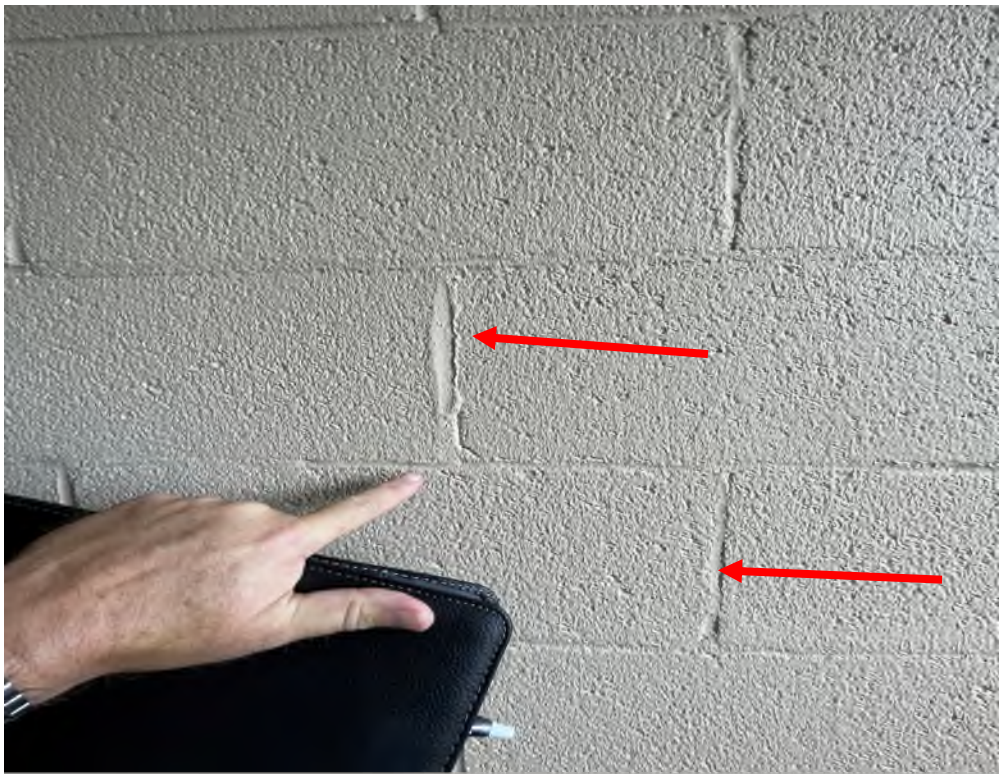

Figure 12 – Identified Stair stepping cracks located in the parking garage. Near Parking Spot 148.

Figure 13 – Existing areas needing repair along the CMU wall located near trash room

Figure 14 – Cracks and voids identified on the interior walls of the trash room

C. Reinforced Concrete Columns

Concrete beams were not observed inside of the building's main structural components; instead, reinforced masonry shear walls and steel cross bracings are included to resist lateral and transversal loads applied to the building. Tie-beams however were observed in stair casings systems as well as the trash room areas. Typically, deflections, or a "sagging" feature, is observed when a concrete beam is under excessive loads. Such features were not visible during our visits at Promenades East. In one instance spalling was observed in the lintel placed above the trash room area's entrance door at building 244.

Figure 15 – Typical column located in the Trash room

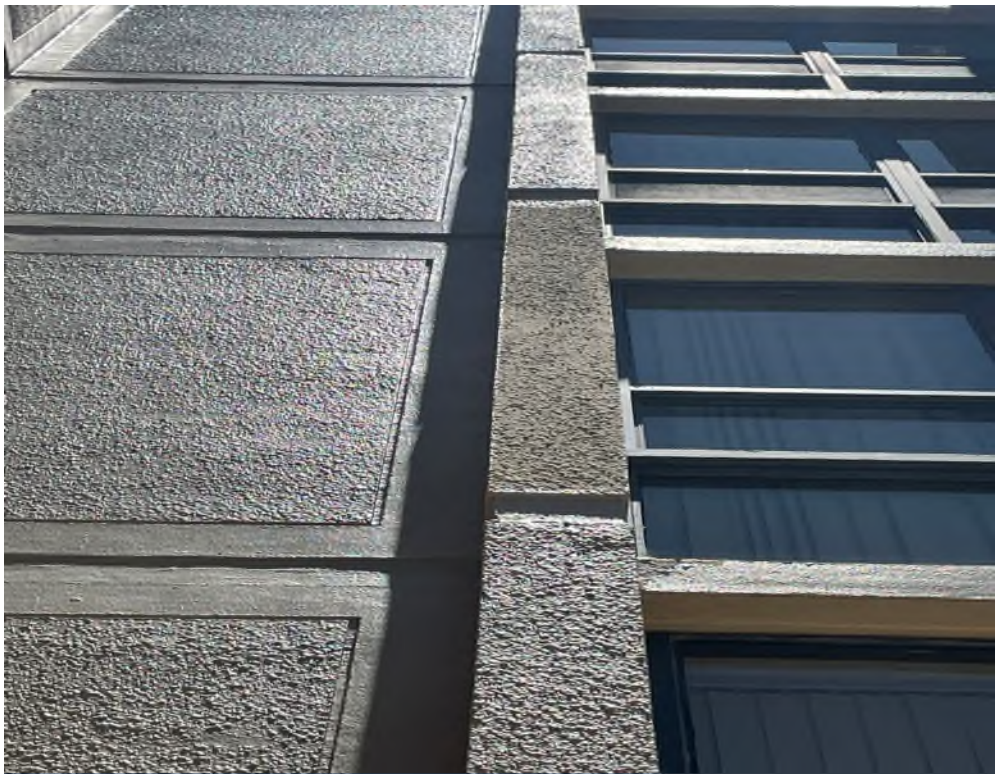

Figure 16 – Exterior columns with post tension slabs

Figure 17 – Front Entrance – Typical of building construction

2. Roofing System

A. Flat Roofing Systems

During KEG's visit to Promenades East, both roofs were observed for further analysis of its existing condition. Metal mansard roof panels are placed to encase the exterior parapet walls used on the perimeter of the roof. A Polyurethane foam roof is observed to be used at both buildings and used as the primary source of the protection for the underlying roofing elements. KEG could not verify if an existing roof or protective membrane was placed before the development of the Polyurethane reroofing placed circa 2014. Typically, Polyurethane foam roofs have a life span of 10 years with an additional top coating lasting up to 5 years. It has been brought to KEG's attention that roof inspections occur yearly and are inspected for continued maintenance. No leaks were reported by the association at the time of our visit to Promenades East. At select areas of the roof, the top and base coat has been damaged and requires some repairs to prevent intrusions of water into the underlying foam.

The mechanical equipment and A/C condensers current conditions range from good to poor, dependent on their date of installation. Some of the a/c tiedowns were observed showing signs of corrosion, but none were observed to be broken. Drainage vents are emplaced and are used as one of the roof's components of drainage. Overflow scuppers were observed, and areas of preexisting ponding water have been identified. The scupper detail is depicted in the following diagram. The following photos depict a sampling of the existing conditions identified:

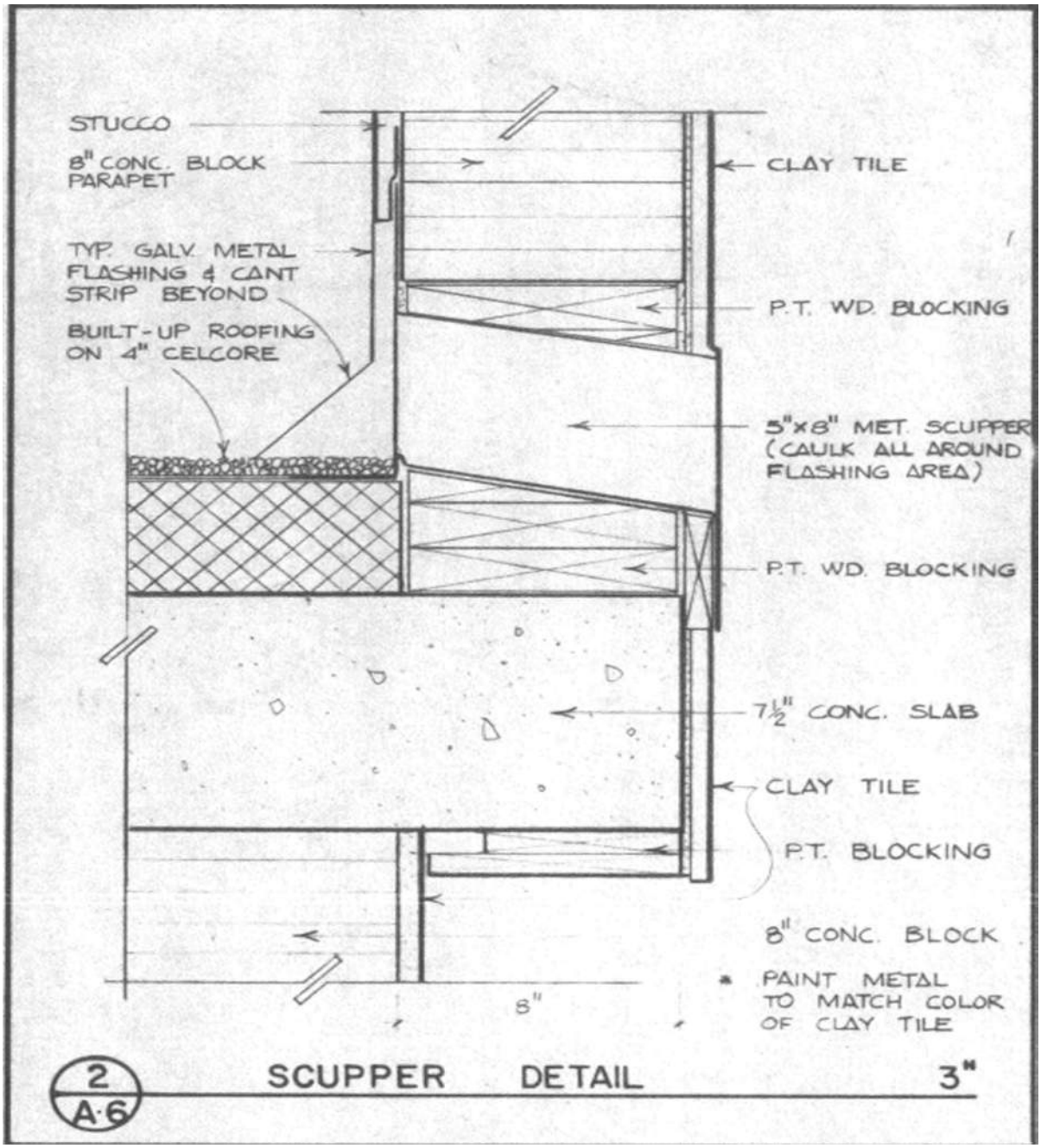
STUCCO
8" CONC. BLOCK PARAPET
TYP. GALV. METAL FLASHING & CANT STRIP BEYOND
BUILT-UP ROOFING ON 4" CELCORE
CLAY TILE
P.T. WD. BLOCKING
5"x8" MET. SCUPPER (CAULK ALL AROUND FLASHING AREA)
P.T. WD. BLOCKING
7½" CONC. SLAB
CLAY TILE
P.T. BLOCKING
8" CONC. BLOCK
* PAINT METAL TO MATCH COLOR OF CLAY TILE
8"
2
A-6
SCUPPER DETAIL
3"

Figure 18 – Overview of the roof

Figure 19 – Roof at end of life – cracks in membrane

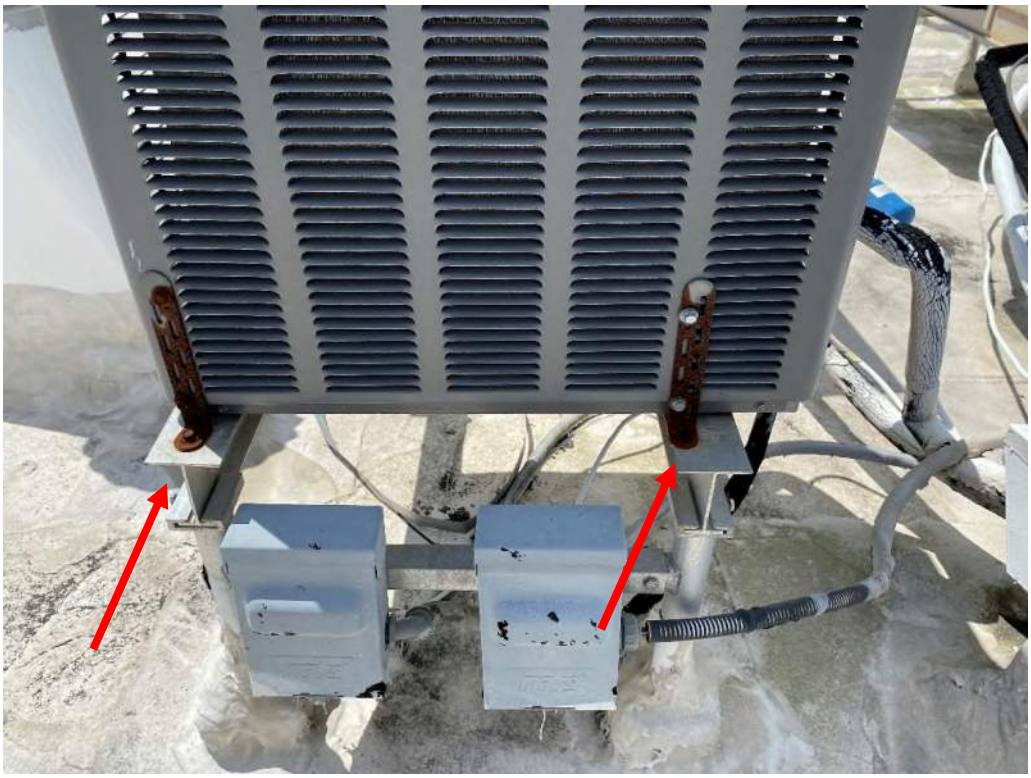

Figure 20 – Typical oxidated A/C tiedowns

Figure 21 – Upgraded A/C stands

Figure 22 – Damage susceptible to water intrusion

Figure 23 – Evidence of water ponding

Steel stairs are used on the roof for access to the differing roof levels. KEG observed areas where handrails have begun to oxidate and have been left unsealed around areas where the railings have been attached to the exterior of the parapet walls. Such voids in the sealant can allow for water penetrations into the CMU block wall. The stairwell located on the roof is observed to be deteriorated as the protective paint membrane has failed and allowed for much of the ferrous metal to corrode. The roof access hatch has corroded components and rusted latch. It should be replaced. The following photos depict a sampling of the existing conditions identified:

Figure 24 – Existing condition of the steel ladder on the roof

Figure 25 – Corroded Roof access

Figure 26 – Mount failing at wall to ladder attachment area

3. Exterior Finishes

A. Stucco & Paint Coatings

KEG inspected the exterior grounds the building for further analysis of the current existing conditions, paint and stucco observations appeared to be in good condition. The association informed KEG that the exterior of the building was painted in the last 2-3 years. Stucco delamination as well as spalling was evident in some instances – mainly along balcony slab edges. It should be noted that the exterior of the building was only observable from the exterior grounds, walkways and at balconies. A drone video was incorporated into the field inspection and used to determine locations of needed repair. Sprinkler units were found in close proximity to the building envelope in many cases. This can allow for constant exposure to moisture which can deteriorate the building envelope's protective elements at an accelerated rate. At some locations the exterior paint and sealant was observed to be depleted as a result. In the event that hairline cracks form in the paint coatings, it may eventually "swell up" with the accumulation of water. Water may sit in the paint membrane for some time and eventually permeate into the structure, following the path of least resistance. These areas mentioned are not an immediate major structural concern but could lead to potential issues in the future if left unaddressed for an extended amount of time.

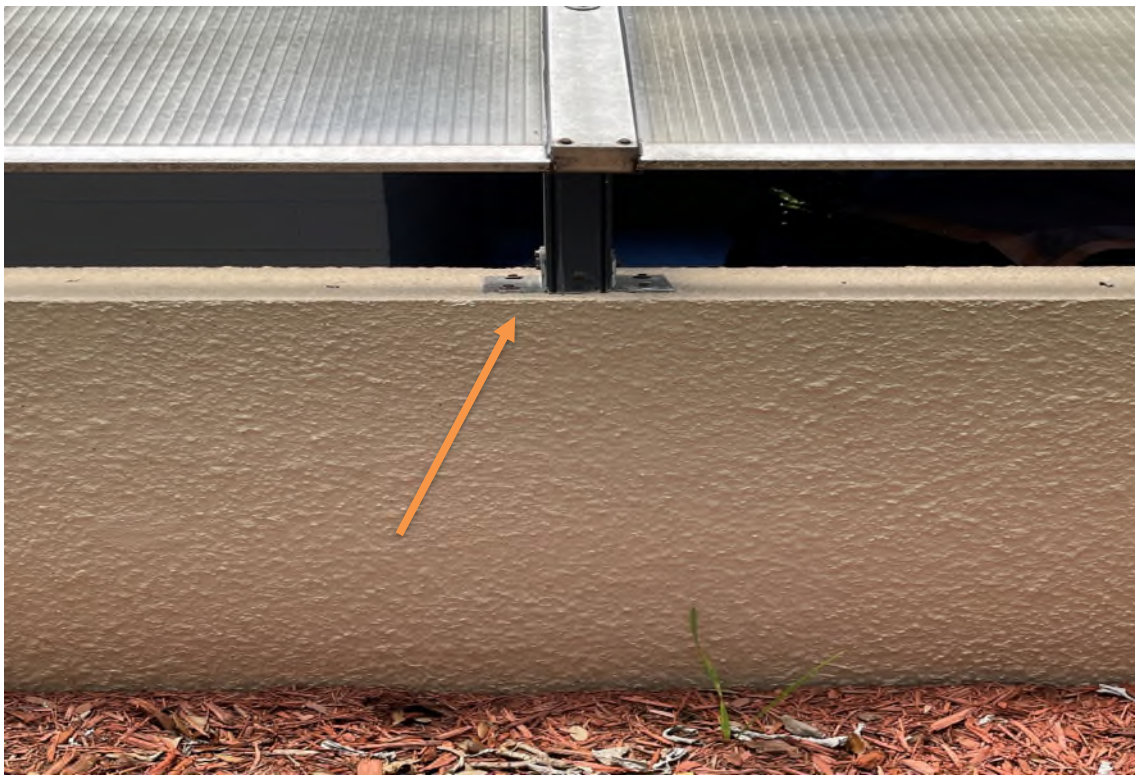

Figure 27 – Evidence of water intrusion at unsealed corroded fasteners on exterior wall of parking garage

Figure 28 – Possible moisture issue

Figure 29 – Paint discoloration due to constant water exposure

4. Windows and Doors

The windows and doors systems were not exhaustively observed or investigated at Promenades East. Sealant used around enclosed screen systems appeared to be in a state of failure at majority of all balconies inspected. Depleted sealant was also observed around sliding glass doors and balcony enclosures. The lack of sealant has allowed for water penetrations in some of the observed units. The unit entry doors are located on the interior of the building and appear to be in good condition from general observation. The windows on the exterior of the building were not observable past the ground level, besides those observed through the balconies on each floor.

With a general observation from the ground level and through drone observation, the windows appear to be in good condition. A more in-depth survey with high-reach access would be necessary to confirm this statement. The interior sliding glass doors (SGDs) leading out to the balconies and the exterior sliding glass doors that enclose the balconies range from excellent to poor, with some unit owners choosing to upgrade to current code-recognized impact-rated doors, while others have the original heat tempered SGDs. The following photos depict a sampling of the existing conditions identified:

Figure 30 – Typical sliding glass door

Figure 31 – Failed sealant along exterior door

Figure 32 – Failed sealant or lack of sealant around sliding glass doors

Figure 33 – Typical window on exterior of Promenade

5. Life Safety

The life-safety systems were not exhaustively observed or investigated at Promenades East. Due to KEG's balcony sampling, railing systems were inspected to confirm that they could resist a 250-pound point load at all vertical positions, which could create a potential fall hazard in the event they become unstable. If they were not safe, those railing systems were noted by Promenades East maintenance staff.

Railings that were accessed were tested for stability and could withstand a manual load. The existing railing conditions do not meet current Florida Building Code (FBC), which requires the railings to be 42 inches above finished floor (Meets Code) and have picket spacings no greater than 4-inches apart (Does not meet code). The association is "grandfathered in" as it pertains to their railings due to the original design emplaced, but in the event these railings are replaced, they will have to meet the current FBC.

The front entrance railings were also tested to analyze the current state of their stability. Overall, the railings replicate the same qualities found at the balconies observed. Past repairs can be observed where the association has taken precautions and implemented repairs where needed. The front entrance railing fasteners need reseated to prevent a possible life safety hazard. The railings have been painted and are peeling in areas. The following photos depict a sampling of the existing conditions identified:

Figure 34 – Picture depicting the relative length between pickets being larger than 4 inches

Figure 35 – Possible corrosion on railing system – staining of wall under front entrance railing system.

Figure 36 – Deterioration – Railing to Balcony Slab – Unit 309

Figure 37 – Fasteners not fully seated on front entrance railings

6. Balconies

While on site, KEG inspected all available balconies to observe the current conditions. It should be noted that KEG did not observe all balconies as a minor few were unavailable to view. Every attempt was made to view all balconies at Promenades East with access provided & accompanied by Promenades East board members and maintenance staff. Many of the unit owners have opted to put tile down as the flooring finish while others used carpet, leaving the underlying substrate unobservable. Items such as spalled concrete, carpet with plants on balcony, delaminated/cracking stucco, failed sealants, installed hurricane protection, areas of ponding water, >50% surface area of "hollow" sounding tile, tiles floated flat against the pre-sloped balcony surface which could potentially result in negative drainage toward the structure, tiles set above sliding glass doors (SGD) track weep system leaving the water no option but to eventually permeate through the concrete, and tiles obstructing the overflow scupper balcony drainage systems are typical concerns that KEG tries to identify per balcony.

Cracks were identified along some of the columns located at the end of the unit balconies and in several instances, spalling was identified at the extruded floor slab. Promenades East maintenance staff accompanying KEG marked those balconies that needed repair. This was identified due to the hollow sounding nature of the concrete in the area and easily identifiable spalled areas. A frequent pattern that was noticed at most of the units visited was the case of water intrusion. Water intrusions can be observed at most units and are seen to travel past the SGD sealant. KEG was unable to verify if there was a balcony waterproofing membrane installed prior to tile installation, however most unit balconies are enclosed by SGD's. If the concrete slab is subjected to constant exposure from moisture, then it will accelerate the deterioration of the waterproofing membrane (if any), and the water will eventually permeate into the concrete balcony deck and affect the reinforcing steel. There were multiple types of coatings, tile, carpet, and bare concrete on the balcony slabs.

Figure 38 – Typical sampling of balcony with carpet and plants - Unit 228

Figure 39 – Plant growth on balcony deck and through railing system - Unit 226

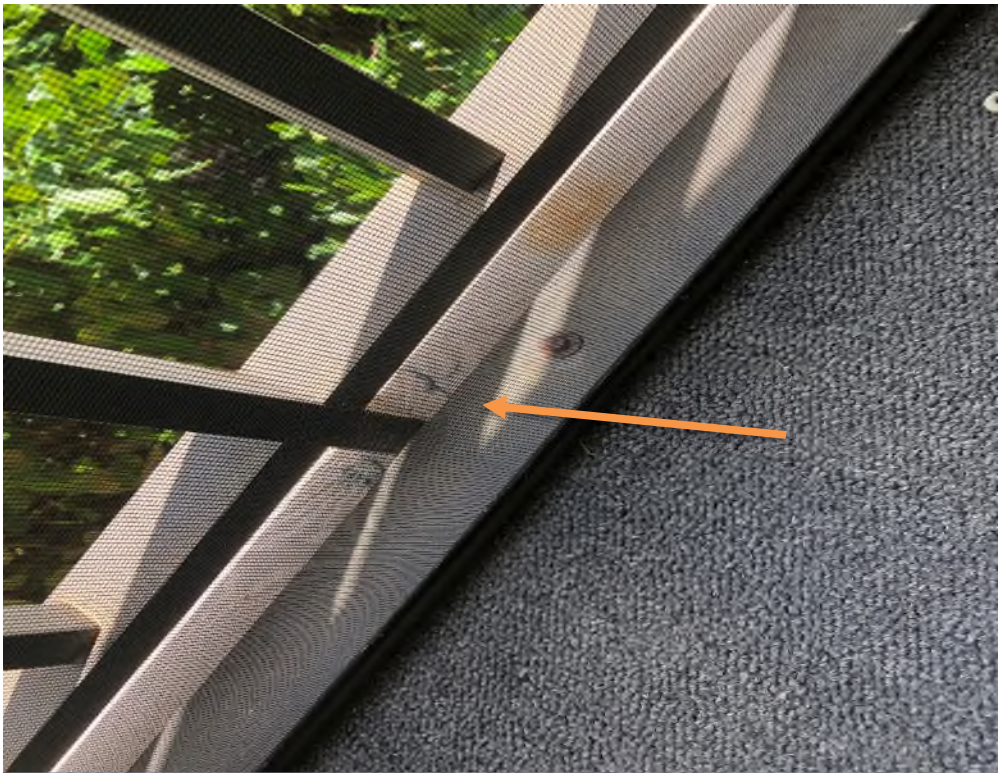

Figure 40 – Railing Post Pocket damage - Unit 214

Figure 41 – Typical crack in balcony slab - Unit 214

Figure 42 – Typical coating delamination at balcony slab edge under railings - Unit 512

Figure 43 – Delaminated area of wall - Unit 612

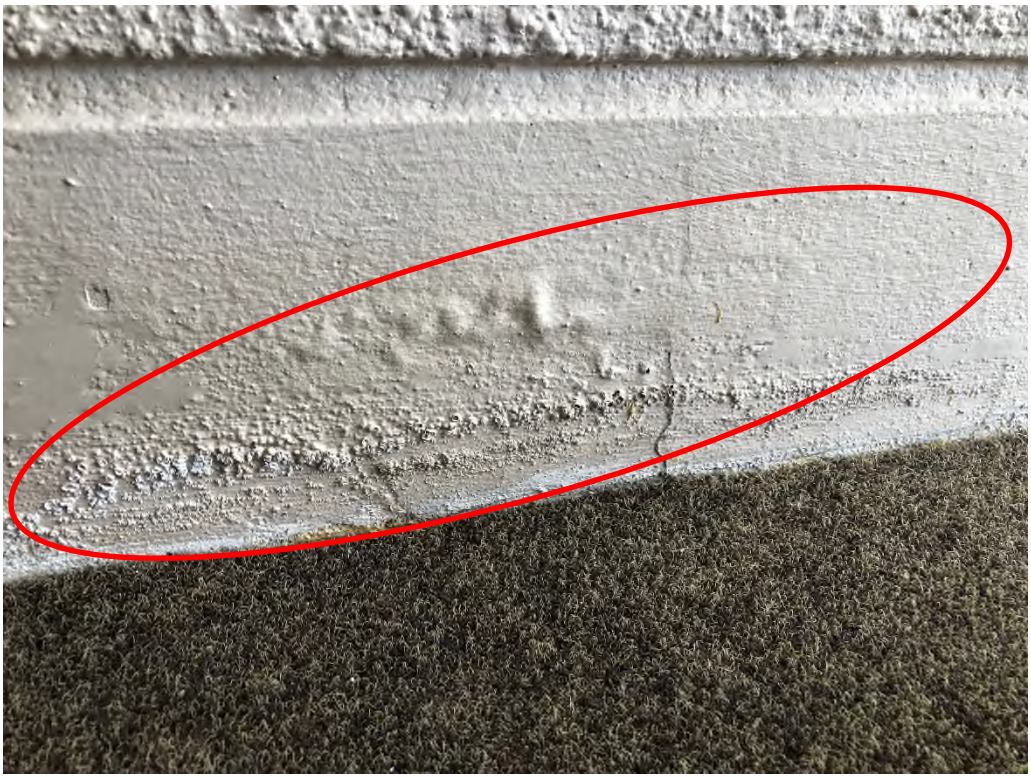

Figure 44 – Deterioration observed along balcony wall - Unit 5

Figure 45 – Spalling located along the overhead floor slab - Unit 516

7. Parking Garage

The existing conditions of the parking garage at Promenades East appear to be in fair condition. A concrete curing agent has been put in place with some damage observed and evidence of ponding at some areas. Delamination, past repairs, and existing cracks were evident on the parking garage concrete floor. Several columns around the parking garage have damage to the column from cars hitting the edge and causing needed repairs. KEG was made aware of several spalls in the ceiling with exposed rebar where needed repairs area needed. Further investigation of the cracks and delamination is recommended during the repair project to correct any concrete deficiencies if found.

Railing post pocket spalls were also found along the front entrance and in several units on the balconies. Originally, the railing was imbedded into the concrete walkways and overtime has allowed for exposure into the concrete. During KEG's inspection, moisture was identified in one of the post pockets. This will in turn accelerate the concrete deterioration process and allow for water to penetrate further into the surrounding concrete. These areas should be remediated during the needed repairs.

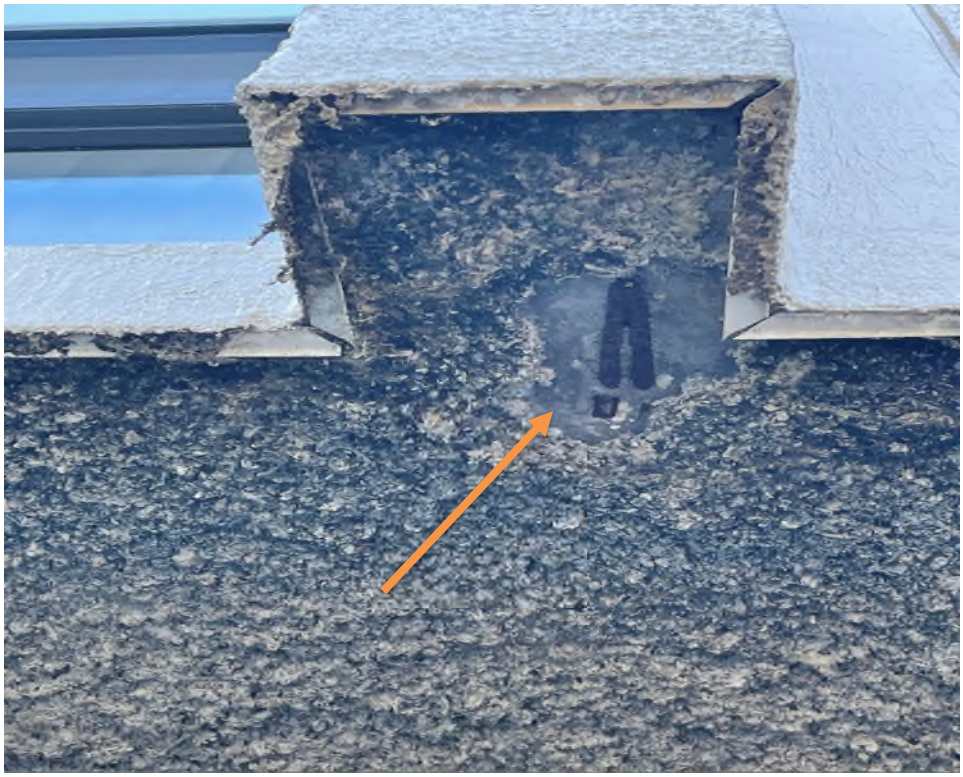

Figure 46 – Stucco delamination and exposed rebar found at the North Entrance

Figure 47 – Repair in progress on parking garage ceiling

Figure 48 – Typical stair step cracking on parking garage wall

Figure 49 – Parking garage slab cracks and typical previous repair

Figure 50 – Typical column damage throughout parking garage.

Figure 51 – Typical rusted pipe hangers, anchor bolts, and fasteners throughout parking garage.

OPINION AND RECOMMENDATIONS

Based upon our visual observations of the above listed systems at Promenades East, KEG has provided a list of recommendations below. These recommendations are further broken into incidental and non-incidental categories for the prudent implementation and scheduling by Promenades East.

It is our professional opinion that the following course of action should be taken to protect the building going into the future:

1. The existing deteriorated concrete should be repaired in accordance with International Concrete Restoration Institute (ICRI) industry standards. Areas of concern are located at select unit columns, trash room lintel, windowsills, extruded floor slabs and walkways as indicated above. Continued monitoring of the cracks and spalling should be done until proper repairs have been made.
2. The balconies are recommended to undergo further investigation during the resurfacing project to identify if concrete repairs are needed at locations where cracks, delamination, or post pocket spalling has occurred.
3. The current roofing membrane shows signs of ponding at select areas, KEG recommends contacting a roofing contractor to re-slope some sections of the roof to prevent premature breakdown of materials, possible roof leaks, and redirect flow to the drains. This can be accomplished with a reroofing project as KEG recommends a reroofing project within the next few years. Areas were the top and base coat have voids within the polyurethane system should be patched to prevent further intrusions of water.
4. The existing windows, railings, and enclosures should be inspected for lack of sealant. Most screen enclosures and sliding glass doors residing on the balconies and patios fall into this category. Sealant should be applied to all these listed areas to prevent further water intrusion into the units. Typically, this is addressed during a painting project.
5. Karins recommends instituting impact rated windows and sliding glass doors where hurricane shutters are not being utilized to protect against wind-borne debris during a high velocity wind event.
6. KE recommends the following for the balconies:
    - Clean the grout and tiles of all balconies where used.
    - Apply new applications of waterproof membranes on elevated concrete slabs and curbs where the existing membrane has reached the end of its useful life.
    - Unclog and reopen covered weep holes that may not allow for proper drainage.

- Patch all holes found at the walls and overhead slab where hanging plants, light fixtures, and flexible hurricane protection shields have been previously placed to prevent the intrusion of water into the concrete.
- In the event where concrete deterioration is evident at a balcony, KEG recommends repairing the area following International Concrete Repair Institute (ICRI) guidelines. This is when the association should implement a liquid applied waterproofing membrane in lieu of the tile finish or outdoor carpet where applicable.
- Remove overlaying carpets on the concrete slab to examine the membrane's current condition. Typically, outdoor carpets cover any hidden defects and can collect/ hold water that may eventually break down the concrete's protective membrane if used.

7. While the exterior of the building was reported to be painted 2-3 years ago, KEG recommends repainting/ resealing the building every 7 to 10 years depending on the quality of paint used. The current condition of the exterior paint is in good condition and a continued maintenance schedule is recommended. Areas where paint delamination or swelling has occurred should be removed and reapplied with a new coat of paint.
8. Remove and replace any sprinkler systems away from the building envelope to avoid constant water contact. Continued water contact can accelerate the breakdown of materials.
9. Proper re-sloping is recommended at select areas of the balconies to allow for proper drainage away from the building. This can be addressed during the resurfacing project.
10. Balconies not evaluated during the inspections are recommended to be further investigated for further signs of cracks and spalls.
11. KEG recommends sealing all areas where cracks were identified in the areas listed above to prevent water penetrations intruding into the concrete.
12. The roof top staircase steel decking should be replaced and reapplied with a new protective paint membrane. Sections where railings are observed to be detached should be repaired and recoated. Shoring is recommended to be placed beneath the staircase system until proper repairs.
13. KEG recommends repairing areas where the front entrance railings are found to be unstable immediately to avoid potential fall hazards.
14. KEG recommends adding additional drainage vents along the rooftops to help extrude water build up on the roof tops.

SUMMARY

This structural inspection is for the sole purpose of identifying structural deficiencies of the building or structure that poses an immediate threat to life, safety, or where failure of a critical component is imminent. This structural inspection was for the sole purpose of determining the structural condition of the building to the reasonable extent possible that any part, material, or assembly of a building which affects the safety of such building or structure and/or which supports any dead or designed live load may be affected by internal or external elements, components, or forces.

The structural deficiencies that require immediate attention are:

1. Concrete repairs where spalling was identified.
2. Railings and steel decking associated with the rooftop staircases.
3. Areas where the front entrance railings have become unstable.
4. Further investigation of the cracks found along the walkways.

CONCLUSION

Our statements referencing the structural integrity of the building at Promenades East are in reference to the original installation. Our statements are not intended to verify compliance with building codes or accepted techniques except as explicitly identified herein.

Based on the scope of the inspection and for the areas that were able to be assessed, within a reasonable degree of engineering certainty, we have not observed any conditions that would compromise the safety of the building for its intended use and occupancy. We reserve the right to amend our opinion should new information be brought to our attention.

Our opinion is that the existing condition of Promenades East are due to the age of the building and the proximity to salinized water sources; this is highly probably wherein evidenced with verbal reports and our observations.

We believe that the most prudent action to be taken would be an aggressive maintenance schedule while planning to implement our above listed recommendation based on urgency and incidence. This would allow enough time for Promenades East to appropriately exhaust insurance avenues and build up balances to pay for the recommended actionable.

We trust this information is helpful. Should questions arise, please do not hesitate to call.

Sincerely,
Karins Engineering

Digitally signed by David Karins
DN: E=david@karins.com, CN=David Karins, OU=Engineering, O="Karins Engineering Group, Inc.", L=Sarasota, S=Florida, C=US
Date: 2022.09.27 10:24:45-04'00'

David G. Karins
FL PE #52677
President/CEO

THIS ITEM HAS BEEN DIGITALLY SIGNED & SEALED BY DAVID G. KARINS, PE ON THE DATE ADJACENT TO THE SEAL

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDEDRED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

Attachments: *Exhibit A – 40 Year Building Safety Inspection Program*
Exhibit B – Existing Conditions Checklist
Exhibit C – Cracking In Concrete Walls – Tech Notes

GENERAL CONSIDERATIONS

SCOPE OF STRUCTURAL INSPECTION

The fundamental purpose of the required inspection and report is to confirm in reasonable fashion that the building or structure under consideration is safe for continued use under the present occupancy. As implied by the title of this document, this is a recommended procedure, and under no circumstances are these minimum recommendations intended to supplant proper professional judgment.

Such inspection shall be for the purpose of determining the general structural condition of the building or structure to the extent reasonably possible of any part, material or assembly of a building or structure which affects the safety of such building or structure and/or which supports any dead or designed live load, and the general condition of its electrical systems pursuant to the Building Code.

In general, unless there is obvious overloading, or significant deterioration of important structure elements there is little need to verify the original design. It is obvious that this has been “time tested’ if still offering satisfactory performance. Rather, it is of importance that the effects of time with respect to deterioration of the original construction materials be evaluated. It will rarely be possible to visually examine all concealed construction, nor should such be generally necessary. However, a sufficient number of typical structure members should be examined to permit reasonable conclusions to be drawn.

Visual Examination will, in most cases, be considered adequate when executed systematically. The visual examination must be conducted throughout all habitable and non-habitable areas of the building, as deemed necessary by the inspecting professional to establish compliance. Surface imperfections such as cracks, distortion, sagging, excessive deflections, significant misalignment, signs of leakage, and peeling of finishes should be viewed critically as indications of possible difficulty.

Testing Procedures and quantitative analysis will not generally be required for structural members or systems except for such cases where visual examination has revealed such need, or where apparent loading conditions may be critical.

Manual Procedures such as chipping small areas of concrete and surface finishes for closer examinations are encouraged in preference to sampling and/or testing where visual examination alone is deemed insufficient. Generally, unfinished areas of buildings such as utility spaces, maintenance areas, stairwells and elevator shafts should be utilized for such purposes. In some cases, to be held to a minimum, ceilings or other construction finishes may have to be opened for selective examination of critical structural elements. In that event, such locations should be carefully located to be least disruptive most easily repaired and held to a minimum. In an event, a sufficient number of structural members must be examined to afford reasonable assurance that such are representative of the total structure.

Evaluating an existing structure for the effect of time, must take into account two, basic considerations; movement of structural components with respect to each other, and deterioration of materials.

With respect to the former, volume change considerations, principally from ambient temperature changes, and possible long-time deflections, are likely to be most significant. Foundation movements will frequently be of importance, usually settlement, although upward movement due to expansive soils actually may occur. However, it is infrequent in this area. Older buildings on spread footings may exhibit continual, even recent settlements if founded on deep unconsolidated fine grained or cohesive soils or from subterraneous losses or movements from several possible causes.

With very little qualification, such as rather rare chemically reactive conditions, deterioration of building materials can only occur in the presence of moisture, largely to metals and their natural tendency to return to the oxide state in the corrosive process.

In this marine climate, highly aggressive conditions exist year-round. For most of the year, outside relative humidity may frequently be about 90 or 95%, while within air-conditioned buildings, relative humidity will normally be about 35 to 60%. Under these conditions moisture vapor pressures ranging from about 1/3 to 1/2 pounds per square inch will exist much of the time. Moisture vapor will migrate to lower pressure areas. Common building materials such as stucco, masonry and even concrete, are permeable even with these slight pressures. Since most of our local construction does not use vapor barriers, condensation will take place within the enclosed walls of the building. As a result, deterioration is most likely adjacent to exterior walls, or wherever else moisture or direct leakage has been permitted to penetrate the building shell.

Structural deterioration will always require repair. The type of repair, however, will depend on the importance of the member in the structural system and degree of deterioration. Cosmetic type repairs may suffice in certain non-sensitive members such as tie beams and columns, provided that the remaining sound material is sufficient for the required function. For members carrying assigned gravity or other loads, cosmetic type repairs will only be permitted if it can be demonstrated by rational analysis that the remaining material, if protected from further deterioration can still perform its assigned function at acceptable stress levels. Failing that, adequate repairs or reinforcement will be considered mandatory.

Written Reports shall be required attesting to each required inspection. Each such report shall note the location of the structure, description of type of construction, and general magnitude of the structure, the existence of drawings and location thereof, history of the structure to the extent reasonably known, and description of the type and manner of the inspection, noting problem areas and recommending repairs, if required to maintain structural integrity.

FOUNDATION:

If all of the supporting subterranean materials were completely uniform beneath a structure, with no significant variations in grain size, density, moisture content or other mechanical properties; and if dead load pressures were completely uniform, settlements would probably be uniform and of little practical consequence. In the real world, however, neither is likely. Significant deviations from either of these two idealisms are likely to result in unequal vertical movements.

Monolithic masonry, generally incapable of accepting such movements will crack. Such cracks are most likely to occur at corners, and large openings. Since, in most cases, differential shears are involved, cracks will typically be diagonal.

Small movements, in themselves, are most likely to be structurally important only if long term leakage through fine cracks may have resulted in deterioration. In the event of large movements, continuous structural elements such as floor and roof systems must be evaluated for possible fracture or loss of bearing.

Pile foundations are, in general, less likely to exhibit such difficulties. Where such does occur, special investigation will be required.

ROOFING SYSTEMS:

Sloping roofs, usually having clay or cement tiles, are of concern in the event that the covered membrane may have deteriorated, or that the tiles may have become loose. Large deflections, if merely resulting from deteriorated rafters or joists will be of greater importance. Valley Flashing, and Base Flashing at roof penetration will also be matters of concern.

Flat roofs with built up membrane roofs will be similarly critical with respect to deflection considerations. Additionally, since they will generally be approaching expected life limits at the age when building recertification is required, careful examination is important. Blisters, wrinkling, alligatoring, and loss of gravel are usually signs of difficulty. Punctures or loss of adhesion of base flashing, coupled with loose counterflashing will also signify possible problems. Wind-blown gravel, if excessive, and the possibility of other debris, may result in pounding, which if permitted, may become critical.

MASONRY BEARING WALLS

Random cracking, or if discernible, definitive patterns of cracking, will of course, be of interest. Bulging, sagging, or other signs of misalignment may also indicate related problems in other structural elements. Masonry walls where commonly constructed of either concrete masonry remits or scored clay tile, may have been constructed with either reinforced concrete columns tie beams, or lintels.

Steel bar joists are, of course, sensitive to corrosion. Most critical locations will be web member welds, especially near supports, where shear stresses are high possible failure may be sudden, and without warning.

Cold formed steel joists, usually of relatively light gage steel, are likely to be critically sensitive to corrosion, and are highly dependent upon at least normal lateral support to carry designed loads. Bridging and the floor or roof system itself, if in good condition, will serve the purpose.

Wood joists and rafters are most often in difficult from “dry rot”, or the presence of termites. The former (a misnomer) is most often prevalent in the presence of sustained moisture or lack of adequate ventilation. A member may usually be deemed in acceptable condition if a sharp pointed tool will penetrate no more than about one eighth of an inch under moderate hand pressure. Sagging floors will most often indicate problem areas. Gypsum roof decks will usually perform satisfactorily except in the presence of moisture. Disintegration of the material and the foam-board may result from sustained leakage. Anchorage of the supporting bulb tees against uplift may also be of importance, with significant deterioration. Floor and roof systems of case in place concrete with self-centering reinforcing, such as paper backed mesh and rib-lath, may be critical with respect to corrosion of the unprotected reinforcing. Loss of uplift anchorage on roof decks will also be important if significant deterioration has taken place, in the event that dead loads are otherwise inadequate for that purpose.

STEEL FRAMING SYSTEM

Corrosion, obviously enough, will be the determining factor in the deterioration of structural steel. Most likely suspect areas will be fasteners, welds, and the interface area where bearings are embedded in masonry. Column bases may often be suspect in areas where flooding has been experienced, especially if salt water has been involved.

Thin cracks may indicate only minor corrosion, requiring minor patching. Extensive spalling may indicate a much more serious condition requiring further investigation.

Of most probable importance will be the vertical and horizontal cracks where masonry units abut tie columns, or other frame elements such as floor slabs. Of interest here is the observation that although the raw materials of which these masonry materials are made may have much the same mechanical properties as the reinforced concrete framing, their actual behavior in the structure, however, is likely to differ with respect to volume change resulting from moisture content, and variations in ambient thermal conditions.

Moisture vapor penetration, sometimes abetted by salt laden aggregate and corroding rebars, will usually be the most common cause of deterioration. Tie columns are rarely structurally sensitive, and a fair amount of deterioration may be tolerated before structural impairment becomes important. Usually, if rebar loss is such that the remaining steel area is still about 0.0075 of the concrete area, structural repair will not be necessary. Cosmetic type repair involving cleaning, and patching to effectively seal the member, may often suffice. A similar approach may not be unreasonable for tie beams, provided they are not also serving as lintels. In that event, a rudimentary analysis of load capability using the remaining actual rebar area, may be required.

FLOOR AND ROOF SYSTEMS

Cast in place reinforced concrete slabs and/or beams and joists may often show problems due to corroding rebars resulting from cracks or merely inadequate protecting cover of concrete. Patching procedures will usually suffice where such damage has not been extensive. Where corrosion and spalling has been extensive in structurally critical areas, competent analysis with respect to remaining structural capacity, relative to actual supported loads, will be necessary. Type and extent or repair will be dependent upon the results of such investigation.

Precast members may present similar deterioration conditions. End support conditions may be important. Adequacy of bearing, indications of end shear problems, and restraint conditions are important, and should be evaluated in at least a few typical locations.

CONCRETE FRAMING SYSTEMS

Concrete deterioration will, in most cases be similarly related to rebar corrosion possibly abetted by the presence of salt-water aggregate or excessively permeable concrete. In this respect, honeycomb areas may contribute adversely to the rate of deterioration. Columns are frequently most suspect. Extensive honeycomb is most prevalent at the base of columns, where fresh concrete was permitted to segregate, dropping into form boxes. This type of problem has been known to be compounded in areas where flooding has occurred, especially involving salt water.

In spall areas, chipping away a few small loose samples of concrete may be very revealing. Especially, since loose material will have to be removed even for cosmetic type repairs, anyway. Fairly reliable

quantitative conclusions may be drawn with respect to the quality of the concrete. Even though our cement and local aggregate are essentially derived from the same sources, cement will have a characteristically dark grayish brown color in contrast to the almost white aggregate. A typically white, almost alabaster like coloration will usually indicate reasonably good overall strength. The original gradation of aggregate can be seen through a magnifying glass. Depending upon the structural importance of the specific location, this type of examination may obviate the need for further testing if a value of 2000 psi to 2500 psi is sufficient for required strength, in the event that visual inspection indicates good quality for the factors mentioned.

WINDOWS

Window condition is of considerable importance with respect to two considerations. Continued leakage may have resulted in other adjacent damage and deteriorating anchorage may result in loss of the entire unit in the event of severe windstorms short of hurricane velocity. Perimeter sealant, glazing, seals, and latches should be examined with a view toward deterioration of materials and anchorage of units for inward as well as outward (section) pressures, most importantly in high buildings.

WOOD FRAMING

Older wood framed structures, especially of the industrial type, are of concern in that long term deflections may have opened important joints, even in the absence of deterioration. Corrosion of ferrous fasteners will in most cases be obvious enough. Dry rot must be considered suspect in all sealed areas where ventilation has been inhibited, and at bearings and at fasteners. Here too, penetration with a pointed tool greater than about one eighth inch with moderate hand pressure, will indicate the possibility of further difficulty.

LOADING

It is of importance to note that even in the absence of any observable deterioration, loading conditions must be viewed with caution. Recognizing that there will generally be no need to verify the original design, since it will have already been “time tested”, this premise has validity only if loading patterns and conditions remain **unchanged**. Any material change in type and/or magnitude or loading in older buildings should be viewed as sufficient jurisdiction to examine load carrying capability of the affected structural system.

SCOPE OF ELECTRICAL INSPECTION

The purpose of the required inspection and report is to confirm with reasonable fashion that the building or structure and all habitable and non-habitable areas, as deemed necessary by the inspecting professional to establish compliance, are safe for continued use under present occupancy. As mentioned before, this is a recommended procedure, and under no circumstances are these minimum recommendations intended to supplant proper professional judgement.

ELECTRIC SERVICE

A description of the type of service supplying the building or structure must be provided, stating the size of amperage, if three (3) phase or single (1) phase, and if the system is protected by fuses or breakers. Proper grounding of the service should also be in good standing. The meter and electric rooms should have sufficient clearance for equipment and for the serviceman to perform both work and inspections. Gutters and electrical panels should all be in good condition throughout the entire building or structure.

BRANCH CIRCUITS

Branch circuits in the building must all be identified, and an evaluation of the conductors must be performed. There should also exist proper grounding for equipment used in the building, such as an emergency generator, or elevator motor.

CONDUIT RACEWAYS

All types of wiring methods present in the building must be detailed and individually inspected. The evaluation of each type of conduit and cable, if applicable, must be done individually. The conduits in the building should be free from erosion and checked for considerable dents in the conduits that may be prone to cause a short. The conductors and cables in these conduits should be chafe free, and their currents not over the rated amount.

EMERGENCY LIGHTING

Exit signs lighting and emergency lighting, along with a functional fire alarm system must all be in good working condition.

TECH NOTES

Cracking In Concrete Walls

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Concrete Foundations Association of North America

TECH NOTES

Cracking In Concrete Walls

NOTES:

GOAL AND PURPOSE

This edition of *Tech Notes* answers common questions about cracking in concrete walls: What Causes Them? How Can They Be Reduced? When Should You Be Concerned?.

Cracks in concrete walls and slabs are a common occurrence. They appear in floors, driveways, walks, structural beams, and walls. Cracking can not be prevented but it can be significantly reduced or controlled when the causes are taken into account and preven-tative steps are taken. Most cracks should not be a cause for alarm.

• Causes of Cracks

Cracking can be the result of one or a combination of factors, all of which involve some form of restraint. Some examples include:
- Drying Shrinkage—This occurs as water used in the mix design evaporates.
- Thermal Contraction/Expansion—Due to temperature changes.
- Subgrade Settlement (or Expansion) - Resulting from poor soil conditions or changes in soil moisture content.
- Differential Bearing Capacity— Harder soils under part of the foundation can cause stresses as the building "settles in."
- Applied Stresses—Forces such as building load, earth load, hydrostatic pressure, or heavy equipment operated too close to the wall.

• Types of Cracks

Tremendous forces can build up inside the wall due to any of these causes. When the forces ex-ceed the strength of the material, cracks will develop. Each of these causes normally leave a "signature" in the type of crack it creates. The vast majority of cracks are of little concern by themselves.

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Shrinkage and Temperature cracks are most often vertical to diagonal. They typically emanate from a corner of a window, beam pocket, or other opening. Cracks of this type are called reentrant cracks. These are very common and, unless they leak or show significant lateral displacement, are of no structural concern.

Cracks which are horizontal are most likely caused by an applied load. Vertical cracks which are sig-nificantly wider at the top or bottom could indicate heaving or settlement. With these cracks it is very likely that the crack itself is not the problem, but rather the result of an external problem such as poor drainage, overloading, etc.

• Minimizing the Problem

Contractors can employ several methods of reducing the occurrence and width of cracks.

- The first is the use of proper concrete mix designs. A mix with sufficient strength using the minimum amount of water necessary to distribute the concrete throughout the wall without voids should be used. The type and amount of cement, as well as course and fine aggregates, can also have a large effect on the amount of shrinkage.

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NOTES:

- A small amount of temperature steel reinforcement will reduce the width of cracks that do occur.
- Control joints are intentional weak spots designed to induce shrinkage or thermal cracks in pre-determined locations. These can be very effective if waterproofed carefully.
- Rapid water loss and extreme temperature swings while the concrete is in the early stages of curing should be avoided where possible.
- Careful backfilling is mandatory. Typical basement walls are not designed to act as retaining walls. They must be secured with the basement floor at the bottom and the floor deck at the top, or be braced adequately, before being backfilled. The use of heavy equipment near the wall should be restricted and carefully considered.
- Anchoring the deck in accordance with local building codes, including the use of anchor bolts/straps and blocking, is very important. Improper anchoring has been the cause of a number of failures.

• When Should You Be Concerned

Temperature and shrinkage cracks in walls or slabs are likely to occur in nearly all structures. When the width of a crack exceeds 1/4" in width; when they show 1/4" in lateral dis-placement; when water leaks through the cracks; or you find long horizontal cracks, it is probably time to seek professional assistance. The contractor that built the wall, or your local CFA member should be able to help you.

NOTES:

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