Hillcrest Condominium Building #15

4800 hillcrest Lane
Hollywood, FL-33021

Concrete Deterioration Narrative Report

Prepared By

S&D Engineering and Construction, Inc
1031 NW 31st Avenue,
Pompano Beach, Fl 33069

September 6th, 2023

OBJECTIVE

S&D Engineering and Construction, Inc. was authorized to perform a visual inspection of Hillcrest Condominium Building #15 located at 4800 Hillcrest Lane, Hollywood, FL-33021 to provide findings in connection with the concrete deterioration at the buildings.

The deteriorated concrete assessment was performed according to the guidelines of ACI-562R-13 & ACI 201.1R-08. Existing conditions of the concrete deterioration were visually assessed, as deemed necessary, to verify existing structural geometry and conditions and an observatory evaluation was completed based on the information gathered from site conditions, review of existing drawings provided by the association and verbal communication with the property manager.

The assessment of the deteriorated concrete at the building was performed with the objective of identifying the deteriorated structural members of the building, concrete cracks, deterioration due to material degradation, physical impact, and member's strength perspectives.

DISCLAIMER

The observations performed during the site visit were conducted without any testing. No expanded details or any kind of laboratory tests have been performed at this time; however, this document should provide the Client with sufficient findings related to the concrete cracks and concrete deterioration. Consequently, some system-specific assumptions were made regarding the existing conditions and structural integrity of the existing Buildings. Furthermore, the findings within this document have been based on the information discovered during the walkthrough and the information provided by the property manager. If additional information is discovered concerning the building concrete deterioration, the assumptions, conclusions, and recommendations presented herein may require re-assessment. The client should understand that the Engineer may have missed items during the inspection and S&D Engineering and Construction, Inc. will not be held liable or reimburse the client for such items.

POSSIBLE CAUSES OF CONCRETE DETERIORATION & REINF. CORROSION:

Concrete spalling indicates the final stage of concrete deterioration. It represents complete detachment and separation of pieces of concrete from the main structure, which will often lead to exposure of the rebar within the concrete. When the rebar becomes exposed to the exterior environment, it is prone to deterioration and corrosion. Corroded rebar expands and introduces additional pressure into the structure; thus, it could potentially cause additional concrete cracking and spalling (See Figure 1).

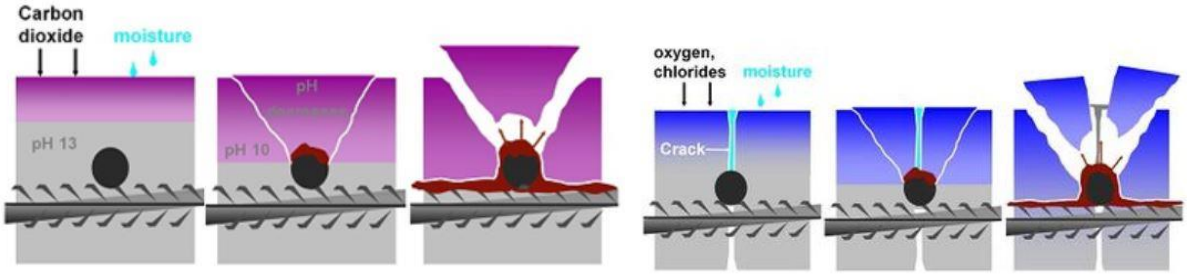

Figure 1

Spalling is primarily a result of the corrosion of the reinforcing steel and/or embedded objects such as clips, chairs, anchors, etc. When the steel corrodes, the oxidized steel expands to 10 times the original volume, creating internal, outward tensile forces in the concrete. Concrete is unable to handle the tensile forces and, consequently, the pieces between the corroded steel and the nearest surface will break off, a process known as "spalling". Concrete cracks allow moisture to infiltrate and reach the reinforcement. Once moisture touches the reinforcement, the process of corrosion commences.

This condition is a threat to both the local and overall structural integrity of the concrete elements and the structure itself. These conditions shall be repaired to avoid further reinforcement deterioration and potential structural failure. Severely corroded rebars (those with a loss of 20% or more of its cross-section) reduce the concrete structural member load carrying capacity and shall be repaired to avoid further deterioration and potential structural failure.

Rust spots need to be removed up to the point where there is no more corrosion in the steel. At the time of removing the rust spots, it is a practice standard to cut a square area of concrete around the rust spot (Full Depth and/or Partial Depth). The squared area cut will allow the concrete to be properly patched/repaired.

Concrete cover for the reinforcement is necessary to prevent moisture reaching the reinforcement inside of the concrete. The lack of appropriate concrete cover and the humidity will eventually allow the process of reinforcement corrosion, and ultimately, spalling concrete.

FINDINGS

Concrete deterioration was observed in the beams, columns, poured walls, block walls, slab, overhead slab, slab edge, window-sill, stucco, walkways slab, balcony slab and staircases.

To perform the repairs as per current Florida Building Code 2020 with Amendments and ICRI Code removal of (Aluminum Handrails, shutters, sunscreens, windows, sliding glass doors, balcony tiles and existing floor finish) and shoring of the buildings may be required. The detail of the structural and non-structural repairs is shown in the Concrete Repair Spread Sheet provided by S&D Engineering and Construction, Inc.

Following are some of the major repairs required at the Buildings & Garage:

Balconies:

Shutter Removal/Installation (If Any)
Aluminum Handrail Removal/Reinstallation
Aluminum Screen Frame Removal/Reinstallation
Tile removal
Waterproofing
Slab Repairs (Partial Depth)
Slab Repairs (Full Depth)
Column Repair
Beam Repairs (If Any)
Block Wall Repairs

Building Exterior:

Column Repairs
Beam Repairs (If Any)
Block Wall Repairs
Poured Wall Repairs
Slab Edge Repairs
Window-Sill Repairs
Delaminated and Cracked Stucco Repairs
Corroded Fastener Removal/Patching

Staircase & Walkways Repairs:

Column Repairs
Beam Repairs
Slab Repairs
Block Wall Repairs
Poured Wall Repairs
Staircase Landing & Steps Repairs
Stucco Repairs

Misc. Caulking

Misc. Repair Cost:

Mobilization
General Condition
Permit Fee
Painting of the Bldg.
Shoring During Construction
Misc. MEP Equipment R/R

REPAIR RECOMMENDATION

Deteriorated concrete repair and crack repairs are primarily required due to three main factors:

- Assurance of Building structural component stability.
- Prevention of further deterioration to the concrete and reinforcement.
- Retention of the aesthetics and functionality.

From these perspectives, considering structural stability concerns, both deteriorated concrete and concrete cracks are indicative of an increment of stresses and/or a yielding of reinforcing bars; therefore, concrete deterioration and cracking becomes a major cause of concern when it tends to stress or yield the main reinforcement, which is required for resistance of the structural member to anticipated loads. From a progressive deterioration perspective, concrete deterioration repairs and crack repairs are essential because it reduces the service life of structures by permitting more rapid penetration of carbonation and allowing chloride ions, moisture and oxygen to reach the reinforcing steel. Concrete deterioration and cracks also accelerate the corrosion onset that, with time, becomes more wide-spread due to the penetration of water and chloride ions in un-cracked concrete. Therefore, the repair of deteriorated concrete and cracks becomes mandatory in order to prevent the structure from further deterioration, provided the crack widths exceed the tolerable values as shown in Figure 3 (ACI 224R-01 table 4.1).

Exposure condition	Crack width	
	in.	mm
Dry air or protective membrane	0.016	0.41
Humidity, moist air, soil	0.012	0.30
Deicing chemicals	0.007	0.18
Seawater and seawater spray, wetting and drying	0.006	0.15
Water-retaining structures†	0.004	0.10

Figure 1: Allowable Crack Widths in Concrete

CONCLUSION

It is S&D Engineering and Construction, Inc.'s recommendation that all deteriorated concrete structural and non-structural members should be restored as per the requirements of the current Florida Building Code 2020 with amendments and ICRI Code. A permit should be pulled from the local Building Department and the actual repairs to be performed by a Licensed & Insured contractor.

Respectfully Submitted By
S&D Engineering and Construction, Inc.

Farrukh Sayeed Digitally signed by Farrukh Sayeed
Date: 2023.09.12 18:43:20 -04'00'

Farrukh Sayeed, P.E., CGC, MBA, MIS
President
Sep 6th,2023

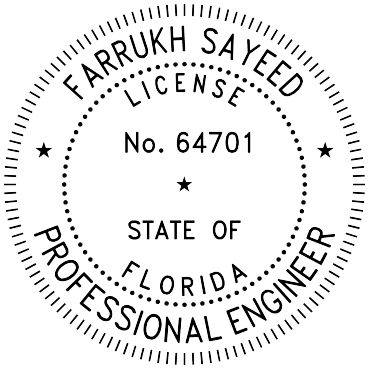

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Photo Log

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Photo 1: Spalled concrete on the balcony floor slab.

Photo 2: Multiple cracks on the overhead slab.

Photo 3: Spalled concrete and exposed corroded rebar in the overhead slab.

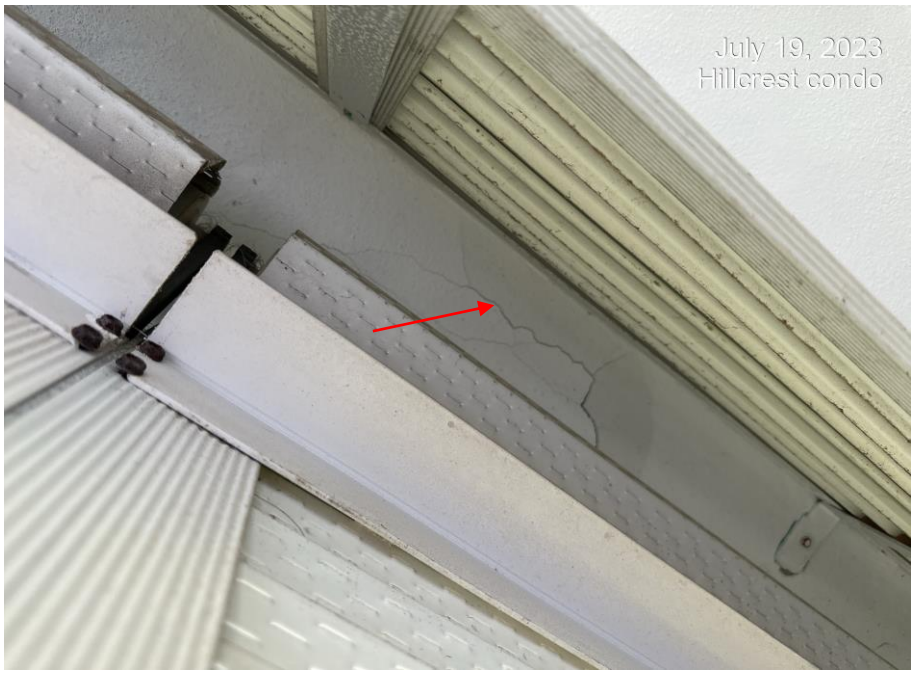

Photo 4: Cracks on the overhead slab.

Photo 5: Spalled concrete and exposed corroded rebar in the overhead slab.

Photo 6: Spalled concrete in the overhead slab.

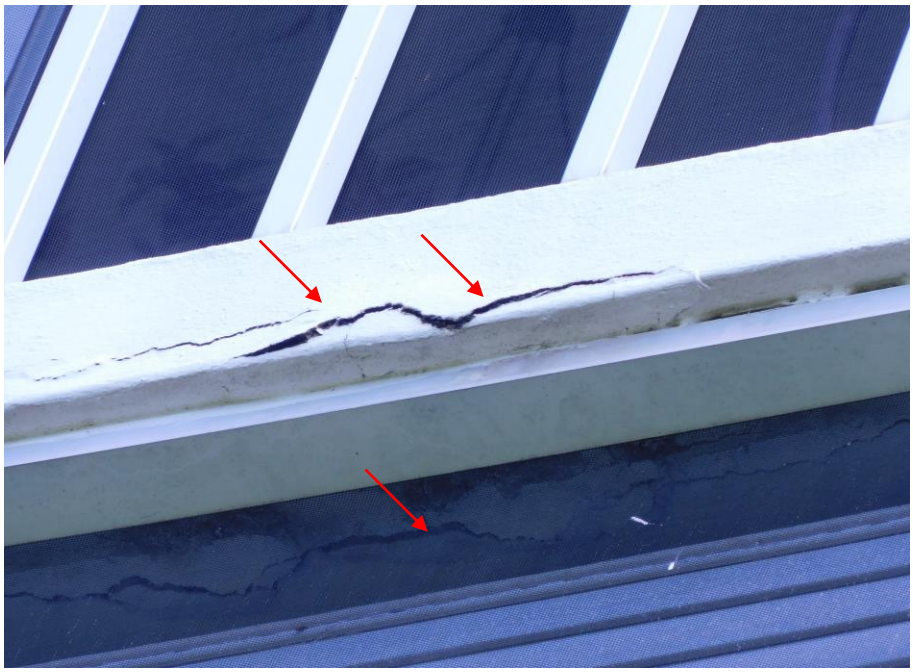

Photo 7: concrete spalling on the slab edge.

Photo 8: Concrete spalling and cracks on the slab edge.

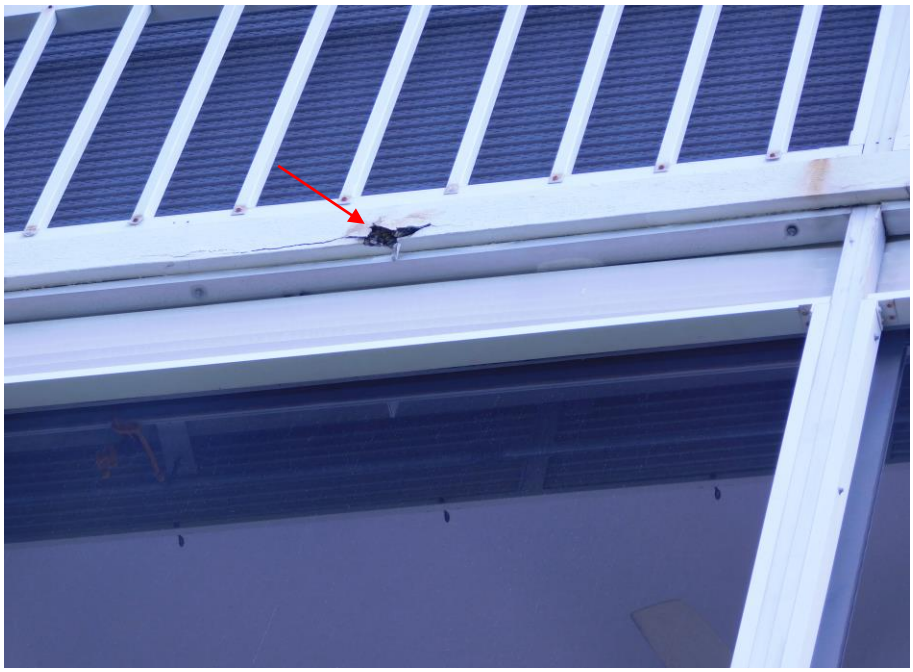

Photo 9: Concrete spalling and cracks on the slab edge.

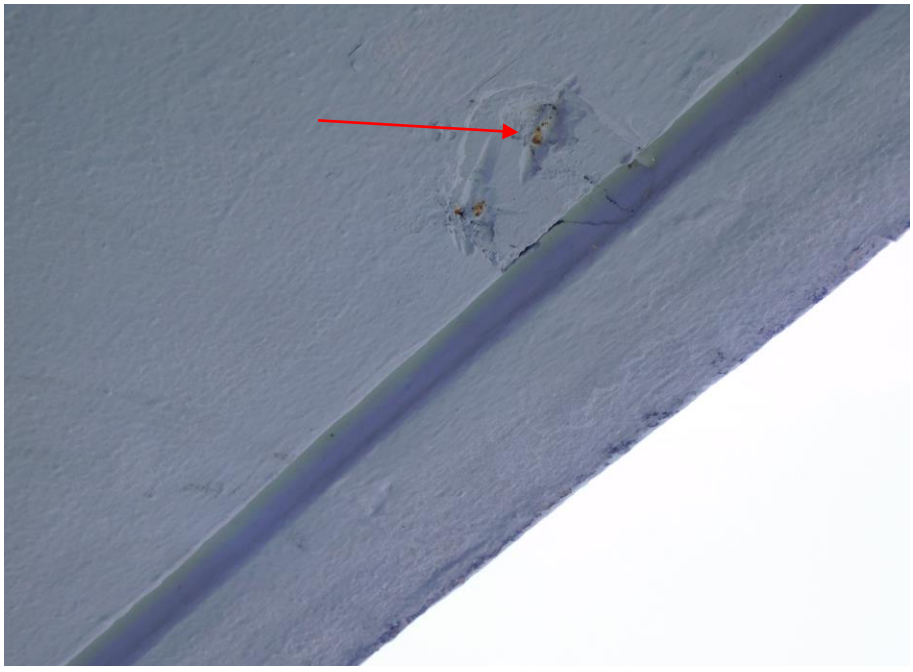

Photo 10: Exposed rebar on the overhead slab in the walkway.

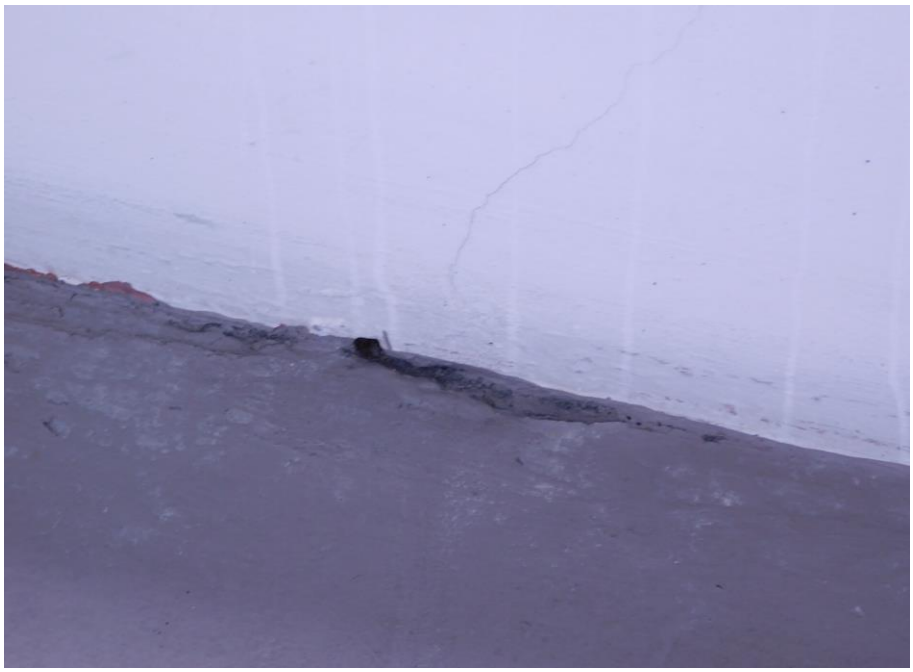

Photo 11: Cracks on the wall in the walkway.

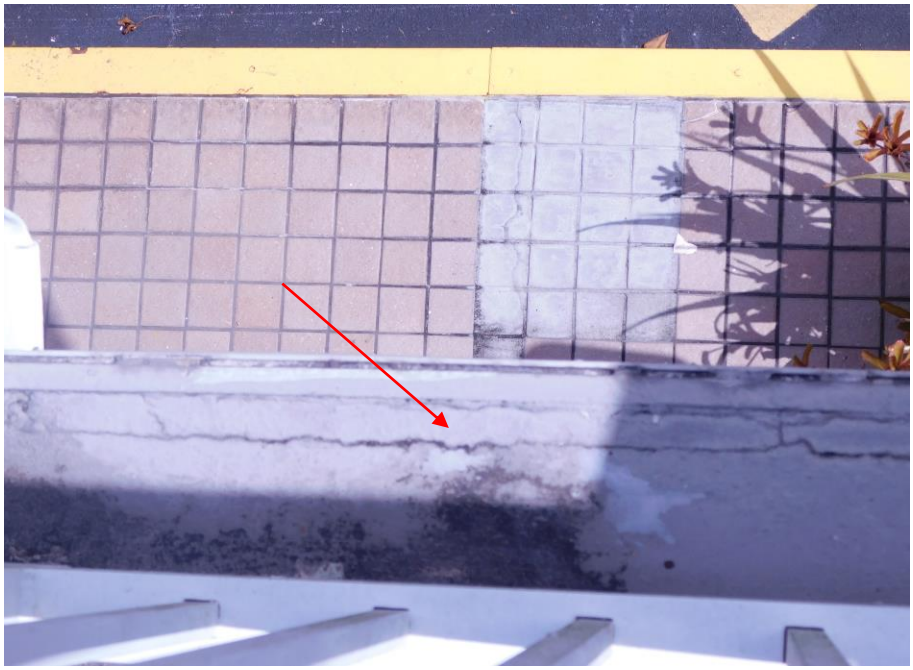

Photo 12: Cracks on the slab edge in the walkway

Photo 13: Cracks on the overhead slab in the balcony.

Photo 14: Cracks on the slab in the walkway.

Photo 15: Cracks on the slab in the walkway.

Photo 16: Cracks on the concrete slab in the walkway.