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Stuber Stone Lofts – Concrete Header Beam Delamination Survey

June 18th, 2020

Prepared for:

Mr. Robert Knapp
4221 Cass Ave. Apt 300
Detroit, MI 48201

Prepared by:

Pullman SST
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Introduction:

Per the request and authorization granted by Mr. Rob Knapp, PULLMAN SST, Inc. (Pullman) has completed a delamination survey for the concrete beam header at the Stuber Stone Loft's housing complex. The purpose of this survey was to evaluate the existing condition of the concrete beam and develop recommendations/prioritization for the recommended repairs in the future for each unit. The following information contained in this report summarizes our observations and provides recommendations for your consideration.

Structure Description:

The Stuber–Stone Loft building was built in 1916. It is a two-story brick commercial building measuring 100 feet by 150 feet. The main facade is divided into five bays two-story piers, with three wider bays containing storefronts in the center. The first and second floors are divided by a wide decorative spandrel beam. On the second floor, each of the bays contains a bank of tall, narrow, windows, with nine in the central bay, four in the narrower entry bays, and six in the outer bays. The concrete beams located on the North side of the building have deteriorated over time, resulting a need for a survey to further assess the damage

Delamination Survey:

Nick Poddam, Geoff Gabala, John Hamblin and Codey Hamblin (Pullman), visited the site on Friday, June 5th, 2020 to perform the delamination survey. The Pullman team performed a detailed sounding survey of the concrete beam header using a hammer. Pullman noted the extents of unsound and delaminated concrete to estimate the anticipated repair quantities. The insides of the units were visually inspected for large defects to preserve the concrete condition. The following is a summary of pertinent observations and findings, including a brief synopsis for each unit with close-up photos, as well as an anticipated quantity/prioritization chart at the end of the report. For reference, Square Feet is denoted by (SF) and lineal feet is denoted by (LF).

Please feel free to reach out with any further questions regarding the report.

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Unit #300:

Unit #300 was visually inspected from the interior and hammer sounded from the exterior. During the survey, we noted severe deterioration at the entire bottom of the beam (above the window), with moderate damage observed at the surrounding concrete members (beam below window and adjacent column 300/400). This includes widespread cracking and spalling concrete. Large crack separation at bottom of beam. No steel reinforcement was visible but it should be assumed that the crack has developed from steel corrosion and a structural repair is required. Pullman recommends fixing these areas to eliminate falling debris hazards (both inside and outside) and the potential for growth of the deteriorated areas.

Unit #400:

Unit #400 was visually inspected from the interior and hammer sounded from the exterior. During the survey, we noted severe deterioration at majority of the bottom of the beam (above the window). Large crack separation at bottom of beam. No steel reinforcement was visible but it should be assumed that the crack has developed from steel corrosion and a structural repair is required. Pullman recommends fixing these areas to eliminate falling debris hazards (both inside and outside) and the potential for growth of the deteriorated areas.

Unit #500:

Unit #500 was not visually inspected from the interior, but was hammer sounded from the exterior. During the survey, we noted a small amount of deterioration at an area of the bottom of the beam (above the window). A small amount of crack separation at bottom of beam. No steel reinforcement was visible. Pullman recommends fixing these areas early to stop the potential for growth of the deteriorated areas.

Unit #600:

Unit #600 was visually inspected from the interior and hammer sounded from the exterior. During the survey, we noted an area of severe delamination at a location near the bottom of the beam (above the window). No large crack separation was visible; however, there were several locations of small cracks near the damaged concrete. Pullman recommends fixing these areas to eliminate falling debris hazards (both inside and outside) and the potential for growth of the deteriorated areas.

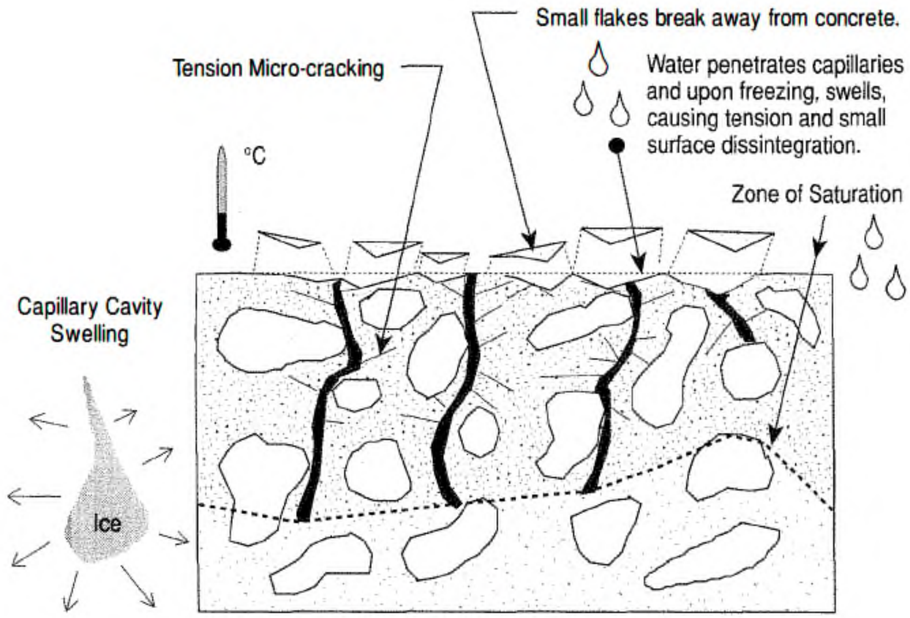
Unit #700:

Unit #700 was visually inspected from the interior and from the exterior, landscaping prohibited lift access at this unit. Based on the condition assessment of the adjacent units, we noted several similar small locations where the concrete has started to deteriorate near the bottom of the beam (above the window). No large crack separation was visible; however, there were several locations of small cracks near the damaged concrete. Pullman recommends fixing these areas to eliminate falling debris hazards (both inside and outside) and the potential for growth of the deteriorated areas.

Cause Analysis:

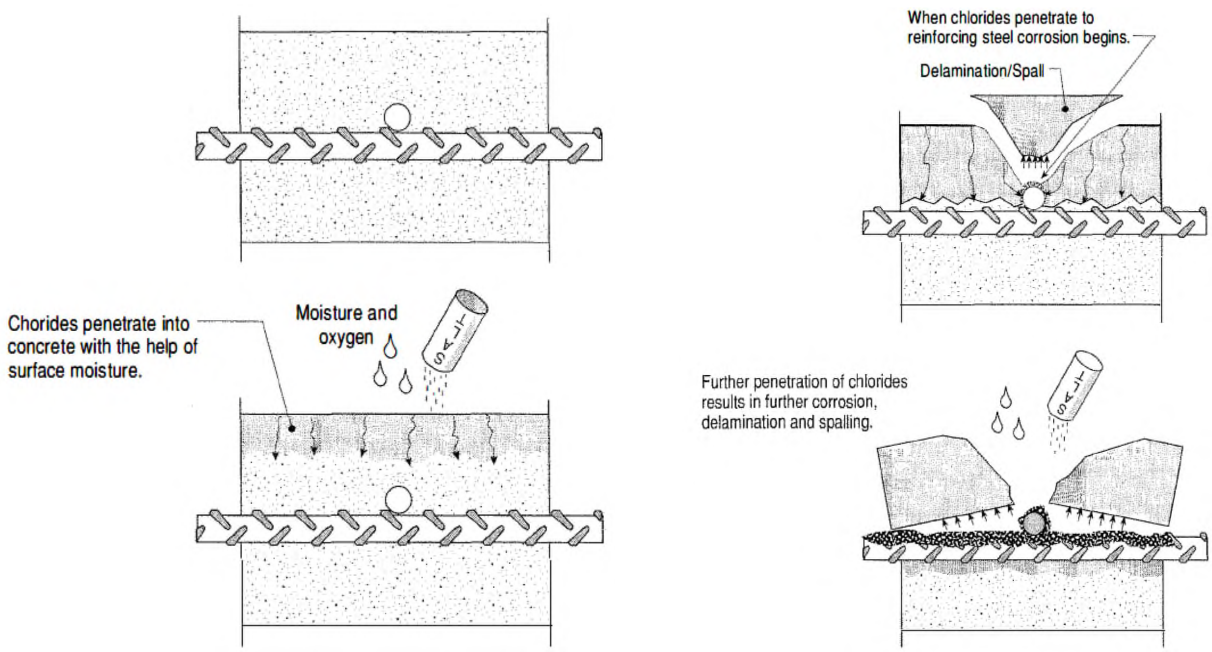
Pullman’s delamination survey identified localized areas of concrete deterioration across the concrete structure. Based on our field observations, there has been a significant amount of deterioration occurring at the Northern-most section of the building. While we could not determine a specific anomaly for this location, it is certain that all these locations have been exposed to moisture for a long period of time. These conditions have promoted localized freeze-thaw damage to the concrete materials, and if corrective action is not taken in the future, it will eventually lead to promoting corrosion of the embedded steel reinforcement once open to the elements.

The extent of deterioration varies by each unit. While some specific areas display a large amount of deterioration, no reinforcement steel was discovered during the delamination survey. Exterior concrete structures are extremely susceptible to deterioration due to their exposure to moisture, deicing salts, and temperature changes. In this case, the primary cause of concrete deterioration across the dock is freeze-thaw disintegration. Freeze-thaw disintegration or deterioration takes place when freezing and thawing temperature cycles occur within the concrete and when porous concrete starts to absorb water through its capillary openings. Freeze-thaw damage is commonly seen as scaling of the top of the concrete’s surface, caused by small-to medium sized flakes that break away from concrete. Freeze-thaw deterioration generally occurs on horizontal surfaces that are exposed to water, or on vertical surfaces that are at the water line in submerged portions of structures. The freezing water contained in the pore structure expands as it is converted into ice. The expansion causes localized tension forces that fracture the surrounding concrete matrix. The fracturing occurs in small pieces, working from the outer surfaces inward, creating shallow depressions along the concrete surface.



Pore and Capillary swelling causes tension cracking.

The damage caused by freeze-thaw damage can eventually lead to more harmful causes of concrete deterioration by eventually exposing reinforcement steel and enhancing the corrosion process. Often, this corrosion is accelerated by exposure to moisture, chloride contamination and carbonation. The volume of steel corrosion byproduct (i.e. rust) is up to ten times larger than the steel, and the forces incurred when the embedded steel corrodes causes concrete distress in the form of cracks, delamination, or spalls within the concrete.



Repair Findings and Pullman's Recommendation:

Stuber-Stone Lofts - 4221 Cass Ave

Location	Type of Repair		Notes	Priority Risk (LOW, MED, HIGH)	Priority Rank (1 - 5)
	Concrete Beam Repair	Rout and Seal Cracks			
#300	20 SF (12" Depth)	25 LF	Additional 12 SF (12" Depth) repair at Beam below window and 8 SF (6" Depth) of repair at Column between 300/400. Rout and Seal Allowance is Typical	High	1 (Worst Condition)
#400	16 SF (12" Depth)	25 LF	No additional concrete repairs. Rout and Seal Allowance is Typical	High	2
#500	12 SF (6" Depth)	25 LF	Additional 12 SF (6" Depth) of repair at Column between 500/600. Rout and Seal Allowance is Typical	Low	5 (Best Condition)
#600	20 SF (12" Depth)	25 LF	No additional concrete repairs. Rout and Seal Allowance is Typical	Medium	3
#700	20 SF (12" Depth)	25 LF	No additional concrete repairs. Rout and Seal Allowance is Typical	Medium	4