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CONDITION ASSESSMENT

THE VILLAGE OF OAK PARK PARKING STRUCTURES

OAK PARK, ILLINOIS

Prepared for:
VILLAGE OF OAK PARK

WRC PROJECT NO. 31-8130.00
MAY 2017



WALKER
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PROJECT NO. 31-8130.00

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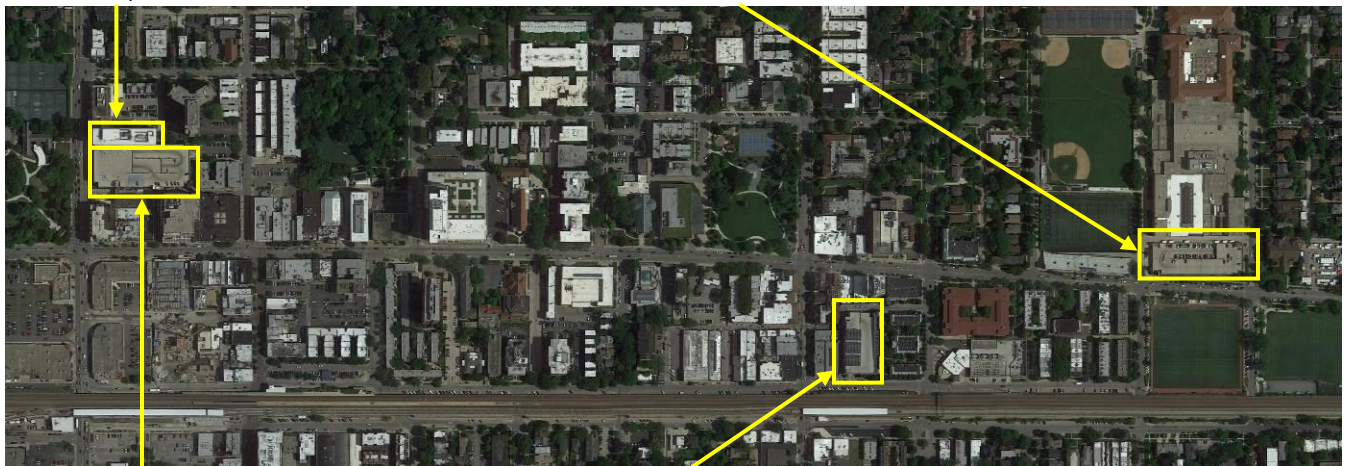
OAK PARK, ILLINOIS

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VILLAGE OF OAK PARK

MAY 2017

Holley Court
North Expansion

OPRF Parking
Structure



Holley Court
Parking Structure

Avenue Parking
Structure

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CONDITION ASSESSMENT OF THREE PARKING STRUCTURES

WRC PROJECT NO. 31-8130.00



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EXECUTIVE SUMMARY

This report contains the results of Walker Restoration Consultant's Condition Assessment of three parking structures owned by the Village of Oak Park, Illinois. The condition assessment of the three structures was performed to evaluate the existing condition of each structure and develop repair and maintenance recommendations for the structures based on observed deterioration.

HOLLEY COURT PARKING STRUCTURE

This thirty-three-year-old, cast-in-place post-tensioned portion of the parking structure remains in fair condition. The identified deterioration included varying amounts of concrete delamination and deterioration on the floors, ceilings, beams, columns, and walls. We also identified deteriorated expansion joints, construction joints, vertical, façade and cove joint sealants, along with random floor cracks, worn out traffic membrane, areas of ponded water, corroding doors and frames and handrails. Also, varying amounts of deterioration was noted on the façade panels and many severely deteriorated sealants.

We recommend performing concrete repairs at the locations with deterioration on the floors, ceilings, beams columns, and walls, façade panels, replacement of the severely deteriorated expansion and construction joints, cove joints, façade and vertical joint sealants, and routing and sealing the random floor cracks. Furthermore, we recommend installing a traffic topping at select locations, including on the pedestrian bridges, within the stair towers and re-coating the worn out areas. Additionally, we recommend adding supplemental floor drains to alleviate standing water on the supported levels and have the entire drainage system cleaned. Finally, we recommend repair and tuck pointing the cracks in the masonry façade panels, replacing the roofing systems on both pedestrian bridges and as an additional level of waterproofing, application of a concrete sealer on the exposed supported floor surfaces, along with re-striping the parking stalls.

Our opinion of probable construction cost for the maintenance and recommended repairs is \$1,015,000. Please see Table 1 in the Recommendations section for a breakdown of the individual repair and maintenance cost items.

Repairs to the masonry addresses only the current ongoing deterioration symptoms. The original design of the masonry façade walls including at the west expansion did not allow for thermal expansion and contraction of the main garage structure, which has caused the masonry façade to crack and deteriorate in numerous areas. It would be extremely costly and invasive to correct this original design issue and allow for independent movement of the structure. Therefore, we recommend continuing to address the symptoms on an annual basis while monitoring the façade distress. Note that these observations also apply to the other parking structure with extensive masonry facades.

HOLLEY COURT NORTH EXPANSION

Adjacent to the Holley Court Parking Structure is the Oak Park Place Apartment Building. Additional parking is provided underneath the apartment building on the first five levels. Access to this parking area is directly from the Holley Court Structure. In reviewing this parking area we found some very minor concrete floor and wall spalls, deteriorated tee-to-tee flange, cove and vertical joint sealants and some cracked and deteriorated masonry.

For this area, we recommend repair of the very minor floor and wall spalls, replacement of the deteriorated joint sealants, repair of the deteriorated masonry, installation of a metal flashing between the parking structure and the building to prevent water from running down between the buildings and application of a concrete sealer on the supported floor surfaces, along with re-striping the parking stalls.

Our opinion of probable construction cost for the maintenance and recommended repairs is \$90,000. Please see Table 1A in the Recommendations section for a breakdown of the individual repair and maintenance cost items.

AVENUE PARKING STRUCTURE

The fifteen-year-old cast-in-place post-tensioned parking structure remains in fair to good condition. The identified deterioration includes minor amounts of concrete delamination and deterioration on the floor slabs and columns. We also identified deteriorated expansion joints, construction joints, vertical, façade and cove joint sealants, along with random floor cracks. The floor drains should be replaced due to the small diameter, which clog very easily. Also, a fair amount of mortar joint and masonry capstone deterioration was observed on most of the façade panels.

We recommend performing concrete repairs at the locations with deterioration on the floor columns, façade panels, replacement of the severely deteriorated expansion and construction joints, cove joints, façade and vertical joint sealants, and routing and sealing the random floor cracks. Furthermore, we recommend replacing the existing floor drains with larger capacity drains to prevent overflowing situations due the drains being clogged on the supported levels and have the entire drainage system cleaned. Additionally, we recommend replacing the severely cracked brick, tuck pointing and re-building the masonry façade walls. As an additional level of waterproofing, we recommend application of a concrete sealer to the floor surfaces, along with re-striping the parking stalls. Finally, we recommend painting the handrails within the stair towers and applying an elastomeric coating to the peeling masonry block walls on the east elevation.

Our opinion of probable construction cost for the maintenance and recommended repairs is \$375,000. Please see Table 2 in the Recommendations section for a breakdown of the individual repair and maintenance cost items.



OPRF PARKING STRUCTURE

This fourteen-year-old precast concrete parking structure has gone through approximately thirteen winter cycles since it was opened and is in poor condition. The identified deterioration included varying amounts of concrete deterioration to the cast-in-place topping, precast tees, tee stems, columns, beams and walls, severely deteriorated tee-flange-to-tee-flange joint sealants, cove and control joint sealants, vertical sealants, expansion joints and architectural sealants. Also, areas of ponding water were noted, along with corroding doors and frames, metal stairs, guard railings, structural steel supports along with severely deteriorated masonry units and mortar joints.

We recommend total replacement of all the joint sealants including tee-to-tee, control joint, cove and vertical sealants, architectural sealant, and expansion joint. Additionally, we recommend replacement of the deteriorated cast-in-place topping, repairs to the concrete tee stems, columns, beams and walls, selective replacement of tee-flange-to-tee-flange shear connectors, along with the capstone joint replacement, tuck pointing cracked masonry joints and precast façade panel. Also, we recommend an application of a penetrating concrete sealer over the precast tees. The sealer is needed to keep chloride ions from penetrating deeper into the concrete matrix. Sealers typically have a life cycle of only three to five years. We further recommend recoating the areas with traffic membrane and chemical grout injection on several vertical cracks on the foundation wall.

In addition to the repairs listed above, we recommend routing and sealing of select random cracks on the precast tees and re-striping the Top Level since cleaning of the surface to apply the penetrating sealer will remove a portion of the existing striping.

Also, the cracking observed in the exterior precast loadbearing spandrel beams is unusual. These cracks appear to have been previously repaired and the cracks appear to have extended beyond the previous repair in some areas. We recommend performing additional investigation as well as structural analysis to determine the significance of these cracks.

Finally, we recommend adding floor drains where water is ponding on the supported tees and re-sealing leaking floor drains and cleaning the entire drainage system, replacing the corroded doors and frames, replacing the roof over the elevator and both stair towers, painting the door and frame on the northeast stair tower, painting the handrails in both stair towers, painting the steel stairs, structural steel supports, and guard rails.

Implementation of the conceptual recommended repairs in a timely manner will greatly contribute to reducing leakage and subsequent corrosion of embedded steel shear connections, thereby extending the useful life and performance of the structure.

Our opinion of probable construction cost for the maintenance and recommended repairs is \$425,000. Please see Table 3 in the Recommendations section for a breakdown of the individual repair and maintenance cost items.

The repaired cracks on the precast bumper wall panels on the Top Level,

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Please see the attached discussion for a detailed report of our investigation.

Laurence C. Susmarski
Project Manager/Principal Investigator

May 18, 2017

Date

Daniel E. Moser, S.E., P.E.
Principal/Director of Restoration

May 18, 2017

Date

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INTRODUCTION

Walker Restoration Consultants performed a Condition Assessment of the Holley Court, Avenue and OPRF Parking Structures in Oak Park, Illinois, in accordance with our proposal dated July 8, 2016.

Project Manager Larry Susmarski, Assistant Project Manager John Morgan and Assistant Project Manager Jose Perez performed the assessment on February 1, 2 and 17, 2017. The condition assessment included a visual review of readily accessible exposed structural members, supported floor surfaces, wall surfaces, exterior façade, stair towers, and floor drainage systems. Chain dragging and hammer sounding of representative elements was conducted to identify typical subsurface concrete delamination.

OBJECTIVES

The objectives of the condition assessment were to evaluate the existing condition of each of the three structures, develop repair and maintenance recommendations for the structures based on observed deterioration, provide an opinion of probable cost for the recommended items, and to suggest improvements to enhance the usability and appearance of the structures.

PARKING STRUCTURE DESCRIPTIONS

HOLLEY COURT

The original cast-in-place post-tensioned portion of the structure was completed around 1984. A vertical expansion was done in the 1990's and was horizontally expanded to the west in 2005. As viewed in plan, this portion of the structure measures approximately 375 feet in the east-west direction with eighteen bays and approximately 170 feet in the north-south direction with three bays with six parking levels, four and one half supported parking levels and one on-grade level. The structural system consists of 5-inch post-tensioned concrete slabs and post-tensioned beams, supported by cast-in-place columns. Precast concrete spandrel panels make up the façade on the four elevations.

Traffic circulation consists of a double-threaded sloping ramp system with one-way traffic with angle parking. Vehicle entrance/exit of the parking structure is at the northeast corner off Holley Court, at the north side off Ontario Street and at the southeast corner off the alley way.

Pedestrian access is via two stair/elevator cores, a single elevator tower and by two independent stairwells. One stair/elevator tower is located at the southeast corner of the parking structure and the other stair/elevator tower is located near the southwest corner. The single elevator tower is located about midway along the south elevation. One stairwell is located near the northwest corner and the other stairwell is located at the northeast corner of

the parking structure. The structure is clad with precast concrete spandrel and façade panels with a brick veneer.

HOLLEY COURT NORTH EXPANSION

Adjacent to the Holley Court Parking Structure is the Oak Park Place Apartment Building. The North Expansion provides additional parking for 180 vehicles on five supported levels and one level on grade. The parking area is directly underneath the apartment building. The structural system consists of nine-foot wide precast double-tees supported by precast beams and spandrel panels, which are supported by precast columns. As viewed in plan, the supported floor area measures approximately 180 feet in the east-west direction with five bays and approximately 60 feet in the east-west direction with just one bay. Pedestrian access to this area is via the Holley Court Parking Structure stairs and elevators.

AVENUE PARKING STRUCTURE

The Avenue Parking Structure has five supported levels and one level on grade. The parking structure is located about mid-block between N. Oak Park Avenue and N. Euclid Avenue along the north side of North Boulevard. The parking structure was originally constructed around 2002, making it approximately 15 years old.

As viewed in plan, the structure measures approximately 237 feet in the north-south direction with ten bays and approximately 116 feet in the east-west direction with twelve bays. Pedestrian access is provided to the supported levels by two stair and elevator towers. One stair tower is located at the southwest corner of the parking structure and the other is located near the northwest corner of the parking structure. Vehicle access is provided by a single entrance and exit from North Boulevard on the south elevation. Traffic circulation consists of a single-threaded sloping ramp system with two-way traffic with ninety-degree parking.

The structural framing consists of post-tensioned concrete slabs and beams supported by conventionally reinforced concrete columns. The stair towers in the structure consist of concrete masonry walls clad with brick masonry veneer to match the adjacent building.

OPRF PARKING STRUCTURE

The OPRF Parking Structure is a one supported level parking structure bordered by N. East Avenue to the west, N. Scoville Avenue to the east and Lake Street to the south. The parking structure was originally constructed around 2003, making it approximately 14 years old.

As viewed in plan, the structure measures approximately 126 feet in the north-south direction with two bays and approximately 364 feet in the east-west direction with thirteen bays. Pedestrian access is provided to the supported level via stair and elevator tower located on the northeast corner and a stair tower located at the northwest corner. Vehicle access is provided by a single entrance and exit off N. Scoville Avenue to the east.

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The structural system consists of ten-foot wide precast double-tees supported by precast inverted tee beams, spandrel panels and precast light walls, which are supported by precast columns. Architectural precast concrete spandrel panels make up the façade elevations.



RECOMMENDATIONS

HOLLEY COURT PARKING STRUCTURE

The Holley Court Parking Structure is currently in fair condition. Most of the observed deterioration is common for similar cast-in-place post-tensioned parking structures of this age. However, we recommend the repairs identified below be addressed in a timely manner to address the current deterioration problems and maintain the integrity of the structure.

We recommend the following repairs:

1. Repair of delaminated concrete at floor surfaces, column, ceilings, beams and walls.
2. Replacement of deteriorated expansion joints on the supported floor slabs, around stair towers and on the pedestrian bridges.
3. Routing and sealing of random cracks in the post-tensioned floor slab.
4. Replacement of severely deteriorated construction joint sealants.
5. Replacement of severely deteriorated vertical joint sealants near the stair towers.
6. Replacement of deteriorated cove sealants around the perimeter of the structure.
7. Replacement of the roofing system on the two pedestrian bridges.
8. Installation of a new elastomeric waterproofing membrane (traffic topping) at selective locations and within the stair towers.
9. Re-coating the waterproofing membrane where it has worn out at selective locations.
10. Application of a penetrating concrete sealer on the un-coated supported floor surface.
11. Re-painting of traffic markings where the sealer is being applied. The original striping will be partially removed when preparing the surface for the sealer application.
12. Installation of supplemental floor drains to remove localized water ponding.
13. Repairing and tuck pointing of deteriorated and cracked masonry on the stair towers, façade, and capstones.
14. Replacement of deteriorated façade panel joint sealants.
15. Installation of metal flashing around door opening at center elevator tower and along the perimeter where flashing is missing.
16. Painting of the corroded doors and frames and handrails.

The recommended repairs are tabulated in Table 1 along with our opinion of probable cost. Our opinion of probable cost for the repairs is \$1,015,000.

HOLLEY COURT NORTH EXPANSION

The Holley Court North Expansion is currently in fair to good condition. Most the observed deterioration is common for similar precast parking structures of this age. However, we recommend the repairs identified below be addressed in a timely manner to address the current deterioration and maintain the current condition of the structure.

We recommend the following repairs:

1. Repair very minor concrete at floor surfaces and walls.
2. Replacement of the severely deteriorated Tee-to-Tee joint sealants.
3. Replacement of severely deteriorated vertical joint sealants.
4. Replacement of deteriorated cove sealants around the perimeter.
5. Tuck pointing the minor deteriorated masonry joints.
6. Application of a penetrating concrete sealer on the supported floor surface.
7. Re-painting of traffic markings where the sealer is being applied. The original striping will be partially removed when preparing the surface for the sealer application.
8. Installation of metal flashing to cover the opening between the two parking areas.

AVENUE PARKING STRUCTURE

The Avenue Parking Structure is currently in fair to good condition. Similar to the Holley Court Parking Structure, the majority of the observed deterioration is common for similar cast-in-place post-tensioned parking structures of this age. However, we recommend the repairs identified below be addressed in a timely manner to address the current deterioration and maintain the current condition of the structure.

We did note a condition that we recommend that should be addressing immediately. The two capstones that are cracked and broken cap stones, on south façade elevation along North Avenue, should be removed until repairs can be done. Refer to photographs 12 and 13 for Avenue Parking Structure in Appendix A.

1. Repair delaminated concrete at floor surfaces and columns.
2. Replacement deteriorated expansion joint between the grade slab and supported floor.
3. Rout and seal random cracks in the post-tensioned floor slab.
4. Replace severely deteriorated construction joint sealants.
5. Replace severely deteriorated vertical joint sealants near the stair towers.
6. Replace deteriorated cove sealants around the perimeter and around the columns of the structure.



7. Application of a penetrating concrete sealer on the supported floor surface.
8. Re-paint traffic markings where the sealer is being applied. The original striping will be partially removed when preparing the surface for the sealer application.
9. Replace the existing floor drains with larger floor drains to avoid the drains from clogging.
10. Replace damaged and deteriorated drainage pipe.
11. Repairing, replacing and tuck pointing of the cracked and deteriorated masonry on the stair towers, façade, and capstones.
12. Replace deteriorated façade panel joint sealants.
13. Paint stair tower handrails and structural steel.
14. Re-paint masonry wall with an elastomeric coating where the paint has peeled off.

The recommended repairs are tabulated in Table 2 along with opinion of probable cost. Our opinion of probable cost for the repairs is \$375,000.

OPRF PARKING STRUCTURE

The OPRF Parking Structure is currently in poor condition. The majority of the observed deterioration is common for similar precast parking structures of this age, but it is more severe. The lack of proper maintenance has led to this condition. To restore the structure back to a good condition, we recommend the repairs identified below be done in a timely manner to address this situation.

We recommend the following repairs:

1. Selective replacement of broken and deteriorated tee-flange to tee-flange shear connectors with retrofit connectors.
2. Repair concrete spalls in the cast-in-place washes and at lifting loops on the precast double-tees.
3. Repair deteriorated and spalled columns, column haunches, beams and walls.
4. Repair concrete spalls at the underside of the precast tee flanges and tee stems.
5. Rout and seal random cracks in the cast-in-place washes and precast tees.
6. Complete replacement of the construction joint, tee-flange to tee-flange and cove joint sealants on the exposed level.
7. Application of a penetrating concrete sealer on the precast tees.
8. Re-paint traffic markings where the sealer is being applied. The original striping will be partially removed when preparing the surface for the sealer application.
9. Chemical grout injection in leaking crack in the foundation wall.



10. Remove and replace the traffic topping at selective areas.
11. Installation of supplemental floor drains to remove localized water ponding.
12. Repairs to deteriorated drainage piping.
13. Total replacement of all façade panel sealants.
14. Paint steel stairs and handrails in the stair towers, structural steel supports and guard rails.
15. Repairing, replacing and tuck pointing of the cracked and deteriorated masonry on the stair towers, façade, and capstones.
16. Perform additional investigation as well as structural analysis to determine the significance of these cracks.

The recommended repairs are tabulated in Table 3 along with our opinion of probable cost. Our opinion of the probable cost for the recommended repairs is estimated to be \$450,000.

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OPINION OF PROBABLE COSTS

HOLLEY COURT PARKING STRUCTURE

Table 1 – Opinion of Probable Repair Costs for the Recommended Repairs & Maintenance

WORK ITEM	DESCRIPTION	EXTENSION	Notes for Tables
1.1	General Requirements	\$ 55,000	1. Estimated costs are in 2017 U.S. dollars and are based on the repairs being completed in one construction season.
3.1	Floor Repair	48,000	
3.5	Floor Repair w/Traffic Topping	105,000	
4.1	Ceiling Repair	16,000	
5.1	Beam Repair	12,000	2. Estimated costs are based on historical records of similar types of work.
6.1	Column Repair	12,000	
7.1	Wall Repair	4,000	3. Costs may vary due to local economy, time of year, phasing, or other factors.
10.2	Expansion Joint - Adhered	47,000	
10.3	Expansion Joint - Elastomeric	149,000	4. Estimated probable repair cost for the two bridges is approximately \$78,000, which includes construction contingency and engineering. Repairs include floor, column beam repairs, new expansion joints, floor waterproofing, new drains and roof replacement.
11.1	Random Crack Repair	14,000	
11.2	Construction Joint Sealant	3,000	
11.3	Vertical Joint Sealant	2,000	
11.7	Cove Sealant	39,000	
15.1	Concrete Sealer	28,000	
16.1	Traffic Topping	12,000	
16.4	Traffic Topping - Recoat	18,000	
25.1	Clean Existing Drains & Piping	10,000	
25.2	Floor Drain – New & Replacement	16,000	
25.3	Pipe and Hanger	35,000	
35.1	Tuck pointing	47,000	
45.1	Paint Traffic Markings	6,000	
45.5	Paint Door & Frame	3,000	
45.6	Paint Handrails	25,000	
73.1	Door Opening Flashing	5,000	
74.7	Capstone Joint Repair	9,000	
74.8	Capstone Repair	5,000	
96.4	Remove & Replace Roofing System	30,000	
Construction Subtotal		\$ 755,000	
Construction Contingency		155,000	
Engineering		105,000	
TOTAL		\$ 1,015,000	

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HOLLEY COURT NORTH EXPANSION

Table 1A – Opinion of Probable Repair Costs for the Recommended Repairs & Maintenance

WORK ITEM	DESCRIPTION	EXTENSION
1.1	General Requirements	\$ 5,000
3.1	Floor Repair	500
7.1	Wall Repair	2,000
11.3	Vertical Joint Sealant	2,000
11.4	Tee-to-Tee Joint Sealant	15,000
11.7	Cove Sealant	15,000
15.1	Concrete Sealer	19,000
35.1	Tuck pointing	1,500
38.1	Metal Flashing	8,000
45.1	Paint Traffic Markings	2,000
Construction Subtotal		\$ 70,000
Construction Contingency		11,000
Engineering		9,000
TOTAL		\$ 90,000

Notes for Tables

1. Estimated costs are in 2017 U.S. dollars and are based on the repairs being completed in one construction season.
2. Estimated costs are based on historical records of similar types of work.
3. Costs may vary due to local economy, time of year, phasing, or other factors.

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AVENUE PARKING STRUCTURE

Table 2 – Opinion of Probable Repair Costs for the Recommended Repairs & Maintenance

WORK ITEM	DESCRIPTION	EXTENSION	Notes for Tables
1.1	General Requirements	\$ 23,000	1. Estimated costs are in 2017 U.S. dollars and are based on the repairs being completed in one construction season.
3.1	Floor Repair	1,000	
3.1.1	Floor Repair w/Traffic Topping	5,000	
6.1	Column Repair	1,000	2. Estimated costs are based on historical records of similar types of work.
10.3	Expansion Joint Elastomeric	9,000	
11.1	Random Crack Repair	6,000	
11.2	Construction Joint Sealant	8,000	3. Costs may vary due to local economy, time of year, phasing, or other factors.
11.3	Vertical Joint Sealant	4,000	
11.7	Cove Sealant	42,000	
15.1	Concrete Sealer	46,000	
25.1	Clean Existing Drains & Piping	5,000	
25.2	Floor Drain - Replacement	62,000	
25.3	Pipe and Hanger	19,000	
25.6	Downspout Repair	1,000	
35.1	Tuck Pointing	12,000	
37.3	Door Sweeps	1,000	
45.1	Paint Traffic Markings	6,000	
45.6	Paint Handrails	10,000	
45.8	Paint Structural Steel	1,000	
74.7	Capstone Joint Repair	5,000	
74.8	Capstone Repair	5,000	
91.5	Elastomeric Coating	20,000	
Construction Subtotal		\$ 292,000	
Construction Contingency		43,000	
Engineering		40,000	
TOTAL		\$ 375,000	

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OPRF PARKING STRUCTURE

Table 3 – Opinion of Probable Repair Costs for the Recommended Repairs & Maintenance

WORK ITEM	DESCRIPTION	EXTENSION	Notes for Tables
1.1	General Requirements	\$ 25,000	1. Estimated costs are in 2017 U.S. dollars and are based on the repairs being completed in one construction season.
2.6	Floor Preparation – Topping Removal	3,000	
3.1	Floor Repair	16,000	
3.5	Floor Repair – Lifting Loops	9,000	2. Estimated costs are based on historical records of similar types of work.
5.1	Beam Repair	500	
6.1	Column Repair	500	
6.6	Column Repair - Haunch	22,000	3. Costs may vary due to local economy, time of year, phasing, or other factors.
8.1	Tee Stem Repair	2,000	
8.4	Tee Flange Repair	1,000	
10.3	Expansion Joint – Elastomeric	9,000	
11.1	Random Crack Repair	5,000	
11.2	Construction Joint Sealant	3,000	
11.3	Vertical Joint Sealant	22,000	
11.4	Tee-to-Tee Joint Sealant	39,000	
11.6	Chemical Grout Injection	1,000	
11.7	Cove Sealant	17,000	
15.1	Concrete Sealer	19,000	
16.1	Traffic Topping	6,000	
25.2	Floor Drain - New	6,000	
25.3	Pipe and Hanger	12,000	
25.6	Clean Existing Drains and Piping	5,000	
35.1	Tuck Pointing	6,000	
37.1	Door & Frame Replacement	8,000	
40.2	Shear Connector Replacement	8,000	
45.1	Paint Traffic Markings	4,000	
45.5	Paint Door & Frame	1,000	
45.6	Paint Handrails	5,000	
45.7	Paint Steel Stairs	8,000	
45.8	Paint Structural Steel	1,000	
45.9	Paint Guard Rail	20,000	
74.7	Capstone Joint Repair	13,000	
83.6	Precast Panel Repair	25,000	
Construction Subtotal		\$ 322,000	
Construction Contingency		48,000	
Engineering		45,000	
TOTAL		\$ 415,000	



IMPLEMENTATION

The repair program outlined in the tables can be competitively bid and executed by experienced restoration contractors. The first step in this process is to obtain a quality set of bidding documents prepared by an experienced restoration engineer. This will allow for appropriately designed repairs and estimated quantities, so the project can be competitively bid by restoration contractors. The availability and bid prices will depend on the market conditions at the time of the bids. Issuing for bids in the early part of a year will produce the best results.

Walker recommends construction be scheduled in moderate weather due to the weather sensitive repair procedures. Implementation of the repairs during winter months is possible, but at increased costs and with some technical difficulties.

If desired, the repairs may be phased to fit within budgetary constraints. If this is done, we recommend completing the repairs in the OPRF Parking Structure first to minimize further deterioration, followed by the Holley Court Parking Structure, and Avenue Parking Structure.

DISCUSSION

We found each of the structures to be in typical condition for parking structures of similar construction and age. Each type of observed deterioration is discussed in this section in conjunction with the recommended repair and maintenance activities necessary to address the items noted and to properly maintain each of the structures. A list of detailed observations for each structure (including photo references) is included under the heading Observations and Findings.

HOLLEY COURT PARKING STRUCTURE

CONCRETE STRUCTURE

The Holley Court Parking Structure utilizes un-bonded post-tensioning as the main structural reinforcement for both the concrete beams and floor slabs. This system consists of high strength steel seven wire strands that are encased in a plastic sheathing, embedded in the concrete slab, and anchored at each end of the member. During the initial stages of construction, these strands or tendons are stressed to approximately 33,000 pounds of force to provide uplift in the structural members. This method of construction counteracts the effects of a portion of the dead load and allows for longer spans and more slender members than a conventionally reinforced concrete member.

Chain dragging and sounding of the supported floor surfaces revealed floor slab concrete delamination and deterioration over top of the post-tensioned beams and near construction joints in the slab. Higher concentrations of floor delamination were found on the lower levels. The supported floor surfaces, on the original portion of the structure, has a traffic topping to help protect from chloride ion penetration into the concrete matrix, thus reducing the amount of corrosion to the mild reinforcement within the slab. This traffic topping has significantly helped reduce the amount of deterioration on the floor slab. On the expanded portion of the structure to the west, only minor amounts of floor deterioration were found on that section of slab.

We also noted locations of column, wall, and underside of slab delamination throughout the structure on various levels. We recommend performing partial depth repairs at these locations and at floor slab delaminations to restore the integrity of these members and mitigate additional deterioration.

We recommend addressing concrete repairs within the next year to minimize the amount of additional deterioration and to prevent an unsafe loss of slab post-tensioning.

WATERPROOFING

The waterproofing systems in a parking structure are essential to protecting embedded reinforcing and concrete from premature deterioration. The waterproofing systems within the Holley Court Parking Structure include sealants at construction joints, cove sealant along the

exterior walls, and expansion joints at the stair towers and at locations where the structure abuts the adjacent building.

The construction joint and cove sealants throughout the structure were observed to be in poor condition, with numerous locations of failure and age related deterioration. In addition, leakage was noted through the construction joints at multiple locations. The construction joints contain intermediate anchorages for the slab post-tensioning tendons, making maintenance of these joint sealants essential to protecting the tendons. Quality urethane sealants typically have a life expectancy of approximately 5 years when exposed to UV rays and 7 to 9 years if in a covered level, after which time replacement is necessary to maintain their effectiveness. We recommend complete replacement of the construction joint and cove joint sealants in the structure.

On the portion of the floor slab without traffic topping, several random floor cracks were found on all levels. Some of these floor cracks were through-slab and showed signs of active leaking. These cracks allow water to penetrate into the floor slab, exposing the post-tensioned tendons to a potential corrosive environment. We recommend that the through-slab cracks be routed and sealed with a flexible sealant to avoid additional moisture infiltration and deterioration in these areas.

We also noted torn sealant and severely deteriorated expansion joints at the stair towers in the structure. At these locations, we recommend replacing the joints to prevent water infiltration and deterioration of the concrete members below. At the joint separating the structural supported slab from the slab-on-grade, we recommend installing a winged expansion joint. This joint experiences a significant amount of movement and a narrow sealant joint as currently installed usually fails quickly in this type of situation. A new expansion joint will accommodate this movement and adequately protect the slab post-tensioning anchorages located at the edge of the structural slab.

In addition to the measures above, we recommend application of a clear concrete silane sealer to be applied to the exposed floor areas of the structure to minimize moisture infiltration into the post-tensioned slab. A silane sealer will help minimize water ingress into the concrete and slow the potential rate of corrosion on the tendons and mild reinforcement. Application of the sealer involves shot blasting the concrete surface, which also removes much of the striping paint. For this reason, we have also included costs for re-striping the structure in our opinion of probable cost.

Due to the age of the structure, the amount of deterioration present and the high levels of chloride contamination found in the supported structural slab, we recommend installation of an elastomeric waterproofing membrane (traffic topping) on all supported surfaces. The installation of a membrane will help minimize the amount of future chloride intrusion into the slab and slow the corrosion cycle and rate of deterioration.

MISCELLANEOUS & FAÇADE

We did observe one condition that we consider to be an immediate repair. On the southeast corner of the southeast stair tower, we noted that the precast cap stones appear to be shifting and in danger of falling from the façade panel. We recommend performing a close-up inspection of the southeast corner cap stones and additional representative cap stones to determine if stabilization and/or re-anchoring is necessary.

At the corners of the stair towers, vertical cracking is present through the brick masonry. At these locations, we recommend repair of the masonry to restore the integrity of the masonry corners.

A review of the remaining façade from ground level revealed the presence of a few column and wall concrete delaminations, which we recommend repairing as soon as possible to prevent loose concrete from falling onto pedestrians or vehicles.

The repairs to the masonry addresses only the current ongoing deterioration symptoms. As previously stated, the original design of the masonry façade walls including at the west expansion did not allow for thermal expansion and contraction of the main garage structure, which has caused the masonry façade to crack and deteriorate in numerous areas. It would be extremely costly and invasive to correct this original design issue and allow for independent movement of the structure. Therefore, we recommend continuing to address the symptoms on an annual basis while monitoring the façade distress.

HOLLEY COURT NORTH EXPANSION

CONCRETE STRUCTURE

The Holley Court North Expansion provides additional parking for 180 vehicles on five supported levels and one level on grade. The structural system consists of nine-foot wide precast double-tees supported by precast beams and spandrel panels, which are supported by precast columns. Only a couple of minor floor spalls were detected over the shear connector and a couple of wall spalls were noted. Overall, the concrete beams and columns remain in good condition.

WATERPROOFING

Proper maintenance of waterproofing systems is vital to extending the life of the parking structure, particularly in a precast structure where there are many joints for potential infiltration. Waterproofing systems are intended to minimize the intrusion of moisture into the concrete, which leads to corrosion of the embedded steel reinforcement and connections, as well as concrete deterioration. The waterproofing systems within the parking structure include sealants at the tee-to-tee joints, construction joints, vertical joints, and cove sealant along the interior and exterior walls.



Urethane sealants typically have a life expectancy of approximately 5 years when exposed to UV rays and 7 to 9 years if in a covered level, after which time replacement is necessary to maintain their effectiveness. The joint sealants in the structure were observed to be in fair condition. There were a few locations of adhesion failure. We recommend select replacement of the tee-flange to tee-flange, vertical and cove sealants.

In addition to the measures above, we recommend application of a clear concrete silane sealer to the Second to Fifth Levels to minimize moisture infiltration into the precast tees. Concrete sealers typically have an effective life of 3 to 5 years, after which time a reapplication is necessary to maintain their effectiveness. A silane sealer will help minimize moisture ingress into the concrete and slow the potential rate of corrosion. Application of the sealer involves shot blasting the concrete surface, which also removes much of the striping paint. For this reason, we have included costs for re-striping the Second to Fifth Levels.

FAÇADE

The brick façade is in good condition. We noted a couple of locations where the mortar joints are disengaging and requires re-tuck pointing.

MISCELLANEOUS

The gap between the North Expansion parking area and the main parking is allowing rain to drain down between the two buildings. This is causing water staining on the masonry façade of the two buildings. We recommend installation of a metal flashing over the open area to prevent the water from pouring down to the lower levels.

AVENUE PARKING STRUCTURE

CONCRETE STRUCTURE

Comparable to the Holley Court Parking Structure, the Avenue Parking Structure utilizes the same type of un-bonded post-tensioning as the main structural reinforcement for both the concrete beams and floor slabs. This system consists of high strength steel seven wire strands that are encased in a plastic sheathing, embedded in the concrete, and anchored at each end of the member. During the initial stages of construction, these strands or tendons are stressed to approximately 33,000 pounds of force to provide uplift in the structural members. This method of construction counteracts the effects of a portion of the dead load and allows for longer spans and more slender members than a conventionally reinforced concrete member.

Chain dragging and sounding of the supported floor surfaces revealed very minor amounts of floor slab concrete delamination and deterioration over top of the post-tensioned beams and near construction joints in the slab. The majority of the floor deterioration was found on the Roof Level below the traffic topping.



We also noted very minor amounts of column deterioration. We recommend performing partial depth repairs at these locations and at floor slab delaminations to restore the integrity of these members and mitigate additional deterioration.

WATERPROOFING

As previously described, the waterproofing systems in a parking structure are essential to protecting embedded reinforcing and concrete from premature deterioration. The waterproofing systems within the Avenue Parking Structure include sealants at construction joints, cove sealants, and expansion joints where it abuts the grade slab.

The construction joints throughout the structure were observed to be in fair to poor condition, with numerous locations of age related deterioration. In addition, leakage was noted through the construction joints at multiple locations. The construction joints contain intermediate anchorages for the slab post-tensioning tendons, making maintenance of these joint sealants essential to protecting the tendons. As noted previously, high quality urethane sealants typically have a life expectancy of approximately 5 years when exposed to UV rays and 7 to 9 years if in a covered level, after which time replacement is necessary to maintain their effectiveness. We recommend complete replacement of the construction joint sealants in the structure and routing and sealing of random cracks in the floor slab to avoid additional moisture infiltration and deterioration in these areas.

There is a lack of cove sealants at all concrete vertical interfaces with the supported floor slab. It is essential that these locations be sealed to prevent water from infiltrating through the cold joints between the interfaces and causing the reinforcement to corrode. We recommend that all these joints be sealed with sealant throughout the structure.

At the expansion joint separating the structural supported slab from the slab-on-grade, we recommend installing a winged expansion joint. This joint experiences a significant amount of movement and a narrow sealant joint as currently installed usually fails quickly in this type of situation. A new expansion joint will accommodate this movement and adequately protect the slab post-tensioning anchorages located at the edge of the structural slab.

In addition to the measures above, we recommend application of a clear concrete silane sealer to be applied to the exposed floor areas of the structure to minimize moisture infiltration into the post-tensioned slab. A silane sealer will help minimize water ingress into the concrete and slow the potential rate of corrosion on the tendons and mild reinforcement. Application of the sealer involves shot blasting the concrete surface, which also removes much of the striping paint. For this reason, we have also included costs for re-striping the structure in our opinion of probable cost.

MECHANICAL

The plumbing systems appeared to be in relatively good condition; however, we noted the floor drain top opening on every drain is very small and is subject to clogging very easily. This has been reported by the maintenance staff. It has been reported that during heavy rains the drains constantly overflow causing water to cascade down between the floor slabs and



shorting out some of the electrical circuits. In new parking structures, Walker recommends a minimum of twelve inches for a floor drain top opening. Therefore, we recommend that the current drains be replaced with larger floor drains, which can handle heavy rain downpours.

We also noted the drain pipe from the roof of the stair and elevator tower has been damaged. We recommend that the drain pipe be repaired now, before it leads to worst condition.

MISCELLANEOUS

The doors to the stair tower and stair and elevator tower do not have sweeps at the bottom of the doors on the Roof Level. We recommend that sweeps be added to these doors to prevent wind driven rain and snow from entering. Also, the paint on the handrails on both stair towers have worn off and need to be repainted.

FAÇADE

The brick façade is in fair condition. We noted numerous locations where the mortar joints are disengaging and require re-tuck pointing. Also, several cap stone joints on all levels need to be sealed and is letting water into the masonry wall below. On the south elevation at the 5th Level, the cap stones are spalling away from the building and need to be repaired before they fall off the building. We saw the same condition at one location on the north elevation.

The paint is peeling off the interior masonry wall on the west elevation on the Fifth and Roof Levels, allowing water to penetrate the wall cavity. We recommend the wall be repainted with an elastomeric coating to repel water from infiltrating the wall cavity.

OPRF PARKING STRUCTURE

CONCRETE STRUCTURE

Chain dragging of the floor surface on the Second Level located a substantial amount of deteriorated concrete in the cast-in-place topping over the precast double-tees and inverted double ledger beams' washes. Additionally, all the double-tee lifting loop patches have delaminated and need to be repaired. We recommend the deteriorated and delaminated concrete be removed and repaired.

The shear connectors are simple metal connections that provide transfer of loads from one precast element to another. These connections are required for the individual precast double-tees to act compositely as a structure and perform as designed. A number of the shear connectors were corroded and/or broken. At this stage of deterioration, it is typically more cost-effective to replace the shear connectors with a retrofit connector rather than attempt to repair them, so we have included replacement of the broken shear connectors in our opinion of probable cost.

A minor amount of beam and column deterioration was noted, which can be readily repaired. However, several haunches, or corbels, on the center light wall were noted to be deteriorating and require repair. Also, we found some tee flanges and a tee stem that needed to be repaired.

We did note one condition which we consider to be an immediate repair. On Level 1, at grid A-2, the connection securing a precast beam to the column has begun to crack. At this location, we recommend providing a supplemental connection plate from the beam to the existing column.

The cracking observed in the exterior precast loadbearing spandrel beams is unusual. These cracks appear to have been previously repaired and some of the cracks appear to have extended beyond the previous repair in some areas. We recommend performing additional investigation as well as structural analysis to determine the significance of these cracks.

WATERPROOFING

Proper maintenance of waterproofing systems is vital to extending the life of the parking structure, particularly in a precast structure where there are many joints for potential infiltration. Waterproofing systems are intended to minimize the intrusion of moisture into the concrete, which leads to corrosion of the embedded steel reinforcement and connections, as well as concrete deterioration. The waterproofing systems within the parking structure include sealants at the tee-to-tee joints, construction joints, vertical joints, traffic topping and cove sealant along the interior and exterior walls.

Urethane sealants typically have a life expectancy of approximately 5 years when exposed to UV rays and 7 to 9 years if in a covered level, after which time replacement is necessary to maintain their effectiveness. The joint sealants in the structure were observed to be in very poor condition. There were numerous locations of adhesion failure, joint deterioration, and damaged and torn sealants. From the underside, several joints were observed to display signs of continuing heavy leakage and corrosion of the embedded tee flange shear connectors. At this time, we recommend complete replacement of the tee-flange-to-tee-flange, construction joint, vertical and cove sealants on the Second Level and the expansion joint that abuts the grade slab.

During our walkthrough, we noted several isolated random cracks in the precast tee flange surfaces. At some locations, leakage was observed through some of these cracks into the level below. To correct this issue, we recommend the cracks be routed and sealed with a high quality urethane sealant to prevent further leakage.

In addition to the measures above, we recommend application of a clear concrete silane sealer to the Fifth Level to minimize moisture infiltration into the precast tees. Concrete sealers typically have an effective life of 3 to 5 years, after which time a reapplication is necessary to maintain their effectiveness. A silane sealer will help minimize moisture ingress into the concrete and slow the potential rate of corrosion. Application of the sealer involves shot blasting the concrete surface, which also removes much of the striping paint. For this reason, we have included costs for restriping the Fifth Level. Also, the traffic topping membrane on the Second Level has cracked and deteriorated in several locations. For these locations, we



recommend that the areas be removed and re-coated with new traffic membrane to prevent water infiltration into the level below.

In the Lower Level, on the east foundation wall, there are two cracks on the wall that are actively leaking. We recommend that these cracks be chemical grout injected to stop the water from leaking through the cracks.

MECHANICAL

The plumbing systems on this portion of the structure appears to be in fair condition. However, we noted areas on the Second Level that were ponding water. We recommend that supplemental floor drains be added to alleviate this ponding water problem. Additionally, a cover on the triple basin in the Lower Level has totally corroded away and has become a safety issue. Also, we recommend the entire drainage system be cleaned, since it has never been done before.

MISCELLANEOUS

In both stair towers, the metal pan stairs and handrails are corroding. It is recommended that the stairs and handrails be sand blasted clean, primed, and repainted. The also applies to the stairs from Level 1 to the Lower Level. Also, the doors and frames on the east stair tower should be repainted. The doors and frames on the west stair tower are currently too corroded to be painted, they should be replaced. Additionally, the guard railings on the center light wall are heavily corroded and should be sand blasted clean and repainted.

FAÇADE

A review of the structure's façade from ground level revealed significant deterioration. Almost all the joints on the cap stones have severely deteriorated and are allowing water to infiltrate the masonry brick cavity. This water infiltration into the masonry cavity has led to areas of mortar bond separation on the façade panel. On one façade panel, the water infiltration has caused a section of the panel to separate. The masonry on this panel may have to be re-built on the entire panel. We recommend replacing all the mortar joints on the cap stones with flexible sealant and tuck pointing all the deteriorated mortar joints.

SUMMARY

On February 1st, 2nd & 17th, 2017 Walker Restoration Consultants performed a Condition Assessment of the Holley Court, Avenue, and OPRF Parking Structures. The assessment consisted of a visual review of readily accessible exposed structural (columns, beams, walls, floor slabs and precast tees) and waterproofing (sealants and expansion joints) elements and chain dragging and hammer sounding of representative areas to identify concrete delaminations and possible corrosion of the embedded steel reinforcement. In addition, the stair towers, façades, and floor drainage systems were visually reviewed.

The following conditions were noted; representative photos may be found in Appendix A.

OBSERVATIONS AND FINDINGS

HOLLEY COURT PARKING STRUCTURE

Concrete Structure

1. Chain dragging of the supported floor surfaces revealed concrete delaminations in the post-tensioned floor slabs, particularly over pour strips (Photo 1) and randomly throughout the structure. (Photos 2 and 5).
2. Concrete delaminations were observed on the underside of floor slabs and at columns and walls throughout the structure (Photos 6 and 8).

Waterproofing

3. Severely deteriorated expansion joint between original structure and westerly expansion (Photo 9).
4. The sealants and expansion joint have severely deteriorated around the stair/elevator tower (Photo 10).
5. Areas of localized ponding were noted at several locations (Photo 11).
6. Broken drainage piping was seen on several drain lines (Photo 12).

Façade

7. Open mortar joints were seen at the center elevator and along the perimeter walls (Photos 13 and 14).
8. At numerous locations on the façade, broken and cracked brick and deteriorated masonry joints were noted (Photos 15 to 18).

HOLLEY COURT NORTH EXPANSION

1. Severely deteriorated tee-to-tee joint on supported level (Photo 1).



2. Deteriorated wall cap stone on façade panel (Photo 2).
3. Minor floor spall on top of precast tee (Photo 3).
4. Gap between the two structures allowing water to flow down between them (Photo 4).
5. Typical step crack on masonry façade (Photo 5).

AVENUE PARKING STRUCTURE

Concrete Structure

1. Chain dragging of the supported floor surfaces revealed concrete delaminations in the post-tensioned floor slabs (Photo 1).
2. Several isolated random floor cracks were seen throughout the structure (Photo 2).

Waterproofing

3. Active leaking construction joints were noted on all levels (Photo 3).
4. Severely deteriorated mortar joints were seen on many cap stones allowing water into the wall cavity (Photos 4 and 5).
5. Severely deteriorated vertical sealant around stair/elevator tower (Photo 6).
6. Severely deteriorated painted masonry wall at Roof Level allowing water into wall cavity (Photo 7).
7. Lack of cove sealant between the columns and perimeter walls (Photo 8).
8. Observed crack in drainage pipe (Photo 9).
9. Inadequate sized floor drain (Photo 10).

Miscellaneous & Façade

10. Typical worn off paint on stair handrails (Photo 11).
11. Cracked and broken cap stone on façade (Photos 12 and 13).
12. Severely deteriorated vertical sealant on masonry façade (Photo 14).

OPRF PARKING STRUCTURE

Concrete Structure

1. Chain dragging of the supported floor surfaces revealed numerous delaminations on the cast-in-place toppings (Photos 1 and 2).
2. Almost all the lifting loop patches have severely deteriorated (Photo 3).
3. Typical floor spalling over shear connector (Photo 4).
4. Severe floor delamination on tee flange (Photo 5).



5. Spalling occurring on column and column haunch (Photos 8 and 9).

Waterproofing

6. The tee-to-tee joint sealants were observed to be in very poor condition and leaking throughout the structure. (Photos 6 and 7, 10).
7. Typical severely deteriorated cove and vertical joint sealants (Photos 11 and 12).
8. All the sealants have severely deteriorated on the cap stone (Photo 13).
9. Severely deteriorated expansion joint between grade slab and supported slab (Photo 14).

Miscellaneous

10. Severely corroding metal stairs and handrails between Lower Level and First Level (Photo 15).
11. Corroding metal stairs within stair tower (Photo 16).
12. Severely corroded door and frame on stair tower (Photo 17).
13. Typical corroding tee stem support angles (Photo 18).
14. Corroded covers on triple basins (Photo 19).
15. Typical corrosion on guard rail on light wall (Photo 20).

Façade

16. Broken connection on spandrel panel connection (Photo 21).
17. Typical severely deteriorated vertical joint sealant on façade panels (Photo 22).
18. Severely deteriorated masonry section on façade panel on south elevation (Photo 23).
19. Efflorescence staining on masonry wall due to water infiltration (Photo 24).

LIMITATIONS

This report contains the professional opinions of Walker Restoration Consultants based on the conditions observed as of the date of our site visit and documents made available to us by Village of Oak Park (CLIENT). This report is believed to be accurate within the limitations of the stated methods for obtaining information.

We have provided our opinion of probable costs from visual observations, limited testing, and field survey work. The opinion of probable repair costs is based on available information at the time of our assessment and from our experience with similar projects. There is no warranty to the accuracy of such cost opinions as compared to bids or actual costs. This condition appraisal and the recommendations therein are to be used by CLIENT with additional fiscal and technical judgment.

It should be noted that our renovation recommendations are conceptual in nature and do not represent changes to the original design intent of the structure. As a result, this report does not provide specific repair details or methods, construction contract documents, material specifications, or details to develop the construction cost from a contractor.

Based on the agreed scope of services, the assessment was based on certain assumptions made on the existing conditions. Some of these assumptions cannot be verified without expanding the scope of services or performing more invasive procedures on the structure. More detailed and invasive testing may be provided by Walker Restoration Consultants as an additional service upon written request from CLIENT.

The recommended repair concepts outlined represents current generally accepted technology. This report does not provide any kind of guarantee or warranty on our findings and recommendations. Our assessment was based on and limited to the agreed scope of work. We do not intend to suggest or imply that our observation has discovered or disclosed latent conditions or has considered all possible improvement or repair concepts.

A review of the facility for Building Code compliance and compliance with the Americans with Disabilities Act (ADA) requirements was not part of the scope of this project. However, it should be noted that whenever significant repair, rehabilitation or restoration is undertaken in an existing structure, ADA design requirements may become applicable if there are currently unmet ADA requirements.

Similarly, we have not reviewed or evaluated the presence of, or the subsequent mitigation of, hazardous materials including, but not limited to, asbestos and PCB.

This report was created for the use of CLIENT and may not be assigned without written consent from Walker Restoration Consultants. Use of this report by others is at their own risk. Failure to make repairs recommended in this report in a timely manner using appropriate measures for safety of workers and persons using the facility could increase the risks to users of the facility. CLIENT assumes all liability for personal injury and property damage caused by current conditions in the facility or by construction, means, methods and safety measures implemented during facility repairs. CLIENT shall indemnify or hold Walker Restoration Consultants harmless from liability and expense including reasonable attorney's fees, incurred by Walker Restoration Consultants as a result of CLIENT's failure to implement repairs or to conduct repairs in a safe and prudent manner.

APPENDIX A PHOTOGRAPHS



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Photo 1 – Typical concrete delamination and cracking in floor slabs at pour strips.



Photo 2 – Concrete deterioration in floor slab under traffic topping.

**HOLLEY COURT PARKING
STRUCTURE**



Photo 3 – Floor slab deterioration at entrance to elevator tower.



Photo 4 – Floor slab deterioration within stair/elevator tower.



Photo 5 – Floor slab deterioration at elevator landing.



Photo 6 – Typical wall deterioration.



Photo 7 – Typical ceiling delamination.



Photo 8 – Typical delaminated beam at stair tower.



Photo 9 – Severely deteriorated expansion joint on Second Floor.

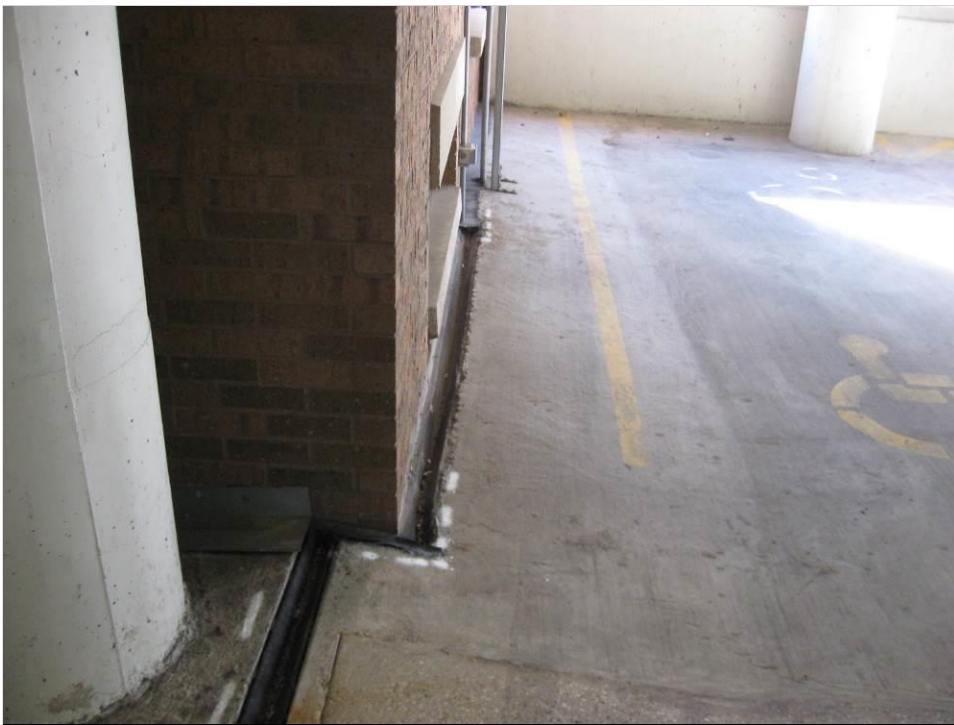


Photo 10 – Severely deteriorated expansion joint around stair tower.



Photo 11 – Area of ponding water of supported slab.



Photo 12 – Broken elbow on floor drain.



Photo 13 – Open joint at elevator tower.



Photo 14 – Masonry wall without any cap stones.



Photo 15 – Damaged masonry façade at entrance.



Photo 16 – Crack in masonry façade.



Photo 17 – Severely deteriorated mortar joint on cap stone.



Photo 18 – Loose masonry on façade.



**HOLLEY COURT NORTH
EXPANSION**

Photo 1 – Adhesion failure of tee-to-tee joint sealant.

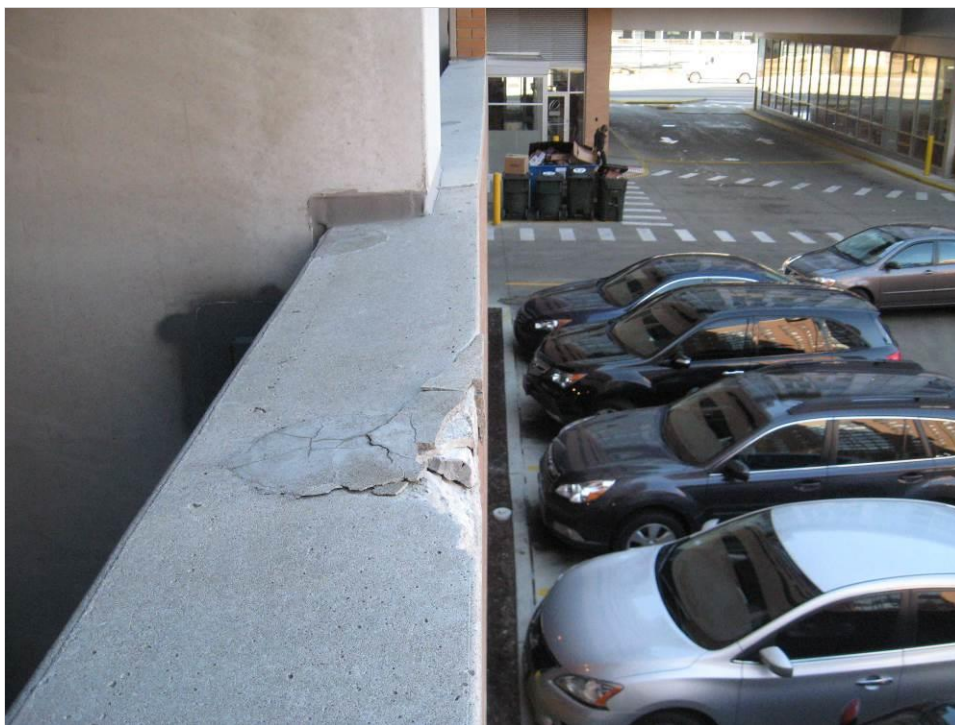


Photo 2 – Minor deterioration on façade wall.

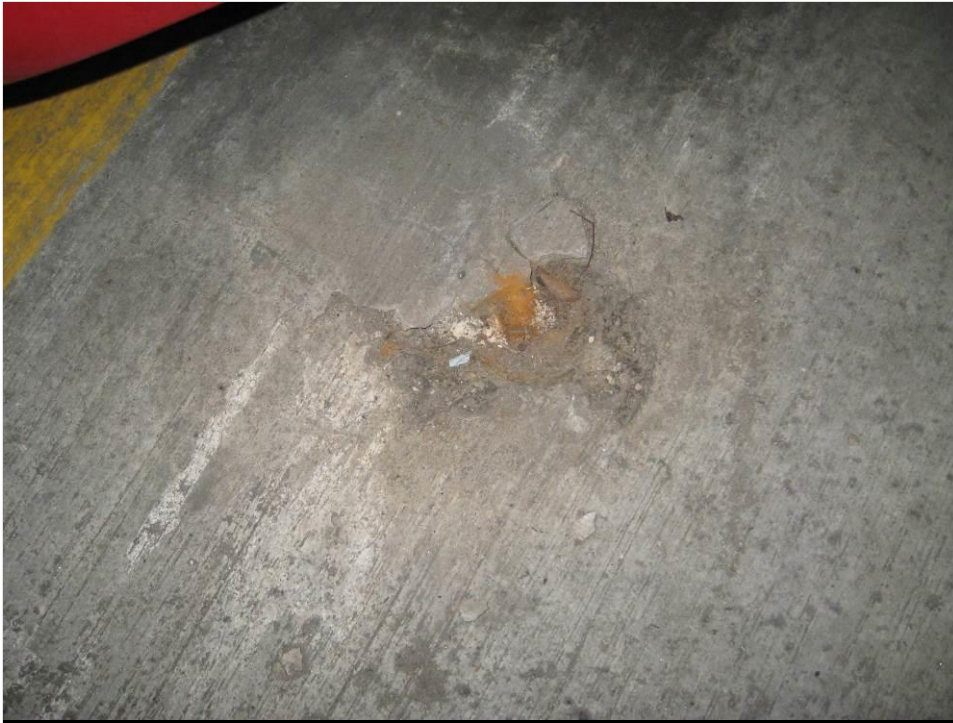


Photo 3 – Minor floor spall of precast tee.



Photo 4 – Open gap area between both structures.



Photo 5 – Crack in masonry on façade.



**AVENUE PARKING
STRUCTURE**

Photo 1 – Typical concrete delamination on floor slabs over top of post-tensioned beams.



Photo 2 – Typical random floor crack in floor slab.



Photo 3 – Active leaking construction joint seen from below slab.



Photo 4 – Typical severely deteriorated mortar joint on cap stone.



Photo 5 – Severely deteriorated mortar joint under window mullion on stair tower.



Photo 6 – Severely deteriorated vertical joint sealant on stair/elevator tower.



Photo 7 – Severely deteriorated painted masonry wall at Roof Level.



Photo 8 – Typical, no cove sealant between column and floor slab.



Photo 9 – Crack in drain pipe.



Photo 10 – typical inadequate size floor drain.



Photo 11 – Worn off paint on stair tower handrails.



Photo 12 – Broken cap stone and cracked masonry.



Photo 13 – Broken cap stone with the potential to fall off, south elevation.



Photo 14 – Severely deteriorated vertical joint sealant on exterior masonry wall.

**OPRF PARKING
STRUCTURE**



Photo 1 – Typical concrete delamination and spall at cast-in-place wash area.



Photo 2 – Typical concrete delamination and deterioration at cast-in-place washes.



Photo 3 – Floor delamination over lifting loop.



Photo 4 – typical floor spall over shear connector.



Photo 5 – Hole in the flange.



Photo 6 – Concrete spall at underside of precast tee flange.



Photo 7 – Corroding tee-flange-to-tee-flange shear connectors at joint with severely deteriorated sealant.



Photo 8 – Spall on the side of a column.



Photo 9 – typical concrete delamination at haunch for tee stem bearing.



Photo 10 – Typical severely deteriorated tee-to-tee flange joint sealant.



Photo 11 – Typical severely deteriorated cove sealant around column.



Photo 12 – Typical severely deteriorated vertical joint sealant at perimeter wall.



Photo 13 – Typical severely deteriorated cap stone joint sealant.



Photo 14 – Severely deteriorated expansion joint at grade slab.



**AVENUE PARKING
STRUCTURE**

Photo 1 – Severely corroded stairs from Lower Level to First Level.



Photo 2 – Corroding stairs within stair tower.



Photo 3 – Severely corroded door and frame.

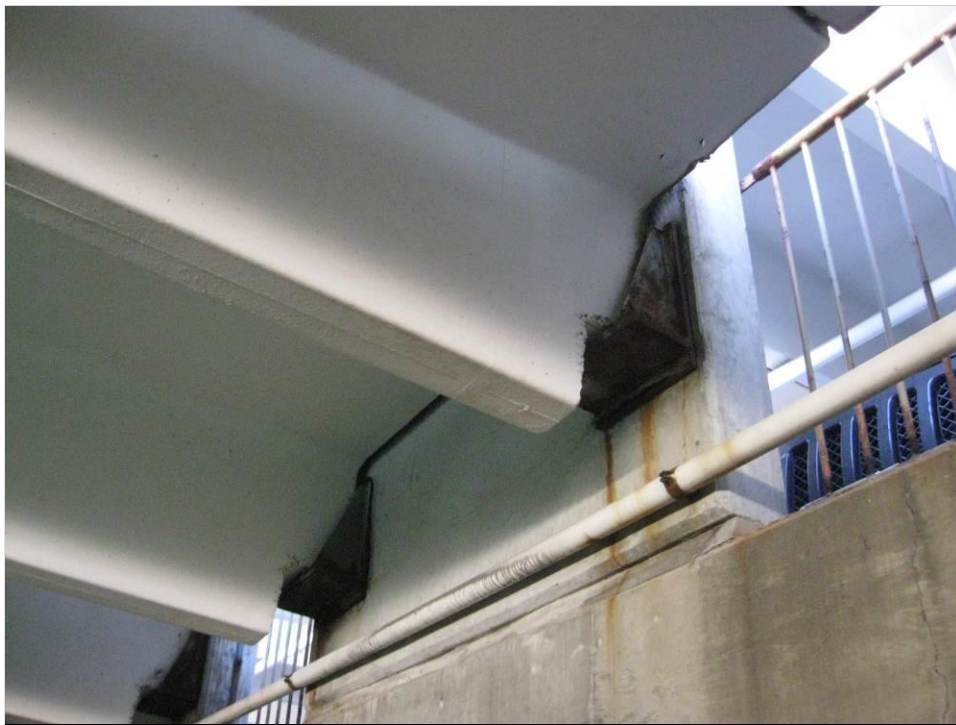


Photo 4 – Corroded tee stem support angles.



Photo 5 – Corroded cover on triple basin.



Photo 6 – Typical corroding guard rail on light wall.



Photo 7 – Broken connection on façade panel.



Photo 8 – Severely deteriorated vertical joint sealant on façade panel.



Photo 9 – Severely deteriorated masonry section on façade panel along south wall.



Photo 10 – Efflorescence on masonry due to water infiltration.

APPENDIX B

5-YEAR MAINTENANCE FORECAST



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Table B1 – Holley Court Parking Structure 5-Year Maintenance Forecast

Construction: Cast-in-Place Post-Tensioned

Built: 1984

Capital Budget									
NO.	WORK DESCRIPTION	REPLACEMENT FREQUENCY	2017	2018	2019	2020	2021	2022	5-YEAR TOTAL COST
1.0	Concrete Repairs			\$ 197,000	\$ -	\$ -	\$ 86,000	\$ -	\$ 283,000
1.1	Floor Repair			48,000			24,000		\$ 72,000
1.2	Floor Repair w/Traffic Topping			105,000			50,000		\$ 155,000
1.3	Ceiling Repair			16,000			4,000		\$ 20,000
1.4	Beam Repair			12,000			3,000		\$ 15,000
1.5	Column Repair			12,000			3,000		\$ 15,000
1.6	Wall Repair			4,000			2,000		\$ 6,000
2.0	Waterproofing			\$ 312,000	\$ -	\$ -	\$ -	\$ 127,000	\$ 439,000
2.1	Expansion Joint - Adhered			47,000				20,000	\$ 67,000
2.2	Expansion Joint Elastomeric			149,000				50,000	\$ 199,000
2.3	Random Crack Repair			14,000				5,000	\$ 19,000
2.4	Construction Joint Sealant			3,000				2,000	\$ 5,000
2.5	Vertical Joint Sealant			2,000				1,000	\$ 3,000
2.6	Cove Sealant			39,000				20,000	\$ 59,000
2.7	Concrete Sealer			28,000				14,000	\$ 42,000
2.8	Traffic Topping			12,000				6,000	\$ 18,000
2.9	Traffic Topping - Recoat			18,000				9,000	\$ 27,000
3.0	Masonry Repairs			\$ 61,000	\$ -	\$ -	\$ 20,000	\$ -	\$ 81,000
3.1	Tuck Pointing			47,000			15,000		\$ 62,000
3.2	Capstone Joint Repair			9,000			3,000		\$ 12,000
3.2	Capstone Repair			5,000			2,000		\$ 7,000
4.0	Mechanical/Electrical/Plumbing			\$ 61,000	\$ -	\$ -	\$ -	\$ 20,000	\$ 81,000
4.1	Clean Existing Drains & Piping			10,000				5,000	\$ 15,000
4.2	Floor Drain - New & Replacement			16,000				5,000	\$ 21,000
4.3	Pipe and Hanger			35,000				10,000	\$ 45,000
5.0	Architectural/Miscellaneous			\$ 69,000	\$ -	\$ -	\$ -	\$ 29,000	\$ 98,000
5.1	Paint Traffic Markings			6,000				6,000	\$ 12,000
5.1	Paint Door & Frame			3,000				3,000	\$ 6,000
5.2	Paint Handrails			25,000				20,000	\$ 45,000
5.3	Door Opening Flashing			5,000					\$ 5,000
5.4	Remove & Replace Roofing System			30,000					\$ 30,000
6.0	Immediate Repair		\$ 5,000						\$ 5,000
6.1	Immediate Maintenance Repairs		5,000						\$ 5,000
Sub Total			\$ 5,000	\$ 700,000	\$ -	\$ -	\$ 106,000	\$ 176,000	\$ 987,000
Contingency				\$ 155,000	\$ -	\$ -	\$ 11,000	\$ 18,000	\$ 184,000
General Conditions				\$ 55,000	\$ -	\$ -	\$ 11,000	\$ 18,000	\$ 84,000
Engineering Fees				\$ 105,000	\$ -	\$ -	\$ 13,000	\$ 21,500	\$ 139,500
Opinion of Probable Repair Cost			\$ 5,000	\$ 1,015,000	\$ -	\$ -	\$ 141,000	\$ 233,500	\$ 1,394,500

Table B2 – Holley Court North Expansion 5-Year Maintenance Forecast

Construction: Cast-in-Place Post-Tensioned

Built: 2002

Capital Budget								
NO.	WORK DESCRIPTION	REPLACEMENT FREQUENCY	2018	2019	2020	2021	2022	5-YEAR TOTAL COST
1.0	Concrete Repairs		\$ 2,500	\$ -	\$ -	\$ -	\$ 1,000	\$ 3,500
1.1	Floor Repair		500					\$ 500
1.2	Wall Repair		2,000				1,000	\$ 3,000
2.0	Waterproofing		\$ 51,000	\$ -	\$ -	\$ -	\$ 36,000	\$ 87,000
2.1	Vertical Joint Sealant		2,000				1,000	\$ 3,000
2.2	Tee-to-Tee Joint Sealant		15,000				8,000	\$ 23,000
2.3	Cove Sealant		15,000				8,000	\$ 23,000
2.4	Concrete Sealer		19,000				19,000	\$ 38,000
3.0	Masonry Repairs		\$ 9,500	\$ -	\$ -	\$ -	\$ 1,000	\$ 10,500
3.1	Tuck Pointing		1,500				1,000	\$ 2,500
3.2	Metal Flashing		8,000					\$ 8,000
4.0	Architectural/Miscellaneous		\$ 2,000	\$ -	\$ -	\$ -	\$ 2,000	\$ 4,000
4.1	Paint Traffic Markings		2,000				2,000	\$ 4,000
Sub Total			\$ 65,000	\$ -	\$ -	\$ -	\$ 40,000	\$ 105,000
Contingency			\$ 11,000	\$ -	\$ -	\$ -	\$ 4,000	\$ 15,000
General Conditions			\$ 5,000	\$ -	\$ -	\$ -	\$ 4,000	\$ 9,000
Engineering Fees			\$ 9,000	\$ -	\$ -	\$ -	\$ 5,000	\$ 14,000
Opinion of Probable Repair Cost			\$ 90,000	\$ -	\$ -	\$ -	\$ 53,000	\$ 143,000

Table B3 – Avenue Parking Structure 5-Year Maintenance Forecast

Construction: Cast-in-Place Post-Tensioned
Built: 2002

Capital Budget									
NO.	WORK DESCRIPTION	REPLACEMENT FREQUENCY	2017	2018	2019	2020	2021	2022	5-YEAR TOTAL COST
1.0	Concrete Repairs			\$ 7,000	\$ -	\$ -	\$ 7,000	\$ 1,000	\$ 15,000
1.1	Floor Repair			1,000			1,000	1,000	\$ 3,000
1.2	Floor Repair w/Traffic Topping			5,000			5,000		\$ 10,000
1.3	Column Repair			1,000			1,000		\$ 2,000
2.0	Waterproofing			\$ 115,000	\$ -	\$ -	\$ -	\$ 75,000	\$ 190,000
2.1	Expansion Joint Elastomeric			9,000				5,000	\$ 14,000
2.2	Random Crack Repair			6,000				2,000	\$ 8,000
2.3	Construction Joint Sealant			8,000				2,000	\$ 10,000
2.4	Vergical Joint Sealant			4,000				2,000	\$ 6,000
2.5	Cove Sealant			42,000				18,000	\$ 60,000
2.6	Concrete Sealer			46,000				46,000	\$ 92,000
3.0	Masonry Repairs			\$ 22,000	\$ -	\$ -	\$ 8,000	\$ 2,000	\$ 32,000
3.1	Tuck Pointing			12,000			5,000		\$ 17,000
3.2	Capstone Joint Repair			5,000				2,000	\$ 7,000
3.2	Capstone Repair			5,000			3,000		\$ 8,000
4.0	Mechanical/Electrical/Plumbing			\$ 86,000	\$ -	\$ -	\$ -	\$ 9,000	\$ 95,000
4.1	Clean Existing Drains & Piping			5,000				2,000	\$ 7,000
4.2	Floor Drain - Replacement			62,000				5,000	\$ 67,000
4.3	Pipe and Hanger			19,000				2,000	\$ 21,000
5.0	Architectural/Miscellaneous			\$ 39,000	\$ -	\$ -	\$ -	\$ 38,000	\$ 77,000
5.1	Paint Traffic Markings			6,000				6,000	\$ 12,000
5.2	Paint Handrails			10,000				10,000	\$ 20,000
5.3	Paint Structural Steel			1,000				1,000	\$ 2,000
5.4	Door Sweeps			1,000				1,000	\$ 2,000
5.5	Downspout Repair			1,000					\$ 1,000
5.4	Elastomeric Coating			20,000				20,000	\$ 40,000
6.0	Immediate Repairs		\$ 5,000						\$ 5,000
6.1	Immediate Maintenance Repairs		5,000						\$ 5,000
Sub Total			\$ 5,000	\$ 269,000	\$ -	\$ -	\$ 15,000	\$ 125,000	\$ 414,000
Contingency				\$ 43,000	\$ -	\$ -	\$ 1,500	\$ 12,500	\$ 57,000
General Conditions				\$ 23,000	\$ -	\$ -	\$ 1,500	\$ 12,500	\$ 37,000
Engineering Fees				\$ 40,000	\$ -	\$ -	\$ 2,000	\$ 15,000	\$ 57,000
Opinion of Probable Repair Cost			\$ 5,000	\$ 375,000	\$ -	\$ -	\$ 20,000	\$ 165,000	\$ 565,000

Table B4 – OPRF Parking Structure 5-Year Maintenance Forecast

Construction: Precast

Built: 2003

Capital Budget								
NO.	WORK DESCRIPTION	REPLACEMENT FREQUENCY	2017	2018	2019	2020	2021	5-YEAR TOTAL COST
1.0	Concrete Repairs		\$ 54,000	\$ -	\$ -	\$ 25,000	\$ -	\$ 79,000
1.1	Floor Repair - Topping Removal		3,000			1,000		\$ 4,000
1.2	Floor Repair		16,000			8,000		\$ 24,000
1.3	Floor Repair - Lifting Loops		9,000			3,000		\$ 12,000
1.4	Beam Repair		500			500		\$ 1,000
1.5	Column Repair		500			500		\$ 1,000
1.6	Column Repair - haunch		22,000			10,000		\$ 32,000
1.7	Tee stem Repair		2,000			1,000		\$ 3,000
1.8	Tee Flange Repair		1,000			1,000		\$ 2,000
2.0	Waterproofing		\$ 121,000	\$ -	\$ -	\$ -	\$ 81,000	\$ 202,000
2.1	Expansion Joint Elastomeric		9,000				5,000	\$ 14,000
2.2	Random Crack Repair		5,000				2,000	\$ 7,000
2.3	Construction Joint Sealant		3,000				2,000	\$ 5,000
2.4	Vertical Joint Sealant		22,000				10,000	\$ 32,000
2.5	Tee-to-Tee Joint Sealant		39,000				32,000	\$ 71,000
2.6	Chemical Grout Injection		1,000					\$ 1,000
2.7	Cove Sealant		17,000				8,000	\$ 25,000
2.8	Concrete Sealer		19,000				19,000	\$ 38,000
2.9	Traffic Topping		6,000				3,000	\$ 9,000
3.0	Masonry Repairs		\$ 19,000	\$ -	\$ -	\$ 10,000	\$ -	\$ 29,000
3.1	Tuck Pointing		6,000			3,000		\$ 9,000
3.2	Capstone Joint Repair		13,000			7,000		\$ 20,000
4.0	Mechanical/Electrical/Plumbing		\$ 23,000	\$ -	\$ -	\$ -	\$ 11,000	\$ 34,000
4.1	Clean Existing Drains & Piping		5,000				2,000	\$ 7,000
4.2	Floor Drain - New		6,000				3,000	\$ 9,000
4.3	Pipe and Hanger		12,000				6,000	\$ 18,000
5.0	Architectural/Miscellaneous		\$ 80,000	\$ -	\$ -	\$ -	\$ 33,000	\$ 113,000
5.1	Paint Traffic Markings		4,000				4,000	\$ 8,000
5.1	Paint Door & Frame		1,000				1,000	\$ 2,000
5.2	Paint Handrails		5,000				5,000	\$ 10,000
5.3	Paint Steel Stairs		8,000				8,000	\$ 16,000
5.4	Paint Structural Steel		1,000				1,000	\$ 2,000
5.5	Paint Guard Rail		20,000				10,000	\$ 30,000
5.6	Door & Frame Replacement		8,000					\$ 8,000
5.7	Shear Connector Replacement		8,000				4,000	\$ 12,000
5.8	Precast Panel Repair		25,000					\$ 25,000
Sub Total			\$ 297,000	\$ -	\$ -	\$ 35,000	\$ 125,000	\$ 457,000
Contingency			\$ 48,000	\$ -	\$ -	\$ 3,500	\$ 12,500	\$ 64,000
General Conditions			\$ 25,000	\$ -	\$ -	\$ 3,500	\$ 12,500	\$ 41,000
Engineering Fees			\$ 45,000	\$ -	\$ -	\$ 4,500	\$ 15,000	\$ 64,500
Opinion of Probable Repair Cost			\$ 415,000	\$ -	\$ -	\$ 46,500	\$ 165,000	\$ 626,500



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