

Midtown Parking Garage

Condition Survey

December 2010

Prepared by:



300 State Street, Suite 201 Rochester, New York 14614 (585) 454-6110 (585) 454-3066 fax www.labellapc.com

Table of Contents

1.0	PURPOSE
2.0	BACKGROUND
2.1	Previous Repairs2
3.0	OBSERVATIONS
3.1	Top of Elevated Slabs/Floors
3.2	Underside of Elevated Slabs (Ceilings)4
3.3	Beams5
3.4	Columns5
3.5	Walls6
3.6	Curbs6
3.7	Expansion Joints
3.8	Ramp R-1 (Entry from Clinton Avenue to Level A)7
3.9	Ramp R-3 (Level B to C in Area D)8
3.10	Ramp R-4 (Level A & B Exit to Chestnut Street)8
3.11	Ramp R-5 (Level A to B)9
3.12	Ramp R-6 (Level B to C in Area B)9
3.13	Ramp R-7 (Broad Street Entry to Level A)9
3.14	Ramp R-8 (Court Street Entry to Level B)10
3.15	Ramp R-10 (Level A Exit to Court Street)10
3.16	Ramp R-9 (Level B to Level A)11
3.17	Ramp R-11 & 12 (Level C to Level B and Exit to Broad Street)11
3.18	Mechanical Systems12
3.19	Electrical Distribution
3.20	Lighting Systems
3.21	Fire Alarm System
4.0	REHABILITATION
4.1	Concrete Repairs18
Та	able 4-1 Concrete Repair Areas (Square Feet)19
4.2	Expansion Joint Replacement19

4.3	Mecha	anical Rehabilitation	20
4.4	Electri	cal Rehabilitation	22
4.5	Rehab	ilitation Opinion of Probable Construction Cost	23
Tabl	e 4-2	Opinion of Probable Construction Cost	23
4.6	Upgrad	de Opinion of Probable Construction Cost	23
Tabl	e 4-3	Opinion of Probable Construction Cost	24

CONDITION SURVEY PHOTO LOG

DRAWINGS

1.0 PURPOSE

LaBella Associates, PC was retained by the City of Rochester to perform a condition survey of the existing Midtown Parking Garage facility as part of the Midtown Redevelopment Project. The survey identified the existing condition of the garage's structural, mechanical and electrical components and established approximate rehabilitation quantities.

2.0 BACKGROUND

The Midtown Parking Garage is a three level underground parking facility constructed in 1960 as part of an indoor shopping plaza and office tower complex. The structure has a predominantly rectangular footprint. Overall, the garage is 547 feet in the north/south direction and 556 feet in the east/west direction. The garage column bays are predominately 30' long in the north/south direction and alternate between 25' and 30' long in the east/west direction. The floor area per level is approximately 255,000 square feet. The garage has a total parking capacity of 1,773 vehicles.

The garage's structural framing is constructed of cast-in-place, reinforced concrete slabs, beams, columns and walls. The Level A and B elevated floors are 9" thick, two-way flat slabs with drop panels with a $1 \frac{3}{4}$ " minimum low slump concrete overlay. The Level C floor is comprised of a 5" concrete slab on grade with a $1 \frac{1}{2}$ " asphalt overlay wearing surface. The roof, which doubles as the former Mall Level floor, is the same construction as the elevated floor levels. Beams are introduced between column lines to accommodate depressing the roof slab under Broad Street and Atlas Street and prior bus terminal. The roof slab is 12" thick at the Mall Level and 13" thick where depressed under the streets. The columns and walls are founded on bedrock.

Thermal movement and volume change in the garage's structural framing system is provided by expansion joints running north/south and east/west. This approximately divides the garage structure into four quadrants.

Vehicle entry/exit ramps are located at Broad Street, Clinton Avenue, Court Street and Chestnut Street. Exterior to the garage structure, the entry/exit ramps are bounded by cast-in-place, reinforced concrete retaining walls.

Stair towers and elevators (abandoned) are located around the perimeter of the garage. An elevator tower and escalators (abandoned) are located in the center of the garage to provide access to the former plaza Mall Level and the proposed redeveloped Midtown Tower.

2.1 **Previous Repairs**

Since the original construction, previous garage repairs have been performed under various contracts. The following is a brief summary of the previous repairs:

1983 - 1986 (3 phases) – partial and full depth concrete repairs to the elevated slabs; Level A & B curbs between parking stalls removed and replaced with full depth concrete slab repair; concrete surface repairs to the beams, columns and walls; north/south expansion joint replacement in the Mall Level slab (garage roof) under Broad Street between south perimeter wall and Column 5-H/H.1 with 36" wide membrane strip; north/south and east/west expansion joint replacement in Levels A & B slabs using armored joints with compression seal; elevated floor slab asphalt wearing course removed and replaced with a concrete overlay and a traffic grade membrane system

1991 – fire protection system, ventilation improvements, lighting control, and fire alarm system

1992 – north/south expansion joint replacement in Mall Level slab (garage roof) under Broad Street between garage south perimeter wall and Column 5-H/H.1 (former Midtown Mall building face) and Level A between Columns 2-H/H.1 & 3-H/H.1

1994 – concrete surface repairs to the underside of the Mall Level slab in the southeast quadrant

2000 - electrical distribution system upgrades, replaced the garage main distribution panel, motor control centers, branch circuit panels, and feeders.

As a result of the May 2008 "Midtown Parking Structure - Condition Appraisal" prepared by Walker Parking Consultants, emergency action was undertaken to install temporary shoring steel bents along Column Line H between Columns 5 and 6 on all three floor levels. This action was prompted by the extensive deterioration observed to these concrete columns (located under the actively leaking north/south expansion joint extending under Broad Street).

3.0 OBSERVATIONS

A condition survey of the Midtown Parking Garage facility was performed by LaBella Associates, PC in August/September 2010. The scope of the survey focused on those structural components designated to be addressed in Repair Scenario #1, as described in the May 2008 "Midtown Parking Structure - Condition Appraisal" by Walker Parking Consultants. The structural components include the reinforced concrete elevated slabs, beams, columns, walls and curbs and expansion joints.

The observed concrete deterioration is corrosion related. Salt laden snow brought in from vehicles and deposited onto or against floors, curbs, columns and walls resulted in concrete delaminations. Some of the delaminations have advanced into spalls, exposing corroded steel reinforcing bars.

The condition survey also included the evaluation of the mechanical and electrical systems in the parking garage facility.

3.1 Top of Elevated Slabs/Floors

Level A & B. As part of the rehabilitation work in the mid-1980's, the Level A and B structural concrete floor slabs were topped with a concrete overlay and traffic grade membrane system (see Photo 1). The traffic topping is in various degrees of deterioration. In the main drive and recirculation aisles, widespread areas of the membrane system is worn and disintegrated, exposing the concrete overlay (see Photos 5, 7 & 8). The remainder of the membrane system in these aisles exhibits random cracks and isolated debonded or worn areas. Isolated cracks were observed in the exposed concrete overlay (see Photo 6).

The membrane in the parking stall areas and drive aisles between the parking stalls is generally in good condition. On both garage levels, random cracks and isolated debonded and worn areas were noted (see Photo 3). The majority of the debonded areas are located along column lines. The largest quantity of debonded areas is located in the west half of Level B. The worn areas are predominantly in the drive aisles, especially where vehicles negotiate a turn.

Removal of the debonded membrane was performed at a few locations and generally revealed deterioration to the top of the concrete overlay (see Photo 4). At one location, concrete was removed to the top of the structural slab steel reinforcing bars.

Isolated areas of ponding water were observed on Level A (see Photo 2). The majority of the ponding was observed in the west half of the garage.

For observed deterioration on the Level A and B floors and photo locations, see Drawings S3.1 to S3.4 and S2.1 to S2.4, respectively.

<u>Level C.</u> The Level C asphalt overlay wearing surface is generally in good condition. Cracks, predominantly running between columns in the north/south and east/west directions, and small potholes were observed (see Photo 9).

An existing 8'-8" wide utility tunnel runs below the Level C floor. The tunnel alignment is predominantly east/west between column lines 5 & 6, extending the entire width of the garage from the Clinton Avenue garage perimeter wall to the perimeter wall near the Broad Street/Chestnut Street intersection. The 8" thick tunnel roof slab forms the Level C floor spanning the tunnel. Three manhole access points exist; Broad Street wall, near Column 6-I and

the Clinton Avenue wall (in Ramp R-3). During a 9/29/10 site visit by LaBella Associates, Rochester District Heating personnel were available to open the three manhole covers. Being the utility tunnel is a confined space with hazardous materials, the inspection inside the tunnel only amounted to sticking a camera down the manholes to take photos. The photos revealed concrete spalls with severely corroded reinforcing bars at the manhole near Column 6-I (see Photo 47) and the manhole in the Ramp R-3 floor along the Clinton Avenue perimeter wall (see Photo 48).

For observed deterioration on the Level C floor and photo locations, see Drawings S1.1 to S1.4.

3.2 Underside of Elevated Slabs (Ceilings)

The underside of the Mall Level slab is generally in good condition. The slab underside exhibits isolated efflorescence stained and delaminated areas, some with spalled concrete exposing slab reinforcement, and random cracks with some efflorescence and some dripping water (see Photo 10). The majority of the slab deterioration is in the southwest quadrant (under Broad Street). For observed deterioration, see Level A Reflected Ceiling Plan Drawings S3.5 to S3.8.

The underside of the Level A and B slabs, especially under the drive aisles, exhibit numerous efflorescence stained and delaminated areas, scaled concrete, and spalled concrete exposing corroded slab reinforcement (see Photos 15, 16 & 19). The majority of the slab deterioration is in the southern half of the garage, with the southwest quadrant the worst. Most scaled and spalled concrete areas have deposited an outline of the deterioration on the floor below (see Photos 6 & 17).

Previous patching, partial and full depth, were observed and noted to be generally in good condition. There are some exceptions where these previous repairs have deteriorated. New delaminations and spalled concrete have also developed around previous patches (see Photos 14 & 21). This condition is called "ring corrosion" where the PH of the new concrete patch is different from the existing surrounding concrete accelerating corrosion of the reinforcement at the patch interface.

On Level C at Column 8-H, an efflorescence stained and spalled concrete area with exposed corroded reinforcement in the slab underside is adjacent to a crack and spall in the column drop panel (see Photo 18).

For observed deterioration on the underside of the Level A and B slabs and photo locations, see the Level B and C Reflected Ceiling Plan Drawings S2.5 to S2.8 and S1.5 to S1.8, respectively.

3.3 Beams

The majority of the beams are located on the underside of the Mall Level slab to accommodate depressing the slab below City streets, accommodate the expansion joints and reinforce the slab under the former Mall Level escalators and around slab penetrations. On other levels, beams reinforce the elevated slabs under the ramps. In general, the beams are in good condition. There are an isolated number of beams exhibiting various degrees of deterioration, i.e., delaminated and spalled concrete with exposed, corroded reinforcement and cracks with efflorescence. The majority of these beams are located along the leaking north/south expansion joint (between column line H/H.1, see Photo 25), under Broad Street (see Photo 12) and the former plaza loading dock at Atlas Street. Some deteriorated beams are located under the drive aisle ramps (see Photo 20).

Concrete catch basins, located in Broad Street and the former Atlas Street plaza loading dock, extend below the Mall Level slab. The bottoms of a few of the catch basins exhibit delaminated concrete with efflorescence and rust stains (see Photo 13).

Refer to the Level A, B & C Reflected Ceiling Plan drawings for the beam and catch basin repair and photo locations.

3.4 Columns

The garage columns come in a variety of shapes, i.e., round, square, rectangular and "pillshaped." All columns are painted from floor to ceiling. On Levels A and B, a urethane floor topping extends 6" up the bottom of the column. Level C columns do not have this protection. In general, the columns on all levels are in good condition.

Columns on Level A and B typically exhibit isolated concrete delamination and spalls at the floor line (see Photo 22). Level C columns are in worse condition; exhibiting concrete delamination and spalls on the majority of the columns at the floor line (see Photo 23).

At the leaking Mall Level north/south expansion joint that extends under Broad Street, the columns at 5-H, 5-H.1, 6-H & 6-H.1 exhibit severe concrete deterioration; significant map cracking, delamination, spalls, rust stains and exposed, corroded reinforcement. This deterioration carries down to all three garage levels (see Photos 24, 26 & 27). In 2008, temporary steel bents were installed in this column bay in the event the columns' structural load carrying capacity is compromised by the active deterioration.

Refer to the Level A, B & C Floor Plan drawings for the column repair and photo locations.

3.5 Walls

The walls form the garage exterior perimeter and the interior separation at ramps and enclosures around stairs, elevators and ventilation exhaust shafts. All wall faces have a painted protective coating. The perimeter and interior garage walls are generally in good condition. Typically, they exhibit protective coating blistering/peeling (see Photo 34), isolated vertical and horizontal cracks and isolated areas of concrete delamination.

On Level A, evidence of leakage through the south exterior perimeter wall was observed (see Photo 28). This leakage has resulted in an extensive efflorescence build-up on the floor (see Photo 29).

On Level B, a vertical wall crack and spall at the east/west expansion joint at Ramp R-4 (exit ramp to Chestnut Street) was observed (see Photo 31). Also on Level B, the wall ends at two locations exhibit severe cracking under a Level A slab floor beam. At Ramp R-4, the wall end exhibits a 3/16" wide diagonal crack on both sides of the wall (see Photo 30). At Stair Tower S-9, the wall end exhibits a diagonal crack and concrete spall (see Photos 32 & 33).

For observed wall deterioration and photo locations, see the Level A, B & C Wall Elevations, Drawings S4.0 to S4.9.

3.6 Curbs

Concrete curbs are located on all three garage parking levels. They extend along the perimeters of all walls and around some columns in traffic flow areas. In addition to this, Level C has curbs located between rows of parked vehicles (see Photo 36). These curbs separate parked vehicles and accommodate the Level C garage ventilation duct system. Steel ventilation grills are incorporated into these curbs.

Delaminated concrete sections and spalled areas with exposed, corroded reinforcement were observed, predominately along drive aisles (see Photos 35, 37 & 38). On Level C, extensive areas of scaled concrete were observed on the topside of the curbs.

Refer to the Level A, B & C Floor Plan drawings for the observed curb deterioration and photo locations.

3.7 Expansion Joints

<u>Mall Level.</u> At the Mall Level, expansion joints over the parking garage footprint run east/west between Column Lines 9 & 9.2 / H.1 to T and north/south between Columns 1 to 14 / H & H.1. In the depressed slab area, active leakage was observed along the east/west joint from Column Line Q to S.3 causing deterioration to the adjacent roof slab (see Photo 11). Heavy active leakage was observed along the north/south joint in the depressed slab portion extending under Broad Street (Column Lines 5 to 6) which has caused significant concrete damage to the underlying columns and beams at Levels A, B and C (see Photos 24-27). Evidence of leakage was observed along the remainder of the joint, based on the condition of the underlying edge beams and columns.

The roof expansion joints at the interface between the garage and the entry/exit ramps consist of premolded joint filler material and a continuous rubber bulb-type waterstop. Evidence of leakage through these joints was observed, based on the deterioration to the underlying edge beams.

Levels A & B. Expansion joints on elevated slab Levels A and B run across the entire garage footprint in the east/west and north/south directions, approximately dividing the garage into four quadrants. Also at these garage levels, expansion joints are provided at the garage floor slab interface with the entry/exit ramps to Chestnut Street (Ramp R-4) and Court Street (Ramps R-8 & R-10). The expansion joints consist of steel armor angles with rubber compression seals. On Levels A and B, the joints are generally in good condition, exhibiting minor corrosion on the armor angles (see Photo 39). At a few locations, the compression seal is raised above or excessively depressed below the armor angle. At the garage entry/exit ramps, the steel armor angles exhibit more advanced corrosion (see Photo 40).

Along the Level A north/south joint, active leakage was observed from below (on Level B) at the north perimeter wall (Column 14), and Column Bays 5-6 and 1.5-2. Along the Level B north/south joint, evidence of leakage was observed from below (on Level C) between Column Line 8 and the south perimeter wall. An active leak was observed at Column Line 1.5.

3.8 Ramp R-1 (Entry from Clinton Avenue to Level A)

The exterior (open) portion of the ramp is located over the garage footprint. Cast-in-place, reinforced concrete wall extensions from the garage below form the ramp walls. The walls exhibit isolated areas of delaminated concrete and rust stains at exposed steel reinforcing bar ends. The walls have extensive deterioration to the protective coating. The ramp floor is an elevated, curbed, concrete slab topped with a traffic grade membrane system. The concrete curbs and floor traffic membrane system are in good condition.

The interior (covered) portion of the ramp is under Broad Street. The depressed Mall Level slab forms the ramp roof and exhibits heavy stained and delaminated areas and one large spalled area with exposed, corroded reinforcement, located adjacent to a steam line shaft in Broad Street above (see Photo 41). The concrete walls exhibit isolated areas of delaminated concrete and rust stains and extensive deterioration to the protective coating. Heavy efflorescence is noted on the easterly wall (see Photo 42). The elevated, curbed, concrete floor slab is topped with a traffic grade membrane system. The curbs exhibit isolated delaminated concrete areas and the floor traffic membrane system is in good condition.

For observed ramp deterioration and photo locations, see Drawing S5.0.

3.9 Ramp R-3 (Level B to C in Area D)

The abandoned Ramp R-2 floor slab underside forms the ramp roof and is in good condition, exhibiting minor transverse cracking and some efflorescence staining. The concrete walls exhibit isolated areas of delaminated concrete and peeling/deteriorated protective coating. The curbs have extensive areas of delaminated concrete along both sides of the ramp. The upper portion of the floor slab is topped with a traffic grade membrane system which is worn and deteriorated in the vehicle tire tracks, exposing the floor slab concrete overlay. Where exposed, the concrete overlay exhibits transverse cracking. The lower portion of the floor slab is topped with asphalt that is worn in the tire tracks creating minor rutting. For observed ramp deterioration, see Drawing S5.1.

3.10 Ramp R-4 (Level A & B Exit to Chestnut Street)

The exterior (open) portion of the ramp is comprised of cast-in-place, reinforced concrete retaining walls and curbs on both sides of the ramp. The floor is a concrete slab-on-grade with brick paver wearing surface. The walls exhibit some random vertical cracks, isolated areas of delaminated concrete and protective coating failure. The curbs have isolated areas of delaminated and spalled concrete with exposed, corroded reinforcement. The brick pavers are in good condition.

The interior (covered) portion of the ramp is divided into two sections; covered section outside footprint of garage structure under Atlas Street and the interior section within the footprint of the garage structure.

<u>Outside Garage Footprint</u>. This section is under Atlas Street and is comprised of a cast-in-place, reinforced concrete roof slab & beams, walls and curbs. The floor is a concrete slab-on-grade with brick paver wearing surface. The roof slab & beams are in good condition, except at the interface with the garage structure. At the interface, there is a roof expansion joint with parallel concrete beams on each side of the joint spanning the Level A & B ramp openings.

The beams exhibit efflorescence stained and scaled concrete areas. The bottom side of the beams is cracked and delaminated with rust stains evident at the bottom rebar layer. The walls and curbs exhibit isolated areas of delaminated concrete. The brick pavers are in good condition.

<u>Inside Garage Footprint</u>. The Mall Level slab underside forms the ramp roof and is in good condition. The walls exhibit isolated areas of delaminated concrete. The floor up from Level A is topped with a traffic grade membrane system and is in good condition. The floor up from Level B is exposed concrete (no topping) exhibiting random transverse cracks and isolated delaminated concrete areas. The concrete curb is in good condition.

For observed ramp deterioration, see Drawings S5.2 to S5.4.

3.11 Ramp R-5 (Level A to B)

The Mall Level slab underside forms the ramp roof and is in good condition, exhibiting isolated scaled, efflorescence stained and delaminated concrete areas. The concrete walls exhibit isolated areas of delaminated concrete. The concrete curbs are in good condition. The floor is topped with a traffic grade membrane system exhibiting random transverse cracks. For observed ramp deterioration, see Drawing S5.5.

3.12 Ramp R-6 (Level B to C in Area B)

The Ramp R-5 floor slab underside forms the ramp roof and is in good condition, exhibiting isolated scaled and delaminated concrete areas. The concrete walls exhibit isolated areas of delaminated concrete. The concrete curbs are in good condition. The floor is topped with a traffic grade membrane system exhibiting map cracking throughout. For observed ramp deterioration, see Drawing S5.6.

3.13 Ramp R-7 (Broad Street Entry to Level A)

The exterior (open) portion of the ramp is located over the garage footprint. Cast-in-place, reinforced concrete wall extensions from the garage below form the ramp walls. The walls exhibit delaminated concrete areas and isolated areas of spalled concrete with exposed steel reinforcing bars (see Photo 43). West of the garage's north/south expansion joint between column lines H & H.1, the ramp floor is an elevated, curbed, concrete slab topped with a traffic grade membrane system. In this ramp portion, the floor topping and concrete curbs are in good condition. East of the expansion joint, the ramp floor is comprised of concrete fill placed over the depressed Mall Level slab extending under Broad Street and topped with an asphalt overlay.

In this ramp portion, the asphalt overlay is in good condition and the north concrete curb exhibits an extensive delaminated concrete area with a few spalls exposing steel reinforcing bars. The south curb is in good condition.

Along the interior (covered) portion of the ramp, the concrete garage roof slab forms the ramp roof and is generally in good condition, exhibiting an isolated crack with efflorescence and an adjacent area of rust staining near the door entrance. The concrete walls exhibit isolated delaminated concrete areas and peeling protective coating. The concrete curbs are in good condition. The concrete floor slab is topped with a traffic grade membrane system and is in good condition.

For observed ramp deterioration and photo locations, see Drawings S5.7 & S5.8.

3.14 Ramp R-8 (Court Street Entry to Level B)

This entry ramp extends under Xerox area between Broad Street and Court Street. The roof slab is comprised of a concrete waffle slab (begin portion closest to Court Street)) and a cast-inplace, reinforced concrete slab (adjacent to the garage). The walls utilize both cast-in-place, reinforced concrete and CMU construction. The columns (in-line with the walls) and the floor slab and curbs are cast-in-place, reinforced concrete.

The waffle slab roof system is generally in good condition. The concrete roof slab portion exhibits heavy efflorescence staining and delaminated concrete areas. The concrete wall portions and columns exhibit isolated delaminated concrete areas. The CMU wall portions are in good condition. The concrete curbs exhibit isolated delaminated concrete areas. The floor from the entrance door to the trench drain near the garage interface has no topping and exhibits random transverse and longitudinal cracks and a scaled concrete strip along the west curb. The remainder of the floor is topped with a traffic grade membrane system which is heavily worn and deteriorated between vehicle tire tracks.

For observed ramp deterioration, see Drawings S5.9 & S5.10.

3.15 Ramp R-10 (Level A Exit to Court Street)

This exit ramp extends under Xerox area between Broad Street and Court Street. The roof slab is comprised of a concrete waffle slab (begin portion closest to Court Street) and a cast-in-place, reinforced concrete slab (adjacent to the garage). The walls utilize both cast-in-place, reinforced concrete and CMU construction. The columns (in-line with the walls) and the floor slab and curbs are cast-in-place, reinforced concrete. The waffle slab roof system is generally in good condition. At one column location on the east wall, a portion of the waffle slab appears to have been previously filled with cast-in-place concrete which exhibits heavy efflorescence staining and cracks with stalactites. The column at this location has a few full-height vertical cracks (see Photo 44). The concrete roof slab portion exhibits numerous concrete spalls with exposed, corroded reinforcement. The beam spanning the ramp opening at the garage interface expansion joint exhibits delaminated concrete areas and cracks with efflorescence. The floor is topped with a traffic grade membrane system and exhibits random cracking in the upper ramp portion (closest to Court Street) and worn, deteriorated areas along vehicle tire tracks in the lower, curved portion. A large area of ponding water from curb-to-curb was observed in the upper portion of the ramp.

For observed ramp deterioration, see Drawings S5.13 & S5.14.

As part of the original garage construction, a portion of the Ramp R-10 alignment fell within the footprint of the existing garage. Years later, Ramp R-10 was re-aligned and the portion within the footprint of the garage was abandoned. The walls exhibit isolated areas of scaling, delaminated and spalled concrete. The walls also exhibit random horizontal and vertical cracking. For observed deterioration, see Drawings S5.15 & S5.16.

3.16 Ramp R-9 (Level B to Level A)

The continuation of this ramp is Ramp R-10 (exit to Court Street). The underside of the Mall Level and Level A floor slabs forms the ramp roof and is in good condition, exhibiting isolated cracks and delaminated concrete. The concrete walls and curbs are in good condition. The floor is topped with a traffic grade membrane system exhibiting random transverse cracks. For observed ramp deterioration, see Drawings S5.11 & S5.12.

3.17 Ramp R-11 & 12 (Level C to Level B and Exit to Broad Street)

The exterior (open) portion of the ramp (R-12) is located over the garage footprint. Cast-inplace, reinforced concrete wall extensions from the garage below form the ramp walls. The walls exhibit isolated areas of delaminated concrete and spalls exposing the steel reinforcing bars. Both walls exhibit horizontal and vertical cracks. The north wall cracking is more extensive with numerous cracks originating from the steel railing post locations on the exposed back face and front face (see Photo 45). The concrete curbs exhibit extensive delaminated concrete on both sides of the ramp. Similar to Ramp R-7, the ramp floor is comprised of both an elevated concrete slab portion and a concrete fill portion topped with an asphalt overlay. The concrete slab portion exhibits transverse and radial cracks. The asphalt overlay exhibits extensive map cracking, asphalt patches and potholes. In the interior (covered) portions of both ramps, the Mall Level and Ramp R-9 floor slab undersides form the ramp roof and is generally in good condition, exhibiting isolated stained, scaled, delaminated concrete areas. The concrete walls and curbs exhibit isolated delaminated areas.

The floor is topped with a traffic grade membrane system. In the Ramp R-11 portion, the membrane exhibits random map cracking. In the Ramp R-12 portion, the membrane is extensively worn and deteriorated in the vehicle tire track area, exposing the concrete overlay (see Photo 46). The exposed concrete overlay areas exhibit transverse cracks.

For observed ramp deterioration and photo locations, see Drawings S5.17 to S5.22.

3.18 Mechanical Systems

The mechanical systems in the parking garage facility are comprised of plumbing, fire protection, ventilation systems, spot heating elements and air-conditioning systems for special areas.

Sanitary, Storm and Water Systems

All three parking garage levels have Sanitary/Waste, Storm, Vent and Water Piping systems. Most of this piping is original to the parking garage facility (circa 1960), with some subsequent upgrades and minor repairs.

The sanitary and storm systems discharge to the Rochester Pure Water District's combined sewer system. They appear to be separated above the floor and are combined at, or prior to, connection to Rochester Pure Water District's combined sewers.

Building drains are located at the lowest levels of the building, and on all parking garage levels and current service tunnel. Ponding water has been observed on some garage floor areas. Additionally, some floor drain grates exhibit deterioration, with about 50% of them having broken or damaged grates and some missing sediment buckets.

Water for the parking garage facility is provided by the City of Rochester Domestic Water System. There are multiple points with meters and RPZ's. Based on information from the City of Rochester Domestic Water System, pressure appears adequate for the requirements of the parking garage. The domestic water feeds toilet rooms, office areas, hose bibbs, wall hydrants and miscellaneous HVAC and mechanical equipment throughout the garage facility. The water conveyance system is in good condition and there have been no major issues reported.

Plumbing fixtures are old and should be upgraded to low flow fixtures and the water heater replaced with on-demand units at lavatories and sinks.

Fire Suppression System

The fire suppression system that protects the Midtown Parking Garage was installed in 1960 and updated in 1991, with the replacement of seven (7) of the dry pipe riser alarm valves. The alarm valve system on the remaining eighteen (18) stand pipe risers should be replaced due to their age. The system is fed from the 'Rochester Bureau of Water's' high pressure fire service or 'Holly System'. The Holly system enters the garage at three vault locations at South Clinton Avenue/Broad Street, Chestnut Street/Broad Street and Atlas Street where they become the property of the City of Rochester. Fire protection mains then feed from these vaults to a point where they merge at a location in the middle of the 'C7' drive lane, just west of Sprinkler Riser Room 312. There are three isolation valves buried below grade in valve boxes at this location, which allows any one of the three fire mains to be isolated by shutting the valve at the street and at the valve box (this shuts down any sprinkler riser located between those valves). This arrangement also allows the ability to shut down the water supply from any vault while still maintaining water supply to all the sprinkler risers.

The fire suppression system feeding from the Sprinkler Riser Room consists of the following:

- Wet pipe sprinkler mains feeding the former Midtown Plaza and Midtown Tower
- Dry pipe sprinkler systems for the Midtown Parking Garage
- Wet/Dry pipe standpipe systems for the Midtown Parking Garage. The system is wet in the summer and drained and pressurized in the winter.
- Fire supply lines from fire department connections at street level.

The parking garage Levels 'A', 'B', and 'C' and the current truck service tunnel are protected by dry pipe sprinkler systems which are fed from twenty-five (25) dry pipe sprinkler risers. These risers are strategically located in eleven (11) Sprinkler Riser Rooms located around the garage perimeter and in the center of Level 'C'. The current service tunnel is protected by two dry pipe risers located in a Sprinkler Riser Room located on 'A' Level near the former loading dock. The risers on the garage perimeter also have a feed from fire department connections at street level which are maintained dry. Also, feeding out of these perimeter rooms are wet pipe risers that feed the former Midtown Plaza and the Midtown Tower wet pipe sprinkler systems.

Water enters the various sprinkler riser rooms from fire protection mains located below grade. These water mains then feed the sprinkler room's dry pipe risers and their associated dry pipe sprinkler systems and the water supply risers feeding the wet pipe systems that were part of Midtown Tower and former plaza. These water supply mains are heat traced and insulated where they are exposed to freezing at the various garage levels they pass through. Each sprinkler room (on Level C) has an air compressor which is connected to the dry pipe riser assemblies providing the required air pressure to maintain the dry pipe systems air pressure.

The condition of the fire suppression system as of December 13, 2010 is as follows:

- a. Risers S-1, S-2, and S-3, Room 307 (near Stair #5)
 - i. No air and no water, compressor runs.
 - ii. Comment: Water is off due to leak in tunnel sprinkler piping, system will require reactivation.
- b. Riser S-4, Room 313 (near Shaft 'C')
 - i. Air and water are on, system is active, compressor runs, no issues.
 - ii. Comment: Compressor was run and air tank blown out.
- c. Risers S-5 and S-6, Room 312, (near Elevator #3 & #4)
 - i. Air OK, no water, compressor runs.
 - ii. Comment: Water is off due to leak in tunnel sprinkler piping.
- d. Risers S-7 and S-8, Room 308 (between C13 & C15)
 - i. Air and water are on, system is active, compressor runs, no issues.
 - ii. Comment: Compressor was run and air tank blown out.
- e. Risers S-9, S-10, S-11, and S-12, Rooms 316 & 317 (near Stair #9)
 - i. S-9 water and air are OK.
 - ii. S-10, S-11, S-12 systems have been tripped and are flooded.
 - iii. Air compressor cannot be cycled.
 - iv. S-10 and S-12 feed Level B.
 - v. Comment: Systems S-10, S-11, and S-12 need to be inspected by the City's FP Contractor to determine why they tripped, and then be repaired and reactivated.
- f. Risers S-13 and S-14, Room 318 (near Stair #8)
 - i. S-13 and S-14 systems have been tripped and are flooded.
 - ii. Air compressor does not run.
 - iii. Comment: Systems S-13 and S-14 need to be inspected by the City's FP Contractor to determine why they tripped, and then be repaired and reactivated.
- g. Risers S-15 and S-16, Room 304 (near Stair #1)
 - i. S-15 and S-16 systems have water and air on and are presently OK.
 - ii. Air compressor in very bad condition and requires replacement as soon as possible.
 - iii. Comment: Replace air compressor.
- h. Risers S-17, S-18, and S-19, Room 315 (northwest corner, west of Shaft 'E')
 - i. S-17, S-18 and S-19 systems all have water and air on and are presently OK.
 - ii. Air compressor was just replaced and is just over a year old.
 - iii. Comment: None.

- i. Risers S-20, S-21 and S-22, Room 303 (near Shaft 'B')
 - i. S-20, S-21 and S-22 air and water are OK, compressor runs.
 - ii. Comment:
 - 1. Water is off due to leak in tunnel sprinkler piping.
 - 2. Compressor was run and air tank blown out.
- j. Riser S-23, Room 302 (near Stair #2)
 - i. Air OK. No water, compressor runs OK.
 - ii. Comment:
 - 1. Compressor was run and air tank blown out.
 - 2. Water is off due to leak in S-24 system.
- k. Risers S-24 and S-25, Room 125 (near tunnel loading dock on 'A' Level)
 - i. S-24 has no air and is waterlogged due to leak in branch line.
 - ii. S-25 has air and water and is OK.
 - iii. Air compressor runs and is OK (unit is about 3 yrs old), air lines were replaced on this system on 12-01-2010 and both S-24 and S-25 were OK
 - iv. Comment: Water is off due to leak in the S-24 system. City FP Contractor to repair leak and reactivate S-24 system.

For the dry pipe systems to remain active during parking garage modifications, the associated heat tracing systems, air compressors, alarm devices, and room heating elements must remain active.

There is very little wet pipe sprinkler system visible in the parking garage facility. Most wet pipe system piping was used to feed the former Midtown Plaza and Midtown Tower. Any existing wet pipe system piping feeding out of the sprinkler riser rooms should be isolated, drained at their base, capped at garage Level 'A' and the riser maintained for future use.

The standpipe system is operated as a wet pipe system in the summer months and dry pipe system in the winter months.

As noted earlier, the original fire protection system was installed when the garage was built in 1960 and updated in 1991, with the replacement of seven (7) of the dry pipe riser alarm valves. The alarm valve system on the remaining eighteen (18) stand pipe risers is recommended to be replaced due to their age. In addition, two (2) of the air compressors have been replaced in the last three years.

HVAC System

The ventilation requirements for the garage facility are being provided by various supply fans and exhaust fans located throughout the garage. There are six (6) main shafts, labeled 'Shaft A' through 'Shaft F'. Each shaft is dedicated to either intake air or exhaust air. The shafts extend upward from garage Level C to above the garage roof (Mall Level slab). Each shaft contains an individual fan for each garage level. The intake and exhaust ductwork extends above the roof of the shaft enclosure and is terminated in most cases with simple rain caps. In some instances, the termination is accomplished with louvered penthouses or side wall louvers. This was dependent on the configuration of the buildings or structures above or around the shaft enclosures at ground level or at whatever level the shaft terminated (i.e. Midtown Concourse Second Level).

The central core, consisting of the former plaza escalators, lobby, and garage administrative areas, is ventilated and air-conditioned. This area was supplied through an air handling unit and cooling coil connected to a condensing unit which is located in a fenced area on Level A. The outside air for this system is introduced through 'Shaft E'.

There are various air distribution systems (ductwork) located on Level A and Level B. Level C supplies and exhausts air through large supply and exhaust grills mounted directly on the shaft walls. A visual examination of the systems indicated that all systems had been shut down. The air-handling equipment (fans and fan motors) is past its useful life and would be considered inefficient by today's energy standards. The ductwork condition is acceptable. Record drawings indicated that the fans were powered through variable speed drives, indicating that an automatic carbon monoxide (CO) monitoring and controls system was in operation.

Various condensing units which serviced air conditioning systems or refrigeration systems above the garage are scattered throughout Level A. These have been decommissioned and require removal.

Electric heating elements (i.e., unit heaters, baseboard radiators, and heat tape) provide freeze protection for mechanical spaces. The functionality of these units could not be determined.

3.19 Electrical Distribution

The electrical distribution system for the garage is supplied from Rochester Gas and Electric (RG&E) electrical vaults located within the garage. Multiple primary feeders to the electrical vaults are configured so that the loss of one feeder will not result in power interruption to the garage. Main distribution panel (MDP) is located on Level B of the garage, which distributes power to various motor control centers (MCC's) and distribution panelboards located throughout the garage.

The MCC's and panelboards supply power to the HVAC, lighting, and other miscellaneous electrical loads in the garage. An "emergency" electrical service is also present, which is used to supply emergency lighting loads. This service is located upstream of panel MDP, so that a tripped breaker in MDP cannot affect the emergency loads. An electrical upgrade around Year 2000 replaced panel MDP, MCC's, distribution panelboards, and their associated feeders. In general, the equipment appears to be in good condition, and should have significant serviceable life remaining.

3.20 Lighting Systems

Lighting throughout the open areas of the garage is provided by high pressure sodium type high intensity discharge (HID) luminaires. Llinear fluorescent luminaires are used at entrance ramps and along center drive aisles. With the exception of areas requiring luminaire maintenance, lighting levels generally appeared to be appropriate for a parking garage. HID luminaires are pendant mounted units with prismatic globes, typical for garage applications. The majority of the HID luminaires are approximately 25 years old, with some newer units installed where complete replacement has been required. The fluorescent luminaires are newer gasketed units with prismatic lenses and T8 lamps. Emergency lighting is provided by unswitched lighting circuits that are fed from the emergency service.

Lighting control is handled by relay panels installed in Year 1991. The system provides the ability to reduce lighting levels by switching off one-half of the luminaires in an area.

The lighting and control equipment appears to be in generally poor condition. Luminaires were noted that weren't operational, had missing or damaged lenses, or were missing all together. Based on the age of the lighting and control equipment, replacement parts would likely be difficult to obtain.

3.21 Fire Alarm System

The Fire Alarm system for the garage is handled by a Simplex 4100 fire alarm controller installed in Year 1991. Detection devices are located where code required, such as in electrical rooms and elevator lobbies. Pull stations and horn/strobes are located at entrances to stairways. The system also monitors flow, tamper, and pressure switches for the fire suppression system. The system does not appear to provide adequate notification appliance coverage throughout the facility, and the installed devices are in poor condition and non-ADA compliant. While the fire alarm controller appears to be in good condition, it is a dated model, and replacement parts will be increasingly difficult to obtain.

4.0 **REHABILITATION**

The proposed structural rehabilitation to the Midtown Parking Garage is based on Repair Scenario #1 outlined in the May 2008 "Midtown Parking Structure - Condition Appraisal" prepared by Walker Parking Consultants which addresses those repairs necessary to maintain the garage's structural integrity. This repair scenario consists of repairing all concrete spalls and delaminations in the floors (slab topside), curbs, ceilings (slab underside), beams, columns and walls. Observed leaking expansion joints will be replaced; north/south joint extending under Broad Street and east/west joint extending under Atlas Street. The service life of Repair Scenario #1 ranges from 8 to 10 years. Minor repairs should be anticipated every 3 to 5 years.

Repair Scenario #1 does not address waterproofing (i.e., floor traffic topping membrane, concrete protective coating) and other maintenance items. Therefore, the observed corrosion induced concrete deterioration will continue to advance into new future repair areas.

4.1 Concrete Repairs

To address the observed concrete deterioration, full and partial depth concrete repairs are proposed. These repairs are required to minimize the advancement of concrete deterioration (delaminations and spalls) and steel reinforcement corrosion. Taking no action to perform the required concrete repairs could lead to the eventual reduction of structural load carrying capacity in the garage's structural members and pose a danger to the public (i.e., falling concrete).

Concrete repair materials are assumed as follows:

- Class A Concrete = full depth repair (i.e., elevated slabs)
- Class D Concrete = partial depth horizontal and vertical repairs (i.e., slab topside, beams, columns, walls, curbs)
- Shotcrete = overhead partial depth repairs (i.e., slab underside)

The presence of the floor slab traffic topping membrane and concrete overlay on the elevated slabs (Levels A and B) prohibits the ability to determine the condition of the structural slab's topside. For estimating purposes, the elevated slab topside repairs are assumed to be partial depth based on the observed debonded/delaminated floor traffic topping areas. Where the debonded/delaminated traffic topping areas coincide with the observed slab underside (ceiling) deterioration, full depth concrete repairs are assumed. The actual extent of the elevated slab topside repairs will not be known until during construction when the debonded/delaminated traffic topping areas are removed. This may reveal the actual required repair only extends down into the concrete overlay and not the structural slab.

Presented in Table 4-1 is a summary of the observed concrete repair areas broken down by structural member for each parking garage level and the entry/exit ramps.

STRUCTURAL MEMBER	LEVEL A	LEVEL B	LEVEL C	RAMPS	TOTAL
Floor (Slab topside)					
Full Depth	0	450	1,440	0	1,890
Partial Depth	2,315	5,035	225	155	7,730
Ceiling (Slab Underside)	1,955	17,120	28,055	2,190	49,320
Beams	625	340	130	215	1,310
Columns	520	615	1005	0	2,140
Walls	960	560	475	1,200	3,195
Curbs	190	560	2,760	780	4,290
TOTAL	6,565	24,680	34,090	4,590	69,875

Table 4-1Concrete Repair Areas (Square Feet)

4.2 Expansion Joint Replacement

The Mall Level (garage roof) depressed slab north/south and east/west expansion joints are proposed to be replaced. Active leaking was observed at both joints. The north/south depressed slab expansion joint extends under Broad Street from the garage south perimeter wall to Columns 6-H/H.1. Between Column Line 5 and 6, this joint extends inside the former plaza building face. The east/west depressed slab expansion joint extends under Atlas Street Extension from the garage east perimeter wall to Columns 9/9.2-Q.

The proposed joint replacement requires removing a 5-foot wide strip of existing concrete fill and waterproof membrane over the depressed Mall Level slab, repairing the slab corners at the joint opening as necessary, installing a "Silicoflex" joint system by R.J. Watson (or equivalent), installing a sheet-applied waterproofing membrane within the limits of the removed strip, and replacing the concrete fill up to the proposed asphalt concrete roadway reconstruction for Broad Street and Atlas Street Extension. The opinion of probable construction cost for the replacement of the two expansion joints is \$155,000.

Extending the replacement of the north/south expansion joint from Columns 6-H/H.1 to the garage north perimeter wall is estimated to cost an additional \$65,000. This portion of the joint is located at the former Mall Level floor elevation adjacent to the footprint of the existing Midtown Tower building to remain.

4.3 Mechanical Rehabilitation

Sanitary, Storm and Water Systems

As a minimum rehabilitation measure to make the parking garage facility operational, the damaged or missing floor drain/trench grates and sediment buckets require replacement. The opinion of probable cost to perform this work is \$30,000.

Additional measures are recommended to upgrade the existing garage sanitary, storm and water systems. These measures include:

- Provide new floor and/or trench drains where ponding occurs.
- Replace floor drains in their entirety
- Replace sanitary/storm/vent piping above ground
- Replace domestic water piping above ground
- Replace plumbing fixtures with low fixtures

Opinion of Probable Cost to replace/upgrade:

Total Cost:	\$1,113,250
Replace plumbing fixtures	<u>\$10,000</u>
Replace domestic water piping (\$0.25/ Sq Ft)	\$38,250
Replace sanitary/storm/vent piping (\$1.00/ Sq Ft)	\$765,000
Replace/add floor drains (\$2000 x 150 drains)	\$300,000

Fire Suppression System

To make the parking garage facility operational, the minimum rehabilitation measures to the fire suppression system include service and maintenance to the system to verify proper operation and replacement of nine (9) of the eleven (11) air compressors (2 were previously replaced in the last 3 years). As part of the service and maintenance, the piping will be flushed and inspected for corrosion and blockage. The outcome of this activity may reveal additional repairs are required.

For the existing dry pipe system to remain active and operational, power and heat must be maintained in the eleven (11) Sprinkler Service Rooms. Failure to maintain these rooms fully powered could allow water to invade the sprinkler system creating freeze ups, corrosion and other issues. This also applies to any piping that is heat traced.

The original fire suppression system was installed when the garage was built in 1960 and upgraded in 1991, with the upgrade and replacement of seven (7) of the twenty-five (25) Dry Pipe Alarm Valves.

Although the present fire suppression systems are functional, they should have a full in-depth evaluation done based on the 2010 NFPA 13 design standards. At a minimum, all sprinkler heads are recommended to be changed-out due to age, corrosion and possible recalls. The additional eighteen (18) Dry Pipe Alarm Valve systems are recommended to be replaced and upgraded to current code requirements per NFPA 13.

Opinion of Probable Cost to rehabilitate the garage sprinkler system:Service to verify proper operation\$16,000Replace nine air compressors w/air dryers (\$5,000 Each)\$45,000Total Cost:\$61,000

Opinion of Probable Cost to replace/upgrade the entire parking garage facility sprinkler system:

Level 'A'	255,000 Sq Ft x \$5.00/ Sq Ft	\$1	1,275,000
Level 'B'	255,000 Sq Ft x \$3.50/ Sq Ft	\$	892,500
Level 'C'	255,000 Sq Ft x \$3.00/ Sq Ft	<u>\$</u>	765,000
Total Cost:		\$2	,932,500

HVAC System

The air-handling equipment (fans and fan motors) are past their useful life and considered inefficient by today's energy standards. The existing equipment is functional and can remain, however, it is recommended that all fans and motors be replaced to meet current energy standards and codes.

The ductwork condition is acceptable. The final configuration of the ventilation system will depend on final garage configurations and the removal or modification of offices, egress access, ventilation shafts, etc.

For operational cost considerations, the minimum required ventilation rate according to the NYS Mechanical code is 1.5 cfm/sq. ft. of garage space or 1,147,500 cfm of outside air. Air flows will be reduced where the system is arranged to operate automatically upon detection of a concentration of carbon monoxide of 25 parts per million (ppm) by approved automatic detection devices. It is recommended that these devises be incorporated into any new ventilation system designs or any existing system modifications.

The requirement for heat for the garage is dependent on the Owner's environmental requirements. Currently, the garage is unheated and various systems have been designed for isolated freeze protection of individual areas. All mechanical spaces have installed heat. The operation of these systems could not be verified and require a service/operational inspection. Any new systems or areas that have the potential for causing structural or component damage due to freezing temperatures would be required to be addressed on an individual basis.

Electric heat (unit heaters, baseboard heaters, heat trace, etc.) would be the recommended heat source. The opinion of probable cost for maintenance and start-up of the existing ventilation system as well as the isolated heating elements is \$40,000. If the ventilation fans were to be replaced, as is recommended above, the opinion of probable cost for fan replacement is \$1,600,000.

The following describes a description of the systems required if the owner requires assurance that the garage environment be maintained above freezing.

The garage will require a heat source as much of the existing former plaza building structures above the garage roof are being removed under the 2010 Midtown Plaza – Demolition and Site Preparation contract. The existing ventilation system is unheated and will require a heating system depending on the environmental condition requirements (temperature). The required heat for the ventilation air is significant. A heat load calculation will be performed during the design phase of the project. The energy source will be determined based on life cycle costing relevant to the final site configuration. Energy sources considered will be a gas fired high efficiency hot water system, district steam, and electric resistance heat. The cost for the ventilation heating systems is \$300,000. This cost represents the distribution costs of a heating system only. The opinion of probable cost for the central plant heating system is \$800,000. Therefore, the total cost to provide heat for the garage is \$1,100,000 which would be in addition to any cost described above.

4.4 Electrical Rehabilitation

<u>Luminaires</u>

Based on the condition of the existing luminaires, replacement of all garage luminaires is proposed. Replacement would provide more energy efficient and serviceable units, with a known installation baseline for maintenance scheduling. In addition to possibly reducing energy costs, replacing the luminaires presents the opportunity to improve lighting quality for security and public perception purposes. The opinion of probable cost to perform this work is \$980,000.

Lighting Relay Control System

Replacement of the existing lighting relay control system is proposed. Along with providing serviceable equipment with readily available parts, a network connected lighting control system can be remotely monitored and controlled through a building management system or network connected PC. Installation of a modern lighting control panel also offers the ability to pursue additional energy savings through various light level reduction techniques. The opinion of probable cost to replace the existing lighting relay control system is \$45,000.

Fire Alarm System

In order to provide a code complaint and serviceable fire alarm system for the facility, replacement of the existing fire alarm system is proposed. The proposed replacement would be a modern point addressable analog fire alarm system. All field wiring would be replaced, as well as existing initiation and notification appliances. Additional notification appliances would be installed to provide code compliance. The opinion of probable cost to perform this work is \$95,000.

4.5 Rehabilitation Opinion of Probable Construction Cost

Presented in Table 4-2 is the opinion of probable construction cost for Repair Scenario #1, outlined in the May 2008 "Midtown Parking Structure - Condition Appraisal" prepared by Walker Parking Consultants plus the mechanical and electrical work required to make the parking garage facility operational. The costs are based on 2010 dollars.

DESCRIPTION	COST
Full Depth Floor Repairs	\$105,000
Partial Depth Floor Repairs	\$270,000
Ceiling Repair	\$2,470,000
Beam Repair	\$60,000
Column Repair	\$100,000
Wall Repair	\$145,000
Curb Repair	\$195,000
Expansion Joint Replacement	\$155,000
Sanitary, Storm and Water Rehabilitation	\$30,000
Fire Suppression System Rehabilitation	\$61,000
HVAC System Rehabilitation	\$40,000
CONSTRUCTION COST	\$3,631,000

Table 4-2Opinion of Probable Construction Cost

4.6 Upgrade Opinion of Probable Construction Cost

Presented in Table 4-3 is the opinion of probable construction cost for Repair Scenario #1, outlined in the May 2008 "Midtown Parking Structure - Condition Appraisal" prepared by Walker Parking Consultants plus the recommended upgrades to the mechanical and electrical systems in the parking garage facility. The costs are based on 2010 dollars.

DESCRIPTION	COST
Full Depth Floor Repairs	\$105,000
Partial Depth Floor Repairs	\$270,000
Ceiling Repair	\$2,470,000
Beam Repair	\$60,000
Column Repair	\$100,000
Wall Repair	\$145,000
Curb Repair	\$195,000
Expansion Joint Replacement	\$155,000
Sanitary, Storm and Water Rehabilitation	\$1,113,250
Fire Suppression System Rehabilitation	\$2,932,500
HVAC System Rehabilitation	\$1,600,000
Electrical Rehabilitation	\$1,120,000
CONSTRUCTION COST	\$10,265,750

Table 4-3Opinion of Probable Construction Cost



1. Level A: Main Drive Aisle



2. Level A: Ponding Water





3. Level A: Crack in Traffic Membrane



4. Level A: Debonding in Traffic Membrane & Deterioration in Concrete Overlay





5. Level B: Worn Traffic Membrane and Ceiling Scaling Deposits on Floor



6. Level B: Transverse Crack in Exposed Concrete Overlay

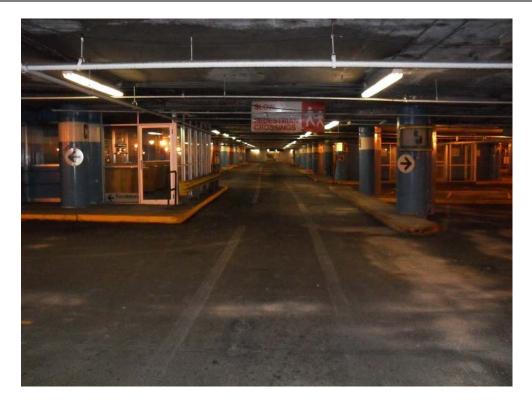


7. Level B: Worn Traffic Membrane in Recirculation Aisle



8. Level B: Worn Traffic Membrane in Recirculation Aisle

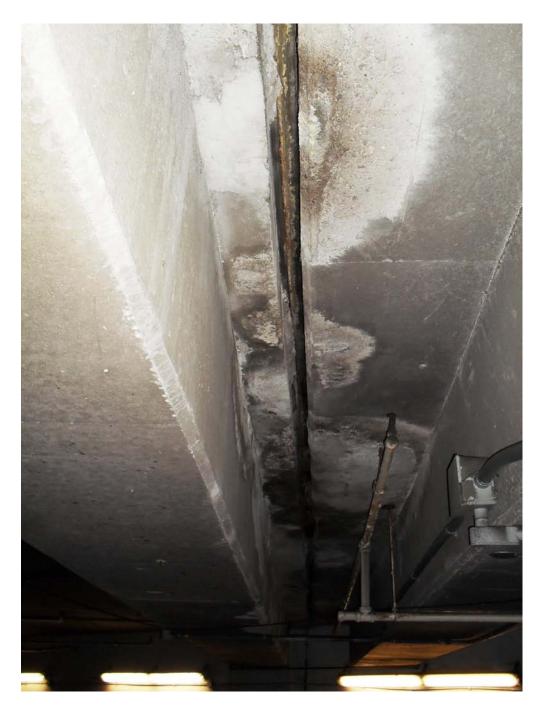




9. Level C: Main Drive Aisle



10. Level A: Ceiling and Beam Deterioration



11. Level A: Ceiling Deterioration at Leaking Expansion Joint





12. Level A: Beam Bottom Deterioration



13. Level A: Bottom of Broad Street Catch Basin



14. Level B: Ceiling Deterioration Adjacent to Previous Patch



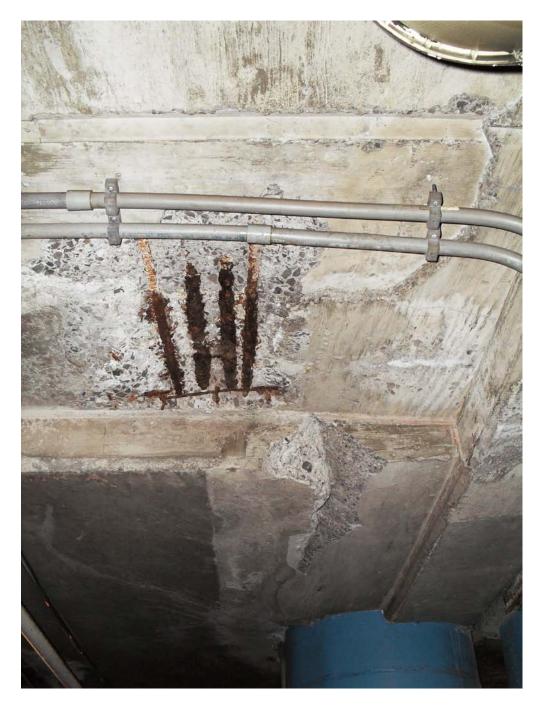
15. Level B: Ceiling Deterioration



16. Level B: Ceiling Deterioration



17. Level C: Ceiling Scaling Deposits on Main Drive Aisle



18. Level C: Column 8-H Drop Panel Spall and Crack



19. Level C: Ceiling Deterioration



20. Level C: Ceiling and Beam Deterioration

IVBELIV



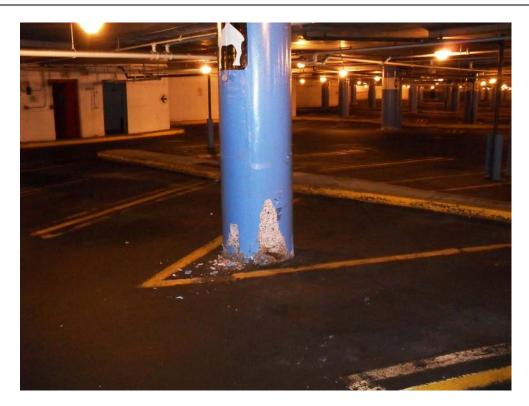
21. Level C: Ceiling Deterioration Around Previous Patch



22. Level B: Typical Deterioration at Column Base

IVBELIV

Midtown Parking Garage Condition Survey Photo Log

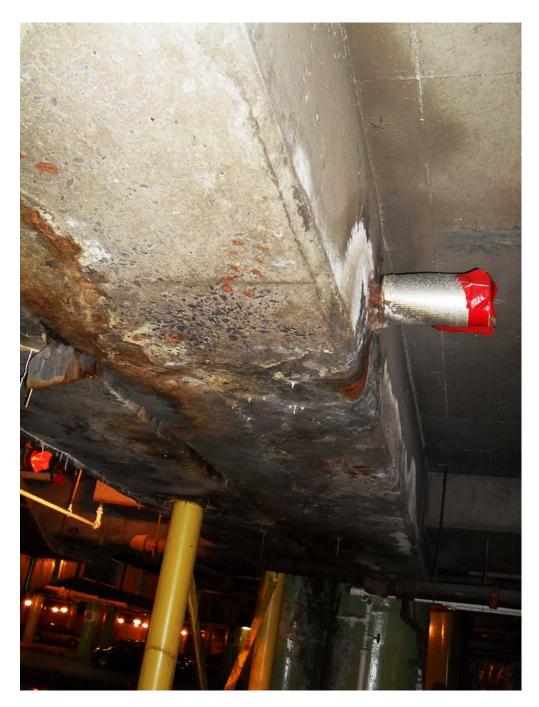


23. Level C: Typical Deterioration at Column Base



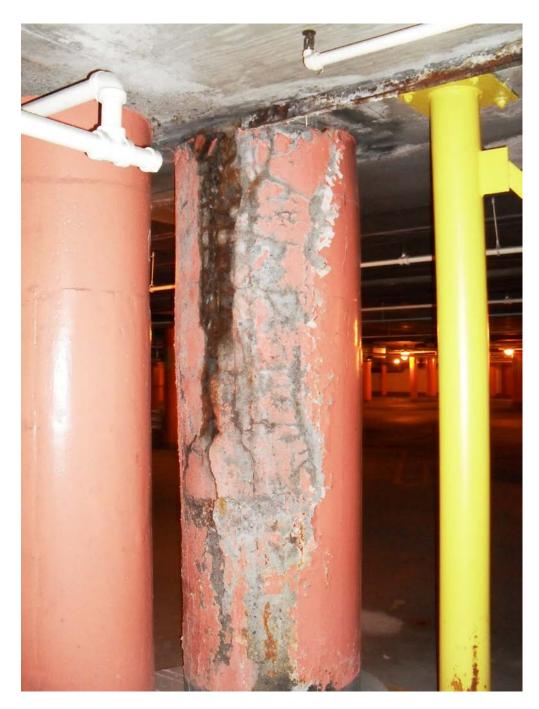
24. Level A: Columns 5-H and 5.4-H.1 Deterioration at Leaking Expansion Joint





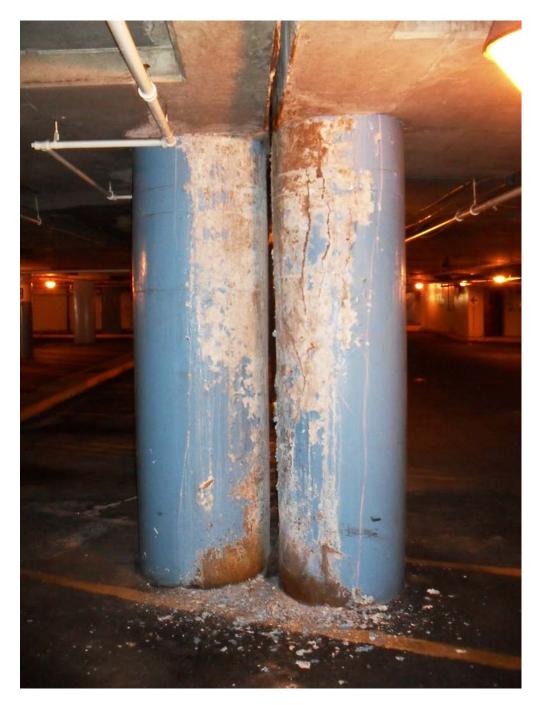
25. Level A: Beam Deterioration at Leaking Expansion Joint





26. Level B: Column 5-H Deterioration at Leaking Expansion Joint

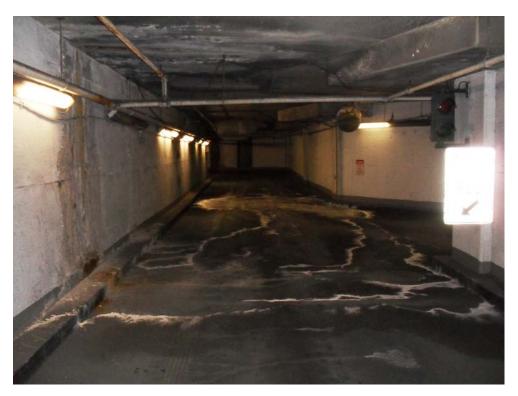




27. Level C: Columns 6-H/H.1 Deterioration at Leaking Expansion Joint

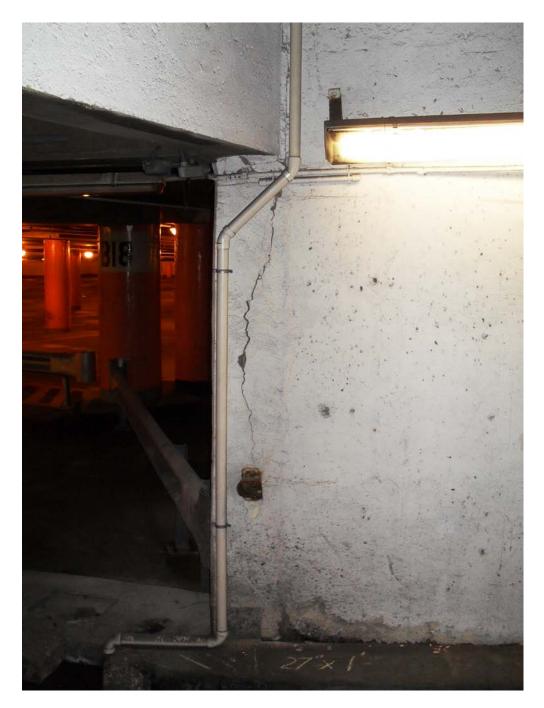


28. Level A: Exit to Court Street Wall Leakage



29. Level A: Exit to Court Street Efflorescence Buildup on Floor

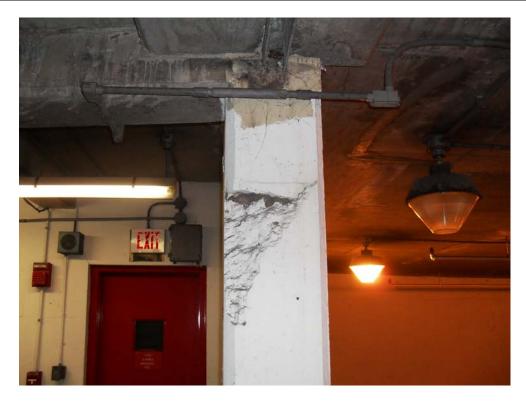




30. Level B: 3/16" Wide Wall Crack Under Beam



31. Level B: Wall Crack and Spall at Expansion Joint



32. Level B: Spall Under Beam at Stair S-9



33. Level B: Diagonal Crack and Spall Under Beam at Stair S-9

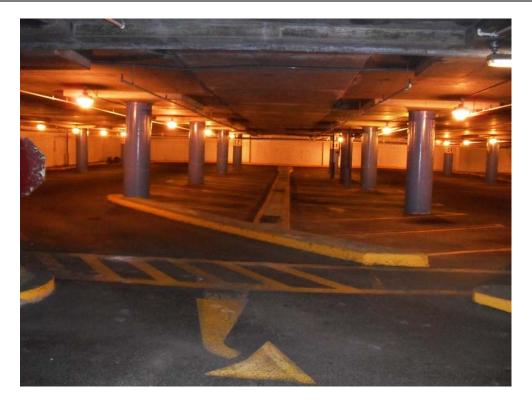




34. Level C: Typical Wall Coating Condition



35. Level B: Curb Spall with Exposed Rebar



36. Level C: Typical Curb Layout Between Parking Rows

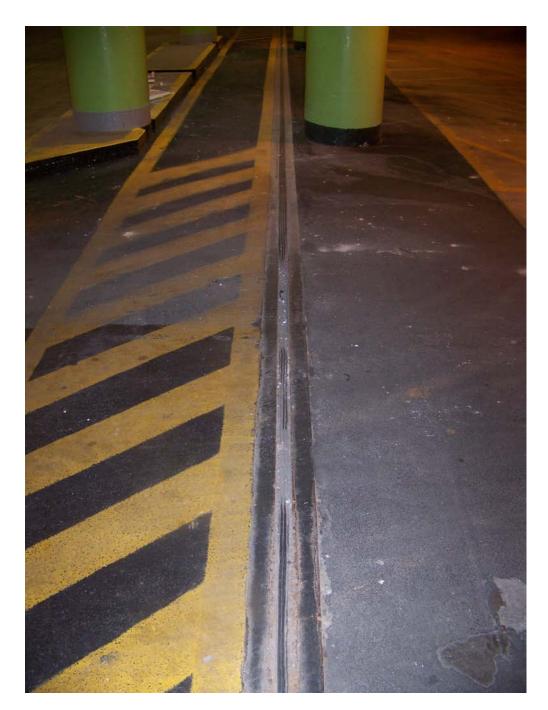


37. Level C: Typical Curb Spalls



38. Level C: Typical Curb Scaling and Spall at Ventilation Grill





39. Level A: East/West Expansion Joint



40. Level A: Expansion Joint at Exit Ramp to Court Street



41. Clinton Avenue Entry: Wall and Ceiling Deterioration



42. Clinton Avenue Entry: Wall and Ceiling Deterioration





43. Broad Street Entry: Retaining Wall Isolated Spalls



44. Exit to Court Street: Ceiling Deterioration and Column Cracking





45. Broad Street Exit: Retaining Wall Cracks at Railing Posts



46. Broad Street Exit: Worn Traffic Membrane and Transverse Floor Crack





47. Level C: Utility Tunnel Roof Slab Deterioration



48. Level C: Utility Tunnel Roof Slab Deterioration

