Observations and Recommendations

Huntington Park Garage

1141 West Third Street

Cleveland, Ohio 44113

Prepared For:

Cuyahoga County Department of Public Works

2100 Superior Viaduct

Cleveland, Ohio 44113

May 2012

URS

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Huntington Park Garage
Architectural and Structural Assessment Report

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Assessment Scope:

This observation and assessment was requested by Cuyahoga County to evaluate the current structural and architectural conditions of the existing concrete Huntington Park Garage, to estimate the extent of any required repairs, and to provide a timeframe for the repairs. Existing construction drawings by Prindle, Patrick and Partners Architects Engineers and Planners dated May 1974 were used as a reference. Repair and paving documents by S.M. HAW Engineers dating from 1997, 2003, 2004, 2005, 2006, and 2009 were also used as reference.

Visual observations were limited to areas not covered by piping, or other obstructions. No testing was performed on materials or structural systems. This observation report is in no way a guarantee to the future performance of the existing architectural or structural materials or systems. This observation was not intended to be an inspection for health or environmental problems such as mold, radon gas, asbestos, PCB’s, lead, ants, termites, etc.

All quantities and pricing information shown is used to help assess the existing architectural and structural condition of the parking garage and provide Cuyahoga County with relevant information to determine the present and future architectural and structural maintenance requirements. Mechanical, and electrical systems within the parking garage were not observed. The existing fire protection system was evaluated by URS in 2011, a copy of the fire protection report is included as an appendix of this report. Assessments are based upon field observations undertaken by URS staff during the months of April and May 2012.
Assessment Description:

Within this report, observations with commentary are provided for both architectural and structural considerations. An executive summary giving a general description of the architectural and structural condition of the parking garage is provided below. Within each discipline section, a description of the garage and a repair summary of the current architectural and structural condition of the parking garage is provided. The repairs summary will indicate approximate rough areas or percentages of the recommended repairs. This assessment report does not include areas south of the top level parking area nor the underground tunnel.

At the end of the assessment report a description of repairs, an opinion of probable cost and an appendix is provided listing in drawing form all of the recorded observations. Cuyahoga County can use this information to determine scope of work based on a particular yearly repair budget.
Executive Summary:

The overall structural integrity of the garage is sound at this time. There does not appear to be any areas of observed structural distress within the Huntington Park Garage that may result in an immediate failure. There are many locations of sufficient concrete and reinforcement deterioration throughout the parking garage, some of which warrant temporary shoring to assure public safety. The useful operation of the garage can be increased through the repairs indicated within this report. Water infiltration into the parking garage is the cause of much of the deterioration. Elimination of water infiltration will prolong the useful life of the parking garage. The extents of any top surface deteriorated concrete could not be fully determined due to a layer of asphalt curbs and planters at the top level (level 1) of the parking garage and due to surface traffic coatings at levels 2 through 4.

There are four major types of water infiltration into the parking garage: water infiltration at deteriorated expansion joints, water infiltration at leaking roof membranes at level 1, water infiltration through exterior wall cracks, and moisture brought in from motor vehicles.

Water infiltration through the garage expansion joints is a common problem at all of the existing expansion joints. As indicated within this assessment, many of these joints have reached their useful life span and either have failed, or could fail in the near future. It is recommended that all expansion joints within parking garage be replaced. To create a new joint to last for an extended life span, joint replacement will require some concrete replacement/stabilization along each expansion joint. Similar to the expansion joints, water infiltration is occurring through vertical cracks in the exterior concrete wall. It is recommended that these joints be repaired to eliminate future water infiltration through these cracks.

Water infiltration at the roof membrane is the cause of much concrete deterioration within each floor of the parking garage. Observations indicate the source of many of the membrane leaks occur at the top surface concrete planters. It is recommended that the top surface planters be removed and a new waterproof membrane applied at the top surface. It is feasible to replace the planters after concrete repairs and a new waterproofing membrane is installed.

Water and road salt infiltration from motor vehicles must be managed to limit further concrete deterioration. It is recommended that a new surface applied concrete traffic coating be applied at all levels and ramps to increase the useful life of the parking garage.

Due to the amount of water infiltration, there are many areas of concrete repair which require immediate attention. The most critical area of the parking garage, the ramp leading to each floor, requires major concrete repair and partial replacement. Multiple locations of concrete delamination at existing columns, girders, and precast concrete T-beams as well as cracking of concrete support members can be found within the parking garage and are detailed within this report. There are many locations throughout the garage which have been closed to parking access or are currently shored for structural stability. A separate report by URS which specifically addressed six different closed parking and stabilized areas has been provided to Cuyahoga County and is included within this report (Appendix A) as a reference. Additional commentary to the closed parking and stabilized area report has been added as part of this report and is included at the conclusion of Appendix A.
Within this assessment report, repairs are separated into three categories: Immediate Repairs (repairs to occur within a one year time period), Intermediate Repairs (repairs to occur within a three year time period), and Future Repairs (repairs to occur within a five year time period). The total estimate of probable costs for Immediate Repair is $5,424,487.00. The total estimate of probable costs for Intermediate Repairs is $263,393. The total estimate of probable costs for Future Repairs is $109,067.

URS recommends in addition to the repairs indicated, Cuyahoga County institute a regular observation and maintenance program to quickly find and repair troubled areas before deterioration advances creating both large and expensive repairs, as well as a safety risk to users of the Huntington Parking Garage.
Evaluation Criteria and Time Requirements:

The recommended concrete repairs within this assessment are broken into three categories: Immediate repairs – repairs to occur within a year’s time, Intermediate repairs – repairs which should occur in a one to three year timeframe, and finally long term or Future repairs – repairs which should occur within a five year time horizon.

**Immediate Repairs** (repairs to occur within a year) are generally required at large concrete spalling areas, concrete collapse areas, and where the existing reinforcement within a structural member has corroded and lost more than 20% of its original cross section. Immediate concrete repairs are also required where water infiltrates the parking garage in large quantities.

**Intermediate Repairs** (repairs to occur within a one to three year timeframe) are generally required at concrete spalling areas and where reinforcement corrosion has begun, but has not lost more than 20% of its original cross section. Note: visual observations are fairly limited in determining reinforcement corrosion; it is recommended during the immediate repair process, corroded intermediate repairs be checked to determine if reinforcement corrosion has advanced to a point where the repair becomes an immediate repair. Intermediate repairs are also required where water infiltration consistently occurs, but not as much water infiltration as an immediate repair.

**Long Term Repairs** (repairs to occur within a five year time horizon) are required at smaller concrete spalling areas and locations of minor corrosion to the reinforcement has begun. Long term repair areas left un repaired will eventually become intermediate and immediate repairs.
Summation of Garage Repairs

The following is a summary of all parking garage repairs along with the total estimate of probable repair cost to complete each section of repair. See each individual discipline section for a more thorough discussion of each repair. Drawings depicting the repairs associated within the report can be found in the Appendix C.

Immediate Repairs: (Repairs to occur within a year). Total estimate of probable cost for immediate repairs is $5,424,487.00

Structural:

1. Approximately 2,400 square feet of parking garage level 2 require immediate concrete delamination repair with 60 lineal feet of concrete crack repair.
2. Approximately 2,600 square feet of parking garage level 3 require immediate concrete delamination repair with 20 lineal feet of concrete crack repair.
3. Approximately 1,650 square feet of parking garage level 4 require immediate concrete delamination repair with 105 lineal feet of concrete crack repair.
4. Approximately 1,600 square feet of parking garage ramp require immediate concrete delamination repair. See page 46 for extents of ramp construction.
5. Approximately 1,400 square feet of parking garage ramp require immediate concrete replacement. The replacement concrete consists of the double T-flanges where double T members meet. The precast concrete located between the tee stems on individual double T beams is generally satisfactory with exception of some delamination repair as quantified above as Structural Immediate Repair item 4.
6. Approximately 200 lineal feet of additional angle required to increasing bearing at precast double tee members.

Architectural:

1. Approximately 2,800 lineal feet removal of interior planter walls and related 17,500 square feet of concrete planter base pavement
2. Approximately 124,000 square feet of waterproofing replacement at upper deck level 1.
3. Approximately 100,000 square feet of asphaltic pavement replacement at upper deck level 1.
4. Approximately 315,000 square feet of traffic topping at drive lanes and parking stalls levels 2, 3, and 4.
5. Approximately 13,250 square feet of traffic topping at internal ramp levels 1, 2, 3, and 4.
6. Approximately 2,500 square feet of concrete curb/walk replacement, all levels
7. Approximately 1,080 linear feet of sealant joint replacement in concrete curb/walk joints all levels
8. Approximately 85 linear feet of vertical exterior wall expansion joint seal replacement
9. Approximately 175 linear feet of vertical exterior wall construction/sealant joint repair
10. Approximately 1,600 linear feet of horizontal pavement expansion joint replacement and 70 lineal feet of vertical expansion joint replacement.
11. Installation of approximately 1,700 lineal feet of concrete wheel stops at planter removal areas
12. Restripe 1110 parking stalls and paint curbs.
13. Replacement of 36 existing non-functioning area drains
14. Install 6 additional area drains at ponding water, levels 2, 3 and 4.
15. Replacement of 6 hollow metal doors and frames
16. Repair of four interior and one exterior exposed electrical junction boxes

**Intermediate Repairs:** (Repairs to occur within a three year timeframe). Total estimate of probable costs for intermediate repairs is $263,393

**Structural:**

1. Approximately 500 square feet of parking garage level 2 requires intermediate concrete delamination repair with 20 lineal feet of concrete crack repair.
2. Approximately 700 square feet of parking garage level 3 requires intermediate concrete delamination repair with 50 lineal feet of concrete crack repair.
3. Approximately 360 square feet of parking garage level 4 requires intermediate concrete delamination repair with 180 lineal feet of crack repair.

**Architectural:**

1. Prepare and repaint 90 hollow metal doors and frames
2. Prepare and repaint three vehicular and one pedestrian coiling entrance door frames
3. Remove vegetation from stair structure roofs and confirm free draining membrane. (Total stair roof area is approximately 2,700 square feet. Existing roof is ballasted. This will require removing the ballast, cleaning the roof and likely replacing any degraded portions of the existing roof.)
4. Replace guard rail at upper deck level 1

**Long Term Repairs:** (Repairs to occur within a five year timeframe). Total estimate of probable costs for long term repairs is $109,067

**Structural:**

1. Approximately 50 square feet of parking garage level 2 requires future concrete delamination repair.
2. Approximately 100 square feet of parking garage level 3 requires future concrete delamination repair.
3. Approximately 50 square feet of parking garage level 4 requires future concrete delamination repair.
Architectural:

1. Replace approximately 2,700 square feet of stair roofs
2. Paint 125 lineal feet of guard rail around the cooling tower
3. Replace steel exhaust louver with aluminum louver
4. Repair or replace rusted metal guard station structure
Huntington Park Garage Construction Summary:

Originally constructed in the mid 1970’s the Huntington Park Garage is a concrete parking garage consisting of four levels and located in downtown Cleveland Ohio along Lakeside Avenue between West 3rd Street and Erieview Plaza. A service drive runs east-west just north of the Huntington Park Garage and will provide access to the future Cleveland Convention Center.

Each level of the parking garage is constructed of precast concrete double T-beams extending to precast concrete girders supported by cast-in-place concrete columns. The lowest level (Level 4) floor is constructed of concrete slab-on-grade construction. The concrete columns are supported by shallow spread footings. At the north, south, east, and west edges of the parking garage cast-in-place concrete walls provide both vertical support and horizontal support from lateral earth pressure.

The Level 1 surface atop the precast concrete double T-beams consist of an asphalt finish surface atop a waterproofing membrane atop a concrete topping slab. Levels 2, 3, and 4 surface consists of a traffic coating atop a concrete topping slab placed directly above the precast concrete double T-beams. Expansion joints are specifically located to allow for structure movement.

A general floor plan of the Huntington Park Garage is provided below:
Architectural Observations:

The architectural observations primarily focused on the top surface level of the Huntington Park Garage (HPG). Photographs of the architectural observations are referenced within the write up and included at the conclusion of the observations listed.

Topography and Drainage

Description:
No area drains were observed in the lawn areas just south of the HPG. The entrance drive lanes have trench drains connected to an underground storm drainage system which connects to the municipal storm drainage system. The parking areas slope to area drains, and connect to the underground storm drainage system. South stairs E and F roof drainage gutter systems daylight along the south side of the parking garage at the upper level parking deck. All other stair structure roof drainage is piped underground to the municipal storm drainage system.

Vehicle access to the site is by way of three vehicular drives: southeast via a ramp from Lakeside Avenue to the second level of the garage, southwest from Lakeside Avenue to upper level of the garage, and one to the west from West 3rd Street to the second level of the garage. Pedestrian access to the site is by way of walks along the vehicular drives. There is tunnel access to the HPG at the second level from the Justice Center located across Lakeside Drive.

Observations/Comments:
Site drainage at the perimeter of the building appears to be functioning and is adequate for the building except for lawn areas just south of the building. Some area drains in the parking areas do not adequately remove surface water. Ponding water was observed along the top deck.

Observed present deficiencies include the following:
The lawn area just south of column line A is not graded to allow drainage away from the foundation walls. URS recommends the soil be graded away from the top of foundation wall at south of line A and re-seed lawn. (See Photo 1) To aid in the drainage of the lawn area just south of line A, add area drains in lawn areas and tie drains into the storm sewer system.

Maintenance or Construction vehicles parked in lawn area just south of line A has created wheel ruts in the lawn. These ruts allow water to pond at the top of the foundation wall. This ponding water is contributing to water intrusion along the south foundation wall at line A.

Roof downspouts daylight at expansion joint along line A and are contributing to water intrusion at the expansion joint cover. Relocate downspout/rain leaders at stair structure E and F to tie drain lines directly into the storm sewer system. (See Photo 2)

Remove all damaged and non-functioning area drains in the parking area pavements and replace in kind. Set at appropriate inlet elevation for surface drainage. (See Photo 3)

The existing planters leak and allow a direct path for rain water to enter the structure. URS recommends the planters be removed and new waterproofing installed. (See Photos 5-6)
Area drain grate at west entrance apron of upper deck level is missing grating and is hazardous to pedestrian traffic. See drain replacement item above.

**Paving-Upper Deck Level 1**

**Description:**
Paving consists of concrete and asphalt drives and asphalt parking areas at the Upper deck level one, and traffic coating topped concrete deck floors at lower levels two through four. Concrete curbs and walks are present at all deck levels. Sidewalks are concrete.

**Observations/Comments:**
In general, asphalt pavement at the upper deck level appears to be poor, and concrete walks and curbs are satisfactory with some areas which require replacement.

**Observed present deficiencies include the following:**
Asphalt pavement wearing surface is cracked, deteriorated, beyond its useful life, and is allowing moisture to deteriorate adjacent pavements and stress the waterproofing membrane below. Replace all asphaltic pavement and fluid applied waterproofing membrane at this upper level one deck with a new waterproofing membrane and asphalt topping. (See Photos 7-8)

Concrete pavement is cracked and deteriorated and is beyond its useful life in the areas indicated on plans. (see appendix). Replace concrete drive wearing surface at S.E. Entrance. upper level one.

Vehicular ramp at upper deck level between lines B/C and 16 to 20 is deteriorated and requires repair. Replace the following; (See Photos 10-11)

A. E/W concrete curbs along sides and at middle of ramp.
B. Horizontal and vertical sealant and expansion joints in C.I.P. concrete walls.
C. Repair ramp double T structure. (see structural repair items)
D. Install traffic coating on topping slab.
E. Paint curbs yellow.
F. Replace steel angle asphalt stop at top of ramp.

Concrete pavement just south of line A at line 22 of upper deck is cracked. This section of concrete pavement is recommended to be replaced. (See Photo 13)

The steel angle stop between the asphaltic and concrete pavement at upper end of deck ramp along line 20 has moved and the adjacent pavement has deteriorated. This condition allows for moisture intrusion and contributes to the deterioration of the ramp pavement. Remove steel angle and replace to allow for traffic coating on the ramp side of angle.

The Stainless steel welded protective covers at expansion joints (where concrete walks transition to vehicular drive pavement conditions) are satisfactory. Remove and reinstall these covers after expansion joint replacement. (See Photos 12 and 14)
Surface applied walks and curbs at upper level one deck vary in condition and there are numerous deteriorated walks and curbs requiring replacement. (See drawings in appendix) To allow consistent application of waterproofing membrane on topping slab below, all upper level deck concrete curbs and walks are recommended for removal and replacement. (See Photos 15-17)

Sealant joints between concrete walks and south side of concrete foundation wall along line A have failed. Replace these sealant joints. (See Photos 17 and 19)

Horizontal sealant joints in concrete walk pavement along lines B and C at intersection of wall and walk have failed. After replacement of concrete walks/curbs, install sealant in joint to prevent moisture intrusion. (See Photo 18)

Concrete walk pavement at perimeter of ramp walls upper level includes control joints at 8'-0" on center in alignment with joints in structural double T members below. These sealant joints have failed and require replacement. After replacement of concrete curb/walks, install sealant in these joints is required. (See Photo 9)

Concrete walk pavement just south of stair D is deteriorated. Replace deteriorated concrete areas at a minimum. (See Photo 9)

At non-planter C.I.P. concrete walls along lines B and C, the vertical sealant joints located at 20'-0" on center have failed. These sealant cracks allow for moisture intrusion and continual deterioration of the concrete structure below. Sealant in these joints is to be replaced.

At planter C.I.P. interior concrete walls, sealant joints at wall and walk intersections have failed. If interior concrete planter walls are not permanently removed as recommended, replace sealant joints at base of walls where walls intersect concrete walks. (See Photo 19)

At planter C.I.P. concrete walls, the sealant joints and expansion joint covers in the vertical joints of these walls have failed. Replace all vertical sealant joints and expansion joints in these concrete walls if they are to remain. (See Photos 19-20)

The north/south expansion joint along the west wall of stair D has failed and allows moisture intrusion, entire expansion joint requires replacement. (See Photo 21)

East/west expansion joint along column line A is deteriorated, entire expansion joint requires replacement. (See Photo 22)

North/south expansion joints along column lines 7 and 15 are deteriorated, entire expansion joint requires replacement. (See Photo 23)

Expansion joint at top of C.I.P. concrete walls along line 15 have failed at lines B and C. These expansion joints are to be replaced. (See Photo 24)

The sealant at base of stair D structure at its west and south wall intersection with the concrete pavement is missing. Sealant in this area is required.
To maintain city standards and parking restrictions previously in place, paint all new curbs yellow where no parking is permitted.

Restripe all parking spaces including ADA spaces after asphalt replacement. An ADA evaluation of the required quantity of ADA parking spaces was not included in this scope of work, and it is anticipated that the stalls will be striped as indicated presently. As part of the next phase, URS could complete an ADA evaluation for the toilet rooms and parking requirements, and provide this information in the construction drawings.

Guard rail posts just north of line A are mounted in concrete curbed pavement islands. After removal of concrete islands, confirm posts are properly secured to structure and are watertight.

Guard rail posts have failed at single guard rail just east of expansion joint on line 7. The posts and rail should be replaced to maintain a vehicular barrier.

The guard rails and support posts paint has deteriorated. Repaint all steel guard rails and posts.

Steel guard posts around cooling tower enclosure (top of concrete walls) at upper deck level have rusted at the base of each post. Protect by removing corrosion and painting posts with partial demo to remove corrosion.

**Paving-Levels 2 through 4**

**Description:**
Paving consists of traffic coating on concrete topping slabs on double T concrete joists for drive lanes and parking areas with concrete curbs and concrete walks.

**Observations/Comments:**
Traffic coating at drive lanes and parking areas of lower level decks are generally in satisfactory condition, with some minor areas requiring replacement. It is understood that the existing traffic topping has exceeded the 5 to 7 year life expectancy, and an overcoat is recommended to extend the service life of this traffic topping.

**Observed present deficiencies include the following:**
Sealant joints at the intersection of curb/walk and south foundation wall along line A at level two between columns 4 and 8 have failed, and allow moisture to drain to deck levels below. Replace sealant.

Sealant in crack between concrete walk/curb and concrete pavement along entrance drive at west of third street vehicular entrance has failed. Replace sealant joints.

The top of the concrete foundation wall at the west third street vehicular entrance has deteriorated and is susceptible to moisture intrusion. Interior wall staining and concrete deterioration is present below this joint. Replace sealant joint at wall to pavement after completing structural repairs. (See Photo 30) (see also structural repairs.)

Concrete slab at middle of Maintenance Storage room at northwest corner of level two is deteriorated and is recommended for replacement. (See drawings in appendix)

Concrete ramp at curb adjacent to Maintenance Storage room at northwest corner of level two is cracked and does not perform as intended. Replace this approximately 60 SF of concrete pavement.
Delamination, cracking, and failure of traffic topping in three specific areas was observed, and these areas are to be spot repaired as part of the preparation for the installation of the Traffic coating. Areas include the area adjacent to column D/3 at level three, concrete curb island at southeast vehicular entrance of level two, and in parking stall south wall level two adjacent to column 19/A.

Area of concrete walk/curb just outside stair D has cracked and requires replacement. See plans for location.

Area of concrete walk/curb just outside stair A has deteriorated and failed and does not perform as required. Replace this section of concrete where shown on plans. (see appendix)

Concrete located at the vehicular drive lane at southeast entrance level two is cracked and deteriorated. This section of concrete pavement requires replacement where shown on plans. (see appendix)

The area of concrete walk/curb just outside stair D at level two has cracked and is deteriorated. Replace this section of concrete where shown on plans. (see appendix)

Concrete heaving and cracks in concrete were observed at the ramp at curb and walk adjacent to Stair F at level two. Replace this section of concrete walk and ramp where shown on plans. (see appendix)

Area of concrete walk/curb/ramp just outside stair G at level three has cracked and deteriorated. Replace this section of concrete walk and ramp where shown on plans.

Area of concrete walk/curb just outside stair B at level four has deteriorated and failed. Replace this section of concrete where shown on plans.

Drain grates at bottom of vehicular drive lane ramp at level four are damaged, present a tripping hazard to pedestrians, and require replacement.

Area drain grate in parking stall at the northeast corner of level four on line 13 has failed and requires repair or replacement.

The concrete walk construction joint filler material west of the West 3rd street vehicular entrance is raised and presents a hazard to pedestrians. Replace joint filler flush with top of walks. (See Photo 29.)

**Exterior Walls and Roofs**

**Description:**
Exterior cast-in-place concrete walls serve as foundation and bearing walls for the upper decks at all sides of the HPG. At the upper deck level, these concrete walls also serve as the planter walls. Cast-in-place concrete walls also serve as the support walls of the Stair and elevator structural enclosures.

Stair enclosure roofs consist of an apparent combination of built-up roofing with gravel cover on the horizontal concrete roof decks. Aluminum formed standing seam panels on treated plywood are utilized on the sloping concrete deck. The built-up bituminous membrane roofing system appears to be original but could not be confirmed
by observation. The roofing membrane slopes to perimeter gutters for some stair structures daylight at grade. Low slope horizontal built-up roofs sloping to interior roof drains at other structures. Roof access is by way of a ladder.

**Observations/Comments:**
Except for some vertical cracking and areas of spalling concrete on the exterior face, the concrete walls were generally found be in satisfactory condition. The stair roof areas include numerous areas of thriving vegetation, and covered the ballast.

**Observed present deficiencies include the following:**
The vertical exterior wall construction and expansion joint sealant has failed. Openings in vertical wall joints at level two line 7/E, 11-12/E, and level three at line 7/E and 24/D allow daylight and moisture to pass through these joints. This sealant failure has allowed moisture intrusion at the joint and some concrete deterioration. Saw cut concrete wall to provide appropriate width joint and install weather sealed joint cover. (See Photo 73)

Vertical cracks have developed in north exterior wall at approximate locations shown on plans. (see appendix). Cracks allow for moisture intrusion and deterioration of wall. Saw cut existing panels on vertical line to provide consistent seal substrate and provide appropriate width joint seal and sealant. (See Photos 25-28)

Coiling entrance door frames/tracks at all vehicular entrances are rusted. Remove rust and paint all frames. (See Photo 84)

Air louver at west wall of third street entrance is rusted and top of louver is open along concrete wall at electrical conduit penetration. This condition will continue to promote rust build-up of louver. Relocate conduit to penetrate wall through separate wall opening and weather seal with sealant. Replace steel louver with aluminum louver or seal opening at top of louver with sealant and remove rust, repaint louver. (See Photo 85)

Antennae cable is not secured to face of concrete exterior wall at Third Street entrance. Reroute cable in conduit and secure to face of wall.

Electrical wiring is exposed at light pole base in lawn area at west end of Third Street entrance. Remove wires and add cover to junction box.

Electrical conduit serves duplex electrical outlet at vertical expansion joint in north exterior wall, and conduit has pulled apart exposing electrical wiring. Repair conduit to meet N.E.C. requirements. (See Photo 41)

Coiling door frame at head condition of door at northeast corner of building, level 3, has corroded and deteriorated. Provide rain drip above top of door frame and paint frame.

Exterior hollow metal doors and frames are rusted and deteriorated, most commonly deteriorated at bottom of door and frame from moisture on adjacent pavement, and salt splash from vehicles. Doors do not provide a secure opening and do not perform as intended. Replace door, frame, and hardware where noted on plans. (See Photos 32)

Roofs above stair structures E and F have vegetation growth buildup which is impacting roof drainage. Although moisture through the concrete roof deck was not observed, this vegetation should be removed. Remove ballast, repair roofs, and reinstall ballast. (See Photo 33)
Interior Elements (architectural)

Description:
Interior partitions are concrete block at office and service areas. Two hour fire-rated partitions enclose stairs, elevator shafts and main chases.
Common area finishes include the following:
Floors: Sealed concrete in service areas, ceramic tile in toilet rooms;
Walls: Ceramic tile in toilet rooms, painted concrete block in office and service areas;
Ceilings: 2'x4' suspended acoustic panel ceilings, suspended painted gypsum board soffits;
Doors: Hollow metal in hollow metal frames.

Observations/Comments:
In general, interiors are in satisfactory condition except for finishes affected by moisture intrusion.

Observed present deficiencies include the following:
Hollow metal door frame and door are rusted and deteriorated. Where noted on plans, replace door, frame, and hardware, and paint door and frame. (Consider fiberglass in lieu of steel door and frame if moisture persists). (See Photos 34-35)

Hollow metal doors and frames are rusted, most commonly at bottom of door and frame from moisture on adjacent floor and splash from vehicles. Prepare door and frame for paint and repaint. See plans for locations and quantities.

Restripe all parking spaces and ADA spaces where wearing surface replaced.

Paint all new curbs yellow where no parking allowed.

Original metal gutters at bottom of deck expansion joints have generally been replaced in all locations. However, drain lines from these moisture collection gutters have not all been piped to a storm sewer drainage system. Lack of drain piping has promoted concrete deterioration directly below open ended gutter piping. Upon completion of the new expansion joint installation directly above these gutters, moisture collected in these gutters should be eliminated. Locations of unconnected gutter piping include line 22 at column 22/D and on line 15 at column 15/A. (See Photos 36-37)

Electrical wires are exposed at electrical junction boxes and boxes are rusted due to moisture intrusion from above in stair B level two and three. Replace junction box and conduit to meet building code and N.E.C. eliminate source of moisture intrusion from above, see level one items. Remove junction box and related conduit wiring if circuit is not in service. (See similar photos other locations, Photo 41)

Steel structure of the guard station shelters are deteriorated and rusted at the base of the units and the base requires replacement and paint finish. (See Photo 40)
PAVEMENT RENOVATIONS SUMMARY

UPPER LEVEL 1 DECK

- Remove asphaltic pavement and waterproofing protection layer.
- After structural deck repair completed, pre-treat all joints in concrete with uncured Hydrotech flex flash membrane.
- Install Hydrotech asphaltic fabric reinforced waterproofing membrane #6125 to maintain minimum 180 mil thickness. (10 year warranty)
- Install Asphalt Pavement

LOWER LEVEL DECKS 2 THROUGH 4

- Remove all failed and non-adhering, and delaminated areas of traffic coating.
- Patch any deteriorated concrete topping with concrete. (See structural report section.)
- Primer all areas of existing traffic coating with Neogard primer to allow re-bonding.
- Install two coats of solvent free Neogard Autogard FC traffic coating system (24 mil thickness total) in all parking stall areas.
- Install three coats of solvent free Neogard Autogard FC traffic coating system (36 mil thickness total) in drive lanes.

INTERIOR CENTRAL RAMP

- Remove any existing coatings and loose concrete topping.
- Repair all structural damage.
- Replace concrete topping slab in areas where removed for structural repairs.
- Completely clean all substrates to receive traffic topping.
- Install solvent free NeoGuard Autogard F urethane based system on ramp deck and apply flint aggregate protection finish.

EXPANSION JOINT SYSTEMS

- Remove existing expansion joint systems and adjacent concrete substrate.
- Form/pour new concrete blockouts for horizontal applications to receive winged joint seal.
- At failed pavement expansion joints, replace existing joints with Emseal Thermaflex winged gland with wings set in block-outs in concrete.
- At failed wall expansion joints, replace existing vertical expansion joints in concrete walls with Emseal Colorseal Joint System.
- At construction joints presenting movement cracks in the wall substrate, saw cut the walls to create consistent substrate edge for the joint seal installation, and install Emseal Backerseal system and sealant. Sealant over Backerseal.
Architectural Repair Summary:

Immediate Repairs:
1. Approximately 2,800 lineal feet removal of interior planter walls and related 17,500 square feet of concrete planter base pavement
2. 124,000 square feet of waterproofing replacement at upper deck level 1.
3. 100,000 square feet of asphaltic pavement replacement at upper deck level 1.
4. 315,000 square feet of traffic topping at drive lanes and parking stalls levels 2, 3, and 4.
5. 13,250 square feet of traffic topping at internal ramp levels 1, 2, 3, and 4.
6. 2,500 square feet of concrete curb/walk replacement, all levels.
7. 1,080 linear feet of sealant joint replacement in concrete curb/walk joints all levels.
8. 85 linear feet of vertical exterior wall expansion joint seal replacement.
9. 175 linear feet of vertical exterior wall construction/sealant joint repair.
10. 1,600 linear feet of horizontal pavement expansion joint replacement and 70 lineal feet of vertical expansion joint replacement.
11. Installation of 1,700 lineal feet of concrete wheel stops at planter removal areas.
12. Restripe 1110 parking stalls and paint curbs.
13. Replacement of 36 existing non-functioning area drains.
14. Install 6 additional area drains at ponding water, levels 2, 3 and 4.
15. Replacement of 6 hollow metal doors and frames.
16. Repair of four interior and one exterior exposed electrical junction boxes.

Intermediate Repairs: (within a three year timeframe)
1. Prepare and repaint 90 hollow metal doors and frames.
2. Prepare and repaint three vehicular and one pedestrian coiling entrance door frames.
3. Remove vegetation from stair structure roofs and confirm free draining membrane. (Total stair roof area is 2,700 square feet. Existing roof is ballasted. This will require removing the ballast, cleaning the roof and likely replacing any degraded portions of the existing roof.)
4. Replace guard rail at upper deck level 1.

Long Term Repairs: (within a five year timeframe)
1. Replace 2,700 square feet of stair roofs.
2. Paint 125 lineal feet of guard rail around the cooling tower.
3. Replace steel exhaust louver with aluminum louver.
4. Repair or replace rusted metal guard station structure.
Architectural Photographs:

Photo 1

Photo 2
Structural Observations:

The structural observation began at Level 4 and continued upward through the parking garage. At the conclusion of observing each level, a separate structural observation was performed on the ramp and within the exit stair structures. At the conclusion of the observations, photographs are provided of each type of deficiency which requires repair. Appendix C provides drawings depicting each observed deficiency at each parking Level.

Many structural deficiencies were found during observations of the parking garage. The most abundant structural deficiency found was concrete delamination where the steel reinforcement has corroded. Concrete delaminations were found on the concrete walls, girders, T-beams, corbels, and concrete columns. Many of the delaminations were originated from rebar corrosion due to water infiltration. As the steel reinforcement corrodes and expands, the expanded rebar places internal pressure on the surrounding concrete causing the concrete to crack and separate from the base construction. In addition to the concrete delaminations, the concrete structure has cracked in many locations. Some of the concrete cracks are due to shrinkage of the concrete during the curing process, and some of the cracks are allowing water infiltration and are recommended for repair. A summary of each Level and the corresponding observations is provided below:

Level 4 Structural Observations:

Level 4 structural observations consist of the top surface of the concrete slab on grade (elevation 609 +/-) walls between Level 4 and the underside of Level 3, columns between Level 4 and Level 3, concrete corbels supporting Level 3 framing, as well as the underside of the precast double T-beams and concrete girders which support Level 3. Structural drawings S5 and S6 located in Appendix C depict Level 4 observations.

Reviewing the Level 4 structural observations, there are a few areas of concern:

- Along all perimeter walls and framing there are many areas of concrete delamination and concrete cracking. The concrete delaminations at some wall exceed areas of 40 square feet and require immediate repair.
- Along column lines CN and DN between column lines 1 and 5 the concrete girders supporting Level 3 show significant concrete delamination with rebar corrosion. These girders are immediate repairs and may require supplemental reinforcement if shown the rebar corrosion has exceeded 20% of the original rebar cross section.
- Many of the concrete T-beams supporting Level 3 along column line CN have areas of delamination which require immediate repair, in addition to the delaminations the T-beams should be evaluated to verify a minimum bearing length of 4” for the 60’span double T-beams and 3” for the 26’ span double T-beams. Where the double T-beams have a bearing length less than minimum, steel angles can be added to increase the bearing length.
- The concrete girder along column line CN between column lines 22 and 23 is currently shored by steel columns. The girder has large areas of concrete delamination, but the steel reinforcement was still obstructed from view by concrete cover. The girder requires immediate concrete delamination repair and is likely to require additional supplemental reinforcing if corrosion of the
existing reinforcement has exceeded 20% of the original rebar cross section.

A summary of Level 4 immediate, intermediate repairs and long term repairs is shown below:

**Repair Summary Level 4:**

**Immediate Repairs:**
1. 1,650 square feet of concrete delamination repairs
2. 105 lineal feet of concrete crack repair
3. Determine actual bearing areas of double T-beams and add bearing angles as required.

**Intermediate Repairs:**
1. 360 square feet of concrete delamination repairs
2. 170 lineal feet of concrete crack repair

**Long Term Repairs:**
1. 40 square feet of concrete delamination repairs

**Level 4 observation photographs:**

Photo S-1 – Shored Concrete Girder along column line CN between column lines 22 and 23
Photo S-2 – Concrete column and wall delamination with corroded reinforcement

Photo S-3 – Concrete delamination of double T-beam
Level 3 Structural Observations:

Level 3 structural observations consist of the top surface of the concrete double T-beams (elevation 620 +/-) walls between Level 3 and the underside of Level 2, columns between Level 3 and Level 2, concrete corbels supporting Level 2 framing, as well as the underside of the precast double T-beams and concrete girders which support Level 2. Structural drawings S3 and S4 located in Appendix C depict Level 3 Observations.

Reviewing the Level 3 structural observations, there are a few areas of concern:

- Along all perimeter walls and framing there are many areas of concrete delamination and concrete cracking. The concrete delaminations along the north wall reach areas of 100 square feet between column lines 7 and 8.
- Along column line CN, adjacent to the concrete ramp, there are many concrete girders and columns with large concrete delaminations with rebar corrosion. These girders and columns are immediate repairs and may require supplemental reinforcement if shown the rebar corrosion has exceeded 20% of the original rebar cross section.
- Many of the concrete girders along column line DN have large amounts of concrete delamination with rebar corrosion which require immediate repair.
- The concrete double T-beams, corbels and wall along the south wall east of the expansion joint along column line 15 require extensive repair due to concrete delamination with rebar corrosion.
A summary of Level 3 immediate, intermediate repairs and long term repairs is shown below:

**Repair Summary Level 3:**

**Immediate Repairs:**
1. 2,600 square feet of concrete delamination repairs
2. 20 lineal feet of concrete crack repair

**Intermediate Repairs:**
1. 700 square feet of concrete delamination repairs
2. 50 lineal feet of concrete crack repair

**Long Term Repairs:**
1. 100 square feet of concrete delamination repairs

**Level 3 observation photographs:**

Photo S-5 – Concrete column delamination with concrete cracking at girder end bearing.
Photo S-6 – Concrete column delamination at the underside of a concrete double T-beam located at a leaking (and previously repaired) drain location.

Photo S-7 – Concrete delamination of a concrete double at concrete corbel location.
Level 2 Structural Observations:

Level 2 structural observations consist of the top surface of the concrete double T-beams (elevation 632 +/-) walls between Level 2 and the underside of Level 1, columns between Level 2 and Level 1, concrete corbels supporting Level 1 framing, as well as the underside of the precast double T-beams and concrete girders which support Level 1. Structural drawings S1 and S2 located in Appendix C depict Level 2 observations.

Reviewing the Level 2 structural observations, there are a few areas of concern:

- The concrete walls, corbels and double T-beams along the south wall between column lines 5 and 8 have substantial concrete delamination with rebar corrosion. Much of this area is currently shored for structural stability. This entire area is an immediate repair.
- Along column lines CN and BN, adjacent to the concrete ramp, there are many concrete girders and columns with large concrete delaminations with rebar corrosion. These girders and columns are immediate repairs and may require supplemental reinforcement if shown the rebar corrosion has exceeded 20% of the original rebar cross section.
- Many of the concrete girders along column line DN have large amounts of concrete delamination with rebar corrosion which require immediate repair.
- The concrete double T-beams, corbels and wall along the south wall east of the expansion joint along column line 15 require extensive repair due to concrete delamination with rebar corrosion.

A summary of Level 2 immediate, intermediate repairs and long term repairs is shown below:
Repair Summary Level 2:

Immediate Repairs:
1. 2,400 square feet of concrete delamination repairs
2. 60 lineal feet of concrete crack repair

Intermediate Repairs:
1. 500 square feet of concrete delamination repairs
2. 20 lineal feet of concrete crack repair

Long Term Repairs:
1. 50 square feet of concrete delamination repairs

Level 2 observation photographs:

Photo S-9 – Concrete girder delamination with rebar corrosion.
Photo S-10 – Concrete column cracking and delamination at expansion joint location.

Photo S-11 – Concrete double T-beam shoring along south wall. Note rain water running down wall due to poor condition of waterproof membrane and expansion joint at Level 1.
Ramp Structural Observations:

The Huntington Parking Garage has one ramp which provides access to all levels. The ramp is located north-south between column lines CN-BN and east-west between column lines 5-22. The ramp is constructed of slab on grade construction between column lines 5-10, constructed of concrete double T-beams supported by concrete walls between column lines 10-14, and constructed of concrete double T-beams supported by concrete girders spanning to concrete columns between column lines 14-22. Observations of the ramp slab-on-grade construction west of column line 10 found the slab to be in satisfactory condition. Observations of the ramp constructed of double T-beams supported by concrete walls between column lines 10-14 could not be performed since the perimeter of this area is surrounded by concrete walls which provide no access to the underside of the structure. It is recommended an opening be created in one of the support walls to provide access to the underside of the double T-beams in this area. A storage area complete with roll up door access is located between columns 14 to 17.

The majority of the concrete delaminations and areas of concern are located at the intersection of parallel double T-beam section. In many of these areas the concrete is heavily degraded and requires stabilization. This area has experienced previous repairs consisting of steel plates bolted to the top surface of the double T-beams. Structural drawing S7 located in Appendix C depicts the ramp structural observations.

Reviewing the ramp structural observations, areas of concern are as follows:

- Many of the girders and columns observed along column lines CN and BN have substantial areas...
of concrete delamination with rebar corrosion. These girders and columns are immediate repairs and may require supplemental reinforcement if shown the rebar corrosion has exceeded 20% of the original rebar cross section.

- The intersection of the double T-beams between column line 17 and column line 20 require concrete replacement for the full length of the double T-beam. The replacement could consist of new cast-in-place concrete sections or steel framing spanning between adjacent double T-beam stems supporting a new cast-in-place concrete slab.
- The concrete double T-beams, at the ramp require extensive repair in specific locations due to concrete delamination with rebar corrosion.
- Provide an opening in the bearing walls between column lines 14-22 so a structural observation of the underside of the precast double T-beams can be completed.

A summary of the ramp repairs is shown below:

**Repair Summary Ramp:**

**Immediate Repairs:**

1. 1,600 square feet of concrete delamination repairs.
2. 1,400 square feet of concrete replacement. The replacement concrete consists of the double T-flanges where double T members meet. The precast concrete located between the tee stems on individual double T beams is generally satisfactory with exception of some delamination repair as quantified above as Structural Immediate Repair item 4.

**Ramp observation photographs:**

Photo S-13 – Concrete girder, column, and double T-beam delamination with corroded reinforcement.
Photo S-14 – Storage area located under the concrete ramp. Water infiltration caused anchors supporting the light fixture to corrode resulting in the light falling to the floor.

Photo S-15 – Ramp between column lines 17 to 22. The water infiltration occurs at the joints between adjacent double T-beams.
Photo S-16 – Underside of joints between adjacent double T-beams. The steel plates were installed as part of a previous repair project.

Photo S-17 – Concrete double T-beam to Girder connection at column depicting areas of concrete delamination with rebar corrosion.
Structural Repair Descriptions:  Use in conjunction with probable cost of construction section

1. Typical spalled concrete/concrete delamination area repairs will be as follows:

   With a spalled concrete/concrete delamination repair, the contractor will first locate and mark the extent of the unsound concrete and then shore the area as required before beginning the actual repair. Once the repair area is marked and any shoring is in place, the contractor carefully sawcuts around the perimeter of the repair area while being conscious not to cut any reinforcing within the concrete. The loose concrete is then removed within the repair area. Once the concrete in poor condition has been removed, any corroded reinforcing steel is sandblasted clean. Any reinforcing which has lost more than 20% of its cross section after the cleaning process will be replaced (see reinforcing repair description below). The final step will be to use a repair mortar to replace the concrete removed in the repair process.

2. Typical concrete crack repair:

   The typical concrete crack repair will require cleaning of the crack to remove any blocking material. The crack will then be infilled with an epoxy injection system or epoxy joint filler installed per manufacturers recommendations

3. Typical steel reinforcement repair:

   Once a reinforcing bar has been found to have lost 20% or more of its cross section the reinforcing bar shall be repaired by one of two methods indicated below: The first option for repair would be to remove the existing corroded rebar and replace in kind with a new reinforcing bar. The new reinforcing bar would lap the existing reinforcing as required. The second option for joint repair would be to add a new reinforcing bar parallel and close in proximity to the cleaned deteriorated existing reinforcing bar.
Estimate of Possible Repair Costs:

Section A. Estimate of Probable Costs for Immediate Repairs:

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<th>Description</th>
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<th>Unit Cost</th>
<th>Total Cost</th>
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Alternate: Replace planters, includes walls, soil, plants, etc - $390,000 Lump Sum

Markups

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Section B. Estimate of Probable Costs for Intermediate Repairs:

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<td>Design Contingency</td>
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<td>$246,161.37</td>
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<tr>
<td>Construction Contingency</td>
<td>7.00%</td>
<td>$17,231.30</td>
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<tr>
<td>Total Project Cost</td>
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<td>$263,392.66</td>
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</table>
Section C. Estimate of Probable Costs for Future Repairs:

### Rough Order Of Magnitude/Opinion Of Probable Costs

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Quantity</th>
<th>U/M</th>
<th>Unit Cost</th>
<th>Total Cost</th>
<th>Unit Cost With Markups</th>
<th>Total Cost With Markups</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Concrete Delamination Surface Repair - Level 2</td>
<td>500 SF</td>
<td></td>
<td>$70.00</td>
<td>$3,500.00</td>
<td>$106.79</td>
<td>$5,339.73</td>
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<tr>
<td>2</td>
<td>Concrete Delamination Surface Repair - Level 3</td>
<td>100 SF</td>
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<td>$70.00</td>
<td>$7,000.00</td>
<td>$106.79</td>
<td>$10,079.45</td>
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<td>3</td>
<td>Concrete Delamination Surface Repair - Level 4</td>
<td>500 SF</td>
<td></td>
<td>$70.00</td>
<td>$3,500.00</td>
<td>$106.79</td>
<td>$5,339.73</td>
</tr>
<tr>
<td>4</td>
<td>Replace Stair Roofs</td>
<td>2700 SF</td>
<td></td>
<td>$9.50</td>
<td>$25,850.00</td>
<td>$14.49</td>
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<td>5</td>
<td>Paint Guard Rails Around Cooling Tower</td>
<td>125 LF</td>
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<td>$18.50</td>
<td>$2,312.50</td>
<td>$28.23</td>
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<td>6</td>
<td>Replace Steel Exhaust Louver With Aluminum Louver</td>
<td>1 EA</td>
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<td>$850.00</td>
<td>$850.00</td>
<td>$1,296.79</td>
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<td>7</td>
<td>Pipe Metal Gutter Under Expansion Joints Where Not Connected To Storm Sewer</td>
<td>0 LF</td>
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<td>$15.65</td>
<td>$0.00</td>
<td>$23.88</td>
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<td>8</td>
<td>Repair/Replace Rusted Metal Guard Station Structure</td>
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<td>$24,000.00</td>
<td>$24,000.00</td>
<td>$36,615.26</td>
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</tbody>
</table>

### Markups

- **Total Cost**: $66,812.50
- **General Conditions**: 15.00% ($10,021.88)
- **Subtotal**: $76,834.38
- **Overhead and Profit**: 12.00% ($9,220.13)
- **Subtotal**: $86,054.51
- **Mid-Project Escalation**: 3.00% ($2,581.64)
- **Subtotal**: $88,636.14
- **Design Contingency**: 15.00% ($13,295.42)
- **Total Construction Cost**: $101,931.56
- **Construction Contingency**: 7.00% ($7,135.22)
- **Total Project Cost**: $109,066.78
Project Phasing:

The Huntington Park Garage has only one ramp providing access to each level. Repairs associated with the ramp will require closing the lower levels of the parking garage. Since the ramp controls access to the lower levels of the parking garage, it is recommended that repairs associated with the ramp occur during late December early January when parking demand is likely to be lighter than normal. Construction during the holiday season will likely require increased costs for cold weather construction techniques these costs have been accounted for in the estimate of probable costs included within this report.

For general construction at each level of the parking garage there are multiple options for phasing alternatives. A typical parking garage construction phasing could consist of completing half of each parking level at a time. In addition to construction phasing options, there is also an option of allowing the contractor to work multiple shifts. Allowing a contractor to work second shift or at night would reduce the construction schedule minimizing the financial impact due to parking spaces lost during construction.

Using the urgency timeline for repairs as suggested within this report, the URS recommended project phasing is as follows: An initial project is recommended to commence in 2012/2013 which would be comprised of the immediate repairs as outlined within this report. The ramp repairs could occur during the December/January holiday season where demand is likely to be reduced. It is also recommended the observation and maintenance program discussed in the Executive Summary begin at this time. A second project could commence 2014/2015 to include all intermediate repairs and, depending on funding, include long term repairs as outlined in this report. Additional areas can be repaired as they are uncovered in the observation and maintenance program.

Although the recommendation of URS is to have the immediate repairs completed as a single repair project, it is feasible that the immediate repairs could be further broken down into multiple repair projects. It is a strong recommendation from URS that the repairs identified as immediate be addressed within a year’s timeframe to assure public safety and reduce the rate of structural deterioration.