BUILDING ENVELOPE

CONSULTING

FORENSIC RESTORATION

PARKING DESIGN

PLANNING

Condition Assessment

AURORA POLICE DEPARTMENT PARKING STRUCTURE

Aurora, Illinois

April 29, 2022

Prepared for: City of Aurora

Walker Project No. 31-009419.00

WALKER CONSULTANTS

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EXECUTIVE SUMMARY

This report contains the results of Walker's Condition Assessment of the Aurora Police Department Parking Structure in Aurora, Illinois. The objectives of this were to provide an evaluation of the parking structure to identify the existence, nature, and extent of current distress and to provide conceptual repair recommendations and an opinion of probable repair costs that can be used for budgeting and prioritizing repairs over the next five years.

The Aurora Police Department parking structure is a two-level precast concrete parking structure that was constructed in the late 2000's. Overall, it is in fair condition for a parking structure of this construction, age, and environmental exposure.

Our investigation program consisted of a walk-through of the structure while it was in operation on March 3, 2022. During our walk-through, we visually observed the readily accessible exposed structural elements, such as the floors, ceilings, beams, columns, and façade to document noticeable distress such as cracks, leaks, spalls, scaling, joint deterioration, and other similarly adverse conditions. We also performed concrete sounding, using a hammer and/or chains, of representative areas of the floor surface and other structural elements to identify concrete delaminations and possible corrosion of the embedded steel reinforcement. Repair quantities were based upon projections from field measurements in representative areas.

There are immediate concerns for which immediate action has been recommended. Previous locations of full-depth concrete repairs to double-tee flanges are currently exhibiting through-depth cracking and water infiltration. At these locations, the concrete should be removed and replaced full depth to reestablish the integrity of the double-tee flanges. Additionally, there are localized areas of overhead concrete deterioration that could result in loose concrete potentially falling on garage occupants. We recommend engaging a restoration contractor to survey the garage and remove loose overhead concrete that could be hazardous to garage pedestrians.

After the immediate concerns, a majority of the recommended repairs address deterioration within the structural elements and waterproofing systems that have reached the end of their anticipated limited life. Major observations, conclusions, and recommendations include:

- Several types of joint sealants (construction joint, tee-to-tee, vertical, and cove) were observed to be in a deteriorated condition exhibiting adhesion and cohesion failures at multiple joint locations throughout the structure. Failed joint sealants should be replaced in order to reduce the potential of water infiltration into the slabs, protect the embedded steel, and to maintain watertightness of precast connections. Additionally, we observed widespread locations of cracking in the floor slab. These cracks should be routed and sealed.
- Several small areas of spalled/delaminated concrete on the floors were observed throughout the structure and at previously repaired concrete patches. Two areas were noted where through-depth cracking in the double-tee flanges and water infiltration were evident at locations of previous repairs. Isolated spalled/delaminated concrete on the ceilings, beams, columns, and walls were also observed. Considerable repairs to these items are needed to restore these structural members, the protective concrete cover over the reinforcement, and to reduce potential falling or tripping hazards.
- Expansion joints within the parking structure and separating the parking structure from the adjacent building were observed to be in poor condition and require replacement.

- Traffic bearing waterproofing membranes were observed to be damaged or worn throughout the Upper Level of the parking structure. Recoating and/or new application of heavy-duty traffic bearing waterproofing membrane is recommended to reduce water infiltration.
- Application of a silane concrete sealer to the Upper-Level floor surface and restriping of traffic markings and curb faces is recommended to reduce further chloride ingress into the concrete and slow the potential rate of corrosion at the reinforcement level. Application of the sealer involves shot blasting the concrete surface, which also removes much of the striping paint. For this reason, we have also included costs for restriping the structure and curb faces in our opinion of probable cost.
- The mechanical/electrical/plumbing systems in the facility generally appear in good condition. Some drain grates were observed to be clogged. Drain grates should be free and clear of debris in order to properly shed water.
- Cleaning and painting of the metal guardrails anchored to the top of the precast wall along the north elevation is recommended, especially if the guardrail contributes to the fall protection system.

The recommended maintenance/repair budget for each year in the next five years, including recommended construction contingency and estimated engineering fees, is shown below in Table i:

Table i – Opinion of Probable Repair Costs – Parking Structure

YEAR	BUDGET
2022	$ 450,000.00
2023	$ 250,000.00
2024	$ 80,000.00
2025	$ 80,000.00
2026	$ 145,000.00

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

April 29, 2022

John S. Morgan, III — Date
Restoration Consultant

April 29, 2022

Daniel E. Moser, PE, SE, FPTI — Date
Vice President, Forensic Restoration and Building Envelope

01 Introduction

INTRODUCTION

At the request of the City of Aurora, Walker Consultants conducted a condition assessment of the Aurora Police Department Parking Structure located in Aurora, Illinois on Thursday, March 3, 2022. The condition assessment consisted of a visual review of readily accessible exposed structural elements (columns, beams, walls, ceilings, and double tee floor surfaces), waterproofing (expansion joints and sealants), as well as limited chain dragging and hammer sounding of representative areas to identify concrete delaminations and possible corrosion of the embedded steel reinforcement. In addition, the façade, lighting, and floor drainage systems were visually reviewed.

OBJECTIVE

Based upon our February 7, 2022, proposal, the objectives were to perform a condition assessment to identify the current level of visible distress of the structural and waterproofing elements inside the parking structure and develop a conceptual restoration program along with an opinion of probable cost. Per discussions on-site with Jim Birchall of the City of Aurora, Walker also included a five-year asset management plan for annual budgeting purposes.

FACILITY DESCRIPTION AND BACKGROUND

The Aurora Police Department Parking Structure is a one-supported-level precast concrete parking structure in Aurora, IL. The parking structure is positioned to the north of the Aurora Police Department headquarters and provides parking for the Department's vehicle fleet as well as for the personal vehicles of officers and other employees. The parking structure is not open to the public and can only be accessed via a security gate to the west of the Department headquarters. The layout of parking within the structure allows for two-way traffic flow on each level and provides standard 90-degree parking stalls.

Viewed in plan, the parking structure has approximate dimensions of 320 feet in the north-south direction and 320 feet in the east-west direction. The supported level, Upper Level, of the structure is approximately 10 feet above the surrounding grade. The Upper Level consists of five flat bays of precast double-tees spanning in the north-south direction. The double-tees are supported by precast tee beams spanning in the east-west direction that are supported by precast concrete columns and walls. The Lower Level of the structure is at grade and consists of a concrete slab-on-grade to provide additional parking. The Upper Level of the structure is accessed via a ramp on the west side of the structure. The ramp consists of precast flat slabs spanning east-west that are supported by precast walls.

The parking structure has one stair tower positioned at the northwest corner of the structure and one stair/elevator tower positioned on the south side of the structure. The parking structure is connected to the Police Department headquarters by a pedestrian bridge that extends from the Upper Level of the south stair/elevator tower to the Department headquarters building.

02 Recommendations

RECOMMENDATIONS

The deterioration observed in the parking structure is severe for the structure's age, and timely repairs are needed to address the conditions noted and to minimize further deterioration. The recommended repairs listed below are intended to address the noted deterioration within the structure, minimize future deterioration of structural elements, and to extend the service life of the structure. We recommend the following repairs:

IMMEDIATE REPAIRS

Immediate repairs, when required, are typically intended to mitigate potentially hazardous conditions, and should be undertaken without delay.

1. Perform full-depth double-tee flange repairs at locations that were previously repaired but currently exhibiting through-depth cracking and water infiltration.
2. Survey and remove loose and/or delaminated overhead concrete that may be a potential falling hazard throughout the structure. This recommendation should be performed on a continuous basis.

Cost opinions for immediate repairs is included in the "Current Repair and Maintenance Work (Year 2022)" category below.

5-YEAR REPAIR AND MAINTENANCE PLAN

The conceptual repair and maintenance work listed under Year 2022 includes items needed to address the most significant deterioration conditions observed during our condition assessment. For Years 2023-2026, we prioritized repairs that are not included in 2022 and also projected reasonably anticipated parking structure repair and maintenance recommendations. Broad assumptions to the future repair and maintenance projections include the assumption that the previous Year work was performed. Deferring any of the recommended work will likely increase the overall cost to repair and maintain the facility because areas of deterioration will continue to grow each year if left unaddressed. Costs shown are adjusted future value and include inflation of 3% per year after 2022.

CURRENT REPAIR AND MAINTENANCE WORK (YEAR 2022) - $450,000.00

CONCRETE SLAB AND FRAME REPAIRS

1. Perform partial-depth concrete repairs to floors, ceilings, beams, columns, walls, precast double-tee stems and flanges on all levels.
2. Strengthen precast double-tee flanges that exhibit longitudinal cracks at the interface between the double-tee flange and the stem below.
3. Perform grout pocket repairs for floor lifting loop pockets and wall grout pockets.

WATERPROOFING

1. Replace a minimum of one-half of the tee-to-tee joint sealants on the Upper Level.
2. Replace construction joint sealants on the Upper Level.
3. Perform isolated cove joint sealant replacement on the Upper Level.
4. Replace the failed elastomeric concrete-edged expansion joint and header material.
5. Rout and seal random floor cracks on the Upper Level.
6. Replace traffic bearing waterproofing membranes on the Upper Level.
7. Replace the failed silicone expansion joint sealant at the stair tower.
8. Replace isolate deteriorated vertical joint sealants on façade.
9. Replace the expansion joint separating the parking structure from the adjacent building exhibiting punctures. Replace sealants and counter flashing associated with the expansion joint.

PRECAST CONNECTION REPAIR

1. Replace or supplement precast double-tee shear connectors throughout the parking structure.
2. Repair broken connections between precast double-tees and precast walls.

MECHANICAL/ELECTRICAL/PLUMBING

1. Clean clogged floor drain grates and piping.

ARCHITECTURAL/MISCELLANEOUS

1. Clean and paint metal guardrails anchored to the top of the precast wall along the north elevation exhibiting corrosion.

REPAIR AND MAINTENANCE WORK (YEARS 2023-2026) - $555,000

1. Replace remaining existing tee-to-tee joint sealants on the Upper Level that were not replaced in 2022.
2. Perform isolated replacement of sealants between precast members such as cove sealants, vertical joint sealants, and construction joint sealants.
3. Apply penetrating concrete sealer to the Upper Level. Repaint pavement markings after sealer application.
4. Repair newly developed deteriorated concrete on floors, walls, lifting loop pockets, beams, columns, double tee stems, chord connections, slab-on-grade, and at overhead tee flanges.
5. Clean drains of sediment, as needed.

OPINION OF PROBABLE COSTS – 5-YEAR PLAN

Our opinion of probable repair costs, for the conceptual repair and maintenance work to the parking structure, including a recommended construction contingency, and estimated engineering (design, bidding, and engineering services during construction) services for the next 5 years, are summarized in the following table:

Table 1 – Opinion of Probable Costs – 5-Year Plan

Year	Budget	
2022	$	450,000.00
2023	$	250,000.00
2024	$	80,000.00
2025	$	80,000.00
2026	$	145,000.00

A detailed breakdown of probable repair costs is presented in the attached Appendix A.

NOTES:

1. Construction costs/Consulting and engineering fees are based on work during normal working business hours with reasonable areas provided to the contractor to complete work.
2. Cost opinions are based on historical data and experience with similar types of work and are in 2022 dollars rounded to the nearest $500.
3. General conditions and construction contingency are based on 10% of the construction cost and rounded to the nearest $500.
4. Actual costs may vary due to time of year, local economy, material shortages, or other factors.
5. Cost opinions do not include costs for phasing, financing or other owner requirements, or bidding conditions.
6. Costs account for general inflation (3%) of the U.S. Dollar and do not include an increase for material or labor.
7. Cost opinions do not include upgrades if it becomes necessary to bring the structure up to current building code requirements, seismic upgrades, or for ADA or similar items.
8. The structure has not been reviewed for the presence of, or subsequent mitigation of, hazardous materials including, but not limited to, asbestos and PCB.

IMPLEMENTATION

The parking structure repair program for years 2022, to address the current repair and maintenance work as outlined in the table above, can be competitively bid and then executed by experienced restoration contractors. We estimate that an experienced restoration contractor can complete the recommended repairs in approximately 3 to 4 months, depending on the number of spaces that can be closed for repairs at any one time. Typically, we recommend closing a minimum of 150 to 200 parking spaces at a time to allow for efficient workflow. Reduction in the number of spaces made available to the contractor will typically increase project time and cost.

Success of the repairs depends on having proper repair design, material selection, and contractor execution. To implement the outlined repair program, we recommend having bidding documents prepared by an experienced restoration engineering firm, with significant experience in the preparation of Bidding Documents for parking structure repairs. Bidding documents, including drawings, details, and material specifications, should conform to the American Concrete Institute, Committee 562 - Code Requirements for Evaluation, Repair, and Rehabilitation of Concrete Buildings (ACI-562). Bid documents will allow for competitive bidding amongst qualified restoration contractors on an identical repair program and thus eliminate bid confusion. Finally, we recommend an experienced restoration engineering firm be engaged throughout repairs to assist the contractor with challenging conditions and to observe that the repairs are completed in general conformance with the design intent of the contract documents.

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

We also recommend implementing the repairs within the timeframe indicated in the repair plan. If budget constraints exist, we can work together to develop a customized repair program that addresses the restoration goals and budgetary requirements. It is important to note that deferring the repairs will result in an increase in repair quantities, structural deterioration, and costs as the deterioration cycle continues.

03 Discussion

DISCUSSION

A proactive repair and maintenance program is the most effective method to reduce long-term maintenance costs. Condition assessments, such as this one, are typically the first phase of a repair implementation program. They are intended to assist owners in identifying and prioritizing maintenance needs by providing general repair recommendations and an opinion of probable repair costs. With the results from a condition assessment, owners and engineers are able to work together to develop a customized repair program that addresses the restoration goals and budgetary requirements. We typically classify the condition of a parking structure as being:

Excellent	-	Like new condition exhibiting only minor isolated deterioration.
Good	-	Exhibiting isolated concrete deterioration. Potentially requiring replacement of waterproofing or other systems that have reached the end of their anticipated life.
Fair	-	Frequent concrete deterioration and requiring replacement of waterproofing or other systems that have reached the end of their anticipated life. Deterioration does not present an immediate hazard or impede use of the structure.
Poor	-	Widespread concrete deterioration and requiring replacement of waterproofing or other systems that have reached the end of their anticipated life. Deterioration may present an immediate hazard or require restricted use of the structure.

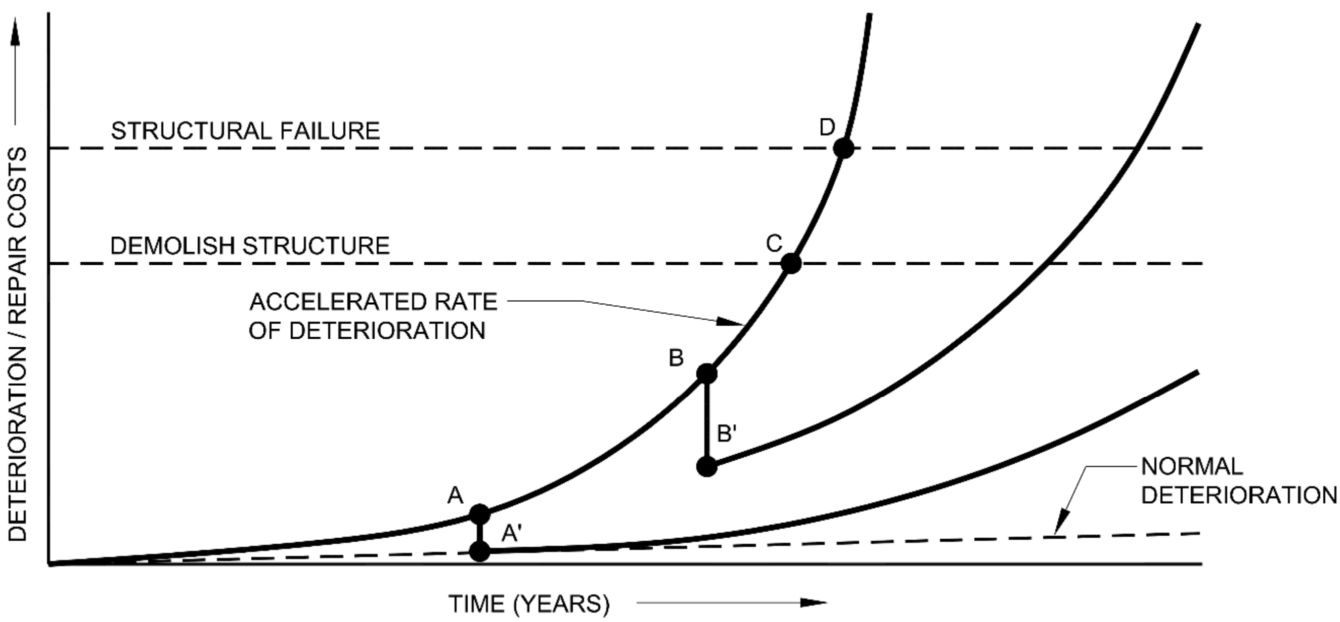
We found this parking structure to be in “Poor” condition. Parking structures are subject to conditions that cause the build-up of stress, such as temperature fluctuations, volumetric changes, moisture intrusion, and vehicle impact. Due to these cumulative stresses, even the best designed and constructed parking structures require routine maintenance and repairs. With proper maintenance, the service life of the structure can be extended. On the other hand, delaying the required maintenance and repair leads to future costly repair since the deterioration will continue growing rapidly.

History has shown that there are many benefits to implementing a repair and preventive maintenance program at the earliest feasible time. Long-term delay of repairs can significantly increase cost. It is our opinion that the cost to repair and maintain this structure will continue to increase at progressively faster rates should deterioration continue. Please see the graph below depicting a typical deterioration curve for a parking structure. The main benefits resulting from implementing the recommended repairs and waterproofing are:

- Reducing infiltration of water.
- Maintaining the structural capacity and service life of the structure.
- Cost savings due to the minimization of potential future structural repairs.
- Higher level of service to the users of the facility due to fewer days of downtime for future repairs.
- Greater degree of safety by reducing deterioration mechanisms before they have a chance to cause serious harm.

Figure 1 below conceptually shows the deterioration rate and repair costs of a parking structure throughout its service life with and without routine maintenance.

PARKING STRUCTURE
DETERIORATION CURVE



NOTES:

1. POINTS A - D REPRESENT STAGES OF ACCELERATED DETERIORATION IN PARKING STRUCTURES.
2. STRUCTURES REPAIRED AT POINT A COST LESS OVERALL AND LAST LONGER THAN STRUCTURES REPAIRED AT POINT B (COMPARE CURVE A' TO B')

Fig. 1 – Parking Structure Deterioration Curve

This section discusses our findings and recommended actions. Each significant type of observed deterioration is discussed in this section in conjunction with the recommended repair and maintenance activities necessary to address the items noted and to properly maintain the structure. A list of detailed observations, including photo references is included under the heading Observations.

RECOMMENDED IMMEDIATE REPAIRS

During our assessment, we observed through-depth cracking and water infiltration at double-tee flanges that were previously repaired. The cracked tee flanges are supported by a steel angle that spans between adjacent tee stems. However, cracking extends beyond the support of the supplemental steel angle. At one location, a portion of the double-tee flange that previously failed was replaced with concrete-filled metal decking. However, cracking in the tee flange adjacent to this area was still noted. Walker recommends performing full-depth tee flange repairs to replace the damaged tee flange sections and properly anchor the new sections to the existing double-tees.

Additionally, we observed a few localized areas of overhead concrete deterioration. Further deterioration may cause the concrete to become loose, potentially falling on garage occupants. Therefore, we recommend engaging a contractor to survey all overhead surfaces and removing loose and/or deteriorated concrete.

RECOMMENDED BASE REPAIRS

CONCRETE STRUCTURE

The observed concrete deterioration at the tops and undersides of the precast flanges is likely due to infiltration of water at open joints. Chain dragging of representative portions of the precast tee flange surfaces revealed concrete delaminations at several tee-to-tee shear connectors throughout the structure. Additionally, at various locations throughout the structure, shear connectors appear to be broken. These shear connectors were designed to allow the individual precast double tees to act together and to provide a unified floor diaphragm in the structure to resist lateral loads from wind or seismic events. This connection also allows for the double tee cantilevered flanges to distribute loads as vehicles travel over the joint. As vehicles travel, the double tee will experience slight deflections that may cause some of the welded connections to eventually fail, potentially damaging the joint sealant as well. Failure of the tee-to-tee joint sealant leads to water infiltration and corrosion of other embedded reinforcement at the tee edges, along with water leakage and staining on the vehicles below. Throughout the structure, ferrous metal shear connectors were used in original construction. At several locations, the ferrous metal shear connectors were observed to be severely corroded. Continued corrosion of the shear connectors will eventually damage the welds and break the connection. At this stage of deterioration, it is typically more cost-effective to replace the shear connectors with a retrofit connector rather than attempt to repair them. Additionally, a portion of the shear connectors are stainless steel. Therefore, broken welds, and not corrosion of the connector, were noted. At stainless steel shear connectors with observed broken welds, we recommend rewelding the broken connections. We have included items in our opinion of probable cost to replace corroded shear connectors and reweld broken welds at stainless steel shear connectors in Year 2022.

The precast concrete walls, inverted T-beams, columns, and corbels were generally observed to be in good condition with minor deterioration noted. At a few isolated locations, small concrete delaminations were noted at the underside of the precast tee flanges on the supported levels. In addition, several floor spalls were noted throughout the Upper Level. Widespread locations of delaminated concrete at lifting loop pockets were also noted. At all the areas mentioned above, the delaminated concrete should be removed, metal connections/reinforcing cleaned of corrosion, and the areas patched to minimize further corrosion of the embedded connections and reinforcement. We have included items in our opinion of probable cost to replace these corroded shear connectors in Year 2022.

At the double-tee flange surface, we observed longitudinal cracks at the interface between the double-tee flange and the stem below at several locations. The lengths and widths of the cracks varied. Several locations exhibited corrosion staining and efflorescence on the underside of the slab, indicating active corrosion of the tee flange primary reinforcement. These cracks provide an easy path for moisture and chloride ions to ingress into the concrete and cause corrosion of the embedded reinforcing steel, which is typically small steel wire mesh. Deterioration of the embedded reinforcing steel at this location will cause a loss of structural capacity, which in turn can lead to a localized collapse of the concrete flange without noticeable warning signs. Walker has observed failures of the flanges due to these cracks more frequently in the last several years. Currently, the cracks at these locations appear to be narrow in width. However, the shear connectors along the length of the flange appear to be broken. Since the embedded reinforcement cannot be observed and could rapidly deteriorate, repair of these cracks should be prioritized, and supplemental steel reinforcement be installed as soon as possible within the next six months.

Additionally, random cracking was observed in the pre-topped double-tee flange surfaces at isolated locations throughout the structure. These cracks appear to be isolated and random throughout the structure and are normal for a concrete parking structure of this construction. If left unrepaired, these locations can allow significant amounts of water into the concrete to the level of the reinforcement and cause for additional delamination and spalls to the concrete, reducing the service life of these structural elements at these locations. The cracks should be routed and filled with sealant.

WATERPROOFING

Proper maintenance of waterproofing systems is vital to extending the life of the parking structure. Waterproofing systems are intended to minimize the intrusion of chloride (road salt) contaminated moisture into the concrete, which leads to corrosion of the embedded steel reinforcement and connections, as well as concrete deterioration. The waterproofing systems within the parking structure include sealants at tee-to-tee joints, cove sealants along the perimeter and interior precast walls, construction joint sealants, vertical sealants, and crack sealants.

Urethane sealants typically have a life expectancy of approximately 5 to 7 years when exposed to ultraviolet (UV) rays and 7 to 10 years if in a covered level, after which time replacement is necessary to maintain their effectiveness. In general, the tee-to-tee joint sealants appeared to be in poor condition throughout the structure. Joint sealants mainly exhibited adhesion failure between the sealant and the concrete surface. Proper surface preparation of the concrete receiving the joint sealant is essential to achieve a full life expectancy of the sealant. Based on the observed deterioration of joint sealants due mainly to adhesion failure, we recommend that all tee-to-tee joint sealants are replaced. It is anticipated that at least one-half of the tee-to-tee joint sealants are replaced in year 2022. In year 2023, it is anticipated that tee-to-tee joint sealants not replaced in year 2022 are replaced. In years 2024-2026, maintain replaced tee-to-tee joint sealants and replace as required to limit water infiltration.

In general, construction joint sealants appeared to be in poor condition throughout the structure due to adhesion failure at multiple locations along the length of the joint. Based on the observed deterioration, we recommend that all construction joint sealants are replaced in the year 2022. Isolated damaged cove sealant was also observed. We recommend that damaged cove sealants are replaced in the year 2022.

An elastomeric concrete-edged expansion joint runs east-west along the parking structure's length. The expansion joint serves to limit the stresses induced in the parking structure's concrete framing due to volume change effects from temperature fluctuations. The condition of the expansion joint is poor along most of its length. Cracking, tears, and hardening of the expansion joint gland were observed. Spalls, delamination, and cracking in the elastomeric concrete headers on each side of the joint were also observed. Deterioration of the expansion joint allows water infiltration that may cause additional damage to the adjacent concrete framing. We recommend replacing the elastomeric concrete-edged expansion joint, rubber gland and headers, in the year 2022. When properly installed and maintained, these joint systems typically have a life expectancy of approximately 7 to 10 years. A silicone expansion joint runs around the stair/elevator tower on the south elevation of the parking structure. Adhesion and cohesion failure of the silicone sealant was observed. Similar to urethane joint sealants, surface preparation of the concrete to receive the sealant is essential to achieve a full life expectancy of the sealant. We recommend that the silicone expansion joint is replaced in the year 2022.

An expansion joint with counter flashing runs along the east elevation of the parking structure and separates the structure from the adjacent building. Punctures within the expansion joint, especially at splices of expansion joint material, bent or unattached metal flashing, and failed sealant above and below the expansion joint were all observed. We recommend repairing this expansion joint to maintain watertightness between the parking structure and the adjacent building in the year 2022. Careful attention to the detailing should be exercised at the intersection of the parking structure elastomeric concrete-edged expansion joint and the expansion joint separating the parking structure from the adjacent building to maintain watertightness.

Although chloride samples were not extracted from the Upper Level, based on the age of the structure, the structure's exposure to de-icing salts, and our experience, high chloride levels should be expected in the near surface portion of the floor concrete. Therefore, we recommend application of a clear concrete silane sealer to reduce moisture infiltration into the exposed concrete precast double tees. A silane sealer will help reduce further chloride ingress into the concrete and slow the potential rate of corrosion at the reinforcement level. Application of the sealer involves shot blasting the concrete surface, which also removes much of the striping paint. For this reason, we have also included costs for restriping the structure in our opinion of probable cost. Concrete sealers typically have an effective life of up to 7 to 10 years, after which time a reapplication is necessary to maintain their effectiveness. Sealing the tee-to-tee joints and applying a concrete sealer to the concrete is the most cost-effective method to reduce the amount of deterioration and corrosion that typically occurs at the precast tee joints and double-tee flange connections. We recommend application of a concrete sealer on the Upper Level in 2023.

MISCELLANEOUS

Corrosion was observed on the metal guardrails anchored to the top of the precast wall along the north elevation of the structure. We recommend that the guardrails are cleaned and painted to avoid further corrosion. It is crucial that guardrails that contribute to the fall protection system of the Upper Level are properly maintained.

The precast concrete façade remains in generally good condition based on our visual review with no readily observable deficiencies.

The floor drainage system and lighting systems appeared to be in relatively good condition without any significant readily visible deterioration. We observed partially clogged drain grates within the structure. Existing drain grates and piping should be regularly cleaned out by maintenance staff to prevent debris build-up so that they can function properly.

04 Investigative Summary

INVESTIGATIVE SUMMARY

On March 3rd, Walker Consultants performed a condition assessment of the Aurora Police Department Parking Structure in Aurora, Illinois. The assessment consisted of a visual review of readily accessible exposed structural elements (columns, beams, walls, ceilings, and floor slabs), waterproofing (traffic topping, and sealants), as well as chain dragging and hammer sounding of representative areas to identify concrete delaminations and possible corrosion of the embedded steel reinforcement. In addition, the façade, lighting, and floor drainage systems were visually reviewed.

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

OBSERVATIONS

CONCRETE SLAB

FLOOR SLAB SURFACE

- Small concrete delamination/spalling was observed along the tee-to-tee joints and within concrete washes at isolated locations throughout the parking structure. (Photos 1 & 2)
- Delaminated concrete at lifting loop pockets on the floor surface throughout the parking structure were identified during our chain drag survey. (Photos 3 & 4)
- Isolated random cracking was noted in the precast double tees. Cracking was observed to be narrow ranging from 0.010” – 0.015”.

CONCRETE FRAME

CEILINGS, WALLS, BEAMS, AND COLUMNS

- Spalled/delaminated concrete was observed overhead on the underside of the double-tee flanges at numerous locations throughout the structure. (Photo 5)
- Full-depth cracking and water infiltration was observed at double-tee flanges that were previously repaired. (Photos 6 & 7)
- Isolated spalled concrete and precast wall panels was observed on the top level. (Photo 8)
- Isolated delaminated grout pockets at the top of precast wall panels were identified. (Photo 9)

WATERPROOFING

JOINT AND CRACK SEALANTS

- Widespread failed tee-to-tee joint sealant was observed on the top level throughout the parking structure. (Photos 10 - 14)

- Drying and shrinkage cracks noted on vertical joint sealant and cove sealant. (Photo 15)
- Isolated damaged cove sealant was observed throughout the parking structure. (Photo 16)
- Failed construction joint sealant was noted throughout the parking structure. (Photo 17)
- The parking structure expansion joint has failed. Delamination/spalling in the elastomeric concrete headers on each side of the expansion joint was observed. (Photo 18)
- Counter flashing within the expansion joint separating the parking structure from the adjacent building was bent and was allowing water infiltration. Sealant at the counter flashing along the precast wall panel and at the floor line was failed. Punctures within the joint boots connecting separate runs of expansion joint were observed. (Photos 19 - 21)
- The existing traffic bearing waterproofing membrane on the top level near the ramp was observed to be worn. (Photo 22)

PRECAST CONNECTIONS

- Broken and corroded double-tee shear connecters were observed throughout the parking structure. (Photos 23 & 24)
- Broken connections between precast double-tee and precast walls were noted. (Photo 25)

MECHANICAL/ELECTRICAL/PLUMBING

- Drain grates were observed to be clogged at isolated locations within the parking structure.

ARCHITECTURAL/MISCELLANEOUS

- Metal guardrails anchored to the top of the precast wall along the north elevation were observed to be corroded. (Photo 26)

LIMITATIONS

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

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

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

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

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

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

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

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

Appendices

APPENDIX A – DETAILED 5-YEAR OPINION OF PROBABLE COSTS

Appendix A – Detailed 5-Year Opinion of Probable Costs

WORK DESCRIPTION	2022	2023	2024	2025	2026
General Conditions / Mobilization	$ 33,500	$ 18,000	$ 5,500	$ 5,500	$ 9,000
Floor Repair - Partial Depth	$ 55,000	$ -	$ -	$ -	$ -
Lifting Loop Repair	$ 10,000	$ -	$ -	$ -	$ -
Floor Repair - Tee Flange Strengthening	$ 16,500	$ -	$ -	$ -	$ -
Wall Repair	$ 4,000	$ -	$ -	$ -	$ -
Wall Repair - Grout Pockets	$ 500	$ -	$ -	$ -	$ -
Tee Flange Repair	$ 9,500	$ -	$ -	$ -	$ -
Tee Flange Repair - Full Depth	$ 4,000	$ -	$ -	$ -	$ -
Concrete Repair Allowance - Future Years	$ -	$ -	$ 15,000	$ 15,000	$ 20,000
Expansion Joint Replacement - Elastomeric	$ 45,000	$ -	$ -	$ -	$ -
Expansion Joint Replacement - Adhered	$ 7,500	$ -	$ -	$ -	$ -
Install New Expansion Joint - Adhered	$ -	$ 50,000	$ -	$ -	$ -
Seal Random Cracks	$ 2,500	$ -	$ -	$ -	$ -
Construction Joint Sealant	$ 25,000	$ -	$ 15,000	$ 15,000	$ 50,000
Vertical Joint Sealant	$ 10,500	$ -	$ 3,000	$ 2,000	$ 2,000
Tee-to-Tee Joint Sealant	$ 42,500	$ 42,500	$ 7,000	$ 5,000	$ 5,000
Cove Sealant	$ 8,000	$ 2,500	$ 5,000	$ 5,000	$ 5,000
Concrete Sealer	$ -	$ 53,000	$ -	$ -	$ -
Traffic Bearing Waterproofing Membrane with Fabric	$ 4,000	$ -	$ -	$ -	$ -
Traffic Bearing Waterproofing Membrane	$ 2,000	$ -	$ -	$ -	$ -
Clean Drain Lines and Piping	$ 5,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
Install Supplemental Shear Connector	$ 39,000	$ 4,000	$ -	$ 1,500	$ 2,500
Reweld Broken Shear Connectors	$ 27,000	$ 15,000	$ 5,000	$ 3,000	$ 5,000
New Precast Connection	$ 6,500	$ -	$ -	$ -	$ -
Paint Traffic Markings	$ -	$ 4,000	$ -	$ -	$ -
Paint Perimeter Railings	$ 8,000	$ -	$ -	$ -	$ -
Sub Total	$ 365,500	$ 191,000	$ 57,500	$ 54,000	$ 100,500
Recommended Construction Contingency	$ 36,500	$ 19,000	$ 6,000	$ 7,000	$ 10,000
Estimated Consulting & Engineering Fees	$ 48,000	$ 25,000	$ 9,000	$ 9,500	$ 14,500
Opinion of Annual Budget (Dollars)	**$ 450,000**	**$ 235,000**	**$ 72,500**	**$ 70,500**	**$ 125,000**
Opinion of Annual Budget (Adjusted Future Value)	**$ 450,000**	**$ 250,000**	**$ 80,000**	**$ 80,000**	**$ 145,000**

NOTES:

1. Construction costs/Consulting and engineering fees are based on work during normal working business hours with reasonable areas provided to the contractor to complete work.
2. Cost opinions are based on historical data and experience with similar types of work and are in 2022 dollars rounded to the nearest $500.
3. General conditions and construction contingency are based on 10% of the construction cost and rounded to the nearest $500.
4. Actual costs may vary due to time of year, local economy, material shortages, or other factors.
5. Cost opinions do not include costs for phasing, financing or other owner requirements, or bidding conditions.
6. Costs account for general inflation (3%) of the U.S. Dollar and do not include an increase for material or labor.
7. Cost opinions do not include upgrades if it becomes necessary to bring the structure up to current building code requirements, seismic upgrades, or for ADA or similar items.
8. The structure has not been reviewed for the presence of, or subsequent mitigation of, hazardous materials including, but not limited to, asbestos and PCB.

APPENDIX B - PHOTOGRAPHS

Photo 1 – Typical spalled and delaminated concrete.

Photo 2 – Typical spalled and delaminated concrete.

Photo 3 – Typical delaminated concrete at lifting loop pockets.

Photo 4 – Deteriorated concrete at a curb on the top level.

Photo 5 – Typical delaminated/spalled concrete on the underside of a tee flange.

Photo 6 – Full-depth cracking and water infiltration observed at double-tee flanges that were previously repaired.

Photo 7 – Full-depth cracking and water infiltration observed at double-tee flanges that were previously repaired.

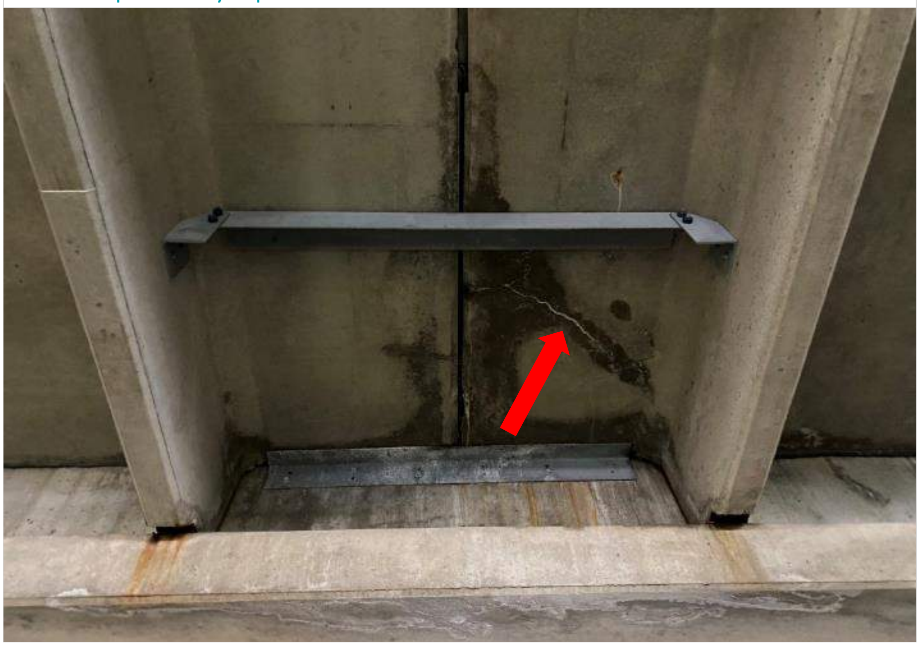


Photo 8 – Isolated spall concrete at precast wall panels observed.

Photo 9 – Typical delaminated concrete observed at a precast wall.

Photo 10 – Widespread failed tee-to-tee joint sealant observed.

Photo 11 – Widespread failed tee-to-tee joint sealant observed.

Photo 12 – Widespread failed tee-to-tee joint sealant observed.

Photo 13 – Widespread failed tee-to-tee joint sealant observed.

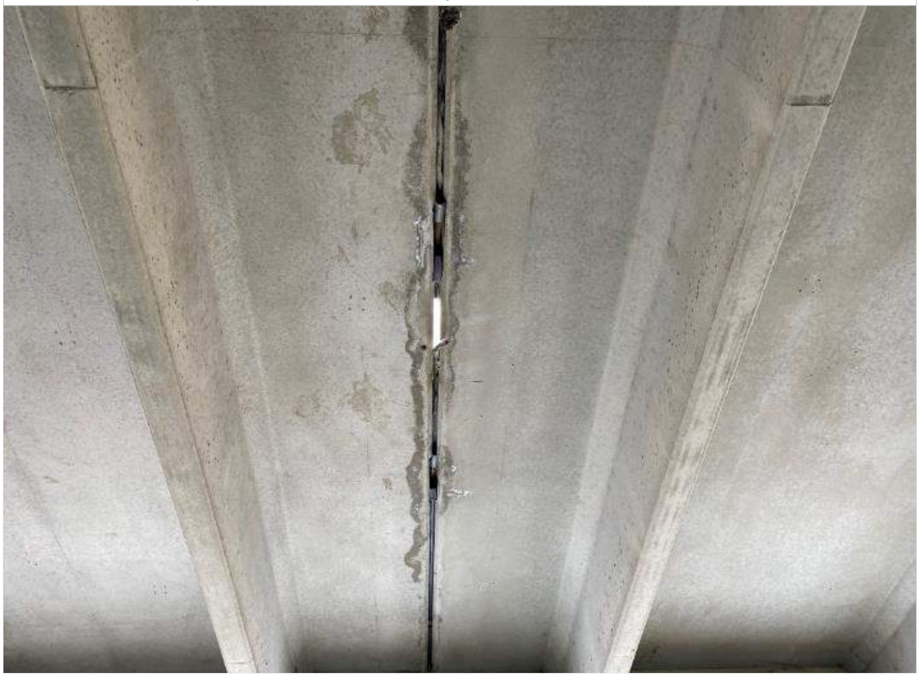


Photo 14 – Typical failed tee-to-tee joint sealant as observed from the underside at isolated locations throughout the structure. Note daylight at failed sealant.

Photo 15 – Drying and shrinkage cracks noted in cove sealant.

Photo 16 – Adhesion failure to cove joint sealant.

Photo 17 – Failed construction joint sealant noted throughout parking structure.

Photo 18 – The parking structure expansion joint has failed. Delamination/spalling in the elastomeric concrete headers was also observed.

Photo 19 – Counter flashing bent and allowing water intrusion. Sealant at floor line failed.

Photo 20 – Sealant at precast wall panel failed.

Photo 21 – Joint boot in expansion joint punctured.

Photo 22 – Traffic bearing membrane on top level worn.

Photo 23 – Broken double-tee shear connector observed (welds broken).

Photo 24 – Corroded double-tee shear connector noted.

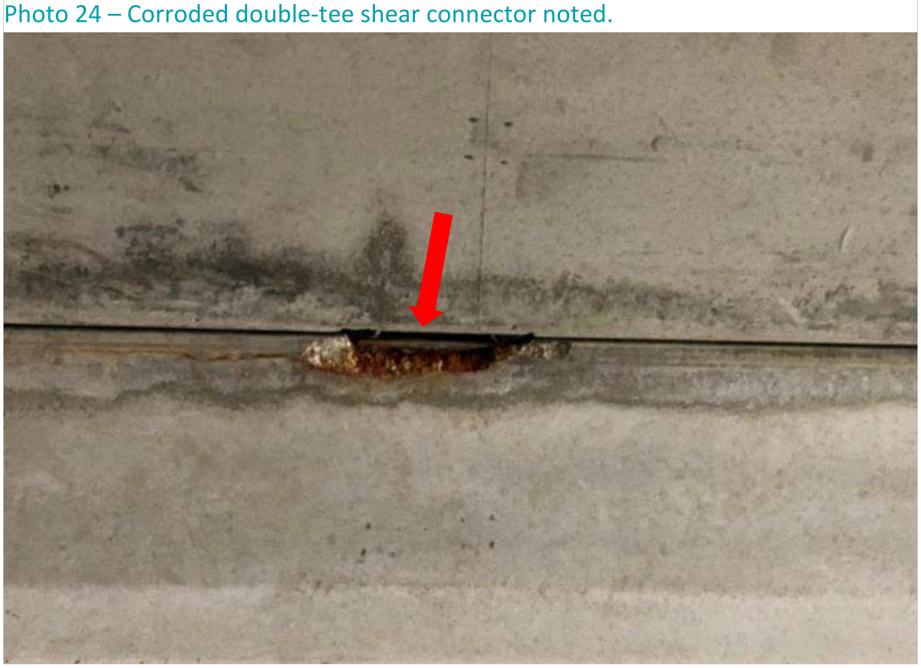


Photo 25 – Broken double-tee to wall connection observed.

Photo 26 – Metal guardrail attached to top of precast wall along north elevation corroded.