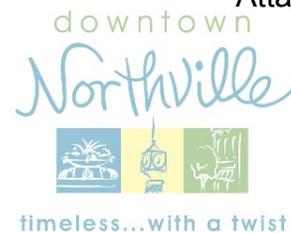


Executive Committee Meeting  
Wednesday, August 8, 2018  
City Manager's Conference Room – 8:00 am

---

## Agenda

1. Current DDA Project Updates (Attachment 1)
2. Parking Structure Repairs
  - A. Reports (Attachment 2.A)
  - B. MainCentre Prorated Share of Repairs (Attachment 2.B)
  - C. Funding Strategy
3. Town Square Rental
  - A. Draft Policy (Attachment 3.A)
  - B. Application (Attachment 3.B)
4. Meeting with Chamber of Commerce Board
5. Next Executive Committee Meeting – Wednesday, September 12, 2018



## August Executive Committee Update

### North 320, 320 Center Street

All utilities have been installed for the building of 16 luxury townhomes. The building is slated to be ready in spring/summer 2019. Phase I faces Center Street while Phase II overlooks the creek. Homes range from 1,885 to 2,816 square feet, with four different floor plans. Prices start in the low \$600,000s. Some feature private rooftop terraces, with views of downtown and Ford Field. DW Development, owned by former Lions defensive end Dewayne White, and Tekton Development are behind the project. NextHome All Pro Realty is handling sales.

### Cady Street Developments

The Planning Commission has approved plans for two condominium projects: the Corner House at Griswold and Cady, and the Cady Project, at Center and Cady, which also plans to have first-floor commercial. Both projects have completed city approvals but start dates for the project are uncertain.

### Northville Downs

A pre-application meeting between the City and the development team involved with the redevelopment of the Northville Downs site was held on Monday, July 23<sup>rd</sup> to discuss plans for the 48 acre site and other parcels included in the option agreement. The first phase of the project will be constructed by Water Mark development of Indiana and will include 317 apartment units and between 10,000 – 18,500 square feet of commercial development.

### Foundary Flask Site

Singh Development has indicated to the City that they are still committed to moving forward with the Foundary Flask Project.

### Secondary Streetscape Design Standards

The secondary streetscape design standards have been updated and will be presented to the DDA Design Committee on Monday, August 13<sup>th</sup> and to the DDA on August 21<sup>st</sup> for review and input. Once the DDA has completed their review the Standards will go to the Planning Commission for review and acceptance.

### Seasonal Staff

All three of the seasonal staff will be leaving the job by August 17<sup>th</sup>. DDA Staff is working to find 1-2 replacements through mid-November. Two of the seasonals are going to college, and the third is moving to Lansing to look for new work.

## Overnight Parking Permits

The Parking Committee met on July 25<sup>th</sup> to discuss issues surrounding residential overnight parking in the downtown. Two issues were discussed at the meeting: the monthly rate for the parking permits and where the permit holders can park in the lot. The rate of \$10/month for residential overnight parking was determined to be fair and reflected the time and resources that are devoted to issuing the permits and implementing the program. Police Officers process the applications, issue the permits, and check the lots each night to ensure compliance with the program. Citations are issued when necessary. In addition, DDA staff compiled a list of neighboring cities to compare the rates that are charged for residential overnight parking in municipal parking lots or decks with those charged in Northville.

In addition to the parking rates, the Committee discussed where overnight residents park and what happens when they come home and the designated spaces are full. The Committee discussed several options and are recommending the following to the DDA and City Council:

1. That the number of spaces designated for overnight parking in each lot be expanded. The entire perimeter of the Marquise and Old Church Square lots will be designated for the residential permit holders. The two parking decks will also have expanded parking on the south end of the MainCentre parking deck (upper floor) and the north row of the lower level of the Cady Street deck. Please see the attached maps for details. This will more than double the amount of spaces that are currently available in the downtown for overnight parking. In the Marquis Lot the designated spaces will increase from 12 to 44.
2. Permit holders are allowed to park in any of the downtown residential spaces designate for residential overnight parking, not just the spaces in the parking lot closest to them. The Committee looked at the entire parking system when making their recommendation. If a permit holder cannot find a space in the lot closest to them, they can move to one of the other lots in the designated residential spaces. The DDA will update the Downtown Parking map to reflect these changes.
3. If there are no spots in any of the designated lots, the permit holder can call dispatch and let them know where they are parking.

## CITY OF NORTHVILLE

CADY STREET PARKING STRUCTURE | FINAL REPORT

24183249.00 | August 6, 2018 | Engineering Condition Assessment



5136 Lovers Lane, Suite 200, Kalamazoo, MI 49002  
269.381.2222 | [WGIinc.com/parking](http://WGIinc.com/parking)

Mark Sampson  
Restoration Manager  
[Mark.Sampson@wginc.com](mailto:Mark.Sampson@wginc.com)

Justin Thomson  
Project Engineer  
[Justin.Thomson@wginc.com](mailto:Justin.Thomson@wginc.com)

## **TABLE OF CONTENTS**

- I. INTRODUCTION**
- II. STRUCTURE DESCRIPTION**
- III. DOCUMENT REVIEW**
- IV. GENERAL CONDITION REVIEW**
- V. DISCUSSION**
- VI. RECOMMENDATIONS**
- VII. COST ESTIMATE**
- VIII. FUTURE REPAIRS AND MAINTENANCE**
- IX. LIMITATIONS**

## **I. INTRODUCTION**

In accordance with our proposal dated March 29, 2018, **WGI** has completed an Engineering Condition Assessment of the Cady Street Parking Structure in Northville, Michigan. The primary objectives of this assessment were to assess the general condition of the structure, identify items requiring repair, maintenance, and/or protection, and provide an estimate of preliminary construction costs for the recommended repairs prioritized into a short-term and long-term plan.

## **II. STRUCTURE DESCRIPTION**

The Cady Street Parking Structure is located on Cady Street, northeast of the Cady Street and Center Street intersection, in Northville, MI. The parking structure was built in 1994. The two-bay structure consists of 1 supported level and one slab-on-grade level with entrances and exits at each level. The entrance and exit to the Upper Level is on the north side of the parking structure from Mary Alexander Court and has no access controls. The entrance and exit to the Lower Level is on the south side of the parking structure from Cady Street and has no access controls.

The typical structural plan dimensions measure approximately 199 feet in the east-west direction and 125 feet in the north-south direction. Each level covers approximately 25,000 square feet for a total of 50,000 square feet. The parking structure provides approximately 152 parking spaces.

The structural system is composed of precast concrete double-tees, beams, and columns. Each precast concrete double-tee typically spans 60 feet in the east-west direction perpendicular to the bays. The double-tees are 9 feet wide, which forms the column spacing of 27 and 36 feet in the north-south direction. There is a 3-inch thick cast-in-place concrete topping on the tees. The double-tees are supported by precast inverted tee beams on the interior and precast spandrels on the exterior. Precast concrete columns support the beams and spandrels. Slab-on-grade consists of asphalt paving.

Stair towers are located at the northwest and northeast corners of the structure and are both fully enclosed. The northeast stair tower has one elevator. A pedestrian bridge at the upper level provides access to the CadyCentre Building to the west. An exterior stair to the east of the structure provides access between Cady Street and Mary Alexander Court.

## **III. DOCUMENT REVIEW**

We reviewed the following documents:

- Original Design Drawings by Rich and Associates, Inc. dated March 12, 1994.
- Specifications and drawings for the "Cady and M.A.G.S. Deck Restoration" by Rich and Associates, Inc. dated July 2005.

From these documents, we noted the following pertinent information:

- Original Design Drawings dated 1994
  - The building was designed in accordance with the 1993 edition of the BOCA Basic National Building Code.
  - The Upper Level was designed for a 50 psf live load plus 30 psf snow load. The stairs were designed for a 100 psf live load.

- Pile foundation design was based on 14" diameter augered cast-in-place piles with capacity of 50 tons each. The average pile length was estimated to be 45 feet.
- The 28-day compressive strength for the cast-in-place concrete slab, topping, columns, wall, and footings was specified to be a minimum of 4,000 psi.
- The 28-day compressive strength for the precast was specified to be a minimum of 6,000 psi.
- The minimum yield strength of all reinforcing steel was specified at 60,000 psi.
- Minimum concrete cover specified for reinforcing was as follows: footings – 3", columns – 1.5", from top of slab and beams – 1.5" for #5 and smaller, and 2" for others.
- The reinforcement for the concrete topping was specified to be WWF 6X6-W2.9 X W2.9. Added reinforcement in the concrete topping was specified to be the following: #4 @ 16" by 10' across the inverted tee-beam at column line B; and 2 - #5 in the perimeter concrete wash parallel along column lines A, E, 1 and 6.
- Some of the precast connections were specified to be stainless steel, such as the flange connectors.
- Concrete masonry units were specified to be normal weight units with a minimum compressive strength of 1,500 psi.
- Mortar was specified to ASTM C-270 Type S with an average compressive strength of 1,800 psi for a 2" cube at 28 days.
- Deck coating was specified to be installed on the Upper Level floor surface above the Inverted tee-beams at column lines B, C, and D.
- Specification and Drawings for the "Cady and M.A.G.S. Deck Restoration" project dated July 2005
  - Small quantities of concrete delaminations were specified to be repaired.
  - Small quantities of joint sealants were specified to be repaired.
  - A concrete sealer (40% silane) was specified to be installed on the entire Upper Level.
  - All the deck coating was specified to be removed and replaced.
  - All the metal railings, stairs and overhead entrance signs were specified to be painted.

#### **IV. GENERAL CONDITION REVIEW**

On May 10, 2018, WGI completed a review of the Cady Street Parking Structure. The review included a visual examination of floor and ceiling surfaces, structural elements and their supports, and stair towers to assess the current condition and locate areas of deterioration and/or deficiencies. A chain drag survey was performed at the supported slab surfaces to determine the extent of slab delamination due to the corrosion of the embedded reinforcing steel. The following is a summary of our observations.

## Floor Slabs

A representative chain drag survey of the floor slab was performed to locate and quantify concrete delaminations. A delamination is a horizontal fracture beneath the surface of the concrete. In general, slab delaminations are caused by corrosion of the embedded reinforcing steel. Rust, which is the byproduct of the corrosion process, has a volume several times that of the original steel. The volume change created by corrosion generates pressures on the surrounding concrete that eventually becomes sufficient to cause internal fracturing of the concrete and the loss of bond of the corroded reinforcing steel with the surrounding concrete.

The chain drag survey of the floor slab revealed approximately 1,100 square feet of slab delaminations at the Upper Level, which is approximately 4.5% of the supported slab. The floor slab delaminations range in size from approximately 1 to 40 square feet. Many of the delaminations are caused by the corrosion of the welded wire fabric which appears to have very little concrete cover. Floor slab delaminations should be repaired to help maintain the structural integrity of the facility and eliminate safety hazards such as trip hazards.



## Tee Flanges/Stems

The double tees appear to be in good condition. We estimate a total of 80 square feet of tee flange delaminations, with most of them approximately 1 to 4 square feet in size. The delaminations are typically located along leaking joints that allow water and chlorides to corrode embedded reinforcement. These delaminations should be repaired to help maintain the structural integrity of the facility and eliminate safety issues such as falling concrete.

The tee stems appear to be in good condition. We estimate a total of 10 square feet of tee flange delaminations, with most of them approximately 1 to 2 square feet in size. These delaminations should be repaired to help maintain the structural integrity of the facility and eliminate safety issues such as falling concrete.



### Beams

The beams appear to be in good condition. We estimated a total of 10 square feet of delaminations, with most of them approximately 1 to 5 square feet in size. The delaminations are typically located along leaking joints that allow water and chlorides to corrode embedded reinforcement. These delaminations should be repaired to help maintain the structural integrity of the facility and eliminate safety issues such as falling concrete.



### Columns

The columns appear to be in good condition with an estimated total of 10 square feet of delaminations. Most of the delaminations are small, approximately 1 to 2 square feet in size, and primarily located at the Lower Level adjacent leaking floor drains and risers. These delaminations should be repaired to help maintain the structural integrity of the facility and eliminate safety issues such as falling concrete.



### Spandrels

The precast concrete spandrels with brick veneer are located at the perimeter of the Upper Level. The spandrels appear to be in good condition with an estimated total of 10 square feet of delaminations. Most of the delaminations are small, approximately 1 to 2 square feet in size and primarily located near the columns. The delaminations at the interior face are typically caused by the corrosion of the reinforcement with shallow concrete cover. The deterioration at the exterior face appear to be caused by failed sealants, which allows moisture to penetrate behind the brick veneer. The moisture can then attack the concrete causing corrosion of the reinforcement, especially if there is shallow concrete cover on this face. Also, once moisture is behind the brick, freeze-thaw can cause damage to the concrete and the brick.

We observed areas of multiple hairline cracks at the interior face of the spandrels, which may be from alkali-silica reaction (ASR). To help protect these areas we would recommend installing a concrete sealer.



### Walls

The cast-in-place concrete walls are located at the perimeter of the Lower Level. The walls appear to be in good condition with an estimated total of 10 square feet of delaminations. Most of the wall delaminations are small, approximately 1 to 4 square feet in size. The wall at the north end has a few leaking cracks that should be sealed to protect the wall from further delaminations. Also, there is leaking onto the north wall below the concrete-to-asphalt joint at the Upper Level entrance/exit and below the isolation joints at the northeast stair tower (elevator/electrical room). These joints above should be repaired to prevent the infiltration of water and chlorides.



### Curbs

The concrete curbs are in fair condition with approximately 20 square feet of delaminations noted at the Upper Level. All of the curb delaminations were observed at the entrance/exit. The concrete curbs help direct water to the floor drains and provides a walking surface for pedestrians. These delaminations should be repaired to prevent potential trip hazards and to protect the embedded steel reinforcement.



### Masonry

The exterior façade consists of precast concrete and brick masonry. The brick masonry appears to be in good condition, with some small areas deterioration observed. We observed spalls at the northeast stair tower and deteriorated mortar joints at the north exterior columns. All loose bricks and deteriorated mortar joints should be repaired to help prevent future deterioration.



### Asphalt

The Lower Level is at grade and the floor surface consists of asphalt. The asphalt throughout this level appears to be in fair condition with approximately 6,600 square feet of deterioration, which is approximately 24% of the floor surface. The paving seams are opening up which may lead to future deterioration of the asphalt. The asphalt should be repaired to reduce future deterioration and trip hazards.



### Joint Sealants

It is our understanding that a small quantity of the tee-to-tee joint sealants were repaired in 2005 and 2013. Failed tee-to-tee joint sealants and active leaking were observed throughout the Upper Level.



Cove joint sealants are typically installed at the slab-to-wall joints and slab-to-curb joints at the perimeter of the structure. The cove joint sealants appear to be in good condition throughout the Upper Level; they appear to have been recently replaced. Cracked and weathered sealants were observed at the exterior stairs and the pedestrian bridge.

Vertical and horizontal wall sealants at the interior and exterior of the structure are in poor condition. Cracked and weathered sealants were observed throughout the structure. Most of the wall sealants are located at the columns.

The typical service life for joint sealants is 7 to 10 years, especially at the roof level. Sealants should be repaired to prevent the infiltration of moisture and chlorides into the structural elements below and to prevent leaking onto vehicles and pedestrians at the Lower Level.



### Surface Treatments

Deck coating has been installed at the Upper Level slab directly above the inverted tee beams along column lines B, C, and D, and at the entrance/exit. It is our understanding that the deck coating was replaced in the 2005 repair project. The deck coating appears to be in poor condition with many worn areas, especially in the drive lanes. All of the deck coating should be recoated to help protect the underlying structural concrete elements.

It is our understanding that a 40% silane sealer was applied to the Upper Level slab surfaces during the 2005 repair project. The effective service life of a 40% silane sealer is typically 4 to 5 years.



## Mechanical

Cast iron storm drainage piping (vertical risers) are at four locations in the structure, along column lines B and D. Corroded and damaged cast iron piping were noted at three of the four locations, caused by leaking joints above. The damaged piping should be replaced to maintain proper water removal from the structure. Piping could be replaced with PVC to eliminate corrosion damage, if allowed by the local codes.

The steel pipe guards protecting the risers were all observed to be corroded. As a minimum, these should be cleaned and repainted or better yet, replaced with new galvanized pipe guards.

The standpipe system has been painted, which helps protect the steel from corrosion. Most of this paint is deteriorating, causing corrosion. The standpipe system should be cleaned and repainted. A section of severely corroded standpipe near the northwest stair tower should be replaced to maintain the proper function of the system. The system should also be tested, if it has not been recently, to make sure it is working properly.



## Electrical

HPS light fixtures at the Lower Level are located near the edges of the drive lane at a spacing of approximately 30 feet. The fixtures are surface mounted to the underside of the slab and are serviced by exposed electrical conduit. The lighting system appears to be in good working order. WGI can conduct a lighting survey to review existing lighting levels and provide recommendations to improve (increase) lighting levels while using more energy efficient fixtures. LED lighting technology is available that could provide energy savings as well as a longer bulb life.

Electrical junction boxes and conduits were noted to be corroded due to leaking joints above. The conduits and junction boxes should be repaired to prevent future deterioration and possible electrocution.



## Stair Towers

The stair towers consist of metal pans with concrete infill. The northeast stair/elevator tower appears to be in good condition, while the northwest stair tower appears to see more foot traffic and is in relatively fair condition.

The following items were noted at the northeast stair tower:

- Stairs and handrails were observed to be corroded; steel surfaces should be cleaned and repainted (touch-up only at underside).
- Existing sealant appear to be in good condition.
- Upper Level landing has a mat adhered to the floor. We recommend removing the mat flooring and replacing with cove joint sealants and deck coating.
- A full system deck coating should be added to the stair treads and landings to help protect the underlying structure.
- Exterior door fails to close at the Upper Level and should be repaired.
- Interior paint at walls and ceiling appears to be in good condition.



The following items were noted at the northwest stair tower:

- Stairs and handrails were observed to be corroded; steel surfaces should be cleaned and repainted.
- Isolated areas of severe corrosion were observed, including five tread pans and one landing panel that were damaged and should be replaced.
- Existing sealant appear to be in good condition.
- Deck coating has been applied to the floor at the top two landings. The deck coating appears to be in good condition.
- A full system deck coating should be added to the stair treads and untreated landing to help protect the underlying structure.
- Interior paint at walls and ceiling appears to be in good condition.

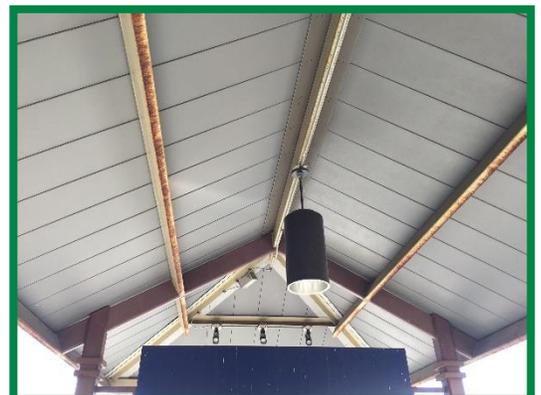


## Pedestrian Bridge

The pedestrian bridge appears to be in relatively good condition. The bridge is not original to the structure and was constructed of steel framing members, standing seam metal roof, concrete supported slab, and cement board ceiling at the underside of bridge.

The following items were noted at the pedestrian bridge:

- Cracked and weathered sealants should be replaced.
- Existing deck coating at the bridge floor is worn and should be recoated.
- A full system deck coating should be added to the untreated floor area to help protect the underlying structure.
- Tube Steel (columns, beams and handrails) was observed to be corroded; steel surfaces should be cleaned and repainted.



### Perimeter Railing

The steel railings around the perimeter of both levels were observed to be corroded in areas with peeling paint throughout. As a minimum, these corroded areas should be cleaned and repainted.



## V. DISCUSSION

This structure is in good condition, but all structures require maintenance and preventative measures to obtain a long-term service life, especially in the harsh environment of Michigan. The Cady Street Parking Structure is subject to extreme weather conditions, temperature fluctuations, and the widespread use of de-icing road salts during the winter months which create an ideal environment for deterioration of the embedded reinforcing steel, exposed metal components, and concrete components of the parking structure.

As with most parking structures, the largest portion of anticipated future maintenance and repair costs are associated with the slab system. This is due to the direct exposure of these elements to water, deicing chemicals (chlorides), and vehicular traffic. The results of the visual observations and the chain drag survey indicate that the intrusion of water and chlorides have caused continued deterioration of the floor system. Even though chloride ion testing has not been performed, it is our assumption based on the visible evidence, that the chloride ion concentrations are above the threshold to cause corrosion of reinforcement. Therefore, the potential for continued corrosion and accelerated deterioration of the floor slab is high.

In a precast structure, the topping not only functions as a wearing surface for the double tees, but it also provides a layer of protection. Moisture and chloride ions will have to diffuse through the topping before reaching the underside of the double tees and the beams, walls, and columns, below. However, if there is leaking through any joints or cracks, the joint will serve as a direct path to the underlying structural system for moisture and chloride ions. Thus, it is of vital importance to maintain the integrity of the joint sealants and deck coating.

Since the existing chloride exposure cannot be easily removed from the floor slab concrete, our recommended approach would be to maintain existing waterproofing systems and introduce protection methods at areas of the slab that are currently unprotected to minimize future corrosion induced deterioration and reduce infiltration of moisture and chlorides. This protection method would involve recoating the existing deck coating and an application of one of the following at the remaining slab areas: a clear penetrating silane sealer; a clear penetrating silane sealer with a corrosion inhibitor; a deck coating; or a deck coating with corrosion inhibitor. The following provides a comparison of each.

### **Option 1: Concrete Sealer**

The application of a concrete sealer has a lower initial implementation cost but has less long-term durability. A concrete sealer is a water repellent, but does not provide 100% waterproofing. Actual in-place performance is difficult to verify, however, it is anticipated that the sealer will provide an 85% water and chloride barrier. The sealer does not span cracks. Reapplication every 8 to 10 years is recommended to maintain effectiveness if a 100% silane sealer is applied.

#### Advantages of Concrete Sealer:

- Lower initial construction cost.
- Reduces moisture and chlorides into the slab by 85%.
- Reduces rate of corrosion.
- Shorter construction schedule when compared to deck coating.

#### Disadvantages of Concrete Sealer:

- Continued corrosion of the embedded reinforcing steel at patch perimeter.
- Reapplication of sealer required every 8 to 10 years.
- Does not stop the corrosion process.
- Does not waterproof the slab, especially at cracks.

### **Option 2: Concrete Sealer with Corrosion Inhibitor**

This option is similar to above, but includes a corrosion inhibitor. The application of a concrete sealer with a corrosion inhibitor reduces corrosion significantly. The manufacturers will provide a warranty against corrosion delaminations at the top side for 10 years. The reapplication of the corrosion inhibitor will depend on the results from periodic testing, will be most likely every 10 to 15 years. The reapplication of the 100% silane sealer is recommended every 8 to 10 years to maintain effectiveness.

#### Advantages of Concrete Sealer with Corrosion Inhibitor:

- Lower initial construction cost than deck coating.
- Reduces moisture and chlorides into the slab by 85%.
- Reduces rate of corrosion by 90%.
- Reduces maintenance and future repair costs due to corrosion damage at the top side.
- Shorter construction schedule when compared to deck coating.
- Ten-year warranty against floor delaminations.

#### Disadvantages of Concrete Sealer with Corrosion Inhibitor:

- Reapplication of sealer required every 8 to 10 years.
- Will require periodic testing and reapplication of corrosion inhibitor.
- Does not waterproof the slab, especially at cracks.

### **Option 3: Deck Coating**

The application of a deck coating effectively waterproofs the floor slab and reduces moisture and chloride penetration by 98%, significantly reducing the rate of corrosion of the embedded reinforcing steel. Deck coatings can bridge small cracks with limited movement. The application of a deck coating to the floor slab will likely increase the longevity of the structure (compared to sealer) by minimizing moisture and chloride penetration into the slab and help protect the joint sealants.

We have estimated a 5 to 7 year life expectancy for the deck coating on this structure if it is properly maintained. At the end of 5 to 7 years the deck coating will need to be reapplied over the entire floor area. We anticipate a reduction in structural repair costs during this time. Maintenance includes corrosion-damaged slab repairs in isolated areas and reapplication of deck coating.

#### Advantages of Deck Coating:

- Provides flexible waterproofing bridge over slab cracks and control joints.
- Provides improved waterproofing characteristics when compared to sealers.
- Helps protect joint sealants.
- Reduces maintenance and future repair costs.
- Reduces rate of corrosion more effectively than concrete sealer.

#### Disadvantages of Deck Coating:

- Direct wear on the waterproofing system would limit the anticipated life of the waterproofing system.
- Deck coating prone to snow plow damage at the roof levels.
- Continued corrosion of the embedded reinforcing steel at patch perimeter.
- Reapplication of the coating required every 5 to 7 years.
- Longer construction schedule when compared to sealers.

### **Option 4: Deck Coating plus Corrosion Inhibitor**

The application of a deck coating plus a corrosion inhibitor gives you the best of both options. The deck coating effectively waterproofs the floor slab and reduces moisture and chloride penetration by 98%, and the corrosion inhibitor significantly reduces the corrosion rate.

It is important to note that the structure will continue to deteriorate despite any repair and maintenance program. All structures require maintenance and preventative measures to obtain a long-term service life, especially in the harsh environment in Michigan. Therefore, WGI recommends periodic reviews of the structure to update its condition, and verify that it remains on course to achieve the desired service life.

## **VI. RECOMMENDATIONS**

No one-restoration method has proven entirely effective in all applications or even throughout a single facility. Instead, costs have to be weighed against potential benefits in selecting repair methods for a particular facility. Several basic methods, as discussed above, have been developed for restoration of corrosion damaged reinforced concrete structures. These methods vary both in initial cost and in life expectancy. The goal is to conduct repairs, which provide cost-effective means of extending the serviceable life of the facility.

To extend the service life of the structure we recommend the following repairs be performed:

### **Division 3 - Concrete**

- 3.1 *Top of Slab Repair* – This item includes repairing the delaminated/spalled concrete in the concrete topping at the Upper Level.
- 3.2 *Tee Flange Repair* – This item includes repairing delaminated concrete at the underside of the precast tee flanges (Lower Level ceiling).
- 3.3 *Tee Stem Repair* – This item includes repairing delaminated concrete at the precast tee stems.
- 3.4 *Beam Repair* – This includes the repair of beam delaminations at the underside of the Upper Level.
- 3.5 *Column Repair* – This item includes the repair of column delaminations throughout the structure.
- 3.6 *Spandrel Repair* - This item includes repairing delaminated concrete at the precast spandrels.
- 3.7 *Wall Repair* - This item includes repairing delaminated concrete at the walls.
- 3.8 *Curb Repair* - This item includes the repair of curb delaminations at the entrance/exit at the Upper Level.

### **Division 4 - Masonry**

- 4.1 *Brick Repair* – This item includes repairing the deteriorated bricks at the façade of the structure.
- 4.2 *Repoint Mortar Joints* – This item includes repointing the failed/deteriorated mortar joints of the masonry walls at the façade of the structure.

### **Division 5 - Metals**

- 5.1 *Steel Tread Pan Repair* – This item includes replacing the corroded tread pans at the northwest stair tower.
- 5.2 *Steel Landing Panel Repair* – This item includes replacing the corroded landing panel at the northwest stair tower.
- 5.3 *Door Repair* – This item includes repairing the door at the northeast stair tower.

### **Division 7 - Waterproofing**

- 7.1 *Rout & Seal Cracks at Topping* – This item includes routing and sealing all cracks in the concrete floor topping at the Upper Level.
- 7.2 *Remove & Replace Control Joint Sealants* – This item includes removing and replacing all tee-to-tee control joint sealants and all other construction/control joint sealants throughout the structure.
- 7.3 *Remove & Replace Isolation Joint Sealants* – This item includes removing and replacing isolation joint sealants at the concrete curbs adjacent the northeast stair tower.
- 7.4 *Remove & Replace Cove Joint Sealants* – This item includes removing and replacing all cove joint sealants at the exterior stairs and pedestrian bridge.
- 7.5 *Install Cove Joint Sealants* – This item includes installing cove joint sealants at the upper landing of the northeast stair tower.

- 7.6 *Remove & Replace Interior Wall Sealant* – This item includes removing and replacing all wall joint sealants at the interior of the structure.
- 7.7 *Remove & Replace Exterior Wall Sealant* – This item includes removing and replacing all joint sealants at the exterior façade of the structure.
- 7.8 *Inject Wall Cracks* – This includes injecting the leaking wall cracks at the north end of the Lower Level with chemical grout.
- 7.9 *Recoat Deck Coating* – This item includes recoating all the existing deck coating.
- 7.10 *Install Deck Coating (full system)* – This item includes installing a full system deck coating at the pedestrian bridge, stair tower treads/landings, and Upper Level entrance/exit.
- 7.11 *Apply Concrete Sealer at Spandrels* – This includes applying a concrete sealer at the interior face of the spandrels at the Upper Level.

#### **Division 9 - Finishes**

- 9.1 *Clean & Paint Perimeter Railings* – This item includes cleaning and painting the metal railings at the perimeter of the structure at both levels.
- 9.2 *Clean & Paint Handrails & Stairs* – This item includes cleaning and painting the metal handrails and stairs, including stringers, risers and the underside, at the northeast and northwest stair towers.
- 9.3 *Clean & Paint Tube Steel at Pedestrian Bridge* – This item includes cleaning and painting the steel columns, beams and handrails at the pedestrian bridge.
- 9.4 *Clean & Paint Standpipe System* – This item includes cleaning and painting the standpipe system at both levels.
- 9.5 *Clean & Paint Pipe Guards* – This item includes cleaning and painting the pipe guards at the vertical risers at the Lower Level.
- 9.6 *Remove Flooring at NE Stair Tower* – This item includes removing the mat flooring from the northeast stair tower at the Upper Level.

#### **Division 22 - Mechanical**

- 22.1 *Remove & Replace Storm Drainage Piping* – This item includes replacing the damaged vertical risers at the Lower Level.
- 22.2 *Remove & Replace Standpipe* – This item includes replacing the damaged standpipe at the Lower Level.

#### **Division 26 - Electrical**

- 26.1 *Misc. Electrical Repairs* – This item includes replacing corroded electrical conduits and junction boxes at the Lower Level, as required.

#### **Division 32 – Exterior Improvements**

- 32.1 *Asphalt Repair* – This includes repairing the deteriorated asphalt at the Lower Level.
- 32.2 *Seal Asphalt Cracks/Joints* – This includes routing and sealing all cracks/joints in the asphalt at the Lower Level.

- 32.3 *Concrete-to-Asphalt Joint Repair at Upper Level* – This includes removing asphalt and excavating the width of the entrance/exit at the Upper Level, waterproofing the underlying wall, and replacing with a reinforced concrete slab and silicone joint sealants.
- 32.4 *Paint Pavement Markings* – This includes repainting the pavement markings after the application of a concrete sealer and/or deck coating.
- 32.5 *Install Railing Post Covers* - This includes installing post covers on the railing at the Upper Level where they are missing.

**Optional Items:**

- O1. *Concrete Sealer* – This includes installing a silane sealer to the Upper Level slab at areas that are not covered by deck coating.
- O2. *Concrete Sealer with Corrosion Inhibitor*– This includes installing a silane sealer with corrosion inhibitor to the Upper Level slab at areas that are not covered by deck coating.
- O3. *Deck Coating* – This includes installing a full system deck coating to the Upper Level slab at areas that are not covered by deck coating.
- O4. *Deck Coating plus Corrosion Inhibitor* – This includes installing a full system deck coating plus corrosion inhibitor to the Upper Level slab at areas that are not covered by deck coating.
- O5. *Replace Light Fixtures at Lower Level* - LED lighting technology is available that could provide energy savings as well as a longer bulb life. WGI can run lighting software to determine if the fixture spacing is adequate for the IES recommendations. The rate of return would most likely be in 3 to 5 years.

WGI recommends selecting one of the four optional protection methods discussed above (O1 to O4) to help minimize future corrosion induced deterioration and reduce infiltration of moisture and chlorides at the supported slab. Based on our experience, we recommend selecting Option 2: Concrete Sealer with Corrosion Inhibitor. This option has a lower cost than Options 3 and 4 and will provide better corrosion protection than Options 1 and 3. Options 3 and 4 with deck coating are very good options, but since there is only one supported level, all of the deck coating would be exposed to weather and snow plow damage. In addition, repairs to the deck coating would increase maintenance costs. Therefore, we believe Option 2 with good future maintenance will provide the most cost-effective option to extend the life of the structure for upwards of 30 additional years.

**VII. COST ESTIMATE**

We have prepared an opinion of cost for the recommended and optional repairs for the Cady Street Parking Structure to assist you with developing a budget for implementing the repairs.

### Base Cost Estimate

Work Item No.	Work Item Description	Units	Estimated Quantity	Unit Cost	Cost
<b>Division 0 &amp; 1 - General Conditions</b>					
1.1	Contractor Mobilization (5%)	L.S.	n/a	n/a	\$ 13,300
1.2	Contractor General Requirements (10%)	L.S.	n/a	n/a	\$ 26,600
<b>Division 3 - Concrete</b>					
3.1	Top of Slab Repair	S.F.	1,100	\$ 40.00	\$ 44,000
3.2	Tee Flange Repair (Ceiling)	S.F.	80	\$ 100.00	\$ 8,000
3.3	Tee Stem Repair	S.F.	10	\$ 100.00	\$ 1,000
3.4	Beam Repair	S.F.	10	\$ 100.00	\$ 1,000
3.5	Column Repair	S.F.	10	\$ 100.00	\$ 1,000
3.6	Spandrel Repair	S.F.	10	\$ 100.00	\$ 1,000
3.7	Wall Repair	S.F.	10	\$ 100.00	\$ 1,000
3.8	Curb Repair	S.F.	20	\$ 100.00	\$ 2,000
<b>Division 4 - Masonry</b>					
4.1	Brick Repair	EA.	60	\$ 20.00	\$ 1,200
4.2	Repoint Mortar Joints	L.F.	150	\$ 20.00	\$ 3,000
<b>Division 5 - Metals</b>					
5.1	Steel Tread Pan Repair	EA.	5	\$ 500.00	\$ 2,500
5.2	Steel Landing Panel Repair	EA.	1	\$ 1,000.00	\$ 1,000
5.3	Door Repair	EA.	1	\$ 1,000.00	\$ 1,000
<b>Division 7 - Waterproofing</b>					
7.1	Rout & Seal Cracks at Topping	L.F.	100	\$ 5.00	\$ 500
7.2	Remove & Replace Control Joint Sealants	L.F.	3,500	\$ 5.00	\$ 17,500
7.3	Remove & Replace Isolation Joint Sealants	L.F.	40	\$ 10.00	\$ 400
7.4	Remove & Replace Cove Joint Sealants at Ext. Stairs & Bridge	L.F.	250	\$ 5.00	\$ 1,250
7.5	Install Cove Joint Sealants at NE Stairs	L.F.	50	\$ 6.00	\$ 300
7.6	Remove & Replace Interior Wall Sealants	L.F.	120	\$ 10.00	\$ 1,200
7.7	Remove & Replace Exterior Wall Sealants	L.F.	160	\$ 10.00	\$ 1,600
7.8	Inject Wall Cracks	L.F.	10	\$ 50.00	\$ 500
7.9	Recoat Deck Coating	S.F.	4,000	\$ 3.25	\$ 13,000
7.10a	Install Deck Coating at Entry/Exit - Full System	S.F.	600	\$ 5.60	\$ 3,360
7.10b	Install Deck Coating at Ped. Bridge - Full System	S.F.	350	\$ 5.60	\$ 1,960
7.10c	Install Deck Coating at Stair Towers - Full System	S.F.	380	\$ 7.00	\$ 2,660
7.11	Apply Concrete Sealer at Spandrels	S.F.	1,400	\$ 0.50	\$ 700
<b>Division 9 - Finishes</b>					
9.1a	Clean & Paint Perimeter Railing at Lower Level	L.F.	450	\$ 40.00	\$ 18,000
9.1b	Clean & Paint Perimeter Railing at Upper Level	L.F.	600	\$ 30.00	\$ 18,000
9.2a	Clean & Paint Handrails & Stairs at NE Stair Tower	L.S.	1	\$ 8,000.00	\$ 8,000
9.2b	Clean & Paint Handrails & Stairs at NW Stair Tower	L.S.	1	\$ 6,000.00	\$ 6,000
9.3	Clean & Paint Tube Steel at Pedestrian Bridge	L.S.	1	\$ 3,000.00	\$ 3,000
9.4	Clean & Paint Standpipe System	L.F.	380	\$ 15.00	\$ 5,700
9.5	Clean & Paint Pipe Guard	EA.	4	\$ 300.00	\$ 1,200
9.6	Remove Flooring at NE Stair Tower	S.F.	130	\$ 10.00	\$ 1,300
<b>Division 22 - Mechanical</b>					
22.1	Remove & Replace Storm Drainage Piping	L.F.	30	\$ 80.00	\$ 2,400
22.2	Remove & Replace Standpipe	L.F.	10	\$ 100.00	\$ 1,000
<b>Division 26 - Electrical</b>					
26.1	Misc. Electrical Repairs	L.S.	1	\$ 1,000.00	\$ 1,000
<b>Division 32 - Exterior Improvements</b>					
32.1	Asphalt Repair	S.F.	6,600	\$ 8.00	\$ 52,800
32.2	Seal Asphalt Cracks/Joints	L.F.	750	\$ 2.50	\$ 1,875
32.3	Concrete-to-Asphalt Joint Repair at Upper Level	S.F.	120	\$ 40.00	\$ 4,800
32.4	Paint Pavement Markings	L.S.	1	\$ 3,500.00	\$ 3,500
32.5	Install Railing Post Covers at Upper Level	EA.	10	\$ 50.00	\$ 500
<b>RECOMMENDED PROTECTION OPTION</b>					
O2	Concrete Sealer with Corrosion Inhibitor	S.F.	21,300	\$ 1.10	\$ 23,430
<b>Total Estimated Construction Cost</b>					<b>\$ 305,035</b>
Construction Contingency (10%)					\$ 30,600
Probable Construction Cost Budget					\$ 335,635
Soft Costs (Engineering, Testing) (20%)					\$ 67,200
<b>Total Probable Construction Cost Budget</b>					<b>\$ 402,835</b>

\*Unit Key Code: L.S. - Lump Sum, S.F. - Square Foot, L.F. - Lineal Foot, EA. - Each

### Optional Items – Cost Estimate

Work Item No.	Work Item Description	Units	Estimated Quantity	Unit Cost	Cost
<b>PROTECTION OPTIONS</b>					
O1	Concrete Sealer	S.F.	21,300	\$ 0.45	\$ 9,590
O2	Concrete Sealer with Corrosion Inhibitor	S.F.	21,300	\$ 1.10	\$ 23,430
O3	Deck Coating	S.F.	21,300	\$ 3.25	\$ 69,230
O4	Deck Coating with Corrosion Inhibitor	S.F.	21,300	\$ 4.35	\$ 92,660
<b>LIGHTING UPGRADE</b>					
O5	Replace Light Fixtures at Lower Level	L.S.	1	\$ 20,000.00	\$ 20,000

\*Unit Key Code: L.S. - Lump Sum, S.F. - Square Foot, L.F. - Lineal Foot, EA. - Each

## VIII. FUTURE REPAIRS AND MAINTENANCE

The repairs and protection presented in Section 8 are based on the current condition of the structure. As you are aware, even after repairs are completed, continued maintenance and repairs should be anticipated to keep the facility safe and operational. The following is a summary of anticipated future maintenance and repair items.

**Concrete Repairs** – Miscellaneous concrete repairs should be anticipated, including slab, beam, and columns. Increasing repair quantities should be anticipated in the future.

**Crack & Joint Sealant Replacement** – Sealant repairs should be anticipated periodically as part of the annual maintenance program. Total replacement is anticipated every 8 years.

**Expansion Joint Replacement** – Expansion joint replacement should be anticipated every 8 years.

**Deck Coating** – Recoating should be anticipated every 8 years.

**Sealer Reapplication** – Reapplication of the sealer should be anticipated every 8 years.

**Pavement Markings** – Repainting of the pavement markings should be anticipated every 2 to 3 years.

**Annual Maintenance** – Annual maintenance should include a slab wash-down in the Spring and the Fall, annual inspection for deterioration, miscellaneous sealant repair, isolated concrete repairs, painting touch up, floor drain clean-out, lighting lamp replacement, etc.

## **IX. LIMITATIONS**

The recommended restoration and protection of the parking structure can be performed and the rate of further deterioration reduced. However, we cannot guarantee that further deterioration will not take place with continued service-related exposure. Effective ongoing maintenance can significantly reduce long-term maintenance costs. Monitoring of the parking structure can assist in scheduling future maintenance.

Specific repair procedures are not part of this evaluation. This report defines items in need of repair and presents conceptual procedures. Construction Documents are required to address all aspects of materials selection and methods for repair of the parking structure. Repair cost projections are based on deterioration quantities identified during our review. Quantities and costs are not intended to define a guaranteed maximum cost, and variations in final quantities should be anticipated.

The evaluation and restoration of existing structures require that certain assumptions be made regarding existing conditions. Since some of these assumptions may not be confirmed without expending additional sums of money and/or destroying otherwise adequate or serviceable portions of the building, WGI cannot be held responsible for latent deficiencies which may exist in the structure, but which have not been discovered within the scope of this evaluation.

WGI did not review the structure for conformance with the Americans with Disabilities Act (ADA).



## NORTHVILLE - CADY STREET PARKING STRUCTURE

### 20-Year Maintenance / Repair Forecast

August 2018

Work Item	Work Item Description	TOTAL COST	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
<b>DIVISION 0 &amp; 1 - GENERAL CONDITIONS</b>																						
1.1	Contractor Mobilization (5%)	\$ 40,100	\$ 7,400	\$ 5,900	\$ 1,600		\$ 9,600		\$ 300		\$ 4,800		\$ 300		\$ 4,300		\$ 300		\$ 4,800	\$ 300	\$ 500	
1.2	Contractor General Requirements (10%)	\$ 79,900	\$ 14,800	\$ 11,800	\$ 3,100		\$ 19,100		\$ 600		\$ 9,600		\$ 600		\$ 8,500		\$ 600		\$ 9,600	\$ 600	\$ 1,000	
<b>DIVISION 3 - CONCRETE</b>																						
3.1	Top of Slab Repair	\$ 64,000	\$ 44,000		\$ 800		\$ 4,000		\$ 800		\$ 4,000		\$ 800		\$ 4,000		\$ 800		\$ 4,000		\$ 800	
3.2	Tee Flange Repair (Ceiling)	\$ 16,000	\$ 8,000				\$ 2,000				\$ 2,000				\$ 2,000				\$ 2,000			
3.3	Tee Stem Repair	\$ 3,000	\$ 1,000				\$ 500				\$ 500				\$ 500				\$ 500			
3.4	Beam Repair	\$ 3,000	\$ 1,000				\$ 500				\$ 500				\$ 500				\$ 500			
3.5	Column Repair	\$ 3,000	\$ 1,000				\$ 500				\$ 500				\$ 500				\$ 500			
3.6	Spandrel Repair	\$ 3,000	\$ 1,000				\$ 500				\$ 500				\$ 500				\$ 500			
3.7	Wall Repair	\$ 3,000	\$ 1,000				\$ 500				\$ 500				\$ 500				\$ 500			
3.8	Curb Repair	\$ 4,000	\$ 2,000				\$ 500				\$ 500				\$ 500				\$ 500			
<b>DIVISION 4 - MASONRY</b>																						
4.1	Brick Repair	\$ 2,400	\$ 1,200				\$ 300				\$ 300				\$ 300				\$ 300			
4.2	Re-Point Mortar Joints	\$ 7,000	\$ 3,000				\$ 1,000				\$ 1,000				\$ 1,000				\$ 1,000			
<b>DIVISION 5 - METALS</b>																						
5.1	Steel Tread Pan Repair	\$ 6,500	\$ 2,500				\$ 1,000				\$ 1,000				\$ 1,000				\$ 1,000			
5.2	Steel Landing Panel Repair	\$ 3,000	\$ 1,000								\$ 1,000				\$ 1,000				\$ 1,000			
5.3	Door Repair	\$ 5,400	\$ 1,000				\$ 1,000				\$ 1,000				\$ 1,100				\$ 1,300			
5.4	Miscellaneous Metal Repairs (Railings, Doors, Stairs, etc.)	\$ 8,000					\$ 2,000				\$ 2,000				\$ 2,000				\$ 2,000			
<b>DIVISION 7 - WATERPROOFING</b>																						
7.1	Rout & Seal Cracks at Topping	\$ 2,500	\$ 500				\$ 500				\$ 500				\$ 500				\$ 500			
7.2	Remove & Replace Control Joint Sealants	\$ 56,000	\$ 17,500				\$ 500		\$ 500		\$ 17,500		\$ 500		\$ 500		\$ 500		\$ 17,500		\$ 500	
7.3	Remove & Replace Isolation Joint Sealants	\$ 1,900	\$ 400		\$ 100		\$ 100		\$ 100		\$ 400		\$ 100		\$ 100		\$ 100		\$ 400		\$ 100	
7.4	Remove & Replace Cove Joint Sealants	\$ 12,550	\$ 1,250		\$ 300		\$ 300		\$ 300		\$ 4,600		\$ 300		\$ 300		\$ 300		\$ 4,600		\$ 300	
7.5	Install Cove Joint Sealants at NE Stairs	\$ 900	\$ 300								\$ 300								\$ 300			
7.6	Remove & Replace Interior Wall Sealants	\$ 3,600	\$ 1,200								\$ 1,200								\$ 1,200			
7.7	Remove & Replace Exterior Wall Sealants	\$ 4,800	\$ 1,600								\$ 1,600								\$ 1,600			
7.8	Inject Wall Cracks	\$ 1,500	\$ 500								\$ 500								\$ 500			
7.9	Install Deck Coating - Recoat	\$ 47,800	\$ 13,000								\$ 17,400								\$ 17,400			
7.10a	Install Deck Coating at Entry/Exit - Full System	\$ 3,360	\$ 3,360																			
7.10b	Install Deck Coating at Ped. Bridge - Full System	\$ 1,960	\$ 1,960																			
7.10c	Install Deck Coating at Stair Towers - Full System	\$ 2,660	\$ 2,660																			
7.11	Apply Concrete Sealer at Spandrels	\$ 2,100	\$ 700								\$ 700								\$ 700			
7.12	Roof Replacement at Stair Towers	\$ 16,000					\$ 16,000															
7.13	Remove & Replace Exterior Sealants at Stair Towers	\$ 8,000									\$ 4,000								\$ 4,000			
7.14	Concrete Sealer with Corrosion Inhibitor	\$ 23,430	\$ 23,430																			
7.15	Concrete Sealer	\$ 19,200									\$ 9,600								\$ 9,600			
<b>DIVISION 9 - FINISHES</b>																						
9.1a	Clean & Paint Railing at Lower Level	\$ 36,000		\$ 18,000											\$ 18,000							
9.1b	Clean & Paint Railing at Upper Level	\$ 36,000		\$ 18,000											\$ 18,000							
9.2a	Clean & Paint Handrails & Stairs at NE Stairs	\$ 16,000		\$ 8,000											\$ 8,000							
9.2b	Clean & Paint Handrails & Stairs at NW Stairs	\$ 12,000		\$ 6,000											\$ 6,000							
9.3	Clean & Paint Tube Steel at Ped. Bridge	\$ 6,000		\$ 3,000											\$ 3,000							
9.4	Clean & Paint Standpipe System	\$ 11,400		\$ 5,700											\$ 5,700							
9.5	Clean & Paint Pipe Guards	\$ 2,400		\$ 1,200											\$ 1,200							
9.6	Remove Flooring at NE Stairs	\$ 1,300		\$ 1,300																		
9.7	Miscellaneous Painting (Stair tower walls, other walls, steel, etc.)	\$ 10,000									\$ 5,000								\$ 5,000			
<b>DIVISION 14 - ELEVATORS</b>																						
14.1	Elevator Upgrades (every 15 years)	\$ 10,000																			\$ 10,000	
14.2	Elevator Replacement (25 to 30 years)	\$ 150,000					\$ 150,000															
<b>DIVISION 21 - FIRE SUPPRESSION</b>																						
21.1	Fire Protection / Standpipe System	\$ 4,000									\$ 2,000								\$ 2,000			
<b>DIVISION 22 - MECHANICAL</b>																						
22.1	Remove & Replace Storm Drainage Piping	\$ 7,200	\$ 2,400								\$ 2,400								\$ 2,400			
22.2	Remove & Replace Standpipe	\$ 7,000	\$ 1,000								\$ 3,000								\$ 3,000			
<b>DIVISION 26 - ELECTRICAL</b>																						
26.1	Miscellaneous Electrical Repairs (Lights, Conduits, Boxes, etc.)	\$ 5,000		\$ 1,000			\$ 1,000				\$ 1,000				\$ 1,000				\$ 1,000			
26.2	Upgrade Light Fixtures at Lower Level	\$ 20,000			\$ 20,000																	
26.3	Upgrade Light Fixtures at Upper Level	\$ 5,000			\$ 5,000																	
<b>DIVISION 32 - EXTERIOR IMPROVEMENTS</b>																						
32.1	Asphalt Repair	\$ 68,800		\$ 52,800			\$ 4,000				\$ 4,000				\$ 4,000				\$ 4,000			
32.2	Seal Asphalt Cracks/Joints	\$ 3,875		\$ 1,875			\$ 500				\$ 500				\$ 500				\$ 500			
32.3	Concrete-to-Asphalt Joint Repair at Upper Level	\$ 4,800	\$ 4,800																			
32.4	Paint Pavement Markings	\$ 35,000	\$ 3,500		\$ 3,500		\$ 3,500		\$ 3,500		\$ 3,500		\$ 3,500		\$ 3,500		\$ 3,500		\$ 3,500		\$ 3,500	
32.5	Install Railing Post Covers	\$ 900		\$ 500			\$ 100				\$ 100				\$ 100				\$ 100			
PROBABLE CONSTRUCTION COST		\$ 912,235	\$ 169,960	\$ 135,075	\$ 34,900	\$ -	\$ 219,500	\$ -	\$ 6,100	\$ -	\$ 109,500	\$ -	\$ 6,100	\$ -	\$ 97,600	\$ -	\$ 6,100	\$ -	\$ 109,800	\$ -	\$ 6,100	\$ 11,500
CONSTRUCTION CONTINGENCY (10%)		\$ 91,900	\$ 17,000	\$ 13,600	\$ 3,500	\$ -	\$ 22,000	\$ -	\$ 700	\$ -	\$ 11,000	\$ -	\$ 700	\$ -	\$ 9,800	\$ -	\$ 700	\$ -	\$ 11,000	\$ -	\$ 700	\$ 1,200
<b>PROBABLE CONSTRUCTION COST BUDGET</b>		<b>\$1,004,135</b>	<b>\$ 186,960</b>	<b>\$ 148,675</b>	<b>\$ 38,400</b>	<b>\$ -</b>	<b>\$ 241,500</b>	<b>\$ -</b>	<b>\$ 6,800</b>	<b>\$ -</b>	<b>\$ 120,500</b>	<b>\$ -</b>	<b>\$ 6,800</b>	<b>\$ -</b>	<b>\$ 107,400</b>	<b>\$ -</b>	<b>\$ 6,800</b>	<b>\$ -</b>	<b>\$ 120,800</b>	<b>\$ -</b>	<b>\$ 6,800</b>	<b>\$ 12,700</b>
SOFT COSTS (Engineering, Testing) (20%)		\$ 201,200	\$ 37,400	\$ 29,800	\$ 7,700	\$ -	\$ 48,300	\$ -	\$ 1,400	\$ -	\$ 24,100	\$ -	\$ 1,400	\$ -	\$ 21,500	\$ -	\$ 1,400	\$ -	\$ 24,200	\$ -	\$ 1,400	\$ 2,600
<b>TOTAL PROBABLE CONSTRUCTION COST BUDGET (2018 \$)</b>		<b>\$1,205,335</b>	<b>\$ 224,360</b>	<b>\$ 178,475</b>	<b>\$ 46,100</b>	<b>\$ -</b>	<b>\$ 289,800</b>	<b>\$ -</b>	<b>\$ 8,200</b>	<b>\$ -</b>	<b>\$ 144,600</b>	<b>\$ -</b>	<b>\$ 8,200</b>	<b>\$ -</b>	<b>\$ 128,900</b>	<b>\$ -</b>	<b>\$ 8,200</b>	<b>\$ -</b>	<b>\$ 145,000</b>	<b>\$ -</b>	<b>\$ 8,200</b>	<b>\$ 15,300</b>
<b>TOTAL PROBABLE CONSTRUCTION COST BUDGET (3% INFLATION)</b>		<b>\$1,501,000</b>	<b>\$ 231,100</b>	<b>\$ 189,400</b>	<b>\$ 50,400</b>	<b>\$ -</b>	<b>\$ 336,000</b>	<b>\$ -</b>	<b>\$ 10,100</b>	<b>\$ -</b>	<b>\$ 188,700</b>	<b>\$ -</b>	<b>\$ 11,400</b>	<b>\$ -</b>	<b>\$ 189,300</b>	<b>\$ -</b>	<b>\$ 12,800</b>	<b>\$ -</b>	<b>\$ 239,700</b>	<b>\$ -</b>	<b>\$ 14,400</b>	<b>\$ 27,700</b>

CITY OF NORTHVILLE

MAINCENTRE PARKING STRUCTURE | FINAL REPORT

24183249.00 | August 6, 2018 | Engineering Condition Assessment



5136 Lovers Lane, Suite 200, Kalamazoo, MI 49002  
269.381.2222 | [WGIinc.com/parking](http://WGIinc.com/parking)

Mark Sampson  
Restoration Manager  
[Mark.Sampson@wginc.com](mailto:Mark.Sampson@wginc.com)

Justin Thomson  
Project Engineer  
[Justin.Thomson@wginc.com](mailto:Justin.Thomson@wginc.com)

## **TABLE OF CONTENTS**

- I. INTRODUCTION**
- II. STRUCTURE DESCRIPTION**
- III. DOCUMENT REVIEW**
- IV. GENERAL CONDITION REVIEW**
- V. DISCUSSION**
- VI. RECOMMENDATIONS**
- VII. COST ESTIMATE**
- VIII. FUTURE REPAIRS AND MAINTENANCE**
- IX. LIMITATIONS**

## **I. INTRODUCTION**

In accordance with our proposal dated March 29, 2018, **WGI** has completed an Engineering Condition Assessment of the MainCentre Parking Structure in Northville, Michigan. The primary objectives of this assessment were to assess the general condition of the structure, identify items requiring repair, maintenance, and/or protection, and provide an estimate of preliminary construction costs for the recommended repairs prioritized into a short-term and long-term plan.

## **II. STRUCTURE DESCRIPTION**

The MainCentre Parking Structure is located at the southeast corner of the Cady Street and Center Street intersection in Northville, MI. The parking structure was built in 1994. The two-bay structure consists of 1 supported level and one slab-on-grade level with entrances and exits at each level. The entrance and exit to the Upper Level is on the north side of the parking structure from Cady Street and has no access controls. The entrance and exit to the Lower Level is on the south side of the parking structure from a service drive and has controlled access with card readers.

The typical structural plan dimensions measure approximately 117 feet in the east-west direction and 254 feet in the north-south direction. Each level covers approximately 29,500 square feet for a total of 59,000 square feet. The parking structure provides approximately 182 parking spaces.

The structural system is composed of precast concrete double-tees, beams, and columns. Each precast concrete double-tee spans 58 feet in the east-west direction across the bays. The double-tees are 9 feet wide, which forms the column spacing of 36 feet in the north-south direction. There is a 3-inch thick cast-in-place concrete topping on the tees. The double-tees are supported by precast inverted tee beams on the interior and precast spandrels on the exterior. Precast concrete columns support the beams and spandrels. Slab-on-grade consists of asphalt paving.

Stair towers are located at the northeast and southwest corners of the structure. The northeast stair tower is fully enclosed and has one elevator. The stair tower has four flights of stairs above the Upper Level, leading to a pedestrian bridge which provides access to the MainCentre Building to the north. The southwest stair tower is not covered and consist of aluminum members.

## **III. DOCUMENT REVIEW**

We reviewed the following documents:

- Original Design Drawings by Rich and Associates, Inc. dated March 12, 1994.
- Specifications and drawings for the "Cady and M.A.G.S. Deck Restoration" by Rich and Associates, Inc. dated July 2005.
- Proposal for the MainCentre Parking Structure repairs by Pullman dated April 18, 2013.
- Drawing for the "Northville Parking Deck Spandrel Repair" by Desai Nasr Consulting Engineers dated May 27, 2015.

From these documents, we noted the following pertinent information:

- Original Design Drawings dated 1994

- The building was designed in accordance with the 1993 edition of the BOCA Basic National Building Code.
- The Upper Level was designed for a 50 psf live load plus 30 psf snow load. The stairs were designed for a 100 psf live load.
- Spread footing design was based on a soil bearing capacity of 3,000 psf.
- The 28-day compressive strength for the cast-in-place concrete slab, topping, columns, wall, and footings was specified to be a minimum of 4,000 psi.
- The 28-day compressive strength for the precast was specified to be a minimum of 6,000 psi.
- The minimum yield strength of all reinforcing steel was specified at 60,000 psi.
- Minimum concrete cover specified for reinforcing was as follows: footings – 3", columns – 1.5", from top of slab and beams – 1.5" for #5 and smaller, and 2" for others.
- The reinforcement for the concrete topping was specified to be WWF 6X6-W2.9 X W2.9. Added reinforcement in the concrete topping was specified to be the following: #4 @ 16" by 10' across the inverted tee-beam at column line B; and 2 - #5 in the perimeter concrete wash parallel along column lines A, C, and 9.
- Some of the precast connections were specified to be stainless steel, such as the flange connectors.
- Concrete masonry units were specified to be normal weight units with a minimum compressive strength of 1,500 psi.
- Mortar was specified to Type S with an average compressive strength of 1,800 psi for a 2" cube at 28 days.
- Deck coating was specified to be installed on the Upper Level floor surface above the Inverted tee-beams at column line B.
- An oil interceptor is located at the Lower Level near column line B.7 - 4.
- The southwest stair was specified to be metal frame with concrete in-fill treads.
- Specification and Drawings for Cady and M.A.G.S. Deck Restoration dated July 2005
  - Small quantities of concrete delaminations were specified to be repaired.
  - Small quantities of joint sealants were specified to be repaired.
  - A concrete sealer (40% silane) was specified to be installed on the entire Upper Level.
  - All the deck coating was specified to be removed and replaced.
  - Expansion joint gland at the Upper Level entry was specified to be replaced.
  - All the metal railings were specified to be painted.
  - The southwest stair was specified to be replaced with an anodized aluminum stair.
  - The brick stair retaining wall at the northwest corner was specified to be rebuilt.
  - The fire protection standpipe system was specified to be repainted.

- The walls and ceilings of the northeast stair tower were specified to be repainted.
- Pullman’s Proposal for the MainCentre Parking Structure repairs dated April 18, 2013
  - Provided a quote of \$4,985 to repair 234 ft of joint sealants and 24 ft of Jeene expansion joint at the Upper Level entrance. This work was performed per conversation with Pullman.
  - Provided a quote of \$12,390 to remove and replace 3,300 ft of joint sealants. This work was not performed per conversation with Pullman.
- Drawing for the Northville Parking Deck Spandrel Repair dated May 27, 2015.
  - A precast concrete spandrel with brick veneer was specified to be repaired. The damage appeared to be caused by corrosion of the reinforcement and was located on the east elevation.

#### **IV. GENERAL CONDITION REVIEW**

On May 10, 2018, WGI completed a review of the MainCentre Parking Structure. The review included a visual examination of floor and ceiling surfaces, structural elements and their supports, and stair towers to assess the current condition and locate areas of deterioration and/or deficiencies. A chain drag survey was performed at the supported slab surfaces to determine the extent of slab delamination due to the corrosion of the embedded reinforcing steel. The following is a summary of our observations.

##### **Floor Slabs**

A representative chain drag survey of the floor slab was performed to locate and quantify concrete delaminations. A delamination is a horizontal fracture beneath the surface of the concrete. In general, slab delaminations are caused by corrosion of the embedded reinforcing steel. Rust, which is the byproduct of the corrosion process, has a volume several times that of the original steel. The volume change created by corrosion generates pressures on the surrounding concrete that eventually becomes sufficient to cause internal fracturing of the concrete and the loss of bond of the corroded reinforcing steel with the surrounding concrete.



The chain drag survey of the floor slab revealed approximately 400 square feet of slab delaminations at the Upper Level, which is approximately 1.4% of the supported slab. Most of the top-of-slab delaminations are small, approximately 1 to 4 square feet in size. Many of the delaminations are caused by the corrosion of the welded wire fabric which appears to have very little concrete cover. Floor slab delaminations should be repaired to help maintain the structural integrity of the facility and eliminate safety hazards such as trip hazards.



Water ponding was observed at the Upper Level Adjacent to the southwest stairs. This ponding could be relieved by minor re-profiling or installing a supplementary floor drain.

### Tee Flanges/Stems

The double tees appear to be in good condition. We estimate a total of 20 square feet of tee flange delaminations, with most of them approximately 1 to 3 square feet in size. The delaminations are typically located along leaking joints that allow water and chlorides to corrode embedded reinforcement. These delaminations should be repaired to help maintain the structural integrity of the facility and eliminate safety issues such as falling concrete.

The tee stems appear to be in good condition. No delaminations were noted at the stems.



### Beams

The inverted tee beams running column line B appear to be in good condition with an estimated total of 30 square feet of delaminations. Most of the delaminations are small, approximately 1 to 2 square feet in size and primarily located near the columns. The delaminations are typically located at leaking joints that allow water and chlorides to corrode embedded reinforcement. These delaminations should be repaired to help maintain the structural integrity of the facility and eliminate safety issues such as falling concrete.



### Columns

The columns appear to be in good condition with an estimated total of 40 square feet of delaminations. Most of the column delaminations are small, approximately 4 to 5 square feet in size and primarily located along column line B at both the Upper and Lower Levels.

The delaminations at the Lower Level are typically located at leaking joints that allow water and chlorides to corrode embedded reinforcement. These delaminations should be repaired to help maintain the structural integrity of the facility and eliminate safety issues such as falling concrete.

The interior columns at the Upper Level, a total of three, are used to support the light posts. These columns have multiple hairline cracks, which may be from alkali-silica reaction (ASR). To help protect these columns we would recommend installing an elastomeric coating.



### Spandrels

The precast concrete spandrels with brick veneer are located at the perimeter of the Upper Level. The spandrels appear to be in good condition with an estimated total of 30 square feet of delaminations. Most of the delaminations are small, approximately 1 to 2 square feet in size and primarily located near the columns. The delaminations at the interior face are typically caused by the corrosion of the reinforcement with shallow concrete cover. The deterioration at the exterior face appear to be caused by failed sealants, which allows moisture to penetrate behind the brick veneer. The moisture can then attack the concrete causing corrosion of the reinforcement, especially if there is shallow concrete cover on this face. Also, once moisture is behind the brick, freeze-thaw can cause damage to the concrete and the brick.



### Walls

The cast-in-place concrete walls are located at the perimeter of the Lower Level. The walls appear to be in good condition with an estimated total of 20 square feet of delaminations. Most of the wall delaminations are small, approximately 4 to 6 square feet in size. The wall at the north end has multiple leaking cracks, which has helped cause the delaminations. Also, the expansion joint above at the entrance has failed causing leaking on to the wall. The cracks and expansion joint needs be sealed to protect this wall.



### Curbs

The concrete curbs are in good condition with approximately 20 square feet of delaminations noted at the Upper Level. At some locations the deterioration is undermining the curb. All of the curb delaminations were observed at the entrance/exit. The concrete curbs help direct water to the floor drains and provides a walking surface for pedestrians. These delaminations should be repaired to prevent potential trip hazards and to protect the embedded steel reinforcement.



### Masonry

The exterior façade consists of precast concrete and brick masonry. The brick masonry appears to be in good condition, with some small areas deterioration observed. Spalls were observed at the brick at the steps in the northeast corner and on the east face of the pedestrian bridge. All loose bricks should be repaired to help prevent future deterioration.

The brick stair retaining wall at the northwest corner was rebuilt in 2005. A crack in the north face of the wall has developed. The cove joint sealant between the brick and steps has failed, causing moisture to enter the backside of the wall. Thermal movement of the concrete steps and freeze-thaw has most likely caused this crack.



### Asphalt

The Lower Level is at grade and the floor surface consists of asphalt. The asphalt throughout this level is in good condition with approximately 240 square feet of deterioration, which is approximately 0.9% of the floor surface. The paving seams are opening up which may lead to future deterioration of the asphalt. The asphalt should be repaired to reduce future deterioration and trip hazards.



### Joint Sealants

It is our understanding that a small quantity of the tee-to-tee joint sealants were repaired in 2005 and 2013. Failed tee-to-tee joint sealants and active leaking were observed throughout the Upper Level.

Cove joint sealants are typically installed at the slab-to-wall joints and at the slab-to-curb joints at the perimeter of the structure. The cove joint sealants are in poor condition and appear to have been damaged by snow plows.

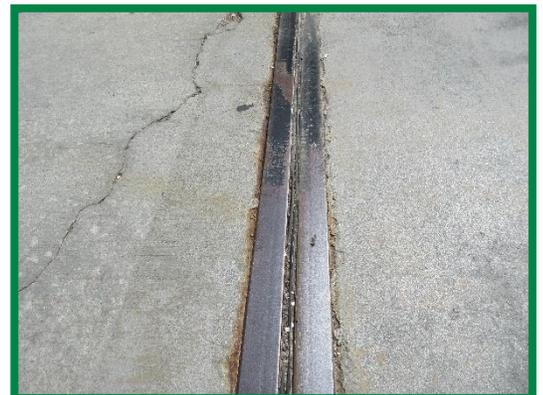
Vertical wall sealants at the interior and exterior of the structure are in poor condition. Cracked and weathered sealants were observed throughout the structure. Most of the wall sealants are located at the columns.

Most of these sealants appear to be very old and are at the end of their useful life. The typical service life for joint sealants is 7 to 10 years, especially at the roof level. Sealants should be repaired to prevent the infiltration of moisture and chlorides into the structural elements below and to prevent leaking onto vehicles and pedestrians at the Lower Level.



### Expansion Joints

There is an expansion joint running east-west at the entrance/exit to the Upper Level. The purpose this joint is to provide isolation from the structural slab and the foundation which allows movement to occur without causing damage to the structure. The joint consists of steel angles with a compression seal (Jeene Joint). The gland was replaced in 2013. The gland has failed causing leaking below and corrosion damage to the foundation wall. This gland should be replaced to prevent water from damaging the structural elements.



### Surface Treatments

Deck coating has been installed at the Upper Level slab directly above the inverted tee beams at column line B and along the north edge of the structure. It is our understanding that the deck coating was replaced in the 2005 project. The deck coating appears to be in fair condition with many worn areas, especially in the drive lanes. All of the deck coating should be recoated to help protect the underlying structural concrete elements.

It is our understanding that a 40% silane sealer was applied to the Upper Level slab surfaces during the 2005 repair project. The effective service life of a 40% silane sealer is typically 4 to 5 years.

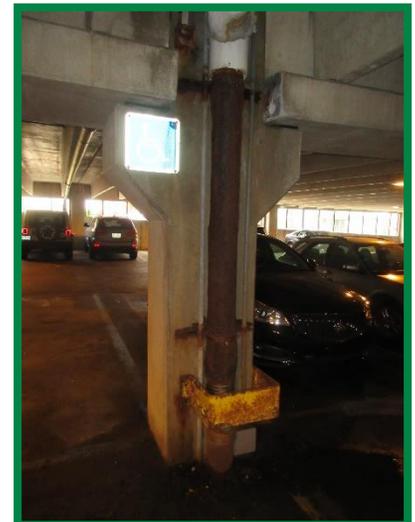


### Mechanical

Cast iron storm drainage piping (vertical risers) are at three locations in the structure, all along column line B. Corroded and damaged cast iron piping were noted at all locations, caused by leaking joints above. The piping should be replaced to maintain proper water removal from the structure. The piping could be replaced with PVC to eliminate the corrosion damage, if allowed by the local codes.

The steel pipe guards protecting these risers were observed to be corroded. As a minimum, these should be cleaned and repainted or better yet, replaced with new galvanized pipe guards.

The standpipe system has been painted, which helps protect the steel from corrosion. Most of this paint is deteriorating, causing corrosion. The standpipe system should be cleaned and repainted. The system should also be tested, if it has not been recently, to make sure it is working properly.



## Electrical

HPS light fixtures at the Lower Level are located near the edge of each drive lane at a spacing of 30 feet. The fixtures are surface mounted to the underside of the slab and are serviced by exposed electrical conduit. The lighting system appears to be in good working order. WGI can conduct a lighting survey to review existing lighting levels and provide recommendations to improve (increase) lighting levels while using more energy efficient fixtures. LED lighting technology is available that could provide energy savings as well as a longer bulb life.

Electrical junction boxes and conduits were noted to be corroded due to leaking joints above. Some of the boxes were missing covers exposing the wires. The conduits and junction boxes should be repaired to prevent future deterioration and possible electrocution.



## Stair Towers

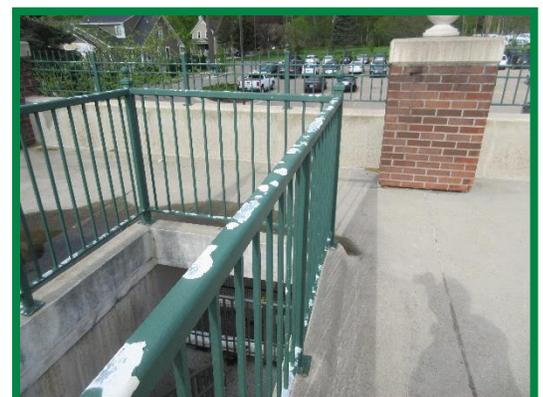
The stair towers are in relatively good condition. The northeast stairs consist of metal pans with concrete infill and the southwest stairs consist of anodized aluminum. The southwest stairs originally consisted of metal pans with concrete infill, but was replaced in 2005.

The following items were noted at the northeast stair tower:

- Cracks in many of the concrete treads and landings, which need to be sealed.
- Paint stained and peeling at some of the concrete walls.
- Handrails and metal pans have some corrosion.
- Door hinge badly corroded at the Upper Level.
- Roof appears to have a leak.
- Failed sealant at the east window at the Upper Level.
- Paint peeling from the interior ceiling of the pedestrian bridge.

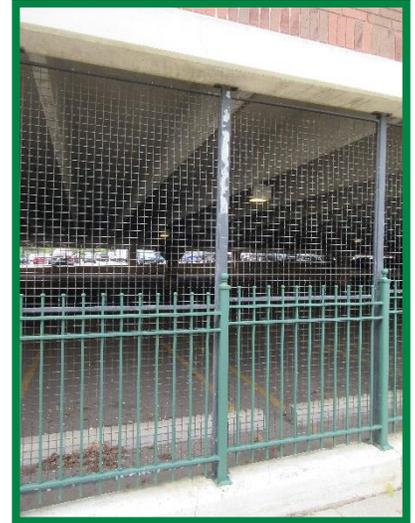
The following items were noted at the southwest stair tower:

- Paint peeling from the rail around the stairs at the Upper Level.
- One riser missing from the stairs.
- Bottom of door frame corroded at the Lower Level.



### Perimeter Railing & Fencing

The steel railings around the perimeter of both levels and the security fencing around the perimeter of the lower level were observed to be corroded in areas with peeling paint throughout. As a minimum, these corroded areas should be cleaned and repainted.



## V. DISCUSSION

This structure is in good condition, but all structures require maintenance and preventative measures to obtain a long-term service life, especially in the harsh environment of Michigan. The MainCentre Parking Structure is subject to extreme weather conditions, temperature fluctuations, and the widespread use of de-icing road salts during the winter months which create an ideal environment for deterioration of the embedded reinforcing steel, exposed metal components, and concrete components of the parking structure.

As with most parking structures, the largest portion of anticipated future maintenance and repair costs are associated with the slab system. This is due to the direct exposure of these elements to water, deicing chemicals (chlorides), and vehicular traffic. The results of the visual observations and the chain drag survey indicate that the intrusion of water and chlorides have caused continued deterioration of the floor system. Even though chloride ion testing has not been performed, it is our assumption based on the visible evidence, that the chloride ion concentrations are above the threshold to cause corrosion of reinforcement. Therefore, the potential for continued corrosion and accelerated deterioration of the floor slab is high.

In a precast structure, the topping not only functions as a wearing surface for the double tees, but it also provides a layer of protection. Moisture and chloride ions will have to diffuse through the topping before reaching the underside of the double tees and the beams, walls, and columns, below. However, if there is leaking through any joints or cracks, the joint will serve as a direct path to the underlying structural system for moisture and chloride ions. Thus, it is of vital importance to maintain the integrity of the joint sealants, expansion joints, and deck coating.

Since the existing chloride exposure cannot be easily removed from the floor slab concrete, our recommended approach would be to maintain existing waterproofing systems and introduce protection methods at areas of the slab that are currently unprotected to minimize future corrosion induced deterioration and reduce infiltration of moisture and chlorides. This protection method would involve recoating the existing deck coating and an application of one of the following at the remaining slab areas: a clear penetrating silane sealer; a clear penetrating silane sealer with a corrosion inhibitor; a deck coating; or a deck coating with corrosion inhibitor. The following provides a comparison of each.

### **Option 1: Concrete Sealer**

The application of a concrete sealer has a lower initial implementation cost but has less long-term durability. A concrete sealer is a water repellent, but does not provide 100% waterproofing. Actual in-place performance is difficult to verify, however, it is anticipated that the sealer will provide an 85% water and chloride barrier. The sealer does not span cracks. Reapplication every 8 to 10 years is recommended to maintain effectiveness if a 100% silane sealer is applied.

#### Advantages of Concrete Sealer:

- Lower initial construction cost.
- Reduces moisture and chlorides into the slab by 85%.
- Reduces rate of corrosion.
- Shorter construction schedule when compared to deck coating.

#### Disadvantages of Concrete Sealer:

- Continued corrosion of the embedded reinforcing steel at patch perimeter.
- Reapplication of sealer required every 8 to 10 years.
- Does not stop the corrosion process.
- Does not waterproof the slab, especially at cracks.

### **Option 2: Concrete Sealer with Corrosion Inhibitor**

This option is similar to above, but includes a corrosion inhibitor. The application of a concrete sealer with a corrosion inhibitor reduces corrosion significantly. The manufacturers will provide a warranty against corrosion delaminations at the top side for 10 years. The reapplication of the corrosion inhibitor will depend on the results from periodic testing, will be most likely every 10 to 15 years. The reapplication of the 100% silane sealer is recommended every 8 to 10 years to maintain effectiveness.

#### Advantages of Concrete Sealer with Corrosion Inhibitor:

- Lower initial construction cost than deck coating.
- Reduces moisture and chlorides into the slab by 85%.
- Reduces rate of corrosion by 90%.
- Reduces maintenance and future repair costs due to corrosion damage at the top side.
- Shorter construction schedule when compared to deck coating.
- Ten-year warranty against floor delaminations.

#### Disadvantages of Concrete Sealer with Corrosion Inhibitor:

- Reapplication of sealer required every 8 to 10 years.
- Will require periodic testing and reapplication of corrosion inhibitor.
- Does not waterproof the slab, especially at cracks.

### **Option 3: Deck Coating**

The application of a deck coating effectively waterproofs the floor slab and reduces moisture and chloride penetration by 98%, significantly reducing the rate of corrosion of the embedded reinforcing steel. Deck coatings can bridge small cracks with limited movement. The application of a deck coating to the floor slab will likely increase the longevity of the structure (compared to sealer) by minimizing moisture and chloride penetration into the slab and help protect the joint sealants.

We have estimated a 5 to 7 year life expectancy for the deck coating on this structure if it is properly maintained. At the end of 5 to 7 years the deck coating will need to be reapplied over the entire floor area. We anticipate a reduction in structural repair costs during this time. Maintenance includes corrosion-damaged slab repairs in isolated areas and reapplication of deck coating.

#### Advantages of Deck Coating:

- Provides flexible waterproofing bridge over slab cracks and control joints.
- Provides improved waterproofing characteristics when compared to sealers.
- Helps protect joint sealants.
- Reduces maintenance and future repair costs.
- Reduces rate of corrosion more effectively than concrete sealer.

#### Disadvantages of Deck Coating:

- Direct wear on the waterproofing system would limit the anticipated life of the waterproofing system.
- Deck coating prone to snow plow damage at the roof levels.
- Continued corrosion of the embedded reinforcing steel at patch perimeter.
- Reapplication of the coating required every 5 to 7 years.
- Longer construction schedule when compared to sealers.

### **Option 4: Deck Coating plus Corrosion Inhibitor**

The application of a deck coating plus a corrosion inhibitor gives you the best of both options. The deck coating effectively waterproofs the floor slab and reduces moisture and chloride penetration by 98%, and the corrosion inhibitor significantly reduces the corrosion rate.

It is important to note that the structure will continue to deteriorate despite any repair and maintenance program. All structures require maintenance and preventative measures to obtain a long-term service life, especially in the harsh environment in Michigan. Therefore, WGI recommends periodic reviews of the structure to update its condition, and verify that it remains on course to achieve the desired service life.

## **VI. RECOMMENDATIONS**

No one-restoration method has proven entirely effective in all applications or even throughout a single facility. Instead, costs have to be weighed against potential benefits in selecting repair methods for a particular facility. Several basic methods, as discussed above, have been developed for restoration of corrosion damaged reinforced concrete structures. These methods vary both in initial cost and in life expectancy. The goal is to conduct repairs, which provide cost-effective means of extending the serviceable life of the facility.

To prolong the service life of the structure we recommend the following repairs be performed:

### **Division 3 - Concrete**

- 3.1 *Top of Slab Repair* – This item includes repairing the delaminated/spalled concrete in the concrete topping at the Upper Level.
- 3.2 *Tee Flange Repair* – This item includes repairing delaminated concrete at the underside of the precast tee flanges (Lower Level ceiling).
- 3.3 *Beam Repair* – This includes the repair of beam delaminations at the underside of the Upper Level.
- 3.4 *Column Repair* – This item includes the repair of column delaminations throughout the structure.
- 3.5 *Spandrel Repair* - This item includes repairing delaminated concrete at the precast spandrels.
- 3.6 *Wall Repair* - This item includes repairing delaminated concrete at the walls.
- 3.7 *Curb Repair* - This item includes the repair of curb delaminations at the entrance/exit at the Upper Level.

### **Division 4 - Masonry**

- 4.1 *Brick Repair* – This item includes repairing the deteriorated bricks at the pedestrian bridge and the northwest stairs.
- 4.2 *Repoint Mortar Joints* – This item includes repointing the failed/deteriorated mortar joints at the masonry wall at the perimeter of the parking structure and pedestrian bridge.

### **Division 5 - Metals**

- 5.1 *Install Stair Riser* – This item includes installing a stair riser that is missing at the southwest stairs.
- 5.2 *Repair Doors* – This item includes replacing the corroded door hinge at the northeast stair tower and repairing corroded door frame at the southwest stairs

### **Division 7 - Waterproofing**

- 7.1 *Rout & Seal Cracks* – This item includes routing and sealing all cracks in the concrete floor topping.
- 7.2 *Remove & Replace Control Joint Sealants* – This item includes removing and replacing all tee-to-tee control joint sealants and all other construction/control joint sealants.
- 7.3 *Remove & Replace Cove Joint Sealants* – This item includes removing and replacing all cove joint sealants.
- 7.4 *Remove & Replace Interior Wall Sealant* – This item includes removing and replacing all wall joint sealants at the interior of the structure.
- 7.5 *Remove & Replace Exterior Wall Sealant* – This item includes removing and replacing all joint sealants at the façade of the structure.
- 7.6 *Remove & Replace Expansion Joint Sealant* – This item includes removing and replacing the expansion joint gland at the entrance and exit to the Upper Level.
- 7.7 *Recoat Deck Coating* – This item includes recoating all the existing deck coating.

- 7.8 *Inject Wall Cracks* – This includes injecting the leaking wall cracks at the north end of the Lower Level with chemical grout.
- 7.9 *Crack Repair at Treads/Landings* – This item includes sealing the cracks in the concrete treads and landings at the northeast stair tower.
- 7.10 *Roof Repair at NE Stair Tower* – This item includes repairing the leak in the northeast stair tower roof.
- 7.11 *Remove & Replace Wall Sealant* – This item includes removing and replacing the failed joint sealant at the east window of the northeast stair tower.

#### **Division 9 - Finishes**

- 9.1 *Clean & Paint Perimeter Railings* – This item includes cleaning and painting the metal railings at the perimeter of the structure.
- 9.2 *Clean & Paint Security Fence* – This item includes cleaning and painting the cyclone fence at the perimeter of the Lower Level.
- 9.3 *Clean & Paint Columns* – This includes cleaning and painting the interior columns at the Upper Level with an elastomeric coating to help protect it from ASR.
- 9.4 *Clean & Paint Standpipe System* – This item includes cleaning and painting the standpipe system at both levels.
- 9.5 *Clean & Paint Pipe Guards* – This item includes cleaning and painting the pipe guards at the Lower Level.
- 9.6 *Touch-up Paint at Northeast Stair Tower* – This item includes touching up the paint on the damaged portions of the walls, stair pans, and handrails as needed at the northeast stair tower.
- 9.7 *Touch-up Paint at Pedestrian Bridge Ceiling* – This item includes touching up the paint on the damaged portions of the ceiling at the pedestrian bridge as needed.
- 9.8 *Clean & Paint Entry Signage Frame* – This item includes cleaning and painting the metal posts and signage frame at the entrance/exit of the Upper Level.

#### **Division 22 - Mechanical**

- 22.1 *Install Supplemental Floor Drain* – This item includes installing an additional drain and associated piping where water is ponding along the southwest stairs.
- 22.2 *Remove & Replace Storm Drainage Piping* – This item includes replacing the damaged vertical risers at the Lower Level.

#### **Division 26 - Electrical**

- 26.1 *Remove & Replace Junction Boxes* – This item includes replacing the corroded electrical conduits and junction boxes at the Lower Level.

#### **Division 32 – Exterior Improvements**

- 32.1 *Asphalt Repair* – This includes repairing the deteriorated asphalt at the Lower Level.
- 32.2 *Seal Asphalt Cracks/Joints* – This includes routing and sealing all cracks/joints in the asphalt at the Lower Level.

- 32.3 *Pavement Markings* – This includes repainting the pavement markings after the application of a concrete sealer or a deck coating.
- 32.4 *Install Railing Post Covers* - This includes installing post covers on the railing at the Upper Level where they are missing.
- 32.5 *Fence Repair* - This includes repairing the fence.

**Optional Items:**

- O1. *Concrete Sealer* – This includes installing a silane sealer to the Upper Level slab at areas that are not covered by deck coating.
- O2. *Concrete Sealer with Corrosion Inhibitor* – This includes installing a silane sealer with corrosion inhibitor to the Upper Level slab at areas that are not covered by deck coating.
- O3. *Deck Coating* – This includes installing a full system deck coating to the Upper Level slab at areas that are not covered by deck coating.
- O4. *Deck Coating plus Corrosion Inhibitor* – This includes installing a full system deck coating plus corrosion inhibitor to the Upper Level slab at areas that are not covered by deck coating.
- O5. *Replace Light Fixtures at Lower Level* - LED lighting technology is available that could provide energy savings as well as a longer bulb life. WGI can run lighting software to determine if the fixture spacing is adequate for the IES recommendations. The rate of return would most likely be in 3 to 5 years.

WGI recommends selecting one of the four optional protection methods discussed above (O1 to O4) to help minimize future corrosion induced deterioration and reduce infiltration of moisture and chlorides at the supported slab. Based on our experience, we recommend selecting Option 2: Concrete Sealer with Corrosion Inhibitor. This option has a lower cost than Options 3 and 4 and will provide better corrosion protection than Options 1 and 3. Options 3 and 4 with deck coating are very good options, but since there is only one supported level, all of the deck coating would be exposed to weather and snow plow damage. In addition, repairs to the deck coating would increase maintenance costs. Therefore, we believe Option 2 with good future maintenance will provide the most cost-effective option to extend the life of the structure for upwards of 30 additional years.

**VII. COST ESTIMATE**

We have prepared an opinion of cost for the recommended and optional repairs for the MainCentre Parking Structure to assist you with developing a budget for implementing the repairs.

### Base Cost Estimate

Work Item No.	Work Item Description	Units	Estimated Quantity	Unit Cost	Cost
<b>Division 0 &amp; 1 - General Conditions</b>					
1.1	Contractor Mobilization (5%)	L.S.	n/a	n/a	\$ 10,700
1.2	Contractor General Requirements (10%)	L.S.	n/a	n/a	\$ 21,300
<b>Division 3 - Concrete</b>					
3.1	Top of Slab Repair	S.F.	400	\$ 40.00	\$ 16,000
3.2	Tee Flange Repair (Ceiling)	S.F.	20	\$ 100.00	\$ 2,000
3.3	Beam Repair	S.F.	30	\$ 100.00	\$ 3,000
3.4	Column Repair	S.F.	40	\$ 100.00	\$ 4,000
3.5	Spandrel Repair	S.F.	30	\$ 100.00	\$ 3,000
3.6	Wall Repair	S.F.	20	\$ 100.00	\$ 2,000
3.7	Curb Repair	S.F.	20	\$ 100.00	\$ 2,000
<b>Division 4 - Masonry</b>					
4.1	Brick Repair	EA.	40	\$ 20.00	\$ 800
4.2	Repoint Mortar Joints	L.F.	180	\$ 20.00	\$ 3,600
<b>Division 5 - Metals</b>					
5.1	Install Stair Riser at SW Stairs	EA.	1	\$ 1,000.00	\$ 1,000
5.2	Door Repair	EA.	2	\$ 1,000.00	\$ 2,000
<b>Division 7 - Waterproofing</b>					
7.1	Rout & Seal Cracks	L.F.	100	\$ 5.00	\$ 500
7.2	Remove & Replace Control Joint Sealants	L.F.	3,800	\$ 5.00	\$ 19,000
7.3	Remove & Replace Cove Joint Sealants	L.F.	910	\$ 5.00	\$ 4,550
7.4	Remove & Replace Interior Wall Sealants	L.F.	120	\$ 10.00	\$ 1,200
7.5	Remove & Replace Exterior Wall Sealants	L.F.	220	\$ 10.00	\$ 2,200
7.6	Remove & Replace Expansion Joint Sealant	L.F.	30	\$ 120.00	\$ 3,600
7.7	Recoat Deck Coating	S.F.	3,400	\$ 3.00	\$ 10,200
7.8	Inject Wall Cracks	L.F.	80	\$ 50.00	\$ 4,000
7.9	Crack Repair at Treads/Landings	L.F.	70	\$ 30.00	\$ 2,100
7.10	Roof Repair at NE Stair Tower	L.S.	1	\$ 2,000.00	\$ 2,000
7.11	Remove & Replace Wall Sealant at NE Stair Tower	L.F.	20	\$ 15.00	\$ 300
<b>Division 9 - Finishes</b>					
9.1a	Clean & Paint Railing (Green) at Lower Level	L.F.	40	\$ 40.00	\$ 1,600
9.1b	Clean & Paint Railing (Green) at Upper Level	L.F.	690	\$ 30.00	\$ 20,700
9.1c	Clean & Paint Railing (Green) at SW Stairs	L.F.	40	\$ 30.00	\$ 1,200
9.1d	Clean & Paint Railing (Green) at Exterior Stair/Ramp	L.F.	120	\$ 20.00	\$ 2,400
9.2	Clean & Paint Security Fencing (Black)	S.F.	3,200	\$ 10.00	\$ 32,000
9.3	Clean & Paint Columns at Upper Level Interior (ASR)	S.F.	120	\$ 10.00	\$ 1,200
9.4	Clean & Paint Standpipe System	L.F.	270	\$ 15.00	\$ 4,050
9.5	Clean & Paint Pipe Guards	EA.	3	\$ 300.00	\$ 900
9.6	Touch-up Paint at NE Stair Tower	L.S.	1	\$ 4,000.00	\$ 4,000
9.7	Touch-up Paint at Ped. Bridge Ceiling	L.S.	1	\$ 2,000.00	\$ 2,000
9.8	Clean & Paint Entry Signage Frame (Green)	L.S.	1	\$ 2,000.00	\$ 2,000
<b>Division 22 - Mechanical</b>					
22.1	Install Supplemental Floor Drain	EA.	1	\$ 3,500.00	\$ 3,500
22.2	Remove & Replace Storm Drainage Piping	L.F.	30	\$ 80.00	\$ 2,400
<b>Division 26 - Electrical</b>					
26.1	Remove & Replace Junction Box	EA.	3	\$ 300.00	\$ 900
<b>Division 32 - Exterior Improvements</b>					
32.1	Asphalt Repair	S.F.	240	\$ 20.00	\$ 4,800
32.2	Seal Asphalt Cracks/Joints	L.F.	1,900	\$ 2.50	\$ 4,750
32.3	Paint Pavement Markings	L.S.	1	\$ 4,000.00	\$ 4,000
32.4	Install Railing Post Covers	EA.	20	\$ 50.00	\$ 1,000
32.5	Fence Repair	L.S.	1	\$ 1,000.00	\$ 1,000
<b>RECOMMENDED PROTECTION OPTION</b>					
O2	Concrete Sealer with Corrosion Inhibitor	S.F.	26,000	\$ 1.10	\$ 28,600
<b>Construction Cost Subtotal</b>					<b>\$ 244,050</b>
Construction Contingency (10%)					\$ 24,500
Probable Construction Cost Budget					\$ 268,550
Soft Costs (Engineering, Testing) (20%)					\$ 53,800
<b>Total Probable Construction Cost Budget</b>					<b>\$ 322,350</b>

\*Unit Key Code: L.S. - Lump Sum, S.F. - Square Foot, L.F. - Lineal Foot, EA. - Each

### Optional Items – Cost Estimate

Work Item No.	Work Item Description	Units	Estimated Quantity	Unit Cost	Cost
<b>PROTECTION OPTIONS</b>					
O1	Concrete Sealer	S.F.	26,000	\$ 0.45	\$ 11,700
O2	Concrete Sealer with Corrosion Inhibitor	S.F.	26,000	\$ 1.10	\$ 28,600
O3	Deck Coating	S.F.	26,000	\$ 3.25	\$ 84,500
O4	Deck Coating with Corrosion Inhibitor	S.F.	26,000	\$ 4.35	\$ 113,100
<b>LIGHTING UPGRADE</b>					
O5	Replace Light Fixtures at Lower Level	L.S.	1	\$ 24,000.00	\$ 24,000

\*Unit Key Code: L.S. - Lump Sum, S.F. - Square Foot, L.F. - Lineal Foot, EA. - Each

## VIII. FUTURE REPAIRS AND MAINTENANCE

The repairs and protection presented in Section 8 are based on the current condition of the structure. As you are aware, even after repairs are completed, continued maintenance and repairs should be anticipated to keep the facility safe and operational. The following is a summary of anticipated future maintenance and repair items.

**Concrete Repairs** – Miscellaneous concrete repairs should be anticipated, including slab, beam, and columns. Increasing repair quantities should be anticipated in the future.

**Crack & Joint Sealant Replacement** – Sealant repairs should be anticipated periodically as part of the annual maintenance program. Total replacement is anticipated every 8 years.

**Expansion Joint Replacement** – Expansion joint replacement should be anticipated every 8 years.

**Deck Coating** – Recoating should be anticipated every 8 years.

**Sealer Reapplication** – Reapplication of the sealer should be anticipated every 8 years.

**Pavement Markings** – Repainting of the pavement markings should be anticipated every 2 to 3 years.

**Annual Maintenance** – Annual maintenance should include a slab wash-down in the Spring and the Fall, annual inspection for deterioration, miscellaneous sealant repair, isolated concrete repairs, painting touch up, floor drain clean-out, lighting lamp replacement, etc.

## **IX. LIMITATIONS**

The recommended restoration and protection of the parking structure can be performed and the rate of further deterioration reduced. However, we cannot guarantee that further deterioration will not take place with continued service-related exposure. Effective ongoing maintenance can significantly reduce long-term maintenance costs. Monitoring of the parking structure can assist in scheduling future maintenance.

Specific repair procedures are not part of this evaluation. This report defines items in need of repair and presents conceptual procedures. Construction Documents are required to address all aspects of materials selection and methods for repair of the parking structure. Repair cost projections are based on deterioration quantities identified during our review. Quantities and costs are not intended to define a guaranteed maximum cost, and variations in final quantities should be anticipated.

The evaluation and restoration of existing structures require that certain assumptions be made regarding existing conditions. Since some of these assumptions may not be confirmed without expending additional sums of money and/or destroying otherwise adequate or serviceable portions of the building, WGI cannot be held responsible for latent deficiencies which may exist in the structure, but which have not been discovered within the scope of this evaluation.

WGI did not review the structure for conformance with the Americans with Disabilities Act (ADA).

**NORTHVILLE - MAINCENTRE PARKING STRUCTURE**

**20-Year Maintenance / Repair Forecast**

August 2018

Work Item	Work Item Description	TOTAL COST	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
<b>DIVISION 0 &amp; 1 - GENERAL CONDITIONS</b>																						
1.1	Contractor Mobilization (5%)	\$ 41,100	\$ 6,500	\$ 4,200	\$ 2,800		\$ 9,700		\$ 300		\$ 5,300		\$ 300		\$ 5,600		\$ 300		\$ 4,600	\$ 1,000	\$ 500	
1.2	Contractor General Requirements (10%)	\$ 81,800	\$ 13,000	\$ 8,300	\$ 5,500		\$ 19,300		\$ 600		\$ 10,500		\$ 600		\$ 11,200		\$ 600		\$ 9,200	\$ 2,000	\$ 1,000	
<b>DIVISION 3 - CONCRETE</b>																						
3.1	Top of Slab Repair	\$ 26,000	\$ 16,000		\$ 400		\$ 2,000		\$ 400		\$ 2,000		\$ 400		\$ 2,000		\$ 400		\$ 2,000		\$ 400	
3.2	Tee Flange Repair (Ceiling)	\$ 6,000	\$ 2,000				\$ 1,000				\$ 1,000				\$ 1,000				\$ 1,000			
3.3	Beam Repair	\$ 9,000	\$ 3,000				\$ 1,500				\$ 1,500				\$ 1,500				\$ 1,500			
3.4	Column Repair	\$ 12,000	\$ 4,000				\$ 2,000				\$ 2,000				\$ 2,000				\$ 2,000			
3.5	Spandrel Repair	\$ 9,000	\$ 3,000				\$ 1,500				\$ 1,500				\$ 1,500				\$ 1,500			
3.6	Wall Repair	\$ 6,000	\$ 2,000				\$ 1,000				\$ 1,000				\$ 1,000				\$ 1,000			
3.7	Curb Repair	\$ 4,000	\$ 2,000				\$ 500				\$ 500				\$ 500				\$ 500			
<b>DIVISION 4 - MASONRY</b>																						
4.1	Brick Repair	\$ 1,600	\$ 800				\$ 200				\$ 200				\$ 200				\$ 200			
4.2	Re-Point Mortar Joints	\$ 22,100	\$ 3,600				\$ 4,000				\$ 4,400				\$ 4,800				\$ 5,300			
<b>DIVISION 5 - METALS</b>																						
5.1	Install Stair Riser at SW Stairs	\$ 1,000	\$ 1,000																			
5.2	Door Repair	\$ 6,400	\$ 2,000				\$ 1,000				\$ 1,000				\$ 1,100				\$ 1,300			
5.3	Miscellaneous Metal Repairs (Railings, Fences, Stairs,etc.)	\$ 4,000					\$ 1,000				\$ 1,000				\$ 1,000				\$ 1,000			
<b>DIVISION 7 - WATERPROOFING</b>																						
7.1	Rout & Seal Cracks	\$ 2,500	\$ 500				\$ 500				\$ 500				\$ 500				\$ 500			
7.2	Remove & Replace Control Joint Sealants	\$ 60,500	\$ 19,000		\$ 500		\$ 500		\$ 500		\$ 19,000		\$ 500		\$ 500		\$ 500		\$ 19,000		\$ 500	
7.3	Remove & Replace Cove Joint Sealants	\$ 15,850	\$ 4,550		\$ 300		\$ 300		\$ 300		\$ 4,600		\$ 300		\$ 300		\$ 300		\$ 4,600		\$ 300	
7.4	Remove & Replace Interior Wall Sealants	\$ 3,600	\$ 1,200								\$ 1,200								\$ 1,200			
7.5	Remove & Replace Exterior Wall Sealants	\$ 6,600	\$ 2,200								\$ 2,200								\$ 2,200			
7.6	Remove & Replace Expansion Joint Sealant	\$ 10,800	\$ 3,600								\$ 3,600								\$ 3,600			
7.7	Install Deck Coating - Recoat	\$ 30,600	\$ 10,200								\$ 10,200								\$ 10,200			
7.8	Inject Wall Cracks	\$ 8,000	\$ 4,000								\$ 2,000								\$ 2,000			
7.9	Crack Repair at Treads/Landings	\$ 2,400	\$ 2,100								\$ 300											
7.10	Roof Repair at NE Stair Tower	\$ 18,000	\$ 2,000				\$ 16,000															
7.11	Remove & Replace Wall Sealants at NE Stair Tower	\$ 6,300	\$ 300				\$ 1,500				\$ 1,500				\$ 1,500				\$ 1,500			
7.12	Concrete Sealer with Corrosion Inhibitor	\$ 28,600	\$ 28,600																			
7.13	Concrete Sealer	\$ 23,400									\$ 11,700								\$ 11,700			
<b>DIVISION 9 - FINISHES</b>																						
9.1a	Clean & Paint Railing (Green) at Lower Level	\$ 3,200		\$ 1,600											\$ 1,600							
9.1b	Clean & Paint Railing (Green) at Upper Level	\$ 41,400		\$ 20,700											\$ 20,700							
9.1c	Clean & Paint Railing (Green) at SW Stairs	\$ 2,400		\$ 1,200											\$ 1,200							
9.1d	Clean & Paint Railing (Green) at Exterior Stair/Ramp	\$ 4,800		\$ 2,400											\$ 2,400							
9.2	Clean & Paint Security Fencing (Black)	\$ 64,000		\$ 32,000											\$ 32,000							
9.3	Clean & Paint Columns at Upper Level Interior (ASR)	\$ 2,400	\$ 1,200												\$ 1,200							
9.4	Clean & Paint Standpipe System	\$ 8,150		\$ 4,050											\$ 4,100							
9.5	Clean & Paint Pipe Guards	\$ 1,800		\$ 900											\$ 900							
9.6	Touch-up Paint at NE Stair Tower	\$ 28,000		\$ 4,000							\$ 12,000										\$ 12,000	
9.7	Touch-up Paint at Ped. Bridge Ceiling	\$ 6,000		\$ 2,000							\$ 2,000										\$ 2,000	
9.8	Clean & Paint Entry Signage Frame (Green)	\$ 6,000		\$ 2,000							\$ 2,000								\$ 2,000			
<b>DIVISION 11 - EQUIPMENT</b>																						
11.1	Replace Traffic Control Equipment at Lower Level (every 10 years)	\$ 40,000			\$ 20,000										\$ 20,000							
<b>DIVISION 14 - ELEVATORS</b>																						
14.1	Elevator Upgrades (every 15 years)	\$ 10,000																			\$ 10,000	
14.2	Elevator Replacement (25 to 30 years)	\$ 150,000					\$ 150,000															
<b>DIVISION 21 - FIRE SUPPRESSION</b>																						
21.1	Fire Protection / Standpipe System Repairs	\$ 4,000									\$ 2,000								\$ 2,000			
<b>DIVISION 22 - MECHANICAL</b>																						
22.1	Supplemental Floor Drain	\$ 10,500	\$ 3,500								\$ 3,500								\$ 3,500			
22.2	Remove & Replace Risers	\$ 7,200	\$ 2,400								\$ 2,400								\$ 2,400			
<b>DIVISION 26 - ELECTRICAL</b>																						
26.1	Remove & Replace Junction Box	\$ 900	\$ 900																			
26.2	Miscellaneous Electrical Repairs (Lights, Conduits, Boxes, etc.)	\$ 4,000					\$ 1,000				\$ 1,000				\$ 1,000				\$ 1,000			
26.3	Upgrade Light Fixtures at Lower Level	\$ 24,000			\$ 24,000																	
26.4	Upgrade Light Fixtures at Upper Level	\$ 5,000			\$ 5,000																	
<b>DIVISION 32 - EXTERIOR IMPROVEMENTS</b>																						
32.1	Asphalt Repair	\$ 8,800		\$ 4,800			\$ 1,000				\$ 1,000				\$ 1,000				\$ 1,000			
32.2	Seal Asphalt Cracks/Joints	\$ 6,750		\$ 4,750			\$ 500				\$ 500				\$ 500				\$ 500			
32.3	Paint Pavement Markings	\$ 40,000	\$ 4,000		\$ 4,000		\$ 4,000		\$ 4,000		\$ 4,000		\$ 4,000		\$ 4,000		\$ 4,000		\$ 4,000		\$ 4,000	
32.4	Install Railing Post Covers	\$ 1,400		\$ 1,000			\$ 100				\$ 100				\$ 100				\$ 100			
32.5	Fence Repair	\$ 5,000		\$ 1,000			\$ 1,000				\$ 1,000				\$ 1,000				\$ 1,000			
<b>PROBABLE CONSTRUCTION COST</b>																						
		\$ 932,850	\$ 149,150	\$ 94,900	\$ 62,500	\$ -	\$ 221,100	\$ -	\$ 6,100	\$ -	\$ 120,200	\$ -	\$ 6,100	\$ -	\$ 127,900	\$ -	\$ 6,100	\$ -	\$ 105,100	\$ -	\$ 22,200	\$ 11,500
<b>CONSTRUCTION CONTINGENCY (10%)</b>		\$ 94,100	\$ 15,000	\$ 9,500	\$ 6,300	\$ -	\$ 22,200	\$ -	\$ 700	\$ -	\$ 12,100	\$ -	\$ 700	\$ -	\$ 12,800	\$ -	\$ 700	\$ -	\$ 10,600	\$ -	\$ 2,300	\$ 1,200
<b>PROBABLE CONSTRUCTION COST BUDGET</b>		\$ 1,026,950	\$ 164,150	\$ 104,400	\$ 68,800	\$ -	\$ 243,300	\$ -	\$ 6,800	\$ -	\$ 132,300	\$ -	\$ 6,800	\$ -	\$ 140,700	\$ -	\$ 6,800	\$ -	\$ 115,700	\$ -	\$ 24,500	\$ 12,700
<b>SOFT COSTS (Engineering, Testing) (20%)</b>		\$ 205,900	\$ 32,900	\$ 20,900	\$ 13,800	\$ -	\$ 48,700	\$ -	\$ 1,400	\$ -	\$ 26,500	\$ -	\$ 1,400	\$ -	\$ 28,200	\$ -	\$ 1,400	\$ -	\$ 23,200	\$ -	\$ 4,900	\$ 2,600
<b>TOTAL PROBABLE CONSTRUCTION COST BUDGET (2018 \$)</b>		\$ 1,232,850	\$ 197,050	\$ 125,300	\$ 82,600	\$ -	\$ 292,000	\$ -	\$ 8,200	\$ -	\$ 158,800	\$ -	\$ 8,200	\$ -	\$ 168,900	\$ -	\$ 8,200	\$ -	\$ 138,900	\$ -	\$ 29,400	\$ 15,300
<b>TOTAL PROBABLE CONSTRUCTION COST BUDGET (3% INFLATION)</b>		\$ 1,563,400	\$ 203,000	\$ 133,000	\$ 90,300	\$ -	\$ 338,600	\$ -	\$ 10,100	\$ -	\$ 207,200	\$ -	\$ 11,400	\$ -	\$ 248,100	\$ -	\$ 12,800	\$ -	\$ 229,600	\$ -	\$ 51,600	\$ 27,700

## **NORTHVILLE TOWN SQUARE RENTAL GUIDELINES**

The Northville Town Square is managed by the Northville Downtown Development Authority (DDA) and is made available for use in accordance with the guidelines established by the Northville Downtown Development Authority (DDA) Board of Directors and by Northville City Council.

### **CONDITIONS OF USE:**

**ALCOHOLIC BEVERAGES:** Alcohol is not permitted within Town Square without an approved special liquor license issued through Northville City Hall. A State liquor license is required if alcohol is sold (cash bar) or if there is an admission charge to the activity.

**SMOKING:** There is no smoking allowed in Town Square at any time.

**CHAPERONE:** All groups must provide at least one (1) responsible adult chaperone for every 15 minors in attendance.

### **WHO NEEDS TO SUBMIT A TOWN SQUARE RENTAL AGREEMENT?**

Anyone may utilize Town Square for daily activities or small gatherings at no charge and without the need for a reservation. An example would be an acoustic guitar player, or book club gathering. However if a user wishes to have guaranteed exclusive use of Town Square and/or the stage/pavilion, the user must have a completed rental agreement approved and on file with the DDA and must have paid all applicable fees and provided the DDA with the required certificate of insurance and hold harmless agreement. An example would be a special fitness class, office party, or wedding. Public pedestrian access from Mary Alexander Court to Main Street must remain accessible at all times.

### **APPLICANTS MUST AGREE TO THE FOLLOWING:**

Orderly Behavior

Financial responsibility for any damages due to renter's use of the premises.

Responsiveness to directives of department personnel.

That the activity is lawful and conforms to the regulations of State and Federal laws, community of Northville, and the Northville Downtown Development Authority.

Tables and chairs located in Town Square are to be used on a first-come, first-serve basis and shall not be reserved for future use. Tables and chairs may be moved briefly but in any event shall be moved back to their normal positions as soon as possible.

Between late May and early October, Town Square may have a platform stage erected under the shelter. The stage area can be rented for private functions that do not unreasonably disrupt or interfere with the general public's use.

Due to the presence of underground heating coils, no heavy equipment or vehicles are permitted on the brick pavers and no stakes may be used to stabilize an erected tent or temporary structure.

Outside equipment such as grills, tents, tables, chairs, etc. are not permitted without prior approval from the DDA or an approved special event application from the City of Northville.

All events in Town Square must end by 11:00 p.m.

The DDA assumes no responsibility, financial or otherwise, for accidents, injuries, or losses sustained by individuals while using the facilities.

Renters selling food must comply with current Wayne County Health Department regulations.

#### **INSURANCE WILL BE REQUIRED FOR THE FOLLOWING RENTALS:**

Events open to the public- Weekend shows or special events rented by any person or any group will require a special comprehensive general liability policy in the amount of one million dollars (\$1,000,000), combined single limit, with the Northville Downtown Development Authority and the City of Northville named "Additional Insured: from set-up to take down."

Private Events: Weddings, showers, parties, etc., rented by any person or group will require proof of property liability coverage under the renter's "homeowners" or "renter's insurance" policy.

Rentals for the purpose of providing instruction to the public - Individual(s) or group(s) renting Town Square for the purpose of providing instruction to the public, must provide a certificate of insurance for general liability in the amount of one million dollars (\$1,000,000), with DDA and the City of Northville named "Additional Insured: from set-up to take-down."

A cash bar or if tickets are sold to an event serving alcohol: a State Liquor License is required and a separate Liquor Liability Policy is required in the amount of one million dollars (\$1,000,000), combined single limit, with DDA and the City of Northville named "Additional Insured: from set-up to take-down."

#### **PAYMENT AND REFUNDS:**

All renters must pay \$100 for a full day rental, or \$50 for a half day rental (4 hours or less). Balance of rent is due thirty (30) days prior to event.

**REFUND POLICY:** If the renter cancels in excess of 30 days before the scheduled event, then Northville Downtown Development Authority will retain 50% of those funds already paid. Refunds requested received less than 30 days before the scheduled event will not be returned. There will be no exceptions.

\*\* I have read the information and conditions of the Town Square Rental Guidelines, am familiar with the contents and agree to abide by the guidelines. I will not hold the Downtown Development Authority responsible for any injury or illness sustained while participating in activities at the Town Square and/or any affiliated locations. I fully understand that medical insurance is the responsibility of the participants. I, the undersigned, have the authority to sign this agreement for the named individual organization. Failure to abide by rental guidelines will result in termination of contract.

---

Signature of Renter

---

Date

### Northville Downtown Development Authority Town Square Rental Form

Complete and return this application to the DDA at least 21 calendar days prior to the starting date of the event.

<b>Event</b>		
Event Name:		
Describe the Event:		
<b>Host Information</b>		
Name:		
Address:	City:	State/Zip:
Telephone:	Email:	
Business:	Title:	
Telephone	Email:	
<b>Type of Event</b> (Check one - See Special Events Policy for additional information)		
<input type="checkbox"/> City Operated/Sponsored Event	<input type="checkbox"/> Non-Profit Event	
<input type="checkbox"/> Co-sponsored Event	<input type="checkbox"/> For-Profit Event	
<input type="checkbox"/> Video/Photography	<input type="checkbox"/> Political	
<input type="checkbox"/> Wedding	<input type="checkbox"/> Other _____	
<b>Event Information</b>		
Event Location(s):		
Event Date(s):		
Event Hours:		
Estimated date/time for set up:		
Estimated date/time for clean up:		

Will music be provided/included during the event? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Describe type of music proposed: <input type="checkbox"/> Live <input type="checkbox"/> Amplification <input type="checkbox"/> Recorded <input type="checkbox"/> Loudspeakers	
Proposed time music will begin:	
Proposed time music will end:	
Proposed location of live band/disc jockey/loudspeakers/equipment:	
Do you plan to have special event signs? <input type="checkbox"/> Yes <input type="checkbox"/> No <div style="text-align: right;"><i>Signs must conform to City ordinances</i></div>	
Describe signs, proposed locations, etc.	
Do you plan to use the city entrance signs? <input type="checkbox"/> Yes <input type="checkbox"/> No <div style="text-align: right;"><i>If yes, you must apply for use through the City Entrance Sign Policy</i></div>	
Do you plan to have banners? <input type="checkbox"/> Yes <input type="checkbox"/> No <div style="text-align: right;"><i>If yes, you must apply for use through the Municipal Banner System Policy</i></div>	
<b>Application Checklist</b>	
I have attached the following items: <ul style="list-style-type: none"> <li><input type="checkbox"/> Completed Application</li> <li><input type="checkbox"/> Certificate of Insurance and Indemnification (due to City Clerk's Office within 1 week following notice of event approval)</li> <li><input type="checkbox"/> Insurance Policy Endorsement (due to City Clerk's Office within 1 week following notice of event approval)</li> <li><input type="checkbox"/> Event Signage (description)</li> <li><input type="checkbox"/> Driver's License of Applicant</li> </ul>	

**The applicant and sponsoring organization understands and agrees to:**

- Provide a certificate of insurance with all coverages deemed necessary for this event, name the City of Northville as an additional insured on all applicable policies, provide a separate copy of the insurance policy Endorsement, and submit the required documents to the City Clerk's Office no later than one week following notice of event approval.
- Execute a Hold Harmless Agreement and submit it to the City Clerk's Office no later than one week following notice of the event approval.

- Comply with all City and County ordinances and applicable State laws, City policies and acknowledges that the special events permit does not relieve the applicant or sponsoring organization from meeting any application requirements of law or other public bodies or agencies;
- Promptly pay any billing for City services which may be rendered or deemed necessary as part of the event and event approval.
- Applicant and sponsoring organization further understands the approval of this special event may include additional requirements and/or limitations based on the City's review of this application, in accordance with the City's Special Events Policy. The applicant and sponsoring organization understands that it may be necessary to meet with City staff during the review of this application and that City Council approval may be necessary. The applicant agrees the sponsoring organization will operate the event in conformance with the written approval.

I hereby apply for approval of this Town Square Rental Application and affirm the above understandings. The information provided on this application is true and complete to the best of my knowledge.

<b>Applicant Signature</b>	<b>Date</b>
<b>Complete this application and return it, along with all required documentation, to the Northville DDA Office at least 21 calendar days prior to the starting date of the event. Please note that a new application must be submitted each year. Questions about this application can be directed to Lori Ward at <a href="mailto:lward@ci.northville.mi.us">lward@ci.northville.mi.us</a> or 248-349-0345. Police, Public Works, Parks &amp; Rec can be reached during the event through Dispatch at 248-349-1234.</b>	<b>Application Receipt Date</b>