



**WALKER**  
PARKING CONSULTANTS

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October 15, 2003

Mr. Buick Alavy  
City of Minneapolis  
Property Services  
350 South 5th Street, Room 223  
Minneapolis, MN 55415

Re: Annual Observation Report  
Courthouse Parking Facility  
333 3<sup>rd</sup> Avenue South  
Minneapolis, Minnesota  
Walker Commission No. 21-3136.16

Dear Mr. Alavy:

In conformance with the City of Minneapolis inspection requirements for parking ramps, the following is a summary of the structural condition of the Plaza Parking Facility.

Walker completed a first year field observation, chain drag and chloride ion testing of this parking facility to review the condition of the structural elements.

### **FACILITY DESCRIPTION**

Built in 1997, the Courthouse Parking Facility is a cast-in-place, post-tensioned concrete parking structure approximately 180 feet wide by 240 feet long. There are two supported levels below grade with a floor area of 47,000 square feet and a slab-on-grade with a floor area of 58,000 square feet.

There are additional supported parking levels along with multiple levels of office space above the parking levels inspected for this report. A concrete sealer was applied to the slab surface in 1997.

Access to and from the facility is provided by express ramp on Third Avenue S. Traffic flow in the parking facility is two-way with 90-degree straight in parking. There are two stair/elevator towers located at the northwest and northeast corners of the facility. The facility provides parking for approximately 300 vehicles below grade.

Epoxy coated reinforcement steel was used in the structure. A corrosion-inhibiting admixture (DCI, by W.R. Grace Co.) was added to the micro silica concrete used in floor slabs. A typical dose rate for DCI was 3.5 gallons per cubic yard of concrete.



## **VISUAL OBSERVATION SUMMARY AND CONCLUSIONS**

The following is a summary of our visual observations.

During the course of our visual observation of this parking facility, we did not observe any conditions, which would restrict the facility from qualifying for an operating certificate. Limited overhead concrete removals to reduce the hazard of falling concrete are recommended. However, hidden or latent conditions may exist in this facility, which have not yet revealed themselves through visual evidence and may require removal in subsequent years. The following is a summary of conditions noted:

1. Isolated slab cracks were not sealed and leaking.
2. Isolated leaking slab crack with formation of stalactite located in slab above area being reviewed.
3. Worn traffic topping in express ramps, drive aisles and turn areas. Traffic topping located at express ramps, over pour strips, strips over construction joints and cracks.
4. Isolated spot of leaking expansion joint located at the slab-on-grade to supported level.
5. Isolated cracked and spalled expansion joint nosing.
6. PARCS equipment wooden gate arm broken.

Leaking or unsealed construction joints, expansion joints, or cracks can contribute to corrosion of embedded post-tensioning tendons and anchors, and reinforcing steel. Corrosion of embedded post-tensioning tendons and anchors, located at all construction and expansion joints, can adversely affect the structural integrity of the floor slab; therefore, all joints shall be sealed and maintained annually.

It should be noted that Walker Parking Consultants/Engineers, Inc. has not performed a structural review to verify the structural adequacy of the original design, as this is not within the scope of work. During our review, we did not observe deterioration to be indicative of inadequate original structural design or construction.

## **CHLORIDE ION TESTING**

Enclosed are test results from American Engineering Testing. 2003 is the first year for chloride testing. In future years, continued testing will be performed and a chloride comparison table will be included indicating changes in chloride concentrations at the selected locations in the parking facility.

Nine (9) concrete powder samples were removed from three (3) locations and tested for acid soluble chloride ion content (salt contamination). Powder samples were removed in one-inch increments at each location to establish the chloride ion content of concrete as a function of depth.



Concentrations of chloride ions ranging from 280 to 410 parts per million (PPM), along with the presence of moisture and oxygen, are needed to support corrosion of "gray" (non-epoxy coated) mild steel reinforcement in concrete. Of particular importance is the chloride ion concentration at the level of steel reinforcement. The amount of chloride ions in the concrete at the 0 to 1-inch increment below the surface ranges from 185 PPM to 445 PPM, averaging 275 PPM. At the 1 to 2 inch increment, the amount of chloride ranges from 95 PPM to 145 PPM, averaging 120 PPM. At the 2 to 3 inch increment, the amount of chloride ranges from 80 PPM to 105 PPM, averaging 100 PPM.

Review of the test results indicates chloride ion concentrations at the threshold in the top 1-inch of the floor slab at only one of three locations. Values above the threshold values can support corrosion of "gray" reinforcing steel. The design drawings specify that the top of slab mild steel have 1-1/2 inches of concrete cover. Therefore, the floor slab is not chloride contaminated at the level of top reinforcing steel. Since the mild steel in the top of the floors, beams and stirrups are epoxy coated and the concrete contains a corrosion inhibitor (DCI), additional protection against corrosion is in place.

## **CERTIFICATION**

The City of Minneapolis Ramp Certification Ordinance requires that the engineer state whether the structure is capable of supporting the loads for which it is used. This structure is primarily used for the parking of passenger cars and, in our opinion, presently is capable of supporting that load.

Our recommendations include the continuation of annual structural maintenance, sealing of all non-sealed and/or leaking cracks, sealing all construction joints, removal of all loose overhead concrete as it is detected, and remaining items noted above and on drawings.

The above engineering services provided were completed by me or under my direct supervision. My field of practice is structural engineering with primary emphasis on concrete deterioration and renovation. Walker Parking Consultants/Engineers, Inc. carries the \$250,000 insurance coverage required by Section 108.80 of the City Ordinance.

If we can be of further assistance or answer any questions, please call on us.

Sincerely,

WALKER PARKING CONSULTANTS

Stephen D. Disch, P.E.  
Principal

Richard J. Elsner, P.E.  
Project Manager