

Technical Memorandum

Riverwalk Promenade Inspection

October 28, 2016

HR Green No. 86150480.02

Prepared For:

City of Aurora

Prepared By:



INTRODUCTION

The City of Aurora requested that HR Green inspect the Riverwalk Promenade for public safety. The following report gives a summary of the inspection including a brief description, structural condition, photos, maintenance/repair recommendations, and a safe load limit.

OVERVIEW/HISTORY

The approximately 405 foot long Riverwalk Promenade runs over the west bank of the Fox River's East Channel between the Galena Boulevard Bridge and Downer Place Bridge. It runs alongside 23 E. Galena (Paramount Theater) and 28 Downer (Fox Theater Building/Paramount Theater Costume Shop).



Overall Elevation View



Overall Underside View

The Sylvandell Dance Hall and Amusement Park opened in 1915 at the location of the present Paramount Theater. Looking at historical photos, it appears the main structural components of the cantilever (steel beams, river walls and foundations) most likely date back to this original construction. These photos indicate that the Riverwalk along the Downer Building were not part of the original construction, but likely added during a remodel. After a fire in 1928, the Paramount was built at its present location on top of portions of the existing foundations. The plans show existing foundation walls and the promenade (Riverwalk) to remain. Plans indicate major renovations to the Paramount Theater and Riverwalk were done in 1977 and to the Downer Riverwalk in 1994.

The main structural system to support the Riverwalk is a "back span cantilever" system. It used everywhere except at the slab on grade which separates the Paramount Theater and the Downer Building cantilevers. The beams that support the overhang are continuous over the exterior support wall and span back and connect to an interior support wall or foundation. This back span is required as the supporting masonry walls cannot take the bending moment generated by the cantilever Riverwalk. In this case, the back span and supports system are also an integral part of the privately owned structure's floor system and foundation.

The Riverwalk Promenade has been broken up into two separate sections in the following report. See Riverwalk Promenade Plan (attached).

The first section runs for approximately 290 feet adjacent to the Paramount Theater. It ties into the Galena Bridge at the north end and ends at the slab on grade at the south end.

The second section runs for approximately 121 feet adjacent to the Downer Building. It includes 40 linear feet of slab on grade at the north end and ties into the Downer Bridge at the south end.

The following report pieces together all the available information HR Green was able to gather including historical pictures, descriptions, and elements visible during field inspections. Partial plan sets used include:

- 1908 Original Downer Bridge Plans (5 Sheets)
- 1931 Paramount Theater Plans (20 Sheets)
- 1977 Paramount Promenade Rehabilitation Plans (1 As-Built Sheet)
- 1994 Downer Promenade Rehabilitation Plans (4 Sheets)
- 1995 Galena Bridge Rehab Plans (1 Sheet)

OBSERVATIONS

Paramount Theater Promenade:

Description:

The Paramount back span cantilever system has two slightly different configurations based on the theater's geometry. The north 150 feet are adjacent to the lobby. The south 140 feet are adjacent to the auditorium. See Riverwalk Promenade Plan (attached).

The Paramount Lobby section of the Riverwalk is typically a 7" concrete slab overlaid with brick pavers on a drainage layer. This 13 foot cantilever and back span is supported by pairs of steel I shaped beams (circa 1910's) completely encased in concrete. The as-built plans indicate these beams are typically 20 I 80 sections spaced 15 feet on center. To tie into the Galena Boulevard Bridge at the north end, the beams fan out to support wider walkway with concrete pavers. A reinforced concrete edge beam ties the cantilever beam ends together under the parapet. The beams are supported by the river wall and the back span connects basement walls of the Paramount Theater. The back span is part of the Paramount Lobby floor and is over unexcavated fill. At the south end of this section, the Riverwalk walkway widens around the south end of the lobby where the exterior wall juts in at the auditorium. Here the back span also supports the Riverwalk and acts as a ceiling over the basement of the Paramount. There is an expansion joint in the slab located 81'-9" south of where the brick pavers meet the concrete pavers near Galena Boulevard. The joint is only visible from underneath because it has been covered with brick pavers. At the joint, one encased beam is north of the joint and three are south.

The Paramount Auditorium section is very similar to the south end of the Lobby with a 6" concrete overlaid with brick pavers on a drainage layer. However, the cantilever is much shorter and varies from 1'-6" at the north end to 6'-0" at the south end. The beams here are typically smaller single steel I

shapes encased in concrete. The beam spacing varies from 4' to 8'. Similar to the south end of the Lobby section, the back span also supports the Riverwalk and acts as a ceiling over the basement of the Paramount. The slab has two heavy integral planters as part of the walkway. Plans indicate four additional planter boxes were to be included, but have since been removed or were never built.

The 1977 Paramount Promenade Rehabilitation Plans indicate the existing top slab and concrete beam encasements were completely removed and replaced along the entire length of the Paramount Theater. Two new steel wide flange beams were added to each side of the expansion joint at that time, possibly to address deterioration. Several other new wide flanges were installed at this time, typically to support the planter boxes that were added during the rehab. We believe the remaining steel members are from the original Sylvandell structure.

The total thickness of the brick pavers and drainage system above the top slab is unclear. The 1977 plans indicate 2 ¼" total thickness whereas the 1995 plans indicate 4". The 1977 plans indicate that a waterproof membrane of unknown type was applied to top of the concrete slab, below the drainage layer. A neoprene water stop was detailed at the expansion joint.

The river wall that supports the encased cantilever beams also predates the Paramount and was either constructed as part of the Sylvandell foundation or possibly even earlier. The base of the wall is reinforced concrete. The top of the wall is brick and mortar. The footing for the wall is unknown but may be set into bedrock or tied back to the building foundation.

Precast parapets were added in 1995 as part of the Galena Bridge repairs. Plans indicate the widened cantilever slab that connects to the Galena Bridge was also replaced at this time.

Condition:

The top of the slab, neoprene joint and waterproof membrane are not visible due to the brick pavers. The brick paver surface is uneven which may cause water to pool. At the slab underside, transverse cracks with efflorescence, rust stains, and evidence of leakage were visible in the exterior cantilever and the interior back span. The worst of this slab deterioration occurs in the atypical spans near Galena Bridge.

The deterioration below the expansion joint in slab is extensive. The concrete cover on the bottom of the encased beams is mostly gone exposing the beam bottom flange on either side of the joint. The bottom flanges have significant pack rust and section loss. The beam appears to have little of its initial capacity north of the joint. There was not significant cracking in the slab or notable deflection that would indicate the slab north of the joint is under duress.

There are several locations of spalls in the concrete edge beam with exposed reinforcement. One pair of encased beams north of the expansion joint has lost a portion concrete cover, exposing the steel beams. Several other encased beams have cracks forming in the concrete.

The river wall is in good to fair condition. The concrete base has wide spread spalls with reinforcement exposed in some cases. Spalls have been worsened by areas of poorly consolidated concrete and decades of abrasive action by the river. Some locations appear to have been patched or overlaid at some point, but portions of these repairs have failed. The bricks above the concrete are generally in good condition, but there are several locations where bricks are disintegrating or missing.



Riverwalk at Paramount Lobby



Uneven Brick Pavers at Paramount



Cantilever Underside at Paramount Lobby



Underside of Expansion Joint



Steel Deterioration at Expansion Joint



Spalls on Fascia of Edge Beam



Exposed Beams North of Joint



Underside near Galena Bridge



Back Span Underside at Paramount Auditorium



Riverwalk at Paramount Auditorium



Paramount River Wall



Cantilever Underside at Paramount Auditorium

Downer Building Promenade:

Description:

The Promenade adjacent to the Downer Building consists of two distinct structures: approximately 81 linear feet of back span cantilever and 40 linear feet of slab on grade. See Riverwalk Promenade Plan (attached).

The Downer cantilever section of the Riverwalk is a 3" slab on a pan joist system. The joists are 6" wide and 8" deep for a total system thickness of 11". The joists are spaced 3'-0" on center and span between the cantilever beams. The approximate 12'-6" cantilever and back span are supported by pairs of steel I shaped beams, similar to the Paramount Promenade. The beams are encased in concrete only outside of the building. The beams are exposed inside the basement of Downer Building. The beam spacing varies between 10' and 16' on center. The beams are supported by the stacked limestone river wall/building exterior and the back span connects to an interior basement wall. The back span is the first floor of the Downer Building and the ceiling of the basement. The walkway widens to tie into the slab on grade at the north end and the Downer Bridge at the south end.

The 1994 Downer Promenade Rehabilitation Plans indicate the existing ribbed concrete slab system was removed and replaced with the current pan joist system. The rehab plans indicate the 3" slab is reinforced with a single layer of welded wire mesh (uncoated) and #4 bars at 12" on centers running parallel to the joists (supposed to be epoxy coated). Repair details were included for the steel beams and concrete encasement, but because these plans do not appear to be "as built" it is not clear if or where the steel repairs were made. The extent of the steel deterioration at that time is also unknown. We have assumed that the repairs performed in 1994 were intended to bring the much older existing steel beams up to their original capacity. The rehab plans do not show the size of the existing steel beams. Field measurements indicate the Downer cantilever beams are the same or very similar to the size and shape as those used for the Paramount. The precast parapet was also added up to the new Downer Place Bridge during this rehabilitation.

The limestone wall appears to be much older. The 1908 plans for the Downer Place Bridge show the bridge abutments poured against this building's foundation walls. The building was labeled "Beacon Building."

The Downer slab on grade consists of a concrete slab on fill behind the concrete river wall. This portion of the promenade separates the Downer and Paramount cantilevers. The base of wall appears original and may date back to the early 1900's. The top of the river wall is newer and the repairs may coincide with other work performed on promenade in the mid 1990's. The precast parapet is mounted to the top of the river wall. The foundation type is unknown.

Condition:

The Downer cantilever is in good to fair condition. Longitudinal and transverse cracks with rust stains show through the top of the slab at approximately 12" centers. This most is likely caused by a lack of

cover above the slab reinforcement. The caulked joint between the pan joist slab and the masonry building wall is in fair condition. There does not appear to be any flashing between the slab and wall. Transverse cracks also show at the underside with efflorescence and are typically at the pan joist span quarter points between the cantilever beams. The bottom cover has spalled off on several encased beams leaving the steel exposed. Only surface rust with initial section loss was observed. The remaining encased beams all have wide cracks near the bottom indicating the concrete is delaminated and will soon spall off as well. The stacked limestone is in good condition.

The Downer slab on grade was in good condition. The base of the wall has numerous spalls and abrasion near the waterline. There are also several wide vertical and diagonal cracks. No differential movement was observed. The newer top portion of the river wall was in good condition.



Downer Cantilever Topside



Downer Cantilever Underside



Downer Underside at Bridge



Slab on Grade River Wall

RECOMMENDATIONS

Paramount Theater:

We recommend performing structural steel repairs at the expansion joint as soon as possible. The beam north of the joint is of particular concern. Without physically removing the remaining concrete and steel pack rust, it is not possible to determine what capacity remains. Until repairs are made, no vehicles should be allowed on the Riverwalk. The slab north of the joint should be closely monitored for vertical movement that would indicate a significant loss of capacity and potential failure.

Other repairs include concrete patching in edge beams with exposed reinforcement, concrete patching and epoxy crack injection for river wall foundation, and brick and mortar repairs in the river wall.

It appears the drainage layer under the pavers is holding water. This will lead to deterioration of any waterproofing that may be present between the slab and the drainage layer and will eventually cause the slab to deteriorate. Any water that is able to penetrate the joint between the building wall and the slab will lead to deterioration of the cantilevered steel beams at the location where they carry the highest shear and moment. If a renovation of the surface of the Riverwalk is planned, sampling and testing should be included in the process. We would also recommend a different type of pavement, flashing, and drainage system that will better protect the concrete slab and the steel beams by assuring rapid run off.

Downer Building:

We recommend sealing the cracks in the top surface of pan joist slab and adding coving/sealant between the building and slab to help prevent further deterioration. We also recommend removing the delaminated concrete from the encased beams. Afterwards, any area of the steel beams that are exposed should be cleaned and painted. We also recommend concrete patching and epoxy crack injection for the slab on grade portions of river wall foundation.

LOAD RATING

The ratings below are based on no deterioration or section loss of the structural components. We have assumed that any deterioration or damage to the existing steel that occurred prior to the 1977 Paramount Rehab Plans and the 1994 Downer Rehab Plans were adequately repaired during construction.

The pedestrian live load ratings are based on the current AASHTO standards of 90 psf. The vehicle inventory ratings are based on the current AASHTO maintenance vehicle configuration.

Paramount Theater:

The calculated available pedestrian live load capacity is 78 psf. This is slightly under the current design load, but is adequate for typical usage. Situations that would cause the entire Paramount Promenade to be tightly packed with pedestrians should be avoided.

The calculated vehicle live load capacity is 3.5 tons.

Please note that rating above is based on a typical section with no section loss. Until the deterioration at the expansion joint is repaired, we recommend that no vehicles be on the Paramount Promenade.

Downer Building:

The calculated pedestrian live load capacity exceeds the 90 psf design load.

The calculated vehicle live load capacity is 1 ton.

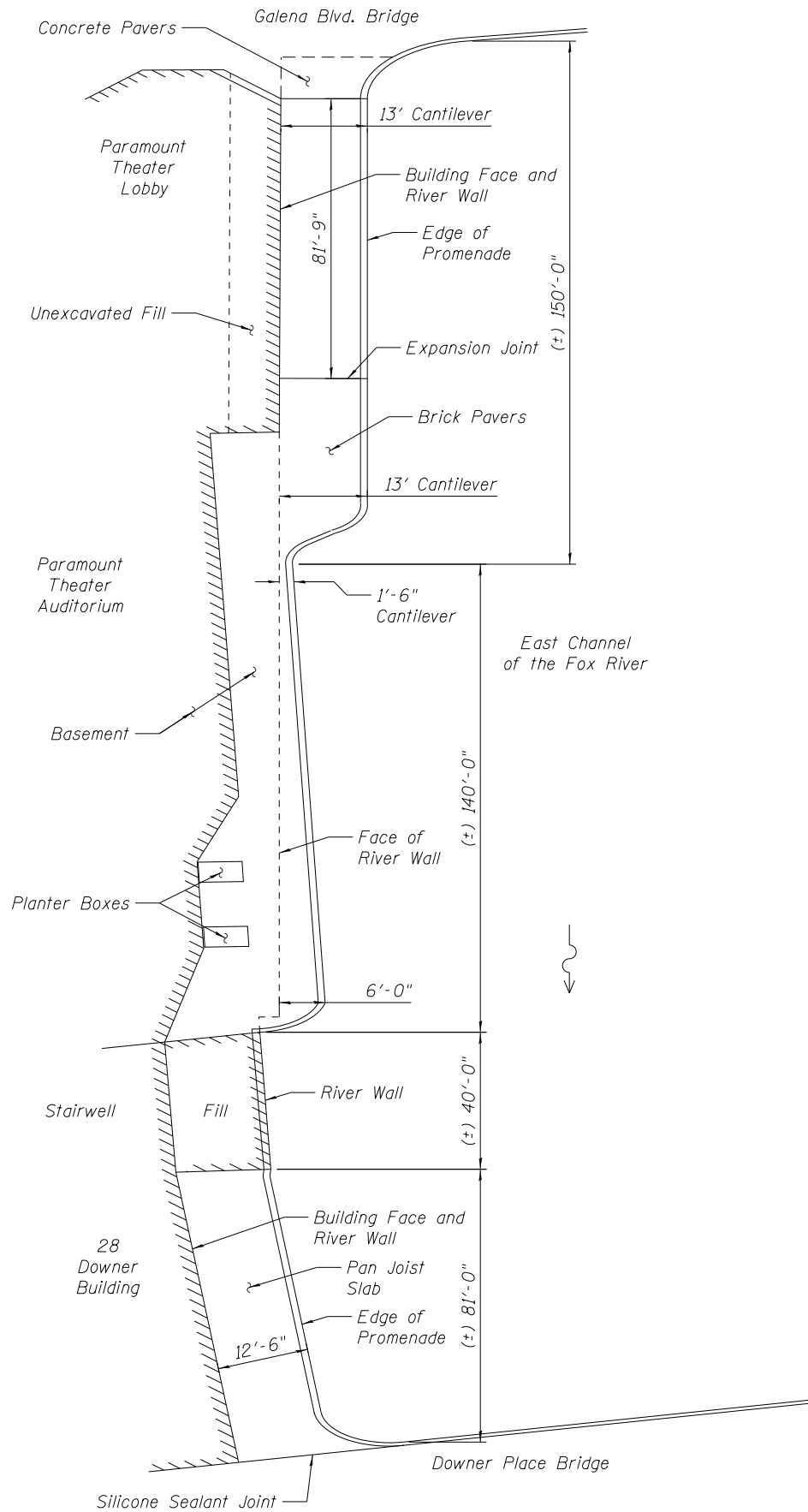
Please note that the pan joist system handles area loads well, but is not able to take large concentrated loads resulting in the low vehicle capacity.

CONCLUSIONS

The joint deterioration at the Paramount Promenade is a major concern and should be addressed as soon as possible. No motorized vehicle should be allowed on Riverwalk until joint repairs are made. Modern design standards would indicate a 90 psf design load which would translate to a 6' x 10' vehicle weighing slightly less than 3 tons. We do not know if these loads were used for design nor do we know what capacity has been lost due to corrosion.

Please note that repairs made to the Riverwalk Promenade should be coordinated with the owner of the Paramount Theater and Downer Building because the promenade and river wall are integral with both buildings and the limits of ownership are unclear.

The Downer Promenade should be limited to 1 ton vehicles.



RIVERWALK PROMENADE PLAN

PROJECT CONTACT:

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