

Lakeside Park Pedestrian Bridge Feasibility Study



Prepared by:

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PROJECT DESCRIPTION

MSA has been retained by the City of Fond du Lac to investigate the feasibility of placing a new pedestrian bridge across the Fond du Lac River. The proposed project is located in the City's Lakeside Park, about 720 feet south of Lake Winnebago. The proposed bridge will provide a trail connection between Lakeside Park and Lakeside Park West. This study involved determining the permitting requirements, establishing the navigational clearance needs and developing a proposed bridge height to accommodate boat traffic, reviewing the floodplain and hydrology at the site, determining a feasible span configuration for the new bridge, developing a preliminary trail alignment to the bridge that meets ADA accessibility needs, and developing preliminary cost estimates for construction.

PERMITTING REQUIREMENTS

Preliminary coordination was conducted with the Wisconsin Department of Natural Resources (WDNR), the Army Corps of Engineers (ACOE), and the United States Coast Guard (USCG) to determine the permitting that would be required for the bridge.

WDNR

The WDNR liaison completed a preliminary review of the project and noted the following:

- The project concept would meet the requirements for a General Permit.
- Wetland impacts are not anticipated as there are manicured lawns up to the stream bank and there are no mapped wetlands or hydric indicator soils in the immediate vicinity of the project.
- The Natural Heritage Inventory database was reviewed and it is not anticipated that there will be impacts to threatened, endangered, or special concern resources. This includes the Rusty Patched Bumblebee and Northern Long-Eared Bat. The project will also be eligible for the Broad Incidental Take Permit if needed.
- The Fond du Lac Wastewater Treatment Plant is listed as a closed site with continuing obligations. While impacts are not anticipated from the bridge project, a provision should be included with the project specifications to ensure proper handling and disposal of any contaminated material encountered during construction.
- The WDNR liaison will help coordinate with the appropriate agencies for what is anticipated to be some minimal 6(f) coordination due to impacts to the park. Given that the bridge and trail are a direct benefit to users of the park, the DNR does not anticipate any concerns, but coordination will be required nonetheless.

ACOE

The ACOE completed a preliminary review of the project. The project concept would require a Section 10 (Rivers and Harbors Act) permit and a Section 404 (Clean Waters Act) permit. The permit request information required by the designer would be similar to that of a typical roadway bridge replacement project. The project location is also potentially within a Federal Navigation Project and would require Section 408 (Clean Waters Act) permissions. This permission/approval would be handled internally at ACOE using the materials submitted for the Section 10 and Section 404 permits.

USCG

The USCG completed a preliminary review of the project and indicated that it can be authorized under 33 USC 499. There would be no need to go through the USCG permitting process. To obtain the authorization, the USCG would need a formal request for a review of the project on the city letterhead. The request would include a short description of the proposed bridge, a short purpose and need statement, and a description of what (if any) environmental coordination has been completed. This request will start the paperwork process with USCG and authorization should be obtained in as little as 3-5 business days. The USCG also noted that based on the location, they can waive their requirement for the vetting and approval of the project's construction methodology and schedule. Once the project is complete, the only documentation needed by the USCG is a copy of the as-built plans.

LOCAL INTEREST COORDINATION

MSA worked with multiple local interest groups to gather feedback about the project. Individuals and businesses contacted included the property owners and marina businesses along the Fond du Lac River north of the Scott Street bridge, Lakeside Park Marina, and the Lighthouse Anglers club.

Summarized below is the key input received:

- The tallest boats noted to use this stretch of the river were 18 feet above the water surface.
- Sailboats can't use this portion of the river because it is too shallow.
- Water levels in this portion of the river fluctuate 1 to 2 feet.
- This stretch of the Fond du Lac River is one of the busiest spots on the south part of Lake Winnebago with the nearby boat launch and businesses.
- Recommend including ordinances against fishing on the bridge due to safety concerns with boaters underneath.

- The river banks are very popular for fishing. Along the west bank there are several fishing platforms which were constructed by several local civic groups. The bridge should be located to avoid these platforms.

Our recommendation and the basis for the concept development of this study is that the bridge will provide 18 feet of vertical clearance (top of water to bottom of bridge) during the recorded highwater for this waterway. A follow-up email was sent to all parties involved, with a summary of the input received along with the recommended clearance for the bridge. There were no issues or concerns voiced with this concept.

PRELIMINARY BRIDGE DEVELOPMENT

Through a Flood Insurance Study (FIS) within the project area, it was determined that the 100-year highwater elevation is approximately 747.2 feet (NAVD 88). It is required by the WDNR that the bridge abutments either be located outside of the floodway, or that hydraulic calculations be submitted showing that the proposed bridge will not increase the backwater. As defined on the FEMA website, the floodway is “the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.” The floodway elevation from the FIS, which is 749.4, was used in conjunction with the contours at the project location developed from field survey, to ensure that the bridge abutments and all associated fill/riprap will be located outside the floodway area. See Attachment A for the preliminary site Plan and Profile.

In order for the bridge and the fill embankments to be located outside of the floodway area at this site, the bridge will need to be 210 feet long and supported on 10-foot tall (Type A5) pile encased reinforced concrete abutments supported on driven piling. These bridge dimensions were determined by setting the abutment bearing seats at elevation 765.2, which is 18 feet about the 100-year highwater elevation of 747.2. The abutments were then pushed back on the riverbanks until the riprap embankment in front of them no longer encroached within the floodway elevation of 749.4. See Attachment B for the Bridge Elevation.

MSA performed preliminary hydraulic calculations using the cross sections from the field survey at the bridge location. Through this investigation it was determined that the 210-foot long bridge and 10-foot tall abutments would work with no increase in the 100-year backwater elevation.

Fill embankments with graded side slopes were assumed for the trail up to the bridge. The graded side slopes range from 1.5:1 at the bridge to 3:1. The steeper 1.5:1 slope was used around the bridge to reduce the necessary bridge length, to avoid impacts to the wastewater treatment property on the east bank, and to minimize tree impacts on the west bank. Slopes steeper than 2.5:1 are stabilized with light riprap. Additionally, a pedestrian railing is required and included along the trail in all areas where the side slopes are steeper than 3:1.



Figure 3: Lakeside Park Pedestrian Bridge Rendering

Other alternatives to construct the trail leading up to the bridge include retaining walls and boardwalk (bridge span type) structures. Both of these options are more costly and present increased future maintenance costs for the trail when compared to the fill embankment with graded side slopes.

The bridge will provide access for park maintenance staff and equipment between Lakeside Park and Lakeside Park West. A removable bollard will be used in the center of the trail pavement at both ends of the bridge.

A prefabricated steel truss bridge is recommended for this site. This structure type is commonly used for trail bridges due to its ease of construction and its large span capabilities. MSA contacted multiple truss bridge manufacturers to gather input and cost estimates. The bridge quotes received were structures designed for an H10 (10 ton truck) loading. Provided below is a brief summary of the input and recommendations received.

- With a span length of 210 feet, a box truss (truss with overhead bracing) will be the most efficient truss option.
- The box truss will restrict the style to Warren or Pratt trusses, see Figure 1 and 2 on page 6 for examples of both truss types.
- The box truss type will allow for 10 feet of overhead clearance.

- The overhead bracing can be used to attach conduit and fixtures for overhead lighting. Electrical conduit costs are included in the construction estimates on page 7.
- Both 12-foot and 10-foot clear bridge width options were investigated. The 10-foot width provided minimal cost savings and was removed as an option.
- For the bridge deck, timber should offer far more economy and is more common for this type of application. With properly specified treated timber using an oil-borne preservative, there should be little difference in maintenance when compared to a concrete deck, assuming winter plowing will be minimal. A timber deck should also melt snow and ice faster in comparison to concrete due to heat retention and air flow.
- Composite decking is not an economical option. The composite deck boards do not have a design spec and as such the decking support structure within the truss bridge is designed more conservatively.



Figure 1: Warren Truss



Figure 2: Pratt Truss

COST ESTIMATE

The estimated costs to furnish and install a single span steel truss pedestrian bridge crossing the Fond du Lac River are provided below. The cost estimates assume that the pedestrian bridge will be constructed using weathering steel to minimize future maintenance costs. Aesthetics and overhead lighting costs are not included in the estimates.

Option 1: 210' Long Bridge with 12' Wide Timber Deck

| | |
|---------------------------|--------------------|
| Trail Construction | \$314,000 |
| Bridge Construction | \$1,155,000 |
| <u>Design Engineering</u> | <u>\$90,000</u> |
| Total | \$1,559,000 |

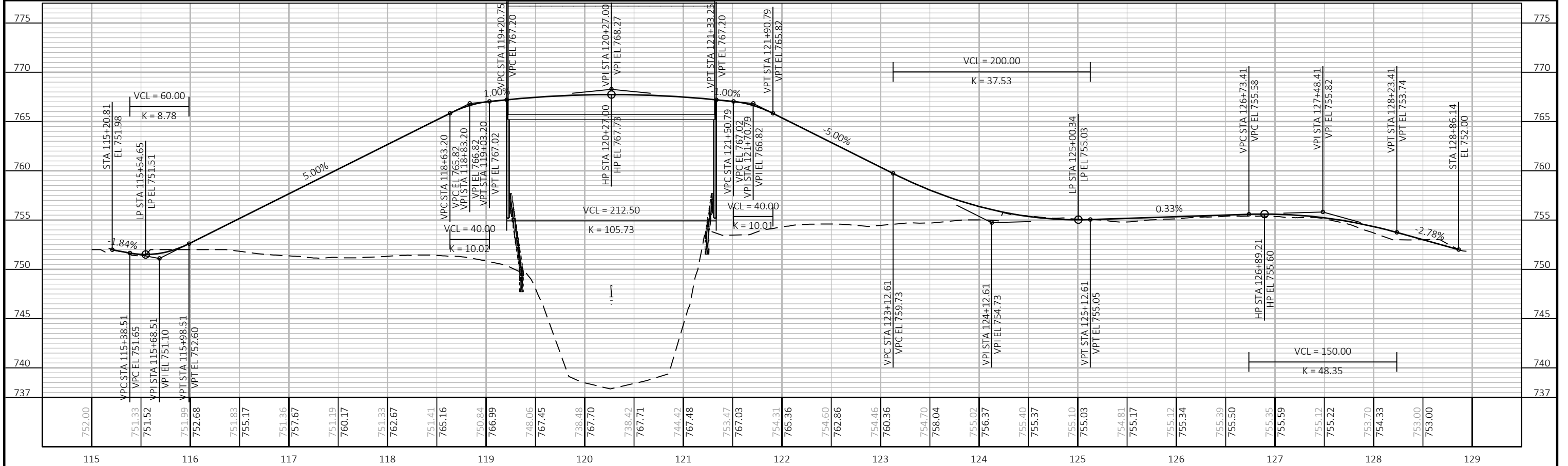
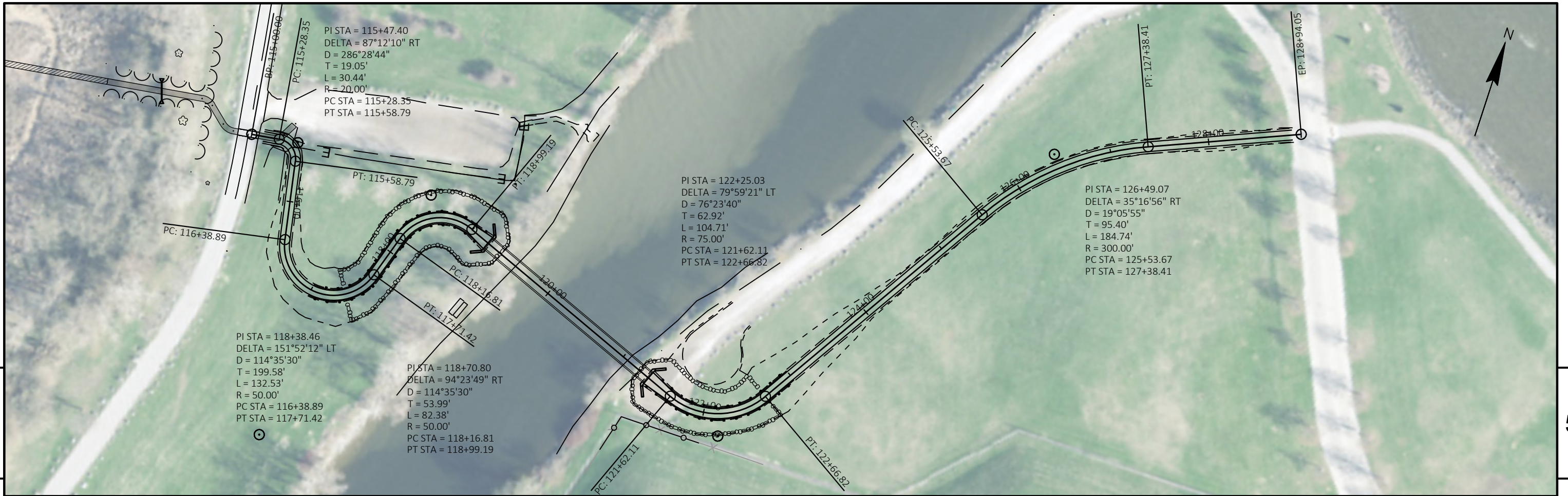
Option 2: 210' Long Bridge with 12' Wide Concrete Deck

| | |
|---------------------------|--------------------|
| Trail Construction | \$314,000 |
| Bridge Construction | \$1,191,000 |
| <u>Design Engineering</u> | <u>\$95,000</u> |
| Total | \$1,600,000 |

CONCLUSION

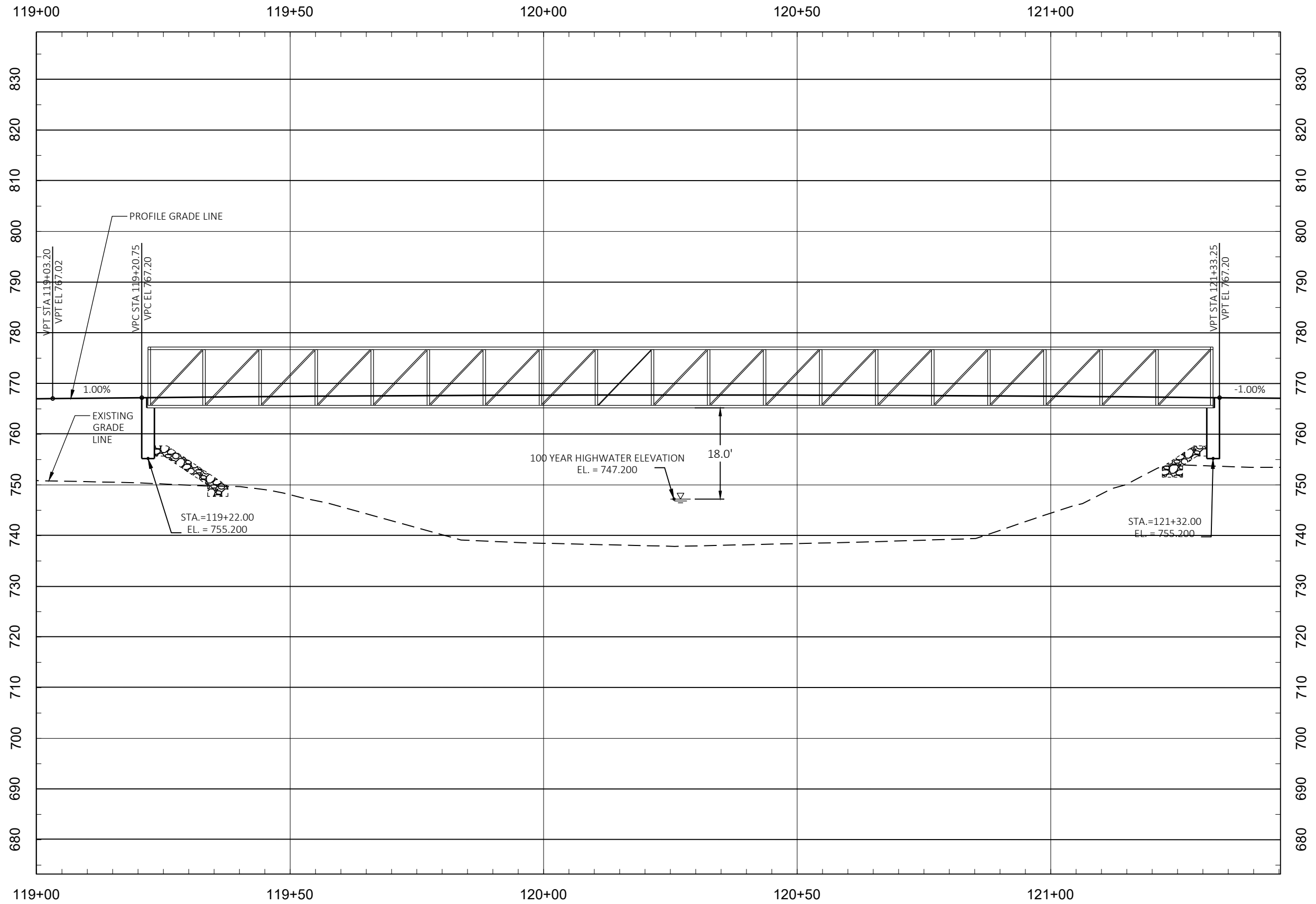
This project's purpose is to provide a pedestrian crossing over the Fond du Lac River, serving as a trail connection between Lakeside Park and Lakeside Park West. This project is deemed feasible through a 210-foot long prefabricated pedestrian bridge supported on concrete abutments founded on driven piling. If the City of Fond du Lac decides to move forward with this project the next steps would include subsurface investigations, permitting, and final design.

ATTACHMENT A
PLAN AND PROFILE



| | | | | |
|----------------------|--------|---------------------|---|---------|
| PROJECT NO: 01878070 | HWY: - | COUNTY: FOND DU LAC | PLAN AND PROFILE: LAKESIDE PARK PEDESTRIAN BRIDGE | SHEET 5 |
|----------------------|--------|---------------------|---|---------|

ATTACHMENT B
BRIDGE ELEVATION



ELEVATION
(LOOKING NORTH)

SCALE = SCALE