Lower Henry Schuette Park Pedestrian Bridge Feasibility Study

Phase II – Bridge Concepts

Recommendations Report

Prepared for:

City of Manitowoc
Public Infrastructure Committee

Prepared by:

Stantec Consulting Services, Inc.

Sign-off Sheet

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Executive Summary

Located on the near west side of Manitowoc, Lower Henry Schuette Park and Manitou Park are separated by the Manitowoc River. The City of Manitowoc is undertaking this project to study the feasibility of constructing a pedestrian bridge spanning the river that would connect and improve public access between the parks. A new bridge like this one can contribute towards making the surrounding areas more attractive for residents. The study is split into two phases: Phase I – Existing Conditions Survey, and Phase II – Development of Pedestrian Bridge Concept Plans.

The Site Analysis Report summarized the findings of our research under Phase I and provided base information for the planning and engineering design of a bridge. This Recommendations Report prepared under Phase II takes a closer look at two bridge locations, the Northern Tip Schuette – Manitou and the Central Manitou – Pier – Schuette, developing preliminary conceptual requirements and drawings, cost estimates, and an implementation plan.

The next steps recommended for realizing the vision of a pedestrian bridge are bulleted below:

Phase 3 - Preliminary engineering & environmental reports

- Environmental Study
- Hydraulic Analysis
- Soils Report

Phase 4 - Preliminary design, final design & contract documents

- Preliminary Design
- Final Design
- Contract Specifications
- Permitting

Phase 5 - Construction services

- Request for Proposal Notification (RFP)
- Proposal Review and Selection
- Construction
- Final Acceptance/Open for Use

Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ABA	Architectural Barriers Act
ADA	Americans with Disabilities Act
ADAAG	ADA Accessibility Guidelines
ATBCB	U.S. Federal Architectural and Transportation Barriers Compliance Board
DOA	Department of Administration
EL	Elevation
FEMA	Federal Emergency Management Agency
LRFD	Load-and-Resistance Factor Design
NAD 83	North American Datum of 1983, for horizontal and geometric control of surveys
RFP	Request for Proposal
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
WDNR	Wisconsin Department of Natural Resources
WisDOT	Wisconsin Department of Transportation
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

The City of Manitowoc is studying the feasibility of a pedestrian bridge to connect Lower Schuette Park and Manitou Park.

This Recommendations Report represents the second step or Phase 2 and serves as a preliminary investigation developing conceptual requirements, plan and profile drawings, cost estimates, and an implementation plan. Grant opportunities have also been identified. The report tends toward high-level planning but helps bring clarity to moving progress to the next level. Phases outside the scope of this report and to follow are:

- Phase 3: Preliminary engineering & environmental reports
- Phase 4: Preliminary design, final design & contract documents
- Phase 5: Construction services

2.0 GENERAL CONSIDERATIONS

Taking into account feedback from the Parks Committee, parameters for the bridge project are defined by these general criteria:

- Function – provide a path for pedestrians and bicyclists over the Manitowoc River plus great continuity with park trails. In addition, the bridge would see an occasional maintenance vehicle as the need arises. Provide proper clearance over existing park trails.
- Hydraulics – affects clearance height of superstructure and location of supporting substructure piers and abutments. Provide proper clearance over the water for floodwater debris, and snowmobile and boat traffic.
- Aesthetics – involves structure and material types, surface treatments, landscaping, and lighting. Provide an attractive structure with simple lighting for boat and snowmobile traffic.
- Materials - utilize durable low maintenance materials. Provide stable approach surfaces to meet both ADA and Bicycle requirements.
- Economics – provide an efficient and economical structure.

2.1 DESIGN CODES, STANDARDS, LOADS

- AASHTO LRFD Guide Specifications for Design of Pedestrian Bridges
- AASHTO LRFD Bridge Design Specifications
- WisDOT's Bridge Manual Chapter 37 Pedestrian Bridges
- Americans with Disabilities Act (ADA) Standards - designates accessibility, grades
- Wisconsin Bicycle Facility Design Guidelines – requirements for grades, curve and trail clearance
- Project Specific Documents
  - Foundation Investigation Report
- Design Live Loads
  - Uniform pedestrian live load of 90 LBS/SF
  - H-5 design vehicle (10,000 LB) for an occasional single maintenance vehicle).
- Clear Width – 12-feet, bridge and approaches are intended for pedestrians, including walkers and runners, wheelchair users, people with infant strollers and bicyclists.

2.2 AMERICANS WITH DISABILITIES ACT

The Americans with Disabilities Act (ADA) prohibits discrimination against people with disabilities in employment, transportation, public accommodation, communications, and governmental activities. The Architectural and Transportation Barriers Compliance Board (ATBCB), also known as the Access Board, is a federal agency that issues guidelines to ensure that buildings, facilities, and transit vehicles are accessible and usable by people with disabilities. The ATBCB is responsible for developing and updating design guidelines known as the ADA Accessibility Guidelines (ADAAG). ADA Standards establish design requirements used to guide this project and are based on ADAAG.

Accessible routes consist of walking surfaces with a running slope not steeper than 1:20 (5%). Portions of accessible routes with running slopes steeper than 5% also must be treated as ramps. Handrails are required on both sides of ramps with a rise greater than 6".

It is recommended that the proposed bridge crossing and approaches be ADA accessible. Accessible ground surfaces must be stable, firm, and slip resistant. Stable surfaces resist movement, while firm surfaces resist deformation by applied forces. Accessible surfaces remain unchanged by external forces, objects, or materials. For the approach connections, concrete or bituminous paved surface is recommended to meet surface requirements. Other undeveloped surfaces are subject to erosion and other forces, causing instability.

2.3 WISCONSIN BICYCLE FACILITY DESIGN HANDBOOK

The Wisconsin Bicycle Facility Design Handbook prescribes path widths, turning radius, stopping sight distances, vertical and horizontal curve requirements, and general design guidelines. Throughout Wisconsin bicycling is allowed on the Ice Age Trail where it coincides with the state bicycle trail system. While the Manitowoc Segment of the Ice Age Trail in Schuette Park, the Rahr Family Trail, and other paths in the parks are not currently designated or designed as bicycle trails, they may be in the future. It is desired that the proposed bridge and approach trails meet the bicycle guidelines.

2.4 PERMIT CONSIDERATIONS

Federal and state laws require the issuance of special permits for projects affecting certain environmental resources. This section goes through the permits potentially needed to complete the project. Early planning and coordination with the Wisconsin Department of Natural Resources (WDNR), the U.S. Army Corps of Engineers (USACE), the U.S. Fish and Wildlife Service (USFWS), and the County regarding permit requirements are essential to avoid unnecessary delays.

- WDNR **401** Water Quality Certification/Final WDNR Concurrence is a requirement of the Clean Water Act. Any 401 certification requires the DNR to certify that the proposed discharge of dredged or fill materials into waters of the United States will not have a significant effect on the quality of the water. Complete application Form 3500-053 "Water Resources Application for Project Permits (WRAPP)".

- USACE regulatory program includes Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act.

    - **Section 10** of the Rivers and Harbors Act requires a permit from the USACE to do any work in or affecting commercially navigable waters of the United States. The commercially navigable waters along the Manitowoc River do not extend beyond the fixed railroad bridge above 21st Street, which means that Section 10 does not apply to this project.

    - **Section 404** of the Clean Water Act requires permit authorization from the USACE for the discharge of dredged or fill material into waters of the United States, including wetlands which are often considered waters of the United States. Discharge of dredged material means the addition of dredged material into, including redeposit of dredged material other than incidental fallback within, the waters of the U.S. (40 CFR Part 323.2).

- USFWS administers native endangered and threatened species permits under the Endangered Species Act. Contact and coordinate with USFWS early in the design phase.

- Manitowoc County **Shoreland Ordinance Sec. 9.33** requires the issuance of a zoning permit. A Shoreland Vegetative Buffer is the area of protected vegetation along the shoreline extending 35 feet inland from the Ordinary High-Water Mark. Removal of vegetation within the Buffer is restricted by county and state shoreland regulations. Removal of vegetation beyond 35 feet from the waterway is allowed when accomplished using WDNR Best Management Practices (BMP's) for forestry and soil conservation.

2.5 SUBSURFACE GEOLOGY AND SOILS CONDITIONS

According to Wisconsin Well Index records, we would expect the underlying soils within the project to be clays. Well report 8MI166, included in the Appendix, is at the location of the north pier of Option 2. The Karst and Bedrock Features Inventory, which is administered by the Manitowoc County Soil and Water Conservation Department, shows depth to estimated bedrock below grade as summarized in the table below.

Estimated Depth to Bedrock

Option	North Abutment	Piers	South Abutment
2	50-75 feet	50-75 feet	50-75 feet
2A	75-125 feet	75-125 feet	50-75 feet
5	75-125 feet	50-75 feet	50-75 feet
5A	75-125 feet[1]	75-125 feet	75-125 feet[1]

[1] The Historical Landfill Map shown in the Appendix indicates that a landfill site may be near this foundation See the Karst and Bedrock Inventory map included in the Appendix

A geotechnical investigation with soil borings at proposed substructure locations to help determine an appropriate foundation system will be undertaken for the preferred bridge location. Foundation alternatives typically include spread footings, driven piles, and helical screw piles. Supporting the substructure piers and abutments on shallow concrete spread footings will cause the most disturbance of existing soils with excavation to only 5 to 6 ft below grade if the geotechnical borings confirm that there is good bearing capacity in the soil.

Deep pile foundations would limit excavation to the depth of a pile cap, which could be about 3 feet below grade. Typically pile foundations near waterways are preferred to address scour issues. Many similar bridges have been supported on helical piles, which like a deep pile foundation can limit excavation to about 3 feet. As helical screw piles are spun into the ground no material would be brought to the surface. With helical or driven piles excavation could be even further limited by placing the cap above existing grades.

Another foundation type, which is used in accelerated bridge construction and called GRS, could be used with a smaller volume of excavation. The GRS system consists of a modular block wall tied back with reinforced earth making it well suited for fill situations rather than cut or excavation situations.

2.6 HYDRAULIC CONSIDERATIONS

As a part of this study, we set out to establish likely flood elevations and clearance requirements to minimize impacts. Within the project area, Base Flood Elevations have been determined. The proposed bridge locations and approaches lay within floodway area Zone AE based on FEMA flood insurance rate maps, see Appendix. The floodway is the channel of the stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance of flood (100-year event) can be carried without substantial increase in flood heights.

Clearance to the low member is based on the higher elevation of the Base 100-year flood event elevation plus two-feet or Normal Yearly high-water elevation plus a five-foot clearance for small non-motorized watercrafts. The five-foot clearance does not need to be maintained over the entire width of the river.

Hydraulic modeling will be required by the permitting agencies to demonstrate that the proposed bridge will not cause adverse flooding impacts. A significant design consideration when computing backwater is the potential for increasing flood damage for upstream property owners. Bridges are generally restrictions to the normal flow of floodwaters and increase the flood profile in most situations. The increase in the flood profile is referred to as the backwater and the resultant upstream water surface elevation is referred to as the high-water elevation. The high-water elevation or backwater calculations at the bridge are directly related to the bridge size and path alignment.

The proposed approach boardwalks will be constructed in the floodway and should be included in the model to study impacts. They should be designed to withstand the 100-year flood and have sufficient vertical clearance for the passage of woody debris and ice. The Base 100-year flood elevation at the proposed locations is EL 588' (NAD 83). This means the bottom chord of the bridge needs to be at or above EL 590'.

In addition to evaluating the base flood 100-year event we determined the likely Normal Yearly high-water elevation. Based upon the existing hydraulic study conducted for the Broadway Street bridge over the Manitowoc River, the next structure up stream, the normal yearly high-water elevation is EL 579.8'. This means the bridge bottom chord needs to be at or above EL 584.8 to maintain a 5-feet small craft clearance at a center section of the river.

Upon considering both clearance requirements the Base Flood elevation controls. Therefore, for planning purposes, the bridge elevation will be set based on these criteria. The hydraulic study and clearance confirmation by WDNR will establish the final low member elevation.

2.7 AESTHETICS AND LIGHTING

The Parks Committee wants to provide an attractive bridge with low-cost aesthetics and simple lighting for boat and snowmobile traffic.

The nature of the proposed bridge's location and surroundings means the bridge will be quite noticeable. At the most likely viewpoints from the shore the following features of the bridge determine the visual impression:

- The shape of the basic horizontal and vertical geometry
- Superstructure type or types
- Pier shape, number and spacing of piers
- Railing design
- Navigational requirements of the waterway

Geometry and layout - Consideration should be given to develop the bridge to blend in with the surrounding area. Vertical and horizontal alignments made up of long, continuous curves and tangents will look better than alignments made up of short, discrete segments. Long span truss type structures give the look and feel of a pedestrian bridge. Layout substructure units to minimize disruption to the continuation of whatever the bridge crosses. Place them clear of park trails and aligned with the Railroad Trestle piers and the island. The appearance of piers is heavily influenced by their proportion…how wide they are relative to their exposed height.

Color and texture - The application of special color or texture treatments is not necessary for the creation of a good-looking bridge. Structural materials have their own characteristic color and surface finish. Appropriately shaped materials in their natural state can create an aesthetic bridge without the use of additional treatments. However, color and texture are sources of enrichment and interest which can enhance a good structural design.

Landscaping - Slope protection is both a landscaping feature and a structural component. However, it should be comprised of a landscaping material, such as riprap, and placed so that it looks like part of the landscape. Riprap has the advantage of having plants growing in it and blurring the edge with the landscape.

Lighting of the structure - With the significant amount of recreational boat and snowmobile traffic on the river, Manitowoc has a desire to have some type of lighting that illuminates the bottom of each span to enhance nighttime safety. This also offers a special opportunity to make the bridge a nighttime feature. Provide lights mounted under the bridge to flood the underside of the spans in light or outline the bottom features of each span in lights. The area beneath the bridge would be the brightest part of the night visual field, creating a "lighted portal" effect. However, given this natural park location, care must be taken in the design phase to select the right color and brightness so that bridge lighting does not become a such a dominating feature that it pollutes the park with too much light.

Pathway lighting - There is a desire to consider outlining the bridge deck with downlights mounted in the railings or an upper feature of the superstructure. Solar lights can be provided on approach boardwalks. While there are light poles along the paved trail in Manitou Park lighting specifically for the trail within the project area currently does not exist and is not anticipated. Trail lighting could be reconsidered in the design phase or anytime in the future. The Parks Committee wishes to avoid placing streetlights on the bridge. The poles often appear as add-ons and would visually disrupt the appearance of the bridge.

Rendering/Aesthetic Analysis - Once the final decision on preferred bridge option is made, a perspective drawing to scale showing visible elements, such as boardwalks, lighting, and railings will be produced. Elements which will be below ground or hidden would be eliminated so as not to distort the analysis. Small differences in structure depth or pier width can make enormous differences in the final appearance of the structure.

2.8 BASIC O&M REQUIREMENTS

A Bridge Owner's Manual can be developed for the selected type of bridge. Items to be included in the bridge Owner's Manual include:

- Description of how bridge was designed, constructed, and intended to function from an operational perspective.
- Design loads
- Expected movements at expansion joints
- Relevant as-built data, including, but not limited to:
  - Concrete mix design
  - Chemical content of materials
  - Compression cylinder test results
  - Reinforcing steel material certifications
  - Coating tests on reinforcement
  - Formwork materials
  - Actual construction procedures
  - Temperature of concrete
  - Ambient temperature and time of casting
  - Timing of casting sequence and concrete delivery
  - Concrete cover measurements
- For each component, a description of what is needed to achieve design service life for specific elements. Include:
  - Required maintenance
  - Expected rehabilitation and/or replacement of bridge elements with service life less than overall bridge system design service life
  - Areas for inspection and types of adverse behavior to watch for

Preventive Maintenance is the recurrent day-to-day, periodic, or scheduled work that is required to preserve the bridge so that it can be effectively utilized as intended. It includes work to prevent damage to or deterioration that otherwise would be more costly to restore. The concept of preventive maintenance involves repair of small or potential problems in a timely manner so that they will not develop into expensive bridge replacements.

Basic preventative maintenance items include:

Ice and Snow Removal, Deck Sweeping/Washing	The primary reason for the removal of snow and ice is to provide a safe bridge for users. When deicing salts (calcium chloride or sodium chloride) are used as part of this process, it is imperative that the maintenance schedule includes cleaning the bridge in the spring to remove any lasting effects of the salts. Any abrasives used on the structure should be removed as soon as possible after the snow period is over to reduce wear on the deck.
Cleaning, Sealing, Protecting and Lubricating	A good pressure washer is a fundamental bridge maintenance tool. While cleaning bridges, crews should have the materials on hand to touch up, protect and lubricate freshly cleaned bridge parts. Seal cracks in concrete decks. Paint, epoxy, wood preservative, mortar and general-purpose lubricants go together with cleaning activities. All rockers, pins, and rollers are to be kept free of debris and corrosion, lubricated where necessary, and maintained in good working order.
Spot Painting Steel Members [1]	Once steel members begin to corrode, they will begin to lose strength. It is important that areas of spot rust be touched up routinely. The loose rust must always be removed before the touch up. Importantly, if the corrosion is due to exposure from a leaking drain or joint, maintenance or repair of the source defect must be coordinated with the spot painting.
Debris Removal	Any debris left on the superstructure due to use or high water should be removed for safety reasons and to prevent deterioration in areas were the debris would trap moisture onto the superstructure. Debris or floating ice that drifts against the substructure can cause premature deterioration and place excessive lateral loads on the whole structure. The techniques available to remove drift are: • Clear small debris with a pole or hook. • Pull large pieces of debris clear with a crane • Clear large and small pieces of debris with a powerboat • Blast large jams to break them up
Scour Protection	Removal of the soil from beneath the substructure undermines the load carrying capacity of the bridge. Preventive maintenance for scour includes: • Place riprap consisting of stones weighing at least 50 pounds or bags filled with stones or cement mortar. • Divert drainage lines when scouring is due to local ground drainage, storm sewer outfall or drainage from the deck itself.

[1] Weathering steel would give a natural look and avoid maintenance of paint

3.0 PRELIMINARY CONCEPTS

Five options to connect the Ice Age Trail, Henry Schuette Trail and Rahr Family Trail between Manitou Park and Henry Schuette Park were considered and presented with the Phase I – Site Analysis Report. Option 2 Northern Tip Schuette – Manitou and Option 5 Central Manitou – Pier – Schuette advanced to Phase II for development of concept and bridge type. Refinements to those concepts are also presented here as Options 2A and 5A.

3.1 OPTIONS 2 AND 2A NORTHERN TIP SCHUETTE – MANITOU

Option 2 made a reasonable choice based on shortest span/least construction cost. However, the easiest tie-in over the sewer line and the Rahr Family Trail is to the steep slope to the north. Exhibit 1.0 shows a conceptual plan and profile drawing for this option. At the south end a boardwalk could tie-in to the Ice Age Trail then pass over the floodplain and ramping up to the bridge. Consideration should be given to extending the south connection clear across the floodplain. Options for connecting trails traversing the steep north slope are shown. Cutting a connecting trail into the steep slope is a challenge likely requiring cuts and walls or an elaborate structure tied back into the slope. Consideration was given to taking advantage of the existing switchback trail however, it is just too far to the east to make an easy connection. Consideration was given to extending the sidewalk along the south side of Michigan Avenue providing continuity to the east and west however, the steep slope is too close to the edge of the roadway. The narrow space on the Rahr Trail or a platform in the water can be used for staging construction on the north end. South side construction access would be via the Ice Age Trail with staging along the trail or in the open areas to the south.

Option 2A is a concept recently developed during a plan-in-hand field review of proposed tie-in locations. Moving the entire bridge crossing east towards the entrance drive reduces the length of connecting trail, eliminates the steep slope issue, and provides great continuity with the switchback and sidewalk along Michigan Avenue. Exhibit 1.1 shows a conceptual plan and profile drawing for this option. At the south end a boardwalk could tie-in to the Ice Age Trail then pass over the floodplain and ramping up to the bridge. Consideration should be given to extending the south connection clear across the floodplain. On the north end, construction could be staged from the parking lot to the area west of the shelter building. South side construction access would be via the Ice Age Trail with staging along the trail or in the open areas to the south.

Main Span – less than 150 ft (prefabricated)

A Modified Bowstring the top chord is arched relative to the bottom, the top and bottom chords are separated by verticals at the ends of the span. The Modified Bowstring is often used as an affordable alternative and can be used for most span lengths. It is an attractive truss providing an inherent aesthetic appeal.

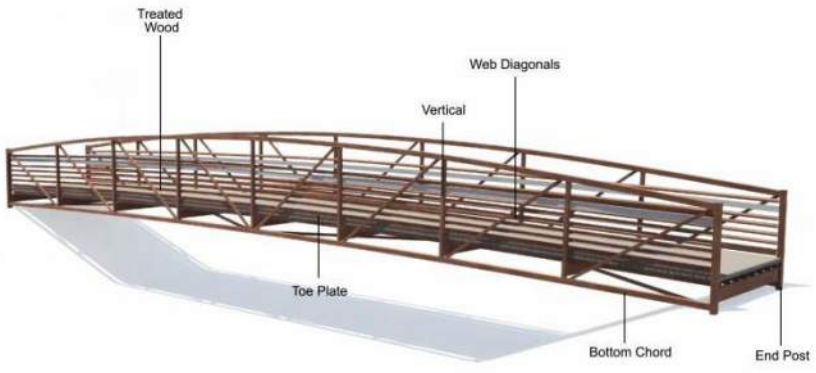


Image courtesy Wheeler, Bloomington, MN

3.2 OPTIONS 5 AND 5A CENTRAL MANITOU – PIER – SCHUETTE

Option 5, which is more centrally located, crosses the river in two long spans with a center pier located at the upstream tip of the island west of the high trestle railroad bridge. Exhibit 2.0 shows a conceptual plan and profile drawing for this option. At the south end a boardwalk would tie into the Ice Age Trail, pass over the floodplain, and then ramp up to the bridge. At the north end, providing over 10ft of clearance over the proposed Manitou to Spring Street Trail, which is an extension of the Rahr Family Trail, pushes the north touchdown high up the slope. A level trail could follow the contours to the east to meet up with the trail. The field between the parking lot and the railroad trestle can be used for staging construction on the north end. A barge would be needed for construction of the piers South side construction access would be via the Ice Age Trail with staging at the trail junction.

Option 5A shown in Exhibit 2.1, is like Option 5 except it crosses the river east of the high trestle railroad bridge. At the south end, a short segment of boardwalk would tie in directly with the existing Ice Age Trail. At the north end, the bridge blends in nicely with the proposed Manitou to Spring Street Trail near the top of the embankment. The pier layout minimizes disruption to the continuation of the Manitowoc River. The field between Michigan Avenue and the north end of the bridge can be used for construction access and staging.

Main spans – 240 ft (prefabricated)

The Box Truss provides optimum efficiency and offers an alternative appearance for medium to long spans. A parallel chord truss with diagonals in alternating directions creating a “W” pattern, it may or may not include vertical members. The Box Truss styles include overhead bracing which often reducing the overall bridge depth. Overhead bracing often reduces member sizes by adding stability and may be required for the longest spans.

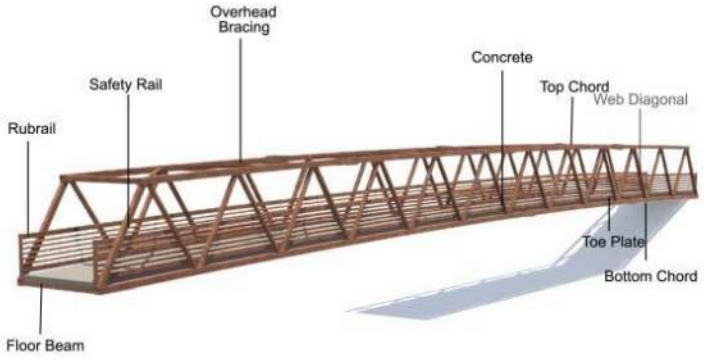


Image courtesy Wheeler, Bloomington, MN

Other prefabricated types that can span even longer such as a Signature Cable Stayed or Tied Arch were considered but were not as cost effective as the prefabricated truss types.

Decking - Prefabricated bridges have been decked with gravel, grass, paving stones, natural flag stone, various types of metal grating and asphalt. Grate decking is not usually used on pedestrian bridges as many pets won’t cross it during a walk, it may not meet ADA requirements, and some shoes sometimes become a trip hazard on open bar grating. The most common decks by far are wood and concrete. Poured in place concrete is a low maintenance choice and the preferred choice for this bridge. IPE wood, which is a tough, long lasting timber deck, is another good choice.

Material – For the steel truss, weathering steel provides an economical choice with a rustic appearance and little maintenance. The bridge will never require recoating and graffiti can be removed by light sand blasting. Painted finishes are typically more expense and require repainting in 10 – 15 years.

3.3 RECOMMENDATION

Option 5A offers the best location for crossing over the river and floodplains, and integrating with the trail system on either side of the river. Provide prefabricated steel box type trusses for the longest spans, and Modified Bowstring type trusses for the shorter spans fabricated with weathering steel finishes and concrete decks.

4.0 IMPLEMENTATION PLAN

4.1 POSSIBLE GRANT OPPORTUNITIES

The benefits to a prefabricated structure are lower cost and a simpler project. However, with a signature bridge and the tie-in to the trail system, the City may be able to attract additional funding sources and better engage the public. Funding development and fund raising; explores independent fund raising, and government/agency funding opportunities that may be available for financing the project. Capturing funds and knowing the funding sources helps with preparing project documents in a way that meet funding requirements. There is no overriding schedule for this process; however, each fund opportunity, application and award typically follows its own schedule set by the funding agency.

There are multiple sources of possible grant opportunities that may be applicable to this project based on our preliminary review, which includes, but is not limited to the following.

Funder	Program	About	Award Amount	Deadline
Wisconsin Department of Natural Resources (WDNR)	Recreational Trail Program	Funds for project development or maintenance of recreational trails. https://dnr.wi.gov/Aid/RTP.html	Up to 50% of project costs	May 1
	Land and Water Conservation Fund	Funding for the development of outdoor areas including parks, trails and recreation areas. http://dnr.wi.gov/aid/lwcf.html	Up to 50% of project costs	May 1
Wisconsin Department of Transportation (WisDOT)	Transportation Assistance Program	Funds projects that improve bicycle and pedestrian conditions http://wisconsindot.gov/Pages/doing-bus/local-gov/astnce-pgms/aid/funding-bp.aspx	Varying amounts	Summer
	Congestion Mitigation Air Quality Program	Funding for transportation projects that mitigate poor air quality. Almost all bike and pedestrian projects qualify. http://wisconsindot.gov/Pages/doing-bus/local-gov/astnce-pgms/aid/cmaq.aspx	For construction projects of $200,000+	Summer
Wisconsin Department of Administration (DOA)	Community Development Block Grants	Funding for facility and infrastructure projects for communities in WI. https://doa.wi.gov/Pages/LocalGovtsGrants/CommunityDevelopmentPrograms.aspx	50% of project costs, up to $500,000	June 25
Wisconsin Economic Development Corporation's (WEDC's)	[1] Community Development Investment (CDI) Grant	Funds for projects that support local businesses, downtowns, and revitalization. https://wedc.org/programs-and-resources/community-development-investment-grant/	25% of eligible project costs, with a maximum grant amount of up to $250,000.	Ongoing, contact WEDC Manager

[1] Would have to frame project as a stimulus for economic or community development.

4.2 PROJECT BUDGET

Based on the refined boardwalk, bridge, and trail lengths depicted in the conceptual drawings the order of magnitude construction budgets were updated. Detailed costs are presented in the Appendix.

Table 1 Summary of Probable Costs

Option	Construction Cost	Design, Permitting, CRS, Contingency, Management Reserve	Budget
2 Northern Tip Schuette – Manitou	$501,500.00	$274,200.00	$775,700.00
2A Northern Tip Schuette – Manitou			
5 Central Manitou – Pier – Schuette	$1,215,640.00	$585,700.00	$1,801,340.00
5A Central Manitou – Pier – Schuette			

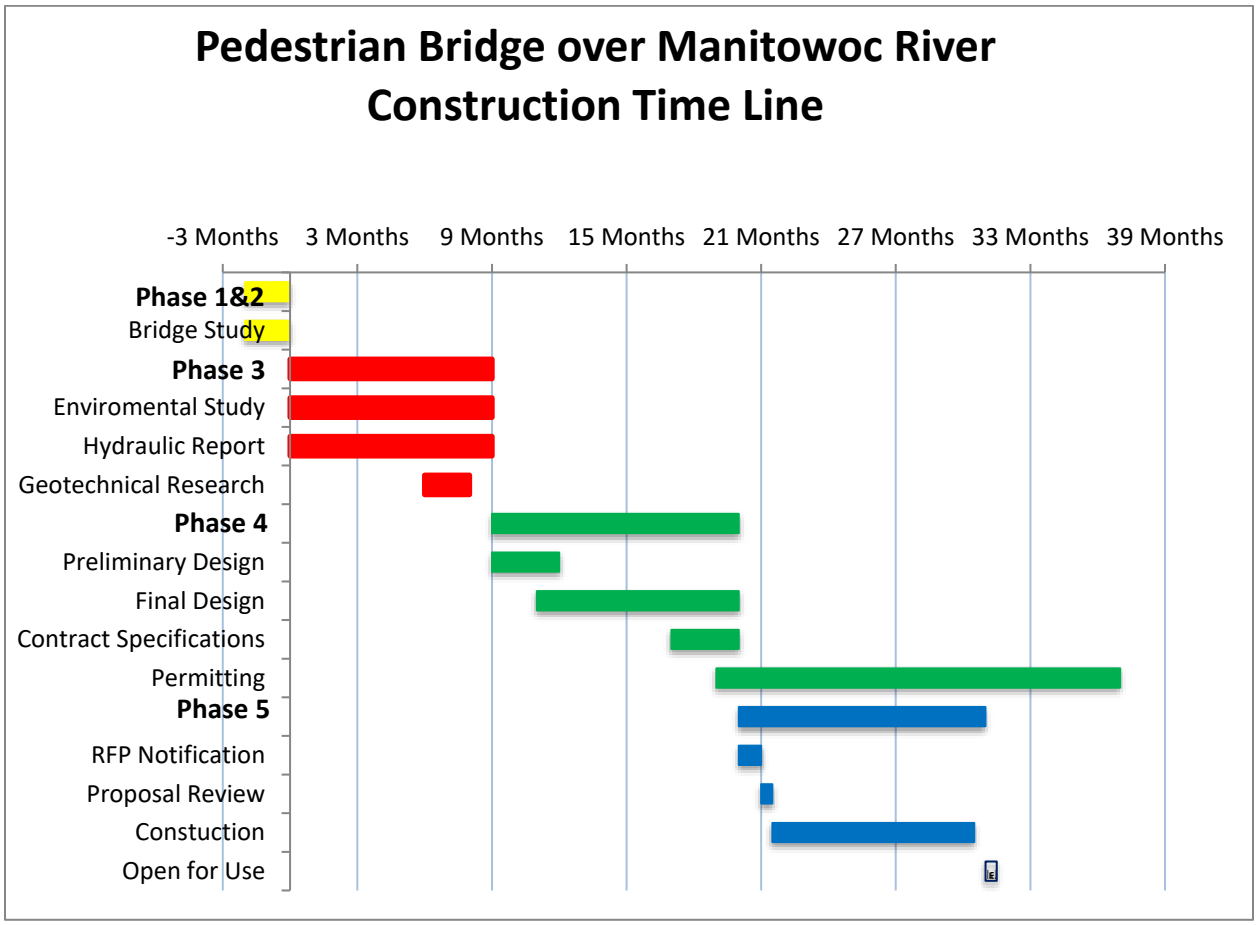
Optional Costs

- ❖ Pathway Lighting $xxxxx

4.3 PROJECT SCHEDULE

Project funding has not been identified at this time and can have a significant impact on the overall schedule. It should be noted that some funds such as state and federal funding, are tied to budget cycles. If this is the case, design and construction would need to meet scheduling constraints mandated by the funding source. The following is a general timeline of design and construction work and that could be expected after funding is in place.

Milestone List	Time Frame
Phase 1 Site Analysis	Completed
Phase 2 Bridge Concepts	Completed
Phase 3 • Environmental Study • Hydraulic Analysis • Soils Report	6 to 12 months
Phase 4 • Preliminary Design • Final Design • Contract Specifications • Permitting	8 to 12 months
Phase 5 • Request for Proposal Notification (RFP) • Proposal Review and Selection • Construction • Final Acceptance/Open for Use	6 to 12 months



The following is a review of each future phase and what is to be expected. **Phase 1 and Phase 2– site analysis and recommendations** are complete.

Phase 3 - Preliminary Engineering and Environmental Reports; is the phase where existing conditions are determined that will be used in the design. A geotechnical investigation to determine underlying soil conditions and foundation recommendations is undertaken. We recommend taking at least one soil boring per substructure. Hydraulic needs are examined, hydraulic implications are determined, final bridge location is set, substructure elements are determined, and environmental impacts are explored and mitigated. Studies may also include field surveys, utility locations, environmental reports, property determinations, permit requirements, and agency reviews.

Phase 4 - Preliminary Design, Final Design & Contract Documents; this entails all the documentation that are needed to publicly bid and construct the project.

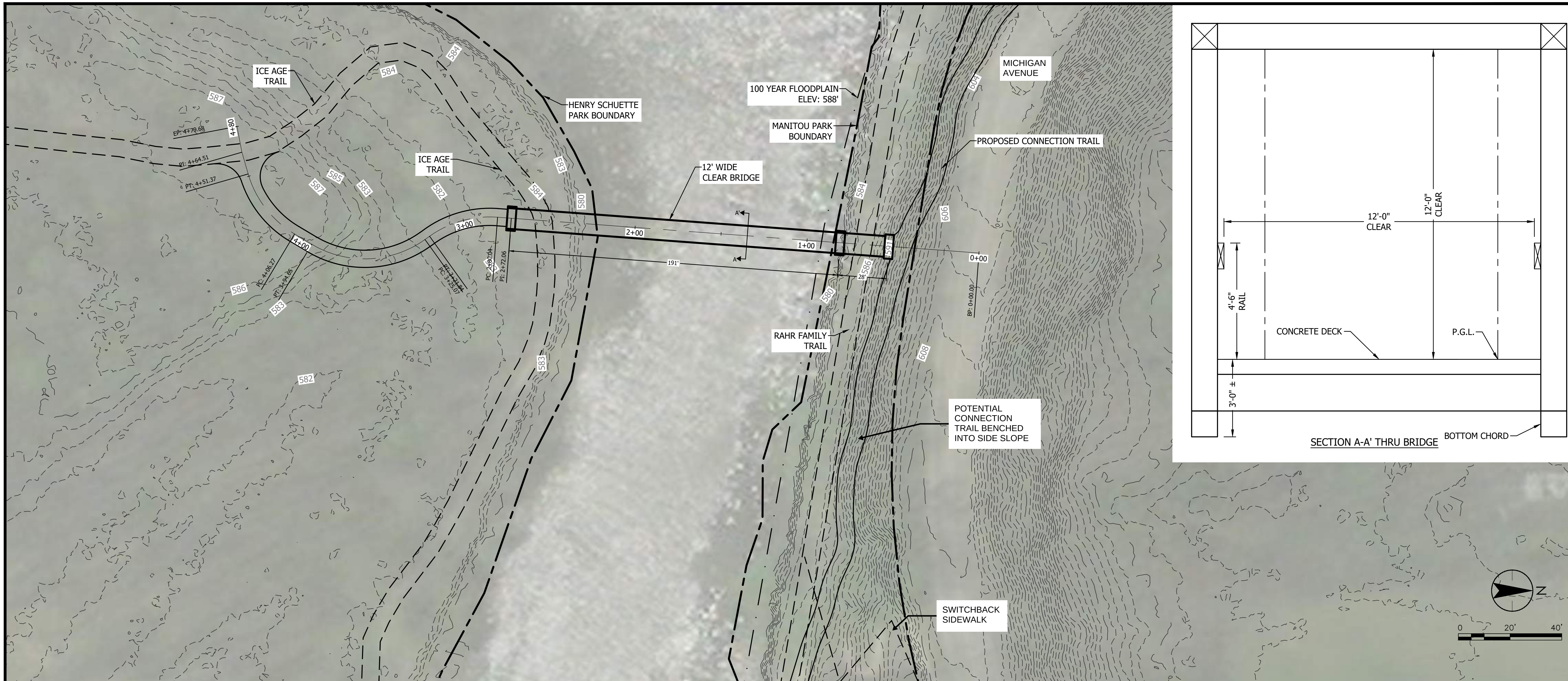
Preliminary design and plans show the location of the bridge, trails, walls and other project features; and how they will look and fit on the site. They are not used for construction but are used to obtain owner approval and help ensure that the project is in alignment with the owner's intent.

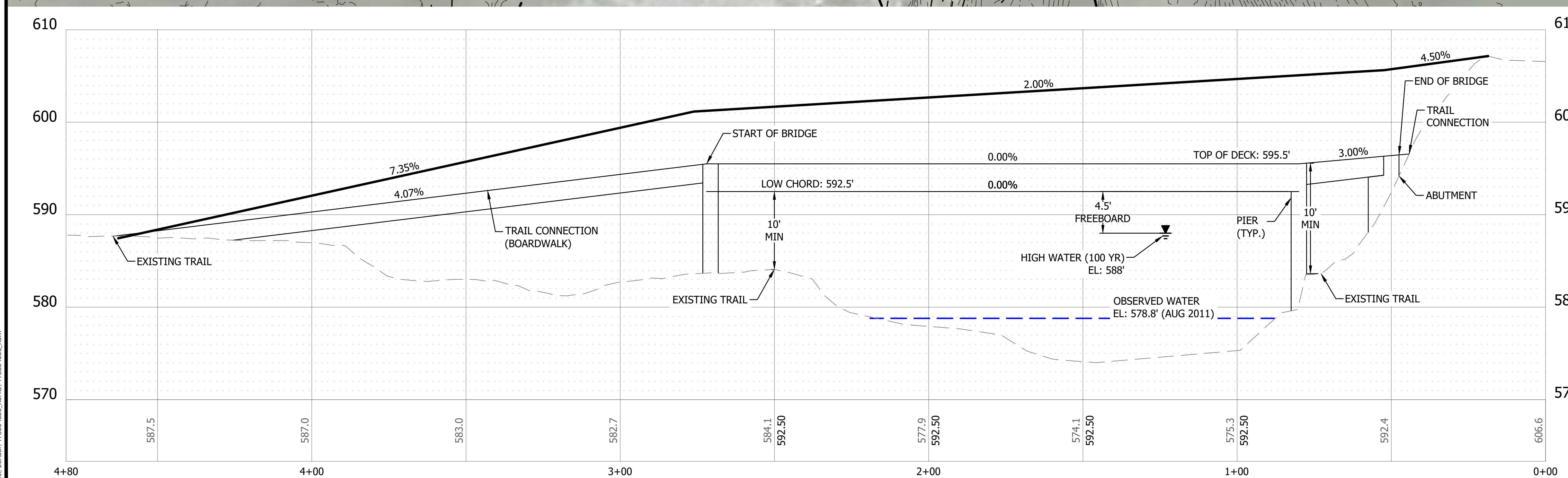
Final design and drawing production commences after the preliminary design is approved. Project drawings are updated to a final plans state and the additional details are added to complete the plan set. Technical specifications are written to supplement design details. A Project Manual combines contract documents, technical specifications and final plans, and is made available for public bid.

Phase 5 - Construction Services; publishing the Project Manual and advertising the Project for public bid, and construction.

Appendix

Exhibit No.	Title
1.0	Option 2
1.1	Option 2A
2.0	Option 5
2.1	Option 5A
3.0	Options
3.1	Floodplain Options 2 & 2A
3.2	Floodplain Options 5 & 5A
4.0	FEMA Parks
4.1	FEMA Broadway
5.0	Parks Proposed Manitou to Spring Street Trail Plan
6.0	Historical Landfill Sites
7.0	Probable Construction Costs and Budget





Stantec

12075 N. Corporate Parkway, Suite 200
Mequon, WI 53092
www.stantec.com

BRIDGE 2 - PLAN AND PROFILE

LOWER HENRY SCHUETTE PARK
CITY OF MANITOWOC
MANITOWOC, WISCONSIN

DATE OF ISSUANCE
March 2, 2020

PROJ. NO. 193804556

SHEET NUMBER
EX 1.0

Plot Date: 03/02/2020 - 12:27pm
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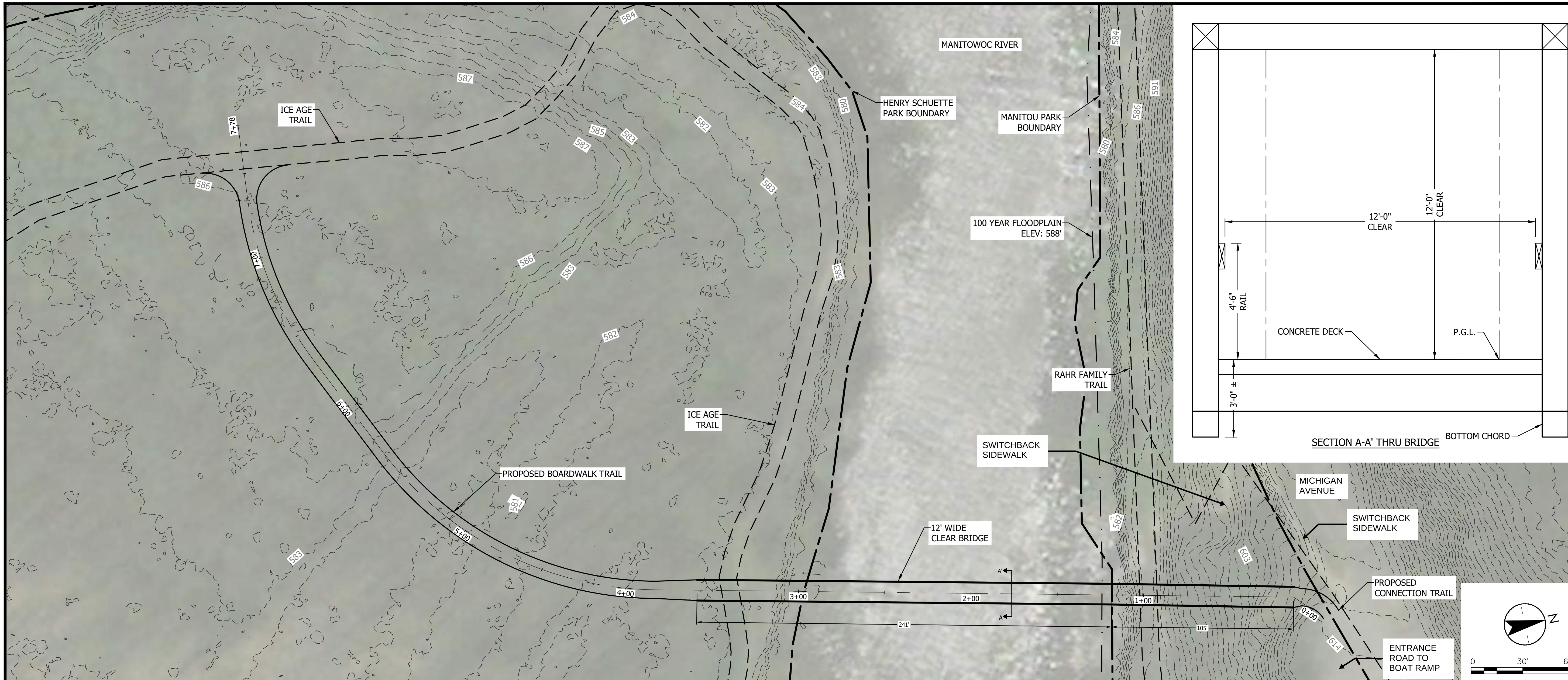
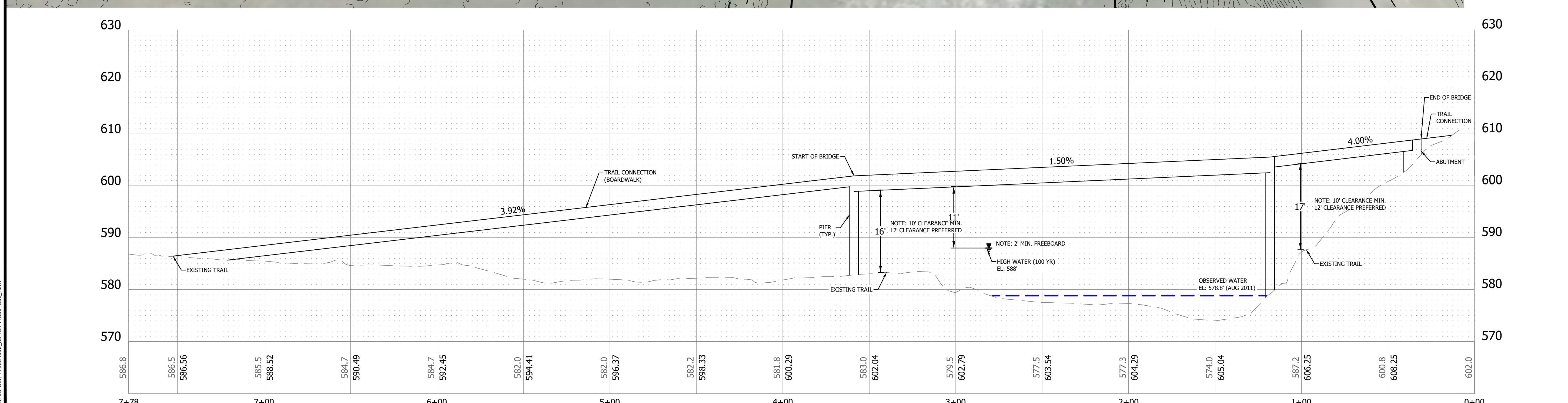
Xrefs: Border, 193804556_XSNO, 193804556_XSXT

THE CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS. DO NOT SCALE THE DRAWING - ANY ERRORS OR OMISSIONS SHALL BE REPORTED TO STANTEC WITHOUT DELAY. THE COPYRIGHTS TO ALL DESIGNS AND DRAWINGS ARE THE PROPERTY OF STANTEC. REPRODUCTION OR USE FOR ANY PURPOSE OTHER THAN THAT AUTHORIZED BY STANTEC IS FORBIDDEN.





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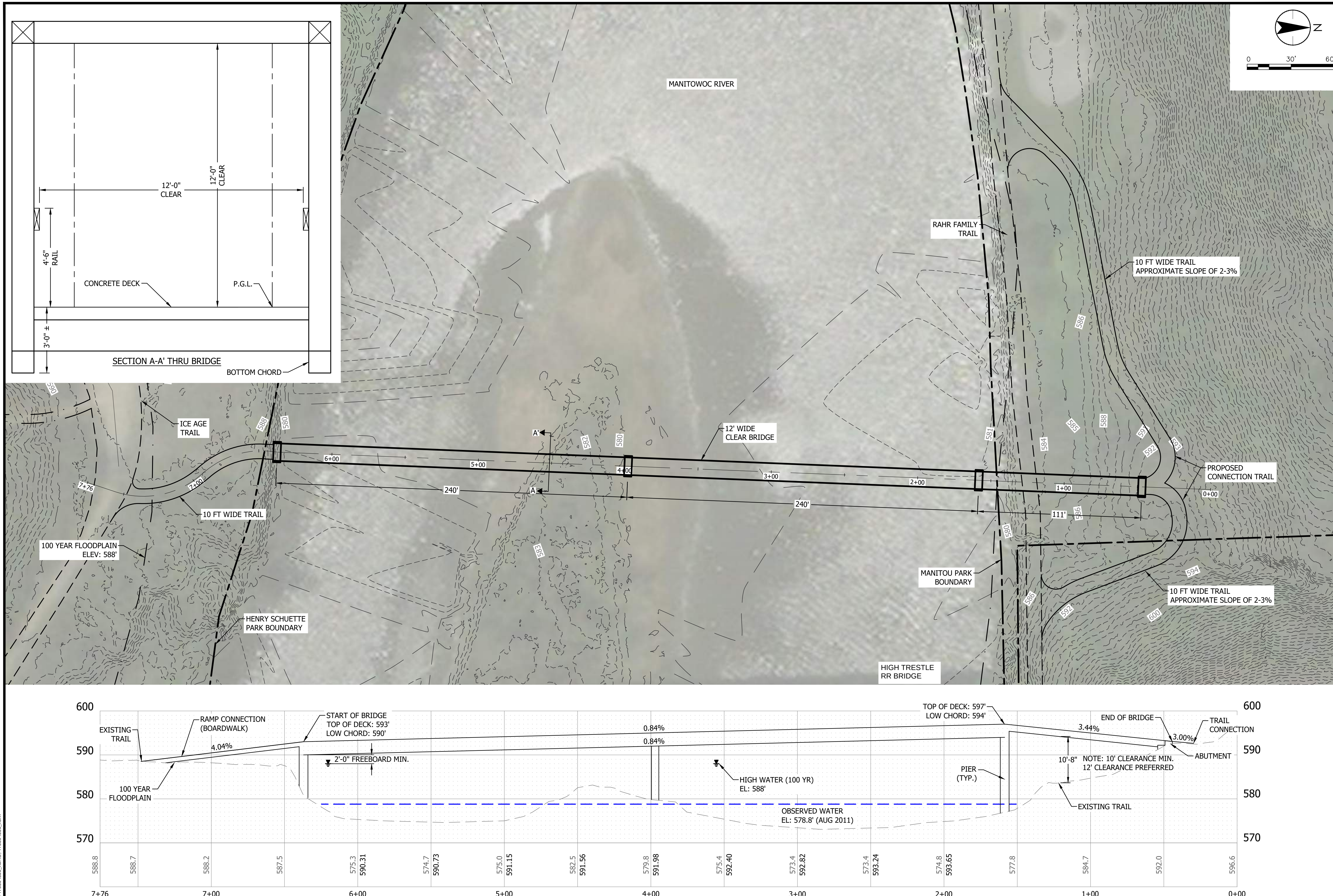
BRIDGE 2A - PLAN AND PROFILE

LOWER HENRY SCHUETTE PARK
CITY OF MANITOWOC
MANITOWOC, WISCONSIN

DATE OF ISSUANCE
March 19, 2020

PROJ. NO. 193804556

SHEET NUMBER
EX 1.1



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BRIDGE 5 - PLAN AND PROFILE
LOWER HENRY SCHUETTE PARK
CITY OF MANITOWOC
MANITOWOC, WISCONSIN

DATE OF ISSUANCE
March 2, 2020

PROJ. NO. 193804556

SHEET NUMBER
EX 2.0

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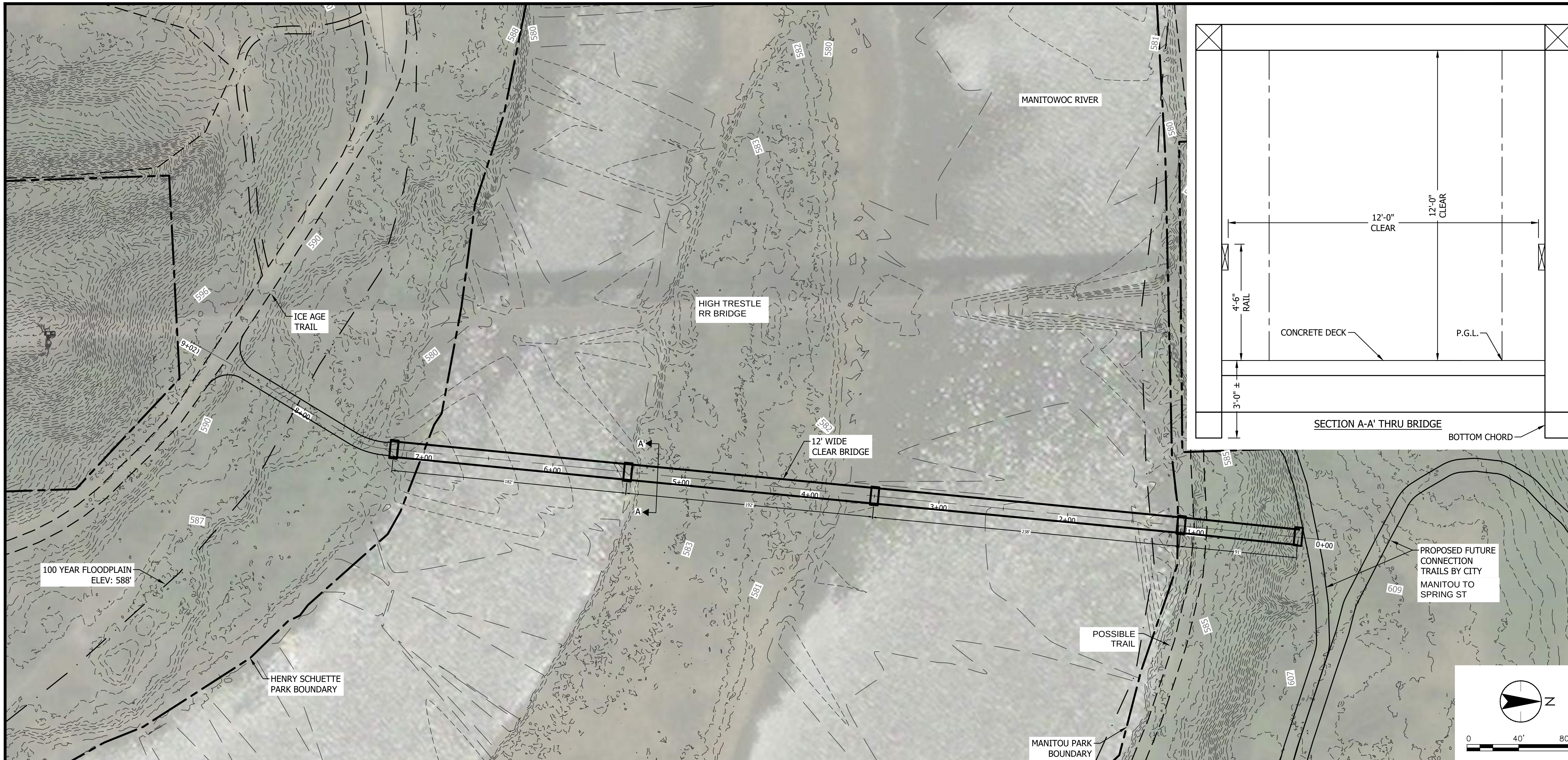

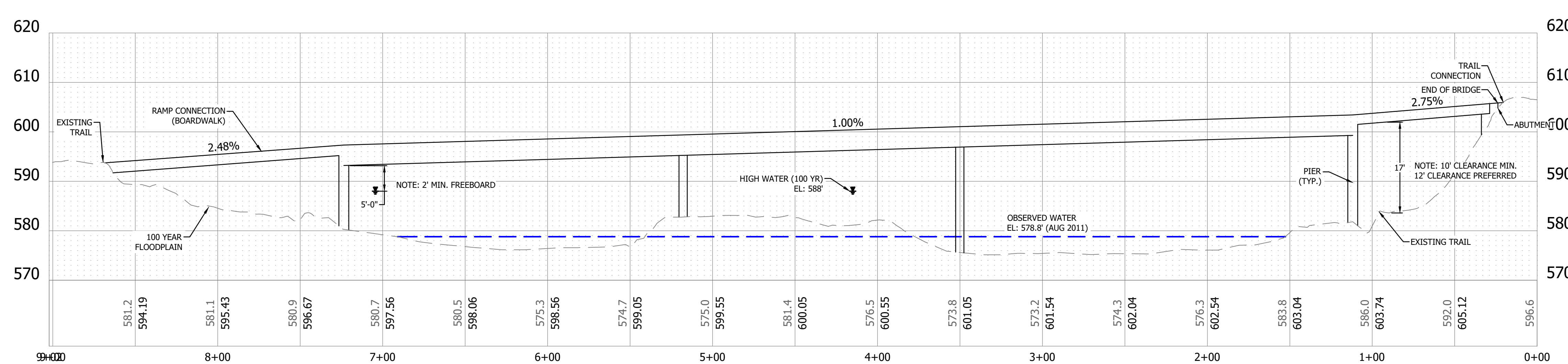

Stantec
12075 N. Corporate Parkway, Suite 200
Mequon, WI 53092
www.stantec.com

BRIDGE 5A - PLAN AND PROFILE

LOWER HENRY SCHUETTE PARK
CITY OF MANITOWOC
MANITOWOC, WISCONSIN

DATE OF ISSUANCE
March 19, 2020

PROJ. NO. 193804556

SHEET NUMBER
EX 2.1

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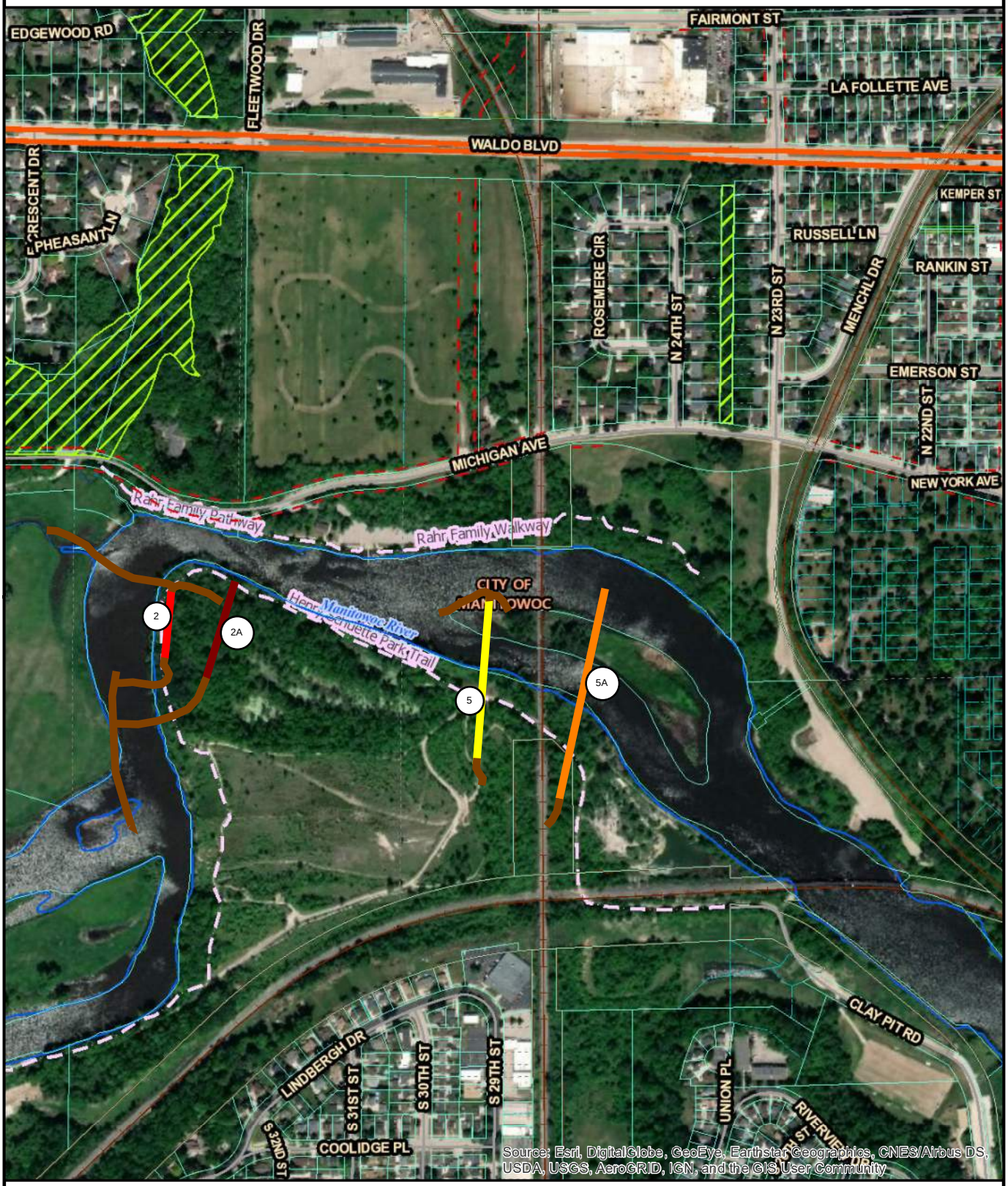


Author:
Date Printed: 3/24/2020

N

EXHIBIT 3.0
OPTIONS

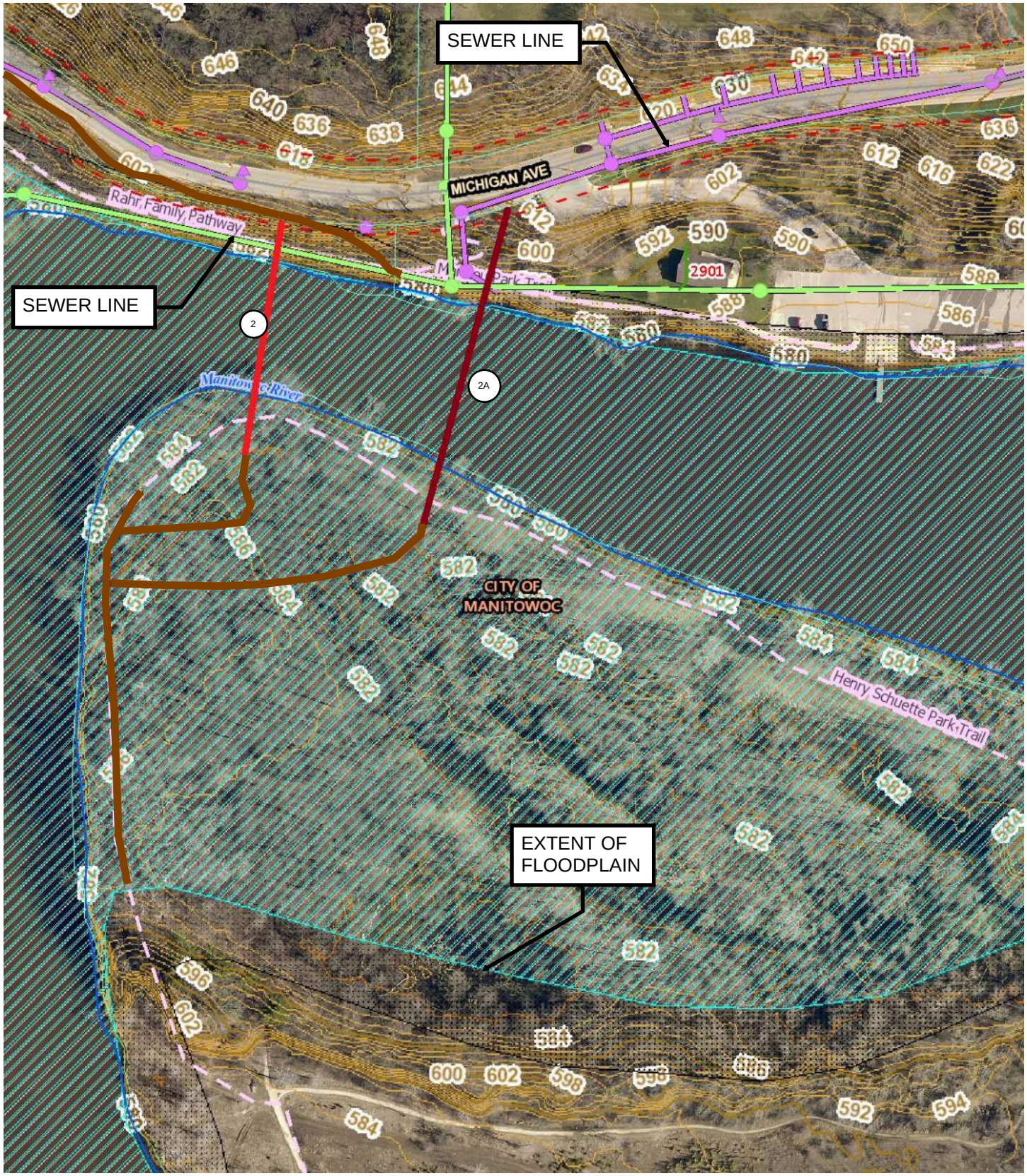
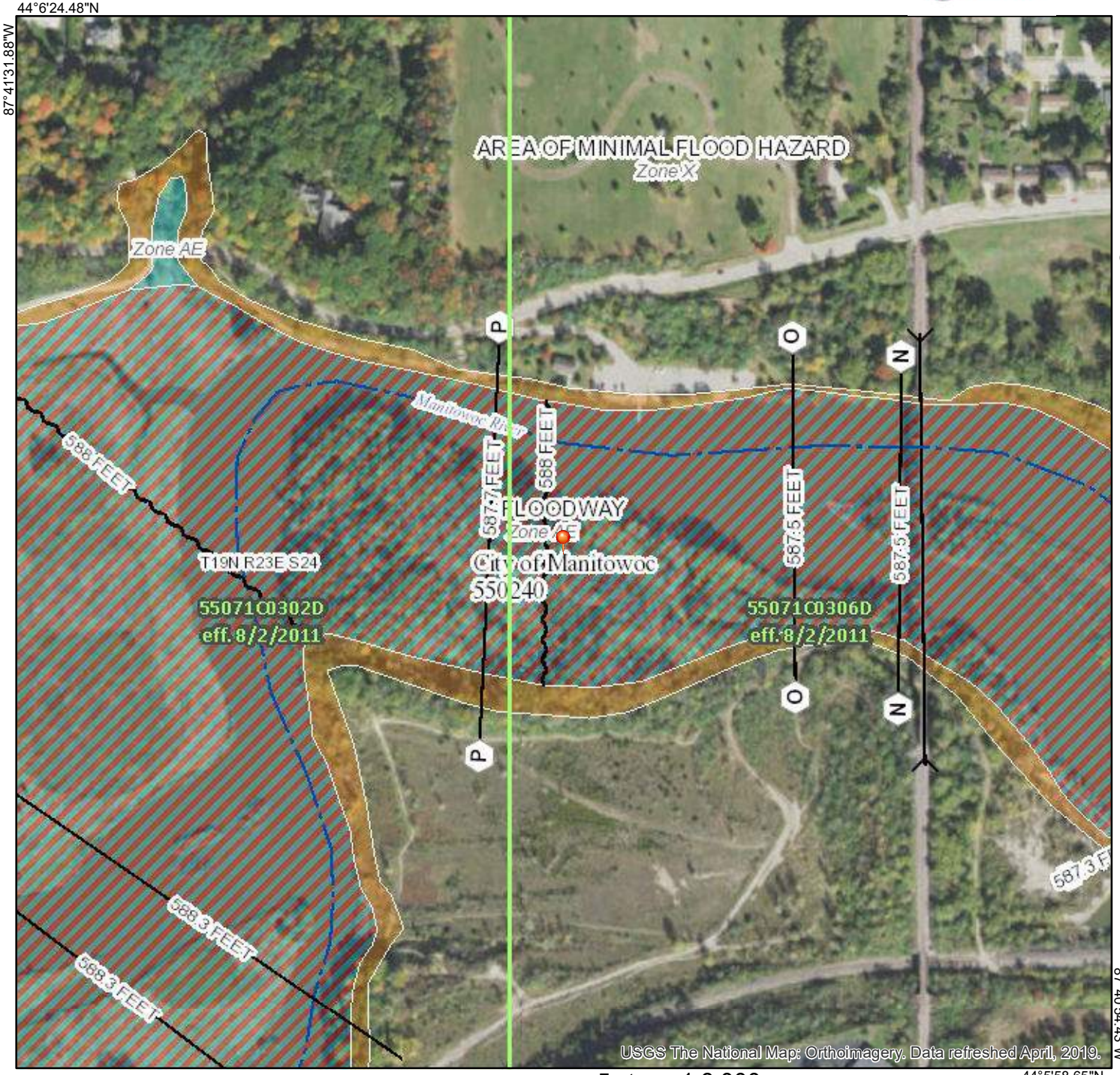


EXHIBIT 3.1
FLOODPLAIN
OPTIONS 2 & 2A

EXHIBIT 3.2
FLOODPLAIN
OPTIONS 5 & 5A

National Flood Hazard Layer FIRMette

FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

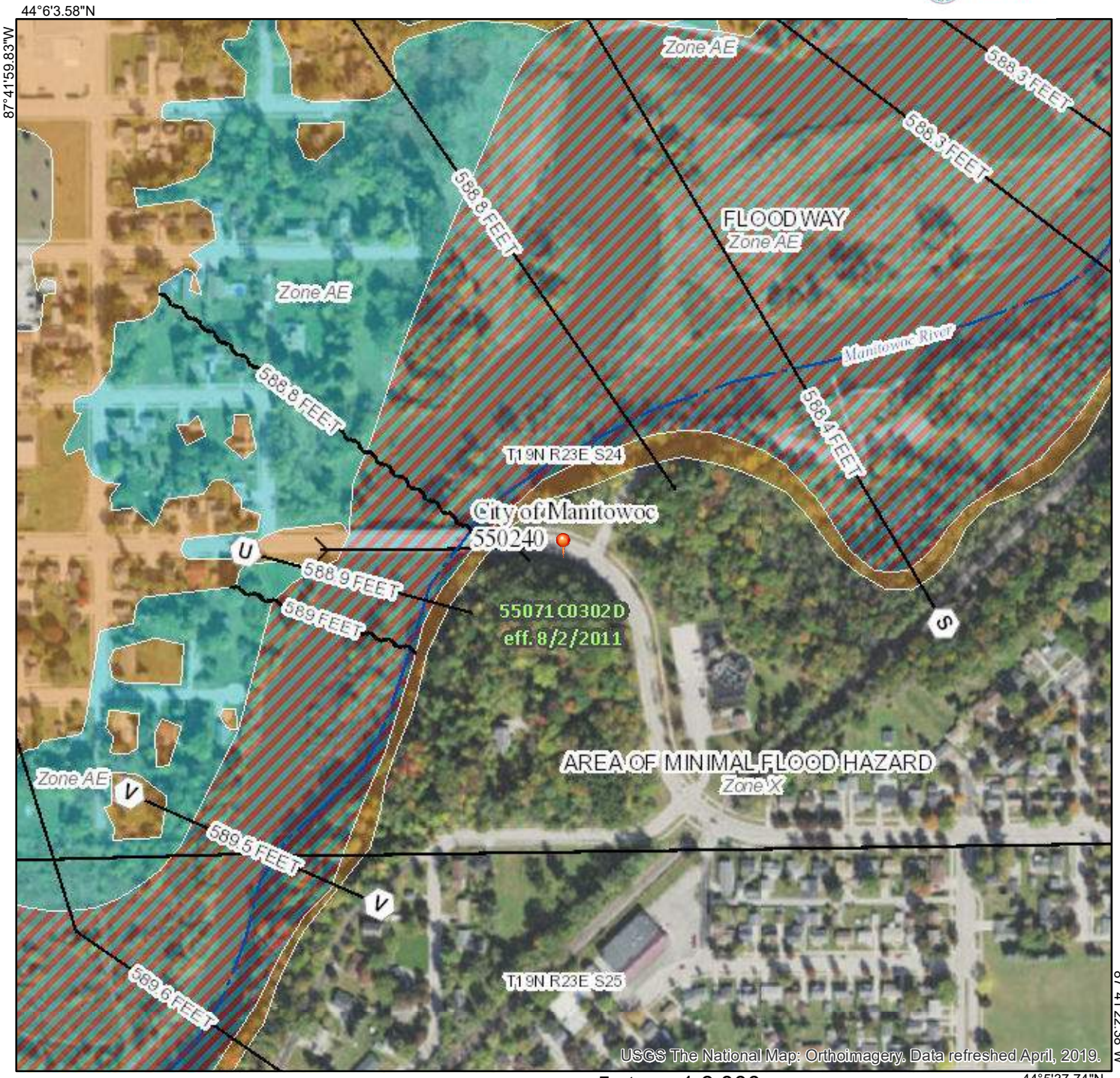
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/17/2020 at 6:51:58 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

EXHIBIT 4.0 FEMA PARKS

National Flood Hazard Layer FIRMette

FEMA



Feet

0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/17/2020 at 5:49:55 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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EXHIBIT 4.1 FEMA BROADWAY

Manitou Park to Spring Street Trail

Trail Options	Approx. Total Length
Option 1	4500'
Option 2	4150'

* Each segment length marked on map

740'

640'

2420'

450'

Railroad Bridge - possible pinch point
Option - reroute around, boardwalk, walk-only

CN Owned - Approval, Purchase, or Easement

CN Owned Bridge

Drainage Ditch -
Bridge or Culvert needed

Weigh Station & Storm Catch Basin

ZONE AE

ZONE X

Manitou Park to Spring Street Trail
City of Manitowoc, WI

EXHIBIT 5.0 PARKS PROPOSED TRAIL

Aerial Flight - Spring 2017
Prepared by City of Manitowoc
Community Development Department
www.manitowoc.org
Map Plotted: 1/27/2020
X:\Maps\Parks\Bike Trails\CN_SpringSt_Trail.mxd

Legend
DNR_Wetlands_2013
FEMA
Flood Zones
100 Year Flood - Base Flood Elevations Determinted - Zone AE
500 Year Flood - 2% Annual Chance of Flood Hazard - Zone X

N

100 50 0 100 200 300
Feet

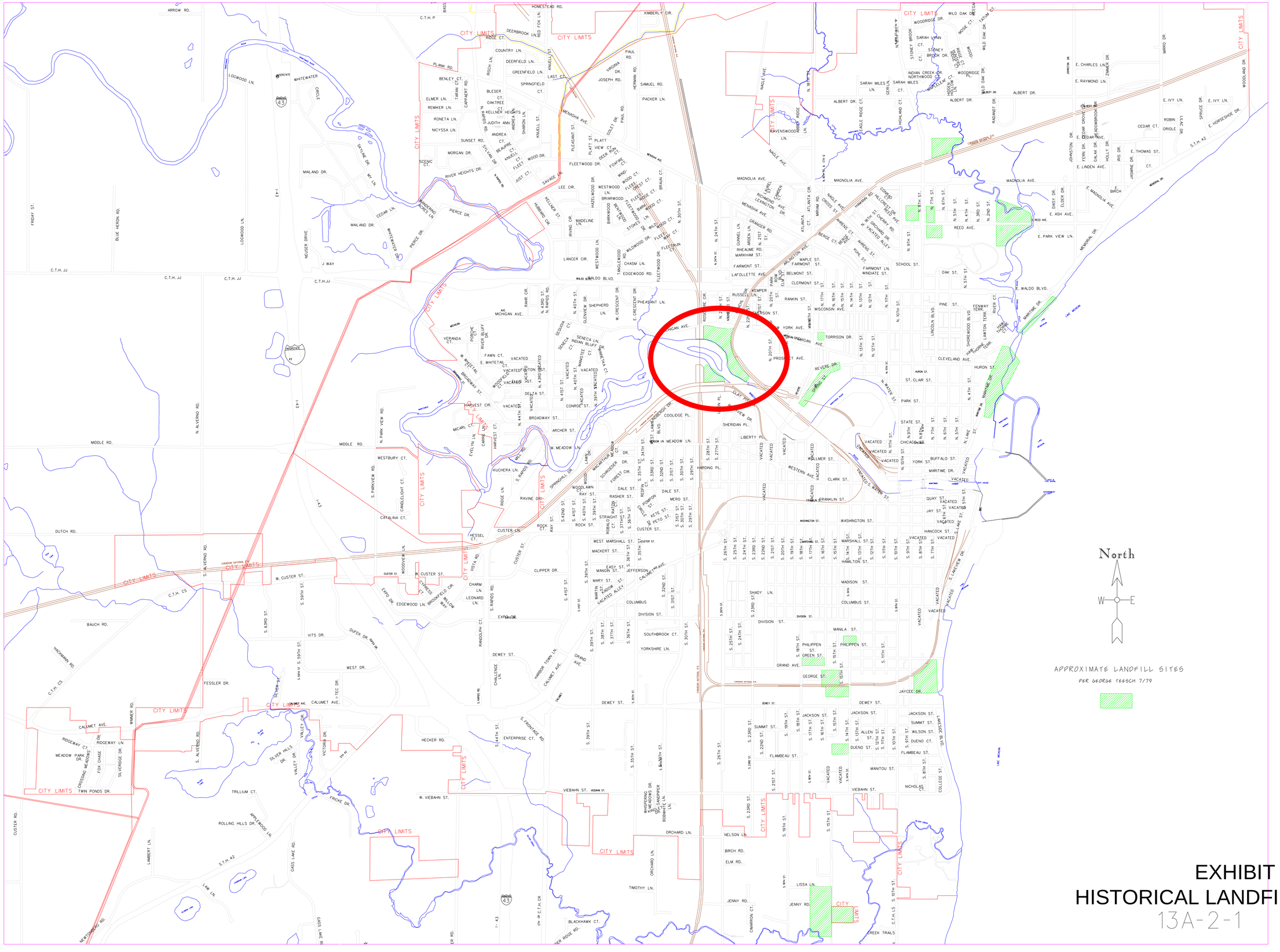

EXHIBIT 6.0
HISTORICAL LANDFILLS
13A-2-1

Opinion of Budget - Order of Magnitude Level, Phase 2
Lower Schuette Park Bridge Study
City of Manitowoc, Wisconsin
4/7/2020

Alternative/Description		Range for Construction Cost			Design	Permitting	Construction Related Services	Construction Contingency	Management Reserve	Budget **
		Optimistic	Most * Likely	Pessimistic						
2. Northern Tip Schuette - Manitou										**$1,510,300.00**
A. Boardwalk		$264,600.00	**$ 294,000.00**	$323,400.00	$58,800.00	$5,900.00	$14,700.00	$36,800.00	$44,100.00	$454,300.00
Comment	75 ft south plus raise Ice Age above floodplain									
Type	Timber boardwalk									
Comment	Over floodplain to Ice Age Trail									
B. Steel Truss Prefabricated Bridge		$477,360.00	**$530,400.00**	$583,440.00	$106,100.00	$10,700.00	$26,600.00	$66,300.00	$79,600.00	$819,700.00
Length	230 ft total (60 ft/148 ft/22 ft)									
Type	Box & Bowstring trusses , concrete deck									
Touchdown 1	North - Hillside									
Touchdown 2	South- build up from ex trail to EL 593.0									
Comment	Span 1 provide 8 ft clear over Rahr Family pathway									
C. Trail		$135,000.00	**$150,000.00**	$165,000.00	$30,000.00	$7,500.00	$7,500.00	$18,800.00	$22,500.00	$236,300.00
Length	250 ft									
Type	Paved with walls cut into steep slope									
Comment	100 ft tie to east sidewalk, 150 ft switchback west, both to paved trail									
5. Central Manitou – Pier- Schuette										**$2,145,790.00**
A. Boardwalk		$37,800.00	**$ 42,000.00**	$46,200.00	$8,400.00	$900.00	$2,100.00	$5,300.00	$6,300.00	$65,000.00
Comment	75 ft south									
Type	Timber boardwalk									
Comment	Over floodplain to Ice Age Trail									
B. Steel Truss Prefabricated Bridge		$1,257,930.00	**$ 1,397,700.00**	$1,537,470.00	$186,400.00	$28,000.00	$69,900.00	$174,800.00	$209,700.00	$2,066,500.00
Length	585 ft total (85 ft/250 ft/250 ft)									
Type	Box & Bowstring trusses , concrete deck									
Touchdown 1	North - north of Rahr Family pathway, EL 592.5									
Touchdown 2	South- slope walk 6 ft above grade, EL 593.0									
Comment	Span 1 provide 8 ft clear over Rahr Family pathway									
C. Trail		$8,001.00	**$ 8,890.00**	$9,779.00	$1,800.00	$500.00	$500.00	$1,200.00	$1,400.00	$14,290.00
Length	127 ft east or 186 ft west									
Type	Crushed stone									
Comment	follow contours to east, switchbacks to west									

Width of bridges and trails 10 ft
100 year High Water EL = 588.1 at Broadway Street. Assume Low Chord of bridges is set at EL 590 to provide 2 ft of freeboard
* Probable construction based on square foot costs
** Order of Magnitude Budget value uses most likely construction cost

Opinion of Budget - Order of Magnitude Level, Phase 2
Lower Schuette Park Bridge Study
City of Manitowoc, Wisconsin
4/7/2020

Alternative/Description		Range for Construction Cost			Design	Permitting	Construction Related Services	Construction Contingency	Management Reserve	Budget **
		Optimistic	Most * Likely	Pessimistic						
2A. Northern Tip Schuette - Manitou										**$1,707,520.00**
A. Boardwalk		$264,600.00	**$ 294,000.00**	$323,400.00	$58,800.00	$5,900.00	$14,700.00	$36,800.00	$44,100.00	$454,300.00
Comment	325 ft south plus raise Ice Age above floodplain									
Type	Timber boardwalk									
Comment	Over floodplain to Ice Age Trail									
B. Steel Truss Prefabricated Bridge		$728,028.00	**$808,920.00**	$889,812.00	$161,800.00	$16,200.00	$40,500.00	$101,200.00	$121,400.00	$1,250,020.00
Length	346 ft total (105 ft/241 ft)									
Type	Pratt truss, timber deck									
Touchdown 1	North - Hillside									
Touchdown 2	South- build up from ex trail to EL 593.0									
Comment	Span 1 provide 8 ft clear over Rahr Family pathway									
C. Trail		$1,800.00	**$2,000.00**	$2,200.00	$400.00	$100.00	$100.00	$300.00	$300.00	$3,200.00
Length	10 ft									
Type	Paved									
Comment	10 ft tie to switchback sidewalk									
5A. Central Manitou – Pier- Schuette										**$2,578,330.00**
A. Boardwalk		$45,360.00	**$ 50,400.00**	$55,440.00	$10,100.00	$1,100.00	$2,600.00	$6,300.00	$7,600.00	$78,100.00
Comment	90 ft south									
Type	Timber boardwalk									
Comment	Over floodplain to Ice Age Trail									
B. Steel Truss Prefabricated Bridge		$1,520,694.00	**$ 1,689,660.00**	$1,858,626.00	$225,300.00	$33,800.00	$84,500.00	$211,300.00	$253,500.00	$2,498,060.00
Length	703 ft total (91 ft/238 ft/192 ft/182 ft)									
Type	Box truss bridges, timber deck									
Touchdown 1	North - south of field connectinng to Mich. Ave, EL									
Touchdown 2	South- slope walk 6 ft above grade, EL 597.0									
Comment										
C. Trail		$1,143.00	**$ 1,270.00**	$1,397.00	$300.00	$100.00	$100.00	$200.00	$200.00	$2,170.00
Length	10 ft north to proposed Manitou to Spring Street Trail									
Type	Paved									
Comment	connects directly to Manitou to Spring treet Trail									

Width of bridges and trails 10 ft
100 year High Water EL = 588.1 at Broadway Street. Assume Low Chord of bridges is set at EL 590 to provide 2 ft of freeboard
* Probable construction based on square foot costs
** Order of Magnitude Budget value uses most likely construction cost