Services for

Feasibility Report: Recreational Bridge Crossing, Mississippi River

Prepared for:
Minneapolis Park and Recreation Board (MPRB)

Mississippi River Crossing
MPRB

Prepared by:

WEST 8 sbp BARR TC^2

Feasibility Report: Recreational Bridge Crossing, Mississippi River

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Source: MWMO Drone Photo

1.1 About the Project

Project Overview

About the Project

The Minneapolis Park & Recreation Board (MPRB) and many other organizations seek to fill a longstanding gap in the regional trail system between North and Northeast Minneapolis. Currently, the Lowry Avenue Bridge and the Plymouth Avenue Bridge are the only bicycle and pedestrian-friendly routes crossing the Mississippi River north of Nicollet Island in Minneapolis.

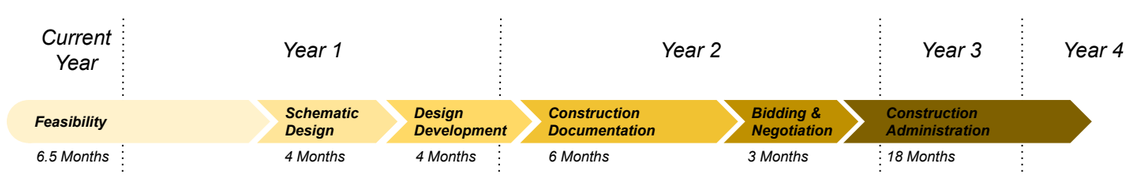
The Great Northern Greenway lays halfway between Lowry and Plymouth Avenues and travels east-west across the width of Minneapolis, but does not cross the Mississippi River. In North Minneapolis, it connects Theodore Wirth Regional Park to the river along 26th Avenue N, and in Northeast it connects the Minneapolis Diagonal Trail to the river, generally along 18th Avenue NE. Previous planning efforts by multiple agencies propose a trail crossing that utilizes the south half of an existing BNSF Railway Bridge, about 500 feet south of the greenway. The project team will address the unworkable prospects of using the BNSF bridge, including its age, modifications required to safely add a trail next to an active freight line, the full or partial reuse of the bridge structure with no freight rail use, and an uncertain timeline associated with any given option.

This project seeks to better understand the requirements of a new river crossing upstream of the BNSF bridge and explore the possibilities of connecting two neighborhoods to each other and to the Mississippi River. As an MPRB-led initiative, this river crossing can be more aligned with the characteristics of a park, not just a transportation conduit. The bridge and its connective landscapes can be artful and fun but must also be obtainable and constructible. The MPRB is pursuing a bridge study and conceptualization to:

- Connect people to, across, and along the Mississippi River.
- Heal inequitable access to natural resources, open space, and regional connections.
- Create a space more aligned with the characteristics of a park, not a vehicular corridor.
- Create a connection that is ecologically driven, and reverses past human-caused impairments of the river's banks.

The MPRB will be informing the public of the progress throughout the feasibility portion of work, then transition to more in-depth community engagement to help create concepts for the bridge crossing and its connections to the neighborhoods on either side of the river. The MPRB will use this feasibility report to as a starting point to discuss project funding from multiple sources.

Estimated Project Schedule



Purpose of a Feasibility Report

The feasibility report is a starting point for collecting and assembling relevant data, analysis of that data, and to be a tool for framing discussions with members of the community, project stakeholders, and regulatory agencies. The report will be expanded as new information and details are discovered, and a design direction is established. It is not intended as a rigid tool, but a working document that allows the project to maintain its baseline framework while pivoting to accept input and challenges as they are encountered.

The feasibility report documents ongoing due diligence work, including reviewing and compiling site parameters, timelines for design and construction, and general constraints to ensure an informed process for the realization of the project. It also outlines general guiding parameters of the site related to geotechnical, civil, structural, and environmental engineering of the new bridge.

Project Team

Minneapolis Park & Recreation Board

Project Owner, Community Engagement, Visioning

WEST 8	sbp schlaich bergermann partner	BARR	TC^2
Landscape Architecture, Urban Design, Public Realm, Bridge Form Conceptualization	Bridge Engineering and Design, Lighting	Permitting, and Environmental, Civil, and Geotechnical Engineering	Community Engagement

1.1 About the Project

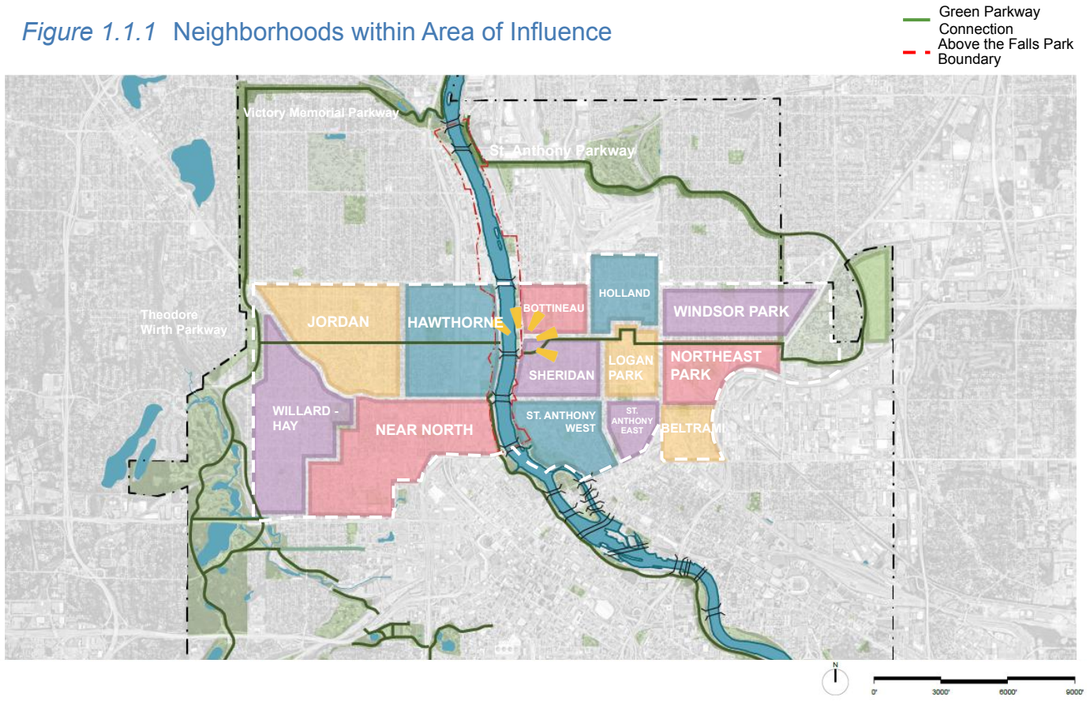
Project Overview

Community, Neighborhood, and Site Scale

To contextualize the proposed crossing and its potential benefits to the adjacent communities, MPRB and the project team are studying an area of influence that prioritizes neighborhoods along the Great Northern Greenway. The intent of this analysis is to better understand how a river crossing could support community destinations and multimodal transportation, as well as contribute to the integrity of the city's overall open space and regional trail network.

As outlined below, the area of influence covers the neighborhoods of Jordan, Hawthorne, Willard-Hay, Near North in the Near North Minneapolis community district, and Bottineau, Holland, Sheridan, Logan Park, Northeast Park, St. Anthony West, St. Anthony East & Beltrami in the Northeast Minneapolis community district.

Figure 1.1.1 Neighborhoods within Area of Influence



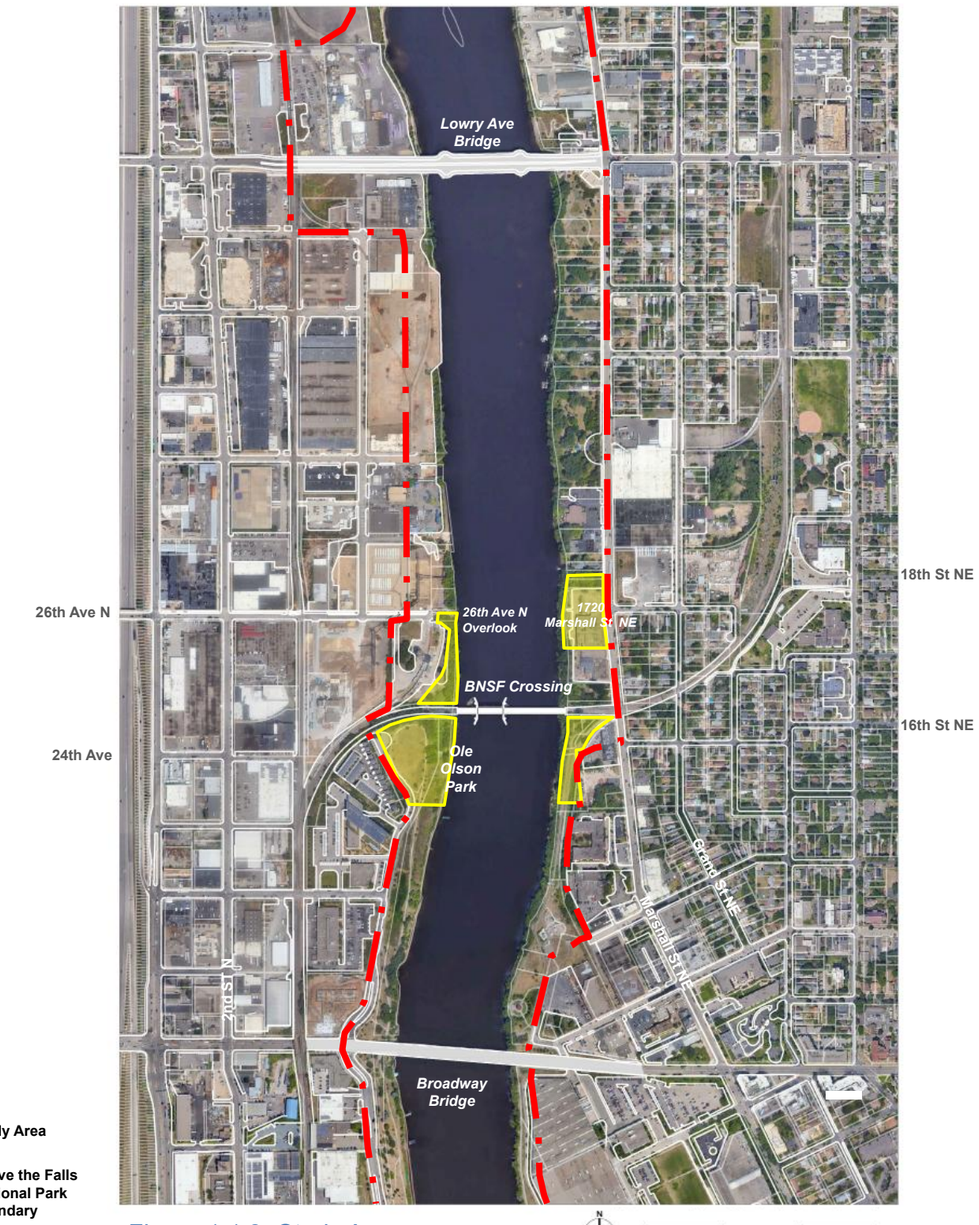


Figure 1.1.2 Study Area within Above the Falls Regional Park

1.1 About the Project

Project Overview

Study Area

The study area is approximately 800-feet downstream from the US Army Corps of Engineers' 856 mile marker of the Mississippi River. This section of the river is being studied to determine the feasibility for a new, recreational (non-vehicular) crossing which is approximately aligned with 26th Ave N on the west bank of the river and 18th Ave NE on the east bank.

The MPRB currently has a use permit with the City of Minneapolis (City) to operate a park at the terminus of 26th Ave N, where the new 26th Avenue North Overlook now sits. The Overlook is a new space that introduces northside residents and trail users to the river. It is assumed the bridge's western end would land near this site. The MPRB and Continental Cement have agreed to a riverfront easement just south of the Overlook and is currently undergoing negotiations with BNSF to acquire an easement under their bridge, each allowing for the construction of a new trail that connects existing trails at the Overlook and Ole Olson Park. The MPRB owns 1720 Marshall St NE on the east bank of the river within Above the Falls Regional Park. The riverfront site has a derelict, two-story brick building requiring demolition and terraced parking lots that step down towards the river. It is assumed the bridge's eastern end would land at this site.

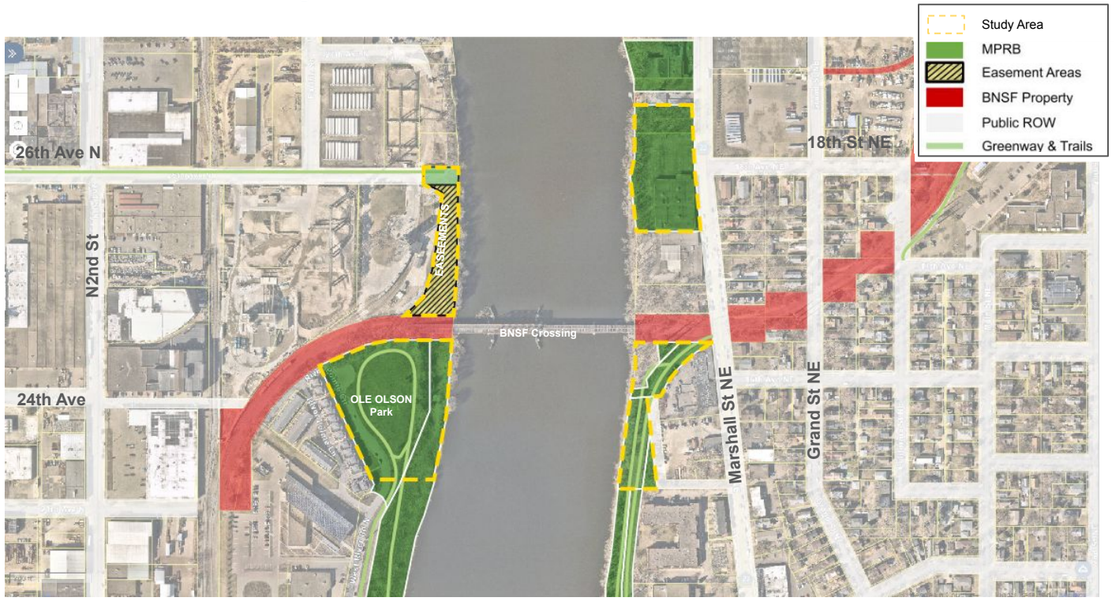


Figure 1.1.3 Study Area and Adjacent Land Ownership

Google Maps Link to Project Site

Adjacent Crossings

Lowry Street Bridge

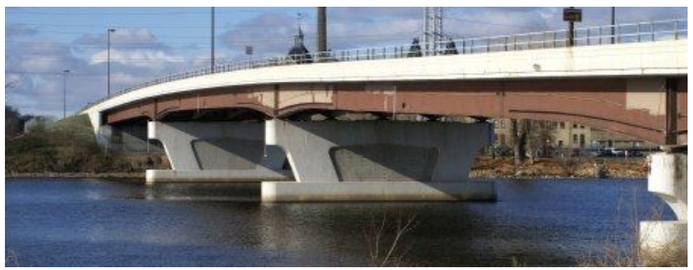
- Built: 2012
- Type: Steel tied-arch
- Span: 450ft
- Height: 37ft
- Length: 1576ft

The Lowry Avenue Bridge is a steel tied-arch bridge over the Mississippi River. Construction of the this new bridge began in 2010 and was completed in 2012. The crossing includes two protected, 12 foot trails on either side for pedestrians and bicyclists.

BNSF Bridge

- Built: 1884
- Type: Girder, truss
- Span: 192ft
- Height: 27ft
- Length: 801ft

The bridge in closest proximity to the study area is the BNSF Minneapolis Rail Bridge, a combination plate girder and truss structure that spans the Mississippi River. This bridge is the northernmost of the two BNSF Bridges in Minneapolis. Its construction and structure has been modified since the original construction, notably in 1963, it was rebuilt with a Warren Truss in place of two girders.



Broadway Avenue Bridge

- Built: 1987
- Type: Girder bridge
- Span: 186ft
- Height: 22ft
- Length: 857ft

Broadway Avenue Bridge is a steel girder bridge, with a concrete deck. The bridge design features a modern, streamlined profile, with tapered concrete piers. A regional trail crosses beneath the bridge structure, with low clearance. This bridge mainly accommodates vehicular travel with two travel lanes in each direction. A 7' unprotected sidewalk on either side provides access for pedestrians and bicyclists.

1.2 Executive Summary

Overview and Recommendations

Executive Summary

The MPRB is pursuing a new recreational (non-vehicular) crossing over the Mississippi River adjacent to the north side of the existing BNSF Railway bridge. As this bridge design develops, the project team will follow a set of working goals which members of the community have helped shape:

- Make it comfortable for people walking, biking, and rolling.
- Create spaces for people to gather.
- Celebrate the history and culture of communities on both sides of the river.
- Promote connections to the environment and river.
- Consider the impact of past city planning decisions and environmental injustices

BNSF Bridge Opportunity

No new crossings have been constructed over the Mississippi River since 1977 due to the prioritization for adaptive reuse of existing bridges or the construction of parallel crossings that partially reuse foundations or structures of existing bridges. The BNSF Railway Bridge is a vital linkage for manufacturing and commerce within the immediate site area, necessitating its continued ongoing use as a railway. Retrofitting the BNSF Bridge for parallel or shared use (both regional trail and railway on existing structure) is both economically and logistically prohibitive, presenting numerous safety and environmental challenges and therefor necessitating the consideration of a new crossing, generally within the BNSF bridge's existing bridge corridor, that is dedicated to pedestrians and cyclists.

Site Overview and Suitability

The proposed study area, as indicated on Figure 1.1.2, outlines the optimal location for a new recreational bridge, derived from the connective opportunities of existing trail systems, available land, and from connections that prioritize neighborhoods historically disconnected from the river and other destinations. These site qualities, in combination with a lack of naturally occurring bluff ecotones and opportunity for direct access to the river, further underscore the suitability of this location. The appended environmental reviews outline the need for further study to determine the optimal alignment for a new crossing and required engineering assessments to determine the extent of rehabilitation measures to restore and improve soils and the riparian landscape.

Project Parameters and Agencies Having Jurisdiction

Due to the unique nature of this project, continued engagement with agencies having jurisdiction and parameters governing the Mississippi waterway and study area is required. The project schedule reflects an expected timeline to address input and guidance.

Typologies of Bridge Crossing and Cost

The driving factors for determination of a suitable bridge typology and accompanying opinion of cost;

1. External Factors (limited control by project team) - Length, site conditions (geotechnical), cost of labor, material, and transport
2. Structural Factors (partial control by project team) - Span, width, maintenance vehicle size
3. User Experience Factors (significant control by project team) quality and extent of designed elements

The feasibility report is to be used as a starting point for conversations with potential funding or programming partners. It outlines a high/mid/low opinion of cost based on several variables that are yet to be determined. Based on the report's information and guidance, the MPRB will assume a project cost, to which the project will be designed.

Source: Project Team, MPRB

Figure 1.2.1 Select Photos From Project Team Tour of Adjacent Sites

1.3 BNSF Bridge

Feasibility of Structure Reuse or Adaptation

Summary of BNSF Reuse Opportunity

Adjacent to the immediate study area is the existing BNSF Railway Bridge, an active Class I railroad providing a connection over the Mississippi River for material transport, and is the northernmost of the BNSF bridges in Minneapolis. An important component of the feasibility report and for the project team in general is a due diligence review to exclude the potential of adaptive reuse for the BNSF bridge. Throughout this review it is important to state that MPRB and the project team does not propose to reuse the existing BNSF bridge for pedestrian use.

In addition to field review and observation, the project team consulted regional studies on adaptive reuse of existing railway bridges and the BNSF Railway Public Projects Manual, specifically the guidelines for rail grade separation projects. The manual provides rules and regulations for those wishing to implement construction and improvement projects that may potentially involve BNSF Railway property. In addition to the restrictions set out by the owners of the BNSF Railway, the following general parameters were also considered; existing use and importance to ongoing economic activity within the area, suitability of the bridge for use in the public domain, and extent, logistics, and cost of necessary improvements.

Current Bridge Use & Context

During the initial design team site visit in October, 2023, active use of the BNSF Bridge for supply and transport was observed. And according to Continental Cement, the only known customer who currently uses the BNSF Bridge for transport, roughly nine train cars pass over and back each day. Continental Cement takes delivery of Portland cement and other concrete products by train only, then transfers that material to trucks who haul much of it a few hundred feet west to a Cemstone concrete batch plant. The MPRB recognizes the importance of proximity for concrete sources to limit construction costs and carbon emissions.

Suitability of Bridge for use in Public Domain

Two key motivations within the Above the Falls Regional Park Master Plan are to expand trail development into a coherent loop system and expand a continuous network of trails on both banks of the river within the park. Reuse of the BNSF Bridge was considered to supplement crossings at the Lowry Avenue Bridge to the north and the Broadway Bridge to the south, with a new non-vehicular alternative that prioritizes pedestrian and bicycle users.

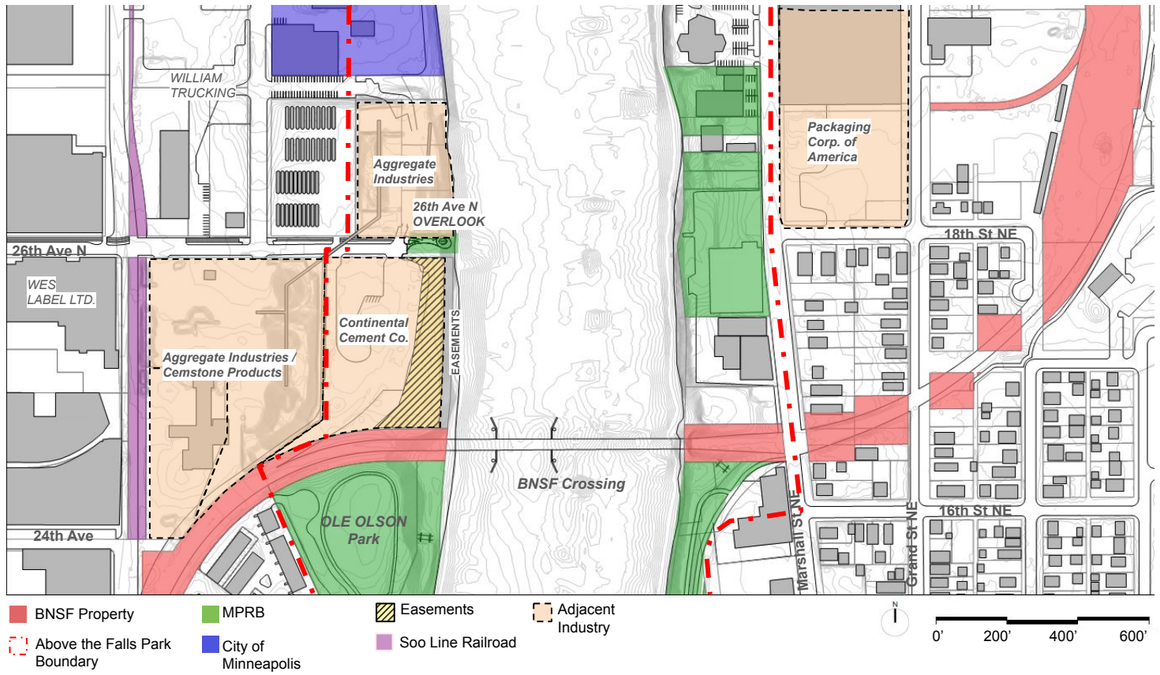


Figure 1.3.1 Site Plan and Adjacent Land Ownership

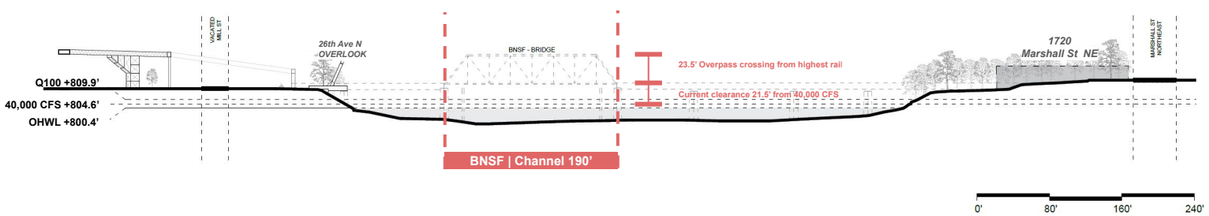


Figure 1.3.2 Section of Mississippi River at Study Area

1.3 BNSF Bridge

Reuse Feasibility

The project team studied three reuse alternatives for the BNSF Bridge which formed the primary analysis and confirms the need to pursue a new river crossing. Each alternative considered barriers to pedestrian connectivity, requirements for safety, potential maintenance measures, and comparative cost analyses.

ALTERNATE A: PARALLEL TRAIL (ABOVE, BELOW, BESIDE)

Alternative A considers the installation of a parallel trail placed above, below, and beside the existing bridge structure.

- Requires permission be granted for right of passage offsets
- Per BNSF Public Projects Manual (2018), horizontal clearances of 25-feet from centerline of track are required
- Vertical clearances between the river and the lowest part of the new bridge structure prohibit effective attachment to existing rail bridge
- Placement above or below bridge are not possible
- Combination of pedestrians and cyclists with active rail creates a stressful and noisy environment
- **Not practicable due to spatial limitations, high-stress environment, cost, and age of existing bridge structure**

ALTERNATE B: DEDICATED BRIDGE, DECOMMISSION AS ACTIVE RAIL

Alternate B considers the removal of freight rail operations and dedicates the structure to a shared use trail.

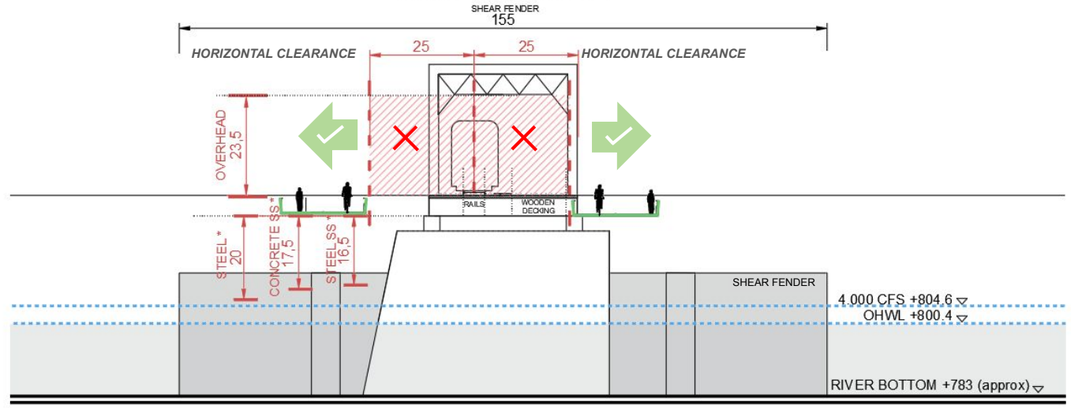
- Results in considerable economic impact to local businesses, pushes concrete production further from the city center resulting in greater concrete material costs and increased carbon emissions
- Results in a low-stress crossing with no railway noise or emissions
- No indication from BNSF for potential decommission resulting in an unknown timeframe for project completion
- Depending on structure ownership, MPRB may inherit risks and maintenance of structure built in 1884
- **Not practicable due to removal of existing freight rail use and unknown timeframe**

ALTERNATE C: USE OF BNSF STRUCTURE FOR NEW BRIDGE

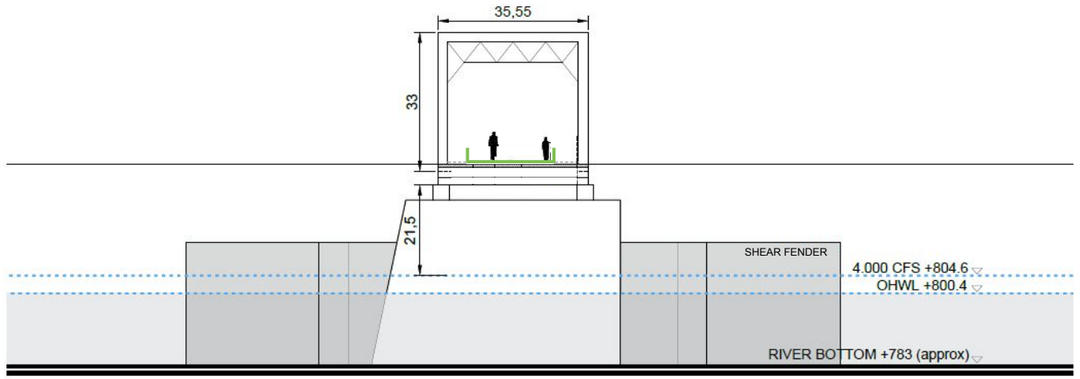
Alternate C considers the utilization of existing BNSF piers and structure for a new bridge that accommodates rail and trail uses.

- Per BNSF Public Projects Manual (2018), horizontal clearances of 25-feet from centerline of track are required
- Vertical clearances between the river and the lowest part of the new bridge structure are required per the structure type, prohibiting effective attachment to bridge structure for trail use
- Combination of pedestrians and cyclists with active rail creates a stressful and noisy environment
- Requires structure renovation to elevate to Rail to Trail guidelines and standards
- Depending on structure ownership, MPRB inherits risks and maintenance of structure
- **Not practicable due to spatial limitations, high-stress environment, cost, and age of existing bridge structure**

ALTERNATE A: PARALLEL TRAIL (ABOVE, BELOW, BESIDE)



ALTERNATE B: DEDICATED BRIDGE, DECOMMISSION AS ACTIVE RAIL



ALTERNATE C: USE OF BNSF STRUCTURE FOR NEW BRIDGE

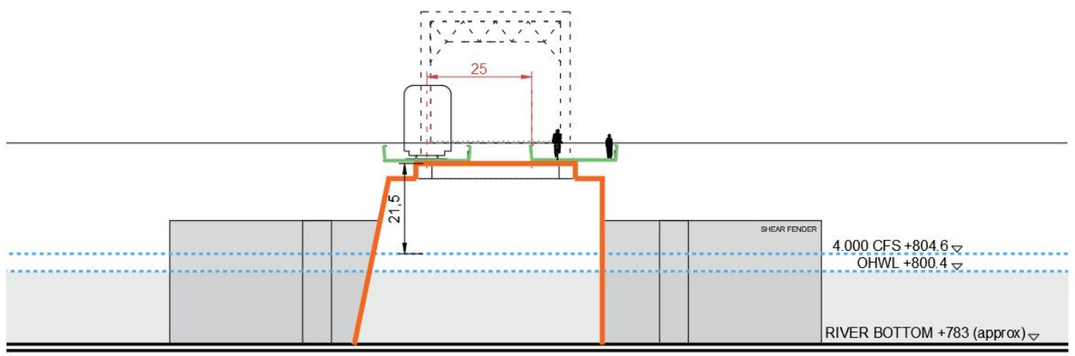


Figure 1.3.3 Diagram of BNSF Sections and Clearances

MNDNR Ordinary High Water Level: 800.4 NGVD29

1.4 Public Engagement Framework & Project Values

Engagement Overview

Engagement Approach

The idea of a connection over the Mississippi River has been in discussion for at least 25 years, and has been noted in plans authored by Minneapolis Park and Recreation Board, City of Minneapolis, and Hennepin County. A proposed bridge would be in the Above the Falls Regional Park and look to provide greater and more equitable connectivity to regional trails, amenities, open space, and retail corridors.

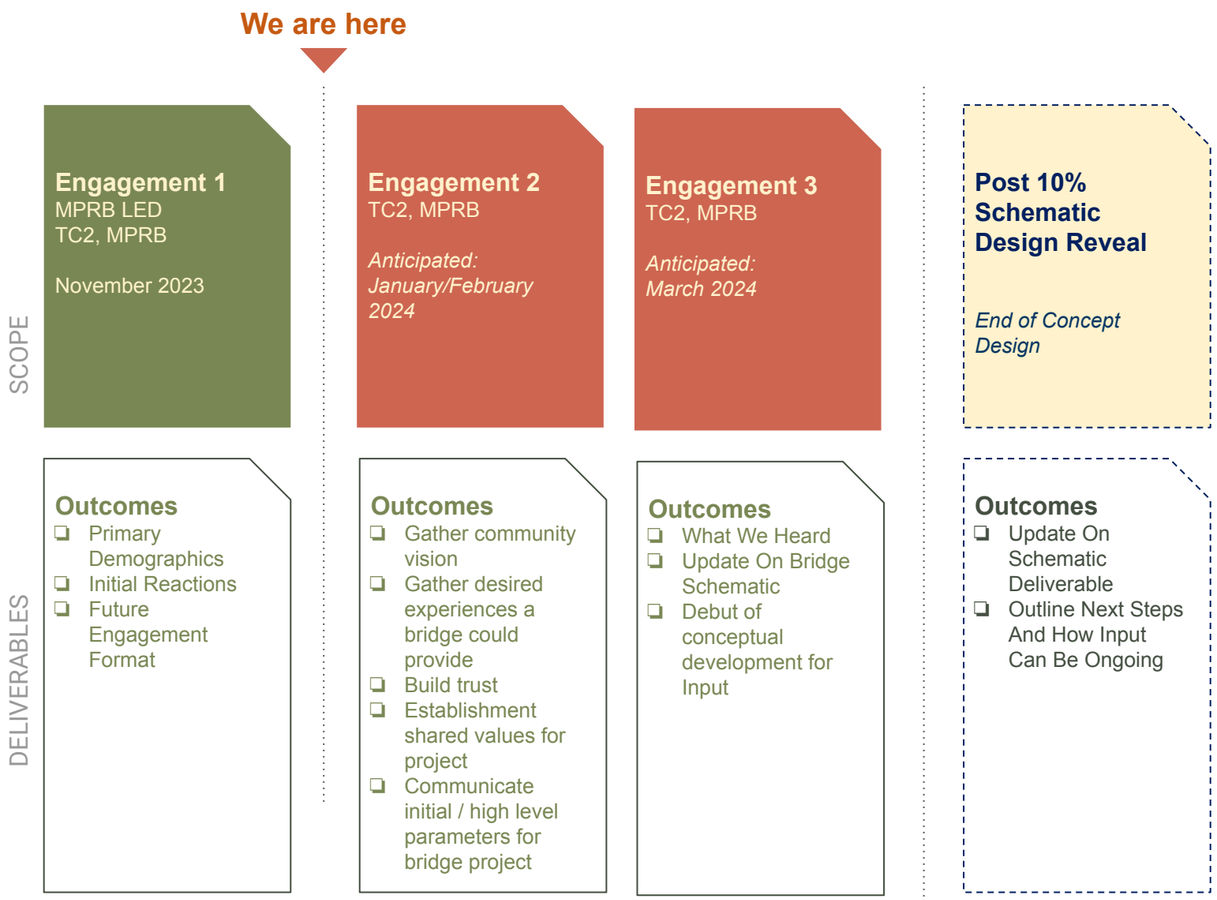


Figure 1.4.1 Engagement Approach

Constituency and Outreach Goals

The success of the project is highly dependent on integrating the community's voice in the process. Early engagement focused on community visioning. During this phase, the community and stakeholders were introduced to the project, identified critical community themes, and discussed their vision and priorities for the project.

Outreach thus far has been via email notifications, post card mailings, yard signs, online surveys, in-meeting polls, onsite intercept surveys, and one-on-one or group conversations with:

- Neighborhood organizations
- Trail advocacy groups
- Elected officials
- Neighbors and businesses
- Minneapolis Bicycle and Pedestrian Advisory Committees
- Regulatory agencies

Project Goals from Community Engagement to Date

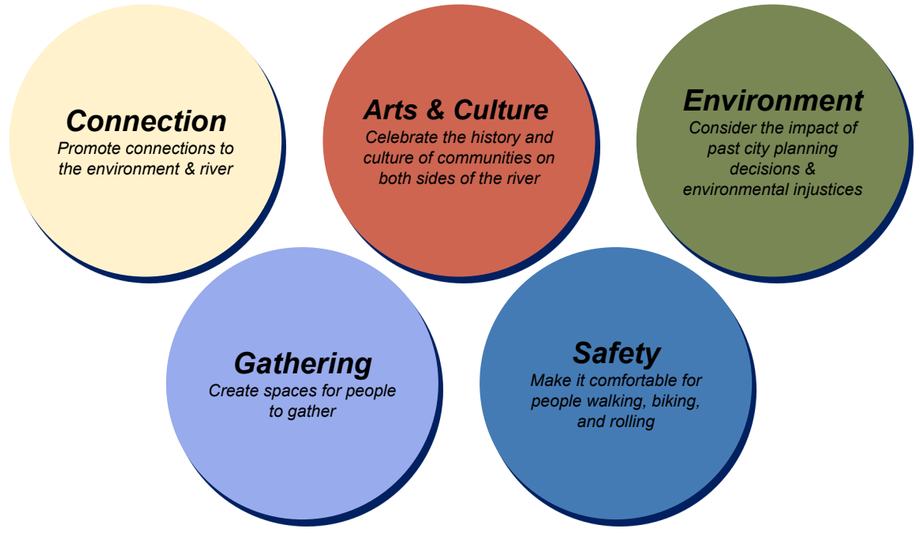


Figure 1.4.2 Working Project Goals

2.0 Site Analysis

Source: Project Team

2.1 Project Context Analysis

Why are we connecting?

As Minneapolis developed in the 19th and 20th centuries, industry grew quickly along the banks of the Mississippi River upstream of and along St. Anthony Falls. Industry below the falls was largely impeded by the steep bluffs of the Mississippi River Gorge. Today, we still see this pattern, though industry has changed, and some has moved away. The MPRB has been purchasing and protecting waterfronts in Minneapolis since its establishment in 1883, following the guidance of Horace W. S. Cleveland's plan for a system of parks and parkways encircling the city. Nearly all the land along the shores of the Mississippi River Gorge in South Minneapolis, and St. Paul, are publicly accessible parkland. The story is different above St. Anthony Falls, especially in North Minneapolis, west of the river. Interstate 94 was constructed through the east portion of North Minneapolis in the late 1960s, removing hundreds of homes, and effectively cutting off residences from the river. Northeast Minneapolis, on the east bank of the river, was not impacted by an interstate highway, and currently has direct access to the river in several locations but does not benefit from a contiguous riverfront like neighborhoods in South Minneapolis.

The MPRB sees natural resource access as an enormous benefit to the health, wellness, and happiness of Minneapolitans. Providing equitable access to those resources is fundamental to the mission of the organization. A new crossing in North and Northeast Minneapolis means better access to the river, and to other neighborhoods for people who have been historically cut off from the river and each other.

A new crossing, separate of fast-moving cars, noisy trucks, and exhaust fumes, can offer people a stress-free space that is specifically designed for them to encourage respite, health, wellness, and enjoyment. It can be a space that is constructed in a way that heals the scars of industrial use by mitigating polluted and debris laden soils, minimizing erosion, establishing new riparian plantings, and reconstructing habitat for animal species who have been extirpated.

Greenway to Greenway

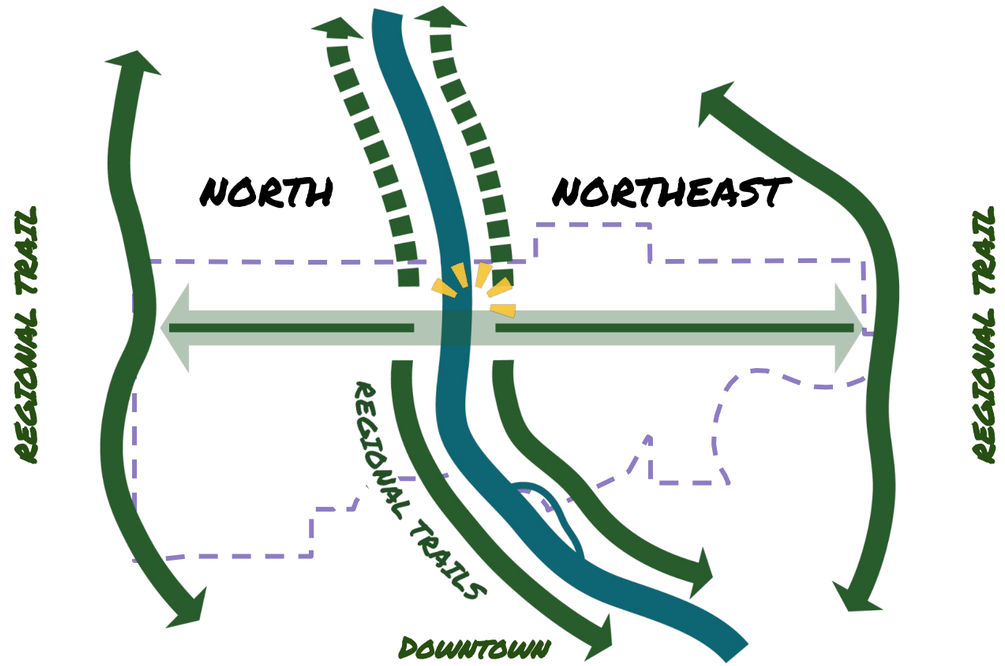


Figure 2.1.1 Critical Gap Diagram

2.1 Project Context Analysis

Who are we connecting?

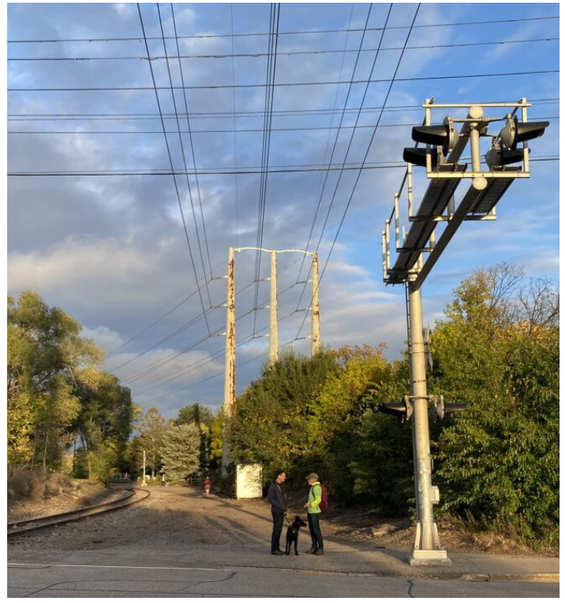
MPRB staff and a group of volunteers from the Great Northern Greenway Coalition hosted a morning and evening session of onsite conversations with folks near the existing BNSF Bridge. The group spoke to runners, hikers, dog walkers, cyclists, people going to the new brewery, people experiencing homelessness, and folks coming or going across the BNSF Bridge.

The volume of people crossing the existing bridge, though trespassing, is significant. In three hours spread over a morning session and evening session, about a dozen people were seen crossing the bridge, some to the east and some to the west. This tells us that a desired connection is wanted, so much so folks are willing to traverse a wood planked deck, unintended for pedestrian or bicycle use.

The bridge has the potential to connect people to the river, to scenic views, to wildlife, and to each other. The connection offers significant value to:

- Runners and hikers completing a newly formed loop along the river
- Dog walkers out for an early morning or evening walk
- Cyclists commuting to work, school, or the store
- Cyclists riding recreationally for health and wellness
- Cyclists or runners crossing over during an organized race or event
- Folks looking for a shortcut to restaurants on the other side of the river
- Paddlers putting in or taking out
- Folks participating in a river-based programming hosted by a nearby recreation center
- Fishers looking for easy river access and their next PB bass
- Communities gathering to watch fireworks
- Nearby office workers stretching their legs at lunch
- People looking for convenient routes that support less driving
- Folks that simply want a nice low-stress view of the river

Figure 2.1.2 Select Photos From Project Team Tour of Adjacent Sites



Source: Project Team, MPRB

2.1 Project Context Analysis

Who are we connecting?

Population Density

Comparable population densities on either side of the river suggest similar demand for a safe, comfortable, and connected multi-modal system that connects people across neighborhoods.

Figure 2.1.3 Population Density by Census Block Group Source: Policy Map

Income Per Capita

Per capita income is lower west of the river, and higher east of the river. A future connection has potential to provide lower income communities with improved regional trail, neighborhood, and river access.

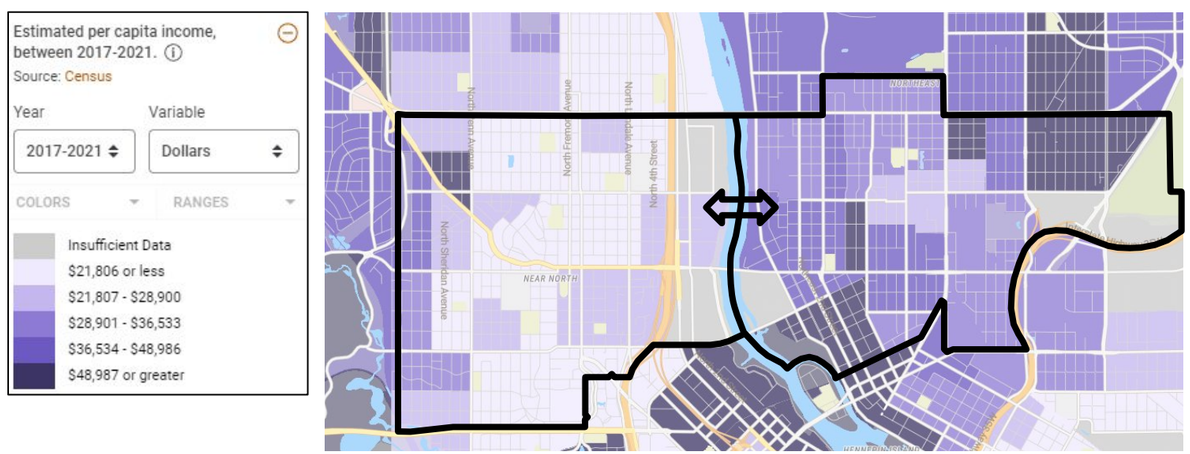


Figure 2.1.5 Income Per Capita by Census Block Group Source: Policy Map

Predominant Ethnicities

Varied ethnic makeup is evident on either side of the river. A future connection would expand regional trail, neighborhood, and river access between North and Northeast communities and across a wider range of demographics..

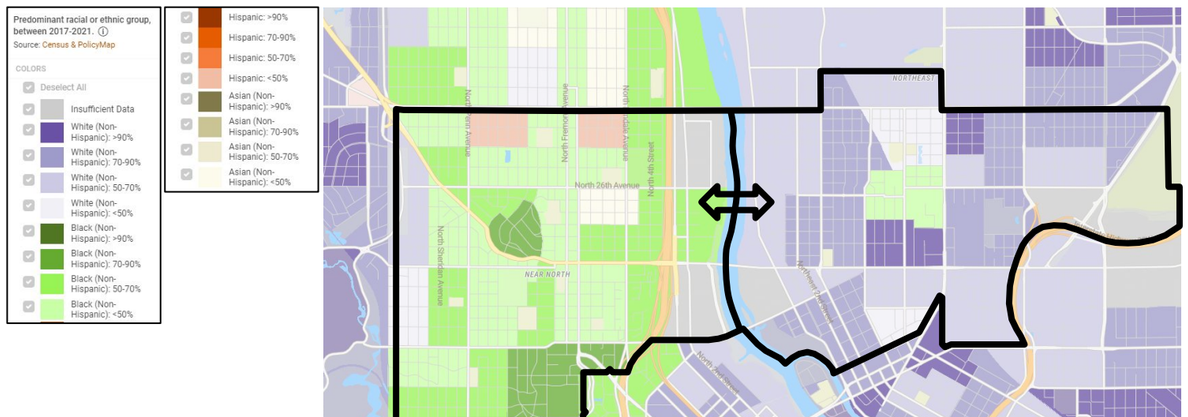


Figure 2.1.4 Population Ethnicities by Census Block Group Source: Policy Map

Low Income & Low Food Access

A larger number of low income/low access (LILA) neighborhoods on the west side of the river, along 26th Ave N, suggests that a stronger connection across the river may increase access to food and household supplies.

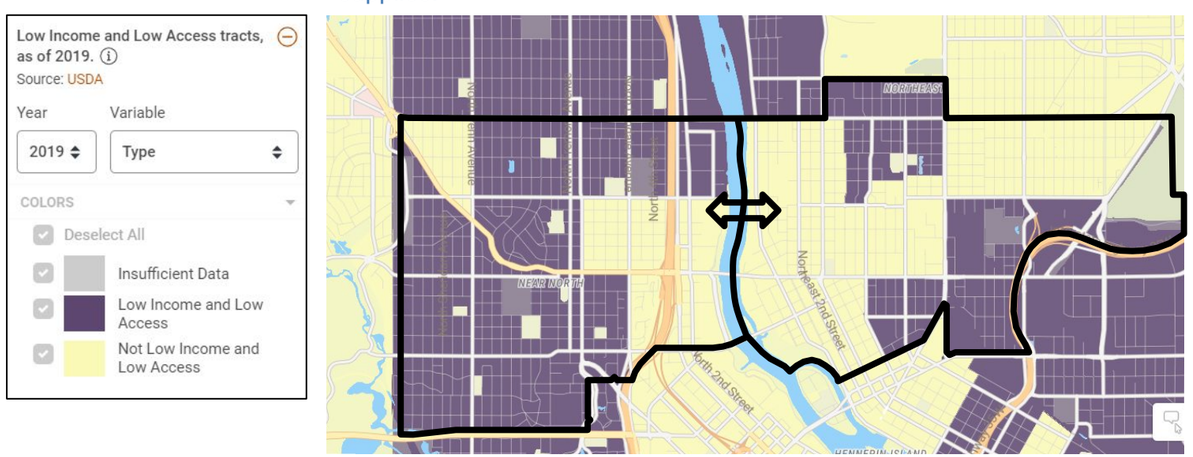


Figure 2.1.6 Low Income/Low Access by Census Tract Source: Policy Map

2.1 Project Context Analysis

What are we connecting?

Community Destinations Analysis

A desktop community destinations analysis mapped locations of **food establishments, retail/shopping/grocery, schools & recreation centers, religious institutions, museums, cultural institutions, libraries, existing parks, and existing/future mixed use**. These destinations are important considerations as start and end points for multimodal transportation users. They are sources of population flow across the bicycle and pedestrian network.

Figure 2.1.7 below shows a higher distribution and density of community destinations in Northeast, with most North Minneapolis community destinations located along West Broadway and Lowry Ave N, major east-west corridors. A completed east-west connection from Theodore Wirth Parkway to the Minneapolis Diagonal Trail can increase cross-city travel to existing and new destinations.

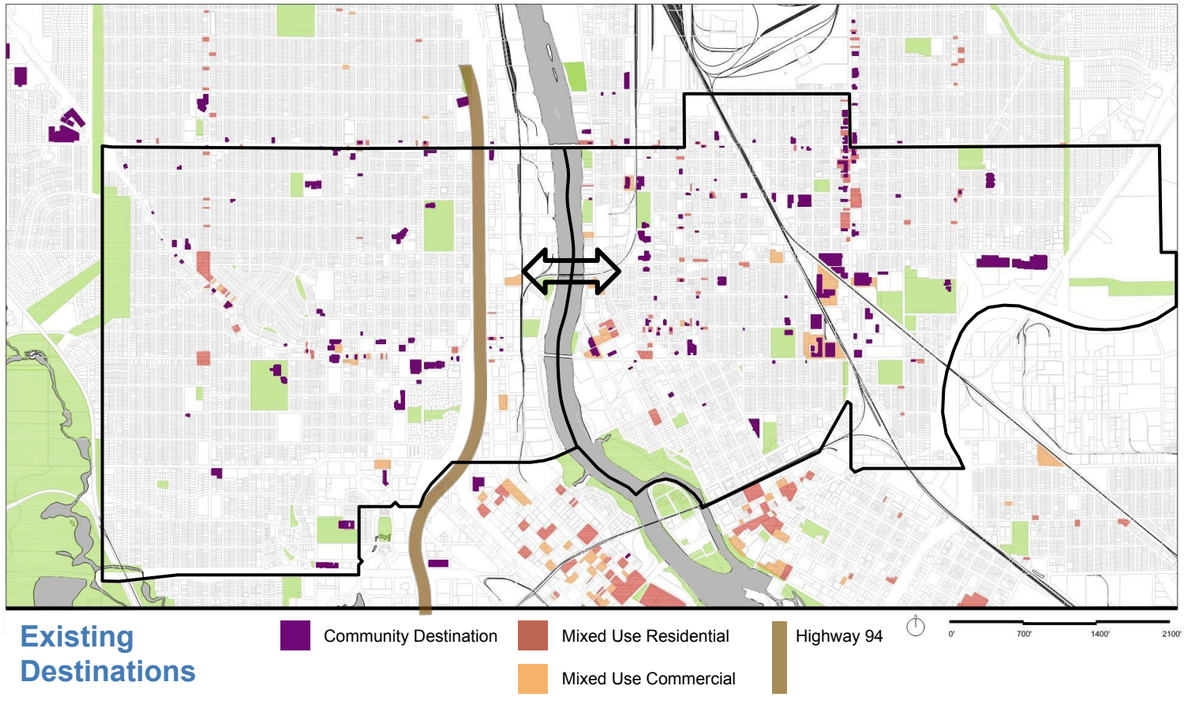


Figure 2.1.7 Mapping of Community estinations, arks, and xisting ixed se

Plans for future mixed-use areas, according to the 2040 Comprehensive Plan, show anticipated growth along the existing mixed-used corridors of Central Ave, Lowry Ave, Broadway St, West Broadway, and Plymouth Ave. Additionally, there are anticipated new mixed-use areas along the river on both sides, in Hawthorne and Sheridan. A future connection would serve these new community destinations.

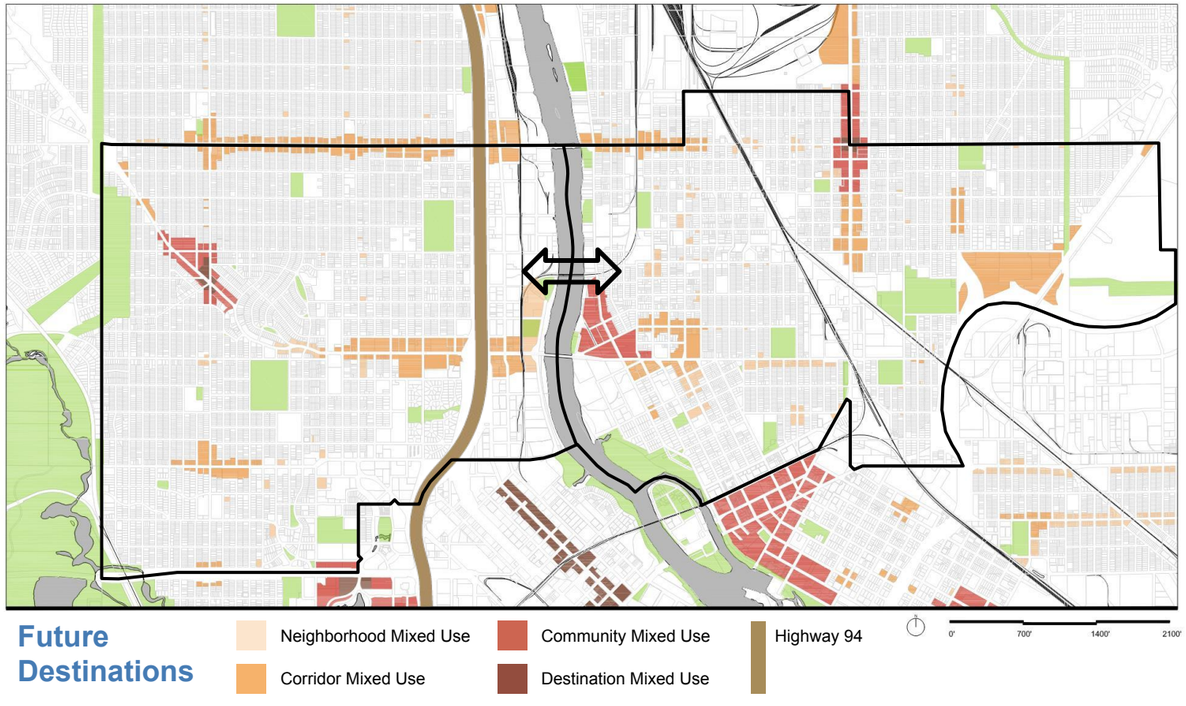


Figure 2.1.8 Future Mixed Use Areas

2.1 Project Context Analysis

What are we connecting?

Community Destinations: North and Northeast

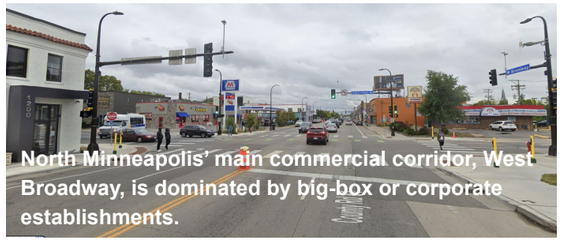
The breakdown below suggests the potential for a bridge connection to soften inequities in access to certain destinations while bringing together North and Northeast communities. Planning for increased multimodal flow across the river in the short term may contribute towards improved access to destinations and mixed-uses on either side of the river.

Destinations Summary and Counts

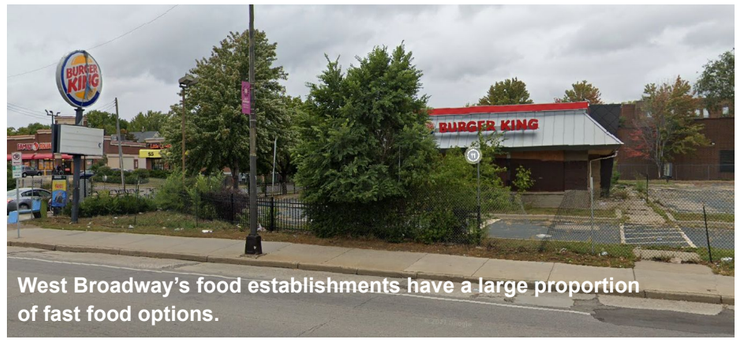
The categories of existing mixed-use, existing food establishments, and existing retail, shopping, and grocery destinations show the largest disparity between North and Northeast Minneapolis. Generally, destinations in North Minneapolis are further from the river, and separated by I-94 and industrial uses, and destinations in Northeast are nearer the river with few barriers to access.

	North	*Northeast*	*Notes*
Square Miles Existing Mixed Use (2020)	.04 sq mi	.12 sq mi	Currently, more extensive mixed-use areas in Northeast.
Square Miles Future Mixed Use (2040)	.29 sq mi	0.31 sq mi	Planned expanded mixed-use areas on both sides of river, with more even distribution.
Count of Existing Food Establishments	17	52	A clear contrast is seen between North and Northeast of the distribution and density of food destinations. Mixed-use areas in North Minneapolis along West Broadway are dominated by big box or corporate restaurants.
Count of Existing Retail, Shopping, Grocery	11	35	A greater diversity of retail and shopping options is seen in Northeast compared to North Minneapolis. Northeast neighborhoods benefit from access to the large Central Avenue mixed-use corridor, local establishments within the residential areas, and large department stores.
Count of Existing Schools & Community/Recreation Centers	9	10	Similar distribution. Northeast school and recreation center destinations are in closer proximity to river.
Count of Religious Institutions	12	13	Similar distribution.
Count of Museums, Cultural Institutions, Libraries	2	4	Similar distribution.
Count of Existing Parks	14	12	Similar distribution of parks, with slightly more in North Minneapolis

Figure 2.1.9 Photos From Area of Influence Relevant to Destinations Analysis


North Minneapolis' main commercial corridor, West Broadway, is dominated by big-box or corporate establishments.


Northeast Minneapolis' main commercial corridor, Central Ave, is dense, more walkable, and has several independent establishments.



West Broadway's food establishments have a large proportion of fast food options.


In North, the school closest to the river, Nellie Stone Johnson School, is a 20-minute walk.


In Northeast, the school closest to the river, Menlo Park Alternative School, is a 10-minute walk.

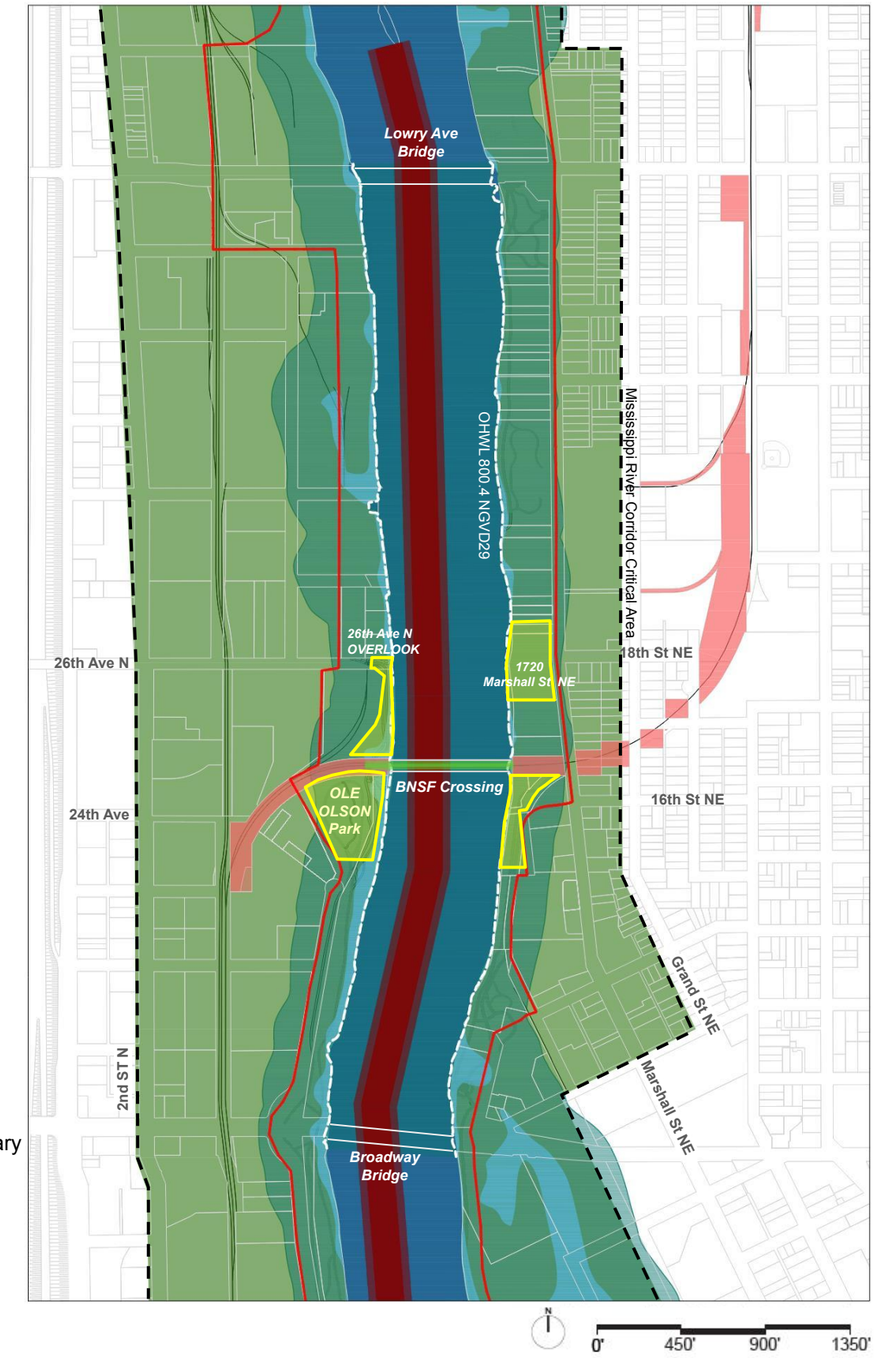
Source: Google Streetview

2.2 Riverbank and Surrounding Neighborhood Site Analysis

Agencies Having Jurisdiction

Agency	*Code*	*Identified Parameters to Date*
US Army Corps of Engineers		Commercial channel widths
US Coast Guard		Navigable waterway, vertical clearance
Minnesota Department of Transportation		Vertical clearance, lateral clearance, bike trail clearance, pedestrian clearance, railing guidance
City of Minneapolis - Public Works Bridge Department		Snooper vehicle specifications and requirements
BNSF Railroad		Channel width, current vertical clearance, overpass crossing clearance, vertical clearance for structure, non-vehicular crossing, lateral clearance 1, lateral clearance 2
State Board of Water & Soil Resources		N/A
US Fish and Wildlife Service		N/A
National Park Service		Mississippi National River & Recreation Area boundary
Federal Emergency Management Agency		100-year floodplain
MN Department of Natural Resources		Public waters boundary (OHWL), Shoreland boundary
State Historic Preservation Office		N/A
Minnesota Pollution Control Agency		N/A

Figure 2.2.1
Context Map With Overlay of Agencies Having Jurisdiction

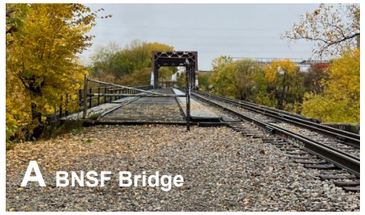


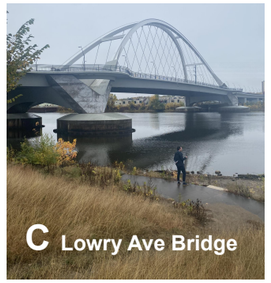
2.2 Riverbank and Surrounding Neighborhood Site Analysis

Riverbank and Surrounding Neighborhood Site Analysis

Sitewalk Overview

On October 26th, 2023, the project team visited the study area to observe the site context, topography, site characteristics, and existing landscape qualities to begin to build a site inventory and analysis. This visit was essential to document the existing conditions and integrate field analysis into the feasibility report.

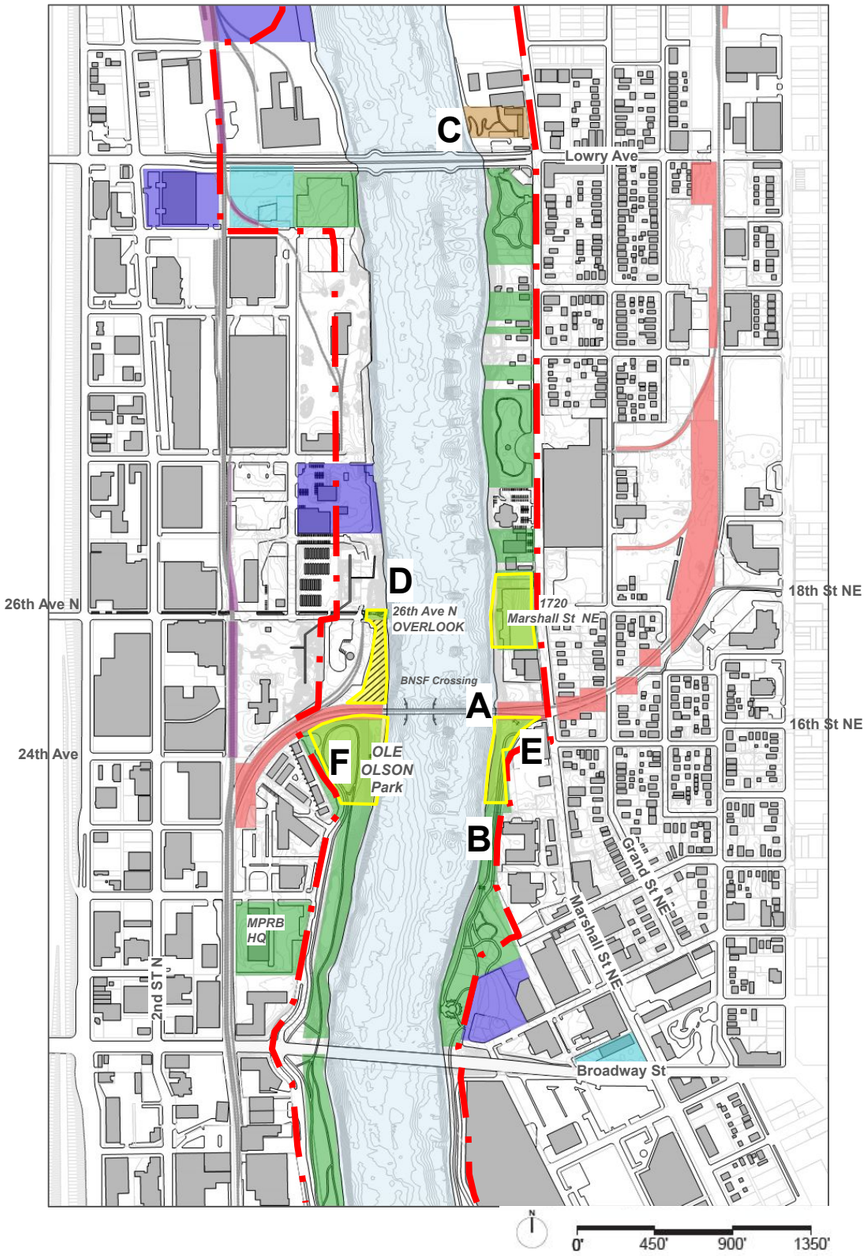




Outside Project Area

Sitewalk Overview

Figure 2.2.2
Context Map With Overlay of Land Ownership and Site Walk Stops

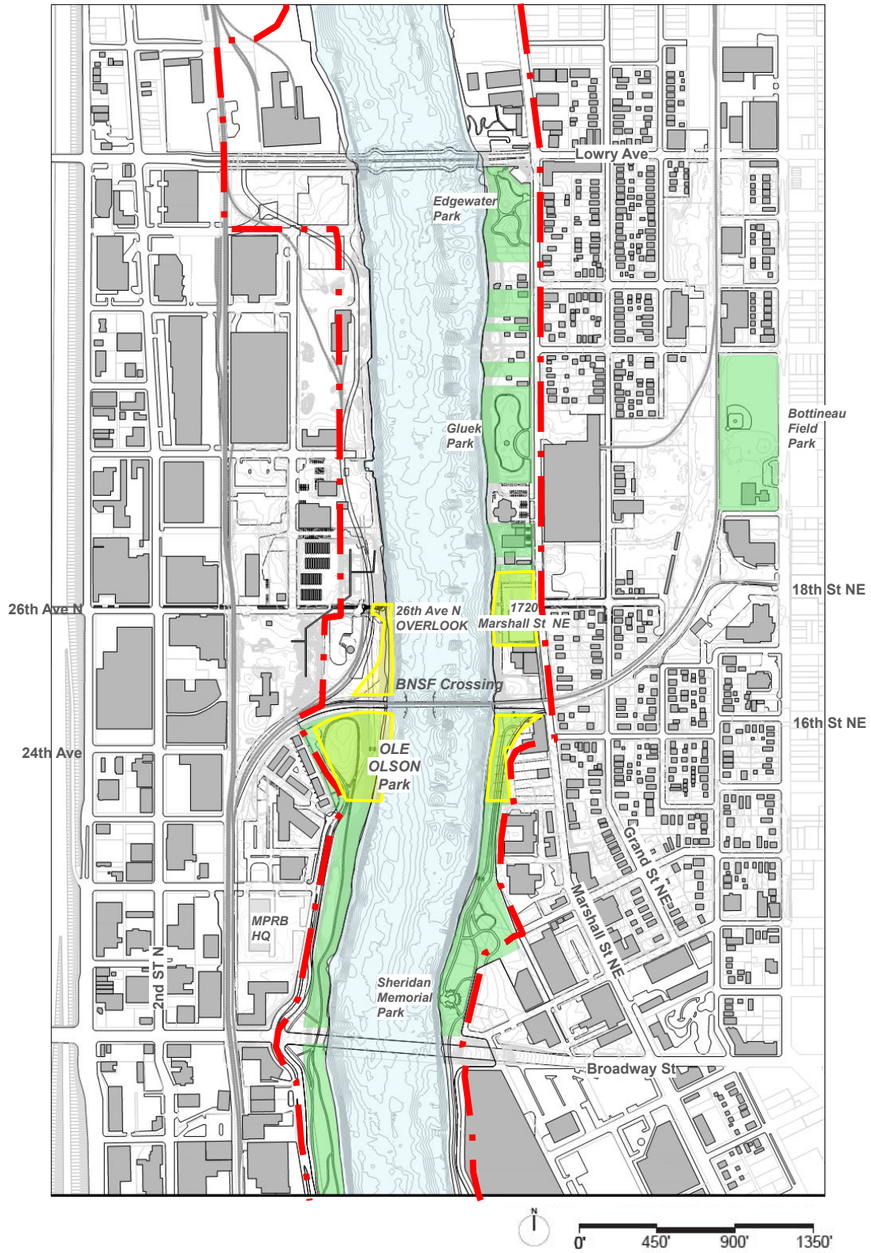


2.2 Riverbank and Surrounding Neighborhood Site Analysis

Existing and Planned Park System

Figure 2.2.3
Existing Park System

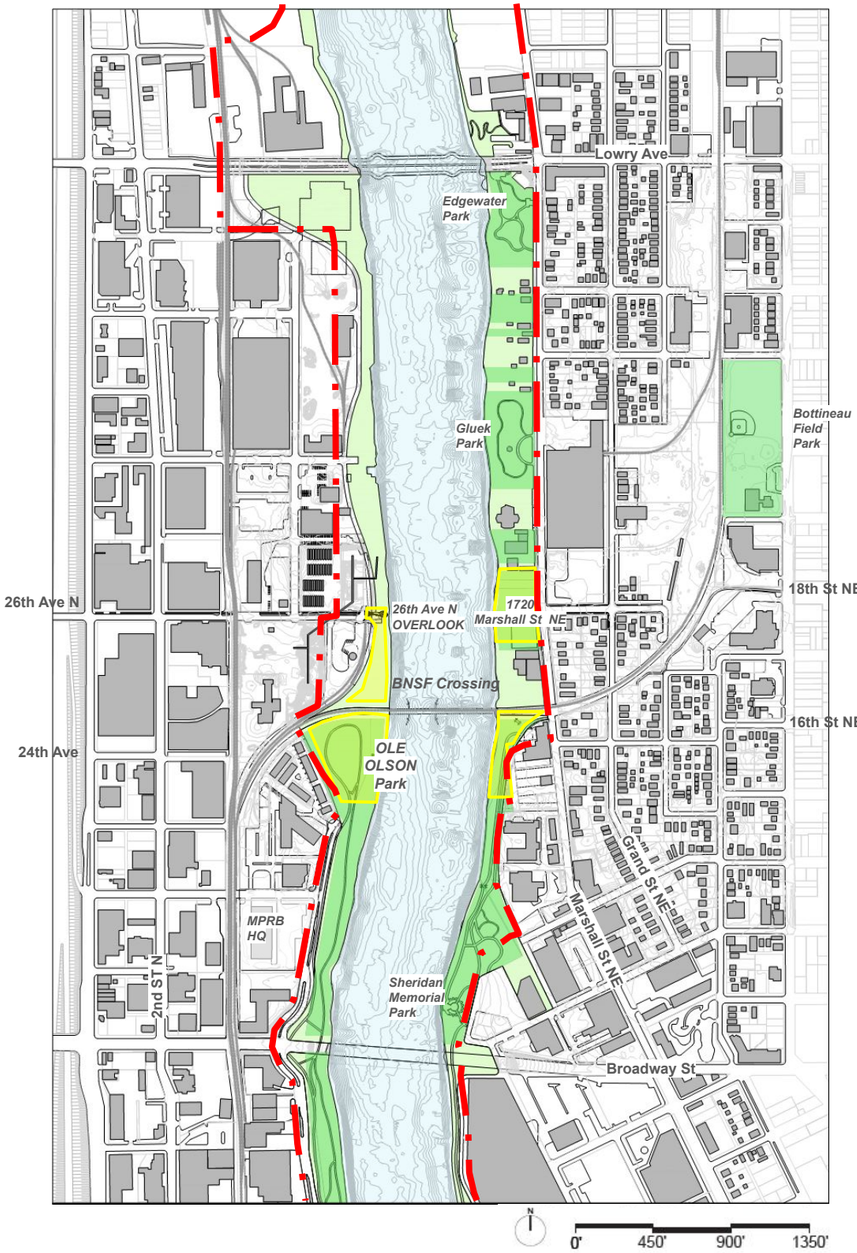
Existing parks within Above the Falls Regional Park and near the study area include Edgewater Park, Gluek Park, East Bank Trail, and Sheridan Memorial Park on the east side, and West River Road, Ole Olson Park, and the Overlook on the west side.



Existing Park
Study Area
Above the Falls Regional Park Boundary

Figure 2.2.4
Planned Park System

The Above the Falls Regional Park Master Plan proposes a system of riverfront trail and parks which are assembled over time by partnering with willing landowners or acquiring new property. A goal of that plan is to eventually have a contiguous trail on either side of the river from north to south.



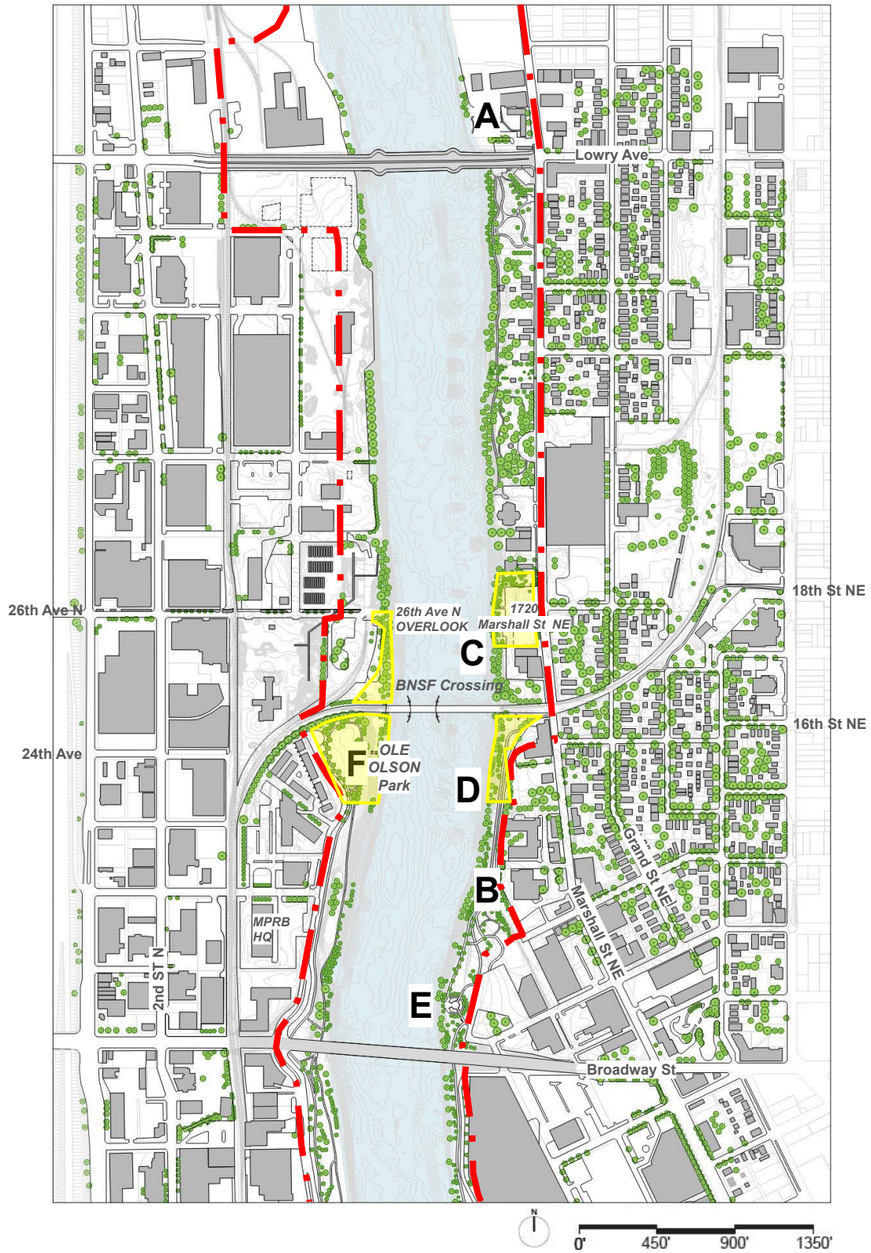
Existing Park
Planned Park
(Above the Falls Regional Park Masterplan)
Study Area
Above the Falls Regional Park Boundary

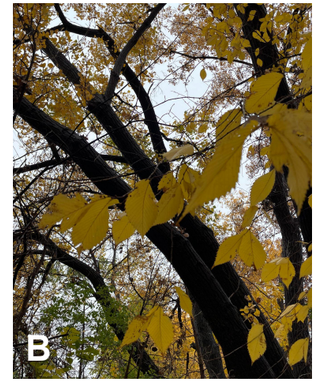
2.2 Riverbank and Surrounding Neighborhood Site Analysis

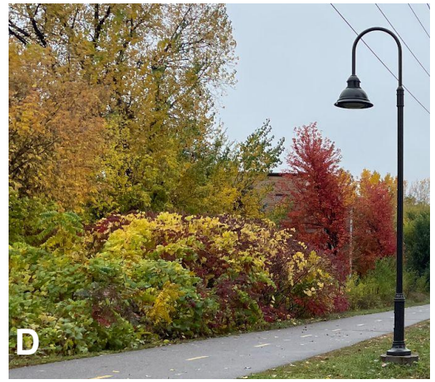
Existing Tree Canopy

Figure 2.2.5
Existing Tree Canopy

Within the study area, canopy coverage is higher on the east side, where residential neighborhoods directly abut the river system. This is in sharp contrast to the west side which is dominated by industrial land uses between I-94 and the river.







Source: Project Team

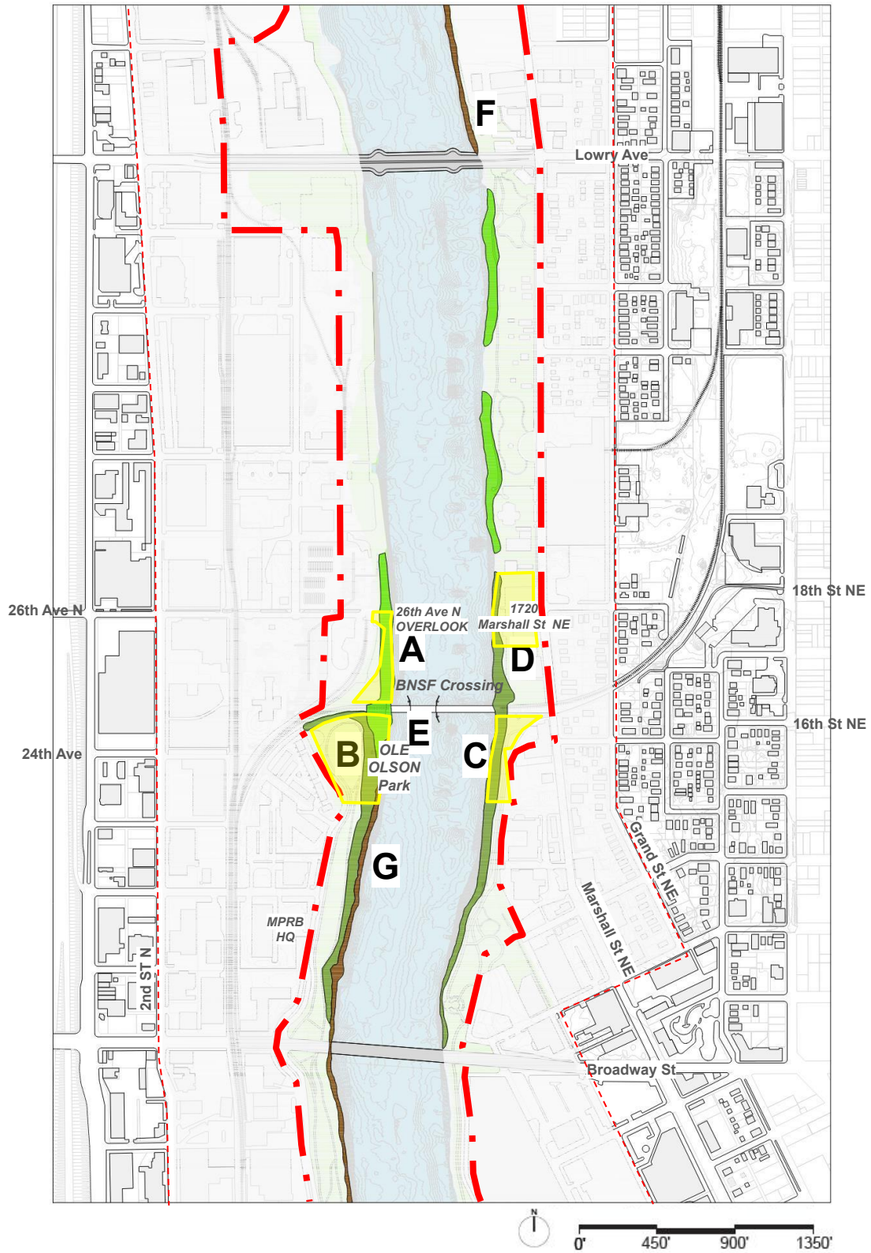
2.2 Riverbank and Surrounding Neighborhood Site Analysis

Riparian Vegetation within Mississippi River Corridor Critical Area

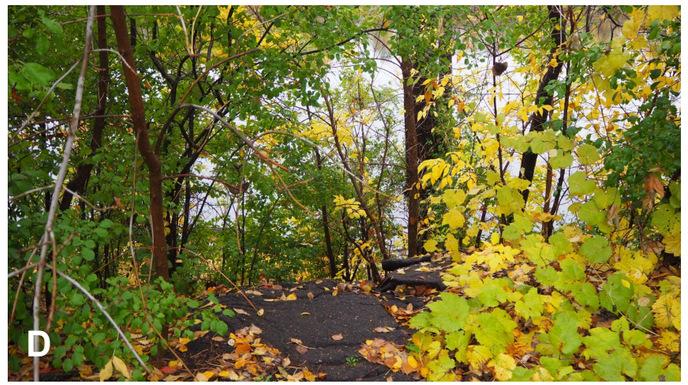
Figure 2.2.6
Riparian Vegetation

The map shows riparian vegetation, as described by the Mn DNR, within the Mississippi River Corridor Critical Area.

The riverbanks adjacent to the 26th Ave N Overlook and 1720 Marshall St NE are lined with midwest box elder/ash ruderal forest, along with black locust, eastern cottonwood, smooth sumac, and invasive species such as common buckthorn.



- **Developed Land** (Mississippi River Corridor Critical Area)
- **Midwest box elder / ash ruderal forest**
- **Ash / elm mixed lowland hardwood forest**
- **Riverine sand flats**
- **Study Area**
- **Above the Falls Regional Park Boundary**



Source: Project Team

2.2 Riverbank and Surrounding Neighborhood Site Analysis

Topography and River Edges

Bluff Definitions and Implications

The study area lays within three protective overlay districts, including the shoreland, floodplain, and Mississippi River Critical Corridor Area (MRCCA) overlay districts. Regulations set by the City of Minneapolis Zoning Code ensure development within applicable districts is done in a way that protects the natural and built environment from degradation, flooding, erosion, or other damages.

Bluffs are defined within the zoning code a few different ways depending on which overlay district applies. As defined within the MRCCA Overlay District, a bluff is “A slope that rises at least twenty-five (25) feet and where the grade of the slope averages eighteen (18) percent or greater, measured over any horizontal distance of twenty-five (25) feet, from the toe of the slope to the top of the slope. Where the slope begins below the ordinary high water level, the ordinary high water level is the toe of the slope.”

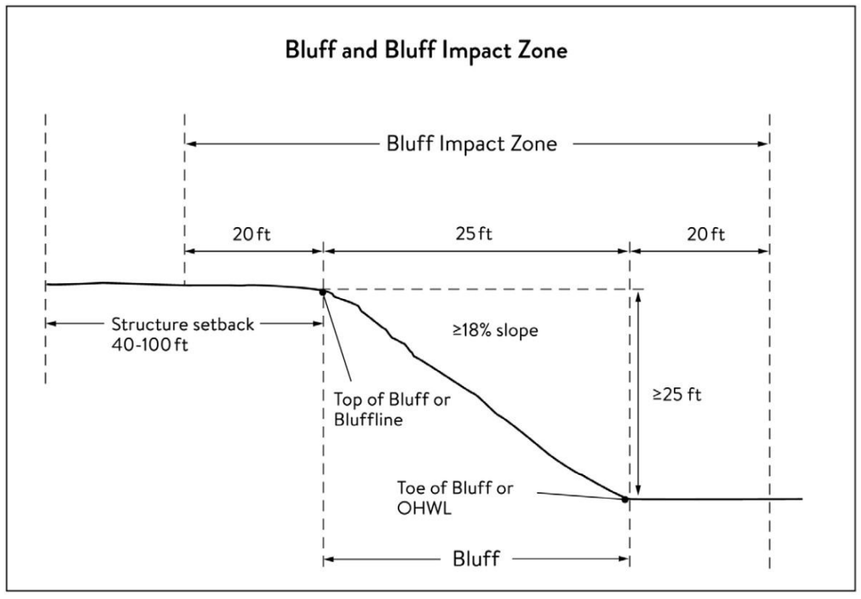


Figure 2.2.7 Definition of Bluff

Figure 2.2.8 Bluff Impact Zones

As indicated in the map, the west and east banks of the river, within the study area, are considered bluffs. Though considered bluffs, these riverfront spaces have been highly modified by humans for industrial uses. Environmental investigations in the area suggest a great deal of debris-laden fill had been placed and sites graded to maximize flat, usable space for industry operations.

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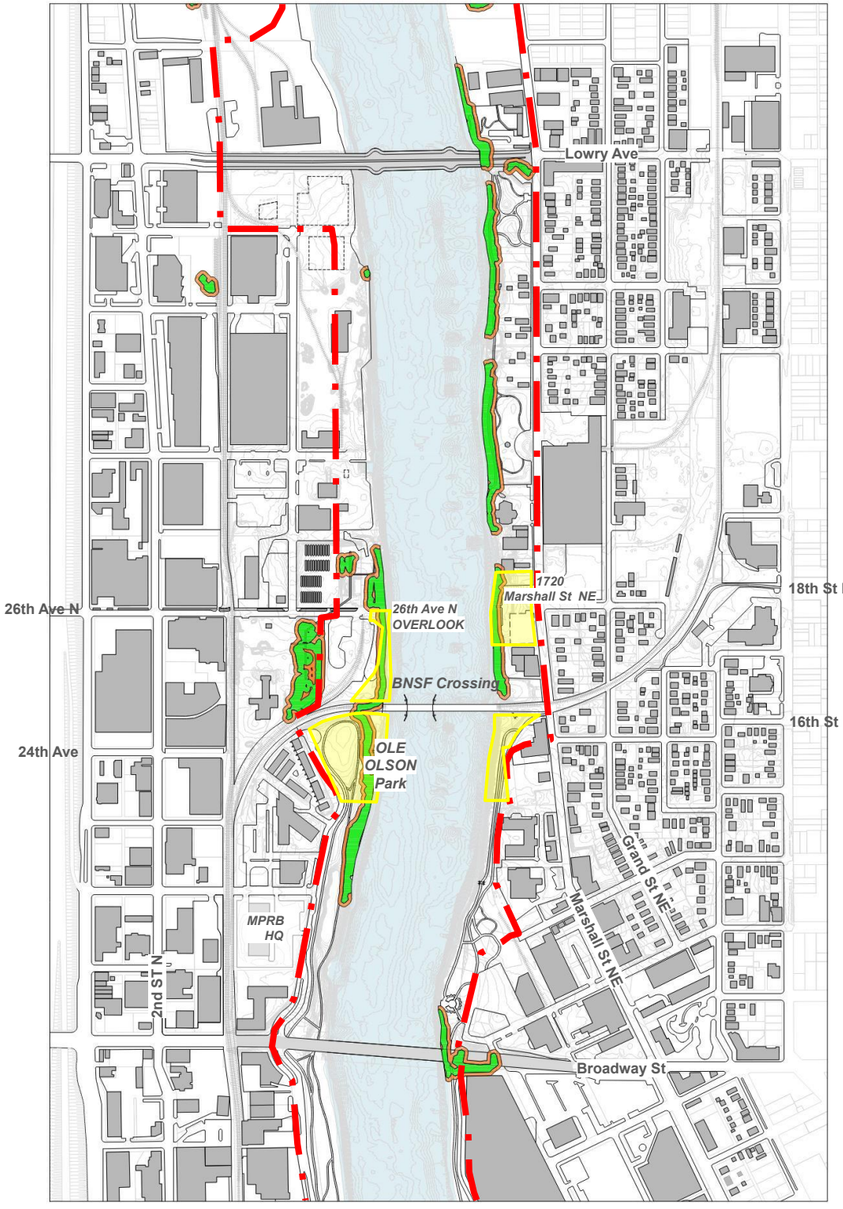


2.2 Riverbank and Surrounding Neighborhood Site Analysis

Topography and River Edges

Bluff Definitions and Implications

A critical driver of the project is not only connecting North and Northeast Minneapolis neighborhoods to each other, but also connecting these vibrant communities to the river, especially neighborhoods in North Minneapolis who face greater obstacles between their homes and the river. While on site, the project team observed steep, human-made slopes that are pushed right to the river's edge, and likely not engineered or constructed in a way that limits erosion or promotes sustainability. This results in steep, unstable slopes that inhibit accessibility and direct connection to the water.

Modifying existing, human-made slopes or bluffs in the area for restorative purposes is not new. The riverbank at the Mississippi Watershed Management Organization's (MWMO) headquarters on Marshall St provides an aspirational precedent that includes a restored riverbank. The restoration facilitates an accessible connection to the water, and a look back in time at a natural landscape similar to what might have been prior to industry. MWMO's stormwater park and learning center is a wonderful space that educates visitors on how stormwater moves through a site and how that water can be filtered, or absorbed prior to reaching a body of water.

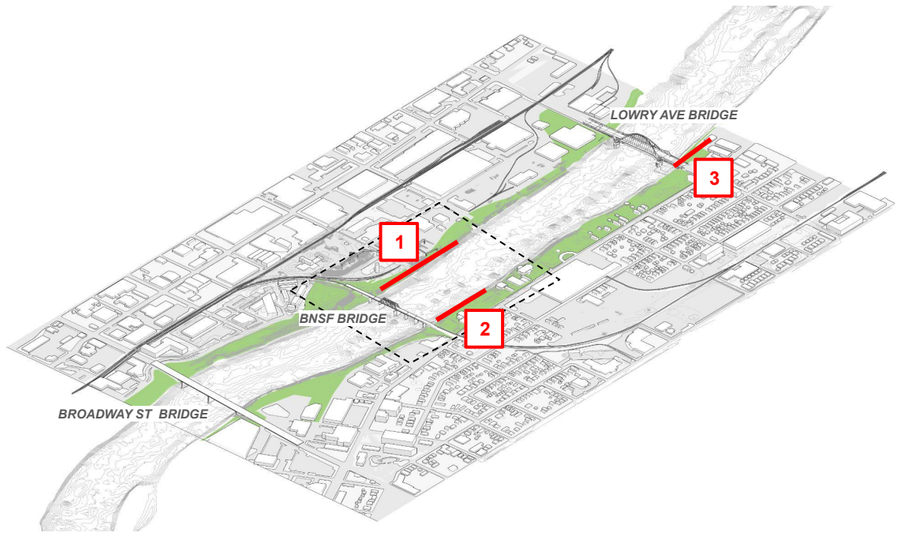
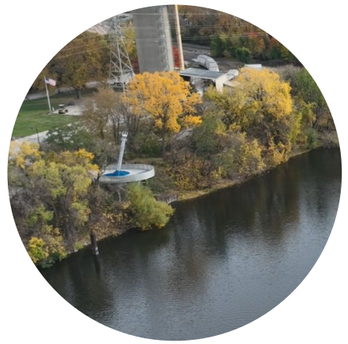


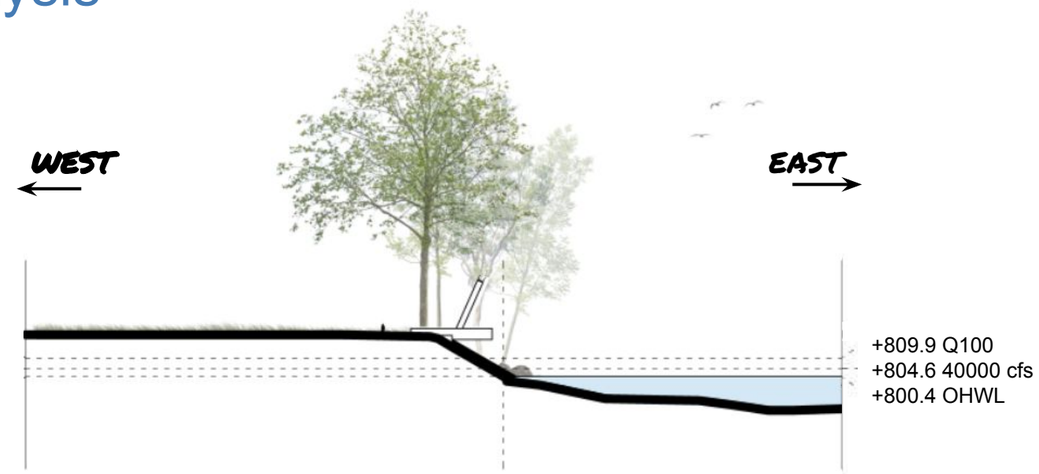
Figure 2.2.9 River Edge Conditions Key Diagram

Project Riverbank Sections



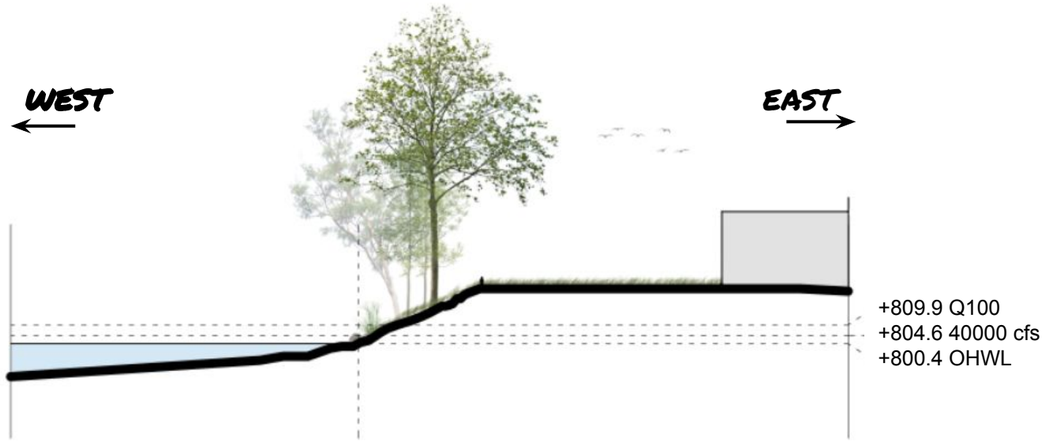
1

26th Ave N Overlook
West Bank



2

1720 Marshall St NE
East Bank



Referential Section of Restored Riverbank

3

Mississippi Watershed Management Organization

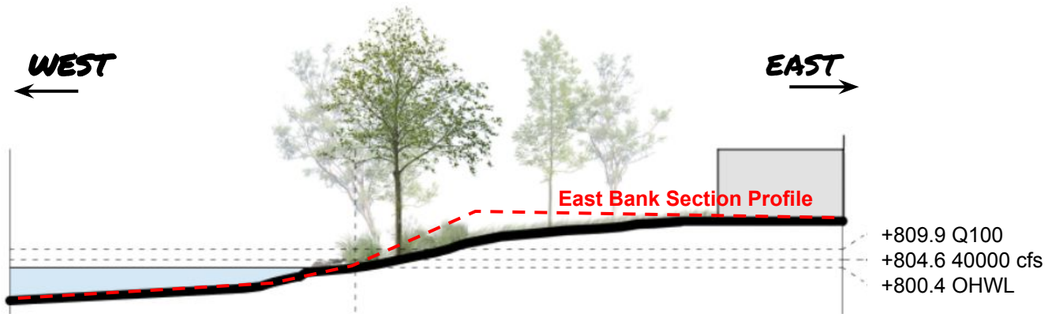
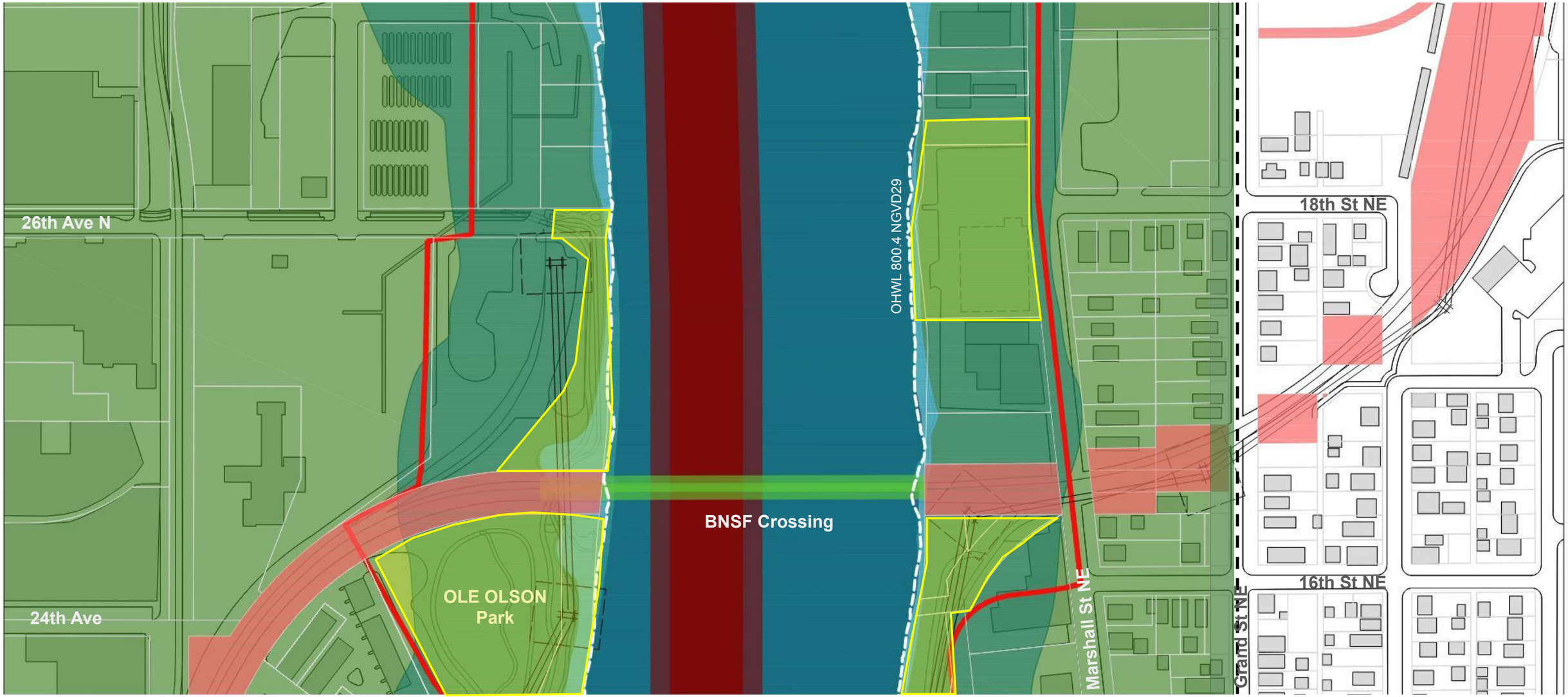


Figure 2.2.10 Project Riverbank Sections

2.3 Technical Project Parameters of the Mississippi Waterway

Compilation of Governing Parameters

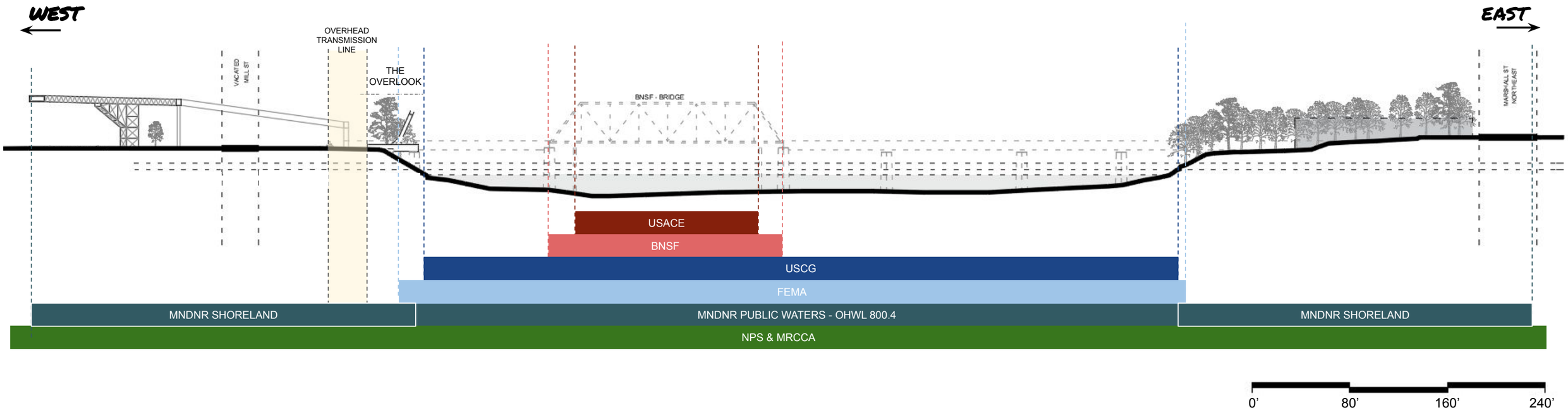
Figure 2.3.1 *Immediate* Project Site with Overlay of Governing Parameters



2.3 Technical Project Parameters of the Mississippi Waterway

Compilation of Governing Parameters

Figure 2.3.2 Site Section with Extents of Governing Parameters at Typical Mississippi River Section



2.3 Technical Project Parameters of the Mississippi Waterway

Environmental Desktop Review

Environmental Desktop Review

The review summarizes potential environmental concerns associated with development of a proposed Mississippi River crossing by the Minneapolis Park and Recreation Board (MPRB). For ease of discussion, the review site is split into two areas on either side of the Mississippi River and on either side of the BNSF Bridge. The project team reviewed physical setting information, historical records, and regulatory records and developed the following findings:

- **Fill Soils/Debris –** Undocumented fill soils and debris including trash, glass, bituminous pieces, metal, slag, wood, concrete, and brick were encountered during geotechnical and environmental investigations conducted at the west bank, east bank, and surrounding area. Debris and fill soils were documented up to a depth of 25-feet below ground surface (bgs).
- **Onsite Identified Release BF0002611 –** Test pits were advanced at 33 26th Ave. N (Continental Cement) and 2325 West River Rd. N (Ole Olson Park) to assess environmental conditions prior to construction for an MPRB trail expansion project just south of the 26th Avenue North Overlook. Debris and fill were encountered in the test pits and analytical results indicated diesel range organics (DRO), benzene, lead, and polycyclic aromatic hydrocarbon (PAH) concentrations in soil were above regulatory criteria. A Response Action Plan (RAP) for the trail expansion project was submitted to the Minnesota Pollution Control Agency (MPCA) and approved in September 2023.
- **Onsite Identified Release VP28011 –** Sub slab vapor sampling was conducted at 1720 Marshall St. NE, which identified trichloroethylene (TCE) and perchloroethylene (PCE) at concentrations that exceeded the industrial intrusion screening values (ISVs) at the time of investigation. Similarly, TCE and PCE concentrations in groundwater exceeded the Minnesota Department of Health (MDH) Health Risk Limits (HRLs) established at the time of investigation. PAH and lead concentrations in the soil, exceeded the industrial soil reference values (SRVs), and concentrations of arsenic and mercury exceeded the residential SRVs at the time of investigation. Cleanup records were not identified on MPCA's What's in My Neighborhood Database (WIMN) nor provided for review.
- **Onsite Identified Release BF0001838 –** An investigation conducted at 1712 Marshall St. NE identified the following compounds above regulatory criteria:
    - PCE and TCE in soil;
    - PCE, TCE, cis-1,2-dichloroethene and trans-1,2-dichloroethene in groundwater;
    - and PCE, TCE, and other non-petroleum VOCs in soil vapor.

The site was entered into the Brownfields Program, where it subsequently received a No Further Action letter from MPCA for petroleum compounds and a NAD. The No Further Action letter states that it should be assumed that petroleum contamination is present when considering future development of the site. The site was referred to the MPCA Site Assessment Program in April 2023 to determine if cleanup actions are required.

Figure 2.3.3 East Bank Site Photos

Source: MWMO Site Photo

Source: Project Team

Figure 2.3.4 West Bank Site Photos

Source: MWMO Site Photo

Source: Project Team

2.3 Technical Project Parameters of the Mississippi Waterway

Environmental Desktop Review (continued)

- **Historical and Current Industrial Use –** According to previous reports and historical aerial imagery, the west bank was historically used as a lumberyard and slab piling yard, blacksmith, and a sawmill between the early 1890s and early 1900s. In 1914, it was developed with a roundhouse and other rail operations until the late 1960s to early 1970s. Its current uses include a concrete manufacturer/distributor and recreational parkland. The east bank has been used for industrial purposes since at least the early 1900s. Former uses for 1720 Marshall St. NE include a barrel warehouse, chemical shop, electrical factory, auto garage, metal manufacturing, and laminated countertop manufacturing. Former uses for 1712 Marshall St. NE include a machine shop, metal stamping, commercial screen printing, and rubber manufacturer. The surrounding area was largely developed for industrial purposes and remains industrial to an extent. Onsite and offsite historical industrial operations, chemical usage/storage, and demolished/buried historical structures have potential to impact the site.
- **Offsite Identified Releases –** According to MPCA's WIMN database, several documented petroleum and non-petroleum releases have occurred on offsite, upgradient properties. These releases have the potential to migrate and impact the site. See the Environmental Assessment Figure 1 in the Appendix for locations of documented releases.

Based on these findings, environmental precautions should be taken prior to and during construction. The full Environmental Review Memorandum can be found in the Appendix.

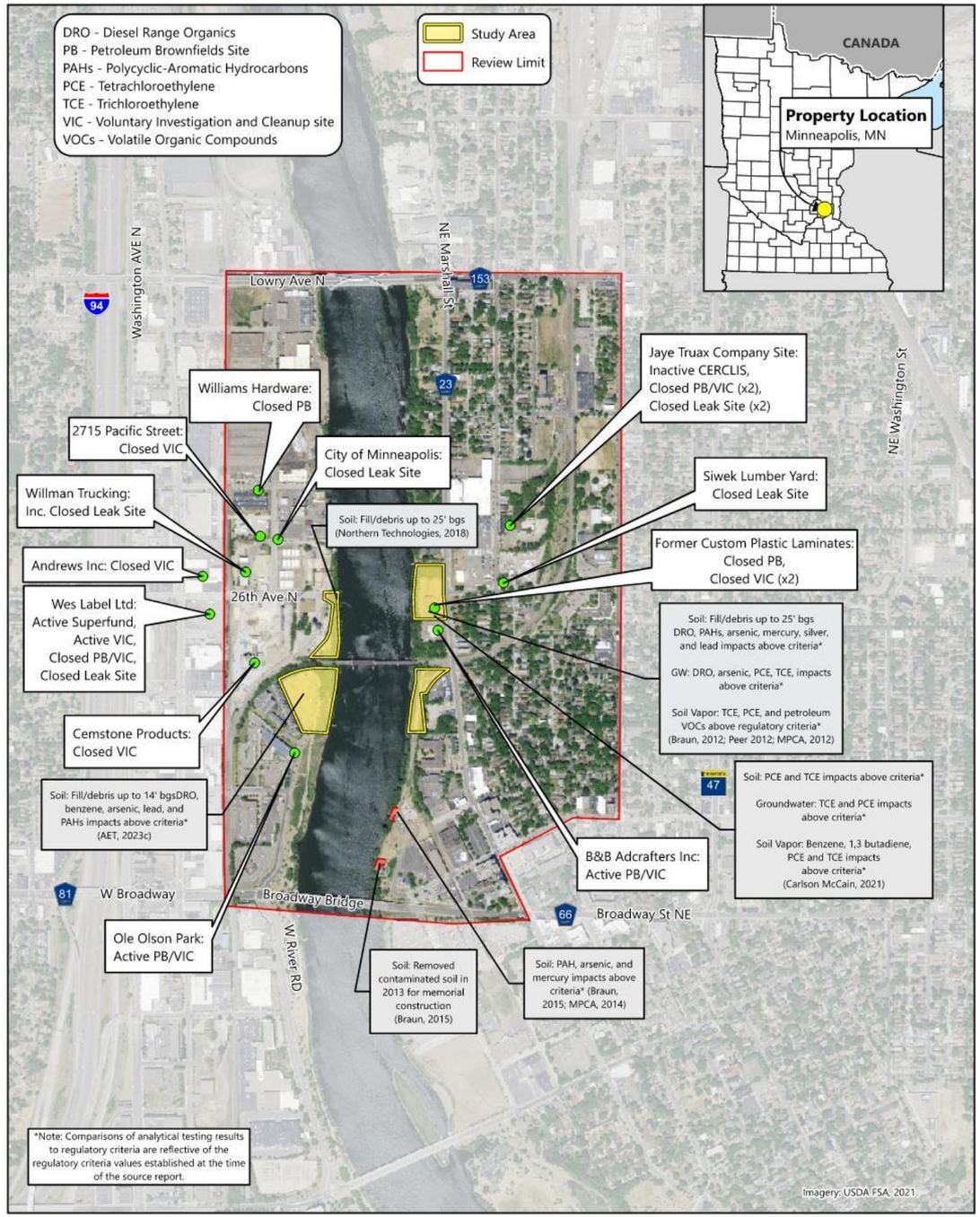


Figure 2.3.5 Environmental Assessment

2.3 Technical Project Parameters of the Mississippi Waterway

Geotechnical Desktop Review

Geotechnical Desktop Review

The review summarizes the project team's preliminary findings of publicly available geotechnical data for reference in development of conceptual planning of the proposed Mississippi River crossing. The review site is split into two areas on either side of the Mississippi River and on either side of the BNSF Bridge.

The project team assumes the proposed bridge will have an abutment with soil-retaining wing walls at each of the west and east banks, and have multiple piers in the river channel. Review of geotechnical data indicates terrace deposits, with undocumented fill, at the river banks, and alluvial deposits over bedrock in the river channel. Nearby information, available for the BNSF Bridge, Plymouth Avenue Bridge, and Lowry Avenue Bridge indicate pile lengths of 90 to 130 feet driven to elevations of 630 to 730 feet. Existing data reviewed indicates there is significant variation in the sub-surface. Geologic maps indicate an erosional cut through the bedrock in the area of the existing BNSF Bridge and the proposed river crossing with shallower bedrock to the north and south.

Further geotechnical investigation during the detailed design and engineering phase of the project will provide the project team with necessary pier and foundation-specific information. Based on the available information and the project team's local knowledge, the team anticipates cast-in-place (CIP) pile or H-pile will be competent foundation types at the abutments and piers, which is consistent with existing bridge foundations in the area. After receiving conceptual plans, and performing the geotechnical investigation, the geotechnical engineer will use LRFD Bridge Design Manual - MnDOT (state.mn.us) and Geotechnical Engineering Manual - MnDOT (state.mn.us) to prepare more complete geotechnical recommendations for use in the detailed design phase of work.

The full Geotechnical Memorandum can be found in the Appendix. See the Geotechnical Assessment Figure 2 for locations of existing information reviewed.

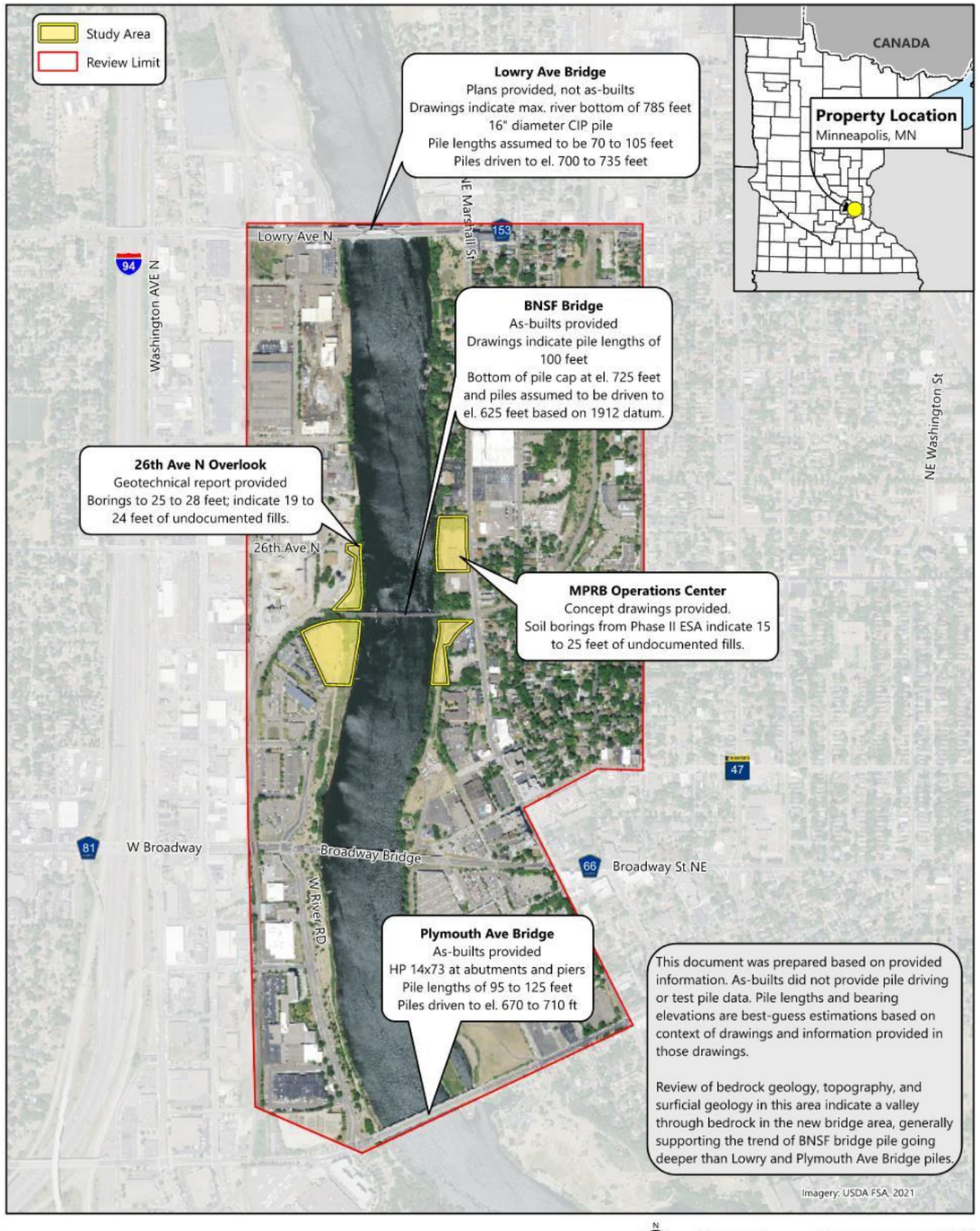


Figure 2.3.6 Geotechnical Assessment

2.3 Technical Project Parameters of the Mississippi Waterway

Floodplain Desktop Review

Floodplain Desktop Review

Work that is in the river's one-percent-annual-flood-chance (a.k.a. 100-year) floodplain is regulated by the City of Minneapolis and the Federal Emergency Management Agency (FEMA), with assistance from the Minnesota Department of Natural Resources (MnDNR). Any project that could cause an increase in the 100-year flood elevation or modifies the floodplain extent by greater than 25 feet must be reviewed through a FEMA process that includes a Conditional Letter of Map Revision (CLOMR) submitted before the project occurs, which can take up to 9 months to review and approve. After the project is complete, a CLOMR must be followed up with a Letter of Map Revision (LOMR) which essentially confirms that the as-built condition had the expected flood impacts.

If the project does not result in an increase in the floodplain or a greater than 25 foot change to the floodplain extent, then the project will only need a No-Rise Certificate from the City of Minneapolis that is reviewed by MnDNR.

Based on the project team's modeling experience in this stretch of the river, the presence of piling in the river will probably cause a slight local rise in the 100-year flood elevation, and that could extend quite a way upstream because this section of the river is a pool behind the Saint Anthony Falls. Strategies to reduce or eliminate that impact could include reducing the number of piling and creating additional flood conveyance capacity on one of the banks near the abutment through additional excavation (likely the east bank). Fill to construct the bridge approaches is not allowed in the floodway. If flood impacts cannot be avoided, MPRB will need to work with any property owners impacted by the increase in flood elevation, as well as work with the City to get local buy-in. The first round of floodplain modeling will occur during schematic design.

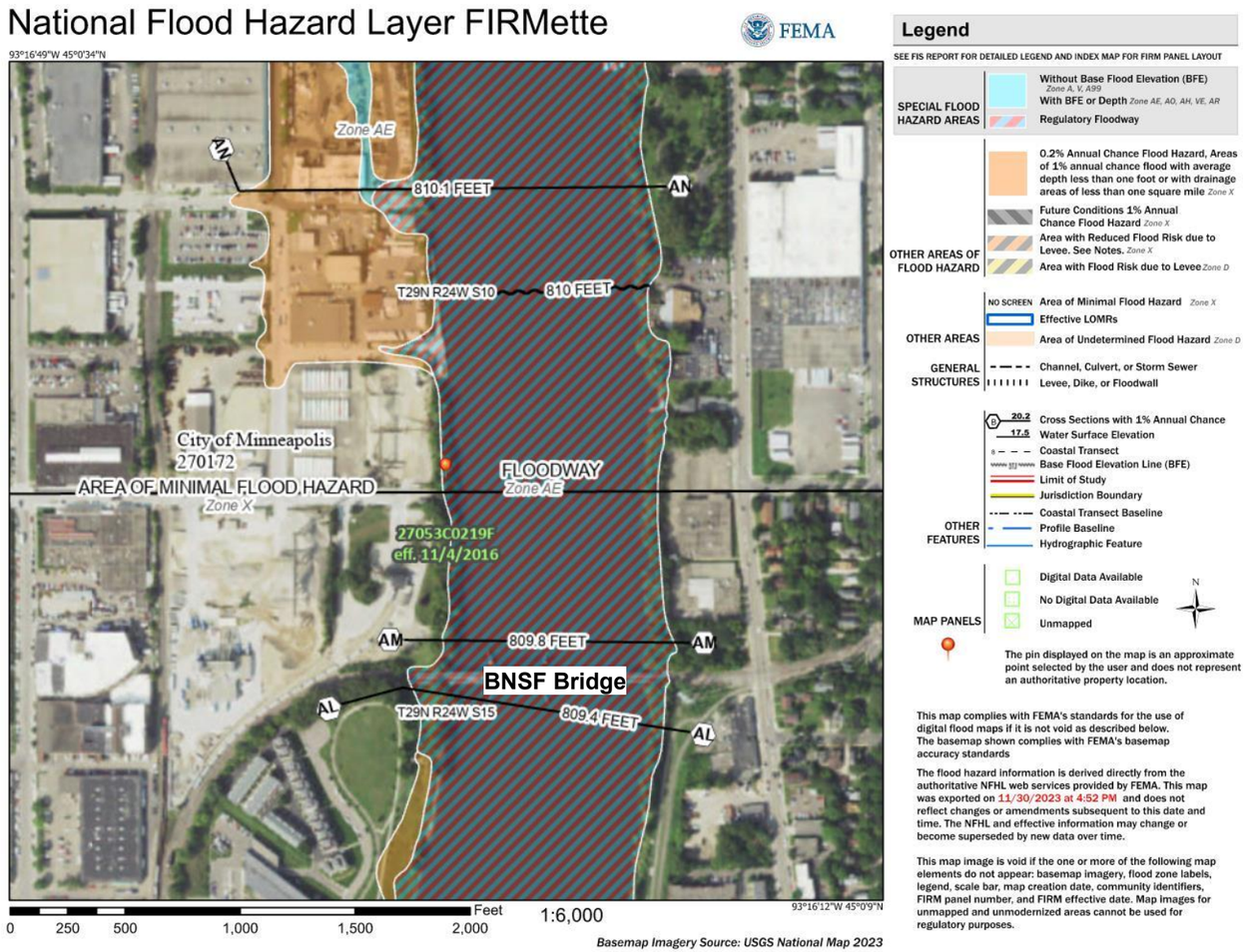


Figure 2.3.7 FEMA Flood Hazard Desktop Review

3.0 Bridge Alignment and Opportunities

Source: Project Team

3.1 Bridge Overview

Criteria, Opportunities, Recommendations

Alignment Overview

Within the study area, a crossing could hypothetically begin and end at several different places. However, different landing locations and bridge alignments affect the way that people access and experience the bridge and the river. During the next phase of work, the project team with coordinate with stakeholders and the community to begin to explore the various options, keeping in mind the working goals of the project. Variations should be assessed for their concurrence with the working goals: connection, arts & culture, environment, community, and safety.

Qualifiers for Bridge Alignment

- Does the alignment option enhance or promote social equity and better access for adjacent neighborhoods?
- Is the alignment conducive to creating easy, universal access and use by those walking, biking, or rolling?
- Does the alignment option support persons with a disability?
- How well does the alignment option fit into the existing and planned trail connections on either side of the river?
- Is the alignment option low or high stress?
- Does the alignment cause direct interaction between the user and motor vehicle or rail traffic?
- Does the alignment option encourage or improve direct access to the river?
- How might the bridge alignment affect adjacent landowners?
- Does the alignment option fall on MPRB-owned or controlled land?
- Does the alignment option fit within the geographical, geotechnical, or spatial constraints of the site?

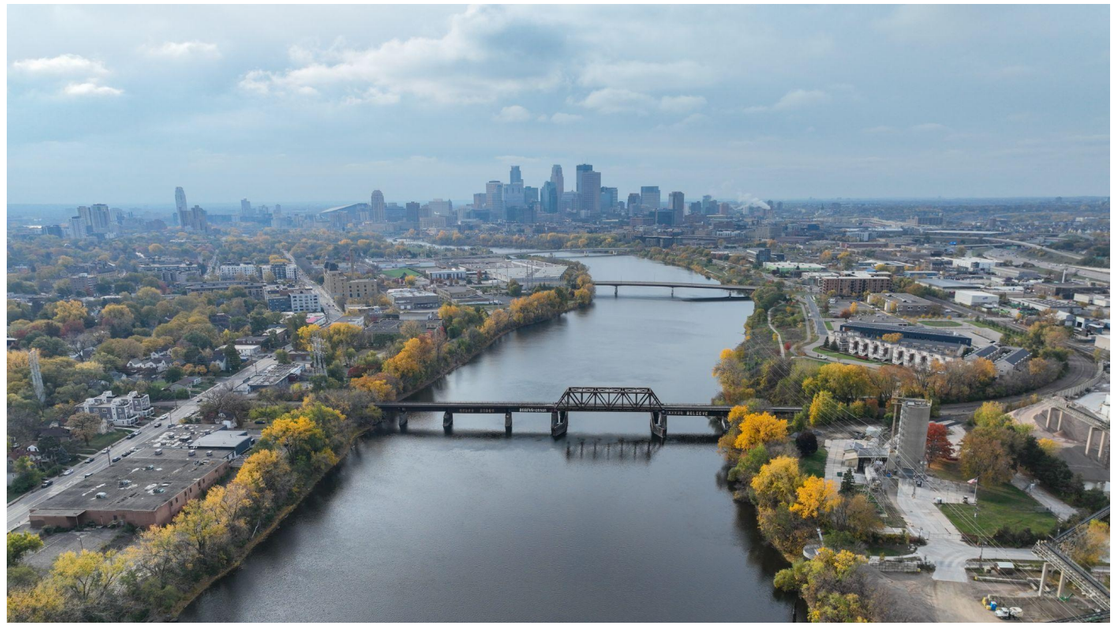


Figure 3.1.1 Site Photo from Above *Source: MWMO Drone Photo*

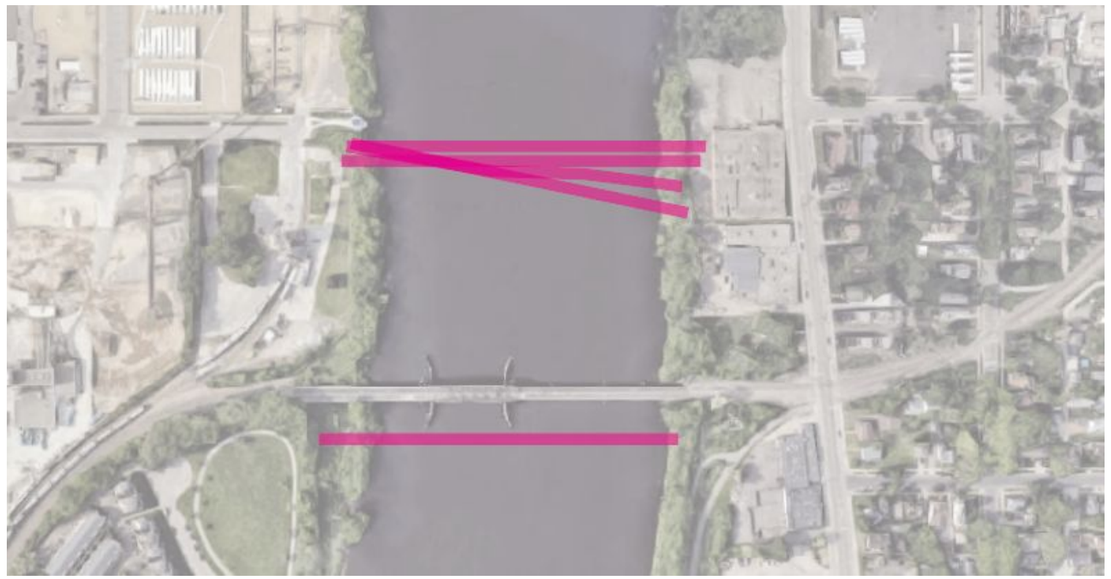


Figure 3.1.2 Alignment Examples

3.2 Typologies of a Crossing

Connection at the Human Scale

Design for Humans

A design shaped by human experience will emerge by prioritizing the following qualities in the design:

Warm, welcoming materials:

As users approach or cross the bridge their experience can be enhanced by designing with materials or colors that promote positive, welcoming feelings. Using weathered steel can be warmer than stainless steel. Warmer colored paint over concrete can bring more energy and closeness to a space over traditional cool greys. Simply using wood slats on a bench instead of metal makes the sit more comfortable on cold or hot days.

Accessibility:

All users, or potential users, should feel welcome in the space. Sufficient width, comfortable slopes, benches for resting, and materials and lighting that promote safety are all items that should be considered in future phases of design.

Gentle and integrated lighting:

Lighting options should align with the project goals as well as dark sky compliance and best practices for bird migration and nesting. Beyond poor aesthetics, harsh lighting may inhibit vision and cause accidents for those traveling across the bridge or accessing adjacent trail systems. Consideration of lighting color temperature can ensure a welcoming space that's easy on the eyes.

Unity and connection with landscape:

This section of the Mississippi River differs from sections nearer St. Anthony Falls or the gorge in South Minneapolis. The banks are not incredibly high, the width of the river is not overbearing, adjacent bridge crossings offer some precedence in design and connection, the river sees little barge traffic, park spaces exist on either bank within the study area, and three (soon to be four) off-street trails await new connections either way across the river.

Design for the Environment

A bridge will improve the lives of community members, but how might it affect birds, animals, fish, or plant communities? The design of the bridge and the landscapes on either end should be harmonious with habitats and ecology.

Creating opportunity for restoration:

Restoration of mussel habitat has been a success for the MPRB at nearby sites like Graco Park. A new bridge crossing may require mitigative measures to enhance underwater habitats which may be combined with river access for paddlers or fishers.

Minimizing flight pattern disturbances:

Lighting, bridge height, or color may affect bird migration along the Mississippi flyway. The bridge design should follow best practices to avoid or minimize impact to bird migration and habitat.

Allowing for fish movement:

Like birds, many species of fish call this section of the Mississippi River home, including carp, catfish, smallmouth bass, walleye and sauger, northern pike, muskellunge, pan fish, and others. The bridge design, particularly its piers and abutments, should ensure minimal disturbance to movement and nesting of fish. Shoreline restorations may include habitat enhancements for fish.

Figure 3.2.1 Mississippi River, Looking North Towards BNSF Bridge

3.2 Typologies of a Crossing

Connection at the Human Scale

Structure and Experience

The structural system, though largely defined by cost, can reflect, enhance, and build upon the design qualities previously mentioned. To investigate which structural systems will promote design at the human scale and minimize environmental disruption, we need to consider two separate but related factors:

1. The number of supports the bridge will have and the span between those supports.

2. The primary structural behavior(s) associated with different numbers of supports and their related spans.

Span Considerations

Accounting for the clearance channel requirements, the bridge crossing can be divided in different ways, which have varying implications for the crossing's structural behavior, appearance, user experience, and impact to the river.

As more total supports in the structure are added into a particular design, the smaller those individual supports need to be, as the forces are transferred to the ground more frequently. Conversely, fewer supports built within the river means each individual support must bear more weight, thus increasing in size.

As the project team weighs these options with the MPRB, stakeholders, and community, careful consideration of placement, frequency, and size should be considered.

Figure 3.2.2 Mississippi River, Seen from the Stone Arch Bridge

3.2 Typologies of a Crossing

Applied Structural Behavior

Imagine you come to a creek in the woods to cross and have three materials to make a crossing over the creek: a log, stones, and a rope.

With the log, you can simply lay it over the creek and walk across. Because the log is very thick, its cross section can carry your weight and send those forces into the ground at either end. When you walk across the log, the log is said to be in bending. A local example of this is the Plymouth Avenue Bridge.

With the stones, you can stack these in a vertical semi-circle shape, placing the largest stones at each base of your structure and the smaller stones towards the top of the arch. This combination of geometry and material will also carry your weight: as you walk across this stone arch, the fact that the stones are pressed (pushed) together allows them to transfer force from one to the other. Here, it is said that the stone arch is in compression. A local example of this is the Stone Arch Bridge.

With the rope, you could tie it to trees on either side of the creek and allow it to hang in the shape of an upside-down arch (a catenary). To cross easier, you could attach a walking surface to that rope (some sticks, etc). When you walk across, the fibers of the rope will be pulled towards the two trees on opposite banks. Through this pulling, which is called tension, your force can be carried. A local example of this is the Martin Olav Sabo Bridge.

Bending

Structure: typically **below** bridge deck
Materials: Steel, concrete, timber

Compression

Structure: **above** or **below** bridge deck
Materials: Steel, concrete, timber, stone

Tension

Structure: typically **above** bridge deck
Materials: Steel

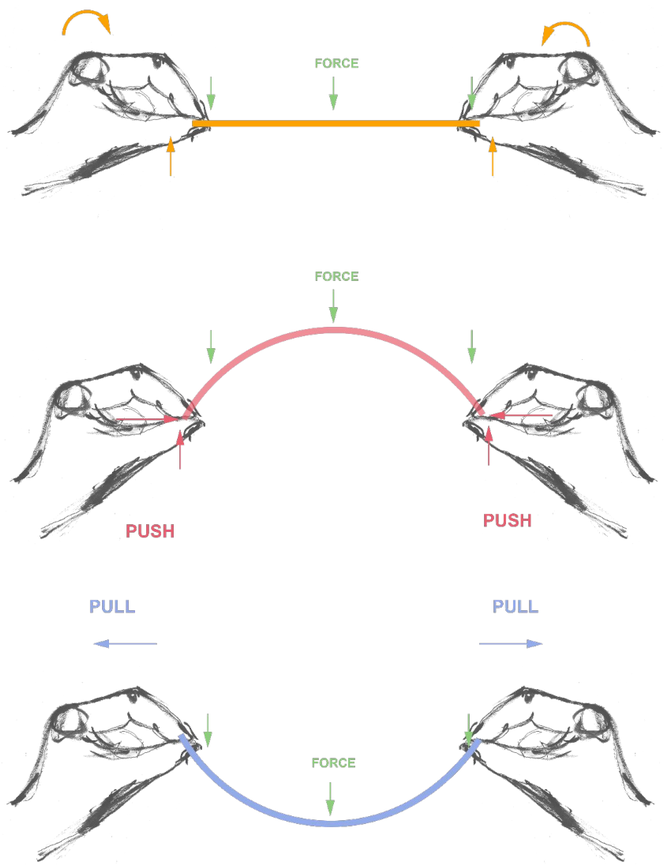


Figure 3.2.3 Illustration of Structural Behaviors

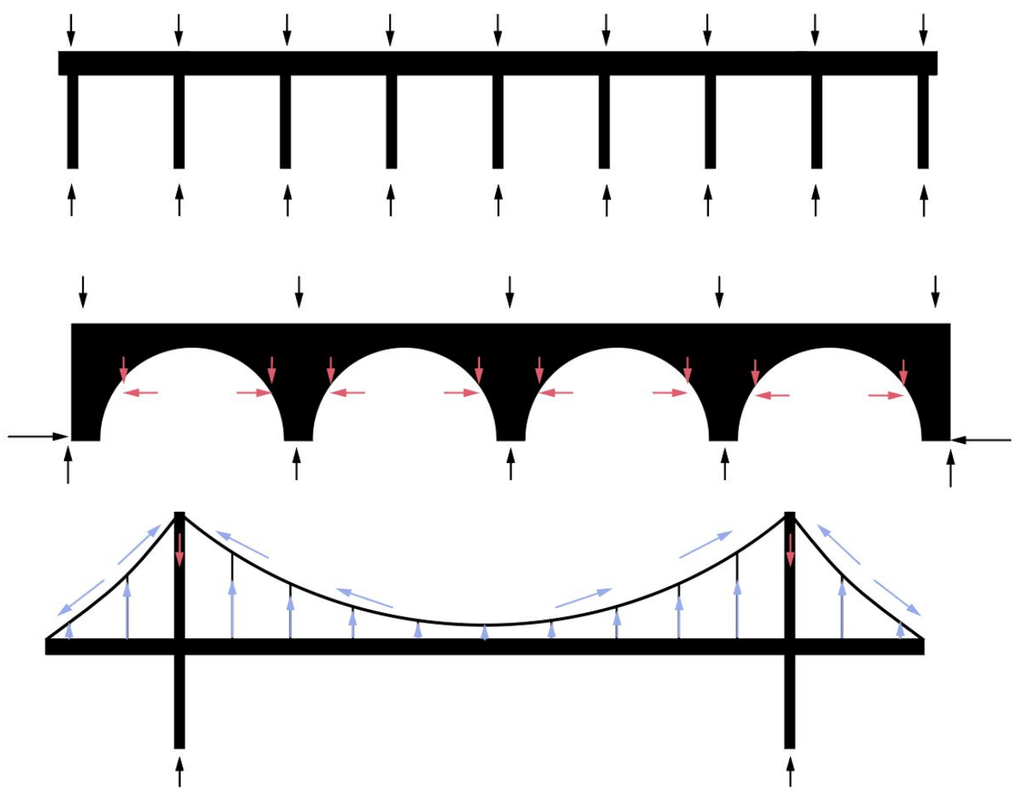
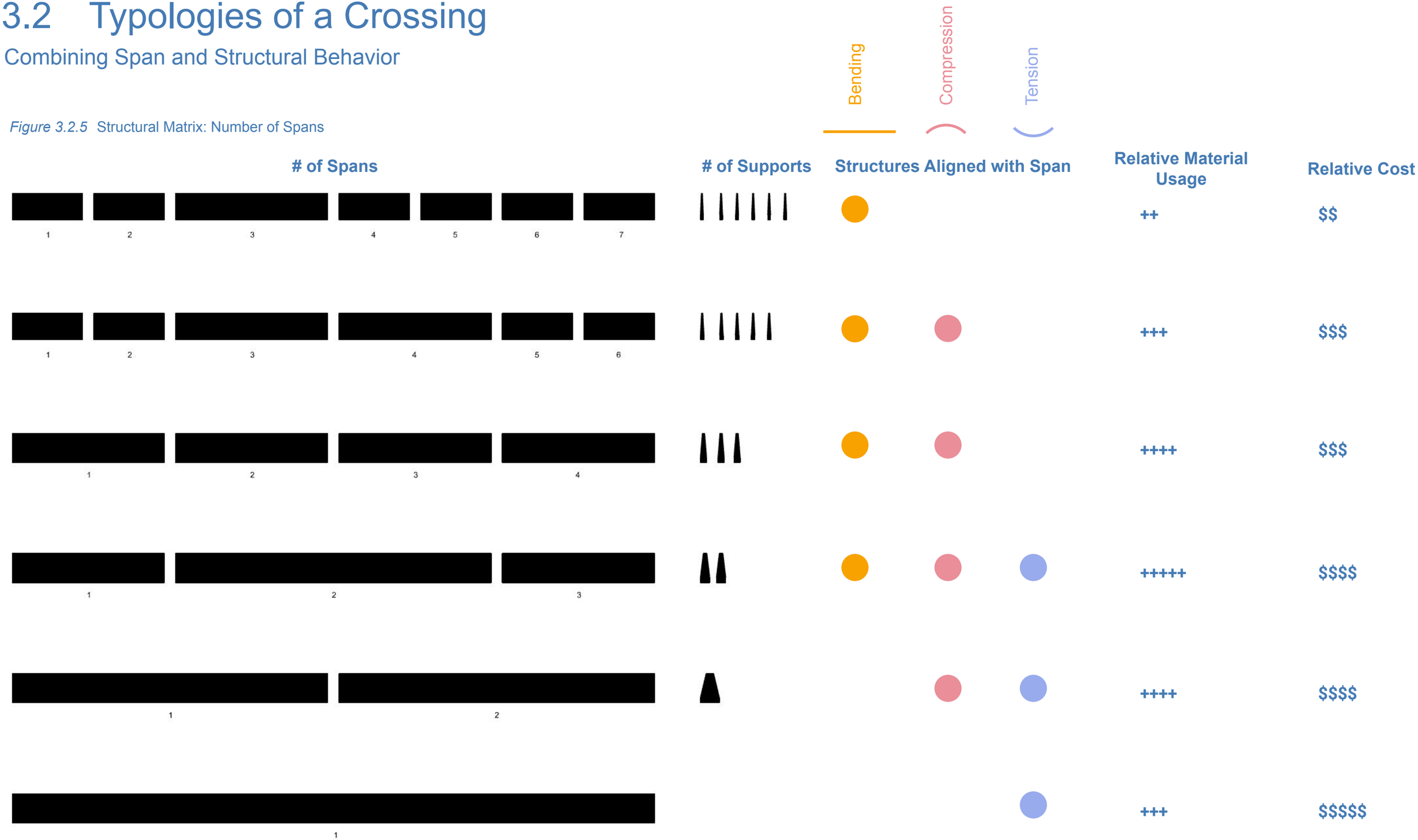


Figure 3.2.4 Bridge Structures Associated with Structural Behaviors

3.2 Typologies of a Crossing

Combining Span and Structural Behavior

Figure 3.2.5 Structural Matrix: Number of Spans



3.3 Bridge Design Considerations

Summary of Considerations

Structure Length [Source: 1]

- Length Over River: 680 feet (straight path, excluding approaches)
- Approach Ramp Length: TBD based on alignment and % slope
- Total Length: TBD

Vertical Clearance Above Water at Navigation Channel [Source: 2]

- Vertical Clearance: +826.10 feet (NGVD29)
  - Structure must be 21.4 feet above river stage of 40,000 cfs for river mile points 853.0 – 857.6 (MnDOT LRFD)
- 100 Year Flood Elevation (Q100): +809.9 feet NGVD29 [Source: 4]

Horizontal Span Across Navigation Channel [Source: 1]

- Required Span: 150’ minimum to align with the navigation channel of the adjacent BNSF bridge

Deck Width

- Minimum Clear Width by Code: 10’ required [Source: 3]
- Final Clear Width: TBD in Schematic Design
  - MPRB Standards for Regional Trails: If separated 10-foot bicycle trail and 8-foot pedestrian trail. If multi-use, 14-foot share use trail. 2-foot clearance buffers to obstacles such as lights, signs, benches etc. should be considered. [Source: 5]

Live Loading Criteria [Source: 2]

- Pedestrian load requirement as determined by code: 90psf
- Maintenance/vehicle loads as agreed upon with governing agencies
  - Recommendation that maintenance vehicles not exceed H5 or H10

Additional Loading [Source: 2]

- Wind: Speed 116 mph
- Snow: 50 psf
- Ice: Thickness 0.70 inch
  - Concurrent Temperature: -5 degrees F
  - 3-s Gust Speed 50 mph

Sources

1 As measured from existing site surveys
2 MnDOT LRFD
3 AASHTO Guide for the Development of Bike Facilities
4 FEMA
5 MPRB

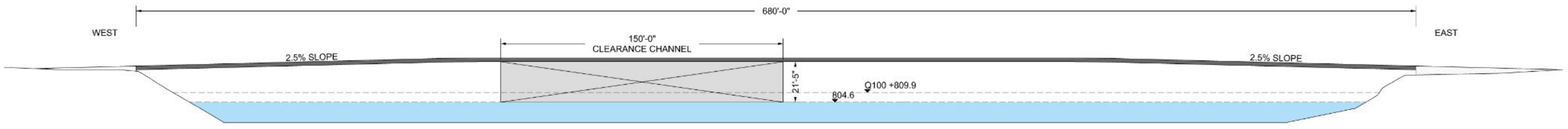


Figure 3.3.1 Site Cross Section Diagram with Crossing Length, Slope, and Clearance

3.3 Bridge Design Considerations

Operations and Maintenance

Maintenance

- Winter climate with snow, sleet, and ice precipitation
- Frequency and method of removal influence deck design (plows / salt)
- Maintenance vehicle: size and weight to be coordinated

Bridge Maintenance + Operations

- Traditional materials include: steel, timber, stone, and concrete
- Concrete requires the lowest maintenance, steel is higher
- Timber lifespan should be considered

Loading

- Security vehicle: size and weight to be coordinated
- Limit vehicular access on bridge to only preapproved loads, protocol to be determined

Emergency Services or Evacuation

- Amount of energy to withstand / ship impact
- Fire and EMS protocol

Ecology and Hydrology

Environmental & Regulatory Agencies

- Mussel environments
- Bird migration
- Riverine ecologic habitat

Geotechnical & River Conditions

- Soil conditions
- Bank profile and extent of bluff
- Baseline geotechnical assumptions
- Hydrology, velocity of water
- Bathymetry

Social and Neighborhood Context

Social Connections

- Sense of place
  - Great Northern Greenway completion
  - Connection to nature
  - Connection to new neighborhood amenities
- Planning Framework
  - Above the Falls Regional Park Master Plan
  - RiverFirst
  - Transportation Action Plan and Complete Streets Policy (City)
  - Bicycle Transportation Plan (County)
- Historic Connection & Legacy Landscape
  - Horace W.S. Cleveland's contributions to the park system
  - Completion of the Grand Rounds trail system to provide equitable access for residents north of the Broadway Bridge

Usability

Bikeability

- Low stress connections to existing trail network
- Accessible and inclusive slopes
  - 2-3% comfortable
  - 4% maximum
  - >5% uncomfortable

Walkability

- Low stress connections to existing trail and sidewalk network
- Connection to neighboring amenities
- ADA access and compliance, including slope
  - 5% comfortable, does not require handrail
  - 8.33% (1:12) maximum, considered a ramp which requires handrail, landings, etc.
  - >9% uncomfortable

4.0 Landscape Opportunities

Source: MPRB

4.1 Parkland Ownership

Understanding Opportunities

Introduction

The current ownership and easements under MPRB purview allow for opportunities to expand the open space network and connect several trail networks. Current parkland ownership and future acquisitions are guided by the Above the Falls Regional Park Master Plan (2019). The MPRB works with willing landowners to purchase property or provide access across private property to expand trail connectivity and access to the Mississippi River. Doing so proactively increases access to and protection of natural resources.

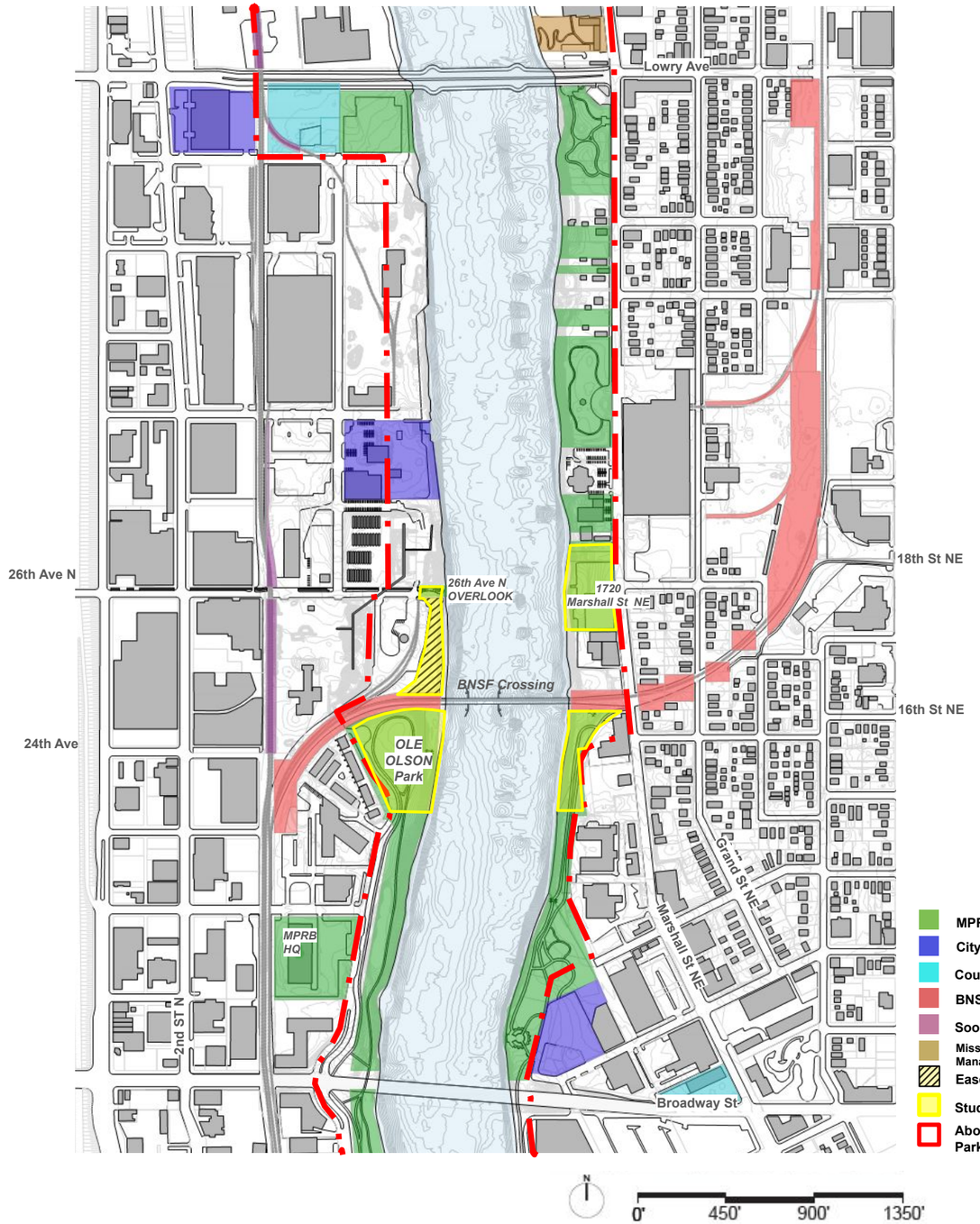
The bridge crossing is anticipated to fall just south of the 26th Avenue North Overlook on the west bank and within 1720 Marshall St, an MPRB-owned property approximately 1.9 acres in size, on the east bank. The MPRB does not currently anticipate additional acquisitions will be required for this project's success.

MPRB Properties or Rights of Access Near the Study Area

- 26th Avenue North Overlook
- Continental Cement riverfront easement
- BNSF trail easement (pending)
- Ole Olson Park
- West River Road
- Edgewater Park
- Gluek Park
- 1720 Marshall St NE
- East Bank Trail
- Sheridan Memorial Park
- Several individual properties

Figure 4.1.1 Typical Greenway Trail Connections

Figure 4.1.2 Land Ownership and Adjacent Relevant Land



4.1 Parkland Ownership

Existing Conditions & Opportunities

26th Avenue North Overlook

The Overlook was constructed and opened by the MPRB and its partners in 2021 and represents a movement and reconnection to the river. It lays at the terminus of the City's 26th Avenue Bikeway (Great Northern Greenway), which runs from the river to Theodore Wirth Parkway and the Grand Rounds' regional trail network. Space near the Overlook is tight; however, the Overlook's deck structure was placed on the north half of the park site to ensure room for a crossing and for a connection along the river to Ole Olson Park to the south. Park improvements that are a part of the bridge project can be minimal and should respect the community involvement which shaped the design of the Overlook.

1720 Marshall St NE

This park property is about 1.9 acres with about 360-feet of riverfront. Plans for this property had been created that would have constructed a new Northeast Minneapolis park maintenance facility, however that plan never commenced and a maintenance facility was established at about 41st Avenue North and the river in North Minneapolis.

1720 Marshall currently sits unused, including a vacant masonry building and large parking lots. Plans to demolish the building, remove the parking lots, and clean the underlying soils are underway. The site is a blank slate with incredible opportunities for improved river access, shoreline and site restorations, and amenities that serve the public, including restrooms and programming.

The site sits very near the northern terminus of the East Bank Trail and the western terminus of the 18th Avenue Bikeway (Great Northern Greenway). Marshall St NE is Hennepin County Road 23, and according to County plans, the roadway will be improved in 2027 and include a two-way dedicated bike trail on the river side of the street.

Figure 4.1.3 Potential Crossing and Site Overview Outlining Potential Connections

5.0 Permitting & Costs

Source: Project Team

5.1 Regulatory Agencies

Agency Engagement and Project Schedule Overview

As outlined in the Project Parameters section, several agencies have jurisdiction over the study area and should be considered in the project timeline and overall schedule. As stated, the significance and ambition of the project to create a river crossing will need close coordination to provide an appropriate response that meets regulations, budget, and timeline. In adjacent Figure 5.1.1, the anticipated agencies with jurisdiction are outlined with expected permits, requirements, and their expected timelines of review.

To ensure an overall efficient schedule, the project team has outlined anticipated permits and agency coordination required to facilitate the estimated schedule. The team has projected the expected coordination with these agencies and outlined key milestone check-ins and anticipated commencement of permitting review periods for each agency.

The timeline included on the following page assumes funding is secured at the start of year two. Any delay in funding may result in delays in detailed design and engineering for the project, and ultimately the grand opening date being pushed further out. The project timeline should be used as a beginning point only and be periodically reviewed and updated as various tasks are completed or as variables change.

Agency	Permits/Coordination	Requirements and Applicability	Are field surveys required?	Permitting Timeline	Recommended Engagement Point
USACE	Section 404/Section 10; likely NOT Section 408 NEPA process (possibly, but unlikely)		Yes; wetland delineation	4-6 months if no Section 408 required	
USFWS	Section 7 Consultation (bird nesting, mussels, etc.)	Required for USACE Approval	Potentially; depending on listed species. Bird nesting survey, mussel surveys, NLEB and RPBB habitat surveys	2-3 months	
National Park Service	Design coordination	Project located in Mississippi National River & Recreation Area	No		
FEMA /MDNR	CLOMR/LOMR	Required for work occurring within the floodplain	No		
SHPO	Section 106 Consultation	Required for USACE Permitting	Yes; A Phase 1a literature review would be required. If the area has not been previously evaluated a field survey would be required.	2-3 months	
MPCA	Environmental Cleanup (brownfields program) Section 401 Water Quality Certication (with 404 permitting) Construction Stormwater Permit				
MDNR	Work In Public Waters Permit National Heritage Review (possibly) License to cross public water	Required for work occurring within the Public Water	No	4-6 months	
City of Minneapolis	Environmental Assessment Worksheet (EAW) IF petitioned or if City requests General Land Use Application MRCCA Project Review Floodplain Review	To fulfill state-level environmental Review process	No	6-9 months	
City of Minneapolis/BWSR	Wetland Conservation Act	Required for work occurring in wetlands	Yes; wetland delineation	4-6 months	
City of Minneapolis	General Land Use Application	Required for nonconforming land uses; This may not be required.	No	3-4 months	
City of Minneapolis	MRCCA Vegetation Management Application	Required for work within MRCCA	Yes; tree inventory	3-4 months	
City of Minneapolis	MRCCA Project Review	Review of project plans for compliance with MRCCA Ordinance; Structure height, vegetation management, lighting, land alteration standards and stormwater treatment	No	3-4 months	
City of Minneapolis/DNR	Floodplain Review	Required for work within the Floodplain	No	3-4 months	
City of Minneapolis	Transportation and Bridge Departments	Review of project plans and maintenance coordination	No	3-4 months	
MN Dept of Transporation (MnDOT)	Bridge Plan review	Required if any State funding is used for the project	No	3-4 months	

USACE may want a NEPA process, but unlikely if pier disturbance is small. Separate and longer process than state process: 12-15 months
Field surveys are outside the scope of this project and would be completed after 10% design.
If Federal funding is being looked at, USDOT, Section 4(f) procedures will be applicable

Early Engagement Recommended Engagement During Schematic Design Engagement at 10% Schematic Design

Figure 5.1.1 Agencies Having Jurisdiction in the Mississippi Waterway

5.2 Overall Project Timeline

Anticipated Scope of Work Timeline with Permitting Intervals

Assuming Funding is Secured

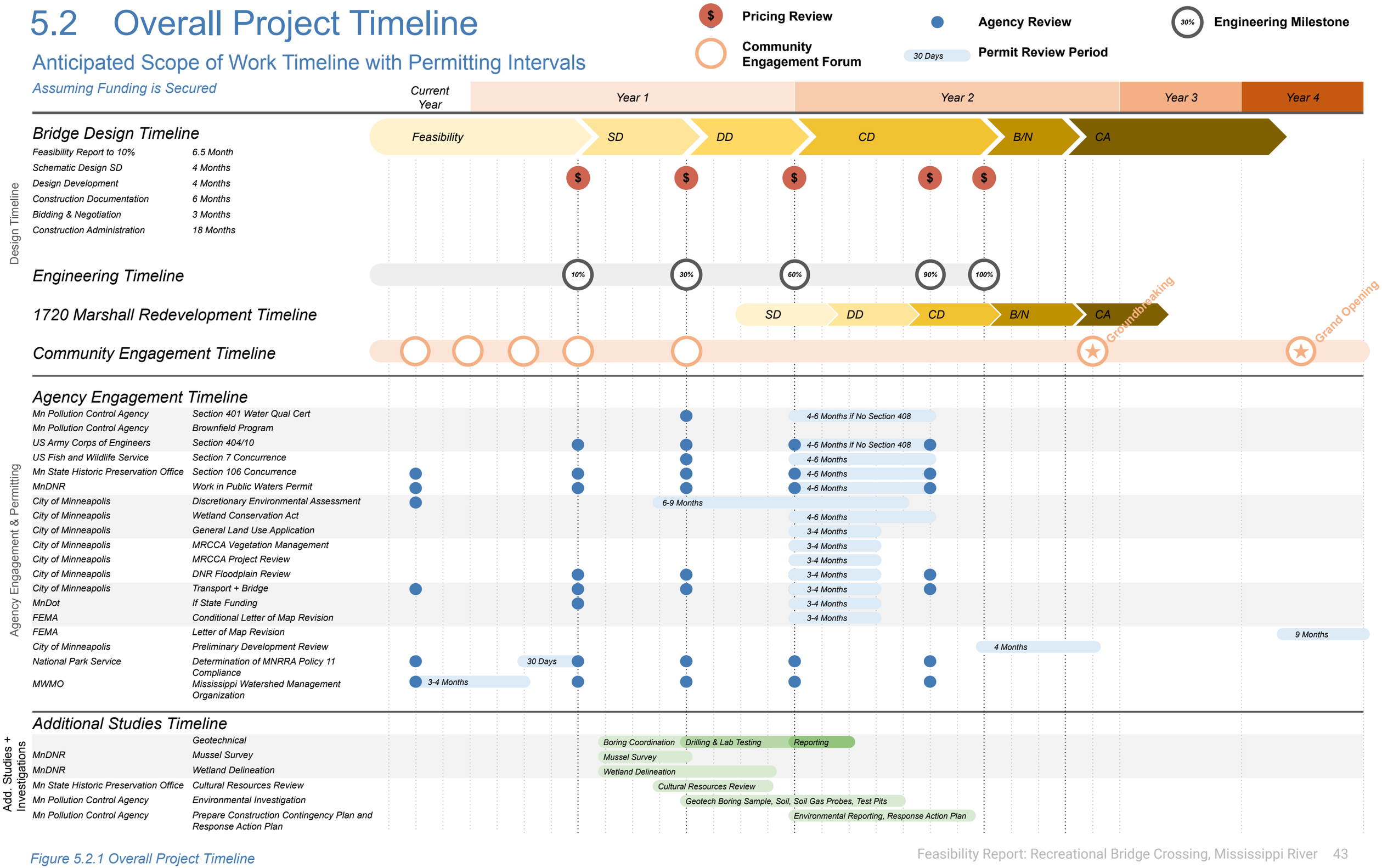


Figure 5.2.1 Overall Project Timeline

5.3 Anticipating Costs at Feasibility Level

Anticipating Bridge Costs

At the feasibility level of the project, the anticipated bridge costs have inherently large variation due to the number of still-unknown and undecided factors. These factors can be divided into three categories:

1. External Factors (Project Focused)

- **Limited** control by the design team / client over these factors
- These factors are beyond the design team and client, and have an important role in the cost of the project

- Key Instances
  - Bridge Length
  - Site Conditions, Geotechnical Requirements (Implications for foundations)
  - Costs of labor, material, and transport

2. Structural Factors (Bridge Focused)

- **Partial** control by design team / client over these factors
- These factors may also be influenced by other governing bodies (additional funders, code requirements), which is why controlling the cost of these items is not a given.
- Key Instances
  - Spans of the bridge
    - A single span bridge will cost much more than a bridge with multiple spans
    - See *3.2 Typologies of a Crossing* for recommended structural types to accompany spans
  - Width
    - There is a roughly linear relationship between bridge width and cost. As width doubles, cost doubles.
  - Maintenance vehicle weight
    - A bridge with a required maintenance vehicle load of +70,000 lbs will cost more than a bridge with a maintenance vehicle load of +20,000 lbs

3. User Experience Factors (Bridge Focused)

- **Significant** control by design team / client over these factors
- These factors do not influence the structural performance of the bridge, and instead contribute to the experience that a person will have on the bridge.

- Key Instances
  - Quality and finish of primary bridge elements
    - Painted steel, finished concrete, connection details
  - Quality and finish of architectural components
    - Walking surface, seating, handrail, stainless steels
  - Quality and integration of lighting into structure
    Accent lighting to highlight the structure, color changing lighting

Feasibility Stage Summary

The cost range shown at the feasibility level is intended to offer a sense of the capital resources required to build a recreational bridge of this scale, as well as structural and architectural implications that result from a higher or lower targeted project cost.

Based on similar scale, built bridge projects, the recreational bridge crossing is expected to cost between $1,000 and $3,000 per square foot of bridge deck area.

Determining a Targeted Bridge Cost

To develop a general sense of the costs at the feasibility level of design, the most critical steps relate to factors in categories 1 (external) and 2 (structural). Category 3 (user experience) factors can comprise a significant part of the budget but can be modified more readily than other factors to fit a maximum project cost.

- Establish and account for external factors as much as possible in the early stages by looking to nearby precedents.
  - In the absence of on-site borings, do geotechnical conditions at adjacent sites suggest the need for unique structural interventions (very long piles, etc) that would add to the project cost?

- Reduce high-cost structural factors by pursuing designs early on with multiple spans to create more efficient structures. Conversations must be conducted as soon as possible to gain an understanding of maintenance vehicle weight loads, as these vehicles will be the heaviest users of the bridge. The greater the loading requirements, the more costly the bridge.

  Early in the design process, establish a goal deck width that balances cost and user comfort. Early calculations indicate one foot of width can add up to $2M to the bridge cost.

5.4 Cost Overview at Feasibility Level

Bridge Costs

The total estimated pre-planning level cost is calculated using comparable projects as reference. All costs are computed in 2025 dollars and are subject to change as further design is completed. An inflation factor must be added for each year beyond 2025. As with all conceptual cost estimation, there is cost uncertainty and risk ranging from minus 25% to plus 50%, per ASTM E2516 11, Standard Classification for Cost Estimate Classification System.

Figure 5.4.1 Bridge Cost Overview

Category	Factor	Range: $1,000-2,000 / SF	Range: $1,500-2,500 / SF	Range: $2,000-3,000 / SF
1. External	Bridge Length Site Conditions, Geotechnical Requirements Costs of labor, material, and transport	Limited to no control over these factors		
2. Structure	Span Lengths / Number → Span lengths influence efficiency of structural systems (See Slide)	Minimize typical span lengths to simplify bridge deck structure	Medium length spans	Largest spans with less support piers in water
	Bridge structural system (See Slide)	Simple structure, standard beam shapes / prefabricated truss	Custom structure, shaped beams, arches	Complex structure, tension elements, freeform geometry
	Clear width of bridge	Deck width has a linear relationship with total bridge cost. For example, doubling the deck width will double the cost of the structure		
	Maintenance vehicle loads	Recommend limiting maintenance vehicle loading to a level such that it does not control global bridge design		
3. User Experience	Quality and finish of structural elements (steel coating grades, architecturally exposed structural steel, concrete finishes, steel detailing quality)	A larger budget will mean that elements contributing to user experience and bridge appearance are less likely to be value engineered out of the budget.		
	Quality and finish of architectural components (handrail, walking surfaces, seating)			
	Quality and integration of lighting into structure	Safety (essential) lighting and accent lighting to highlight structure should be integrated as much as possible to avoid clunky features (light posts) on bridge in all scenarios. Note that color-changing lighting is more expensive than white lighting.		
Summary				
	The notes under each column are intended to provide general statements about the implication of a price range on a structure. They should **not** be taken as a 1:1 statement of what is guaranteed or beyond reach for a given price range.	Maximum number of spans Simple finishes with possibility of non-essential features being value-engineered out of scheme	Fewer (longer) spans are an option Higher quality finishes	Fewer (longer) spans are an option Highest quality finishes, materials Architectural lighting

*Anticipated costs in this table refer only to cost of the bridge structure rather than to cost of project in its entirety

5.5 Park Development Cost Overview, Feasibility Level

Figure 5.5.1 Park Cost Overview: East Bank Park (1.9 Acres)

Category	Factor	Low - $20/sf	Mid - $60/sf	High - $100/sf
East Bank Park	Landscape Type	Primarily vegetated spaces, limited hardscape.	Balanced hardscape and vegetation, key/limited material palette, limited designed pedestrian furnishings.	More hardscape, robust material palette with stone elements,, designed pedestrian furnishings, mature and diverse vegetation.
	Structures	No structure	Small restroom building	Medium size community/partner building with restrooms
	River Access	No river access	Small river access (visual or indirect)	Direct and accessible access to river

Figure 5.5.2 Park Cost Overview: West Bank Park (0.1 Acres)

Category	Factor	Low - $20/sf	Mid - $60/sf	High - $100/sf
West Bank Park	Landscape Type	Less hardscape, more vegetation	Balanced hardscape and vegetation	More hardscape, less vegetation
	Structures	Overlook constructed in 2021, limited space for additional structures		
	River Access	River access will be provided downstream of BNSF bridge, construction starting in 2024		

*Anticipated costs in these tables refer only to cost of the park restoration on the east and west banks, and a park building on the east bank. The costs do not reflect bridge or site costs.

The total estimated pre-planning level cost is calculated using comparable projects as reference. All costs are computed in 2025 dollars and are subject to change as further design is completed. An inflation factor must be added for each year beyond 2025. As with all conceptual cost estimation, there is cost uncertainty and risk ranging from minus 25% to plus 50%, per ASTM E2516 11, Standard Classification for Cost Estimate Classification System.

Note: Park improvement costs include all work necessary to construct a new park at 1720 Marshall St NE and modify the existing trail connection at the 26th Avenue North Overlook, including the creation of paths or ramps that lead up to either end of the bridge's abutments. Factors that are called out in the table above indicate three levels of built park infrastructure that range from simple to more intense. Fortunately, the park on the west side of the bridge has a big head start. Most park improvements and trail connections on the west side of the bridge will have already been installed when the bridge project commences. This however isn't true of the east side of the bridge as it lands at 1720 Marshall. As mentioned earlier, 1720 Marshall has great opportunities for meaningful park development, including shoreline and habitat restoration and indoor space for public restrooms and accommodations for park programming by MPRB or partners.

5.6 Site Cost Overview, Feasibility Level

Site Costs

Figure 5.6.1 Site Costs

Category	Factor	25% Cost of Construction
Geotechnical Study	Number of bridge piers	Borings and calculations will be required at each bridge pier, the more borings required the higher it will cost.
	Availability of Contractor and equipment to perform borings in the river	River borings are not common in the area and must be performed from a barge. Costs will depend on the number of contractors bidding the work and the availability of equipment.
	River flow and weather	Borings cannot be completed safely when the river is at flood stage. Weather and schedule may impact costs.
Environmental Study	Number of borings	Cost has a linear relationship with the number of borings required. Each boring will require sampling and testing, so more borings will equate to more cost.
	Amount of contaminated material to be removed	Environmental staff will need to determine which materials are contaminated and need to be disposed of offsite. The more rubble and contaminated material found, the more time staff will need to spend in the field for observation, resulting in higher costs.
Design and Engineering	Contract Fee	Contingent on Cost of Construction
Permitting	Complexity of permit applications	Permitting costs vary depending on engagement with all agencies, the complexity of the design, and review iterations within permitting submittals

Note: Study costs include specific studies and permitting costs not included in the bridge or park costs. Geotechnical work must be performed within the river and at either end of the bridge. Similarly, environmental work at each bridge abutment and where improvements are constructed at 1720 Marshall will be required to better understand how exported or moved soils will be handled or disposed.

Design and engineering costs are significant and include all soft costs that result in a set of construction documents that a contractor can use to construct the project. Design and engineering is often split into several phases of design, including feasibility or pre-planning, concept design, schematic design, design development, and construction documentation. Each phase of design progresses in specificity until the project is ready for bidding, contracting, and construction. Most of the community engagement happens in pre-planning and concept design when high level decisions are made.

Permitting costs are incurred directly from the regulating agency, but more so in the preparation of the permits themselves by qualified engineers or professionals.

Study, design and engineering, and permitting costs can vary, but can be generally assumed to be about 25% of construction costs.

6.0 Summary Recommendations

Source: Project Team

6.1 Feasibility Study Summary & Conclusions

Project Overview

Summary & Conclusions

A new recreational bridge is required to realize the plans set forth by the MPRB, City of Minneapolis, and Hennepin County. Converting or otherwise reusing the existing 140-year-old BNSF Bridge, as previously assumed in those agencies' adopted plans, will result in an inferior user experience, cost significantly more if railway use continues, and ultimately take years if not decades to negotiate and complete.

Creating a new bridge, arguably within the existing corridor of the existing BNSF bridge, is a prudent and feasible option. It provides equitable connections to other communities, destinations, and natural resources other communities in Minneapolis thrive on. It provides a low-stress environment created solely for human use, away from speeding vehicles, loud trucks, and noxious emissions. A new bridge puts North and Northeast Minneapolis communities on the river rather than providing just a view of it.

A target project cost, including all construction costs, studies, design and engineering, permitting, and contingencies will be developed by the MPRB using the information provided within this feasibility report. Once a target project cost is established, the remaining phases work, from concept design through construction documentation, will design the project to that cost.

Future Recommended Studies

There are several studies and investigations that will need to take place prior to or along with design development. These include:

- Geotechnical soil borings at each abutment, in the river at each of the proposed pier locations, and in the green spaces on each river bank. Information obtained from the borings will be used to create a geotechnical report including global stability or pile analysis at abutments and pile analysis at bridge piers.
- Environmental review should happen concurrently with the geotechnical borings. Soil sampling, groundwater sampling, soil probes for gas sampling, field screening for debris and chemical impacts, and excavate test pits should be incorporated into the investigation.
- Work with the MPCA's Brownfields Program to obtain a No Association Determination (NAD). This may require preparation of an updated Phase 1 report.
- Preparing a Phase 2 report, a Response Action Plan (RAP), construction contingency plan (CCP), and vapor mitigation system design for any buildings on the site. These reports must be included in the bid documents and should outline procedures for managing contaminated soil, groundwater, and unexpected environmental impacts during construction.
- Cultural Resources Review to comply with SHPO Section 106.
- Wetland delineation.
- Mississippi River mussel survey.
- Topographic survey for any areas where survey is not already available.
- Bathymetric survey for any areas where survey is not already available.
- Bidding documents for the demolition of the building and parking lot at 1720 Marshall Street NE.

7.0 Appendices

Source: Project Team

7.1 Figure List

Document Figures by Chapter

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7.2 Geotechnical Review

resourceful. naturally.
engineering and environmental consultants

BARR

Technical Memorandum

To: Minneapolis Park and Recreation Board
From: Barr Engineering Co., Katie Zadrozny, P.E., and Michael Haggerty, P.E.
Subject: Initial Geotechnical Review for Mississippi River Crossing
Date: December 14, 2023
Project: 23272029.00 100 010
Enclosures: Figure 2, Geotechnical Assessment

1 Introduction

This geotechnical review summarizes Barr Engineering Co.'s (Barr) findings of publicly available geotechnical data for reference in development of conceptual planning for the proposed Mississippi River crossing by the Minneapolis Park and Recreation Board (MPRB) as part of an expansion of the Great Northern Greenway trail. The proposed Mississippi River crossing is in Minneapolis, between the Lowry Avenue and Broadway Street bridges, to be located near the Burlington Northern Santa Fe (BNSF) railroad bridge (review site). For ease of discussion, the review site is split into two areas on either side of the Mississippi River, referred to in this memo as west Bank and east Bank. The review site can be seen on attached Figure 2.

1.1 Objective

MPRB retained West 8 and Barr to review of publicly available geotechnical information to identify potential geotechnical-related impacts to bridge design and construction. Information obtained will be used to formulate a geotechnical investigation and provide subsequent geotechnical design recommendations.

1.2 Scope

As part of this assessment, Barr reviewed geologic maps, historical records, and other publicly available documents that provided geotechnical information in the vicinity of the proposed project and nearby developments and river crossings.

1.3 Limitations

This memo presents our review of available information. We anticipate additional information will change our preliminary comments. Barr performed this work in a manner consistent with the care and skill ordinarily exercised by members of the geotechnical profession under similar budget and time constraints. Within this context, Barr assumes responsibility for its own observations, along with its interpretation of the information gathered. No warranty is made or intended.

Because Barr was not retained to verify information, Barr assumes no responsibility for the accuracy of information that it obtained from other sources including, without limitation, regulatory and government agencies, persons knowledgeable about the review site, vendors of public data, and prior reports on the review site or other properties identified in the evaluation. This memo is intended to inform, not exhaustively, on potential geotechnical implications for site design and development.

2 Available Information

2.1 Summary

Limited design information is available at this time, however some foundation information about existing structures in the general area were obtained and reviewed. The design team assumes the proposed bridge will have an abutment with soil-retaining wing walls at each of the west and east banks, and have multiple piers in the river channel. Review of geotechnical data indicates terrace deposits, with undocumented fill, at the riverbanks and alluvial deposits over bedrock in the river channel. Nearby information, available for the BNSF Bridge, Plymouth Avenue Bridge, and Lowry Avenue Bridge indicate pile lengths of 90 to 130 feet with piles driven to elevations of 630 to 730 feet above mean sea level (amsl). Existing data reviewed indicates there is significant variation in the sub-surface bedrock elevation. Geologic maps indicate an erosional cut through the bedrock in the area of the existing BNSF bridge and the proposed river crossing, with top of bedrock over 100 feet below grade, with shallower bedrock to the north and south, with top of bedrock at or near 100 feet below grade.

Barr reviewed available data to identify existing foundation types and subsurface conditions along the review site's river corridor. The geology is greatly affected by the river erosion and deposition which creates a layered system predominately of sands, with interbedding of other materials, and a depth to bedrock expected to be over 100 ft.

2.2 Report Review

Geotechnical Report for 26th Ave N Overlook: This was a report prepared by Northern Technologies (NTI) for the west bank overlook at 26th Ave N in Minneapolis, which is on the west bank of the river and in the vicinity of the proposed west abutment for the bridge. The geotechnical borings were advanced to depths of 25 to 28 feet, terminating in terrace-deposited sands. Bottom of fill was encountered 19 to 24 feet below surface. The bottom of fill elevation was close to river elevation. Moisture contents, percent fines, and sieve analysis tests were performed on select samples. Some follow-up review is recommended to answer the following questions regarding this project:

1. The report mentions global stability – was this performed and where are those analyses? This would help support expected river bank stability as it relates to the pedestrian bridge project.
2. Are as-builts available? This would help confirm what type of foundation was installed.

As-Built drawings for Plymouth Avenue Bridge: The Plymouth Avenue bridge is a segmental concrete girder bridge built in 1983. Based on a review of available Minnesota Department of Transportation (MnDOT) drawings, H-piles 14x73 were used at abutments and piers. A central row of piles were installed vertically and the rest were battered at 3 inches on 12 inches. The MnDOT drawings also indicate that the

7.2 Geotechnical Review

west abutment was built partially over an existing abutment with the piles being battered around the left-in-place abutment. The piles appear to have driven to el. 670 to 710 ft amsl corresponding to pile lengths of 95 to 125 feet. Some questions for follow-up include:

1. Can pile driving records and test pile data be provided?
2. What geotechnical testing was performed as part of the bridge design?

Concept drawings for MPRB Operations Center: Plan documents indicate an overlook on the east bank supported by a retaining wall. Drawings do not indicate foundation types for building or wall and do not indicate wall design information. Follow-up questions for this site include:

1. Is there a geotechnical report available for this site?
2. Are there any other design documents or calculations such as slope stability or wall design?

Lowry Ave Bridge Replacement Drawings: The current Lowry Avenue Bridge opened in 2012. The previous bridge was a five span truss bridge, constructed in 1958, however it was closed in 2008 due to documentation of lateral movement of one of the bridge piers, located in the river. Bridge replacement plans for the Lowry Ave crossing of the MS River were provided by Hennepin County (bridge owner). These drawings are from 2009 – 2010 and include bridge drawings with foundation type, boring logs, and river bottom elevation. River bottom elevations are provided at the current bridge location and 250 feet upstream and 200 feet downstream. The three sections show a minimum river bottom elevation of about 782 ft. amsl.

The bridge plan and profile sheets indicate 16-inch diameter cast-in-place (CIP) piles and test piles. The piles are stated as having lengths ranging from 70 feet to 105 feet long at the west abutment with a bottom of pile cap elevation of 809 ft. amsl. Based on these soil borings, bearing elevation for piles are expected in the range of elevation 650 to 730 ft. amsl; the trend indicates (as is mirrored with the river bottom) deepest bearing elevations on the western half of the river channel. There is also a drilled shaft at the west side of Pier 2. Follow-up questions for this study:

1. Can Hennepin County provide the geotechnical report?
2. Can Hennepin County provide pile driving and test pile reports?

As-Built Drawings for BNSF Bridge: This bridge was built to replace a pre-existing BNSF bridge. Six pages were provided, as images from 1954 plans, of the BNSF bridge. Image file "490579.TIF" is presented below. This figure supports an assumption that the piles are in the range of 12" diameter piles.

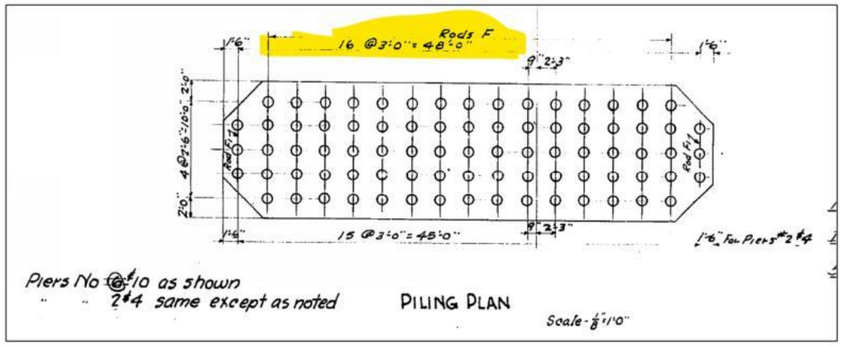

Image file "490626.TIF" states "Ice Load: a force from flow ice of 10 tons per lineal foot on ends of new piers. Ice flow is applied at elevation 800 ft. amsl." This page also indicates a datum from 1912 and the information reviewed would need to be adjusted to align with current vertical datums. Additionally, the image provides estimated quantities and indicates timber piles were used. If 8300 linear feet of timber pile had to be furnished to provide 81 piles (as shown in image above), then there are about 100 feet per pile. This page also indicates the bottom of pile cap is about el. 725 ft. per the 1912 datum.

$$\frac{8300\ feet\ of\ furnished\ pile}{81\ piles} \cong 100\ feet\ per\ pile$$

ESTIMATED QUANTITIES

ITEM	UNIT	NEW PIER 4	NEW PIER 5	RAISED PIERS	ABUTMENTS	NEW SPAN 4	TOTAL
RAISE BRIDGE	LUMP SUM						
SHIFT DECK PLATE GIRDER SPANS	"						
REMOVE OLD PIERS 4, 5 & 6	"						900 cy.
FALSEWORK FOR NEW SPAN 4	"						
STRUCTURE EXCAVATION	CU. YD.	1,210	1,210				2,420
FURNISH & DRIVE TIMBER TEST PILES	EACH	2	2				4
FURNISH UNTREATED TIMBER PILES	LIN. FT.	8300	8300				16,600
DRIVE UNTREATED TIMBER PILES	"	7470	7470				14,940
CONCRETE CLASS B	CU. YD.	1,063	1,088	–	53		2,204
" " C		–	–	112	17		129
REINFORCEMENT STEEL	LB	26470	26,670	7,260	3,100		63,500
REMOVE DECK PLATE GIRDER SPANS	LUMP SUM						
STRUCTURAL STEEL: TRUSS SPAN & NOSE	"	1,190	1,190	–	–	1,186,800	1,189,180
STEEL GRILLAGE & SHIMS	"	–	–	116,350	13,500	–	129,850
STEEL JACKING BEAMS	"						26800

1. Can Hennepin County provide pile driving and test pile records?

Marshall Street Properties, Phase II ESA: Braun Intertec (Braun) prepared a Phase II Environmental Site Assessment (ESA) for properties on the east bank. Nine borings were performed as push probe or hand

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auger borings to depths ranging from 4 to 43 feet below ground surface (bgs). Soil borings found 15 to 25 feet of fill over native sands interbedded with clays. Fill is undocumented and will need to be removed and replaced.

1. Is a geotechnical report available? Were there any additional follow-up geotechnical explorations?

2.3 Geologic Map Review

A review of geological maps from the Minnesota Geological Society was performed to summarize depth to bedrock and surficial geology data (County Geologic Atlas | College of Science and Engineering (umn.edu)).

Bedrock Geology: In the figures below, St. Peter Sandstone, OS, cream-colored, cuts through in this area with deeper cuts to Shakopee, blue, and Oneota, lighter blue, both of which are Formations of the Prairie Du Chien group. In general, the river has carved an erosional channel through the bedrock in the river valley and this channel has been filled in with various layers of alluvium and some clay layers. This figure indicates the new river crossing (indicated by red line) is in the vicinity of the erosional channel:

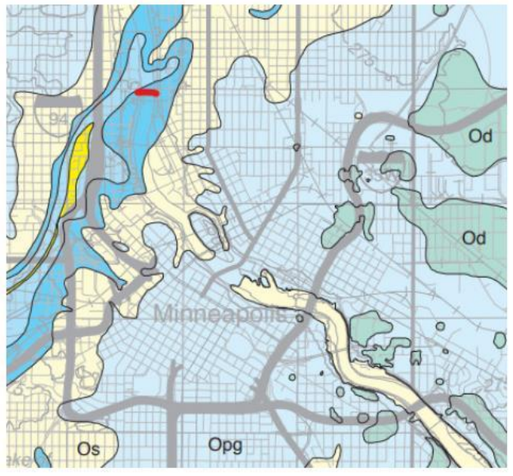

Figure 1: Bedrock Geology

Bedrock Topography: The bedrock topography map also illustrates an erosional channel through the area of the proposed river crossing (indicated by red line). The colors indicate a valley with steep change in this area with bedrock at 100 to 200 feet below grade.

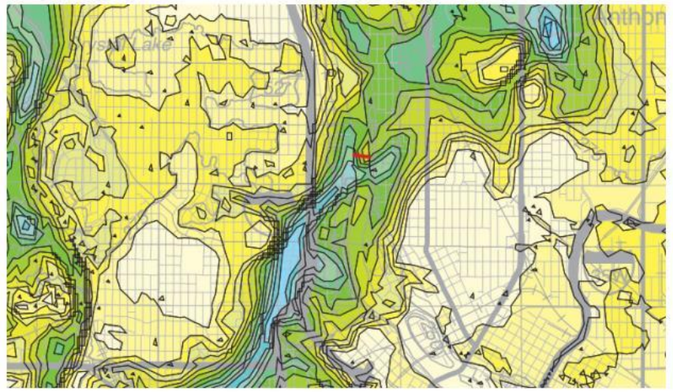

Figure 2: Top of Bedrock Topography

Surficial Geology: The map of surficial geology shows terrace sand and gravel, Qat, yellow, at the west bank and sand and gravel, Qag, light orange, at the east bank. This map does not indicate any widespread human/machine dumping of fill material along the river banks (as has been done to create land for developments). Red line indicates approximate river crossing.

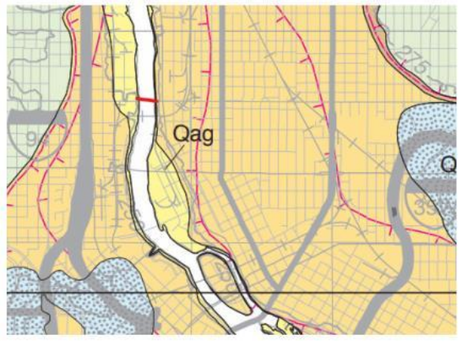

Figure 3: Surficial Geology

Overall, this geologic map review supports the findings from the pile length/bearing elevation review. The available information for BNSF indicates deeper piles than Plymouth or Lowry, which supports the presence of an erosional channel in this area.

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3 Additional Information

Further geotechnical investigation during the detailed design and engineering phase of the project will provide data so the project team can generate site-specific and foundation-specific recommendations and considerations. In the meantime, additional data requests mentioned in Section 2.2 relate to: pile driving and test pile records, geotechnical reports for nearby bridges, slope stability or retaining wall analyses related to nearby riverbank developments.

The information to be determined with a site specific geotechnical investigation consists of:

- Data at foundation locations: depth to river bottom, depth to bedrock, soil classification and strength field and laboratory testing. Note we have requested borings from the BNSF bridge design and Broadway St Bridge design; these bridges are close to the proposed crossing and would be valuable information before a geotechnical investigation is performed.
- Preferred pile type by the designer. Soil borings in the river will help inform design parameters to perform pile analyses for axial and lateral resistance. The design team will also need to know anticipated axial and lateral loads.
- Conceptual design: bridge alignment, abutment type, retaining and/or wing walls.

4 Design Guides, Guidelines, and Manuals

If the bridge is to receive state/federal funding, design standards will need to follow MnDOT requirements (which follows Federal Highway Administration (FHWA) and American Association of State Highway and Transportation Officials (AASHTO)). MnDOT guidance includes bridge scour evaluation. The Load and Resistance Factor Design (LRFD) Bridge Design Manual (LRFD Bridge Design Manual - MnDOT (state.mn.us)) contains MnDOT Bridge Office procedures for the design, evaluation, and rehabilitation of bridges. Except where noted, the design provisions employ the LRFD methodology set forth by AASHTO. For geotechnical guidance, such as investigation scoping, to provide design recommendations, Barr will use the MnDOT Geotechnical Engineering Manual (Geotechnical Engineering Manual - MnDOT (state.mn.us)).

Other resources pertaining to MnDOT, FHWA, and AASHTO standards that will be used:

- Construction Project Planning and Design Tools (state.mn.us) – MnDOT design guideline
- Technical Resources | FHWA (dot.gov) – FHWA design guidance

The following United States Army Corps of Engineers (USACE) manuals may also be relevant for geotechnical design considerations:

- EM 1110-2-2906 Design of Pile Foundations: relevant sections include guidance for instrumentation, pile load testing, dynamic considerations; no mention of ice; pub date 1/15/1991;
- EM 1110-2-3402 Barge Impact Forces for Hydraulic Structures; one case study mentions ice, scour is not mentioned, pub date 8/1/2022;

- EM 1110-2-2503 Design of Sheet Pile Cellular Structures Cofferdams and Retaining Structures; and
- EM 1110-1-1905 Bearing Capacity of Soils.

5 Preliminary Design Comments

Based on the available information and the design team's local knowledge, the team anticipates cast-in-place (CIP) pile or H-pile will be competent foundations at the abutments and piers, which is consistent with existing bridge foundations in the area. After receiving conceptual plans, and performing the geotechnical investigation, the design team will prepare more complete geotechnical recommendations for use in detail design.

For conceptual design, the team has prepared the following comments:

- Foundation pile caps are expected to be 5 feet below exposed grade at abutments.
- Foundation pile caps are expected to be embedded 5 feet into the riverbank and extend approximately to elevation 670 ft amsl.
- Piles are expected to potentially extend up to 120 feet below pile cap.
- River bottom elevation can be assumed to be 782 ft. amsl.

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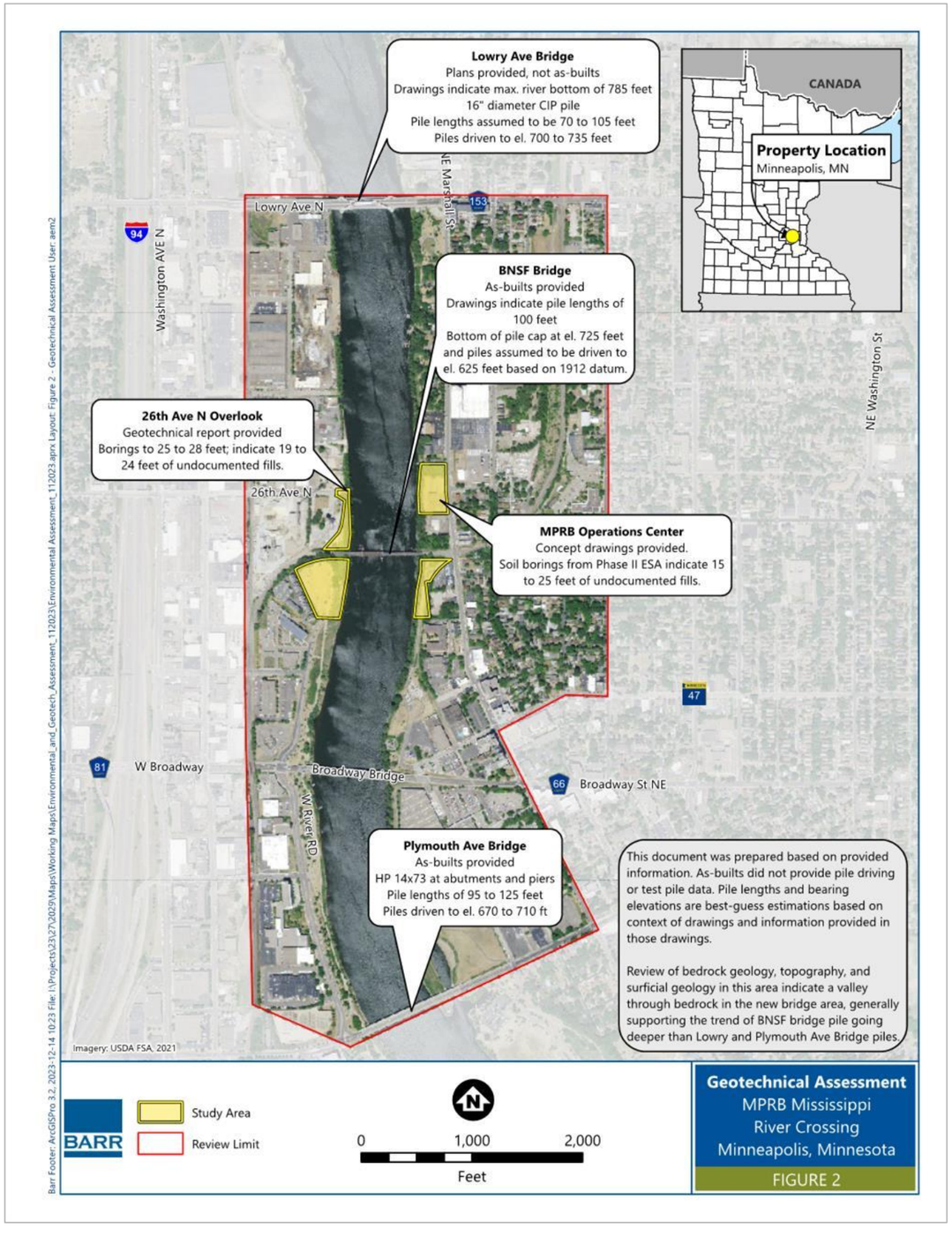

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BARR

Technical Memorandum

To: West 8, Minneapolis Park & Recreation Board
From: Barr Engineering Co.
Subject: Environmental Assessment for Mississippi River Crossing
Date: December 14, 2023
Project: 23272029.00 100 010

1 Introduction

The review summarizes information regarding the proposed location for a Mississippi River crossing by the Minneapolis Park and Recreation Board (MPRB) as part of an expansion of the Great Northern Greenway trail. The proposed Mississippi River crossing is in Minneapolis, between the Lowry Avenue and Broadway Street bridges, on either side of the Burlington Northern Santa Fe (BNSF) railroad bridge (review site). For ease of discussion, the review site is split into two areas on either side of the Mississippi River, referred to in this memo as west bank and east bank. The review site and study area can be seen on Figure 1.

1.1 Objective

MPRB retained West 8 and Barr Engineering Co. (Barr) to identify potential environmental impacts that may be encountered during bridge construction and to provide MPRB with a summary of past and current uses and conditions of the review site and surrounding area.

1.2 Scope

This assessment included the following tasks:

- Physical Setting Review:
    - Reviewed discretionary physical setting sources including Minnesota Department of Health (MDH) well and boring records for wells in the review site vicinity and published geological reports to determine physical setting information.
- Historical Records Review:
    - Reviewed publicly available aerial photographs through Google Earth and the University of Minnesota online library.
    - Reviewed soil boring logs, geotechnical investigation reports, previous Phase I environmental site assessment (ESA) reports, and Phase II Investigation reports provided by MPRB and Hennepin County.

- Regulatory and Other Records Review:
    - Reviewed the Minnesota Pollution Control Agency's (MPCA's) and the Minnesota Department of Agriculture's (MDA's) What's in My Neighborhood (WIMN) websites.

1.3 Limitations

This review is a preliminary report and the information within is subject to change as additional records or information become available. Barr performed this work in a manner consistent with the care and skill ordinarily exercised by members of the environmental profession under similar budget and time constraints. Within this context, Barr assumes responsibility for its own observations, along with its interpretation of the information gathered. No warranty is made or intended.

Because Barr was not retained to verify information, Barr assumes no responsibility for the accuracy of information that it obtained from other sources including, without limitation, regulatory and government agencies, persons knowledgeable about the review site, vendors of public data, and prior reports on the review site or other properties identified in the evaluation. This memo is intended to reduce, but not eliminate, uncertainty regarding the presence of environmental impacts at the review site and surrounding area.

2 Review Site Description and Setting

2.1 Review Site Use and Adjoining Property Uses

The west bank includes all or portions of the following properties:

- The 26th Avenue N overlook (public right-of-way [ROW]),
- an easement of 33 26th Ave. N (cement manufacturing, owned by the Continental Cement Company),
- an easement of 76 23rd Ave. N (railroad, owned by BNSF), and
- portions 2000 West River Rd N and 2325 West River Rd N (Ole Olson Park, owned by MPRB)

The current use of adjoining properties of the west bank includes the following:

- **North –** Propane tank storage and aggregate stockpiles
- **East –** Mississippi River
- **South –** Pedestrian/bike path
- **West –** Cement product facility and Ole Olson Park

The east bank includes all or portions of the following properties:

- 1720 Marshall St. NE (park service operations and equipment storage and owned by MPRB),

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- 1712 Marshall St. NE (brewery owned by Apiary LLC),
- 1620 Marshall St. NE (vacant residential lot owned by Cardinal Properties, LLC),
- 1514 Marshall St. NE (owned by BNSF),
- 1604 ½ Marshall St. NE (owned by MPRB),
- 1600 ½ Marshall St. NE (owned by MPRB),
- 1601 16th Ave. NE (owned by City of Minneapolis), and
- 1510 Water St. (owned by City of Minneapolis).

The current use of adjoining properties of the east bank includes the following:

- **North –** Vacant residential lot
- **East –** Marshall Street, residential properties, a pet groomer, and a trucking company
- **South –** Pedestrian/bike path (east bank trail)
- **West –** Mississippi River

2.2 Physical Setting

Native surficial geology is characterized by fine to coarse grained sand and gravel deposited by former glacial meltwater channels and modern Mississippi River channels. Based on previous investigations on the west bank, east bank, and in the vicinity of the review site, non-native fill soils may be present up to 25 feet below ground surface (bgs). The uppermost bedrock layer is the Shakopee formation of the Prairie du Chien dolostone, characterized by thin- to medium-bedded dolostone, sandy dolostone, sandstone, and shale. Depth to bedrock is approximately 150 to 200 feet bgs. Groundwater was encountered 24 to 25 feet bgs during previous investigations and is assumed to flow towards the Mississippi River.

3 Regulatory Review

A summary of database listings for the west bank and east bank and upgradient listings with a potential or documented release to the environment in the surrounding area (within 0.25 miles of the review site) are summarized in Table 3-1 and locations are shown on Figure 1. These listings were identified and reviewed using MPCA's and the MDA's WIMN websites.

Table 3-1 Review Site and Surrounding Area Regulatory Status

Name / Address	Regulatory Listing(s)	Distance / Gradient from Review Site
Ole Olson Park / 2325 West River Road N	Active PB/VIC (BF0002611)	west bank
Cemstone Products, Aggregate Industries Inc / 65 26th Ave N	AST/UST (TS0020864, TS0017688) Closed VIC (VP13840)	West adjacent to west bank / upgradient
Willman Trucking Inc. / 62 26th Ave N	Closed Leak Site (LS0011886)	0.10 miles west of west bank / upgradient
City of Minneapolis / 2700 Pacific St N	Closed Leak Site (LS0006032)	0.10 miles northwest of west bank / upgradient
2715 Pacific Street	Closed VIC (VP31510)	0.15 miles northwest of west bank / upgradient
Williams Hardware / 55 28th Ave N	Closed PB (PB4545)	0.15 miles northwest of west bank / upgradient
Web Label Ltd / 2518 2nd St N	Active Superfund (SR0001622) Active VIC (BF0002300) Closed PB/VIC (BF0000446) Closed Leak Site (LS0008077)	0.20 miles west of west bank / upgradient
Andrews Inc / 2600 N 2nd St	Closed VIC (VP21550)	0.20 miles west of west bank / upgradient
Former Custom Plastic Laminates / 1720 Marshall St NE	Closed PB (PB4069) Closed VIC (VP28010) Closed VIC (VP28011)	east bank
B&B Adcrafters Inc / 1712 Marshall St NE	Active PB/VIC (BF0001838)	east bank
Jaye Truax Company Site / 1901 Grand St NE	Inactive CERCLIS (MND985749803) Closed PB/VIC (BF0001170) Closed VIC (VP2220) Closed Leak Site (LS0019198) Closed Leak Site (LS0001478)	0.10 miles northeast of east bank / upgradient
Siwek Lumber Yard / 18th and Grand NE	Closed Leak Site (LS0001852)	0.10 miles east of east bank / upgradient

Regulatory Database Definitions:
AST – Aboveground Storage Tank
UST – Underground Storage Tank
PB – Petroleum Brownfields
VIC – Voluntary Investigation and Cleanup Site
CERCLIS – Comprehensive Environmental Response, Compensation, and Liability Information System

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4 Historical Review

4.1 Aerial Imagery

Historical aerial imagery from Google Earth was reviewed for the following 21 years: 1991, 2003, 2004, 2005, 2006, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, and 2023. In addition, aerial imagery available through University of Minnesota's online historical aerial photograph library was reviewed for the following six years: 1938, 1945, 1947, 1953, 1957, and 1964. A summary of aerial imagery is provided in Table 4-1 below.

Table 4-1 Historical Aerial Photo Summary

Photo Year(s)	Summary
1938, 1945, 1947	The railroad bridge is present. **west bank –** A roundhouse and other structures associated with the rail line are present south of the railroad bridge (present-day Ole Olson Park). **east bank –** A rectangular building is present at 1720 Marshall St. NE. In 1938, the ground surface appears more uneven compared to 1945, which may indicate filling occurred during this time. A rail spur located south of the railroad bridge runs north-south along the east bank of the river. Bulk tanks are present south of the railroad bridge, east adjacent of the east bank. Residential houses are present on the east side of Marshall Avenue and north of the east bank.
1953, 1957	**west bank –** The roundhouse and associated rail structures are still present. **east bank –** The rectangular building at 1720 Marshall St. NE is no longer present. The rail spur and industrial development along it is still present. A commercial/industrial building has been constructed on the 1712 Marshall St. NE property.
1964	Supports have been added to a section of the railroad bridge and it appears as it does now. **west bank –** Construction of a rail spur at 33 26th Ave. N (Continental Cement property) is in progress. **east bank –** 1720 Marshall St. NE remains vacant. An addition has been constructed for the 1712 Marshall St. NE building.
1991	**west bank –** 26th Ave. N appears to have been extended eastward towards the riverbank. The rail spur and cement facility are present at 33 26th Ave. N and appear as they do now. The roundhouse has been demolished and a rectangular building is present on the Ole Olson Park property. **east bank –** The current building and parking lot is present at 1720 Marshall St. NE. Based on the former topography, filling and grading likely occurred for construction of the current building. Another addition has been constructed for the 1712 Marshall St. NE building. At the east-adjacent property, the bulk tanks are no longer present, and the current building has been constructed.
2003, 2004, 2005, 2006, 2008, 2009	**west bank –** The rectangular building located on the Ole Olson Park property is no longer present and construction for residential development is in progress. By 2005, the apartment complex construction appears complete. By 2008, a pedestrian/bike path has been constructed east of the residential apartment complex and Ole Olson Park appears as it does now. **east bank –** No significant changes.
2010, 2011, 2012, 2013, 2014, 2015,	**west bank –** 26th Ave. N has been extended eastward towards the river. **east bank –** In 2013, construction for a memorial on the east bank trail is visible (located south

Photo Year(s)	Summary
2016, 2017, 2018, 2019	of the east bank and north of the Broadway Street bridge). In 2016, the rail spur located south of the railroad bridge that ran along the east bank of the river appears partially demolished. By 2017, a pedestrian and bike path have been constructed in the location of the former rail spur (the east bank trail).
2020, 2021, 2022, 2023	**west bank –** Construction on the 26th Ave. N overlook is visible. By 2021, the overlook structure appears complete. **east bank –** No significant changes.

4.2 Previous Records Review

Documentation related to previous work conducted at the review site and surrounding area including soil boring logs, geotechnical investigation reports, previous Phase I ESA reports, Phase II Investigation reports, and correspondence with regulatory agencies were provided by MPRB and Hennepin County for review. The relevant findings of the reports are summarized in Table 4-2. Comparisons of analytical testing results to regulatory criteria are reflective of the regulatory criteria values established at the time of the source report.

Table 4-2 Previous Records Review

Location(s)	Distance/ Direction from Review Site	Summary	Source(s)
26th Avenue N Overlook	west bank	Undocumented fill materials and debris including trash, glass, bituminous pieces, metal, slag, wood, concrete, and brick were encountered during geotechnical investigations near the 26th Avenue N overlook. Debris and fill soils were documented to a depth of approximately 25 feet bgs.	Northern Technologies, 2018.
33 26th Ave. N (Continental Cement) 2325 West River Rd N (Ole Olson Park)	west bank and west adjacent of west bank	A Phase I ESA identified multiple Recognized Environmental Conditions (RECs) for the site including: presence of debris/fill, an upgradient Superfund site and documented releases, and historical industrial use since at least the 1880s. The Continental Cement property was historically used as a lumberyard and slab piling prior to being developed as a concrete manufacturer and distributor in the early 1970s. The Ole Olson Park property was historically used for blacksmithing, a sawmill, and lumberyard between the early 1890s and early 1900s. In 1914, it was developed with a roundhouse and other rail operations until the late 1960s to early 1970s. Eight test pits were advanced to depths between 4 and 16 feet bgs to assess the presence of environmental impacts. Test Pits 1-6 were advanced at 2325 West River Rd. N in Ole Olson	AET, 2023a AET, 2023b AET, 2023c

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Location(s)	Distance/ Direction from Review Site	Summary	Source(s)
		Park. Test Pits 7 and 8 were advanced at 33 26th Ave. N (Continental Cement Easement). Debris and fill were encountered in test pits. A chemical/petroleum odor was noted in Test Pits 3 and 6. Analytical tests indicated diesel range organics (DRO), benzene, lead, and polycyclic-aromatic hydrocarbons (PAHs) concentrations were present in soil above regulatory criteria. Groundwater was not encountered. Recommendations in the response action plan/construction contingency plan (RAP/CCP) included continuously screening soils during excavation and confirmation sampling in excavations within areas of known contamination. If confirmations sample concentrations exceed Residential / Recreational Soil Reference Values (SRVs), the excavation should extend to establish a two-foot clean soil buffer. Soils not meeting unregulated fill or onsite reuse criteria should be managed in accordance with the approved RAP.	
1720 Marshall St. NE	east bank	A Phase I ESA identified multiple RECs for the site including: historical site operations (a barrel warehouse and shed, chemical shop, electrical factory, auto garage, hand tool manufacturer, lubricant manufacturer, and most recently, a laminated countertop manufacturer), historical filling, and potential impacts from offsite sources. A limited Phase II investigation performed by The Javelin Group, Inc. (report not available for review) identified DRO above regulatory criteria and volatile organic compounds (VOCs) below regulatory criteria in soil. Petroleum and non-petroleum VOCs were detected in soil vapor at concentrations below industrial 10X Intrusion Screening Values (ISVs). The site was entered into the Petroleum Brownfields Program (PB4069) and VIC program (VP28010, VP28011). In late February / early March 2012, an additional investigation was performed by Braun Intertec and included nine soil borings, ranging from 4 to 43 feet bgs. Soil, soil vapor, and groundwater samples were collected. Fill soils with debris were observed on the west side of the site to depths ranging 15-25 bgs. The investigation identified the following compounds above regulatory criteria: PAHs, arsenic, lead, and DRO in soil;	Sheltertech, 2011 Braun Intertec, 2012 Peer Engineering, 2012 MPCA, 2012

Location(s)	Distance/ Direction from Review Site	Summary	Source(s)
		arsenic and DRO in groundwater; and petroleum and chlorinated constituents, including TCE and PCE, in soil vapor. An additional investigation was conducted in October 2012 by Peer Engineering. Soil and groundwater samples were collected from 18 borings. Soil samples were analyzed for PAHs and metals and groundwater samples were analyzed for VOCs. Two soil vapor samples and one soil sample were collected from below the building slab and analyzed for VOCs. Based on the results of this investigation and previous investigations, MPCA defined the Identified Release as: PAHs, lead, arsenic, and mercury in soil; TCE, PCE, cis-1,2-dichloroethane, and 1,1,1-trichloroethane in groundwater; and TCE and PCE in soil vapor. The likely sources of TCE are near the former loading dock area and below the southwest portion of the building. A No Associated Determination (NAD) was issued to MPRB in October 2012.	
1712 Marshall St. NE	east bank	A Phase I ESA identified multiple RECs including: historical use of the site for a machine shop, metal stamping, commercial screen printing, and rubber manufacturer, presence of floor drains in the compressor room and former screen washing room, and the adjacent identified release on 1720 Marshall St. NE. A Phase II investigation was conducted April 2021, which included four push probe borings for soil and groundwater samples, four exterior soil vapor samples, and one interior sub-slab soil vapor sample. The investigation identified the following compounds above regulatory criteria: PCE and TCE in soil; benzene, 1,3, butadiene, PCE and TCE in soil vapor, and TCE and PCE in groundwater. The site was entered into the Petroleum Brownfields and VIC programs (BF0001838). A NAD was issued for the site in April 2021. A No Further Action letter for petroleum compounds was issued in May 2021. The letter states that it should be assumed petroleum contamination is present when considering future development.	Carlson McCain, 2021
10th Avenue NE to BNSF Railroad Bridge (MPRB east bank trail; 1326, 1342, 1404,	east bank and 0.1-0.7 miles south	The site has been developed with one to two rail spurs since at least the early 1900s. Eighteen soil borings were drilled across the proposed	MPCA, 2014 Braun Intertec,

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Location(s)	Distance/ Direction from Review Site	Summary	Source(s)
1420, 1500, and 1510 Water St.; 1415 Ramsey St. NE; 1600 ½ and 1604 ½ Marshall St. NE; and 1601 16th Ave. NE)	of east bank	footprint of the east bank trail. Concentrations of PAHs, arsenic, and mercury were detected in soil greater than SRVs for residential land use. Eight test pits were advanced to depths of 2 to 6 feet bgs to assess soil that would be disturbed during construction of the east bank trail. PAHs and metals were encountered in soil above regulatory criteria. The site was entered into the VIC program (VP31730) and a RAP was submitted to the MPCA and approved prior to the east bank trail construction.	2015

5 Findings

Barr identified the following findings and developed the following opinions regarding these findings, as summarized in the following paragraphs:

- **Fill Soils/Debris –** Undocumented fill soils and debris including trash, glass, bituminous pieces, metal, slag, wood, concrete, and brick were encountered during geotechnical and environmental investigations conducted at west bank, east bank, and surrounding area. Debris and fill soils were documented up to a depth of 25 feet bgs.
- **Onsite Identified Release BF0002611 –** Test pits were advanced at 33 26th Ave. N (Continental Cement) and 2325 West River Rd. N (Ole Olson Park) to assess environmental conditions prior to construction for an MPRB trail expansion project just south of the 26th Avenue Overlook. Debris and fill were encountered in the test pits and analytical results indicated DRO, benzene, lead, and PAH concentrations in soil were above regulatory criteria. A RAP for the trail expansion project was submitted to the MPCA and approved in September 2023.
- **Onsite Identified Release VP28011 –** Sub slab vapor sampling was conducted at 1720 Marshall St. NE, which identified TCE and PCE at concentrations that exceeded the industrial ISVs at the time of investigation. Similarly, TCE and PCE concentrations in groundwater exceeded the MDH Health Risk Limits (HRLs) established at the time of investigation. PAH and lead concentrations in the soil, exceeded the industrial SRVs, and concentrations of arsenic and mercury exceeded the residential SRVs at the time of investigation. Cleanup records were not identified on MPCA's WIMN database nor provided for review.
- **Onsite Identified Release BF0001838 –** An investigation conducted at 1712 Marshall St. NE identified the following compounds above regulatory criteria:

  - PCE and TCE in soil;
  - PCE, TCE, cis-1,2-dichloroethene and trans-1,2-dichloroethene in groundwater;
  - and PCE, TCE, and other non-petroleum VOCs in soil vapor.

  The site was entered into the Brownfields Program, where it subsequently received a No Further Action letter for petroleum compounds and a NAD. The No Further Action letter states that it should be assumed that petroleum contamination is present when considering future development of the site. The site was referred to the MPCA Site Assessment Program in April 2023 to determine if cleanup actions are required.

- **Historical and Current Industrial Use –** According to previous reports and historical aerial imagery, the west bank was historically used as a lumberyard and slab piling yard, blacksmith, and a sawmill between the early 1890s and early 1900s. In 1914, it was developed with a roundhouse and other rail operations until the late 1960s to early 1970s. Its current uses include a concrete manufacturer/distributor and recreational parkland. The east bank has been used for industrial purposes since at least the early 1900s. Former uses for 1720 Marshall St. NE include a barrel warehouse, chemical shop, electrical factory, auto garage, metal manufacturing, and laminated countertop manufacturing. Former uses for 1712 Marshall St. NE include a machine shop, metal stamping, commercial screen printing, and rubber manufacturer**.** The surrounding area was largely developed for industrial purposes and remains industrial to an extent. Onsite and offsite historical industrial operations, chemical usage/storage, and demolished/buried historical structures have potential to impact the site.
- **Offsite Identified Releases –** According to MPCA's WIMN database, several documented petroleum and non-petroleum releases have occurred on offsite, upgradient properties. These releases have the potential to migrate and impact the site.

Based on these findings, environmental precautions should be taken prior to and during construction.

6 Recommendations

Based on the results of this environmental assessment, Barr recommends MPRB perform the following actions:

- Prior to construction or purchasing property, enter the MPCA's Brownfields Program to obtain a NAD for properties where environmental impacts from hazardous substances were identified. This may require a Phase I ESA and possibly an additional investigation.
- After the construction extent is defined, conduct an investigation, if necessary, to further characterize and possibly delineate environmental impacts to understand conditions that will be encountered during construction. The investigation should include drilling soil borings and/or excavating test pits in the proposed areas of construction, field screening for debris and chemical

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impacts, and collecting analytical soil and groundwater samples. If offsite disposal of excavated material is anticipated, collect waste characterization samples.

- Prepare a CCP and a RAP if environmental impacts are identified during the investigation and submit to the MPCA for approval prior to construction. The CCP/RAP should be included in construction plans and bid documents and outline procedures for managing contaminated soil, groundwater, and unexpected environmental impacts in areas disturbed by construction. Export soils that are environmentally unsuitable for reuse to an appropriately permitted landfill. Coordinate with a disposal facility to establish a waste profile.
- Provide environmental construction monitoring oversight at locations where contaminated soil may either be reused or removed for offsite disposal. Oversight shall include documentation of construction progress, continuous field screening of excavated material, determining reuse or disposal of excavated materials, and collection of confirmation samples, as needed. Construction oversight activities shall be summarized in a RAP implementation report.

7 References

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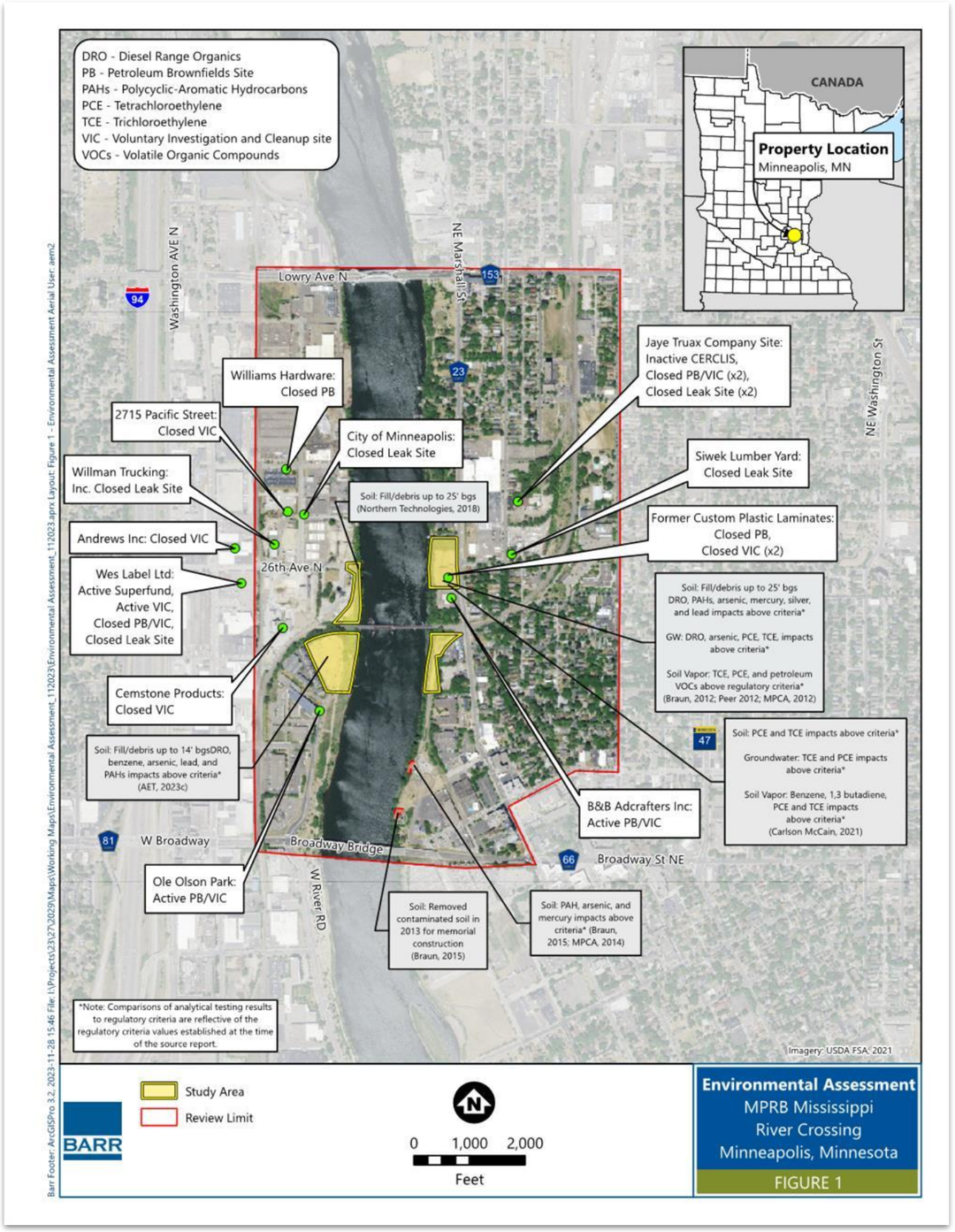

7.4 External Reference Index

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1.0 Introduction

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3.0 Bridge Alignment & Opportunities

4.0 Landscape Opportunities

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5.0 Permitting & Costs

6.0 Summary Recommendations

7.0 Appendices