1 Brief introduction of the project

The Minnesota Department of Transportation (MnDOT), in partnership with the Wisconsin Department of Transportation (WisDOT), has initiated the planning for improvements to the John A. Blatnik Bridge (Minnesota Bridge 9030, Wisconsin Bridge B-16-5, hereafter called the Blatnik Bridge). The Blatnik Bridge on Interstate 535 (I-535) connects the two communities of Duluth, Minnesota, and Superior, Wisconsin across the St. Louis Bay. The Blatnik Bridge is 7,975 feet long (about 1.5 miles) and consists of a main truss unit (three span continuous truss) flanked by steel beam approach span units (referred to as the Minnesota and Wisconsin approach spans), with a total of 52 spans.

The Blatnik Bridge serves as a local, regional, and international connection for vehicle and freight traffic on I-535 / U.S. Highway 53 (US 53) between Minnesota and Wisconsin. The Blatnik Bridge sits at the epicenter of the Port of Duluth-Superior, which accommodates the maritime transportation needs of a wide range of industries including agriculture, forestry, mining and manufacturing, construction, power generation, and passenger cruising. It is also crucial to maintaining local mobility. Geometric deficiencies in the bridge design and access interchanges along with adverse weather conditions influence poor traffic operations during peak periods and contribute to a high critical crash history. The unique setting of I-535 terminating in a neighborhood in Wisconsin complicates the traffic operations in the nearby local road network.

2 Brief summary of purpose and need

MnDOT, in cooperation with WisDOT, has identified a number of factors justifying the need for the Blatnik Bridge project. The needs have been categorized as primary or secondary as defined below.

Primary needs include the primary transportation problems that led to the initiation of the project. Three primary needs have been identified:

- Bridge condition
- Vehicle safety
- Vehicle mobility

Secondary needs are other transportation problems that may be able to be addressed at the same time as primary needs. One secondary need has been identified: walkability/bikeability.

Additional considerations are elements that are not central to the purpose and need of the project but are important criteria for developing build alternatives. The additional considerations identified for this project include:

- Maritime Freight Navigation
- Connectivity and Redundancy
- Regulatory requirements
- Railroad crossings

3 Summary of evaluation methodology

The alternatives evaluation process for the Blatnik bridge Project will use a three-level process as summarized below. This is an iterative process designed to further refine the alternatives in greater detail as the evaluation progresses through each level from Level 1 through Level 3. Each level also includes a progressively more detailed level of quantitative and qualitative evaluation and analysis.

1. Level 1 – Do the alternatives address the problems that led to the initiation of the project?

2. Level 2 – Do the alternatives address other identified transportation problems?
3. Level 3 – Assessment of Additional Considerations and Social, Environmental, and Economic (SEE) Impacts.

The bridge condition is in the highest tier (Level 1) as it is what is driving the initiation of the project. Level 2 needs are identified transportation problems which include both primary and secondary needs. Level 3 evaluation criteria include an assessment of additional considerations and SEE impacts. The SEE categories included as evaluation criteria are not intended to represent an exhaustive list but rather capture those that have the potential to be differentiators for screening alternatives. The selected SEE categories will provide opportunity for alternative modifications based on a better understanding of potential impacts. Regulatory requirements and railroad crossings do not have evaluation criteria associated with them as they must be addressed in any potential alternative. Table 1 includes evaluation criteria for the project.

Table 1: Evaluation Criteria

Process Level	Category	Evaluation Criteria	Measurement	Methodology
Level 1	Primary Need: Bridge Condition Evaluate by Component (Main truss, MN and WI approaches)	Bridge Condition	Service Life	AASHTO
Level 1	Primary Need: Bridge Condition Evaluate by Component (Main truss, MN and WI approaches)	Structure Robustness	Improves structural robustness	Modern Bridge code provisions
Level 2	Primary Need: Vehicle Safety	Crash rate reduction potential	Compare the crash reduction potential of different roadway and bridge geometric and operational improvements	CMF clearinghouse (and WisDOT clearinghouse) and Highway Safety Manual (HSM) Interactive Highway Safety Design Model (HSDM) Qualitative narrative of conflict reduction
Level 2	Primary Need: Vehicle Mobility	Traffic Operations	Network system analysis – overall system delay; movement delay; capacity; intersection LOS Improves existing roadway and bridge geometric deficiencies	Synchro/SIDRA/HSM Qualitative – Yes/No
Level 2	Primary Need: Vehicle Mobility	OSOW and Freight Mobility	Allows OSOW Vehicles over service life of structure Maintains freight access to and from port	Qualitative – Yes/No
Level 2	Secondary Need	Walkability/Bikeability	Improves network connectivity of bike and pedestrian facilities (map of existing facilities) Consistent with the multimodal goals of the MIC's Long-Range Transportation Plan	Qualitative – Yes/No

Process Level	Category	Evaluation Criteria	Measurement	Methodology
Level 3	Additional Considerations	Maritime Freight Navigation	Horizonal and vertical clearances accommodate navigational needs	USCG Navigation impact report
Level 3	Additional Considerations	Corridor Connectivity	Consistency with Regional Plans	Qualitative – Yes/No
Level 3	Additional Considerations	Corridor Redundancy	Local and regional economic impacts Emergency response impacts STRAHNET impacts	Economic Analysis Risk analysis
Level 3	Social, Economic, Environmental Considerations	Soil, sediment, and water contamination	Ability to manage	Risk – High/Medium/Low
Level 3	Social, Economic, Environmental Considerations	Right of way needs	Total number of Acres/Total Number of parcels impacted; partial/ full/ relocations	Land Use Number of properties and acreage impacted
Level 3	Social, Economic, Environmental Considerations	Environmental Justice	Identify potential EJ populations within the EJ study area and compare potential for impact or avoidance	EPA EJSCREEN tool to identify potential populations and supplement with local experience/information
Level 3	Social, Economic, Environmental Considerations	Section 4(f)	Identify potential Section 4(f) properties are within study area and compare potential for impact or avoidance	Location and size of potential Section 4(f) property impacted
Level 3	Social, Economic, Environmental Considerations	Economic Impacts	Business impacts or user delay due to construction closures	TBD
Level 3	Social, Economic, Environmental Considerations	Cultural Resources and tribal interests	Opportunity to avoid cultural resources	Qualitative – Yes/No
Level 3	Social, Economic, Environmental Considerations	Minimize wetland and waterway impacts	Acres of wetland and waterway impacts	GIS analysis based on NWI/WWI wetland inventory dataset
Level 3	Social, Economic, Environmental Considerations	St. Louis River Area of Concern	Ability to avoid impacting past, current and future AOC project areas	Qualitative – Yes/No

3.1 Level 1 Evaluation Criteria (Bridge Condition Components)

3.1.1 Bridge Condition

Project specific criteria developed from the American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design/Load And Resistance

Factor Rating (LRFD)/(LRFR) screening with refined structural analysis for strength design and NCHRP 12-108 guide specifications to meet the extended target service life for existing elements and maximum service life of new elements.

3.1.2 Structure Robustness

The robustness and resiliency of the structure is essential for the long term demands and the operational needs by the owners. The operational importance and significant investment for this project requires the owners to critically evaluate all aspects of robustness including: environmental demands; structural redundancy; ease of maintenance and inspection; and need for element replacement or repair over the life of the structure.

3.2 Level 2 Evaluation Criteria

3.2.1 Vehicle Safety

3.2.1.1 Crash rate reduction potential

This evaluation criteria will be measured using Crash Modification Factors [CMF] from the CMF Clearinghouse[1]/Highway Safety Manual.

A CMF is a multiplicative factor used to compute the predicted number and severity of crashes after implementing a given countermeasure at a specific site. Generally, a project will consist of geometric characteristics which inherently influence the predicted number of crashes of a road section or intersection. The higher the CMF the higher the predicted number of crashes. Each alternative will be analyzed using CMFs, alternatives with a lower CMF would be considered to have a lower number of predicted crashes. If CMFs are not available, the Highway Safety Manual (HSM) would be used to determine a reduction in crash rates. The Interactive Highway Safety Design Model (IHSDM) is the software used to implement the methods from the HSM.

These quantitative safety measures will be supplemented with qualitative narratives describing the overall conflicts created by each alternative

3.2.2 Vehicle Mobility

3.2.2.1 Traffic Operations

This evaluation criteria will be measured quantitatively by completing a network system analysis. and qualitatively through a comparison of geometric deficiency improvements for each alternative.

The network system analysis will consist of traffic analysis following the Highway Capacity Manual (HCM) methodologies and applied through Synchro, Sidra, or HCS software. These analysis tools will provide information regarding overall system delay, movement delay, capacity, and intersection Level of Service (LOS) for each alternative.

Qualitative analysis may also be included to assist alternative comparisons with undesirable operational characteristics such as speed differential and weaving areas.

The qualitative analysis will assess whether existing roadway and bridge geometric deficiencies have been improved; including roadway deficiencies (short deceleration lane, steep slopes with speed differential, reduced weaving, and number of conflict points at intersection of Hammond and 5th) and bridge deficiencies (inside and outside shoulder widths).

[1] http://www.cmfclearinghouse.org/

3.2.2.2 *Oversize Overweight (OSOW) and Freight Mobility*

This evaluation criteria focuses on weight restrictions on the Blatnik bridge which affect OSOW movements. Each alternative will be assessed for allowance of MnDOT and WisDOT Annual Permit Vehicles over the service life of structure. AASHTO LRFR will be used in this assessment.

3.2.3 Secondary Needs

3.2.3.1 *Walkability/Bikeability*

While the Blatnik Bridge does not have existing bicycle or pedestrian facilities, the corridor is identified as a system gap and appears in regional bicycle and pedestrian plans as a potential future location for multimodal facilities. Alternatives will be evaluated qualitatively based on their ability to improve system connectivity.

In addition, the Duluth-Superior Metropolitan Interstate Council (MIC) Long Range Transportation Plan identifies multimodal transportation as essential to meeting the region's transportation goals. Alternatives will be evaluated qualitatively for the following goals:

- Ensure the Duluth-Superior area transportation system is an integrated multimodal network that supports people and goods getting to where they need to go in an efficient manner
- Develop and maintain the Duluth-Superior area transportation system to support economic productivity and competitiveness, including tourism

3.2.4 Additional Considerations

3.2.4.1 *Maritime Freight Navigation*

Below the main truss, a navigational channel that is 460 feet wide and has a vertical clearance of 120 feet above the high water elevation allows shipping access to the port. The Wisconsin approach also spans Howard's Pocket, a navigational side channel that is 150 feet wide and has 100 feet of vertical clearance above high water elevation. This assessment will use the US Coast Guard (USCG) Navigation Impact Report to determine if an alternative meets horizontal and vertical clearance needs.

3.2.4.2 *Corridor Connectivity*

The Blatnik Bridge (I-535) and US 53 corridor have been designated in several transportation studies due to their importance in vehicle and freight mobility. Each alternative will be evaluated qualitatively for consistency with the following:

- Federal Highway Administration (FHWA) High Priority Corridor program, Corridor No. 41 (Falls to Falls Corridor; International Falls, MN to Chippewa Falls, WI)
- Wisconsin Connections 2030 Long Range Multi-Modal Transportation Plan, "backbone" route
- Duluth-Superior Metropolitan Interstate Council (MIC) Long Range Transportation Plan, major trunk line or main supply line
- Metropolitan Interstate Council Duluth-Superior Area Truck Route Study 2018 Update, designated truck route

3.2.4.3 Corridor Redundancy

Maintaining the dual crossing of the Blatnik and Bong Bridges of the St. Louis Bay between the Twin Ports is essential to vehicle and freight mobility. Project specific criteria will be developed to evaluate how alternatives affect vehicle and freight mobility on a local, regional, and international scale. The analysis will use economic and risk assessments to determine impacts to business, emergency response, and STRAHNET operations.

3.3 Level 3 Evaluation Criteria (Social, Economic, Environmental Considerations)

3.3.1 Soil, sediment, and water contamination

Contaminated sites will be identified within the project area and each alternative will be assessed based on the ability to avoid soil, sediment, and water contamination. Risk will be categorized based on the type and extent of contamination that is identified based on best available data. The risks will be categorized the following way:

- High risk: In general, sites with high environmental risks are properties that have documented releases of chemicals or hazardous or regulated substances (e.g., active and inactive state and federal cleanup sites, active and inactive dump sites, and active leaking underground storage tank sites), strong evidence of contamination (e.g., soil staining, stressed vegetation), or storage of large volumes of petroleum or other chemicals (e.g., bulk storage tank facilities).
- Medium risk: Sites of medium environmental risk are properties where smaller volumes of petroleum, chemicals, or hazardous materials are frequently stored and used (e.g., registered underground and aboveground storage tanks, vehicle repair facilities, metal working shops), but at which no evidence of spills or releases exists, or properties with documented releases that have been "closed" (signifying no further cleanup actions are deemed necessary) by the MPCA. Closed sites, such as closed leaking underground storage tank sites, are considered medium risks because residual soil or groundwater contamination may exist.
- Low risk: Low environmental risk sites include properties where minor volumes of chemicals or hazardous materials have been used or stored (e.g., hazardous waste generators, and possibly some farmsteads and residences).

3.3.2 Right of way needs

Assessment of new right of way needed for each alternative. This assessment will compare the number of acres and total number of parcels impacted (partial, full takes, relocation, or easements).

3.3.3 Environmental Justice

MnDOT Highway Project Development Process methodology, which was developed in partnership with FHWA based on NEPA requirements, will be used to identify low income and minority populations in the project area. Potential impacts to these populations will be identified based on the concept level design for each alternative.

3.3.4 Section 4(f)

The project area will be evaluated for potential Section 4(f) properties using parcel data and through coordination with property owners and FHWA. One property in particular, a Public Water Access owned by the Duluth Superior Port Authority and operated by the MN DNR located under the Blatnik Bridge, may meet the definition of a Section 4(f) property

depending on permits and lease agreements. Each alternative will be assessed for impacts to potential Section 4(f) properties.

3.3.5 Economic Impacts

Each alternative will be evaluated for impacts to existing landowners and businesses. The details of this assessment will be determined as concepts are considered and may include factors such as duration of construction and associated access closures.

3.3.6 Cultural Resources

Potential for cultural resources and tribal interests will be identified via review of existing or known data and coordination with tribes within the project area. Each alternative will be assessed for the opportunity to avoid potential impacts to identified resources.

3.3.7 Minimize Wetland Impacts

Wetlands will be identified within the project study area using the National Wetlands Inventory from the Minnesota Department of Natural Resources (within MN) and the Wisconsin Wetland Inventory from the Wisconsin Department of Natural Resources (within WI). Each alternative will be evaluated for acres of impacts to identified resources.

3.3.8 St. Louis River Area of Concern

This project area is located within the St. Louis River Area of Concern (SLRAOC) Remedial Action Plan (RAP). The goal of the AOC program is to improve the areas of concern so they are no more environmentally degraded than other comparable areas of the Great Lakes. As of 2020, there are several completed, ongoing, or planned management actions identified within the SLRAOC. Each alternative will be evaluated for impacts to past, current and future SLRAOC project areas.