DRAFT ENVIRONMENTAL IMPACT STATEMENT
***BNSF Railway Bridge 196.6 Project* across the Missouri River,**
Morton and Burleigh Counties, North Dakota

U.S. Coast Guard
District Eight
St. Louis, Missouri

June 11, 2021

UNITED STATES COAST GUARD (COAST GUARD) DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR BNSF RAILWAY BRIDGE 196.6 PROJECT ACROSS THE MISSOURI RIVER, MILE POINT 1315.0, MORTON AND BURLEIGH COUNTIES, BETWEEN BISMARCK AND MANDAN, NORTH DAKOTA

DOCKET NUMBER: USCG-2019-0882

PREPARED BY: U.S. Coast Guard Commander, Eighth District (D8-DWB). Cooperating Agencies: U.S. Army Corps of Engineers; Advisory Council on Historic Preservation; and North Dakota State Historic Preservation Office

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ABSTRACT: The U.S. Coast Guard (USCG) through consultant, Jacobs Engineering Group, Inc., has prepared this environmental document as the lead federal agency, pursuant to the National Environmental Policy Act (NEPA) of 1969 (42 *United States Code* [U.S.C.] Sections 4321 et seq.). This Draft Environmental Impact Statement examines the potential environmental effects of the proposed replacement of the BNSF Railway Bridge 196.6 Project with USCG policy and procedures for implementing NEPA.

DATE OF PUBLICATION: June 11, 2021

DATE COMMENTS MUST BE RECEIVED: July 26, 2021

I reviewed the draft environmental impact statement DEIS and submitted my written comments to the Proponent.

Matthew S. Robertson — Digitally signed by Matthew S. Robertson Date: 2021.06.03 10:57:25 -04'00'

June 3. 2021		Bridge Management Specialist	Level II
Date	Matthew Robertson Environmental Reviewer[2]	Title/Position	Warrant Level

I reviewed the DEIS and submitted my written comments to the Proponent.

Shelly H Sugarman — Digitally signed by Shelly H Sugarman Date: 2021.06.03 11:03:00 -04'00'

June 3, 2021		Chief, Bridge Permits and Policy	Level II
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I reviewed the DEIS and submitted my written comments to the Proponent.

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June 3, 2021		USCG Legal Counsel
Date	Timothy W. Pavilonis Legal Reviewer	Title/Position

In reaching my decision/recommendation on the Coast Guard's proposed action, I considered the information contained in this DEIS and considered and acknowledge the written comments submitted to me from the Environmental and Legal Reviewers.

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June 3, 2021		Chief, Office of Bridge Programs
Date	Brian L. Dunn Proponent	Title/Position

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[2] Signature of the Environmental Reviewer/Senior Environmental Professional for the Bridge Administration Program may be that of the Preparer's.

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ABBREVIATIONS AND ACRONYMS

Acronyms	Definitions
%	percent
APE	area of potential effects
Association	Bismarck Veterans Homeowners Cooperative Association
BA	Biological Assessment
BAC	Bridge Advisory Committee
BFE	base flood elevation
BIS	Bismarck Indian School
BMP	best management practice
BNSF	BNSF Railway Company
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CLOMR	Conditional Letter of Map Revision
CO	carbon monoxide
CWA	Clean Water Act
DEIS	Draft Environmental Impact Statement
DMVW	Dakota, Missouri River Valley and Western Railroad
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIS	Flood Insurance Study
FORB	Friends of the Rail Bridge
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HEC-RAS	Hydrologic Engineering Center – River Analysis System
HEI	Houston Engineering Inc.
I	Interstate
ID	identification
MHA Nation	Mandan, Hidatsa, and Arikara Nation

Acronyms	Definitions
MPO	Metropolitan Planning Organization
MRNA	Missouri River Natural Area
N/A	not applicable
NAAQS	National Ambient Air Quality Standards
NDDEQ	North Dakota Department of Environmental Quality
NDDOH	North Dakota Department of Health
NDDOT	North Dakota Department of Transportation
NDGFD	North Dakota Game and Fish Department
NDPR	North Dakota Parks and Recreation
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act of 1966
NLCD	National Land Cover Database
NLEB	northern long-eared bat
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWP	nationwide permit
OHWM	ordinary high water mark
OHW	ordinary high water
OLW	ordinary low water
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PCN	preconstruction notification
$PM_{2.5}$	particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10}	particulate matter less than 10 micrometers in aerodynamic diameter
Project	BNSF Railway Bridge 196.6 Project
PTC	positive train control
RCRA	Resource Conservation and Recovery Act of 1976
RHA	Rivers and Harbors Act of 1899
ROW	right-of-way
SFHA	special flood hazard area
SHPO	North Dakota State Historic Preservation Officer
SO_2	sulfur dioxide
SPCC	spill prevention, control, and countermeasure
SWPPP	Stormwater Pollution Prevention Plan

Acronyms	Definitions
TBD	to be determined
THPO	Tribal Historic Preservation Office
TIP	Transportation Improvement Program
U.S.	United States
USACE	U.S. Army Corps of Engineers
U.S.C.	*United States Code*
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
WQC	Water Quality Certificate

Note:

This document contains acronyms that are longer than four letters. Please confirm acronym settings if using assistive technology.

Footnotes and table notes are denoted with [].

EXECUTIVE SUMMARY

In coordination with the BNSF Railway Company (BNSF) and their consultant, Jacobs Engineering Group Inc., the U.S. Coast Guard (USCG) has prepared this environmental document as the lead federal agency, pursuant to the National Environmental Policy Act (NEPA) of 1969 (42 *United States Code* [U.S.C.] Sections 4321 et seq.). This Draft Environmental Impact Statement (DEIS) examines the potential environmental effects of the BNSF Railway Bridge 196.6 Project (Project) in accordance with USCG policy and procedures for implementing NEPA.

In exercising these bridge authorities, USCG considers navigational and environmental impacts. The primary responsibility of USCG regarding the BNSF proposed railroad bridge is to ensure that the structure does not unreasonably obstruct navigation. The federal bridge statutes, including the River and Harbors Act of 1899, as amended, the Act of March 23, 1906, as amended, and the General Bridge Act of 1946 (33 U.S.C. Section 525 et seq.), require that the location and plans of bridges in or over navigable waters of the United States be approved by the Secretary of Homeland Security, who has delegated that responsibility to USCG. The Missouri River is a navigable water of the United States, as defined in Title 33, Part 2.36(a) of the *Code of Federal Regulations*. As the lead federal agency for this Project, USCG is responsible for the review of its potential effects on the human environment, including historic properties and tribal impacts, pursuant to NEPA and the National Historic Preservation Act of 1966. USCG is, therefore, required by law to ensure that potential environmental effects are carefully evaluated in each bridge permitting decision.

On December 14, 2017, USCG held a public meeting and an open house in Bismarck, North Dakota, to identify impacts of the bridge alteration or replacement and to provide an opportunity for the public to offer comments relating to the Project. At the meeting, USCG accepted input from the public on the potential impacts associated with the Project that should be addressed while developing the Environmental Assessment. Since that time, it has been determined that there might be a significant impact associated with the potential removal of the existing historic bridge at milepost 196.6 (hereafter referred to as Bridge 196.6); therefore, USCG has decided to proceed with the development of an Environmental Impact Statement (EIS).

Purpose and Need

The BNSF Jamestown Subdivision, part of the Twin Cities Division, is a 169.1-mile main line that runs from milepost 31.2 at the KO Subdivision junction (31 miles west of Fargo) to the Dickinson Subdivision at milepost 200.3 at Mandan. With in-service components that are over 130 years old and a history of exposure to ice jams, Bridge 196.6 is approaching the end of its useful life and needs to be replaced to safely move future rail traffic along the BNSF northern corridor. The existing structure has shallow-foundation piers. BNSF has deemed the structure to be scour critical, which requires underwater inspections to be conducted every 5 years and after significant high-water events. Restrictions in load clearance and axle spacing limit the size and type of railcar that can traverse Bridge 196.6. Due to the condition of Bridge 196.6, the speed across it is restricted to 25 miles per hour. To increase the speed across the bridge to the neighboring timetable speed of 35 miles per hour and remove the load restriction on the bridge, BNSF needs to replace Bridge 196.6. The existing main spans are configured with two pin-connected through trusses. Each truss contains fracture-critical members, which are subject to tensile loads. Failure of such a component would result in partial or total collapse.

The purpose of the Project is to provide a safe and reliable crossing of the Missouri River on the BNSF Jamestown Subdivision. The Project intends to:

- Meet existing and future demand for rail transport, as referenced in Section 1.2.2.
- Reduce maintenance outages and disruptions to railroad operations.
- Maintain a safe and reliable railway crossing at the Missouri River.

Based on the previously identified needs, BNSF has developed the following goals and supporting objectives for the Project to balance social, economic, and environmental factors.

- Goal 1: Provide a robust, dependable, and safe railway crossing.
  - Objective 1-1: Maintain the existing crossing location to service existing demand for rail transportation.
  - Objective 1-2: Meet BNSF operational needs to replace aging infrastructure and accommodate potential future need for a second track to meet projected demands for rail freight.
  - Objective 1-3: Reduce the frequency and duration of maintenance activities and associated outages.
  - Objective 1-4: Improve system reliability and bridge structure redundancy.
- Goal 2: Minimize adverse impacts to the human and natural environment.
  - Objective 2-1: Minimize impacts to natural resources during and after construction.
  - Objective 2-2: Minimize displacement to the Residential – Single Family zoning area, south of the bridge.
  - Objective 2-3: Minimize and/or mitigate impacts to cultural and visual resources.
  - Objective 2-4: Minimize flooding and navigational impacts to the Missouri River corridor.
- Goal 3: Be feasible for BNSF to design and construct.
  - Objective 3-1: Deliver the Project at a reasonable cost to BNSF and its customers.
  - Objective 3-2: Complete the Project in a reasonable timeframe to minimize associated costs and impacts to the human and natural environment.
  - Objective 3-3: Complete the Project on the existing BNSF right-of-way or feasibly obtain additional easements from state and local entities.

Alternatives

Several alternatives were considered and were determined to be unfeasible from further consideration in this DEIS, including development of a Bismarck North Route Bypass, development of a Bismarck South Route Bypass, relocation and repurposing of the existing bridge trusses in another location, in-place refurbishing of the existing bridge, and construction of a new bridge 92.5 or 42.5 feet upstream of the existing bridge, with removal of the existing bridge. These alternatives were considered, but were eliminated because they do not meet the goals and objectives in Section 1.2.3.

This DEIS evaluates the following five alternatives:

- No Action Alternative: Maintain the existing bridge; no new construction.
- Proposed Action Alternative: Build a new bridge with 200-foot spans and piers, 20 feet upstream of the existing bridge, and remove the existing structure.
- Offset Alternative 1: Build a new bridge with 200-foot spans and piers, 92.5 feet upstream of the existing bridge, and retain the existing structure.
- Offset Alternative 2: Build a new bridge with 400-foot spans and piers, 92.5 feet upstream of the existing bridge, and retain the existing structure.
- Offset Alternative 3: Build a new bridge with 200-foot spans and piers, 42.5 feet upstream of the existing bridge, and retain the existing structure.

Environmental Effects and Mitigation

Section 3 of this DEIS analyzes the potential environmental effects of the No Action Alternative, the Proposed Action Alternative, and Offset Alternatives 1 through 3, by discipline. This subsection provides a brief summary of environmental effects. Section 3 includes supporting information and references to technical studies performed by subject matter experts and agencies.

The Proposed Action Alternative and Offset Alternatives 1 through 3 are expected to result in short-term impacts to the human and natural environment during the 3.5- to 6.5-year construction period, as described in Section 2.2. Implementation of standard best management practices through a Stormwater Pollution Prevention Plan, a Temporary Erosion and Sediment Control Plan, a Spill Prevention, Control, and Countermeasure Plan, and a Construction Noise Logistics Plan have been proposed to reduce these construction-related impacts.

Air Quality

- The No Action Alternative would result in direct, temporary impacts on air quality, which may result from fugitive dust and exhaust emissions from equipment used for repairs and maintenance. It would also cause increased emissions and air quality impacts as a result of train idling, train engine warmups, and idling vehicles on the local roadway system.
- The Proposed Action Alternative and Offset Alternatives 1 through 3 would result in direct impacts during the 3.5- to 6.5-year construction period from localized increases in fugitive dust and emissions from fuel combustion in construction equipment and vehicles. These emissions would represent a slight, temporary increase over background levels during bridge construction and, for the Proposed Action Alternative, during bridge removal.
- The Proposed Action Alternative and Offset Alternatives 1 through 3 would cause a postconstruction net improvement in air quality as a result of substantial relief to existing train and traffic congestion and reductions in the associated air pollutant emissions.

Geology and Soils

- The No Action Alternative would not result in a change to existing conditions.
- The Proposed Action Alternative would result in minor temporary modifications to topography and soils as a result of access, construction workspaces, and temporary

in-water support structures, while Offset Alternatives 1 through 3 would also impact soils through the construction of retaining walls.

- The Proposed Action Alternative would require the following:
  - 58,000 cubic yards of common excavation
  - 21,000 cubic yards of topsoil excavation
  - 128,000 cubic yards of embankment fill
  - 3,600 cubic yards of sub-ballast fill
  - 600 cubic yards of access road excavation
  - 17,200 cubic yards of river pier excavation
  - 4,600 cubic yards of river pier backfill
  - A total of 233,000 cubic yards of excavation and fill
- Offset Alternative 1 would require the following:
  - 205,700 cubic yards of common excavation
  - 26,900 cubic yards of topsoil excavation
  - 322,000 cubic yards of embankment fill
  - 4,600 cubic yards of sub-ballast fill
  - 600 cubic yards of access road excavation
  - 17,900 cubic yards of river pier excavation
  - 4,300 cubic yards of river pier backfill
  - A total of 582,000 cubic yards of excavation and fill
- Offset Alternative 2 would require the following:
  - 205,700 cubic yards of common excavation
  - 26,900 cubic yards of topsoil excavation
  - 322,000 cubic yards of embankment fill
  - 4,600 cubic yards of sub-ballast fill
  - 600 cubic yards of access road excavation
  - 9,500 cubic yards of river pier excavation
  - 2,000 cubic yards of river pier backfill
  - A total of 571,300 cubic yards of excavation and fill
- Offset Alternative 3 would require the following:
  - 191,800 cubic yards of common excavation
  - 19,800 cubic yards of topsoil excavation
  - 196,700 cubic yards of embankment fill
  - 3,400 cubic yards of sub-ballast fill
  - 600 cubic yards of access road excavation
  - 17,200 cubic yards of river pier excavation

  - 4,000 cubic yards of river pier backfill
  - A total of 433,500 cubic yards of excavation and fill
- Construction of the east retaining wall that would be required for Offset Alternatives 1 through 3 would also have a high potential to engage the existing fault line and lead to landslides.

Water Resources

- Under the No Action Alternative, scour after high-water events would continue to contribute to excess sedimentation and adversely impact water quality downstream of the bridge. Bridge 196.6 is susceptible to collapse, which would adversely impact water quality.
- The Proposed Action Alternative and Offset Alternatives 1 through 3 would require temporary causeways or work trestle, staging, cofferdams, and suspended solids within the Missouri River.
- The Proposed Action Alternative would require 0.98 acre of permanent impacts within the Missouri River.
  - Offset Alternative 1 would require 1.28 acres.
  - Offset Alternative 2 would require 0.70 acre.
  - Offset Alternative 3 would require 1.58 acres.
- Scour potential and susceptibility to collapse would continue for Offset Alternatives 1 through 3, due to retention of Bridge 196.6.
- Alternative 2 would require extensive falsework across the Missouri River for a minimum of 18 months, resulting in temporary impacts to flooding and safety concerns associated with ice jams.

Wetlands

- The No Action Alternative would not result in a change to existing conditions.
- The Proposed Action Alternative would result in 0.72 acre of short-term wetland impacts and 0.33 acre of long-term wetland impacts.
- Offset Alternatives 1 through 3 would result in 0.72 acre of short-term wetland impacts and 0.53 acre of long-term wetland impacts.

Floodplains

- The No Action Alternative would not result in a change to existing conditions.
- The Proposed Action Alternative and Offset Alternatives 1 through 3 would result in short-term impacts to the floodplain during construction.
- Construction of the Proposed Action Alternative would not result in a change to the existing base flood elevation (BFE).
- Offset Alternative 1 would result in a long-term, 0.03-foot increase in the BFE.
- Offset Alternative 2 would not result in an increase in the BFE, but short-term falsework may affect floodplain conditions during construction.
- Offset Alternative 3 would result in a long-term, 0.02-foot increase in the BFE.

Vegetation

- The No Action Alternative would not result in a change to existing conditions.
- The Proposed Action Alternative and Offset Alternatives 1 through 3 would result in minor short-term impacts of up to 20.9 acres of agricultural vegetation.
- The Proposed Action Alternative would affect up to 0.1 acre of emergent herbaceous wetland vegetation while Offset Alternatives 1 through 3 would affect up to 0.2 acre.
- The Proposed Action Alternative would affect up to 13.9 acres of woody vegetation while Offset Alternatives 1 through 3 would affect up to 21.0 acres.
- The Proposed Action Alternative would impact up to 29.1 acres of herbaceous vegetation, Offset Alternatives 1 and 3 would impact up to 36.4 acres, and Offset Alternative 2 would impact 35.9 acres. Slower-growing vegetation types would take longer to revegetate.
- Minor indirect impacts are anticipated due to fugitive dust and the spread of invasive species. Long-term impacts on vegetation are anticipated where wooded land cover is permanently removed and not revegetated.
- Loss of vegetation is anticipated where construction and operation of bride, track, and retaining wall areas result in loss of vegetation.

Fish and Wildlife

- The No Action Alternative would not result in a change to existing conditions.
- The Proposed Action Alternative and Offset Alternatives 1 through 3 would result in minor short-term impacts due to the displacement of individuals during construction and the deferral of wildlife using the river channel as a water source within the Project area.
- The Proposed Action Alternative would result in the following:
  - Short-term impacts to 0.14 acre of emergent wetland habitat.
  - Short-term impacts to 1.1 acres of shoreland habitat.
  - Long-term loss of up to 13.9 acres of forested habitat.
  - Long-term impacts from installation of five in-water piers affecting 0.98 acre.
  - Removal of Bridge 196.6 would result in the removal of two piers within the Missouri River.
- Offset Alternative 1 would result in the following:
  - Short-term impacts of 0.21 acre of emergent wetland habitat.
  - Short-term impacts to 1.5 acres of shoreland habitat.
  - Short-term impacts due to construction of retaining walls.
  - Long-term loss of up to 21.0 acres of forested habitat.
  - Long-term impacts from installation of five in-water piers affecting 1.28 acres.
- Offset Alternative 2 would result in the following:
  - Short-term impacts to 0.21 acre of emergent wetland habitat.
  - Short-term impacts to 1.5 acres of shoreland habitat.

  - Short-term impacts due to construction of retaining walls.
  - Short-term impacts from installation of falsework within the river channel.
  - Long-term loss of up to 21.0 acres of forested habitat.
  - Long-term impacts from installation of two in-water piers affecting 0.70 acre.
- Offset Alternative 3 would result in the following:
  - Short-term impacts to 0.21 acre of emergent wetland habitat.
  - Short-term impacts to 1.5 acres of shoreland habitat.
  - Short-term impacts due to construction of retaining walls.
  - Long-term loss of up to 21.0 acres of forested habitat.
  - Long-term impacts from installation of five in-water piers affecting 1.58 acres.

Threatened and Endangered Species

- The No Action Alternative would not result in a change to existing conditions.
- The Proposed Action Alternative would result in minor, short-term impacts to shoreline habitat for piping plover and forested habitat for northern long-eared bat (NLEB) (long-term conversion of 13.9 acres), as well as in-water impacts to pallid sturgeon due to construction of five in-water piers and the removal of two piers.
- Offset Alternatives 1 and 3 would result in similar impacts, with installation of five in-water piers and no pier removal, as well as long-term conversion of 21.0 acres of forested land, which may be NLEB habitat.
- Offset Alternative 2 would install only two in-water piers, but would require installation of falsework, which may impact pallid sturgeon.

Cultural Resources

- The No Action Alternative would not result in a change to existing conditions. There may be potential long-term significant impacts from eventual bridge abandonment or failure.
- The Proposed Action Alternative would result in minor short-term noise and visual impacts from bridge construction and removal on significant cultural resources and historic properties that have a view of Bridge 196.6.
- The Proposed Action Alternative would also result in long-term significant impacts to historic Bridge 196.6 from bridge removal.
- Offset Alternatives 1 through 3 would result in minor short-term noise and visual impacts from bridge construction on significant cultural resources and historic properties that have a view of the Bridge 196.6. Bridge 196.6 would be retained and likely converted for recreational use.

Socioeconomics and Environmental Justice

- The No Action Alternative would not result in a change to existing conditions.
- The Proposed Action Alternative and Offset Alternatives 1 through 3 would result in temporary benefits due to construction job creation and business revenue, with no long-term measurable change to population or employment.

Land Use and Recreation

- The No Action Alternative would not result in a change to existing conditions.
- The Proposed Action Alternative and Offset Alternatives 1 through 3 would result in minor temporary impacts due to temporary trail closures, impacts to recreational use of the Missouri River, noise and visual impacts to nearby recreational resources, and temporary impacts due to bridge removal during construction.
- Offset Alternatives 1 through 3 would retain Bridge 196.6 for potential conversion to recreational use, but would result in effects from construction of the retaining walls on the east and west sides of the Project area.
- The falsework required for Offset Alternative 2 would result in impacts to recreational use of the Missouri River.

Visual Resources

- The No Action Alternative would result in the retention of Bridge 196.6 and avoidance of short-term impacts to visual resources.
- The Proposed Action Alternative and Offset Alternatives 1 through 3 would result in short-term visual impacts from construction, demolition, and cleanup activities.
- The Proposed Action Alternative would have long-term, substantial, adverse impacts to sensitive viewers due to removal of Bridge 196.6.
- Offset Alternatives 1 through 3 would result in long-term, neutral to minor, adverse visual impacts from retaining wall construction and a long-term benefit to sensitive viewers from the retention of Bridge 196.6.

Noise and Vibration

- Noise impacts associated with the No Action Alternative would increase or decrease depending on future rail traffic.
- The Proposed Action Alternative and Offset Alternatives 1 through 3 would result in short-term impacts from increased noise and vibration.
- Under the Proposed Action Alternative, demolition of Bridge 196.6 would result in additional noise and vibration impacts.
- All build alternatives would move the main line further from the closest sensitive receptors; Offset Alternatives 1 and 2 would move the main line the farthest from sensitive receptors and the Proposed Action Alternative would move it the least.

Hazardous Materials

- While the No Action Alternative would not result in construction activities that may affect or generate hazardous materials, ongoing maintenance of Bridge 196.6 is likely to increase over time and therefore increase the likelihood of inadvertent spills.
- The Proposed Action Alternative would result in minor temporary impacts as Bridge 196.6 components may contain potentially hazardous materials. These materials would be tested and disposed of at appropriate facilities. Hazardous materials encountered during construction would be handled and disposed of properly.
- Offset Alternatives 1 through 3 would not result in the removal of Bridge 196.6.

Traffic

- Under the No Action Alternative, continuing and increased repairs and maintenance for Bridge 196.6 would be required, resulting in temporary impacts to transportation routes or traffic volumes, which may occur during repair or maintenance activities.
- The Proposed Action Alternative and Offset Alternatives 1 through 3 would temporarily impact watercrafts using the river channel during construction.
- Offset Alternative 2 would require significant falsework, resulting in adverse impacts to watercrafts for a minimum of 18 months.
- Truck traffic resulting from dump trucks carrying material from excavations and fill would result in the following:
  - Approximately 17,900 loads for the Proposed Action Alternative.
  - Approximately 44,800 loads for Offset Alternative 1.
  - Approximately 43,900 loads for Offset Alternative 2.
  - Approximately 33,300 loads for Offset Alternative 3.
  - The Proposed Action Alternative would have additional impacts from additional overland trucks for removal of Bridge 196.6.
- River Road would be temporarily closed for two 5-day windows.

Safety and Security

- The No Action Alternative would require increased maintenance and repairs to Bridge 196.6, which may create a safety hazard for inspection and maintenance personnel. Work associated with bridge repair and maintenance activities would be regulated by the Occupational Safety and Health Administration.
- Under the Proposed Action Alternative, construction of a new bridge and removal of the old bridge may introduce additional temporary safety hazards, but construction of new bridge would reduce damage potential, increase train operator and maintenance worker safety, and improve structural redundancy when compared to Bridge 196.6.
- Offset Alternatives 1 through 3 would result in benefits similar to the Proposed Action Alternative, but retention of Bridge 196.6 would require increased maintenance and repairs that may create a safety hazard for inspection and maintenance personnel.

Next Steps

The NEPA process must be complete prior to the issuance of federal permits for the Project (Section 5.2). Based on the information received to date, USCG has determined that an EIS is the appropriate level of environmental documentation for this Project. After consideration of all additional comments, USCG would issue a Final EIS and a Record of Decision.

1.0 INTRODUCTION

In coordination with the BNSF Railway Company (BNSF) and their consultant, Jacobs Engineering Group Inc., the U.S. Coast Guard (USCG) has prepared this environmental document as the lead federal agency, pursuant to the National Environmental Policy Act (NEPA) of 1969 (42 *United States Code* [U.S.C.] Sections 4321 et seq.). This Draft Environmental Impact Statement (DEIS) examines the potential environmental effects of the BNSF Railway Bridge 196.6 Project (Project) in accordance with USCG policy and procedures for implementing NEPA.

Per the 2019 USCG Environmental Planning Implementing Procedures, "NEPA establishes an analytical process for federal agency decision-making which requires that for all federal actions where NEPA applies, agencies must:

1. Identify and analyze environmental consequences of proposed federal actions in comparable detail to economic and operational analyses;
2. Assess reasonable alternatives to agency proposed actions;
3. Document the environmental analysis and findings; and
4. Make environmental information available to public officials and citizens before agency decisions are made" (USCG 2019).

Section 3[d] of the USCG procedures further details the USCG Environmental Impact Statement (EIS) process, defining the required content of an EIS and the procedural steps in EIS preparation, review, distribution, and USCG decisions.

NEPA applies to the Project because the Project constitutes a "major federal action," as defined by the Council on Environmental Quality (CEQ) NEPA regulations (Sections 1508.18(a) and (b)(4) in Title 40 of the *Code of Federal Regulations* [CFR]). The Project requires federal permits, including a bridge permit from USCG under the General Bridge Act of 1946 (33 U.S.C. 525-533). In addition to the USCG bridge permit, the Project involves the following federal permits and approvals:

- Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) before dredged or fill material may be discharged into waters of the United States. Permits are required from USACE under Section 404 of the CWA (33 U.S.C. Section 1344) for permanent impacts to 0.33 acre of wetland and 0.98 acre within the Missouri River. USACE will review Project impacts following conclusion of the NEPA process. Impacts within the Missouri River are anticipated to be covered under Nationwide Permit (NWP) 15 for USCG bridges. Per NWP North Dakota Regional Condition 4, a preconstruction notification (PCN) is required for impacts within the Missouri River. NWPs are scheduled to be reissued in March 2022. The applicability of NWPs will be re-evaluated following reissuance. Permit requirements for impacts to aquatic resources, outside of the Missouri River, will be evaluated with USACE following submittal of a Section 404 application.
- Section 401 requires a Water Quality Certificate (WQC) from the state when a 404 permit or a USCG bridge permit is triggered. Typically, this certification is granted by the state to which the U.S. Environmental Protection Agency (EPA) has delegated authority to certify that the discharge would not violate state water quality standards.

EPA retains jurisdiction in limited cases. In North Dakota, the North Dakota Department of Health (NDDOH) regulates permit reviews and issuance under Section 401. NDDOH will review Project impacts following conclusion of the NEPA process.

- A Conditional Letter of Map Revision (CLOMR) is required to be obtained from the Federal Emergency Management Agency (FEMA) for actions that would affect the hydrologic or hydraulic characteristics of a flooding source and thus modify the existing regulatory floodway, the effective base flood elevations (BFEs), or the special flood hazard area (SFHA). The Project occurs within a FEMA-defined SFHA and is within a FEMA-designated floodway.
- Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires federal agencies to consider the effects that an action would have on historic properties. The existing historic bridge at milepost 196.6 (hereafter referred to as Bridge 196.6) was recorded as eligible for listing in the National Register of Historic Places (NRHP) in 2016. A Section 106 Programmatic Agreement (PA) was executed on January 16, 2021 (Appendix B). The PA addressed retainment and removal of the bridge, as well as action items for each party. A Memorandum of Agreement is currently being developed and will serve as the implementation plan to the PA.
- Section 7 of the Endangered Species Act of 1973 (ESA) requires federal agencies to consider whether actions would jeopardize the continued existence of federally listed endangered or threatened species, or destroy or adversely modify critical habitat. Informal ESA Section 7 consultation with U.S. Fish and Wildlife Service (USFWS) has been conducted, including the submission of a Biological Assessment (BA) to USFWS for concurrence with species effects determinations.

In exercising these bridge authorities, USCG considers navigational and environmental impacts. The USCG primary responsibility regarding the BNSF proposed railroad bridge is to ensure that the structure does not unreasonably obstruct navigation.

USCG permits the location and plans of bridges and causeways in or over navigable waters of the U.S. and imposes conditions necessary to the construction, maintenance, operation, and removal of these bridges in the interest of preserving the public right of navigation in accordance with several bridge acts. Portions of any bridge subject to USCG jurisdiction shall include the bridge superstructure, bridge piers, fenders, approaches, pier protection systems, and appurtenances, as well as any structures necessary for construction, operation, or maintenance of the bridge, including navigation lighting, floating work platforms, falsework, dolphins, and mooring buoys. Any structures temporarily or permanently affixed to the bridge shall also be considered part of the bridge and under USCG jurisdiction. Furthermore, temporary bridges and other structures used to facilitate bridge construction, maintenance, operation, or removal in or affecting navigable waters of the United States are within USCG jurisdiction.

The Secretary of the Army, acting through the Chief of Engineers and delegated to District Commanders, has jurisdiction over the discharge of dredged or fill material in waters of the United States under Section 404 of the CWA. As such, bridge and causeway projects that involve a permanent or temporary discharge of dredged or fill material in waters of the United States would require a Section 404 permit or exemption from USACE.

The Secretary of the Army, acting through the Chief of Engineers and delegated to District Commanders, has jurisdiction over certain structures or work in or affecting navigable waters of the United States under Section 10 of the Rivers and Harbors Act of 1899 (RHA). Bridge (and causeway) projects can include activities such as dredging, in-water disposal of dredged material, excavation, filling, or other modification of a navigable water of the United States that would require a Section 10 RHA permit from USACE.

Bridge 196.6 was constructed with similar methods in the same era as the Brooklyn Bridge. It is an iconic landmark that predates official North Dakota statehood by 6 years. The bridge is eligible for listing in the NRHP for its association with broad patterns of railroad, commercial, and military history of the United States (U.S.). Because of these attributes, certain interest groups have expressed a desire to preserve Bridge 196.6.

The federal bridge statutes, including the RHA, as amended, the Act of March 23, 1906, as amended, and the General Bridge Act of 1946 (33 U.S.C. 525 et seq.), require that the location and plans of bridges in or over navigable waters of the United States be approved by the Secretary of Homeland Security, who has delegated that responsibility to USCG. The Missouri River is a navigable water of the United States as defined in 33 CFR 2.36(a). In exercising these bridge authorities, USCG considers navigational and environmental impacts, which include historic and tribal effects. The primary responsibility of USCG regarding Bridge 196.6 is to ensure that the structure does not unreasonably obstruct navigation. As the lead federal agency for this Project, USCG is responsible for the review of its potential effects on the human environment, including historic properties and tribal impacts, pursuant to NEPA and the NHPA. USCG is, therefore, required by law to ensure that potential environmental effects are carefully evaluated in each bridge permitting decision.

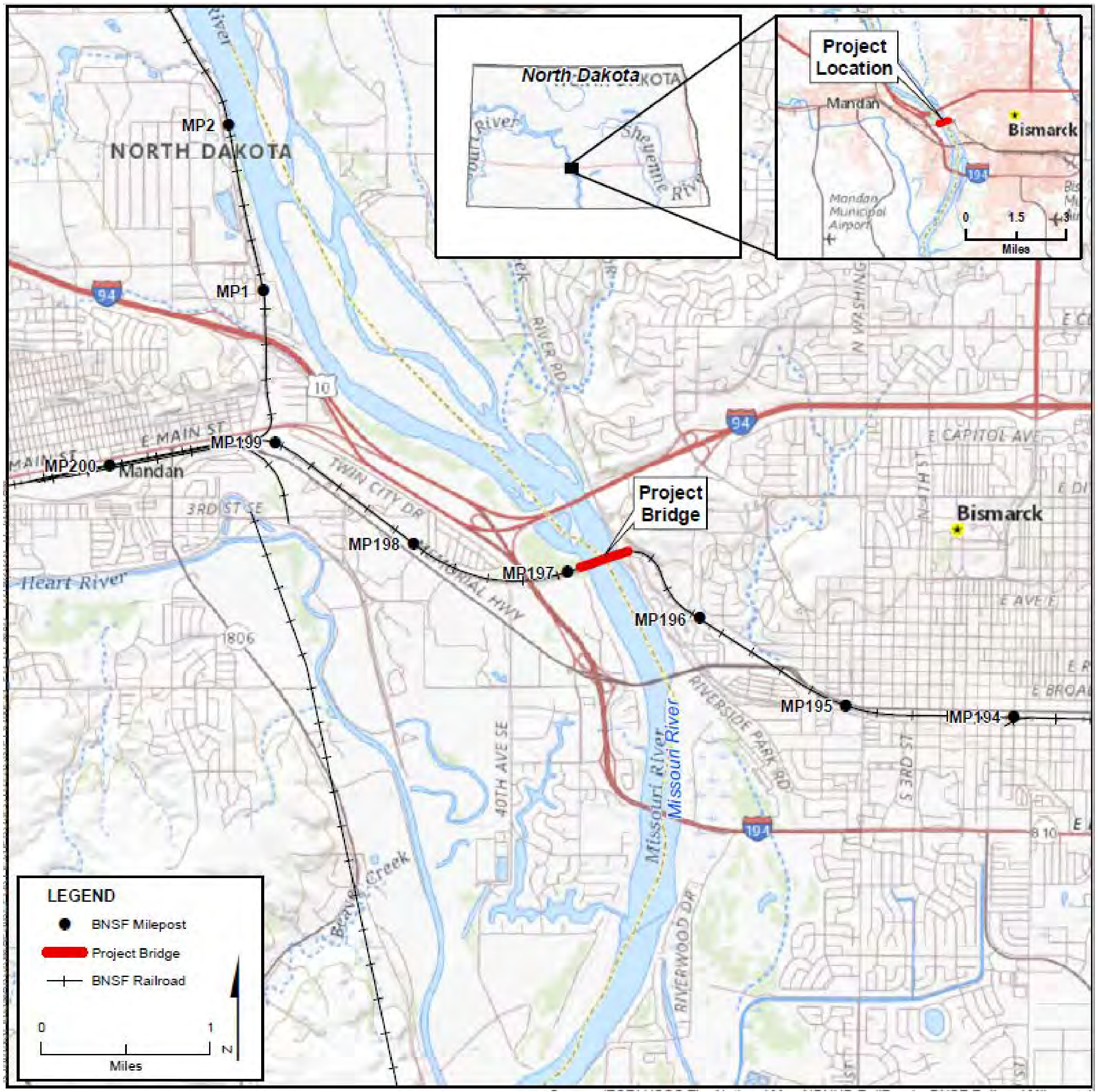
On December 14, 2017, USCG held a public meeting and open house in Bismarck, ND, to identify impacts of the bridge alteration or replacement and to provide an opportunity for the public to offer comments relating to the Project. The meeting was held in compliance with Section 106 of the NHPA, 36 CFR 800.2(d). In addition, the meeting was also used to explain the NEPA process for this Project. At the meeting, USCG accepted input from the public on the potential impacts associated with the Project that should be addressed while developing the Environmental Assessment (EA). Since that time, it has been determined that there might be a significant impact associated with the potential removal of Bridge 196.6; therefore, USCG has decided to proceed with the development of an EIS.

During the EIS development process, USCG addressed the significant impact on Bridge 196.6 through a PA in accordance with Section 106 of the NHPA. The final PA is available in Appendix B. As part of this evaluation process, USCG solicits comments from state and federal agencies with expertise in, and authority over, particular resources that may be impacted by a project. Additionally, USCG seeks input from any tribes that may be affected or otherwise have expertise or equities in the Project. Agencies that have already participated in the environmental review of this Project include USACE, USFWS, FEMA, the North Dakota State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation.

1.1 Site Location and Existing Structure

BNSF is proposing to replace Bridge 196.6 on the Jamestown Subdivision of Line Segment 0038 in Morton and Burleigh counties, North Dakota. The railway bridge is a single-track structure that crosses the Missouri River between the cities of Bismarck and Mandan, North Dakota (Figure 1). Constructed between 1880 and 1883, Bridge 196.6 was the first bridge built across the Missouri River in the Bismarck-Mandan area.

Figure 1: Project Area



1.1.1 Site Location

The Project area is within the existing BNSF right-of-way (ROW) from approximately milepost 196.6 to milepost 196.9, on Line Segment 0038 of the Jamestown Subdivision. The Project is in Morton (western bank) and Burleigh (eastern bank) counties. The western bank of the Project is west of the city of Mandan, but within the Mandan extraterritorial zoning area. The east bank of the Project is in the city of Bismarck.

The Project encompasses portions of section 36, township 139N, and range 81W in Morton County and section 31, township 139N, and range 80W in Burleigh County. Latitudinal and longitudinal coordinates for the approximate Project center are 46°49'5.12"N, 100°49'36.50"W.

The U.S. Geological Survey Hydrologic Unit Code is 10130101 within the Painted Woods-Square Butte sub-basin of the Missouri River Basin.

1.1.2 Existing Structure

The current structure is approximately 1,470 feet long and consists of the following:

- Three primary river spans (approximately 1,200 feet long)
  - Three independent steel through-truss structures, each approximately 400 feet long
- Six approach spans
  - A single-deck truss span to transition between the primary spans and the west approach embankment
  - Five spans of precast box girders located at the east approach
- Four granite masonry pier structures, numbered 1 to 4 in east to west order
  - Pier 1, located on the eastern bank immediately east of River Road, includes a vertical concrete support installed to prevent the pier from sliding downward toward the river
  - Piers 2 and 3, located in the main channel of the Missouri River, with steel and granite icebreaker caps on the north side of both structures
  - Pier 4, located on the western bank within the floodplain, supported on wooden pilings because of the shallow depth to bedrock

The primary river truss spans were installed in 1905, to replace the steel truss spans installed during the original construction in 1883. The granite masonry pier structures are the only original bridge elements that remain.

1.2 Purpose and Need

1.2.1 Background

BNSF is one of two Class I rail operators in the state of North Dakota, operating over a network of 1,723 miles of rail line in the state. Class I railroads are the largest rail providers in the U.S., generating revenues greater than $467 million (NDDOT 2017). There is a total of seven Class I providers in the country. The other Class I rail operator in North Dakota is Canadian Pacific, which operates 484 miles of rail line in North Dakota.

BNSF operates two primary routes through North Dakota, linking the Pacific Northwest to Chicago, Illinois. These connections allow for the movement of goods from and through North Dakota to overseas markets, making it a critical transportation link in the national transport and international delivery of products. As a federally designated common carrier, BNSF has a legal obligation to provide transportation services for all regulated goods upon reasonable request. This rail corridor moves all types of traffic, including consumer goods, grain, lumber, and energy products such as crude oil, wind turbines, and coal. On an annual basis, 1.9 million car loads of freight are moved by rail through the state. The segment of BNSF rail line in the Bismarck-Mandan area runs an average of 14 to 16 trains per day, carrying approximately 52 million gross tons of freight eastbound and 13 million gross tons westbound.

1.2.2 Problem Definition

The BNSF Jamestown Subdivision, part of the Twin Cities Division, is a 169.1-mile main line that runs from milepost 31.2 at the KO Subdivision junction (31 miles west of Fargo) to the Dickinson Subdivision at milepost 200.3 at Mandan. With in-service components over 130 years old and a history of exposure to ice jams, Bridge 196.6 is approaching the end of its useful life and needs to be replaced to safely move future rail traffic along the BNSF northern corridor. The existing structure has shallow-foundation piers BNSF has deemed the structure to be scour critical, requiring underwater inspections conducted every 5 years and after significant high-water events.

Rail traffic on Bridge 196.6 is restricted based on dimensional clearances and car-axle spacing. Bridge 196.6 has a load clearance of 19.2 feet (vertical) and 21.5 feet (horizontal). The horizontal load clearance[1] for Bridge 196.6 is 21.5 feet. The maximum vertical load clearance[2] for Bridge 196.6 is 19.2 feet. Unless otherwise approved, BNSF requires that new overhead bridges (including existing bridge replacements) span the BNSF ROW and have a minimum vertical load clearance of 23 feet, 6 inches (BNSF 2018). The vertical load clearance of 19.2 feet across Bridge 196.6 limits the number of freight cars that can be stacked on a railcar.

While the Jamestown and Dickinson subdivisions are rated at 143 tons for cars with axle spacing down to 41 feet, Bridge 196.6 is restricted to cars with a minimum axle spacing of at least 45 feet for 143-ton loads. Restrictions in load clearance and axle spacing limit the size and type of railcar that can traverse Bridge 196.6.

Due to the condition of Bridge 196.6, the speed across it is restricted to 25 miles per hour, which reduces the impacts from freight traffic on the bridge and limits the forces applied to the bridge. In general, the efficient movement of freight improves by not limiting speeds across short segments of track. To increase the speed across the bridge to the neighboring timetable speed of 35 miles per hour and remove the load restriction on the bridge, BNSF needs to replace Bridge 196.6.

The existing main spans are configured with two pin-connected, through trusses. Each truss contains fracture-critical members. A fracture-critical member is a steel bridge component that is subject to tensile loads. Failure of such a component would result in partial or total collapse. For the existing trusses, the fracture-critical members are contained within the bottom chord, or segments of the truss located below the tracks. In addition, the connections used to assemble the bottom chord members utilize steel pins. Although not acting in tension, failure of any one of these pins would also result in a catastrophic bridge collapse. For older bridges, the collapse liability associated with these features typically increases over time as material degradation occurs.

Although modern steel truss bridges are constructed by incorporating fracture-critical members, the practice is not preferred and is only implemented when other alternatives are not available. In these instances, pin connections are no longer recommended and special fabrication practices are implemented to minimize the probability of failure. Modern structures also incorporate improvements in construction material properties and design, and construction

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[1] The horizontal load clearance is the distance measured perpendicularly from the centerline of any track to the nearest obstruction at any elevation between the top of rail and the maximum vertical clearance of the track.

[2] The vertical load clearance is the distance measured vertically from the top of the highest rail to the lowest obstruction under the structure.

practices not available to previous generations. Accordingly, even a nonredundant modern structure would be less susceptible to catastrophic failure than a similar bridge constructed at the turn of the previous century. Ideally, the replacement structure would incorporate multiple lines of support, reducing the risk of collapse should one of the members be fatally damaged.

1.2.3 Project Purpose

The purpose of the Project is to provide a safe and reliable crossing of the Missouri River on the BNSF Jamestown Subdivision. The Project is intended to:

- Meet existing and future demand for rail transport, as referenced in Section 1.2.2.
- Reduce maintenance outages and disruptions to railroad operations.
- Maintain a safe and reliable railway crossing at the Missouri River.

Based on the previously identified needs, BNSF has developed the following goals and supporting objectives for the Project to balance social, economic, and environmental factors.

- Goal 1: Provide a robust, dependable, and safe railway crossing.
  - Objective 1-1: Maintain the existing crossing location to service existing demand for rail transportation.
  - Objective 1-2: Meet BNSF operational needs to replace aging infrastructure and accommodate potential future need for a second track to meet projected demands for rail freight.
  - Objective 1-3: Reduce the frequency and duration of maintenance activities and associated outages.
  - Objective 1-4: Improve system reliability and bridge structure redundancy.
- Goal 2: Minimize adverse impacts to the human and natural environment.
  - Objective 2-1: Minimize impacts to natural resources during and after construction.
  - Objective 2-2: Minimize displacement to the Residential – Single Family zoning area south of the bridge.
  - Objective 2-3: Minimize and/or mitigate impacts to cultural and visual resources.
  - Objective 2-4: Minimize flooding and navigational impacts to the Missouri River corridor.
- Goal 3: Be feasible for BNSF to design and construct.
  - Objective 3-1: Deliver the Project at a reasonable cost to BNSF and its customers.
  - Objective 3-2: Complete the Project in a reasonable timeframe to minimize associated costs and impacts to the human and natural environment.
  - Objective 3-3: Complete the Project on the existing BNSF ROW or feasibly obtain additional easements from state and local entities.

Alternatives that propose construction of a bridge over navigable waters, such as the Missouri River, would require a bridge permit from USCG under the General Bridge Act of 1946. Alternatives that propose discharge into waters of the United States. or construction of a structure or other work in navigable waters would require a permit from USACE under Section 404 of the CWA and/or the General Bridge Act of 1946.

2.0 ALTERNATIVES

As described in Section 1.2, the purpose of the Project is to provide a safe and reliable rail crossing of the Missouri River on the BNSF Jamestown Subdivision. The age of the bridge (130 years), susceptibility to scour events, design, and maintenance challenges contribute to the potential for its collapse in an extreme or unforeseen event. If the bridge had to be taken out of service, reroutes would result in costs and delays for customers because alternative routes would need to be established. BNSF bridge management would repair and replace bridges, where needed, to minimize the risk of unplanned service interruptions and impacts to customers.

This section describes how BNSF and USCG have identified and evaluated alternatives to replace Bridge 196.6 that crosses the Missouri River between the cities of Mandan and Bismarck, North Dakota. The first phase of the alternative analysis identified three conceptual alternatives, which included bypass routes. As the evaluation progressed to a second phase, BNSF and USCG considered a No Action Alternative and alternative bridge crossings in the vicinity of Bridge 196.6. The alternative crossings incorporated design options with varying pier placement and bridge-span designs. Consistent with the purpose and need, this section also describes how and why reasonable alternatives have been selected for detailed study in this DEIS, and why other alternatives have been eliminated from further consideration.

BNSF has considered the following alternative options:

- No action (analysis of the No Action Alternative).
- Develop a Bismarck North Route Bypass (eliminated alternative).
- Develop a Bismarck South Route Bypass (eliminated alternative).
- Relocate the existing bridge trusses to another location and repurpose (eliminated alternative).
- Refurbish the existing bridge in place (eliminated alternative).
- Build a new bridge with 200-foot spans and piers, 20 feet upstream of the existing bridge, and remove the existing structure (analysis of the Proposed Action Alternative).
- Build a new bridge with 200-foot spans and piers, 92.5 feet upstream of existing bridge, and retain the existing structure (analysis of Offset Alternative 1).
- Build a new bridge with 200-foot spans and piers, 92.5 feet upstream of existing bridge, and remove the existing structure (eliminated alternative).
- Build a new bridge with 400-foot spans and piers, 92.5 feet upstream of existing bridge, and retain the existing structure (analysis of Offset Alternative 2).
- Build a new bridge with 400-foot spans and piers, 92.5 feet upstream of existing bridge, and remove the existing structure (eliminated alternative).
- Build a new bridge with 200-foot spans and piers, 42.5 feet upstream of existing bridge, and retain the existing structure (analysis of Offset Alternative 3).
- Build a new bridge with 200-foot spans and piers, 42.5 feet upstream of existing bridge, and remove the existing structure (eliminated alternative).

As part of the NEPA of 1969 (42 U.S.C. Sections 4321 et seq.), USCG is required to assess and objectively evaluate all reasonable alternatives and, for alternatives that have been eliminated from the detailed study, briefly discuss the reasons for their elimination. Reasonable alternatives are those that are technically and economically feasible, meet the purpose and need for the proposed action, and, where applicable, meet the goals of the applicant (CEQ 2020).

In addition to the alternative evaluation requirements under NEPA, the CWA Section 404 permit evaluation to be submitted to USACE would require analysis to identify the least environmentally damaging practicable alternative, as described in Section 404(b)(1). These requirements do not permit the discharge of dredged or fill material if:

1. A practicable alternative exists that is less damaging to the aquatic environment.
2. The nation's waters would be considerably degraded.

An alternative is practicable if it is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." In 40 CFR 230, the 404(b)(1) guidelines state that discharges of dredged or fill material into waters of the United States, including wetlands, should not occur unless it can be demonstrated that such discharges, either individually or cumulatively, would not result in unacceptable adverse effects on the aquatic ecosystem. In addition, 40 CFR 230.10(a) specifically states, "No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." A practicable alternative could include one that does not involve a discharge of dredged or fill material into waters of the United States or one that allows discharges at another location.

Section 2.1 discusses conceptual alternatives that have been considered and not carried forward for further analysis. Section 2.2 identifies alternatives retained for further analysis in this EIS, and Section 2.3 summarizes construction methods.

2.1 Alternatives Not Carried Forward for Further Analysis

The following alternatives were considered, but were eliminated because they do not meet the goals and objectives in Section 1.2.3:

- Develop a Bismarck North Route Bypass.
- Develop a Bismarck South Route Bypass.
- Relocate the existing bridge trusses to another location and repurpose.
- Refurbish the existing bridge in place.
- Build a new bridge with 200-foot spans and piers, 92.5 feet upstream of existing bridge, and remove the existing bridge.
- Build a new bridge with 400-foot spans and piers, 92.5 feet upstream of existing bridge, and remove the existing bridge.
- Build a new bridge with 200-foot spans and piers, 42.5 feet upstream of existing bridge, and remove the existing bridge.
- Preserve the historic piers and replace existing spans with 400-foot spans.

The conceptual-level alternatives have been considered at a screening level to determine which of the concepts might be practicable and feasible. Conceptual alternatives were publicly discussed at a Section 106 consulting parties meeting on July 11, 2018. Engineering plans were not developed during this phase; therefore, cost estimates for comparison purposes were determined at a conceptual level.

The conceptual alternatives have been evaluated on the basis of:

- Operational efficiencies
- Construction cost
- ROW acquisition
- Likely environmental impacts

Route length is one measure of operational efficiency. Shorter routes typically have shorter travel times, less energy use, and lower maintenances costs associated with their operation than longer routes. Travel times may also be reduced where routes are dedicated to a single carrier rather than a shared carrier. Construction costs are related to requirements for a new track, a replacement track, property acquisition, and the need for lease or purchase of other rail lines.

The following subsections summarizes the specific rationale for elimination of each alternative.

2.1.1 Bismarck North Route Bypass

The Bismarck North Route Bypass would originate at the BNSF Zap Subdivision, cross the Missouri River, extend east to the Dakota, Missouri River Valley and Western Railroad (DMVW), and then continue south to the BNSF Jamestown Subdivision line (Figure 2). The north route would require about 9 miles of new track at a cost of about $6 million per track mile and upgrades to about 16 miles of track at a cost of about $2 million per track mile. The cost of track improvements was estimated at $86 million for this alternative, not including costs associated with crossing the Missouri River, other bridges, property acquisition, and lease or purchase of the DMVW line. The Bismarck North Route Bypass is significantly longer than the existing rail line in the vicinity of Bridge 196.6, and would be expected to have greater operating costs and reduced efficiencies.

This route alternative was eliminated because it failed to meet the following goals and objectives in Section 1.2.3:

- Goal 1, Objective 1-1: The North Route Bypass fails to maintain the existing crossing location to service existing demand for rail transportation.
- Goal 2, Objective 2-1: With the addition of 9 miles of new track and reconstruction of 16 miles of existing track, the North Route Bypass would result in additional resources, and as such, fails to minimize impacts to natural resources during and after construction.
- Goal 3, Objectives 3-1, 3-2, and 3-3: Due to the route length, additional improvement needs, property acquisition, and lease or purchase of the DMVW line, the North Route Bypass fails to deliver the Project at a reasonable cost, be completed in a reasonable timeframe, and be completed on the existing BNSF ROW or feasibly obtainable easements.

2.1.2 Bismarck South Route Bypass

A second conceptual alternative, the Bismarck South Route Bypass, would originate at the BNSF Dickenson Subdivision, head south along the western bank of the Missouri River, following the former Union Pacific embankment, and cross the Missouri River about 7 miles south of Bridge 196.6. From there, it would continue northeast until it intersected with the BNSF Jamestown Subdivision rail (Figure 2). The south route would require about 18 miles of new track with an estimated cost of track improvements of $108 million, not including costs associated with the Missouri River crossing, other bridges, and land acquisition. Similar to the North Bypass Route, the Bismarck South Route Bypass would be significantly longer than the existing rail line in the vicinity of Bridge 196.6, and would be expected to have greater operating costs and reduced efficiencies. The South Route Bypass fails to meet the same goals and objectives, for the same reasons, as the North Route Bypass.

Figure 2: Bismarck Bypass Conceptual Alternatives

2.1.3 Truss Relocation and Repurposing

The third conceptual alternative involved relocation of Bridge 196.6 trusses to an alternative location to be repurposed for public use for pedestrian, bicycle, and/or vehicular traffic. BNSF conducted a conceptual-level study to understand the costs, scope, and risks associated with removal, transportation, and installation of trusses in three potential locations. Due to the width of the trusses, the chord centerlines are insufficient to accept two lanes of vehicular traffic, limiting the use of the repurposed bridge to pedestrian, bicycle, equestrian, and maintenance and emergency service vehicle use only.

BNSF identified three potential sites to relocate Bridge 196.6. Site 1 would be north of Bridge 196.6 and would require the span to be disassembled, moved, and re-assembled. Sites 2 and 3 are adjacent to one another and are south of the current bridge alignment. The existing bridge truss could be transported intact.

All three sites lack established trail connections. Due to the elevation of the proposed restructured bridge alignments, fill would be placed within the Missouri River floodway, which would have to be evaluated by FEMA, the City of Bismarck, and the City of Mandan. The Truss Relocation Study (Appendix A) discusses additional details on the potential environmental impacts and feasibility of this conceptual alternative.

Relocation of Bridge 196.6 would cost approximately $1.3 million for earthwork at any of the three sites. Disassembly and reassembly of the trusses at Site 1 would cost approximately $19.3 million. Transportation of the trusses to sites 2 or 3 would cost approximately $15.9 million.

This alternative would fail to meet the following goals and objectives:

- Goal 1, Objective 1-1: Truss relocation fails to maintain the existing crossing location to service existing demand for rail transportation.
- Goal 2, Objective 2-4: Fill placement in the Missouri River floodway for truss relocation fails to minimize flooding impacts to the Missouri River corridor.

2.1.4 Rehabilitation of the Existing Bridge

BNSF considered rehabilitation of Bridge 196.6 via replacement of worn elements with new components and retainment of the majority of existing infrastructure. This alternative would not address existing structure vertical clearance for rail that does not meet current American Railway Engineering and Maintenance-of-Way Association standards. Inspection and maintenance hazards would remain due to bridge height and lack of walkways. The shallow-foundation pier construction and scour potential would also continue, as would the on-land bank stability issues on the east side of the Project which result in on-land pier shifting. Furthermore, fracture-critical pin-connected truss construction lacks structural redundancies would contribute to Bridge 196.6 susceptibility to collapse during catastrophic or extreme events.

This alternative fails to meet the following goals and objectives:

- Goal 1, Objective 1-2: Rehabilitation of the existing bridge fails to meet BNSF operational needs to replace aging infrastructure and accommodate potential future need for a second track to meet projected demands for rail freight.
- Goal 1, Objective 1-3: Due to the age and condition of the current structure, this alternative fails to reduce the frequency and duration of maintenance activities and associated outages.
- Goal 1, Objective 1-4: Rehabilitation of the existing bridge fails to improve system reliability and bridge structure redundancy.

2.1.5 Replacement of the Existing Bridge 92.5 or 42.5 feet Upstream, and Removal of the Existing Bridge

As described in the Notice of Intent (NOI) published in the *Federal Register* on January 8, 2020, four build alternatives were identified for assessment in the EIS: the Proposed Action Alternative and three offset alternatives (CEQ 2020). The three offset alternatives (building a new bridge with 200-foot spans and piers 92.5 feet upstream of the existing bridge) each included the option of removing the existing bridge. Reasoning for elimination of these alternatives from further construction is as follows:

- Build a new bridge with 200-foot spans and piers 92.5 feet upstream of the existing bridge (the alternative considered keeping the existing bridge and removing the existing bridge)
- Build a new bridge with 400-foot spans and piers 92.5 feet upstream of the existing bridge (the alternative considered keeping the existing bridge and removing the existing bridge)
- Build a new bridge with 200-foot spans and piers 42.5 feet upstream of the existing bridge (the alternative considered keeping the existing bridge and removing the existing bridge)
- Build a new bridge with 200-foot spans and piers 20 feet upstream of the existing bridge and removing the existing bridge (Proposed Action Alternative)

Increasing the distance between Bridge 196.6 and a new bridge would allow for retention of the existing structure. An increase in the offset between bridges to either 42.5 or 92.5 feet and removal of the existing bridge would result in additional impacts to natural resources and would not meet the objective of minimizing and/or mitigating impacts to cultural and visual resources. The offset design alternatives have been developed with the specific objective of evaluating opportunities to retain Bridge 196.6. There is no realistic scenario by which BNSF would construct the new bridge at one of the 42.5- or 92.5-foot offset alignments and then still remove the existing structure. Accordingly, subalternatives that increase the offset beyond the proposed 20 feet and remove Bridge 196.6 have not been carried forward for further analysis.

2.1.6 Preserve the Historic Piers

On April 12, 2021, Friends of the Rail Bridge (FORB) submitted an alternative for consideration, which would retain the four historic bridge piers and replace the existing superstructure. FORB is a nonprofit group, organized to preserve the rail bridge across the Missouri River. FORB is dedicated to the preservation of the bridge and to repurposing the bridge as a pedestrian and bicycle pathway. The intent of this alternative is to preserve the existing historic piers and run trains on the existing structure with new track. The historic piers were constructed in 1882, and would serve as the substructure for the replacement superstructure, reducing adverse impacts to the historic property.

Assessment of this potential alternative determined that, in order to meet current AREMA and BNSF design standards, the historic piers would need to be strengthened by replacing and upsizing the pier top, anchoring re-enforcing steel to the existing blocks, and encasing the existing blocks in concrete. Though the historic piers would still be present, they would no longer be visible and would resemble modern bridge piers constructed from concrete and structural steel. Strengthening of the piers and expansion of the pier top would be necessary to accommodate a single-track superstructure. These modifications, including an increase in the cross-sectional area of the piers below the 100-year floodplain water surface elevation have not been modeled. It is unclear whether or not this alternative meets the criteria of a no net rise alternative. Expansion to a dual track would not be possible using the historic piers.

This potential alternative has limitations on technical and economic feasibility. Replacement of an existing alignment limits necessary schedule and design flexibility when combining new and old bridge components. Construction and maintenance costs are anticipated to be greater than replacement of the existing bridge, with a shorter life span. Construction of all three truss spans would need to be completed in a single construction season, necessitating falsework all of the way across the Missouri River. Extensive falsework would significantly affect recreational and commercial boat traffic on the Missouri River, as well as pose a potential flooding and ice jam risk.

This alternative fails to meet the following goals and objectives:

- Goal 1, Objective 1-1: This alternative does not maintain the existing crossing location to service existing demand for rail transportation. A 3- to 5-day outage would be required for bridge completion and track alignment, affecting the movement of freight on the BNSF system.
- Goal 1, Objective 1-2: This alternative fails to fulfill BNSF operational needs to replace aging infrastructure and accommodate potential future need for a second track to meet projected demands for rail freight. The existing piers were not designed to accommodate the load and longitudinal forces of two tracks and modern-sized locomotives and trains. While the piers could be expanded and strengthened to accommodate a single track, this alternative would not accommodate potential future need for a second track.
- Goal 1, Objective 1-3: This alternative would not reduce the frequency and duration of maintenance activities and associated outages. Due to the age and condition of the existing piers, maintenance activities would continue and potentially increase as the structure continues to age.
- Goal 1, Objective 1-4: This alternative would not improve system reliability and bridge structure redundancy. The historic piers were built on shallow foundations, which present an elevated risk of scour. The existing bridge is considered to be scour critical by BNSF, which would not be resolved by construction of this alternative. Furthermore, this alternative does not address the chronic pier settlement issues on the east bank of the Project area.
- Goal 2, Objective 2-3: This alternative would not minimize and/or mitigate impacts to cultural and visual resources. Though the historic piers would be retained, the measures necessary to strengthen the piers would result in significant visual impacts. Concrete encasement would remove the historic piers from view.
- Goal 2, Objective 2-4: This alternative would not minimize flooding and navigational impacts to the Missouri River corridor. Construction of the bridge would require significant falsework across the entire Missouri River, impeding navigation for one construction season. Concrete encasement of the piers would expand their overall dimensions, potentially resulting in a rise in the BFE.
- Goal 3. Objective 3-1: This alternative would not deliver the Project at a reasonable cost to BNSF and its customers. Due to the uncertainties of placing new track on old piers,

design and build costs would exceed those projected for the Proposed Action Alternative. Maintenance and inspection costs would also increase, and this alternative would have a shorter life span than the Proposed Action Alternative.

2.2 Alternatives Retained for Further Analysis

Replacing Bridge 196.6 would require less than 2 miles of new or upgraded track. Depending on the location and design decisions, additional costs would be associated with the Missouri River crossing and may be associated with ROW or land acquisition. BNSF, in conjunction with USCG, has identified a range of construction alternatives to replace the Bridge 196.6 that would:

- Meet the Project goals in Section 1 and provide safe and dependable rail transportation.
- Minimize impacts to the human and natural environment, including the Missouri River.
- Be feasible to design and construct.
- Reduce operational and maintenance burdens.

Each alternative alignment is in the vicinity of Bridge 196.6 and was selected to minimize the overall construction footprint of the Project.

The location of the northernmost alternative was constrained by the Missouri River Natural Area (MRNA) on the west side of the Missouri River and the Bismarck underground water reservoirs on the east side of the river. The MRNA is managed by the North Dakota Parks and Recreation (NDPR) in cooperation with the North Dakota Department of Transportation (NDDOT) and Morton County Parks, and was purchased with federal funds under the authority of 23 CFR 752.9. As such, it is protected by Section 4(f) of the U.S. Department of Transportation Act of 1966. Due to feasibility and permitting timeline uncertainties, acquisition of a ROW within the MRNA is not being considered any further. The City of Bismarck operates a city water facility and associated infrastructure on the east side of the Project area, northeast of the existing ROW. This facility is referred to as the West End Reservoirs and includes three underground water takes and associated piping, which supports the municipal water distribution network. The City of Bismarck has indicated that encroachment of the hillside upslope of the Project would affect the Bismarck West End Reservoirs, which would require mitigation.

Track geometry was another limiting factor; the further a new bridge is offset from the existing track, the greater the length of new track needed to maintain a safe track geometry. The expressway overhead bridge on the west side of the Missouri River was also a constraint on track realignments that might be associated with different bridge locations. Alternatives south of Bridge 196.6 were not considered because they would impact residential development along Captain Leach and Captain Marsh drives.

Per stipulations identified in the PA (Appendix B), interested parties were afforded an opportunity to develop additional offset construction alternatives that would meet the purpose and need of the Project, in a manner that minimizes environmental impacts. The alternatives retained for further analysis are as follows:

- No Action Alternative: Maintain the existing bridge; no new construction.
- Proposed Action Alternative: Build a new bridge with 200-foot spans and piers, 20 feet upstream of the existing bridge, and remove the existing structure.

- Offset Alternative 1: Build a new bridge with 200-foot spans and piers, 92.5 feet upstream of the existing bridge, and retain the existing structure.
- Offset Alternative 2: Build a new bridge with 400-foot spans and piers, 92.5 feet upstream of the existing bridge, and retain the existing structure.
- Offset Alternative 3: Build a new bridge with 200-foot spans and piers, 42.5 feet upstream of the existing bridge, and retain the existing structure.

Section 1 describes the detailed goals and objectives developed by BNSF as part of the effort to identify and evaluate a range of alternatives to meet the Project purpose and need. The goals and objectives have been the basis for identifying and evaluating alternatives.

BNSF has developed each of these alternatives, as described herein, to a similar level of detail to allow a reasonable comparison. Table 1 summarizes how each of the alternatives meet the Project goals and objectives, and ultimately, the Project purpose and need. USCG would determine a preferred alternative after reviewing all alternatives for safety performance and environmental impacts, and after agency and public review of, and comments on, the alternatives evaluated in this DEIS.

Table 1: Alternative Comparison

Goal	Objective	No Action Alternative	Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure	Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure	Offset Alternative 2: 92.5-foot offset, 400-foot Spans, Retain Existing Structure	Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure
Goal 1: Provide a robust, dependable, and safe railway crossing.	1-1: Maintain the existing crossing location to service existing demand for rail transportation. (Yes/No)	Yes	Yes	Yes	Yes	Yes
	1-2: Meet operational needs to replace aging infrastructure and accommodate potential future need for a second track for rail freight. (Yes/No)	No	Yes	Yes	Yes	Yes
	1-3: Reduce the frequency and duration of maintenance activities and associated outages.	No, the age and condition of Bridge 196.6 would require frequent inspection and maintenance activities.	Yes	Yes, with the anticipated transfer of ownership of Bridge 196.6.	Yes, with the anticipated transfer of ownership of Bridge 196.6.	Yes, with the anticipated transfer of ownership of Bridge 196.6.
	1-4: Improve system reliability and bridge structure redundancy.	No, the age, condition, design, and operational limitations on speed and railcar type of the bridge would not meet this objective.	Yes	Yes	Yes, system reliability would be improved, but this design would require a nonredundant fracture-critical truss.	Yes
Goal 2. Minimize adverse impacts to the human and natural environment.	2-1: Minimize impacts to natural resources during and after construction.	Yes	Yes, Section 3.19 provides a description of impacts to natural resources.	Yes, Section 3.19 provides a description of impacts to natural resources.	Yes, Section 3.19 provides a description of impacts to natural resources.	Yes, Section 3.19 provides a description of impacts to natural resources.
	2-2: Avoid displacement to the Residential – Single Family zoning area south of the bridge.	Yes	Yes	One of the potential floodplain mitigation measures identified would require displacement of residences south of the bridge.	Yes	One of the potential floodplain mitigation measures identified would require displacement of residences south of the bridge.
	2-3: Minimize and/or mitigate impacts to cultural and visual resources.	Yes	No, removal of Bridge 196.6 constitutes a significant impact to a cultural resource.	Yes	Yes	Yes
	2-4 Minimize flooding and navigational impacts to the Missouri River corridor.	Yes	Yes	No, this alternative would result in an increase in the 100-year BFE.	Yes	No, this alternative would result in an increase in the 100-year BFE.

Goal	Objective	No Action Alternative	Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure	Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure	Offset Alternative 2: 92.5-foot offset, 400-foot Spans, Retain Existing Structure	Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure
Goal 3: Be feasible for BNSF to design and construct.	3-1: Deliver the Project at a reasonable cost to BNSF and its customers.	N/A	$50 to $60 million	$110.5 and $125.5 million	$155.5 to $170.5 million	$86.6 to $101.6 million
	3-2: Complete the Project in a reasonable timeframe to minimize associated costs and impacts to the human and natural environment.	N/A	3.5 years	5.5 years	6.5 years	4.5 years
	3-3: Complete the Project on the existing BNSF ROW or feasibly obtain additional easements from state and local entities.	No, ROW acquisition is needed.	Yes, temporary construction access off of the ROW.	Yes, construction of a retaining wall on the western bank would keep the Project outside of the MRNA. Similarly, construction of a retaining wall on the eastern bank would minimize the need for additional easements.	Yes, construction of a retaining wall on the western bank would keep the Project outside of the MRNA. Similarly, construction of a retaining wall on the eastern bank would minimize the need for additional easements.	Yes, construction of a retaining wall on the western bank would keep the Project outside of the MRNA. Similarly, construction of a retaining wall on the eastern bank would minimize the need for additional easements.

Notes:
N/A = not applicable
TBD = to be determined

2.2.1 No Action Alternative

Under the No Action Alternative, BNSF would not construct a new bridge crossing the Missouri River. The No Action Alternative would only include maintenance activities and associated costs; no safety improvements or bridge replacement activities would be included. The No Action Alternative serves as a baseline for a comparison of impacts associated with the other alternatives.

With in-service components over 130 years old, the Bridge 196.6 structure is approaching the end of its useful service life. While the current bridge is structurally sound and continues to be in service, the vertical clearance for rail traffic provided by the existing structure does not meet current American Railway Engineering and Maintenance-of-Way Association standards and may not be able to meet increasing load capacity demands because the design load for Bridge 196.6 is approximately 66 percent of the current American Railway Engineering and Maintenance-of-Way Association standard. With no action, the bridge would eventually fail and cease to be used as a rail bridge. The Jamestown and Dickinson subdivisions are rated for a capacity of 143 tons for cars with axle spacing down to 41 feet, while Bridge 196.6 is restricted to cars with a minimum axle spacing of at least 45 feet for 143-ton loads. This may require double handling to redistribute loads prior to crossing the bridge.

Bridge 196.6 has a number of limitations. Due to its elevation (the upper part of the truss is 120 to 135 feet above the water surface elevation, depending upon water levels), inspection and maintenance is labor-intensive and hazardous to complete.

Bridge 196.6 is considered scour critical due to its age and shallow-foundation pier construction, which necessitate underwater inspection every 5 years and after significant flood events. Scour-critical conditions occur when streambed material is removed by swiftly moving water from around bridge abutments or piers. Scour can become so deep that streambed material is removed from beneath the abutment or pier footings, compromising the integrity and stability of a bridge structure. Inspection and maintenance activities costs would continue to increase as the bridge ages. Following construction of the original bridge in 1882, poor bank stability on the east side of the Project resulted in the on-land pier shifting west toward the river, several inches per year. Multiple remediation efforts to correct the pier damage and location and slope movement took place from the early 1800s to the mid-1950s.

Bridge 196.6 is also considered fracture-critical, meaning that the failure of a bridge component in tension could cause a portion of a bridge, or an entire bridge, to collapse. The existing main spans are configured with two pin-connected through trusses. Each truss contains fracture-critical members. A fracture-critical member is a steel bridge component that is subject to tensile loads; failure of such a component would result in partial or total collapse of the structure. For the existing trusses, the fracture-critical members are contained within the bottom chord, or segments of the truss located below the tracks. In addition, the connections used to assemble the bottom chord members utilize steel pins. Although not acting in tension, failure of any one of these pins would also result in a catastrophic bridge collapse. For older bridges, the collapse liability associated with these features typically increases over time as material degradation occurs.

Maintaining the existing structure would have no immediate impacts to the environment, the ROW, river hydraulics, or horizontal clearances, but would impact rail operations with increased inspection and maintenance needs. Reliability is also a concern as the existing structure is fracture-critical and is susceptible to collapse during catastrophic or extreme events. Furthermore, the No Action Alternative does not provide for additional rail capacity. The No Action Alternative does not meet the purpose or need of the Project as it does not address future demand for rail transportation and would not reduce maintenance outages and disruptions to operation. With no action, Bridge 196.6 would eventually fail and cease to be used as a rail bridge. Accordingly, the No Action Alternative would not result in continuance of a safe and reliable crossing of the Missouri River. BNSF and USCG eliminated the No Action Alternative from consideration since it does not satisfy the Project purpose and need, but are carrying it forward in this analysis to serve as a baseline for comparing the other alternatives.

2.2.2 Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

Under the Proposed Action Alternative, BNSF would construct a new bridge immediately upstream of Bridge 196.6 and downstream of the three construction offset alternatives. The new bridge would generally follow the alignment of Bridge 196.6 and be constructed to allow for a single track that would be 30 feet from the centerline of the current bridge with space for a future second track at 10 feet from the centerline of the current bridge, providing a distance of 20 feet between the new and future tracks. The centerline of the proposed bridge would be halfway between these tracks, 20 feet from the center of Bridge 196.6.

The new bridge is approximately 1,554 feet in length and would consist of seven ballasted-deck, prestressed concrete beam approach spans with span lengths of approximately 70 and 80 feet, and five steel deck-plate girder river spans, each approximately 200 feet in length. The approach spans would be split between the east and west approaches, with four allocated for the west and three allocated for the east. The superstructure spans would be supported on reinforced concrete substructures that, in turn, would be supported by deep driven pile foundations.

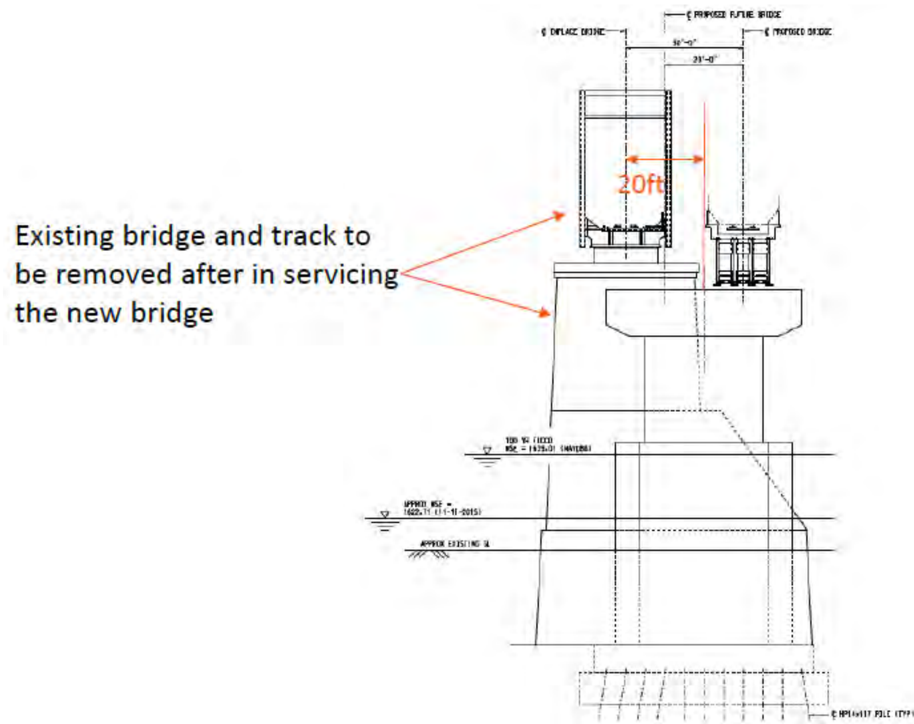
The rendering in Figure 3 is representative of the view of the Proposed Action Alternative from above ground level, from the west side of the Project, looking east.

Figure 3: Proposed Action Alternative – Conceptual Rendering

Construction of a 200-foot span bridge would result in three additional piers in the river and one additional pier on land (Appendix C). All of the new piers would be offset from, rather than aligned with, existing piers to achieve adequate spacing and to allow for construction compatibility with the existing structure (Figure 4). The bridge would have 200-foot-long deck-plate girders positioned below the rail to provide structural redundancy and to minimize the potential for catastrophic events.

Piers installed in the Missouri River would be sized larger than those on land to allow for the addition of a second track. Constructing the substructure across the river to accommodate two tracks would allow for an increase in capacity in the future without additional construction in the river. The new track would be constructed upstream of Bridge 196.6 with piers that extend underneath Bridge 196.6. Once the new main line was in service, Bridge 196.6 would be removed. If a second track was needed in the future, additional or expanded piers would be needed on land.

Figure 4: Proposed Action Alternative – Pier Configuration



The proximity of the Proposed Action Alternative to Bridge 196.6 allows for construction activities to be limited to the existing ROW, minimizing impacts to adjacent properties. No retaining walls would be needed on the eastern or western banks for the Proposed Action Alternative. The Proposed Action Alternative would originate west of the Missouri River, on the east side of Interstate (I) 194. It would generally follow the alignment of the existing railway, cross the Missouri River and River Road, immediately to the south of the City of Bismarck underground water reservoirs, with rail replacement ending approximately halfway between River Road and Schaefer Street. Additional civil works would be required at both approaches to accommodate the proposed alignment shift. The civil works would be minimized to limit the overall Project footprint and would consist primarily of grading operations at both approaches. Construction of an earthen embankment would be the predominate feature of the west approach, whereas, embankment removals would be the primary task at the east approach. The rail bridge over I-194 would not need to be modified and the Proposed Action Alternative would result in approximately 4,200 feet (0.8 mile) of new rail to be constructed. The Proposed Action Alternative is estimated to cost approximately $62 million and would take approximately 3.5 years to construct.

2.2.3 Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

Under Offset Alternative 1, BNSF would construct a new bridge crossing the Missouri River and upstream of Bridge 196.6 (Appendix C). The new bridge would be constructed to allow for a single track that would be 80 feet from the centerline of the current bridge with space for a future second track at 105 feet from the centerline of the current bridge, providing a distance of 25 feet between the new and future tracks. The additional track spacing is provided to accommodate construction efforts, given the proposed alignment deviation off of the existing corridor. The centerline of the proposed bridge would be halfway between these tracks, 92.5 feet upstream from the center of Bridge 196.6.

Under Offset Alternative 1, the new bridge would have 200-foot spans constructed using four lines of welded-steel girders that would reside below the track section. The new bridge would result in a greater number of piers than Bridge 196.6 (three additional piers in the river with the new bridge, and one additional pier on land [Appendix C]). Two of the five piers in the river would be aligned with existing piers to reduce flow restrictions, to the extent possible. Where existing piers align with new piers, the new and existing piers would be about 10 feet apart.

Figure 5 is representative of the visual impact of construction of Offset Alternative 1, with retention of Bridge 196.6 to the south, from a similar vantage point as Figure 3.

Figure 5: Offset Alternative 1 Conceptual Rendering

Similar to the Proposed Action Alternative, piers installed in the Missouri River would be sized larger than those on land to allow for the addition of a second track. Constructing the substructure across the river to accommodate two tracks would allow for an increase in capacity in the future without additional construction in the river. If a second track was needed in the future, additional or expanded piers would be needed on land. In that event, a USCG bridge permit would be required and the NEPA process would be initiated to evaluate the potential impacts of an additional track.

Offset Alternative 1 would originate west of the Missouri River at the intersection of 3rd Street and Memorial Highway. It would generally follow the alignment of the existing railway, crossing over I-194 and passing between the MRNA to the north and the existing railway to the south. It would then cross the Missouri River and River Road, immediately to the south of the City of Bismarck underground water reservoirs, with rail replacement ending at the intersection with Schaefer Street. This alternative would require approximately 8,450 feet (1.6 miles) of rail replacement. In addition to the new bridge crossing the river, the new track alignment would require replacement of the rail bridge over I-194.

Offset Alternative 1 was developed in response to input received during Section 106 of the NHPA consulting parties meetings held between January 2018, and August 2019, and during a Section 106 public information meeting held on December 14, 2017.

The Offset Alternative 1 rail alignment would remain within the existing BNSF ROW, with construction limits extending beyond the ROW in several locations. On the west side of the Missouri River, a retaining wall about 35 feet high would be needed to stabilize embankment fill, support the new rail track, and maintain Project limits within the existing ROW adjacent to the MRNA. The retaining wall would add approximately $20 million to the Project costs. An alternative to the retaining wall would be to acquire property in the MRNA about 80-feet wide to construct an earthen embankment; however, the MRNA is managed by NDPR in cooperation with the NDDOT, and Morton County Parks, and was purchased with federal funds under the authority of 23 CFR 752.9 Scenic Lands. As such, it is protected by Section 4(f) of the U.S. Department of Transportation Act of 1966. Due to feasibility and permitting timeline uncertainties, acquisition of a ROW within the MRNA is not being considered any further.

Similarly, moving the new bridge further north during construction would encroach on land owned by the City of Bismarck and occupied by underground water reservoirs. To minimize the overall grading requirements at the east approach and to avoid impacting the City of Bismarck underground water reservoirs, a concept-level evaluation was completed to assess the feasibility of constructing a retaining wall north of the track to minimize and mitigate impacts to the City of Bismarck water supply infrastructure. For Offset Alternative 1, a soldier-pile lagging wall has been proposed with four 60-foot tiebacks to anchor the wall into the slope. The wall would be approximately 48 feet tall, with pilings extending 32 feet below ground surface. Approximately 28,900 cubic yards of material would be removed for construction of the wall and the cost would be approximately $15.5 million. The retaining wall risk assessment determined that reactivation of the existing landslide feature on the eastern bank would be possible, which could result in impacts to Bridge 196.6, underground water reservoir infrastructure, and any new civil works constructed near the retaining wall.

Offset Alternative 1 would allow Bridge 196.6 to remain in service during construction, limiting disruptions to rail traffic. Offset Alternative 1 is estimated to cost approximately $145 million and would take approximately 5.5 years to construct. Constructing the substructure across the river to accommodate two tracks would allow for an increase in capacity in the future without additional construction in the river. If a second track was needed in the future, additional or expanded piers would be needed on land. In that event, a USCG bridge permit would be required and the NEPA process would be initiated to evaluate the potential impacts of an additional track.

2.2.4 Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

Under Offset Alternative 2, BNSF would construct a new bridge crossing the Missouri River at the same location as Offset Alternative 1, but with piers spaced 400 feet apart, to align with existing piers, and 400-foot spans. This alternative was added following a Section 106 consulting parties meeting held on August 21, 2019. During the meeting, attendees questioned whether the bridge could be designed in a way that would not put additional piers in the river nor increase the river water elevation. The BNSF Sibley Bridge in Missouri was identified as an example of such a design.

Offset Alternative 2 would result in the same number of piers as Bridge 196.6 (two in the river, and one each on the east and west sides of the river). Two of the piers in the river would be aligned with existing piers, as would the pier on the west side of the Missouri River (Appendix C). The pier on the east side of the river would be east of River Road, further landward. As with Offset Alternative 1, the distance between the new and existing piers would be approximately 10 feet.

Offset Alternative 2 would involve installation of dual 400-foot truss spans. BNSF owns and operates the Sibley Railroad Bridge, which is also 400-foot truss span bridge that crosses the Missouri River, approximately 10 miles east of Kansas City, Missouri. The Sibley Railroad Bridge crosses the Missouri River at a location that is both wider and deeper than the Missouri River in Bismarck, and all three truss spans are entirely over the water. These conditions allowed the truss spans for the Sibley Bridge to be assembled offsite and floated into place with barges and tug boats. In contrast, flow in the Missouri River at Bismarck is too shallow and narrow to float in the 400-foot truss spans. In addition, at least two of the three truss spans for Offset Alternative 2 would have approximately one third of the span over land and would require a significant amount of falsework in the river to erect the truss in place. Falsework is a temporary framework structure used to support the bridge during its construction. Although the falsework is only a temporary structure (in place for an estimated 12 months), it would be more disruptive to navigation and pose a greater flooding risk during construction. Accordingly, BNSF would construct a dual 400-foot truss spans capable of supporting two tracks at the outset (as opposed to building substructure that can accommodate two tracks and installing the superstructure at a later date).

As with Offset Alternative 1, Offset Alternative 2 would originate west of the Missouri River at the intersection of 3rd Street and Memorial Highway. It would generally follow the alignment of the existing railway, crossing over I-194, the Missouri River, and River Road, immediately to the south of the City of Bismarck underground water reservoirs, with rail replacement ending at the intersection with Schaefer Street. This alternative also would require approximately 8,450 feet (1.6 miles) of rail replacement. Offset Alternative 2 would require a retaining wall about 35 feet high on the west side of the Missouri River to stabilize embankment fill, support the new rail track, and maintain Project limits within the existing ROW adjacent to the MRNA. In addition to the new bridge crossing the river, the new track alignment would require replacement of the rail bridge over I-194.

Offset Alternative 2 would also require construction of the retaining walls on the eastern and western banks (Section 2.2.3). In addition to the new bridge crossing the river, the new track alignment would require replacement of the rail bridge over I-194. Bridge 196.6 would remain in service during construction, limiting disruptions to rail traffic. Offset Alternative 2 is estimated to cost approximately $169 million and would take approximately 6.5 years to construct.

2.2.5 Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

Under Offset Alternative 3, BNSF would construct a new bridge 42.5 feet upstream of Bridge 196. The new bridge would be constructed to allow for a single track that would be 55 feet from the centerline of the current bridge with space for a future second track at 30 feet from the centerline of the current bridge, providing a distance of 25 feet between the new and future tracks (Appendix C). The centerline of the proposed bridge would be halfway between these tracks, 42.5 feet from the center of Bridge 196.6.

The new bridge would have 200-foot spans, resulting in two additional piers in the river and two additional piers on land. All the new piers would be offset from, rather than aligned with, existing piers to achieve adequate spacing. The bridge would have 200-foot-long deck-plate girders positioned below the rail to provide structural redundancy and to minimize the potential for catastrophic events.

Similar to the Proposed Action Alternative and Offset Alternative 1, piers installed in the Missouri River would be sized larger than those on land to allow for the addition of a second track. Constructing the substructure across the river to accommodate two tracks would allow for an increase in capacity in the future without additional construction in the river. If a second rail was needed in the future, additional or expanded piers would be needed on land. In that event, a USCG bridge permit would be required and the NEPA process would be initiated to evaluate the potential impacts of an additional track.

Offset Alternative 3 would originate at the same location as the Proposed Action Alternative, west of the Missouri River on the east side of I-194. It would generally follow the alignment of the existing railway, cross the Missouri River, and River Road, immediately to the south of the City of Bismarck underground water reservoirs, with rail replacement ending approximately halfway between River Road and Schaefer Street. Similar to the Proposed Action Alternative, the rail bridge over I-194 would not need to be modified and would result in approximately 4,200 feet (0.8 mile) of new rail to be constructed. Offset Alternative 3 would require a retaining wall approximately 35 feet high on the west side of the Missouri River to stabilize embankment fill, support the new rail track, and maintain Project limits within the existing ROW adjacent to the MRNA. The retaining wall on the eastern bank would be shorter for Offset Alternative 3 than for Offset Alternatives 1 and 2 (approximately 23 feet high with pilings that would be 23 feet below the ground surface) and would require one 45-foot tieback. Approximately 3,700 cubic yards of fill would be removed for construction of the retaining wall. Offset Alternative 3 would cost approximately $116 million and would take 4.5 years to construct. The track alignment may also require replacement of the rail bridge over I-194. Bridge 196.6 would remain in service during construction, limiting disruptions to rail traffic. Constructing the substructure across the river to accommodate two tracks would allow for an increase in capacity in the future without additional construction in the river. If a second track was needed in the future, additional or expanded piers would be needed on land. In that event, a USCG bridge permit would be required and the NEPA process would be initiated to evaluate the potential impacts of an additional track.

2.3 Bridge Construction and Removal Methods

The construction process includes all Project activities related to:

- Mobilizing equipment and materials needed for construction.
- Constructing access roads at the western and eastern sides of the Project area.
- Preparing staging areas in the existing BNSF ROW and as developed by easement agreement.
- Constructing the new permanent bridge.
- Removing Bridge 196.6, if applicable.
- Restoring site conditions.
- Demobilizing equipment.

The following subsections summarize the anticipated construction process.

2.3.1 Mobilization

Equipment and materials mobilization to staging areas would be an ongoing process during construction. Mobilized equipment and materials would be staged in the existing BNSF ROW or areas leased for the Project.

2.3.2 Site Preparation

Using the identified site access and staging and laydown areas, construction of the west approach civil works are anticipated to begin at the west Project end and progress back toward the river. BNSF would begin construction by establishing access routes, clearing and grubbing activities, and installation of temporary construction fencing and erosion and sediment control devices. Clearing activities would be conducted during winter months to minimize impacts to wildlife species.

A permanent access easement has been secured at the west approach, including a construction parking area within the agricultural field between the Missouri River and I-194. The permanent access easement through the agricultural field will be used for staff access during construction, staff parking, and site trailers. The construction access easement on the west end is still in process and will be updated once it has been secured. Easements are not anticipated on the east approach as all work is within the BNSF ROW.

The Project access route, as currently proposed, would be off the West Bismarck Expressway/I-194 via McKenzie Drive Southeast on the west side of the Project area. The access route would use the existing Marina Road Southeast and a temporary access road running north to the Project area along the eastern edge of the Bismarck Expressway. Improvements to existing roads may include repaving, work necessary to improve safety (for example, line-of-sight clearing), and environmental protection measures, such as sediment tracking and containment. Access for construction personnel would originate from Captain Leach Drive, south of the Project area, and traverse along the east side of the agricultural field to the edge of the BNSF ROW. A parking area (approximately 200 by 200 feet) would be created in the northeast corner of the field and would also contain construction offices. On the west side of the Project area, an earthen embankment would be constructed. Fill would be imported to the Project area using dump trucks and would be staged in laydown areas on the western edge of the Project area. Fill would be graded and compacted, progressing east toward the Missouri River. A small temporary retaining wall and additional fill would be placed along the toe of slope to create a 30-foot wide construction access road to the Missouri River.

On the east approach, access to the north side of Bridge 196.6 would be via a temporary access road adjacent to the riverbank, which would be shored using steel-sheet piling installed via vibratory methods. Additional imported granular fill material and a geotextile fabric would be placed to separate fill from the in-situ soils. Access to the south side of the east end of the Project area would be by an existing access road intersecting with River Road, just south of Bridge 196.6. Construction equipment and material would be delivered from these access routes. Temporary closures would be needed on both River Road and the Riverfront Trail. Staging and laydown areas would be located on the north and south sides of the track in the BNSF ROW. Tree clearing and grading would be conducted during the site preparation construction phase.

2.3.3 Substructure Construction

Following site preparation activities, construction of the approach span-bridge substructures would begin with installation of a mat of steel H-piling, driven with a diesel-powered hammer. The anticipated pile lengths would range from approximately 70 to 170 feet on the west side, and 80 to 100 feet on the east side of the Project. Concrete footings and stems would be placed on top of the pile mats. Concrete would be delivered to the Project area via the construction access road and a concrete pump would be used, if necessary. On the east side of the Project, a temporary shoring system would be required for construction piers adjacent to River Road and the in-place pier.

In-water piers would be constructed from barges in the Missouri River. Equipment and material would be loaded onto the barges from a temporary dock wall, which would be constructed along the western bank of the river. The dock wall would be constructed of steel-sheet piling with fill material placed behind it, topped with geotextile fabric and an aggregate base. Dredging would be completed, as needed, to maintain a working water depth of 6 feet. Dredged materials would be stockpiled within the staging and laydown area and would either be reused as embankment fill material or transported offsite for disposal.

Construction of the river piers would begin with installation of the cofferdams. Cofferdams would be constructed with steel-sheet piling installed with vibratory methods. To minimize impacts to the Missouri River hydraulics, no more than two river pier cofferdams would be installed at any one time. Following cofferdam installation, the material contained within the cofferdams would be removed to the bottom of the footing seal. Excavated materials would be transported to the staging and laydown area and would either be reused as embankment fill material or backfill around the piers, or transported offsite for disposal.

Within the excavated cofferdams, H-piles would be driven with a diesel-powered hammer. The anticipated pile length would vary between 40 to 60 feet. Pile-point reinforcement would be used at all substructure locations. Once the piles have been installed, a cast-in-place concrete seal would be placed at the bottom of the cofferdam excavation. Concrete for the seal would be delivered to the Project area via the construction access road, and transported to the individual foundation via barge, where necessary. After the concrete is cured and sealed, and the water inside of the cofferdam is neutralized to within 1 unit of pH of the background pH in the river, the water would be pumped directly back into the Missouri River. Large amounts of sedimentation (if present) would be collected and transported to the staging and laydown area for disposal.

Construction of the river pier footings and stems would begin after the cofferdams seals have been exposed and the H-pile has been cut off. Footings and stems would be constructed from cast-in-place concrete and strengthened with mild steel reinforcement. Concrete would be delivered to the Project area via the construction access road, and transported to the individual foundations by barge, where necessary. Once the pier stems have been elevated to the level of the water surface, cofferdams may be removed by vibratory methods, if possible, or cut off at the lowest possible elevation.

2.3.4 Superstructure Construction

Upon completion of the substructure units, construction of the superstructure elements would begin. The river spans are configured with welded steel-plate girder elements that would be fabricated offsite and delivered in segments to the Project.

The approach spans would be constructed from precast-prestressed concrete beams that would be fabricated offsite and delivered to the Project area via the approved Project access roads. Placement of the individual beams on the substructures would be completed by cranes within the BNSF ROW. A cast-in-place concrete deck with cast-in-place concrete-ballast curbs would be placed on the beams.

The anticipated access for construction of the river spans is by barges. The barges would be delivered to the Project area using the construction access road and would be set into the river using cranes. While in use for construction of an individual pier or placement of an individual span, barges would remain moored in the river adjacent to active works. To support these moored barges, material barges would be used to transport equipment and material from the western dock wall. While not in use, the material barges would be moored to the dock wall away from the main navigation channel. All barges and material barges would be cleaned and surveyed to verify that no invasive species were attached or held within the equipment.

The river spans would either be constructed from welded steel-plate girders or steel trusses. Both configurations would be fabricated offsite and delivered in segments to the Project via the construction access road. Individual girders would be assembled within the staging and laydown area, whereas the trusses would need to be assembled at their finished locations. Installation of either system would be completed with cranes positioned on barges or in the staging and laydown area. In addition, erection of the trusses would require installation of falsework within the river and approaches to provide support during assembly of the spans. Falsework towers would be constructed from steel H-piling, either driven or vibrated into place, as required, and steel framing necessary to support the anticipated loads. Spacing of the towers would be approximately 50 feet to match the location of the truss nodes. Both river span superstructure configurations would incorporate a cast-in-place concrete deck with cast-in-place concrete-ballast curbs. Concrete would be supplied to the Project area via the construction access road and pumped to the deck elevation. Following completion of decking, track would be installed and tied into the existing railway.

2.3.5 Bridge Removal

Once rail traffic is shifted to the new structure, Bridge 196.6 would be completely removed in accordance with the PA/Memorandum of Agreement stipulations. The track and ties would be stripped from the deck in a linear fashion and then superstructure components would be removed. The approach spans would be lifted from their substructures and placed at grade, where they may be broken down and transported from the Project area for either salvage or disposal. Removal of the river spans would be completed on an individual span-by-span basis. Temporary supports constructed of clusters of vibrated or driven piles would be placed at two locations within an individual span at the truss' lower-chord panel points. Complete removal of the temporary supports would be completed prior to initiation of adjacent truss span removals. With the temporary supports in place, the truss may be dismantled in a member-by-member process. The individual members would be severed from the structure as a whole by mechanical means and transported from the Project area for either salvage or disposal. Substructure removals would also be completed by mechanical means and would not involve the use of explosives. The primary truss span piers are of masonry construction and would be dismantled block-by-block or broken into smaller pieces for transportation and disposal. As applicable, removal limits would be to 2 feet below the existing channel bottom or 2 feet below the finished ground surface.

Additional details related to demolition methodology are dependent upon the means and methods of the contractor selected to execute the work. Accordingly, specific details associated with a demolition plan are not available at this time. If the existing bridge is to be demolished, BNSF will work with USCG and USACE on development of an approved demolition plan.

2.3.6 Final Cleanup

While the temporary work bridges are being dismantled and removed from the Project area, all remaining final grading and track construction would occur in upland areas in the Project area. Disturbed areas in the Project area would be stabilized using erosion and sediment control best management practices (BMPs), including mulch, seed, and sediment fences to control stormwater discharges, as required by the CWA Section 402 National Pollutant Discharge Elimination System (NPDES) permit and the CWA Section 401 WQC. Permanent fencing, where appropriate to promote safety, would be constructed within the BNSF ROW, and temporary construction fencing and erosion control measures would be removed and stabilized. Final inspection punch-list items would be addressed at this time. All construction supplies and equipment would be removed from the staging areas. Staging areas would then be restored to BNSF standards.

3.0 AFFECTED ENVIRONMENT AND ANTICIPATED CONSEQUENCES

This section describes the affected environment and potential environmental effects of the No Action Alternative, the Proposed Action Alternative, and Offset Alternatives 1 through 3, by resource area. Unless otherwise noted by resource, the APEs for each build alternative are as described in Sections 2.2.2 to 2.2.5.

Each resource section describes the existing affected environment (the existing condition of each resource) and evaluates potential environmental effects on those resources for each alternative.

For the purposes of this DEIS, impacts are described in the following terms:

- Effect:
  - Beneficial: Impacts resulting in positive environmental effects.
  - Adverse: Impacts resulting in negative environmental effects.
- Type:
  - Direct: Impacts caused by the Project and occurring in the same location and at the same time.
  - Indirect: Impacts caused by an action related to the Project, but occurring at a later time or a location further removed from the Project.
  - Cumulative: Impacts added to, or interacting with, other effects in a particular place and within a particular time.
- Duration:
  - Short term: Temporary impacts associated with construction activities, occurring during the construction period (3.5 to 6.5 years).
  - Long term: Permanent impacts with indefinite timing beyond the construction period (that is, land use conversion and vegetation clearance for permanent infrastructure).
- Intensity:
  - Minor: Impacts that are not detectable or are so minor that they would neither destabilize nor noticeably alter any important attribute of the resource.
  - Moderate: Impacts that are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
  - Major: Impacts that are clearly noticeable and are sufficient to destabilize important attributes of the resource.

3.1 Air Quality

The federal Clean Air Act (CAA) establishes a comprehensive program for improving and maintaining air quality throughout the U.S. The focus of the CAA is to reduce ambient concentrations of air pollutants and toxins that degrade air quality; the reduction of air pollution, in turn, improves the human and biologic environment. The CAA is implemented by EPA and agencies with delegated EPA authority by permitting stationary sources, restricting emissions of toxic substances from stationary and mobile sources, and overseeing compliance with air quality standards, such as the National Ambient Air Quality Standards (NAAQS) that are promulgated by EPA. The North Dakota Department of Environmental Quality (NDDEQ) Division of Air Quality is responsible for maintaining ambient air quality in accordance with levels established by the state and federal NAAQS, and, if applicable, implementing the prevention of significant deterioration regulations for preconstruction permitting of major sources of air pollution.

3.1.1 Affected Environment

As required by the CAA, EPA establishes NAAQS for criteria pollutants to protect public health (primary standards) and public welfare (secondary standards). The NAAQS pollutants include:

- Carbon monoxide (CO)
- Nitrogen oxide as nitrogen dioxide
- Ozone
- Particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10})
- Particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$)
- Sulfur dioxide (SO_2)
- Lead

States are required to adopt standards that are at least as stringent as the NAAQS. Table 2 lists the current NAAQS (EPA 2016a).

The CAA requires EPA to use local or regional ambient air quality monitoring data to evaluate compliance with applicable standards. EPA then works with the states to designate the air quality status of geographic areas in one of three ways for each pollutant and standard:

- Attainment (meeting a standard)
- Nonattainment (failing to meet a standard)
- Unclassifiable (not enough information to classify)

Areas designated as nonattainment for any of the NAAQS are required to develop a State Implementation Plan detailing commitments by which the state would attain the NAAQS for each violating pollutant (EPA 2017b). There are no nonattainment areas in North Dakota, indicating that the state has good air quality (EPA 2020a). The closest air quality monitoring station is located in Bismarck, North Dakota, approximately 2.75 miles east of the Project area. This station monitors local particulate matter, CO, nitrogen oxide, ozone, and SO_2 levels (NDDEQ 2020a). Neither state nor federal standards have been exceeded at any air quality monitoring stations in North Dakota in 2020, for the monitored pollutants (NDDEQ 2020a). Existing sources of criteria pollutants in the area have not been considered further because there have been no exceedances of NAAQS measured in North Dakota and air quality in the Project area is good.

Table 2: National Ambient Air Quality Standards

Pollutant	Primary/ Secondary[a]	Averaging Time	Level	Form
CO	Primary	8 hours	9 parts per million	Not to be exceeded more than once per year
CO	Primary	1 hour	35 parts per million	Not to be exceeded more than once per year
Lead	Primary and secondary	Rolling 3-month average	0.15 microgram per cubic meter of air	Not to be exceeded
Nitrogen dioxide	Primary	1 hour	100 parts per billion	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
Nitrogen dioxide	Primary and secondary	1 year	53 parts per billion	Annual mean
Ozone	Primary and secondary	8 hours	0.07 part per million	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle pollution - $PM_{2.5}$	Primary	1 year	12 micrograms per cubic meter of air	Annual mean, averaged over 3 years
Particle pollution - $PM_{2.5}$	Secondary	1 year	15 micrograms per cubic meter of air	Annual mean, averaged over 3 years
Particle pollution - $PM_{2.5}$	Primary and secondary	24 hours	35 micrograms per cubic meter of air	98th percentile, averaged over 3 years
Particle pollution - PM_{10}	Primary and secondary	24 hours	150 micrograms per cubic meter of air	Not to be exceeded more than once per year, averaged over 3 years
SO_2	Primary	1 hour	75 parts per billion	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
SO_2	Secondary	3 hours	0.5 part per million	Not to be exceeded more than once per year

Source: EPA 2016a

[a] The CAA identifies two types of NAAQS. Primary standards provide public health protection, including protecting the health of sensitive populations. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Operational Emissions

In the regional corridor, air emissions associated with fuel combustion in train locomotives originate from the transportation of freight and the exchange of train carriages at passing siding lines. Currently, there are passing siding lines of rail located 2 miles west and 2.4 miles east of the bridge, but the lines coming in and out of Bismarck-Mandan are one-tracked. The railroad track does not meet the current industry standard for maximum gross-weight-on-rail per car of 286,000 pounds. Trains must stop and exchange train carriages due to restrictions on carriage type, resulting in periods of locomotive idling. These periods of idling result in a higher rate of fuel consumption and increased emissions associated with train locomotives powering up from idle holding.

Studies conducted by the Washington State Department of Ecology indicate that during both idle and drive-through periods, trains generate fugitive dust ($PM_{2.5}$, PM_{10}, and total suspended particulates) and fuel combustion emissions (CO, nitrogen oxide, SO_2, $PM_{2.5}$, PM_{10}, total suspended particulates, volatile organic compounds, hazardous air pollutants, and diesel particulate matter) (Washington State Department of Ecology and Cowlitz County 2017). Relative to idling, drive-through trains have relatively low combustion-related emissions and a higher fuel efficiency. A scenario where locomotives sit idling for extended periods of time due to restrictions on carriage type would result in the highest levels of combustion-related emissions, due to lower fuel efficiency and the time they remain in place. A drive-through scenario, where the locomotives are spending a shorter amount of time traveling through the area at a higher speed, would result in lower combustion-related emissions. The amount of smoke and opacity may be relatively similar between idle and various throttle positions, but varies depending on the test unit used (EPA 1998).

3.1.2 Environmental Consequences

The following subsections describe the environmental consequences for each alternative.

No Action Alternative

Increased repairs and maintenance would be required for Bridge 196.6 in the coming years. Direct, temporary impacts on air quality may result from dust and exhaust emissions from equipment used for repairs and maintenance. A temporary increase in repairs and maintenance would not be expected to result in adverse impacts on regional air quality due to the good air quality conditions of the Project area. The amount of freight moved by train is driven by market conditions and freight origins and destinations along the rail line. As a federally designated common carrier, BNSF has a legal obligation to provide transportation services for all regulated goods upon reasonable request. Train traffic within the Project area has increased over the past 30 years and can be reasonably expected to continue to increase in response to population growth and an increased demand for movement of freight and passenger rail service.

Over the long term, the No Action Alternative would result in increased air pollutants due to continued and increased train idling and engine warmups from idling on the main line or regional siding tracks. Increased train idling would also exacerbate vehicle idling on the local roadway system as vehicles queue waiting for a train to clear, leading to further increases in emissions when compared with the traffic-related benefits of the build alternatives.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

Construction of the Proposed Action Alternative would result in localized increases in fugitive dust from land disturbance, demolition, and other construction activities, and emissions from fuel combustion in construction equipment, worker commute vehicles, and haul trucks. These emissions would represent a slight, temporary increase over background levels during bridge construction and removal. Based on the good air quality conditions in the Project area, this temporary increase would not result in a lasting or significant impact on regional air quality. The construction duration of the Proposed Action Alternative would be approximately 3.5 years, which is the shortest duration of all build alternatives. The Proposed Action Alternative would thus result in the lowest temporary increase in air pollutants of all build alternatives due to it having the shortest construction duration.

Long-term improvements in rail operations associated with the Proposed Action Alternative would result in a net benefit to ambient air quality by providing substantial relief from existing train and traffic congestion. Enabling trains and vehicles to drive more efficiently through Project area, versus idling until clear tracks and roadways are available, would increase fuel efficiency and decrease the total pollutants emitted (EPA 1998). Locomotive emissions would also be dispersed along the length rail corridor instead of being concentrated at idling locations. Overall, having trains in the Project area for shorter durations and reducing idling times would result in a net improvement in local ambient air quality. The Proposed Action Alternative would also reduce greenhouse gas emissions because reduced bridge congestion and improved travel times would reduce total train and vehicle fuel consumption.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

Emissions and impacts associated with construction of Offset Alternative 1 would be similar to those of the Proposed Action Alternative. The construction duration for Offset Alternative 1 would be approximately 5.5 years. Offset Alternative 1 would thus result in an extended temporary impact to air quality when compared with Offset Alternative 3 and the Proposed Action Alternative.

Offset Alternative 1 would result in long-term air quality benefits similar to those of the Proposed Action Alternative, including substantial relief to existing train and traffic congestion. Locomotive emissions would be dispersed along the length rail corridor instead of being concentrated at idling locations. Enabling trains and vehicles to drive efficiently through the Project area, versus idling until clear tracks and roadways are available, would increase fuel efficiency and decrease the total criteria pollutants and greenhouse gases emitted.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

Short-term construction-related emissions and long-term air quality benefits associated with Offset Alternative 2 would be similar to those of the Proposed Action Alternative and Offset Alternative 1. The construction duration for Offset Alternative 2 would be approximately 6.5 years. Offset Alternative 2 would thus result in the most extensive temporary impact to air quality of the evaluated build alternatives, but long-term benefits would be the same.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

Short-term construction-related emissions and long-term air quality benefits associated with Offset Alternative 3 would be similar to those of the Proposed Action Alternative and Offset Alternatives 1 and 2. The construction length of Offset Alternative 3 would be approximately 4.5 years. Offset Alternative 3 would thus result in an extended temporary impact to air quality when compared with the Proposed Action Alternative, but long-term benefits would be the same.

Table 3 summarizes environmental consequences for each alternative.

Table 3: Environmental Consequences Summary – Air Quality

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	Direct, short-term impacts on air quality from fugitive dust and exhaust emissions from equipment used for repairs and maintenance.	Increased long-term emissions and air quality impacts from train idling, train engine warmups, and idling vehicles on the local roadway system.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Short-term localized increases in fugitive dust and emissions from fuel combustion in construction equipment and vehicles during the 3.5-year construction duration.	Long-term net improvement in air quality from substantial relief to existing train and traffic congestion.
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Short-term localized increases in fugitive dust and emissions from fuel combustion in construction equipment and vehicles during the 5.5-year construction duration.	Long-term net improvement in air quality from substantial relief to existing train and traffic congestion.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Short-term localized increases in fugitive dust and emissions from fuel combustion in construction equipment and vehicles during the 6.5-year construction duration.	Long-term net improvement in air quality from substantial relief to existing train and traffic congestion.
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	Short-term localized increases in fugitive dust and emissions from fuel combustion in construction equipment and vehicles during the 4.5-year construction duration.	Long-term net improvement in air quality from substantial relief to existing train and traffic congestion.

3.2 Geology, Soils, and Topography

3.2.1 Affected Environment

The geology, soils, and topography of the region are directly related to the geomorphology of the area. The Project area, defined as the area within the area of potential effects (APE) boundary for the largest of the build alternatives, straddles the River Breaks subsection of the Northwestern Great Plains ecoregion and the Collapsed Glacial Outwash subsection of the Northwestern Glaciated Plains ecoregion.

The Northwestern Great Plains ecoregion stretches from the Missouri River west to eastern Montana and northeastern Wyoming. It is an unglaciated, semi-arid rolling plain with occasional buttes and badlands in the rain shadow of the Rocky Mountains. In North Dakota, the soils are formed of tertiary sandstone and shale. The River Breaks subsection is characterized by highly dissected hills and uplands bordering rivers and associated alluvial plains. The Northwestern Glaciated Plains ecoregion is an approximately 100-mile swath to the north and east of the Missouri River from Montana to Nebraska. It forms the barrier between the more level and moister Northern Glaciated Plains ecoregion and the more topographically irregular and drier Northwestern Great Plains ecoregion. The soils are late-Wisconsinan glacial outwash deposits over tertiary sandstone and shale and cretaceous Pierre shale.

The Collapsed Glacial Outwash subsection is characterized by irregular plains left by glacial outwash over stagnant ice with broad, shallow semipermanent and seasonal "prairie pothole" wetland. (Bryce et al. 1996; USGS 2015).

In the Project area, Quaternary alluvium forms the west side of the Missouri River while Quaternary landslide deposits form the east side in the Project area. Further east, the Tertiary Cannonball Formation consists of layers of marine sandstone and mudstone (Murphy and North Dakota Geological Survey 1997). There are no documented faults near the Project. The nearest faults are approximately 500 miles west in western Montana (USGS 2020a).

Information on soil types and definition in the Project area was obtained from preliminary research using data published by the U.S. Department of Agriculture (USDA) – Natural Resources Conservation Service (NRCS) in the *Soil Survey of Burleigh County, North Dakota* (USDA-NRCS 1974), the *Soil Survey of Morton County, North Dakota* (USDA-NRCS 2002), and the *Web Soil Survey* (USDA-NRCS 2019). Soils in this region have developed primarily from shale and sandstone. Prime farmland, as defined by USDA-NRCS, is "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses" (USDA-NRCS 2019). Because of the soil quality, limited access to irrigation, and urban development, prime farmland is not found in the Project area (USDA-NRCS 2019).

Banks loamy fine sand (0 to 6 percent slopes, occasionally flooded) is the dominant soil type on the western bank of the Missouri River in the Project area. Banks loamy fine sand soils are excessively drained with a slight erosion hazard rating (USDA-NRCS, 2019). Banks soils occur on flats and levees of flood plains in river valleys. In the river bottom and on the western bank, the depth to bedrock is approximately 100 feet (USDA-NRCS 2002, 2019; Bluemle and North Dakota Geological Survey 1986).

The Flasher-Rock outcrop-Vebar complex (9 to 70 percent slopes) is the dominant soil type on the east bank of the Missouri River in the Project area. Flasher-Rock outcrop-Vebar complex soils are formed from sandy residuum from weathered sandstone. These soils are somewhat excessively drained. The complex rises up to 150 feet above the Missouri River with 0 to 20 inches to weathered bedrock. Due to the steep slopes, the erosion hazard rating is severe. Flasher-Rock outcrop-Vebar complex soils are not prime farmland (USDA-NRCS 1974, 2019)

With predominantly sandy soils in the Missouri River bed, sandbars are a defining feature of the river corridor. These sandbars have been known to completely reconfigure themselves during large flood events (for example, release of water from the Garrison Dam in 2011). The presence of these sandbars has historically provided habitat for the piping plover and other shorebirds, and some sandbar habitat lies within the Project area.

Overall topography in the Project area is generally flat on the west side of the Missouri River with slopes of 0 to 6 percent along the river bank, and 0 to 2 percent slopes west of I-194. The east side of the Missouri River is hilly with steep terrain and slopes up to 70 percent. The existing BNSF line cuts into the bedrock outcrops. The eastern railroad track approach is cut into this slope; the slope was designed to be 1.75 horizontal to 1 vertical. Several erosional features and shallow sloughing have been noted on the slope face. The northeast approach slope is currently about 100 feet in height and is sloped at about 1.5 to 1.7 horizontal to 1 vertical from the track at an elevation of 1,695 to about 1,795 feet, and a steeper slope of 5 horizontal to 1 vertical above an elevation of 1,795 feet (Appendix D).

A landslide fault line and slope failure area have been identified on the east approach slope. Landslides in this area are typically part of large complex landslides that are several hundred years old. The eastern bridge abutment may have moved in the past as a result of landslide movement. Typically, these slide areas become more active during wet periods that follow a prolonged dry period. The slide area and east approach slopes were regraded in 1951, to the current configuration, in an attempt to limit future landslide movement. Several erosion features, including sinkholes, erosional sloughs, erosional channels, and other surface anomalies, have also developed within the existing east approach slope (Appendix D).

3.2.2 Environmental Consequences

Temporary impacts to soils would result from construction of temporary access roads, workspaces, and staging areas. Table 4 summarizes temporarily impacted acreage and the volume of terrestrial and aquatic (within the Missouri River) permanent fill and permanent excavation required for each alternative for bridge construction. Offset Alternatives 1 and 2 involve a new bridge that would be 92.5 feet upstream from Bridge 196.6. Offset Alternative 3 involves a new bridge that would be 42.5 feet upstream from Bridge 196.6. The offset alternatives would require retaining walls to be built along the east and west approaches. Alternative-specific temporary and permanent impacts to site geology, topography, and soils are described in detail in the following subsections.

Table 4: Earthwork Required for Each Project Alternative

Alternative	APE size (acres)	Terrestrial Excavation (cubic yards)	Aquatic Excavation (cubic yards)	Total Excavation (cubic yards)	Terrestrial Fill (cubic yards)	Aquatic Fill (cubic yards)	Total Fill (cubic yards)
No Action Alternative	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	105.07	N/A	15,310	15,310	N/A	4,740	4,740

Alternative	APE size (acres)	Terrestrial Excavation (cubic yards)	Aquatic Excavation (cubic yards)	Total Excavation (cubic yards)	Terrestrial Fill (cubic yards)	Aquatic Fill (cubic yards)	Total Fill (cubic yards)
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	141.39	28,900[a]	22,050	50,950	13,184	13,260	26,444
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	142.32	28,900[a]	12,960	41,860	12,818	7,940	20,758
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	140.90	3,700[a]	23,560	27,260	13,184	14,980	28,164

Source: TKDA 2020 (Appendix C)

[a] Permanent cut quantities are for a retaining wall on the lower part of the east approach slope. Permanent cut quantities would be greater if the retaining wall location on the upper part of the slope is selected.

The following subsections describe the environmental consequences for each alternative.

No Action Alternative

Ongoing maintenance and repair activities would be required to keep Bridge 196.6 operational. This routine maintenance would not be expected to result in any new temporary or permanent impacts to local geology, soils, or topography. Under the No Action Alternative, approximately 2,192 cubic yards of previously placed permanent fill in the Missouri River would remain below the 100-year BFE.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

The Proposed Action Alternative would require installation of a new bridge, 20 feet upstream, with 200-foot spans, and removal of Bridge 196.6. The Proposed Action Alternative would require development of access roads, staging areas, and general construction access, temporarily affecting up to 105.07 acres. The proposed work would be limited to construction of a parallel grade immediately north of the existing main line grade within the BNSF ROW. Nearly all areas proposed for construction have already been altered through past construction and maintenance activities.

The installation of in-water support piles for the temporary work bridges would temporarily displace substrate from the Missouri River. However, the substrate would revert to its natural condition once the piles have been removed after construction. The potential effects of pile driving include an increase in turbidity or possible mobilization of contaminated sediments if present. There is no indication that contaminated sediments are present within the Project area (Section 3.14). Pile installation (that is, vibratory or impact methods) is not expected to mobilize sediment beyond the localized area of the pile. Temporary impacts are anticipated to be minor.

Indirect impacts include potential transport of contaminated soils or sediment offsite. BMPs to control turbidity and sediment transport, such as the use of a turbidity curtain, would be implemented, as needed. Other BMPs include balancing cut and fill volumes, to the extent practicable, and testing soils for contaminates prior to arriving or leaving the Project area. Excavated materials from the east approach would be reused onsite as fill material, where possible. Any excess excavated soil would be disposed of at an approved facility or an upland location away from wetlands and waters of the United States, and outside of the floodplain. If additional fill material was required, it would be confirmed as free of contaminants prior to its use onsite.

The Proposed Action Alternative would require 58,000 cubic yards of common excavation, 21,000 cubic yards of topsoil excavation, 128,000 cubic yards of embankment fill, 3,600 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 17,200 cubic yards of river pier excavation, and 4,600 cubic yards of river pier backfill. The total excavation and fill would be 233,000 cubic yards.

The new track-grade embankment slope would be contoured to a 2:1 slope, per standard rail specifications. BNSF bridges are designed to meet current seismic standards (Section 3.14).

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

As with the Proposed Action Alternative, Offset Alternative 1 would require development of access roads, staging areas, and general construction access. The proposed construction area consists of a previously cleared ROW, agricultural lands, grasslands, and some wetland areas. Offset Alternative 1 would result in temporary impacts of up to 141.39 acres (Table 4). Section 3.6 further describes how clearing and grubbing activities would be required in areas with existing vegetation. Temporary impacts are anticipated to be minor.

Offset Alternative 1 would require modifications to the topography of the east and west approach embankments to accommodate the new bridge position. Retaining walls would need to be constructed on both the eastern and western banks of the Missouri River to limit off-ROW impacts. Section 3.11 discusses retaining walls in greater detail.

Construction of Offset Alternative 1 would require the greatest amount of permanent fill placement and excavation, when compared with the other alternatives. Offset Alternative 1 would require 205,700 cubic yards of common excavation, 26,900 cubic yards of topsoil excavation, 322,000 cubic yards of embankment fill, 4,600 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 17,900 cubic yards of river pier excavation, and 4,300 cubic yards of river pier backfill. The total excavation and fill would be 582,000 cubic yards.

Construction of the east approach retaining wall would also engage or be in close proximity to the known landslide fault location. Reactivation of the landslide could result in detrimental impacts to topography and soils. If a landslide were to occur, the structural integrity of the railroad, bridges, and the underground reservoir at the City of Bismarck facility could be compromised (Appendix D). The existing track-grade elevation would remain the same and the new track-grade embankment slope would be contoured to a 2:1 slope, per standard rail specifications. BNSF bridges are designed to meet current seismic standards (Section 3.14). Permanent impacts resulting from construction of Offset Alternative 1 are anticipated to be more significant than the Proposed Action Alternative or the No Action Alternative.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

The Offset Alternative 2 temporary impacts to geology, soils, and topography would be similar to those of Offset Alternative 1. Development of access roads, staging areas, and general construction access would be required. Offset Alternative 2 would result in the largest overall APE (approximately 142.32 acres) compared to the other alternatives (Table 5). Temporary impacts are anticipated to be minor.

Temporary in-water support piles with in-water workspace would be needed for the falsework associated with Offset Alternative 2. Pile installation (that is, vibratory or impact methods) is not expected to mobilize sediment beyond the localized area of the pile. BMPs to control turbidity and sediment transport, such as the use of a turbidity curtain, would be implemented, as needed.

Other BMPs include balancing cut and fill volumes, to the extent practicable, and testing soils for contaminates prior to arriving or leaving the Project area. Excavated materials from the east approach would be reused onsite as fill material, where possible. Any excess excavated soil would be disposed of at an approved facility or an upland location away from wetlands and waters of the United States, and outside of the floodplain. If additional fill material was required, it would be confirmed as free of contaminants prior to use onsite.

Construction of Offset Alternative 2 would require similar permanent soil and topography modifications to Offset Alternative 1. Offset Alternative 2 would also require modifications to the topography of the east and west approach embankments to accommodate the new bridge position. Retaining walls would need to be constructed on both the eastern and western banks of the Missouri River to limit off-ROW impacts. Section 3.11 discusses retaining walls in greater detail.

Construction of Offset Alternative 2 would require 205,700 cubic yards of common excavation, 26,900 cubic yards of topsoil excavation, 322,000 cubic yards of embankment fill, 4,600 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 9,500 cubic yards of river pier excavation, and 2,000 cubic yards of river pier backfill. The total excavation and fill would be 571,300 cubic yards.

Construction of the east approach retaining wall would also engage or be in close proximity to the known landslide fault location. Reactivation of the landslide would result in detrimental impacts to topography and soils. If a landslide was to occur, the structural integrity of the railroad, bridges, and the underground reservoir at the City of Bismarck facility could be compromised (Appendix D).

The existing track-grade elevation would remain the same and the new track-grade embankment slope would be contoured to a 2:1 slope, per standard rail specifications. BNSF bridges are designed to meet current seismic standards (Section 3.14). Permanent impacts resulting from construction of Offset Alternative 2 are anticipated to be similar to Offset

Alternative 1 and more significant than the Proposed Action Alternative or the No Action Alternative.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

The Offset Alternative 3 short-term impacts to geology, soils, and topography would be less than Offset Alternatives 1 and 2 (with a 92.5-foot offset) because the 42.5-foot offset would require less extensive modifications to the east and west approaches to align the new bridge position. As with other alternatives, access roads, staging areas, and general construction access would be required. Offset Alternative 3 would result in impacts of up to 140.90 acres with the APE (Table 4).

Temporary in-water support piles would be installed for the temporary work bridges. Pile installation (that is, vibratory or impact methods) is not expected to mobilize sediment beyond the localized area of the pile. BMPs to control turbidity and sediment transport, such as the use of a turbidity curtain, would be implemented, as needed.

Other BMPs include balancing cut and fill volumes, to the extent practicable, and testing soils for contaminates prior to arriving or leaving the Project area. Excavated materials from the east approach would be reused onsite as fill material, where possible. Any excess excavated soil would be disposed of at an approved facility or and upland location away from wetlands and waters of the United States, and outside of the floodplain. If additional fill material is required, it would be confirmed as free of contaminants prior to use onsite.

Offset Alternative 3 would require similar permanent soil and topography modifications to Offset Alternatives 1 and 2. Construction of the new bridge and connecting railway would result in changes to land use as new structures would be installed and would require a larger permanent footprint. Additional ROW would be needed along the east approach.

Offset Alternative 3 would also require modifications to the topography of the east and west approach embankments to accommodate the new bridge position. Retaining walls would need to be constructed on both the eastern and western banks of the Missouri River to limit off-ROW impacts. Section 3.11 discusses retaining walls in greater detail.

Construction of Offset Alternative 3 would require 191,800 cubic yards of common excavation, 19,800 cubic yards of topsoil excavation, 196,700 cubic yards of embankment fill, 3,400 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 17,200 cubic yards of river pier excavation, and 4,000 cubic yards of river pier backfill. The total excavation and fill would be 433,500 cubic yards.

Offset Alternative 3 would require a smaller retaining wall on the eastern bank (Appendix D). Construction of the east approach retaining wall would also engage or be in close proximity to the known landslide fault location. Reactivation of the landslide would result in detrimental impacts to topography and soils. If a landslide was to occur, the structural integrity of the railroad, bridges, and the underground reservoir at the City of Bismarck facility could be compromised (Appendix D).

The existing track-grade elevation would remain the same and the new track-grade embankment slope would be contoured to a 2:1 slope, per standard rail specifications. BNSF bridges are designed to meet current seismic standards (Section 3.14). Permanent impacts resulting from construction of Offset Alternative 3 are anticipated to be less than those of Offset Alternatives 1 and 2, but more significant than the Proposed Action Alternative or the No Action Alternative.

Table 5 summarizes environmental consequences for each alternative.

Table 5: Environmental Consequences Summary – Geology, Soils, and Topography

Alternative	Short-term Impact (During Construction)	Long-term Impact (Postconstruction)
No Action Alternative	No change.	No change.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Minor temporary modifications to topography and soils as a result of access, construction workspaces, and temporary in-water support structures.	Long-term fill for bridge piers, abutments, and the west approach: 58,000 cubic yards of common excavation, 21,000 cubic yards of topsoil excavation, 128,000 cubic yards of embankment fill, 3,600 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 17,200 cubic yards of river pier excavation, 4,600 cubic yards of river pier backfill (a total of 233,000 cubic yards of excavation and fill).
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Minor temporary modifications to topography and soils as a result of access, construction workspaces, and temporary in-water support structures.	Long-term fill for excavation and installation of retaining walls at the east and west approaches: 205,700 cubic yards of common excavation, 26,900 cubic yards of topsoil excavation, 322,000 cubic yards of embankment fill, 4,600 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 17,900 cubic yards of river pier excavation, 4,300 cubic yards of river pier backfill (a total 582,000 cubic yards of excavation and fill). The east retaining wall has a high potential to engage the existing fault line and lead to landslides.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Minor temporary modifications to topography and soils as a result of access, construction workspaces, and temporary in-water support structures. Additional short-term in-water support structures to accommodate installation of the 400-foot spans.	Long-term fill for excavation and installation of retaining walls at the east and west approaches: 205,700 cubic yards of common excavation, 26,900 cubic yards of topsoil excavation, 322,000 cubic yards of embankment fill, 4,600 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 9,500 cubic yards of river pier excavation, 2,000 cubic yards of river pier backfill (a total of 571,300 cubic yards of excavation and fill). The east retaining wall has a high potential to engage the existing fault line and lead to landslides.

Alternative	Short-term Impact (During Construction)	Long-term Impact (Postconstruction)
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	Minor temporary modifications to topography and soils as a result of access, construction workspaces, and temporary in-water support structures.	Long-term fill for excavation and installation of retaining walls at the east and west approaches: 191,800 cubic yards of common excavation, 19,800 cubic yards of topsoil excavation, 196,700 cubic yards of embankment fill, 3,400 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 17,200 cubic yards of river pier excavation, 4,000 cubic yards of river pier backfill (a total of 433,500 cubic yards of excavation and fill). The east retaining wall has a potential to engage the existing fault line and lead to landslides.

3.3 Water Resources and Water Quality

The CWA governs the release of pollutants into waterways. Sections 3.4 and 3.5 discuss wetlands and floodplains. Four sections of the CWA potentially apply to the Project: Sections 401, 402, 404, and 303(d).

- Section 401 requires WQC from the state when a 404 permit or a USCG bridge permit is triggered. Typically, this certification is granted by the state to which EPA has delegated authority to certify that the discharge would not violate state water quality standards. EPA retains jurisdiction in limited cases. In North Dakota, NDDOH regulates permit reviews and issuance under Section 401. NDDOH will review Project impacts following conclusion of the NEPA process.
- Section 402 authorizes EPA, or states to which EPA has delegated authority, to permit the discharge of pollutants under the NPDES program. Construction projects that disturb 1 acre or more of ground, and discharge to surface waters are required to obtain an NPDES Stormwater Construction General Permit. In North Dakota, NDDOH regulates permit reviews and issuance under Section 402.
- Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Section 404 requires a permit from USACE before dredged or fill material may be discharged into waters of the United States. The basic premise of the 404 program is that no discharge of dredged or fill material may be permitted if: (1) a practicable alternative exists that is less damaging to the aquatic environment; or (2) the nation's waters would be considerably degraded. Section 2 contains more detailed discussion of the alternatives analysis under Section 404(b)(1) of the CWA and the determination of a least environmentally damaging practicable alternative.
- Section 303(d) of the CWA establishes that states are to list waters that do not meet applicable water quality standards. The list includes priority rankings set by the states for the listed waters. Once the impaired waters are identified, Section 303(d) requires that the states establish total maximum daily loads that would meet water quality standards

for each listed water body. In North Dakota, NDDEQ is responsible for implementing the requirements of Section 303(d).

Sections 9 and 10 of the RHA grant USACE control over obstructions to navigable waters of the United States. Section 9 details requirements to construct dams, dikes, bridges, or causeways in a navigable waterway. Section 10 gives USACE the authority to approve the construction of smaller structures such as wharves, booms, and bulkheads, as well as dredging and filling operations.

The Safe Drinking Water Act is the main federal law that ensures the quality of drinking water in the U.S. Under the act, EPA sets health-based standards for drinking water quality to protect against both naturally occurring and synthetic contaminants, and oversees the states, localities, and water suppliers who implement those standards. The Safe Drinking Water Act was amended in 1986, to require states to develop Wellhead Protection Programs.

In the Project area, the Missouri River is not designated as a Wild and Scenic River. It is not listed on the Nationwide Rivers Inventory, nor in Executive Oder (EO) 13061 (National Wild and Scenic Rivers System 2019; NPS 2016).

3.3.1 Affected Environment

The Project area is adjacent to, and over, the Missouri River (Figure 1). The Missouri River is a low-gradient perennial watercourse with an unconsolidated bottom (that is, R2UBH) that extends 2,319 miles from its origin in Three Forks, Montana to its confluence with the Mississippi River just upstream of St. Louis, Missouri. The Missouri River flows generally east and south, with a total drainage area of 529,350 square miles. Houston Engineering Inc. (HEI) conducted aquatic resource delineations of the Project area in 2015, and 2017 (HEI 2017). Appendix E provides the delineated ordinary high water mark (OHWM) of the Missouri River.

The Missouri River segment has been designated as ND-10130101-028-S within the Project area. The total drainage area is approximately 186,000 square miles (USGS 2020b) and the channel slope is approximately 0.9 foot per mile. The average daily discharge at Bismarck, North Dakota is approximately 23,200 cubic feet per second (USACE 2018). are The Field Wetland Delineation Report (Appendix E) documents regulated waters of the United States within the Project area.

USACE has placed several revetment structures along the banks of the Missouri River to help stabilize banks of the river. The nearest revetment structure is 1,000 feet upstream of Bridge 196.6.

Flow within the Project area is primarily regulated by Lake Sakakawea and the Garrison Dam, approximately 75.4 miles upstream. The Garrison Dam is one of six federal dams that occur along the Missouri River that are maintained and operated by USACE. These dams have been constructed for the purposes of flood control, water supply, recreation, irrigation, hydropower, water quality, fish and wildlife, and navigation (North Dakota State Water Commission 2015). Damming of the river has confined the river to a narrow floodplain that is approximately 10 percent of its original width, eliminated side channels and quiet pools, and isolated backwaters and associated wetlands (USACE 1993).

Within the Project area, the Missouri River has been designated as a Class 1, cold-water fishery stream by the state of North Dakota. The quality of Class 1 waters shall be "suitable for propagation or protection, or both, of resident fish species and other aquatic biota and for swimming, boating, and other water recreation" (*North Dakota Administrative Code*, Title 33, Article 16, Chapter 2.1, "Standards of Quality for Waters of the State"). Currently, the Missouri River does not have any listed water quality impairments within the Project area. Historically, the Missouri River has had impairments to fish and other aquatic biota caused by physical substrate habitat alterations (from 2002 to 2008). Probable sources contributing to this impairment included:

- Channel erosion and incision
- Loss of riparian habitat
- Urban runoff and stormwater
- Upstream impoundments
- Stream modifications

Historically, total maximum daily loads have not been established for the Missouri River (EPA 2017a).

The Project area occurs in the Northwestern Glaciated Plains and the Northwestern Great Plains ecoregions. The average annual precipitation is 15 to 19 inches, and mean air temperatures range from -2 to 86 degrees Fahrenheit (°F) with approximately 100 frost-free days a year (EPA 1996). The City of Bismarck and the City of Mandan operate regional water treatment plants that obtain water from the Missouri River. The North Dakota Source Water Assessment Program has classified the drinking water of Bismarck and Mandan as moderately susceptible to potential contaminants and as meeting all state and federal requirements (City of Mandan 2018; City of Bismarck 2018). Activities and sources that may impact water quality in North Dakota include agriculture, commercial and industrial activities, public water systems, and residential activities.

The Project area is underlain by the Northern Great Plains aquifer system. Regional flow of deep, confined aquifers generally flows from southwest to northeast. The local groundwater flow system within the Project area is underlain by an unconsolidated-deposit aquifer that discharges water to the Missouri River (USGS 1996).

The Project area is within a Source Water Assessment Program area. Areas within this program are established to generate information on significant potential contamination sources and on the susceptibility of public water systems to contamination. Source Water Assessment Program plans may also provide actions to assure compliance with drinking water standards (NDDOH 1999).

3.3.2 Environmental Consequences

Table 6 quantifies the potential impacts of each alternative to the Missouri River (Appendix F). Subsequent sections discuss potential impacts of the alternatives and Section 3.4 provides wetland impacts.

Table 6: Summary of Impacts to Jurisdictional Waterways (Missouri River)

Alternative	Temporary Impacts (acres)	Permanent Impacts (acres)	Total Impacts (acres)
No Action Alternative	0	0	0
Proposed Action Alternative	2.89	0.98	3.87
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	3.22	1.28	4.50
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	3.05	0.70	3.75
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	2.87	1.58	4.45

Notes:
Acreages have been rounded to the nearest 0.01 acre.

Table 7 summarizes the volume of on-land permanent fill and permanent excavation required for each alternative for bridge construction.

Table 7: Summary of Aquatic Earthwork In Jurisdictional Waterways (Missouri River)

Alternative	Aquatic Excavation (cubic yards)	Aquatic Fill (cubic yards)
No Action Alternative	N/A	N/A
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	15,310	4,740
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	22,050	13,260
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	12,960	7,940
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	23,560	14,980

Source: TKDA 2021 (Appendix F)

The General Bridge Act of 1946 require any bridge construction or modification over navigable waters to be approved by USCG. All build alternatives, except for the No Action Alternative, would require a USCG bridge permit, which is a federal action requiring NEPA review and compliance with various federal regulations, including the CWA. While fill placed in waters of the United States are regulated by USACE under Section 404 of the CWA, projects that require work in or above water must meet water quality standards in compliance with Section 401 of the CWA.

USACE will review Project impacts following conclusion of the NEPA process. Impacts within the Missouri River are anticipated to be covered under NWP 15 for USCG bridges. Per NWP North Dakota Regional Condition 4, a PCN is required for impacts within the Missouri River. NWPs are scheduled to be reissued in March 2022. The applicability of NWPs will be re-evaluated following reissuance. Permit requirements for impacts to aquatic resources, outside of the Missouri River, will be evaluated with USACE following submittal of a Section 404 application.

Construction projects that disturb more than 1 acre of upland areas must obtain an NPDES Stormwater Construction General Permit from NDDEQ in compliance with Section 402 of the CWA. All build alternatives would result in the requirement of an NPDES Stormwater Construction General Permit. A Stormwater Pollution Prevention Plan (SWPPP), including a Temporary Erosion and Sediment Control Plan and a Spill Prevention, Control, and Countermeasure (SPCC) Plan, would be prepared in accordance with the requirements of the NPDES Stormwater Construction General Permit.

The following subsections describe the environmental consequences for each alternative.

No Action Alternative

Under the No Action Alternative, no new construction would occur. Ongoing maintenance and repair of the existing railroad tracks and bridges would continue. Routine maintenance of the existing structure may include cleaning, minor repairs, or replacement of track components. These maintenance actions would require the use of construction equipment that contains petroleum products. Spills associated with the use of petroleum products during these actions could impact water quality in the Missouri River. BNSF would maintain water quality standards during maintenance activities through the implementation of BMPs defined in an SPCC Plan to ensure that pollutants and products would be controlled and contained. Maintenance and repair activities would not be anticipated to impact water or water resources. While there is a connection between the Missouri River and the Northern Great Plains Aquifer, the implementation of these BMPs and safety practices to avoid and minimize contamination of the Missouri River, and the BNSF proposed response to a potential spill, would protect water quality in the Missouri River and, consequently, the aquifer.

Bridge 196.6 has shallow-foundation piers and is therefore considered to be scour critical. After high-water events, scour would continue to contribute to excess sedimentation and would adversely impact water quality downstream of the bridge. Bridge 196.6 also lacks structural redundancies, which contribute to its susceptibility to collapse. If a collapse was to occur, bridge materials would be deposited in the Missouri River and would adversely impact water quality.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

During construction, impacts to water resources would result from temporary structures within the floodplain, necessary to facilitate construction, including, but not limited to, cofferdams, docks, or falsework. Concrete and steel materials would be used in construction and are not anticipated to directly degrade water quality. Construction equipment and material would be supplied to barges via a temporary access road constructed along the north side of the proposed embankment. To provide the necessary water depths to allow the transition from land-based to water-based construction operations, a temporary dock wall would be placed along the western bank of the river. Within the Project area, the Missouri River fluctuates between 5 and 18 feet deep, with 18 feet considered to be a major flood stage (NOAA 2021). To be feasible, the minimum water depth adjacent to the dock wall and throughout the working area of the Missouri River must be 6 feet. As such, some degree of dredging may be needed to maintain construction operations. Dredged materials would be stockpiled within the upland staging and laydown area, and would either be reused as embankment fill material or transported offsite for disposal. Causeways or temporary work trestles may be pursued, should water depths decrease significantly below the 6-foot minimum threshold requirement and localized dredging prove to be ineffective. Causeways or work trestles, if used would not be in the navigational channel. Causeways, if utilized, would be constructed as earthen embankments using imported fill material with riprap to armor the causeways against erosion. A geotextile fabric would be used to separate the proposed temporary fills from the in-situ soils. All temporary causeway material would be removed once no longer needed for construction.

Cofferdams would be installed to accommodate the construction of piers within the river channel. The material contained within the cofferdams would be removed to the proposed bottom of footing seal elevation with clam-shell type excavation equipment. Excavated materials would be transported to the staging and laydown area, and either reused as embankment fill material, or backfill around the piers, or transported offsite for disposal. Installation and removal methods may cause turbidity due to a temporary, localized increase in suspended sediments. Upon sufficient cure of the seal concrete and pH neutralization of the water inside the cofferdam to within 1 pH unit of background levels in the river, water contained within the cofferdam would be pumped out. Pumped water from the cofferdam interior would be discharged directly back into the Missouri River. If large amounts of sediment were present, it would be collected and transported to the staging and laydown area for disposal (Appendix G). The Proposed Action Alternative would result in approximately 2.89 acres of temporary impact within the Missouri River (Appendix F).

Temporary water quality impacts associated with the Proposed Action Alternative may include temporary sedimentation, potential petroleum spills from construction equipment operations, and potential spills from concrete work above the OHWM of the Missouri River. Suspension of sediments (increased turbidity) may temporarily occur during construction activities within the Missouri River. Implementation of BMPs defined within the 401 WQC and the SWPPP, as well as ongoing adaptive management adjustments throughout construction would maintain water quality standards during construction (Section 4). For example, to minimize suspension of sediments, a turbidity curtain would be used during in-water ground disturbance activities in water deeper than 2 feet. To prevent and minimize spill impacts, fully stocked petroleum containment spill kits would be located at power equipment work sites and construction staging areas during construction. Potential temporary impacts to water quality during construction are not expected to be significant.

The Missouri River within the Project area does not have any listed water quality impairments (NDDOH 2019). Square Butte Creek is the closest Missouri River tributary with a listed impairment. Approximately 7 miles north of the Project location, Square Butte Creek is listed as having a fecal coliform, physical substrate habitat alterations, and sedimentation and siltation impairments (Data Basin 2021). Disturbance to substrate within the Missouri River would be minimized to the extent necessary for construction. Appropriate erosion control BMPs, such as silt fences, silt curtains, and straw wattles, would be implemented to minimize the amount of sediment entering water bodies, including the Missouri River, and to minimize sedimentation and siltation.

After construction is complete, the Proposed Action Alternative would result in 0.98 acre of permanent impacts to the Missouri River as a result of installation of new bridge piers. In total 17,200 cubic yards of excavation and 4,600 cubic yards of fill would be required within the Missouri River. Ongoing maintenance and repair of the new railroad track and bridge would be required. Trains traveling through the Project area would travel on new, modern, more reliable infrastructure that requires less maintenance, which would reduce the likelihood of spills associated with maintenance activities. These maintenance and repair activities would require the use of construction equipment that contains petroleum products. Spills associated with the use of petroleum products could impact water quality in the Missouri River. BNSF would maintain water quality standards during maintenance activities through the implementation of BMPs defined in an SPCC Plan to ensure that pollutants and products would be controlled and contained. Maintenance and repair activities would not be anticipated to impact water resources. Impacts to water quality from operations are not anticipated.

As with the No Action Alternative, while there is a connection between the Missouri River and the Northern Great Plains Aquifer, the implementation of BMPs and safety practices to avoid and minimize contamination of the Missouri River, and the BNSF proposed response to a potential spill, would protect water quality in the Missouri River and, consequently, the aquifer. Section 3.14 discusses the potential for Project construction to mobilize contaminated sediments.

This alternative would have no long-term adverse impacts on ice jams or navigation within the river channel because Bridge 196.6 would be removed (Appendixes H and I). The number of piers in the water (11 total piers, with 4 in the main river channel) for the Proposed Action Alternative is similar to that of the I-94/Grant Marsh Bridge, located immediately upstream (6 total piers, with 3 in the main river channel), and the Memorial Bridge (13 total piers, with 5 in the main river channel), located immediately downstream.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

During construction, water resource impacts associated with Offset Alternative 1 would include temporary impacts from construction of the new track and bridges and would similar to those described for the Proposed Action Alternative. Offset Alternative 1 would result in 3.22 acres of temporary impacts to the Missouri River (Appendix F). In total 17,900 cubic yards of excavation and 4,300 cubic yards of fill would be required within the Missouri River.

Following construction, water resource impacts associated with Offset Alternative 1 would be similar to those of Proposed Action Alternative and would include permanent fills within the Missouri River as a result of construction, ongoing maintenance and repairs of the new track and bridges, and scour that occurs at Bridge 196.6. Offset Alternative 1 long-term water resource impacts would be comparable to those of the Proposed Action Alternative. Construction of the new bridge would result in 1.28 acres of permanent fill as a result of installation of new piers in the Missouri River. BMPs defined in an SPCC Plan would ensure that pollutants and products would be controlled and contained if spills were to occur during maintenance or repair activities.

Offset Alternative 1 would retain Bridge 196.6, which would continue to be susceptible to an increase in scour. Bridge 196.6 has shallow-foundation piers and is, therefore, considered to be scour critical. After high-water events, scour would continue to contribute to excess sedimentation and would adversely impact water quality downstream of the bridge. Bridge 196.6 also lacks structural redundancies, which contribute to its susceptibility to collapse. If a collapse was to occur, bridge materials would be deposited in the Missouri River and would adversely impact water quality.

The number of piers in the river would increase with two bridges on this reach of the Missouri River, as opposed to one. This increase in total piers and reduction in pier spacing would likely increase the potential for ice jams.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

During construction, water resource impacts associated with construction of the new track and bridges would exceed those identified for the Proposed Action Alternative. It is not feasible to float in 400-foot spans to this location of the Missouri River and, accordingly, temporary falsework would need to be constructed across the entirety of the river to build the spans in place upstream of the proposed structure. While specific configuration of the falsework is not known at this time, it is estimated that there would be a temporary impact to flooding in the Missouri River, in addition to safety concerns associated with ice jams. It is anticipated that the falsework would need to remain in place for a minimum of 12 months.

Construction equipment and materials would be supplied via a temporary access road constructed along the north side of the proposed embankment, and a temporary dock wall would be placed along the western bank of the river. Offset Alternative 2 would require 3.05 acres of temporary workspace within the Missouri (Appendix F). Temporary workspaces include an area upstream of the new bridge where falsework would be erected to construct the 400-foot truss spans in place. Temporary causeways or work trestles may also be needed if water depths decrease significantly. Causeways or work trestles, if used would not be in the navigational channel. Temporary cofferdams would be required to construct the new bridge piers within the Missouri River. Water from the cofferdam interior would be pumped directly back into the Missouri River. Construction within and adjacent to the Missouri River may lead to temporary, localized increases in suspended sediments. However, this would be limited by SWPPP BMPs, including the use of turbidity curtains.

Following construction, water resource impacts associated with Offset Alternative 2 would include permanent fills within the Missouri River as a result of construction, ongoing maintenance and repairs of the new track and bridges, and scour at Bridge 196.6. Construction of the new bridge would result in 0.70 acre of permanent fill due to installation of new piers within the Missouri River. In total 9,500 cubic yards of excavation and 2,000 cubic yards of fill would be required within the Missouri River. BMPs defined in an SPCC Plan would ensure that pollutants and products would be controlled and contained if spills were to occur during maintenance or repair activities.

Offset Alternative 2 would retain Bridge 196.6, which would continue to be susceptible to an increase in scour. Bridge 196.6 has shallow-foundation piers and is, therefore, considered to be scour critical. After high-water events, scour would continue to contribute to excess sedimentation and would adversely impact water quality downstream of the bridge. Bridge 196.6 also lacks structural redundancies, which contribute to its susceptibility to collapse. If a collapse was to occur, bridge materials would be deposited in the Missouri River and would adversely impact water quality.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

During construction, Offset Alternative 3 would result in approximately 2.87 acres of impact within the ordinary high water (OHW) line of the Missouri River (Appendix F). Impacts to water resources during construction would result from installation of cofferdams, dock walls, and shoring walls.

Following construction, water resource impacts associated with Offset Alternative 3 would include permanent fills within the Missouri River as a result of construction, ongoing maintenance and repairs of the new track and bridges, and scour at Bridge 196.6. Construction of the new bridge would result in 1.58 acres of permanent fill due to installation of new piers within the Missouri River. A total of 17,200 cubic yards of excavation and 4,000 cubic yards of fill would be required within the Missouri River.

Water resource impacts associated with Offset Alternative 3 would include increased downstream debris loading and deposition. The configuration of Offset Alternative 3 generates a finished geometry with a lateral clearance between new and existing piers of approximately 55 feet at two locations below the OHWM. At these two locations, individual pier footing scour limits have the potential to overlap, interact with each other, and cause additional scour from mutual interference. Scour could add to downstream sediment loading, which would degrade water quality. Scour could also lead to catastrophic failure, which would further adversely impact water quality.

Table 8 summarizes environmental consequences for each alternative.

Table 8: Environmental Consequences Summary Table – Water Resources

Alternative	Short-term Impact (During Construction)	Long-term Impact (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	Scour after high-water events would continue to contribute to excess sedimentation and adversely impact water quality downstream of the bridge Bridge 196.6 susceptibility to collapse, which would adversely impact water quality.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	2.89 acres of short-term impact from causeways, staging, cofferdams, and suspended solids within the Missouri River.	0.98 acre of long-term dredge and fill within the Missouri River, 17,200 cubic yards of river pier excavation, and 4,600 cubic yards of river pier backfill. A long-term benefit of no scour potential and no potential for Bridge 196.6 to collapse.

Alternative	Short-term Impact (During Construction)	Long-term Impact (Postconstruction)
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	3.22 acres of short-term impact from causeways, staging, cofferdams, and suspended solids within the Missouri River.	1.28 acres of long-term dredge and fill within the Missouri River, 17,900 cubic yards of river pier excavation, and 4,300 cubic yards of river pier backfill. Scour after high-water events would continue to contribute to excess sedimentation and adversely impact water quality downstream of the bridge Bridge 196.6 susceptibility to collapse, which would adversely impact water quality.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	3.05 acres of short-term impact from causeways, staging, cofferdams, and suspended solids within the Missouri River.	0.70 acre of long-term dredge and fill within the Missouri River, 9,500 cubic yards of river pier excavation, and 2,000 cubic yards of river pier backfill. Extensive falsework across the Missouri River would be required for a minimum of 18 months and potential short-term impacts to flooding and safety concerns would be associated with ice jams. Bridge 196.6 susceptibility to collapse, which would adversely impact water quality.
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	2.87 acres of short-term impact from causeways, staging, cofferdams, and suspended solids within the Missouri River.	1.58 acres of long-term dredge and fill within the Missouri River, 17,200 cubic yards of river pier excavation, and 4,000 cubic yards of river pier backfill Scour after high-water events would contribute to excess sedimentation and adversely impact water quality downstream of the bridge. Lateral clearance between new Offset Alternative 3 piers and existing piers could cause the greatest potential for scour of all the alternatives. Bridge 196.6 susceptibility to collapse, which would adversely impact water quality.

3.4 Wetlands

EO 11990 requires federal agencies to act to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Wetlands adjacent to navigable waters, tributaries of navigable waters, or with a major nexus to interstate commerce are regulated pursuant to the CWA.

Section 404 of the CWA defines wetlands as areas that are "inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions" (16 U.S.C. Section 3801). Wetlands generally include swamps, marshes, bogs, and similar areas.

As described in Section 3.3, CWA Sections 401 and 404 potentially apply to the Project. Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Section 401 requires WQC from the state when a 404 permit or a USCG bridge permit is triggered. The General Bridge Act of 1946 grants USCG the authority to administer and approve locations and plans of bridges in navigable waters of the United States.

USACE Omaha District regional conditions specify that activities impacting peatlands must notify USACE for certain NWPs. Peatlands are permanently or seasonally saturated and inundated wetlands, where conditions inhibit organic matter decomposition and allow for the accumulation of peat. Under cool, anaerobic, and acidic conditions, the rate of organic matter accumulation exceeds organic decay (USACE 2017).

The Ramsar Convention on Wetlands is an intergovernmental treaty that provides a framework of action for the conservation and wise use of wetlands and their resources. No Wetlands of International Importance, as designated under the Ramsar Convention on Wetlands criteria, occur in North Dakota (The Ramsar Convention Secretariat 2021).

3.4.1 Affected Environment

Wetlands within the Project area have been identified by field delineations and offsite data sources. HEI conducted field wetland delineations in 2015, and 2017, on 57.55 acres of the Project area (HEI 2017). The wetland delineations were conducted in accordance with the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and Version 2.0 of the *Great Plains Regional Supplement* (USACE 2010). In accordance with USACE methodology, an area is a wetland if positive indicators for the three mandatory wetland criteria are identified in an area, with special exceptions. These criteria include the presence of hydrophytic vegetation, wetland hydrology, and hydric soils. The National Wetlands Inventory has been used to identify wetlands outside of the field delineation study area.

A total of 12 potentially jurisdictional wetlands (2.1 acres) have been identified in the Project area and have been classified based on the same classification system used by the National Wetlands Inventory, *Classification of Wetlands and Deepwater Habitats of the United States/Riverine System* (Cowardin et al. 1979). This hierarchical system broadly classifies wetlands as marine, estuarine, palustrine, riverine, or lacustrine, and then further characterizes them by vegetation type and hydrology. The wetland types identified include:

- PEM1C (palustrine, emergent, and seasonally flooded)
- PEM1Ad/Cd (palustrine, emergent, seasonally/temporarily flooded, and ditched)
- PEM1f (palustrine, emergent, seasonally flooded, and farmed)
- PFO1Cd (palustrine, forested, seasonally flooded, and ditched)

These wetland areas formed in the ditches that were created during railway construction and highway construction.

The palustrine, emergent wetland communities are dominated by herbaceous plants, including Canadian anemone (*Anemone canadensis*), wheat sedge (*Carex atherodes*), Nebraska sedge (*Carex nebrascensis*), fringed willowherb (*Epilobium ciliatum*), water smartweed (*Persicaria amphibia*), reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites australis*), peachleaf willow (*Salix amygdaloides*), and hybrid cattail (*Typha x glauca*). All of these species have been classified as obligate or facultatively wet in the Great Plains Region, which indicates that they always occur in saturated soils or nearly always occur in saturated soils, respectively (Lichvar 2016). The palustrine, forested wetland community is dominated by tree species, including green ash (*Fraxinus pennsylvanica*) and box elder (*Acer negundo*). The delineation of these wetlands is available in Appendix E. Table 9 identifies the wetland identification number, Cowardin classification, and acreage of each wetland in the Project area.

Table 9: Summary of Delineated Wetlands within the Project Area

Wetland ID	Cowardin Classification[a]	Acreage within the Project Area[b]
1	Palustrine, emergent, persistent, temporarily flooded, and partially drained/ditched (PEM1Ad)	0.01
2	Palustrine, emergent, persistent, seasonally flooded, partially drained/ditched (PEM1Cd) and palustrine, forested, persistent, seasonally flooded, and partially drained/ditched (PFO1Cd)	0.61
3	Palustrine, emergent, persistent, and seasonally flooded (PEM1C)	0.26
4	Palustrine, emergent, persistent, and seasonally flooded (PEM1C)	0.23
5	Palustrine, emergent, persistent, seasonally flooded, and partially drained/ditched (PEM1Cd)	0.39
6	Palustrine, emergent, persistent, seasonally flooded, and partially drained/ditched (PEM1Cd)	0.13[c]
7	Palustrine, emergent, persistent, and seasonally flooded (PEM1C)	0.04[c]
8	Palustrine, emergent, persistent, and seasonally flooded (PEM1C)	0.01[c]
9	Palustrine, emergent, persistent, and seasonally flooded (PEM1C)	0.07[c]
10	Palustrine, emergent, persistent, and seasonally flooded (PEM1C)	0.01[c]
11	Palustrine, emergent, persistent, and seasonally flooded (PEM1C)	0.33[c]
12	Palustrine, emergent, persistent, and semipermanently flooded (PEM1f)	0.01[c]
Total acres within Project area		2.10

Sources: HEI 2017; USFWS 2020b

[a] Cowardin et al. 1979

[b] Acreages rounded to the nearest 0.01 acre.

[c] Wetland identified offsite using the National Wetlands Inventory. Acreages have not been field-verified.

Note:

ID = identification

3.4.2 Environmental Consequences

Coordination with the USACE Omaha District was initiated during the formal NEPA scoping process for the Project. As the Project has progressed, coordination with the Omaha District has continued regarding the necessary Section 404 permit documentation. A joint evaluation meeting was held on May 6, 2014, which included USFWS, EPA, and USACE.

Table 10 quantifies the potential impacts of each alternative to wetland features (Appendix J). All wetland areas identified within the Project area have been assumed to be jurisdictional due to direct hydrologic connections and adjacency to the Missouri River, a traditional navigable water. Impact acreages have been estimated as detailed drainage and bridge designs have yet to be developed. Reassessment of these estimates would be completed during the detailed design phase.

Table 10: Summary of Wetland Impacts Per Alternative

Alternative	Temporary Impacts (acres)[a]	Permanent Impacts (acres)[a]	Total Impacts (acres)[a]
No Action Alternative	0	0	0
Proposed Action Alternative	0.72	0.33	1.05
Offset Alternative 1	0.72	0.53	1.25[b]
Offset Alternative 2	0.72	0.53	1.25[b]
Offset Alternative 3	0.72	0.53	1.25[b]

[a] Acreages have been rounded to the nearest 0.01 acre.

[b] The Field Wetland Delineation Report (Appendix E) did not include areas west of I-194; therefore, wetland impact acreages for Offset Alternatives 1 through 3 may be greater than those presented here.

The following subsections describe the environmental consequences for each alternative.

No Action Alternative

Under the No Action Alternative, new construction would not occur and, therefore, would not result in long-term impacts to wetlands. Ongoing maintenance and repair of the existing railroad tracks and bridges would continue, including cleaning, minor repairs, and replacement of track components. Spills associated with maintenance activities could impact wetlands adjacent to the existing railroad track. BNSF would implement BMPs defined in an SPCC Plan to ensure that pollutants and products would be controlled and contained. Maintenance and repair activities would not be anticipated to cause temporary or long-term impacts to wetlands.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

During construction, wetland impacts associated with the Proposed Action Alternative may include temporary impacts associated with construction workspaces. Activities within construction workspaces include construction vehicle access routes, material and equipment staging, and minor grading. Vegetation within wetlands may be mowed or removed in preparation for construction. Heavy equipment may compact the soils, which can diminish their drainage capacity. The hydrology would be temporarily altered by changes in topography and vegetation if runoff, drainage, and flow were to be diverted directly or indirectly during construction. Temporary filling of wetlands is not anticipated at the east and west approaches (Appendix F).

Implementation of BMPs defined within the 401 WQC and the SWPPP, as well as ongoing adaptive management adjustments throughout construction, would prevent impacts to wetlands during construction. To prevent and minimize spill impacts, fully stocked petroleum containment spill kits would be located at power equipment work sites and construction workspaces. Potential temporary impacts to wetlands are not expected to be significant. Following construction, temporarily impacted wetland areas would be restored to preconstruction elevations and would be allowed to naturally revegetate. In total, 0.72 acre of wetlands would be temporarily impacted as a result of construction workspaces.

Over the long term, the Proposed Action Alternative may result in 0.33 acre of permanent impacts to wetlands. 0.33 acre would be permanently filled to accommodate construction of the railroad embankment. It is anticipated that CWA authorization for an NWP with a PCN would be required. If wetland impacts exceed 0.5 acre, an individual permit would be required. NWPs are scheduled to be reissued in March 2022. The applicability of NWPs will be re-evaluated following reissuance. Permit requirements for impacts to aquatic resources, outside of the Missouri River, will be evaluated with USACE following submittal of a Section 404 application. Wetland mitigation would be conducted in accordance with CWA permit conditions.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

The short-term wetland impacts of Offset Alternative 1 would be similar to those of the Proposed Action Alternative and may include 0.72 acre of temporary wetland impacts associated with construction workspaces. Temporary filling of wetlands is not anticipated. Implementation of BMPs throughout construction would minimize impacts to wetlands. Long-term wetland impacts would also be similar to those of the Proposed Action Alternative and may include 0.53 acre of permanent fill placement within wetlands to accommodate construction of the railroad embankment. It is anticipated that a CWA individual permit would be required as permanent impacts to wetlands would exceed 0.5 acre. Wetland mitigation would be conducted in accordance with CWA permit conditions.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

The short-term wetland impacts of Offset Alternative 2 would be similar to those of Offset Alternative 1 and the Proposed Action Alternative, and may include 0.72 acre of temporary wetland impacts associated with construction workspaces. Temporary filling of wetlands is not anticipated. Implementation of BMPs throughout construction would minimize impacts to wetlands. Long-term wetland impacts would also be similar to those of Offset Alternative 1 and the Proposed Action Alternative, and may include 0.53 acre of permanent fill placement within wetlands to accommodate construction of the railroad embankment. It is anticipated that a CWA individual permit would be required as permanent impacts to wetlands would exceed 0.5 acre. Wetland mitigation would be conducted in accordance with CWA permit conditions.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

The short-term wetland impacts of Offset Alternative 3 would be similar to those of Offset Alternatives 1 and 2, and the Proposed Action Alternative, and may include 0.72 acre of temporary wetland impacts associated with construction workspaces. Temporary filling of wetlands is not anticipated. Implementation of BMPs throughout construction would minimize impacts to wetlands. Long-term wetland impacts would also be similar to those Offset Alternatives 1 and 2, and the Proposed Action Alternative, and may include 0.53 acre of permanent fill placement within wetlands to accommodate construction of the railroad embankment. It is anticipated that a CWA individual permit would be required as permanent impacts to wetlands would exceed 0.5 acre. Wetland mitigation would be conducted in accordance with CWA permit conditions.

Table 11 provides a summary of short- and long-term wetland impacts per alternative.

Table 11: Environmental Consequences Summary – Wetlands

Alternative	Short-term Impact (During Construction)	Long-term Impact (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	No change to ongoing maintenance activities.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	0.72 acre of short-term wetland impacts associated with construction workspaces, vehicle access routes, material and equipment staging, minor grading, and vegetation removal.	0.33 acre of long-term wetland impacts associated with permanent fill to accommodate the railroad embankment.
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	0.72 acre of short-term wetland impacts associated with construction workspaces, vehicle access routes, material and equipment staging, minor grading, and vegetation removal.	0.53 acre of long-term wetland impacts associated with permanent fill to accommodate the railroad embankment.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	0.72 acre of short-term wetland impacts associated with construction workspaces, vehicle access routes, material and equipment staging, minor grading, and vegetation removal.	0.53 acre of long-term wetland impacts associated with permanent fill to accommodate the railroad embankment.
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	0.72 acre of short-term wetland impacts associated with construction workspaces, vehicle access routes, material and equipment staging, minor grading, and vegetation removal.	0.53 acre of long-term wetland impacts associated with permanent fill to accommodate the railroad embankment.

3.5 Floodplains

Representatives from CDM Smith Inc., who review MT-2 applications on behalf of FEMA, attended a consulting parties meeting for the Project on June 20, 2018. The MT-2 process is used by community officials or individuals via community officials to ask FEMA to revise the effective NFIP Map (Flood Hazard Boundary Map, Flood Insurance Rate Map, Flood Boundary and Floodway Map, or Digital Flood Insurance Rate Map) and Flood Insurance Study (FIS) report for a community. These forms are also used for requesting FEMA comments on a proposed project, and are issued in the form of a CLOMR. In the meeting, the CDM Smith Inc. staff, who administer the MT-2 process on behalf of FEMA, stated that any action that would raise the BFEs or increase the size of the SFHA is considered to be a negative impact. Furthermore, they stated that, per NFIP regulation 44 CFR 65.12, any project that occurs within a floodway can have no rise in the BFE that would impact any other dwelling of free-standing structure.

EO 11988, Floodplain Management, requires federal agencies to avoid the authorization of projects in the base floodplain unless there is no practical alternative. EO 11988 also endorses actions to reduce the risk of flood loss, to minimize the impacts of floods, and to restore and preserve the natural and beneficial values served by floodplains. Most bridges are located within the base floodplain; therefore, USCG must ensure that the Project design includes all measures practicable to minimize floodplain impacts and to protect the natural and beneficial values of the floodplain.

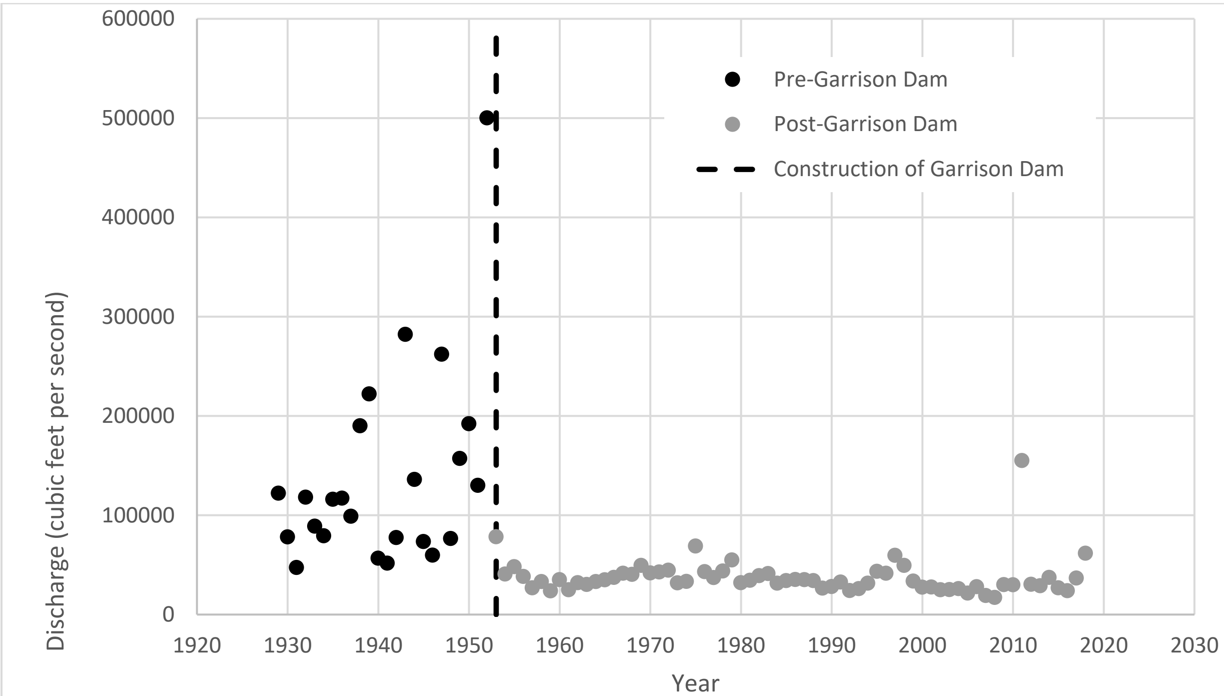
3.5.1 Affected Environment

The Project spans the Missouri River, connecting the cities of Bismarck and Mandan. The existing bridge is located within a FEMA-defined SFHA and is within a FEMA-designated floodway (Zone AE). The bridge is mapped on the effective Flood Insurance Rate Map No. 38015C, Panel No. 0780D (Burleigh County), and on Map No. 38059C, Panel No. 0505D (Morton County). Floodway Zone AE is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment and be sufficient to convey the 1 percent annual chance flood.

Garrison Dam was constructed in 1953, and is approximately 72 miles upstream of the Project. Garrison Dam serves multiple purposes in that it provides both power generation and flood attenuation in the Missouri River Basin. The regulation of flows has provided an extensive flood control benefit for downstream communities and agricultural producers.

There is a U.S. Geologic Survey (USGS) stream gage that is located approximately 2,100 feet downstream from the Project. USGS stream gage 06342500 contains peak streamflow data from 1929 to present (91 recorded peak discharge events). Annual peak discharge data over the period of record shows the attenuation of flooding since completion of the dam (Figure 6).

Figure 6: Peak Streamflow at U.S. Geologic Survey Stream Gage 06342500 – Missouri River at Bismarck, North Dakota



The surface water within the Missouri River study reach occurs from either snowmelt runoff, runoff from rainfall, or both. Four sources of flooding occur within the section of the Missouri River near Bridge 19:

1. Open-water seasonal flooding from Garrison Dam operation
2. Open-water seasonal flooding from the Knife River, the Heart River, or other residual drainage areas between Garrison Dam
3. Flooding resulting from ice jams and ice conditions
4. Flooding caused by aggradation in the upper reaches of Lake Oahe

Since the construction of Garrison Dam, notable ice jam events have occurred in 1983 and 2009.

FEMA developed an FIS in 1999 (river mile 1,300 to 1.328.9), for a 28.9-mile stretch of the Missouri River that encompasses the Project. The Morton County FIS identifies snowmelt runoff and ice jams as the major sources of flooding on the Missouri River. Since the construction of Garrison Dam, notable ice jam events have occurred in 1983 and 2009. The flood of record since the construction of Garrison Dam occurred in 2011 (FEMA 2015a). The 1 percent annual chance (100-year) discharge for the Missouri River at the Project is 94,000 cubic feet per second. The effective FIS water surface profiles were developed using the USACE Hydrologic Engineering Center – River Analysis System (HEC-RAS) computer program. For both the existing and proposed bridges, the low chord elevation of the bridge (the lowest portion of the bridge superstructure) is above the 100-year water surface profile.

FEMA performed a study of the potential for ice jams to increase flooding on this stretch of the Missouri River. This was done by comparing stage-frequency curves on the Missouri River, both for open water and during the ice jam period, using data from USGS stream gage 06342500 at the City of Bismarck, USGS stream gage 06349070 at the City of Mandan, and USGS stream gage 06349700 at Schmidt. Their evaluation showed that ice jam flooding impacted water surface elevations for the 10-year recurrence interval flood, but not for the larger 50-year, 100-year, or 500-year floods.

3.5.2 Environmental Consequences

BNSF utilized the HEC-RAS hydraulic model (HEC-RAS version 5.0.3) developed for the Burleigh FIS and the Morton County FIS. The model has been truncated to represent the river reach that contains the Project (from 13 miles upstream of Bridge 196.6 to 1,800 feet downstream of Bridge 196.6). The model contains cross-sectional data that define the channel geometry and riverine characteristics. There are several bridge crossings within this reach of the FIS effective hydraulic model. When the FIS effective hydraulic model was developed, the traditional bridge routine was not utilized to represent the bridge substructure. Instead, the channel bathymetry within cross sections at the river crossings were modified to represent the piers and the reduction in conveyance area under each of the bridge alternatives.

Development of the corrected effective model involved the incorporation of a bridge detail that was defined for the Proposed Action Alternative, as well as the addition of several more cross sections adjacent to historic Bridge 196.6. Additional cross sections were developed utilizing survey data that were obtained as part of the Project. The additional detail was incorporated into the corrected effective model, as well as the post-Project model, to identify impacts specific to the Proposed Action Alternative. Table 12 presents the results of the HEC-RAS modeling for all alternatives.

Installation of temporary structures within the floodplain that are necessary to facilitate construction, including, but not limited to, cofferdams, docks, or falsework, would have a short-term impact on flood levels.

Table 12: 100-year Base Flood Elevation (feet) and Floodplain Rise (feet)

Alternative	100-year BFE (feet)	Change in 100-year BFE (feet)	Vertical Clearance
No Action Alternative	1,636.62	0.00	61.50 feet to OHW 52.33 feet to 100-year floodplain 68.23 feet to OLW
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	1,636.62	0.00	52.35 feet to OHW 43.18 feet to 100-year floodplain 59.08 feet to OLW
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	1,636.64	0.02	52.35 feet to OHW 43.18 feet to 100-year floodplain 59.08 feet to OLW

Alternative	100-year BFE (feet)	Change in 100-year BFE (feet)	Vertical Clearance
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure[a]	1,636.62	0.00	62 feet to OHW 52.4 feet to 100-year floodplain 68.7 feet to OLW
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	1,636.65	0.03	52.35 feet to OHW 43.18 feet to 100-year floodplain 59.08 feet to OLW

[a] There was no independent model created for Offset Alternative 2, but it is acknowledged that the 400-foot span alternative would not cause a rise in the BFE as piers would line up with Bridge 196.6.

Note:
OLW = ordinary low water

The following subsections describe the environmental consequences for each alternative.

No Action Alternative

Under the No Action Alternative, no new construction would occur and, accordingly, no new fill would be placed in the Missouri River floodplain. Ongoing maintenance and repair of the existing railroad tracks and bridges would continue, but maintenance and repair activities would not be anticipated to impact floodplain conveyance on a short-term or long-term basis.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

In the short term, construction of temporary structures within the floodplain that are necessary to facilitate construction, including, but not limited to, cofferdams, docks, or falsework, would have a short-term impact on flood levels. To minimize short-term impacts to flood conveyance, BNSF has committed to constructing no more than two river pier cofferdams at any one time (Appendix G).

Following construction, the Proposed Action Alternative would not result in an increase to the BFE upstream of the bridge after construction and, accordingly, would not impact any structures within the floodway.

BNSF has applied for and received a CLOMR from FEMA. If a project is constructed as designed, a CLOMR ensures that there would be no rise in the BFE. The following is the timeline for the CLOMR approval process:

- September 11, 2017: BNSF submitted an application for a CLOMR to FEMA.
- November 13, 2017, through April 11, 2018: FEMA provided BNSF with three requests for additional information. BNSF and their design team addressed FEMA questions and data needs.
- April 24, 2018, through May 23, 2018: the CLOMR was published in the *Bismarck Tribune and Mandan News*.
- July 16, 2018: the CLOMR was approved by FEMA.

The CLOMR was sent from FEMA to the North Dakota Office of the State Engineer, in addition to the local floodplain administrators in the cities of Bismarck and Mandan. The North Dakota Office of the State Engineer accepted the CLOMR and considered the Project to be in compliance with state and federal regulations as it pertains to floodplain management and the NFIP. Appendix K provides a copy of the CLOMR letters of determination from FEMA to the City of Bismarck and the City of Mandan, along with the response letter from the North Dakota Office of the State Engineer.

The local floodplain administrators in the City of Bismarck and the City of Mandan are awaiting necessary state and federal permits prior to issuance of a Floodplain Development Permit. Both letters of determination outline how BNSF must submit additional data when the Project is completed and request that FEMA make a final determination on revising the effective Flood Insurance Rate Map and FIS report. Appendix K outlines the data required for the final determination.

In the absence of a rise in the BFE at the Project area, mitigation is neither proposed nor necessary under the Proposed Action Alternative.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

In the short term, construction of temporary structures within the floodplain that are necessary to facilitate construction, including, but not limited to, cofferdams, docks, or falsework, would have a short-term impact on flood levels. To minimize short-term impacts to flood conveyance, BNSF has committed to constructing no more than two river pier cofferdams at any one time (Appendix G).

Following construction, Offset Alternative 1 would result in an increase of approximately 0.02 foot (Table 12) to the BFE upstream of the bridge and would impact approximately 500 structures within the floodplain. At the time of publication of this DEIS, an application for a CLOMR has not been submitted for Offset Alternative 1 to FEMA, the City of Bismarck, or the City of Mandan. Per the stipulations identified by FEMA for the MT-2 review process, a CLOMR that contains a rise in the BFE that impacts structures would not be approved without mitigation.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

Unlike the Proposed Action Alternative, Offset Alternative 1, and Offset Alternative 3, all of which propose 200-foot girder spans, Offset Alternative 2 would be a 400-foot truss span bridge. It is possible to float in 200-foot bridge spans to this location on the Missouri River, but not 400-foot spans. Accordingly, the 400-foot spans would be constructed in place and would require extensive falsework to be installed across the Missouri River, upstream of the proposed structure. While specific configuration of the falsework is not known at this time, it is estimated that there would be a temporary impact to flooding in the Missouri River, in addition to safety concerns associated with ice jams. It is anticipated that the falsework would need to remain in place for a minimum of 12 months.

Following construction, Offset Alternative 2 would not result in an increase in the BFE postconstruction and, accordingly, would not impact any structures in the floodplain (Table 12). Offset Alternative 2 has not been modeled; however, piers on the new structure are 400 feet apart and would line up with the piers on the existing structure. Installing piers in alignment would not contract flow through the Missouri River at the Project area and, accordingly, the piers are assumed to convey floodwater in a similar manner than the No Action Alternative.

In the absence of a rise in the BFE at the Project area, mitigation is not proposed or necessary under Offset Alternative 2.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

In the short term, construction of temporary structures within the floodplain, necessary to facilitate construction, including, but not limited to, cofferdams, docks, or falsework, would have a short-term impact on flood levels. To minimize short-term impacts to flood conveyance, BNSF has committed to constructing no more than two river pier cofferdams at any one time (Appendix G).

After construction, Offset Alternative 3 would result in an increase of approximately 0.03 foot (Table 12) to the BFE upstream of the bridge and would impact approximately 550 structures within the floodplain. At the time of publication of this DEIS, an application for a CLOMR has not been submitted for Offset Alternative 3 to FEMA, the City of Bismarck, or the City of Mandan.

Horizontal clearance between new and existing piers would be approximately 55 feet at two locations below the OHWM: one east, and one west of the main navigational channel (Figure 7). A horizontal clearance of 55 feet is significantly less than any of the other construction alternatives and any other crossing within the Project area. The reduction in horizontal clearance at these two locations on the river cross section would increase susceptibility for the development of ice jams and debris jams. FEMA conducted an analysis of ice jam potential to impact flooding. The resulting analysis showed that ice jam flooding only impacted the water surface profiles for the 10 percent annual chance (10-year) flood event and did not impact the profiles for the larger flood events (50-year, 100-year, and 500-year).

Ice jams have contributed to historic flooding in the Project area. While the severity of ice jams has decreased since the construction of Garrison Dam, the potential for severe river blockage still exists. Ice jams that occur in the Project area are both freeze-up and breakup types of jams. Freeze-up type jams normally occur during the ice-in period. They result from higher flow-frequency discharge because of additional roughness of the newly formed ice cover. The ice-in period for the Project area normally begins by the formation of ice on Lake Oahe, downstream of the Project area. The head of the ice then moves upstream on the Missouri River through the Project area, causing increased blockage (Appendix H).

Figure 7: Offset Alternative 3 – Pier Configuration

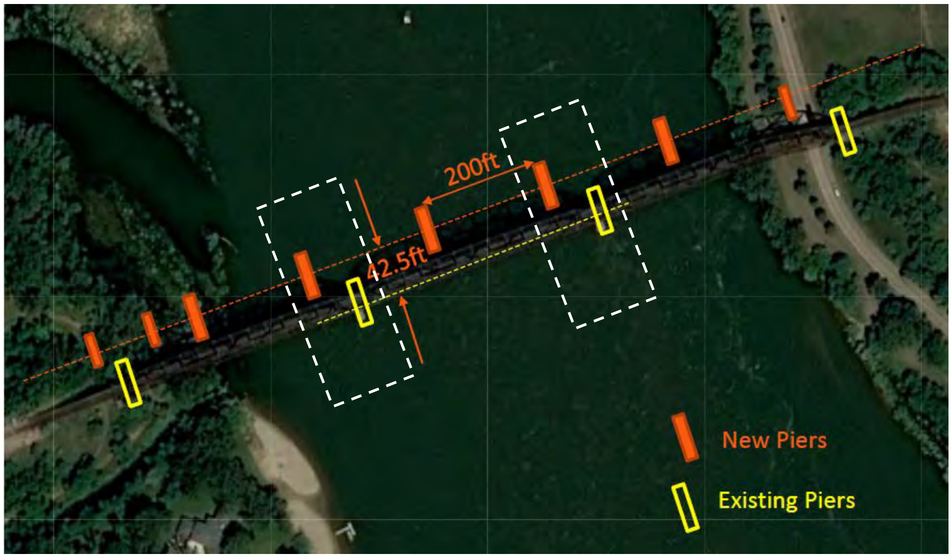


Table 13 summarizes environmental consequences for each alternative.

Table 13: Impact Summary

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	No change to ongoing maintenance activities.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Minor short-term impacts to the existing floodplain during the construction period from structures necessary to facilitate construction (cofferdams, docks, or falsework) would have a short-term impact on flood levels.	No long-term impacts due to a change in the existing BFE and no impacts to structures within the floodplain,
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Minor short-term impacts to the existing floodplain during the construction period from structures necessary to facilitate construction (cofferdams, docks, or falsework) would have a short-term impact on flood levels.	A long-term, 0.02-foot increase in the BFE and potential impact to approximately 500 structures within the floodplain.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Minor short-term impacts to the existing floodplain during the construction period from structures necessary to facilitate construction (cofferdams, docks, or falsework) would have a short-term impact on flood levels.	No impact to the BFE upstream of the bridge, after construction, and, accordingly, no structures would be impacted within the floodway.

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
Offset Alternative 3: 42.5 foot offset, 200-foot spans, retain existing structure	Minor short-term impacts to the existing floodplain during the construction period from structures necessary to facilitate construction (cofferdams, docks, or falsework) would have a short-term impact on flood levels.	A long-term, 0.03-foot increase in the BFE and potential impact to approximately 550 structures within the floodplain. Horizontal clearance between new and existing piers of approximately 55 feet at two locations below the OHWM, outside of the main navigational channel. Increased susceptibility to ice jams and debris jams, which has been modeled to impact the severity of the 10-year flood.

Avoidance, Minimization, and Mitigation Measures

Per NFIP regulation 44 CFR 65.12, any project that occurs within a floodway can have no rise in the BFE that would impact any other dwelling of free-standing structure. The 0.02-foot rise in the BFE associated with Offset Alternative 1 and the 0.03-foot rise in the BFE associated with Offset Alternative 3 would require mitigation. FEMA recommended evaluating mitigation in the form of modification of the Missouri River channel. Mitigation would involve excavation of 26,963 cubic yards of material from the western bank of the Missouri River and installation of 40,890 square yards of concrete slope paving to reduce the friction and allow flood waters to move through the river cross section more efficiently (Appendix L). This mitigation is estimated to cost approximately $8.4 million dollars. The quantities and cost estimate were prepared to address a rise in the BFE of 0.02 foot (Offset Alternative 1) and it is assumed that it would require more to mitigate the 0.03-foot rise for Offset Alternative 3. Similar mitigation is not proposed for the east bank of the Missouri River, given the historic slope instability in that location.

In a technical memorandum dated April 14, 2021, FORB identified mitigation for floodplain rise, which would require development of flood conveyance culverts in the I-94 embankment, approximately 0.38 mile upstream of Bridge 196.6 (Appendix L). At the time of publication of this DEIS, the HEC-RAS model developed for floodplain relief culverts has not been reviewed or validated by FEMA or the North Dakota Office of the State Engineer.

USCG has requested the following information from FORB, but has not received sufficient information to include in the DEIS. Information from FORB, based on their description of their proposed floodplain mitigation, is relevant to evaluating reasonably foreseeable significant adverse impacts on the human environment, and includes the following:

- Confirmation of whether the HEC-RAS model for their proposed culvert mitigation would lead to a no net rise in the BFE. If additional floodplain mitigation is required to achieve no net rise, information regarding what the additional mitigation would involve would also be required.
- Information from FORB and NDDOT about the environmental impacts associated with the construction and maintenance of the culverts and any other mitigation required to

achieve to no net rise, including impacts to wetlands, species, water quality, and ice flow.

- Confirmation from NDDOT that they are committed to the design, implementation, construction, and maintenance of these culverts.
- Information from NDDOT about permits and land access requirements for construction and maintenance of the culverts, to include any requirement for authorizations from the FHWA. Information regarding maintenance should also address the potential for ice or debris jams in the culverts.
- Information from NDDOT about how long the process will take to obtain permits and funding for the culverts and how long it will take for the culverts to be constructed.
- Information from FORB and NDDOT about who will fund the design, construction, and maintenance of the culverts and how much each will cost.

The FORB technical memorandum proposes the upstream flood conveyance culverts as mitigation for the 0.03 foot of rise in the BFE for Offset Alternative 3. USCG is requesting the previously noted data in order to determine if Offset Alternate 3 is technically or economically feasible. Should this mitigation measure also apply to offsetting the 0.02 foot of rise in the BFE for Offset Alternative 1, the same information regarding permitting, construction, maintenance, funding source, and additional costs would be required in order to determine the technical and economic feasibility of Offset Alternative 1.

3.6 Vegetation

Vegetation stabilizes soils, controls erosion, reduces sedimentation, and provides habitat and forage for wildlife. Vegetation, within the Proposed Action Alternative Project area, was surveyed in 2017, during the field wetland delineation and the BA (Appendixes E and M).

3.6.1 Affected Environment

The Project area straddles the River Breaks subsection of the Northwestern Great Plains ecoregion and the Collapsed Glacial Outwash of the Northwestern Glaciated Plains ecoregion. Common natural vegetation in the River Breaks subsection includes blue grama (*Boutelous gracilis*), western wheatgrass (*Pascopyrum smithii*), buffalo grass (*Bouteloua dactyloides*), and multiple species of bluestem. Juniper and deciduous trees are often found on north-facing slopes while cottonwood gallery forests are located on the floodplain. Land cover is mostly rangeland and native grasses with remnant woodlands on existing alluvial flats (Bryce et al. 1996; USGS 2015).

3.6.2 2017 Vegetation Survey

A vegetation survey was completed in the Project area for the Proposed Action Alternative that provides site-specific data on the existing environment. Vegetation in the remainder of the Project area was identified using the Multi-Resolution Land Characteristics consortium National Land Cover Database (NLCD).

In the Proposed Action Alternative Project area, the shoreline (1 to 3 meters from the edge of the water) is narrow on both the Burleigh County and Morton County sides of the river. There is about a 0.5- to 1-meter band of shoreline with vegetation that grades from sparse to bare ground. After the initial meter of sparse vegetation, there is a heavily vegetated zone, 1 to 3 meters from the edge of the water (shoreline). Vegetation below the OHWM in the Proposed Action Alternative Project area includes boxelder (*Acer negundo*), reed canary grass (*Phalaris arundinacea*), white dogwood (*Cornus alba*), Nebraska sedge (*Carex nebrascensis*), field sow thistle (*Sonchus arvensis*), and peachleaf willow (*Salix amygdaloides*).

Wetland vegetation in the 2017 survey area includes species such as round-leaf thimbleweed (*Anemone canadensis*), wheat sedge (*Carex atherodes*), Nebraska sedge (*Carex nebrascensis*), fringed willowherb (*Epilobium ciliatum*), water smartweed (*Persicaria amphibia*), reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites australis*), peachleaf willow (*Salix amygdaloides*), and hybrid cattail (*Typha x glauca*).

Outside of the wetland areas, the Proposed Action Alternative Project area west of the Missouri River, in the rail ROW, is a forest community. This area includes species such as green ash (*Fraxinus pennsylvanica*), box elder (*Acer negundo*), eastern cottonwood (*Populus deltoides*), and white willow (*Salix alba*). South of the rail ROW is cropland with annual rotation of corn, soybeans, and spring wheat.

Beyond the shoreline, the Proposed Action Alternative Project area east of the Missouri River is dominated by grassland vegetation and is largely populated with crested wheatgrass (*Agropyron cristatum*) and smooth bromegrass (*Bromus inermis*), which was planted after disturbance by railroad maintenance activities. Most native plant species diversity has been eliminated.

National Land Cover Database

The NLCD has been used to analyze land cover types in areas where field surveys were not conducted. The database has been used to generally describe land cover. Species specifics available for areas where the vegetation surveys were conducted are not available for areas assessed using the NLCD, and the overall data is generalized and less specific.

As characterized by the Multi-Resolution Land Characteristics, the vegetation communities within the Project area consist of:

- Agricultural lands, dominated by grasses and legumes or cultivated crops
- Emergent herbaceous wetlands areas dominated by perennial herbaceous vegetation
- Herbaceous areas dominated by graminoids (grasses) or herbaceous vegetation
- Woody wetlands with woody, herbaceous plants that are present for most of the growing season

Agricultural land includes the croplands on the west side of the Project and other planted pasture or hay areas. Emergent herbaceous wetland communities are found in the delineated wetland areas. Dominate species include round-leaf thimbleweed, wheat sedge, Nebraska sedge, peachleaf willow, and hybrid cattail. Herbaceous areas include nonwoody, herbaceous plants, such as the wheatgrass and smooth bromegrass on the east and west approaches of the Project area. The woody wetland community is found on the west approach outside of the delineated wetland areas with green ash and box elder trees.

North Dakota has 13 Noxious weed species (NDDA-PID 2020). The Burleigh and Morton County Weed Boards have not designated any additional Noxious weed species beyond the state species (NDDA-PID 2020). Four invasive species have been observed in the Project area: absinth wormwood (*Artemisia absinthium*), Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), and musk thistle (*Carduus nutans*).

3.6.3 Environmental Consequences

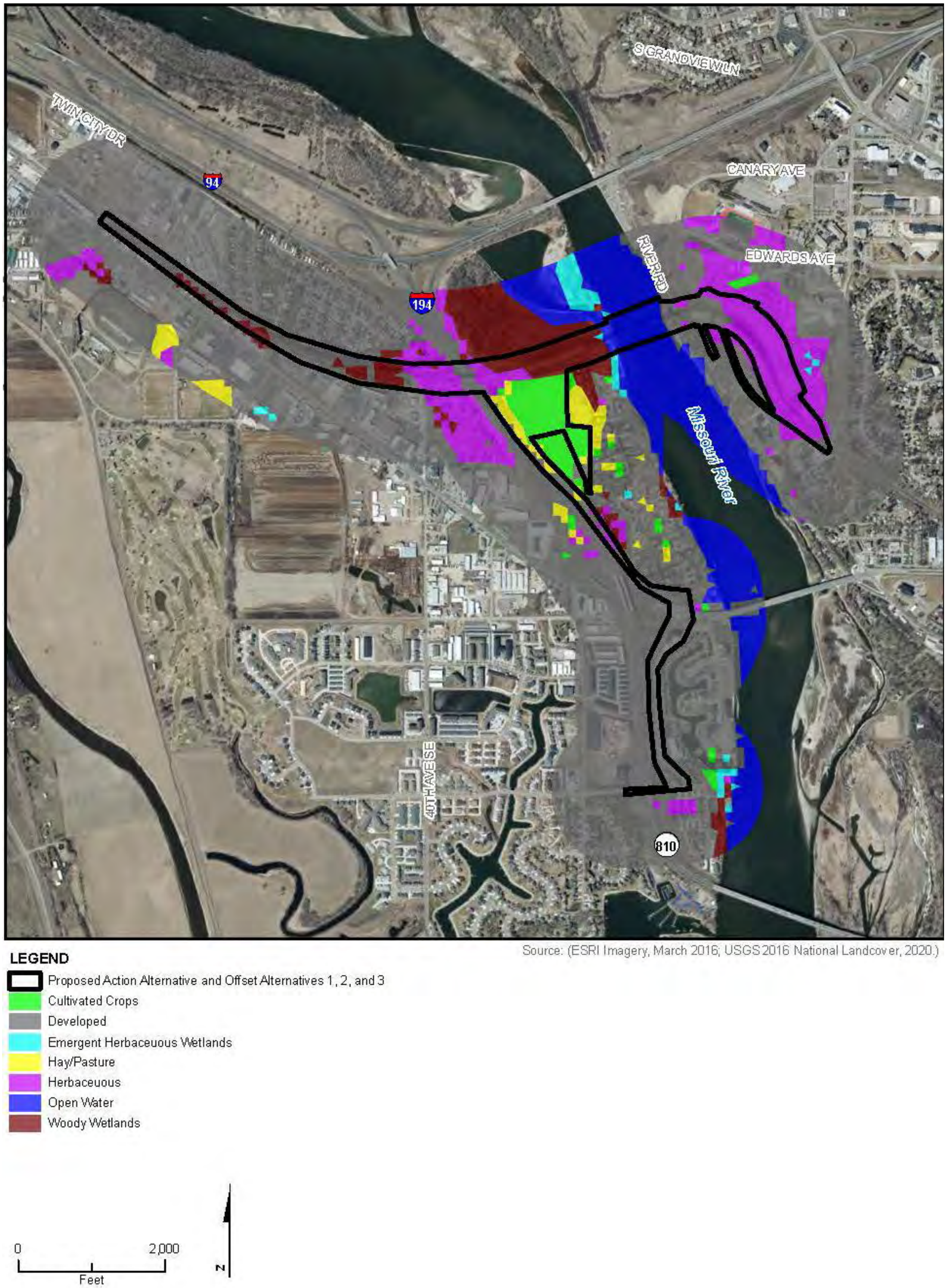
Environmental consequences have been evaluated using field survey data for the Proposed Action Alternative and NLCD data. The NLCD data were used to compare impacts to vegetation between the build alternatives (including the Proposed Action Alternative and Offset Alternatives 1 through 3). Table 14 includes the acreage impacted for each alternative (Figure 8). The No Action Alternative assumes that all Project work areas would be restricted to the existing ROW, and that no additional impacts would occur.

Direct Impacts

Table 14: Land Cover Impacts (acres) for each Alternative

Land Cover Classification (NLCD)	No Action Alternative	Proposed Action Alternative: 20-foot Offset, 200--foot Spans, Remove Existing Structure	Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure	Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure	Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure
Agriculture	0	20.9	20.9	20.9	20.9
Emergent herbaceous wetlands	0	0.1	0.2	0.2	0.2
Herbaceous	0	29.1	36.4	35.9	36.4
Woody wetland	0	13.9	21	21	21
Total vegetation	0	64.1	78.5	78	78.5
Developed	0	32.3	54.2	54.2	54.2
Open water	0	8.7	8.7	8.7	9
Total land cover	0	105.1	141.4	140.9	142.3

Figure 8: Vegetation Map



The following subsections describe the environmental consequences for each alternative.

No Action Alternative

The No Action Alternative would result in no direct permanent impacts to vegetation. Maintenance activities could be conducted from Bridge 196.6 in the existing ROW, or a barge on the river, eliminating access routes and direct impacts to vegetation. Indirect impacts related to the introduction of invasive plants could potentially occur when vehicles and equipment enter the area for maintenance activities.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

The Proposed Action Alternative would require temporary removal of agricultural vegetation, emergent herbaceous wetlands, and herbaceous, woody wetland areas. Construction is anticipated to take 3.5 years. Temporary workspaces, access roads, and staging areas would be cleared, as needed, and allowed to revegetate following construction. Slower-growing vegetation types, such as woody wetlands and sparse shoreline vegetation, would take longer to establish. Vegetation removed for installation of the new bridge and track would be permanently lost, and herbaceous, woody wetland areas would be permanently converted to herbaceous vegetation. Impacts resulting from the Proposed Action Alternative are anticipated to be minor.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

Temporary impacts associated with Offset Alternative 1 would be similar to those of the Proposed Action Alternative; however, the APE for Offset Alternative 1 would be larger, to accommodate additional track alignment. Construction is anticipated to take 5.5 years. Furthermore, Offset Alternative 1 would require construction of retaining walls on the eastern and western banks. Construction of these retaining walls would affect adjacent vegetation and would necessitate tree removal, resulting in the permanent conversion of woody wetland vegetation to herbaceous vegetation. Impacts resulting from Offset Alternative 1 are anticipated to be minor.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

Temporary impacts associated with Offset Alternative 2 would be similar to those of Offset Alternative 1; however, the construction duration for Offset Alternative 2 is 6.5 years. Offset Alternative 2 would also require construction of retaining walls on the eastern and western banks. Construction of these retaining walls would affect adjacent vegetation and would necessitate tree removal, resulting in the permanent conversion of woody wetland vegetation to herbaceous vegetation. Impacts resulting from the Offset Alternative 2 are anticipated to be minor.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

Temporary impacts associated with Offset Alternative 3 would be similar to those of Offset Alternatives 1 and 2; however, the APE for Offset Alternative 3 is slightly smaller. The construction duration for Offset Alternative 3 is 4.5 years. Offset Alternative 3 would also require construction of retaining walls on the eastern and western banks, though the western bank retaining wall would be smaller than those required for Offset Alternatives 1 and 2. Impacts resulting from the Offset Alternative 3 are anticipated to be minor.

Indirect Impacts

Indirect impacts include potential introduction of new invasive plants from vehicles and equipment entering the Project area for construction, or the further spread of invasive plants that already exist in the Project area from vehicles and equipment leaving the area. Once introduced, invasive species could spread beyond the Project area and have a permanent impact on the surrounding landscape. Additionally, fugitive dust settlement onto vegetation outside of the Project area could potentially reduce vegetative productivity. Impacts to vegetation can be mitigated to below significant levels by implementing BMPs and avoidance and minimization measures.

Table 15 summarizes environmental consequences for each alternative.

Table 15: Environmental Consequences Summary - Vegetation

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	No change to ongoing maintenance activities.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Minor short-term impacts of up to 20.9 acres of agricultural vegetation, 0.1 acre of emergent herbaceous wetland vegetation, 29.1 acres of herbaceous vegetation, and 13.9 acres of woody wetland vegetation. Minor short-term indirect impacts due to fugitive dust and the spread of invasive species.	Long-term impacts where wooded land cover is permanently removed and not revegetated.
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Minor short-term impacts of up to 20.9 acres of agricultural vegetation, 0.2 acre of emergent herbaceous wetland vegetation 36.4 acres of herbaceous vegetation, and 21 acres of woody wetland vegetation. Minor short-term indirect impacts due to fugitive dust and the spread of invasive species.	Long-term impacts where wooded land cover is permanently removed and not revegetated.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Minor short-term impacts of up to 20.9 acres of agricultural vegetation, 0.2 acre of emergent herbaceous wetland vegetation, 35.9 acres of herbaceous vegetation, and 21 acres of woody wetland vegetation. Minor short-term indirect impacts due to fugitive dust and the spread of invasive species.	Long-term impacts where wooded land cover is permanently removed and not revegetated.

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	Minor short-term impacts on up to 20.9 acres of agricultural vegetation, 0.2 acre of emergent herbaceous wetland vegetation 36.4 acres of herbaceous vegetation, and 21 acres of woody wetland vegetation. Minor short-term indirect impacts due to fugitive dust and the spread of invasive species.	Long-term impacts where wooded land cover is permanently removed and not revegetated.

Avoidance, Minimization, and Mitigation Measures

Specific limits of activities and disturbance areas would be clearly marked with a high-visibility construction (silt) fence for reference by construction work crews and machinery operators to protect existing vegetation and limit sediment transport to adjacent vegetated areas. Limiting clearing to areas necessary for safe equipment operations and temporarily seeding or mulching areas during construction would minimize available areas for weed seed infestation or spread. Inspection and cleaning of vehicles and equipment, including aquatic equipment, prior to arriving onsite and immediately after departure, would minimize the potential for introduction of new invasive seeds or vegetation pieces, or potential spread offsite. Cleaning could include the scraping and sweeping off any debris or soil, and pressure washing vehicles and equipment at an offsite location before transportation to the work site.

BMPs to limit fugitive dust include the reduction of vehicle speeds and as-needed watering on unpaved roads. The Project would develop and implement a Revegetation and Restoration Plan to address site restoration, including seed mix, revegetation methods, timing of restoration activities, and monitoring. The Project would also implement BMPs during operations, such as maintenance of weed populations within the ROW, as required by federal rail and local regulations.

3.7 Fish and Wildlife

The Fish and Wildlife Coordination Act (1934) directs federal agencies to prevent the loss of, and damage to, fish and wildlife resources. Consultation with USFWS is required when activities result in the control of, diversion of, or modification to any natural habitat or associated water body that alters habitat quality and/or quantity of fish and wildlife.

The Migratory Bird Treaty Act makes it unlawful to: pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; and possess, offer to, or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product, manufactured or not. Provisions are in place for the protection of migratory birds, parts, nests, eggs, or products. Under the Migratory Bird Treaty Act, migratory birds essentially include all birds native to the U.S., and the act pertains to activities throughout the year, not just during migration.

The Bald and Golden Eagle Protection Act (16 U.S.C. Sections 668 to 668c) provides for the protection of bald and golden eagles by prohibiting the taking, possession, and commerce of such birds, except under certain specified conditions. USFWS issues permits to take, possess, and transport bald and golden eagles.

An interagency organization and EO 13112 serve to prevent and reduce the spread of invasive species (Section 3.6), which applies to both vegetation and wildlife. Compliance with invasive species control is also addressed in this subsection.

3.7.1 Affected Environment

The Project area includes the Missouri River, agricultural lands, grassland (herbaceous) uplands, forested uplands, emergent herbaceous wetlands, and bare to heavy shoreline vegetation, as described in Section 3.6. These resources provide foraging, refuge, and nesting or spawning habitat for numerous fish and wildlife species. The Missouri River State Natural Area is a 157-acre preserve consisting of pristine floodplain woodlands managed by NDPR, NDDOT, Morton County Parks, and the City of Mandan (NDPR 2020). The Missouri River State Natural Area provides suitable foraging and nesting habitat for songbirds, shorebirds, raptors, and waterfowl. In addition, many of the fish and wildlife species listed herein utilize the densely forested habitat found in the natural area.

Migratory Birds

Migratory bird species nest in the U.S. and Canada during the summer months and then migrate south to the tropical regions of Mexico, Central and South America, and the Caribbean for the nonbreeding season. Migratory birds follow broad routes called flyways between breeding grounds in Canada and the U.S., and wintering grounds in Central and South America, and the Caribbean. The Project area is part of the Central Migratory Flyway (USFWS 2020a).

Birds of Conservation Concern are species that “without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act,” as specified in the 1988 amendment of the Fish and Wildlife Conservation Act (16 U.S.C. Section 2912). USFWS Migratory Bird Office issued a report describing the Birds of Conservation Concern to accurately identify bird species with the greatest conservation priority (USFWS 2008). The report identifies priority bird species at the national, regional, and Bird Conservation Region levels. The Project area is within Bird Conservation regions 11 (Prairie Pothole Region) and 17 (Badlands and Prairies Region). The Prairie Pothole Region is a glaciated area of mixed-grass prairie in the west and tallgrass prairie in the east. It is the most important waterfowl production area on the North American continent, despite extensive wetland drainage and tillage of native grasslands. The Badlands and Prairies Region is a semi-arid, rolling plain dominated by a mixed-grass prairie that lies west and south of the glaciated Prairie Pothole Region, east of the Rocky Mountains, and north of the true shortgrass prairie. This area is habitat for some of the healthiest populations of high-priority dry-grassland birds on the continent due to large areas of grasslands associated with ranching land use (Bird Studies Canada and North American Bird Conservation Initiative 2020).

Table 16 identifies the 39 Birds of Conservation Concern species that have been documented or are cited as probable to occur (regionally) in the Project area, based on a review of the lists for the Prairie Pothole and Badlands and Prairies Bird Conservation regions (USFWS 2008). In addition, the USFWS Information for Planning and Consultation system identifies Birds of Conservation Concern specific to the Project area. The Information for Planning and Consultation report identified seven bird species as being present in the Project area (Table 16). The bird survey form (Appendix M) contains 30 different species that were identified within the Project area. The list also includes species that are not of conservation concern.

The Project area and the MRNA provide foraging habitat for the bald eagle. However, nesting bald eagles are not known to occur in the Project area (NDGFD 2017).

Table 16: Birds of Conservation Concern Potentially Present within the Project Area

Birds	Scientific Name
American bittern	*Botaurus lentiginosus*
Baird's sparrow	*Ammodramus bairdii*
Bald eagle[a]	*Haliaeetus leucocephalus*
Black tern	*Chlidonias niger*
Black-billed cuckoo	*Coccyzus erythropthalmus*
Brewer's sparrow	*Spizella breweri*
Buff-breasted sandpiper	*Tryngites subruficollis*
Burrowing owl	*Athene cunicularia*
Chestnut-collared longspur	*Calcarius ornatus*
Clark's grebe[a]	*Aechmophorus larkia*
Dickcissel	*Spiza americana*
Ferruginous hawk[a]	*Buteo regalis*
Golden eagle[a]	*Aquila chrysaetos*
Grasshopper sparrow	*Ammodramus savannarum*
Horned grebe	*Podiceps auratus*
Hudsonian godwit	*Limosa haemastica*
Least bittern	*Ixobrychus exilis*
Lesser yellowlegs[a]	*Tringa flavipes*
Lewis's woodpecker[a]	*Melanerpes lewis*
Loggerhead shrike	*Lanius ludovicianus*
Long-billed curlew	*Numenius americanus*
Long-eared owl[a]	*Asio otus*
Marbled godwit	*Limosa fedoa*
McCown's longspur	*Rhynchophanes mccownii*
Mountain plover	*Charadrius montanus*
Nelson's sharp-tailed sparrow	*Ammodramus nelsoni*
Peregrine falcon	*Falco peregrinus*
Pinyon jay	*Gymnorhinus cyanocephalus*

Birds	Scientific Name
Red-headed woodpecker[a]	*Melanerpes erythrocephalus*
Sage sparrow	*Artemisiospiza nevadensis*
Sage thrasher	*Oreoscoptes montanus*
Short-billed dowitcher	*Limnodromus griseus*
Short-eared owl	*Asio flammeus*
Smith’s longspur	*Calcarius pictus*
Solitary sandpiper	*Tringa solitaria*
Sprague’s pipit	*Anthus spragueii*
Swainson’s hawk	*Buteo swainsoni*
Upland sandpiper	*Bartramia longicauda*
Yellow rail	*Coturnicops noveboracensis*

Sources: USFWS 2008, 2020a

[a] The Information for Planning and Consultation report identifies species as being present within the Project area (USFWS 2020a).

The Important Bird Area program is a nationwide Audubon program that identifies habitats that are essential in sustaining bird populations. Important Bird Area sites include migratory staging areas, winter roost sites, and prime breeding areas for songbirds, wading birds, and other species. The Project area is within the Missouri River Important Bird Area, which consists of approximately 20,809 acres. The Important Bird Area consists of 100 percent open-water habitat (National Audubon Society 2013).

Bats

The Missouri River State Natural Area provides suitable roosting habitat and nursery habitat for several species of bats, including the northern long-eared bat (NLEB). The big brown bat (*Eptesicus fuscus*), the little brown bat (*Myotis lucifugus*), and NLEB (*Myotis septentrionalis*) are known to occur in the Project area. Some of the large eastern cottonwood and green ash trees in the Project area have holes or crevices, mainly created by squirrels, that could provide roosting and nursery habitat for bats. However, a survey for NLEBs found no presence of guano under any substructures, include bridge substructures (Appendix M).

Terrestrial Mammals, Amphibians, and Reptiles

Due to the relatively high level of human-related activity associated with the rail line, adjacent residential areas, and I-194, generally only disturbance-tolerant terrestrial mammals are expected to occur within or around the Project area. White-tailed deer (*Odocoileus virginianus*), coyotes (*Canis latrans*), red fox (*Vulpes vulpes*), raccoons (*Procyon lotor*), ground and tree squirrel species, and various rodents are known to occur in the Project area (NDPR 2020). In addition to these species, bobcats (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), eastern spotted skunks (*Spilogale putorius*), fishers (*Pekania pennant*), long-tailed weasels (*Mustela frenata*), river otters (*Lontra canadensis*), beavers (*Castor canadensis*), and several species of mice and shrew may occur in the Missouri River State Natural Area (NDGFD 2020) Typically, transportation corridors are purposely managed to be unattractive to larger terrestrial mammals to reduce vehicle collisions with wildlife. The forested land, grasslands, and wetlands in the Project area provide marginal to medium value habitat for terrestrial mammals.

Terrestrial and aquatic habitats within the Project area provide suitable habitat for a variety of amphibians and reptiles, including several species of frogs and toads, salamanders, turtles, and snakes. Frog and toad species may include plains spadefoot (*Spea bombifrons*), Woodhouses' toad (*Anaxyrus woodhousii*), Great Plains toad (*Anaxyrus cognatus*), Northern leopard frog (*Lithobates pipiens*), and boreal chorus frog (*Pseudacris maculata*). Salamander species include tiger salamander (*Ambystoma tigrinum*) (NDGFD 2015). Turtle species may include painted turtle (*Chrysemys picta*), smooth softshell turtle (*Apalone mutica*), spiny softshell turtle (*Apalone spinifera*), false map turtle (*Graptemys pseudogeographica*), and snapping turtle (*Chelydra serpentina*) (NDGFD 2015). Snake species may include common garter snake (*Thamnophis sirtalis*), plains garter snake (*Thamnophis radix*), smooth green snake (*Opheodrys vernalis*), plains hog-nosed snake (*Heterodon nasicus*), and gopher snake (*Pituophis catenifer*) (NDGFD 2015).

Fish and Aquatic Organisms

Northern pike, walleye, catfish, salmon, smallmouth bass, and trout are found in the Missouri River (NDGFD 2017). Non-native fish species include rainbow trout, brown trout, Chinook salmon, silver carp, bighead carp, common carp, largemouth bass, smallmouth bass, rainbow smelt, white bass, zander, pure muskellunge, and tiger muskellunge. Table 17 identifies fish species that are potentially present within the Project area, based on the fish species listed in *Common Fish of North Dakota* (NDGFD 2020).

Table 17: Fish Species Potentially Present within the Project Area

Fish Species	Scientific Name
Banded killifish	*Fundulus diaphanous*
Bigmouth buffalo	*Ictiobus cyprinellus*
Bigmouth shiner	*Notropis dorsalis*
Black bullhead	*Ameiurus melas*
Black crappie	*Pomoxis nigromaculatus*
Blacknose shiner	*Notropis heterolepis*
Blackside darter	*Percina maculata*
Blue sucker	*Cycleptus elongatus*
Bluegill	*Lepomis macrochirus*
Bluntnose minnow	*Pimephales notatus*
Brassy minnow	*Hybognathus hankinsoni*
Brook stickleback	*Culaea inconstans*
Brown bullhead	*Ameiurus nebulosus*

Fish Species	Scientific Name
Brown trout	*Salmo trutta*
Burbot	*Lota lota*
Carmine shiner	*Notropis percobromus*
Central mudminnow	*Umbra limi*
Central stoneroller	*Campostoma anomalum*
Channel catfish	*Ictalurus punctatus*
Chestnut lamprey	*Ichthyomyzon castaneus*
Chinook salmon	*Oncorhynchus tshawytscha*
Cisco	*Coregonus artedi*
Common carp	*Cyprinus carpio*
Common shiner	*Luxilus cornutus*
Creek chub	*Semotilus atromaculatus*
Cutthroat trout	*Oncorhynchus clarkia*
Emerald shiner	*Notropis atherinoides*
Fathead minnow	*Pimephales promelas*
Finescale dace	*Phoxinus neogaeus*
Flathead catfish	*Pylodictis olivaris*
Flathead chub	*Platygobio gracilis*
Freshwater drum	*Aplodinotus grunniens*
Gizzard shad	*Dorosoma spp.*
Golden redhorse	*Moxostoma erythrurum*
Golden shiner	*Notemigonus crysoleucas*
Goldeye	*Hiodon alosoides*
Greater redhorse	*Moxostoma valenciennesi*
Green sunfish	*Lepomis cyanellus*
Hornyhead chub	*Nocomis biguttatus*
Iowa darter	*Etheostoma exile*
Johnny darter	*Etheostoma nigrum*
Lake chub	*Couesius plumbeus*
Lake sturgeon	*Acipenser fulvescens*

Fish Species	Scientific Name
Lake trout	*Salvelinus namaycush*
Lake whitefish	*Coregonus clupeaformis*
Largemouth bass	*Micropterus salmoides*
Largescale stoneroller	*Campostoma oligolepis*
Logperch	*Percina spp.*
Longnose dace	*Rhinichthys cataractae*
Longnose sucker	*Catostomus catostomus*
Mooneye	*Hiodon spp.*
Northern pike	*Esox lucius*
Northern redbelly dace	*Chrosomus eos*
Orange-spotted sunfish	*Lepomis humilis*
Paddlefish	*Polyodon spathula*
Pallid sturgeon	*Scaphirhynchus albus*
Pearl dace	*Margariscus margarita*
Plains minnow	*Hybognathus placitus*
Pugnose shiner	*Notropis anogenus*
Pumpkinseed	*Lepomis gibbosus*
Pure muskellunge	*Esox masquinongy*
Quillback	*Carpiodes cyprinus*
Rainbow smelt	*Osmerus mordax*
Rainbow trout	*Oncorhynchus mykiss*
Red shiner	*Cyprinella lutrensis*
River carpsucker	*Carpiodes carpio*
River shiner	*Notropis blennius*
Rock bass	*Ambloplites rupestris*
Sand shiner	*Notropis stramineus*
Sauger	*Sander canadensis*
Shorthead redhorse	*Moxostoma macrolepidotum*
Shortnose gar	*Lepisosteus platostomus*
Shovelnose sturgeon	*Scaphirhynchus platorynchus*

Fish Species	Scientific Name
Sicklefin chub	*Macrhybopsis meeki*
Silver carp	*Hypophthalmichthys molitrix*
Silver chub	*Macrhybopsis storeriana*
Silver lamprey	*Ichthyomyzon unicuspis*
Silver redhorse	*Moxostoma anisurum*
Smallmouth bass	*Micropterus dolomieu*
Smallmouth buffalo	*Ictiobus bubalus*
Spotfin shiner	*Cyprinella spiloptera*
Spottail shiner	*Notropis hudsonius*
Stonecat	*Noturus flavus*
Sturgeon chub	*Macrhybopsis gelida*
Tadpole madtom	*Noturus gyrinus*
Tiger muskellunge	*Esox masquinongy X Esox lucius*
Troutperch	*Percopsis omiscomaycus*
Walleye	*Sander vitreus*
Western blacknose dace	*Rhinichthys obtusus*
Western silvery minnow	*Hybognathus argyritis*
White bass	*Morone chrysops*
White crappie	*Pomoxis annularis*
White sucker	*Catostomus commersonii*
Yellow bullhead	*Ameiurus natalis*
Yellowperch	*Perca flavescens*
Zander	*Sander lucioperca*

Source: NDGFD 2020

Very little is known about the current status of mussel species in North Dakota. To date, a handful of mussel surveys have been conducted in North Dakota (Cvancara 1970; Cvancara and Freeman 1978; Cvancara 1983; Jensen et al. 2001), with the majority of the surveys occurring in the western part of the state. A mussel survey conducted in North Dakota rivers from 2008, to 2011, did not identify any dead or live mussels in sample locations 0.5 mile east of Mandan and 0.5 mile north of I-94 (DeLorme 2011).

Invasive Species

North Dakota has 39 species listed as aquatic nuisance species (NDGFD 2018). Only 6 of the 39 species are known to be present in North Dakota. Of these six species, two are fish species and one is an invertebrate: silver carp (*Hypophthalmichthys molitrix*), common carp (*Cyprinus carpio*), and zebra mussel (*Dresissena polymorpha*). The common carp is the only species known to occur within the Missouri River in North Dakota. Silver carp have been documented in the James River and zebra mussels have been documented in the Red River (NDGFD 2018). North Dakota has not identified any nonaquatic wildlife invasive species.

3.7.2 Environmental Consequences

The following subsections describe the environmental consequences for each alternative.

No Action Alternative

Impacts to fish and wildlife would continue to occur under the No Action Alternative due to the continued operation of the rail line and the need for repair and maintenance activities on Bridge 196.6. Maintenance activities would likely be conducted from the railway and thus would not impact the river channel and the aquatic species within it.

Inspection and maintenance activities such as removing and replacing ties, removing and replacing ballast, tightening bolts, and aligning the track may deter birds temporarily from entering the Project area for foraging, roosting, and nesting. This disturbance may result in more significant impacts if maintenance activities occur on the bridge and nesting birds abandon their nests. Similarly, maintenance activities may deter mammals temporarily from entering the Project area, but mammal fatalities are not anticipated. These impacts are anticipated to be temporary and minimal. Section 3.3 discusses temporary impacts within the Missouri River resulting from spills.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

Construction activities associated with Proposed Action Alternative would be expected to result in species avoiding the area (terrestrial and aquatic) for the duration of Project construction. Temporary impacts associated with the construction of the new bridge would include increased traffic and noise in the Project area. Permanent impacts from alteration of terrestrial and shoreline habitat are anticipated due to construction of the new bridge and removal of Bridge 196.6.

Migratory Birds

Construction of the Proposed Action Alternative would result in minor temporary impacts to migratory birds. During periods of construction with higher noise levels, such as pile driving, birds may alter flight patterns or temporarily change foraging and habitat use in the Project area to avoid elevated noise levels. Suitable foraging habitat is available adjacent to the Project, and birds would be able to move to other areas, if displaced.

Cliff swallows (*Petrochelidon phyrrhonota*) are known to build their nests under active rail bridges, and many individuals were observed during field surveys. The removal of Bridge 196.6 may temporarily directly impact swallows if they utilize the bridge as a nesting spot immediately prior to removal. However, preconstruction nest surveys would be conducted prior to demolition of Bridge 196.6. If a nest is identified, a plan for impact minimization would be established with the necessary agencies.

Operation of the Proposed Action Alternative is not expected to alter flight patterns, foraging, or habitat use, except in areas directly impacted by structures or vegetation removal. The placement of the new track would require permanent alteration of approximately 13.9 acres of forested habitat, as well as 1.1 acres of permanent impacts to shoreline habitat. The footprint of the Proposed Action Alternative is the smallest of the build alternatives with the shortest construction duration. The Proposed Action Alternative would result in minor permanent impacts to migratory birds through habitat removal and conversion of vegetation types.

Bats

Temporary impacts to bats would be similar to the previously noted impacts to migratory birds. The Proposed Action Alternative would permanently alter approximately 13.9 acres of forested habitat that may be used by bats. To ensure that direct impacts to bats are minimized, tree clearing during construction of the Project would occur when bats are not present, from November 1 to April 1.

Terrestrial Mammals, Amphibians, and Reptiles

Temporary impacts to terrestrial mammals, reptiles, and amphibians as a result of the Proposed Action Alternative are anticipated to be minor. Species normally found in forested and emergent wetland habitat would most likely be impacted by the Proposed Action Alternative through temporary or permanent displacement. It is likely that most terrestrial animals would avoid construction zones and areas adjacent to construction zones during construction, and animals could return to nearby areas after construction is complete. Limited incidental mortality of less mobile animal species could occur, but no populations would be at risk because of this. Bridge construction and removal activities may temporarily deter terrestrial wildlife from utilizing the river channel as a water source within the Project area. The placement of the new track may also temporarily impact forage and nesting habitat for terrestrial wildlife. Native vegetation would be re-established, where practicable and in accordance with EO 13112, to replace important forage and cover to wildlife.

The Proposed Action Alternative would impact 0.14 acre of emergent wetland habitat. Construction in these areas would have a temporary impact on species present in these habitats; however, there is substantial similar habitat for these species to relocate nearby and outside of the construction areas. Animal populations, both terrestrial and aquatic, are anticipated to recover following completion of construction activities. The Project does not require any new mammal crossings in upland areas. The Proposed Action Alternative is not anticipated to result in increased terrestrial wildlife fatalities. The Proposed Action Alternative has the shortest construction duration (3.5 years) due to decreased construction on the eastern and western bank approaches. No new retaining walls would be required for the Proposed Action Alternative.

Permanent impacts to terrestrial wildlife would be minor, resulting from loss of habitat due to loss of forested habitat and shoreline habitat.

Fish and Aquatic Organisms

The Proposed Action Alternative would require five new piers in the Missouri River, with the existing two in-water bridge piers removed. Pile driving would generate the highest sound above ambient noise levels. The pile driving proposed for the bridge has the potential to temporarily impact all species, particularly fish species that may be present in the Project area. Aquatic species response would be, in part, dependent on:

- Proximity to the piles being installed
- Individual size (juvenile, subadult, or adult)
- The presence of a swim bladder
- Activity (foraging, migrating, and overwintering)

The expected response for most fish species in the work area would be to avoid the general area. The availability of extensive alternate habitat in the Missouri River would allow fish to widely disperse away from the aquatic impact zone. Injury or behavioral impacts, such as disruption of localized feeding opportunities or short-term migration, could occur to species that remain in the Project area.

Most species of fish are susceptible to pile-driving impacts associated with underwater sound pressure waves, depending on the level. Underwater sound pressure waves can injure or even kill fish if they are close to the source due to barotrauma. Even in the absence of mortality, elevated noise levels can cause sublethal injuries. Fish suffering damage to hearing organs may suffer equilibrium problems and may have a reduced ability to detect predators and prey (Turnpenny et al. 1994; Hastings et al. 1996). Minimization measures, such as initiating limited low-impact strikes at the beginning of each work period to encourage fish dispersal, or the use of bubble curtains to attenuate sound, are common approaches that minimize the potential of fish injury and mortality. The Project ESA BA includes minimization measures, which would be implemented during Project construction. Section 3.8 and the Project BA (Appendix M) provide more detailed discussion related specifically to threatened pallid sturgeon. Section 5 describes the ongoing coordination with USFWS and the North Dakota Game and Fish Department (NDGFD). These efforts would potentially result in identification of additional BMPs to avoid, minimize, and mitigate impacts to fish and wildlife during construction. Section 4.1 identifies current impact minimization measures, and the Project SPCC Plan and SWPPP detail the BMPs from Section 3.3.2.

Due to the limited duration and spatial extent of construction activities, temporary impacts to fish and aquatic organisms are anticipated to be minor. Section 3.8 and the Project BA (Appendix M) provide ESA-listed species determinations. Additionally, adherence to conditions imposed in applicable water quality permits would further avoid and minimize impacts to the aquatic environment.

Installation of new piers would result in permanent impacts to the Missouri River of 0.98 acre. The installation of new piers would disrupt riverbed sediments and the organisms living within them. These sediments and organisms would be displaced, and the organisms might die or disperse to adjacent areas. Temporary increases in turbidity during bridge construction would be controlled with a turbidity curtain. Since turbidity impacts would be localized and contained to pile-driving activities, no substantial ecological impacts would be expected (Section 3.3.2). The existing stone masonry piers would be removed to 2 feet below the existing channel bottom, which would facilitate restoration of those areas for aquatic species use. Permanent impacts to fish and aquatic species are anticipated to be minor.

Invasive Species

Common carp are the only aquatic species identified in the Missouri River, and the Project is not anticipated to contribute to the spread of the species. As such, the Project would not result in temporary or permanent impacts to invasive species spread.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

Similar to the temporary impacts of the Proposed Action Alternative, construction activities associated with Offset Alternative 1 would be expected to result in terrestrial species avoiding the Project area for the duration of Project construction. Temporary impacts associated with the construction of the new bridge would include increased traffic and noise in the Project area. Impacts to migratory birds, bats, and terrestrial wildlife species would be greater for Offset Alternative 1 than for the Proposed Action Alternative due to the expanded APE, retaining wall construction, and construction of a new I-194 underpass. The construction duration would be approximately 5.5 years, 2 years longer than the Proposed Action Alternative.

Permanent impacts to wildlife species would be similar to those in Section 3.7.2. Offset Alternative 1 may affect up to 21 acres of forested habitat and result in permanent impacts to 1.5 acres of shoreline habitat. The footprint of Offset Alternative 1 is larger than the Proposed Action Alternative. As such, it would affect more habitat for a variety of wildlife species. Offset Alternative 1 would require construction of five new piers in the Missouri River, with impacts to 1.28 acres. Bridge 196.6 would be left in place, resulting in a total of seven in-water piers.

Permanent impacts from alteration of terrestrial and shoreline habitat, and construction of retaining walls are anticipated due to the expansion of the ROW and the new track. These impacts are anticipated to be minor.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

Construction of Offset Alternative 2 would result in temporary impacts to terrestrial wildlife, comparable to those for Offset Alternative 1. Offset Alternative 2 may affect up to 21 acres of forested habitat, as well as 1.5 acres of permanent impacts to shoreline habitat. The footprint of Offset Alternative 2 is the larger than the Proposed Action Alternative. As such, it would affect more habitat for a variety of wildlife species. Offset Alternative 2 would also last approximately 6.5 years, which is 3 years longer than the Proposed Action Alternative. Offset Alternative 2 would require construction of two new piers in the Missouri River, with impacts to 0.70 acre. Bridge 196.6 would stay in place, resulting in a total of four in-river piers. This alternative would require construction of significant falsework within the Missouri River, which may affect aquatic species during installation. Installation of falsework would be similar in impacts to installation of the piers (Section 3.7.2).

Permanent impacts from alteration of terrestrial and shoreline habitat and construction of retaining walls are anticipated due to the expansion of the ROW and the new track. These impacts are anticipated to be minor.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

Impacts to wildlife species would be similar to those in Section 3.7.2. Offset Alternative 3 may affect up to 21 acres of forested habitat, as well as 1.4 acres of permanent impacts to shoreline habitat. The footprint of Offset Alternative 3 is larger than the Proposed Action Alternative. As such, it would affect more habitat for a variety of wildlife species. Offset Alternative 3 would also last approximately 4.5 years, which is 1 year longer than the Proposed Action Alternative. Offset Alternative 3 would require construction of five new piers in the Missouri River, with impacts to 1.58 acres. Bridge 196.6 would be left in place, resulting in a total of seven in-water piers.

Permanent impacts from alteration of terrestrial and shoreline habitat, and construction of retaining walls are anticipated due to the expansion of the ROW and the new track. These impacts are anticipated to be minor.

Table 18 summarizes environmental consequences for each alternative.

Table 18: Impact Summary Table

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	No change to ongoing maintenance activities.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Minor short-term displacement of individuals during the 3.5-year construction duration, 0.14 acre of emergent wetland habitat, and short-term deferral of wildlife using the river channel as a water source within the Project area.	Minor long-term loss of up to 13.9 acres of forested habitat and 1.1 acres of shoreland habitat, installation of five in-water piers (0.98 acre of impact), and removal of two in-water piers.
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Minor short-term displacement of individuals during the 5.5-year construction duration, 0.21 acre of emergent wetland habitat, and short-term deferral of wildlife using the river channel as a water source within the Project area.	Minor long-term loss of up to 21 acres of forested habitat and 1.5 acres of shoreland habitat, installation of five in-water piers (1.28 acres of impact), and construction of a retaining wall.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Minor short-term displacement of individuals during the 6.5-year construction duration, 0.21 acre of emergent wetland habitat, and short-term deferral of wildlife using the river channel as a water source within the Project area. Short-term displacement of aquatic species due to installation of falsework within the river channel.	Minor long-term loss of up to 21 acres of forested habitat and 1.5 acres of shoreland habitat, installation of two in-water piers (0.70 acre of impact), and construction of a retaining wall.

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	Minor short-term impacts due to displacement of individuals during the 4.5-year construction duration, 0.21 acre of emergent wetland habitat, and temporary deferral of wildlife using the river channel as a water source within the Project area.	Minor permanent loss of up to 21 acres of forested habitat and 1.5 acres of shoreline habitat, installation of five in-water piers (1.58 acres of impact), and construction of a retaining wall.

3.8 Endangered Species Act-listed Species and Critical Habitat

The primary federal law protecting threatened and endangered species is the ESA, 16 U.S.C. Sections 1531 to 1544, and 50 CFR 402. The ESA and its subsequent amendments provide for the conservation and recovery of endangered and threatened species, and the ecosystems on which they depend. Under Section 7 of the ESA, federal agencies are required to consult with USFWS and/or the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service to ensure that they are not undertaking, funding, permitting, or authorizing actions that are likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat.

Critical habitat is defined as geographic locations essential for the conservation of threatened or endangered species. The outcome of consultation under Section 7 may include a Biological Opinion with an Incidental Take statement, a Letter of Concurrence, and/or documentation of a no effect finding. Section 3 of the ESA defines “take” as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or any attempt at such conduct” (USFWS 1973).

3.8.1 Endangered Species Act Consultation History

USCG is the lead federal agency associated with this Project and undertook formal consultation with USFWS on potential effects to federally listed species and critical habitat. An early coordination meeting was held on June 8, 2017, with NDGFD, and USFWS, to identify any potential take of threatened or endangered species, or critical habitat. A draft BA was sent to USFWS for review on November 6, 2017. USFWS concurred with the findings of the BA as of February 19, 2018 (Appendix M). If listed species may be adversely affected, further/formal consultation with USFWS would be required. The anticipated impacts to federally listed species and critical habitat between all four build alternatives (the Proposed Action Alternative and Offset Alternatives 1 through 3) are not expected to be any different. USFWS provided concurrence on May 17, 2021, stating that they reviewed the alternatives and have concluded that the proposed modifications to the action will not cause an effect to the listed species or critical habitat that were not considered in the previous consultation (Appendix P).

Additional build alternatives (Offset Alternatives 1 through 3) were later developed for assessment. Though not discussed in the BA, the following subsection details the affected environment of the overall Project area for all alternatives and provides a comparison of potential environmental impacts to listed species and critical habitat for all alternatives.

3.8.2 Affected Environment

Federally Listed Threatened and Endangered Species

The study area for ESA-listed species and critical habitat is the "action area," the term used to define the study area under Section 7 of the ESA, per the Project BA (Appendix M). The Project area includes the existing track and bridge, the Project area on the west side of the Missouri River, the Project area on the east side of the Missouri River, and the access route. Uplands in the Project area are primarily undeveloped cropland, grassland, and forested land. The Project area also includes herbaceous wetlands. Developed areas consist of railroad tracks and roadways. Table 19 summarizes species or critical habitat listed under the ESA that could potentially occur in Burleigh County or Morton County, as well as rationale for species excluded from evaluation. Information in the following subsections has been summarized from the Project BA (Appendix M).

Table 19: U.S. Fish and Wildlife Service Federally Listed Species and Critical Habitat

Species	Species Common and Scientific Name	Status[a]	Potential to Occur	Rationale For Exclusion[b]	Habitat Description and Range In North Dakota
Endangered	Black-footed ferret (*Mustela nigripes*)	E	No	(HAB)	Requires expansive black-tailed prairie dog (*Cynomys ludovicianus*) colonies for food and habitat. 80 acres is the typical minimum black-tailed prairie dog colony size that can support the black-footed ferret. Historically, black-footed ferrets have been found in southwestern North Dakota; the current occurrence is unlikely to questionable and no reintroduction sites have occurred in North Dakota at this time.
Endangered	Gray wolf (*Canis lupus*)	D	N/A	N/A	Has been documented in North Dakota since the 1990s. Habitat varies from woodland to grassland, and populated areas with high road densities are typically avoided.
Endangered	Pallid sturgeon (*Scaphirhynchus albus*)	E	Yes	N/A	The Missouri River supports pallid sturgeon. The current range is from the confluence of the Yellowstone and Missouri rivers, which is the eastern-most range in North Dakota, with the exception of the tailrace below the Garrison Dam. Preferred habitat is at the bottom of large, turbid, relatively warm, free-flowing rivers.
Endangered	Poweshiek skipperling (*Oarisma poweshiek*)	E	No	(ODR/HAB)	Adult butterflies feed on nectar from prairie flowers, including purple coneflower (*Echinacea angustifolia*), blackeyed Susan (*Rudbeckia hirta*), and lobelia (Lobelia spicata). Larvae feed on native, fine-stemmed grasses and sedges (for example, little bluestem [*Schizachyrium scoparium*] and prairie dropseed [*Sporobolus heterolepis*]). No designated critical habitat is within Morton or Burleigh counties.
Endangered	Whooping crane (*Grus americana*)	E	No	N/A	Only migrate through North Dakota in spring and fall, using large, shallow marshes for roosting and loafing while feeding on harvested grain fields.

Species	Species Common and Scientific Name	Status[a]	Potential to Occur	Rationale For Exclusion[b]	Habitat Description and Range In North Dakota
Endangered	Rusty patched bumble bee (*Bombus affinis*)	E	No	(ODR/HAB)	Rusty patched bumble bees once occupied grasslands and tallgrass prairies of the Upper Midwest and Northeastern U.S., but most grasslands and prairies have been lost, degraded, or fragmented by conversion to other uses. Bumble bees need areas that provide: • Nectar and pollen from flowers • Nesting sites (underground and abandoned rodent cavities or clumps of grasses) • Overwintering sites for hibernating queens (undisturbed soil) North Dakota is currently considered to be outside of the species' range.
Threatened	Western fringed prairie orchid (*Platanthera praeclara*)	T	No	(ODR/HAB)	Prefers mesic to wet unplowed tallgrass prairies and meadows; can also be found in old fields and road ditches. This plant is known to be found in North Dakota, outside of the southeast corner of the state.
Threatened	Piping plover (*Charadrius melodus*)	T, CH	Yes	N/A	Prefers sparsely vegetated sandbars and shorelines, and large alkaline wetlands with shorelines. Breeding pairs exist; although, they have slightly decreased in past decades. The Project is within Unit 11 – North Dakota Missouri River and Reservoirs, which is designated critical habitat for the species.
Threatened	Dakota skipper (*Hesperia dacotae*)	T	No	(ODR/HAB)	Preferred habitat includes moist bluestem prairie with blooming wildflower species (wood lily [*Lilium philadelphicum*]), harebell (*Campanula rotundifolia*), and smooth camas (*Zygadenus elegans*); other preferred habitat includes relatively dry upland prairie found on ridges and hillsides. In North Dakota, Dakota skippers are found in scattered, mostly isolated sites that are lightly grazed, favoring little bluestem with flowering native forbs. No designated critical habitat is within Burleigh or Morton counties.

Species	Species Common and Scientific Name	Status[a]	Potential to Occur	Rationale For Exclusion[b]	Habitat Description and Range In North Dakota
Threatened	NLEB (*Myotis septentrionalis*)	T	Yes	N/A	Habitat varies by season; winter habitat requires caves or mines, and summer habitat requires large trees for roosting, with occasional roosting in barns or structures. NLEB occurs in North Dakota from May through September. Cottonwood and green ash trees are found in the Project area. These trees provide suitable roosting and nursery habitat as some of these large trees contain holes and caverns. The current bridge can also provide roosting habitat. The Project area is within their summer territory and the Missouri River is considered to be primary habitat in North Dakota.
Threatened	Rufa red knot (*Calidris canutrus rufa*)	T	No	N/A	Habitat includes shorelines during migration with a few occasional inland migrants. Four known locations with sightings have been found in North Dakota (NatureServe 2021).

[a] Status Codes: E= federally listed endangered; T= federally listed threatened; D=delisted; CH= designated critical habitat

[b] Exclusion Rationale Codes: ODR= outside known distributional range of the species; HAB= no habitat present in action area

Birds

Interior Least Tern

The interior least tern was added to the USFWS threatened and endangered species list in 1985 (USFWS 1985a). Widespread loss and alteration of its riverine nesting habitat has eliminated the species from many locations within its former breeding range in the interior U.S. Additionally, recreational vehicle use and other disturbances around nesting colonies has reduced nesting success and reproduction. The interior least tern is a migratory, colonial shorebird that breeds and rears its young along inland river systems in the U.S. and winters in Central and South America. In North Dakota, the interior least tern is primarily found on sandbars on the Missouri River between the Garrison Dam and Lake Oahe, in the reservoirs, and on the Missouri and Yellowstone rivers upstream of Lake Sakakawea (USFWS 2008).

USFWS delisted the interior least tern on January 12, 2021. While the species is included in the Project BA, it has been removed from further discussion in this section.

Piping Plover

The Great Plains population of the piping plover was listed as a threatened species in 1985 (USFWS 1985b). The plover nests in 23 counties in North Dakota, primarily in alkali wetlands in the Missouri Coteau and on barren sandbars in the Missouri River and system reservoirs. Reasons for decline of the piping plover include habitat loss and nest depredation in the wetlands, but the main reason for decline of the species along the Missouri River is habitat loss due to water development projects (for example, the Fort Peck Dam, the Garrison Dam, and the Oahe Dam) and loss of wetlands due to agriculture and other developments.

Critical habitat for the piping plover was designated on September 11, 2002 (USFWS 2002), and includes the entire length of the shorelines of the Missouri River in North Dakota. Known populations of piping plover adults, fledglings, and nests occur on the Missouri River; however, no piping plovers or nests were found within the Project area during field surveys in June 2017. Piping plover prefer sparse to no vegetation on long stretches of sandy beaches (100 to 400 meters wide); therefore, these shorelines would not meet the required habitat to attract nesting females. The current shorelines are narrow (0.3 to 1 meter) and have sparse vegetation; however, the adjacent banks are heavily vegetated and are only 1 to 3 meters wide.

The piping plover begins arriving on the breeding ground as early as mid-March and remains there for 3 to 4 months. In late February, piping plovers begin leaving the wintering grounds to migrate back to their breeding sites. Northward migration peaks in late March, and by late May, most birds have left the wintering grounds.

Due to heavy recreational use of this region of the Missouri River (that is, boating, jet skiing, fishing, hiking on the trails that run parallel to the Burleigh County shoreline, and cycling on the trail that lies along the Morton County shoreline), and residential houses on the Morton County shoreline, actual use by a piping plover adult is unlikely, but still possible.

Whooping Crane

The whooping crane is protected by state and federal laws in the U.S. It was considered to be endangered in the U.S. in 1970, and the endangered listing was grandfathered into the ESA in 1973. Under the *North Dakota Comprehensive Wildlife Conservation Strategy* (Hagen et al. 2005), the whooping crane is a level three species of conservation priority. This classification indicates species of moderate priority that are believed to be peripheral or nonbreeding in North Dakota. One self-sustaining wild population of whooping cranes currently exists in the world. Members of this population breed primarily within the boundaries of Wood Buffalo National Park in Canada, and migrate through the central U.S. en route to the wintering grounds at Aransas National Wildlife Refuge (NWR) along the Gulf Coast of Texas.

Whooping cranes undertake a 5,000-mile annual round-trip migration from the breeding area in Canada to the wintering area in Texas. Individuals depart the breeding ground in Canada and travel south through the Northwest Territories, Alberta, Saskatchewan, Montana, North Dakota, South Dakota, Nebraska, Kansas, and Oklahoma before reaching the wintering ground on the Texas coast. The migration route is well-defined, and 95 percent of all observations occur within a 200-mile-wide corridor during spring and fall migration (Canadian Wildlife Service and USFWS 2007). Along their migration route, whooping crane use large, shallow marshes for roosting and loafing while feeding on harvested grain fields. Pearse et al. (2015) identified 1,095 20-square-kilometer grid cells that contained stopover sites for whooping cranes, and categorized occupied grid cells based on the density of stopover sites and the amount of time that cranes spent in the area. This assessment resulted in four categories of stopover site use: unoccupied, low intensity, core intensity, and extended-use core intensity.

No whooping cranes were observed during biological surveys in June 2017. No suitable roosting habitat and no small fields of harvested grain exist within the Project area. Although the whooping crane may fly over for temporary feeding, they would not stay for any extended time period. Although wetlands are present within the Project area, none of these wetlands are large shallow marshes, which are the preferred wetland type for foraging. Furthermore, based on a map showing the likelihood of whooping crane stopping areas (Pearse et al. 2015), the polygon that represents the Project area shows no cranes.

Rufa Red Knot

The rufa subspecies of the red knot was listed as a threatened species in 2014 (USFWS 2014a). Although it is recognized as a coastal bird, the red knot rufa has been sighted at four locations in North Dakota (NatureServe 2016). The closest location would be south of Bismarck, along the Missouri River. The red knot rufa breeds in the tundra and the Arctic Cordillera in the far north of Canada, Europe, and Russia (Baker et al. 2013), thus these sightings would be classified as migratory sightings. No red knot rufa were found during biological surveys in June 2017. The Project area is not within the breeding range of this species and is rarely used within the migratory route. Only one sighting of a red knot rufa has occurred along the Missouri River.

Fish

Pallid Sturgeon

The pallid sturgeon was listed as an endangered species in 1990 (USFWS 1990). The Missouri River has a population of adult pallid sturgeon. Pallid sturgeon are a bottom-oriented, large river obligate fish that inhabit the Missouri and Mississippi rivers, and some tributaries from Montana to Louisiana (Kallemeyn 1983). The Missouri River has a population of adult sturgeon. With Project construction activity for on and in the river, an individual may be impacted from human activity and noise. The current recovery plan provides the present-day range from the confluence of the Yellowstone and Missouri rivers as the eastern-most range in North Dakota, with the exception of the tailrace below the Garrison Dam (Dryer and Sandvol 1993; USFWS 2014b).

Mammals

Gray Wolf

The gray wolf was listed as an endangered species in 1978 (USFWS 1978). In 2003, USFWS downlisted the two northern subpopulations (western and eastern distinct population segments) to threatened (USFWS 2003) and the species was delisted in February 2020. The BA was developed prior to delisting and includes the species based on its previous threatened status.

Northern Long-eared Bat

NLEB was listed as an endangered species in 2015 (USFWS 2015). The wooded area within the Project area has been identified as potential habitat for NLEB (Appendix M). Habitat needs for NLEB varies by season, but summer habitat requires large trees or structures.

During summer, NLEB roosts singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and nonreproductive females may also roost in cooler places, like caves and mines. NLEB spends the winter hibernating in caves and mines, called hibernacula. They typically use large caves or mines with large passages and entrances, constant temperatures, and high humidity with no air currents. Breeding begins in late summer or early fall.

No NLEBs were observed during the biological surveys in June 2017, and no bat guano was found under any substructures, including bridge substructures. However, the Missouri River is classified by USFWS as primary range for this bat, specifically forested areas along the river. Suitable habitat in the form of large eastern cottonwood and green ash trees were found within the Project area, based on this classification. The live and dead trees would provide primary roosting and nursery habitat for NLEB.

Essential Fish Habitat

In 1996, U.S. Congress made amendments to the Magnuson-Stevens Act that mandated the identification of essential fish habitat as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” (16 U.S.C. Section 1802(10)). In addition to their ecological significance, essential fish habitat areas are of high economic importance due to the dependence of recreational and commercial fisheries associated with them. The Magnuson-Stevens Act granted the National Marine Fisheries Service legislative authority for fisheries regulation in the U.S. within a jurisdictional area between 3 and 200 miles offshore, depending on geographical location. Federal agencies that authorize, fund, or undertake activities that may adversely impact essential fish habitat must consult with the National Marine Fisheries Service. The Project area does not contain any essential fish habitat (NOAA 2020).

The Project may affect, but not adversely affect, NLEB, piping plover, and pallid sturgeon, and would not destroy or adversely modify piping plover designated critical habitat (Appendix M).

3.8.3 Environmental Consequences

The following subsections describe the environmental consequences for each alternative.

No Action Alternative: Maintain the Existing Bridge; No New Construction

Without construction of a new bridge, ongoing maintenance actions on the current bridge would continue. Routine maintenance would not include track or pier replacement and would have minimal effects on threatened and endangered species in this area. The No Action Alternative would have no effect, as defined by the ESA, on all federally listed species and critical habitat.

Impacts Summary – All Build Alternatives

Due to unsuitable suitable habitat presence in the Project Area and/or a low (or no) probability of occurrence, USFWS has concurred with the BA findings that Project would have no effect on the red knot rufa, whooping crane, and the delisted interior least tern. Table 20 summarizes impacts by alternative for species, which may be affected, but are not likely to be adversely affected by the Project. Impacts associated with species for which the build alternatives would have no effect are not included in Table 20. Justification for these determinations would be similar across all build alternatives though impacts (specifically to species habitat) would differ based upon the Project area and whether Bridge 196.6 would be retained or removed.

Table 20: Impact Summary for Species, which May Be Affected, but Are Not Likely to Be Adversely Affected by the BNSF Railway Bridge 196.6 Project

Species	No Action Alternative: Maintain the Existing Bridge; No New Construction	Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure	Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure	Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure	Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure
Piping plover (*Charadrius melodus*) and piping plover designated critical habitat	No impact	Short-term disturbance of approximately 1.1 acres of shoreline. Shoreline disturbance: 3.5 years	Short-term disturbance of approximately 1.5 acres of shoreline. Shoreline disturbance: 5.5 years	Short-term disturbance of approximately 1.5 acres of shoreline. Shoreline disturbance: 6.5 years	Short-term disturbance of approximately 1.4 acres of shoreline. Shoreline disturbance: 4.5 years
NLEB (*Myotis septentrionalis*)	No impact	Long-term loss of up to 13.9 acres of forested habitat. Construction duration: 3.5 years	Long-term loss of up to 21 acres of forested habitat. Construction duration: 5.5 years	Long-term loss of up to 21 acres of forested habitat. Construction duration: 6.5 years	Long-term loss of up to 21 acres of forested habitat. Construction duration: 4.5 years
Pallid sturgeon (*Scaphirhynchus albus*)	No impact	Installation of five in-water piers and sheet piling, and potential water contamination from construction equipment fluids. Pier and bridge superstructure and track construction duration, and removal of the existing structure: 3.5 years	Installation of five in-water piers, installation of sheet piling, and potential water contamination from construction equipment fluids and turbidity. Pier and bridge superstructure and track construction duration: 3 years	Installation of two in-water piers, sheet piling, and extensive falsework, and potential water contamination from construction equipment fluids and turbidity. Pier and bridge superstructure and track construction duration: 2.5 years	Installation of five in-water piers and sheet piling, and potential water contamination from construction equipment fluids and turbidity. Pier and bridge superstructure and track construction duration: 3.5 years

Piping Plover and Piping Plover Critical Habitat

The activities associated with the Project (that is, all build alternatives) would temporarily disturb shoreline, which may deter the piping plover from entering the Project area or utilizing the area for forage or resting habitat. Table 20 summarizes specific acreages of shoreline disturbance. The following alternative-specific sections provide further details. There is sufficient forage and resting habitat in the surrounding areas; therefore, the impacts on this species would be minimal. Additionally, the increased noise and human activities would deter adults from using the Project area. No suitable nesting or brood-rearing habitat occurs in the Project area.

If construction occurs during the breeding season (April 1 to August 31), presence or absence surveys would be conducted prior to construction. Surveys would be conducted during daylight hours by a qualified biologist and would include all sandbars and shoreline within a 250-meter radius of the Project area.

The Missouri River is classified as critical habitat for the piping plover. During construction of the Project, a small area directly under and alongside Bridge 196.6, where the new bridge would be placed, would be impacted and likely disturbed. However, this area of disturbance is heavily vegetated and is not classified as meeting the requirements of required habitat. As previously noted, although individual adult birds may be directly affected, critical habitat for nesting and brood-rearing does not exist within the Project area for any of the build alternatives.

Northern Long-eared Bat

All build alternatives would require permanent alteration of forested habitat, which is suitable habitat for NLEB. The following subsections discuss specific acreages of forested habitat disturbance. To ensure that direct impacts to bats are avoided, tree clearing would occur between November 1 and April 1, when NLEB is in hibernacula. Indirect effects associated with the permanent alternation of roosting and nursery habitat are considered insignificant relative to the amount of available suitable habitat within the adjacent Missouri River State Natural Area and forested riparian habitat along stretches of the Missouri River, north and south of the Project.

Pallid Sturgeon

All build alternatives would require construction of a new bridge. The installation of new piers within the Missouri River would involve pile driving. Pile driving would generate the greatest sound above ambient noise levels. The pile driving proposed for the bridge has the potential to result in temporary impacts to the pallid sturgeon. Permanent piles for the new bridges would be vibrated to resistance and finished with an impact hammer. Pile driving would occur during daylight working hours. Vibratory hammers vibrate the pile into the sediment by use of an oscillating hammer placed on top of the pile. Vibratory driving sound pressure levels are generally 10 to 20 decibels lower than impact hammer driving, with a much slower rise time. Due to reduced noise levels, vibratory driving of piles is generally considered to be less harmful to aquatic organisms and is the preferred method, if geologic conditions allow. However, piles must be seated to load-bearing capacity with the use of an impact hammer. This is referred to as proofing. This may take just a few strikes or many strikes, depending on site-specific characteristics. In areas where geologic conditions preclude the driving of piles, primarily with a vibratory hammer, piles would be driven with an impact hammer. Risk of injury or mortality to aquatic species resulting from in-water impact pile driving is related to the effects of rapid pressure changes, especially on gas-filled spaces in the body of a fish (including the swim bladder, the lungs, and sinus cavities).

Noise generated by impact pile driving is impulsive, consisting of a broad range of frequencies. In-water noise effects are expected to be limited in spatial extent by the sinuosity of the water body and the land and water interface. Though adult and juvenile pallid sturgeon may be impacted by elevated sound pressure levels during construction, the relatively small area where fish may be susceptible to injury, when compared with available areas within the river that are free of disturbance, minimizes the potential for exposure. Sediment on the bottom of river may be mobilized during pile installation and temporary bridge pile removal (Section 3.2.2). The potential effects of this turbidity increase are expected to be localized and controlled effectively using a turbidity curtain for most piles.

Other direct effects, such as potential water contamination from construction equipment fluids, would be temporary in nature and would be insignificant relative to the low density of species occurrence within this segment of the Missouri River, and the extent of available habitat. The impacts would be minimized using construction BMPs identified in the SPCC Plan and the SWPPP (Section 4), and permit conditions identified in the water quality permits.

Proposed Action: 20-foot Offset, 200-foot Spans, Remove Existing Structure

Piping Plover and Critical Habitat

Construction of the Proposed Action Alternative would take approximately 3.5 years to complete, the least of all build alternatives, resulting temporary impacts due to increased noise and human activities associated with construction. Bridge removal is necessary for the Proposed Action Alternative and would take approximately 1 year, resulting in potential temporary disruption of foraging habitat and activities due to activity and noise. The Proposed Action Alternative would disturb approximately 1.1 acres of shoreline habitat on the Missouri River. These impacts are anticipated to be minor.

Northern Long-eared Bat

Similar to the previously described piping plover impacts and construction durations, temporary and minor impacts to NLEB would result from noise and human activities associated with construction. The Proposed Action Alternative would result in permanent conversion of 13.9 acres of forested habitat suitable for NLEB. No impacts are anticipated within the Missouri River State Natural Area. Tree clearing would occur between November 1 and April 1, to minimize impacts to NLEB.

Pallid Sturgeon

Temporary impacts to pallid sturgeon would result from noise, vibration from pile driving, and increased turbidity, and are expected to be minor. Removal of Bridge 196.6 piers would be conducted without explosives, reducing impacts to pallid sturgeon from debris or concussive sound. Construction of the new bridge is anticipated to take 3.5 years and removal of Bridge 196.6 would take approximately 1 year. Construction of the Proposed Action Alternative would result in permanent impacts due to the installation of five in-water support piers. Removal of the two existing bridge piers may result in restoration of riverbed habitat.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

Piping Plover and Critical Habitat

Offset Alternative 1 would temporarily disturb approximately 1.5 acres of shoreline habitat on the Missouri River (within the piping plover critical habitat area; a heavily vegetated area that is not classified as meeting the requirements of required habitat), which may deter the piping plover from entering the Project area or utilizing the area for forage or resting habitat. Increased noise and human activities associated with construction would deter adults from using the Project area. The overall Project construction timeframe would be approximately 5.5 years. These impacts are anticipated to be minor.

Northern Long-eared Bat

Similar to the previously described piping plover impacts and construction durations, increased noise and human activities associated with construction may temporarily deter NLEB from using the Project area. Offset Alternative 1 would result in permanent conversion of 21 acres of forested habitat, which is suitable habitat for NLEB. Tree clearing would occur between November 1 and April 1. These impacts are anticipated to be minor.

Pallid Sturgeon

Construction of Offset Alternative 1 would result in temporary impacts to pallid sturgeon, similar to those in Section 3.8.2. Offset Alternative 1 would not require removal of Bridge 196.6, which would avoid the 1-year impact associated with the Proposed Action Alternative. Permanent impacts would result from installation of five in-water support piers. Impacts are anticipated to be minor.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

Piping Plover and Critical Habitat

Offset Alternative 2 would temporarily disturb approximately 1.5 acres of shoreline habitat on the Missouri River (that is, within the piping plover critical habitat area; a heavily vegetated area that is not classified as meeting the requirements of required habitat), which may deter the piping plover from entering the Project area or utilizing the area for forage or resting habitat. Due to the depth and width of the river, construction of at least two of the three truss pans would require significant falsework within the river. Though this would not impact piping plover habitat, the increased noise and human activities associated with falsework and construction would deter adults from using the Project area. The overall Project construction timeframe would be approximately 6.5 years, resulting in minor temporary impacts.

Northern Long-eared Bat

Offset Alternative 2 would affect the same amount of forested area as Offset Alternative 1; therefore, Offset Alternative 2 would result in the same degree of minor short-term and long-term impacts to NLEB.

Pallid Sturgeon

Construction of Offset Alternative 2 would require installation of two in-water support piers. While Offset Alternative 2 would result in less impact to pallid sturgeon during pier installation, construction of falsework is expected to result in increased turbidity levels. The potential effects of this turbidity increase are expected to be localized and controlled effectively using a turbidity curtain for most piles. Construction of the piers and bridge is anticipated to take 2.5 years, though overall Project construction would take 6.5 years.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

Piping Plover and Critical Habitat

Offset Alternative 3 has a slightly reduced footprint than Offset Alternatives 1 and 2, temporarily disturbing approximately 1.4 acres of shoreline habitat on the Missouri River (within the piping plover critical habitat area; a heavily vegetated area that is not classified as meeting the requirements of required habitat). The overall Project construction timeframe and impacts associated with increased noise and human activities would be approximately 4.5 years, 1 year longer than the Proposed Action Alternative, with pier installation and bridge construction taking approximately 2.5 years. Impacts are anticipated to be minor.

Northern Long-eared Bat

Similar to the previously described piping plover impacts and construction durations, increased noise and human activities associated with construction may deter NLEB from using the Project area. Offset Alternative 3 would result in permanent conversion of 21 acres of forested habitat. Tree clearing would occur between November 1 and April 1. Impacts are anticipated to be minor.

Pallid Sturgeon

Offset Alternative 3 would not require removal of Bridge 196.6, which would avoid the 1-year impact associated with the Proposed Action Alternative. Permanent impacts would result from installation of five in-water support piers. Impacts are anticipated to be minor.

Table 21 summarizes environmental consequences for each alternative.

Table 21: Environmental Consequences Summary Table

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	No change to ongoing maintenance activities.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Minor temporary impacts to shoreline habitat, impacts to piping plover, forested habitat impacts to NLEB, and in-water impacts to pallid sturgeon from construction of five in-water piers and removal of two piers.	Long-term removal of up to 13.9 acres of forested habitat and potential habitat loss for NLEB.

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Minor temporary impacts to shoreline habitat, impacts to piping plover, forested habitat impacts to NLEB, and in-water impacts to pallid sturgeon from construction of five in-water piers.	Long-term removal of up to 21 acres of forested habitat and potential habitat loss for NLEB.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Minor temporary impacts to shoreline habitat, impacts to piping plover, forested habitat impacts to NLEB, and in-water impacts to pallid sturgeon from construction of two in-water piers and falsework installation.	Long-term removal of up to 21 acres of forested habitat and potential habitat loss for NLEB.
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	Minor temporary impacts to shoreline habitat, impacts to piping plover, forested habitat impacts to NLEB, and in-water impacts to pallid sturgeon from construction of five in-water piers.	Long-term removal of up to 21 acres of forested habitat and potential habitat loss for NLEB.

3.9 Cultural Resources

Cultural resources are products of history and culture, and can include historic architectural resources (such as buildings and bridges), prehistoric and historic archaeological sites in both terrestrial and marine environments, historic districts, designed or vernacular landscapes, traditional cultural properties, sacred sites, and archaeological collections. A traditional cultural property is a significant cultural resource or a property that is eligible for the NRHP because of its associations with cultural practices or beliefs of a living community that are rooted in history of that community, and are important in maintaining the continuing cultural identity of the community (36 CFR 60.4). Cultural resources also encompass historic properties, which are districts, sites, buildings, structures, and objects included in, or eligible for, the NRHP. Under Section 106 of the NHPA, the eligibility of historic properties is determined by the lead federal agency, in consultation with SHPO. In North Dakota, SHPO is housed in the State Historical Society of North Dakota.

The primary federal regulations that apply to cultural resources and historic properties are NEPA and Section 106 of the NHPA. Cultural resources are specifically included under one of the mandates of NEPA, to “preserve important historic, cultural, and natural aspects of our national heritage” (42 U.S.C. Section 4331). The implementing regulation for the NHPA (54 U.S.C. Sections 306108 et seq.) is the “Protection of Historic Properties” (36 CFR 800). 36 CFR 800.8(a)(1) states that the NHPA encourages federal agencies to coordinate compliance with NEPA to maximize the timely and efficient execution of both statutes.

3.9.1 Affected Environment

36 CFR 800.16(d)I defines the APE as the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The APE for this Project was initially identified in 2017,

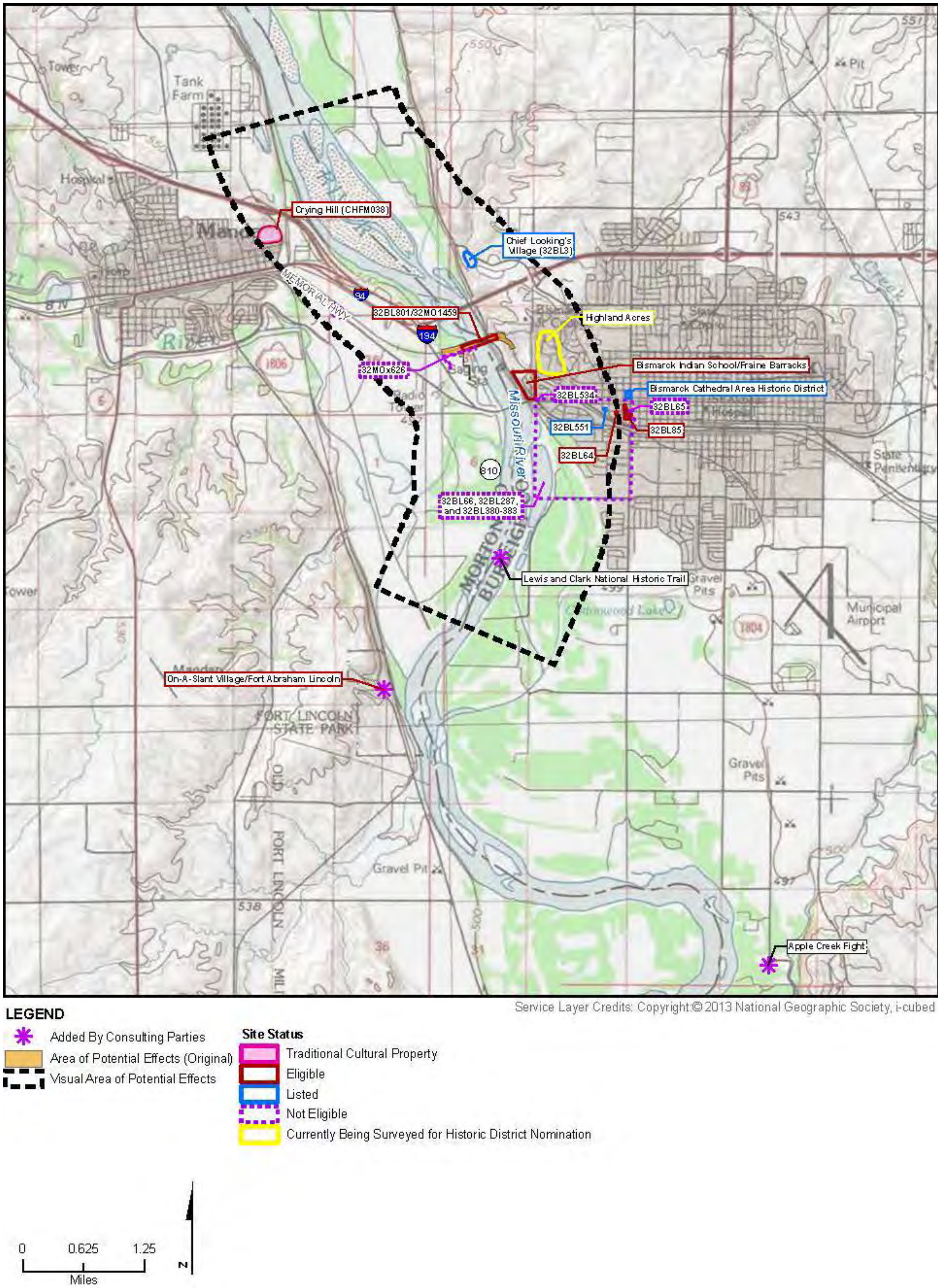
as part of the Section 106 consultation process. Areas in the vicinity of the undertaking were identified, where the potential for effects to historic properties could exist. Based on the nature and the scope of the undertaking and past experience with similar projects, these areas were defined as the footprint of the proposed undertaking within which all proposed construction and ground-disturbing activity is confined, including the existing and proposed ROW for the replacement of the railroad bridge (Figure 9). The APE was surveyed, and the results were reported by Juniper Environmental Consulting (Juniper) of Bismarck, North Dakota in *BNSF Bridge 0038-196.6A of the Jamestown Subdivision Over the Missouri River, A Class III Cultural Resource Inventory, Burleigh and Morton Counties, North Dakota* (Juniper 2017). SHPO accepted the report with this APE on October 16, 2017, and formally concurred with the APE on October 2, 2019. As this DEIS was developed, a revised APE (Figure 10) that includes the previously approved APE, the construction access road, and the footprint of all DEIS alternatives was prepared. SHPO provided concurrence with the revised APE on May 11, 2021 (Appendix P).

During Section 106 consultation, a visual APE for historic properties was developed by USCG and SHPO in December 2020. The visual APE was shared with the other consulting parties on December 16, 2020, and was finalized by USCG on February 25, 2021 (Figure 11). The visual APE was established to identify those historic properties from which the bridge is visible and where setting is a contributing aspect of significance, and to then assess the visual effects of the undertaking on those properties. It was also used to determine if there are significant cultural resources under NEPA that could have visual impacts.

Figure 9: Original Area of Potential Effects

Figure 10: Revised Area of Potential Effects

Figure 11: Visual Area of Potential Effects



Class I Literature Search

In 2017 and 2019, John G. Morrison of Juniper conducted Class I literature searches of the files maintained by the State Historical Society of North Dakota to inventory all previously documented cultural resources located within the Project APE and a 1-mile study area surrounding it (Juniper 2017, 2019; Appendix N).

The review identified 49 previously recorded cultural resources within 1 mile of the Project. The report states, “The majority of the previously recorded resources are located within the North Dakota National Guard Headquarters to the southeast of the Project area. Bridge 196.6 (Site 32BL801/32MO1459) had been previously recorded by Barth in 2016. Barth recommended the bridge *eligible* for listing in the NRHP. Site Lead 32MOx626, an irrigation or drainage ditch, lies within the western portion of the project area. Site Lead 32MOx626 was previously recommended *not eligible* for listing the NRHP (Yates 2016). Site Lead 32MOx626 also does not meet the 50-year guideline to be considered for the NRHP. None of the other previously recorded cultural resources lie within the inventoried project area” (Juniper 2017).

Three cultural resources were identified within the APE: Bridge 196.6 (site 32BL801/32MO1459), Liberty Memorial Bridge (site 32BL114/32MO321, demolished in 2008), and an irrigation ditch (site 32MOx626).

BNSF Bridge was the first bridge constructed across the Missouri River in the Bismarck-Mandan area. The Northern Pacific Railroad Company recruited and assigned George Shattuck Morison as the lead engineer to oversee and design the bridge. Construction of the bridge was initiated in 1880, and took approximately 3 years to complete. The original bridge design included Warren trusses that were representative of construction techniques used in the late-1800s. However, between 1905 and 1906, the Warren trusses were replaced with Parker trusses. The bridge was recorded and recommended as eligible for listing in the NRHP in 2016 (Barth 2016).

The Liberty Memorial Bridge (site 32BL114/32MO321) was a three-span Warren-Turner truss bridge that was demolished and replaced between 2008 and 2009, with a modern concrete bridge (Juniper 2019). Site 32MOx626 is recorded as an irrigation ditch that was built in 1982, as part of the drainage system related to the development of the I-94 interchange. The irrigation ditch was recorded and recommended as not eligible for listing in the NRHP in 2017 (Yates 2017). The irrigation ditch has no cultural value and does not qualify as a significant cultural resource.

Class III Cultural Resources Inventory

Class III inventories were conducted to review the previously documented cultural resources in the APE and to identify any potentially undocumented cultural resources. A Class III Cultural Resources Inventory of the original APE was completed in 2017, by Juniper, and an additional Class III Cultural Resources Inventory was completed in 2019, to cover the portion of the revised APE that was expanded for the construction access road (Juniper 2017, 2019). These Class III inventories were performed by walking parallel pedestrian transects that were spaced no more than 15 meters apart, in addition to paying particular attention to areas that had greater ground surface visibility and to exposures of subsurface sediments, including, but not limited to, ant mounds, cut banks, erosional features, and rodent burrows within or immediately adjacent to the APE. During the 2019 survey, no new cultural resources were identified. Additionally, no properties adjacent to the revised APE were identified as being 50 years of age or older.

The 2019 Class III Cultural Resources Inventory identified no historic properties or significant cultural resources in the APE beyond what had been identified through the literature search. Known cultural resources within the APE were previously evaluated according to the established criteria for listing in the NRHP. The report concurred with the previous evaluations. Juniper recommended that an archaeologist be present during ground-disturbing construction activities on the eastern and western banks of the Missouri River and along the railroad approaches to the bridge because of a high likelihood for buried historic and prehistoric cultural resources. This recommendation was based on historic photographs and known use of the area by prehistoric peoples.

The National Park Service (NPS) states that the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet one or more of the following criteria (NPS 1997):

- Criterion A: associated with events or activities that have made a significant contribution to the broad patterns of our history.
- Criterion B: associated with the lives of persons significant in our past.
- Criterion C: embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D: have yielded, or may be likely to yield, information important in prehistory or history.

As a result of the Class III inventories and the previous eligibility recommendations, USCG, as the lead federal agency, determined the historic Bridge 196.6 as eligible for listing in the NRHP, under Criterion A, for its association with broad patterns of railroad, commercial, and military history in the U.S., and Criterion C, for its design and construction, and its association with engineers George Shattuck Morison and Ralph Modjeski. USCG determined site lead 32MOx626 (the ditch) as not eligible for listing in the NRHP as it does not meet the 50-year threshold to be considered for listing. SHPO concurred with the USCG eligibility determinations in a letter dated November 28, 2017; therefore, the only extant historic property in the APE is the historic Bridge 196.6.

32BL801/32MO1459 – BNSF Bismarck Bridge 0038-196.6A

BNSF Bridge was constructed between 1880 and 1883. It was the first bridge in the Bismarck-Mandan area to cross the Missouri River. The current structure is approximately 1,470 feet in length and consists of three primary river spans and six approach spans. Totaling approximately 1,200 feet of the overall bridge length, the three primary river spans consist of three independent steel through-truss structures, each approximately 400 feet in length. A single-deck truss span is utilized to transition between the primary spans and the west approach embankment. One of the two spans of the west approach dates from 1906; the other west approach span is from 1980. Five spans of precast box girders that date from 1991, compose the east approach. The primary river truss spans were installed in 1905, and are replacement structures for the steel truss spans from the original construction in 1883. The trusses are supported on four granite piers, numbered one to four, from east to west. These are the only bridge elements that remain from the original bridge. Each river pier is supported on a shallow foundation, except for pier four, which is supported on a mat of timber piling. The bridge is eligible for the NRHP, under Criterion A, for its association with broad patterns of railroad, commercial, and military history in the U.S., and under Criterion C, for its design and construction, and its association with engineers, George Shattuck Morison and Ralph Modjeski.

As a significant cultural resource, the historic Bridge 196.6 is an icon within the community as it represents the unprecedented industrial expansion of its era. The construction of the bridge and completion of the rail line allowed for increased settlement in the northern Dakota Territory resulting in a boom in population, growth, and development. This increase in settlement also contributed to the displacement of Native Americans. The International Coalition of Sites of Conscience has identified the historic Bridge 196.6 as an International Site of Conscience for the role it played in opening the western U.S. to white settlement and the resulting profound impacts to Native American communities (International Coalition of Sites of Conscience 2019).

Section 3.9.1 provides an evaluation and a discussion of historic properties and significant cultural resources within the visual APE.

Visual Area of Potential Effects

Through Section 106 consultation, a visual APE was identified to encompass a larger area for the assessment of visual effects, and several additional resources were identified for consideration. Table 22 lists the historic properties and significant cultural resources identified within the visual APE, as well as additional significant cultural resources beyond the visual APE that were assessed for visual impacts under NEPA.

Table 22: Historic Properties and Significant Cultural Resources within the Visual Area of Potential Effects and Surrounding Area

Smithsonian Institution Trinomial System Number/Cultural Heritage Identification Number	Name/Address	NRHP Status	Criteria Eligibility	Within Visual APE?
32BL64	Residence/301 West Thayer Avenue	Eligible	Criterion C	Yes
32BL85	Custer Park	Eligible	Criterion A	Yes
32BL551	Lundquist House/ 622 West Thayer Avenue	Listed	Criterion A	Yes
32BL3a	Chief Looking's Village (Ward Earth Lodge Village)	Listed	Criterion D	Yes
32BL602, 32BL605, 32BL608, 32BL609, and 32BL611-613a	BIS/Fraine Barracks Historic District	Eligible	Criteria A and C	Yes

Smithsonian Institution Trinomial System Number/Cultural Heritage Identification Number	Name/Address	NRHP Status	Criteria Eligibility	Within Visual APE?
32BL27, 32BL410, 32BL412, 32BL428-32BL433, 32BL454, 32BL457-32BL461, 32BL510, 32BL513-32BL517, and 32BL522-32B523	Bismarck Cathedral Area Historic District	Listed	Criterion A	Yes
32MO26a	On-A-Slant Village	Not evaluated	TBD	Yes
32MO031	Scattered Village	Recommended eligible	Criterion D	Yes
CHFM038a	Crying Hill	Eligible	Criterion A	Yes
32MO141a	Fort Abraham Lincoln	Recommended eligible	Criterion D	No
32BL801/32MO1459a	BNSF Bridge	Eligible	Criteria A and C	Yes
N/A	Highland Acres Potential Historic District	Currently being surveyed	TBD (likely eligible)	Yes
N/A	Apple Creek Fight[a]	Not evaluated	TBD (likely eligible)	No
N/A	Potential cultural landscape	Not evaluated	TBD (likely eligible)	Partially
N/A	Lewis and Clark National Historic Trail	Not evaluated	TBD (likely eligible)	Partially

[a] Denotes historic properties that are also considered to be significant cultural resources.

Note:

BIS = Bismarck Indian School

Descriptions of Historic Properties and Significant Cultural Resources Located within the Visual Area of Potential Effects

Residence/301 West Thayer Avenue, Custer Park, the Lundquist House, the Bismarck Cathedral Area Historic District, and the Highland Acres Historic District are historic properties under Section 106. Chief Looking's Village, Crying Hill, the BNSF Bridge, and BIS/Fraine Barracks Historic District are historic properties under Section 106 and are also considered to be significant cultural resources under NEPA. Section 3.9.1 describes the historic Bridge 196.6.

Residence/301 West Thayer Avenue (32BL64)

The residential property at 301 West Thayer Avenue, constructed circa 1935, was determined as eligible for listing in 1988, under Criterion C, as a building that embodies the distinctive characteristics of the international style.

Custer Park (32BL85)

This site is generally between Rosser Avenue West and Broadway Avenue West, and Washington Avenue and Park Street. The site was founded circa 1910, and is eligible under Criterion A as the first organized park in Bismarck and for its effect on the development of recreational sites and facilities in Bismarck.

The Lundquist House (32BL551)

The Lundquist House at 622 West Thayer Avenue was constructed circa 1920. The property was listed in the NRHP in 2006, as a well-preserved example of a house built by the Home Building Association of the Nonpartisan League that qualified under the NRHP-listed *Nonpartisan League's Home Building Association Resources in North Dakota* multiple property submission.

Bismarck Cathedral Area Historic District (32BL27, 32BL410, 32BL412, 32BL428-32BL433, 32BL454, 32BL457-32BL461, 32BL510, 32BL513-32BL517, and 32BL522-32B523)

Constructed on a hilltop, this historic district is located four city blocks north of the western edge of the Bismarck Central Business District. According to the NRHP nomination, this siting "…provides a degree of shelter from winter winds. The protected hilltop location, which, in the early Twentieth Century provided homeowners in the developing residential area with a panoramic view of the Missouri River valley, made it an attractive area in which to build. The success of curbside plantings, primarily Siberian elm, hardy to the North Dakota climate, eventually eliminated the panoramic view but resulted in heavily canopied streets which embrace the neighborhood and contribute significantly to the ambience of the district as it exists today" (Vyzralek and Hafermehl 1980). The district is listed in the NRHP, under Criterion C, for its intact and diverse collection of various architectural styles.

Highland Acres

Highland Acres is a post-World War II subdivision from the 1940s and 1950s that was developed by the Bismarck Veterans Homeowners Cooperative Association (Association), a group of returning World War II veterans. According to a letter submitted to the Bismarck Historic Preservation Commission:

> A 'perfect storm' of circumstances, many of them unique to North Dakota, set the stage and opened the curtain for the development of Highland Acres by the Bismarck Veterans Homeowners Cooperative Association, guaranteeing its place in North Dakota's history.
>
> First, in post-war America, millions of young men returned home, married millions of young women, and needed housing. Highland Acres was Bismarck's response.
>
> Second, the project was launched as a cooperative. The cooperative movement was exceptionally strong in North Dakota, bringing electricity and telephones to rural North Dakota in the form of the North Dakota Rural Electric and Rural Telephone Cooperatives; fuel and other farm supplies through the Farmers Union Oil Company; insurance for homes, farms, vehicles and medical care through the Farmers Union Mutual Insurance Company; and markets for grain—elevators for farmers to sell their crops through the Farmers Union Grain Terminal Association (GTA). Most city dwellers in North Dakota were just one generation removed from the farm, and most had benefited from, or still participated in, local

> and statewide cooperatives. So it was not surprising that the response to the housing shortage in Bismarck, North Dakota, was the formation of a cooperative to get homes built for returning veterans. While the cooperative structure ultimately failed, it was critical to the launch of the project, which eventually succeeded.
>
> Third, because the project was launched as a cooperative, it caught the attention of another cooperative venture, the North Dakota Central Credit Union. The Central Credit Union was a child of the North Dakota Farmers Union, the ultimate cooperative in the state. The Farmers Union, organized in North Dakota in 1927, grew out of the state's socialist movement of the early 20th Century. By the time of the post-war housing shortage, in addition to its other cooperative business ventures, it had also organized its own lending and savings institutions, in the form of credit unions, organized at the local level but partnered together statewide as the North Dakota Central Credit Union, owned by Farmers Union cooperative members. Credit unions worked by members pooling their savings to provide financing to other cooperative ventures, such as the Bismarck Veterans Homeowners Cooperative Association. So the Highland Acres venture had immediate access to credit to begin operations.
>
> Fourth, there was the Bank of North Dakota. Financing individual homes was a critical part of the venture, and that's where the Bank of North Dakota came in. A product of the Nonpartisan League takeover of North Dakota government for a decade earlier in the 20th century, and still today the nation's only state-owned bank, it stretched its charter provisions to provide home mortgages to co-op members, greatly aiding the sale of homes by providing a central clearinghouse for prospective homeowners.
>
> And fifth, the timing of two events unique to North Dakota also played a key role in Highland Acres development. By the time the war ended, plans were already being implemented to begin the state's largest-ever infrastructure project, construction of the massive Garrison Dam on the Missouri River. Not only did it provide jobs for returning veterans, enabling them to stay in their home state, but it brought a flood of new workers as well, and the promise of economic development for central North Dakota once it was completed. Thus the need for housing.
>
> And the discovery of oil in western North Dakota in the early 1950s brought more new residents, new wealth, and two entrepreneurs to North Dakota, Irvin Wilhite and Arthur Seay, who rescued and completed the project as a private venture once the cooperative structure had broken down. The absence of any one of those factors—a critical need for new housing, a strong cooperative movement, a state-owned bank, the construction of the Garrison Dam, and the discovery of oil—might have doomed the project. The existence of all of them guaranteed its success. (Hutchings 2019)

Prior to construction, the Association created strict protective covenants that were designed to create what the members hoped would be the most family friendly neighborhood in Bismarck. The restrictions included:

- Construction of single-family dwellings only
- Approval of buildings, fences, walls, walks, drives, and other structures by a committee of the Association

- Approval of hedges, trees, shrubbery, and other plantings, landscaping, and grading by a committee of the Association
- No refuse piles, unsightly signs, unkempt yards, poultry or livestock, and unusual pets(Fugile 2018).

Building began in the subdivision in 1948, with construction of the manager house and the Association office. The initial residences were prefabricated and shipped to the site in panels with all the accessory parts precut. Today, Highland Acres contains approximately 400 houses (Fugile 2018). In April 2020, Bismarck City Commissioners voted to accept a grant from the NPS Historic Preservation Fund to assist in carrying out a historic neighborhood survey. The draft report for this survey was due to the Bismarck Historic Preservation Commission on May 1, 2021. The final report is due on September 30, 2021. Once the report is released, more detailed information on the neighborhood and its potential as a historic district will be available for evaluation, including district boundaries, the number of contributing resources, and eligibility criteria.

Chief Looking's Village (32BL3)

Chief Looking's Village (also known as Ward Earth Lodge) is a historic archaeological site listed in the NRHP, under Criterion D, as a site that has yielded and has the potential to yield information important in history. The village was founded in the mid-1500s, by the Mandan tribe of Indians (Paleocultural Research Group 2002). Located on a flat-topped promontory, the site is enclosed on three sides by the remnants of a moat. The fourth side is enclosed by a steep slope that falls toward the Missouri River. The site contains evidence of 43 earth lodge depressions and several storage pit depressions (Ludwickson 1977). The village is named after Mandan Chief Looking. The village was first mapped by George Francis Will in 1905. In 1934, the Civilian Conservation Corps excavated portions of the site under the supervision of NPS. The Civilian Conservation Corps also built three replica earth lodges at the site in 1934. These replicas were modeled on the earth lodges built by the Mandans, the Hidatsas, and the Arikaras in the 1800s (Paleocultural Research Group 2020). These lodges eventually fell into disrepair and were then destroyed by fire. The site is currently owned by the City of Bismarck and is used as a park that includes an interpretive trail. It remains a place for continued archaeological study (Paleocultural Research Group 2020). Chief Looking's Village is also a significant cultural resource because of its association with the Mandan tribe and their cultural practices and beliefs. The site provides a tangible link to the past and is important to the local community because it serves as a place where visitors can learn about the history of local indigenous peoples.

Bismarck Indian School/Fraine Barracks Historic District (32BL602, 32BL605, 32BL608, 32BL609, and 32BL611-613)

BIS/Fraine Barracks Historic District is eligible for listing in the NRHP, under Criteria A and C. Under Criterion A, the district is important as a tangible example of the U.S. Indian policy on assimilation from the late-1870s to the mid-1930s. The district is also important under Criterion C as an "…illustration of the evolution of BIA [Bureau of Indian Affairs] at non reservation boarding schools in the early twentieth century" and because the buildings "…reflect the transformation of the former Indian school to the NDNG [North Dakota National Guard] state headquarters and/or the evolution of the Fraine Barracks built environment during the historic era" (McCormick 2006). BIS opened in 1908, on 225 acres, on the east bank of the Missouri River. From the 1870s to the mid-1930s, the underlying goal of the U.S. Indian policy was to assimilate Native Americans into white society by forcing them to abandon their cultural traditions. An important component of the policy involved the creation of a federal nonreservation boarding school system, where Native American children could be taught English and other aspects of the Euro-American lifestyle (McCormick 2006). BIS was opened as a part of this system. It functioned as a school until its closure in 1937, after which Brigadier General Heber L. Edwards recognized the potential of the site to house the National Guard Headquarters for the state. The North Dakota National Guard (NDNG) assumed ownership of the property in October 1937. In 1945, the property was officially renamed Fraine Barracks. Some buildings remain from the BIS days; among them are the Adjutant General's Quarters, Fraser Hall (Adjutant General's Office Building), Boyd Hall (Operations and Training Building), four residences, several wood-frame and brick storage buildings, and a brick building that is presently used as a multivehicle garage. Over the years, many modern office, warehouse, and equipment maintenance buildings have been constructed at Fraine Barracks to keep pace with the growth of NDNG (NDNG 1994). In addition to its eligibility for listing in the NRHP, BIS/Fraine Barracks Historic District is also a significant cultural resource as it provides a tangible link to the past for Native American communities whose forebears may have been impacted by the Indian policies of the U.S. during the first part of the 20th century.

On-A-Slant Village (32MO26)

On-A-Slant Village (also known as Slant Indian Village) is a prehistoric Mandan Indian village site that existed more than 400 years ago (NPS 2020b). The village was constructed on a plain that slopes toward the Missouri River. At one time, the village contained approximately 75 earth lodges that housed approximately 1,000 people. The Mandan people lived in sedentary communities and were considered to have advanced skills in village design and defense (NDPR n.d.). Villagers relied on a mixture of fishing, hunting, and agriculture for subsistence. In 1781, a smallpox epidemic virtually eliminated the village. Those that survived moved north along the Missouri River and joined the Hidatsa. In 1804, Lewis and Clark discovered the village and reported that it was in an advance state of decay (NDPR n.d.). Today, the village site is located within Fort Abraham Lincoln State Park and has six reconstructed earth lodges, including a large council lodge. The park was opened in 1907, and is the oldest state park in North Dakota. On-A-Slant Village is significant as a cultural resource because it provides an opportunity to interpret archaeological findings and reproductions, it offers educational opportunities to understand past lives of indigenous North Dakota people, and it provides insight into the lives of the Mandan people for the present community.

Scattered Village (32MO31)

Scattered Village is located on the north side of the Heart River, directly where the Heart River valley joins the trench of the Missouri River in western Morton County. The site exists within and beneath the present city of Mandan. Due to this location, the exact boundaries are unknown. In 2002, *Prehistory on First Street NE, The Archaeology of Scattered Village in Mandan, North Dakota* was published by the City of Mandan and NDDOT. The accompanying site form made the following recommendation, “The site clearly retains significant research potential, and should continue to be regarded as eligible for the NRHP” (Paleocultural Research Group 2002). According to the report, “This site is one of several Native American earth lodge village sites near Crying Hill… All evidence indicates that settlement began just before Euroamerican [sic] trade artifacts found their way into the region in the sparsest of numbers, and occupation continued unbroken for several decades and probably a century. We place the occupation period as starting just before AD 1600 and continuing for perhaps a century, but no later than AD 1700” (Paleocultural Research Group 2002). Although this site qualifies as a historic property under Section 106 for its potential to yield information, it does not possess additional cultural significance under NEPA, as it has been covered by the modern city of Mandan with no publicly visible or accessible components, and was only recently rediscovered.

Crying Hill (CHFM038)

Crying Hill is eligible for the NRHP as a traditional cultural property, under Criterion A, for its cultural associations with the Mandan, Hidatsa, and Arikara Nation (MHA Nation). The landform that comprises Crying Hill is located above the former Native American village known as Scattered Village. Crying Hill was used as a ceremonial site and its significance has largely been passed down through oral histories.

As a site of early Native American villages, Crying Hill has also been known as Good Fur Robe's Village and Two Faced Stone Village. The name Crying Hill is thought to reference its use as a sacred place for prayer and other spiritual activities (Wingert 2017). Although apparently abandoned as a village site by the time of the Lewis and Clark expedition in 1804, the hill continues to hold importance for Native Americans. "Crying Hill is still used today by regional Native Americans as evidenced by freshly planted sage, sweet grass, and symbolic stone formations" (Atkinson n.d.).

Crying Hill is also a significant cultural resource. The Mandan Historical Society considers the hill to be a landmark as it has three components – concrete letters that spell out Mandan on the northeast side of the hill, Mandan formed by trees on the south side, and the physical hill as a Native American cultural site (Mandan Historical Society 2020). The site remains important to living communities of MHA Nation. In addition to its importance to the Native American community, "Crying Hill is also important to the local community. The hill is home to the Mandan sign, which is the largest sign in North Dakota" (Mandan Historical Society 2020). The first Mandan sign was erected on the hill in 1934, and the most recent one, spelled out in trees, dates from the 1990s (Mandan Historical Society 2020). The signage provides a visual landmark to the greater community. For the community at large, Crying Hill "is a place of prayer used by many groups of non-native cultures, including local Christian groups. It is a play area, a park, and a point of inspiration for the people of the local communities" (Atkinson n.d.).

Fort Abraham Lincoln (32MO141)

Originally called Fort McKeen, the U.S. military established the infantry post in 1872, on a bluff above the ruins of On-A-Slant Village. The post was used to house infantry companies that were dispatched to the area in preparation for the construction of the Northern Pacific Railroad. Two years later, the post housed a nine-company command that made it among the largest and most important forts on the Northern Plains (NDPR n.d.). At its peak, Fort Abraham Lincoln encompassed 78 separate buildings. The fort was decommissioned in 1891. The buildings were dismantled by area settlers who repurposed the materials for the construction of local homes and farms. Today the site is located within Fort Abraham Lincoln State Park. The park was opened in 1907, and is the oldest state park in North Dakota. The Commanding Officer's Quarters, Central Barracks, Granary, Commissary, and Stables were reconstructed circa 1990 (Good 1988). Fort Abraham Lincoln was recommended as eligible for listing in the NRHP in 1988, as an archaeological site under Criterion D, for its potential to yield information (Good 1988). It is also a significant cultural resource as a site that provides an opportunity to interpret the historic significance of archaeological findings and reproductions, and offers educational opportunities about the interactions of the U.S. military and the Mandan people.

Apple Creek Fight

This is the site of a battle known as the Apple Creek Fight; although, the hill was also once known as the Bluff Where They Dig for Paint. The battle occurred between approximately 500 Dakota and Lakota Indian warriors and approximately 3,000 U.S. military soldiers under the command of General Henry Sibley. The battle lasted from July 30 to August 1, 1863, and is "…the only native fight of the 1863-1864 Punitive Campaigns in which the Dakota and Lakota chose the battlefield, met their aggressor, and held them off until they withdrew" (University of Mary 2019). In 2019, historian, Dakota Goodhouse, Native American Studies professor at United Tribes Technical College, and Dr. Mike Taylor, Associate Professor of Education at the University of Mary, further characterized this site as having "played a significant role in that victory, the Battle of Apple Creek also adds to the legend of North Dakota, and to U.S. and Native American history-one that is often neglected or continually overlooked by many historians and scholars" (University of Mary 2019). The site is now the home of the University of Mary. The site has largely been developed and no longer retains sufficient integrity to be eligible for listing in the NRHP. It may possess additional significance under NEPA; although, the site has been developed by the university, degrading the setting, and the site has been disturbed by pathway and highway construction, it is still considered an important site in Native American history. According to Dr. Taylor, "This conflict was four-and-a-half times longer than the Battle of Little Big Horn and twice as large in terms of U.S. Military and Native American involvement" (University of Mary 2019). It was a Native American victory that has been overshadowed by battles where the U.S. military was victorious and by the story of Little Big Horn. Ceremonies commemorating the fight have been held at the site, demonstrating its continued importance to the community.

Potential Cultural Landscape

The Project area may be part of a previously unidentified vernacular cultural landscape. According to the Cultural Landscape Foundation, "A Vernacular Landscape is a cultural landscape that evolved through use by the people whose activities or occupancy shaped that landscape. Through social or cultural attitudes of an individual, family or a community, the landscape reflects the physical, biological, and cultural character of those everyday lives" (Cultural Landscape Foundation 2021). NPS shares this definition and further notes that, "Function plays a significant role in vernacular landscapes" (NPS 1996). During Section 106 consultation, a possible vernacular cultural landscape was proposed in the Project area.

This vernacular cultural landscape roughly follows the Lewis and Clark National Historic Trail along the banks of the Missouri River Corridor and includes a portion of the Northern Plains National Heritage Area. "The Northern Plains National Heritage Area amplifies the nationally important heritage that flows from the Missouri River in central North Dakota. This includes the interconnected stories of explorers and settlers, tribal citizens, origins of various agrarian lifeways, and the expansion of the United States reflected within this lived-in landscape" (NPS 2020a).

The Lewis and Clark National Historic Trail is approximately 4,900 miles long and extends from Pittsburgh, Pennsylvania to near Astoria, Oregon. According to NPS, "The trail follows the inbound and outbound routes used in the Lewis and Clark expedition plus the preparatory section from Pennsylvania to Wood River, Illinois. The trail connects 16 states (Pennsylvania, West Virginia, Ohio, Kentucky, Indiana, Illinois, Missouri, Kansas, Iowa, Nebraska, South Dakota, North Dakota, Montana, Idaho, Washington, and Oregon) and many tribal lands. The trail was established by Congress in 1978, as one of four original national historic trails that is part of the national trails system. By 2019, the trail had been extended by 1,200 miles." The trail was developed with the purpose of commemorating the 1803 to 1806 expedition through the "…identification; protection; interpretation; public use and enjoyment; and preservation of historic, cultural, and natural resources associated with the expedition and its place in U.S. and tribal history" (NPS 2019). On-A-Slant Village is considered to be a "High Potential Site" associated with the trail (NPS 2020b). High potential sites are defined as "Those historic sites related to the route, or sites in close proximity thereto, which provide opportunity to interpret the historic significance of the trail during the period of its major use. Criteria for consideration as high potential sites include historic significance, presence of visible historic remnants, scenic quality, and relative freedom from intrusion" (16 U.S.C. Section 1251 (1)).

This potential vernacular cultural landscape includes numerous archaeological and tribal sites from the prehistoric and historic eras, including many of the previously described historic properties and significant cultural resources. It provides a tangible timeline of the history of this region that begins with its earliest inhabitants through the post-contact period, white settlement, and the dawn of the 20th century. "The Missouri River, as a life source supporting early agriculture; as a transportation corridor facilitating exchange of goods, culture, and ideas; as a low point on the horizon, offering strategic long-range views from its bounding bluffs; as a challenge for industrial development; and as an idyllic setting in which to live, is the natural feature that gives each chapter of the cultural landscape's decades-long history and the history of its component parts—a dynamic quality of interconnectedness" (FORB 2021).

3.9.2 Environmental Consequences

In compliance with NEPA and Section 106 of the NHPA, USCG, as the lead federal agency, is obligated to consider the impacts or effects that the proposed undertaking could have on significant cultural resources and on historic properties listed in, or eligible for listing, in the NRHP. This includes consideration of the criteria for which the property was determined as eligible, or is considered to be culturally significant, and evaluation of whether the introduction of the new bridge and/or loss of Bridge 196.6 would adversely affect the integrity of the property and the ability to convey its significance. It is necessary to evaluate the changes and alterations the undertaking would introduce, physically and visually, to a historic property or resource, whether or not the undertaking takes place within the boundaries of a historic property or resource. This evaluation includes the relationship of a cultural resource or historic property to its setting, which may include the surrounding features and open spaces, and whether that relationship could be negatively affected by the Project. Simply having the bridge visible from a cultural resource or historic property, and having that view altered, does not constitute an adverse effect. For instance, if the setting of a historic property is not essential to understanding its significance, then the introduction of a new feature in that setting may not diminish the integrity of the historic property and would thus not be an adverse effect. When evaluating traditional cultural properties, it is important to note that significance derives from past and continuous use of the site for specific cultural practices.

The aspect of setting may not be important for all types of properties. For most sites that are only eligible under Criterion D, the property does not need to visually recall an event, person, process, or construction technique. These sites "do not require visible features to convey their significance" (NPS 1997). It is only important that the significant data in the property remain sufficiently intact to yield the expected information if the appropriate study techniques are employed (NPS 1997); therefore, setting is not relevant to the significance of most properties that are only eligible under Criterion D. As such, these properties do not need to be evaluated for visual effects under Section 106. Scattered Village is only eligible under Criterion D and is not considered to be a significant cultural resource; therefore, it would not be evaluated for visual effects. Chief Looking's Village and Fort Abraham Lincoln are eligible or recommended as eligible solely under Criterion D and would, therefore, only be evaluated for visual effects as significant cultural resources under NEPA. On-A-Slant Village has not been evaluated for the NRHP, but has been identified as a significant cultural resource and would be evaluated for visual effects under NEPA.

This section presents an evaluation of impacts or effects under NEPA and Section 106. Section 3.0 explains the potential for significant adverse impacts under NEPA. Under Section 106, an effect is any alteration to the characteristics of a historic property that qualify that property for inclusion in the NRHP.

Section 106 mandates one of three findings of effect:

1. **No historic properties affected:** There are either no historic properties present or there are historic properties present, but the undertaking would have no effect on them.
2. **No adverse effect:** The proposed undertaking would have an effect on a historic property, but that effect is not adverse and would not significantly alter the characteristics that qualify the historic property for inclusion on, or eligibility for, the NRHP.
3. **Adverse effect:** The proposed undertaking may alter, either directly or indirectly, the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the location, design, setting, materials, workmanship, feeling, or association of the property. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative.

Table 23 provides an explanation and a comparison of NEPA impacts and Section 106 effects.

Table 23: Impact Significance Criteria for Cultural Resources

Impact Intensity	Description
Negligible	Activities would not be detectable or would result in no effect on significant cultural resources.
Minor	Activities would result in an effect on significant cultural resources, but that effect would not significantly alter the characteristics that make the resource significant or that qualify a historic property for inclusion in the NRHP, and would equate to no adverse effect under Section 106. Loss of integrity would occur and would be slight, but noticeable. The effect would occur in a previously disturbed area or would not affect the character-defining features of a significant cultural resource or historic property. Effects would not appreciably alter resource conditions or the relationship between the resource and the body of practices or beliefs of an affiliated group.

Impact Intensity	Description
Moderate	Activities would directly or indirectly alter the characteristics that make a cultural resource significant or qualify a historic property for inclusion in the NRHP in a manner that would diminish its historic integrity, and could equate to either no adverse effect or an adverse effect under Section 106. These effects would result in some disturbance to a site, the loss of integrity, or the alteration of resource conditions, or would affect the character-defining features of a resource. Effects would alter resource conditions or the relationship between the resource the body of practices or beliefs of an affiliated group.
Significant	Activities would destroy the characteristics that make a cultural resource significant or qualify a historic property for inclusion in the NRHP in a manner that would diminish its integrity, and would equate to an adverse effect under Section 106. These effects would result in severe disturbance to a site, the loss of integrity, or the alteration of resource conditions, or would severely affect the character-defining features of a resource. Effects would appreciably alter resource conditions or the relationship between the resource and the body of practices or beliefs of an affiliated group.
Duration:	Short term: occurs only during a specific activity (for example, a construction period) or during the activity and a short adjustment or recovery period following the end of the event. In many instances, a short-term effect would not have a permanent effect on the integrity of a significant cultural resource or historic property. Long term: the effects of the specific activity extend well beyond the end of the activity and usually result in a permanent effect on the integrity and condition of a significant cultural resource or historic property.

Note: the following findings are pending SHPO concurrence.

No Action Alternative

Under the No Action Alternative, maintenance of the existing structure is assumed to not include significant changes to the bridge. The No Action Alternative would result in no ground disturbance activities, and maintenance activities would continue. Maintenance would consist of periodic inspections and ROW maintenance, with possible replacement of individual bridge components, when necessary. The bridge would not be expected to have significant alterations and would experience minimal change. Minor temporary impacts could occur during future maintenance activities that could, depending on the extent of the required maintenance activities, produce unwanted noise and/or affect views of Bridge 196.6. Under this alternative, the bridge would retain its historic significance and integrity. Furthermore, because there would be no change to the bridge, there would be no change to the setting of any of the previously identified significant cultural resources, or historic properties. Although this alternative could result in no significant impact under NEPA and a finding of no adverse effect under Section 106, there could be a long-term adverse effect if the bridge is abandoned. Furthermore, the bridge would, at some point, reach the end of its useful life, and failure would be imminent, which would require demolition or substantial replacement of character-defining features, resulting in an adverse effect and a significant impact.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Removing Existing Structure

Under the Proposed Action Alternative, the historic Bridge 196.6 would be removed and a new bridge would be constructed. Minor temporary impacts could occur during future construction activities that could, depending on the extent of the required construction activities, produce unwanted noise and/or affect views of Bridge 196.6. As the historic Bridge 196.6 is eligible for listing in the NRHP and is considered to be a significant cultural resource to the community, its removal would have a permanent significant impact under NEPA and result in a finding of adverse effect under Section 106.

A new bridge would be visible from Crying Hill and BIS/Fraine Barracks Historic District; therefore, these historic properties and significant cultural resources have the potential for effects from changes to their setting. Crying Hill is eligible for the NRHP, under Criterion A, for its historic associations with the Native American community. The setting (that is, how the area surrounding Crying Hill looks) is not essential to understanding the connection between Crying Hill and its Native American past. Crying Hill is surrounded by modern-day residential and commercial developments, an interstate highway, and modern street grids. These have all caused significant changes to the setting of Crying Hill, yet it retains its important associations. The removal and replacement of the rail bridge would not affect the ability of Crying Hill to continue as a historic site. Crying Hill is also a significant cultural resource for its associations with the Native American community, for its notable Mandan signs, and for the community at large as a place of prayer, a point of inspiration, and a recreational area. The view of the bridge is not essential to these cultural associations. Many modern intrusions have occurred over the years to the setting and even to the hill itself, such as changes to the Mandan signs. Removal and replacement of the bridge would not impair or impede the uses and cultural associations of Crying Hill, and it would continue to serve its role of cultural significance; therefore, this alternative would result in a minor impact under NEPA and a finding of no adverse effect under Section 106 for Crying Hill.

The new bridge would be minimally visible from BIS/Fraine Barracks Historic District. These buildings are eligible as contributing resources to a potential district, under Criterion A, for their association with the "…underlying goal of the United States's [sic] Indian policy from around the late 1870s to the mid-1930s: that of assimilating Native Americans into white society by forcing them to completely abandon their cultural traditions" and for "transformation from a boarding school to the state headquarters of the North Dakota National Guard" (McCormick 2006). Under Criterion C, these buildings are an example of "…BIA [Bureau of Indian Affairs] architecture at non reservation boarding schools in the early twentieth century" (McCormick 2006). The setting of this property is an acreage near the east bank of the Missouri River, in a collection of historic and modern buildings in a secured campus setting, which is important to the feeling of the historic district and helps to convey what it was like as an Indian school and as the National Guard Headquarters. Bridge 196.6 is generally not visible from the Fraine Barracks campus, but is minimally visible from some select areas of the campus. The view of the bridge does not contribute to the significance of the district setting. Like Crying Hill, the area surrounding the historic district has been changed by modern commercial and residential developments, yet it retains its ability to convey its significance, both architecturally and culturally. The change to the setting from the removal and replacement of the bridge would not alter the ability of the district to convey its design as an intact example of Bureau of Indian Affairs architecture at nonreservation boarding schools in the early 20th century, nor its role in U.S. Indian policy, or its transformation from a boarding school to the state headquarters of NDNG. The school was constructed in 1907, after the construction of the historic Bridge 196.6. As such, a railroad bridge has always been a part of the viewshed from these buildings and the view of a different rail bridge would not change district association with U.S. Indian policy or NDNG. This alternative would result in a minor impact under NEPA and a finding of no adverse effect under Section 106 for BIS/Fraine Barracks Historic District.

On-A-Slant Village, Fort Abraham Lincoln, and the Apple Creek Fight site are significant cultural resources for their associations with the Native American community and the insights they provide into the history of the community. They also provide educational opportunities to the community at large. However, the view of the bridge from these sites is minimal and is not essential to conveying those cultural associations, all of which predate the bridge by at least 3 decades. Fort Abraham Lincoln housed infantry companies that were sent to safeguard the construction of the Northern Pacific Railroad, but the bridge they were sent to guard was replaced in 1905 (except for the piers, which are not visible from Fort Abraham Lincoln). The bridge that is now minimally visible from the site has already caused a change to the historical viewshed, and its removal and replacement with yet another rail bridge would have a similar effect on the setting. A rail bridge would remain at this crossing to help tell the story of the founding of Fort Abraham Lincoln; therefore, this alternative would result in a minor impact under NEPA for On-A-Slant Village, Fort Abraham Lincoln, and the Apple Creek Fight site.

The Proposed Action Alternative would not have a significant impact or an adverse effect on the potential cultural landscape. Although the removal and replacement of Bridge 196.6 with a new bridge would alter the setting, this change would not diminish the community ability to understand the history of the cultural landscape and its importance to the development of the Missouri River corridor and the Lewis and Clark National Historic Trail.

The Proposed Action Alternative would have minor temporary impacts on significant cultural resources and historic properties that have a view of Bridge 196.6 during construction from noise and visual changes. The construction duration for this alternative is estimated at 3.5 years.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

Under Offset Alternative 1, the historic Bridge 196.6 would be retained and a new bridge would be constructed 92.5 feet upstream. The historic Bridge 196.6 would continue to function as an active rail bridge during construction of the proposed bridge. The construction of the new bridge would not involve any physical alterations to historic Bridge 196.6 or result in any physical impacts to it from construction. Minor temporary impacts could occur during future construction activities that could, depending on the extent of the required construction activities, produce unwanted noise and/or affect views of Bridge 196.6. A new bridge, 92.5 feet upstream from the BNSF Bridge, would permanently alter the visual setting of Bridge 196.6 by adding an additional structure into the viewshed. However, additional bridges have historically been, and currently are, visible from the BNSF Bridge, and views of BNSF Bridge are somewhat impacted by both the Grant Marsh Bridge for I-94 (from the north) and the Liberty Memorial Bridge for the I-94 Business/Memorial Highway (from the south). The proposed bridge is a concrete girder bridge with a low profile that is unlikely to impede the view of historic Bridge 196.6 trusses. The presence of a new bridge would not impact Bridge 196.6 historic associations with railroad, commercial, and military history in the U.S. that qualify it for listing under Criterion A, nor would it impact its design, construction, or engineering associations that qualify it for listing under Criterion C; therefore, the presence of a new bridge would not alter or diminish the integrity of design, location, materials, workmanship, or association of the historic property. Although the setting and feeling of the historic Bridge 196.6 would be altered, the defining characteristics would remain. As a significant cultural resource, the historic Bridge 196.6 is considered to be a visual community icon. Under Offset Alternative 1, the bridge would remain visible, but would no longer be an active rail bridge. Due to the addition of the new bridge adjacent to the historic Bridge 196.6 and the change in function of Bridge 196.6, the historic Bridge 196.6 would look different. Changes may include:

- The addition of pedestrian guard rails
- Changes in how the bridge is accessed to accommodate pedestrians, bicycles, and the Americans with Disabilities Act
- Changes in the approaches
- Removal of the rails and ties for a different bridge deck

Although the inclusion of an additional bridge structure would be a permanent visual change, it would be a minor impact under NEPA and a finding of no adverse effect under Section 106 for the historic Bridge 196.6.

The new bridge would be visible from Chief Looking's Village and Crying Hill, and would be minimally visible from BIS/Fraine Barracks Historic District. Of these historic properties, Chief Looking's Village is eligible under Criterion D for its potential to yield information important to history; thus, setting is not relevant to the significance of the property. Furthermore, as discussed in the Proposed Action Alternative, the historic Bridge 196.6 does not contribute to the significance of Crying Hill or to the setting of BIS/Fraine Barracks Historic District. The areas surrounding Crying Hill and BIS/Fraine Barracks Historic District have been changed by modern commercial and residential developments, yet they retain their ability to convey their significance, both architecturally and culturally. As such, the potential change to the view of the historic Bridge 196.6 from the inclusion of the new bridge in the viewshed would have no adverse effect on either property under Section 106. Additionally, the changes to the view of the historic Bridge 196.6 from the addition of a new bridge would not change the cultural associations of either property; therefore, this alternative would result in a minor impact under NEPA for Crying Hill and BIS/Fraine Barracks Historic District.

On-A-Slant Village and Apple Creek Fight were evaluated as significant cultural resources. The minimal view of the bridge from these properties is not essential to those cultural associations, all of which predate the bridge. As a result, this alternative would result in a minor impact under NEPA for On-A-Slant Village and Apple Creek Fight.

As a significant cultural resource, impacts to Fort Abraham Lincoln would be similar to those of the Proposed Action Alternative. However, under Offset Alternative 1, a second bridge alongside the historic Bridge 196.6 would be minimally visible. As described in the Proposed Action Alternative, Fort Abraham Lincoln housed infantry companies that were sent to safeguard the construction of the Northern Pacific Railroad, but the bridge they were sent to guard was replaced in 1905 (except for the piers, which are not visible from Fort Abraham Lincoln). The bridge that is now minimally visible from the site has already caused a change to the historical viewshed, and the addition of a second rail bridge would have a similar effect on the setting. Importantly, a rail crossing would remain visible from this site to help tell the story of the founding of Fort Abraham Lincoln; therefore, this alternative would result in a minor impact under NEPA for Fort Abraham Lincoln.

Offset Alternative 1 would have minor temporary impacts on significant cultural resources and historic properties that have a view of Bridge 196.6 during construction from noise and visual changes. The historic Bridge 196.6 would also experience these temporary impacts. The construction duration for this alternative is estimated at 5.5 years.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

Under Offset Alternative 2, the effects to historic properties and impacts to significant cultural resources would be similar to those in Offset Alternative 1. However, unlike the bridge in Offset Alternative 1, the proposed bridge under this alternative would align two of the piers in the river and the pier on the western bank of the Missouri River with existing piers. The pier on the east bank of the river would be east of River Road, further landward than Bridge 196.6. Offset Alternative 2 also has a different design featuring two 400-foot through-truss spans. The utilization of a truss design, with tall vertical members, would impede the view of the historic Bridge 196.6 and would result in greater visual impacts than the low-profile girder design of Offset Alternatives 1 and 3. The low-profile girder design utilizes horizontal members with less structural members above the rail than a truss design. As a significant cultural resource, the historic Bridge 196.6 is considered to be a visual community icon. Under Offset Alternative 2, the bridge would remain visible, but would no longer be an active rail bridge, and the view of the bridge would be somewhat obscured by the new adjacent trusses. The inclusion of an additional truss bridge structure would be a permanent visual change to the BNSF Bridge, resulting in a moderate impact under NEPA. The presence of a new bridge would not impact Bridge 196.6 historic associations with railroad, commercial, and military history in the U.S. that qualify it for listing under Criterion A, nor would it impact its design, construction, or engineering associations that qualify it for listing under Criterion C. The presence of a new bridge would not alter or diminish the integrity of design, location, materials, workmanship, or association of the historic property. Although the setting and feeling of the historic Bridge 196.6 would be altered by the adjacent truss bridge, the defining characteristics would remain. Similar to Offset Alternative 1, the visual change of adding a new bridge 92.5 feet upstream would result in a finding of no adverse effect to the historic Bridge 196.6 under Section 106.

The new bridge would be visible from Chief Looking's Village and Crying Hill, and would be minimally visible from BIS/Fraine Barracks Historic District. Chief Looking's Village is eligible under Criterion D for its potential to yield information important to history; thus, setting is not relevant to the significance of the property. Similar to Offset Alternative 1, the potential change to the view of the historic Bridge 196.6 from the inclusion of the new bridge in the viewshed would have no adverse effect on either Crying Hill or BIS/Fraine Barracks Historic District under Section 106. Additionally, the changes to the view of the historic Bridge 196.6 from the addition of a new bridge would not change the cultural associations with either property; therefore, this alternative would result in a minor impact under NEPA for Crying Hill and BIS/Fraine Barracks Historic District.

Apple Creek Fight and On-A-Slant Village were evaluated as significant cultural resources. However, the minimal view of the bridge is not essential to those cultural associations, all of which predate the bridge. As a result, similar to Offset Alterative 1, this alternative would result in a minor impact under NEPA for these resources.

As a significant cultural resource, impacts to Fort Abraham Lincoln would be similar to those of Offset Alternative 1. However, under Offset Alternative 2, the new bridge alongside the historic Bridge 196.6 would be more visible due to the truss design, and the view of Bridge 196.6 would be more obscured. As described in the Proposed Action Alternative and Offset Alternative 1, the bridge that is now minimally visible from the site has already caused a change to the historical viewshed, and the addition of another rail bridge would have a similar effect on the setting. Importantly, a rail bridge would remain at this crossing to help tell the story of the founding of Fort Abraham Lincoln; therefore, this alternative would result in a minor impact under NEPA for Fort Abraham Lincoln.

Offset Alternative 2 would have minor temporary impacts on significant cultural resources and historic properties that have a view of Bridge 196.6 during construction from noise and visual changes. The historic Bridge 196.6 would also experience these temporary impacts. The construction duration for this alternative is estimated at 6.5 years.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

Under Offset Alternative 3, the effects to historic properties and impacts to significant cultural resources would be the same as Offset Alternative 1.

Table 24 summarizes environmental consequences for each alternative.

Table 24: Environmental Consequences Summary Table – Archaeological and Historic Resources

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	Potential long-term significant adverse effect from eventual bridge abandonment and failure.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Minor short-term noise and visual impacts from bridge construction and removal on significant cultural resources and historic properties that have a view of Bridge 196.6 during 3.5-year construction duration.	Minor long-term impacts to significant cultural resources and historic properties that have a view of Bridge 196.6. Long-term significant impact to the historic Bridge 196.6 from removal.
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Minor short-term noise and visual impacts from bridge construction and removal on significant cultural resources and historic properties that have a view of Bridge 196.6 during the 5.5-year construction duration.	Minor long-term impacts to significant cultural resources and historic properties that have a view of Bridge 196.6, and to the historic Bridge 196.6 itself, which would be retained and likely converted for recreational use.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Minor short-term noise and visual impacts from bridge construction and removal on significant cultural resources and historic properties that have a view of Bridge 196.6 during the 6.5-year construction duration.	Minor long-term impacts to significant cultural resources and historic properties that have a view of Bridge 196.6, and to the historic Bridge 196.6 itself, which would be retained and likely converted for recreational use.
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	Minor short-term noise and visual impacts from bridge construction and removal on significant cultural resources and historic properties that have a view of Bridge 196.6 during the 4.5-year construction duration.	Minor long-term impacts to significant cultural resources and historic properties that have a view of Bridge 196.6, and to the historic Bridge 196.6 itself, which would be retained and likely converted for recreational use.

Consultation

Section 5 provides a summary of consultation and coordination with SHPO, Native American Tribes, and other consulting parties. USCG initiated government-to-government and Section 106 consultation with Native American Tribes on October 26, 2017. At the request of SHPO, USCG initiated government-to-government and Section 106 consultation with additional tribes on November 2, 2017. This consultation would be ongoing throughout the EIS process. Consultation with SHPO under Section 106 was initiated on May 10, 2017. Other consulting parties were invited to participate in Section 106 in October 2017. A Section 106 PA was executed on January 15, 2021 (Appendix B). A Memorandum of Agreement is currently being developed and will serve as the implementation plan to the PA. Public involvement for Section 106 is being coordinated in compliance with environmental permitting and NEPA requirements.

3.10 Socioeconomics and Environmental Justice

NEPA requires that environmental considerations, including social and economic impacts of a project, are given due weight in the decision-making process (42 U.S.C. Sections 4321 to 4370, with federal implementing regulations in 23 CFR 771 and 40 CFR 1500 to 1508).

EO 12898 requires federal agencies to identify and address any disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. The order directs each agency to develop a strategy for implementing environmental justice. The order is also intended to promote nondiscrimination in federal programs that affect human health and the environment, as well as to provide minority and low-income communities with access to public information and public participation.

Environmental justice populations include both minority populations and low-income populations. The Office of Management and Budget defines the term “minority” as a person who is:

- Black (a person having origins in any of the black racial groups of Africa)
- Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race)
- Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands)
- American Indian and Alaskan Native (a person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition)
- Native Hawaiian or Other Pacific Islander (a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands) (EPA 2016b)

The Federal Highway Administration (FHWA) (1998) guidance defines low-income as a household income at or below the U.S. Department of Health and Human Services poverty guidelines.

3.10.1 Affected Environment

The study area, for purposes of the socioeconomic and environmental justice analysis, includes the census tracts containing the Project (the Proposed Action Alternative and Offset Alternatives 1 through 3).

The west side of the Project is east of the city limits of Mandan in Morton County, but within the Mandan Extra Territorial Area. Offset alternatives extend further west into the city limits of Mandan. Zoning on the west side of the Project is ROW and heavy commercial/light industrial restricted. The racial composition of the city of Mandan and Morton County is primarily White, at 88.8 and 91.2 percent, respectively (U.S. Census Bureau 2019). The largest minority group in the area is American Indian and Alaskan Native, constituting 4.2 percent of the city population and 3.3 percent of the county population. The city of Mandan contains a higher proportion of residents living in poverty (9.6 percent) than Morton County (8.1 percent), but is lower than the state of North Dakota (10.9 percent).

The east side of the Project is in the city limits of Bismarck in Burleigh County, North Dakota. East of the Missouri River, the Project area for all build alternatives is within in the city of Bismarck. Zoning on the east side of the Project is Public Use. The racial composition of the city of Bismarck and Burleigh County is primarily White, at 90.3 and 91.3 percent, respectively (U.S. Census Bureau 2019). The largest minority group in the area is American Indian and Alaskan Native, constituting 3.9 percent of the city population and 3.8 percent of the county population. The city of Bismarck contains a higher proportion of residents living in poverty (9.2 percent) compared to Burleigh County (8.1 percent), but is lower than the state of North Dakota (10.7 percent).

Table 25 highlights key social and economic characteristics of the year-round residential population for the study area, the cities of Mandan and Bismarck, and Morton and Burleigh counties. Data have been retrieved from the 2019 American Communities Survey, which provides 5-year estimates of population and housing demographics based on a sampling of the population.

In addition to year-round residents, tourists and part-time residents are accommodated by the numerous motels, condominiums, lodges, seasonal homes, and trailer and recreational vehicle parks in the region (FHWA 1998).

The EJSCREEN: Environmental Justice Screening and Mapping Tool (EPA 2020b) was used to identify potential environmental justice populations in the Project area. Census tracts in the Project area are below the 95th percentile for environmental justice populations. Surrounding census tracts contain potential environmental justice populations (low-income populations, linguistically isolated populations, less than high-school educated populations, and populations under the age of 5 or over the age of 64) greater than the 95th percentile.

Table 25: Key Social and Economic Characteristics (2019 American Community Survey 5-year Estimates)

Key Social and Economic Characteristic	Subject	Study Area, Census Tract 105	Study Area, Census Tract 106	Study Area, Census Tract 203	City of Mandan	City of Bismarck	Morton County	Burleigh County	State of North Dakota
Population, age, and race	Total population	5,312	4,009	10,198	22,301	72,777	30,868	94,793	756,717
Population, age, and race	Persons under 18	22%	19.2%	22.4%	21.7%	21.8%	21.7%	23.2%	23.2%
Population, age, and race	Persons 65 years and over	14%	19.8%	12.6%	14.7%	17%	16%	15.6%	14.9%
Population, age, and race	White	88.6%	84.5%	89.6%	88.8%	89.9%	91.2%	90.6%	86.6%
Population, age, and race	Black or African American	4.4%	2.6%	0.4%	1.4%	2.7%	1%	2.3%	2.9%
Population, age, and race	American Indian and Alaska Native	1.2%	11.6%	4.7%	4.2%	4.3%	3.3%	4.2%	5.3%
Population, age, and race	Asian	0.6%	0%	1.6%	0.9%	0.9%	0.7%	0.8%	1.5%
Population, age, and race	Native Hawaiian and other Pacific Islander	0.8%	0.1%	0%	0%	0.1%	0%	0.1%	0.1%
Population, age, and race	Some other race alone	0%	0%	0.1%	2%	0.3%	1.7%	0.2%	1.1%
Population, age, and race	Two or more races	4.3%	1.5%	3.6%	2.7%	1.8%	2.1%	1.8%	2.6%
Education, income, unemployment, and poverty	Percent educational attainment, high-school graduate or higher (over 25 years old)	97.8%	94.4%	91.2%	91.8%	93.8%	91.9%	94.3%	92.6%

Key Social and Economic Characteristic	Subject	Study Area, Census Tract 105	Study Area, Census Tract 106	Study Area, Census Tract 203	City of Mandan	City of Bismarck	Morton County	Burleigh County	State of North Dakota
Education, income, unemployment, and poverty	Median household income (in 2017 dollars)	$70,366	$66,845	$72,576	$69,014	$64,444	$70,556	$71,524	$64,894
Education, income, unemployment, and poverty	Percent below poverty level	10.9%	13.1%	7.7%	8.2%	9.2%	7.4%	8.1%	10.7%
Education, income, unemployment, and poverty	Unemployment rate	1%	3.3%	1.9%	3.5%	2.3%	2.1%	2.1%	2.8%
Housing	Total housing units	2,360	2,206	5,159	10,640	34,663	15,002	42,574	373,063
Housing	Occupied housing units	2,123	1,960	4,566	9,856	32,044	13,565	39,507	318,322
Housing	Homeowner vacancy rate	3.1%	6.5%	4.7%	3.3%	1.6%	2.9%	1.3%	1.8%
Housing	Rental vacancy rate	15.8%	8.9%	6.6%	3%	8.5%	3.5%	8.2%	9.6%
Housing	Median owner housing costs (monthly)	$1,455	$1,390	$1,921	$1,457	$1,596	$1,438	$1,632	$1,426
Housing	Median gross rent (monthly)	$886	$756	$1,052	$868	$867	$861	$871	$826

Source: U.S. Census Bureau 2019

3.10.2 Environmental Consequences

The following subsections describe the environmental consequences for each alternative.

Alternative 1: Maintain Existing Structure (No Action)

The No Action Alternative would result in no construction activity other than routine maintenance activities. Continued operations and increasing maintenance needs over time would result in impacts that are expected to be similar for adjacent population groups and would not result in disproportionately high and adverse impacts to potential environmental justice populations. Surrounding census tracts contain potential environmental justice populations (low-income populations, linguistically isolated populations, less than high-school educated populations, and populations under the age of 5 or over the age of 64), but these are not expected to be affected by the No Action Alternative.

Proposed Action and Offset Alternatives

Construction activities under the Proposed Action Alternative and the offset alternatives (Offset Alternatives 1 through 4) would not result in the relocation of businesses or residents. Some of the construction activities would be visible from adjacent areas. Section 3.13 indicates that construction noise would be detectable in the Project area, but would be minimized through several measures implemented by the construction contractor, including a Construction Noise Logistics Plan that would specify timing and provide notification to the community. Census tracts in the Project area are below the 95th percentile for environmental justice populations. Section 3.10.1 describes surrounding census tracts that contain potential environmental justice populations (low-income populations, linguistically isolated populations, less than high-school educated populations, and populations under the age of 5 or over the age of 64) greater than the 95th percentile, though impacts to these populations are not anticipated.

The potential impact to the local economy would depend partially on construction methods and purchase decisions made by a construction contractor that has not been selected. Unknown variables include the use of local versus nonlocal workers and materials, the need for specialized construction expertise that may not be available locally, the need for housing for nonlocal workers, and the actual duration of employment. Although the intensity and magnitude of impacts cannot be estimated due to these unknown variables, impacts to the local economy are not anticipated to be adverse, but would likely result in some level of beneficial impacts associated with the potential creation of jobs over the 3.5- to 7.5-year life of the Project, such as lower unemployment rates, increased median household incomes, increased housing occupancy, increased consumer spending, and a reduced number of individuals living in poverty.

Rental vacancies in Mandan and Bismarck counties are relatively low (3.5 and 8.5 percent, respectively). If a sufficient number of rental units are not available in the study area and/or the cities to accommodate the temporary increase in housing needs, construction workers may need to travel farther outside of the cities to find available housing or they may add pressure to the existing housing market in the area. The increased demand for temporary housing may result in an increase in rental rates within the cities and counties. Additional housing construction over the life of the Project may decrease housing pressures related to the Project.

To the extent that construction workers would be attracted from outside the Mandan-Bismarck area, local hotel and restaurant sales revenues are expected to increase during construction. No permanent roadway closures are anticipated and any potential impacts to local businesses would be minimized by timing restrictions and pedestrian and vehicle access requirements during construction activities near River Road; therefore, construction activities are not expected to restrict or prohibit access to local businesses, decrease local business revenues, or result in substantial disruptions to the tourist industry. Section 4 provides recommended measures to minimize potential effects to the local economy and community facilities during construction.

No measurable impact is anticipated to long-term employment, employee retention, or the overall ability of the region to attract employers. Overall, the build alternatives for the Project:

- Would not displace any businesses or residences
- Would not separate any residences from community facilities or affect community cohesion
- Would not result in any job losses or affect long-term employment
- Would not eliminate any existing parking within the study area

Table 26 summarizes environmental consequences for each alternative.

Table 26: Environmental Consequences Summary Table – Socioeconomics and Environmental Justice

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	No change to ongoing maintenance activities.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Short-term benefits due to construction job creation and business revenue.	No long-term measurable change to population or employment.
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Short-term benefits due to construction job creation and business revenue.	No long-term measurable change to population or employment.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Short-term benefits due to construction job creation and business revenue.	No long-term measurable change to population or employment.
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	Short-term benefits due to construction job creation and business revenue.	No long-term measurable change to population or employment.

3.11 Land Use and Recreation

This section contains a combined analysis of the potential effects of the Project on land use and recreational resources. These two resources are closely related because most of the impacts on land uses are recreational resources. Temporary construction-related activities, permanent

Project structures, and long-term operations would occur within the BNSF ROW, but nearby land uses along the Missouri River include recreational resources.

3.11.1 Affected Environment

Bridge 196.6 straddles the Missouri River and connects the cities of Mandan and Bismarck. The area surrounding the Project supports multiple land uses including transportation corridors, recreational resources, residences, and Bismarck State College. This section focuses on the land use within the Project area.

Land Use and Zoning

The west side of the Project is east of the city limits of Mandan in Morton County, but within the Mandan Extra Territorial Area. On the west approach to the Project, the majority of the Project area is zoned as ROW by the City of Mandan. The cropland south of the main line and east of I-194 is zoned as Agriculture. The proposed access route Project area is also zoned as ROW, except for the corner of Captain Leach Drive and Captain Marsh Drive, north of the I-94 Business/Memorial Highway, which is zoned as Commercial/Light Industrial Transition, and two parcels, which are zoned as Business Commercial along Marina Road, south of the I-94 Business/Memorial Highway (City of Mandan 2020b). The offset alternatives extend further west into the city limits of Mandan and are zoned as ROW.

On the east approach in Bismarck, the entire Project area is zoned as Public Use (Bismarck 2020).

Land cover for the Project area includes developed land, woody wetlands, emergent wetlands, herbaceous vegetation, hay and pasture, and cultivated crops along the ROW realignment on the west side of the Project. The Missouri River is defined as open water. The east side of the Project is developed land and herbaceous vegetation (Figure 8).

Recreational Resources and Special Land Use

Multiple recreational resources are in the Project area and border the Missouri River, including three trails, three parks, one natural area, a rodeo racetrack, a soccer field, and a golf course. Table 27 lists recreational resources up to 2,000 feet from the existing BNSF main line.

Table 27: Recreational Resources in the Project Area

Recreational Resource	Location	Approximate Distance (feet)[a]
Mandan Missouri River Bike Trail (unofficial, unmaintained)	Mandan Extra Territorial Area	0
MRNA	Mandan Extra Territorial Area	0
Riverfront Trail	Bismarck	0
Steamboat Park	Bismarck	250
Mandan Rodeo Days/Dakota Centennial Park	Mandan	700

Recreational Resource	Location	Approximate Distance (feet)[a]
Dacotah Community Bank & Trust Soccer Field	Mandan	780
Keelboat Park	Bismarck	1,000
Prairie West Golf Course	Mandan	1,350
Longspur Trail	Mandan	1,400
Pioneer Park	Bismarck	2,000

[a] Approximate distance is measured from the existing BNSF main line. The distance to the Project APE would vary for each alternative.

The unofficial Mandan Missouri River Bike Trail and the Riverfront Trail are multi-use trails that line the Missouri River. Both cross under the existing BNSF main line within the Project area. The unofficial Mandan Missouri River Bike Trail loops through the Missouri River State Natural Area, north of I-94, then travels 2.4 miles south to Captain Leach Lane (Mandan Parks and Recreation 2020). This trail is not an officially maintained bike trail. The Riverfront Trail is a 2.1-mile-long trail connecting Pioneer Park to Sertoma Park in Bismarck (Bismarck Parks and Recreation District 2020).

The Missouri River State Natural Area is a 157-acre nature preserve located northeast of the Project, bordering the west approach to the bridge. Over 5 miles of trails loop through the native woodlands and are used by cyclists, hikers, fishermen, and bird watchers, as well as cross-country skiers and snowshoers in winter. The area is managed by NDPR, in cooperation with NDDOT, Morton County Parks, and the City of Mandan. The area adjacent to the BNSF ROW includes the unofficial Mandan Missouri River Bike Trail, but no other amenities are provided in this section of the park; the majority of the park is north of I-94 (NDPR 2020).

Steamboat Park, Keelboat Park, and Pioneer Park are all on the east bank of the Missouri River and are managed by the Bismarck Parks and Recreation District. Steamboat Park is a small, 6.4-acre park, approximately 250 feet from the existing BNSF main line, and is notable for its replica steamboat (Bismarck Parks and Recreation District 2015b). Keelboat Park, approximately 1,000 feet north of the Project, includes a boat ramp for public use (Bismarck Parks and Recreation District 2012). Vessel operation in the Missouri River is primarily by motor vessels of varying size and human-powered watercrafts. The highest use period is typically summer weekends and holidays. The Lewis & Clark Riverboat also operates traditional steamboat cruises along the Missouri River, including under the existing Northern Pacific Railway Bridge, from Keelboat Park from May through September (Lewis & Clark Riverboat 2019). Pioneer Park is a 51-acre park north of Keelboat Park with trails, picnic areas, volleyball courts, and other amenities, and is the trailhead of the Riverfront Trail (Bismarck Parks and Recreation District 2015a).

Mandan Rodeo Days/Dakota Centennial Park, the Dacotah Community Bank & Trust Soccer Field, the Prairie West Golf Course, and Longspur Trail are all southwest of the I-94 Business/Memorial Highway and its commercial zone. Due to distance and intervening noise-producing land uses, these recreational resources are not expected to be affected by the Project and are not discussed further in this subsection.

Bridge 196.6 is visible from Chief Looking's Village, which is located approximately 3,700 feet (0.7 mile) to the north. Section 3.12 provides more information regarding visual impacts to this resource. Bridge 196.6 is not visible from Sertoma Park due distance from the Project and tree cover. As such, this subsection does not discuss this recreational resource any further.

Marine traffic under the railroad bridge includes frequent summer recreational watercrafts and the Louis & Clark Riverboat. The Lewis & Clark Riverboat is the largest vehicle known to traverse under the bridge and makes up to four trips per day during the summer months. Recreational watercrafts typically use the river during the peak recreational boating season, which is between May and September. Section 3.15 provides more information regarding river traffic.

The City of Bismarck operates a city water facility and associated infrastructure on the east side of the Project area, northeast of the existing ROW. This facility is referred to as the West End Reservoirs and includes three underground water takes and associated piping, which supports the municipal water distribution network (City of Bismarck 2020b).

3.11.2 Environmental Consequences

The following subsections describe the environmental consequences for each alternative.

No Action Alternative

Under the No Action Alternative, there would be no change in legal land use or recreational uses over the short or long term. BNSF would continue to maintain and operate the existing railroad and exercise access control over the land granted for the railroad ROW. Temporary indirect impacts could occur during future maintenance activities that could, depending on the extent of maintenance activities required, produce unwanted noise, affect views of the existing Northern Pacific Railway Bridge from recreational resources, or temporarily limit use of the unofficial Mandan Missouri River Bike Trail and the Riverfront Trail. There would be no change in the navigational clearance through this section of the Missouri River.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

Under the Proposed Action Alternative, there would be no temporary change to land use or zoning within the BNSF ROW. Similar to the No Action Alternative, BNSF would continue to maintain and operate the existing railroad and exercise access control over the land granted for the railroad ROW. Bridge 196.6 is within the BNSF ROW, which would not change due to bridge removal. No additional ROW would need to be acquired.

The duration of all construction activities is estimated to be 3.5 years, with construction performed in multiple stages. The Proposed Action Alternative would require temporary trail and road closures during certain stages of construction. Contractor operations would impact the use of the unofficial Mandan Missouri River Bike Trail, the Riverfront Trail, and River Road during:

- Construction of temporary access roads and crane pad
- Construction of Pier 4
- Erection of the Span 4 girders

To complete these activities, it is anticipated that River Road would be closed for several days and trails would be closed for several months. Impacts to other nearby recreational resources are largely indirect visual and noise impacts. Sections 3.12 and 3.13 provide further discussion. No closures would be required at Steamboat Park, Keelboat Park, and Pioneer Park, but the temporary construction activities and new bridge would be visible, and potentially heard, from these locations. The construction duration of the Proposed Action Alternative (3.5 years) would be shorter than the construction duration of the offset alternatives. Additionally, the eastern and western bank retaining walls would not be necessary for construction of the Proposed Action Alternative, which would minimize impacts to trails on the east side of the Project.

During construction, recreational use of the Missouri River would be likely be restricted and the narrowest horizontal navigational clearance between an existing pier and cofferdam would be approximately 40 feet (Appendix I). In addition to the anticipated temporary navigation restrictions during construction, interruptions are also anticipated when Bridge 196.6 is removed, which would occur span-by-span (Section 2). Removal of the two outer spans is not expected to impact the primary navigation channel. The interior span, however, would require installation of a temporary supports within the channel. Removal of the interior span would affect recreational use of the Missouri River for approximately one season.

The Proposed Action Alternative would not result in permanent changes to the land use or zoning. It would also result in no permanent changes to the unofficial Mandan Missouri River Bike Trail and the Riverfront Trail. The earthwork required to align the track with the new bridge would result in permanent changes to the trails throughout the Project area.

Because the Proposed Action Alternative would be constructed within the existing BNSF ROW, it would not affect either the MRNA or the Bismarck West End Reservoirs.

Installation of the new bridge would permanently decrease the horizontal and vertical navigational clearance (Appendix I). This reduction in clearance is not anticipated to limit or have an adverse impact to recreational traffic, including the Lewis & Clark Riverboat. USCG addresses navigation and navigation safety through the General Bridge Act as part of the USCG navigational authorities when reviewing bridge permit applications. The scope of this DEIS is limited to environmental impacts. USCG has provided BNSF with clearance requirements and pier placement guidance related to navigation, which has informed the development of alternatives selected for consideration in this DEIS.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

Construction of the new bridge and connecting railway would result in changes to land use as the new structures would include a larger Project area than the Proposed Action Alternative. Constructing the new bridge 92.5 feet upstream of the existing track alignment would require extensive modifications to the approach track on the eastern and western sides of the Missouri River to align with the new bridge position. Offset Alternative 1 would require construction of retaining walls (Section 2). Retaining walls would be necessary to avoid impacts to current land use of the MRNA and the City of Bismarck West End Reservoirs. On the west side of the Project, the 92.5-foot track offset would encroach on the MRNA to the north, requiring a retaining wall to stay within the BNSF ROW. On the east side of the Project, the City of Bismarck indicated that replacing or removing fill from the hillside between the facility and the proposed Offset Alternative 1 would affect the Bismarck West End Reservoirs, which would be minimized through construction of a retaining wall. Section 2.2.3 further details retaining wall construction for Offset Alternative 1. Construction of retaining walls on the east and west sides of the Project would result in temporary visual and noise impacts, as well as impacts to trails within the Project area.

The existing bridge would be retained and would likely be converted for recreational pedestrian use, resulting in a change in land use. Recreational user experience of the converted bridge would be impacted by the train traffic on the new bridge located 92.5 feet away. BMPs previously listed in Section 3.11.2 would be implemented, as necessary.

Short-term impacts on recreational navigation, resulting from construction of the new bridge, would be similar to those associated with the Proposed Action Alternative. Construction of Offset Alternative 1 is anticipated to take approximately 2 years longer to build than the Proposed Action Alternative, which may extend the duration of recreational navigation impacts associated with bridge construction. Offset Alternative 1 does not include demolition of Bridge 196.6, which reduces impacts to recreational navigation less than the Proposed Action Alternative.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

Many of the impacts to land use and recreation would be similar to Offset Alternative 1. Construction of retaining walls on both the eastern and western banks of the Missouri River would be in the same location and have the same configuration as those identified for Offset Alternative 1, as the new bridge would be built in the same location, 92.5 feet upstream from the existing structure.

Trail closures during construction would also occur, similar to those of Offset Alternative 1.

In addition, Offset Alternative 2 would require significant falsework in the Missouri River to support the larger spans during construction. Sufficient space between cribbing would be maintained to allow watercrafts to pass under the falsework, but would result in a more significant temporary impact to recreational uses of the Missouri River than the Proposed Action Alternative or Offset Alternative 1.

Indirect impacts to other nearby recreational resources would be similar to Offset Alternative 1. Also similar to Offset Alternative 1, retaining walls would be required to avoid land use impacts to the MRNA and the Bismarck West End Reservoirs. Section 2.2.4 discusses retaining walls for

Offset Alternative 2 in further detail. BMPs previously listed in Section 3.11.2 would be implemented, as necessary.

In the short term, recreational navigation impacts associated with construction of the new bridge would exceed those identified for the Proposed Action Alternative or Offset Alternative 1. It is not feasible to float in 400-foot truss spans to this location of the Missouri River and accordingly, temporary falsework would need to be constructed across the majority of the river cross section to build the truss spans in place. Falsework would be in place for up to 18 months and would result in short-term impacts to recreational users of the Missouri River. Construction of Offset Alternative 2 is anticipated to take approximately 3 years longer to build than the Proposed Action Alternative, which may extend the duration of recreational navigation impacts associated with bridge construction.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

Many of the impacts to land use and recreation would be similar to the other offset alternatives. Offset Alternative 3 would require retaining walls on the eastern and western banks of the Project. The western bank retaining wall would be smaller for Offset Alternative 3.

Temporary trail closures during construction activities and other recreational impacts would also be similar to the other offset alternatives. If the existing Northern Pacific Railway Bridge is retained and the bridge is converted for recreational use, recreational user experience of the converted bridge would be impacted by the train traffic on the new bridge, located 42.5 feet away.

Temporary recreational navigation impacts associated with construction of the new track and bridges would be expected to be similar to those associated with the Offset Alternative 1. Also similar to Offset Alternative 1, retaining walls would be required to avoid land use impacts to the MRNA and the Bismarck West End Reservoirs. Section 2.2.5 discusses retaining walls for Offset Alternative 3 in further detail.

Construction of Offset Alternative 3 is anticipated to take approximately 1 year less to build than Offset Alternative 1, which may reduce the duration of recreational navigation impacts associated with bridge construction. BMPs in Section 3.11.2 would be implemented, as necessary.

Table 28 summarizes environmental consequences for each alternative.

Table 28: Environmental Consequences Summary Table – Land Use and Recreation

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	No change to ongoing maintenance activities.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Minor short-term impacts from trail closures, impacts to recreational use of the Missouri River, noise and visual impacts to nearby recreational resources, and bridge removal.	Minor long-term adverse impact to navigational clearance.

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Minor short-term impacts from trail closures, impacts to recreational use of the Missouri River, and noise and visual impacts to nearby recreational resources.	Minor long-term adverse impacts due to construction of the retaining walls. The existing bridge would be retained and would likely be converted for recreational use.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Minor short-term impacts from trail closures, impacts to recreational use of the Missouri River, and noise and visual impacts to nearby recreational resources. Short-term impacts to recreational users of the Missouri River due to falsework needed for the 400-foot spans.	Minor long-term adverse impacts due to construction of the retaining walls. The existing bridge would be retained and would likely be converted for recreational use.
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	Minor short-term impacts from trail closures, impacts to recreational use of the Missouri River, and noise and visual impacts to nearby recreational resources.	Minor long-term adverse impacts due to construction of the retaining walls. The existing bridge would be retained and would likely be converted for recreational use.

3.12 Visual Quality

This section discusses visual changes that may be perceived by people viewing the proposed replacement bridge, as well as both bridges during and after construction, if an alternative that proposes retention of Bridge 196.6 is selected. The visual quality analysis for this Project was conducted in accordance with the *Visual Impact Assessment for Highway Projects* (FWHA 1988) and the subsequent update, *Guidelines for the Visual Impact Assessment of Highway Projects* (FHWA 2015), which define recommendations for conducting a Visual Impact Assessment. These methodologies provide definitions and procedures for evaluating existing and proposed changes to the landscape. While this Project is not subject to FHWA guidelines, they provide a useful and widely accepted framework and industry standard for analyzing visual impacts of linear corridors that results in a focused yet comprehensive analysis process. Applying this process helps to mitigate the inherent subjective nature of visual resources and establishes procedures that are repeatable by other experts. The process that has been used in this Visual Impact Assessment follows these steps:

1. Determine the Project elements.
2. Determine the visual extent of the Project, which may extend far beyond construction limits.
3. Describe the visual character of the affected environment and representative key views.
4. Determine who has views toward and from Project elements, and evaluate their sensitivity.
5. Describe and evaluate the same representative views toward the Project after construction, based on changes to visual quality. Incorporate computer simulations to demonstrate proposed changes.

6. Identify minimization and mitigation measures to help offset any anticipated adverse impacts.
7. Analyze cumulative impacts.

Changes to visual quality have been determined by comparing existing conditions to changes expected under each alternative. Landscapes can be characterized by landform, water, vegetation, and humanmade elements. Landscapes can be analyzed for visual quality according to three independent criteria (FHWA 1988):

- Vividness: The memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern.
- Intactness: The integrity of visual order in the natural and humanmade landscape, and the extent to which the landscape is free from visual encroachment.
- Unity: The degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. Refers to the compositional harmony or intercompatibility between landscape elements.

Viewer types include neighbors (for example, local residents and recreationists) and travelers (commuters, tourists, and shipping travelers) with views of Bridge 196.6. The sensitivity of viewers to changes in the landscape is the consequence viewer exposure (the proximity, the number of viewers, and the view duration) and viewer awareness (the attention, the focus, and any protections placed on views) (FHWA 2015).

This Visual Impact Assessment incorporates a numerical rating system used in the methodology for the *Visual Impact Assessment for Highway Projects* (FHWA 1988) to define the visual quality of specific views. This system helps remove subjectivity and demonstrates how and why changes in visual quality would occur. Appendix O includes the rating worksheets, as well as more detailed information in support of this analysis.

3.12.1 Affected Environment

An area of visual effect, or viewshed, has been defined for this Project (Figure 12). The area of visual effect is an area with a line-of-sight (exclusive of vegetation) that looks toward and away from the Project. The construction limits for this Project are from 3rd Street and Memorial Highway in Mandan to the intersection of the railroad and Schaefer Street in Bismarck. Bridge 196.6 is slightly visible from Crying Hill in Mandan and Fort Abraham Lincoln, south of Mandan on the west side of the river. Views of Bridge 196.6 from Sertoma Park, which is south of Memorial Bridge on the east side of the river, are mostly impeded. Public views of Bridge 196.6 from the east are primarily bound to 0.5 mile from the river centerline due to topography. Most public views of Bridge 196.6 on the west side of the river are generally bound by I-194, approximately 0.5 mile west of the river centerline; therefore, the area of visual effect includes these farthest discernable views and Project construction limits.

The landscape of the area of visual effect is primarily urban, with Mandan on the west side, and Bismarck on the east side of the Missouri River. Captains' Landing Township, a "rural residential and agricultural area" (Bismarck-Mandan MPO 2010), is between Mandan and the river, and between I-94 and Memorial Highway. The river is generally flat, approximately 1,000 feet wide, depending on the season and the water level, and is a prominent natural feature. Although some development is visible adjacent to the river, its banks are primarily occupied by vegetation, which obscures many structures and creates an overall natural appearance. During leaf-on seasons, the vegetation interjects a bright green color of various textures that contrasts with the waterway. The color of the river varies depending on light conditions. During leaf-off seasons, the trees display a brown, spindly texture that provides more open views. In winter, trees can be covered in frost or snow, and the river can be covered with an expansive coating of bright, choppy snow and/or ice. Without snow cover, the winter backdrop tends to be shades of beige and brown (Figure 13).

The river is crossed by two major highways that are located north and south of Bridge 196.6: I-94 via the Grant Marsh Bridge, approximately 0.4 mile north of Bridge 196.6, and Memorial Highway via the Memorial Bridge, approximately 0.8 mile south. Where directly over water, these highway bridges provide unobstructed views of Bridge 196.6. Both highway bridges consist of beams with simple deck slabs that create a smooth, continuous horizontal line over the river.

Riverfront Trail, a paved multi-use path, and River Road, a local two-lane paved road, parallel the eastern shoreline between Grant Marsh Bridge and Memorial Bridge. Both provide views of Bridge 196.6 that are intermittently interrupted by mature vegetation that occasionally screen views to the river, which is more prominent during leaf-on seasons. Two riverfront parks, Keelboat Park and Steamboat Park, are accessible from River Road, immediately north and south of Bridge 196.6, and afford views of the bridge. Some views from Steamboat Park, the smaller of the two parks, are partially obscured by riverside vegetation.

The topography rises considerably directly east of River Road, and gains elevation as the road travels north. Beyond this rise, directly east of Bridge 196.6, is an expansive tract of undeveloped land that is associated with Bismarck State College. A small amount of visually unobtrusive commercial development is located to the south along Riverfront Road near Memorial Bridge. Pioneer Park and Pioneer Outlook Park are north of I-94, on the east side of the river, and provide access to Riverfront Trail. Dense, mature vegetation prevents views from these parks, but Bridge 196.6 is intermittently visible from some areas of the trail. Bridge 196.6 is also visible from Chief Looking's Village on a hill, approximately 0.8 mile from Bridge 196.6.

Figure 12: Area of Visual Effect

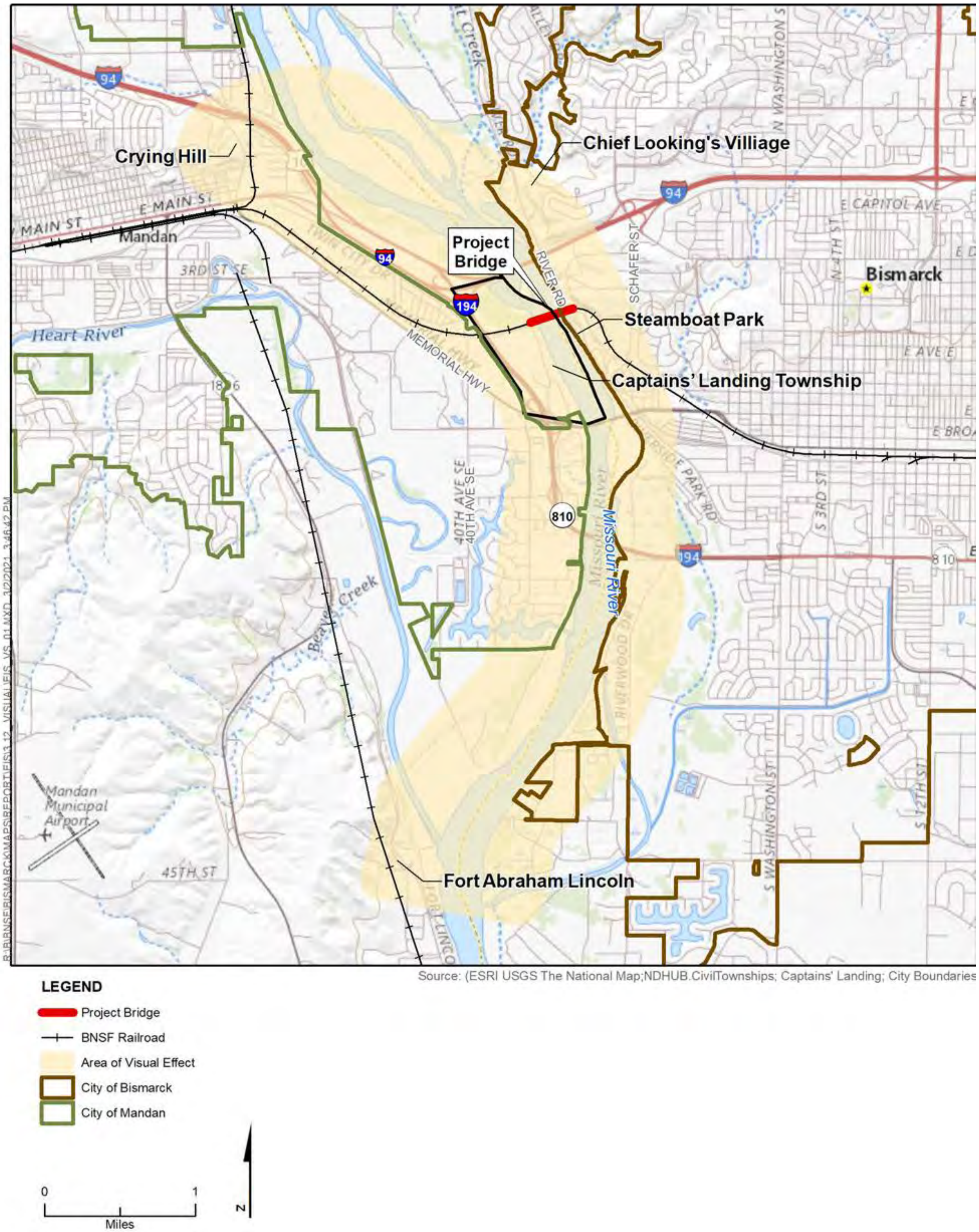


Figure 13: Bridge 196.6 Looking South from Grant Marsh Bridge

3.12.2 Environmental Consequences

The following subsections describe the environmental consequences for each alternative.

Alternative 1: Maintain Existing Structure (No Action)

The No Action Alternative would not immediately change the visual environment and, therefore, would result in no new visual impacts. However, Bridge 196.6 would eventually show signs of continued wear and could potentially fail. In such an event, views of the bridge would be temporarily replaced with wreckage of the partially or completely collapsed structures. A new, modern design bridge would likely be constructed in its place.

Proposed Action Alternative: 20-foot Offset, 200-foot Span, Remove Existing Structure

Under the Proposed Action Alternative, Bridge 196.6 would be removed and a new 200-foot span, single-track, welded steel-plate girder bridge would be built approximately 20 feet from the center of Bridge 196.6. Figure 14 depicts an existing panoramic view from Keelboat Park. Figure 15 depicts the same view with the Proposed Action Alternative in place. The new railroad bridge would have a similar appearance to the existing Grant Marsh Bridge 0.4 mile to the north (but in a neutral color), consisting of a long, horizontal deck atop broad, concrete piers. The new bridge would introduce more vertical structures (piers) than the Bridge 196.6 (five compared to two), and the deck sides would be slightly higher, creating a heavier horizontal line. Removing the distinctive repeating pattern created by the dark trusses would noticeably reduce the vividness and memorability of the bridge, resulting in substantial long-term adverse impacts to sensitive viewers. Although the new bridge would not demonstrate repeating patterns or shapes, it would retain a high degree of visual order and completeness. Most views would remain symmetrical and balanced, but the new bridge would be less of a focal point without pattern elements and shapes formed by trusses, thereby diminishing unity.

The approach track would be shifted slightly to the north, but within the existing ROW, with no impacts to landform or vegetation. Replacing approximately 0.8 mile of new rail would have no noticeable visual impacts.

This alternative would somewhat support the goal of the *City of Bismarck's Infill and Redevelopment Plan* to "promote efforts to beautify, preserve and enhance our aesthetically pleasing community" (City of Bismarck 2017), and would not "diminish" the viewshed of the natural landscape from Fort Abraham Lincoln State Park "by incompatible development" (Morton County 2018).

Figure 14: Bridge 196.6 Looking South from Keelboat Park, Existing Conditions

Figure 15: Bridge 196.6 Looking South from Keelboat Park, Simulation of Proposed Action

Construction activities are estimated to take approximately 5.5 to 6.5 years and would be completed in multiple stages. Construction staging would occur on both sides of the river, but would focus primarily on the western side in the undeveloped agricultural area east of I-194 and south of the bridge. Removal of Bridge 196.6 would result in temporary visual impacts related to demolition and cleanup activities. Fixed navigational lighting, required by USCG, would be implemented and would be comparable to existing navigational lighting.

The vividness and memorability of Bridge 196.6 function as a visual icon (U.S. Department of Homeland Security 2017) of the area, the removal of which would result in substantial, long-term, adverse impacts to a high number of sensitive viewers. For these reasons, overall long-term, moderately high, adverse visual impacts would result from this alternative. Adverse construction impacts would be temporary and, therefore, not significant.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

Under Offset Alternative 1, Bridge 196.6 would remain in place and a new 200-foot span, single-track, welded steel-plate girder bridge would be built approximately 92.5 feet from the center of Bridge 196.6. The new bridge would add a bolder horizontal deck line and five additional piers, some of which would be aligned with existing piers, but would appear offset when viewed at an angle. Because the Bridge 196.6 would be retained, the distinctive repeating pattern created by the dark trusses would remain, which would retain the existing vividness and intactness, and provide long-term beneficial impacts to sensitive viewers. From some views, the two bridges would appear as one, heightening intactness; from others, the two tracks would be noticeably separate. Similarly, from some views, some of the new piers would be aligned with existing piers, aiding intactness. The darker, heavier feel of the new bridge deck would help to visually anchor views of the trusses on Bridge 196.6 from most views, making them appear as one bridge (Figure 16).

Figure 16: Bridge 196.6 Looking South from Keelboat Park, Simulation of Offset Alternative 1

A 35-foot-high retaining wall would be constructed west of the bridge, generally between I-194 and the Missouri River, on the north side of the tracks. A 48-foot-high, soldier-pile lagging wall would be built on the east side of the river, in the hill just north of the curve in the railroad tracks. A total of 28,900 cubic yards of material would be removed. The wall on the western side would not be visible to most viewers. Steep topography and vegetation would block most views of this wall, which would be visible primarily from farther distances.

The railroad bridge over I-194 would be replaced. The new bridge would be visually similar to Bridge 196.6 and would result in neutral impacts. Replacing approximately 1.6 miles of new rail would have no noticeable impacts.

This alternative would support the *City of Bismarck's Infill and Redevelopment Plan* (City of Bismarck 2017) goal to "promote efforts to beautify, preserve and enhance our aesthetically pleasing community," and would not "diminish" the viewshed of the natural landscape from Fort Abraham Lincoln State Park "by incompatible development" (Morton County 2018).

The existing vividness and memorability of the bridge would be retained, affecting a high number of both static and dynamic viewers. For these reasons, overall long-term, neutral to minor, adverse visual impacts would result from this alternative compared to existing conditions. Temporary adverse construction impacts would be similar to the Proposed Action Alternative.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

Bridge 196.6 would remain in place and a new 400-foot span, double-track, steel truss bridge would be built approximately 92.5 feet from the centerline of Bridge 196.6. The result would be two side-by-side truss bridges. The new bridge would add the same number of piers as Bridge 196.6, which would be aligned in most views. Additional trusses, when viewed directly ahead, would be aligned with existing trusses and would result in high levels of vividness, intactness, and unity (Figure 17, east [right]). However, the alignment would become greatly skewed from any other perspective or viewing angle (above or below). In such cases, the dual truss patterns would create a visual jumble of lines that are vivid, but highly discordant (Figure 17, west [right]).

Figure 17: Bridge 196.6 Looking South from Keelboat Park, Simulation of Offset Alternative 2

The piers would be occupied by tracks on both sides, and would appear balanced when viewed from above. Retaining walls would be the same as Offset Alternative 1. The new approach track would be located slightly to the north of the existing track. In addition, the railroad bridge over I-194 and track replacement would be the same as Offset Alternative 1.

This alternative would support local plans, as described for Offset Alternative 1.

Long-term impacts are expected to affect a high number of sensitive viewers, who would retain views of Bridge 196.6 in conjunction with the new truss bridge. Moderate adverse impacts would result from the discordant, disharmonious effect of conflicting truss patterns compared to existing conditions. Temporary, adverse construction impacts would be similar to the Proposed Action Alternative.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

Offset Alternative 3 would have the same impacts as Offset Alternative 1, with minor differences. The new bridge and Bridge 196.6 would be closer together (92.5 feet apart for Offset Alternative 1 versus 42.5 feet apart for Offset Alternative 3). This would result in a higher likelihood of the bridges appearing as one from many views, enhancing intactness and unity. Although the number of piers would be the same for both alternatives, they would not be aligned with Bridge 196.6 under this alternative, which would slightly degrade intactness and unity (Figure 18).

Figure 18: Bridge 196.6 Looking South from Keelboat Park, Simulation of Offset Alternative 3

Offset Alternative 3 would also include retaining walls on both sides of the river, but the height of the walls on the eastern side would be about half that proposed under Offset Alternative 1, making them less visible with less impact to intactness. The railroad bridge over I-194 would be replaced, as described for Offset Alternative 2. As per the Proposed Action Alternative, 0.8 mile of new track would be replaced, with no noticeable visual impact.

This alternative would support local plans, as described for Offset Alternative 1.

Impacts to sensitive viewers would be the same as Offset Alternative 1, but with a very slightly heightened impact from misaligned piers. As with Offset Alternative 1, overall long-term, neutral to minor, adverse visual impacts would result from this alternative compared to existing conditions.

3.12.3 Mitigation

During construction, the contractor would minimize fugitive light from light sources and direct it only on the work zone. Where feasible, construction activities would be limited to daylight hours only.

After receiving Bridge 196.6 design information, the Bridge Advisory Committee (BAC) will present their initial recommendations to USCG no later than 60 days prior to USCG publishing the DEIS for public comment. Recommendations from BAC will be included in the DEIS prior to publication. BNSF presented engineering drawings for the new bridge, including architectural renderings, to BAC on February 18, 2021, and have committed to work in collaboration with BAC to develop design considerations.

Pending completion of collaboration between BNSF and BAC, additional design-related mitigation measures would be presented in the FEIS.

Table 29 summarizes environmental consequences for each alternative.

Table 29: Environmental Consequences Summary Table – Visual Resources

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	Long-term benefit to sensitive viewers from the retention of Bridge 196.6.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Short-term visual impacts from construction, demolition, and cleanup activities.	Long-term, substantial, adverse impacts to sensitive viewers due to removal of Bridge 196.6.
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Short-term visual impacts from construction, demolition, and cleanup activities.	Long-term, neutral to minor, adverse visual impacts from the retaining wall construction. Long-term benefit to sensitive viewers from the retention of Bridge 196.6.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Short-term visual impacts from construction, demolition, and cleanup activities.	Long-term, neutral to minor, adverse visual impacts from the retaining wall construction. Long-term benefit to sensitive viewers from the retention of Bridge 196.6.
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	Short-term visual impacts from construction, demolition, and cleanup activities.	Long-term, neutral to minor, adverse visual impacts from the retaining wall construction. Long-term benefit to sensitive viewers from the retention of Bridge 196.6.

3.13 Noise and Vibration

This section discusses potential noise and vibration impacts to the human environment that are associated with construction and operations of the Project. Potential noise and vibration impacts to fish and wildlife are in Section 3.7.

3.13.1 Regulatory Background

The Noise Control Act of 1972 (42 U.S.C. Sections 4901 to 4918) requires that activities of federal agencies, such as issuing permits, must be consistent with federal, state, interstate, and local requirements for the control and abatement of environmental noise. The primary responsibility for regulating noise is with local government. The Project occurs in the cities of Bismarck and Mandan.

The City of Bismarck regulates noise in Chapters 8 to 10 of its Code of Ordinances. The Project is in zone P – Public Use, which restricts daytime (7:00 a.m.to 11:00 p.m.) noise levels to 55 decibels (A-weighted scale) and nighttime (11:00 p.m.to 7:00 a.m.) noise levels to 50 decibels (A-weighted scale). Under Section 8-10-04(2)(d), construction and maintenance activities are exempt, except during night hours (11:00 p.m.to 7:00 a.m.) in residential zones. Under Section 8-10-04(2)(g), all railroad locomotives and railroad operations engaged in interstate commerce are also exempt (City Bismarck 2020a).

The City of Mandan regulates noise in Chapter 16, Article 6, of its Municipal Code. The Project is in a railroad ROW zone. As described in Section 105-2-3 of the Mandan Municipal Code, ROW zones are to be included in the zone of adjoining properties. Adjacent zones to the Project are residential (R7) and agricultural. Like Bismarck, Mandan restricts daytime (7:00 a.m. to 11:00 p.m.) noise levels to 55 decibels (A-weighted scale) and nighttime (11:00 p.m.to 7:00 a.m.) noise levels to 50 decibels (A-weighted scale). Under Section 16-6-4(d)(4), construction and maintenance activities are exempt except during night hours (11:00 p.m.to 7:00 a.m.) in residential zones. Under Section 16-6-4(d)(7), all railroad locomotives and railroad operations engaged in interstate commerce are also exempt (City of Mandan 2020a).

The Noise Control Act also requires uniformity of treatment for “major noise sources in commerce” (42 U.S.C. Sections 4901 (a)(2-3)). 40 CFR 201 sets noise emission standards for transportation equipment and interstate rail carriers. The Federal Railroad Administration (FRA) also regulates noise limits for railroad equipment.

Vibration, measurements, and analysis techniques for transit projects are discussed by the Federal Transit Administration (FTA) in the *Transit Noise and Vibration Impact Assessment Manual* (FTA manual) (FTA 2018). The FTA manual provides background information on the science and measurement of vibration and provides guidance on vibration limits for transit projects; however, specific limits have not been developed for freight rail, such as this Project, and similar federal guidance documents do not exist for freight railroads. The FTA manual generally describes ground-borne vibrations as common when there is less than 50 feet between at-grade heavy rail track and building foundations. The FTA manual also describes vibration criteria for nine levels of use with differing sensitivity to vibration: workshops have the lowest level of sensitivity, followed by office spaces, day residential uses, and night residential uses. The five levels of highest sensitivity are for uses that require vibration-sensitive equipment, such as high-power optical microscopes, microbalances, and lithography equipment.

3.13.2 Affected Environment

Existing ambient sound levels can vary considerably depending on population density, vehicular traffic noise, and other noise sources. Typically, the smaller the population and the more removed from transportation and other sources of noise, the lower the ambient sound level. Existing sources of noise in the Project area include train traffic, nearby vehicular traffic on local roads and the I-94 and I-194, boat traffic, and commercial and recreational activity associated with adjacent land uses.

Sensitive noise receptors in the Project area include single family residences, Bismarck State College, and recreational users of public spaces. A community of single family residences is just south of the west approach, with the closest residence located approximately 200 feet from the existing BNSF main line. A larger community of mobile homes is north of the west approach, with the closest residence located approximately 150 feet from the existing main line. Bismarck State College is north and east of the east approach, with the closest building located approximately 570 feet from the main line. Two recreational trails, the Mandan Missouri River Mountain Bike Trail, and the Riverfront Trail, cross under Bridge 196.6 on either side of the Missouri River. Steamboat Park, a Bismarck public park, is approximately 400 feet south of Bridge 196.6 on the east bank of the Missouri River. The proposed truck access route would utilize roads adjacent to two residential communities, a marina, and Richard M. Longfellow Veterans Memorial Park.

Ambient noise levels near the Project are dominated by vehicular noise from I-94 and I-194. I-94 travels parallel to the BNSF main line approximately 0.3 mile to the north. In 2019, the annual average daily traffic on westbound I-94 was 17,090 vehicles per day and the truck annual average daily traffic was 1,180 trucks per day. Traffic eastbound was slightly lower with an annual average daily traffic of 17,025 vehicles per day and a truck annual average daily traffic of 1,115 trucks per day. There is a 60-miles-per-hour speed limit on I-94 in the Project area. I-194 travels perpendicular to the BNSF main line through the west approach of the Project area. In 2019, the northbound annual average daily traffic on I-194 was 13,260 vehicles per day and the truck annual average daily traffic was 380 trucks per day. Traffic southbound was slightly lower with an annual average daily traffic of 12,580 vehicles per day and a truck annual average daily traffic of 345 trucks per day. There is a 55-miles-per-hour speed limit on I-194 in the Project area (NDDOT 2020).

Noise from existing train traffic approaching, traveling through, and departing the Project area can be heard in proximity to the bridge and tracks. Freight trains travel at approximately 35 miles per hour through the Project area. Train horns are required to produce sound levels between 96 and 110 decibels (A-weighted scale) at 100 feet forward of the locomotive (49 CFR 229.129). Trains are required to sound their horns as they approach public at-grade crossings (49 CFR 222.21). Trains may also sound their horns at other times, such as when there is a vehicle, a person, or an animal on or near the track and the crew determines that it is appropriate to provide warning. Train horns sounded on BNSF and other railroad lines can be heard in the Project area and at the Bisman Avenue public at-grade crossing on the west edge of the Project. Rail wheel and brake squeal is another existing source of noise in the Project area, often associated with sharp curves in a rail line resulting in a squeal either from the brakes themselves or from the friction between the wheel and the rail top while the train is moving through the curve. The existing east approach to the Project has a significant curve where the main line changes approximately 90 degrees from north-south to east-west.

There are no known nearby receptors that use vibration-sensitive equipment, such as high-power optical microscopes, microbalances, or lithography equipment. There are no building structures within 50 feet of the existing main line.

3.13.3 Environmental Consequences

The following subsections describe the environmental consequences for each alternative.

No Action Alternative

The No Action Alternative would result in no construction activity until maintenance is required to ensure that train traffic would be able to continually move through the site. Noise may temporarily increase during maintenance and repair activities. Noise impacts would be short-term during maintenance activities, but may increase in scale over time as the existing structure requires additional maintenance. No change to vibration is anticipated under Offset Alternative 1.

Transport by rail may increase or decrease depending on market conditions. It is reasonable to expect that train traffic may increase, as needed, as population increases, market conditions change, and demand for movement of freight and passenger rail service increases. Noise and vibration impacts from passing trains may increase or decrease depending on future rail traffic.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

During construction, noise levels are anticipated to temporarily increase in areas near construction activities and along the truck access route. Construction of the Proposed Action Alternative is anticipated to be 3.5 years. Noise at any specific receptor would be dominated by the closest and loudest equipment. As construction activities change, the type and numbers of construction equipment near any specific receptor location would vary over time.

Project equipment expected to be used onsite, including bulldozers, trucks, and jackhammers, is anticipated to emit noise in the range of 80 to 90 decibels (A-weighted scale) at a distance of 50 feet. Pile driving can reach up to 110 decibels (A-weighted scale) at a distance of 50 feet. Due to the difference in noise levels between pile-driving activities and the next loudest construction equipment, pile-driving activities would be the dominant and most noticeable noise during pile-driving activities. Pile driving would only occur for the bridge support structures and is not needed throughout the Project area. Removal of the existing structure would also result in increased temporary noise impacts due to the additional demolition-related activities.

Potential disturbances from construction noise would be minimized through measures to be implemented by the construction contractor. The contractor would also prepare a Construction Noise Logistics Plan that would specify the timing of noise impacts and provide notification to the community. Most construction noise would occur during Bismarck and Mandan daytime hours (7 a.m. to 11 p.m.), equipment would be muffled, and peak noise levels from impact pile driving would be limited. Truck drivers would reduce speeds, as needed, in residential zones to limit impacts along the truck access route.

Over the long term, operational noise of the Proposed Action Alternative is anticipated to be similar to, or less than, the No Action Alternative. The Proposed Action Alternative does not add any origin or destination facilities; therefore, it would not increase or decrease rail volumes, but instead would increase efficiency of movement by rail. The factors influencing train traffic in the Project area would exist with or without construction of the Proposed Action Alternative. The 20-foot offset would move the main line further north and away from the closest sensitive receptors, potentially decreasing permanent noise impacts.

No significant vibration impacts are anticipated during construction. The closest building structure is approximately 300 feet from the anticipated pile-driving activity locations. The Proposed Action Alternative would not realign the BNSF line closer to any known vibration-sensitive receptors, nor within 50 feet of any building structures. The 20-foot offset would move the main line further north and away from the closest receptors, potentially decreasing permanent vibration impacts. Over the long term, vibration impacts in the Project area may increase or decrease depending on future rail traffic. The factors influencing train traffic in the Project area would exist with or without construction of the Proposed Action Alternative.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

During construction, noise levels are anticipated to temporarily increase in areas near construction activities and along the truck access route. Construction of the Proposed Action Alternative is anticipated to be 5.5 years. This would result in 2 additional years of noise impacts relative to the Proposed Action Alternative. As with the Proposed Action Alternative, noise at any specific receptor is dominated by the closest and loudest equipment. Project equipment is anticipated to emit noise in the range of 80 to 90 decibels (A-weighted scale) at a distance of 50 feet; pile driving for support structures is anticipated to reach 110 decibels (A-weighted scale) at a distance of 50 feet. Similar to the Proposed Action Alternative, potential disturbances from construction noise would be minimized through several measures to be implemented by the construction contractor. The contractor would prepare a Construction Noise Logistics Plan, equipment would be muffled, peak noise levels would be limited, and trucks drivers would reduce speeds in residential zones.

Over the long term, operational noise is anticipated to be similar to, or less than, the No Action Alternative. Offset Alternative 1 does not add any origin or destination facilities; therefore, it would not drive increases or decreases in rail volumes, but instead would increase efficiency of movement by rail. The factors driving a continued increase in train traffic in the Project area would exist with or without construction of Offset Alternative 1. The 92.5-foot offset would move the main line further north and away from the closest sensitive receptors, potentially decreasing permanent noise impacts. The east approach would also be realigned, resulting in a wider curve that may reduce impacts from rail wheel and brake squeal.

No significant vibration impacts are anticipated during construction. The closest building structure is approximately 300 feet from the anticipated pile-driving activity locations. Offset Alternative 1 would not realign the BNSF line closer to any known vibration-sensitive receptors, nor within 50 feet of any building structures. The realignment of the east approach may allow for increased speeds for trains through the area; however, it would not result in a significant increase in vibration. The 92.5-foot offset would move the main line further north and away from the closest receptors, potentially decreasing permanent vibration impacts. Over the long term, vibration impacts in the Project area may increase or decrease depending on future rail traffic. The factors influencing train traffic in the Project area would exist with or without construction of Offset Alternative 1.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

During construction, noise levels are anticipated to temporarily increase in areas near construction activities and along the truck access route. Construction of the Proposed Action Alternative is anticipated to be 6.5 years. This would result in 3 additional years of noise impacts relative to the Proposed Action Alternative. As with the Proposed Action Alternative, noise at any specific receptor is dominated by the closest and loudest equipment. Project equipment is anticipated to emit noise in the range of 80 to 90 decibels (A-weighted scale) at a distance of 50 feet; pile driving for support structures is anticipated to reach up to 110 decibels (A-weighted scale) at a distance of 50 feet. The larger, 400-foot spans would require less pile-driving activities than the Proposed Action Alternative and Offset Alternative 1, which have smaller 200-foot spans. Similar to the Proposed Action Alternative, potential disturbances from construction noise would be minimized through several measures to be implemented by the construction contractor. The contractor would prepare a Construction Noise Logistics Plan, equipment would be muffled, peak noise levels would be limited, and trucks would reduce speeds in residential zones.

Over the long term, operational noise is anticipated to be similar to, or less than, the No Action Alternative. Offset Alternative 2 does not add any origin or destination facilities; therefore, it would not drive increases or decreases in rail volumes, but instead would increase efficiency of movement by rail. The factors driving a continued increase in train traffic in the Project area would exist with or without construction of Offset Alternative 2. As with Offset Alternative 1, Offset Alternative 2 would move the main line the same distance north (92.5 feet) and away from the closest sensitive receptors. The east approach would also be realigned, resulting in a wider curve that may reduce impacts from rail wheel and brake squeal.

No significant vibration impacts are anticipated during construction. The closest building structure is approximately 375 feet from the anticipated pile-driving activity locations. Offset Alternative 2 would not realign the BNSF line closer to any known vibration-sensitive receptors, nor within 50 feet of any building structures. The realignment of the east approach may allow for increased speeds for trains through the area; however, it would not result in a significant increase in vibration. The 92.5-foot offset would move the main line further north and away from the closest receptors, potentially decreasing permanent vibration impacts. Over the long term, vibration impacts in the Project area may increase or decrease depending on future rail traffic. The factors influencing train traffic in the Project area would exist with or without construction of Offset Alternative 2.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

During construction, noise levels are anticipated to temporarily increase in areas near construction activities and along the truck access route. Construction of Offset Alternative 3 is anticipated to be 4.5 years. This would result in 1 additional year of noise impacts relative to the Proposed Action Alternative and a reduced period of noise compared to Offset Alternatives 1 and 2. As with the Proposed Action Alternative, noise at any specific receptor is dominated by the closest and loudest equipment. Project equipment is anticipated to emit noise in the range of 80 to 90 decibels (A-weighted scale) at a distance of 50 feet; pile driving for support structures is anticipated to reach up to 110 decibels (A-weighted scale) at a distance of 50 feet. The 200-foot spans would require more pile-driving activities than Offset Alternative 2, which has 400-foot spans and would be similar to Offset Alternative 1. Similar to the Proposed Action Alternative, potential disturbances from construction noise would be minimized through several measures to be implemented by the construction contractor. The contractor would prepare a Construction Noise Logistics Plan, equipment would be muffled, peak noise levels would be limited, and trucks would reduce speeds in residential zones.

Over the long term, operational noise is anticipated to be similar to, or less than, the No Action Alternative. Offset Alternative 3 does not add any origin or destination facilities; therefore, it would not drive increases or decreases in rail volumes, but instead would increase efficiency of movement by rail. The factors driving a continued increase in train traffic in the Project area would exist with or without construction of the Offset Alternative 1. The 42.5-foot offset would move the main line further north and away from the closest sensitive receptors, potentially decreasing permanent noise impacts. The east approach would also be realigned resulting in a wider curve that may reduce impacts from rail wheel and brake squeal.

No significant vibration impacts are anticipated during construction. The closest building structure is approximately 300 feet from the anticipated pile-driving activity locations. Offset Alternative 3 would not realign the BNSF line closer to any known vibration-sensitive receptors, nor within 50 feet of any building structures. The realignment of the east approach may allow for increased speeds for trains through the area; however, it would not result in a significant increase in vibration. The 42.5-foot offset would move the main line further north and away from the closest receptors, potentially decreasing permanent vibration impacts relative to the No Action Alternative. Over the long term, vibration impacts in the Project area are anticipated to increase or decrease depending on future rail traffic. The factors influencing train traffic in the Project area would exist with or without construction of Offset Alternative 3.

Table 30 provides a summary of short- and long-term noise and vibration impacts per alternative.

Table 30: Environmental Consequences Summary – Noise and Vibration

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	Long-term noise and vibration impacts would increase or decrease, depending on future rail traffic.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	A short-term increase in noise and vibration during construction. Short-term impacts from pile driving, up to 110 decibels (A-weighted scale). Short-term impacts from demolition of Bridge 196.6.	Long-term noise and vibration impacts may increase or decrease, depending on future rail traffic. The 20-foot offset would move the main line away from the closest sensitive receptors.
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	A short-term increase in noise and vibration during construction. Short-term impacts from pile driving, up to 110 decibels (A-weighted scale).	Long-term noise and vibration impacts may increase or decrease, depending on future rail traffic. The 92.5-foot offset would move the main line the farthest from the closest sensitive receptor.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	A short-term increase in noise and vibration during construction. Short-term impacts from pile driving, up to 110 decibels (A-weighted scale).	Long-term noise and vibration impacts may increase or decrease, depending on future rail traffic. The 92.5-foot offset would move the main line the farthest from the closest sensitive receptor.
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	A short-term increase in noise and vibration during construction. Short-term impacts from pile driving, up to 110 decibels (A-weighted scale).	Long-term noise and vibration impacts may increase or decrease, depending on future rail traffic. The 42.5-foot offset would move the main line away from the closest sensitive receptors.

3.14 Hazardous Materials and Waste

This section discusses the primary federal laws, regulations, and EOs addressing existing hazardous materials contamination that may be present in the Project area, and management of hazardous materials and wastes to reduce the potential for future releases. Hazardous materials and waste that may be used and generated during construction and operation of a new bridge are also in Section 2.

3.14.1 Regulatory Background

The primary federal laws, regulations, and EOs addressing the control and handling of hazardous substances, cleanup of hazardous wastes releases, and protection of the public from harm include:

- The Resource Conservation and Recovery Act of 1976 (RCRA), which governs the disposal and cleanup of solid and hazardous wastes, including underground storage tanks, which are a common source of contamination. RCRA defines hazardous wastes as materials that exhibit one of the following four characteristics: ignitability, corrosivity, reactivity, or toxicity.
- The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), which regulates cleanup at sites that have been contaminated with hazardous substances and pollutants or contaminants. CERCLA established the National Priorities List of contaminated sites and the Superfund cleanup program.
- EO 12088, which ensures that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to federal facilities and activities under the control of the agency.
- Emergency Planning and Community Right-to-Know Act of 1986, which requires industry to report on the storage, use, and releases of hazardous substances to federal, state, and local governments.
- The Pollution Prevention Act of 1990, which focuses on reducing the release of hazardous substances into the environment prior to recycling, treatment, or disposal.
- Toxic Substances Control Act of 1976, as amended 2016, which addresses the production, import, use, and disposal of specific chemicals, including polychlorinated biphenyls and asbestos.

Other relevant federal laws and regulations include the CWA (1972), the CAA (as amended 1990), and emergency response regulations (and 29 CFR 1926.65).

Under 49 U.S.C. Section 11101, Common Carrier Transportation, Service, and Rates, railroads are required to provide transportation to all parties upon reasonable request, including for hazardous materials. Due to this requirement, BNSF has established plans and safety procedures in compliance with federal law to minimize the risk associated with transport of hazardous materials.

3.14.2 Emergency Planning and Preparedness

The BNSF emergency planning and preparedness program focuses on prevention, mitigation, and response, which addresses and upholds the FEMA National Preparedness Goal. This goal defines what it means to be prepared for all types of disasters and emergencies: “A secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk” (FEMA 2015b).

As the potentially responsible party for a possible oil spill resulting from an accident involving one of its trains, BNSF recognizes the potential for serious environmental consequences of a spill. The following BNSF efforts implement each of the five mission areas.

Prevention

Bridge design, safety, and maintenance. BNSF follows design, safety, and maintenance protocols to meet current design and seismic standards; implements a bridge management program that addresses minimum requirements for inspection, repair, and maintenance, as defined in 49 CFR 217 (Bridge Safety Standards); and conducts annual inspections, as required by FRA (2016).

Track speeds. BNSF adheres to the maximum allowable speed for freight and passenger trains for different classes of track, as identified in 49 CFR 213.9. The bridge within the Project area is currently operating at a maximum speed of 25 miles per hour. The action alternatives would be able to operate at a 35-miles-per-hour maximum speed.

Track inspection. BNSF meets the FRA track maintenance standards and requirements identified in 49 CFR 213 (Track Safety Standards). Visual inspections are supplemented with inspection equipment, such as geometry cars, rail detectors, ground penetrating radar, and unmanned aerial vehicles (BNSF 2019a).

Wayside detectors. BNSF uses a network of detectors to evaluate passing trains and identify stresses on wheels and other equipment to prevent failures. If an abnormal condition is detected, on-board engineers and conductors are alerted so the issue can be proactively addressed to protect structures and waterways (BNSF 2019b).

Positive train control (PTC). As mandated by federal law, BNSF uses PTC to prevent train-to-train collisions, derailments caused by excessive speed, unauthorized incursions by trains onto sections of track where maintenance activities are taking place, and movement of a train through a track switch left in the wrong position. PTC allows BNSF to monitor train movement, provide warnings to crews, enforce speed limits, and stop trains when unsafe conditions occur. BNSF PTC infrastructure covers approximately 11,500 route miles, 80 percent of the total freight volume and more than 5,000 PTC-enabled locomotives (BNSF 2019b). BNSF has implemented PTC along the Jamestown Subdivision (BNSF 2020).

Network Operations Center. BNSF has a centralized Network Operations Center that handles systemwide train traffic monitoring and control. The Network Operations Center maintains constant communication with train operators to ensure safe and efficient operation.

Hazardous materials management. Hazardous materials shipped on the BNSF network receive special identification and handling, including tracking sensitive shipments and in-train placement checks. In accordance with 49 CFR 130, Subparts B and C, BNSF adheres to requirements for basic and comprehensive oil spill response plans, and works closely with local and regional first responder personnel to safely use this equipment during emergencies. In addition to the employee and community training efforts summarized herein, BNSF has a team of emergency responders with expertise in environmental, safety, and mechanical areas.

Employee safety training. BNSF invests in ongoing safety and technical training for its employees using a combination of field training, on-the-job training, long-distance learning, and technical training on exposure and risk identification, technical rules, and safety topics. Between 2018 and 2019, BNSF trained more than 8,800 employees at the Technical Training Center in Overland Park, Kansas. Employees take courses and utilize simulation and lab tools that represent equipment, including locomotives, cranes, and crossing gates (BNSF 2019c).

Community safety training. BNSF environmental and hazardous materials teams have trained more than 125,000 public emergency responders in communities across its network (BNSF 2019a). In North Dakota, from 2015 to 2019, BNSF sponsored and/or trained 205 responders on oil spill response (BNSF 2019c). Trained Hazardous Material Emergency Response Team members are located throughout the BNSF rail system, including throughout North Dakota and in Mandan (BNSF 2016). BNSF regularly participates in spill response exercises to bolster community safety training and emergency preparedness training.

Protection

BNSF planning documents provide operational instructions to protect BNSF employees and assets, and the welfare of the general public. The documents provide special instructions to employees on actions to take during excessive wind conditions, cold weather, or in the event of a tornado, flood, or earthquake. BNSF takes steps to improve resiliency and avoid future disruption from extreme conditions. For example, winter action plans are developed each year for each operating division of rail to minimize impacts from winter weather.

Mitigation

BNSF maintains, updates, and implements a variety of safe operating procedures, safety protocols, response plans and training programs, as previously described, to reduce the severity and probability of an incident. In addition, specific BNSF facilities and projects have industrial and project-specific SWPPPs and SPCC plans developed and implemented to mitigate potential risks associated with hazardous materials releases on BNSF property. BNSF also mitigates potential risk through compliance with federal safety requirements for railroad operation. For example, U.S. Department of Transportation rules require customers to phase out old tank car technology (DOT-111 and CPC-1232 tank cars) by 2025. BNSF incentives for its customers to use best available technology and phase out the old tank cars have resulted in BNSF customers being nearly 100 percent complete with the transition.

Response

BNSF follows U.S. Department of Transportation requirements for prevention, containment, and response planning for transportation of oil by railcar, as identified in 49 CFR 130, Oil Spill Prevention and Response Plans. Part 130.31 requires a plan for transport of oil that is consistent with the requirements of the National Contingency Plan and area contingency plans. These plans identify the personnel and equipment necessary to remove a worst-case discharge, and mitigate or prevent a substantial threat of such a discharge. They also describe the training, equipment testing, drills, and response actions of facility personnel. BNSF follows the accepted USCG and EPA National Contingency Plan practice where emergency response services and resources (such as, equipment and personnel) are staged in regional areas or populations so they can be quickly routed to incident locations by dedicated oil spill response organizations if an incident occurs.

Recovery

In response to an emergency event, BNSF would implement the strategies outlined in their Inland Oil Spill Training Program to recover released material, minimizing potential damage. BNSF would then work with the appropriate regulatory agencies, property owners, and local community to mitigate residual damage that could not be avoided.

3.14.3 Affected Environment

The Project area encompasses the Missouri River and each of the potential bridge crossing locations. No contaminated or previously contaminated sites were identified in the Project area using the following online data sources:

- *Cleanups in My Community Map* (EPA 2021)
- National Priorities List sites (EPA 2020c)
- NDDEQ Brownfields Program (NDDEQ 2020b)
- NDDEQ/NDDOH Leaking Underground Storage Tank Database (NDDEQ 2019)

The same databases were also reviewed for an area within 1.5 miles of the bridge, given that the location of access roads and construction staging areas have not been determined. No National Priorities List or brownfield sites have been identified within the larger 1.5-mile radius of the historic Bridge 196.6. Table 31 describes three previously remediated leaking underground storage tanks, which are present within 1.5 miles of the bridge.

Table 31: Leaking Underground Storage Tank Sites within 1.5 miles of the BNSF Railway Bridge 196.6 Project

Owner	Date	Leaking Underground Storage Tank Status
Kist Livestock Auction Company	10/14/1997	Site cleanup completed.
Twin City Dakota Limited Partnership	9/16/1998	Site cleanup completed.
John W. Dixon	8/2/1991	Site cleanup completed.

Inadvertent and unrecorded releases may have occurred historically. If contaminated soils or sediments are determined to be present prior or during construction, they would be removed and disposed of in commercially approved remediation or disposal facilities.

3.14.4 Environmental Consequences

The following subsections describe the environmental consequences for each alternative.

No Action Alternative

Under the No Action Alternative, no new construction would occur. However, ongoing maintenance and repair of the existing railroad tracks and bridge would continue and would likely increase over time, therefore, increasing the likelihood of inadvertent spills. Routine maintenance of the existing structure may include cleaning, minor repairs, or replacement of track components. These maintenance actions would require the use of construction equipment that contains petroleum products. As part of operational activities over the long term, BNSF would continue to implement emergency planning and preparedness programs that focus on prevention, mitigation, and response. These activities would reduce the risk of hazardous material emergencies.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

The Project is not near a Superfund site or any site regulated under CERCLA, RCRA, or the Toxic Substances Control Act of 1976. During construction, excavation for the new structure would occur. No evidence suggests that material at the site is hazardous or contaminated. Exiting bridge components containing potentially hazardous materials would be tested and disposed of at appropriate facilities. During excavation activities, the presence of obvious contamination would be assessed, and the material would be disposed of properly. Testing of sediments would be performed, as required, by federal and state agencies. BMPs for maintenance of construction equipment would be implemented to minimize the potential for the release of oil, fuel, or other contaminated materials into adjacent waters. Inadvertent releases have the potential to occur over the 3.5-year construction period.

Over the long term, routine maintenance of the structure may include cleaning, minor repairs, or replacement of track components. These maintenance actions would require the use of construction equipment that contains petroleum products. BNSF would continue to implement emergency planning and preparedness programs that focus on prevention, mitigation, and response. These activities would reduce the risk of hazardous material emergencies.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

During construction, excavation for the new structure would occur. No evidence suggests that this material is contaminated. Upon excavation, the presence of obvious contamination would be assessed, and the material would be disposed of properly. Testing of sediments would be performed, as required by federal and state agencies. BMPs for maintenance of construction equipment would be implemented to minimize the potential for the release of oil, fuel, or other contaminated materials into adjacent waters. Inadvertent releases have the potential to occur over the 5.5-year construction period.

Over the long term, ongoing maintenance and repair of the existing railroad tracks and bridge would continue and would likely increase over time. An increase in the frequency of maintenance activities would also increase the likelihood of inadvertent spills. Routine maintenance of the existing structure may include cleaning, minor repairs, or replacement of track components. These maintenance actions would require the use of construction equipment that contains petroleum products. As part of operational activities over the long term, BNSF would continue to implement emergency planning and preparedness programs that focus on prevention, mitigation, and response. These activities would reduce the risk of hazardous material emergencies.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

During construction, excavation for the new structure would occur. No evidence suggests that this material is contaminated. Upon excavation, the presence of obvious contamination would be assessed, and the material would be disposed of properly. Testing of sediments would be performed, as required by federal and state agencies. BMPs for maintenance of construction equipment would be implemented to minimize the potential for the release of oil, fuel, or other contaminated materials into adjacent waters. Inadvertent releases have the potential to occur over the 6.5-year construction period.

Over the long term, ongoing maintenance and repair of the existing railroad tracks and bridge would continue and would likely increase over time. An increase in the frequency of maintenance activities would also increase the likelihood of inadvertent spills. Routine maintenance of the existing structure may include cleaning, minor repairs, or replacement of track components. These maintenance actions would require the use of construction equipment that contains petroleum products. As part of operational activities over the long term, BNSF would continue to implement emergency planning and preparedness programs that focus on prevention, mitigation, and response. These activities would reduce the risk of hazardous material emergencies.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

During construction, excavation for the new structure would occur. No evidence suggests that this material is contaminated. Upon excavation, the presence of obvious contamination would be assessed, and the material would be disposed of properly. Testing of sediments would be performed, as required by federal and state agencies. BMPs for maintenance of construction equipment would be implemented to minimize the potential for the release of oil, fuel, or other contaminated materials into adjacent waters. Inadvertent releases have the potential to occur over the 4.5-year construction period.

Over the long term, ongoing maintenance and repair of the existing railroad tracks and bridge would continue and would likely increase over time. An increase in the frequency of maintenance activities would also increase the likelihood of inadvertent spills. Routine maintenance of the existing structure may include cleaning, minor repairs, or replacement of track components. These maintenance actions would require the use of construction equipment that contains petroleum products. As part of operational activities over the long term, BNSF would continue to implement emergency planning and preparedness programs that focus on prevention, mitigation, and response. These activities would reduce the risk of hazardous material emergencies.

Table 32 provides a summary of the short- and long-term hazardous materials and waste impacts per alternative.

Table 32: Environmental Consequences Summary – Hazardous Materials and Waste

Alternative	Temporary Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	Long-term impacts from retention of Bridge 196.6 potentially increasing the likelihood of inadvertent spills.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Minor short-term impacts from existing bridge components containing potentially hazardous materials and potential inadvertent spills over the 3.5-year construction period.	Minor long-term benefit from removal of Bridge 196.6 reducing the amount of ongoing maintenance and decrease the likelihood of inadvertent spills.
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Minor short-term impacts from hazardous materials encountered during the 5.5-year construction period.	Minor long-term impact from ongoing maintenance of Bridge 196.6 increasing the likelihood of inadvertent spills.

Alternative	Temporary Impacts (During Construction)	Long-term Impacts (Postconstruction)
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Minor short-term impacts from hazardous materials encountered during the 6.5-year construction period.	Minor long-term impact from ongoing maintenance of Bridge 196.6 increasing the likelihood of inadvertent spills.
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	Minor short-term impacts from hazardous materials encountered during the 4.5-year construction period.	Minor long-term impact from ongoing maintenance of Bridge 196.6 increasing the likelihood of inadvertent spills.

3.15 Traffic

Local traffic includes surface vehicle traffic on interstate, state, and local roadways, and watercraft traffic that uses the Missouri River at the bridge location. The Project area for vehicle traffic includes the at-grade rail crossings of highways, streets, and driveways intersecting BNSF lines within 20 miles of the Project. The predominance of watercraft traffic is associated with recreation and fishing, both occurring primarily during the summer boating season from May 1 through October 15. The Project area for watercraft traffic is the Missouri River immediately upstream and downstream of the BNSF ROW Bridge at milepost 196.6.

3.15.1 Affected Environment

The Missouri River is used extensively during the summer months by recreational watercrafts and the Lewis & Clark Riverboat (Appendix I). The Louis & Clark Riverboat operates public and private charters from May 1 to September 30, each year. No other known commercial ships, barges, or tugs have been identified as using the river for transit under the bridge. Within the Project area, the Missouri River is not part of a commercial navigation channel. Bridge 196.6 has a horizontal clearance of approximately 385 feet, and a vertical clearance of approximately 52 feet. The I-94 bridge crossing is approximately 0.4 mile north of Bridge 196.6, and the Memorial Highway bridge crossing is approximately 0.8 mile south of Bridge 196.6. Neither of these interstate roadways pass through the Project area.

The Project area is surrounded by interstate, principal arterial, minor arterial, and collector roadways. Traffic in the Project area is anticipated to grow through 2030 (KLJ 2020).

3.15.2 Environmental Consequences

The following subsections describe the environmental consequences for each alternative.

No Action Alternative

No change would occur to the site that would affect local transportation routes or traffic volumes, except during maintenance activities.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

Over the course of the 3.5-year construction period, construction activities would impact vehicle traffic on both the east and west sides of the Missouri River at different times. Approximately 128,000 cubic yards of fill would be needed on the west side of the Project to construct the approach embankment in its entirety. Across the Project area, 58,000 cubic yards of common excavation and 21,000 cubic yards of topsoil excavation would be required. Within the Missouri River, 17,200 cubic yards of excavation and 4,600 cubic yards of backfill would be required for the proposed piers. This amount of excavation and fill translates to approximately 17,900 dump-truck loads. Transport of all fill or excavated material is expected to occur by truck. During construction, this would result in minor adverse impacts to automobile traffic in the Project area. After completion of construction of the new bridge and removal of the old bridge, automobile traffic would not be impacted.

The west approach would be used as the staging site for bridge removal. Trusses may be dismantled in place using falsework towers. Only one truss would be removed at a time. Dismantled truss components would be removed from the site by an overland truck. Additional disassembly of the individual components may be necessary for trucking removal. River piers would be removed in a block-by-block fashion and transported from the site. Overland trucking is anticipated for this as well. Bridge removal is anticipated to occur during fall or winter months.

During construction, impacts to watercraft movement through the construction site are anticipated. Watercrafts using the river channel during construction may be temporarily redirected away from construction activities. Short-term impacts to watercraft movement in the Missouri River would occur throughout construction of the new bridge and removal of Bridge 196.6.

The spans of the new bridge would be approximately half the width of Bridge 196.6, which may result in a minor increase in watercraft traffic congestion at the bridge location. Over the long term, there would be minor adverse impacts to river traffic within the Project area as a result of the decreased pier spacing.

Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure

Over the course of the 5.5-year construction period, construction activities would impact vehicle traffic on both the east and west sides of the Missouri River at different times. Approximately 322,000 cubic yards of fill would be needed on the west side of the Project to construct the approach embankment in its entirety. Across the Project area, 205,700 cubic yards of common excavation and 26,900 cubic yards of topsoil excavation would be required. Within the Missouri River, 17,900 cubic yards of excavation and 4,300 cubic yards of backfill would be required for the proposed piers. This amount of excavation and fill translates to approximately 44,800 dump-truck loads. Transport of all fill or excavated material is expected to occur by truck. During construction, this would result in minor adverse impacts to automobile traffic in the Project area. After completion of construction of the new bridge, automobile traffic would not be impacted. Offset Alternative 1 requires conversion of the existing rail bridge into a pedestrian bridge. This analysis does not take into consideration any short- or long-term impacts to traffic from the rail bridge conversion.

During construction, impacts to watercraft movement through the construction site are also anticipated. Watercrafts using the river channel during construction may be temporarily redirected to accommodate construction activities.

The spans of the new bridge would be approximately half the width of Bridge 196.6, which may result in a minor increase in watercraft traffic congestion at the bridge location. Increased repairs and maintenance would be required for Bridge 196.6 in the coming years. Changes that could affect local transportation routes or traffic volumes may occur during repair or maintenance activities.

Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure

Over the course of the 6.5-year construction period, construction activities would impact vehicle traffic on both the east and west sides of the Missouri River at different times. Approximately 322,000 cubic yards of fill would be needed on the west side of the Project to construct the approach embankment in its entirety. Across the Project area, 205,700 cubic yards of common excavation and 26,900 cubic yards of topsoil excavation would be required. Within the Missouri River, 9,500 cubic yards of excavation and 2,000 cubic yards of backfill would be required for the proposed piers. This amount of excavation and fill translates to approximately 43,900 dump-truck loads. Transport of all fill or excavated material is expected to occur by truck. During construction, this would result in minor adverse impacts to automobile traffic in the Project area. After completion of construction of the new bridge, automobile traffic would not be impacted. Offset Alternative 2 also requires conversion of the existing rail bridge into a pedestrian bridge. This analysis does not take into consideration any short- or long-term impacts to traffic from the rail bridge conversion.

During construction impacts to watercraft movement through the construction site are also anticipated. Watercrafts using the river channel during construction may be temporarily redirected to accommodate construction activities. The 400-foot spans would be constructed in place and would require extensive falsework to be installed across the Missouri River upstream of the proposed structure. While specific configuration of the falsework is not known at this time, it is estimated that falsework would adversely impact watercraft navigation. It is anticipated that the falsework would need to remain in place for a minimum of 18 months.

Increased repairs and maintenance would be required for Bridge 196.6 in the coming years. Changes that could affect local transportation routes or traffic volumes may occur during repair or maintenance activities. Navigability within the river channel would not be adversely impacted, and there would be no long-term or permanent impacts to river traffic within the Project area.

Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure

Over the course of the 4.5-year construction period, construction activities would impact vehicle traffic on both the east and west sides of the Missouri River at different times. Approximately 196,700 cubic yards of fill would be needed on the west side of the Project to construct the approach embankment in its entirety. Across the Project area, 191,800 cubic yards of common excavation and 19,800 cubic yards of topsoil excavation would be required. Within the Missouri River, 17,200 cubic yards of excavation and 4,000 cubic yards of backfill would be required for the proposed piers. This amount of excavation and fill translates to approximately 33,300 dump-truck loads. Transport of all fill or excavated material is expected to occur by truck. During construction, this would result in minor adverse impacts to automobile traffic in the Project area. After completion of construction of the new bridge, automobile traffic would not be impacted. Offset Alternative 3 also requires conversion of the existing rail bridge into a pedestrian bridge. This analysis does not take into consideration any short- or long-term impacts to traffic from the rail bridge conversion.

During construction, impacts to watercraft movement through the construction site are also anticipated. Watercrafts using the river channel during construction may be temporarily redirected to accommodate construction activities.

The spans of the new bridge would be approximately half the width of Bridge 196.6, which may result in a minor increase in watercraft traffic congestion at the bridge location. Increased repairs and maintenance would also be required for Bridge 196.6 in the coming years. Changes that could affect local transportation routes or traffic volumes may occur during repair or maintenance activities. Navigability within the river channel would not be adversely impacted and there would be no long-term or permanent impacts to river traffic within the Project area.

Table 33 provides a summary of the short- and long-term traffic impacts per alternative.

Table 33: Environmental Consequences Summary - Traffic

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change; ongoing short-term impacts to transportation routes or traffic volumes during repair or maintenance activities.	Long-term impacts of continued and increased repairs and maintenance to transportation routes or traffic volumes during repair or maintenance activities.
Proposed Action Alternative: 20-foot offset, 200-foot spans, remove existing structure	Short-term impacts to watercrafts using the river channel during construction. Short-term impacts from approximately 44,800 dump-truck loads of excavation and fill. Short-term closure of River Road for two 5-day windows. Short-term impacts from additional overland trucks for removal of Bridge 196.6.	Minor long-term adverse impacts to river traffic as a result of the reduced horizontal clearance.
Offset Alternative 1: 92.5-foot offset, 200-foot spans, retain existing structure	Short-term impacts to watercrafts using the river channel during construction. Short-term impacts from approximately 44,800 dump-truck loads of excavation and fill. Short-term closure of River Road for two 5-day windows.	Long-term periodic impacts to transportation routes or traffic volumes may occur during repair or maintenance activities.
Offset Alternative 2: 92.5-foot offset, 400-foot spans, retain existing structure	Short-term impacts to watercrafts using the river channel during construction. Significant falsework would result in short-term adverse impacts to watercrafts for a minimum of 18 months. Short-term impacts from approximately 43,900 dump-truck loads of excavation and fill. Short-term closure of River Road for two 5-day windows.	Long-term periodic impacts to transportation routes or traffic volumes may occur during repair or maintenance activities.

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
Offset Alternative 3: 42.5-foot offset, 200-foot spans, retain existing structure	Short-term impacts to watercrafts using the river channel during construction. Short-term impacts from approximately 33,300 dump-truck loads of excavation and fill. Short-term closure of River Road for two 5-day windows.	Long-term periodic impacts to transportation routes or traffic volumes may occur during repair or maintenance activities.

3.16 Safety and Security

The Occupational Safety and Health Administration (OSHA) was established to assure safe and healthful working conditions by providing workers with a place of employment free from recognized hazards to safety and health, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions. OSHA standards require employers to adopt certain practices, means, methods, or processes that are reasonably necessary and appropriate to protect covered workers on the job. In addition, even in situations where OSHA does not apply, FRA has implemented safety regulations that apply to workers on railroad property.

3.16.1 Affected Environment

BNSF utilizes a combination of field training, on-the-job training, long-distance learning, and technical training at a centralized training center (Section 3.14). Contractors and consultants are required to undertake contractor safety orientation training and railroad safety training prior to being allowed on railroad property to conduct any work.

Workers that enter the BNSF ROW must implement applicable OSHA and/or FRA requirements, and must be certified with railroad safety and security training per FRA safety and security requirements.

3.16.2 Environmental Consequences

The following subsections describe the environmental consequences for each alternative.

No Action Alternative

While Alternative 1 would not result in construction and associated potential impacts, leaving the bridge as is and conducting maintenance as needed could lead to a situation that may create a safety hazard for inspection and maintenance personnel. Work activities associated with maintenance of Bridge 196.6 would be covered under OSHA requirements.

Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure

Construction of a new bridge, which would be designed to meet current design and rail traffic operations requirements, would increase safety and security of rail operations to help prevent possible future impacts to life or human health. Work activities associated with construction of the bridge and removal of Bridge 196.6 would be covered under OSHA and/or FRA requirements.

Construction of a new bridge and removal of the existing structure would result in multiple safety benefits for train operators and emergency response providers. The proposed superstructure for any new bridge (all except the No Action Alternative) places all the primary load-carrying elements below the top of rail elevation. With all primary load-carrying elements below the top of rail, the structure would be less susceptible to damage caused by over-dimension cars or wayward loadings. Similarly, the new bridge would be more resilient to impacts associated with a derailment.

Walkway access would be provided between the primary river span beam lines. Accordingly, inspection and maintenance of the bridge could be conducted with limited disruption to rail service and a reduced risk to BNSF employees.

Although modern steel truss bridges are constructed by incorporating fracture-critical members (components of a bridge whose failure could cause a bridge to collapse), the practice is not preferred and is only implemented when other alternatives are not available. In these instances, special fabrication practices are implemented to minimize the probability of failure, and pin connections are no longer recommended. Modern structures also incorporate improvements in construction material properties and design and construction practices not available to previous generations. Accordingly, even a nonredundant modern structure would be less susceptible to catastrophic failure than a similar bridge constructed at the turn of the previous century. Ideally, each span of a new bridge would consist of multiple beam lines between adjacent supports, thus providing a level of redundancy that is not provided by Bridge 196.6. Accordingly, the proposed structure would be much less susceptible to catastrophic collapse due to unforeseen or extreme events.

Offset Alternatives 1 through 3: Construction of a New Bridge Offset Upstream, Retain Existing Bridge

Construction of a new bridge would meet current design standards and minimize the possibility of future impacts to life or human health, similar to those of the Proposed Action Alternative.

The existing structure would continue to have inspection and maintenance needs resulting in impacts similar to those of the No Action Alternative. Maintenance and inspection would be required for the existing structure regardless of the long-term intended use and could lead to a situation that may create a safety hazard for inspection and maintenance personnel.

Table 34 summarizes environmental consequences for each alternative.

Table 34: Impact Summary

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
No Action Alternative	No change to ongoing maintenance activities.	Long-term impacts from ongoing repair and maintenance activities may create a safety hazard for inspection and maintenance personnel.
Proposed Action Alternative	Short-term impacts from construction of a new bridge and removal of the old bridge may introduce additional temporary safety hazards.	Long-term benefits from reduction in damage potential, an increase in train operator and maintenance worker safety, and structural redundancy.

Alternative	Short-term Impacts (During Construction)	Long-term Impacts (Postconstruction)
Offset Alternatives 1 through 3	Short-term impacts from construction of a new bridge may introduce additional temporary safety hazards.	Long-term benefits from reduction in damage potential, an increase in train operator and maintenance worker safety, and structural redundancy. Long-term impacts from the retention of Bridge 196.6 would require increased maintenance and repairs, which may create a safety hazard for inspection and maintenance personnel.

3.17 Indirect Impacts

Secondary or indirect effects are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR 1508.8). Two types of indirect effects are commonly recognized: encroachment-alteration effects and growth inducing effects. Encroachment-alteration effects are changes in the environment that are a result of the Project but are removed in time or distance from the direct effect. Each resource section (Sections 3.1 to 3.16) discusses encroachment-alteration effects, as appropriate.

Growth inducing effects are changes in the location, magnitude or pace of future development that results from new access provided by the Project. An example of growth inducing effects would include commercial or industrial development occurring in the Project area due to improvements in rail capacity and accessibility, and the environmental impacts associated with this development.

Key underlying issues considered for the induced-growth analysis include:

- No new capacity is planned as part of this Project or along the BNSF rail line in the Project area.[3]
- The improvements are not changing nor providing improved access to an intermodal yard (transloading facility).
- The Project does not have an explicit economic development purpose nor is economic development part of the purpose and need statement (Section 1).
- The Bismarck-Mandan metropolitan area is experiencing population and employment growth. Based on the number of ongoing and future developments identified in the study area (Table 35), current growth trends are likely to continue regardless of whether the Project is implemented.
- The strong land use controls of the region would direct new development in the study area and the larger region to locations consistent with local and regional plans.

[3] North Dakota Department of Transportation (NDDOT). 2017. *2040 North Dakota State Rail Plan*. Accessed March 10, 2020. http://www.dot.nd.gov/divisions/planning/railplan/FINALNorth%20Dakota%20State%20Rail%20Plan%20December%202017.pdf.

In consideration of the nature of the Project to replace a bridge at the end of its life cycle, ongoing development in the Project area, and strong regional and local land use growth management strategies, the Project would not substantially change the location, magnitude, or pace of future development within the study area and beyond; therefore, it is anticipated that there would minimal impacts to air, water, natural systems and cultural resources from induced-growth.

3.18 Cumulative Impacts

This section summarizes the cumulative impacts analysis conducted for the Project. Cumulative impacts are "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period" (40 CFR 1508.7). The analysis of cumulative impacts identifies direct and indirect impacts that may be minimal when examined within the context of the Project, but that may accumulate and become significant when considered with other past or planned actions in the Project area.

3.18.1 Regulatory Context and Methodology for Assessing Cumulative Impacts

This section describes the most pertinent regulatory context for evaluating cumulative impacts and summarizes the methodology that has been used to evaluate those impacts.

The following guidance documents have been used for this analysis:

- *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997)
- CEQ, 40 CFR 1500 to 1508

The methodology that has been used to assess cumulative impacts for the Project is based on the CEQ 11-step process in *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997).[4] The 11-step process can be subcategorized into three primary steps: scoping, describing the affected environment, and determining the environmental consequences.

- Scoping: Step 1, identify the significant issues associated with the proposed action and define the assessment; steps 2 and 3, establish geographic scope and timeframe of the analysis; step 4, identify other actions affecting the resources, ecosystems, and human communities of concern.
- Describe the affected environment: Step 5, characterize resources identified in scoping in terms of their response to change and capacity to withstand stress; step 6, characterize the stresses affecting these resources and their relation to regulatory thresholds; step 7, define a baseline condition for the resources.

[4] The cumulative impacts analysis utilized a qualitative approach, rather than a quantitative framework such as the use of modeling. Cumulative impact models do not exist. Resource-specific data is very important to use in the analysis and has been used to support the findings, as appropriate, in the preceding sections. This data are valuable when preparing permit applications, such as the Section 404 permit.

- Determine the environmental consequences: Step 8, identify the important cause and effect relationships between human activities and resources; step 9, determine the magnitude and significance of cumulative impacts; step 10, modify or add alternatives to mitigate significant cumulative impacts; step 11, monitor the cumulative impacts of the selected alternative and adapt management.

The following subsections describe the cumulative impacts scoping process, the affected environment, and environmental consequences.

3.18.2 Scoping Cumulative Impacts

The purpose of scoping for cumulative impacts is to determine (1) whether the resources, ecosystems, and human communities of concern have already been affected by past or present activities, and (2) whether other agencies or the public have plans that may affect the resources in the future.

The resources assessed for cumulative impacts are typically a subset of the range of environmental resources considered in the assessment of direct and indirect effects. CEQ guidance, *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997), has been used to determine which resource topics to analyze for cumulative impacts. The guidance states: “In a broad sense, all the impacts on affected resources are probably cumulative; however, the role of the analyst is to narrow the focus of the cumulative effects analysis to important issues of national, regional, or local significance… Not all potential cumulative effect issues identified during scoping need to be included in an EA or an EIS. Some may be irrelevant or inconsequential to decisions about the proposed action and corridor alternatives. Cumulative effects analysis should count what counts, not produce superficial analysis of a long laundry list of issues that have little relevance to the effects of the proposed action or eventual decisions.”

Identifying Cumulative Impacts Issues

The cumulative impacts analysis considers the resources that could be affected directly and/or indirectly by the five Project alternatives when combined with other past, present, or reasonably foreseeable future actions that potentially affect the same resources or human communities. Based on comments received in response to the USCG NOI, during the public scoping meeting on December 14, 2017, and the direct and indirect Project impacts, four resources have been reviewed for potential cumulative impacts:

- Cultural resources
- ESA-listed species and critical habitat
- Water resources (hydrology)
- Wetlands

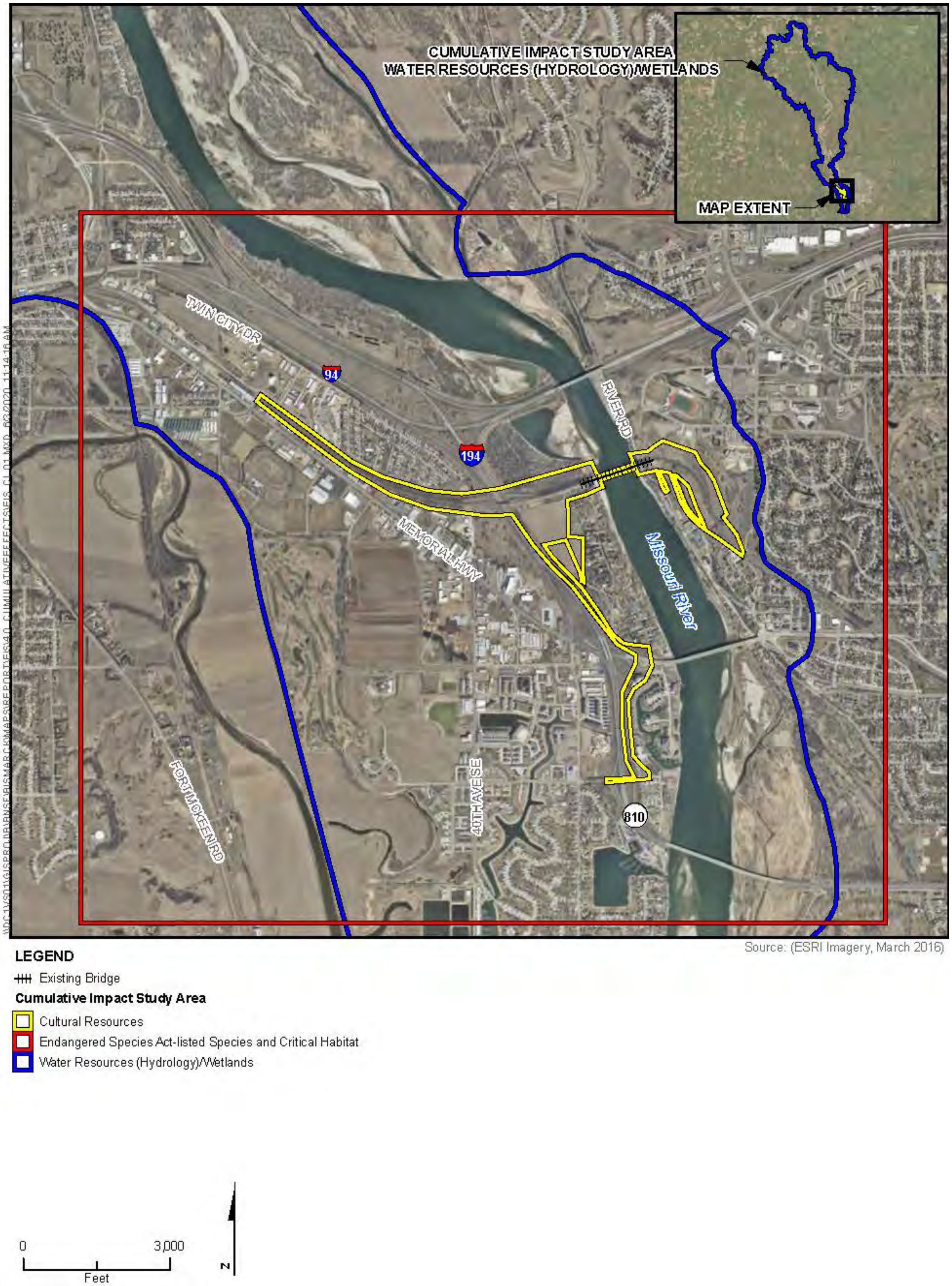
Cumulative Impacts Study Area and Timeframe for Analysis

The study team has used guidance from CEQ to develop the study area. CEQ recommends that a cumulative effects analysis should be conducted on the scale of human communities, landscapes, watersheds or airsheds. Thus, the study area for the impact analysis varies by resource and the distance an effect can travel (Figure 19). Table 35 illustrates the cumulative impacts study area for each evaluated resource, as follows.

- Cultural resources: The footprint of the proposed undertaking within which all proposed construction and ground-disturbing activity is confined, including the existing and proposed ROW for the replacement of the railroad bridge and all access roads
- ESA-listed species and critical habitat: 0.5-mile radius of the Project
- Water resources (hydrology): Sherk Creek-Missouri River Watershed
- Wetlands: Sherk Creek-Missouri River Watershed

The timeframe for the analysis is 2045, which coincides with *Arrive 2045* (Bismarck-Mandan MPO 2020), the Bismarck-Mandan Metropolitan Planning Organization (MPO) Metropolitan Transportation Plan, and the availability of population, employment, and land use information. In addition, this timeframe is long enough for cumulative impacts to unfold, but not so far into the future that the impacts become too difficult to reasonably anticipate.

Figure 19: Cumulative Impact Study Areas



Notable Past, Present, and Reasonably Foreseeable Future Actions

The Bismarck-Mandan metropolitan area, home to the state Capitol and many major employers as well as colleges and universities, has recently experienced a rapid increase in the pace of development. Population has historically grown at a rate of 1.2 percent per year (1985 to 2015); however, more recent trends have shown a more significant growth rate, around 2.4 percent per year (2010 to 2015) (Bismarck-Mandan MPO 2020). New job and household growth is concentrated along the outskirts of the city, with a few areas of infill development. Bismarck-Mandan has much to offer, and has been repeatedly ranked in the top five in both the Forbes list of “Best Small Places for Business and Careers" and the Milken Institute "Best Small Cities" list, as well as being included in the CNN Money list of top 100 places to live (Bismarck-Mandan Development Association 2013).

In Bismarck, State Street/US 83 is a major commercial corridor currently, and the growth trend is expected to continue with more than 20,000 new jobs within 1 mile of the corridor through 2045 (Bismarck-Mandan MPO 2020). The future Century Avenue corridor, east of Centennial Road, is also an expected future commercial corridor, with more than 14,000 new jobs surrounding that corridor through 2045 (Bismarck-Mandan MPO 2020). Major pockets of residential growth are scattered across the city.

In Mandan, the future commercial and industrial areas are concentrated in the northwest along I-94, with more than 4,500 new jobs expected through 2045 (Bismarck-Mandan MPO 2020). The largest residential growth areas are also along the northern edge of the city, with more than 2,100 new households expected through 2045 (Bismarck-Mandan MPO 2020).

Bridge 196.6 was the first bridge constructed across the Missouri River in the Bismarck-Mandan area. The Northern Pacific Railroad Company (NPRR) recruited and assigned George S. Morison as the lead engineer to oversee and design the bridge. Construction of the bridge was initiated in 1880 and took approximately three years to complete. The original bridge design included Warren truss features that were representative of construction techniques used in the late 1800s. However, between 1905 and 1906, the Warren trusses were replaced with Parker trusses. The bridge is eligible for listing in the NRHP for its association with broad patterns of railroad, commercial, and military history in the U.S., for its design and construction, and for its association with important engineers, George Shattuck Morison, and Ralph Modjeski. Many residents of Bismarck, Mandan, and surrounding areas regard the bridge as an iconic landmark for their community and a compelling visual feature in the landscape of the Missouri Valley.

Table 35 identifies notable past, present, or reasonably foreseeable future actions, that when considered with the Project build concepts, may have cumulative impacts on environmental resources. Because most of the reasonably foreseeable projects identified are in early planning stages and are at the conceptual design stage, effects to environmental resources have largely not been quantified. The cumulative impacts analysis has therefore assessed the impacts of these projects qualitatively based on the presumed level of impact.

Table 35: Notable Past, Present, and Reasonably Foreseeable Future Actions

Project Type	Project	Past, Present, or Future Action	Reference
Rail	**BSNF capacity expansion:** In 2014 and 2015, BNSF Railway invested over $700 million to maintain and expand rail capacity in North Dakota. Improvements with termini in the Project area (about 2 miles north and west) include adding siding between Bismarck and Zap, North Dakota, and extending the siding along the Dickinson Subdivision between Mandan and Glendive, Montana, enabling trains on the same line to pass, resulting in better train flows.	Past (2015)	Bonham (2015)
	BNSF bike and pedestrian trail: Parallel and adjoining the existing BNSF active rail line in downtown Bismarck, the concept of the trail would be for it to run from downtown Bismarck, west to the Missouri River. Possible routes, safety concerns, and logistic issues of the routes are being analyzed and investigated by the City of Bismarck, the state, and interested citizens.	Future (uncertain)	*2040 North Dakota State Rail Plan* (NDDOT 2017) and Downtown Bismarck Subarea Plan (City of Bismarck 2013)
	Intermodal container or transload facility: The Bismarck-Mandan MPO area currently does not have a facility to transfer freight between the rail and trucking modes. The addition of an intermodal or transloading facility could improve efficiency and reduce shipping costs for the region. The location is not yet determined.	Future (uncertain)	*Bismarck-Mandan Regional Freight Study* (Bismarck-Mandan MPO 2018)
	DMVW track upgrades: DMVW serves an important role in the regional freight system; it provides the link between the BNSF tracks and local businesses/industrial parks. Approximately half of the DMVW track cannot accommodate the current industry standard of 286,000-pound gross weight railcars. Upgrading the DMVW track would help improve the operational efficiency of the regional rail system.	Future (uncertain)	*Bismarck-Mandan Regional Freight Study* (Bismarck-Mandan MPO 2018)
Roadway	**Liberty Memorial Bridge replacement:** The Liberty Memorial Bridge was the first vehicular bridge to connect Bismarck and Mandan across the Missouri River when it was constructed in September 1922. The bridge was placed on the NRHP in 1997. The bridge was replaced in 2008, by the new Liberty Memorial Bridge and demolished shortly thereafter. The new bridge is approximately 0.75 mile south of the Bridge 196.6.	Past (2008)	Hoffman (2019)

Project Type	Project	Past, Present, or Future Action	Reference
Roadway	**I-94/Mandan Avenue interchange:** Concrete pavement and ramp revisions (TIP 21.6.02).	Future (2021)	2020 to 2023 TIP (Bismarck-Mandan MPO 2019)
	Mandan Memorial Highway (Memorial Highway Phase 1, extents TBD): Reconstruction (TIP 21.6.10).	Future (2021)	2020 to 2023 TIP (Bismarck-Mandan MPO 2019)
	Mandan Memorial Highway (Memorial Highway Phase 2, extents TBD): Reconstruction (TIP 22.6.05).	Future (2022)	2020 to 2023 TIP (Bismarck-Mandan MPO 2019)
	Mandan Memorial Highway (Memorial Highway Phase 3, extents TBD). Reconstruction (TIP 23.6.11).	Future (2023)	2020 to 2023 TIP (Bismarck-Mandan MPO 2019)
	McKenzie Road (Highway 1806 to 39th Avenue East): Construct as a two-lane rural section. Include a new bridge across the Heart River. Add signals at the McKenzie Drive/Bismarck Expressway ramps and at McKenzie Drive/40th Avenue (ID 30).	Future (2024 to 2031)	*Arrive 2045* (Bismarck-Mandan MPO 2020)
	McKenzie Road/46th Avenue Southeast intersection: Intersection capacity improvement (ID 31).	Future (2024 to 2031)	*Arrive 2045* (Bismarck-Mandan MPO 2020)
	Divide Avenue (Turnpike Avenue to 26th Street): Restripe as a three-lane urban section (ID 52).	Future (2024 to 2031)	*Arrive 2045* (Bismarck-Mandan MPO 2020)
	Rosser Avenue (Main Avenue to 10th Street): Restripe as three-lane urban section (ID 54).	Future (2024 to 2031)	*Arrive 2045* (Bismarck-Mandan MPO 2020)
	Century Avenue/Tyler Parkway intersection: Intersection capacity improvement (ID 59).	Future (2024 to 2031)	*Arrive 2045* (Bismarck-Mandan MPO 2020)
	3rd Street (6th Avenue/ND1806 to Memorial Highway): Restripe to include turn lanes or restripe to three-lane section with a center turn lane and no parking (ID 25).	Future (2032 to 2038)	*Arrive 2045* (Bismarck-Mandan MPO 2020)
	I-94/I-194 interchange: Additional westbound lane from I-94/I-194 to Main Street/Exit 155 (ID 26).	Future (2032 to 2038)	*Arrive 2045* (Bismarck-Mandan MPO 2020)
	Tyler Parkway (Schafer Road to Burnt Boat Drive): Intersection capacity improvement. Add turn lanes and include safety improvements (ID 57).	Future (2039 to 2045)	*Arrive 2045* (Bismarck-Mandan MPO 2020)

Project Type	Project	Past, Present, or Future Action	Reference
Roadway	**Burnt Boat Drive/River Road Intersection:** Intersection capacity improvement (ID 61).	Future (2039 to 2045)	*Arrive 2045* (Bismarck-Mandan MPO 2020)
Land Use and Development	**Heritage River Landing:** This development, along River Road. north of I-94 in Bismarck, features 4,400 square feet of community space, including a restaurant and bar, a venue for large parties, and a bicycle repair station.	Past (2019)	Emerson (2018)
	Gateway to Science Center: The science museum in Bismarck is receiving a major upgrade. The new Gateway to Science Center will be built along Canary Avenue, across from the MDU Resources Community Bowl. It will overlook the Missouri River and will be visible from I-94 and adjacent to the BNSF tracks. It will contain 65,000 square feet of space, allowing more room for exhibits.	Current and future (development ongoing)	Emerson (2018)

Note:
TIP = Transportation Improvement Program

3.18.3 Describe the Affected Environment and Determine the Environmental Consequences and Potential Mitigation Measures

This section describes the resources that could experience cumulative impacts as a result of the No Action Alternative, Proposed Action Alternative, and Offset Alternatives 1 through 3, and other past, present, and reasonably foreseeable actions in Section 3.18.1. It summarizes the affected environment, environmental consequences, and potential mitigation measures.

The following resources have been assessed for potential cumulative impacts:

- Cultural resources
- ESA-listed species and critical habitat
- Water Resources (hydrology)
- Wetlands

Affected Environment

Cultural Resources

In 2017 and 2019, Juniper Environmental Consulting conducted a Class I Literature Search of the files maintained by the State Historical Society of North Dakota to inventory all previously documented cultural resources within the Project area. Three cultural resources were identified in the cumulative impacts study area: Bridge 196.6 (site 32BL801/32MO1459), Liberty Memorial Bridge (site 32BL114/32MO321, demolished in 2008), and an irrigation ditch (site 32MOx626). Class III inventories conducted by Juniper Environmental Consulting in 2017 and 2019 identified no historic properties or significant cultural resources beyond what had been identified through the literature search (Juniper 2017, 2019).

Bridge 196.6 (site 32BL801/32MO1459) was the first bridge constructed across the Missouri River in the Bismarck-Mandan area. The bridge was determined eligible for listing in the NRHP in 2017. The Liberty Memorial Bridge (site 32BL114/32MO321) was the first vehicular bridge to connect Bismarck and Mandan across the Missouri River. The bridge was placed on the NRHP in 1997. It was demolished and replaced between 2008 and 2009, with a modern concrete bridge. Site 32MOx626 is recorded as an irrigation ditch that was built in 1982, as part of the drainage system related to the development of the I-94 interchange. The irrigation ditch was determined not eligible for listing in the NRHP in 2017.

Several historic properties and significant cultural resources were also identified within a larger area to assess visual impacts (Table 22 and Figure 11 in Section 3.9).

Section 3.9 and *BNSF Bridge 0038-196.6A of the Jamestown Subdivision Over the Missouri River, A Class III Cultural Resource Inventory, Burleigh and Morton Counties, North Dakota* (Juniper 2017) (Appendix N) describe the resource condition in more detail.

Endangered Species Act-listed Species and Critical Habitat

The diversity of the study area with respect to vegetation, soils, and available water resources provides foraging, refugia, and nesting or spawning habitat for numerous wildlife and fish species. Cropland, grassland uplands, forested uplands, emergent wetlands, dense shoreline vegetation, the Missouri River, and the MRNA are present within the study area.

Seven species have been identified as potentially occurring in the study area: gray wolf, interior least tern, whooping crane, red knot rufa, pallid sturgeon, piping plover, and NLEB. The direct impact analysis (Section 3.8) resulted in only three species (pallid sturgeon, piping plover, NLEB) with an impact of “may affect”; therefore, Section 3.18 only discusses these three species.

Section 3.8 and *Biological Assessment, BNSF Bridge 196.6* (DLW Natural Resource, LLC 2017) (Appendix M) describe the resource condition in more detail.

Water Resources (Hydrology)

The Project spans the Missouri River and is within a FEMA-defined SFHA and FEMA-designated floodway. The Missouri River extends 2,319 miles from its origin in Three Forks, Montana to where it joins the Mississippi River just upstream of St. Louis, Missouri. At the Project location, the total drainage area of the Missouri River is approximately 186,000 square miles and the channel slope is approximately 0.9 foot per mile (USGS 2020b). The average daily discharge at Bismarck, North Dakota is approximately 23,200 cubic feet per second (USACE 2018).

USACE has placed several revetment structures along the banks of the Missouri River to help stabilize the riverbanks. The nearest revetment structure is 1,000 feet upstream of Bridge 196.6. A hydraulic analysis was completed, which found that the bank revetments would not be adversely impacted (Appendix K).

Flow at the Project location is primarily regulated by Lake Sakakawea and the Garrison Dam, approximately 75.4 miles upstream. Garrison Dam is one of six federal dams that occur along the Missouri River and are maintained and operated by USACE. Streamflow data are available in Section 3.5. Snowmelt runoff and ice jams are the major sources of flooding on the Missouri River.

In the Project area, the Missouri River is not designated as a Wild and Scenic River, is not listed on the Nationwide Rivers Inventory, and is not listed in the EO 13061(National Wild and Scenic Rivers System 2019; NPS 2016). Section 3.3 describes the resource condition in more detail.

Wetlands

Twelve potentially jurisdictional wetlands (2.10 acres) were identified within the study area (Table 36). The wetland types identified include PEM1C (palustrine, emergent, and seasonally flooded) and PEM1Ad/Cd (palustrine, emergent, seasonally/temporarily flooded, ditched), PEM1f (palustrine, emergent, seasonally flooded, farmed), and PFO1Cd (palustrine, forested, seasonally flooded, ditched). These wetland areas formed in the ditches that were created during the railway construction. Appendix F provides the delineation of these wetlands.

Table 36: Summary of Delineated Wetlands within the Cumulative Impacts Study Area

Wetland ID	National Wetlands Inventory Listing	Wetland Type	Wetland Acreage
1	N/A	PEM1Ad	0.01
2	N/A	PEM1Cd/PFO1Cd	0.61
3	PEM1C	PEM1C	0.26
4	PEM1C	PEM1C	0.23
5	N/A	PEM1Cd	0.39
6	N/A	PEM1Cd	0.13
7	N/A	PEM1C	0.04
8	N/A	PEM1C	0.01
9	N/A	PEM1C	0.07
10	N/A	PEM1C	0.01
11	N/A	PEM1C	0.33
12	N/A	PEM1f	0.01
Total acres within study area			**2.10**

Section 3.4 describes the resource condition in more detail.

Environmental Consequences

Cultural Resources

Cumulative impacts to significant cultural resources and historic properties would include the direct and indirect impacts in Section 3.9, as well as the impacts of the projects in Table 35, to the extent practical. Unless the development projects are large enough to require state or federal environmental review or have undergone cultural resources review, it is difficult to assess the impacts of other actions. Historically, private, and nonfederal public developments have not been required to investigate cultural resource impacts. Based on available information, the assessment of other actions in this section is limited to the Liberty Memorial Bridge.

Under the No Action Alternative, Bridge 196.6 would be retained, and there would be no significant impact under NEPA and a finding of no adverse effect under Section 106. There would not be a change to the setting of any historic properties or significant cultural resources. However, there could be a long-term (indirect) adverse effect if the bridge is abandoned. The bridge would, at some point, reach the end of its useful life, and failure would be imminent, which would require demolition or substantial replacement of character-defining features, resulting in an adverse effect and a significant impact (Section 3.9). In combination with the Liberty Memorial Bridge removal in 2008, there is a potential cumulative impact on cultural resources if Bridge 196.6 is removed, as the Project could contribute to the loss of another iconic, historic bridge in the Bismarck-Mandan area.

With the Proposed Action Alternative, there would be minor direct and indirect impacts on significant cultural resources and historic properties that have a view of Bridge 196.6. The cumulative impact on these significant cultural resources and historic properties is minor as their uses and cultural association would not be impaired by the Project or other actions. As Bridge 196.6 is eligible for listing in the NRHP, its removal and replacement with the Proposed Action Alternative would have a significant impact under NEPA and would result in a finding of adverse effect under Section 106. In combination with the Liberty Memorial Bridge removal in 2008, there is a potential cumulative impact on cultural resources if Bridge 196.6 is removed, as the Project could contribute to the loss of another iconic, historic bridge in the Bismarck-Mandan area.

With the Offset Alternatives 1 through 3, there would be minor direct and indirect impacts on significant cultural resources and historic properties that have a view of Bridge 196.6. Offset Alternatives 1 through 3 (which would replace Bridge 196.6 on a new alignment while retaining the existing structure) would result in no significant impact under NEPA and a possible finding of adverse effect under Section 106. The new bridge could alter the viewshed of Bridge 196.6 and result in a cumulative impact to cultural resources. Since the removal of the Liberty Memorial Bridge in 2008, Bridge 196.6 is the only remaining historic bridge across the Missouri River in the Bismarck-Mandan area. As a result, the Project could impact the historic significance of Bridge 196.6 through changes to its setting.

Endangered Species Act-listed Species and Critical Habitat

The No Action Alternative would have no effect on all federally listed species and critical habitat. Cumulative impacts to pallid sturgeon, piping plover, and NLEB from the build alternatives would include the direct and indirect impacts in Section 3.8, as well as the impacts of the projects in Table 35.

Pallid Sturgeon

The Proposed Action Alternative and Offset Alternatives 1 through 3 may affect but are not likely to adversely affect the pallid sturgeon. As there are no direct or indirect impacts to the pallid sturgeon, then the Proposed Action Alternative and Offset Alternatives 1 through 3 are unlikely to contribute to a substantial cumulative impact.

Piping Plover

The Proposed Action Alternative and Offset Alternatives 1 through 3 may affect but are not likely to adversely affect the piping plover, and would not destroy or adversely modify piping plover designated critical habitat. As there are no direct or indirect impacts to the piping plover, the Proposed Action Alternative and Offset Alternatives 1 through 3 are unlikely to contribute toa substantial cumulative impact.

Northern Long-eared Bat

The Proposed Action Alternative and Offset Alternatives 1 through 3 may affect but are not likely to adversely affect NLEB after implementation of measures that prohibit tree clearing between November 1 and April 1. As there are no direct and insignificant indirect impacts to NLEB, the Proposed Action Alternative and Offset Alternatives 1 through 3 are unlikely to contribute to a substantial cumulative impact.

Water Resources (Hydrology)

Cumulative impacts to hydrology would include the direct and indirect impacts in Sections 3.3 and 3.5, as well as the impacts of the projects in Table 35. USACE has placed several revetment structures along the banks of the Missouri River to help stabilize the riverbanks, with the nearest revetment structure located 1,000 feet upstream of Bridge 196.6 (Section 3.3). The hydraulic analysis has found that the bank revetments would not be adversely impacted by the build alternatives.

The No Action Alternative, the Proposed Action Alternative, and Offset Alternative 2 would not cause a rise in the BFE.

Offset Alternatives 1 and 3 could alter river hydrology due to increased flood levels. Offset Alternatives 1 and 3 would result in an increase of approximately 0.02 and 0.03 feet, respectively, to the BFE. The rise in the BFE would require mitigation by modifying the Missouri River channel or installing flood conveyance culverts.

Other actions that cross or are adjacent to the Missouri River, such as the Liberty Memorial Bridge Replacement and Heritage River Landing, are required by federal regulations to result in no rise in the BFE; therefore, cumulative impacts to hydrology are not anticipated as federal regulations require mitigation for any action that would raise the BFE.

Wetlands

Cumulative impacts to wetlands would include the direct and indirect impacts in Sections 3.4, as well as the impacts of the projects in Table 35. Under the No Action Alternative, there are no direct or indirect impacts to wetlands, thus, there are no cumulative impacts. Permanent directs impacts of the build alternatives would consist of the placement of nearshore fill and the installation of permanent piers in the Missouri River to support the new bridge.

Substantial adverse cumulative effects to waters of the United States are not anticipated with the proposed build alternatives. Any new development within wetlands would have to comply with Sections 404 and 401 of the CWA, which regulates the filling of and encroachment on these resources, as well as county, and municipal level regulations that promote the continued preservation of wetland areas, and require mitigation to offset impacts. Given the regulatory requirements governing impacts to waters of the United States, and the mitigation measures in Section 4.0, substantial cumulative effects are not anticipated.

Potential Mitigation

Cultural Resources

Cumulative impacts would be mitigated per measures stipulated in the Section 106 PA, developed in coordination with SHPO and other consulting parties. Section 4.0 describes mitigation.

Endangered Species Act-listed Species and Critical Habitat

The build alternatives are not anticipated to contribute to cumulative impacts; therefore, no mitigation is required.

Water Resources (Hydrology)

No cumulative impacts are anticipated; therefore, no mitigation is required.

Wetlands

There are regulations at the federal, county, and municipal levels that promote the continued preservation of localized wetland areas, thus, a reduction in future wetland losses. Under the protection granted to wetlands (Section 404 of the CWA), mitigation guidelines require that wetland losses greater than 0.10 acre be replaced at a ratio of 1.5 to 1 or greater (depending on the type and quality of wetland affected, the mitigation ratios may be higher). In many cases, more wetlands are being created than destroyed by individual projects. These mitigation requirements are applicable to both public and private projects.

Morton and Burleigh counties, the City of Bismarck, and the City of Mandan have stormwater management ordinances that regulate discharge into wetlands. Current and future projects in Table 35 are subject to regulations at the federal, county, and municipal levels. Substantial cumulative effects to waters of the United States are not anticipated, thus, no additional mitigation is proposed.

3.19 Comparative Analysis of the No Action Alternative and the Proposed Action Alternative

The following section compares the potential environmental effects of the No Action Alternative, the Proposed Action Alternative, and Offset Alternatives 1 through 4. The purpose of this section is to allow a quick comparison of the differences in potential effects of the two alternatives. Table 37 summarizes the potential direct, indirect, and cumulative environmental effects of each alternative as detailed in Section 3 by resource area. Potential effects in all resource areas would not be significant and would be mitigated based on federal and applicable state and local standards. Section 3.18 describes cumulative impacts of the No Action Alternative, the Proposed Action Alternative, and Offset Alternatives 1 through 4.

Table 37: Comparison of Potential Environmental Effects of Alternatives

Resource	No Action Alternative	Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure	Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure	Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure	Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure
Air quality	Direct, short-term impacts on air quality from fugitive dust and exhaust emissions from equipment used for repairs and maintenance. Increased long-term emissions and air quality impacts from train idling, train engine warmups, and idling vehicles on the local roadway system.	Short-term localized increases in fugitive dust and emissions from fuel combustion in construction equipment and vehicles during the 3.5-year construction duration. Long-term net improvement in air quality from substantial relief to existing train and traffic congestion.	Short-term localized increases in fugitive dust and emissions from fuel combustion in construction equipment and vehicles during the 5.5-year construction duration. Long-term net improvement in air quality from substantial relief to existing train and traffic congestion.	Short-term localized increases in fugitive dust and emissions from fuel combustion in construction equipment and vehicles during the 6.5-year construction duration. Long-term net improvement in air quality from substantial relief to existing train and traffic congestion.	Short-term localized increases in fugitive dust and emissions from fuel combustion in construction equipment and vehicles during the 4.5-year construction duration. Long-term net improvement in air quality from substantial relief to existing train and traffic congestion.
Geology, soils, and topography	No change.	Minor short-term modifications to topography and soils as a result of access, construction workspaces, and temporary in-water support structures. Long-term fill for bridge piers, abutments, and the west approach: 58,000 cubic yards of common excavation, 21,000 cubic yards of topsoil excavation, 128,000 cubic yards of embankment fill, 3,600 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 17,200 cubic yards of river pier excavation, and 4,600 cubic yards of river pier backfill (a total of 233,000 cubic yards of excavation and fill).	Minor short-term modifications to topography and soils as a result of access, construction workspaces, and temporary in-water support structures. Long-term fill for excavation and installation of retaining walls at the east and west approaches: 205,700 cubic yards of common excavation, 26,900 cubic yards of topsoil excavation, 322,000 cubic yards of embankment fill, 4,600 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 17,900 cubic yards of river pier excavation, and 4,300 cubic yards of river pier backfill (a total of 582,000 cubic yards of excavation and fill). The east retaining wall has a high potential to engage the existing fault line and lead to landslides.	Minor short-term modifications to topography and soils as a result of access, construction workspaces, and temporary in-water support structures. Additional short-term in-water support structures to accommodate installation of the 400-foot spans. Long-term fill for excavation and installation of retaining walls at the east and west approaches: 205,700 cubic yards of common excavation, 26,900 cubic yards of topsoil excavation, 322,000 cubic yards of embankment fill, 4,600 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 9,500 cubic yards of river pier excavation, and 2,000 cubic yards of river pier backfill (a total of 571,300 cubic yards of excavation and fill). The east retaining wall has a high potential to engage the existing fault line and lead to landslides.	Minor short-term modifications to topography and soils as a result of access, construction workspaces, and temporary in-water support structures. Long-term fill for excavation and installation of retaining walls at the east and west approaches: 191,800 cubic yards of common excavation, 19,800 cubic yards of topsoil excavation, 196,700 cubic yards of embankment fill, 3,400 cubic yards of sub-ballast fill, 600 cubic yards of access road excavation, 17,200 cubic yards of river pier excavation, and 4,000 cubic yards of river pier backfill (a total of 433,500 cubic yards of excavation and fill). The east retaining wall has a high potential to engage the existing fault line and lead to landslides.

Resource	No Action Alternative	Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure	Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure	Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure	Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure
Water resources	No change to ongoing maintenance activities. Scour after high-water events would continue to contribute to excess sedimentation and adversely impact water quality downstream of the bridge. Bridge 196.6 susceptibility to collapse, which would adversely impact water quality.	2.89 acres of short-term impact from causeways, staging, cofferdams, and suspended solids within the Missouri River. 0.98 acre of long-term dredge and fill within the Missouri River, 17,200 cubic yards of river pier excavation, and 4,600 cubic yards of river pier backfill. Long-term benefits of no scour potential and no potential for Bridge 196.6 to collapse.	3.22 acres of short-term impact from causeways, staging, cofferdams, and suspended solids within the Missouri River. 1.28 acres of long-term dredge and fill within the Missouri River, 17,900 cubic yards of river pier excavation, and 4,300 cubic yards of river pier backfill. Scour after high-water events would continue to contribute to excess sedimentation and adversely impact water quality downstream of the bridge. Bridge 196.6 susceptibility to collapse, which would adversely impact water quality.	3.05 acres of short-term impact from causeways, staging, cofferdams, and suspended solids within the Missouri River. 0.70 acre of long-term dredge and fill within the Missouri River, 9,500 cubic yards of river pier excavation, and 2,000 cubic yards of river pier backfill. Extensive falsework across the Missouri River would be required for a minimum of 18 months and potential short-term impacts to flooding and safety concerns would be associated with ice jams. Bridge 196.6 susceptibility to collapse, which would adversely impact water quality.	2.87 acres of short-term impact from causeways, staging, cofferdams, and suspended solids within the Missouri River. 1.58 acres of long-term dredge and fill within the Missouri River, 17,200 cubic yards of river pier excavation, and 4,000 cubic yards of river pier backfill. Scour after high-water events would contribute to excess sedimentation and adversely impact water quality downstream of the bridge. Lateral clearance between new Offset Alternative 3 piers and existing piers could cause the greatest potential for scour of all the alternatives. Bridge 196.6 susceptibility to collapse, which would adversely impact water quality.
Wetlands	No change to ongoing maintenance activities.	0.72 acre of short-term wetland impacts associated with construction workspaces, vehicle access routes, material and equipment staging, minor grading, and vegetation removal. 0.33 acre of long-term wetland impacts associated with permanent fill to accommodate the railroad embankment.	0.72 acre of short-term wetland impacts associated with construction workspaces, vehicle access routes, material and equipment staging, minor grading, and vegetation removal. 0.53 acre of long-term wetland impacts associated with permanent fill to accommodate the railroad embankment.	0.72 acre of short-term wetland impacts associated with construction workspaces, vehicle access routes, material and equipment staging, minor grading, and vegetation removal. 0.53 acre of long-term wetland impacts associated with permanent fill to accommodate the railroad embankment.	0.72 acre of short-term wetland impacts associated with construction workspaces, vehicle access routes, material and equipment staging, minor grading, and vegetation removal. 0.53 acre of long-term wetland impacts associated with permanent fill to accommodate the railroad embankment.
Floodplains	No change to ongoing maintenance activities.	Minor short-term impacts to the existing floodplain during the construction period from structures necessary to facilitate construction (cofferdams, docks, or falsework) would have a short-term impact on flood levels. No long-term impacts due to a change in the existing BFE and no impacts to structures within the floodplain.	Minor short-term impacts to the existing floodplain during the construction period from structures necessary to facilitate construction (cofferdams, docks, or falsework) would have a short-term impact on flood levels. A long-term, 0.02-foot increase in BFE and a potential impact to approximately 500 structures within the floodplain.	Minor short-term impacts to the existing floodplain during the construction period and additional short-term in-water support structures to accommodate installation of the 400-foot spans. No long-term impacts due to a change in the existing BFE and no impacts to structures within the floodplain.	Minor short-term impacts to the existing floodplain during the construction period from structures necessary to facilitate construction (cofferdams, docks, or falsework) would have a short-term impact on flood levels. A long-term, 0.03-foot increase in BFE and a potential impact to approximately 550 structures within the floodplain. Horizontal clearance between new and existing piers of approximately 55 feet at two locations below the OHWM, outside of the main navigational channel, and increased susceptibility to ice jams and debris jams, affecting the severity of the 10-year flood.

Resource	No Action Alternative	Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure	Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure	Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure	Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure
Vegetation	No change to ongoing maintenance activities.	Minor short-term impacts of up to 20.9 acres of agricultural vegetation, 0.1 acre of emergent herbaceous wetland vegetation, 29.1 acres of herbaceous vegetation, and 13.9 acres of woody wetland vegetation. Minor short-term indirect impacts due to fugitive dust and the spread of invasive species. Long-term impacts where wooded land cover is permanently removed and not revegetated.	Minor short-term impacts of up to 20.9 acres of agricultural vegetation, 0.2 acre of emergent herbaceous wetland vegetation, 36.4 acres of herbaceous vegetation, and 21 acres of woody wetland vegetation. Minor short-term indirect impacts due to fugitive dust and the spread of invasive species. Long-term impacts where wooded land cover is permanently removed and not revegetated.	Minor short-term impacts of up to 20.9 acres of agricultural vegetation, 0.2 acre of emergent herbaceous wetland vegetation, 35.9 acres of herbaceous vegetation, and 21 acres of woody wetland vegetation. Minor short-term indirect impacts due to fugitive dust and the spread of invasive species. Long-term impacts where wooded land cover is permanently removed and not revegetated.	Minor short-term impacts on up to 20.9 acres of agricultural vegetation, 0.2 acre of emergent herbaceous wetland vegetation, 36.4 acres of herbaceous vegetation, and 21 acres of woody wetland vegetation. Minor short-term indirect impacts due to fugitive dust and the spread of invasive species. Long-term impacts where wooded land cover is permanently removed and not revegetated.
Fish and wildlife	No change to ongoing maintenance activities.	Minor short-term displacement of individuals during the 3.5-year construction duration, 0.14 acre of emergent wetland habitat, and short-term deferral of wildlife using the river channel as a water source within the Project area. Minor long-term loss of up to 13.9 acres of forested habitat and 1.1 acres of shoreland habitat, installation of five in-water piers (0.98 acre of impact), and removal of two in-water piers.	Minor short-term displacement of individuals during the 5.5-year construction duration, 0.21 acre of emergent wetland habitat, and short-term deferral of wildlife using the river channel as a water source within the Project area. Minor long-term loss of up to 21 acres of forested habitat and 1.5 acres of shoreland habitat, installation of five in-water piers (1.28 acres of impact), and construction of a retaining wall.	Minor short-term displacement of individuals during the 6.5-year construction duration, 0.21 acre of emergent wetland habitat, and short-term deferral of wildlife using the river channel as a water source within the Project area. Short-term displacement of aquatic species due to installation of falsework within the river channel. Minor long-term loss of up to 21 acres of forested habitat and 1.5 acres of shoreland habitat, installation of two in-water piers (0.70 acre of impact), and construction of a retaining wall.	Minor short-term displacement of individuals during the 4.5-year construction duration, 0.21 acre of emergent wetland habitat, and short-term deferral of wildlife using the river channel as a water source within the Project area. Minor long-term loss of up to 21 acres of forested habitat and 1.5 acres of shoreland habitat, installation of five in-water piers (1.58 acres of impact), and construction of a retaining wall.
ESA-listed species and critical habitat	No change to ongoing maintenance activities.	Minor temporary impacts to shoreline habitat, impacts to piping plover, forested habitat impacts to NLEB, and in-water impacts to pallid sturgeon from construction of five in-water piers and removal of two piers. Long-term removal of up to of 13.9 acres of forested habitat and potential habitat loss for NLEB.	Minor temporary impacts to shoreline habitat, impacts to piping plover, forested habitat impacts to NLEB, and in-water impacts to pallid sturgeon from construction of five in-water piers. Long-term removal of up to 21 acres of forested habitat and potential habitat loss for NLEB.	Minor temporary impacts to shoreline habitat, impacts to piping plover, forested habitat impacts to NLEB, and in-water impacts to pallid sturgeon from construction of two in-water piers and falsework installation. Long-term removal of up to 21 acres of forested habitat and potential habitat loss for NLEB.	Minor temporary impacts to shoreline habitat, impacts to piping plover, forested habitat impacts to NLEB, and in-water impacts to pallid sturgeon from construction of five in-water piers. Long-term removal of up to 21 acres of forested habitat and potential habitat loss for NLEB.

Resource	No Action Alternative	Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure	Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure	Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure	Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure
Archaeological and historic resources	A potential long-term significant adverse effect from eventual bridge abandonment and failure.	Minor short-term noise and visual impacts from bridge construction and removal on significant cultural resources and historic properties that have a view of Bridge 196.6 during the 3.5-year construction duration. Minor long-term impacts to significant cultural resources and historic properties that have a view of Bridge 196.6. A long-term significant impact to the historic bridge from removal.	Minor short-term noise and visual impacts from bridge construction and removal on significant cultural resources and historic properties that have a view of Bridge 196.6 during the 5.5-year construction duration. Minor long-term impacts to significant cultural resources and historic properties that have a view of Bridge 196.6, and to the historic bridge itself, which would be retained and likely converted for recreational use.	Minor short-term noise and visual impacts from bridge construction and removal on significant cultural resources and historic properties that have a view of Bridge 196.6 during the 6.5-year construction duration. Minor long-term impacts to significant cultural resources and historic properties that have a view of Bridge 196.6, and to the historic bridge itself, which would be retained and likely converted for recreational use.	Minor short-term noise and visual impacts from bridge construction and removal on significant cultural resources and historic properties that have a view of Bridge 196.6 during the 4.5-year construction duration. Minor long-term impacts to significant cultural resources and historic properties that have a view of Bridge 196.6, and to the historic bridge itself, which would be retained and likely converted for recreational use.
Socioeconomics and environmental justice	No change to ongoing maintenance activities.	Short-term benefits due to construction job creation and business revenue, and no long-term measurable change to population or employment.	Short-term benefits due to construction job creation and business revenue, and no long-term measurable change to population or employment.	Short-term benefits due to construction job creation and business revenue, and no long-term measurable change to population or employment.	Short-term benefits due to construction job creation and business revenue, and no long-term measurable change to population or employment.
Land use and recreation	No change to ongoing maintenance activities.	Minor short-term impacts from trail closures, impacts to recreational use of the Missouri River, noise and visual impacts to nearby recreational resources, and bridge removal.	Minor short-term impacts from trail closures, impacts to recreational use of the Missouri River, and noise and visual impacts to nearby recreational resources. Minor, long-term, adverse impacts due to construction of the retaining walls. Bridge 196.6 would be retained and would likely be converted for recreational use.	Minor short-term impacts from trail closures, impacts to recreational use of the Missouri River, and noise and visual impacts to nearby recreational resources. Short-term impacts to recreational use of the Missouri River due to falsework needed for the 400-foot spans. Minor long-term adverse impacts due to construction of the retaining walls. Bridge 196.6 would be retained and would likely be converted for recreational use.	Minor short-term impacts from trail closures, impacts to recreational use of the Missouri River, and noise and visual impacts to nearby recreational resources. Minor long-term adverse impacts due to construction of the retaining walls. Bridge 196.6 would be retained and would likely be converted for recreational use.
Visual resources	No change to ongoing maintenance activities.	Short-term visual impacts from construction, demolition, and cleanup activities. Long-term, substantial, adverse impacts to sensitive viewers due to removal of Bridge 196.6.	Short-term visual impacts from construction, demolition, and cleanup activities. Long-term, neutral to minor, adverse visual impacts from retaining wall construction. A long-term benefit to sensitive viewers from the retention of Bridge 196.6.	Short-term visual impacts from construction, demolition, and cleanup activities. Long-term, neutral to minor, adverse visual impacts from retaining wall construction. A long-term benefit to sensitive viewers from the retention of Bridge 196.6.	Short-term visual impacts from construction, demolition, and cleanup activities. Long-term, neutral to minor, adverse visual impacts from retaining wall construction. A long-term benefit to sensitive viewers from the retention of Bridge 196.6.

Resource	No Action Alternative	Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure	Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure	Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure	Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure
Noise and vibration	Long-term noise and vibration impacts would increase or decrease depending on future rail traffic.	A short-term increase in noise and vibration during construction. Short-term impacts from pile driving, up to 110 decibels (A-weighted scale). Short-term impacts from demolition of Bridge 196.6. Long-term noise and vibration impacts may increase or decrease, depending on future rail traffic. The 20-foot offset would move the main line away from the closest sensitive receptors.	A short-term increase in noise and vibration during construction. Short-term impacts from pile driving, up to 110 decibels (A-weighted scale). Long-term noise and vibration impacts may increase or decrease, depending on future rail traffic. A 92.5-foot offset would move the main line the farthest from the closest sensitive receptor.	A short-term increase in noise and vibration during construction Short-term impacts from pile driving, up to 110 decibels (A-weighted scale). Long-term noise and vibration impacts may increase or decrease, depending on future rail traffic. A 92.5-foot offset would move the main line the farthest from the closest sensitive receptor.	A short-term increase in noise and vibration. Short-term impacts from pile driving, up to 110 decibels (A-weighted scale). Long-term noise and vibration impacts may increase or decrease, depending on future rail traffic. A 42.5-foot offset would move the main line away from the closest sensitive receptors.
Hazardous materials and waste	Long-term impacts from retention of Bridge 196.6 would potentially increase the likelihood of inadvertent spills.	Minor short-term impacts from Bridge 196.6 components that contain potentially hazardous materials, and potential inadvertent spills over the 3.5-year construction period. A minor long-term benefit from removal of Bridge 196.6, reducing the amount of ongoing maintenance and decreasing the likelihood of inadvertent spills.	Minor short-term impacts from hazardous materials encountered during the 5.5-year construction period. A minor long-term impact from ongoing maintenance of Bridge 196.6, increasing the likelihood of inadvertent spills.	Minor short-term impacts from hazardous materials encountered during the 6.5-year construction period. A minor long-term impact from ongoing maintenance of Bridge 196.6, increasing the likelihood of inadvertent spills.	Minor short-term impacts from hazardous materials encountered during the 4.5-year construction period. A minor long-term impact from ongoing maintenance of Bridge 196.6, increasing the likelihood of inadvertent spills.
Traffic	No change, ongoing short-term impacts to transportation routes or traffic volumes during repair or maintenance activities. Long-term impacts of continued and increased repairs and maintenance to transportation routes or traffic volumes during repair or maintenance activities.	Short-term impacts to watercrafts using the river channel during construction. Short-term impacts from approximately 17,900 dump-truck loads of excavation and fill. Short-term closure of River Road for two 5-day windows. Short-term impacts from additional overland trucks for removal of Bridge 196.6.	Short-term impacts to watercrafts using the river channel during construction. Short-term impacts from approximately 44,800 dump-truck loads of excavation and fill. Short-term closure of River Road for two 5-day windows. Long-term periodic impacts to transportation routes or traffic volumes may occur during repair or maintenance activities.	Short-term impacts to watercrafts using the river channel during construction. Significant falsework would result in short-term adverse impacts to watercrafts for a minimum of 18 months. Short-term impacts from approximately 43,900 dump-truck loads of excavation and fill. Short-term closure of River Road for two 5-day windows. Long-term periodic impacts to transportation routes or traffic volumes may occur during repair or maintenance activities.	Short-term impacts to watercrafts using the river channel during construction. Short-term impacts from approximately 33,300 dump-truck loads of excavation and fill. Short-term closure of River Road for two 5-day windows. Long-term periodic impacts to transportation routes or traffic volumes may occur during repair or maintenance activities.

Resource	No Action Alternative	Proposed Action Alternative: 20-foot Offset, 200-foot Spans, Remove Existing Structure	Offset Alternative 1: 92.5-foot Offset, 200-foot Spans, Retain Existing Structure	Offset Alternative 2: 92.5-foot Offset, 400-foot Spans, Retain Existing Structure	Offset Alternative 3: 42.5-foot Offset, 200-foot Spans, Retain Existing Structure
Safety and security	Long-term impacts from ongoing repair and maintenance activities may create a safety hazard for inspection and maintenance personnel.	Short-term impacts from construction of a new bridge and removal of the old bridge may introduce additional temporary safety hazards. Long-term benefits from a reduction in damage potential, an increase in train operator and maintenance worker safety, and structural redundancy.	Short-term impacts from construction of a new bridge may introduce additional temporary safety hazards. Long-term benefits from a reduction in damage potential, an increase in train operator and maintenance worker safety, and structural redundancy. Long-term impacts from the retention of Bridge 196.6 require increased maintenance and repairs, which may create a safety hazard for inspection and maintenance personnel.	Short-term impacts from construction of a new bridge may introduce additional temporary safety hazards. Long-term benefits from a reduction in damage potential, an increase in train operator and maintenance worker safety, and structural redundancy. Long-term impacts from the retention of Bridge 196.6 require increased maintenance and repairs, which may create a safety hazard for inspection and maintenance personnel.	Short-term impacts from construction of a new bridge may introduce additional temporary safety hazards. Long-term benefits from a reduction in damage potential, an increase in train operator and maintenance worker safety, and structural redundancy. Long-term impacts from the retention of Bridge 196.6 require increased maintenance and repairs, which may create a safety hazard for inspection and maintenance personnel.

3.20 Irreversible and Irretrievable Commitments of Resources

The increased inspection costs and scour-critical conditions resulting from the No Action Alternative would be irretrievable. The cost and time associated with the decreasing level of service for rail traffic would also result in an irretrievable commitment of these resources.

Construction of the Proposed Action Alternative and Offset Alternatives 1 through 3 requires the commitment of a range of natural, physical, human, and fiscal resources. Land acquired for constructing the Proposed Action Alternative and Offset Alternatives 1 through 3 would be considered an irreversible commitment during the time period in which the land is used for railway purposes. ROW requirements would convert land from agricultural, recreational, and natural environmental resource uses to railway uses.

The Proposed Action Alternative and Offset Alternatives 1 through 3 involve the commitment of considerable amounts of fossil fuels, labor, and highway construction materials, such as steel, cement, and aggregate material. In addition, considerable labor and natural resources would be used in fabricating and preparing construction materials. Those resources are generally not retrievable. The use of these materials for Project would not have a substantial adverse effect on future availability of such resources.

Committing resources is based on the concept that residents in the Project area, region, and state would benefit by the improved capacity and safety that would result from the proposed improvements. The benefits, such as increased safety, warrant the long-term commitment of these resources.

4.0 MITIGATION

Mitigation has been identified in accordance with the CEQ NEPA Regulation (40 CFR 1508.20) to either:

1. Avoid the impact altogether by not taking a certain action or parts of an action.
2. Minimize the impacts by limiting the degree or magnitude of the action and its implementation.
3. Rectify the impact by repairing, rehabilitating, or restoring the affected environment.
4. Reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action.
5. Compensate for the impact by replacing or providing substitute resources or environments.

Table 38 summarizes identified mitigation measures by alternative.

Table 38: Impact Avoidance and Minimization Measures

Alternative	Measure	Anticipated Benefit/Evaluating Effectiveness	Implementing and Monitoring	Responsibility	Estimated Completion Date
Offset Alternatives 1 through 3	Design and construct a retaining wall on the west side of the Project area, on the BSNF ROW, between the MRNA and the rail line.	Eliminate impacts to the MRNA.	Implemented prior to construction.	BNSF and construction contractor	Prior to construction
	Design and construct a retaining wall on the east side of the Project area, between the rail line and the City of Bismarck West End Reservoirs.	Eliminate impacts to the City of Bismarck West End Reservoirs.	Implemented prior to construction.	BNSF and construction contractor	Prior to construction
Proposed Action Alternative and Offset Alternatives 1 through 3	Install and maintain erosion prevention and sediment control BMPs.	Prevent discharges of stormwater to surface waters and control turbidity and sediment transport within the Missouri River.	Implemented throughout construction. Monitoring as required by an NPDES construction stormwater permit.	Construction contractor	Following successful revegetation of areas disturbed by construction
	Install a turbidity curtain deeper than 2 feet, as needed, during in-water excavation.	Minimize the suspension of sediments in the Missouri River.	Implemented during in-water construction.	Construction contractor	Completion of in-water construction and removal of temporary structures in the Missouri River
	Balance cut and fill volumes, to the extent practicable.	Reduce the need to transport fill material to or from the Project.	Implemented throughout construction.	Construction contractor	Project in-service date
	Test soils for contaminates prior to arriving or leaving the Project area.	Prevent potential soil contamination.	Implemented throughout construction.	Construction contractor	Project in-service date

Alternative	Measure	Anticipated Benefit/Evaluating Effectiveness	Implementing and Monitoring	Responsibility	Estimated Completion Date
	Dispose of excess excavated soils at an approved facility or an upland location away from wetlands and waters of the United States, and outside of the floodplain.	Prevent potential soil contamination from entering wetlands, waters of the United States, or the floodplain.	Implemented throughout construction.	Construction contractor	Project in-service date
	Locate petroleum containment spill kits at power equipment work sites and construction staging areas during construction.	Prevent, mitigate, and respond to spills.	Implemented throughout construction.	Construction contractor	Project in-service date
	Develop and implement an SPCC Plan.	Prevent, mitigate, and respond to spills.	Implemented throughout construction.	BNSF and construction contractor	Project in-service date
	Acquire compensatory wetland mitigation.	Offset unavoidable adverse impacts to wetlands.	Purchase of credits from a wetland mitigation bank, purchase of credits from an in-lieu program, or establishment and monitoring of permittee-responsible mitigation.	BNSF	Prior to construction
	Construct no more than two in-water piers at a time.	Minimize impacts to flood conveyance.	Implemented during in-water construction.	Construction contractor	Completion of substructure construction
Offset Alternative 1	Identify and develop mitigation to offset a rise in the BFE of 0.02 feet.	Reduce the BFE such that no structures within the floodway are impacted.	Implemented prior to construction.	TBD – any interested party[a]	Prior to construction
Offset Alternative 3	Identify and develop mitigation to offset a rise in the BFE of 0.03 feet.	Reduce the BFE such that no structures within the floodway are impacted.	Implemented prior to construction.	TBD – any interested party[a]	Prior to construction

Alternative	Measure	Anticipated Benefit/Evaluating Effectiveness	Implementing and Monitoring	Responsibility	Estimated Completion Date
Proposed Action Alternative and Offset Alternatives 1 through 3	Mark disturbance areas with a high-visibility construction (silt) fence for reference by construction work crews and machinery operators.	Protect adjacent vegetation and prevention of sediment transport to adjacent vegetated areas.	Implemented throughout construction.	Construction contractor	Project in-service date
	Limit clearing to areas necessary for safe equipment operations and temporarily seed or mulch areas during construction.	Minimize available areas for weed seed infestation or spread.	Implemented throughout construction.	Construction contractor	Project in-service date
	Inspect and clean vehicles and equipment, prior to arriving onsite and immediately after departure.	Minimize the potential for introduction of new invasive seeds or vegetation pieces, or potential spread offsite.	Implemented throughout construction.	Construction contractor	Project in-service date
	Reduce vehicle speeds and water unpaved roads, as needed.	Minimize fugitive dust.	Implemented throughout construction.	Construction contractor	Project in-service date
	Develop and implement a Revegetation and Restoration Plan.	Address site restoration, including seed mix, revegetation methods, the timing of restoration activities, and monitoring activities.	Implemented throughout construction.	BNSF and construction contractor	Project in-service date
	Conduct preconstruction nest surveys (including eagle nest surveys).	Identify active migratory bird nests to prevent removal until nest(s) are inactive.	Completed prior to construction.	BNSF and construction contractor	Prior to tree clearing
	Limit tree clearing to November 1 through April 1.	Prevent impacts to NLEB during hibernation season.	Implemented throughout construction.	Construction contractor	Completion of tree clearing
	Initiate limited low-impact strikes to pile driving at the beginning of each work period or install bubble curtains to encourage fish dispersal, as needed.	Minimize impacts to fish by encouraging dispersal.	Implemented during in-water construction.	Construction contractor	Completion of substructure construction

Alternative	Measure	Anticipated Benefit/Evaluating Effectiveness	Implementing and Monitoring	Responsibility	Estimated Completion Date
	Minimize fugitive light and direct it only on the work zone. Limit work to daylight hours.	Limit intensity and duration of light impacts.	Implemented throughout construction.	Construction contractor	Project in-service date
	Review and adopt applicable recommendations from the Bridge Advisory regarding bridge design.	Limit visual impacts.	Completed prior to construction.	BNSF and construction contractor	Project in-service date
	Develop and implement a Construction Noise Logistics Plan.	Limit intensity and duration of noise impacts.	Implemented throughout construction.	BNSF and construction contractor	Project in-service date
No Action Alternative, Proposed Action Alternative, and Offset Alternatives 1 through 3	Develop and implement an Emergency Planning and Preparedness Program.	Prevent, mitigate, and respond to all types of disasters and emergencies.	Implemented throughout operations.	BNSF	Ongoing

[a] Section 3.5.2 provides a discussion of outstanding information related to floodplain mitigation.

5.0 COORDINATION AND COMPLIANCE

5.1 Agency and Tribal Consultation

USFWS is being formally consulted for potential impacts to listed species that are documented to occur in the study area under Section 7 of the ESA. A BA was prepared for the Proposed Action Alternative and was submitted to USFWS by USCG to initiate consultation. USFWS issued concurrence with the BA determinations for the Proposed Action Alternative on May 3, 2019 (Appendix M). Because the offset alternatives had not yet been established, the BA only assesses the Proposed Action Alternative. Since submittal of the BA and subsequent issuance of USFWS concurrence, two species with a no effect determination have been delisted.

5.1.1 North Dakota State Historic Preservation Officer

USCG first notified SHPO of this Project on January 25, 2016. The letter stated, "The Coast Guard has assumed the role as the lead federal agency and will serve as lead federal agency for NEPA and other environmental laws such as Section 106 of the NHPA, Threatened and Endangered Species Act and the Invasive Species Act." The letter invited SHPO to be a cooperating agency under NEPA. Consultation paused for several months while the Project evolved. USCG formally initiated NHPA Section 106 consultation with SHPO for the Project on May 10, 2017, via transmittal of a letter stating intent to begin consultation. A Class III Cultural Resources Inventory Report for the Proposed Action Alternative was submitted on August 10, 2017 (Appendix N). SHPO accepted the report on October 12, 2017, recommended an EIS, and requested a copy of environmental documentation completed to date. Additional information was provided to SHPO on October 26, 2017. SHPO provided formal concurrence on November 14, 2017, with the determinations that the bridge is eligible for the NRHP under Criteria A and C, and that site lead 32MOx626 is not eligible. At the request of USCG, SHPO provided written concurrence with the APE on October 2, 2019, with the request that they would like any additional areas to be used for disposal, borrow, or staging, as those areas have been identified.

USCG sent a copy of the Draft EA to SHPO on March 29, 2018. SHPO responded to the Draft EA with a letter dated April 18, 2018, again requesting an EIS to be prepared. USCG provided a response to SHPO by a letter dated April 26, 2018, noting that the EA was designed to satisfactorily address environmental concerns pertaining to the entire scope of the Project, in addition to the bridge itself.

5.1.2 Native American Tribes

USCG initiated government-to-government and Section 106 consultation with the following Native American Tribes on October 26, 2017:

- Cheyenne River Sioux Tribe
- Chippewa Cree Tribe
- Crow Creek Sioux Tribe
- Crow Nation
- Flandreau Santee Sioux Tribe
- Fort Peck Assiniboine and Sioux Tribe

- Northern Cheyenne Nation
- Oglala Sioux Tribe
- Rosebud Sioux Tribe
- Santee Sioux Nation
- Wahpekute Band of Dakota
- Yankton Sioux Tribe

On November 2, 2018, at the request of SHPO, USCG initiated consultation with the following additional tribes:

- MHA Nation
- Sisseton-Wahpeton Oyate
- Spirit Lake Tribe
- Standing Rock Sioux Tribe
- Turtle Mountain Band of Chippewa

On January 18, 2018, USCG invited all of these tribes to participate in an in-person Section 106 consultation meeting to be held on January 31, 2018.

In addition to written correspondence, USCG attempted to reach each of the tribes by telephone on March 2, 2018 (Table 39).

Table 39: Agencies and Persons Contacted

Tribe Name	Action
MHA Nation	Called and spoke to THPO, and sent the contact an email.
Spirit Lake Tribe	Left a voicemail and sent an email.
Standing Rock Sioux Tribe	Left a voicemail and sent an email.
Turtle Mountain Band of Chippewa	Called and spoke to THPO, and sent the contact an email.
Sisseton-Wahpeton Oyate	Left a voicemail and sent an email.
Fort Peck Assiniboine and Sioux Tribe	No voicemail option available; sent an email.
Northern Cheyenne Nation	Called and spoke to THPO, and sent the contact an email.
Rosebud Sioux Tribe	Left a voicemail and sent an email.
Crow Nation	Left a voicemail and sent an email.
Oglala Sioux Tribe	Left a voicemail and sent an email.
Crow Creek Sioux Tribe	Left a phone number and a message with the THPO Secretary.
Cheyenne River Sioux Tribe	Spoke to THPO.
Yankton Sioux Tribe	Spoke to THPO and sent an email.

Tribe Name	Action
Flandreau Santee Sioux Tribe	No voicemail option available; sent an email.
Santee Sioux Nation	No voicemail option available; sent an email.
Chippewa Cree Tribe	Spoke to THPO.

Note:
THPO = Tribal Historic Preservation Office

In April 2018, the Northern Cheyenne Nation provided a written response to USCG, accepting the invitation to participate as a consulting party. MHA Nation provided a letter to USCG dated August 21, 2018, stating they wanted to be involved in the Section 106 process.

USCG also notified the previously listed tribes listed of 11 additional consulting party meetings held between January 10, 2018, and August 21, 2019. Notification was provided via a letter and an email. Tribal consultation continued throughout the EA process and continues through the Section 106 process.

5.2 Permits and Approvals

5.2.1 Federal

The Project requires federal permits, including a bridge permit from USCG under the General Bridge Act of 1946. In addition to the USCG bridge permit, the Project involves the following additional federal permits and approvals.

Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the United States, including wetlands. While USCG permits the location and plans of bridges and causeways in or over navigable waters of the United States, USACE has jurisdiction over the discharge of dredged or fill material in waters of the United States under Section 404 of the CWA. As such, bridge and causeway projects that involve a permanent or temporary discharge of dredged or fill material in waters of the United States would require a Section 404 permit or exemption from USACE. Impacts to the Missouri River would be covered under NWP 15 for USCG bridges. Per North Dakota Regional Condition 4, a PCN is required for impacts within the Missouri River. NWPs are scheduled to be reissued in March 2022. The applicability of NWPs will be re-evaluated following reissuance. Permit requirements for impacts to aquatic resources, outside of the Missouri River, will be evaluated with USACE following submittal of a Section 404 application.

USACE reviewed a preliminary draft of this EIS and identified additional concerns regarding the assessment of environmental impacts related to temporary fills, specifically construction of the dock walls and causeway. BNSF will work in conjunction with USCG and USACE to determine appropriate mitigation for potential impacts in the Missouri River resulting from temporary structures, following submittal of a Section 404 application.

Section 401 requires a WQC from the state when a 404 permit or a USCG bridge permit is triggered. Typically, this certification is granted by the state to which EPA has delegated authority to certify that the discharge would not violate state water quality standards. EPA retains jurisdiction in limited cases. In North Dakota, NDDOH regulates permit reviews and issuance under Section 401. NDDOH will review Project impacts following conclusion of the NEPA process.

A CLOMR is required to be obtained from FEMA for actions that would affect the hydrologic or hydraulic characteristics of a flooding source and thus modify the existing regulatory floodway, the effective BFEs, or the SFHA. The Project occurs within a FEMA-defined SFHA and is within a FEMA-designated floodway.

Section 106 of the NHPA requires federal agencies to consider the effects that an action would have on historic properties. Bridge 196.6 was recorded as eligible for listing in the NRHP in 2016. A Section 106 PA was executed on January 16, 2021.

Section 7 of the ESA requires federal agencies to consider whether actions would jeopardize the continued existence of federally listed endangered or threatened species, or destroy or adversely modify critical habitat. Informal ESA Section 7 consultation with USFWS has been conducted, including the submission of a BA to USFWS for concurrence with species effects determinations.

5.2.2 State and Local

Under the Interstate Commerce Commission Termination Act, 49 U.S.C. Section 10501(b), the federal Surface Transportation Board has exclusive jurisdiction over railroad operations and facilities. As such, state and local agencies do not have jurisdiction to require railroads to submit state or local permit applications to construct railroad interstate facilities. However, railroads can, and often do, voluntarily agree to comply with reasonable state and local environmental regulations. For the Proposed Action Alternative, BNSF has submitted local floodplain development permits from the cities of Bismarck and Mandan to comply with FEMA requirements. Acquisition of these permits is dependent on the FEMA approval of a CLOMR. BNSF also submitted an Engineers Floodway Review to the North Dakota State Water Commission.

BNSF would need to obtain a General Approval/Coordination for construction at roadway crossings from NDDOT, Burleigh County, Morton County, and affected townships. Approval of an SWPPP would be needed from NDDOH and a Sovereign Lands permit would be needed from the North Dakota State Water Commission.

Additionally, the contractor would work with NDDOT, Burleigh and Morton counties, the cities of Bismarck and Mandan, and Captain’s Landing Township, where necessary, to obtain road and ROW use permits.

5.3 Compliance with Other Laws and Regulations

Table 40 provides the current status of compliance with environmental laws and regulations that may apply to the Project.

Table 40: Status of Compliance with Environmental Laws and Regulations

Law/Regulation	Requirement	Status of Compliance
American Indian Religious Freedom Act	Directs agencies to respect the practice of traditional American Indian religions, including access to religious sites and use of ceremonial items.	No identified American Indian religious sites are located within or adjacent to the APE
Archeological and Historic Preservation Act	Requires federal agencies to identify and recover data from archaeological sites threatened by their actions.	Compliance with the Archeological and Historic Preservation Act is satisfied through compliance with Section 106 of the NHPA.
CAA	Requires agencies to act in conformity with State Implementation Plans that set air quality standards.	Pending
CWA	Requires dredge and fill permits for certain actions affecting the waters of the United States.	Pending
Comprehensive Environmental Response, Compensation, and Liability Act	Requires reporting of releases and cleanup of hazardous substances. Requires identification of uncontaminated property prior to transfer. Requires plans for cleanup of contaminated sites and disclosure to public of hazardous materials and processes.	Pending
ESA	Requires consultation with USFWS or NOAA Fisheries to ensure that actions do not jeopardize threatened or endangered species, or their habitat.	USCG initiated consultation with USFWS under Section 7 of the ESA. USFWS concurred with the findings of the BA. No NOAA Fisheries-managed species are present in the action area; therefore, consultation with NOAA Fisheries is not required.
Environmental Quality Improvement Act	Declares a national policy for enhancement of environmental quality, assigns primary responsibility to state and local governments, and mandates that agencies conducting or supporting public works activities implement existing environmental protection and enhancement policies.	Pending

Law/Regulation	Requirement	Status of Compliance
Flood Disaster Protection Act	Prohibits federal actions related to an occupancy structure in areas subject to flood hazards unless the property is covered by flood insurance.	Pending
Historic Sites Act	Establishes National Historic Landmark program and declares a national policy to preserve sites, buildings, and objects significant in American history.	No National Historic Landmarks are present in or adjacent to the Project.
NHPA	Requires agencies to identify historic properties that may be affected by their actions, evaluate effects of those actions on historic properties, and consult with SHPO and others regarding avoidance, minimization, and mitigation in the event that the undertaking affects a historic property.	The cultural resources evaluation conducted for the Project under Section 106 of the NHPA indicates that there is one historic property within the APE (Section 3.9). Consultation with SHPO, the Advisory Council on Historic Preservation, and others to resolve effects from the undertaking are ongoing. A Section 106 PA was executed on January 11, 2021.
Noise Control Act	Prohibits removing noise control devices or rendering them inoperable. Requires EPA to act as a federal coordinator for noise control efforts and for establishing noise control standards.	Section 3.13 of this DEIS documents potential noise impacts associated with the Project. Construction activities would comply with local noise ordinances.
Resource Conservation and Recovery Act	Regulates hazardous and solid waste activities and underground storage tanks.	Section 3.14 of the EA discusses the potential to encounter contamination during Project construction and summarizes the BNSF emergency preparedness program.
Safe Drinking Water Act	Sets standards for drinking water quality and regulates activities affecting drinking water supplies.	Section 3.3 of the EIS analyzes water quality and potential impacts from the Project.
Toxic Substances Control Act	Regulates specific chemical substances, including polychlorinated biphenyls and asbestos.	Section 3.14 of the EA discusses the potential to encounter contamination during Project construction, including specific chemical substances.

Law/Regulation	Requirement	Status of Compliance
EO 11514	Requires agencies to monitor, evaluate, and control activities to protect and enhance the quality of the environment.	USCG is soliciting input from cooperating agencies and other interested parties throughout preparation of the EIS prior to issuing a decision on the Project. The USCG decision document would identify appropriate mitigation measures to minimize potential impacts to the environment.
EO 11988	Requires agencies to evaluate the potential effects of any action it takes in a floodplain and consider alternatives to avoid adverse effects.	Section 3.5 of this DEIS analyzes potential impacts to floodplains.
EO 12898	Requires federal agencies to identify and address any disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.	Section 3.10 of this DEIS analyzes potential impacts to low-income and minority populations. The Project would not result in disproportionately high and adverse impacts.
EO 13045	Requires federal agencies to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children.	As documented in Section 3.14 of this DEIS, the Project would not generate any environmental health and safety risks that would disproportionately affect children.

5.4 Agency Coordination

Table 41 provides a summary of agencies and persons contacted during preparation of this DEIS.

Table 41: Agencies and Persons Contacted

Agency	Individual	Type of Contact
Advisory Council on Historic Preservation	Christopher Wilson Program Analyst	Formal notification of adverse effect and invitation to participate in Section 106 consultation
Bismarck Historical Society	Walt Bailey Executive Director	Letter, email, teleconference, and in-person meeting
Bismarck-Mandan Historical and Genealogical Society	Donald Smith	Letter and email
Bismarck Tour Company	Annette Schilling Willis Valerie Barbie	Letter, email, in-person meeting
Bismarck-Mandan MPO	Joey Roberson Kitzman	Letter, email, teleconference, and in-person meeting

Agency	Individual	Type of Contact
Burleigh County	Ray Ziegler Building Official-Director	Letter, email, and teleconference
Captain's Landing Township	Fred Rios Chairman	Letter, email, teleconference, and in-person meeting
City of Bismarck	Mayor Steve Bakken Kim Lee Planning Manager, Community Development Corporation Ben Erath, Director, Community Development	Letter, email, teleconference, and in-person meeting
City of Mandan	Mayor Tim Helbring Jim Neubauer City Administrator	Letter, email, teleconference, and in-person meeting
FEMA	Ryan Pietramali Risk Analysis Branch Chief, Region VIII Rick Meyers Deputy Regional Environmental Officer, Region VIII Tim Birney Floodplain Specialist, Region VIII	Letter, email, phone call, and teleconference
Fort Abraham Lincoln Foundation	Aaron Barth Executive Director	Letter, email, teleconference, and in-person meeting
FORB	Susan Wefald	Letter, email, teleconference, and in-person meeting
Historic Bridge Foundation	Kitty Henderson Executive Director	Letter, email, and teleconference
Mandan Historical Society	Robert Porter President	Letter and email
Morton County Historical Society	William "Bill" Engelter	Letter, email, teleconference, and in-person meeting
Nancy Willis	Interested party	Letter
National Trust for Historic Preservation	Elizabeth "Betsy" Merritt Deputy General Counsel Amy Guthrie Sakariassen	Letter, email, teleconference, and in-person meeting
National Trust for Historic Preservation	Amy Guthrie Sakariassen	Letter, email, teleconference, and in-person meeting
NDDOT	Bill Panos Director	Telephone, email, and teleconference
NDDOT	Ron Henke Deputy Director	Telephone, email, and teleconference

Agency	Individual	Type of Contact
North Dakota SHPO	Bill Peterson SHPO	Letter, email, teleconference, and in-person meeting
North Dakota SHPO	Fern Swenson Deputy SHPO	Letter, email, teleconference, and in-person meeting
North Dakota SHPO	Lorna Meidinger Review and Compliance Coordinator	Letter, email, teleconference, and in-person meeting
NDPR Natural Resource Division	Andrea Travnicek Director	Telephone and email
North Dakota State Railroad Museum	William “Bill” Engelter	Letter, email, teleconference, and in-person meeting
North Dakota State Senator	Erin Oban	Email and teleconference
North Dakota State University Department of Landscape Architecture	Dominic Fischer	Letter, email, and teleconference
Preservation North Dakota	Emily Sakariassen	Letter, email, teleconference, and in-person meeting
Rails-to-Trails Conservancy	Brandi Horton	Email
State Historical Society of North Dakota	N/A	Letter and email
USACE	Toni Erhardt Project Manager	Letter, email, teleconference, and in-person meeting
USCG	Eric Washburn Bridge Administrator	Letter, email, telephone, teleconference, and in-person meeting
USCG	Rob McCaskey, Bridge Management Specialist	Letter, email, telephone, teleconference, and in-person meeting
USCG	Shelly Sugarman Chief, Bridge Permits and Policy Division	Letter, email, telephone, teleconference, and in-person meeting
USCG	Brian Dunn Chief, Office of Bridge Programs	Letter, email, telephone, teleconference, and in-person meeting
USFWS	Kevin Shelley Supervisor	Letter

5.5 Public Involvement

On December 14, 2017, USCG conducted a public information meeting to identify Project impacts on Bridge 196.6. USCG explained the NEPA process, provided information on the undertaking and its potential effects on historic properties, and accepted public comment and input. This meeting was also in compliance with Section 106 of the NHPA and 36 CFR 800.

On January 8, 2020, an NOI to prepare an EIS was published in the *Federal Register* and comments were solicited until February 24, 2020.

Between January 31, 2018, and January 8, 2020, USCG conducted 11 consulting party meetings in compliance with Section 106 regulations. This consultation remains ongoing. Table 42 lists opportunities for public comment and consulting party meetings.

Substantive comments are generally considered those that provide additional relevant information not already considered in the preparation of the EA, provide a reasonable basis for questioning the accuracy of the information or adequacy of the methodology used in the analysis, or identify a reasonable alternative that was not previously considered. Substantive comments were received related to several general topics covered in the public meeting and the NOI. These substantive comments have been addressed by making revisions to the analysis and adding information, as necessary, in this DEIS.

Table 42: Public Involvement Opportunities and Consulting Party Meetings

Meeting Type	Date	Relevant Compliance
USCG Bridge Application Public Meeting (in compliance with Section 106 and NEPA)	December 14, 2017	NEPA/Section 106
SHPO Consultation Meeting (conference call)	January 10, 2018	Section 106
Consulting Parties Meeting 1	January 31, 2018	Section 106
Consulting Parties Meeting 2	May 14, 2018	Section 106
Consulting Parties Meeting 3	June 20,2018	Section 106
Consulting Parties Meeting 4	July 11, 2018	Section 106
Consulting Parties Meeting 5	August 1, 2018	Section 106
Consulting Parties Meeting 6	August 22, 2018	Section 106
Consulting Parties Meeting 7	September 11, 2018	Section 106
Consulting Parties Meeting 8	October 10, 2018	Section 106
Consulting Parties Meeting 9	October 30, 2018	Section 106
Consulting Parties Meeting 10	November 14, 2018	Section 106
Consulting Parties Meeting with FEMA	July 12, 2019	Section 106
Consulting Parties Meeting 11	August 21, 2019 (originally scheduled for December 4, 2018)	Section 106
NOI and Request for Public Comments (Notice D8 DWB-891)	January 8, 2020	NEPA
Consulting Parties Meeting 12	September 18, 2020	Section 106
Consulting Parties Meeting 13	January 7, 2021	Section 106
Consulting Parties Meeting 14	March 3, 2021	Section 106

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Appendix A

Truss Relocation Study

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Memorandum

To:	Mike Herzog, BNSF	**Reference:**	Truss Relocation Study
Copies To:	Mike Schaefer, BNSF		BNSF Bridge 196.6A (0038)
		Project No.:	15955.000
From:	Hans Erickson	**Routing:**	
Date:	July 4, 2019		

The discussion provided below documents the concept level investigations completed to date regarding repurposing of the in-place railroad bridge truss spans as public use structures for pedestrian, bicycle, and vehicular traffic.

Background, Motivation, and Intent

BNSF Railway is planning to construct a new railroad bridge across the Missouri River in Bismarck, North Dakota to ensure continued service to North Dakota's agricultural producers, coal and crude oil industries, and other customers. Upon completion of the new structure, the preferred plan includes complete removal of the in-place bridge; therefore, the potential for repurposing portions of the structure as public use facilities exists. To better understand the costs, scope, and risks associated with such an endeavor, a concept level study has been completed. The study investigates truss removal, transport, and installation concepts, permitting and regulatory requirements; and anticipated project costs associated with repurposing the three truss spans shown below.

Figure 1 - In-Place Truss Spans

The following three sites have been considered for possible relocation of an individual truss span:

Figure 2 - Possible Relocation Sites

If installed at one of the three sites identified above, additional modifications to the truss structure will be required before it may be become a component of the local public infrastructure. Recognizing the distance between truss chord centerlines is approximately 22 feet, the clear distance remaining between the chords is insufficient to accept two lanes of vehicular traffic according to American Association of State Highway Transportation Officials (AASHTO) requirements. Therefore, it is assumed the structure will be repurposed for pedestrian, bicycle, equestrian, and maintenance and emergency services vehicle use only. With this understanding, it is anticipated that the existing deck system is the only bridge component requiring modification as it is currently configured to support railroad traffic. Other items such as repair of damaged or deteriorated members, incorporation of bridge deck lighting, maintenance of surface drainage, and bridge painting are beyond the scope of this exercise and have not been included.

The existing deck system is configured to support rail traffic. As such, additional members and components must be installed for the surface to be suitable for the intended purpose. To this end, a concept section has been developed as shown in Figure 3.

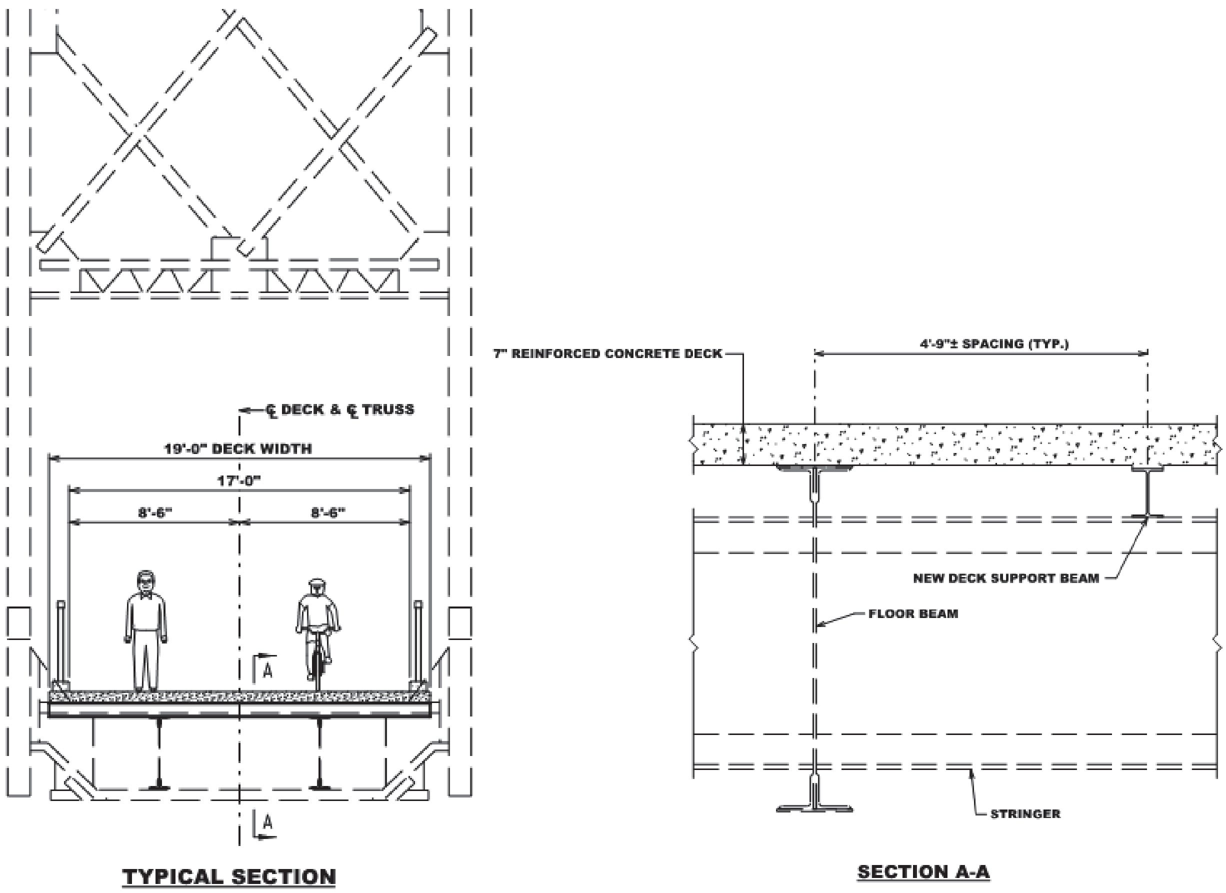

Figure 3 - Repurposed Truss Modifications

The repurposed section provides a 17 foot wide corridor that's contained by concrete curbs and metal railings on both sides. The proposed deck is constructed with reinforced concrete and has been configured with a seven inch thickness. To support the deck, additional steel support beams are required on top of the existing stringers. The assumed spacing of these new beams is 4'-9".

The proposed modifications to the bridge deck are relatively simple compared to efforts necessary to relocate an existing truss span. To help understand these requirements, truss removal, transport, and reinstallation concepts have been developed.

Truss Removals

For each location identified above, the in-place trusses must be removed for the project to be feasible. To this end, two removal concepts have been developed: disassembly by component, and in-tact span removal. Both concepts must be implemented from the south side of the structure as it is assumed the new railroad bridge will be in-place and located approximately 30 feet upstream. Both concepts must also be implemented with recognition that removal operations have the potential to foul active mainline tracks.

Truss #1

Since a portion of Truss #1 spans over the Missouri River, disassembly by component is considered the only feasible mechanism for removal. To complete this operation, the following removal sequence is anticipated:

1. Extend the limits of the temporary work south and install sediment and erosion control measures.
2. Install temporary support bents at the truss floor beam locations.
3. Using a combination of land-based and barge-based cranes, dismantle the truss member-by-member according to the truss removal sequence. This may require installation of temporary truss bracing and/or connection strengthening.
4. Temporarily stockpile the component members within the work area and catalog for reassembly purposes.
5. Load and transport the component members to the installation site.
6. Upon complete truss disassembly, remove the temporary bents and restore the work area.

The process is shown in the following exhibit.

THIS PLAN MUST NOT BE MODIFIED WITHOUT THE APPROVAL OF BNSF SYSTEM ENGINEERING

REMOVAL SEQUENCE:

1. EXPAND TEMPORARY WORK AREA TO LIMITS SHOWN.
2. INSTALL A TEMPORARY BENT AT EACH FLOORBEAM.
3. USE LAND-BASED AND BARGE-BASED CRANES TO DISMANTLE THE TRUSS ACCORDING TO THE TRUSS REMOVAL SEQUENCE. INDIVIDUAL TRUSS COMPONENTS TO BE CATALOGUED AND STOCKPILED IN THE TEMPORARY WORK AREA PRIOR TO TRANSPORT.
4. REMOVE TEMPORARY BENTS.
5. RESTORE WORK AREA.

TRUSS #1 REMOVAL PLAN

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BRIDGE NO 196.6A RELOCATION PLAN
BISMARCK, ND

IN-PLACE TRUSS #1
REMOVAL PLAN

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Truss removal according to this process requires resolving a number of logistical and regulatory details prior to implementation. For example, use of the temporary bents at each floor beam will eliminate river navigation through this corridor and generate a condition that's susceptible to debris loading. In addition, traffic on River Road may be impacted by the temporary support structures, likely requiring a detour during the process. Similarly, Riverfront Trail must be closed for the duration to provide space for the temporary storage and stockpile area as well as crane operations supporting the removals. Tree removals are also necessary in this region, and Riverfront Trail will require reconstruction when removals are complete. Finally, to maintain stability and help ensure components are not damaged by the process, an in-depth analysis of the existing structure will be necessary for development of the removal sequence.

Truss #2

Truss #2 is contained entirely within the limits of the Missouri River. As such, in-tact removal is the mechanism selected for this truss. To complete this operation, the following removal sequence is anticipated:

1. Extend the limits of the temporary work area to the south and install sediment and erosion control measures. Work area extensions to include clearing and grubbing the site, installation of additional shoring and associated grading, installation of a dock wall within the Missouri River, and construction of multiple slide bents.
2. Install temporary support bents adjacent to the in-place pier locations.
3. Jack the truss off of its foundations and slide it south on the temporary bents to a position clear of the in-place substructures.
4. Lower the truss on to barges and secure.
5. Float the truss on the barges to the dock wall, and position the truss to align with the slide bents. Anchor the barges in this position.
6. Transition the truss off the barge supports to the slide bents and slide the truss to the east.
7. Position Self-Propelled Modular Transports (SPMT) beneath the truss bearings and lower the truss on the transports.
8. Move the truss from the site on the SPMTs.
9. Remove the temporary bents, dock wall, slide rails, and work area improvements. Restore the work area.

Figure 4 - In-Tact Truss Transport

The process is shown in the following exhibit.

THIS PLAN MUST NOT BE MODIFIED WITHOUT THE APPROVAL OF BNSF SYSTEM ENGINEERING

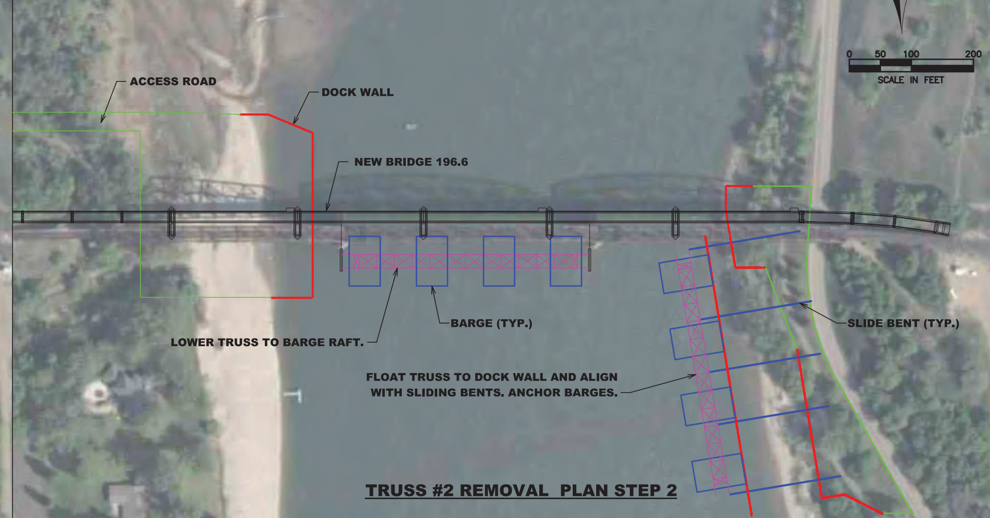
STEP 1 OPERATIONS:

1. INSTALL TEMPORARY BENTS ADJACENT TO RIVER PIERS.
2. CONSTRUCT TEMPORARY DOCK WALL AND SLIDE BENTS ALONG EAST RIVER BANK.
3. JACK TRUSS OFF OF EXISTING PIERS AND INSTALL SLIDE RAILS.
4. SLIDE TRUSS SOUTH.

TRUSS #2 REMOVAL PLAN STEP 1

STEP 2 OPERATIONS:

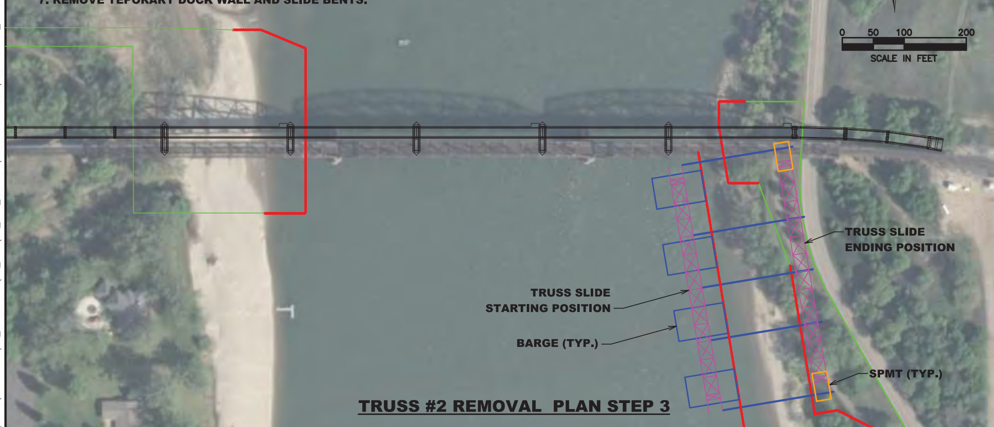
1. LOWER TRUSS ONTO BARGE RAFT. SECURE TRUSS TO BARGES.
2. FLOAT TRUSS TO DOCK WALL ON EAST BANK.
3. POSITION TRUSS FOR MOVE ON SLIDE BENTS.
4. ANCHOR BARGES IN POSITION.
5. REMOVE TEMPORARY BENTS ADJACENT TO RIVER PIERS.



TRUSS #2 REMOVAL PLAN STEP 2

STEP 3 OPERATIONS:

1. JACK TRUSS AS REQUIRED TO RAISE ELEVATION ABOVE SLIDE BENT.
2. MOVE TRUSS ON BARGE SUPPORTS AND POSITION ABOVE SLIDE BENTS.
3. LOWER TRUSS TO SLIDE BENTS.
4. POSITION MODULAR TRANSPORTS TO ACCEPT TRUSS.
5. SLIDE TRUSS TO REPOSITION ABOVE MODULAR TRANSPORTS.
6. LOWER TRUSS ON MODULAR TRANSPORTS AND SECURE.
7. REMOVE TEPORARY DOCK WALL AND SLIDE BENTS.



TRUSS #2 REMOVAL PLAN STEP 3

STEP 4 OPERATIONS:

1. MOVE TRUSS TO PROPOSED RELOCATION SITE.
2. REMOVE TEMPORARY WORK AREA SHORING.
3. RESTORE WORK AREA.

TRUSS #2 REMOVAL PLAN STEP 4

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IN-PLACE TRUSS #2
REMOVAL PLAN

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Similar to Truss #1, removal of Truss #2 according to this process also requires resolving a number of logistical and regulatory details prior to implementation. First, the process will block all river navigation for a period of time while the truss is being moved off its supports, lowered on the barges, and transferred to the dock wall and slide rail system. Also, the barge transport operations will require sufficient draft to be feasible. If the work is attempted during a low flow period, significant dredging may be necessary for the move to be successful. Significant civil works will also be needed at the River's east bank. A large area must be cleared for construction of the dock wall, work area, and slide rails. It is anticipated traffic on River Road will be impacted by these works and likely require a detour during the process. Riverfront Trail must also be closed for the duration to provide space for the work area. Tree removals and construction of a temporary shoring wall with associated grading are necessary in this region to provide the appropriate working surface. As a result, Riverfront Trail will require reconstruction when removals are complete.

Truss #3

The removal process for Truss #3 is identical to that for Truss #1 with the exception that barge-based operations are not anticipated for this structure. Also, expansion of the west bank's temporary work area is not anticipated as the bulk of the new bridge's construction efforts are supported from this location. To complete this removal operation, the following sequence is anticipated:

1. Install temporary support bents at the truss floor beam locations.
2. Dismantle the truss member-by-member according to the truss removal sequence. This may require installation of temporary truss bracing and/or connection strengthening.
3. Temporarily stockpile the component members within the work area and catalog for reassembly purposes.
4. Load and transport the component members to the installation site.
5. Upon complete truss disassembly, remove the temporary bents and restore the work area.

The logistical and regulatory challenges with the removal of Truss #3 are also similar to Truss #1.

The process is shown in the following exhibit.

THIS PLAN MUST NOT BE MODIFIED WITHOUT THE APPROVAL OF BNSF SYSTEM ENGINEERING

REMOVAL SEQUENCE:

1. INSTALL TEMPORARY BENTS.
2. USE LAND-BASED CRANES TO DISMANTLE TRUSS ACCORDING TO THE TRUSS REMOVAL SEQUENCE. INDIVIDUAL TRUSS COMPONENTS TO BE CATALOGUED AND STOCKPILED IN THE TEMPORARY WORK AREA PRIOR TO TRANSPORT.
3. TRANSPORT BY OVERLAND ROUTE WITH ACCESS PROVIDED VIA THE CONSTRUCTION ACCESS ROAD. TRANSPORT BY BARGE WITH ACCESS FROM THE CONSTRUCTION DOCK WALL.
4. REMOVE TEMPORARY BENTS.
5. RESTORE WORK AREA.

TRUSS #3 REMOVAL PLAN

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IN-PLACE TRUSS #3
REMOVAL PLAN

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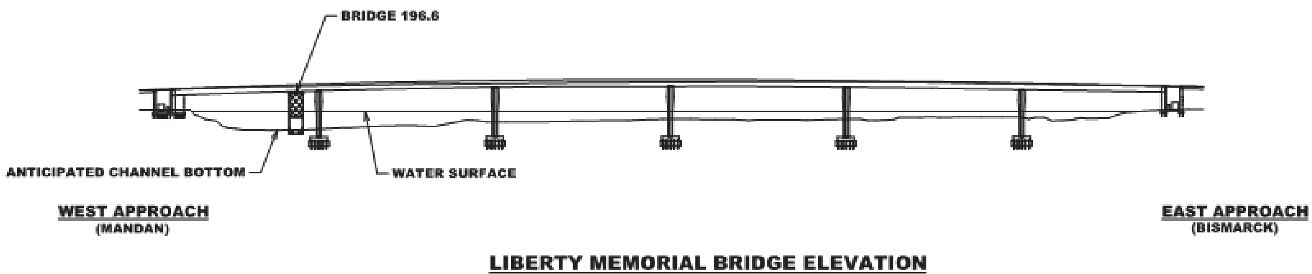
Truss Transport

Following removal, the trusses must be transported to one of the three specified locations. To this end, three transport concepts have been explored: in-tact transport by barge, in-tact transport overland, and component transport overland.

In-tact transport by barge on the river was initially investigated as the most obvious and direct route to the installation sites. However, the upstream and downstream locations require passage beneath adjacent vehicular bridges to be feasible. Recognizing the overall height of the truss about 68 feet with the bearings removed, a significant vertical clearance is required to allow safe passage below these structures. According to the original record drawings, the clearance between the low structural member and the anticipated channel bottom is approximately 59 feet at the Interstate 94 Expressway Bridge and about 63 feet at the Liberty Memorial Bridge. Since these clearances are inadequate for the truss to pass, alternate transport mechanisms must be developed.



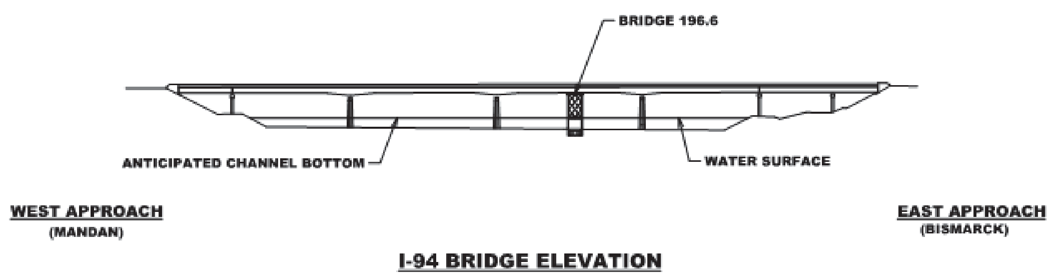


Figure 5 - Inadequate Vehicular Bridge Clearance

Given that in-tact truss transport by barge is not possible, an overland option for in-tact transport was explored. Transport to Site #1 is not supported by the local roadway system without engaging vehicular bridges with limited clearance. As such, in-tact transport to this location is not feasible. For Sites #2 and #3, however, overland transport is possible via the local roadway system according to the following route.

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IN-PLACE TRUSS RELOCATION
OVERLAND TRANSPORT

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The truss must be supported on a modular transport system, similar to that shown in the following figure. The axle spacing and count must be developed to provide an acceptable distribution of loading, and repair or modification of the local road network should be expected if this option is pursued.

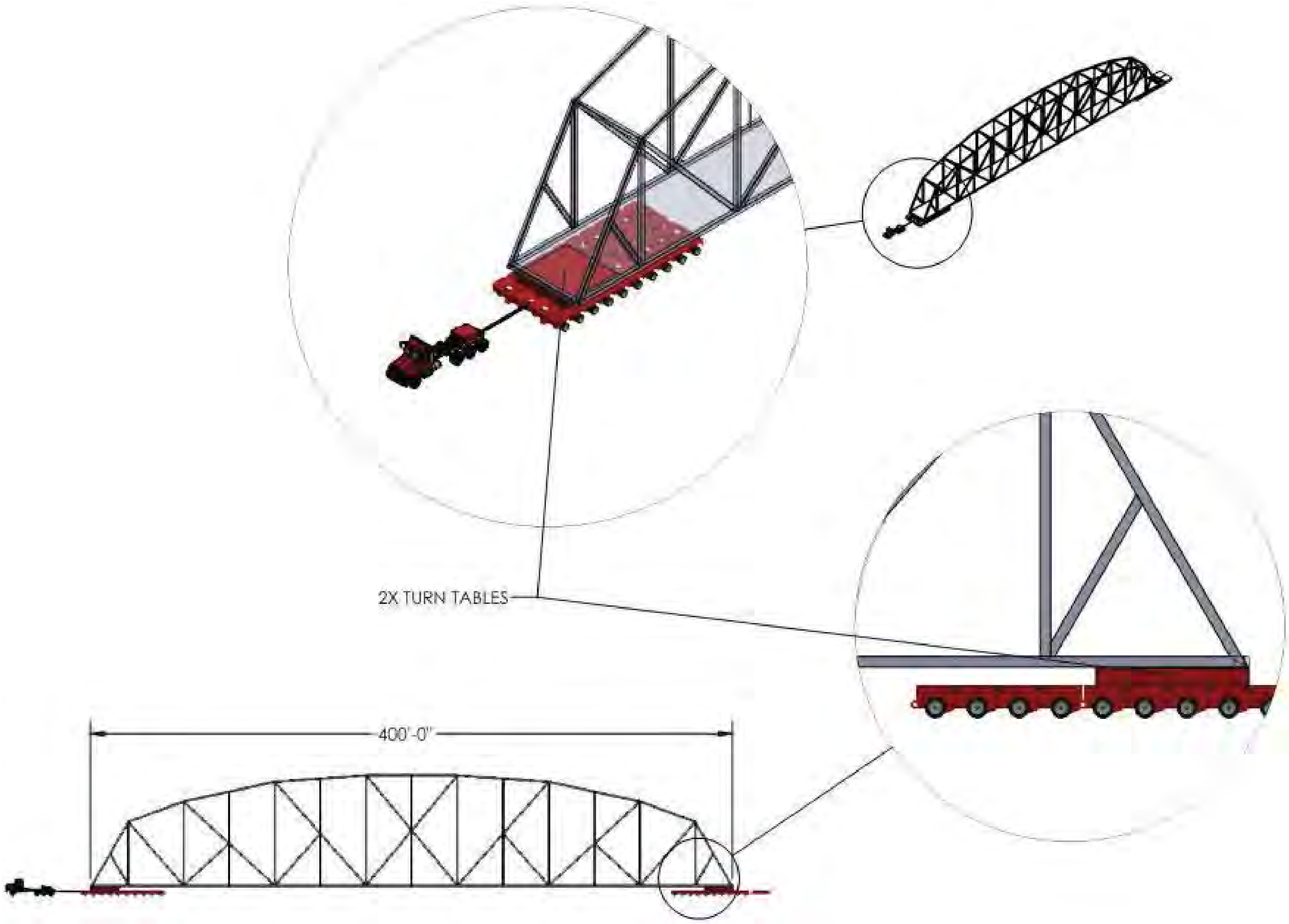

Figure 6 - Self-Propelled Modular Transports

For this transport mechanism to be feasible, several details must be addressed:

- Limited width to East River Road and possible modifications.
- Development of the transport system to navigate the 4% roadway profile grade.
- Roadway capacity to accept loading of the 1,530,000 lb truss and possible modifications.
- Relocation of overhead utilities, including three power transmission lines.
- Temporary shut-down of overhead transmission lines.
- Temporary relocation of traffic signals.
- Temporary relocation of street lights.
- Tree removals along the transport route.
- Modification of Sertoma Park including construction of a 1400± foot access road.
- Roadway closures and detours.
- Development of security measures for the move.

Transport by this option also introduces significant public risk as the corridor is adjacent to public residences and critical city infrastructure.

The final transport option considered is by overland route for the dismantled truss components. As this is the only option for Site #1, a concept access route has been developed as shown in the following exhibit for Truss #1. Overland transport for this option will require approximately 50 trips to complete the move and necessitate construction of approximately 2500 feet of temporary access road. Establishment of a large storage area to receive the individual truss components near the installation site is also required. Furthermore, special heavy haul or over-dimension permits may also be required.

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NOTES:

ANTICIPATE 50± LOADS FOR DELIVERY OF THE TRUSS COMPONENTS.

ANTICIPATE 400± LOADS FOR DELIVERY OF THE WEST APPROACH EMBANKMENT FILL.

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IN-PLACE TRUSS RELOCATION
COMPONENT TRANSPORT ROUTE

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Truss Installation Site #1

A proposed site plan for Installation Site #1 is shown in the following exhibit.

The proposed configuration provides a 12 foot wide bituminous paved trail approach at both ends of the bridge. The trail will be confined by conventional guardrails on both sides and is configured in accordance with Americans with Disabilities Act (ADA) requirements. Trail connections off the structure have not been developed and are beyond the scope of this exercise; however, the alignment depicted represents what is assumed to be the logical configuration for the site.

The existing ground elevation at the site is approximately 1630 according to publically available LiDAR data. Since the Missouri River's 100-Year water surface elevation is approximately 1638 at this location, the trail profile must be raised to elevation 1647 to keep the structure above flood waters. To achieve this configuration, earthen embankments have been detailed at both approaches. Construction of the embankments is assumed to utilize conventional fill with riprap armor below the flood elevation. The overall embankment size has been determined using a 5% trail profile grade and 2H:1V side slopes.

As access to the site is anticipated from the east approach, installation of a temporary crossing of the Missouri River tributary is required to gain access for construction of the west approach. It is assumed a bridge section will be required to complete this function.

Included with the approach embankment construction will be installation of the new abutment substructures to support the truss. The abutments are assumed to be constructed of reinforced concrete and supported on driven steel piling. For cost estimating purposes, it is assumed the site geology will provide a pile capacity of 100 tons with 100 feet of pile embedment.

Since the individual truss components will be delivered and reassembled at the site, a large lay-down yard is required for storage and staging. Typically, a truss would be reassembled in the reverse order of its disassembly. Therefore, the storage site must be sized to accommodate all of the individual components as well as access for their retrieval. The selected site is identified on the following exhibit and limited grading is expected within this area. Tree and vegetation removals as well as installation of sediment and erosion control measures around the perimeter are expected. The elevation of the storage site is approximately 1630.

Once all truss components have been delivered to the site, the reassembly operations may begin. The process will start with installation of temporary support bents at each floor beam location followed by member-by-member reassembly of the steel components. It is assumed high-strength bolts may be used to re-establish riveted connections and the existing pins may be salvaged for reinstallation.

THIS PLAN MUST NOT BE MODIFIED WITHOUT THE APPROVAL OF BNSF SYSTEM ENGINEERING

NOTES:

100-YEAR FLOOD WATER SURFACE ELEVATION 1638.0±.
TOP OF PROPOSED DECK ELEVATION = 1647.0±.

12' WIDE TRAIL APPROACHES AT BOTH ENDS. EMBANKMENTS SUPPORTED ON CONVENTIONAL FILL WITH RIPRAP ARMOR.

TRUSS SUPPORTED ON CAST-IN-PLACE CONCRETE ABUTMENTS CARRIED BY DRIVEN PILE FOUNDATIONS.

TRUSS COMPONENTS TRANSPORTED TO THE SITE AND ASSEMBLED ON FALSEWORK AT THE FINISHED LOCATION. FALSEWORK SUPPORTS ANTICIPATED AT EACH FLOOR BEAM LOCATION.

INSTALLATION OF A TEMPORARY CROSSING OF THE MISSOURI RIVER TRIBUTARY ANTICIPATED TO COMPLETE CONSTRUCTION OF THE WEST APPROACH.

TRAIL CONNECTIONS OFF THE STRUCTURE ARE NOT SHOWN AND MUST BE DEVELOPED.

RELOCATED TRUSS PLAN

NO.	DATE	BY	DESCRIPTION OF REVISIONS

TKDA
444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

DES: | DRW: | CHK:
DATE: | AFE NO.:

VERIFY SCALES 0 1
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS DRAWING
ADJUST SCALES ACCORDINGLY

BNSF RAILWAY

BNSF RAILWAY COMPANY
BRIDGE NO 196.6A RELOCATION PLAN
BISMARCK, ND

IN-PLACE TRUSS RELOCATION
PROPOSED SITE #1

COMM. NO. 15955.000
DRAWING NO.

DATE: 7/4/2019
TIME: 8:35:06 AM
FILENAME: K:\o-t\BNSF\15955000\04_Production\01_CAD\08_106_Exhibits\TrussRelocations\0038-196.6_TrussRelocation_1.dgn

Several design and regulatory conditions must be resolved for installation at Site #1 to be feasible.

First, to keep the structure above 100-Year flood elevation requires construction of earthen embankments at both approaches. This configuration places additional fill within the Missouri River floodway and will likely impact river hydraulics. If pursued, the proposed configuration must be added to current river model and comparison of pre and post construction river behavior evaluated. If a stage increase is generated, the impacts are expected to extend miles upstream and affect multiple properties. It is assumed this condition would not be accepted by the Federal Emergency Management Agency (FEMA) or the City of Bismarck.

Next, in addition to the flood response, the proposed configuration requires evaluation for ice jam potential at the structure creates a new blockage within the Missouri River drainage.

The proposed construction will impact existing wetlands. According to the US Fish and Wildlife Service (USFWS), the site is contained within mapped Riverine and Freshwater wetlands, as shown in the following Figure.

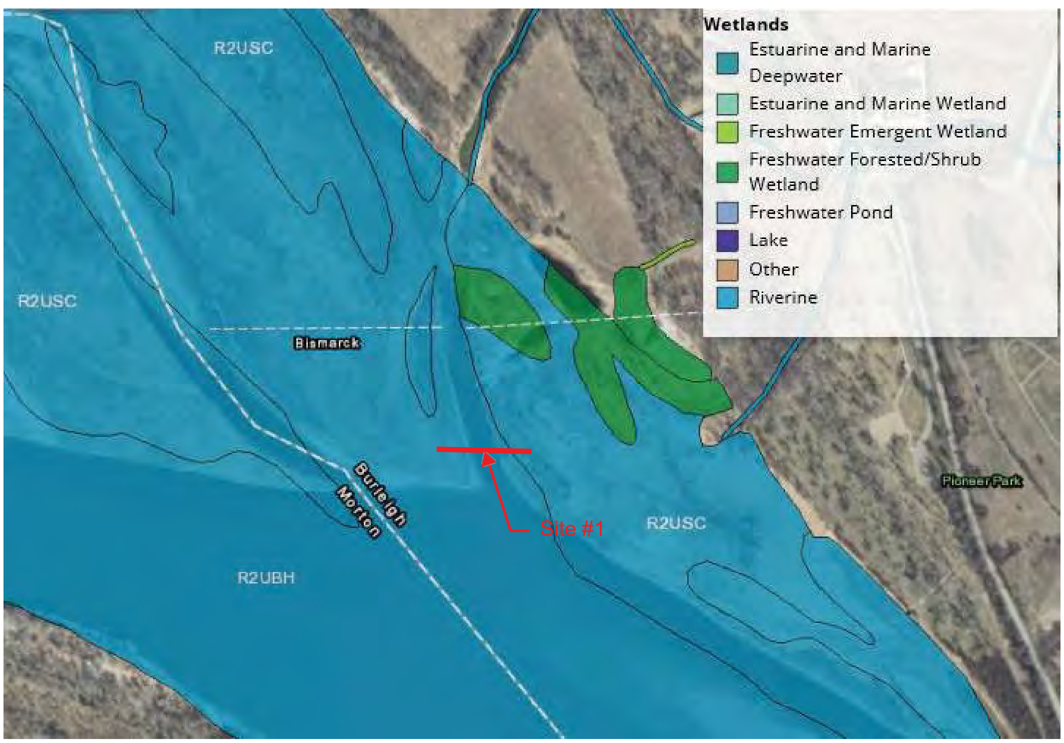


Figure 7 - Site #1 Wetland Impacts

Disassembly and reassembly of the truss will take more than one construction season to complete. As such, the proposed storage area, and all truss components staged within, will be exposed to at least one flood season. Review of stage hydrographs within the vicinity indicate the site would have been flooded at least six times over the past ten years. If this were to occur, additional project costs would be expected to retrieve and clean truss components prior to installation for minor flooding events. If a major flood were to occur, similar to 2011, complete loss of many or all truss components is possible.

The reassembly process assumes high-strength bolts may be used at the connections. To maintain the historic character of a structure, alternate fasteners such as button-head bolts or rivets may be required. Additional costs and construction delays may be anticipated with these alternate fasteners.

The trail connections off the structure have not been developed as a component of this exercise. To minimize overall project costs, the approach embankments have been configured to provide a small footprint at the site. As a result, the approach connections will be underwater during the Missouri River's higher flow periods and the bridge crossing inaccessible for public use. If this condition is considered unacceptable, addition fills will be required to raise the approach embankments generating additional wetland and river performance impacts.

Truss Installation Sites #2 & #3

Given their relative proximity to one another, discussion of installation Sites #2 and #3 is combined. Proposed site plans for the locations are shown in the following exhibits.

Similar to Site #1, the proposed configuration provides a 12 foot wide bituminous paved trail approach at both ends of the bridge. The trail will be confined by conventional guardrails on both sides and is configured in accordance with Americans with Disabilities Act (ADA) requirements. Trail connections off the structure have not been developed and are beyond the scope of this exercise; however, the alignment depicted represents what is assumed to be the logical configuration for the site.

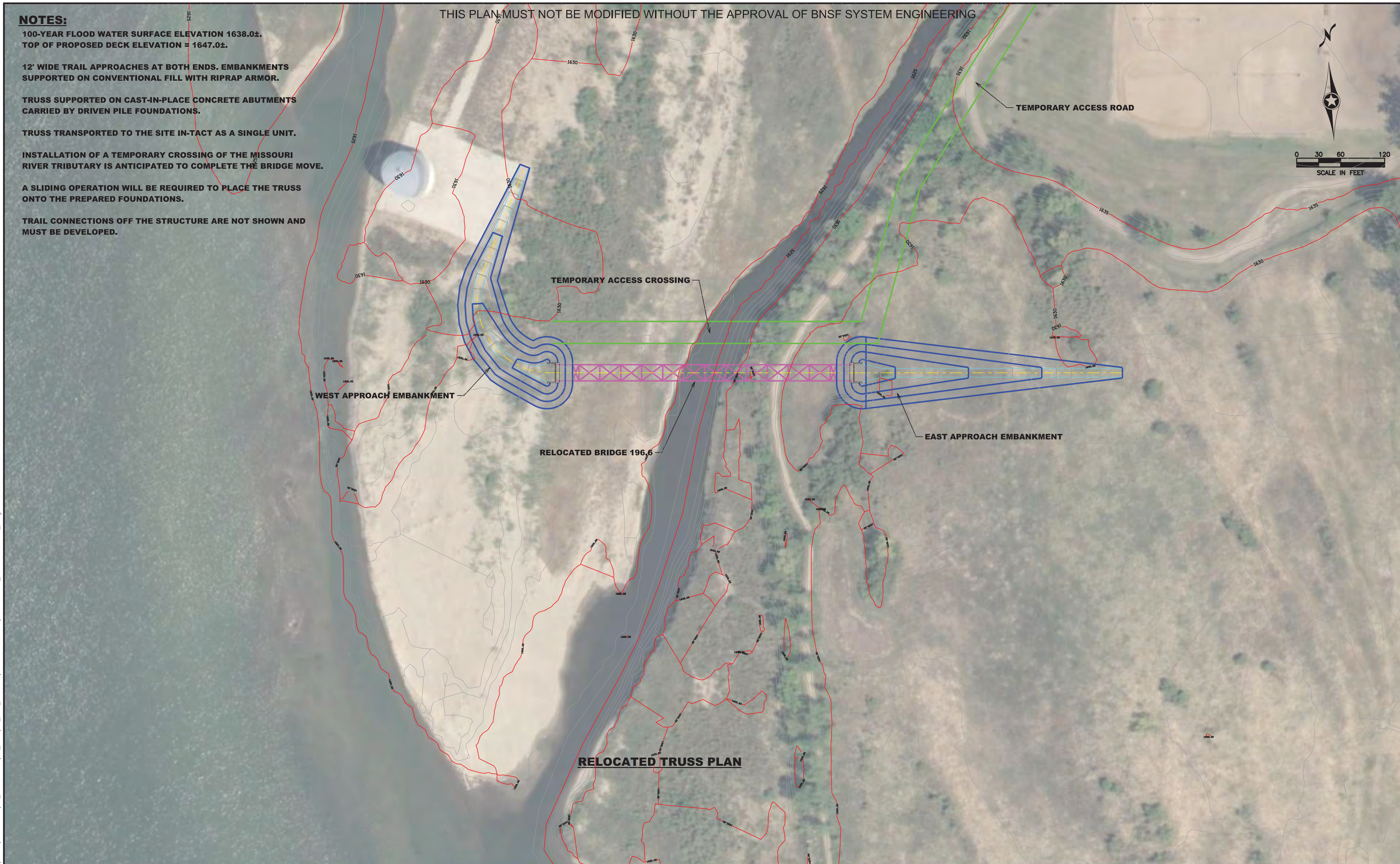
The existing ground elevation at the site is approximately 1630 according to publically available LiDAR data. Since the Missouri River's 100-Year water surface elevation is approximately 1638 at this location, the trail profile must be raised to elevation 1647 to keep the structure above flood waters. To achieve this configuration, earthen embankments have been detailed at both approaches. Construction of the embankments is assumed to utilize conventional fill with riprap armor below the flood elevation. The overall embankment size has been determined using a 5% trail profile grade and 2H:1V side slopes.

As access to the site for the truss move is anticipated from the east approach, installation of a temporary crossing of the Missouri River tributary is required to gain access to the foundations. Approach work, however, may be completed without use of the temporary crossing.

Included with the approach embankment construction will be installation of the new abutment substructures to support the truss. The abutments are assumed to be constructed of reinforced concrete and supported on driven steel piling. For cost estimating purposes, it is assumed the site geology will provide a pile capacity of 100 tons with 100 feet of pile embedment.

Once delivered to the site, moving the in-tact truss from the modular transports to the prepared foundations will be completed with a slide-in operation. This will require installation of slide bents between the temporary access crossing and the finished alignment. After final positioning on the transports, the truss will be jacked up, slid on the bents to the proposed finished alignment, and lowered to the completed abutments.

THIS PLAN MUST NOT BE MODIFIED WITHOUT THE APPROVAL OF BNSF SYSTEM ENGINEERING



NOTES:

100-YEAR FLOOD WATER SURFACE ELEVATION 1638.0±.
TOP OF PROPOSED DECK ELEVATION = 1647.0±.

12' WIDE TRAIL APPROACHES AT BOTH ENDS. EMBANKMENTS SUPPORTED ON CONVENTIONAL FILL WITH RIPRAP ARMOR.

TRUSS SUPPORTED ON CAST-IN-PLACE CONCRETE ABUTMENTS CARRIED BY DRIVEN PILE FOUNDATIONS.

TRUSS TRANSPORTED TO THE SITE IN-TACT AS A SINGLE UNIT.

INSTALLATION OF A TEMPORARY CROSSING OF THE MISSOURI RIVER TRIBUTARY IS ANTICIPATED TO COMPLETE THE BRIDGE MOVE.

A SLIDING OPERATION WILL BE REQUIRED TO PLACE THE TRUSS ONTO THE PREPARED FOUNDATIONS.

TRAIL CONNECTIONS OFF THE STRUCTURE ARE NOT SHOWN AND MUST BE DEVELOPED.

RELOCATED TRUSS PLAN

DATE: 7/4/2019
TIME: 11:20:28 AM
FILENAME: K:\o-r\BNSF\15955000\04_Production\01_CAD\08_106_Exhibits\TrussRelocations\0038-196.6_TrussRelocation_2.dgn

NO.	DATE	BY	DESCRIPTION OF REVISIONS

TKDA
444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

DES:	DRW:	CHK:
DATE:	AFE NO.:	

VERIFY SCALES 0 1
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS DRAWING
ADJUST SCALES ACCORDINGLY

BNSF RAILWAY

BNSF RAILWAY COMPANY
BRIDGE NO 196.6A RELOCATION PLAN
BISMARCK, ND

IN-PLACE TRUSS RELOCATION
PROPOSED SITE #2

COMM. NO. 15955.000
DRAWING NO.

THIS PLAN MUST NOT BE MODIFIED WITHOUT THE APPROVAL OF BNSF SYSTEM ENGINEERING

NOTES:

100-YEAR FLOOD WATER SURFACE ELEVATION 1638.0±.
TOP OF PROPOSED DECK ELEVATION = 1647.0±.

12' WIDE TRAIL APPROACHES AT BOTH ENDS. EMBANKMENTS SUPPORTED ON CONVENTIONAL FILL WITH RIPRAP ARMOR.

TRUSS SUPPORTED ON CAST-IN-PLACE CONCRETE ABUTMENTS CARRIED BY DRIVEN PILE FOUNDATIONS.

TRUSS TRANSPORTED TO THE SITE IN-TACT AS A SINGLE UNIT.

INSTALLATION OF A TEMPORARY CROSSING OF THE MISSOURI RIVER TRIBUTARY IS ANTICIPATED TO COMPLETE THE BRIDGE MOVE.

A SLIDING OPERATION WILL BE REQUIRED TO PLACE THE TRUSS ONTO THE PREPARED FOUNDATIONS.

TRAIL CONNECTIONS OFF THE STRUCTURE ARE NOT SHOWN AND MUST BE DEVELOPED.

RELOCATED TRUSS PLAN

NO.	DATE	BY	DESCRIPTION OF REVISIONS

TKDA
444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

DES: DRW: CHK:
DATE: AFE NO.:
VERIFY SCALES 0 1
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BNSF RAILWAY

BNSF RAILWAY COMPANY
BRIDGE NO 196.6A RELOCATION PLAN
BISMARCK, ND

IN-PLACE TRUSS RELOCATION
PROPOSED SITE #3

COMM. NO. 15955.000
DRAWING NO.

DATE: 7/4/2019
TIME: 11:26:40 AM
FILENAME: K:\a-f\BNSF\15955000\04_Production\01_CAD\08_106_Exhibits\TrussRelocations\0038-196.6_TrussRelocation_3.dgn

Several design and regulatory conditions must be resolved for installation at Sites #2 and #3 to be feasible.

First, to keep the structure above 100-Year flood elevation requires construction of earthen embankments at both approaches. This configuration places additional fill within the Missouri River floodway and will likely impact river hydraulics. If pursued, the proposed configuration must be added to current river model and comparison of pre and post construction river behavior evaluated. If a stage increase is generated, the impacts are expected to extend miles upstream and affect multiple properties. It is assumed this condition would not be accepted by the FEMA or the City of Bismarck.

Next, in addition to the flood response, the proposed configuration requires evaluation for ice jam potential at the structure creates a new blockage within the Missouri River drainage.

The proposed construction will impact existing wetlands. According to the USFWS, both sites are contained within mapped Riverine and Freshwater wetlands, as shown in the following Figure.

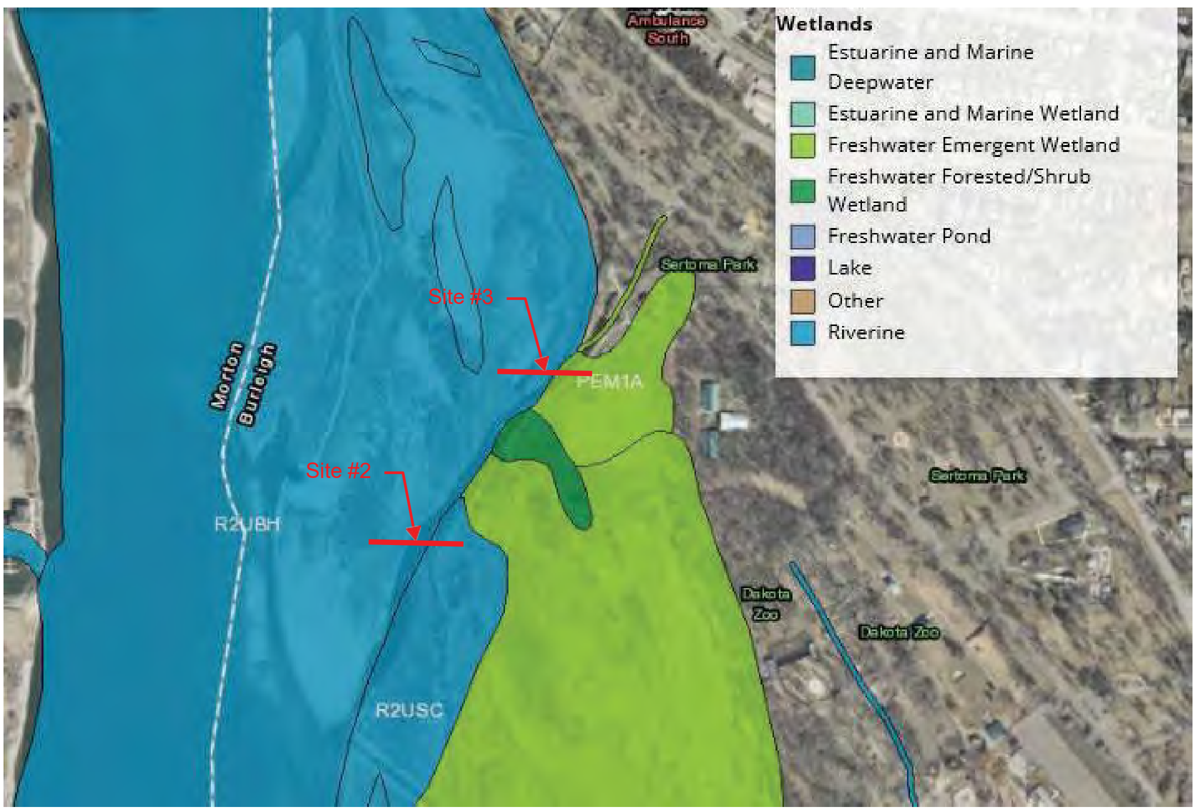


Figure 8 - Sites #2 & #3 Wetland Impacts

The trail connections off the structure have not been developed as a component of this exercise. To minimize overall project costs, the approach embankments have been configured to provide a small footprint at the site. As a result, the approach connections will be underwater during the Missouri River's higher flow periods and the bridge crossing inaccessible for public use. If this condition is considered unacceptable, addition fills will be required to raise the approach embankments generating additional wetland and river performance impacts.

Regulatory Requirements

Repurposing of the truss spans will require a significant degree of development and coordination to secure the necessary permitting. As the relocation may be considered a component of the new railroad bridge construction, it is assumed the existing permitting efforts would be supplemented to include the proposed tasks. To this end, the matrix below was developed to identify the anticipated permits, coordinating agency, general scope of tasks, and level of effort or significance needed to augment the work completed to date.

Bismarck Bridge Relocation Sites Matrix

Permit	Lead Agency	General task descriptions	Level of Significance
Environmental Document - CAT or EA	US Coast Guard	NEPA document revisions or addendum	green inccorporated with ongoing NEPA process)
Rivers and Harbors - Section 9	US Coast Guard	Document revisions or addendum to current application	green inccorporated with ongoing application)
Clean Water Act - Section 404, Section 408	US Army Corps of Engineers	Field Delineation of Wetlands, permit application, mitigation plans; modification of a completed work - **address ice loading issues**	red
Endangered Species Act	US Fish and Wildlife Service	Addendum Biological Assessment Report; Consultation with USFWS	green
Prime Farmland	Natural Resources Conservation Service	Consultation Letter, Soil Maps, Project Map.	green
Sovereign Lands - North Dakota	North Dakota State Water Commission	Permit application, Project Plans	green
Storm Water Pollution Prevention Plan	North Dakota Health Department	Development of the Storm Water Pollution Prevention Plan	green
Conditional Letter of Map Revision -CLOMR	FEMA	Finalize Hydraulics. Develop CLOMR Submittal Documents	yellow
Flood Plain Permit	Bismarck	Permit application, Project Plans, Hydraulic Analysis	red/yellow
General Permit	Burleigh County Water Resource District	Agency Consultation, Permit application	green
General Approval /Coordination - Construction at Roadway Crossings	North Dakota Department of Transportation, Morton County and Burleigh County, Affected Townships	Agency/Local Government Coordination, Traffic Control Plans at Intersections, Roadway Reconstruction Plans	green
Cultural Resources	USCG or USCOE - will coordinate with SHPO	Cultural Resources Report and Consultation	green

Those items highlighted as either yellow or red indicate a significant amount of additional work is required to understand the impacts of the proposed project. Accordingly, a lower probability of acceptance by the regulating agency may be expected.

Memorandum July 4, 2019

Anticipated Project Costs

Conceptual level project cost estimates have been developed for repurposing the trusses to the proposed sites. Given the different transport mechanisms used for relocation, separate estimates were generated for Site #1 and Sites #2 & #3. In lieu of the relative proximity between Sites #2 and #3, it is assumed that only one site would be considered for implementation. Additionally, it is assumed there is no appreciable difference in overall project cost between the two.

The estimates were developed assuming 2019 pricing and include a 30% contingency.

All three proposed sites require civil works associated with approach embankment and abutment substructure construction. Given the similarities between the sites and concept approach taken, construction costs for these tasks are assumed to be independent of the installation site considered. A cost of 1.3M for this work was calculated according to the following estimate.

BNSF Railway
Bridge No. 196.6
Railroad Bridge Over the Missouri River
Bismarck, North Dakota
ENGINEER'S PLAN ESTIMATE OF PROBABLE CONSTRUCTION COSTS - 07-04-2019
BRIDGE APPROACH AND FOUNDATION

Item Description	Unit	Quantities		Estimated Total Cost
		Quantity	Estimated Unit Cost	
Civil / Roadway				
CLEARING AND GRUBBING	LS	1	50,000.00	50,000
TURF ESTABLISHMENT AND EROSION CONTROL	LS	1	10,000.00	10,000
COMMON E CAVATION	CY	1,704	10.00	17,044
COMMON EMBAN MENT	CY	12,800	15.00	192,000
RIPRAP	CY	3,190	75.00	239,250
AGGREGATE BASE COURSE (6)	CY	158	30.00	4,733
4 BITUMINOUS WAL	SQ FT	8,520	8.00	68,160
SINGLE FACE W-BEAM GUARDRAIL	LF	1,420	30.00	42,600
ANCHORAGE ASSEMBLY	EACH	2	1,000.00	2,000
				-
				$ 626,000
Bridge Work				
SUBSTRUCTURE CONCRETE (f c 4000 psi)	CY	204	1,000.00	204,000
SUPERSTRUCTURE DEC CONCRETE (f c 4000 psi)	CY	164	850.00	139,488
METAL RAILING	LF	800	150.00	120,000
E PANSION JOINT DEVICE	LF	40	145.00	5,800
STRUCTURAL STEEL (W8x21 DEC SUPPORTS)	POUND	27,930	1.50	41,895
HP14x102 PILING DELIVERED	LF	2,400	60.00	144,000
HP14x102 PILING DRIVEN	LF	2,400	1.75	4,200
PILE POINTS	EACH	24	200.00	4,800
				$ 664,000
		Total		**$ 1,290,000**
		Total - Rounded		**$ 1,300,000**

For installation Site #1, an overall project cost of 19.3M was calculated assuming Truss #1 is dismantled and reassembled at the project site. The project total was generated according to the following estimate.

BNSF Railway
Bridge No. 196.6
Railroad Bridge Over the Missouri River
Bismarck, North Dakota
ENGINEER'S ESTIMATE OF PROJECT COSTS - 07-04-2019
RELOCATE IN-PLACE 400' TPT BY DISASSEMBLING AND REASSEMBLING - SITE #1

Item Description	Unit	Quantities		Estimated Total Cost
		Quantity	Estimated Unit Cost	
MOBILI ATION (15%)	LUMP SUM	1	2,517,000.00	2,517,000.00
				$ 2,517,000
General				
CLEARING AND GRUBBING	LS	1	50,000.00	50,000
SEDIMENT / EROSION CONTROL	LS	1	50,000.00	50,000
TRAFFIC CONTROL	LS	1	25,000.00	25,000
DISASSEMBLE, TRANSPORT, REASSEMBLE TRUSS	LS	1	10,925,000.00	10,925,000
NEW TRUSS EMBAN MENTS AND FOUNDATIONS	LS	1	1,300,000.00	1,300,000
LOCAL ROAD IMPROVEMENTS OR REPAIRS - ALLOWANCE	LS	1	100,000.00	100,000
PROFESSIONAL SERVICES (DESIGN, CM, PERMITTING, ETC.)	LS	1	600,000.00	600,000
				-
CONTINGENCY (30%)	LS	1	3,735,000.00	3,735,000
				-
				$ 16,785,000
		Total		**$ 19,302,000**
		Total - Rounded		**$ 19,300,000**

For installation Sites #2 & #3, an overall project cost of 15.9M was calculated assuming Truss #2 is transported in-tact to the project site. The project total was generated according to the following estimate.

BNSF Railway
Bridge No. 196.6
Railroad Bridge Over the Missouri River
Bismarck, North Dakota
ENGINEER'S ESTIMATE OF PROJECT COSTS - 07-04-2019
RELOCATE IN-PLACE 400' TPT BY OVERLAND HAUL - SITE #2 OR SITE #3

Item Description	Unit	Quantities		Estimated Total Cost
		Quantity	Estimated Unit Cost	
MOBILI ATION (15%)	LUMP SUM	1	2,079,000.00	2,079,000.00
				$ 2,079,000
General				
CLEARING AND GRUBBING	LS	1	20,000.00	20,000
SEDIMENT / EROSION CONTROL	LS	1	30,000.00	30,000
TRAFFIC CONTROL	LS	1	100,000.00	100,000
UTILITY RELOCATIONS & COORDINATION	LS	1	4,000,000.00	4,000,000
REMOVE & REINSTALL IN-PLACE TRUSS	LS	1	3,852,500.00	3,852,500
TRANSPORT IN-PLACE TRUSS	LS	1	800,000.00	800,000
NEW TRUSS EMBAN MENTS AND FOUNDATIONS	LS	1	1,300,000.00	1,300,000
LOCAL ROAD IMPROVEMENTS OR REPAIRS - ALLOWANCE	LS	1	100,000.00	100,000
PROFESSIONAL SERVICES (DESIGN, CM, PERMITTING, ETC.)	LS	1	600,000.00	600,000
				-
CONTINGENCY (30%)	LS	1	3,060,750.00	3,060,750
				-
				$ 13,863,000
		Total		**$ 15,942,000**
		Total - Rounded		**$ 15,900,000**

Summary

BNSF Railway's plans to construct a new railroad bridge across the Missouri River in Bismarck, North Dakota allows the potential for repurposing portions of the structure as public use facilities. To better understand the costs, scope, and risks associated with such an endeavor, a concept level study has been completed. The study developed truss removal, transport, and installation concepts, identified permitting and regulatory requirements; and generated anticipated project costs to repurpose truss spans as a trail crossing at one of three selected sites.

Each scenario considered requires a significant level of effort to remove and transport an individual truss span to a new installation site. Two removal and transport mechanisms were developed: disassembly and reassembly, and in-tact removal and transport. Final selection of the removal and transport mechanism is dependent on the truss and destination site considered.

To implement the project, several regulatory hurdles must first be negotiated. Given the project scope, it is anticipated that those primarily related to hydraulic impacts of the Missouri River will be most challenging as each configuration considered places additional fill within the Missouri River floodway that will likely impact river hydraulics. If a stage increase is generated, the impacts are expected to extend miles upstream and affect multiple properties. It is likely this condition would not be accepted by the FEMA or the City of Bismarck.

Estimates of overall project cost were generated assuming 2019 rates and incorporating a 30% contingency. Depending on the site considered, project costs range from 15.9M to 19.3M.

Given the complexity of the project and level of development, coordination, and permitting needed prior to implementation, a timeline ranging anywhere from 2-5 years is anticipated before the project is ready for construction.

Appendix B

Programmatic Agreement

PROGRAMMATIC AGREEMENT

AMONG THE UNITED STATES COAST GUARD, THE NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION REGARDING THE PROPOSED BRIDGE PROJECT AT MILE 1315.0 ON THE MISSOURI RIVER NEAR BISMARCK AND MANDAN, BURLEIGH COUNTY, NORTH DAKOTA

WHEREAS, the United States Coast Guard (USCG) is the lead federal agency, responsible for making a federal bridge permit decision for the BNSF Railway Company (BNSF) Bridge Replacement Project (Undertaking) in accordance with the General Bridge Act of 1946, as amended; and

WHEREAS, the Undertaking is defined as construction of a railroad bridge to replace or accompany the existing BNSF Bridge 0038-196.6, a historic through-truss bridge over the Missouri River, Jamestown Subdivision, Milepost 1315.0 (hereafter known as Bismarck Bridge), in Burleigh County, North Dakota, constructed 1880-1883 (substructure) and 1905-1906 (superstructure); and

WHEREAS, BNSF has determined that the Bismarck Bridge has reached the end of its useful life for rail traffic and needs to be replaced in order to safely move future rail traffic along BNSF's northern corridor; and

WHEREAS, the USCG has consulted with the North Dakota State Historic Preservation Officer (SHPO) pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) (54 United States Code Section 306108) and its implementing regulations at *Code of Federal Regulations* (CFR) Title 36 Part 800, as amended; and

WHEREAS, the USCG has defined the Area of Potential Effects (APE) as the footprint of the proposed Undertaking within which all proposed construction and ground disturbing activity is confined, including existing and proposed right of way for replacement of the Bismarck Bridge (Attachment A – APE map), and the SHPO provided formal written concurrence with the APE on October 2, 2019, with the request that they would like to see any additional areas to be used for disposal, borrow or staging as those areas are identified; and

WHEREAS, during consultation, the USCG and SHPO agreed to consider a broader visual APE to take into account visual impacts that may affect historic properties beyond the original APE, and to consider potential construction vibration impacts to historic properties; and

WHEREAS, in 2017 BNSF had a Class I literature review conducted for resources within 1 mile of the project area and a Class III Inventory of the project area encompassing 58 acres, and the review identified 49 previously recorded cultural resources within 1 mile of the bridge, the majority of which are within the North Dakota National Guard's Fraine Barracks, southeast of the project area (the Bismarck Indian School/Fraine Barracks is considered a Traditional Cultural Property that is eligible for the National Register of Historic Places (NRHP) by the Mandan, Hidatsa, and Arikara (MHA) Nation, Standing Rock Sioux Tribe, and Turtle Mountain Band of Chippewa, and has been recorded as site CHFBL2) (see Attachment B for table of identified resources and map of non-confidential sites); and

WHEREAS, cultural resources within the APE are Site Lead 32MOx626, which is a drainage or irrigation ditch, and the Bismarck Bridge (site 32BL801/32MO1459); and

WHEREAS, the USCG, in consultation with the SHPO, has determined Site Lead 32MOx626 not eligible for listing in the NRHP and determined the Bismarck Bridge eligible for listing in the NRHP under Criterion A for its association with broad patterns of railroad, commercial, and military history in the United States, and under Criterion C for design and construction, and for its association with engineers George Shattuck Morison and Ralph Modjeski; and

WHEREAS, one of the two spans of the western approach to the Bismarck Bridge dates from 1906; the other western approach span is from 1980 and the five spans of the eastern approach are from 1991 – these six spans have no historic materials remaining; and

WHEREAS, many residents of Bismarck, Mandan, and surrounding areas regard the Bismarck Bridge to be an iconic landmark for their community identity and a compelling visual feature in the cultural landscape of the Missouri Valley; and

WHEREAS, the National Trust for Historic Preservation listed the Bismarck Bridge on *America's 11 Most Endangered Historic Places for 2019* because it was the first bridge to cross the upper Missouri River, George Shattuck Morison designed and oversaw its construction between 1880 and 1883, and the project employed advanced construction methods including pneumatic caissons such as those used to build its contemporary, the Brooklyn Bridge; and

WHEREAS, MHA Nation ancestral sites overlook this industrial infrastructure that altered the history of their lands and people, and the bridge is upriver from On-A-Slant Village where Mandan Chief Sheheke was born and later accompanied Lewis and Clark back to Washington, D.C. where Sheheke and President Jefferson met; and

WHEREAS, known ancestral areas upriver of the APE (see Attachment A for APE map) include Chief Looking's Village (site 32BL3), Crying Hill (site CHFMO38) (see Attachment B), and areas of the Missouri River bottomlands used to plant corn, beans, and squash; and

WHEREAS, the Bismarck Bridge is an important resource in the cultural landscape of the Northern Plains National Heritage Area and is closely tied with many important historic places and events in the Heritage Area; and

WHEREAS, the USCG, in consultation with the SHPO, has determined that the Undertaking would have an adverse effect on the Bismarck Bridge, and may have an adverse visual effect or effects from construction vibration on additional historic properties; and

WHEREAS, in accordance with 36 CFR 800.6(a)(1), the USCG has notified the Advisory Council on Historic Preservation (ACHP) of its adverse effect determination with specified documentation and the ACHP has chosen to participate in the consultation pursuant to 36 CFR 800.6(a)(1)(iii); and

WHEREAS, the USCG, in consultation with the ACHP and SHPO, has determined that the development of a Programmatic Agreement (PA), in accordance with 36 CFR 800.14(b)(1)(ii), is warranted because effects of the Undertaking are not fully known; and

WHEREAS, Consulting Parties are defined to include Signatories, Invited Signatories, and Concurring Parties; and

WHEREAS, "Signatories" as defined in 36 CFR 800.6(c)(1) have the sole authority to execute, amend, or terminate this agreement, and "Invited Signatories" as defined in 36 CFR 800.6(c)(2) have the same rights with regard to seeking amendment or termination of this agreement as the Signatories; and

WHEREAS, any reference within this PA to a "Signatory" includes Signatories and Invited Signatories; and

WHEREAS, Concurring Parties are asked to concur in this PA, indicating acceptance of the process leading to the PA, but they cannot prevent the PA from being executed, amended, or terminated; and

WHEREAS, BNSF is the project proponent, has specific responsibilities under this PA, and has been invited to participate in this consultation and to sign this PA as an Invited Signatory; and

WHEREAS, Friends of the Rail Bridge (FORB) has specific responsibilities under this PA and they have been invited to participate in this consultation and to sign this PA as an Invited Signatory; and

WHEREAS, because the Undertaking requires authorization by the United States Army Corps of Engineers (USACE) under the Clean Water Act Section 404, the Omaha District of USACE (North Dakota Regulatory Office) has been invited to participate in this consultation and to sign this PA as a Concurring Party; and

WHEREAS, the USCG has consulted with Bismarck Parks and Recreation District, Bismarck Historical Society, Bismarck-Mandan Historical and Genealogical Society, Bismarck Tour Company, Bismarck-Mandan Metropolitan Planning Organization, Burleigh County, Captain's Landing Township, City of Bismarck, City of Mandan, Fort Abraham Lincoln Foundation, Historic Bridge Foundation, Mandan Historical Society, Lakota Consulting, Morton County, Morton County Historical Society, National Trust for Historic Preservation, North Dakota Department of Transportation, North Dakota Parks and Recreation Natural Resources Division, North Dakota State Railroad Museum, North Dakota State University Department of Landscape Architecture, Preservation North Dakota, Rails to Trails Conservancy, and the North Dakota Indian Affairs Commission regarding the effects of the Undertaking on historic properties and has invited them to participate in this consultation and to sign this PA as Concurring Parties; and

WHEREAS, in accordance with 36 CFR 800.2(c)(2)(ii), the USCG invited the following Federally recognized Indian tribes to participate in consultation on this Undertaking and to sign this PA as Concurring Parties: Cheyenne River Sioux Tribe, Chippewa Cree, Crow Creek Sioux Tribe, Crow Nation, Flandreau Santee Sioux Tribe, Fort Peck Assiniboine and Sioux Tribes, MHA Nation, Northern Cheyenne Nation, Oglala Sioux Tribe, Rosebud Sioux Tribe, Santee Sioux Nation, Sisseton-Wahpeton Oyate, Spirit Lake Tribe, Standing Rock Sioux, Turtle Mountain Band of Chippewa, and Yankton Sioux Tribe; and

WHEREAS, the USCG invited the Wahpekute Band of Dakotah, a non-Federally recognized Indian tribe, to participate in consultation on this Undertaking and to sign this PA as a Concurring Party; and

WHEREAS, the MHA Nation and the Northern Cheyenne Nation accepted the invitation to participate in consultation; and

WHEREAS, the USCG initiated Section 106 consultation with the SHPO on May 10, 2017 and has made a good faith effort to consult with interested parties to discuss the Undertaking, its effects, and potential mitigation measures, including 12 Consulting Parties' meetings between January 2018 and September 2020, as documented in the consultation log in Attachment C; and

WHEREAS, the USCG held a public meeting and open house on December 14, 2017, in compliance with Section 106 of the NHPA, to provide the public with information about the Undertaking and its effects on historic properties, seek public comment and input, and provide general information about the project;

NOW, THEREFORE, the USCG, SHPO, ACHP, BNSF, and FORB agree that the USCG shall ensure that the following stipulations are implemented to take into account the effects of the Undertaking on historic properties, and that these stipulations shall govern the Undertaking and all of its parts.

STIPULATIONS

The USCG shall ensure that the following measures are implemented:

I. **AREA OF POTENTIAL EFFECTS**

A. The APE may require amendments or revisions as the project design develops and construction methodologies are detailed. If the APE requires amendment or revision, the following procedure will apply.

1. BNSF will notify the USCG and SHPO in writing of requested changes to the APE within 7 days of learning an amendment or revision is needed. BNSF will provide a map showing the existing APE and the proposed amendment(s) or revision(s), accompanied by a written explanation of the reason for the change(s).

2. The USCG will consult with the SHPO on the requested changes to the APE and will revise or amend the APE as they determine appropriate.

3. The USCG will notify Consulting Parties of changes to the APE along with the map showing the existing APE and the proposed amendment(s) or revision(s), as well as the written explanation of the reason for the change(s), within 15 days of the USCG and SHPO being informed by BNSF of the need for an amendment(s) or revision(s).

4. Consulting Parties will have 30 days to review and comment on the amended or revised APE.

5. The USCG will take all comments into consideration when finalizing the amended or revised APE. The USCG will provide the finalized APE to the Consulting Parties within 30 days of receiving comments. Any disagreements on changes to the APE will be resolved as stated in Stipulation XIV.

6. Once APE changes are finalized, the USCG will file them electronically with the ACHP through e-106.

7. The USCG will ensure that all areas added to the APE that have not been previously surveyed will be surveyed for cultural resources. If any cultural resources are identified, the USCG will determine if they are eligible for the NRHP and submit those determinations to the SHPO for concurrence.

8. If historic properties are identified within the APE revisions, the USCG will consult with the SHPO and other Consulting Parties to determine the effects of the Undertaking on those properties. If those effects are found to be adverse, the USCG will consult with BNSF and the SHPO to explore ways to avoid or minimize the effects.

9. If adverse effects to historic properties within the APE revisions cannot be avoided, those adverse effects will be mitigated through a second tier Memorandum of Agreement (MOA) as provided in Stipulation VIII.

B. **Visual APE.** The USCG will consult with the SHPO to identify a proposed visual APE that encompasses those areas where removal of the existing Bismarck Bridge and/or the addition of a new rail bridge could have visual impacts on historic properties.

1. Once the proposed visual APE is drafted, the USCG will provide it to all Consulting Parties.

2. Consulting Parties will have 30 days to review and comment on the proposed visual APE.

3. The USCG will take all comments into consideration when finalizing the visual APE. The USCG will provide the final visual APE to the Consulting Parties within 30 days of receiving comments. Any disagreements on the visual APE will be resolved as stated in Stipulation XIV.

4. The USCG will consult with the SHPO on a reasonable and good faith cultural resources survey methodology for areas in the visual APE that have not been previously surveyed. The USCG will determine if cultural resources identified by the survey are eligible for the NRHP and submit those determinations to the SHPO for concurrence.

5. If historic properties are identified within the visual APE, the USCG will consult with the SHPO and other Consulting Parties to determine the effects of the Undertaking on those properties. If those effects are found to be adverse, the USCG will consult with BNSF to explore ways to avoid or minimize the effects. The USCG will also consult with the Bridge Advisory Committee (BAC) established for the Undertaking pursuant to Stipulation V.B. to assist with ideas to minimize visual impacts.

6. If adverse effects to historic properties within the visual APE cannot be avoided, those adverse effects will be mitigated through a second tier MOA as provided in Stipulation VIII.

II. VIBRATION MONITORING

A. The USCG will identify a vibration APE for construction and demolition activities that may have adverse effects on historic properties as a result of vibration impacts. The vibration

APE will be based on a 500-foot radius from the construction footprint. 500 feet is considered a reasonable and conservative threshold for screening of construction activities that do not involve blasting, according to the National Cooperative Highway Research Program Project 25-25 (Task 72). No blasting or explosives will be used by BNSF or their contractors. The USCG will distribute the vibration APE to the other consulting parties.

B. BNSF will strive to avoid and minimize vibration impacts from construction on historic buildings and structures.

C. BNSF will hire a qualified consultant (pursuant to Stipulation X) to identify historic buildings and structures (eligible for or listed in the NRHP) within the vibration APE.

1. If any historic buildings or structures are identified within the vibration APE, BNSF will have 60 days from identification of said buildings and/or structures to conduct an initial screening evaluation by a vibration expert using methods recommended by the Federal Transit Administration's *Transit Noise and Vibration Impact Assessment* (May 2006), taking into consideration local soil conditions. The Federal Transit Administration provides a peak particle velocity unit of 0.2 inch per second as the level for potential construction vibration damage to non-engineered timber and masonry buildings with plaster walls and/or ceilings. Peak particle velocity for vibration at the Bismarck Bridge will be specific to the bridge and take into consideration the existing vibrations it currently experiences from train traffic. If the screening indicates construction vibrations are likely to exceed a peak particle velocity unit of 0.2 inch per second at identified historic buildings or structures, or to exceed the velocity level determined for the Bismarck Bridge, then BNSF will explore the feasibility of options to reduce the vibrations below 0.2 inch per second at identified historic buildings or structures, or below the level determined for the Bismarck Bridge.

2. If measures to reduce the vibrations to below 0.2 inch per second at historic buildings are not feasible, BNSF will perform a condition assessment on those historic buildings and structures within the vibration APE prior to construction. The condition assessment will be performed by the vibration expert, a structural engineer, a licensed architect, and an architectural historian, all retained by BNSF, and will include photo and/or video documentation. It will specifically evaluate susceptibility to vibration damage for each building and structure. The assessment will determine specific vibration thresholds for structural and architectural (cosmetic) damage. The condition assessments must be completed before construction can begin. No condition assessment of the Bismarck Bridge will be performed as existing BNSF inspections will suffice.

3. If any of the specific vibration thresholds determined in Stipulation II.C.2. exceed 0.2 inch per second, BNSF, in consultation with the SHPO and affected property owners, will explore vibration mitigation measures to protect the building(s) and/or structure(s) and significant architectural features, and whether these measures are feasible and reasonable. If, after said consultation, BNSF determines these measures to be feasible and reasonable, BNSF will implement them, in consultation and with the approval of the property owner(s). Mitigation measures will not apply to the Bismarck Bridge as it will continue to operate as an active rail bridge under BNSF ownership

throughout construction.

4. In addition to potential vibration mitigation measures, the vibration expert will install vibration amplitude monitoring at the vulnerable historic building(s) and/or structure(s). The vibration monitoring will be done by the vibration expert, who will establish warning and stop work thresholds, as well as procedures for threshold exceedances. Once the vibration expert has established these thresholds and procedures, BNSF will provide this information to the USCG, who will in turn notify the Consulting Parties, and construction may then proceed.

5. If a stop work threshold is exceeded, BNSF will notify the USCG as soon as possible, within normal working hours. BNSF will engage a structural engineer, a licensed architect, and an architectural historian to inspect the building(s) and/or structure(s) for damage within 72 hours of USCG notification. Construction can continue once the inspection is complete.

a) If the inspection determines there is no damage, the vibration expert will consult with the structural engineer, licensed architect, and architectural historian to determine if the threshold should be raised and adjust accordingly.

b) If the inspection determines there is minor structural or architectural damage, BNSF will provide for any necessary repairs, consistent with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. BNSF will offer the SHPO an opportunity to comment on the consistency of such repairs with the *Standards* and will modify the repairs in response to any SHPO comments. The vibration expert will consult with the structural engineer, licensed architect, and architectural historian to determine if a lower stop work threshold is needed and adjust accordingly.

c) If the inspection determines there is severe damage, BNSF will provide for any necessary repairs, consistent with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. BNSF will offer the SHPO an opportunity to comment on the consistency of such repairs with the *Standards* and will modify the repairs in response to any SHPO comments. BNSF will direct the contractor to immediately stop working on that construction activity until appropriate safeguards can be put in place. The vibration expert will consult with the structural engineer, licensed architect, and architectural historian to determine if a lower stop work threshold is needed and adjust accordingly.

d) If vibration levels approach or exceed the stop work levels repeatedly, BNSF will direct the contractor to immediately stop working on that construction activity and will consult with the USCG and SHPO on alternative construction methods or other avoidance/mitigation solutions.

III. NEW ALTERNATIVE WITH NO NET RISE

Interested parties may conduct an independent floodplain evaluation to determine if there is another alternative that meets the Federal Emergency Management Agency (FEMA) no net rise requirement (40 CFR 60.3(d)(3)).

A. If such an alternative is identified, the interested parties will submit a flood model evaluation of a new railroad bridge adjacent to the existing bridge that would cause no net rise in the floodplain. The interested parties will submit this evaluation to FEMA and/or the local floodplain administrators for the cities of Bismarck and Mandan for certification 60 days prior to the USCG publishing the draft environmental impact statement, and will simultaneously notify the USCG of said submission and provide submitted materials to the USCG. The interested parties will keep the USCG informed of the status of the evaluation throughout the floodplain review process, including but not limited to copying the USCG on all correspondence with FEMA and the local floodplain administrators.

B. The USCG will then analyze this information and the alternative's potential impacts on the environment and include it in the draft environmental impact statement for public comment.

C. The interested parties will submit the certified flood model evaluation or Conditional Letter of Map Revision (CLOMR); explanation of the alternative, including environmental impacts from such alternative; and identification and evaluation of any necessary mitigation measures to the USCG at least 30 days prior to the USCG issuing the Record of Decision for the environmental impact statement.

IV. NEW ALTERNATIVE WITH A NET RISE

If an interested party identifies a new alternative(s) to be carried forward that results in a net rise to the floodplain, such party(s) must identify the potential mitigation measures associated with the net rise for that alternative(s). Such party would be responsible for that mitigation as well as all actions in Stipulation IV.A., B., and D.

A. Any new alternative(s) resulting in a net rise must go through the CLOMR process and be accepted by the local floodplain administrators for the cities of Bismarck and Mandan, as well as the state water commission. The process begins with FEMA's acceptance of the CLOMR. Then the floodway review application (which includes the CLOMR) is submitted to the state water commission by the local floodplain administrators for review and acceptance. Coordination of the submittal review is led by the state's National Flood Insurance Program Coordinator. Upon approval and acceptance by the state water commission, the floodplain development permits are issued by the local floodplain administrators for the cities of Bismarck and Mandan. In addition, a Sovereign Lands Permit from the Office of the State Engineer is required for any work completed below the Ordinary High Water Mark. Any ditch modifications require a North Dakota Surface Drain Application, also from the Office of the State Engineer. Local city permits or other permissions may also be required, depending on the type and extent of mitigation considered.

B. The interested parties will submit the flood plain model evaluation to FEMA and/or the local floodplain administrators for the cities of Bismarck and Mandan for certification 60 days prior to the USCG publishing the draft environmental impact statement, and will simultaneously notify the USCG of said submission and provide submitted materials to the USCG. Explanation of such alternative(s) and its mitigation measures, including identification and evaluation of environmental impacts of such mitigation measures, must be submitted to the USCG at least 60 days prior to the USCG publishing the draft environmental impact statement for public comment. The interested parties will keep the USCG informed of the status of the evaluation throughout the floodplain review process, including but not limited to copying the USCG on all correspondence with FEMA and the local floodplain administrators.

C. The USCG will then analyze this alternative(s) and its potential impacts on the environment and include it in the draft environmental impact statement for public comment.

D. The interested party must submit FEMA's CLOMR acceptance and the state water commission's approval for the alternative to the USCG at least 30 days prior to the USCG issuing the Record of Decision for the environmental impact statement. See also approvals regarding floodplain rise described in Stipulation V.B. under Public Private Partnership responsibilities.

V. RETAIN EXISTING BRIDGE

If the USCG determines that retaining the existing Bismarck Bridge and constructing a new adjacent bridge is feasible and reasonable, then the following actions will be implemented.

A. Effects to historic properties, including how the new bridge will visually affect the existing bridge and any surrounding historic properties within the visual APE, will be addressed in the MOA (see Stipulation VIII.C.).

B. The actions in the following table must be completed by the indicated responsible party and by the date or schedule provided. If a party cannot meet the date or schedule stipulated, that party will request an amendment to this PA in compliance with Stipulation XV. This request will be made in writing to the USCG and will include what progress has been made on the action, why the delay has occurred, and provide an anticipated revised date or schedule. The USCG will convey this request to the other consulting parties, who will then consult on the potential change to schedule. After consultation, the decision on any re-scheduling will be the responsibility of the USCG.

Responsible Party	Action
USCG	• Lead the consultation to develop the MOA (Stipulation VIII) that will detail mitigation measures needed to resolve any adverse effects. First draft of the MOA is due to Consulting Parties no later than 30 days after the ACHP signs and executes this PA, and consultation meetings will occur within 60 days. • Prepare a determination of eligibility for the Bismarck Bridge approaches prior to issuing the draft environmental impact statement and submit said determination to the SHPO for concurrence. If the approaches are found to be eligible for the NRHP, effects to them and any mitigation, if necessary, will be addressed in the MOA (see Stipulation VIII.C.). • Identify a vibration APE for construction activities and distribute to other consulting parties.
FORB	• Establish a Bridge Advisory Committee (BAC) to consider how the new bridge could be visually compatible with the Bismarck Bridge and its landscape, setting, and viewshed. The

	role of the BAC would be limited to advice and comment on aesthetic issues and would not involve input on the engineering. The BAC may include representatives from the SHPO, FORB, North Dakota State Water Commission, BNSF, Bismarck Historic Preservation Commission, and tribes. After receiving BNSF's information on bridge design, the BAC will present their initial recommendations to the USCG no later than 60 days prior to the USCG publishing the draft environmental impact statement for public comment so their recommendations can be included in the draft environmental impact statement. • Establish a public private partnership or other governance body that could accept ownership of the Bismarck Bridge and other responsibilities listed in the following table section. FORB will have 45 days from ACHP signature on and execution of this PA to identify a public partner with a commitment to establish a formal partnership, and to inform the USCG of this partnership. • Submit to the USCG a conceptual plan to identify how funds will be raised and funding sources for all costs associated with the project to retain the bridge and convert it to a non-rail use by the close of the draft environmental impact statement public comment period.
Public Private Partnership	• Draft a contract or lease agreement with BNSF to take ownership of or become the lessee for the existing bridge within 60 days of the USCG publishing the final environmental impact statement. Such contract or lease agreement must be signed within 30 days of issuance of the Record of Decision for the environmental impact statement. • Establish a vehicle to receive funds for ongoing maintenance and management of the Bismarck Bridge and notify the USCG of such establishment within 60 days of ACHP signature on and execution of this PA. • Submit a financial management plan and a detailed fundraising plan to the USCG for the following items by the close of the draft environmental impact statement public comment period: o Bridge maintenance and management fund. o Initial phase of bridge-to-trail conversion. Estimated fundraising goal is $700,000* for design and plan preparation, permitting, and inspections. o Added design costs and construction premiums above those for BNSF's proposed action. BNSF will

	provide the estimated amount of funding (see BNSF's responsibilities in the following table section). o Cost to remove the Bismarck Bridge to prevent hazard to navigation in the event of bridge failure or dereliction, estimated at $4 million, once the bridge is no longer used for rail and becomes the responsibility of the Public Private Partnership. This responsibility would not apply until after BNSF's responsibility in Stipulation VII expires. o Cost of construction to repurpose the Bismarck Bridge from a rail bridge to a pedestrian bridge. Estimated cost* is $6,191,720. o Cost to design and implement any mitigation measures, if needed, for alternatives identified under Stipulations III and IV. • Obtain all necessary approvals and permits to construct any floodplain rise mitigation, and fully design such mitigation, including construction documents, to prove feasibility. Approvals/permits and design documents must be provided to the USCG within 30 days of issuance of the USCG bridge permit decision.
BNSF	• Comply with vibration monitoring plan provided in Stipulation II. • Draft a contract or lease agreement with the Public Private Partnership for them to take ownership of or become the lessee for the existing bridge within 60 days of the USCG publishing the final environmental impact statement. Such contract or lease agreement must be signed within 30 days of issuance of the Record of Decision for the environmental impact statement. • Provide the estimated amount of added design costs and construction premiums above those for BNSF's proposed action. BNSF must provide these costs and supporting documentation to the USCG and FORB within 60 days of ACHP signature on and execution of this PA. • BNSF will present engineering drawings for the new bridge, including architectural renderings, to the BAC no later than 30 days after the ACHP signs and executes this PA, and work in collaboration to develop design considerations.

*Estimates and work items from *Final Feasibility Study*, June 30, 2019.

C. If any part of Stipulation V. cannot be fulfilled, then the process may move to Stipulation VI, at the discretion of the USCG. If a party cannot meet the obligation(s) stipulated, that party will request an amendment to this PA in compliance with Stipulation XV. This request will be made in writing to the USCG and will include what progress has been made on the action, why the obligation cannot be fulfilled, and suggested revisions or substitutions to accomplish the goal of the stipulated action in question. The USCG will convey this request to the other consulting parties, who will then consult on the potential change. After consultation, the decision on any revisions to the stipulated obligation(s) will be the responsibility of the USCG.

VI. **REMOVE EXISTING BRIDGE**

A. If the USCG determines that retaining the existing bridge and constructing a new adjacent bridge is not feasible and reasonable, then the actions in the following table must be completed by the indicated responsible party, and by the date or schedule provided.

B. If any part of this stipulation cannot be fulfilled, then the process may move to Stipulation XVI, at the discretion of the USCG. If a party cannot meet the obligation(s) stipulated, that party will request an amendment to this PA in compliance with Stipulation XV. This request will be made in writing to the USCG and will include what progress has been made on the action, why the obligation cannot be fulfilled, and suggested revisions or substitutions to accomplish the goal of the stipulated action in question. The USCG will convey this request to the other consulting parties, who will then consult on the potential change. After consultation, the decision on any revisions to the stipulated obligation(s) will be the responsibility of the USCG.

Responsible Party	**Action**
USCG	• Lead the consultation to develop the second tier MOA (Stipulation VIII) that will detail mitigation measures needed to resolve any adverse effects from the removal of the historic Bismarck Bridge and the addition of a new bridge. First draft of MOA is due to Consulting Parties no later than 30 days after the ACHP signs and executes this PA, and consultation meetings will occur within 60 days. • Prepare a determination of eligibility for the Bismarck Bridge approaches prior to issuing the draft environmental impact statement and submit said determination to the SHPO for concurrence. If the approaches are found to be eligible for the NRHP, effects to them and any mitigation, if necessary, will be addressed in the MOA (see Stipulation VIII.C.). • Identify a vibration APE for construction and demolition activities and distribute to other consulting parties.

FORB	• Establish a BAC to consider how the new bridge could be visually compatible with the landscape, setting, and viewshed. The role of the BAC would be limited to advice and comment on aesthetic issues and would not involve input on the engineering. The BAC may include representatives from the SHPO, FORB, North Dakota State Water Commission, BNSF, Bismarck Historic Preservation Commission, and tribes. After receiving BNSF's information on bridge design, the BAC will present their initial recommendations to the USCG no later than 60 days prior to the USCG publishing the draft environmental impact statement for public comment so their recommendations can be included in the draft environmental impact statement. • No less than 30 days before the draft environmental impact statement is issued by the USCG, provide recommendations to the USCG regarding which, if any, portions of the existing Bismarck Bridge might be retained in place to preserve the history of the bridge while still maintaining no net rise. If there are any impacts related to keeping a portion of the Bismarck Bridge in the waterway, FORB must evaluate these impacts and identify mitigation for these impacts (See Stipulation IV.B.) within this same time period. Present a plan to the USCG to identify how funds for said mitigation will be raised by the close of the draft environmental impact statement public comment period.
BNSF	• Comply with vibration monitoring plan provided in Stipulation II.

VII. IMMINENT FAILURE

The parties acknowledge that, if the existing Bismarck Bridge is determined by BNSF to be subject to derailment, imminent failure, or other serious physical hazard, BNSF would immediately notify the USCG, USACE, and SHPO, and immediately commence the USCG (Commandant Instruction M16590.5C, Chapter 4.F.) and USACE (33 CFR 325.2(e)(4)) emergency permit process prior to bridge removal and replacement. BNSF will notify the other Consulting Parties within 24 hours of notifying the agencies. A second tier MOA will then be developed pursuant to Stipulation VIII. by the USCG, ACHP, SHPO, BNSF, and other Consulting Parties to mitigate the loss of the historic bridge. This provision may only be invoked prior to the conversion of the Bismarck Bridge to a non-rail purpose, and prior to BNSF and the Public Private Partnership executing a contract or lease for the bridge. In the event that BNSF invokes this provision, BNSF shall be exclusively responsible for paying any and all costs associated with the demolition.

VIII. SECOND TIER MEMORANDUM OF AGREEMENT

A. A second tier MOA will be developed by the USCG, ACHP, and the other Consulting Parties to address adverse effects that the Undertaking may have on historic properties and develop detailed mitigation plans, assign responsibilities, and provide timelines.

B. The USCG will provide the first draft of the MOA to Consulting Parties no later than 30 days after the ACHP signs and executes this PA.

C. The MOA will include specific commitments to minimize and mitigate adverse visual effects from the new bridge on the existing Bismarck Bridge, if it is retained, and also on any other historic properties in the visual APE.

IX. POST-REVIEW DISCOVERIES

A. If properties are discovered that may be historically significant, or if unanticipated effects on historic properties are found, the USCG shall implement the inadvertent discovery plan included as Attachment D of this PA.

B. If human remains are discovered during construction, work in that portion of the project shall stop immediately and the USCG shall implement the human remains section of the inadvertent discovery plan included as Attachment D of this PA.

Administrative Provisions

X. PROFESSIONAL QUALIFICATIONS

All work carried out pursuant to this PA will be developed and/or implemented by, or under the direct supervision of, a person or persons meeting or exceeding the minimum professional qualifications, appropriate to the affected resource(s), listed in the *Secretary of the Interior's Professional Qualification Standards* as defined and officially adopted in 1983 (48 FR 44716, September 29) and the *Secretary of the Interior's Historic Preservation Professional Qualification Standards* as expanded and revised in 1997 (62 FR 33708, June 20).

XI. EFFECTIVE DATE

The terms of this agreement will become effective upon signature of all Signatories. The USCG will file a copy with the ACHP.

If an emergency is declared in the area of the Undertaking by the President of the United States or Governor of North Dakota, any deadlines written into this PA are automatically extended 60 days.

XII. DURATION

This PA will expire if its terms are not carried out within 10 years from the date of issuance of the USCG bridge permit. Prior to such time, the USCG may consult with the other Signatories to reconsider the terms of the PA and amend it in accordance with Stipulation XV.

XIII. MONITORING AND REPORTING

BNSF and FORB shall each provide all Consulting Parties to this PA a monthly summary report detailing work undertaken pursuant to its terms on the first of each month following the execution of this PA until the USCG bridge permit is issued, at which point reporting can occur annually, commencing on the first of the month after the date of the signed Record of Decision, until the PA expires or is terminated. Such reports shall include all proposed scheduling changes and disputes or objections received in parties' efforts to carry out the terms of this PA. These reports will be emailed to the USCG point of contact (POC) as well as to POCs for all Consulting Parties. The USCG will hold periodic (quarterly or annual) Consulting Party meetings after the PA is executed based on the interest of the Signatories.

XIV. DISPUTE RESOLUTION

If any Consulting Party to this agreement objects to any actions conducted during the term of this PA or to the manner in which the terms of this PA are implemented, the USCG shall consult with such party to resolve the objection. If the USCG determines that such objection(s) cannot be resolved, the USCG will:

A. Forward all documentation relevant to the dispute, including the USCG's proposed resolution, to the ACHP. The ACHP shall provide the USCG with its advice on the resolution of the objection within 30 calendar days of receiving documentation. Prior to reaching a final decision on the dispute, the USCG shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP and Signatories and provide them with a copy of this written response. The USCG will then proceed according to its final decision.

B. If the ACHP does not provide its advice regarding the dispute within the 30-day time period, the USCG may make a final decision regarding the dispute and proceed accordingly. Prior to reaching a final decision, the USCG shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the Signatories to the PA and provide them and the ACHP with a copy of such written response.

C. The USCG's responsibility to carry out all other actions subject to the terms of this PA that are not the subject of the dispute remain unchanged.

XV. AMENDMENTS AND ADDITIONAL PARTIES

A. This agreement may be modified upon the mutual written consent of the Signatories in accordance with 36 CFR 800.6(c)(7).

B. If additional approvals are needed from another agency that is not a party to this PA and the Undertaking remains unchanged, such agency may comply with Section 106 by agreeing in writing to the terms of this PA and notifying and consulting with the SHPO and ACHP. Any necessary modifications would be considered in accordance with Stipulation XV.A.

XVI. TERMINATION

A. If any Signatory determines that the terms of this PA will not or cannot be carried out, that party shall immediately consult with the other signatories to attempt to develop an amendment per Stipulation XV above. If within 90 days (or another time period agreed to by all signatories) an amendment cannot be reached, the Signatory may terminate the PA upon written notification to the other signatories. The party proposing to terminate the agreement shall so notify all other signatories to this agreement explaining the reasons for termination and affording at least 60 days to consult and seek alternatives to termination. The signatories shall then consult.

B. Should such consultation fail to resolve the dispute, any Signatory may terminate the agreement by so notifying all Consulting Parties. Should this agreement be terminated, the USCG shall either:

1. Consult in accordance with 36 CFR 800.6(a) in an effort to resolve any adverse effects, or
2. Terminate consultation and request ACHP comment in accordance with 36 CFR 800.7(c).

XVII. **POINTS OF CONTACT**

The USCG POC will be Brian Dunn, Chief, Office of Bridge Programs, Coast Guard Headquarters (202) 372-1510. The SHPO POC will be Lorna Meidinger, Architectural Historian (701) 328-2089). The ACHP POC will be Christopher Wilson, Program Analyst (202) 517-0229. The BNSF POC will be Mike Herzog, Director of Bridge Construction (913) 551-4229.

Execution of this PA by the USCG, SHPO, ACHP, BNSF, and FORB, and implementation of its terms, is evidence that the USCG has taken into account the effects of this Undertaking on historic properties and afforded the ACHP an opportunity to comment.

SIGNATORY PAGE

PROGRAMMATIC AGREEMENT

AMONG THE UNITED STATES COAST GUARD,
THE NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE PROPOSED BRIDGE PROJECT AT MILE 1315.0 ON THE MISSOURI RIVER NEAR BISMARCK AND MANDAN, BURLEIGH COUNTY, NORTH DAKOTA

Signatory:

United States Coast Guard

NADEAU.JOHN.P.1006883253 Digitally signed by NADEAU.JOHN.P.1006883253 Date: 2021.01.11 16:07:29 -06'00' ______________________ Date ____________

John P. Nadeau, Rear Admiral, U.S. Coast Guard
Commander, Eighth Coast Guard District

SIGNATORY PAGE

PROGRAMMATIC AGREEMENT

AMONG THE UNITED STATES COAST GUARD, THE NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION REGARDING THE PROPOSED BRIDGE PROJECT AT MILE 1315.0 ON THE MISSOURI RIVER NEAR BISMARCK AND MANDAN, BURLEIGH COUNTY, NORTH DAKOTA

Signatory:

North Dakota State Historic Preservation Officer

[signature] Date 1-11-2021

William Peterson, State Historic Preservation Officer

SIGNATORY PAGE

PROGRAMMATIC AGREEMENT

AMONG THE UNITED STATES COAST GUARD,
THE NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE PROPOSED BRIDGE REPLACEMENT AT MILE 1315.0 ON THE MISSOURI RIVER NEAR BISMARCK AND MANDAN, BURLEIGH COUNTY, NORTH DAKOTA

Signatory:

Advisory Council on Historic Preservation

______________________________ Date 1/15/2021

John M. Fowler, Executive Director

INVITED SIGNATORY PAGE

PROGRAMMATIC AGREEMENT

AMONG THE UNITED STATES COAST GUARD,
THE NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE PROPOSED BRIDGE PROJECT AT MILE 1315.0 ON THE MISSOURI RIVER NEAR BISMARCK AND MANDAN, BURLEIGH COUNTY, NORTH DAKOTA

Invited Signatory:

BNSF Railway Company

Digitally signed by MLH
Date: 2021.01.12 10:59:19
-06'00'

Date

Mike Herzog, P.E., Director of Bridge Construction, BNSF Railway Company

INVITED SIGNATORY PAGE

PROGRAMMATIC AGREEMENT

AMONG THE UNITED STATES COAST GUARD,
THE NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE PROPOSED BRIDGE PROJECT AT MILE 1315.0 ON THE MISSOURI RIVER NEAR BISMARCK AND MANDAN, BURLEIGH COUNTY, NORTH DAKOTA

Invited Signatory:

Friends of the Rail Bridge

Mark Zimmerman, President, Friends of the Rail Bridge

Date 11 January 2021

CONCURRING PARTY PAGE

PROGRAMMATIC AGREEMENT

AMONG THE UNITED STATES COAST GUARD,
THE NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE PROPOSED BRIDGE PROJECT AT MILE 1315.0 ON THE MISSOURI RIVER NEAR BISMARCK AND MANDAN, BURLEIGH COUNTY, NORTH DAKOTA

Concurring Party:

City of Bismarck

______________________________ Date 1/12/2021

Steve Bakken, Mayor, City of Bismarck

CONCURRING PARTY PAGE

PROGRAMMATIC AGREEMENT

***AMONG THE UNITED STATES COAST GUARD,
THE NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE PROPOSED BRIDGE PROJECT AT MILE 1315.0 ON THE MISSOURI RIVER NEAR
BISMARCK AND MANDAN, BURLEIGH COUNTY, NORTH DAKOTA***

Concurring Party:

Preservation North Dakota

_______________________________ Date 1/11/2021

Emily Sakariassen, President

Attachment A

APE Map with SHPO Concurrence

U.S. Department of Homeland Security
United States Coast Guard

Commander
Eighth Coast Guard District

1222 Spruce Street
St. Louis, MO 63103-2832
Staff Symbol: dwb
Phone: (314) 269-2381
Fax: (314) 269-2737
Email: rob.e.mccaskey@uscg.mil
www.uscg.mil/d8/westernriversbridges

September 20, 2017

Ms. Susan Quinnell
Review and Compliance Coordinator
State Historic Preservation Office
612 East Blvd Ave
Bismarck, ND 58505

ND SHPO Ref: 16-0636

SUBJECT: Section 106 Consultation for Proposed Bridge Replacement at Mile 1315.0 on the Missouri River near Bismarck/Mandan, North Dakota

Dear Ms. Quinnell:

The enclosed Class III Cultural Resources Inventory Report presents the findings of a cultural resources survey of the area of development for a new bridge to replace the historic BNSF Bridge 0038-196.6A (Site 32BL801/32MO1459) crossing the Missouri River in Bismarck, North Dakota. The proposed project also entails removing the historic bridge. A total of 58 acres were inventoried to Class III Intensive Pedestrian Inventory standards. Two properties were previously identified in the project area. The bridge, Site 32BL801/ 32MO1459, was previously recorded by Aaron Barth in 2016. Site Lead 32MOx626, an irrigation or drainage ditch, lies within the western portion of the project area and was recorded by Yates earlier this year (2017). Yates recommended Site Lead 32MOx626 not eligible for listing in the National Register of Historic Places (NRHP).

As a result of the current study and information previously provided, the U.S. Coast Guard (USCG), as the lead federal agency, has determined the bridge, Site 32BL801/32MO1459, eligible for listing in the NRHP under criteria A (Event) and B (Person), for its association with broad patterns of railroad, commercial, and military history in the United States and with engineer George Shattuck Morison. In addition, the USCG has determined the bridge eligible under Criterion C in the areas of Design and Construction. Additionally, the USCG has determined Site Lead 32MOx626 not eligible for listing in the NRHP. The USCG respectfully requests your concurrence with these determinations of eligibility.

Area of Potential Effects
The Area of Potential Effects (APE), as defined in 36 CFR 800.16(d), is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of cultural resources, if any such resources exist. The development of the proposed APE consisted of identifying areas in the vicinity of the undertaking where the potential for effects to cultural resources were determined to exist. Based on the nature and the scope of the undertaking and past experience with similar projects, these areas were defined as the footprint of the proposed undertaking within which all proposed construction and ground-disturbing activity is

confined, including the existing and proposed right-of-way for the replacement of the railroad bridge (**see enclosures**). The USCG respectfully requests your comments on the proposed APE.

Finding of Effects
Because the proposed undertaking includes removing the NRHP-eligible BNSF Bridge 0038-196.6A (Site 32BL801/32MO1459), the USCG has determined the project to have a finding of Adverse Effect to Historic Properties. Because the proposed undertaking will have an adverse effect on a historic property, the USCG invites the the North Dakota State Historic Preservation Office to enter into consultation on a Memorandum of Agreement to seek ways to avoid, minimize, or mitigate the adverse effect. The USCG will also invite BNSF Railroad to participate as the project proponent, as well as other consulting parties, as appropriate. The USCG will notify the Advisory Council on Historic Preservation of the adverse effect and provide the required documentation per 36 CFR 800.11(e).

We look forward to your concurrence on the determinations of eligibility as described in the enclosed Class III Cultural Resources Inventory Report, to your comments on the proposed APE, and to your continued consultation. Please direct written correspondence to Mr. Robert McCaskey, Bridge Management Specialist, USCG District Eight Bridge Branch, 1222 Spruce Street, St. Louis, MO 63103-2832. If you have any questions or would like further information, please contact Mr. McCaskey via email at Rob.E.McCaskey@uscg.mil, or by phone at (314) 269-2381.

Sincerely,

ERIC A. WASHBURN
Bridge Administrator, Western Rivers
By direction of the District Commander

Enclosures:
Class III Cultural Resources Inventory Report
Proposed APE Figure (Aerial)
Proposed APE Figure (Topo)

Area of Potential Effects (APE)

0 1,000 2,000
Feet
(Map Scale: 1:8,000)

Base Map Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

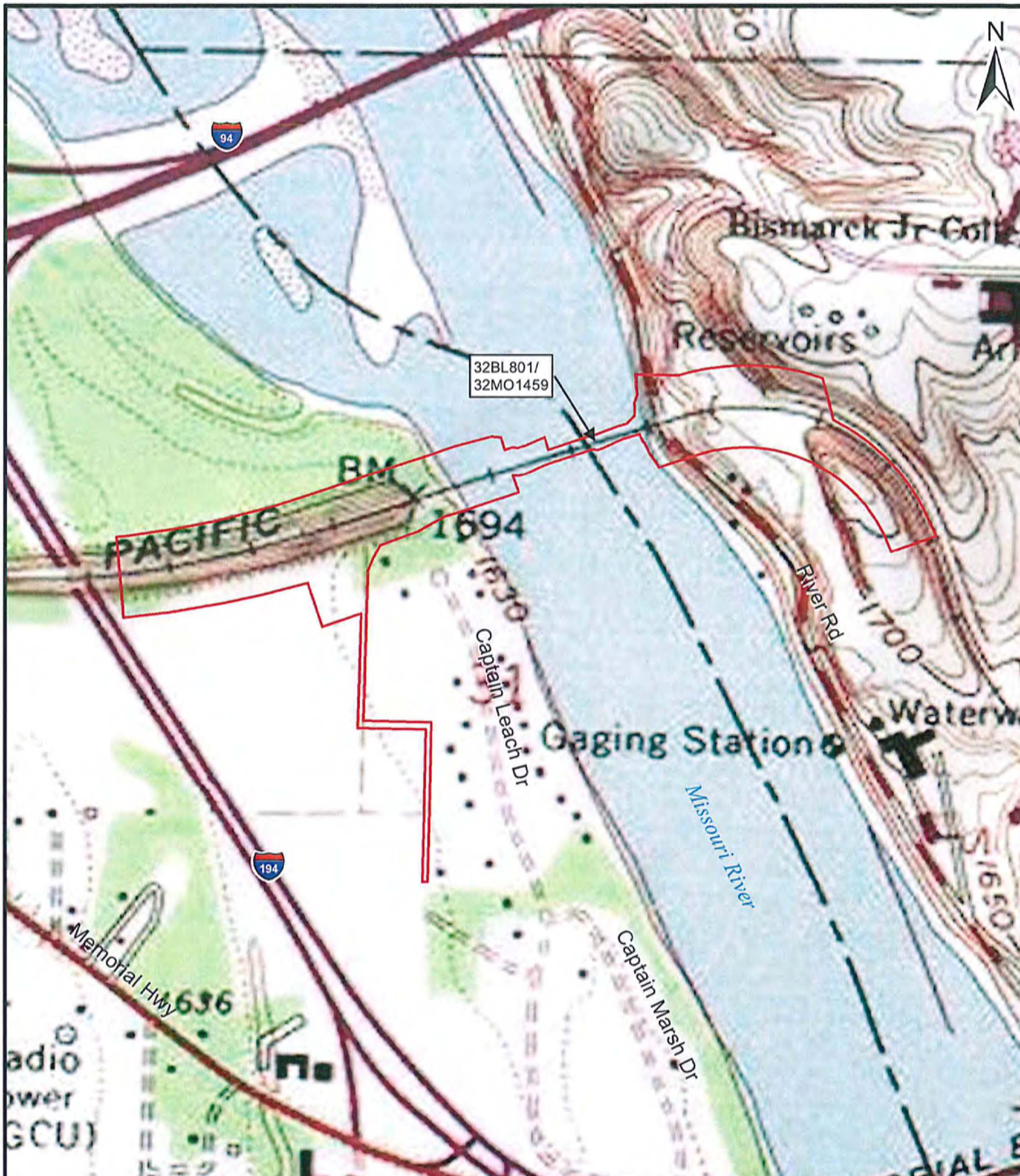
BNSF RAILWAY

ND SHPO Ref: 16-0636

Section 106 Consultation for Proposed Bridge Replacement at Mile 1315.0 on the Missouri River near Bismarck/Mandan, North Dakota

DATE: 9/20/2017

ch2m



Area of Potential Effects (APE)

0 1,000 2,000
Feet
(Map Scale: 1:8,000)

Base MapCopyright:© 2013 National Geographic Society, i-cubed

BNSF RAILWAY

ND SHPO Ref: 16-0636

Section 106 Consultation for Proposed Bridge Replacement at Mile 1315.0 on the Missouri River near Bismarck/Mandan, North Dakota

DATE: 9/20/2017

ch2m

October 2, 2019

Mr. Rob McCaskey
US Coast Guard- Western Rivers
8th District Bridge Branch
1222 Spruce Street
St Louis, MO 63103-2832

ND SHPO Ref.: 16-0636, Section 106 Consultation for the Proposed Bridge Replacement at Mile 1315.0 on the Missouri River near Bismarck/Mandan, North Dakota

Dear Mr. McCaskey,

We reviewed your request for comments on the APE for ND SHPO Ref.: 16-0636, Section 106 Consultation for the Proposed Bridge Replacement at Mile 1315.0 on the Missouri River near Bismarck/Mandan, North Dakota and concur with the APE as defined in the documentation with the understanding that we would like to see any additional areas to be used for disposal, borrow or staging as those areas are identified.

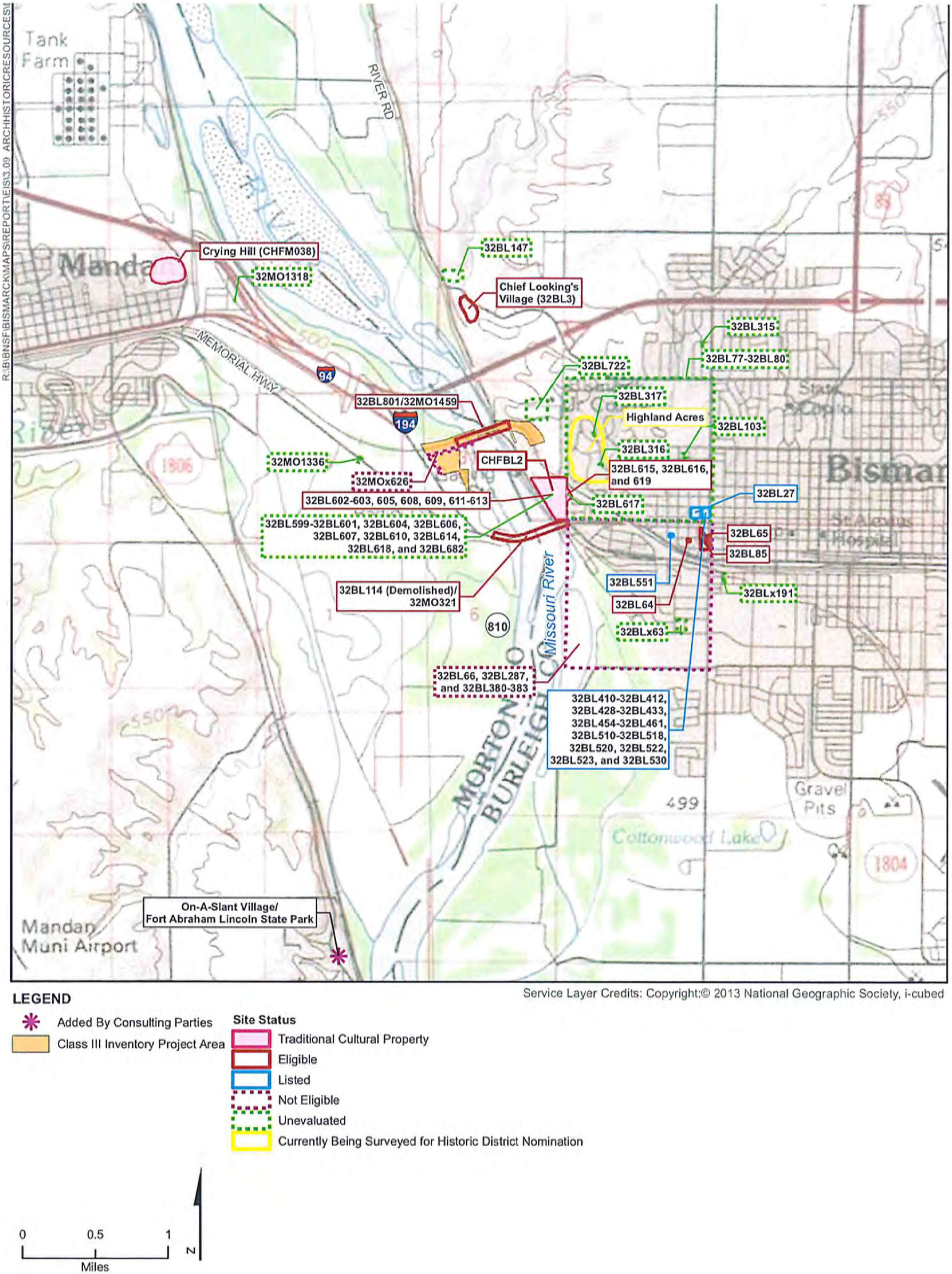
Thank you for the opportunity to review this project. If you have any questions please contact Lisa Steckler, Historic Preservation Specialist at (701) 328-3577, e-mail lsteckler@nd.gov

Sincerely,

for Claudia J. Berg
State Historic Preservation Officer
(North Dakota)

16-0636

Attachment B
Identified Cultural Resources and Map of Non-Confidential Sites



Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

Table 1: Results of the Site, Site Lead, and Isolated Find Files Search					
Sec-Twp/Rng	SITS#	Type	Recorder Date	NRHP Status	MS #
5-138/80	32BL63	Architectural - Residence	Schweigert/ Persinger 1988	E	108, 4554, 8462, 10128, 11555, 17256
	32BL64	Architectural - Residence	Schweigert/ Persinger 1988	E	
	32BL65	Architectural - Residence	Schweigert/ Persinger 1988	E	
	32BL66	Architectural - Residence	Schweigert/ Persinger 1988	NE	
	32BL85	Architectural/Historic - Park, Masonry, Metal	Schweigert/ Persinger 1988	E	
	32BL114	Architectural - Liberty Memorial Bridge	Meidinger 2011; Renewable Technologies, Inc./Hess, Roise, & Co. 1991	E	
	32BL287	Architectural - Calvary Free Lutheran Church	Ford-Dunker 1999	UN	
	32BL381	Architectural - Residence	Meidinger 2013; Wegscheid 1991	UN	
	32BL382	Architectural - Residence	Wegscheid 1991	UN	
	32BL383	Architectural - Residence	Wegscheid 1991	UN	
	32BL534	Archaeological - CMS, Faunal Remains, Chipped Stone	Pratt 2003	NE	
	32BL551	Architectural - Lundquist House	Ryan 2006	L	
	32BLx3	Isolated Find - Projectile Point	Borchert 2006	NE	
	32BLx7	Isolated Find - Fire Cracked Rock, Chipped Stone	Zachmann 2006	NE	
	32BLx63	Site Lead - Residence	BAM 1996	UN	
	32BLx191	Site Lead - Residence	BAM 1996	UN	
6-138/80	32BL114	Architectural - Liberty Memorial Bridge	Meidinger 2011; Renewable Technologies, Inc./Hess, Roise, & Co. 1991	E	87, 3992, 8462, 8772, 8838, 8901, 10128, 15166
	32MO321	Architectural - Liberty Memorial Bridge	Renewable Technologies, Inc./Hess, Roise, & Co. 1991	E	
	32MO1318	Architectural -Bethel Assembly of God	Christopher 2002	UN	
1-138/81	32MO28	Archaeological - CMS, Earthlodge Village, Mound	Simonson 1997; Purcell 1979; Metcalf 1950	NE	80, 94, 2094, 2999, 3992, 6088, 6138, 6708, 6919, 8044, 8838, 8901
29-139/80	32BL315	Architectural - Church of Christ	Ford-Dunker 1999	UN	4554, 5506, 5968, 8172, 16299
30-139/80	32BL3	Archaeological - Chief Looking's Village	Bleier, SHSND 2010; Volk 2010; Metcalf 1950	E	80, 94, 109, 5410, 5506, 6886, 7133,

**Update: The Bismarck Indian School/Fraine Barracks is considered a Traditional Cultural Property by the MHA Nation and the Standing Rock Sioux Tribe (recorded as CHFBL2). The individual buildings are recorded as 32BL599 (not extant) with the following contributing buildings 32BL602-603, 605, 608, 609, 611-613, 615-616, 619.*

Table 1: Results of the Site, Site Lead, and Isolated Find Files Search

Sec-Twp/Rng	SITS#	Type	Recorder Date	NRHP Status	MS #
	32BL147	Architectural - Homestead	Good 1998	NE	8812, 11030, 12124, 15171, 15377, 16299
	32BLx202	Isolated Find - Faunal Remains, Chipped Stone	Good 1998	NE	
	32BKx351	Site Lead - Bismarck State College	Meidinger 2015	UN	
31-139/80	32BL599-32BL614	*Architectural - (16 Sites) - Fraine Barracks/ND National Guard	McCormick/ Renewable Technologies, Inc. 2006		80, 109, 2011, 5920, 6354, 8772, 10861, 15171, 16299
	32BL616	*Architectural - Fraine Barracks/ND National Guard	McCormick/ Renewable Technologies, Inc. 2006	UN	
	32BL618	Architectural - Fraine Barracks/ND National Guard	McCormick/ Renewable Technologies, Inc. 2006	UN	
	32BL682	Architectural - Fraine Barracks/ND National Guard/Motor Vehicle Storage	Rossillon 2009	NE	
	32BL722	Architectural - Barrack Building	Meidinger 2011	UN	
	32BL801	Architectural - Northern Pacific RR Bridge	Barth 2016; Meidinger 2011; Benson 1980	E	
	32BLx66	Site Lead - Steamboat Warehouse	Benson 1980	UN	
	32BLx351	Site Lead - Bismarck State College	Meidinger 2015	UN	
	32MO321	Architectural - Liberty Memorial Bridge	Renewable Technologies, Inc./Hess, Roise, & Co. 1991	E	
	32MO1459	Architectural - Northern Pacific RR Bridge	Barth 2016; Meidinger 2011; Benson 1980	E	
	32MOx626	Site Lead - Water Diversion Ditch	Yates 2017	NE	
32-139/80	32BL27	Architectural - Cathedral of the Holy Spirit	Ford-Dunker 1999	L	108, 4554, 10861, 15495
	32BL75-32BL80	Architectural - (7 Sites) - Residential			
	32BL103	Architectural - Ralph S. Thompson House	Fukuda 1978	UN	
	32BL316	Architectural - Church of the Cross	Ford-Dunker 1999	UN	
	32BL317	Architectural - United Church of Christ	Ford-Dunker 1999	UN	
	32BL410 - 32BL412	Architectural - (3 Sites) - Residential			
	32BL428 - 32BL433	Architectural - (6 Sites) - Residential			

***Update:** *The Bismarck Indian School/Fraine Barracks is considered a Traditional Cultural Property by the MHA Nation, the Standing Rock Sioux Tribe, and the Turtle Mountain Band of Chippewa (recorded as CHFBL2). The individual buildings are recorded as 32BL599 (not extant) with the following contributing buildings 32BL602-603, 605, 608, 609, 611-613, 615-616, 619.*

Table 1: Results of the Site, Site Lead, and Isolated Find Files Search

Sec-Twp/Rng	SITS#	Type	Recorder Date	NRHP Status	MS #
32-139/80	32BL454 - 32BL461	Architectural - (8 Sites) - Residential			108, 4554, 10861, 15495
	32BL510 - 32BL518	Architectural - (9 Sites) - Residential			
	32BL520	Architectural - Cathedral Convent	Mertz 2000	L	
	32BL522-32BL523	Architectural - (2 Sites) - Residential			
	32BL530	Architectural - Residence	Mertz 2000	L	
	32BL615	*Architectural - Fraine Barracks/ND National Guard	McCormick/ Renewable Technologies, Inc. 2006	UN	
	32BL617	Architectural - Fraine Barracks/ND National Guard	McCormick/ Renewable Technologies, Inc. 2006	NE	
	32BL619	*Architectural - Fraine Barracks/ND National Guard	McCormick/ Renewable Technologies, Inc. 2006	UN	
	32BLx159	Site Lead - Bone, Glass, Metal	Ritterbush 1982	UN	
	32BLx170	Site Lead - Mound/Isolated Find	LCT 1990	UN	
25-139/81	32MO1060	Archaeological - CMS, Charcoal, Faunal Remains, Fire Cracked Rock, Chipped Stone	Stine/Kulevsky 2002	UN	87, 6779, 6886, 7753, 8351, 8812, 8897
36-139/81	32MO1336	Architectural - International Cornerstone Church & Academy	Mertz 2002	UN	2054, 2999, 3992, 8351
	32MOx158	Isolated Find - Chipped Stone, TRSS Biface Fragment	Gnabasik 1988	NE	

SITS=Smithsonian Institute Trinomial System, CMS=Cultural Material Scatter, NRHP=National Register of Historic Places, E=Eligible, UN=Unevaluated, NE=Not Eligible, L=Listed, MS=Manuscript

Attachment C
Consultation Log

Meeting Type	Date	Relevant Compliance
USCG Bridge Application Public Meeting (In compliance with Section 106 and NEPA)	December 14, 2017	NEPA/Section 106
SHPO Consultation Meeting (Conference Call)	January 10, 2018	Section 106
Consulting Parties Meeting #1	January 31, 2018	Section 106
Consulting Parties Meeting #2	May 14, 2018	Section 106
Consulting Parties Meeting #3	June 20, 2018	Section 106
Consulting Parties Meeting #4	July 11, 2018	Section 106
Consulting Parties Meeting #5	August 1, 2018	Section 106
Consulting Parties Meeting #6	August 22, 2018	Section 106
Consulting Parties Meeting #7	September 11, 2018	Section 106
Consulting Parties Meeting #8	October 10, 2018	Section 106
Consulting Parties Meeting #9	October 30, 2018	Section 106
Consulting Parties Meeting #10	November 14, 2018	Section 106
Consulting Parties Meeting with FEMA	July 12, 2019	Section 106
Consulting Parties Meeting #11	August 21, 2019 (originally scheduled December 4, 2018)	Section 106
Webinar for Consulting Parties	November 13, 2019	Section 106
Notice of Intent and Request for Public Comments (Notice # D8 DWB-891)	January 8, 2020	NEPA
USCG meeting with Consulting Parties	April 22, 2020	Section 106
Consulting Parties Meeting #12	September 18, 2020	Section 106

Attachment D
Inadvertent Discoveries Plan

Attachment D. Inadvertent Discoveries Plan

A. If previously unidentified cultural resources or unanticipated effects to historic properties are discovered during Project activities, the Project Manager shall immediately halt all project activities within a one-hundred-foot-radius of the discovery and notify BNSF. BNSF shall notify the United States Coast Guard (USCG), the North Dakota State Historic Preservation Officer (ND SHPO), and the City of Bismarck Historic Preservation Commission within 24 hours of the discovery and shall immediately implement interim measures to protect the previously unidentified cultural resource from looting and vandalism.

B. Immediately upon receipt of notification, the USCG or their designee, in consultation with the ND SHPO, shall inspect the construction site to determine the extent of the discovery or the effect, ensure that construction activities have halted, clearly mark the area of discovery, and implement additional measures, as appropriate, to protect the previously unidentified cultural resource from looting and vandalism.

   a. Unanticipated Effects
      i. The USCG or their designee shall assess the unanticipated effect and the USCG shall determine if the effect is adverse. The USCG shall provide their assessment and effects finding to the ND SHPO for concurrence. The ND SHPO shall respond within 15 days of receipt of the finding. If the finding is No Adverse Effect, work may proceed with no further delay.
      ii. If the USCG finds the unanticipated effect is adverse, they shall consult with the ND SHPO to design a plan for avoiding, minimizing or mitigating the adverse effect, prior to project activities resuming in the area of the unanticipated effect.

   b. Previously Unidentified Cultural Resources
      i. The USCG shall ensure that a qualified professional archaeologist examines the previously unidentified cultural resource to determine if it is an archaeological site, isolated find, or not a cultural resource.
      ii. If it is determined not to be an archaeological site, or is determined to be an isolated find, work may proceed with no further delay.
      iii. If it is determined to be an archaeological deposit, it will be assumed eligible for inclusion in the National Register of Historic Places (NRHP) under Criterion D until a formal Determination of Eligibility is made.
      iv. The USCG shall ensure the proper documentation and assessment of any newly discovered cultural resource, in consultation with ND SHPO. All prehistoric and historic cultural material discovered during project construction will be recorded by a professional archaeologist using standard techniques. In consultation with the ND SHPO, the USCG shall determine the appropriate level of documentation and treatment of the resource.
      v. Project construction outside the discovery location may continue while documentation and assessment of the cultural resource proceeds.

vi. The USCG will make a Determination of Eligibility based on the documentation. If the USCG determines the resource is not eligible for the NRHP, they shall provide the documentation to the ND SHPO for concurrence. The ND SHPO will have 15 days to respond.

vii. If the USCG determines the resource to be a historic property, then, in consultation with the ND SHPO, they will design a plan for avoiding, minimizing or mitigating any adverse effects to the historic property prior to project activities resuming in the area of the discovery.

C. Construction may continue at the discovery location only after the process outlined in this plan is followed and the USCG determines that compliance with state and federal laws is complete.

D. Treatment of Human Remains

a. If an inadvertent discovery contains human remains on private property, work in that portion of the project shall stop immediately. BNSF shall be cover the remains and/or protect them in place in such a way that minimizes further exposure of and damage to the remains. BNSF shall immediately notify the USCG, law enforcement, and the ND SHPO.

b. Once notified, the USCG shall immediately consult with the ND SHPO and the Intertribal Reinternment Committee in compliance with *North Dakota Century Code* 23-06-27 and the North Dakota Administrative Code 40-02-03.

c. Suspected human remains shall not be further disturbed or removed until disposition has been determined by the USCG and ND SHPO.

d. At all times the human remains must be treated with the utmost dignity and respect, and in a manner consistent with the Advisory Council on Historic Preservation's Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects (February 23, 2007).

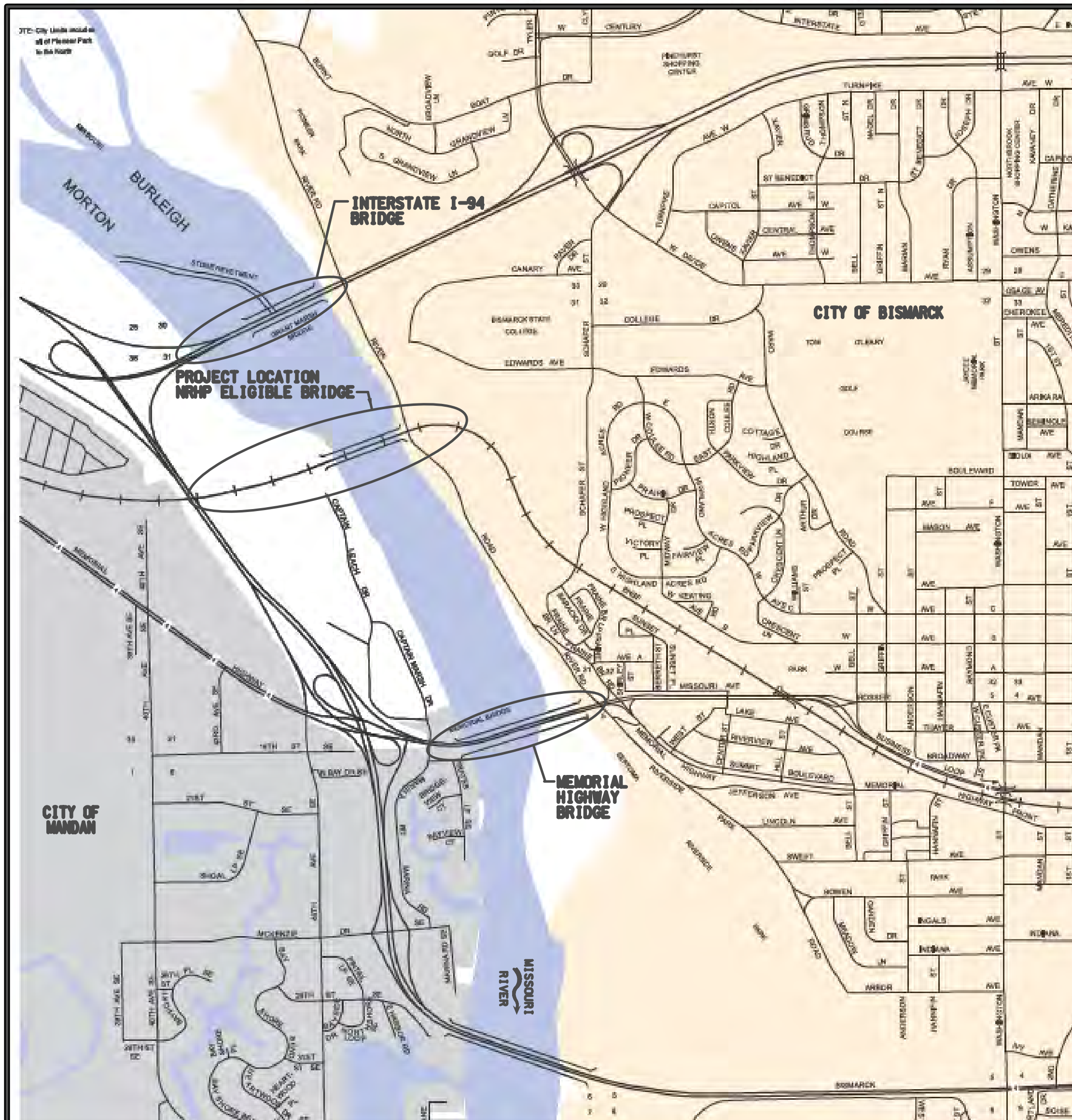
e. If the remains are found to be Native American, in accordance with applicable law, a treatment plan shall be developed by the USCG and ND SHPO in consultation with appropriate federally recognized Indian tribes. The USCG shall ensure that any treatment and reburial plan is fully implemented.

f. If the remains are not Native American, the USCG shall consult with the appropriate local authority to determine final disposition of the remains. Avoidance and preservation in place is the preferred option for treating human remains.

E. BNSF shall ensure that the requirements and protocols established in this Plan are incorporated into all appropriate construction contracts.

Appendix C

Plan Sets



SCALE

Feet

0 1,200 2,400 4,800 7,200 9,600

VICINITY MAP

STATE OF NORTH DAKOTA

TKDA
444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AREMA MANUAL FOR RAILWAY ENGINEERING.

REGISTERED PROFESSIONAL ENGINEER
HANS L. ERICKSON
PE-27244
DATE 3-5-2021
NORTH DAKOTA

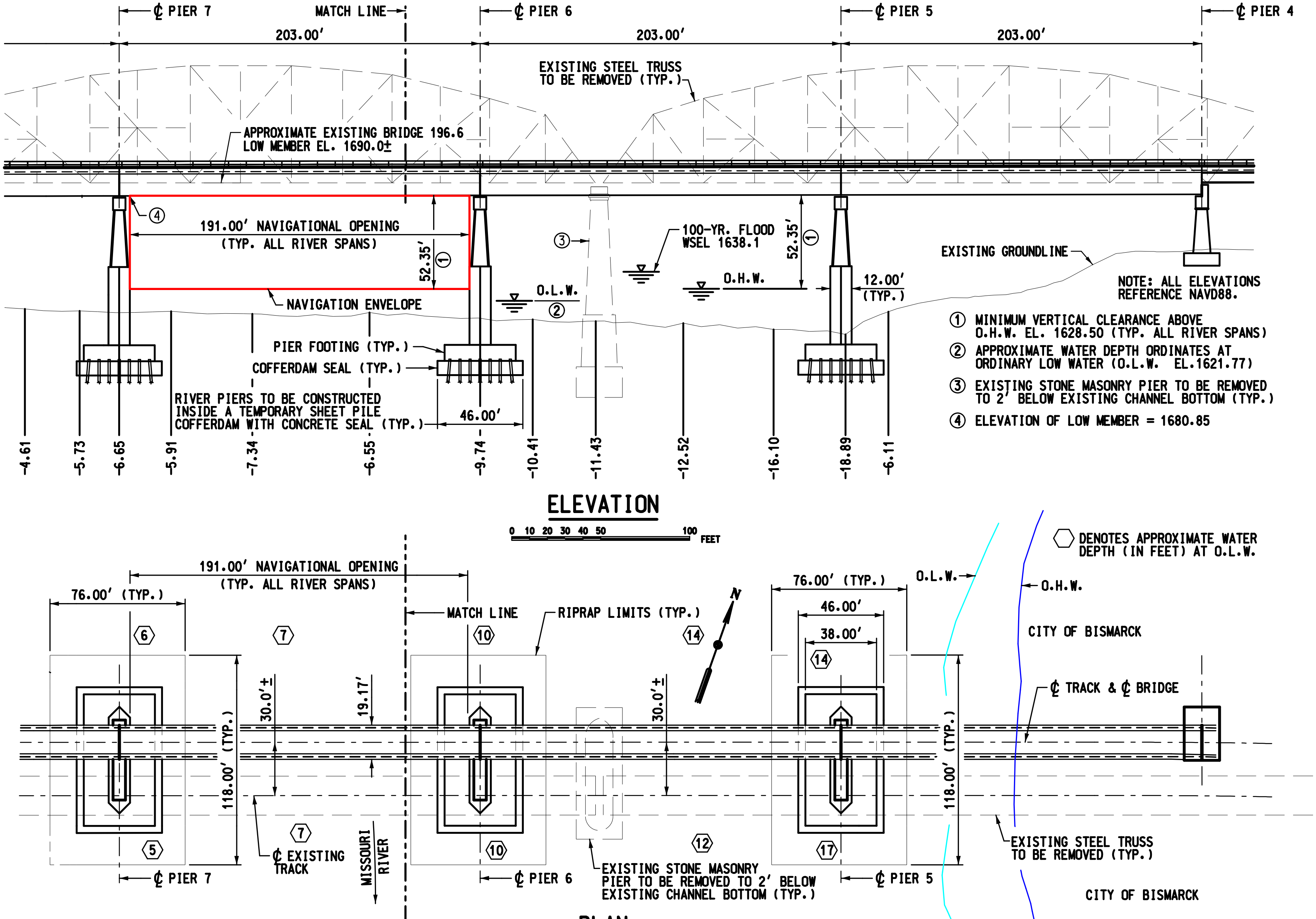
BNSF RAILWAY

BRIDGE ENGINEERING KANSAS CITY, KS

PROPOSED BNSF BRIDGE NO. 196.6A
BISMARCK TO MANDAN
OVER MISSOURI RIVER, MILE POINT 1315.0
NEAR BISMARCK, ND

MORTON & BURLEIGH COUNTIES

MARCH 2021 SHEET: 1 OF 13



THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AREMA MANUAL FOR RAILWAY ENGINEERING.

REGISTERED PROFESSIONAL ENGINEER
HANS L. ERICKSON
PE-27244
DATE 3-5-2021
NORTH DAKOTA

BNSF RAILWAY

BRIDGE ENGINEERING KANSAS CITY, KS

PROPOSED ACTION BNSF BRIDGE NO. 196.6A
BISMARCK TO MANDAN
OVER MISSOURI RIVER, MILE POINT 1315.0
NEAR BISMARCK, ND

MORTON & BURLEIGH COUNTIES

MARCH 2021 SHEET: 2 OF 13

TKDA
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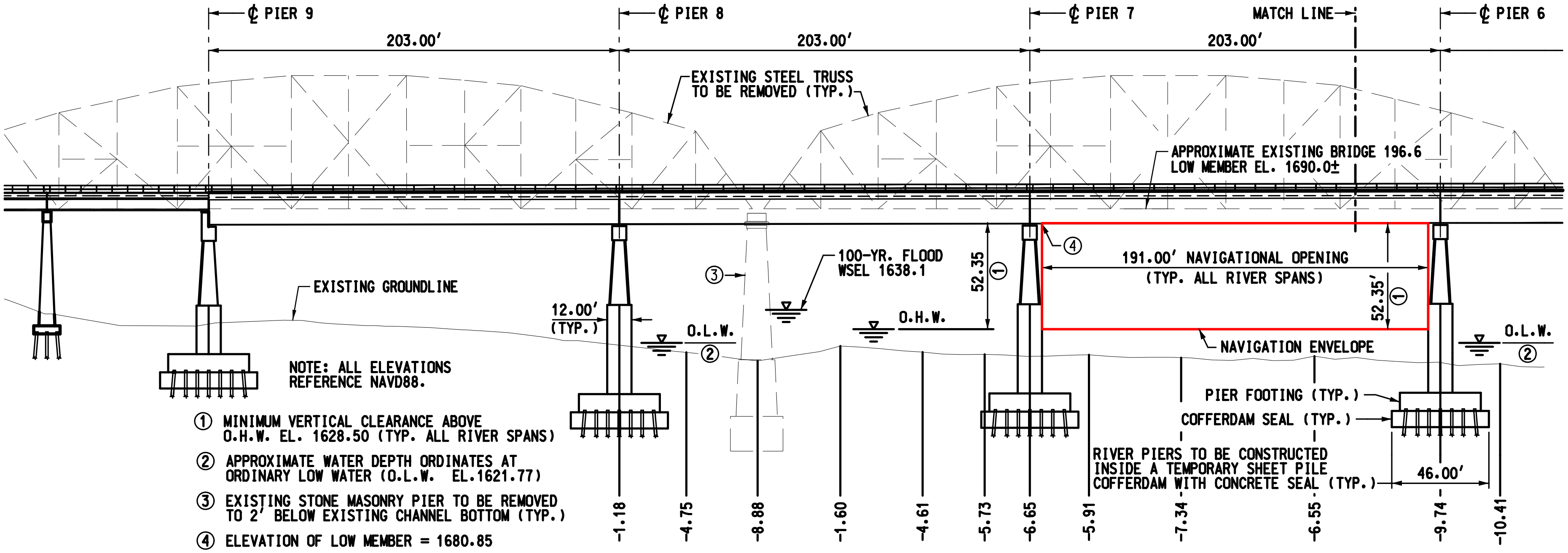
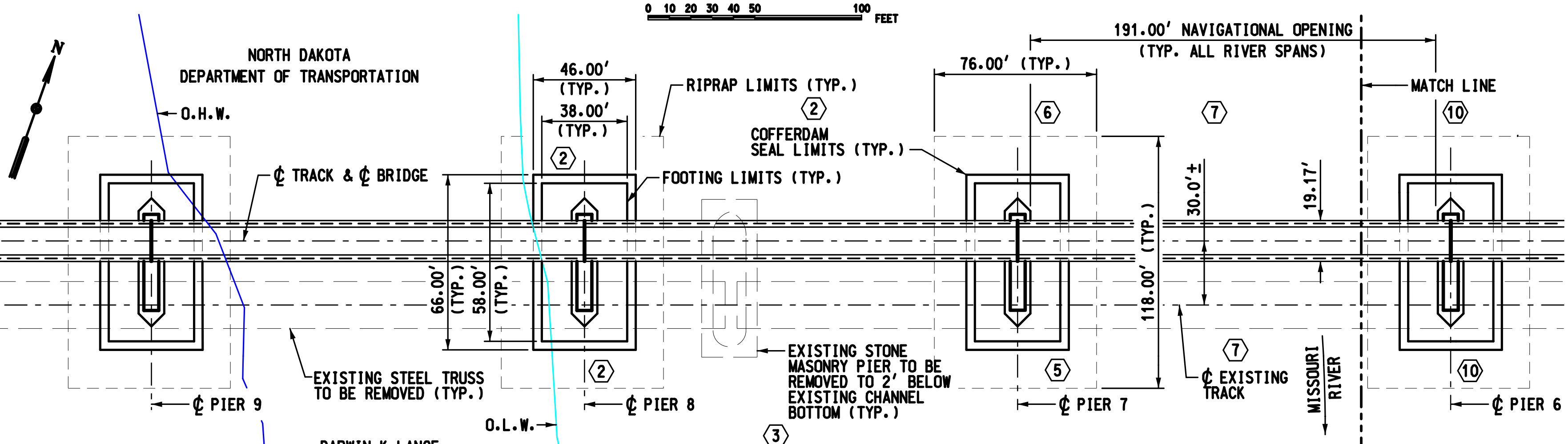
Saint Paul, MN 55101
651.292.4400
tkda.com



ELEVATION

0 10 20 30 40 50 100 FEET



PLAN

0 10 20 30 40 50 100 FEET

⬡ DENOTES APPROXIMATE WATER DEPTH (IN FEET) AT O.L.W.

APPROXIMATE QUANTITIES FOR RIVER PIERS

		PIER 5	PIER 6	PIER 7	PIER 8
EXCAVATION	CU.YD.	3,190	3,540	4,090	4,490
BACKFILL	CU.YD.	840	1,030	1,330	1,540

TKDA
444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

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REGISTERED PROFESSIONAL ENGINEER
HANS L. ERICKSON
PE-27244
DATE 3-5-2021
NORTH DAKOTA

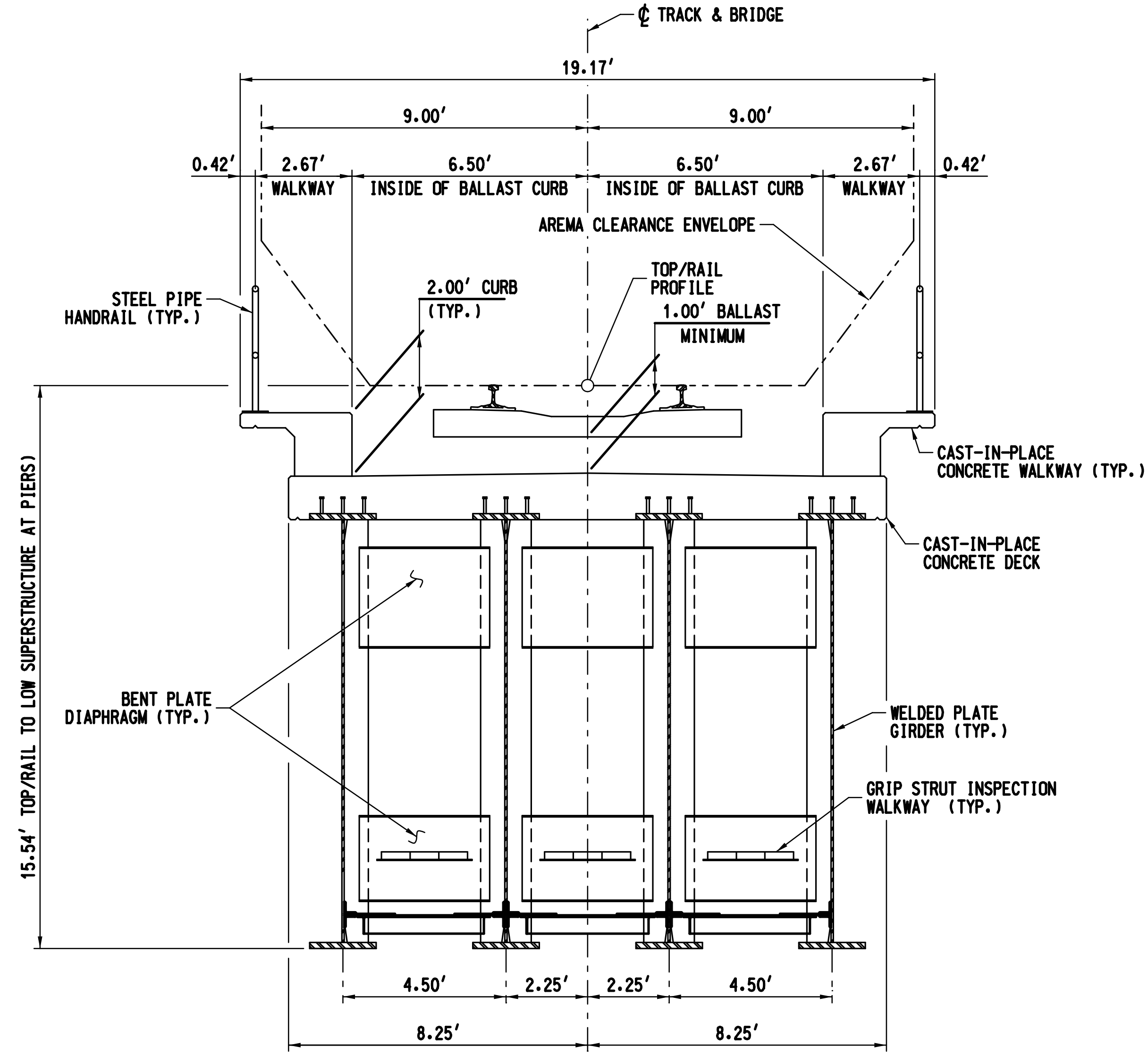
BNSF RAILWAY

BRIDGE ENGINEERING KANSAS CITY, KS

PROPOSED ACTION BNSF BRIDGE NO. 196.6A
BISMARCK TO MANDAN
OVER MISSOURI RIVER, MILE POINT 1315.0
NEAR BISMARCK, ND

MORTON & BURLEIGH COUNTIES

MARCH 2021



TYPICAL SECTION
200′ WELDED PLATE GIRDER SPANS

0 1 2 3 4 5 10 FEET

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AREMA MANUAL FOR RAILWAY ENGINEERING.

REGISTERED PROFESSIONAL ENGINEER
HANS L. ERICKSON
PE-27244
DATE 3-5-2021
NORTH DAKOTA

BNSF RAILWAY
BRIDGE ENGINEERING KANSAS CITY, KS

PROPOSED ACTION BNSF BRIDGE NO. 196.6A
BISMARCK TO MANDAN
OVER MISSOURI RIVER, MILE POINT 1315.0
NEAR BISMARCK, ND

MORTON & BURLEIGH COUNTIES

MARCH 2021 SHEET: 4 OF 13

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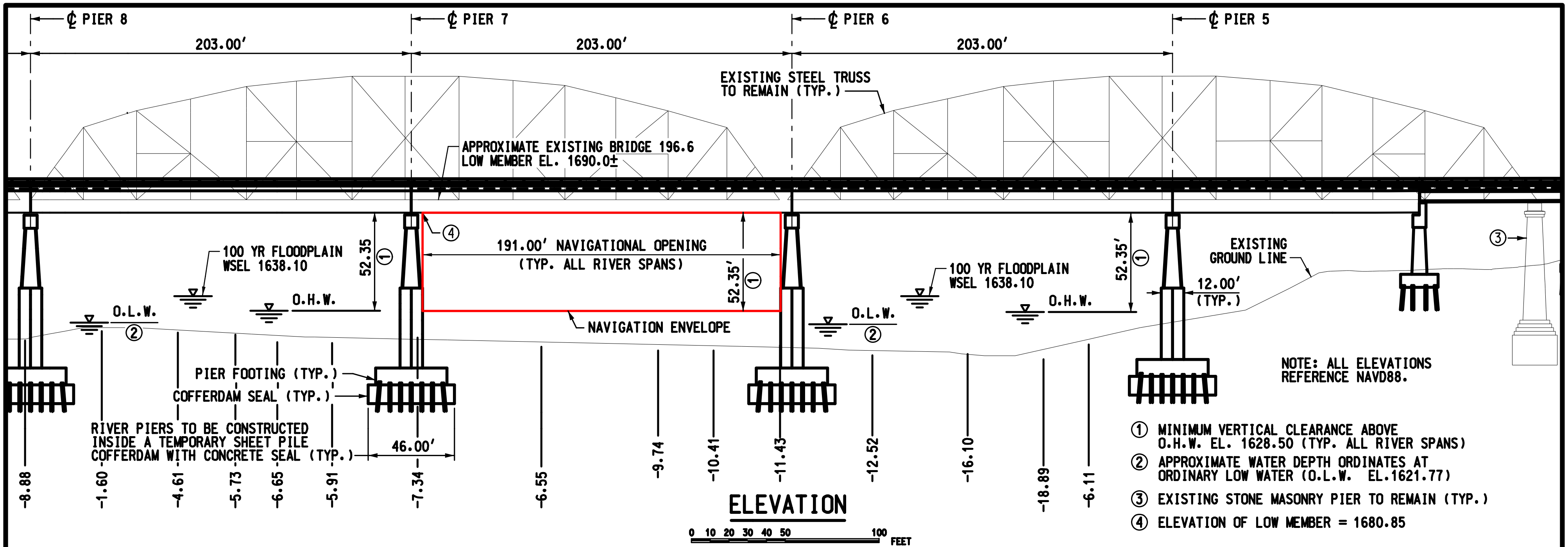
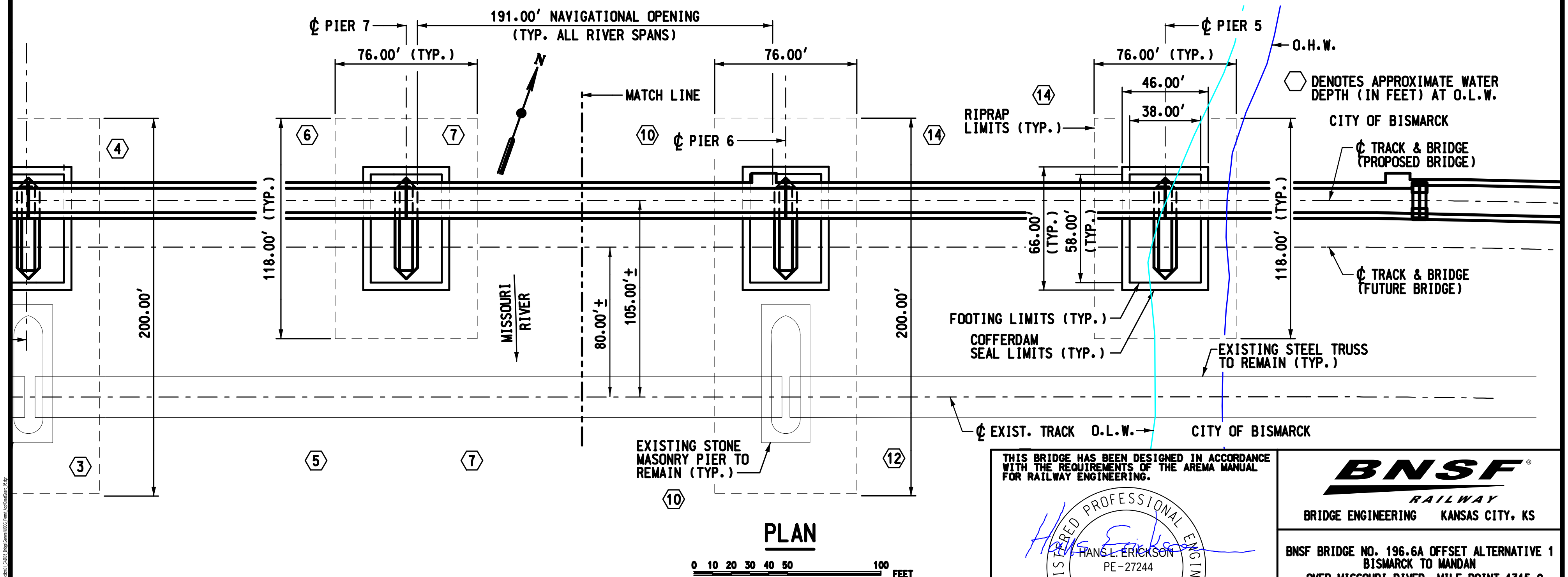
ELEVATION



PLAN



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BRIDGE ENGINEERING KANSAS CITY, KS

BNSF BRIDGE NO. 196.6A OFFSET ALTERNATIVE 1
BISMARCK TO MANDAN
OVER MISSOURI RIVER, MILE POINT 1315.0
NEAR BISMARCK, ND

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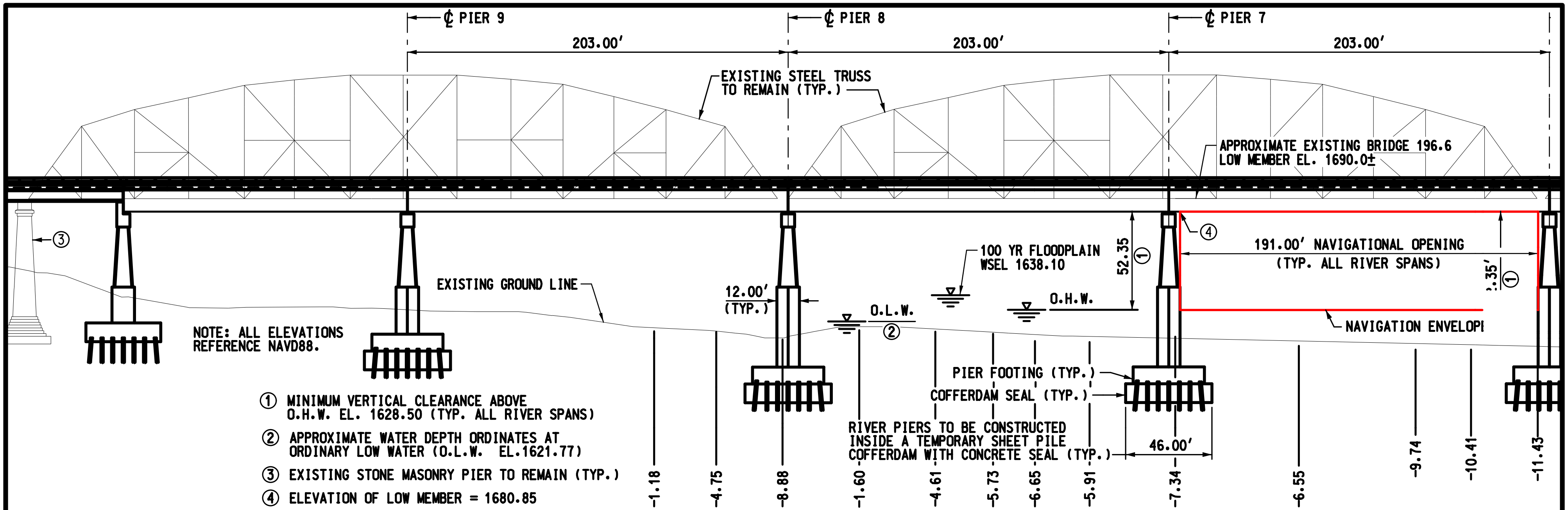

ELEVATION

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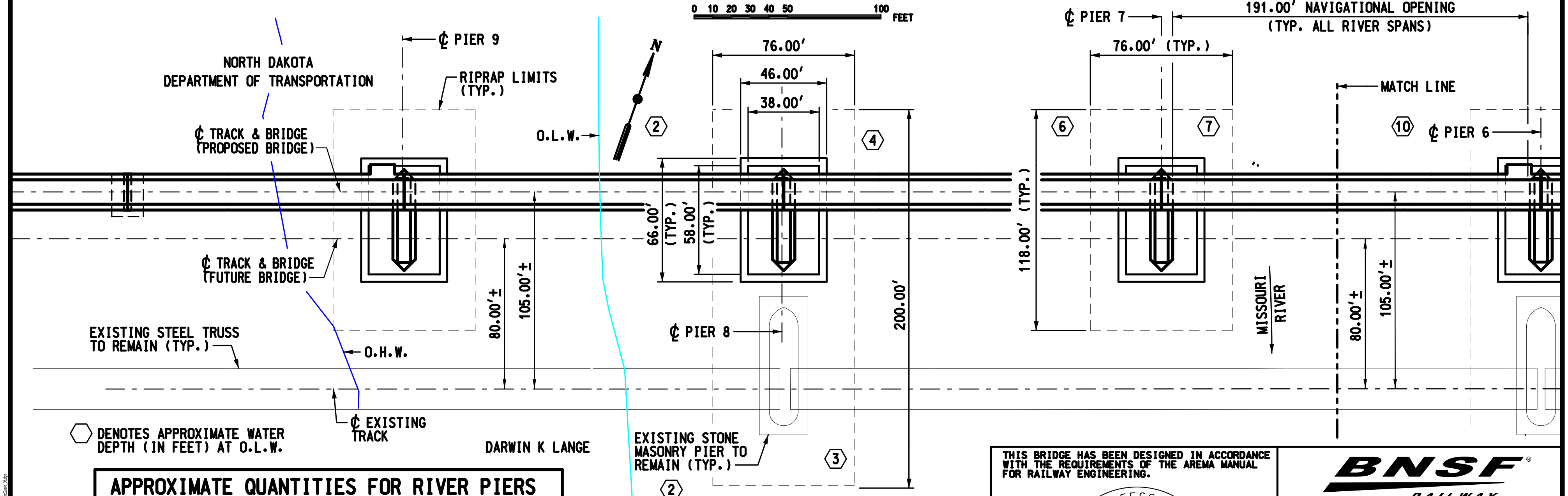

⬡ DENOTES APPROXIMATE WATER DEPTH (IN FEET) AT O.L.W.

PLAN

0 10 20 30 40 50 100 FEET

APPROXIMATE QUANTITIES FOR RIVER PIERS

		PIER 5	PIER 6	PIER 7	PIER 8
EXCAVATION	CU.YD.	5,470	5,430	4,970	6,180
BACKFILL	CU.YD.	3,180	3,340	2,780	3,960

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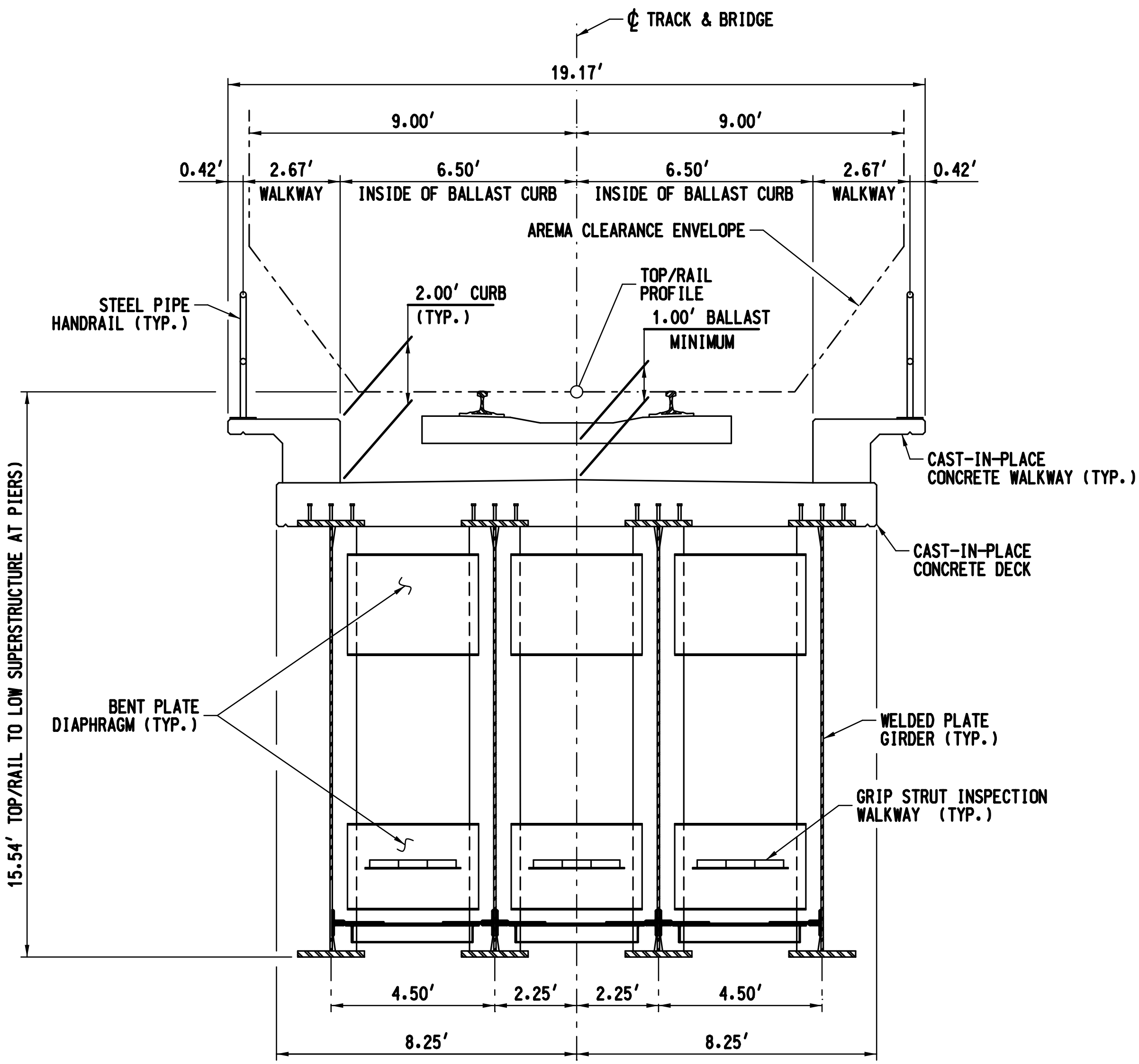

TYPICAL SECTION
200′ WELDED PLATE GIRDER SPANS

0 1 2 3 4 5 10 FEET

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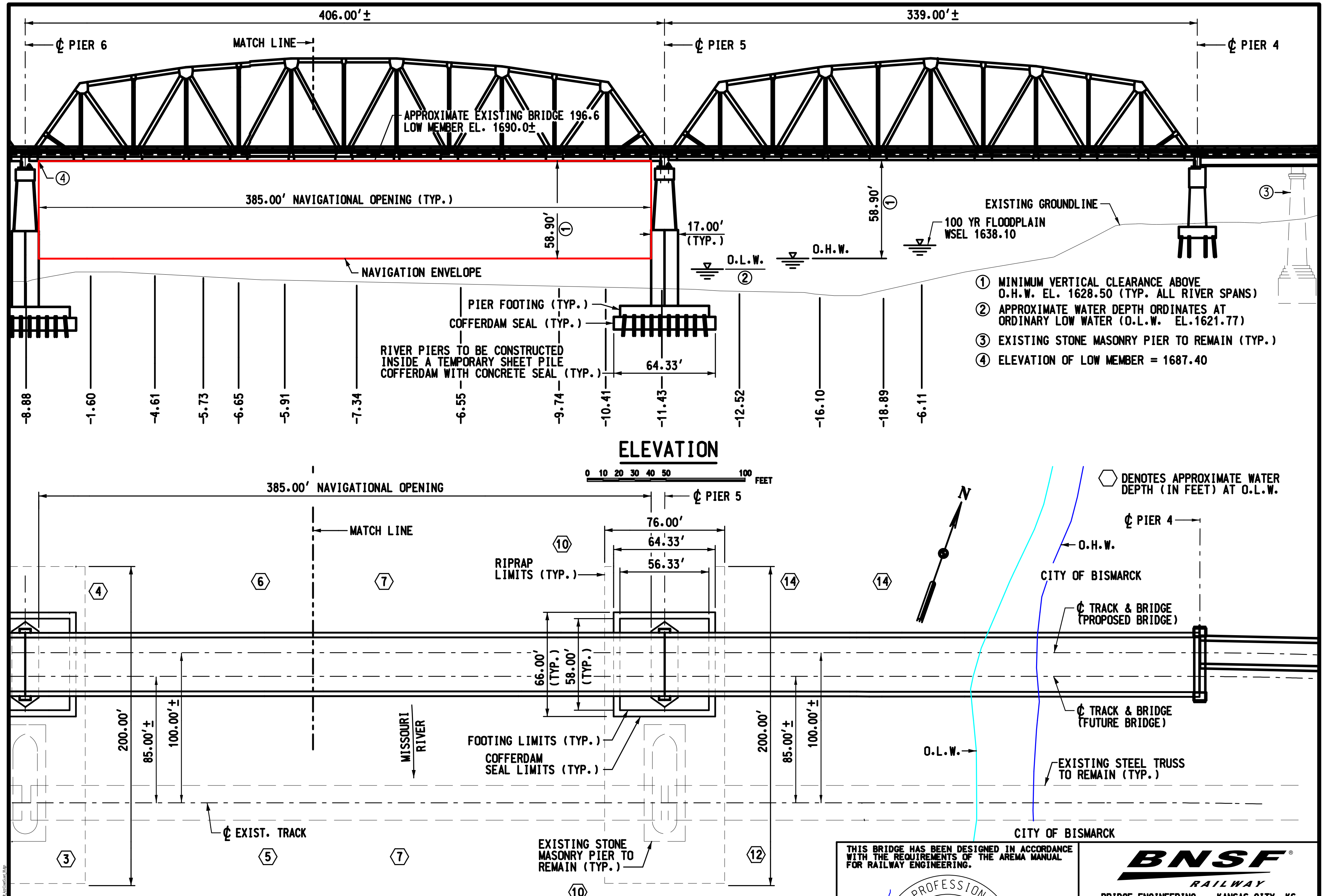

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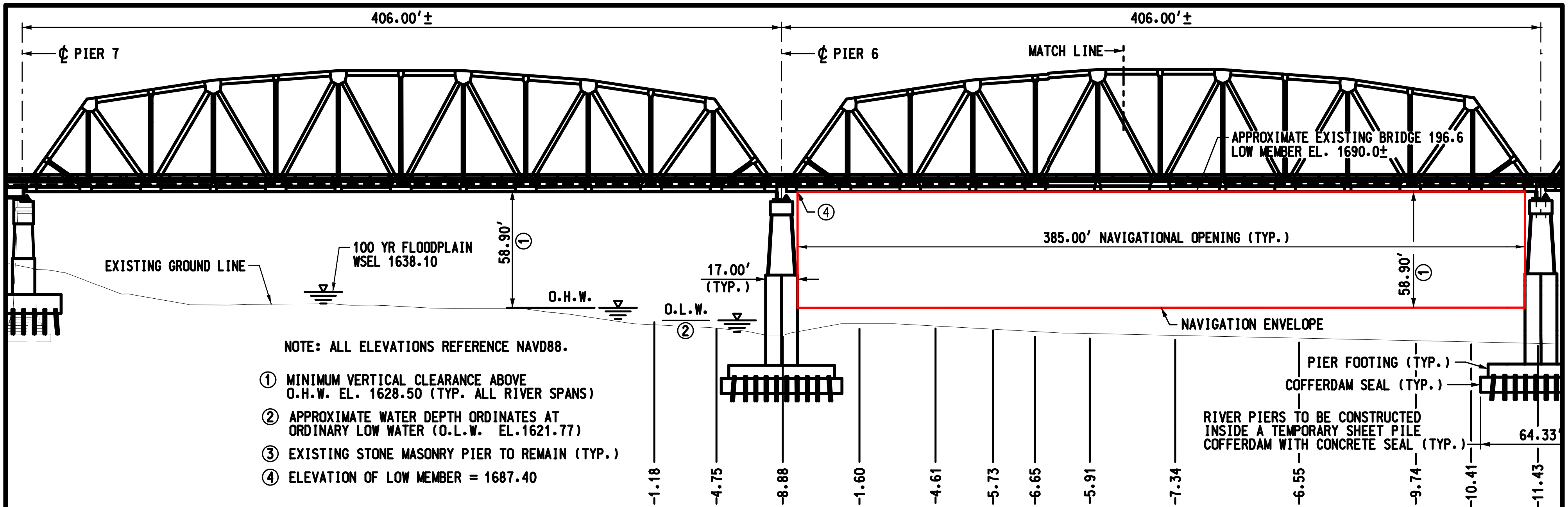

ELEVATION

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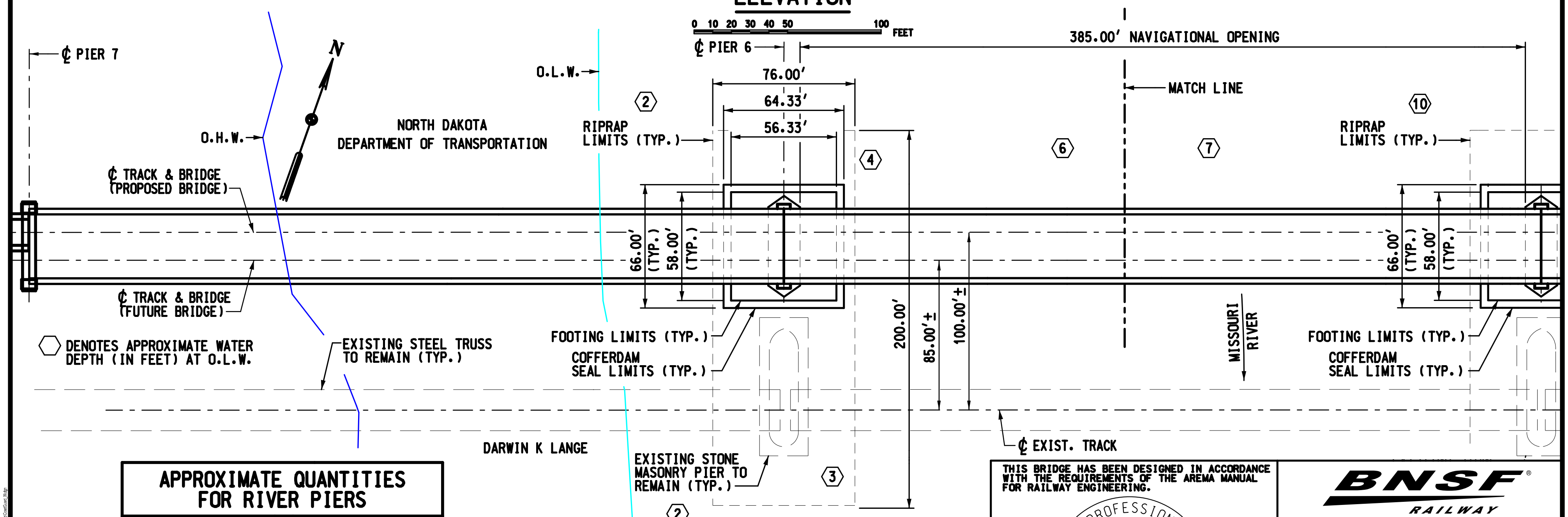

PLAN

0 10 20 30 40 50 100 FEET

APPROXIMATE QUANTITIES FOR RIVER PIERS

		PIER 5	PIER 6
EXCAVATION	CU.YD.	5,900	7,060
BACKFILL	CU.YD.	3,470	4,470

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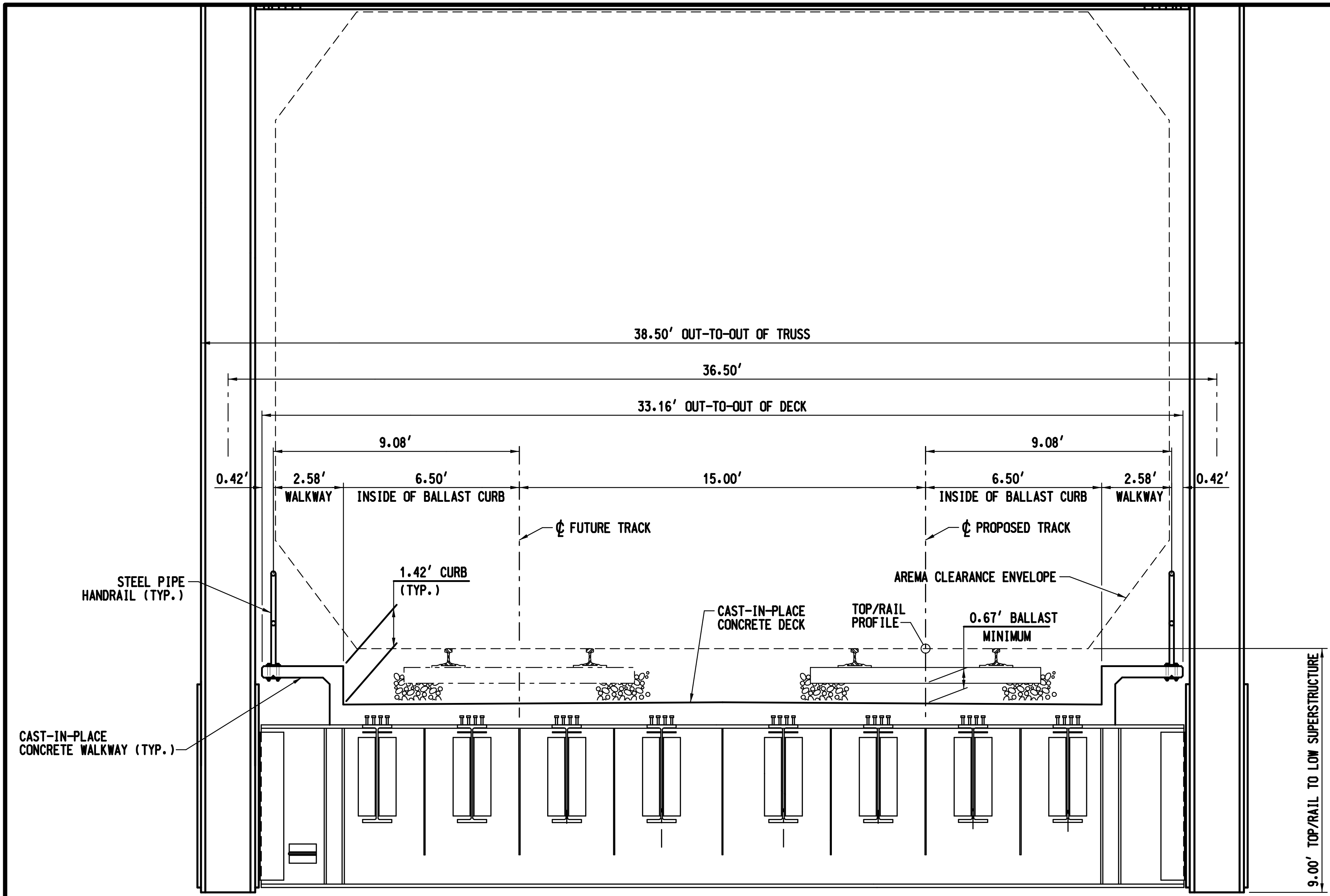

TYPICAL SECTION
400' THROUGH TRUSS SPANS

0 1 2 3 4 5 10 FFFT

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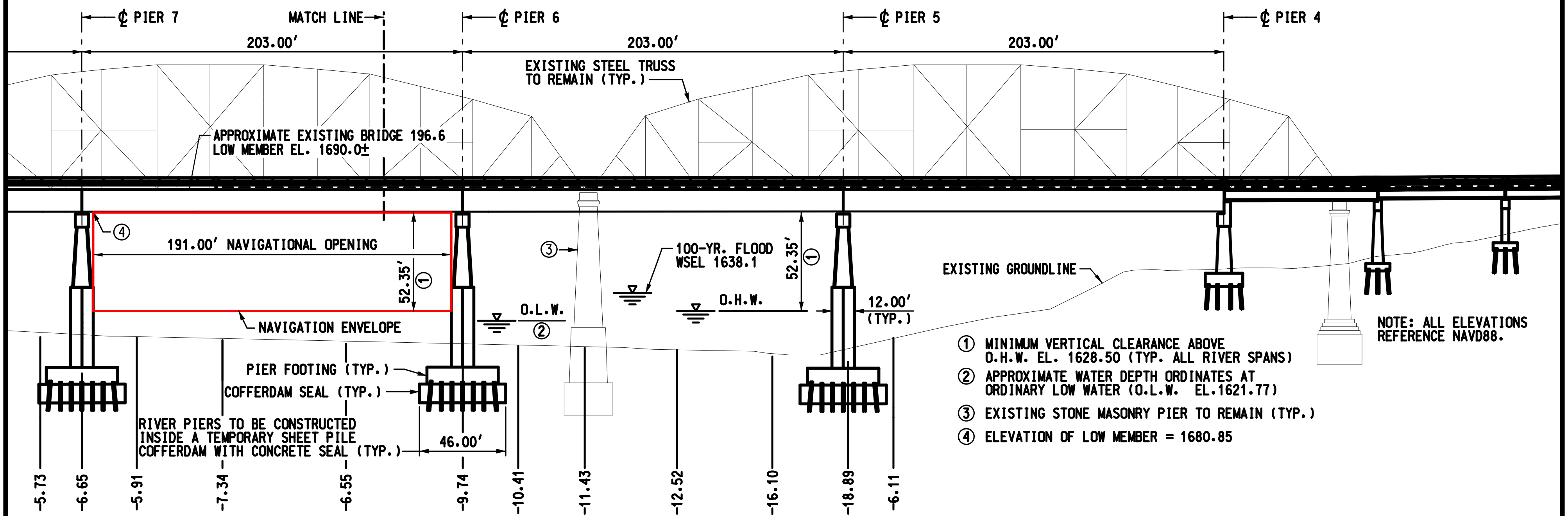

ELEVATION

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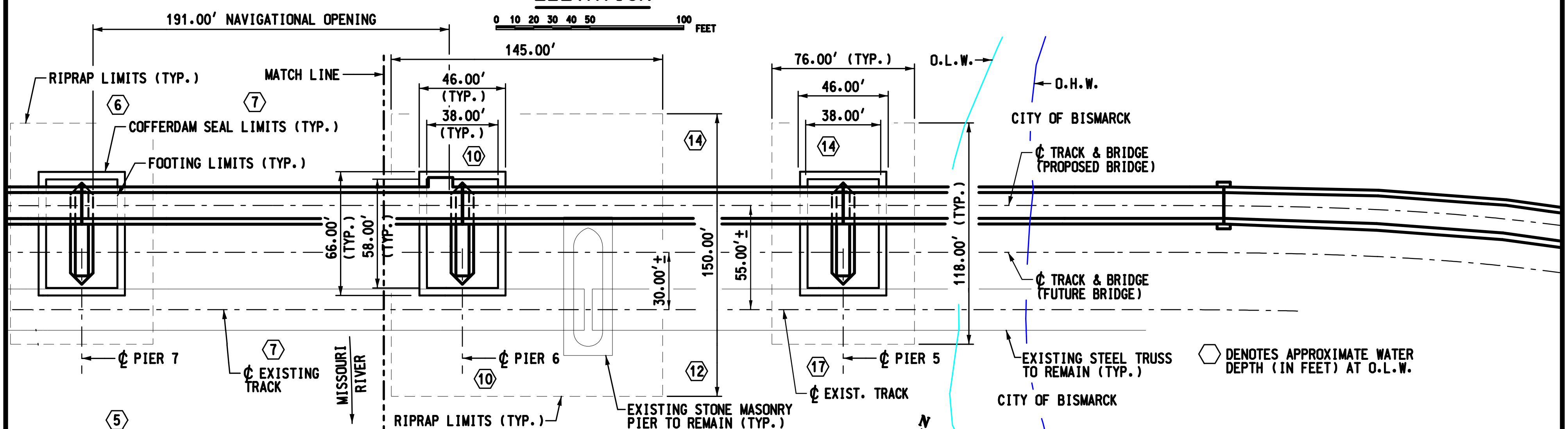

PLAN

0 10 20 30 40 50 100 FEET

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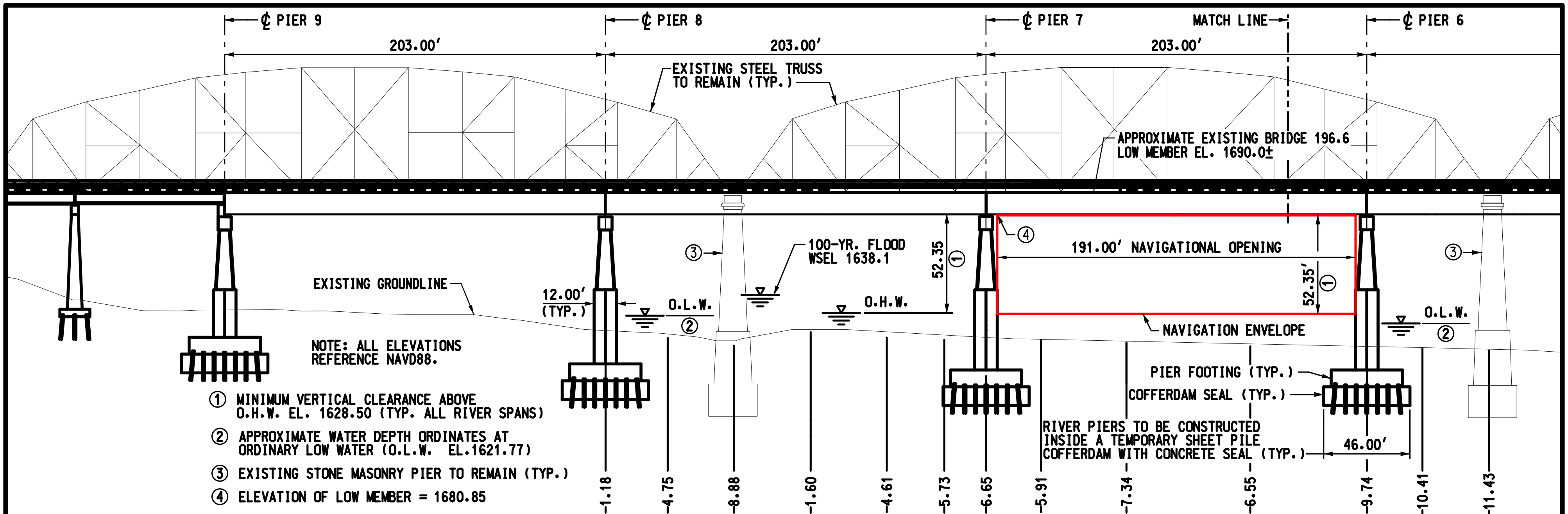

ELEVATION

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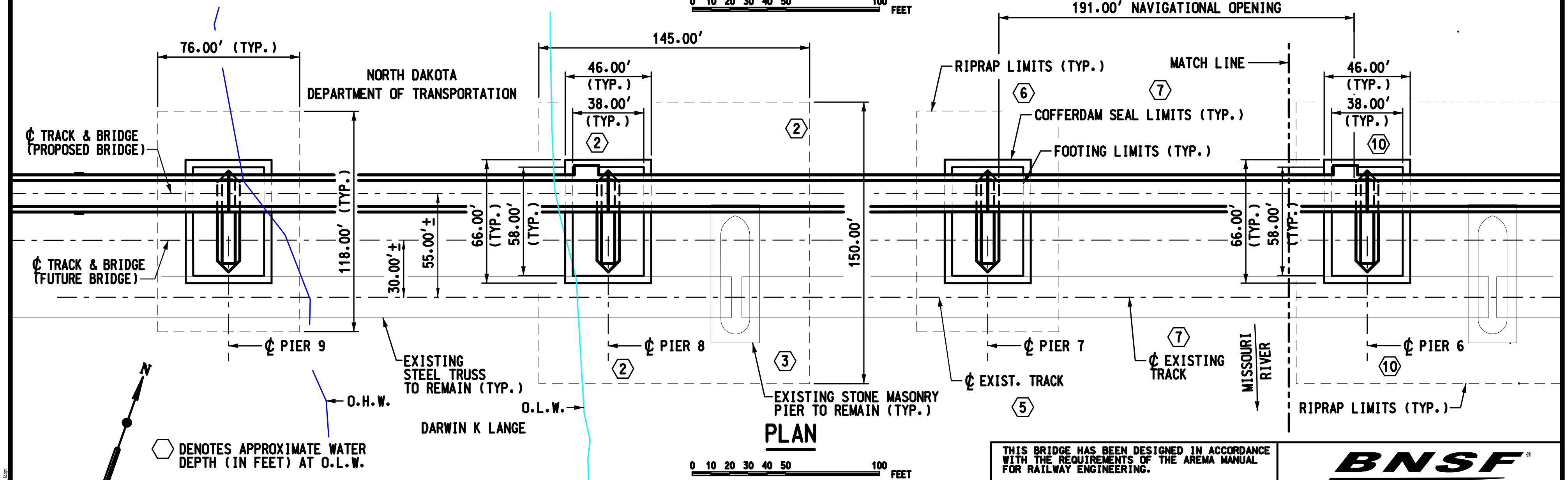

PLAN

0 10 20 30 40 50 100 FEET

APPROXIMATE QUANTITIES FOR RIVER PIERS

		PIER 5	PIER 6	PIER 7	PIER 8
EXCAVATION	CU.YD.	4,370	6,640	5,190	7,360
BACKFILL	CU.YD.	2,300	4,550	2,970	5,160

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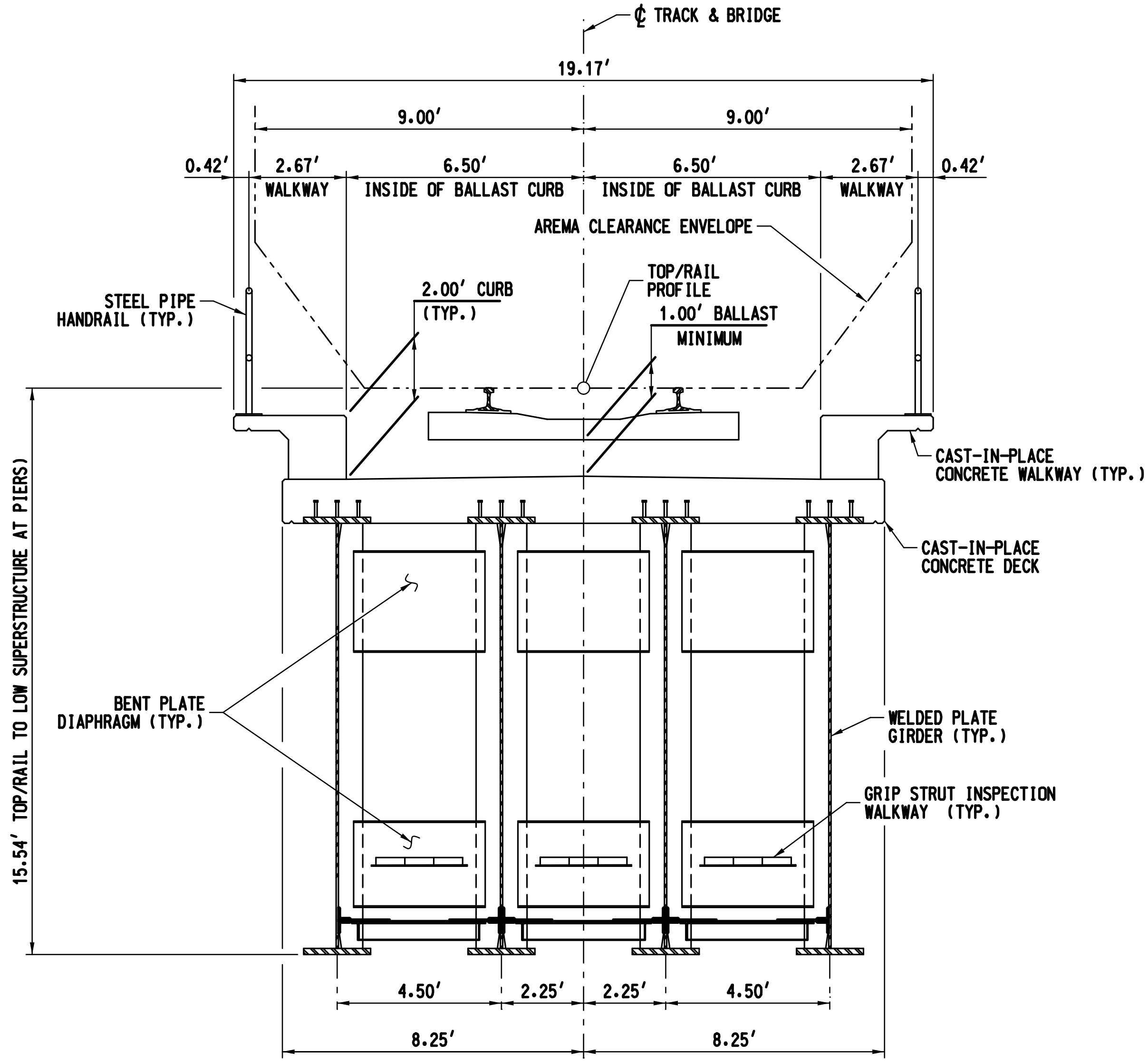

TYPICAL SECTION
200' WELDED PLATE GIRDER SPANS

0 1 2 3 4 5 10 FEET

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Appendix D

0038-196.6 – East Approach Retaining Wall Evaluation

TKDA

Memorandum

To:		Project Reference:	0038-196.6 – East Approach Retaining Wall Evaluation
Copies To:		TKDA Project No.:	15955.001
From:	Hans Erickson, PE, SE	Client No.:	BNSF Railway
Date:	October 15, 2020		

The discussion provided below documents the concept level investigations completed to date regarding the use of retaining walls to reduce construction limits within the east approach of the proposed new BNSF Railway crossing of the Missouri River in Bismarck, North Dakota.

Background, Motivation, and Intent

BNSF Railway is planning to construct a new railroad bridge across the Missouri River in Bismarck, North Dakota to ensure continued service to North Dakota's agricultural producers, coal and crude oil industries, and other customers. Upon completion of the new structure, the preferred plan includes complete removal of the in-place bridge. However, alternative project configurations have been considered for development of the Project's environmental document that include keeping the truss spans in-place. These configurations require realignment of the track geometry to locations further north than considered for the preferred plan. Two configurations are considered, one with the centerline of a double track section offset 42.5' north of the existing alignment, and a second with the centerline of a double track section offset 92.5' north the existing alignments, as shown in Figure 1.

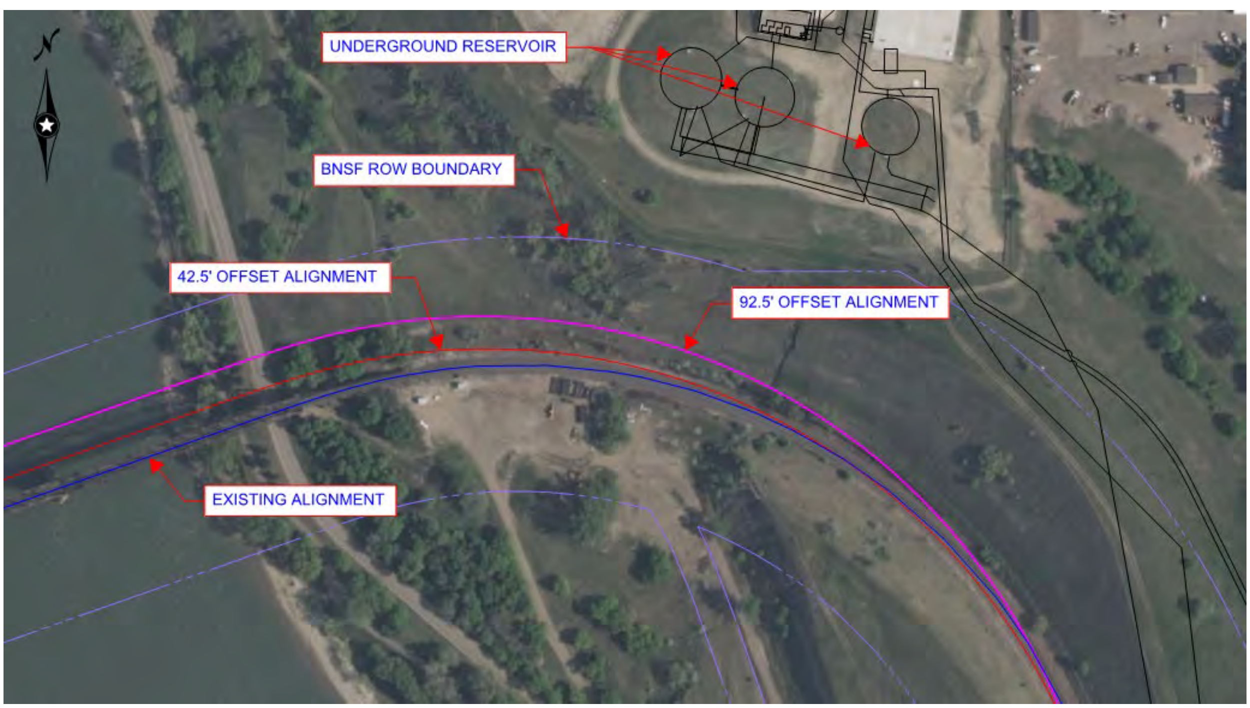

Figure 1 – East Approach Alignment Alternative Configurations

The preferred plan was developed to minimize the overall grading requirements at the east approach and avoid impacting the City of Bismarck's underground water reservoirs located adjacent to the project site. For the alternative configurations however, pushing the track alignments further north extends the project limits beyond BNSF's current Right-of-Way (ROW) and on to the City's property. To understand the impacts of these limits, conversations with City officials were held to determine possible resource conflicts and implications. During these conversations, the use of retaining walls to limit the overall project footprint were suggested as an approach to mitigate potential conflicts. To this end, the following concept level study was conducted to evaluate the feasibility of constructing retaining walls within this region of the project to reduce impacts on the underground reservoir facility.

Evaluation Scope

The study considers two possible wall locations for each alternative configuration, one wall location positioned near the toe, or bottom, of the existing embankment, and a second located near the top, or crest, of the embankment, as shown in Figure 2.

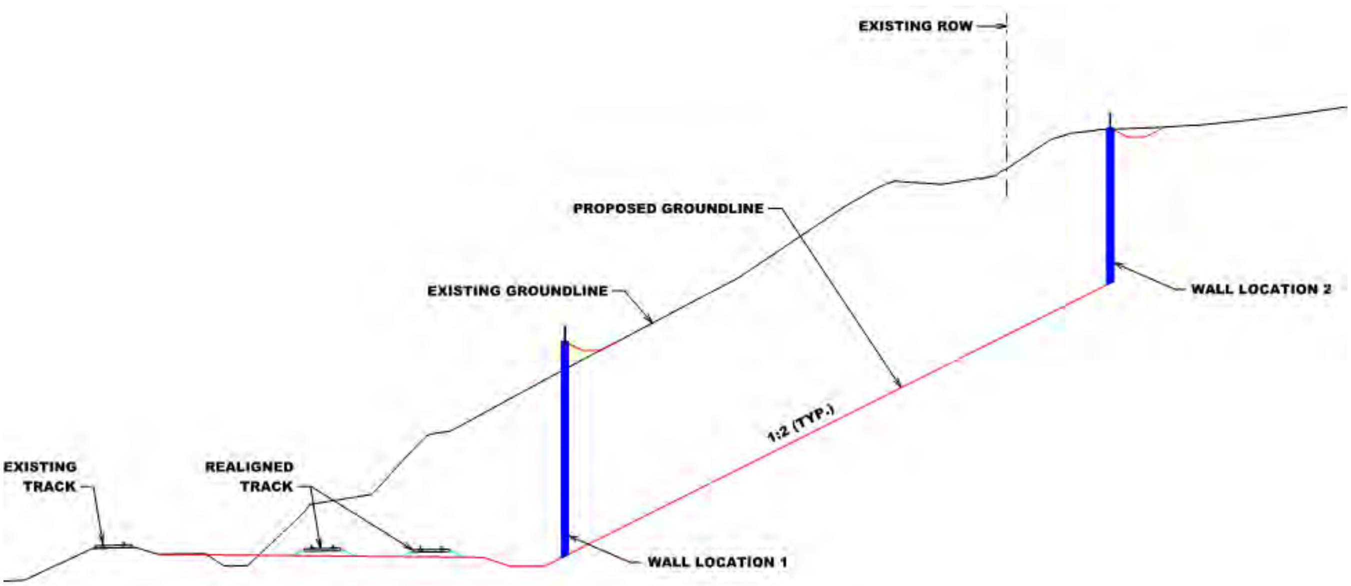

Figure 2 – Wall Locations

The lower wall, Location 1, is positioned 30 feet from the nearest track. The 30 foot dimension was selected to provide room a drainage ditch between the wall and tracks and to provide sufficient clearance such that supplemental crash protection structures are not required. The upper wall, Location 2, is positioned near the crest of the existing embankment to improve the constructability of the wall and to limit the exposed wall height. Regardless of location, both walls incorporate drainage features to direct runoff and prevent storm water from spilling over the top of the wall, and fencing elements for safety.

For each alternative configuration and wall location, the basic wall geometry is determined to establish the required wall length and exposed height. Wall length and height determinations must consider surface drainage patters such that positive drainage is maintained throughout the site. The wall length and maximum exposed height data for each wall location are summarized in Table 1.

Table 1 – Wall Geometric Requirements

Alignment Offset (ft)	Wall Location	Wall Length (ft)	Maximum Height (ft)
42.5	1	1200	23.3
	2	750	22.9
92.5	1	1250	48.6
	2	875	48.7

Using this basic geometry, a number of wall systems are evaluated for the site. To be feasible, each system must be constructed in a "top down" fashion. As such, wall types such as Mechanically Stabilized Earth (MSE) and Cast-In-Place Concrete (CIP) gravity walls are not included. For evaluation, the following wall types are considered:

- Soil Nail
- Soldier Pile with Lagging
- Driven Sheet Pile
- Secant Wall

For each wall type, a risk based evaluation is completed to assess the system's capabilities to satisfy the geometric and project site requirements. For evaluation, impacts to the following project and site features are considered for each wall type and location:

- ROW requirements
- Utility conflicts
- Constructability requirements
- Grading and excavation requirements
- Drainage impacts
- Impacts to railroad operations
- Impacts to existing geologic features
- Susceptibility to unforeseen events
- Anticipated construction cost

The impacts of each evaluation metric are summarized in Tabular format and the configurations that best satisfy the project requirements are identified and progressed to preliminary concept design.

The preliminary concept design was completed to establish feasibility from a design perspective and develop preliminary construction costs. The preliminary concept design uses geotechnical data collected at the site and is completed in accordance with the American Railway Engineering and Maintenance-of-Way Association (AREMA) Guidelines to satisfy the Project's design criteria.

Site Details

Existing Slope Conditions and Topography

The eastern approach slope is moderately vegetated with grass, shrubs and small trees. Based on review of the 1951 track realignment design documents, we understand that the northern, east approach slope was designed to be sloped at 1.75H:1V. Several erosional features and shallow sloughing have been noted on the slope face. Based on the existing topographic information, the northern, eastern approach slope currently is about 100 feet in height and is sloped at about 1.5 to 1.7H:1V from the track at EL 1695 to about EL 1795, and a slope of 5H:1V above EL1795.

Based on review of the topographic information north of the slope, it appears that the surface drainage from north of the slope, generally flows south toward the slope crest. To help control the surface flow, it appears that a drainage ditch has been constructed at the crest of the slope, which generally flows to the northeast and down the slope north of the bridge.

Existing Geologic Conditions and Hazards

Geologic Conditions

The eastern approach is located in an area where a thin mantle of windblown loess/sand overlies the Cannonball Formation. The Cannonball Formation contains interbedded layers of marine clays, silts, sand, sandstone, siltstone, mudstone and lignite and extends to a depth of approximately 300 feet in this area. The general geologic conditions are shown in Figure 3.

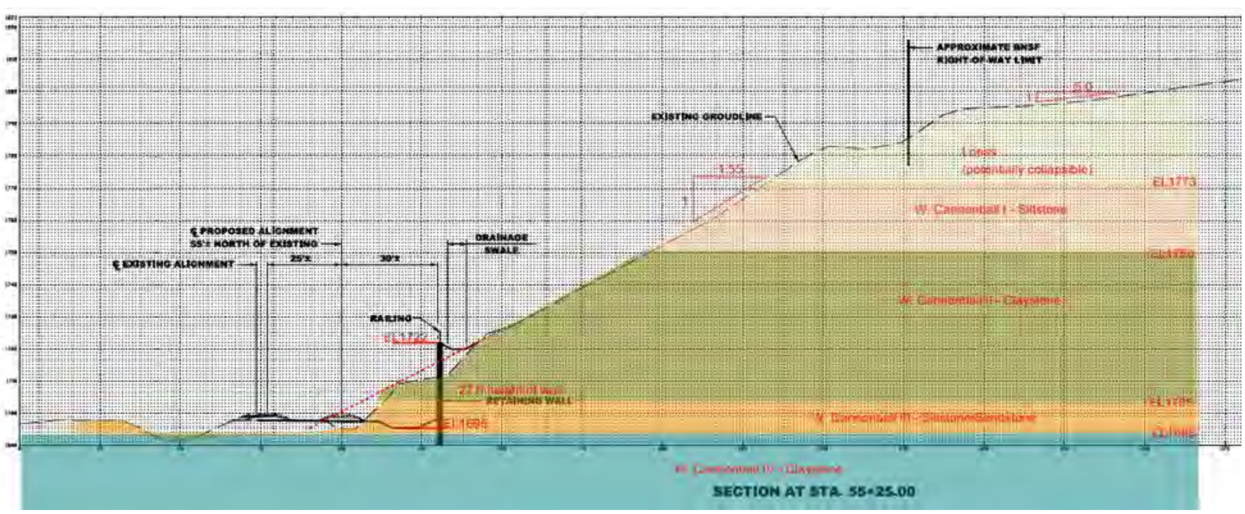

Figure 3 – Generalized Geologic Conditions

Existing Landslide

Of note, a portion of the slope closest to the Missouri River has been mapped as a slope failure area and has been previously investigated by Peck in 1951. The estimated location of the landslide fault is shown in Figure 4 and subsequent wall layout Exhibits. These slides typically are part of large complex landslides that are several hundred years old. We understand that movement of the east bridge abutment has occurred in the past and that this movement may have been a result of landslide movement. Typically, these slide areas become more active during wet periods that follow a prolonged dry period. The slide area and eastern approach slopes were regraded in 1951 to its current configuration in an attempt to limit future landslide movement. Based on the geologic mapping, previous studies and BNSF comments about previous eastern abutment movement, the potential for future landslide movement at the wall location is a potential geotechnical design risk.

Figure 4 – Existing Landslide Fault Location

Erosion Features

Several erosion features including sinkholes, erosional sloughs and erosional channels have developed within the existing eastern slope, as shown in Figure 5. The sinkhole features have developed near the crest of the slope within collapsible loess materials. Field surveys indicate the potential for collapsible materials extend from the crest of the slope at the western end in an east-south easterly direction and appear to continue to about EL 1773. The potential collapse of these materials is a potential geotechnical design risk for the upper wall configuration.

Large Sink Hole on Crest

Erosional Features Along Slope

Figure 5 – Existing Erosion Features

Several other surface anomalies have also been identified along the slope, these anomalies appear to be shallow sloughs within the Cannonball formation where weaker layers have been exposed in the cut. In addition, a surface water erosional feature has developed within the slope in the vicinity of the previously constructed drainage chute. The sloughing and surface erosion are considered minor geotechnical risk for the wall construction.

Wall Geometry

Wall Location 1 (Lower Wall)

Concept wall layouts for the 42.5' and 92.5' offset track alignments are shown in the following exhibits. For development, the wall alignment was set 30 feet from the centerline of adjacent considered track.

Each exhibit contains two sheets. First a plan view showing the beginning and ending points of the wall, the location of the wall relative to the considered track alignment, the in-place utilities, salient geologic features, anticipated construction limits, and the ROW limits. Second, a typical cross-section showing the in-place and considered track alignments, the wall location and approximate maximum wall height, in-place and proposed ground lines, ROW limit, drainage features, and safety features. For reference, individual track alignments are referenced with the relative offset from the in-place track.

Wall Location 2 (Upper Wall)

Concept wall layouts were also developed using the 42.5' and 92.5' offset track alignments for Wall Location 2 and are shown in the following exhibits. Similar to Wall 1, each exhibit contains two sheets. First a plan view showing the beginning and ending points of the wall, the location of the wall relative to the considered track alignment, the in-place utilities, salient geologic features, anticipated construction limits and the ROW limits. Second, a typical cross-section showing the in-place and considered track alignments, the wall location and approximate maximum wall height, in-place and proposed ground lines, ROW limit, drainage features, and safety features.

For Wall Location 2, determination of the wall alignment is not as straightforward as Wall Location 1. When positioned near the crest of the embankment, the wall's interaction with in-place utilities and ROW limits has ramifications on the corresponding required surface drainage and wall height requirements. To explore these interactions, three variants of wall alignment were considered in the vicinity of the underground reservoir. The variants are named Option 1, Option 2, and Option 3 and are depicted in Figure 6.

The underlying logic behind development of Option 1 is to normalize all of the competing variables directing the alignment. For example, constructing on this alignment requires a limited ROW take, moderate grading behind the wall to promote drainage, limited interaction with underground utilities, and a moderate wall height along its entire length. For comparison, the Option 2 alignment was developed to in an attempt to minimize the retaining wall's height with the intention of reducing overall construction cost. When constructed at this location; however, the overall ROW take increases as well as the impacts to underground utilities and surface grading required to promote drainage. Conversely, the Option 3 alignment was developed with the intention of maintaining permanent construction features entirely within existing ROW. When constructed at this location, the overall wall height and corresponding construction costs increase. Therefore, recognizing the intent of Option 1 to mitigate impacts from all contributing factors, the Option 1 variant was progressed through the evaluation exercise.

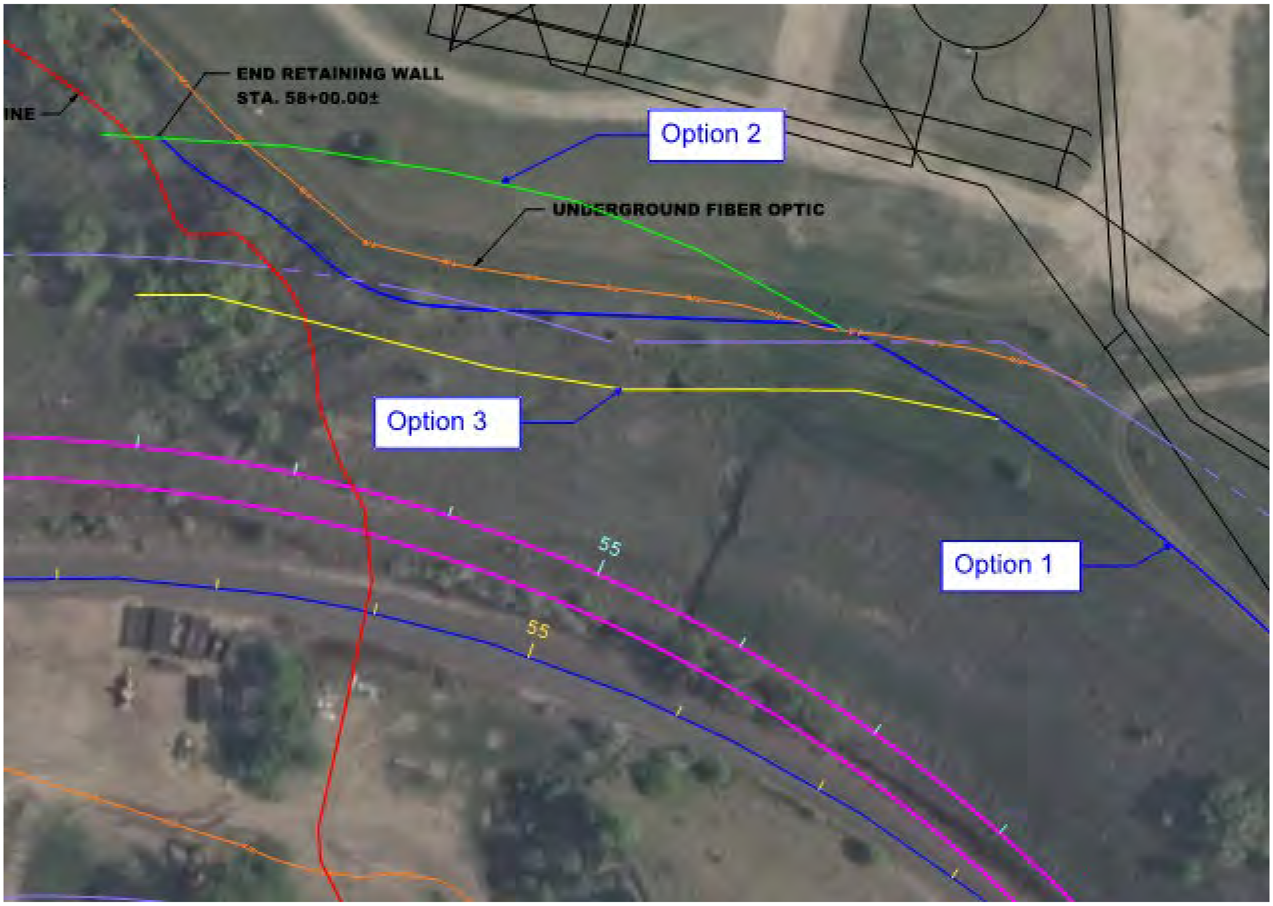

Figure 6 – Wall Location 2 Alignment Variants

Wall System and Location Feasibility Evaluation

Wall Types

Four wall types were identified for consideration in their ability to support the slope for the proposed slope excavations required to develop the offset track alignment. Our wall options focused on top down construction walls that would reduce excavations required for construction. These wall types are described below and include:

- Soil Nail
- Soldier Pile with Lagging
- Driven Sheet Pile
- Secant Wall

Soil Nail

Soil nailing uses grouted, tension-resisting structural elements (i.e., nails) to reinforce in situ soils and create a gravity retaining wall. Soil nail walls are generally constructed from the top down, in which soil is excavated in stages of 3 to 5 feet in depth. After each excavation stage, near-horizontal holes are drilled into the exposed excavation face at typical spacings of 3 to 6 feet. Tension-resisting steel bars (i.e., nails) are inserted into the holes and grouted in place. A drainage system is installed on the exposed excavation face and bearing plates attached to the nail heads, followed by the application of reinforced shotcrete wall facing. This installation process is repeated until the design wall depth is reached.

Soldier Pile with Lagging

A soldier pile wall use H-piles driven or drilled and grouted into the embankment at regular intervals, typically about 6 to 12 feet. Excavating in small stages (i.e., top down construction) about 3 to 5 feet and installing lagging between each pile to support the soil between the gaps in the piles. The lagging transfers the load to the soldier piles and is typically comprised of wood or precast concrete elements. This installation process is repeated until the design wall depth is reached. For taller walls, the soldier piles can be tied back using soil or rock anchors to develop additional lateral capacity. Tie backs are a structural tension element that develops its capacity from embedment into the rock or soil.

Driven Sheet Pile

Sheet piles are sections of steel sheet materials with interlocking edges that are driven into the ground to provide earth retention and excavation support. The full sheet pile wall is formed by connecting the joints of adjacent sheet pile sections in sequential installation. Sheet pile walls provide structural resistance by utilizing the structural capacity of the section. Typically, cantilever sheet pile walls will need to be embedded about 1 to 2 times the retained height. For taller walls, tie backs can be installed similar to the solider pile and lagging system.

Secant Wall

A secant wall is a retaining wall constructed for ground retention prior to excavation. The wall is formed by constructing alternating primary (female) unreinforced piles and secondary (male) reinforced piles where the secondary piles partially cut into either side of the primary piles in order to form a continuous structure. Piles are typically 1 to 4 feet in diameter, spaced at 3 to 4 feet, overlapped about 3 to 8 inches and are comprised of auger cast piles or drilled shafts.

Evaluation of Wall Systems

The wall types were preliminary reviewed on the basis of constructability and costs. The constructability criteria includes the overall wall construction requirements (i.e., ease of installation, excavations, equipment requirements) as well as the degree of establishment for the wall type. Thus, the wall ranking was determined by combining the cost and constructability, i.e., Ranking = Cost x Constructability. The lower the wall ranking the more efficient the wall systems. The wall ranking results are presented in Table 2. Based on the results, the driven sheet pile and secant wall systems were eliminated from consideration and the soil nail and soldier pile lagging systems were progressed for preliminary evaluation.

Table 2 – Wall Type Ranking

Wall Type	Constructability	Cost	Ranking
Soil Nail	2	2	4
Soldier Pile and Lagging	2	1	2
Driven Sheet Piles	5	1	5
Secant Wall	4	4	16

Ranking = Constructability*Cost

Ranking Criteria	Ranking Range
Cost	1- Low, 5-High
Constructability	1-Easy, 5-Difficult

Evaluation of Wall Locations

Concept wall alignments were developed to be compatible with the 42.5' and 92.5' offset track alignments and the two wall locations. Thus, a total of four wall scenarios were evaluated for feasibility.

The wall alignments were evaluated with respect to potential risks and impacts to the overall project cost and compiled in a "Risk Register" to depict the risk ranking associated with various site and geological conditions as related to the proposed wall construction. The purpose of the register is to provide an assessment of the risk to the project cost posed by common issues. This ranking can be refined through final design but provides a means of managing risks and determining suitability of alternatives. The identification of risk and inclusion on the register does not mean the problem actually exists, since existing data may suggest it has a very low probability where mitigation would not be required for the project to progress. Thus, the computed risk is not the risk the impact will occur, it is the risk that mitigation will be required to enable the project to progress.

The risk ranking (R) will be a function of the probability (P) of the hazard occurring and the impact (I) that the hazard and/or associated mitigation will cause. Thus, the risk ranking (R) can be determined by combining the probability (P) with the potential impact (I) of hazard mitigation (i.e., R = P x I). The risk ranking scale against which the probability and impact are measured is summarized in Table 3. The larger the cumulative ranking value the greater the potential risks and impacts are to the project.

Table 3 – Risk Ranking Scale

Probability (P)		Impact				
		1 – Very Low	2 – Low	3 – Medium	4 – High	5 – Very High
	5 – Very Likely	5	10	15	20	25
	4 – Likely	4	8	12	16	20
	3 – Probable	3	6	9	12	15
	2 – Unlikely	2	4	6	8	10
	1 - Negligible	1	2	3	4	5

Increasing Risk Ranking (S)

Using this methodology, each of the wall alignments has been evaluated according to the following metrics:

- ROW Requirements
- Utility Conflicts
- Constructability Requirements
- Grading/Excavation Requirements
- Existing Drainage Impacts
- Impacts to Railroad Operations
- Existing Landslide Fault Remediation
- Erosion Feature Remediation
- Susceptibility to Unforeseen Events

A discussion of each metric is presented below:

Right-of-Way Requirements

For Wall Location 1, the permanent construction footprint will be contained entirely within the existing ROW. For the wall types considered, temporary impacts for construction access will also be contained within ROW. As such the probability value is set to 1. Should this change during the course of further project development, the ROW acquisition process would have a significant impact to the project schedule and, perhaps, the project budget. Consequently, the impact value is set to 5.

For Wall Location 2, the permanent construction footprint will extend outside of existing ROW and is therefore considered inferior compared to Wall Location 1 configurations. Both the probability and impact values are set to 5

Utility Conflicts

Recognizing the underground utilities are all located near or outside of the existing ROW boundary, conflicts are not anticipated for the Wall Location 1 configurations and the probability value set to 1. Similar to the ROW requirement, a utility conflict identified during further project development could have significant implications. Therefore, the impact value is set to 5.

Wall Location 2 configurations engage an underground fiber optic line that would need to be relocated prior to construction. In addition, tie-back systems associated with the soil nail, and soldier pile wall systems may also engage underground infrastructure associated with the reservoir structure, as shown in Figure 7. Accordingly, probability and impact values are both set to 5.

Figure 7 – Wall Location 2 Utility Conflicts

Constructability Requirements

Both soldier pile and soil nail wall types will require the installation of a temporary embankment to establish a working bench for construction. For evaluation, a platform width of 25 feet is considered as the minimum required to complete construction. The platform is positioned in front of the wall alignment to facilitate installation of tie-backs and vertical wall components, where used. Recognizing temporary works are required for all configurations, the probability value is set to 5 for both wall locations.

Impact values for constructability are proportional to the magnitude of temporary embankment required to facilitate construction. On the low end, a value of 2 is allocated for the 42.5 foot offset, Wall Location 1 configuration. On the high end, a value of 4 is assigned for the 92.5 foot offset, Wall Location 2 configuration.

Regardless of configuration considered, construction of the temporary embankment creates a number of project impacts that are not desirable. For example, ditch flow through the railroad corridor is interrupted and requires installation of a temporary culvert to mitigate. Similarly, storm water runoff down the temporary embankment terminates directly on the existing track section and may cause erosion and track degradation. For the Wall Location 1, 42.5 foot offset configuration, embankment fill limits compromise the existing track section, so additional temporary wall features would be necessary to facilitate construction. Finally, the additional embankment fill creates additional loading on the driving side of the landslide fault that may induce slope movements and damage existing bridge elements.

Grading and Excavation Requirements

Both soldier pile and soil nail wall types will require site grading for development of surface drainage features and excavations to generate the wall configurations. The probability value is set to 4 accordingly.

In a similar fashion to the constructability requirements, impact values are proportional to the magnitude of excavation required to facilitate construction. On the low end, a value of 1 is allocated for the 42.5 foot offset, Wall Location 1 configuration. On the high end, a value of 4 is assigned for the 92.5 foot offset, Wall Location 2 configuration.

Existing Drainage Impacts

Existing site drainage is accommodated by two ditch features, one located adjacent to the in-place track alignment and the other located at the crest of the embankment. All configurations will temporarily interrupt the railroad ditch; however, the Wall Location 2 configurations will also require modification to the ditch features at the wall crest. As such, a probability value of 5 is assigned for configurations using walls at this location.

Impacts to drainage elements are assigned a value of 3 for all configurations considered as site drainage must be mitigated to avoid embankment erosion and track degradation. In addition, construction at Wall Location 1 places the earth retaining structure immediately adjacent to a drainage feature. Additional scour protection measures will be necessary within the ditch feature to minimize the probability the wall system may be compromised due to ditch erosion.

Impacts to Rail Operations

Construction for Wall Location 1 requires construction activities adjacent to the active rail corridor. As such, configurations incorporating this wall location are assigned a probability value of 4. Conversely, construction activities associated with Wall Location 2 are largely removed from the rail corridor. Thus, a probability value of 1 is used.

For all configurations, any impacts to rail operations for wall construction will have a significant impact to BNSF. As such, an impact value of 4 is assigned for all configurations considered.

Existing Landslide Fault Remediation

The wall limits associated with construction of Wall Location 1 and the 42.5 foot offset, Wall Location 2 configuration engage the known landslide fault location and a probability value of 5 for these configurations has been assigned accordingly. The wall limits associated with the 92.5 foot offset, Wall Location 2 configuration avoid the fault; however, construction activities will occur in the immediate vicinity of this feature and placement of temporary fills for construction will increase loads on the landslide's driving mechanism. Accordingly, a probability value of 3 has been assigned for this configuration based on the relative magnitude of fills and proximity of construction associated with each.

For all configurations, reactivation of the landslide will have a detrimental impact on the existing rail bridge, proposed future bridge, and perhaps the underground reservoir. Detrimental impacts could include unpredictable lateral translation of bridge foundations and slope failures that could alter the performance of underground utility infrastructure. As such, an impact value of 5 is assigned for all configurations considered.

Erosion Feature Remediation

The existing erosion features are located near the crest of the embankment and extend approximately a quarter of the way down the existing cut. As a result, construction for Wall Location 1 will not engage the soils, so a probability value of 1 is used. Conversely, the bulk of the material will be removed for construction at Wall Location 2, so a probability value of 4 is appropriate.

Inadequate mitigation of the slope erosion could have a detrimental impact on both the underground reservoir system and the rail operations. As such, an impact value of 4 is assigned for all configurations considered.

Susceptibility to Unforeseen Events

The proposed wall locations are positioned adjacent to an active railroad corridor on the outside of a curved alignment on a steep downward grade. The severity and implications of a derailment within this corridor are therefore considered a component of the wall evaluation analysis. Recognizing the infrequent nature of this occurrence a probability value of 1 is assigned for all configurations considered.

Conversely, the implications of a derailment could have severe impacts to both railroad operations and the reservoir infrastructure. The primary mitigation against this phenomena is the wall location relative to the track alignment. Accordingly, Wall Location 1 configurations are assigned an impact value of 5; whereas Wall Location 2 configurations use an impact value of 1.

A summary of the risk evaluation for the wall alignment evaluation is shown in Table 4.

Table 4 – Wall Alignment Risk Ranking Evaluation

	ROW Implications	Utility Implications	Constructability requirements	Grading/Excavation Requirements	Existing Drainage Impacts	Impacts to Rail Operations	Existing Landslide Fault Remediation	Erosional Feature Remediation	Susceptibility to Unforeseen Events	Overall Rank
	WALL 1 LOCATION - LOWER CONFIGURATION									
42.5 Offset										
Probability(P)	1	1	5	4	2	4	5	1	1	
Impact (I)	5	5	2	1	3	4	5	4	5	
Ranking (R)	5	5	10	4	6	16	25	4	5	**80**
92.5 Offset										
Probability (P)	1	1	5	4	2	4	5	1	1	
Impact (I)	5	5	3	3	3	4	5	4	5	
Ranking (R)	5	5	15	12	6	16	25	4	5	**93**
	WALL 2 LOCATION - UPPER CONFIGURATION									
42.5 Offset										
Probability (P)	5	5	5	4	5	1	5	4	1	
Impact (I)	5	5	3	2	3	4	5	4	1	
Ranking (R)	25	25	15	8	15	4	25	16	1	**134**
92.5 Offset										
Probability (P)	5	5	5	4	5	1	3	4	1	
Impact (I)	5	5	4	4	3	4	5	4	1	
Ranking (R)	25	25	20	16	15	4	15	16	1	**137**

The overall risk ranking calculated according to this exercise identifies a significant benefit to constructing at Wall Location 1. Therefore, based on these results, the upper Wall Location 2 has been eliminated from consideration and the lower Wall Location 1 configurations progressed into a preliminary conceptual design.

Preliminary Conceptual Design

Design Criteria

The following criteria shown in Table 5 were used in the preliminary evaluation of the soil nail and soldier pile lagging wall systems.

Table 5 – Wall Design Criteria

Criteria	Preliminary Design Value
Design Life	100 years
Wall Loading	Soil loading
Wall Deflection	1” @ top of wall
Internal Stability FOS	1.5
Global Stability FOS	1.3
Anchor/Soil Nail Pullout FOS	2.0
Soil Nail Structural FOS	1.8
Anchor Structural FOS	1.67
Structural Steel Shapes FOS	1.67

Conceptual Wall Configurations

Using the results of the wall system and alignment ranking evaluation, a preliminary conceptual design of the soil nail and soldier pile and lagging wall systems located at Wall Location 1 for the 42.5 and 92.5 foot offset alignment configurations has been completed. The preliminary wall design is based on the design criteria outlined above in Table 5. The results of the preliminary evaluation are summarized in the following sections.

Soil Nail Wall

A preliminary analysis of a soil nail wall system was performed for the 42.5 foot offset alignment configuration. To meet the wall design criteria, the soil nail wall requires five rows of #9 Grade 75, epoxy coated thread bars, 75 feet long and spaced horizontally at 3 feet. The size of the nails (#9) and the close spacing (4’ vertically and 3’ horizontally) is not uncommon. However, the long nails are required to meet the design criteria due to the large surcharge of the slope extending above the planned wall and are not common for these systems. As such, the soil nail alternative is not advanced for further consideration. A typical sol nail wall configuration is shown in Figure 8.

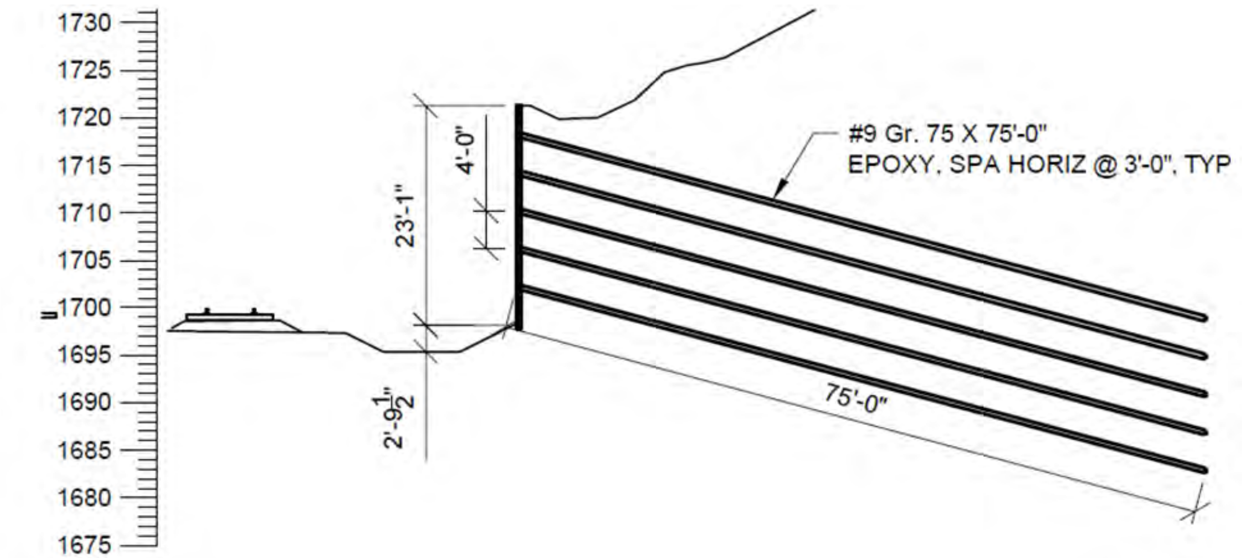

Figure 8 – 42.5 Foot Offset, Wall Location 1 Soil Nail Wall

An analysis for the 92.5 foot offset alignment configuration for the soil nail wall was not performed based on the results of the 42.5 foot analysis as the constructability issues with a taller wall and longer required soil nails would not be feasible.

Soldier Pile Lagging Wall

Both 42.5 and 92.5 foot offset wall configurations use a similar wall system, vertical HP14x89 pile spaced at 8'-0" center-to-center installed by drilling a 2 foot-diameter hole, inserting the pile, and filling the annulus around the pile with concrete. Preliminary analysis indicates the 42.5 foot offset wall will require 1-45 foot long tieback, as shown in Figure 9, and the 92.5 foot wall will require 4-60 foot long tiebacks, as shown in Figure 10.

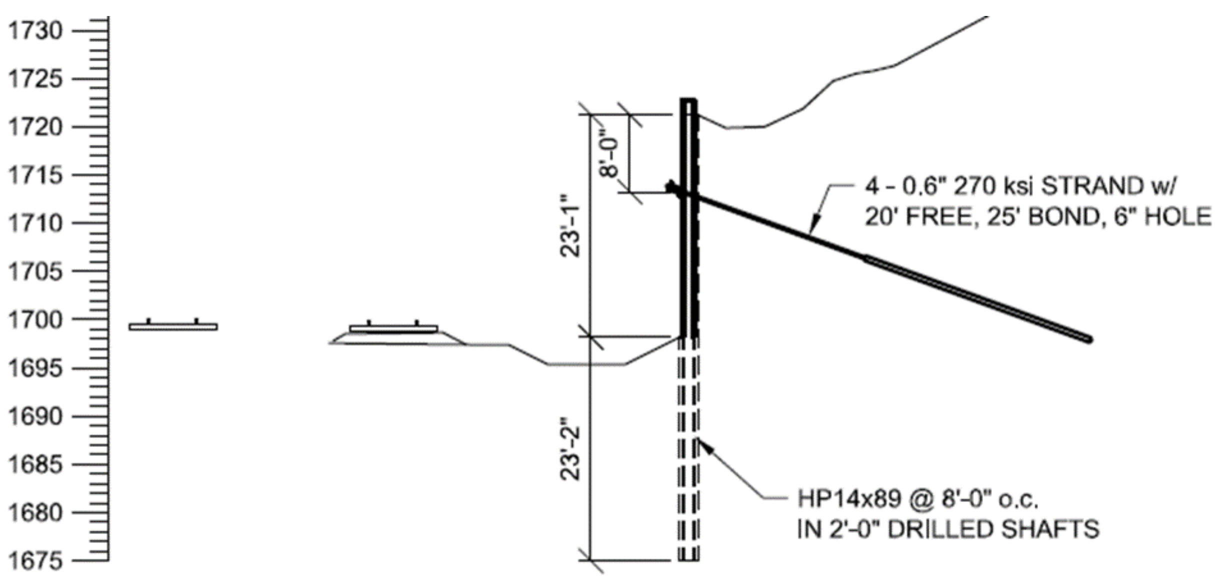

Figure 9 – 42.5 Foot Offset, Wall Location 1 Soldier Pile Wall

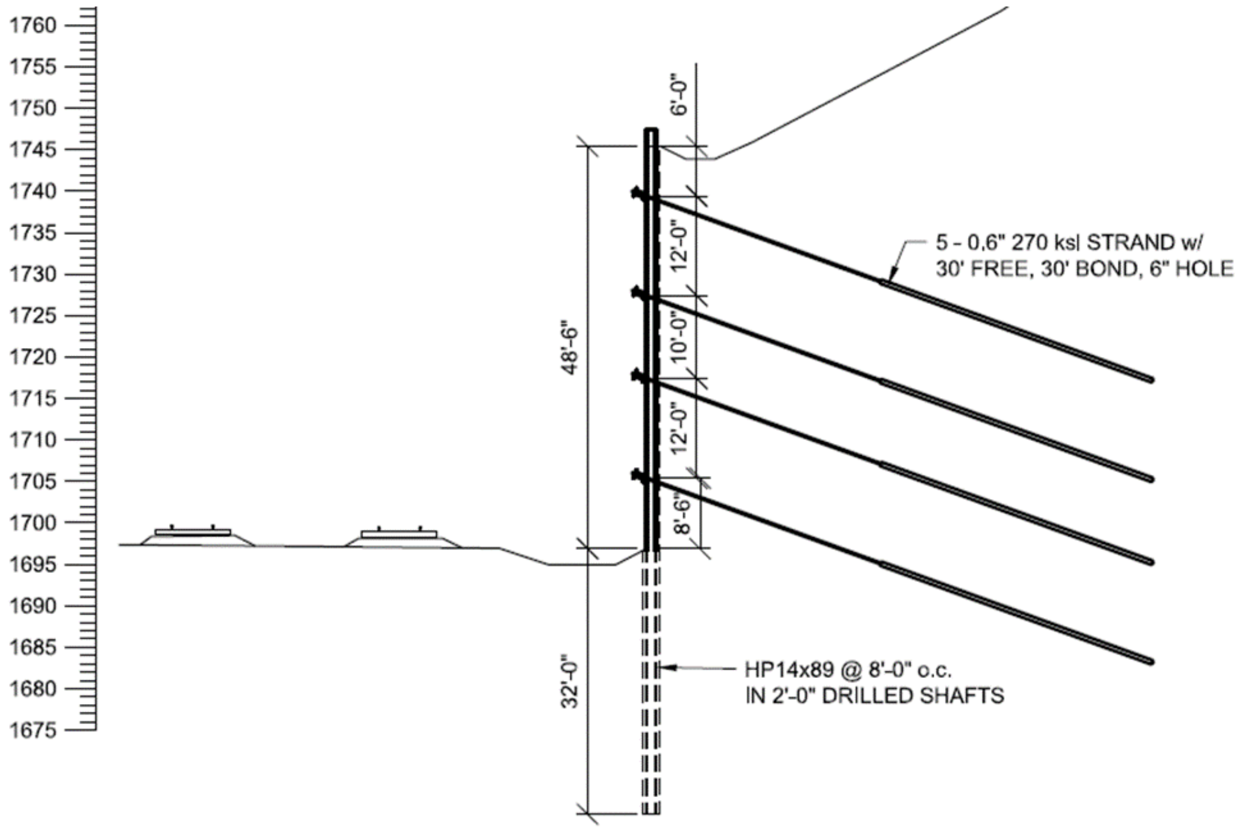

Figure 10 – 92.5 Foot Offset, Wall Location 1 Soldier Pile Wall

Typically soldier pile walls are created with wood lagging attached to the front face of the piles with steel plates. Since this wall will be permanent, treated wood lagging should be installed behind the front flange of the pile and a structural concrete facing be applied to the front of the piles. The structural concrete is connected to the steel piles with headed studs attached to the pile flange and may be installed as shotcrete or as cast-in-place concrete using one-sided forms.

Anticipated Construction Costs

Conceptual level project cost estimates have been developed for constructing the retaining wall alternatives. The estimates were developed assuming 2020 pricing and include a 30% contingency.

The cost estimates consider construction of the walls and associated civil works. Civil works include removal of approximately 28,900 cubic yards of material for construction at the 92.5 foot offset location, requiring approximately 2,300 truckloads to dispose. For the 42.5 foot offset location, removal of approximately 3,700 cubic yards of material requiring approximately 300 truckloads are estimated.

Using this information, the anticipated construction costs are:

- 92.5 foot offset – Wall Location 1 - Soldier Pile $15,500,000
- 42.5 foot offset – Wall Location 1 – Soldier Pile $6,600,000

Summary

To support development of the Project's environmental document, alternative project configurations have been considered that include keeping the truss spans in-place. These configurations require realignment of the track geometry to locations further north than considered for the preferred plan. To minimize the overall grading requirements at the east approach and avoid impacting the City of Bismarck's underground water reservoirs located adjacent to the project site associated with the use of these alternative configurations, the use of retaining wall features has been explored.

For evaluation, two basic wall locations have been considered for each alternative configuration, one near the toe of the slope and one near the crest. The basic geometric features of each wall have been developed and evaluated according to a risk based method for wall systems compatible with a top-down construction. The following metrics were considered:

- ROW requirements
- Utility conflicts
- Constructability requirements
- Grading and excavation requirements
- Drainage impacts
- Impacts to railroad operations
- Impacts to existing geologic features
- Susceptibility to unforeseen events
- Anticipated construction cost

The evaluation calculated a lower project risk for the soil nail and soldier pile wall systems constructed near the toe of the slope. Accordingly, preliminary concept designs were completed for these configurations. The preliminary concept design results eliminated the soil nail wall system from consideration leaving only the soldier pile wall for advancement. Using this design, anticipated project construction costs were calculated. The anticipated project costs are:

- 92.5 foot offset –Soldier Pile $15,500,000
- 42.5 foot offset –Soldier Pile $6,600,000

Although the risk based assessment identified a number of alternatives that were progressed to preliminary design, significant project risks remain with consideration of wall construction at this project location. Specifically, reactivation of the landslide feature could have serious consequences to the existing bridge, underground reservoir infrastructure, and any new civil works constructed near the site. These include unpredictable bridge foundation translations and ground movements that alter utility performance. Recognizing the probability and impact values for the landslide mitigation metric generate the highest possible risk to the project, progressing the retaining wall development beyond the preliminary concept phase is not recommended.

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42.5' OFFSET - WALL LOCATION 1

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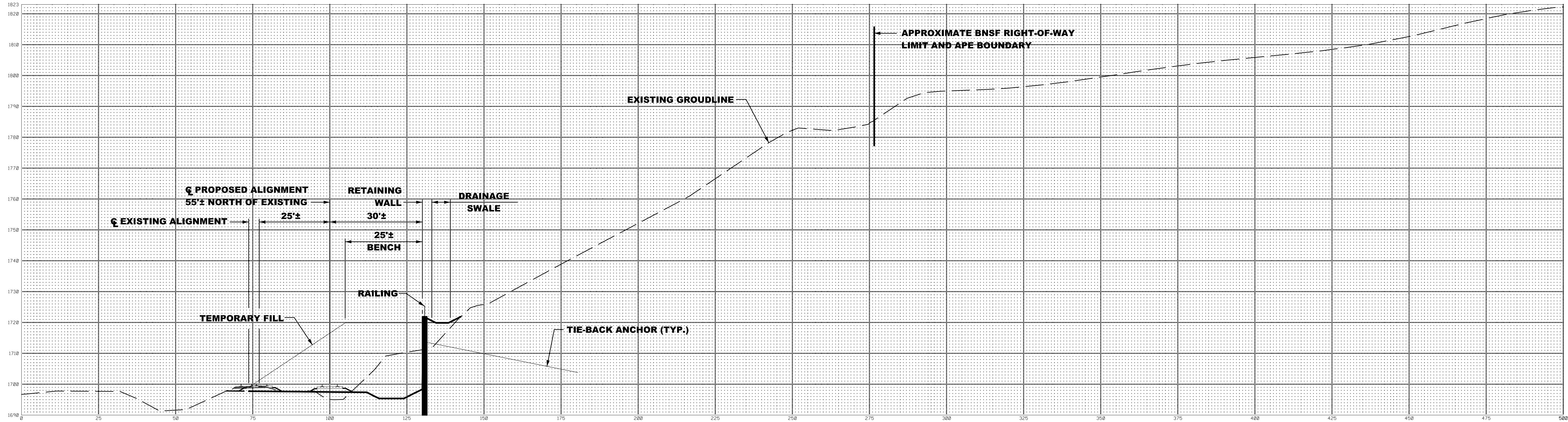

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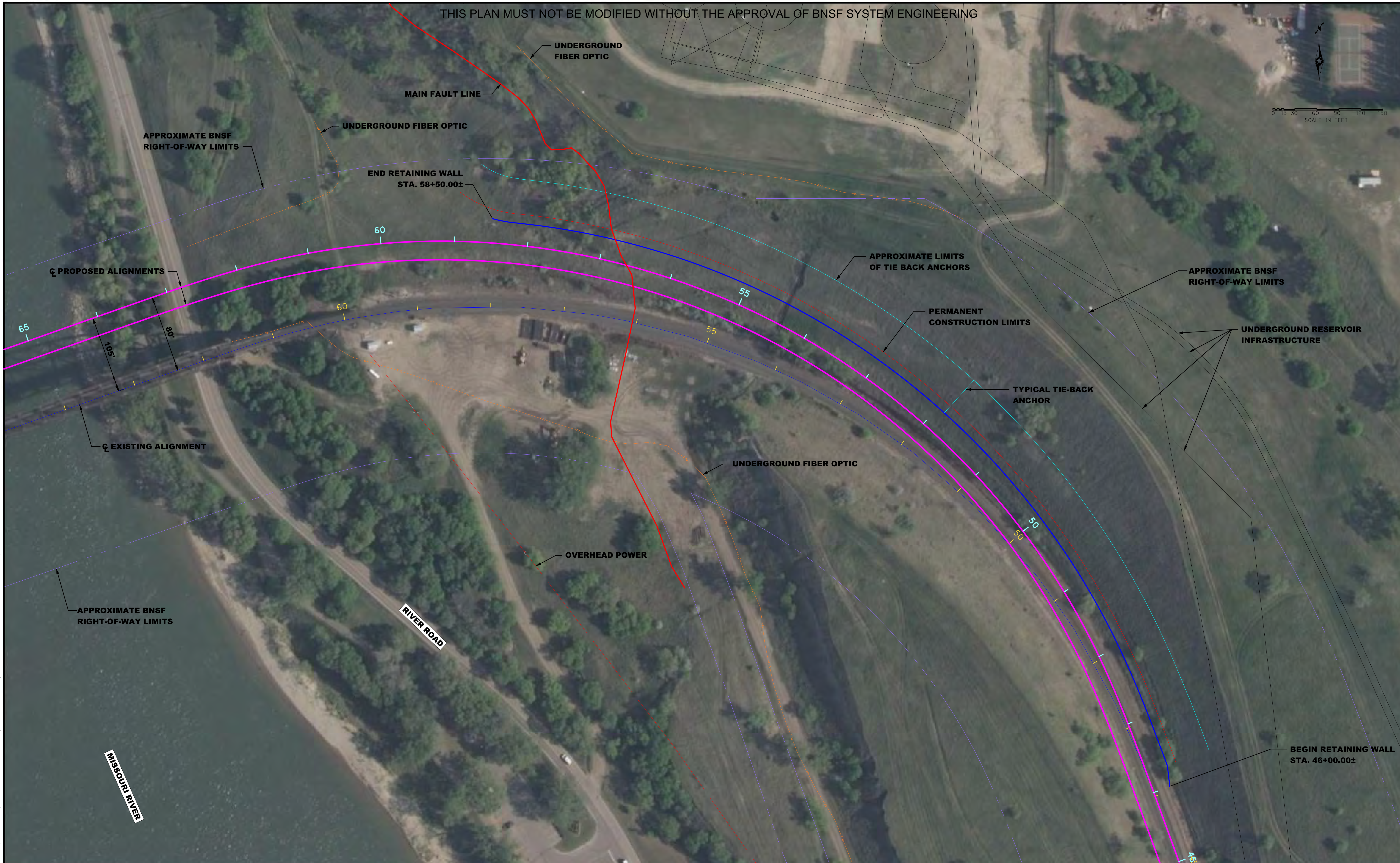

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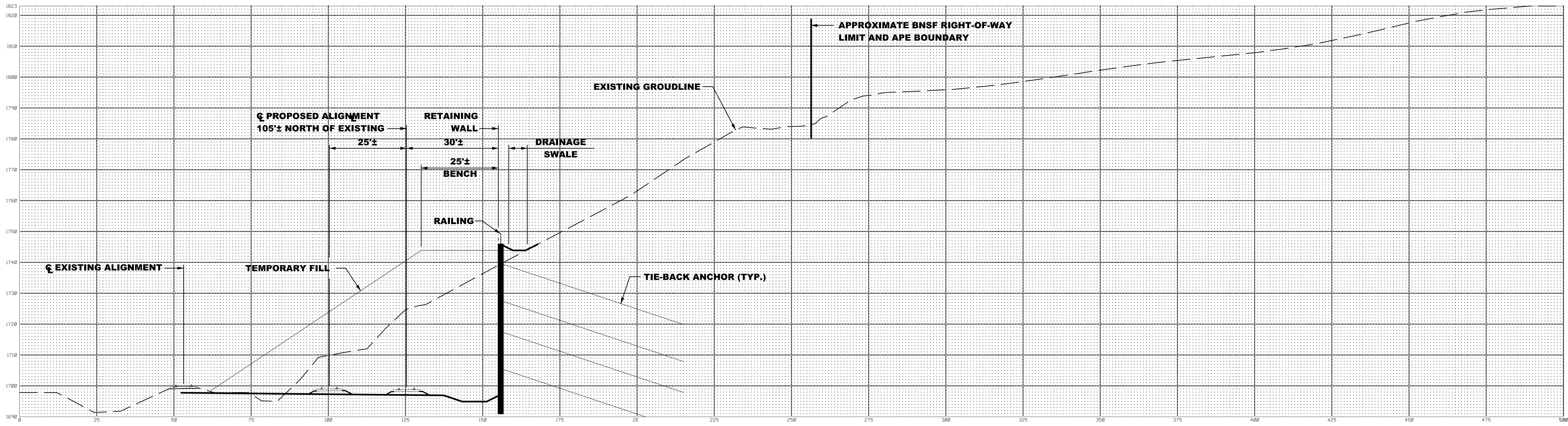

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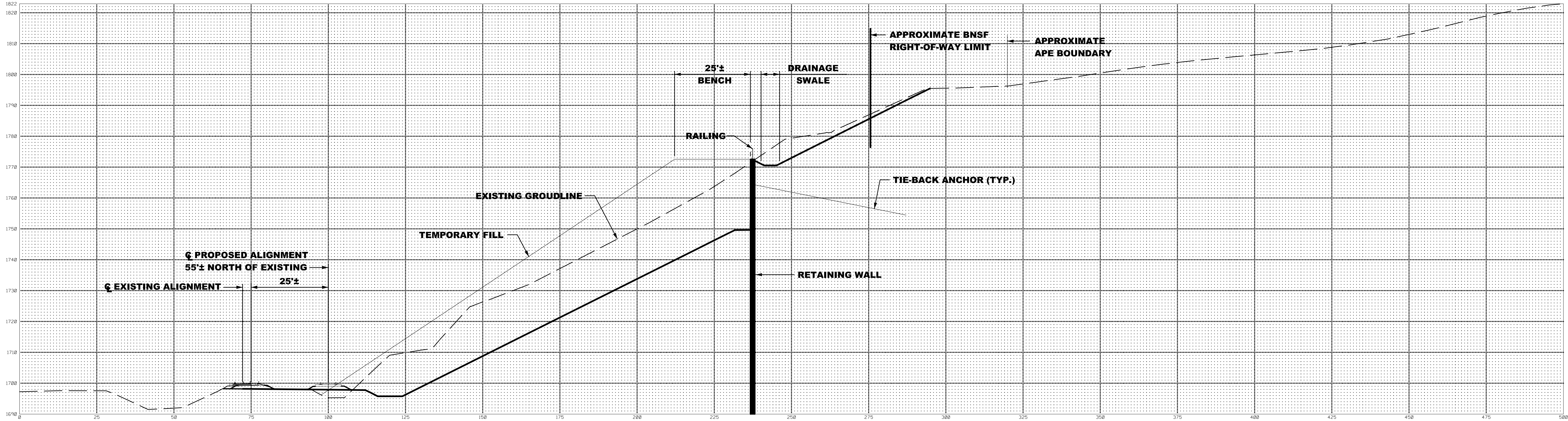

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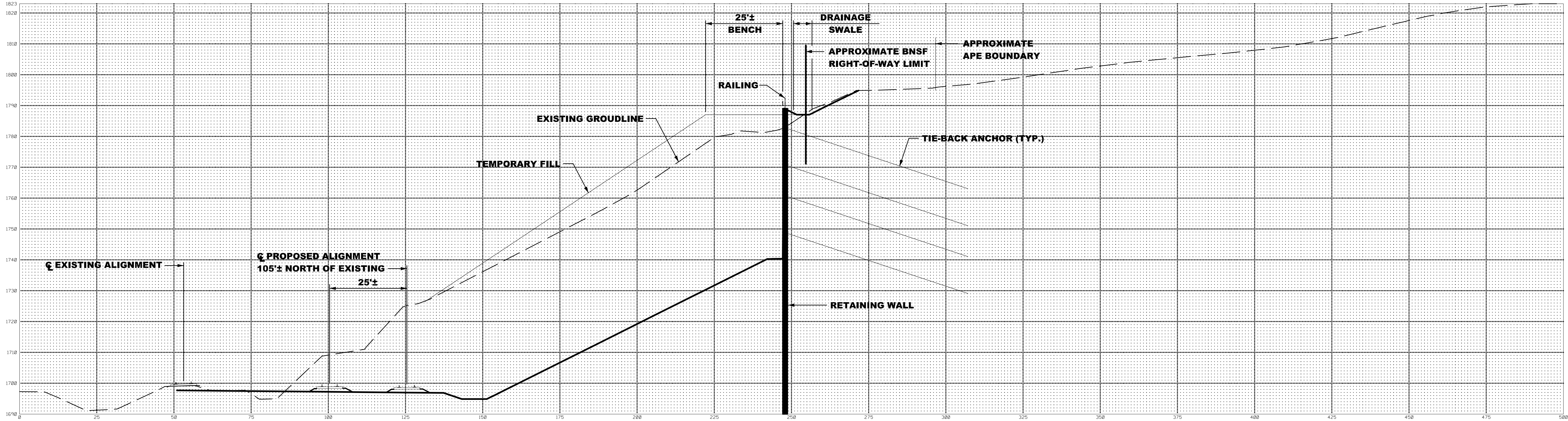

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Appendix E

Field Wetland Delineation Report

FIELD WETLAND DELINEATION REPORT

Bismarck/Mandan, Burleigh/Morton Counties, ND

Prepared for:

BNSF Railway

2500 Lou Menk Dr. AOB-3

Fort Worth, TX 76131

I hereby certify that this report was prepared by me or under my direct supervision.

Mark D. Aanenson
Houston Engineering Inc.
CWD Certification No. 1001

Date: September 5, 2017

HEI project no. 6680-007

HoustonEngineering Inc.

EXECUTIVE SUMMARY

Staff from Houston Engineering, Inc. completed the components of a field investigation of the subject area to identify and delineate areas meeting wetland criteria for a project on behalf of the BNSF Railway Company. Work was completed in accordance with the 1987 Army Corps of Engineers Wetland Delineation Manual, and the Great Plains Supplement Delineation Manual. The subject property (i.e., project) consists of the BNSF Bridge 196.6 Jamestown Subdivision spanning the Missouri River in both Burleigh and Morton County, North Dakota (**Appendix A: Project Location Map**). There are six wetlands, totaling 1.62 acres, within the project area (57.55 acres). Wetland 1 is classified as PEM1A and wetlands 2-6 were classified as PEM1C and are either permanently or seasonally flooded. Four out of six wetlands within the project area are ditched.

1 INTRODUCTION

Staff from Houston Engineering, Inc. completed a field investigation in accordance with the 1987 Army Corps of Engineers Wetland Delineation Manual, and the Great Plains Regional Supplement. The proposed construction includes construction of a new, independent single-track bridge across the Missouri River upstream of the current structure. The purpose of this report is to identify the aquatic resources within the project area.

2 LOCATION

The project is located in Township 139N Range 80W Section 31 (general latitude: 46.817883, longitude: -100.827597). This part of the Jamestown Subdivision runs from Mandan in Morton County, ND to Bismarck in Burleigh County, ND. The project lies between I-94 and I-194 bridges.

3 METHODS

The methods used to delineate the wetland boundaries are described in the 1987 Manual for "routine" delineations. Additionally, methodology from the Great Plains Regional Supplement to the Corps of Engineers Wetland Delineation Manual (USACE 2010) was followed. U.S. Fish and Wildlife Service National Wetland Inventory (NWI) (2017), and the digital soil surveys of each county (USDA-NRCS, 2017), as well as current and historical aerial photography were reviewed prior to the field investigation to identify potential wetland habitats and provide guidance for the investigation of wetlands at the project site.

The following procedures were used to determine wetland habitats:

- Vegetation was sampled to determine whether greater than 50% of the dominant plant species were classified as either obligate wetland, facultative wetland, or facultative.

- Shallow soil pits were hand dug with a soil auger to identify soil morphology, redoximorphic features and soil texture. Hydric soil indicators were determined using the Field Indicators of Hydric Soils in the United States; Guide for Identifying and Delineating Hydric Soils, Version 7.0 (USDA-NRCS, 2010).
- Wetland hydrology indicators were evaluated using open soil pits, shallow water table observations, soil morphology, and vegetative adaptations. Hydrology was determined on-site by observation of hydrologic indicators (US Army Corps of Engineers, 2010). The wetland hydrology determination uses the criteria of the presence of water within 12 inches of the surface for 14 days during the growing season, or within 24 inches of the surface during the dry part of the growing season. Aerial photography was used to assist hydrologic assessment.
- For determination of the extent of Other Waters (OW) in the vicinity, we surveyed the Ordinary High-Water Mark (OHWM). This entailed identifying the transition between plant communities adapted to wet soils and those communities adapted to dryer soils (North Dakota State Engineer 2007, USACE 2005).

Staff from Houston Engineering (Donna Jacob and Mark Aanenson) and North Dakota certified soil classifiers from Prairie Soils Consulting (C.J. Heidt and Mike Ulmer) performed fieldwork between November 20th, 2015 and May 10th, 2017. The weather conditions on the days of fieldwork were normal. The wetland boundaries and sample locations were marked using a Trimble Geo 7X handheld GPS unit with centimeter accuracy. Data sheets were completed for those representative plant communities present along the wetland boundaries. Sample points included observations of dominant vegetation, soil profiling including color and texture, and indications of hydrology. Additional, undocumented sample points were used throughout the delineation to verify vegetation, hydric soils, and hydrology. National Wetland Inventory data were accessed to determine the presence of listed wetlands (USFWS). We recorded data for each sampling site with data forms and geolocated photographs. Inventory of Other Waters was also performed with accompanying data forms and photographs.

4 EXISTING CONDITIONS

Landscape Setting:

The broader landscape of this area serves as a crossroads between the Northwestern Great Plains (River Breaks) and the Northern Glaciated Plains (Collapsed Glacial Outwash and Glaciated Dark Brown Prairie) ecoregions (USGS 2016). The surrounding topography consists of rolling plains with occasional buttes and badlands to the west of the Missouri River, where livestock grazing and resource mining constitutes most of the land use. To the east of the Missouri River, glacial deposits created a landscape littered with "prairie pothole" wetlands. Mixed prairie grasses are native to this region, but major land uses now include agricultural operations and livestock grazing.

The project area lies between the cities of Mandan and Bismarck, ND, where much of the land has been converted to residential, commercial, public lands, and recreational areas. Within the project area, there are sparse wooded areas with a plowed field in the southwestern area of the project boundaries and a small grassland area on the eastern side, all included in the flood plain of the Missouri River.

The project is located in Township 139N Range 80W Section 31 (general latitude: 46.817883, longitude: -100.827597). The total area of the proposed project is 57.55 acres and is divided by the Missouri River which flows southward between the cities of Mandan and Bismarck **(Appendix A: Project Location Map, Appendix B: Wetland Map, and Appendix C: NWI Map).**

Aquatic Resources: There were two wetlands identified during the delineation that are listed in the NWI database (**Table 1, Appendix C: NWI map**). Wetland 3 and Wetland 4 are classified as PEM1C, a palustrine, emergent, seasonally-flooded wetland (following Cowardin et al. 1979). There are a total of six wetlands within the project area. The National Wetlands Inventory listed two of the wetlands as PEM1C. The other wetlands were assessed as PEM1Ad/Cd. The area is bounded by highway 194, public lands to the north of the existing railroad, and the western edge of Captain's Landing neighborhood in Mandan. The project on the east side of the Missouri River is bounded by city-owned land. Wetland areas formed in the ditches that were created during railway construction. The project contains six wetland areas (Table 1) and one site designated as Other Waters, crossings at the Missouri River **(Appendix B: Wetland Map**, **Appendix D: Site Photographs**, **Appendix E: Wetland Delineation Dataforms).**

Wetland 1 is a ditch area formed from road construction. It is located in the southwestern corner of the project area.

Wetland 2 is a ditch area formed from road and railroad construction. It is located northwest of Wetland 1. It is connected to a road ditch that runs under highway 194, but the culvert connecting them is currently closed. Some trees in the surrounding area consist of *Fraxinus pennsylvanica* (green ash) and *Acer negundo* (box elder).

Wetland 3 is in the road ditch further south than Wetland 2 but they are not connected due to upland in between them. The area is a wet meadow with no trees.

Wetland 4 is a ditch area formed from Railroad construction. It is located directly east of wetland 3, south of the railroad tracks, on the east side of the river.

Wetland 5 is a ditch area formed from Railroad construction. It is located directly northwest of the railway within the project area on the west side of the river.

Wetland 6 is a ditch area formed from Railroad construction. It is located directly southeast of the railway within the project area on the west side of the river.

Table 1: Delineated Wetlands and their characteristics (data limited to project boundary only)

Wetland Number	NWI Listing	Wetland type Cowardin et al. 1979	Wetland area (acres)	Latitude (center)	Longitude (center)
1	-	PEM1Ad	281.31 (ft^2)	46.813956	-100.833333
2		PEM1Cd/PFO1Cd	0.61	46.815757	-100.834895
3	PEM1C	PEM1C	0.26	46.816502	-100.831544
4	PEM1C	PEM1C	0.23	46.817020	-100.829514
5	-	PEM1Cd	0.39	46.818057	-100.820605
6	-	PEM1Cd	0.13	46.818611	-100.822272
total acres within project boundary			1.63		

Other Waters description: The current bridge and proposed replacement structure cross the Missouri River. This river is classified by NWI as riverine, lower perennial, unconsolidated bottom, permanently flooded (R2UBH, following Cowardin et al. 1979) (**Appendix F: Other Waters data forms**).

Soil descriptions:

The dominant soils within the project site areas associated with the Missouri River are somewhat excessively to excessively drained and are formed in sandy residuum weathered from sandstone and sandy alluvium materials. On the east side of the Missouri River, the soils have a slope ranging from 9 to 70 percent are not hydric, with a rating of 0% (Flasher-Rock outcrop-Vebar complex). The main soil to the west of the Missouri River has slopes ranging from 0 to 6 percent and has a low hydric rating of 5% (**Appendix G: Hydric soil maps**).

Vegetation descriptions:

In the wetland areas, the dominant species include *Anemone canadensis* (round-leaf thimbleweed), *Carex atherodes* (wheat sedge), *Carex nebrascensis* (Nebraska sedge), *Epilobium ciliatum* (fringed willowherb), *Persicaria amphibia* (water smartweed), *Phalaris arundinacea* (reed canary grass), *Phragmites australis* (common reed), *Salix amygdaloides* (peach leaf willow), and *Typha x glauca* (hybrid cattail), all of which are classified as obligate (OBL) or facultative wet (FACW) species in the Great Plains Region (Lichvar 2016). (**Appendix H: Plant List, Appendix E: Wetland delineation data forms**).

Commerce:

There are no evident commerce activities associated with these wetlands.

5 REFERENCES

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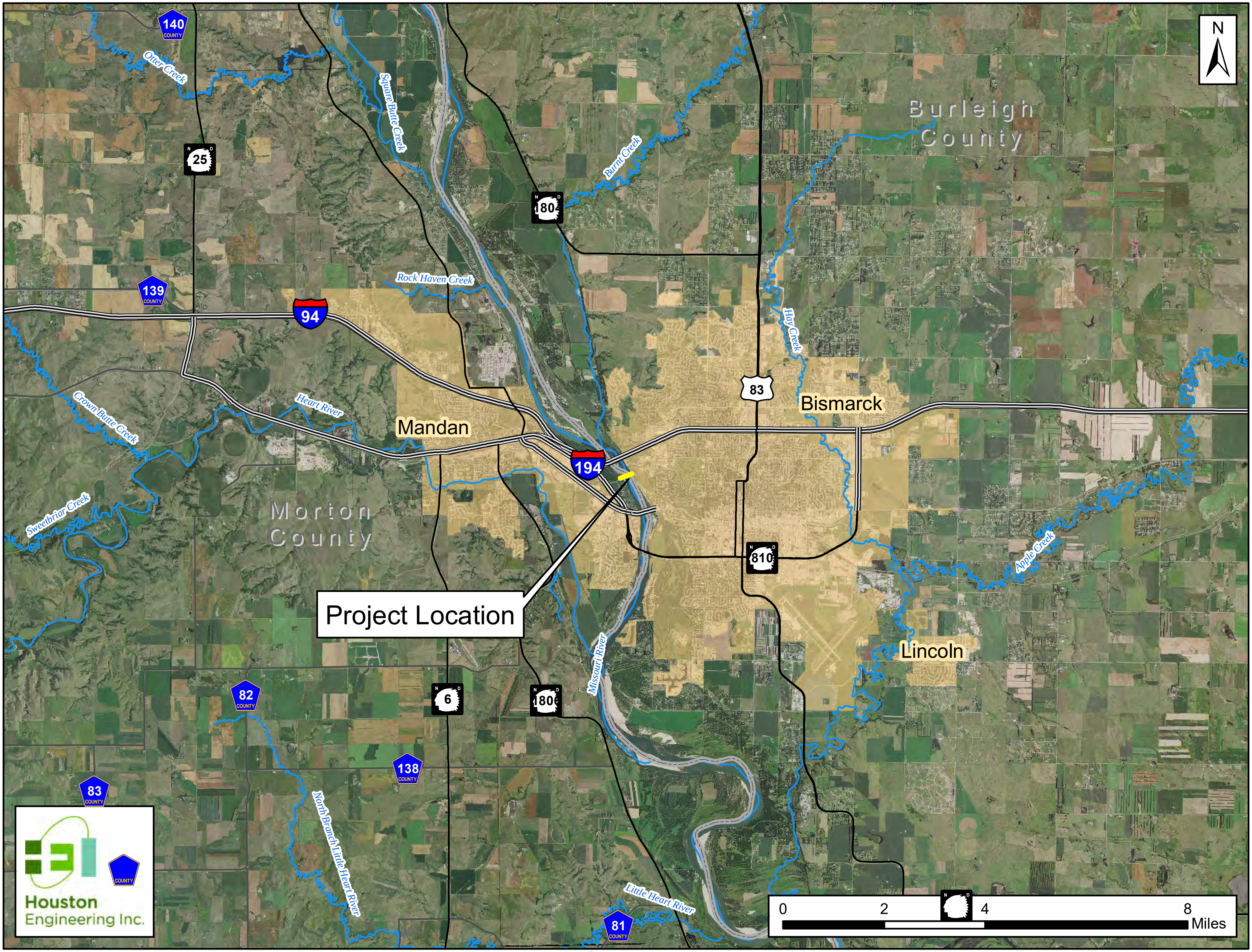
Appendix A

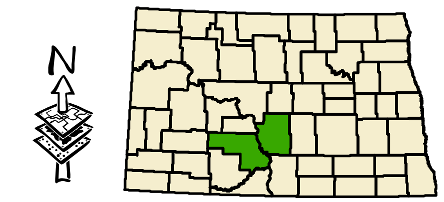
Project Location Map



N
Burleigh County
Morton County
Bismarck
Mandan
Lincoln
Project Location
Otter Creek
Square Butte Creek
Burnt Creek
Rock Haven Creek
Hay Creek
Heart River
Crown Butte Creek
Sweetbriar Creek
Apple Creek
Missouri River
North Branch Little Heart River
Little Heart River
94
194
83
810
1804
1806
25
6
140
139
82
138
83
81
COUNTY
0
2
4
8
Miles
Houston Engineering Inc.

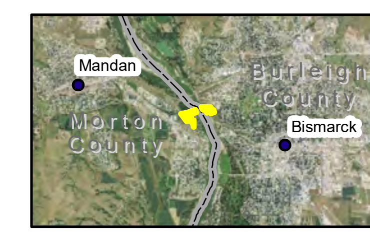
Appendix B

Wetland Map



Burleigh & Morton Counties, North Dakota

- Field Delineated OHW
- Project Boundary
- Wetland Polygons
- Culvert
- Data Point
- Photo
- OHW
- PLSS Townships
- PLSS Sections
- Rivermile Points



Orthophoto Source: MPO
Date of Photography: 2016
Data Source: City of Bismarck

Exhibit 3 - NWI Map

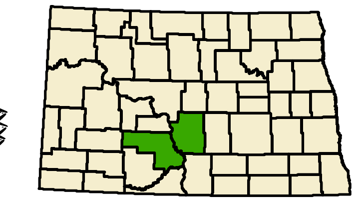
Scale:	Drawn by:	Checked by:	Project No.:	Date:	Sheet:
SHOWN	ESN	MDA	6680-007	8/2/2017	1

HoustonEngineering Inc.

0 130 260 520
Feet

Appendix C

NWI Map



Burleigh & Morton County, North Dakota

- Field Delineated OHW
- Project Boundary
- Wetland Polygons
- Culvert
- Data Point
- Photo
- OHW
- NWI Data
- PLSS Townships
- PLSS Sections
- Rivermile Points

Orthophoto Source: MPO
Date of Photography: 2016
Data Source: City of Bismarck

Exhibit 3 - NWI Map

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Sheet:
SHOWN	ESN	MDA	6680-007	8/2/2017	1

HoustonEngineering Inc

0 130 260 520
Feet

Path: \\houston\heiFargo\JBN\6600\6680\6680-007 BNSF Bridge 196.6\GIS\WetlandMap_11x17_new.mxd 8/2/2017 11:42:06 AM (herdmann)

Appendix D

Site Photographs

Wetland 1

Wetland 2

Wetland 3

Wetland 4

Other Waters 1

Other Waters 2

Other Waters 3

Appendix E

Wetland Delineation Data Forms

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: BNSF Bridge - Bismarck, ND   City/County: Morton   Sampling Date: 5/10/2017

Applicant/Owner: Houston Engineering   State: ND   Sampling Point: 1u

Investigator(s): Donna Jacob and C. J. Heidt   Section, Township, Range: 31-T139N-R80W

Landform (hillslope, terrace, etc.): Ditch slope   Local relief (concave, convex, none): Linear   Slope (%): 3

Subregion (LRR): F   Lat: 46.813897   Long: -100.833322   Datum: NAD 83

Soil Map Unit Name: E4981F Orthents-Urban land, highway complex, 0 to 35 percent slopes   NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☐, significantly disturbed?   Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic?   (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐ No ☒	
Hydric Soil Present?	Yes ☐ No ☒	
Wetland Hydrology Present?	Yes ☐ No ☒	**Is the Sampling Area within a Wetland? Yes ☐ No ☒**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. **Poa pratensis**	40	x	FACU
2. **Elymus repens**	20	x	FACU
3. **Bromus inermis**	20	x	UPL
4. **Taraxacum officinale**	10		FACU
5. **Anemone canadensis**	5		FACW
6. **Astragalus canadensis**	5		FAC
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum			

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 – Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 – Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 1u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (Moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y 3/2	100					sicl	Ap
3-12	2.5Y 4/3	95	7.5YR 5/6	5	C	M	sicl	C

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (Inches): ______

Hydric Soils Present? Yes ☐ No ☒

Remarks*:*

Ustarents. Soil disturbed by cut and fill operations..

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks*:*

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: BNSF Bridge - Bismarck, ND | City/County: Morton | Sampling Date: 5/10/2017

Applicant/Owner: Houston Engineering | State: ND | Sampling Point: 1w

Investigator(s): Donna Jacob and C. J. Heidt | Section, Township, Range: 31-T139N-R80W

Landform (hillslope, terrace, etc.): Ditch Bottom | Local relief (concave, convex, none): Concave | Slope (%): <1

Subregion (LRR): F | Lat: 46.813911 | Long: -100.833292 | Datum: NAD 83

Soil Map Unit Name: E4981F Orthents-Urban land, highway complex, 0 to 35 percent slopes | NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	
Hydric Soil Present?	Yes ☒ No ☐	
Wetland Hydrology Present?	Yes ☒ No ☐	**Is the Sampling Area within a Wetland? Yes ☒ No ☐**

Remarks:

PEM1Ad

VEGETATION – Use scientific names of plants

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **3' x 20'**)			
1. **Persicaria amphibia**	40	x	OBL
2. **Carex brunnescens**	20	x	FAC
3. **Poa pratensis**	10		FACU
4. **Rumex crispus**	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
	75	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum **25**			

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- x 1 – Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 – Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 1w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (Moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/2	100					sicl	Ap1
2-6	2.5Y 3/2	95	7.5YR 5/6	5	C	M	sic	Ap2
6-14	2.5Y 5/2	75	7.5YR 5/6	25	C	M	sicl	C

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☒ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)
  (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16)
  (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (Inches): ______

Hydric Soils Present? Yes ☒ No ☐

Remarks:

Endoaquents. Soil disturbed by cut and fill operations..

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
  (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☒ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
  (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☒ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site:	BNSF Bridge - Bismarck, ND	City/County:	Morton	Sampling Date:	5/10/2017
Applicant/Owner:	Houston Engineering	State:	ND	Sampling Point:	2u
Investigator(s):	Donna Jacob and C. J. Heidt	Section, Township, Range:	31-T139N-R80W		

Landform (hillslope, terrace, etc.): Ditch slope Local relief (concave, convex, none): Linear Slope (%): 4

Subregion (LRR): F Lat: 46.816049 Long: -100.833840 Datum: NAD 83

Soil Map Unit Name: E4981F Orthents-Urban land, highway complex, 0 to 35 percent slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒
Hydric Soil Present?	Yes ☐	No ☒
Wetland Hydrology Present?	Yes ☐	No ☒

Is the Sampling Area within a Wetland? Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size: **30' radius**)	Absolute % Cover	Dominant Species?	Indicator Status
1. **Populus deltoides**	**40**	**x**	**FAC**
2.			
3.			
4.			
	40	= Total Cover	
Sapling/Shrub Stratum (Plot Size: ____)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Bromus inermis**	50	x	UPL
2. **Poa pratensis**	20	x	FACU
3. **Astragalus canadensis**	15		FAC
4. **Anemone canadensis**	10		FACW
5. **Taraxacum officinale**	5		FACU
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size: ____)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum ____			

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	**1**	(A)
Total Number of Dominant Species Across All Strata:	**3**	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	**33**	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ____ 1 – Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ____ 3 – Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

Cottonwood tree has 2' diameter.

SOIL

Sampling Point: 2u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (Moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/2	100					sicl	Ap
2-7	2.5Y 3/2	100					sicl	C1
7-14	2.5Y 4/3	85	10YR 5/6	15	C	M	sicl	C2

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? Yes ☐ No ☒

Remarks:

Ustarents. Soil disturbed by cut and fill operations..

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? Yes ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: BNSF Bridge - Bismarck, ND City/County: Morton Sampling Date: 5/10/2017

Applicant/Owner: Houston Engineering State: ND Sampling Point: 2w

Investigator(s): Donna Jacob and C. J. Heidt Section, Township, Range: 31-T139N-R80W

Landform (hillslope, terrace, etc.): Ditch Bottom Local relief (concave, convex, none): Concave Slope (%): <1

Subregion (LRR): F Lat: 46.816062 Long: -100.833893 Datum: NAD 83

Soil Map Unit Name: E4981F Orthents-Urban land, highway complex, 0 to 35 percent slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	
Hydric Soil Present?	Yes ☒ No ☐	
Wetland Hydrology Present?	Yes ☒ No ☐	**Is the Sampling Area within a Wetland? Yes ☒ No ☐**

Remarks:

The Highway ROW is at the culvert.

VEGETATION – Use scientific names of plants

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot Size: **30' radius**)			
1. **Populus deltoides**	**60**	**x**	**FAC**
2.			
3.			
4.			
	60	= Total Cover	
Sapling/Shrub Stratum (Plot Size: ____)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **5' radius**)			
1. **Anemone canadensis**	40	x	FACW
2. **Astragalus canadensis**	10		FAC
3. **Poa pratensis**	5		FACU
4. **Bromus inermis**	5		UPL
5. **Solidago canadensis**	5		FACU
6. **Apocynum cannabinum**	5		FAC
7. **Cirsium arvense**	5		FACU
8. **Taraxacum officinale**	5		FACU
9.			
10.			
	80	= Total Cover	
Woody Vine Stratum (Plot Size: ____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum **20**

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	**2**	(A)
Total Number of Dominant Species Across All Strata:	**2**	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	**100**	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ____ 1 – Rapid Test for Hydrophytic Vegetation
- **x** 2 - Dominance Test is >50%
- ____ 3 – Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 2w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/2	100					sicl	Ap
1-7	2.5Y 3/2	85	10YR 5/6	15	C	M	sicl	C1
7-16	2.5Y 4/2	80	7.5YR 5/6	20	C	M	sicl	C2

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☒ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? Yes ☒ No ☐

Remarks:

Endoaquents. Soil disturbed by cut and fill operations..

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☒ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☒ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: BNSF Bridge 196.6 City/County: Morton Sampling Date: 11/20/2015

Applicant/Owner: BNSF State: ND Sampling Point: 3u

Investigator(s): Mark Aanenson (Houston Eng) and Mike Ulmer (Prairie Soil) Section, Township, Range: 31-139-80

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Plane Slope (%): 1

Subregion (LRR): F Lat: 46.816561 Long: -100.831021 Datum: NAD 83

Soil Map Unit Name: E4205 Banks loamy fine sand, 0 to 6 percent slopes, occassionaly flooded NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐ No ☒	
Hydric Soil Present?	Yes ☐ No ☒	
Wetland Hydrology Present?	Yes ☐ No ☒	**Is the Sampling Area within a Wetland? Yes ☐ No ☒**

Remarks:

Project area consists of the floodplain adjacent to the Missouri River. BNRR rail corridor. Most areas were manipulated by rail and bridge construction.

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size: 15')			
1. **Franinum pennsylvanica**	2		FAC
2.			
3.			
4.			
5.			
	2	= Total Cover	
Herb Stratum (Plot Size: 5')			
1. **Bromis inermis**	90	x	UPL
2. **Apocynum cannabinum**	5		FAC
3. **Rumex crispis**	5		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ____ 1 – Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ____ 3 – Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 3u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (Moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5	10YR 3/2	100					Loam	Ap
5-15	10YR 4/3	100					Loam	C

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? Yes ☐ No ☒

Remarks:

Typic Ustifluvent. Well drained. Anthopogenic.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site is adjacent to the wetland on floodplain

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: BNSF Bridge 196.6 City/County: Morton Sampling Date: 11/20/2015

Applicant/Owner: BNSF State: ND Sampling Point: 3w

Investigator(s): Mark Aanenson (Houston Eng) and Mike Ulmer (Prairie Soil) Section, Township, Range: 31-139-80

Landform (hillslope, terrace, etc.): Floodplain-ditch Local relief (concave, convex, none): Concave Slope (%): <1

Subregion (LRR): F Lat: 46.816613 Long: -100.831057 Datum: NAD 83

Soil Map Unit Name: E4205 Banks loamy fine sand, 0 to 6 percent slopes, occassionaly flooded NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	
Hydric Soil Present?	Yes ☒ No ☐	
Wetland Hydrology Present?	Yes ☒ No ☐	**Is the Sampling Area within a Wetland? Yes ☒ No ☐**

Remarks:

Project area consists of a floodplain adjacent to the Missouri River. BNRR rail corridor. Most areas were manipulated by rail and bridge construction.

VEGETATION – Use scientific names of plants

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **8'x25'**)			
1. **Phalaris arundinacea**	100	x	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum			

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- x 1 – Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 – Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 3w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 3/2	90	7.5YR 5/6	10	C	M	SiCL	Ap
4-14	2.5Y 4/2	80	10YR 5/6	20	C	M	Loam	C

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)
  (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16)
  (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (Inches): ______

Hydric Soils Present? Yes ☒ No ☐

Remarks:

Typic Fluvaquent. Poorly drained, anthropogenic.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
  (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
  (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☒ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (inches):	**Wetland Hydrology Present?**	**Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site is a ditch adjacent to the rail on the Missouri River floodplain.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: BNSF Bridge 196.6 City/County: Morton Sampling Date: 11/20/2015

Applicant/Owner: BNSF State: ND Sampling Point: 4u

Investigator(s): Mark Aanenson (Houston Eng) and Mike Ulmer (Prairie Soil) Section, Township, Range: 31-139-80

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Plane Slope (%): 1

Subregion (LRR): F Lat: 46.816717 Long: -100.830387 Datum: NAD 83

Soil Map Unit Name: E4205 Banks loamy fine sand, 0 to 6 percent slopes, occassionaly flooded NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐ No ☒	
Hydric Soil Present?	Yes ☐ No ☒	
Wetland Hydrology Present?	Yes ☐ No ☒	**Is the Sampling Area within a Wetland? Yes ☐ No ☒**

Remarks:

Project area consists of the floodplain adjacent to the Missouri River. BNRR rail corridor. Most areas were manipulated by rail and bridge construction.

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: 10'dia)			
1. **Bromis inermis**	90	x	UPL
2. **Apocynum cannabinum**	10		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum			

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 – Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 – Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 4u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/2	100					Loam	Ap
7-15	10YR 4/3	100					Loam	C

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)
  (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16)
  (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____

Depth (Inches): ____

Hydric Soils Present? Yes ☐ No ☒

Remarks:

Typic Ustifluvent. Well drained. Anthopogenic.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
  (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
  (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? Yes ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site is adjacent to the wetland on floodplain

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: BNSF Bridge 196.6 City/County: Morton Sampling Date: 11/20/2015

Applicant/Owner: BNSF State: ND Sampling Point: 4w

Investigator(s): Mark Aanenson (Houston Eng) and Mike Ulmer (Prairie Soil) Section, Township, Range: 31-139-80

Landform (hillslope, terrace, etc.): Floodplain-ditch Local relief (concave, convex, none): Concave Slope (%): <1

Subregion (LRR): F Lat: 46.816786 Long: -100.830390 Datum: NAD 83

Soil Map Unit Name: E4205 Banks loamy fine sand, 0 to 6 percent slopes, occassionaly flooded NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	
Hydric Soil Present?	Yes ☒ No ☐	
Wetland Hydrology Present?	Yes ☒ No ☐	**Is the Sampling Area within a Wetland? Yes ☒ No ☐**

Remarks:

Project area consists of a floodplain adjacent to the Missouri River. BNRR rail corridor. Most areas were manipulated by rail and bridge construction.

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **6'x25'**)			
1. **Phalaris arundinacea**	100	x	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum			

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

x 1 – Rapid Test for Hydrophytic Vegetation
__ 2 - Dominance Test is >50%
__ 3 – Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 4w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (Moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	90	7.5YR 5/6	10	C	M/PL	Loam	Ap
5-15	10YR 4/2	85	7.5YR 5/6	15	C	M	Loam/SL	C stratified

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

Typic Fluvaquent. Poorly drained, anthropogenic.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☒ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☒ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site is a ditch adjacent to the rail on the Missouri River floodplain.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: BNSF Bridge 196.6 City/County: Burleigh Sampling Date: 11/20/2015

Applicant/Owner: BNSF State: ND Sampling Point: 5u

Investigator(s): Mark Aanenson (Houston Eng) and Mike Ulmer (Prairie Soil) Section, Township, Range: 31-139-80

Landform (hillslope, terrace, etc.): Upland Local relief (concave, convex, none): Plane Slope (%): 1

Subregion (LRR): F Lat: 46.818971 Long: -100.823335 Datum: NAD 83

Soil Map Unit Name: E1475F Flasher-Rock Outcrop-Vebar complex, 9 to 70 percent slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐ No ☒	
Hydric Soil Present?	Yes ☐ No ☒	
Wetland Hydrology Present?	Yes ☐ No ☒	**Is the Sampling Area within a Wetland? Yes ☐ No ☒**

Remarks:

Project area consists of dissected uplands adjacent to the Missouri River. BNRR rail corridor. Most areas were manipulated by rail and bridge construction.

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: 10'dia)			
1. **Bromus inermis**	95	x	UPL
2. **Solidago canadensis**	5		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ____ 1 – Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ____ 3 – Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 5u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (Moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	100					Clay Loam	Ap
5-15	10YR 4/3	100					Clay Loam	C

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)
  (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16)
  (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (Inches): ______

Hydric Soils Present? Yes ☐ No ☒

Remarks:

Typic Ustorthent.. Well drained. Surface shaped- anthropogenic.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
  (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
  (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (inches):		

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site is adjacent to the wetland on a dissected upland.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: BNSF Bridge 196.6 City/County: Burleigh Sampling Date: 11/20/2015

Applicant/Owner: BNSF State: ND Sampling Point: 5w

Investigator(s): Mark Aanenson (Houston Eng) and Mike Ulmer (Prairie Soil) Section, Township, Range: 31-139-80

Landform (hillslope, terrace, etc.): Upland- ditch Local relief (concave, convex, none): Concave Slope (%): <1

Subregion (LRR): F Lat: 46.818953 Long: -100.823356 Datum: NAD 83

Soil Map Unit Name: E1475F Flasher-Rock Outcrop-Vebar complex, 9 to 70 percent slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	
Hydric Soil Present?	Yes ☒ No ☐	
Wetland Hydrology Present?	Yes ☒ No ☐	**Is the Sampling Area within a Wetland? Yes ☒ No ☐**

Remarks:

Project area consists of dissected uplands adjacent to the Missouri River. BNRR rail corridor. Most areas were manipulated by rail and bridge construction.

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: 6'x25')			
1. **Phragmittes australis**	90	x	FACW
2. **Typha X glauca**	10		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum ____			

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- x 1 – Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ____ 3 – Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 5w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]		
0-4	2.5Y 3/2	90	7.5YR 5/6	10	C	M/PL	Loam	Ap
4-10	2.5Y 4/2	90	7.5YR 5/6	10	C	M	Loam	C1
10-16	2.5Y 5/3	85	7.5YR 5/6	15	C	M	SL	C2

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

Typic Endoaquent. Poorly drained, anthropogenic.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☒ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☒ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (inches):		

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site is a ditch adjacent to the rail on a dissected upland.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: BNSF Bridge 196.6 City/County: Burleigh Sampling Date: 11/20/2015

Applicant/Owner: BNSF State: ND Sampling Point: 6u

Investigator(s): Mark Aanenson (Houston Eng) and Mike Ulmer (Prairie Soil) Section, Township, Range: 31-139-80

Landform (hillslope, terrace, etc.): Upland Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR): F Lat: 46.818631 Long: -100.822698 Datum: NAD 83

Soil Map Unit Name: E1475F Flasher-Rock Outcrop-Vebar complex, 9 to 70 percent slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒
Hydric Soil Present?	Yes ☐	No ☒
Wetland Hydrology Present?	Yes ☐	No ☒

Is the Sampling Area within a Wetland? Yes ☐ No ☒

Remarks:

Project area consists of dissected uplands adjacent to the Missouri River. BNRR rail corridor. Most areas were manipulated by rail and bridge construction.

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: 10'dia)			
1. **Bromus inermis**	90	x	UPL
2. **Melilotus officinalis**	10		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum			

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 – Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 – Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 6u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (Moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 3/2	100					Silt Loam	Ap
4-14	2.5Y 5/3	85	10YR 5/6	15	C	M	Silt Loam	C

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? Yes ☐ No ☒

Remarks:

Typic Ustorthent.. Well drained. Surface shaped- anthropogenic. Redox are related to residual bedding planes, not contemporary.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site is adjacent to the wetland on a dissected upland.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project Site: BNSF Bridge 196.6 City/County: Burleigh Sampling Date: 11/20/2015

Applicant/Owner: BNSF State: ND Sampling Point: 6w

Investigator(s): Mark Aanenson (Houston Eng) and Mike Ulmer (Prairie Soil) Section, Township, Range: 31-139-80

Landform (hillslope, terrace, etc.): Upland- ditch Local relief (concave, convex, none): Concave Slope (%): <1

Subregion (LRR): F Lat: 46.818671 Long: -100.822668 Datum: NAD 83

Soil Map Unit Name: E1475F Flasher-Rock Outcrop-Vebar complex, 9 to 70 percent slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☒, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	
Hydric Soil Present?	Yes ☒ No ☐	
Wetland Hydrology Present?	Yes ☒ No ☐	**Is the Sampling Area within a Wetland? Yes ☒ No ☐**

Remarks:

Project area consists of dissected uplands adjacent to the Missouri River. BNRR rail corridor. Most areas were manipulated by rail and bridge construction.

VEGETATION – Use scientific names of plants

Stratum	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot Size: **6'x25'**)			
1. **Phragmites australis**	75	x	FACW
2. **Typha X glauca**	25	x	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x1 =	
FACW species		x2 =	
FAC species		x3 =	
FACU species		x4 =	
UPL species		x5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- **x** 1 – Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ____ 3 – Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 6w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (Moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	2.5Y 3/2	90	7.5YR 5/6	10	C	M/PL	Loam	Ap
5-14	2.5Y 4/2	90	7.5YR 5/6	10	C	M	Loam	C

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR F**)
- ☐ 1 cm Muck (A9) (**LRR F, G, H**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 CM Mucky Peat or Peat (S2)(**LRR G, H**)
- ☐ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR I, J**)
- ☐ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ☐ Dark Surface (S7) (**LRR G**)
- ☐ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? Yes ☒ No ☐

Remarks:

Typic Endoaquent. Poorly drained, anthropogenic.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry Season Water Table (C2)
- ☒ Oxidized Rhizospheres along Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☒ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? Yes ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site is a ditch adjacent to the rail on a dissected upland.

Appendix F

Other Waters Data Forms

Other Waters Information Form

Date: 5/10/2017	Project: BNSF Bridge 196.6				Sample Point: OHWM1	
State-County: Burleigh / Morton		Investigators: Donna Jacob				
Waterbody Type:	Lake	Pond	Borrow Pit	River	Stream	Other
Waterbody Name:	Missouri River					
River or Stream						
Stream is:	Natural		Artificial		Manipulated	
Subsurface Flow:	Yes	No	Unknown	Channel Height (ft) OHW to bottom:		unknown
Flow Type:	Perennial (Flows year round)			Intermittent (Flows <3 months)		
	Seasonal (Continuous flow ≥ 3 months)			Ephemeral (Flows only in response to rainfall)		
Stream Width (ft)	200		Stream Depth (ft):	unknown		
OHWM Indicator	Natural Line Impress on bank	Sediment Sorting		Shelving		
	Litter disturbed or washed away	Changes in character of soil		Scour		
	Destruction of terrestrial vegetation	Deposition		Presence of litter or debris		
	Multiple observed flow events	Wracking		Bed and bank		
	Vegetation matted down, bent or absent	Water staining		Change in plant community		
Vegetation Above OHW:	Phalaris arundinacea (FACW), Arctium minus (FACU), Lonicera dioica (FACU), Melilotus officinalis (FACU), Elymus repens (FACU), Maianthemum racemosum (FAC), Astragalus canadensis (FAC), Poa pratensis (FAC), Populus deltoids (FAC)					
Vegetation Below OHW:	Acer negundo (FAC), Phalaris arundinacea (FACW), Cornus alba (FACW), Carex nebrascensis (OBL), Sonchus arvensis (FAC), Salix amygdaloides (FACW)					
Stream Substrate:	Silts	Cobbles	Bedrock	Gravel	Concrete	
	Muck	Vegetation	Sands	Other - Explain:		
Aquatic Habitats:	Sand Bar	Gravel Bar	Mud Bar	Fringing Wetlands	Undercut Banks	Gravel Riffles
	Deep Pools	Bank root systems	Overhanging trees/shrubs	In-stream emergent plants	In-stream submerged plants	
Lakes and other Deepwater Habitat						
Shoreline Type:	Silts	Cobbles	Bedrock	Concrete	Muck	
	Vegetation:		Other (explain):			

Other Waters Information Form

Date: 5/10/2017	Project: BNSF Bridge 196.6				Sample Point: OHWM2	
State-County: Burleigh / Morton		Investigators: Donna Jacob				
Waterbody Type:	Lake	Pond	Borrow Pit	River	Stream	Other
Waterbody Name:	Missouri River					
River or Stream						
Stream is:	Natural	Artificial	Manipulated			
Subsurface Flow:	Yes	No	Unknown	Channel Height (ft) OHW to bottom:	unknown	
Flow Type:	Perennial (Flows year round)	Intermittent (Flows <3 months)				
	Seasonal (Continuous flow ≥ 3 months)	Ephemeral (Flows only in response to rainfall)				
Stream Width (ft)	200	Stream Depth (ft):	unknown			
OHWM Indicator	Natural Line Impress on bank	Sediment Sorting	Shelving			
	Litter disturbed or washed away	Changes in character of soil	Scour			
	Destruction of terrestrial vegetation	Deposition	Presence of litter or debris			
	Multiple observed flow events	Wracking	Bed and bank			
	Vegetation matted down, bent or absent	Water staining	Change in plant community			
Vegetation Above OHW:	Arctium minus (FACU), Anemone canadensis (FACW), Poa pratensis (FAC), Acer negundo (FAC), Ulmus Americana (FAC), Phalaris arundinacea (FACW), Vicia americana (FACU), Taraxacum officinale (FACU), Fraxinus pennsylvanica (FAC)					
Vegetation Below OHW:	Acer negundo (FAC), Phalaris arundinacea (FACW), Cornus alba (FACW), Carex nebrascensis (OBL), Sonchus arvensis (FAC), Salix amygdaloides (FACW)					
Stream Substrate:	Silts	Cobbles	Bedrock	Gravel	Concrete	
	Muck	Vegetation	Sands	Other - Explain:		
Aquatic Habitats:	Sand Bar	Gravel Bar	Mud Bar	Fringing Wetlands	Undercut Banks	Gravel Riffles
	Deep Pools	Bank root systems	Overhanging trees/shrubs	In-stream emergent plants	In-stream submerged plants	
Lakes and other Deepwater Habitat						
Shoreline Type:	Silts	Cobbles	Bedrock	Concrete	Muck	
	Vegetation:	Other (explain):				

Other Waters Information Form

Date: 5/10/2017	Project: BNSF Bridge 196.6	Sample Point: OHWM 3

State-County: Burleigh / Morton	Investigators: Donna Jacob

Waterbody Type:	Lake	Pond	Borrow Pit	River	Stream	Other

Waterbody Name:	Missouri River

River or Stream

Stream is:	Natural	Artificial	Manipulated

Subsurface Flow:	Yes	No	Unknown	Channel Height (ft) OHW to bottom:	unknown

Flow Type:	Perennial (Flows year round)	Intermittent (Flows <3 months)
	Seasonal (Continuous flow ≥ 3 months)	Ephemeral (Flows only in response to rainfall)

Stream Width (ft)	200	Stream Depth (ft):	unknown

OHWM Indicator	Natural Line Impress on bank	Sediment Sorting	Shelving
	Litter disturbed or washed away	Changes in character of soil	Scour
	Destruction of terrestrial vegetation	Deposition	Presence of litter or debris
	Multiple observed flow events	Wracking	Bed and bank
	Vegetation matted down, bent or absent	Water staining	Change in plant community

Vegetation Above OHW:	Phalaris arundinacea (FACW), Artemisia vulgaris (UPL), Euphorbia esula (NL UPL), Penstemon gracilis (FACU), Acer negundo (FAC), Astragalus canadensis (FAC), Elaeagnus angustifolia (FACU), Bromus inermis (UPL)
Vegetation Below OHW:	Phalaris arundinacea (FACW), Carex nebrascensis (OBL)

Stream Substrate:	Silts	Cobbles	Bedrock	Gravel	Concrete
	Muck	Vegetation	Sands	Other - Explain:	

Aquatic Habitats:	Sand Bar	Gravel Bar	Mud Bar	Fringing Wetlands	Undercut Banks	Gravel Riffles
	Deep Pools	Bank root systems	Overhanging trees/shrubs	In-stream emergent plants	In-stream submerged plants	

Lakes and other Deepwater Habitat

Shoreline Type:	Silts	Cobbles	Bedrock	Concrete	Muck
	Vegetation:	Other (explain):			

Appendix G

Hydric Soils Map

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hydric Rating by Map Unit—Morton County, North Dakota

Map Scale: 1:5,780 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

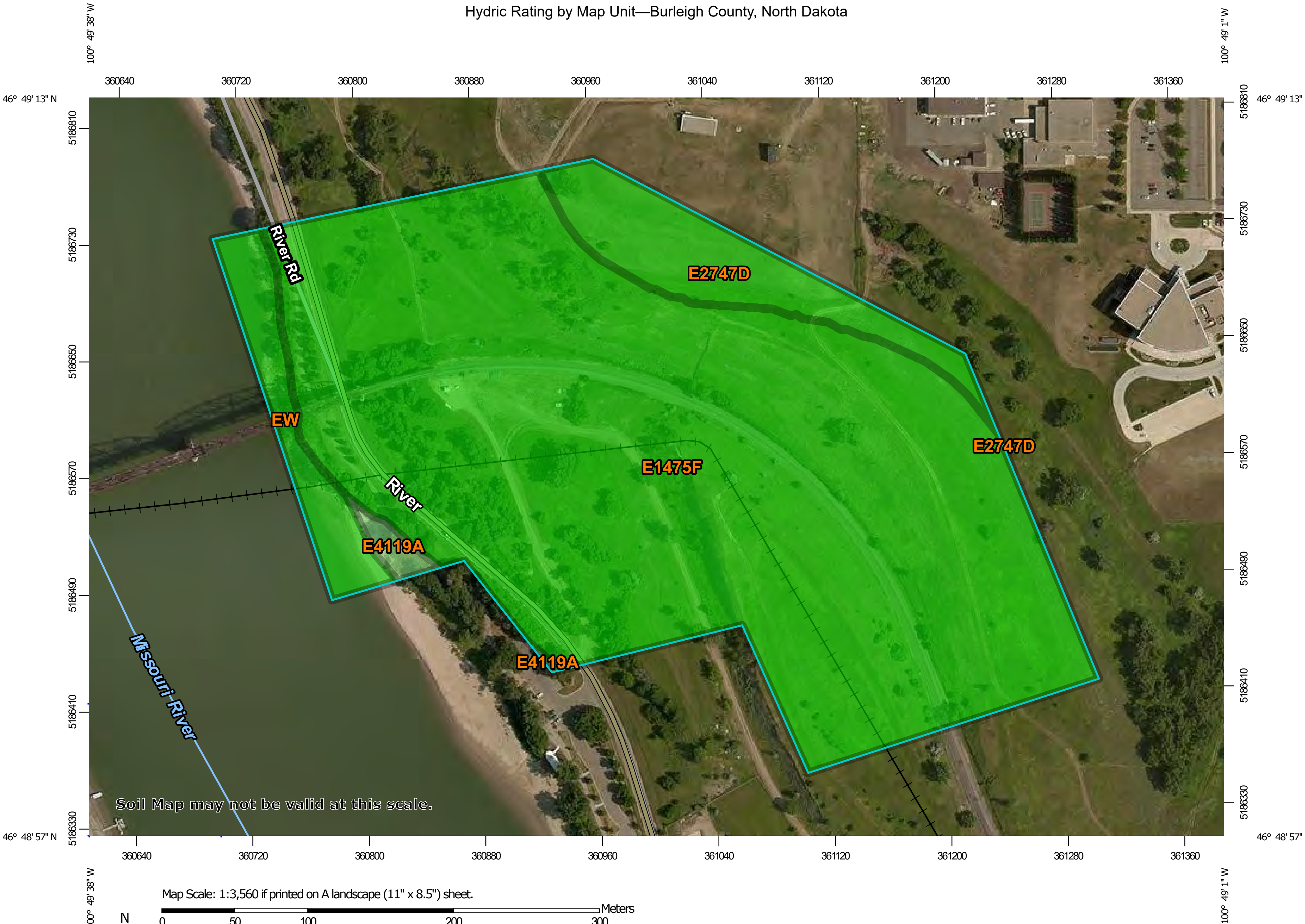
Feet: 0, 250, 500, 1000, 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Morton County, North Dakota (ND059)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
E4205B	Banks loamy fine sand, 0 to 6 percent slopes, occasionally flooded	5	30.6	45.8%
E4225A	Breien fine sandy loam, 0 to 2 percent slopes, rarely flooded	5	25.8	38.7%
E4951A	Riverwash, 0 to 1 percent slopes, frequently flooded	15	1.6	2.4%
E4981F	Orthents-Urban land, highway complex, 0 to 35 percent slopes	0	6.0	9.0%
E4999	Water	0	2.7	4.1%
Totals for Area of Interest			**66.7**	**100.0%**

Hydric Rating by Map Unit—Burleigh County, North Dakota



Map Scale: 1:3,560 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

N

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 14N WGS84

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Burleigh County, North Dakota (ND015)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
E1475F	Flasher-Rock outcrop-Vebar complex, 9 to 70 percent slopes	0	32.3	86.1%
E2747D	Werner-Chama-Sen silt loams, 9 to 15 percent slopes	0	3.1	8.2%
E4119A	Havrelon fine sandy loam, 0 to 2 percent slopes, occasionally flooded	5	0.3	0.8%
EW	Water	0	1.8	4.8%
Totals for Area of Interest			**37.5**	**100.0%**

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Hydric (100%)

Hydric (66 to 99%)

Hydric (33 to 65%)

Hydric (1 to 32%)

Not Hydric (0%)

Not rated or not available

Soil Rating Lines

Hydric (100%)

Hydric (66 to 99%)

Hydric (33 to 65%)

Hydric (1 to 32%)

Not Hydric (0%)

Not rated or not available

Soil Rating Points

Hydric (100%)

Hydric (66 to 99%)

Hydric (33 to 65%)

Hydric (1 to 32%)

Not Hydric (0%)

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Morton County, North Dakota
Survey Area Data: Version 19, Sep 21, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 17, 2013—Jul 27, 2013

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Appendix H

Plant List

Genus/Species	Common Name	Indicator Status
Acer negundo	ash-leaf maple (box elder)	FAC
Anemone canadensis	round-leaf thimbleweed	FACW
Apocynum cannabinum	Indian-hemp	FAC
Arctium minus	Lesser burdock	FACU
Artemisia vulgaris	common wormwood	UPL
Astragalus canadensis	canadian milk-vetch	FAC
Bromus inermis	smooth brome	UPL
Carex atherodes	wheat sedge	OBL
Carex nebrascensis	Nebraska sedge	OBL
Cirsium arvense	Canadian thistle	FACU
Elaeagnus angustifolia	Russian-olive	FACU
Epilobium ciliatum	fringed willowherb	FACW
Elymus repens	creeping wild rye	FACU
Fraxinus pennsylvanica	green ash	FAC
Galium sp		
Helianthus giganteus	giant sunflower	FAC
Juniperus virginiana	eastern red-cedar	UPL
Melilotus officinalis	yellow sweet clover	FACU
Nepeta cataria	catnip	FACU
Persicaria amphibia	water smartweed	OBL
Phalaris arundinacea	reed canary grass	FACW
Pragmittes australis	common reed	FACW
Poa pratensis	Kentucky blue grass	FACU
Populus deltoides	eastern cottonwood	FAC
Rhamnus cathartica	european buckthorn	FACU
Rumex crispus	curly dock	FAC
Salix amygdaloides	peach-leaf willow	FACW
Solidago canadensis	Canadian goldenrod	FACU
Taraxacum officinale	common dandelion	FACU
Typha sp	hybrid cattail	OBL
Verbascum blattaria	white moth mullein	UPL

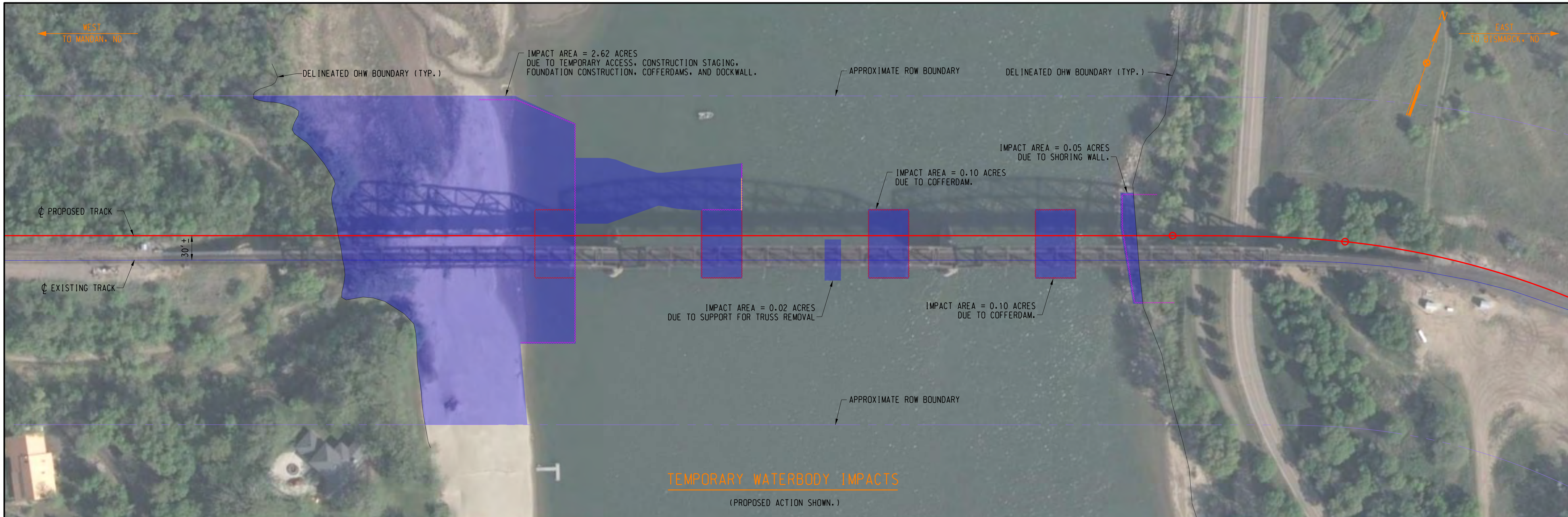
Appendix I

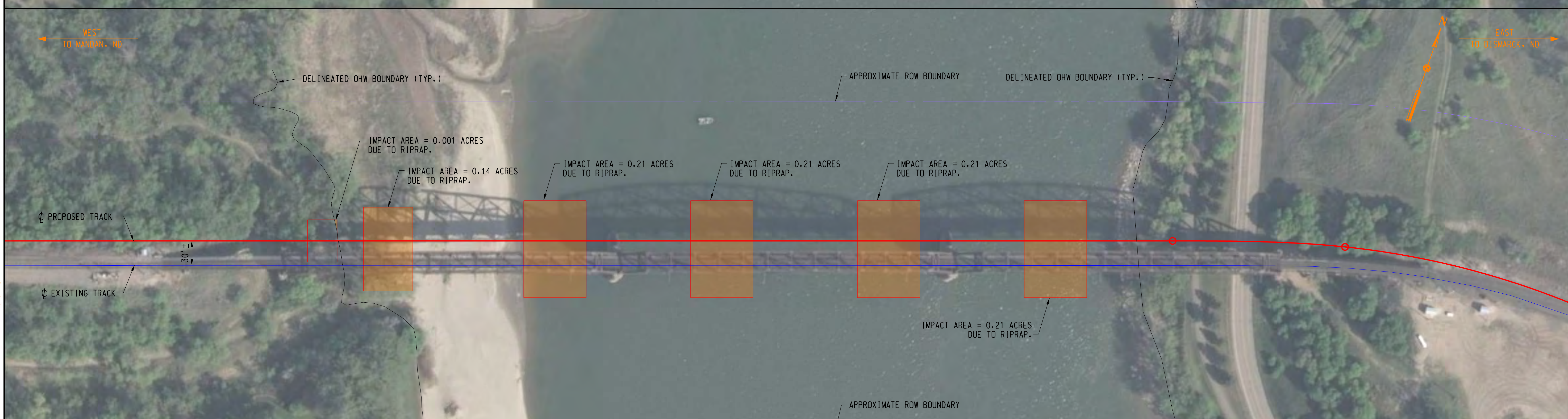
Aquatic Resource Excel Sheet

Waters_Name	State	Cowardin_Code	HGM_Code	Meas_Type	Amount	Units	Waters_Type	Latitude	Longitude
Missouri River	NORTH DAKOTA	R2UB	RIVERINE	Linear	200	FOOT	TNW	46.81809800	-100.82710000
Wetland 1	NORTH DAKOTA	PEM1		Area	281.31	SQ_FT	RPWWN	46.81395600	-100.83333300
Wetland 2	NORTH DAKOTA	PEM1		Area	0.61	ACRE	RPWWN	46.81575700	-100.83489500
Wetland 3	NORTH DAKOTA	PEM1		Area	0.26	ACRE	RPWWD	46.81650200	-100.83154400
Wetland 4	NORTH DAKOTA	PEM1		Area	0.23	ACRE	RPW	46.81702000	-100.82951400
Wetland 5	NORTH DAKOTA	PEM1		Area	0.39	ACRE	NRPW	46.81805700	-100.82050600
Wetland 6	NORTH DAKOTA	PEM1		Area	0.13	ACRE	NRPWW	46.81861100	-100.82227200

Appendix F

Water Body Impacts Mapping





NOTE
INFORMATION SHOWN IS CONCEPTUAL.
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Saint Paul, MN 55101
651.292.4400
tkda.com

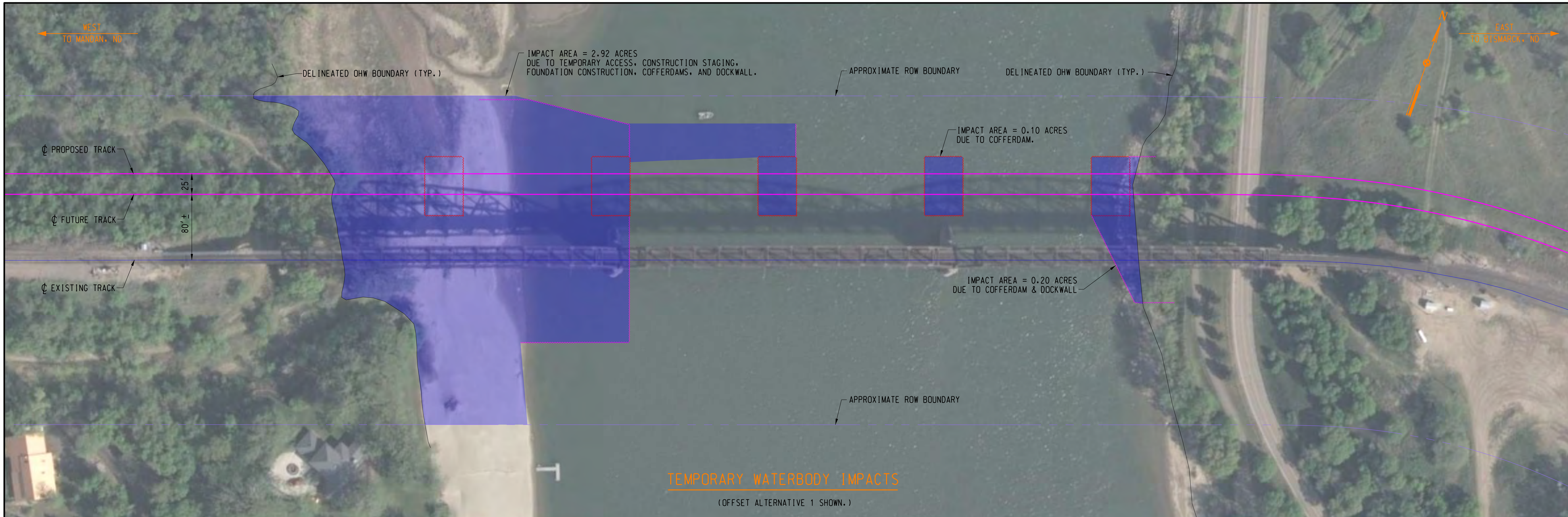
DES:	TKDA
DRAWN:	TKDA
CHECK:	TKDA
DATE:	MAR. 2021
AUTH:	AXXXXX
LINE SEG:	0038

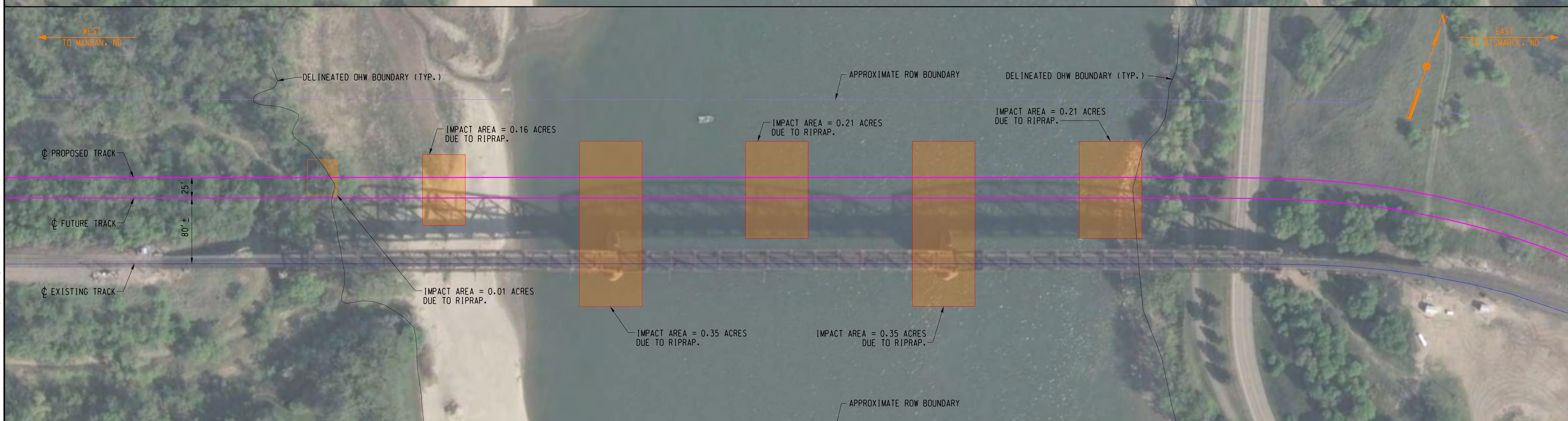
BNSF RAILWAY
BRIDGE ENGINEERING KANSAS CITY, KS
APPROVED:
DIRECTOR STRUCTURES ENGINEERING

BISMARCK TO MANDAN
BRIDGE NUMBER 196.6A
OVER MISSOURI RIVER NEAR BISMARCK, ND
ENVIRONMENTAL IMPACT AREAS
PROPOSED ACTION

PLAN NO: 0038-0196.600-001 SHEET: 1 OF 1

Date Printed: 3/9/2021 Time Printed: 5:01:49 PM





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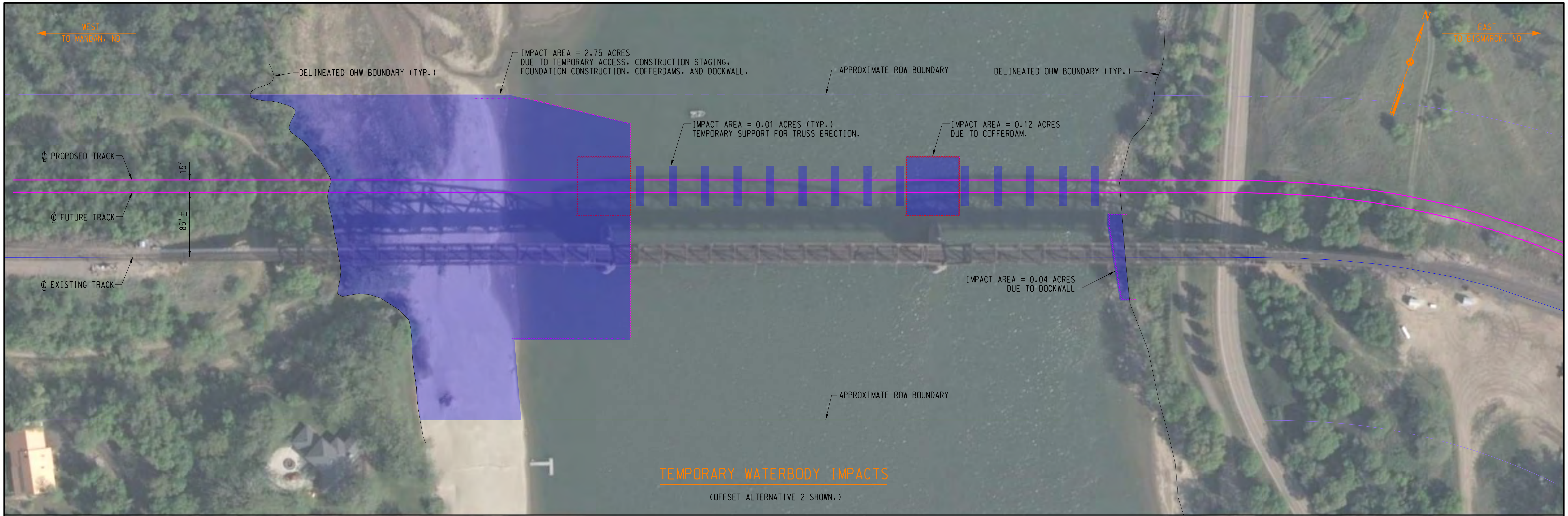
tkda.com

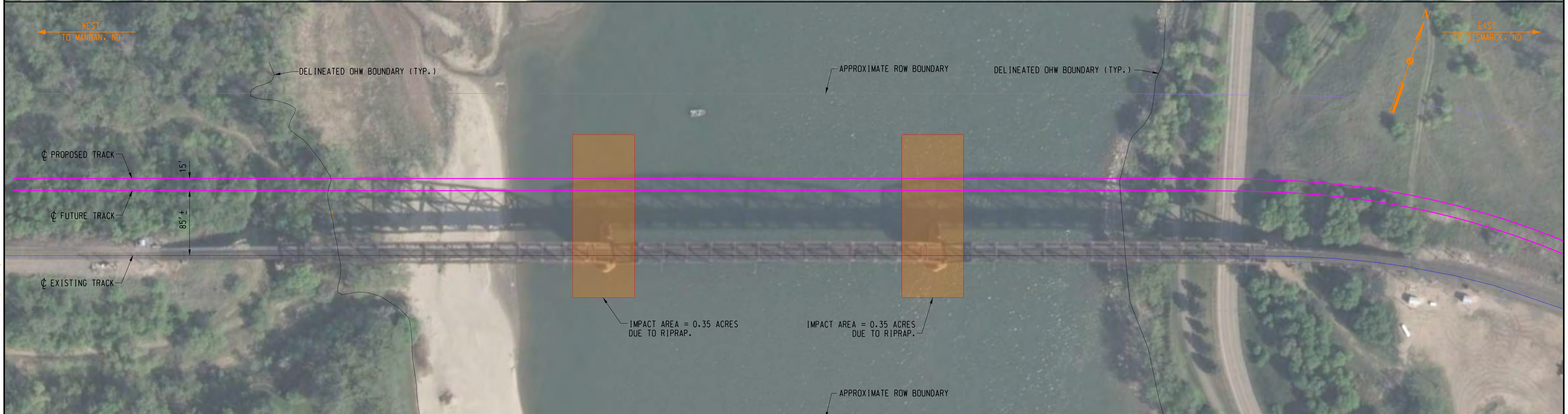
DES: TKDA	BNSF RAILWAY	BISMARCK TO MANDAN	
DRAWN: TKDA		BRIDGE NUMBER 196.6A	
CHECK: TKDA	BRIDGE ENGINEERING KANSAS CITY, KS	OVER MISSOURI RIVER NEAR BISMARCK, ND	
DATE: MAR. 2021		ENVIRONMENTAL IMPACT AREAS OFFSET ALTERNATIVE 1	
AUTH: AXXXXX	APPROVED:		
LINE SEG: 0038	DIRECTOR STRUCTURES ENGINEERING	PLAN NO: 0038-0196.600-001	SHEET: 1 OF 1

Date Printed: 3/9/2021 Time Printed: 2:12:07 PM



TEMPORARY WATERBODY IMPACTS

(OFFSET ALTERNATIVE 2 SHOWN.)



NOTE

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PERMANENT WATERBODY IMPACTS

(OFFSET ALTERNATIVE 2 SHOWN.)

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CHECK:	TKDA
DATE:	MAR. 2021
AUTH:	AXXXXX
LINE SEG:	0038

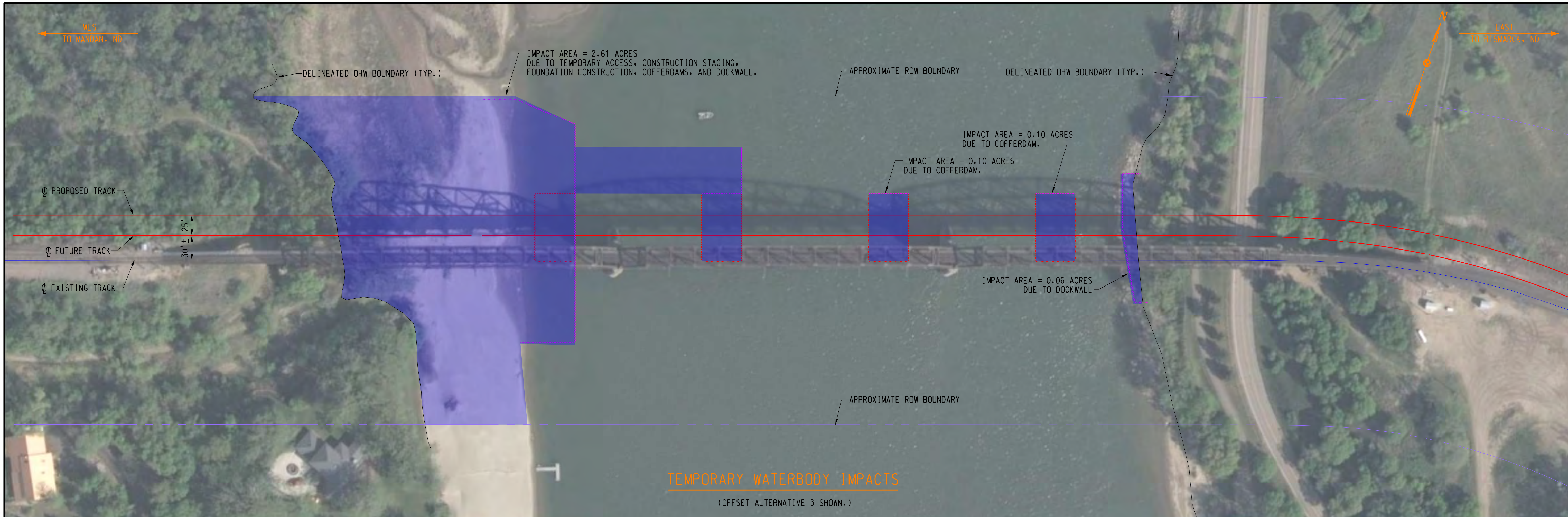
BNSF RAILWAY
BRIDGE ENGINEERING KANSAS CITY, KS

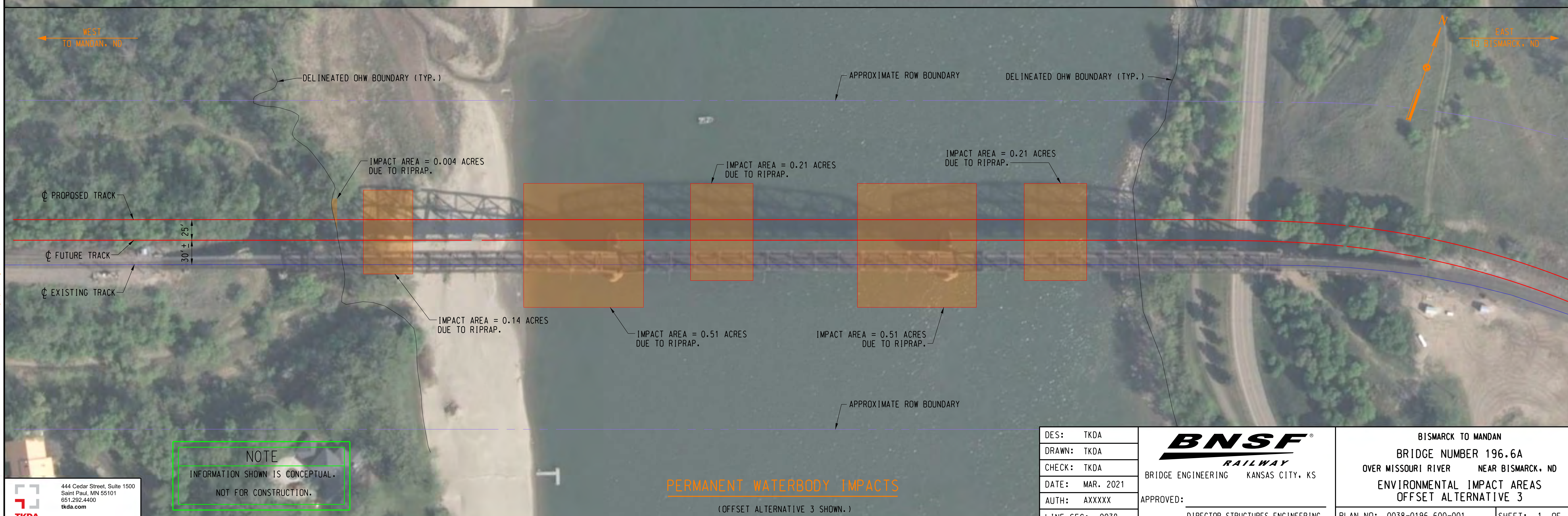
APPROVED: ______________________
DIRECTOR STRUCTURES ENGINEERING

BISMARCK TO MANDAN
BRIDGE NUMBER 196.6A
OVER MISSOURI RIVER NEAR BISMARCK, ND
ENVIRONMENTAL IMPACT AREAS
OFFSET ALTERNATIVE 2

PLAN NO: 0038-0196.600-001 SHEET: 1 OF 1

Date Printed: 3/9/2021 Time Printed: 5:15:39 PM





NOTE

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DRAWN:	TKDA
CHECK:	TKDA
DATE:	MAR. 2021
AUTH:	AXXXXX
LINE SEG:	0038

BNSF RAILWAY

BRIDGE ENGINEERING KANSAS CITY, KS

APPROVED:

DIRECTOR STRUCTURES ENGINEERING

BISMARCK TO MANDAN

BRIDGE NUMBER 196.6A

OVER MISSOURI RIVER NEAR BISMARCK, ND

ENVIRONMENTAL IMPACT AREAS
OFFSET ALTERNATIVE 3

PLAN NO: 0038-0196.600-001 SHEET: 1 OF 1

Date Printed: 3/9/2021 Time Printed: 4:19:08 PM

Appendix G

Construction Methods

Construction Methods

BNSF Railway is currently planning a replacement structure for their crossing of the Missouri River in Bismarck, North Dakota. Located on the Jamestown subdivision of Line Segment 0038, the proposed structure is to be constructed on a parallel alignment offset roughly 30’ from the existing bridge’s centerline, as shown in Figure 18-1.

Figure 18-1. Proposed New Bridge Structure Location

The new bridge is approximately 1554’ in length and will consist of seven ballasted deck prestressed concrete beam approach spans with span lengths of approximately 70’ and 80’, and five steel deck plate girder river spans, each approximately 200’ in length. The approach spans will be split between the east and west approaches, with four allocated for the west and three allocated for the east. The superstructure spans will be supported on reinforced concrete substructures that, in turn, are supported by deep driven pile foundations.

Additional civil works will be required at both approaches to accommodate the proposed alignment shift. The civil works will be minimized to limit the overall project footprint and consist primarily of grading operations at both approaches. Construction of an earthen embankment will be the predominate feature of the west approach; whereas, embankment removals will be the primary task at the east approach.

Once the new bridge is completed and in-service for rail traffic, the existing bridge will be removed. Removal operations will be completed by mechanical means only and removal by demolition will not be allowed.

To complete construction of the proposed structure and corresponding civil works, access to the site and temporary features will be required. Primarily, these temporary works will be required for construction of the proposed substructure units.

All construction activities will be completed in accordance with regulations intended to protect sensitive biological resources. For example, tree clearing within the approaches will be done within the winter months and installation of steel sheet piling for cofferdams and dock walls will not be done between April 15 and June 1.

Since the bridge crosses the Missouri River, site access and construction methods will differ depending on the segment of the project under consideration. As such, the bridge will be separated into three distinct regions for examination: west approach, river spans, and east approach.

West Approach

The project elements contained within the west approach are Piers 9-12, Abutment 13, Spans 9-12, and expansion of the earthen approach embankment, as shown in Figure 18-2.

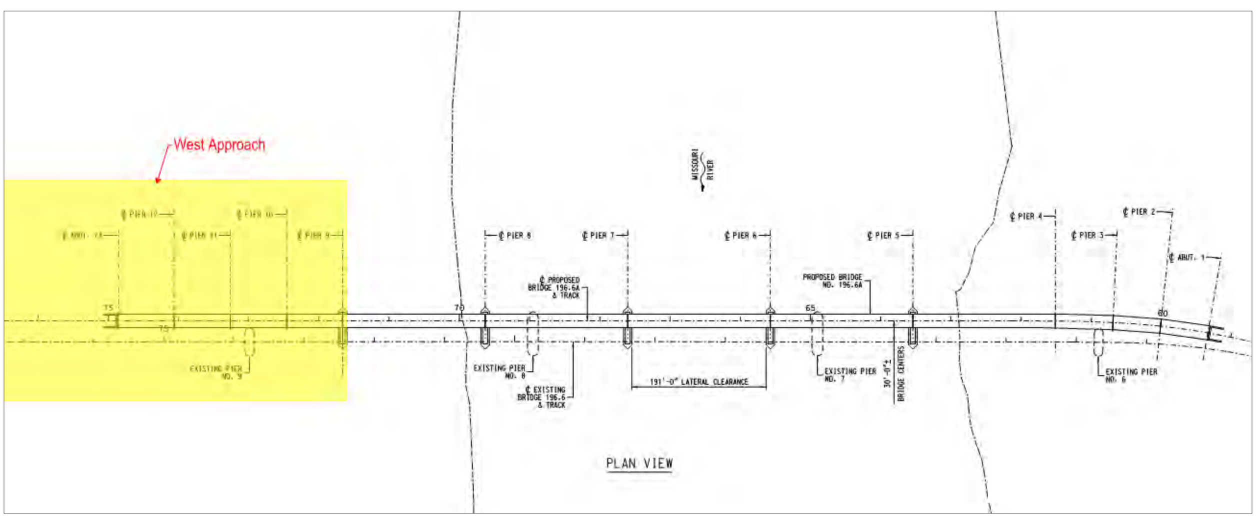


Figure 18-2. West Approach

It is anticipated that construction of the civil works and bridge elements within the west approach will be completed in the following fashion. The primary site access for construction operations will be made off of the West Bismarck Expressway at the far west end of the project. Temporary access will be provided to the two embankment benches located adjacent to the highway underpass structure, as shown in Figure 18-3.

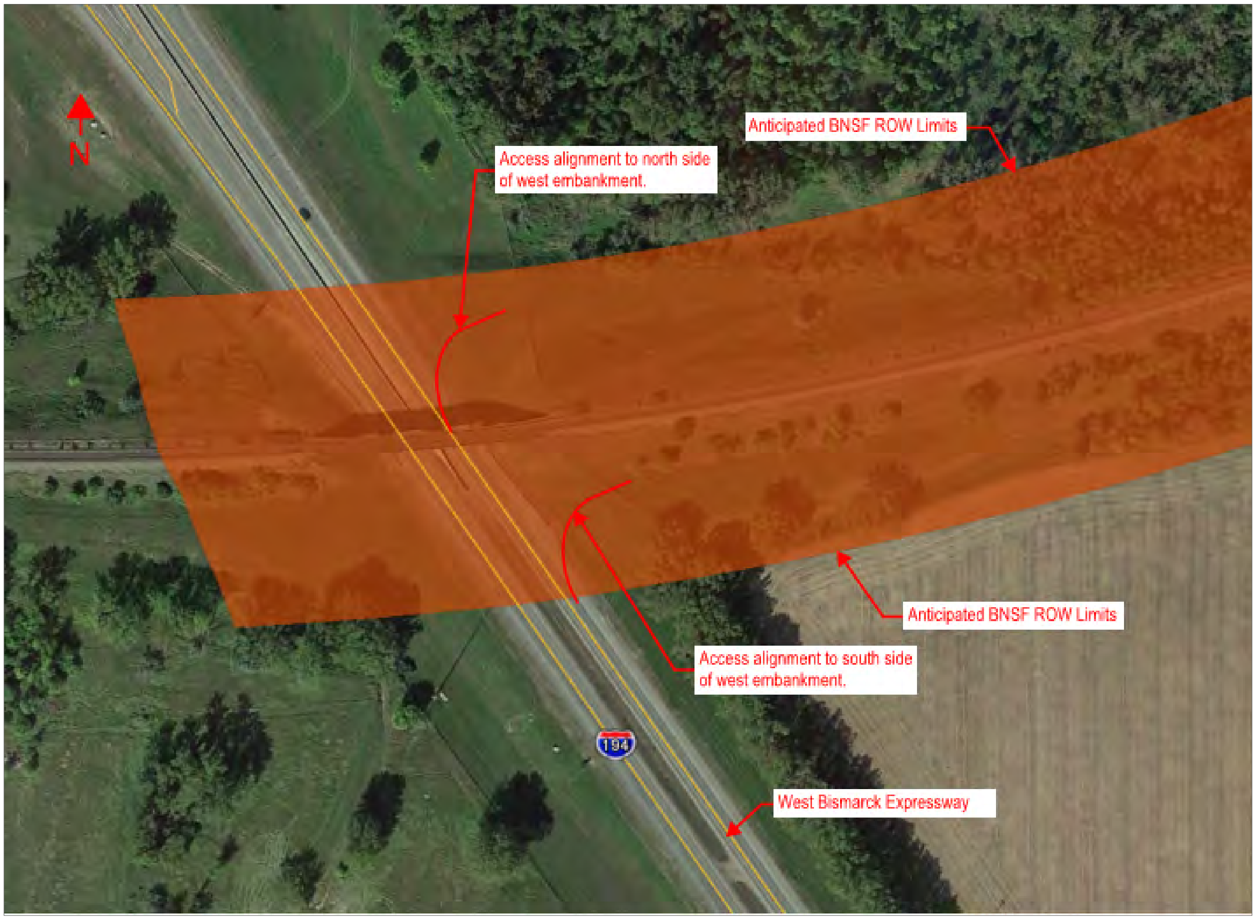


Figure 18-3. West Approach Access

The access points will be configured to avoid the in-place guardrail protecting the underpass bridge pier from northbound expressway traffic, as shown in Figure 18-4.

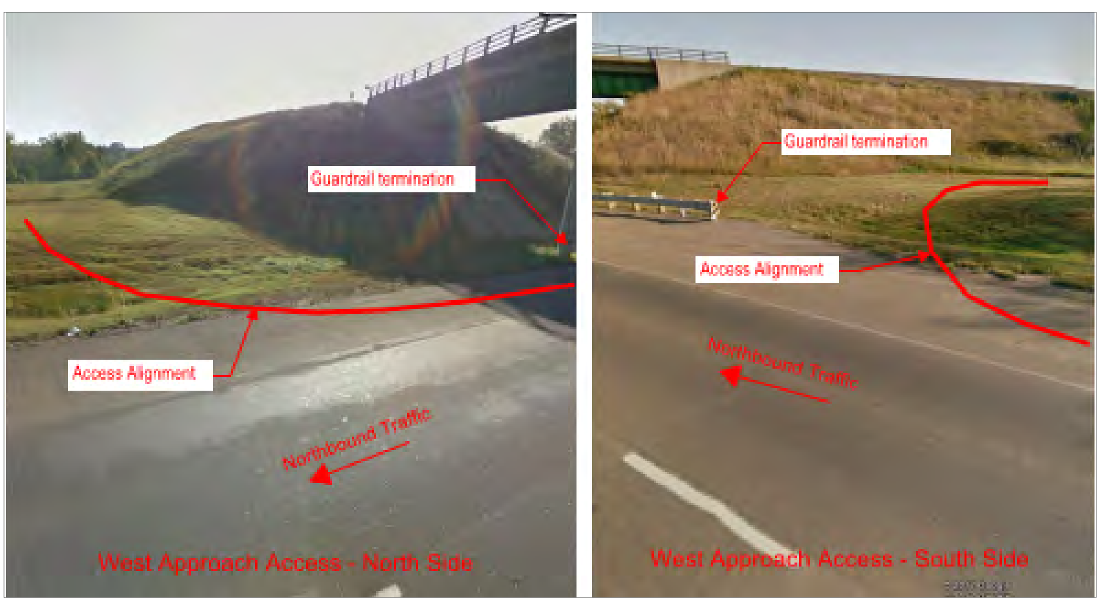


Figure 18-4. West Approach Access

Delivery of construction equipment and material will be made via these access points. Temporary traffic control measures will be required with deliveries proposed during off-peak (i.e. mid-day and overnight) traffic hours only. Access for construction staff will originate off of Captain Leach Drive south of the project site and traverse along the east side of the agricultural field to the edge of BNSF ROW. A parking area approximately 200' x 200' will be created in the field's northeast corner and also contain construction offices.

Other than access for construction personnel and vehicle and construction office parking, construction of the west approach work will be contained entirely within current BNSF ROW. To this end, staging/lay-down areas will be required for completion of the work. The two embankment benches at the west end of the embankment as well as the bank area near the Missouri River are anticipated for this use. These areas are identified in Figure 18-5. Prior to use, minor grading within these regions is expected; however, filling of wetlands is not anticipated.

Figure 18-5. West Approach Staging/Lay-Down Areas

Using the identified site access and staging/lay-down areas, construction of the west approach civil works are anticipated to begin at the west project end and progress back toward the River.

Embankment material will be deposited in the staging/lay-down area and pushed east and compacted in a systematic fashion. As the embankment is constructed to its finished configuration, a small retaining wall and additional fill will be placed along the toe of slope to create a construction access road to the River. The access road will be approximately 30' wide and will be contained entirely within BNSF ROW.

Construction of the west approach span bridge substructures will be initiated by localized grading to the proposed bottom of footing elevation within the plan limits of the individual substructure unit. Within this area, a mat of steel H-piling will be driven with a diesel-powered hammer. The anticipated pile lengths range from approximately 170' at the west abutment to approximately 70' at Pier 9. An HP 14x102 steel pile will be utilized throughout and either welded or prefabricated pile splices will be necessary to achieve the anticipate pile lengths. Pile point reinforcement will be used at all substructure locations.

On top of the pile mats cast-in-place concrete footings and cast-in-place concrete stems will be placed. The concrete elements will be formed by conventional means and strengthened with mild steel reinforcement. Concrete will be delivered to the site via the construction access road and a concrete pump may be used for placement if necessary.

Upon completion of the substructure units, construction of the superstructure elements will begin. The approach spans are configured with precast-prestressed concrete beam elements that will be fabricated off-site and delivered to the project. Delivery to the site will be made via the construction access road and placement of the individual beams on the substructures will be completed with cranes positioned within BNSF ROW. A cast-in-place concrete deck with cast-in-place concrete ballast curbs will be placed on the beams. Concrete placement operations for these elements will be supplied to the site via the construction access road and pumped to the deck elevation.

River Spans

The project elements contained within the river spans are Piers 5-8, and Spans 4-8, as shown in Figure 18-6.

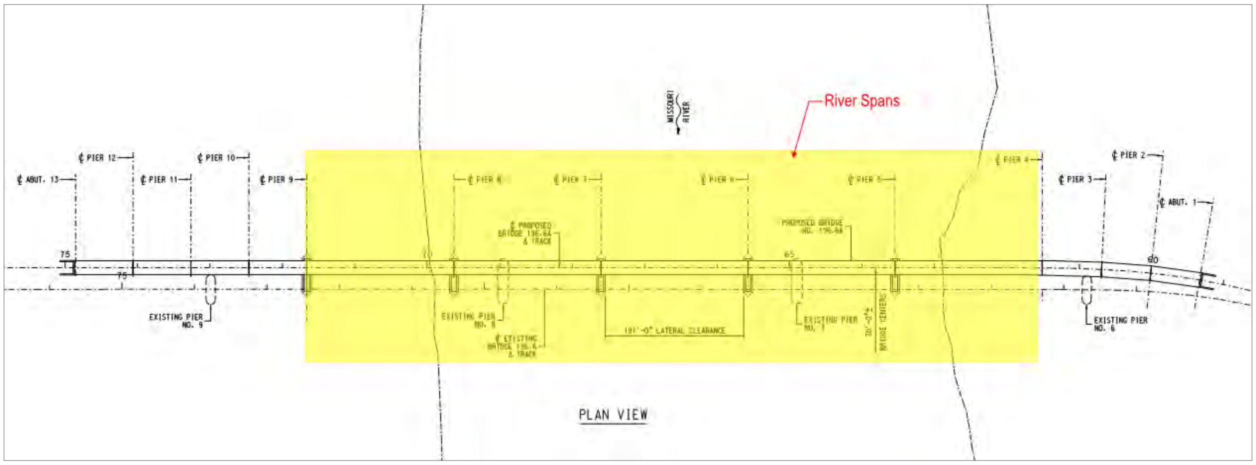


Figure 18-6. River Spans

One of the primary challenges associated with development of the new structure will be construction of the river span foundations, Piers 5-8, as access for construction will be largely dictated by water depths within the Missouri River. With the exception of Pier 8, the intended construction access will be via barges. Equipment and material will be supplied to the barges via the west approach construction access road constructed along the north side of the proposed embankment. To provide the necessary water depths to allow the transition from land-based to water-based construction operations, a temporary dock wall will be constructed along the west bank of the River, as shown in Figure 18-7. Configured as such, the dock wall will allow for construction of Pier 8 without the need for barge access. The dock wall will be constructed utilizing steel sheet piling with fill material placed behind the wall and topped with geotextile fabric and an aggregate base. Individual steel sheets will be installed using vibratory techniques and a geotextile will be placed to separate the aggregate fill from the in-situ soils. To be feasible, the minimum water depth adjacent to the dock wall and throughout the working area of the Missouri River must be 6.0 feet. As such, some degree of dredging may be needed to maintain construction operations. Dredged materials will be stockpiled within the Staging/Lay-down area and will either be reused as embankment fill material or transported off-site for disposal.

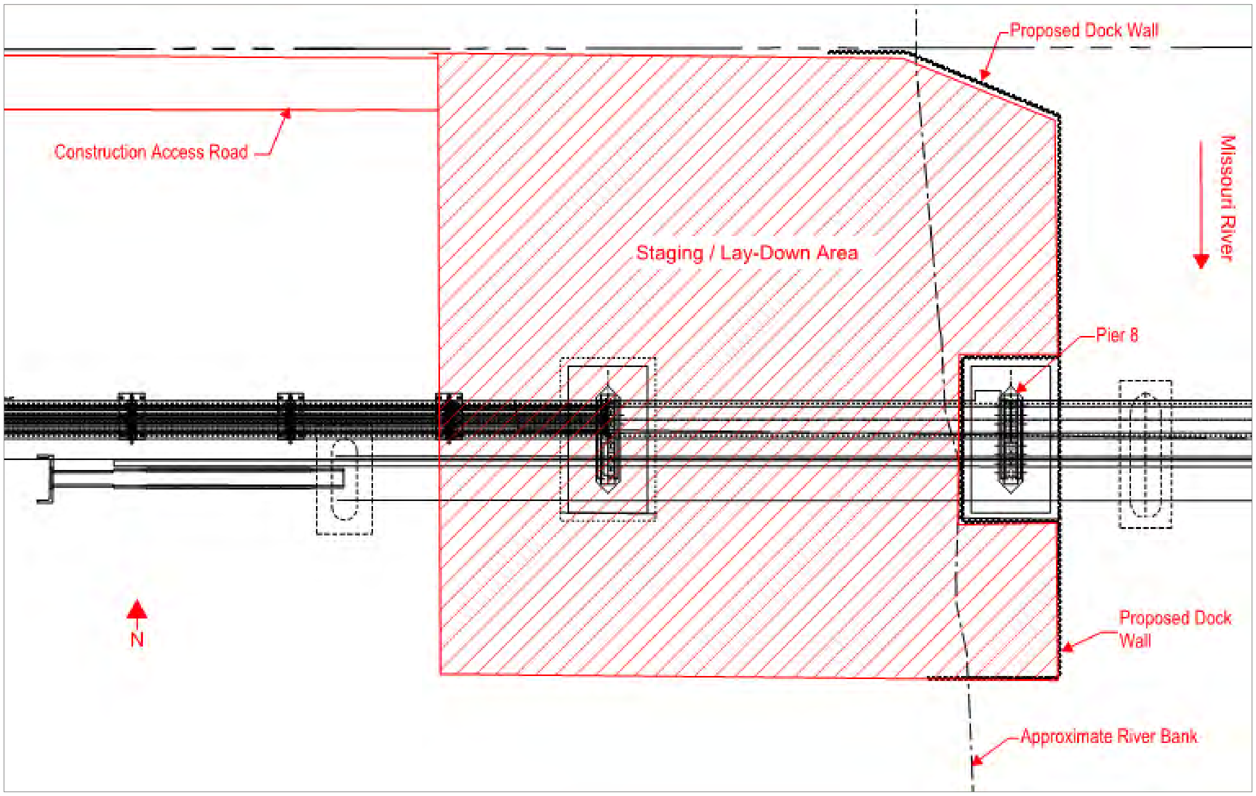


Figure 18-7. West Dock Wall

Construction of the river piers will begin with installation of the cofferdams. Cofferdams will be constructed with steel sheet piling installed with vibratory methods and will be configured to accommodate the proposed pier footing and supporting pile mat. To minimize impacts to the Missouri River hydraulics, no more than two river pier cofferdams will be installed at any one time.

Following cofferdam installation, the material contained within the cofferdams will be removed to the proposed bottom of footing seal elevation with clam-shell type excavation equipment. Excavated materials will be transported to the Staging/Lay-down area and will either be reused as embankment fill material, backfill around the piers, or transported off-site for disposal.

Within the excavated cofferdams, a mat of steel H-piling will be driven with a diesel-powered hammer. The anticipated pile lengths range from approximately 40' at Pier 8 to approximately 60' at Pier 5. An HP 14x102 steel pile will be utilized throughout and either welded or prefabricated pile splices will be necessary to achieve the anticipate pile lengths. Pile point reinforcement will be used at all substructure locations.

Once all of the piles are installed, a cast-in-place concrete seal will be placed at the bottom of the cofferdam excavation. Concrete for the seal will be delivered to the site via the construction access road and transported to the individual foundation via barge where necessary. Strengthening of the seal with mild steel reinforcement will not be required.

Upon sufficient cure of the seal concrete and pH neutralization of the water inside the cofferdam to within 1pH of the background in the River, water contained within the cofferdam will be pumped out. Pumped water from the cofferdam interior will be deposited directly back into the Missouri River. If large amounts of sedimentation are present it will be collected and transported to the Staging/Lay-down area for disposal.

Construction of the river pier footings and stems may be initiated once the tops of the cofferdams seals are exposed and the H-pile cut off. Footings and stems will be constructed from cast-in-place concrete and strengthened with mild steel reinforcement. Similar to the cofferdam seals, concrete will be delivered to the site via the construction access road and transported to the individual foundations via barge where necessary.

When stem construction has progressed to an elevation above the river's water surface, the cofferdam is no longer needed and may be removed. Removal operations will progress in reverse order to cofferdam construction beginning with staged backfilling up to the present streambed elevation. Removal of internal steel strengthening elements will follow and then the dewatering pumps will be turned off to let the water level on the inside equalize to the outside river elevation. Once the water surface elevation between the interior and exterior of the cofferdam has converged, removal of the steel sheets by vibratory methods will be attempted. If removal is not possible, the steel sheets will be cut-off at the lowest possible elevation.

Upon completion of the substructure units, construction of the superstructure elements will begin. The river spans are configured with welded steel plate girder elements that will be fabricated off-site and delivered in segments to the project. Delivery to the site will be made via the construction access road and assembly of the individual girders will be completed within the Staging/Lay-down area. Installation of the girders on the substructures will be completed with cranes positioned on barges or in the Staging/Lay-down area. A cast-in-place concrete deck with cast-in-place concrete ballast curbs will be placed on the girders. Concrete placement operations for these elements will be supplied to the site via the construction access road and pumped to the deck elevation.

The anticipated access for construction of the river spans is via barges. This access method requires at least 6.0 feet of water depth for the duration of construction to be feasible. Since the actual water depth at the time of construction is unpredictable, it may be necessary to complete a portion of the river span work via earthen causeway. Causeways may be pursued should the water depths decrease significantly below the 6.0 foot minimum threshold requirement and localized dredging proves ineffective or offensive. Causeways, if utilized would be constructed as earthen embankments utilizing imported fill material with rip rap used to armor the causeways to protect against erosion. A geotextile fabric would be used to separate the proposed temporary fills from the in-situ soils. All temporary causeway material would be removed once no longer needed for construction.

East Approach

The project elements contained within the east approach are Piers 2-4, Abutment 1, Spans 1-3, and grading work necessary to modify the east approach, as shown in Figure 18-8.

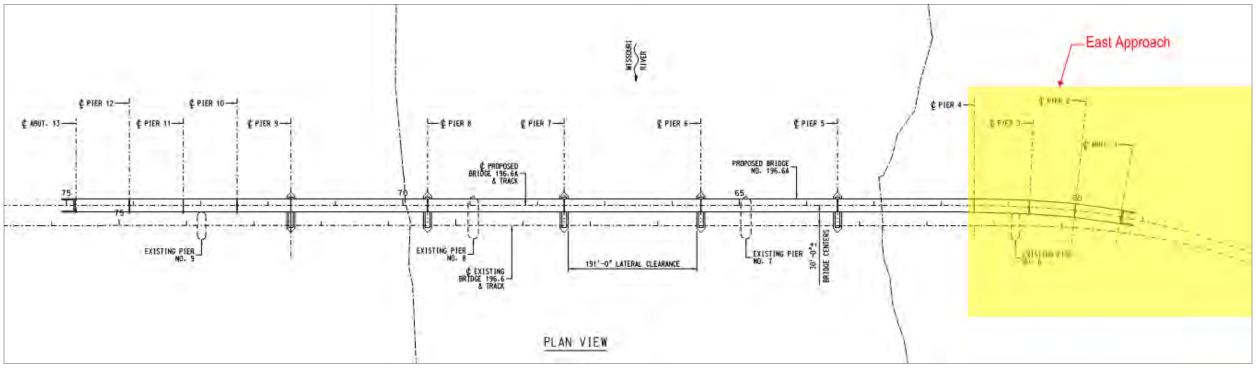


Figure 18-8. East Approach

It is anticipated that construction of the civil works and bridge elements within the east approach will be completed in the following fashion. The primary site access for construction operations will be made off of River Road at the east end of the project. Temporary access will be provided to the north side of the current alignment, as shown in Figure 18-9.

Figure 18-9. East Approach Access

In addition, access to the river bank will be necessary for installation of the Span 4 superstructure and assistance with construction of Pier 5. Access to this location will be provided via a temporary access road adjacent to the river bank, as shown in Figure 18-10. The temporary shoring indicated will be steel sheeting piling installed via vibratory methods. Additional fill needed to generate the proposed working surfaces will be imported granular material and a geotextile fabric will be placed to separate new fills from the in-situ soils. Tree clearing within this region will be necessary to complete the proposed works as well as temporary closures to both River Road and the Riverfront Trail.

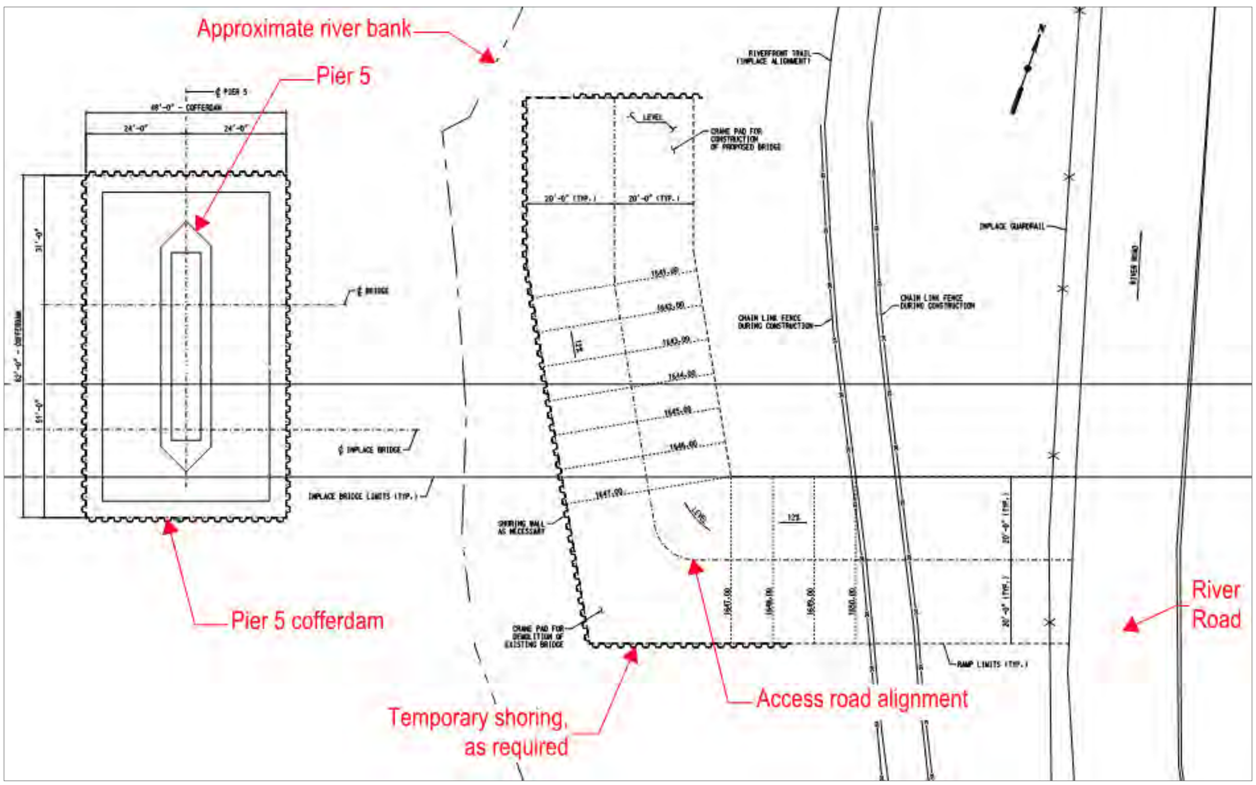


Figure 18-10. East Approach Access

Access for construction personnel and vehicle and construction office parking, and the staging/lay-down area required for completion of the work will be located on the south side of the existing alignment within BNSF ROW, as shown in Figure 18-11. An additional staging/lay-down area is available on the north side as well. Similar to the west approach, minor grading within these regions is expected; however, filling of wetlands is not anticipated.

Figure 18-11. East Approach Staging / Lay-Down Areas

Construction of the east approach span bridge substructures will be initiated by localized grading to the proposed bottom of footing elevation within the plan limits of the individual substructure unit. A temporary shoring system will be required for construction of Pier 4 given its proximity to River Road, and for Pier 3 given its proximity to the in-place pier. Within these excavated areas, a mat of steel H-piling will be driven with a diesel-powered hammer. The anticipated pile lengths range from approximately 80’ at Pier 3 to approximately 100’ at Pier 4 and the east abutment. An HP 14x102 steel pile will be utilized throughout and either welded or prefabricated pile splices will be necessary to achieve the anticipate pile lengths. Pile point reinforcement will be used at all substructure locations.

On top of the pile mats will be placed cast-in-place concrete footings and cast-in-place concrete stems. The concrete elements will be formed by conventional means and strengthened with mild steel reinforcement. Concrete will be delivered to the site via River Road and a concrete pump may be used for placement if necessary.

Upon completion of the substructure units, construction of the superstructure elements will begin. The approach spans are configured with precast-prestressed concrete beam elements that will be fabricated off-site and delivered to the project. Delivery to the site will be made via

River Road and placement of the individual beams on the substructures will be completed with cranes positioned within BNSF ROW. A cast-in-place concrete deck with cast-in-place concrete ballast curbs will be placed on the beams. Concrete placement operations for these elements will be supplied to the site via the construction access road and pumped to the deck elevation.

Appendix H

Missouri River Ice Jams Technical Memorandum

HoustonEngineering Inc.

Technical Memorandum

To: Project File – 6680-007

From: Gregg Thielman PE, CFM Houston Engineering, Inc.

Subject: Missouri River Ice Jams

Date: August 1, 2017

Project: BNSF MP 196.6 LS 0038 Bridge Replacement

INTRODUCTION

As part of the permitting for the BNSF bridge replacement at MP 196.6 LS 0038, concerns have been expressed by agencies about potential impacts the proposed bridge may have on ice jams/ice buildup on the Missouri River due to the additional piers that will be in the water. The effective Flood Insurance Studies for Burleigh County, ND (Effective August 4, 2014) and Morton County, ND (Effective October 16, 2015) include a detailed FIS for the Missouri River that included an ice jam analysis. This technical memorandum summarizes the methodology for analyzing ice jam impacts in the FIS and discusses the potential impact ice jams may have on the replacement structure for the Bridge at MP196.6, LS 0038.

POTENTIAL ICE IMPACTS

The effective FIS for Burleigh County (38015CV000B) references that break-up type ice jams are most common downstream of the confluence of the Missouri River and Heart River, which is approximately 4 River Miles downstream from Bridge 196.6. Specifically, the FIS states the following regarding ice conditions for the Missouri River as it defines the Principal Flood Problems:

The surface water within the Missouri River study reach occurs from either snowmelt runoff, runoff from rainfall, or both. The following four conditions can cause or contribute to flooding in the study reach: (1) open-water season flooding from Garrison Dam operation; (2) open-water season flooding from the Knife River, the Heart River, or other residual drainage areas between Garrison Dam; (3) flooding resulting from ice jams and ice conditions; and (4) flooding caused by aggradation in the upper reaches of Lake Oahe.

Ice jams have contributed significantly to historic flooding in the study area, as evidenced in the 2009 event. While the severity of ice jams has decreased since the construction of Garrison Dam, the potential for severe river blockage still exists. Ice jams that occur in the study area are both the freeze-up and break-up types. Freeze-up type jams normally occur during the ice-in period. They result from higher flow-frequency discharge because of additional roughness of the newly formed ice cover. The ice-in period for the study area normally begins by the formation of ice on Lake Oahe downstream of the study area. The head of the ice then moves upstream on the Missouri River through the study area, causing increased blockage.

Break-up type ice jams normally occur in late winter or early spring during the snowmelt period. Break-up jams in the study area are most common downstream of the confluence of the Missouri River and Heart River. They *usually occur when flows on the Heart River increase as a result of snowmelt or spring rains and the Missouri River is still covered with ice.*

The Hydrologic and Hydraulic Analyses sections of the FIS also reference ice jam flooding and how the analyses was performed. The following excerpt is from the Hydrologic Analyses section for the Missouri River:

Flooding because of ice jams and ice conditions was evaluated by developing composite stage-probability curves for the USGS stream gages near the Cities of Schmidt, Mandan, and Bismarck. The composite curves are a combination of the stage probability curves developed at these sites for the open-water condition involving runoff from the tributaries, downstream from Garrison Dam and ice jam conditions. The WSELs at the other cross sections in the study reach were adjusted based on the results of the composite stage frequency curves.

The following excerpt is from the Hydraulic Analyses section of the FIS for the Missouri River:

Ice jam potential was evaluated in the study area using the direct approach procedure outlined in FEMA's Guidelines and Specifications for Study Contractors. First, stage-frequency curves were established for open-water conditions using the HEC-RAS computer model. Next, stage-frequency curves were developed for the Missouri River at USGS Stream Gage No. 06342500 at the City of Bismarck, Gage No. 06349070 at the City of Mandan, and Gage No. 06349700 at Schmidt for the ice jam period. These ice jam stage-frequency curves were developed by performing a log-Pearson Type III analysis of historical peak stages during the ice jam period, which occurs from approximately December 1 through March 31. The stage-frequency curves for the open-flow and ice jam periods at each location were combined to form a composite stage-frequency curve using the formula defined by the existing FIS report for the City of Bismarck, North Dakota."

The resulting analysis that was performed showed ice jam flooding only impacted the water surface profiles for the 10-percent annual chance (10-year) flood event and did not impact the profiles for the larger flood events (50-year, 100-year, and 500-year). Additionally, we are not aware of any known or documented ice buildup issues for Bridge 196.6 since the construction of Garrison Dam. The number of piers in the water (11 total piers, with 4 in the main river channel) for the proposed condition are similar to the I-94/Grant Marsh Bridge located immediately upstream (6 total piers, with 3 in the main river channel) and the new Memorial Bridge (13 total piers, with 5 in the main river channel) located immediately downstream. Based on this review, we do not believe the proposed replacement for Bridge 196.6 will impact ice jams or ice buildup for the Missouri River in the study area.

Appendix I

Navigation Impact Report

NAVIGATION IMPACT REPORT

BNSF Railway Bridge 196.6, Burleigh & Morton Counties, Bismarck/Mandan, ND

HoustonEngineering Inc.

Date: October 16, 2017

HEI project no. 6680-007

1. EXECUTIVE SUMMARY

BNSF Railway currently owns and operates a single-track structure across the Missouri River in Bismarck, North Dakota (**Attachment A: Location Map**). The existing railway bridge was constructed in 1882, and is approaching the end of its useful service life. As such, BNSF has developed a replacement bridge that will be constructed 30 feet upstream, parallel to the existing bridge. It is important to consider the potential temporary and long-term navigation impacts associated with the construction of the proposed bridge. Temporary effects are associated with the construction of the new bridge piers and removal of the in-place structure. Permanent impacts are associated with an increased number of piers within the navigable river channel. However, even with an increased number of piers in the river channel, navigation will not be affected.

2. PURPOSE AND NEED

With in-service components over 130 years old, the in-place structure is approaching the end of its useful service life. The structure has a history of exposure to ice jams and its substructure configuration renders it potentially susceptible to scour events. Although currently stable, the structure has experienced issues at both approaches, resulting in unanticipated substructure movements in the past. Therefore, the intent of the project is to construct a new, independent single-track bridge across the Missouri River upstream of the in-place structure. Operationally, the new structure will carry the mainline track, while the current structure will be taken down.

The proposed superstructure places all the primary load carrying elements below the top of rail elevation. As such, the structure will have a significantly reduced susceptibility to damage caused by unforeseen or extreme events when compared to the existing structure. Furthermore, inspection and maintenance practices will be possible with limited disruptions to rail service and reduced risk to BNSF employees as walkway access will be provided between the primary river span beam lines. Finally, each span will consist of multiple beam lines between adjacent supports, thus providing a level of redundancy that is not provided by the in-place structure.

Accordingly, the proposed structure will be much less susceptible to catastrophic collapse due to unforeseen or extreme events. The reduction in damage potential, increased safety, and level of redundancy are all considered significant improvements to the existing condition.

3. DESCRIPTION OF PROPOSED PROJECT

The new structure is to be constructed on a parallel alignment offset approximately 30 feet upstream from the existing bridge's centerline. The new structure is anticipated to be approximately 1550 feet in length and consist of seven ballasted deck prestressed concrete beam approach spans with span lengths of approximately 70 feet and 80 feet, and five steel deck plate girder river spans, each approximately 200 feet in length. The approach spans will be split between the east and west approaches, with four allocated for the west and three allocated for the east. The superstructure spans will be supported on reinforced concrete substructures that, in turn, are supported by deep foundations.

Supporting the proposed superstructure will be pier and abutment substructure units constructed from cast-in-place concrete. Each unit will, in turn, be supported on a deep foundation mat of driven steel piling. Spacing of the substructures will be developed such that construction is compatible with the in-place bridge and the configuration of each substructure will be dependent on the loading demands generated by the railroad and environmental forces applicable to the specific location.

Since the configuration of the proposed structure places additional piers within the limits of the Missouri River, the river hydraulics will be affected by the proposed work with a slight increase to the water surface profile anticipated. To minimize the impact to River hydraulics the existing bridge will be completely removed once the new structure is in-service.

4. THE MISSOURI RIVER SYSTEM WATER LEVELS

4.1 River Characteristics

The Missouri River begins in the Rocky Mountains in western Montana and joins the Mississippi River just north of St. Louis, Missouri. Throughout this entire watercourse, the US Army Corps of Engineers (USACE) owns and operates several dams and reservoirs that were put in place for flood control, irrigation, and recreation. These reservoirs are operated as one continuous system, with each of the control structures influencing the others, both upstream and downstream.

The Garrison Dam is the closest upstream reservoir relative to the BNSF project. The dam, located approximately 70 river miles upstream, regulates flows on the Missouri River which will directly affect the water elevation at the BNSF bridge. The USACE has forecast releases from the Garrison Dam that are based on historic and predicted weather forecast. Following their predetermined set of criteria involving water supply to Bismarck, water storage for irrigation, and recreation purposes, the USACE regulates the releases based on inflows to the reservoir and the larger Missouri River System. The Missouri River reservoir system is very complex, and projected releases will change monthly based on precipitation and runoff in the basin, even when it occurs downstream of the project site.

The correlation between the Missouri River flows at Bismarck and outflows from the Garrison Dam is not a 1:1 relationship. The approximately 70-mile stretch between the two locations incorporates additional drainage area, the most prominent of which is the Knife River, with a contributing drainage area well over 2,000 square miles. Several other tributaries such as the Painted Woods Creek, Turtle Creek, Square Butte Creek, and Burnt Creek also enter the Missouri River upstream of the project location and have drainage areas generally under 500 square miles. If desired, the Missouri River Cofferdam Analysis (**Attachment B: Missouri River Cofferdam Analysis**) can be referenced for full details on the flow comparison analysis. In general, the flows at Bismarck range between 1,000 – 8,000 cubic feet per second (cfs) higher than the Garrison releases.

Due to the nature of the soil types throughout the region, the Missouri River tends to reconfigure its channel bottom from year to year, specifically as large flood events occur. In addition to lateral channel migration, large flood events can substantially lower the bottom of the Missouri River channel through scouring affects. With predominately sandy soils in the Missouri River bed, sandbars are a defining feature of the river corridor. These sandbars have been known to completely reconfigure themselves during large flood events. With this in mind, the channel geometrics listed herein are general approximations based on available data at the time of the analysis.

The Missouri River through Bismarck and Mandan has an ordinary high water (OHW) level corresponding with a flow of approximately 32,600 cfs. This flow is approximately equal to a 1.7-year frequency flood event, and equates to an approximate water surface elevation of 1628.5 (NAVD88) at the project location, and corresponds to an approximate channel top width of 700 feet. For reference, the lowest point in the channel bottom is currently at approximate elevation 1603.6 feet (NAVD88). The base flood (100-year) water surface elevation corresponding to the proposed conditions of the BNSF project is elevation 1638.1 feet (NAVD88) and corresponds to an approximate channel top width of 1,000 feet.

4.2 Bridge Characteristics

As described in Sections 1 and 3, the bridge geometrics will be changing and are important to note from a navigational perspective. The existing bridge has two main piers in the water, each approximately 20.5 feet wide at the base sloping to approximately 10 feet wide at the top. The piers support a 400-foot long span, and this equates to an actual horizontal clearance of approximately 385 feet (depending on water elevation). The existing bridge has a low steel elevation of 1690.0, feet resulting in approximately 52 feet of vertical clearance during the base flood event.

The proposed bridge will have generally shorter spans, with more piers in the water. The design consists of four piers within the main portion of the river channel. These piers will be 12 feet wide, and support 203-foot long bridge spans, equating to approximately 191 feet of horizontal clearance. The proposed bridge is set to have a low steel elevation of 1679.8 feet, resulting in approximately 42 feet of vertical clearance during the base flood event (Table 1. Existing versus proposed bridge dimensions) (**Attachment C: Plan Sheets**).

Table 1. Existing versus proposed bridge dimensions

	Existing	Proposed
Base flood elevation (100 yr)	1638.1 ft	
Ordinary High Water (OHW) elevation	1628.5 ft	
Channel bottom elevation	1603.6 ft	
Low steel bridge elevation	1690.0 ft	1679.8 ft
Horizontal clearance	385 ft	191 ft
Vertical clearance (from ordinary high water elevation)	62 ft	51 ft

The BNSF Bridge is bound on the north and south by three other major bridges crossing the Missouri River. The Interstate-94 bridge approximately 2,000 feet upstream, the Memorial Bridge approximately 4,000 feet downstream, and the Bismarck Expressway bridge approximately 1.5 miles downstream (Table 2. Surrounding Bridge Dimensions).

Table 2. Surrounding Bridge Dimensions

	I-94	BNSF (proposed)	Memorial
Low Steel Bridge Elevation	1661.1 ft	1679.8 ft	1681.65 ft
Horizontal Clearance	210 ft	191 ft	280 ft
Vertical Clearance	29 ft (from "reference plane" elev. 1632.4)	42 ft (from base flood elevation)	44 ft (from base flood elevation)

5. CURRENT AND FUTURE NAVIGATIONAL USES

This section describes the current navigation uses under the existing railroad bridge as well as the future anticipated navigational trends. The primary general navigational uses along the Missouri River include summer recreational watercraft transit as well as the Louis & Clark Riverboat tour business.

As described in Section 4.2, the existing railroad bridge (to be removed) has three primary river spans that extend approximately 400 feet each (385 feet horizontal clearance). The proposed railroad bridge is designed to have five 200-foot spans (191 feet horizontal clearance). For a temporary period between construction of the new bridge and demolition of the old bridge, all existing and new piers will be in the water, along with additional encroachment from a temporary dock wall potentially needed for construction. During this period, the resulting widest span and deepest water depths for transit is in the center of the river between new piers #5 and #6.

5.1 Current and Future Marine Traffic

Marine traffic through the railroad bridge includes frequent summer recreational watercraft and the Louis & Clark Riverboat. No other known commercial ships, barges, or tugs have been identified as using the river for transit through the bridge. No changes in the types of river traffic are anticipated in the future.

Recreational watercraft typically use the river during the peak recreational boating season, which is between May and September. No recreational boats are expected to be affected by the proposed bridge as their air draft heights are much less than 51 feet (typical water levels) or 42 feet (100-year). The horizontal and vertical clearance of recreational boats will not be affected by the span of the proposed bridge.

The Louis & Clark Riverboat operates public and private charters May 1 through September 30 with the frequency of operation varying from day-to-day throughout a given week, with increased number of trips throughout the weekends. The riverboat traverses through the center span of the existing railroad bridge, and in a similar manner, it is anticipated that the riverboat will traverse through the center span of the proposed bridge.

6.2 River User Data

The existing railroad bridge provides approximately 62 feet of vertical clearance above the OHW level of 1628.5 feet (NAVD88), whereas the proposed bridge will provide approximately 51 feet of clearance, respective to the OHW. The change will not affect passage of recreational watercraft or the Louis & Clark Riverboat. The riverboat is the largest vehicle known to traverse under the bridge and its air draft has been estimated to be approximately 27 feet, which is lower than the lowest member of the proposed bridge.

In a letter dated August 14, 2017, Mr. Aaron Barth, Executive Director of the Fort Abraham Lincoln Foundation, operator of the Louis & Clark Riverboat, was contacted as part of the U.S. Coast Guard bridge permitting process. The proposed project and comparison to the existing bridge was presented and comments were requested. Mr. Barth responded via email on October 2, 2017 with a description of operations and the path that the riverboat takes on its voyages. Mr. Barth indicated that the path of the riverboat would pass through new piers #6 and #7 (Mr. Barth referred to these piers as #2 and #3, as if the new piers were numbered 1-4 from the east to west river banks). An additional phone conversation took place on October 3, 2017 between Mr. Barth and Houston Engineering, Inc., where Mr. Barth indicated that the project will work if disruption to his business is minimized. Mr. Barth requested that he is provided with advanced notice of navigation closures and that demolition activities and major disruptions take place after their operating season (**Attachment D: River User Correspondence**). The requests were reviewed with the designers and they confirmed the requests could be accommodated during construction.

7. LONG-TERM IMPACTS

There will be no long-term impacts caused by the proposed project.

8. TEMPORARY EFFECTS

Temporary effects on navigation will be associated with the construction of the river span foundations and removal of the existing structure. The intended construction access will be via barges and temporary dock walls. Most watercraft navigate between existing piers #7 and #8. Smaller watercraft may navigate outside of this span, closer to the bank of the river channel. The Lewis & Clark Riverboat is the largest vehicle known to traverse under the bridge, and after consultation with Aaron Barth it was determined that the air draft of the riverboat is approximately 27 feet. With the clearance of the proposed bridge at 62 feet (OHW elevation), the riverboat will not have issue passing under the bridge.

During construction it is likely that navigation will be restricted temporarily to the span between new piers #6 and #7, with the narrowest horizontal distance between an existing pier and cofferdam at approximately 40 feet. Although navigation may need to be restricted during construction of the proposed bridge, these effects will be temporary. Figure 1 shows the alignments of the existing piers versus the new piers, and **Attachment E: Construction Methods** gives a detailed description of construction methods.

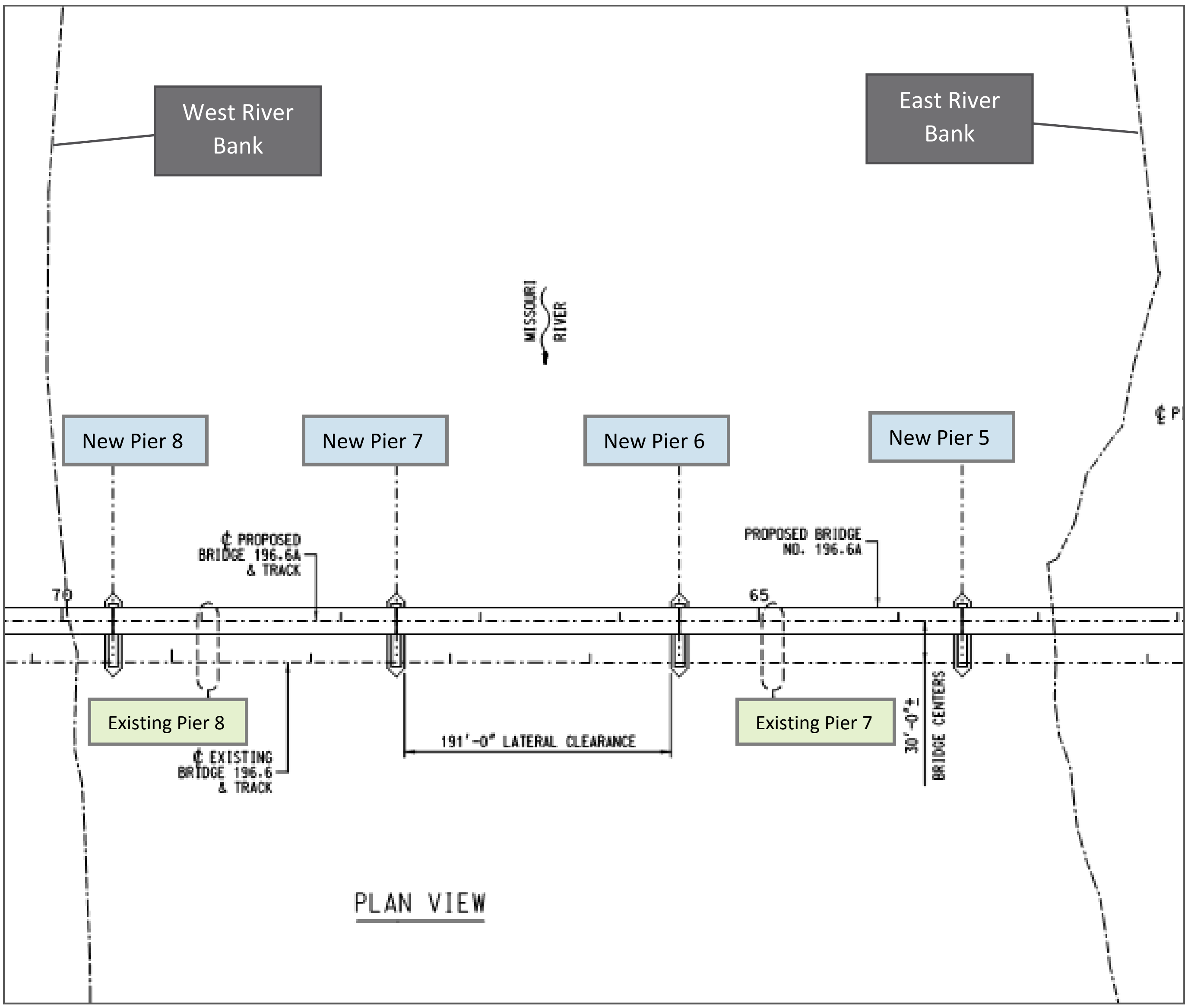


Figure 1: Alignment of existing piers versus new piers within the river channel.

In addition to the anticipated temporary navigation restrictions during construction, additional interruptions are anticipated during removal operations for the in-place bridge. It is anticipated that the in-place bridge will be removed in a span by span fashion with temporary supports utilized to facilitate the process. Removal of the two outer spans is not expected to impact the primary navigation channel. The interior span, however, will require installation of a temporary supports within the channel, as shown in Figure 2. Since removal of the two exterior spans will not impact river navigation, it is assumed this work may be completed within the commercial use season. As such, these two spans are not shown in the Figure.

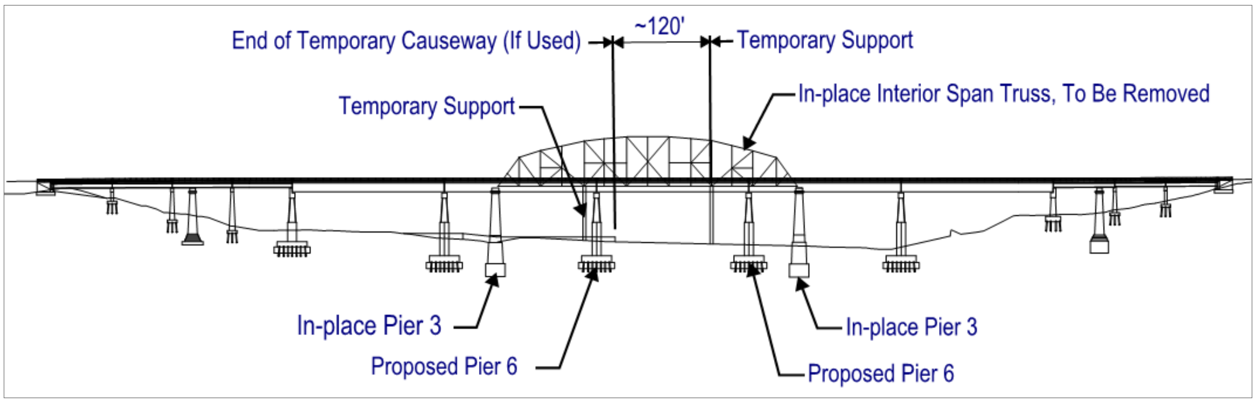


Figure 2: Interior Truss Span Removal

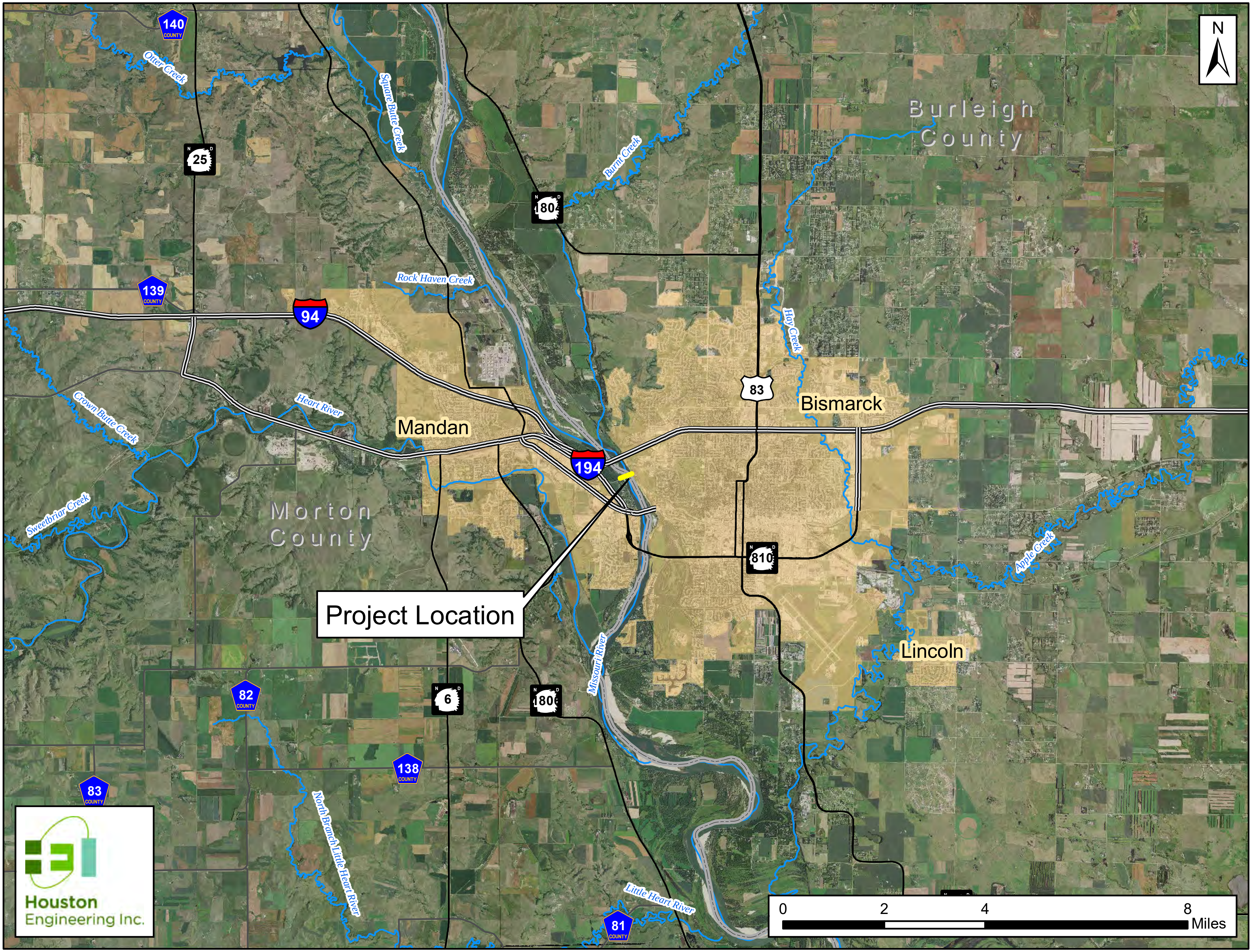
It is anticipated the temporary supports will be placed at the identified truss panel points. The resulting navigation opening is approximately 120’ wide; assuming a full build-out of the west approach causeway is required.

9. POTENTIAL MITIGATION FOR LONG-TERM EFFECTS

Long-term impacts will be related to the number of piers within the river channel. The existing bridge has two piers within the navigable river channel. The proposed bridge will have shorter spans with five piers within the navigable river channel. Even with three additional piers, navigation will not be affected. As stated in Section 8: Temporary Effects, most watercraft navigate through existing piers #7 and #8 which have a horizontal clearance of 385 feet, and vertical clearance of 52 feet. After all construction activities are completed and the original structure removed, the transit route will have a horizontal clearance of 191 feet, and vertical clearance of 42 feet, enabling unrestricted navigation of typical watercraft between these piers.

Attachment A

Location Map



Project Location
Bismarck
Mandan
Lincoln
Burleigh County
Morton County
Missouri River
Heart River
Apple Creek
Hay Creek
Burnt Creek
Rock Haven Creek
Square Butte Creek
Otter Creek
Crown Butte Creek
Sweetbriar Creek
North Branch Little Heart River
Little Heart River
94
194
83
810
1804
1806
6
25
140
139
82
138
83
81
N
0
2
4
8
Miles
Houston Engineering Inc.

Attachment B

Missouri River Cofferdam Analysis

HoustonEngineering Inc

Technical Memorandum

To: Hans Erickson, PE, SE, TKDA

From: Adam N. Nies PE, CFM Houston Engineering, Inc.

Subject: Missouri River Cofferdam Analysis

Date: August 15, 2017

Project: BNSF MP 196.6 LS 0038 Bridge Replacement

INTRODUCTION

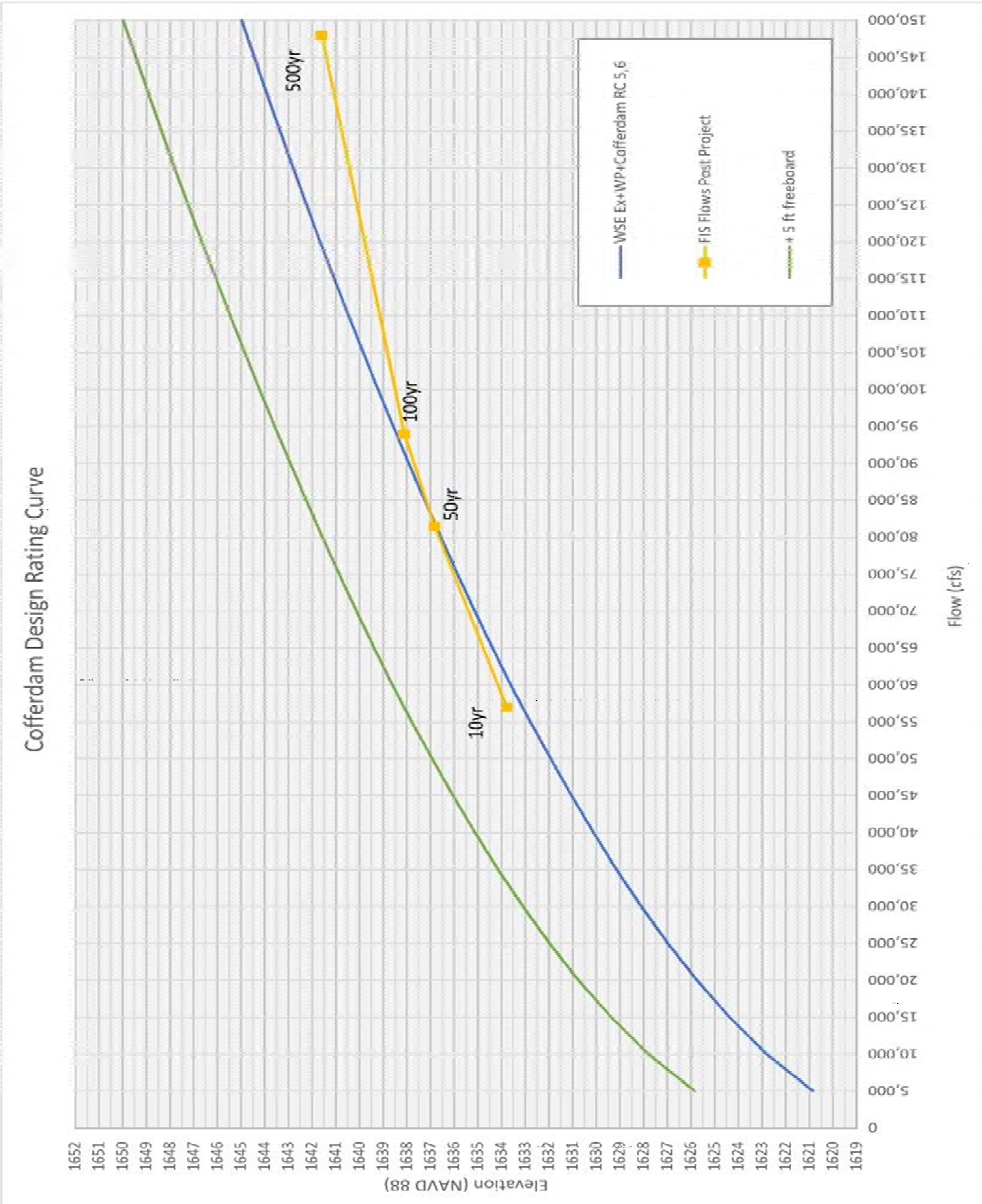
As part of the BNSF bridge replacement at MP 196.6 LS 0038 currently under design, an analysis was completed to determine temporary impacts of a "during construction" scenario. Cofferdams will be utilized during construction of any piers in the water, and will create an obstruction to flows in the channel, and as such, a cofferdam analysis has been performed in conjunction with the hydraulic analysis of the proposed bridge replacement over the Missouri River. This technical memorandum summarizes the design considerations used in the analysis of the cofferdam scenario.

COFFERDAM ANALYSIS

In order to determine the range of potential hydraulic impacts during construction, it was decided to anticipate the worst-case scenario of hydraulic restriction to flow. During a near final phase of construction, the existing piers will be in the water as the existing bridge will not be demolished yet, all but two of the proposed piers will be constructed, with the remaining two piers setup with cofferdams being constructed. Under this scenario, the Missouri River will have three existing piers, four new piers, and two cofferdams in the water. This scenario poses the greatest risk for Missouri River impacts during this replacement project.

The cofferdams will be constructed from steel sheet piles and will be required for new piers, corresponding to plan pier numbers 5, 6, 7, 8, 9, and 10. Cofferdam dimensions of the projecting face (respective to the river flow) will be set with inside width of 48 feet, and wall thickness of 3 feet on either side, creating an overall cofferdam width of 54 feet. Over the course of several construction seasons, two piers with cofferdams will be constructed concurrently.

Duplicating the HEC-RAS (v5.0.3) hydraulic model, the pier configuration within the bridge routine was adjusted such that the worst-case scenario could be hydraulically analyzed, and impacts determined. Impacts range from approximately 0.00 - 0.25 feet throughout the range of flows analyzed. The flows used to model this rating curve scenario do not necessarily match the synthetic events used in the hydraulic analysis, rather, it was more important to obtain a rating curve over an entire range of flows to achieve a complete understanding of the resulting elevations. Starting at 5,000 cfs at the low end and ending at 150,000 cfs at the high end, discharges were set at 5,000 cfs intervals to capture the rating curve. In this analysis, the HEC-RAS model was set with a normal depth slope downstream boundary condition. This is different than what was used in the Flood Insurance Study (FIS). The FIS utilized a known water surface elevation based on a tailwater condition previously determined based on the river's interaction with Oahe Reservoir. Using the normal depth slope for this analysis allows us to obtain water surface elevation relative to flows, independent of downstream interaction. By implementing a different downstream boundary condition, there is some variation in the elevations achieved compared to the FIS, however the projected rating curve does match the FIS modeling relatively well at the approximate 50yr and 100yr flows. **Figure 1** displays the projected rating curve as compared to the FIS modeling, which was also completed as part of the overall analysis.


Cofferdam Design Rating Curve
WSE Ex+WP+Cofferdam RC 5,6
FIS Flows Post Project
+ 5 ft freeboard
500yr
100yr
50yr
10yr
Elevation (NAVD 88)
Flow (cfs)
1652
1651
1650
1649
1648
1647
1646
1645
1644
1643
1642
1641
1640
1639
1638
1637
1636
1635
1634
1633
1632
1631
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1629
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1626
1625
1624
1623
1622
1621
1620
1619
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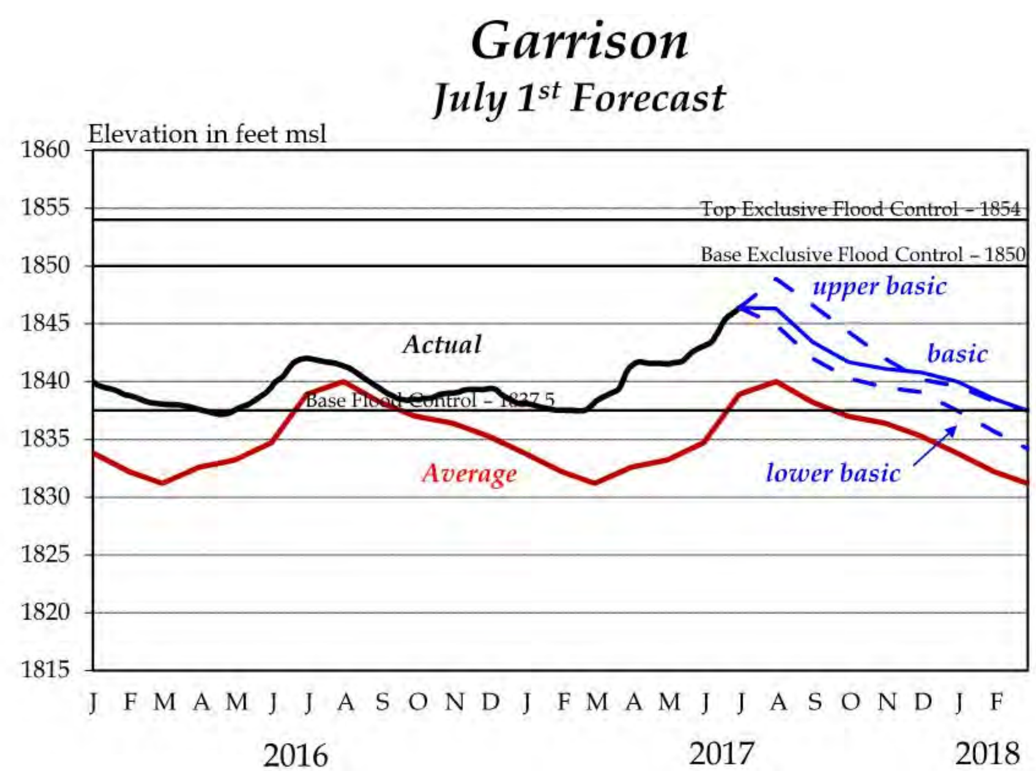
5,000
10,000
15,000
20,000
25,000
30,000
35,000
40,000
45,000
50,000
55,000
60,000
65,000
70,000
75,000
80,000
85,000
90,000
95,000
100,000
105,000
110,000
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000

PREDICTED OUTFLOW FROM GARRISON DAM

Located approximately 70 river miles upstream from the project location, the Garrison Dam regulates flows on the Missouri River. This is a United States Army Corps of Engineers (USACE) operated reservoir and will directly affect the elevation that the cofferdams are constructed to. The USACE has forecasted releases from the Garrison Dam that are based on historic and predicted weather forecast. Following their predetermined set of criteria involving water supply to Bismarck, water storage for irrigation, and recreation purposes, the USACE regulates the flows released based on inflows to the reservoir and the larger Missouri River System. **Figure 2** is a graphic copied directly from the USACE website that illustrates the predicted water surface elevation within Lake Sakakawea upstream of the Garrison Dam. The USACE has tabulated the discharges based on these predicted water surface elevations. Using these predicted reservoir levels and corresponding discharges from the Dam, the top elevation of the cofferdam can be more appropriately set. The USACE includes a "basic" prediction, an "upper basic" prediction, and a "lower basic" prediction of water levels in the reservoir. It is our recommendation that the "upper basic" levels be utilized for this analysis, as it provides a somewhat conservative design. The reservoir levels and forecasting release schedule can be easily accessed online with the following link to the USACE forecast site:

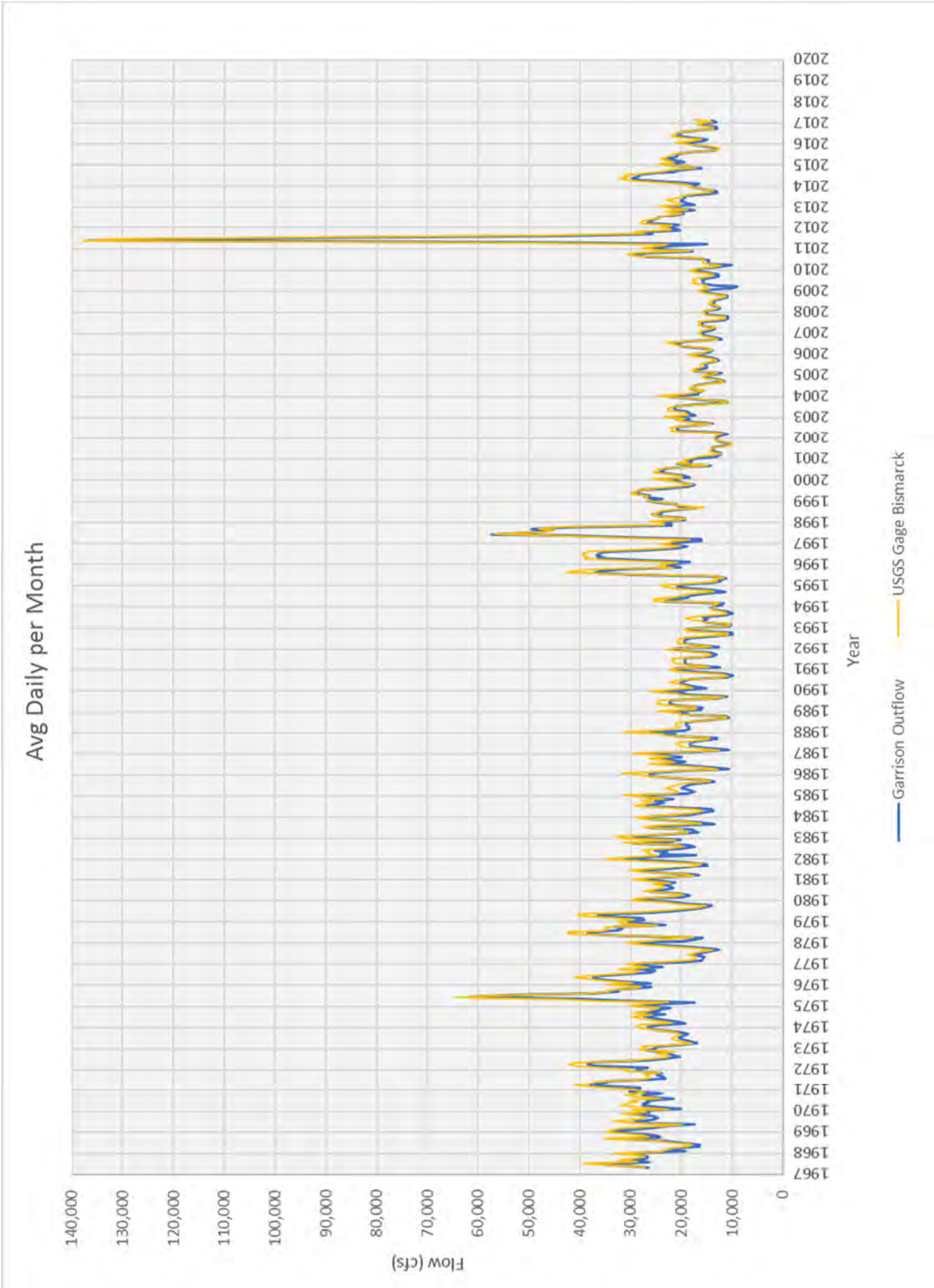
http://www.nwd-mr.usace.army.mil/rcc/reports/resfcast.html

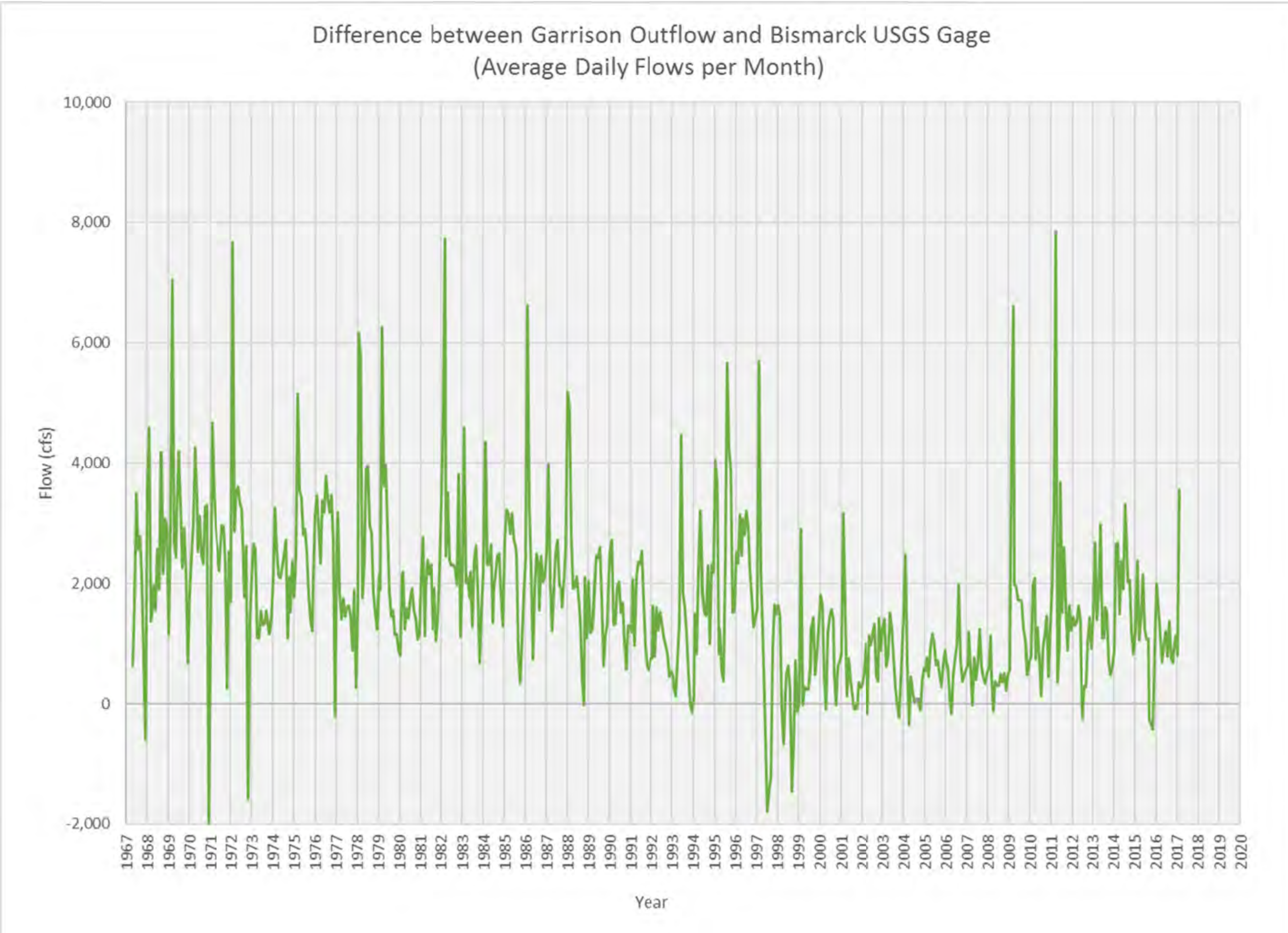


The Missouri River reservoir system is very complex, and projected releases will change monthly based on precipitation and runoff in the basin, even when it occurs downstream of the project site. The cofferdam elevations can be initialized several months in advance based on the USACE forecast, but should be verified each month prior to construction to confirm whether or not the projected flows and resulting water levels have changed.

The correlation between the Missouri River flows at Bismarck, and outflows from the Garrison Dam is not a 1:1 relationship. The approximately 70 mile stretch between the two locations incorporates some significant drainage area, the most prominent of which is the Knife River, with a contributing drainage area well over 2,000 square miles. Several other tributaries such as the Painted Woods Creek, Turtle Creek, Square Butte Creek, and Burnt Creek also enter the Missouri River upstream of the project location and have drainage areas generally under 500 square miles. Considering this additional drainage area coming to the project location, a flow comparison was made between the [USACE provided] historic releases from the Garrison Dam compared to the flows recorded on the USGS Gage near the project location. The Average Daily Flow per month was used to compare the two locations as shown in **Figure 3**. The comparison does show a general trend ranging between 1,000 – 8,000 cfs higher flows occurring at Bismarck as compared to the Garrison releases as shown in **Figure 4**. Based on this comparison, a reasonable estimate for flow increase on Garrison releases would be 5,000 cfs higher at Bismarck. This corresponds to an approximate 98 percentile ranking confidence limit.

HoustonEngineering Inc




Difference between Garrison Outflow and Bismarck USGS Gage
(Average Daily Flows per Month)
Flow (cfs)
10,000
8,000
6,000
4,000
2,000
0
-2,000
Year
1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

WIND AND WAVE RUNUP ANALYSIS

During each construction season, it is likely that there will be wind and wave interactions while the piers are being built and cofferdams are in place. Therefore, a wind and wave analysis was conducted to determine the realistic potential wave heights to be incorporated into the cofferdam design elevations in the form of freeboard. The Natural Resources Conservation Service (NRCS) has published Minnesota Technical Note 2 entitled *Slope Protection for Dams and Lakeshores.* Chapter 2 of this document incorporates the analysis of wave height using several parameters including the "effective fetch" distance for wave generation, and a wind stress factor based on wind direction. Since this is a Minnesota document, the wind stress factors are populated for several major Minnesota cities, and it also includes a wind stress factor for Fargo, ND. In lieu of wind stress factors populated for Bismarck, the wind stress factors generated for Fargo were used in this analysis. The longest fetch distances relative to the project site was determined along a South-South-East compass point and a North-North-West compass point. These correspond to 1 mile downstream, and 0.7 miles upstream from the BNSF railway bridge. River channel velocity was also accounted for as part of the wind stress factor. Using these fetch distances and the corresponding wind stress factors, the upper limit of the potential wave heights was calculated at 4.2 feet. With some uncertainty corresponding to the wind stress factor, it is our recommendation that the cofferdams be constructed with a minimum of 5 feet of freeboard to account for potential wave action.

COFFERDAM DESIGN ELEVATION

Prior to each construction season in which a cofferdam(s) will be constructed, the following process should be followed to set the design elevation of the top of cofferdam;

- Predicted Lake Sakakawea elevations should be monitored using the "upper basic" predicted curve
- Forecasted releases from Garrison, provided by the USACE should be monitored and verified
- Flow value should be increased by a minimum of 5,000 cfs to account for potential Tributary Inflows
- Water surface elevation should be read from Figure 1 within this Technical Memorandum
- 5 feet of freeboard should be added to generate the cofferdam design elevation for that year.

Attachment C

Plan Sheets

Please see Appendix C for the current plan sets.

Attachment D

River User Correspondence

HoustonEngineering Inc.
Fargo Office | P 701.237.5065 | F 701.237.5101
1401 21st Avenue North | Fargo ND 58102

August 14, 2017

Aaron Barth, Executive Director
Fort Abraham Lincoln Foundation
401 West Main St.
Mandan, ND 58554

Subject: BNSF Bridge 196.6
Jamestown Subdivision

As part of the US Coast Guard bridge permit process, we are asking for your comments related to the navigation of the Lewis and Clark River Boat.

BNSF Railway currently owns and operates a single-track structure across the Missouri River in Bismarck, North Dakota. Located on the Jamestown subdivision, the current structure is approximately 1470 feet in length and consists of three primary river spans and six approach spans, with in-service components over 130 years old. The primary river truss spans were installed in 1905 and are replacement structures for the steel truss spans dating from the original construction in 1883.

The intent of this project is to construct a new, independent single-track bridge across the Missouri River upstream of the in-place structure. The project limits are shown in the attached map and the bridge dimensions are shown in the attached General Plan and Elevation drawings. The vertical and horizontal clearance levels of the existing and proposed bridges are shown in the table below.

	Existing Bridge	Proposed Bridge
Horizontal clearance measured from the 100-year flood event level	385 feet	191 feet
Vertical clearance measured from the 100-year flood event level	50 feet	41.8 feet

The proposed project structure and clearances are similar to the existing bridges up and downstream from the project area. Likewise, the proposed project is anticipated to have no impacts on the existing navigation channel.

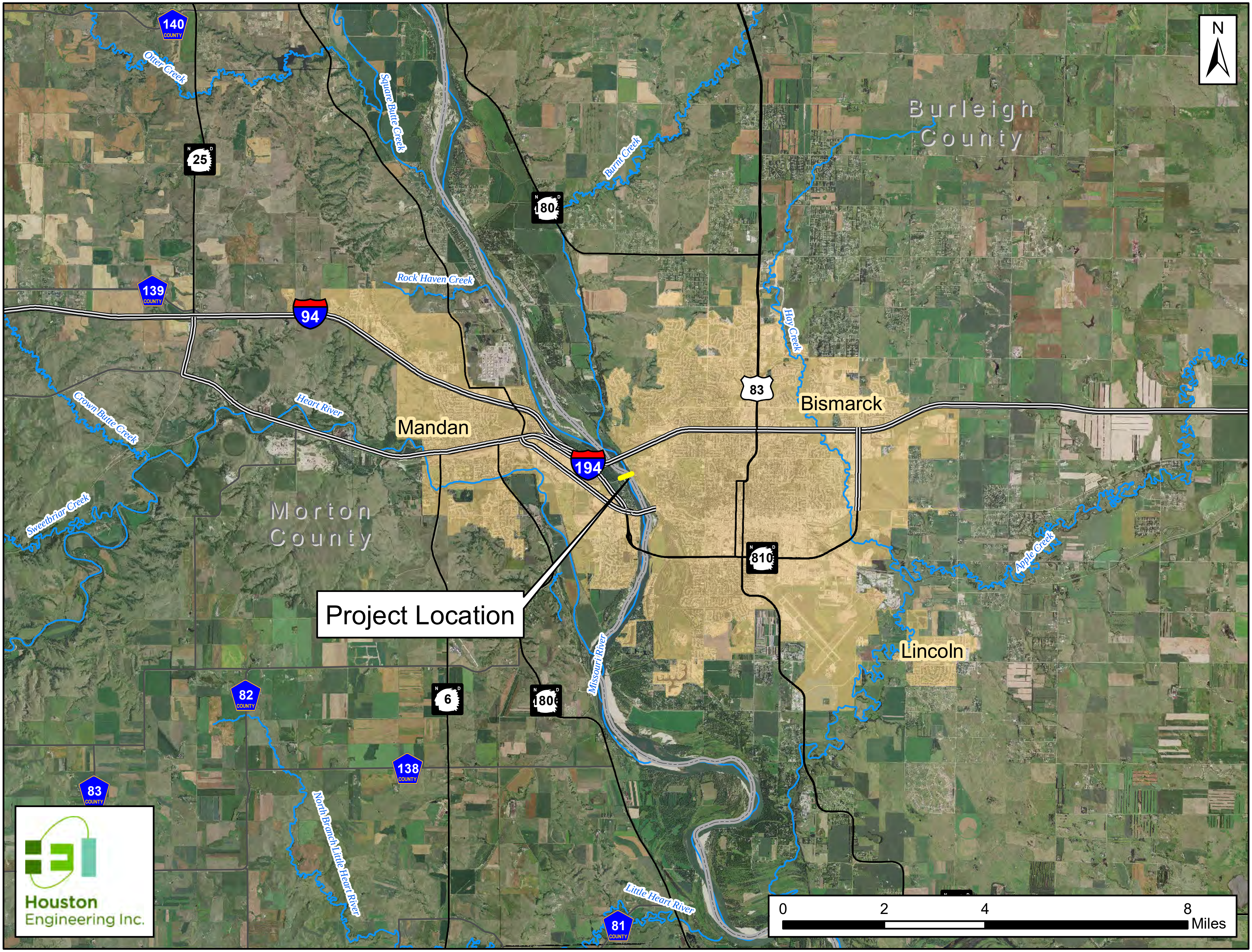
As mentioned above, the US Coast Guard has asked us to solicit comments related to the navigation of the Lewis and Clark River Boat as part of the bridge permit process. If you have any comments or information on navigation regarding this project, we kindly ask you to reply by August 31st, 2017.

If further information is desired regarding the proposed railway improvement, please contact me at (701) 237-5065 or my cell at (701) 371-9867.

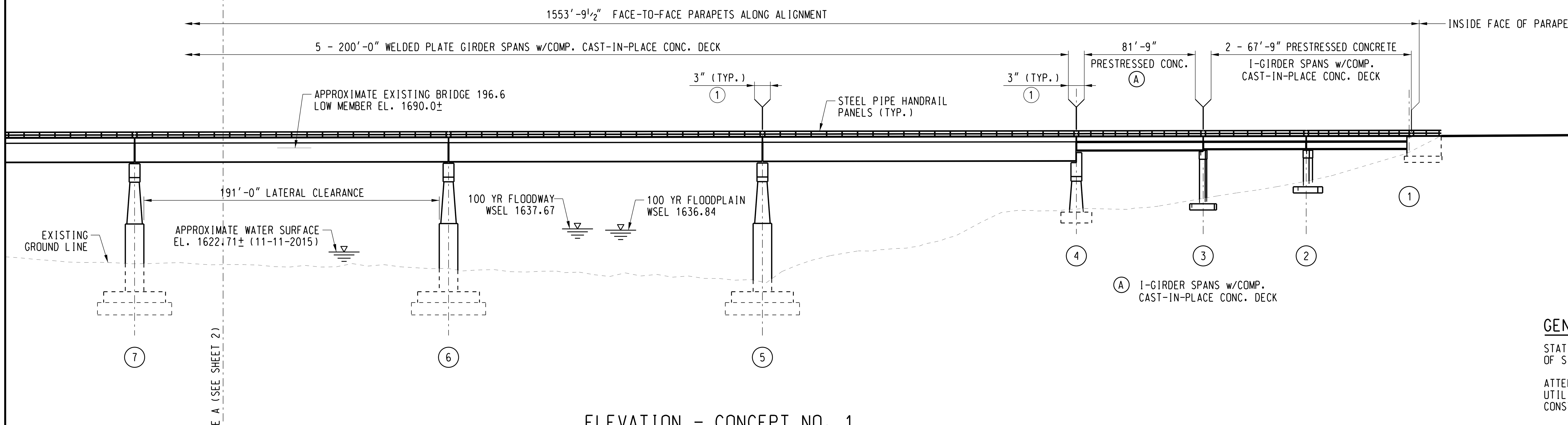
Sincerely,
HOUSTON ENGINEERING, INC.

Mark D. Aanenson

mda/he
Enclosures
cc: Rob McCaskey, USCG District Eight Bridge Branch, 1222 Spruce St., Ste. 2. 102D, St. Louis, MO 63103-2821
Ben Steinkamp, BNSF Director of Construction Permitting, 2500 Lou Menk Dr., AOB-3, Fort Worth, TX 76131-2830
\\houston\hei\Fargo\JBN\6600\6680\6680-007 BNSF Bridge 196.6\Permitting\NavigationImpactsLetter\combined\20170814 NavImpacts Final.docx



N
Burleigh County
Morton County
Bismarck
Mandan
Lincoln
Project Location
Otter Creek
Square Butte Creek
Burnt Creek
Rock Haven Creek
Hay Creek
Heart River
Crown Butte Creek
Sweetbriar Creek
Apple Creek
Missouri River
North Branch Little Heart River
Little Heart River
94
194
83
810
1804
1806
6
25
140
139
82
138
83
81
0
2
4
8
Miles
Houston Engineering Inc.



GENERAL NOTES:

STATIONING AND ELEVATIONS ARE BASED ON A SITUATION SURVEY OF SITE COMPLETED NOVEMBER 23, 2015 BY TKDA OF ST. PAUL, MINNESOTA.

ATTENTION: THE CONTRACTOR SHALL VERIFY THAT ALL UNDERGROUND AND OVERHEAD UTILITIES HAVE BEEN LOCATED AND IDENTIFIED PRIOR TO BEGINNING CONSTRUCTION.

FOUNDATION DETAILS ARE BASED ON THE GEOTECHNICAL EVALUATION REPORT DATED XXXX, 2016 BY BRAUN INTERTEC CORPORATION.

PROPOSED BRIDGE OPENING IS BASED ON HYDRAULIC ANALYSIS OF BRIDGE 196.6A BY TKDA OF ST. PAUL, MN.

X" BALLAST TO BE FURNISHED AND PLACED BY BRIDGE CONTRACTOR. REMAINING BALLAST, TIES, AND RAILS TO BE INSTALLED BY X.

(1) CAST-IN PLACE CONCRETE DECK JOINT OPENING @ 45°F.

TABLE OF EST. LIFTING WEIGHTS

ITEM	MARK NO.	ESTIMATED WEIGHT (LBS)
81'-9" PRESTRESSED CONCRETE BEAM		69,120
79'-9" PRESTRESSED CONCRETE BEAM		67,460
67'-9" PRESTRESSED CONCRETE BEAM		53,300
200'-0" WELDED DECK PLATE GIRDER		181,960

ALIGNMENT NOTES:

(1) C.S. STA. 60+01.70
X = 1,887,260.430
Y = 420,315.308

(2) S.T. STA. 62+11.69
X = 1,887,060.153
Y = 420,252.521

WORKING LINE NOTES:

(A) WORKING LINE "A" = ℄ TRACK & BRIDGE (PROPOSED BRIDGE)
STA. 59+00.00
X = 1,887,360.375
Y = 420,333.905
= 180°00'00.00"

(B) WORKING LINE "A" = WORKING LINE "B"
X = 1,887,248.414
Y = 420,318.797
= 168°17'26.52"

TKDA
444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

DES:	MJC-TKDA
DRAWN:	ADL-TKDA
CHECK:	HLE-TKDA
DATE:	FEB. 2017
AUTH:	AXXXXX
LINE SEG:	0038

BNSF RAILWAY
BRIDGE ENGINEERING KANSAS CITY, KS
APPROVED:
DIRECTOR STRUCTURES ENGINEERING

BISMARCK TO MANDAN
BRIDGE NUMBER 196.6A
OVER MISSOURI RIVER NEAR BISMARCK, ND
GENERAL PLAN AND ELEVATION (1 OF 2)
CONCEPT NO. 1
PLAN NO: 0038-0196.600-001
SHEET: 1 OF 6

File Location: K:\a-I\BNSF\15650004\4_Production\2_CAD\05_Bridge\30% Plan\01966A001.dgn
Date Printed: 2/27/2017 Time Printed: 10:39:21 AM

ALIGNMENT NOTES:

⟨3⟩ P.T. STA. 76+24.39
X = 1,885,727.618
Y = 419,783.410

DES: MJC-TKDA	BNSF RAILWAY	BISMARCK TO MANDAN
DRAWN: ADL-TKDA	BRIDGE ENGINEERING KANSAS CITY, KS	BRIDGE NUMBER 196.6A
CHECK: HLE-TKDA		OVER MISSOURI RIVER NEAR BISMARCK, ND
DATE: FEB. 2017	APPROVED:	GENERAL PLAN AND ELEVATION (2 OF 2) CONCEPT NO. 1
AUTH: AXXXXX		PLAN NO: 0038-0196.600-001
LINE SEG: 0038	DIRECTOR STRUCTURES ENGINEERING	SHEET: 2 OF 6

TKDA
444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

Date Printed: 2/27/2017 Time Printed: 10:39:22 AM

Donna Jacob

From: Mark D. Aanenson
Sent: Monday, October 2, 2017 7:30 PM
To: Donna Jacob
Subject: Fwd: Lewis & Clark Riverboat

Sent from my iPhone

Begin forwarded message:

From: "Aaron Barth" <aaron@fortlincoln.org>
To: "Mark D. Aanenson" <maanenson@houstoneng.com>
Subject: Lewis & Clark Riverboat

[External Email]

Good evening Mark,

For your files:

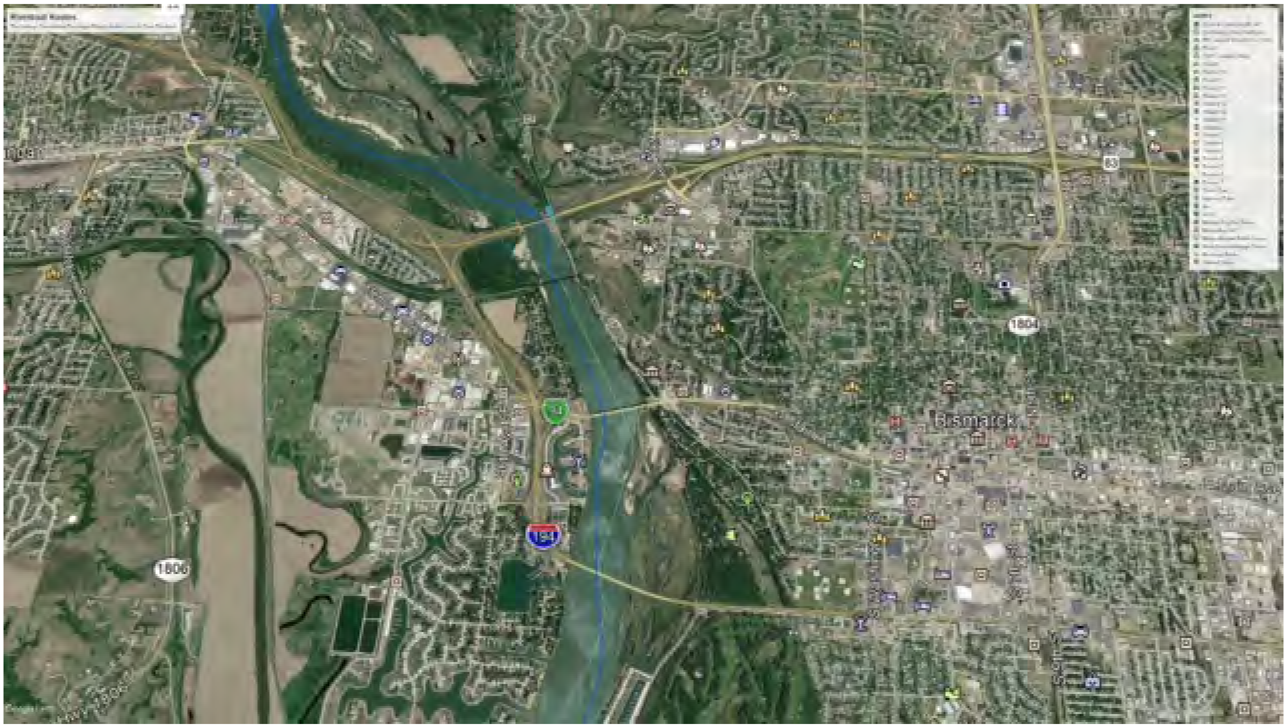
The Missouri Riverboat, Inc., DBA (Doing Business As) the *Lewis & Clark* riverboat, has a port of call at the Port of Bismarck. The riverboat operates seasonally with public and private charters beginning May 1 and ending September 30 each season. The riverboat cruises vary from day to day, with more cruises happening toward the end of the week and the weekends.

The attached riverboat route shows the north and south routes in blue. As it concerns the BNSF/Historic Northern Pacific Railroad Bridge, the *Lewis & Clark* Riverboat travels underneath the historic BNSF/NPRR railroad piers 2-3 on each south route cruise down and then up the Missouri River, with the docking origin at the Port of Bismarck. The Port of Bismarck is located immediately north of the Interstate I-94 bridge on River Road in the City of Bismarck, North Dakota.

Let me know if I can expand on any of this. At least if it would be of more help.

Thanks Mark.

Aaron L. Barth
Executive Director
Fort Abraham Lincoln Foundation
401 West Main Street
Mandan, North Dakota 58554
Ph. 701-663-4758
Cell. 701-425-7342
www.fortlincoln.org
www.fivenationsarts.org
www.lewisandclarkriverboat.com


Riverboat Routes
Bismarck
1806
1804
194
83


Riverboat Routes

Telephone conversation log

Participants: Aaron Barth, Missouri Riverboat, Inc

Mark D. Aanenson, Senior Environmental Scientist, Houston Engineering, Inc.

Subject: Navigational comments regarding the Lewis and Clark riverboat

Date: October 3, 2017, 8:15 am

Project: BNSF Bismarck Bridge

Aaron Barth indicated the project will work for everyone if disruption to his business is minimized. He said his boat tours are booked months in advance, and the height of business is in the summer. He requested as much advance notice of navigation closures as possible, and asked that the demolition activities and other major disruptions take place in the autumn, when his tours are less frequent.

Message relayed to Donna Jacob from Mark Aanenson
2017-10-03, 8:35 am

Attachment E

Construction Methods

Please see Appendix G for a description of anticipated construction methodology.

Appendix J

Wetlands Impact Figure

TKDA
444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

DES: TKDA
DRAWN: TKDA
CHECK: TKDA
DATE: FEB. 2021
AUTH: AXXXXX
LINE SEG: 0038

BNSF RAILWAY
BRIDGE ENGINEERING KANSAS CITY, KS
APPROVED:
DIRECTOR STRUCTURES ENGINEERING

BISMARCK TO MANDAN
BRIDGE NUMBER 196.6A
OVER MISSOURI RIVER NEAR BISMARCK, ND
ENVIRONMENTAL IMPACT AREAS
PLAN NO: 0038-0196.600-001
SHEET: X OF X

Date Printed: 2/15/2021 Time Printed: 4:26:50 PM