USCG0005011/16

BIOLOGICAL ASSESSMENT

SANDPOINT JUNCTION CONNECTOR PROJECT

BNSF Montana Division, Kootenai River Subdivision,
Line Segment 45, MP 2.9 +/- to 5.1+/-
Bonner County, Idaho

UPDATED 2/19/2018

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Acronyms and Abbreviations

BA	Biological Assessment
BO	Biological Opinion
BMPs	Best Management Practices
BNSF	BNSF Railway Co.
CFSA	Clark Fork Settlement Agreement
CHRU	Columbia Headwaters Recovery Unit
CHU	Critical Habitat Unit
dB	Decibel(s)
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FMO	Foraging, Migrating and Overwintering
HUC	Hydrological Unit Code
IDFG	Idaho Department of Fish and Game
IDEQ	Idaho Department of Environmental Quality
IPaC	Information for Planning and Conservation
LWD	Large Woody Debris
LPO	Lake Pend Oreille
MP	Milepost
NOAA	National Oceanic and Atmospheric Administration
OHWM	Ordinary High Water Mark
PCE	Primary Constituent Element
ROW	Right-of-Way
RMS	Root Mean Square
RUIP	Recovery Unit Implementation Plan
SEL	Sound Exposure Level
SPCC	Spill Prevention, Control, and Countermeasure
SR	Spawning and Rearing
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USCG	U.S. Coast Guard
WSDOT	Washington State Department of Transportation

Executive Summary

The BNSF Railway Co. (BNSF) proposes to construct a 2.2-mile-long second mainline track west of the existing BNSF mainline to connect the North Algoma Siding track (MP 5.1) south of Sandpoint, to the Sandpoint Junction switch (MP 2.9), where the BNSF and the Montana Rail Link (MRL) mainlines converge in Sandpoint.

This action will consist of a new mainline track; upgrades to existing access roads, staging areas, tracks, switches and signals; new bridges over Lake Pend Oreille (Bridge. 3.9), Sand Creek (Bridge 3.1), and Bridge Street (Bridge 3.0) adjacent to (west of) the existing rail bridges; temporary construction bridges adjacent to (west of) the new bridges; 0.88-acre of permanent nearshore fill and 0.38-acre of temporary nearshore fill below the jurisdictional ordinary high water mark (OHWM) of 2062.5 feet, associated with bridge abutments and the south switch; and 0.28-acre of wetland fill south of Bridge 3.1.

The project is needed to address continued growth of freight rail service demands in the northern tier, high-volume traffic corridor between the Midwest (Chicago Terminus) and the West Coast. Rail traffic volumes have risen steadily for the past three decades resulting in this portion of the interstate main line becoming a constraint to interstate commerce. The proposed project will relieve system congestion, back-up of rail traffic, and reduce hold times on sidings and wait times at grade crossings both locally and regionally.

The impacts to jurisdictional wetlands, nearshore areas, and navigable waters of Lake Pend Oreille and Sand Creek require permits from the U.S. Coast Guard (USCG) and the U.S. Army Corps of Engineers (USACE). These federal actions trigger evaluation under the Endangered Species Act (ESA) for project impacts to threatened or endangered species and their designated critical habitat.

This biological assessment (BA) preliminarily determines that the project, both Bridge 3.1 and Bridge 3.9, may affect threatened bull trout primarily because of the action of pile driving in Sand Creek and Lake Pend Oreille for the new bridge construction. However, our proposed findings are that the project may affect, but is not likely to adversely affect threatened bull trout because of the project location, species habitat needs, and proposed conservation measures.

There is no bull trout designated critical habitat in Sand Creek. Thus, this BA preliminarily determines that the project will have no effect within Sand Creek, but may affect areas of the lake from the Bridge 3.1 pile driving. This BA preliminarily determines that the Bridge 3.9 construction may affect, but is not likely to adversely affect bull trout designated critical habitat in Lake Pend Oreille because of the project location, species habitat utilization and needs in the action area and proposed conservation measures.

1. Project Area and Project Description

1.1 Location

The project is located in the Panhandle Basin, Lake Pend Oreille Subbasin, HUC 17010214-Pend Oreille Lake, on the BNSF Montana Division, Kootenai River Subdivision, Line Segment 45, from BNSF Milepost (MP) 2.9+/- to MP 5.1+/- in Bonner County, Idaho.

Specifically, the project is in portions of Sections 15, 22, 23, 25, 26, 27 and 36; Township 57 North; Range 2 West, Boise Meridian and is partially within the City of Sandpoint. Latitudinal and longitudinal coordinates for the project north end is 48°16'54.10" N,116°32'49.35" W and the project south end is 48°14'56.24" N,116°31'24.02" W.

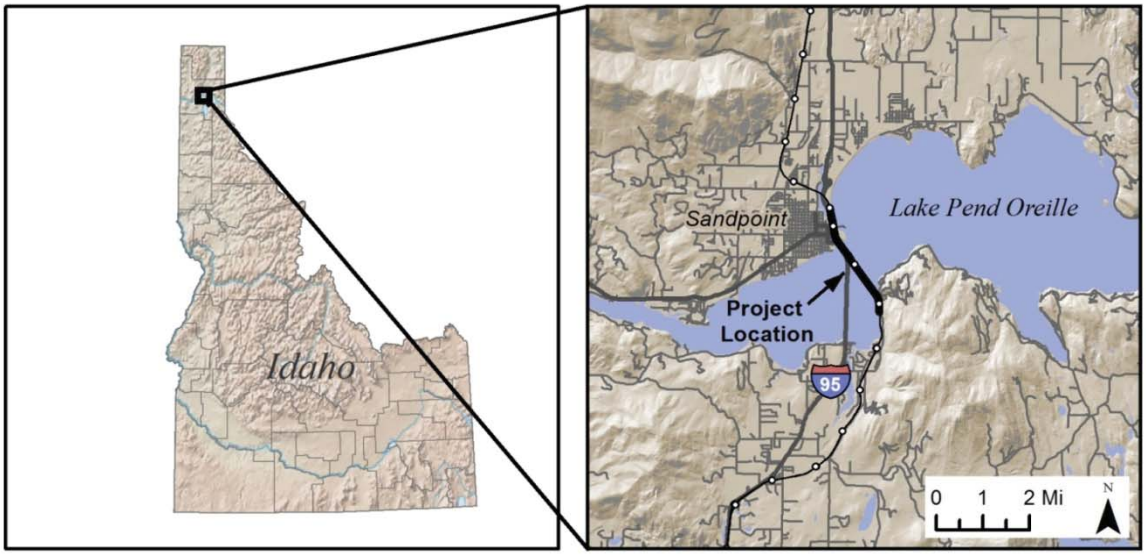

Figure 1. Location and Vicinity Map

1.1.1 Environmental Setting

Lake Pend Oreille

Lake Pend Oreille (LPO) is a natural, temperate, oligotrophic lake. It is the largest natural lake in Idaho and the fifth deepest lake in the United States, with a mean depth of 538 feet, a maximum depth of 1,152 feet at its southern end, and a surface area of 94,720 acres. It is fed by over 20 streams originating in the Selkirk Mountains to the northwest, the Cabinet Mountains to the northeast, and the Coeur d'Alene Mountains to the east, which comprise most of the largely undeveloped, steep rocky terrain of the lake's shoreline and littoral zone. The remaining littoral zone at the lake's northern end and bays consists of gradual or moderately sloping bottom, surrounded by flat to gently sloping upland and floodplain with residential and commercial development within the cities of Sandpoint, Ponderay, and Kootenai; the cities of Hope and Clark Fork (farther east); and within the unincorporated areas of Sagle (south of Sandpoint) (McCubbins, 2016).

The Clark Fork River, originating in western Montana, is the largest tributary into the lake providing 92% of the lake's inflow at the river's mouth near the City of Clark Fork, northeast of Sandpoint. Three hydroelectric dams were constructed from 1913 to 1959 (Cabinet Gorge, Noxon, and Thompson Falls Dams), creating a series of impoundments on the lower Clark Fork River.

The Pend Oreille River is the lake's only surface water outlet west of Sandpoint near the City of Dover. The river flows approximately 27 miles from LPO in Idaho into eastern Washington, then north into Canada where it joins the Upper Columbia River. The Pend Oreille River is impounded by the Albeni Falls hydroelectric dam, constructed in 1955 near the Idaho/Washington border, which regulates the lake's surface elevation/pool at 2062.5 feet from approximately mid-June through September, and at 2051 to 2056 feet from October through May.

A wide diversity of fish species are present in LPO. The native fish present are westslope cutthroat trout (*Oncorhynchus clarki lewisi*), bull trout (*Salvelinus confluentus*), mountain whitefish (*Prosopium williamsoni*), pygmy whitefish (*Prosopium coulterii*), slimy sculpin (*Cottus cognates*), peamouth (*Mylocheilus caurinus*), northern pikeminnow (*Pschocheilus oregonensis*), redside shiner (*Richardsonius balteatus*), longnose sucker (*Catostomus catostomus)* and largescale sucker (*Catostomus macrocheilus*). Non-native sport fish that have been stocked or found their way into the lake over the years include kokanee (*Oncorhynchus nerka* – a land-locked form of sockeye salmon), rainbow trout (*Oncorhynchus mykiss*), Gerrard-strain rainbow trout (Kamloops), lake whitefish (*Coregonus clupeaformis*), lake trout (*Salvelinus namaycush*), smallmouth bass (*Micropterus dolomieu*), and several other species present in low abundance including northern pike (*Esox lucius*), brown trout (*Salmo trutta*), largemouth bass (*Micropterus salmoides*), yellow perch (*Perca flavescens*), and walleye (*Sander vitreus*) (McCubbins, 2016).

Sand Creek

The Sand Creek watershed[1] covers 38 square miles or 24,209 acres, and includes Jack Creek, Little Sand Creek, Swede Creek, and Schweitzer Creek northeast of Sandpoint. Sand Creek generally flows from north to south for approximately 16 miles and discharges into LPO within the City of Sandpoint, where it is subject to the regulated levels of LPO. Most of the drinking water for the City of Sandpoint is withdrawn from Little Sand Creek (IDEQ, 2017; Parsons, 2007).

The average gradient of Sand Creek is 1% and the primary channel substrate is sand. The land use is forestry, agriculture and permanent grasslands, and small areas of shrub land and barren land. The primary land use is agriculture/rural. Landownership is mostly private, with the remainder of the watershed held by the City of Sandpoint, BLM, state and USFS (IDEQ, 2017).

The upper portion of the creek is surrounded by sparse residential development within the unincorporated areas of Bonner County, except for the Schweitzer Mountain Ski Resort, a large residential and commercial development located in the upper reaches of Schweitzer Creek. The lower approximate four-mile portion of Sand Creek is surrounded by residential and commercial development within the Cities of Sandpoint and Ponderay.

[1] Sand Creek Tributary to Lake Pend Oreille; not to be confused with the Sand Creek tributary to Pack River.

1.2 Proposed Actions

1.2.1 Project Description

BNSF proposes to construct a 2.2-mile-long second mainline track west of the existing BNSF mainline to connect the North Algoma Siding track (MP 5.1) south of Sandpoint, to the Sandpoint Junction switch (MP 2.9), where the BNSF and the Montana Rail Link (MRL) mainlines converge in Sandpoint. This action will consist of:

1. A new mainline track west of the existing BNSF mainline track;
2. A new bridge over LPO (Bridge. 3.9) adjacent to (west of) the existing rail bridge;
3. A new bridge over Sand Creek (Bridge 3.1) adjacent to (west of) the existing rail bridge;
4. A new bridge over Bridge Street (Bridge 3.0) adjacent to (west of) the existing rail bridge;
5. Temporary construction bridges over Lake Pend Oreille and Sand Creek;
6. 0.88-acre of permanent and 0.38-acre of temporary nearshore fill below the jurisdictional ordinary high water mark (OHWM) of 2062.5 feet, associated with bridge abutments and the south switch;
7. 0.28-acre of wetland fill in one location between the rail grade and the pedestrian path south of the Sand Creek Bridge 3.1.;
8. Development of temporary construction material/equipment work staging areas; and
9. Track, switch and signal upgrades.

The project need is based on continued growth of freight rail service demands in the northern tier, high-volume traffic corridor between the Midwest (Chicago Terminus) and the West Coast. The existing single mainline and portions of the over-water rail bridges date from the early 1900s. Rail traffic volumes have risen steadily for the past three decades resulting in this portion of the interstate main line becoming a constraint to interstate commerce. The proposed project will relieve system congestion, back-up of rail traffic, and reduce hold times on sidings and wait times at grade crossings both locally and regionally.

1.2.2 Project Elements

In addition to fills for the construction of a second mainline track, and three new bridges, the project includes minor excavation, grading for the new rail grade, retaining walls, development of temporary access roads and staging areas, and construction of temporary work bridges over Sand Creek and LPO (see Figure 2).

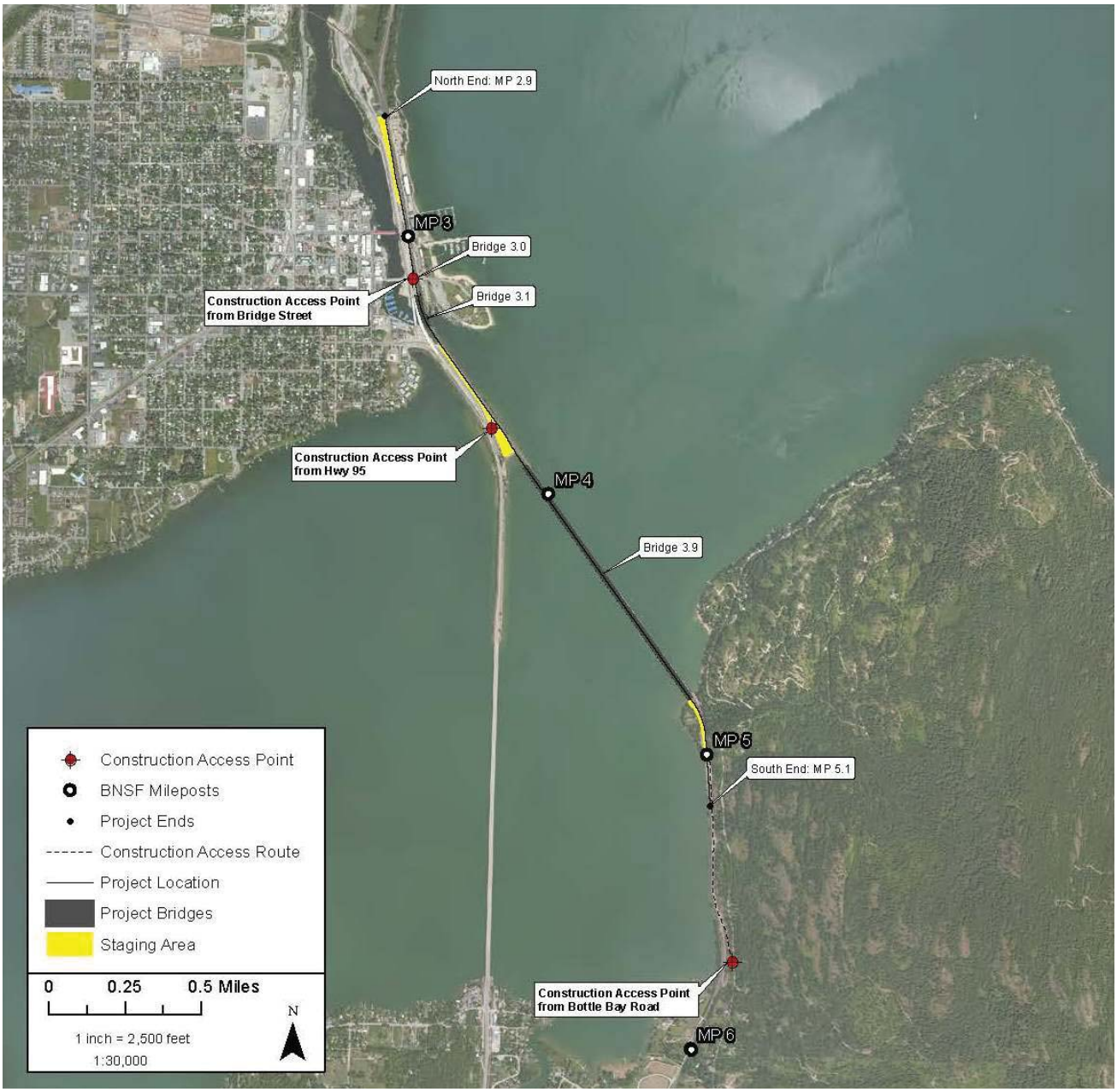

Figure 2. Project Overview

Access Roads/Staging Areas

Access roads and staging areas generally already exist for all project work. Existing upland access points from public roads to the BNSF right-of-way (ROW) will require minor expansion and upgrading and will be used for project access. All access roads and pads will be rock covered for the expected multi-year project. Additional land clearing will limited to the minimum required for safe project construction staging and operations.

Access to the south end of the project will be from Bottle Bay Road on an existing BNSF maintenance road within the ROW along the east side of the railroad tracks. There is an existing staging area within the ROW along the west of the tracks, from the south end of Bridge 3.9 to approximately BNSF MP 5.0.

Access to the north end of LPO Bridge 3.9 and the south end of Sand Creek Bridge 3.1, and the area to be graded between these two bridges, will be from the east side of Highway 95 onto an existing staging area/pad that extends from the north end of Bridge 3.9 to just south of Bridge 3.1.

Access to the north end of Sand Creek Bridge 3.1, and to the south end of Bridge 3.0 over Bridge Street, will be from Bridge Street.

Access to the north end of Bridge 3.0 will be from the BNSF ROW near the Sandpoint Amtrak Station. Staging for both Bridge 3.0 and the north end of Bridge 3.1 will be in the existing BNSF ROW and a project staging/laydown area north of the Amtrak Station adjacent to the Sandpoint Junction.

Bridge 3.9 - Lake Pend Oreille

This bridge will be constructed approximately 50 feet west of the existing rail bridge over LPO, and will be approximately 4,874 feet long and 18 feet wide. The bridge will have 49 spans at the following lengths:

- 42 at 104’ length;
- Six at 75’11” length;
- One at 47’10” length.

The bridge will consist of pre-cast, pre-stressed concrete I-girders and a cast-in-place concrete deck, supported by 48 in-water pier bents (piers), each consisting of six, open-ended, 36-inch-diameter steel pipe piles, for a total of 288 piles below the 2062.5-foot jurisdictional OHWM elevation of the lake. Pier caps will be pre-cast concrete. The new piers will align approximately with every other pier of the existing bridge.

Each of the 288 piles will be vibrated to resistance into the lakebed and finished with an impact hammer with an average of 1,600 strikes. Overall installation is estimated to take two to three hours per pile. Pile driving will occur during daylight working hours. Assuming that up to two piles could be driven per day, pile driving would occur for at an estimated 144 cumulative days (dependent on weather-related or other interruptions). Air bubble curtains will be used during extended impact pile driving to attenuate in-water sound pressure levels per U.S. Fish & Wildlife Service (USFWS) protocol provided to BNSF, and a turbidity curtain will surround the area being disturbed. Open-ended piles generally will further attenuate in-water sound from pile driving.

Temporary Construction Bridge

A temporary timber-deck construction bridge will be constructed immediately adjacent to, and west of, the new Bridge 3.9 location over LPO. This temporary bridge will need to support large cranes (100 to

250 tons) that will be working to construct the adjacent new bridge. The temporary bridge will be approximately 4,800 feet long and 32 feet wide, with 101 approximate 48-foot-long spans and one 24-foot-long span at the north end. Additionally, there will be eight 64-foot-wide staging set-outs at approximately 500-foot intervals along the bridge for safety and material staging, and to provide continuous through-access for the length of the temporary bridge.

The temporary bridge will be supported by 137 piers consisting of 24-inch-diameter steel pipe piles. Seventy-six (76) piers will consist of four piles each, 25 piers will consist of eight piles each, and 32 piers for eight set-outs will consist of four piles each. In total there may be up to 700 piles below the jurisdictional OHWM of the lake to account for minor adjustments in span support needs and site conditions.

Piles will be vibrated to resistance, and one pile per pier will be proofed with an impact hammer at an estimated 20 - 50 strikes for a short duration. Impact pile driving will occur during daylight working hours. Assuming that three piles can be driven per day, pile driving is expected to occur for an estimated 46 cumulative days (dependent on weather-related or other interruptions).

Bridge 3.1 - Sand Creek

This bridge will be constructed approximately 35 feet west/upstream of the existing rail bridge over Sand Creek and will be 505 feet long and 21 feet wide. Approximately 150 feet of this bridge will be in or over open water. The bridge will consist of pre-cast, pre-stressed concrete beams, pier caps and decking and will have 12 spans at the following lengths:

- One approximate 80-foot-long span over the creek channel;
- Seven approximate 45-foot-long spans; one of which will be over a portion of the creek during high water the rest being upland of the OHWM;
- Three 25-foot-long spans; one of which will be over a portion of the creek during high water and the other two being fully upland of the OHWM; and
- One approximate 31-foot-long transition span that will not be over water.

The bridge will be supported by 11 piers, each consisting of open-ended, 24-inch-diameter steel pipe piles. Two piers within the OHWM of the creek channel will consist of eight piles each; seven piers (one partially or wholly within the OHWM and six fully upland) will consist of six piles each; and two piers upland of the OHWM will consist of three piles each. There will be a total of 64 piles, 22 of which will be below the OHWM. Piles within the main channel of Sand Creek, will be driven during low-water conditions/winter pool elevation.

Each of the 64 piles will be vibrated to resistance and finished with an impact hammer with an average of 1,200 strikes. Overall installation is estimated to generally take one to two hours per pile. Pile driving will occur during daylight working hours. Assuming that three piles could be driven per day, pile driving would occur for at an estimated 22 cumulative days (dependent on weather-related or other interruptions). Open-ended piles would further attenuate in-water sound from pile driving.

Neither bubble curtains nor turbidity curtains will be used for Bridge 3.1 pile driving due to the relatively shallow water in Sand Creek and active current flows that would render both curtains

ineffective. The primary use of turbidity curtains is to contain and settle sediments that typically result from the use of bubble curtains. The pile driving itself creates minimal and localized disturbance.

Temporary Construction Bridge

A temporary timber-deck work bridge will be constructed immediately adjacent to and west of the new Bridge 3.1 location over Sand Creek. This temporary bridge will need to support large cranes (100 to 250 tons) used to construct the adjacent new bridge. The temporary bridge will consist of 11 spans, each 48 feet long and 32 feet wide. The bridge will be supported by 10 piers partially or fully below the OHWM. Eight piers will consist of four 24-inch-diameter, open-ended steel pipe piles, and two piers will consist of eight 24-inch-diameter, open-ended steel pipe piles. In total there will be 30 - 40 piles below the OHWM to account for minor adjustments in span support needs and site conditions.

Piles will be vibrated to resistance, and one pile per pier will be proofed with an impact hammer at an estimated 20 - 50 strikes for a short duration. Impact pile driving will occur during daylight working hours. Assuming that three piles can be driven per day, pile driving is expected to occur for an estimated three to eight days (dependent on weather-related or other interruptions).

If the new Bridge 3.1 is not completed prior to May, the center span and piers of the temporary bridge will be removed to accommodate navigation in Sand Creek through September.

Bridge 3.0 - Bridge Street

This bridge will be constructed approximately 35 feet west of the existing rail bridge over Bridge Street, and will fully span the road but be slightly longer than the existing bridge. No temporary construction bridge will be needed.

This bridge does not span a water body and will not have any jurisdictional impacts and will not be discussed in this BA.

1.2.3 Construction Equipment

Work vehicles and machinery for grading and rail embankment work will be typical of heavy construction:

- On and off-road large and small heavy-load haul trucks;
- Backhoes and tracked excavators;
- Bulldozers and graders; and
- Support trucks and maintainers.

Nearshore and over-water bridge construction will likely use:

- Large specialty cranes, support cranes and excavators;
- Crane mounted pile drivers (vibratory and impact); and
- Support vehicles, boats, and safety barges.

1.2.4 Project Sequencing and Timeline

Estimated project start date is in the Fall of 2018 with estimated completion in Winter 2021. Project construction will take approximately 3 to 3.5 years.

Fills in nearshore locations and the wetland will occur at the earliest stages of the project to take advantage of performing work while lake levels are lower and the wetland area is relatively dry. The temporary timber-deck construction bridges will be built second. The new bridges will be built from the temporary construction bridges. Bridge 3.9's permanent bridge work will likely start prior to and be concurrent with the final construction of the remaining temporary bridge sections.

The Bridge 3.9 temporary construction bridge is expected to remain in place for approximately three years, and removal will take approximately three months. The Bridge 3.1 temporary construction bridge is expected to remain in place for up to one year, and removal will take approximately two weeks.

For each temporary bridge, the bridge deck and piles will be removed starting generally in the middle and moving toward each end of the bridge. Each span will be removed by a lift crane and set on a truck behind the crane. Supporting piles for each span will be vibrated out and also set on the truck to be removed to staging areas. All of the bridge sections and piles will ultimately be transported to other projects, the contractor's base facility, or stockpiled at the BNSF Boyer Yard in Sandpoint for sorting and removal.

See Table 1 below for general project sequencing.

Table 1. General Work Activities Sequencing and Timeline

YEAR	ACTIVITIES
Fall 2018	Develop access and staging areas Wetland & nearshore fills Begin temporary work bridges
2019	Finish structural fills Temporary work bridge(s) construction Begin permanent bridge(s) pile driving
2020	Finish permanent bridge(s) pile driving Install permanent bridge components Track & infrastructure construction
2021	Finish track & infrastructure construction Remove temporary work bridges and nearshore fills

1.3 Avoidance, Minimization and Mitigation Measures

1.3.1 Avoidance Measures

The project must be able to provide a rail corridor connection between the two tracks at the north end of the BNSF Algoma Siding (MP 5.1) to the BNSF Sandpoint Junction (MP 2.9) where the BNSF and MRL mainlines converge. The new corridor must be of sufficient width to accommodate a second track that enables safe, adjacent operations for freight and passenger trains within the BNSF ROW. A minimum 15-foot track center is required for adjacent simultaneous train operations on upland rail grade areas, and 30- to 50-foot track centers are needed at bridge locations to ensure that the pile driving for the new bridges does not impact the integrity of the existing bridges' piles.

Constructing the project to the west of the existing track and bridges, rather than to the east, avoided the following:

- Additional nearshore fill of approximately 2.9 acres from Bridge 3.1 to Bridge 3.9 (approximately 0.5-mile of rail grade was already constructed on the west side of the tracks at the time of the Highway 95 Sandpoint Bypass project);
- Additional nearshore fill of approximately 1.2 acres for staging of equipment and materials that would need to be brought in by barge over LPO (otherwise all project equipment/materials would need to be brought in on Bridge Street in Sandpoint); and
- Lake bottom excavation and fill of undetermined quantity for a large work barge landing area.

Constructing the project within the existing BNSF ROW and not off-site avoided the following:

- Development of a new transportation corridor that would still have to cross Sand Creek and LPO; and
- Additional environmental impacts at newly-acquired properties that may have contained wetlands or other waterbodies.

Changes to initial project designs avoided the following:

- Temporary nearshore fill of 0.17-acre by extending the last south span of the Bridge 3.9 temporary construction bridge.
- Permanent nearshore fill of 1.97 acres by extending the north and south ends of Bridge 3.1; a design change to the north end and an extension to the south end, of Bridge 3.9; and a design change to the Algoma Switch area at the south end of the project.

1.3.2 Minimization Measures

A project-specific Water Quality Monitoring and Protection Plan (WQMPP) and Storm Water Pollution Prevention Plan (SWPPP) will be implemented for the project, and will contain Best Management Practices (BMPs) to reduce or eliminate the potential of impacting bull trout and/or degrading designated bull trout critical habitat. These and other measures to be implemented include, but are not limited to, the following:

- Temporary in-water steel piles for the construction bridges will be installed to refusal with a vibratory driver, and one pile per pier will be proofed with an impact hammer, which will reduce the amount and duration of in-water sound.
- For the permanent Bridge 3.9, air bubble curtains will be used to attenuate sound and turbidity curtains will be utilized to contain and settle sediments when impact driving the 36-inch-diameter piles.
- Open-ended piles reduces the number of strikes required to install the piles.
- Existing staging areas and access roads on the BNSF ROW will be utilized to avoid additional impacts to environmentally sensitive areas.
- A Spill Prevention, Control, and Countermeasure (SPCC) Plan will be developed to ensure that pollutants and products will be controlled and contained.
- BMPs will be installed to avoid erosion from exposed soils.
- Fully stocked spill kits will be maintained at all staging areas, on each piece of equipment, and at regular intervals throughout the project.
- Containment BMPs will be used on/under equipment to contain machinery fluids on the temporary work bridges or within 50 feet of surface waters.
- Fuel containers will not be stored on work bridges or within 50-feet of surface water.
- Construction materials will be contained and restricted from entering waters of the U.S.
- Concrete washout areas will be located away from surface waters and concrete debris will be removed daily.
- Containment BMPs will be implemented and maintained under the temporary construction bridges and the permanent bridges to capture inadvertent fall of construction materials or debris. These BMPs will be implemented in a manner so as to not adversely impact navigation.
- BNSF will assign an inspector to document that conservation measures conditioned by regulatory agencies are implemented.

1.3.3 Mitigation Measures

Mitigation for the wetland fill is proposed via the Valencia Wetland Mitigation Bank/Valencia Wetlands Trust (bank), a mitigation bank in Priest River, Idaho that is governed by an inter-agency review team. The project is within the bank's service area that includes Bonner County. The bank currently has over 1,000 credits available to provide compensatory mitigation for projects with impacts to wetlands within the bank's service area. Based on the functional unit score of the wetland (see *Wetlands and Waters of the US Delineation Report* prepared by Jacobs, November 2017) and the bank's credit ratios, BNSF proposes to purchase 3.64 credits at the bank for the project's 0.28 acres of wetland fill.

Mitigation opportunities for nearshore fills associated with the project are also available. Discussions have taken place and will continue with IDFG, along with discussions and review with USFWS, tribal

fisheries, and Avista to define project(s) that would provide the most benefit for the affected aquatic habitats.

BNSF is proposing that these opportunities be funded at an equivalent cost of purchasing bank mitigation functional unit credits for 0.38 acres of temporary nearshore fill and 0.88 acres of permanent nearshore fill, provided that the regulatory agencies are in agreement and can provide direction for calculating the functional units of impacted nearshore waters.

2. Baseline Conditions

2.1 Action Area

ESA regulations define the term “action area” as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (*See* 50 C.F.R. § 402.02). The action area for the project is based on all potential impacts from the construction activities, both temporary and permanent, on listed species (i.e. bull trout) addressed in this Biological Assessment (BA).

The action area was delineated by evaluating the farthest reaching physical, chemical and biotic effects of the action on the environment, which was determined to be underwater sound (sound pressure levels or SPLs) from the loudest construction activity. The loudest construction activity will be impact-hammer pile driving to install steel pipe piles for LPO Bridge 3.9 and Sand Creek Bridge 3.1. Therefore, the action area includes the farthest distance that underwater sound will travel from these two sites until reaching land, background noise levels, or no longer results in potential behavioral effects.

For aquatic species, risk of injury or mortality resulting from noise is related to the effects of rapid pressure changes, especially on gas-filled spaces in the fish’s body (such as swim bladder, lungs, sinus cavities, etc.). Generally, in-water or near-water pile driving is the issue of concern. Noise generated by impact pile driving is impulsive—consisting of a broad range of frequencies over a short duration. Different aquatic species exhibit different hearing ranges, and threshold distances and noise levels have been established to be used as a basis for effect determinations. The decibel (dB) thresholds used in this analysis of effects to bull trout are (WSDOT, 2017):

- Injury: > 2 grams – 187 dB cSEL; <2 grams – 183 dB cSEL; all sizes – 206 dB PEAK;
- Behavioral effects – 150 dB RMS

Peak dB describes the instantaneous peak sound pressure level and is used to evaluate potential injury to fish, and Root Mean Square (RMS) dB describes the pressure level during the impulse and is used to describe disturbance-related effects (i.e. harassment) to fish. Sound Exposure Level (SEL) is used as an indication of the energy dose (WSDOT, 2017).

There are several factors that can reduce the extent of underwater noise transmission, including water depth, sediment type, bottom topography, current, underwater structures, sinuosity (in rivers or streams), type and diameter of piles, and use of attenuation devices such as air bubble curtains (WSDOT, 2017).

The NOAA Pile Driving Impact Calculator was used to determine the distance that underwater unmitigated/unattenuated sound would extend, based on the size and type of piles as measured 10 meters from the pile and proofed with an impact hammer (WSDOT, 2017).

Bridge 3.9 - LPO

Data was entered into the calculator specifying that 288 36-inch-diameter steel pipe piles would be driven with an estimated 1,600 strikes per pile, with single strike levels at 210 dB PEAK, 183 dB SEL, and 193 dB RMS measured at 10 meters. The following calculated sound levels and distances do not take into account the use of open-ended piles that require less strikes/pile than closed-end piles (Singh, 2014; FHWA/IN/JTRP-2002/4), the use of air bubble curtains, or attenuation to underwater ambient/background sound levels. Background sound levels in deep freshwater lakes or deep slow moving rivers are approximately 120 dB RMS, similar to marine levels near developed shorelines (WSDOT, 2017).

Calculated results for Bridge 3.9 show a cumulative SEL of 218 dB and the following distances at which various thresholds of accumulated SEL are expected to be exceeded for bull trout:

- Distance at which 206 dB PEAK is expected to be exceeded (onset of physical injury) = 18 meters (59 feet)
- Distance at which 187 dB accumulated SEL is expected to be exceeded (onset of physical injury to fish 2g or greater) = 1,175 meters (0.74 mile)
- Distance at which 183 dB accumulated SEL is expected to be exceeded (onset of physical injury to fish less than 2g) = 1,585 meters (0.98 mile)
- Distance at which 150 dB RMS is expected to be exceeded (behavioral effects) = **7,356 meters (4.57 miles)**

Therefore, the Bridge 3.9 action area is defined as the farthest 7,356-meter distance that underwater sound will travel before encountering land. Potential behavioral effects to bull trout could therefore extend 4.57 miles northeast to Oden Bay and 4.44 miles southwest to the Pend Oreille River near the City of Dover at the lake's outlet (see Appendix B).

Bridge 3.1 - Sand Creek

Data was entered into the calculator specifying that 64 24-inch-diameter steel pipe piles would be driven with an estimated 1,200 strikes per pile, with single strike levels at 207 dB PEAK, 178 dB SEL, and 194 dB RMS measured at 10 meters. The following calculated sound levels and distances do not take into account the use of open-ended piles that require less strikes/pile than closed-ended piles (Singh, 2014), the shallow water conditions that will be present during pile driving at this location, or ambient/background sound levels. Background sound levels in Sand Creek have not been estimated.

Results showed a cumulative SEL of 214 dB and the following distances within which various thresholds of accumulated SEL are projected to be exceeded for bull trout:

- Distance within which 206 dB PEAK is expected to be exceeded (onset of physical injury) = 12 meters (39 feet)

- Distance within which 187 dB accumulated SEL is expected to be exceeded (onset of physical injury to fish 2g or greater) = 590 meters (0.37 mile)

- Distance within which 183 dB accumulated SEL is expected to be exceeded (onset of physical injury to fish less than 2g) = 736 meters (0.46 mile)

- Distance within which 150 dB RMS is expected to be exceeded (behavioral effects) = **8,577 meters (5.33 miles)**

Because there are no bull trout or critical habitat in Sand Creek (USFWS, 2010; K. Satori & M. Williams, personal comm.), the above distance-related effects would only be in LPO which is 0.25-mile downstream of Bridge 3.1. The Bridge 3.1 action area is defined as the farthest 5.33-mile distance that underwater sound will travel before encountering land. Therefore, the farthest that behavioral effects to bull trout could extend would be approximately 1.48 miles southeast to the LPO shoreline west of Contest Point (see Appendix B).

2.1.1 Listed Species/Designated Critical Habitat in Action Area

The following tables identify USFWS ESA-listed species and designated critical habitat known to occur in Bonner County, Idaho.

The species denoted in **bold text** in Table 2 and Table 3 have the potential to occur or have designated critical habitat within the project action area. Species noted with non-bold text are not listed in the action area, have no designated critical habitat in the action area, or there is no known occurrence in the action area. Consequently, these species will not be further addressed in this BA.

Table 2. ESA-Listed and Proposed Species in Bonner County, ID

COMMON NAME	SCIENTIFIC NAME	ESA LISTING	POTENTIAL TO OCCUR IN ACTION AREA	PRELIMINARY DETERMINATION*
Canada lynx	*Lynx canadensis*	Threatened	No	NE
Grizzly bear	*Ursus arctos horribilis*	Threatened	No	NE
North American wolverine	*Gulo gulo luteus*	Proposed Threatened	No	NE
Woodland caribou	*Rangifer tarandus caribou*	Endangered	No	NE
Bull trout	***Salvelinus confluentus***	**Threatened**	**Yes**	**NLTAA**

*Definitions: NE = No Effect; NLTAA = May Affect, Not Likely to Adversely Affect

Table 3. Designated and Proposed Critical Habitat in Bonner County, ID

COMMON NAME	SCIENTIFIC NAME	CRITICAL HABITAT UNIT AND/OR POPULATION	CRITICAL HABITAT IN ACTION AREA	PRELIMINARY DETERMINATION*
Canada lynx	*Lynx canadensis*	Contiguous U.S. DPS	No	NE
Woodland caribou	*Rangifer tarandus caribou*	Selkirk Mountain Population	No	NE
Bull trout	***Salvelinus confluentus***	**Unit 31 – Clark Fork River Basin**	**Yes**	**NE**

*Definitions: NE = No Effect; NLTAA = May Affect, Not Likely to Adversely Affect

2.2 Status of the Species and Critical Habitat

2.2.1 Bull Trout

Listing/Species Description/Life History

The coterminous United States population of bull trout (*Salvelinus confluentus*) was listed by the USFWS as threatened in November 1999 (64 FR 58910). Bull trout presently occur in approximately 45% of their estimated historical range within the Columbia River Basin, and were listed due to declining trends in distribution and abundance caused by the combined effects of habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, angler harvest and poaching, entrainment into diversion channels and dams, and introduced non-native fish species (USFWS BO, 2015).

Bull trout are members of the family Salmonidae and are char native to Washington, Oregon, Idaho, Nevada, Montana and western Canada. Compared to other salmonids, bull trout have the most specific habitat requirements that appear to influence their distribution and abundance. These requirements are referred to as “the four Cs” – cold, clean, complex and connected habitat – including cold water temperatures (less than 12 degrees Celsius/54 degrees Fahrenheit); stable stream channels and clean spawning and rearing gravel; complex stream habitat including deep pools, overhanging banks and large woody debris; and connectivity (i.e. unblocked migratory corridors) between spawning and rearing (SR) areas and downstream foraging, migration, and overwintering (FMO) habitats (USFWS, 2015).

Bull trout exhibit two life-history forms: resident and migratory. Resident bull trout spend their entire lives in the same stream/creek. Most bull trout are migratory, rearing one to four years in natal tributaries before moving to larger rivers (fluvial) or lakes (adfluvial) and then migrating back to natal tributaries to spawn from August through November. An anadromous form of bull trout also exists in the Coastal-Puget Sound population, which spawns in rivers and streams but rears young in the ocean. Resident and juvenile bull trout prey on invertebrates and small fish. Adult migratory bull trout primarily eat fish. Resident bull trout range up to 10 inches long, and migratory forms may range up to 35 inches long and weigh up to 32 pounds (USFWS ECOS, 2017).

Bull trout normally reach sexual maturity in four to seven years and live as long as 12 years. They spawn more than once in a lifetime, with both repeat- and alternate-year spawning reported. Therefore, bull trout require two-way passage upstream and downstream for repeat spawning and also for foraging (USFWS BO, 2015). In Idaho, bull trout generally spawn in September and October. Fry normally emerge from early April through May depending upon water temperatures and increasing stream flows (Miller, 2014). Most downstream migrations for all size-classes of bull trout throughout the year are almost exclusively at night, after sunset and before sunrise (USFWS BO, 2015).

Adfluvial bull trout comprise the predominant life history form present in the LPO basin and are the predominant large-bodied native predator in the lake (McCubbins, 2016).

Critical Habitat

In September 2010, the USFWS designated critical habitat for bull trout throughout their range that contains features considered essential for conservation of the species (75 FR 63898). Thirty-two Critical Habitat Units (CHUs) were designated, including Habitat Unit 31-Clark Fork River Basin that includes the open water and shorelines of LPO and the Pend Oreille River within the project action area, but does not include Sand Creek.

The primary function of individual CHUs is to maintain and support core areas. The 32 designated CHUs are clustered into six recovery units. The Columbia Headwaters Recovery Unit (CHRU) includes western Montana, northern Idaho, and the northeastern corner of Washington. The CHRU is further divided into five geographic regions and 35 core areas. Core areas are defined as groups of partially isolated local populations of bull trout with some degree of gene flow occurring between them, and are considered to be “metapopulations” (USFWS BO, 2015).

Unique to the CHRU is that bull trout life history in most of the core areas is predominantly adfluvial, with adult and subadult fish residing in the lake during much of their life, often with extensive migrations upstream by adults and downstream by juveniles and post-spawn adults (USFWS, 2015). For example, bull trout were tracked migrating at least 82 km (51 miles) to LPO from the East Fork River, a spawning tributary of Priest River (Dupont, 2007).

Fifteen (15) of the core areas are referred to as “complex” core areas that represent large, interconnected habitats with multiple spawning streams containing separate and genetically identifiable local populations. These 15 complex core areas contain the majority of individual bull trout and the bulk of the designated critical habitat (USFWS RUIP, 2015).

LPO is identified as a complex core area contained within the designated Lower Clark Fork Geographic Region. The Lower Clark Fork Geographic Region, the largest and most diverse bull trout core recovery area in the CHRU, is essential to bull trout conservation because it is among the more secure and stable bull trout refugia across the range of the species and may provide a very important stronghold against potential extinction. It also provides important bull trout FMO habitat for local populations in LPO, Pend Oreille River tributaries, and the Lower Clark Fork River, as well as an essential migratory corridor for bull trout from LPO to access upstream productive watersheds (USFWS, 2009).

Because of its systematic and jurisdictional complexity (three states, a tribe, five mainstem dams), the LPO core area is further divided into three parts:

- (LPO-A) Clark Fork River mainstem upstream of Cabinet Gorge Dam on the Idaho/Montana border, almost entirely in Montana;
- (LPO-B) Lake Pend Oreille basin proper and its tributaries, extending from Cabinet Gorge Dam on the Clark Fork River downstream to Lake Pend Oreille to Albeni Falls Dam on the Pend Oreille River, entirely in Idaho; and
- (LPO-C) the lower basin (lower Pend Oreille River) downstream of Albeni Falls Dam through the Box Canyon Dam to the Boundary Dam one mile upstream of the Canadian border, including portions of Idaho, Washington and the Kalispel Indian Reservation (USFWS RUIP, 2015).

The LPO basin proper and its tributaries (LPO-B) represent 15 percent of the LPO complex core area, covering 0.67 million acres with 1,250 miles of mapped streams. The BNSF Sandpoint Junction Connector project lies wholly within LPO-B.

Local Population - Threats, Status, and Recovery Activities

Both the Idaho Department of Fish & Game (IDFG) and the USFWS have confirmed that there is no documented presence of bull trout, or designated bull trout habitat, in Sand Creek, and there is minimal data on bull trout use of LPO within the project action area (K. Satori & M. Williams, personal comm.). However, bull trout most likely use the action area in the course of migrating between spawning habitat and as FMO habitat, and three separate studies of radio-tagged bull trout from 2005-2009 documented a few bull trout at or in close proximity to Bridge 3.9 throughout the winter. While most bull trout migration into LPO occurs from upstream tributaries in the spring, a fall migration occurs from the downstream East Fork River, presumably to allow bull trout to avoid swimming upstream into the lake against the current during spring high flows (USFWS BO, 2015).

LPO and Sand Creek within the project action area are listed for water quality impairments which have mostly been addressed by established TMDLs. These include Sand Creek TMDLs for temperature, sediment, and nutrients approved in 2007, and a nearshore LPO TMDL for total phosphorus approved in 2002. LPO is also currently listed as impaired by mercury and development of a TMDL is a medium priority for 2018. Additionally, the Pend Oreille River is currently in need of TMDLs (medium priority for 2019) for temperature and dissolved gas supersaturation impairments (IDEQ, February 2017).

Specific threats identified in the LPO-B core area include:

- Historic fragmentation of the lower Clark Fork River due to three privately-owned mainstem hydroelectric dams (Cabinet Gorge, Noxon Rapids, and Thompson Falls) that seriously compromised access and productivity of this bull trout habitat for nearly a century (USFWS, 2009);
- Overfishing of bull trout and the presence of voracious non-native species, specifically lake trout (mackinaw) that prey on juvenile bull trout and consume kokanee, a primary food source for bull trout, as identified by the Idaho Department of Fish & Game (IDFG); and

- One primary habitat threat--legacy impacts from upland/riparian land management that increase sedimentation and cause riparian and instream degradation, loss of large woody debris (LWD), and pool reduction in FMO habitat and in some SR tributaries.

Additionally, altered seasonal water level fluctuations have caused reduced riparian vegetation, eroding beaches and shorelines, and decreasing productivity of littoral habitats.

While the adfluvial nature of bull trout in LPO can make them susceptible to threats from non-native fish invasion and mainstem river migratory barriers, it does allow for greater resiliency due to the highly suitable cold water habitat that the lake provides, and the robust size, condition and fecundity of adfluvial fish that are able to capitalize on the lake's high-quality forage base. This may explain why the bull trout population is relatively robust in the LPO area (approximately 12,000 fish) despite loss of connectivity to large areas of upstream and downstream spawning and rearing habitat (USFWS, 2015). A 2007-2008 study also noted that an estimated population of 12,513 bull trout in LPO was similar to that estimated one decade earlier in 1997-1998, indicating a stable population (McCubbins, 2016).

Also, it is suggested that a minimum of 10 local populations are required for a bull trout core area (metapopulation) to function effectively, and core areas with more than 10 interconnected local populations are at diminished risk of extirpation. It is also estimated that approximately 1,000 spawning adults within any bull trout population are necessary to ensure persistence of the population by maintaining genetic variation. The LPO core area has at least 20 local populations, and the IDFG has determined that approximately 4,000 adult spawning bull trout occupy LPO at any given time (USFWS BO, 2015).

Further, bull trout redd counts show a stable to increasing trend in the LPO-B core area. Bull trout redd counts are conducted on a five-year rotational basis on LPO and lower Clark Fork River tributaries[2] under *Appendix A - Idaho Tributary Habitat Acquisition and Fishery Enhancement Program* of the Avista Clark Fork Settlement Agreement (CFSA). These tributaries are designated as critical habitat outside of the project action area. Six index streams[3] have been counted consistently since 1983 prior to the CFSA. [The CFSA outlines protection, mitigation, and enhancement (PMEs) efforts required under the 2005 relicensing of the Cabinet Gorge and Noxon Rapids Dams on the lower Clark Fork River.]

These bull trout SR tributaries in the LPO-B core area have averaged 738 bull trout redds annually from 1995 to 2014, and 792 bull trout redds from 2005 to 2014. The six index streams represented 68 percent and 62 percent of the total redds during these time periods, respectively (Bouwens, 2016). Habitat conditions in the tributaries vary widely among streams and years, ranging from fish passage barriers due to low water in dry years, to variable stream morphology, pool frequency and quality, amount of sedimentation and large woody debris (LWD), road densities, and water temperature.

Ongoing and planned near-term fish passage efforts (fishways and trap and transport programs) have improved the longer-term prognosis for bull trout connectivity, and are expected to provide a critical

[2] Caribou, Char, East Fork Lightning, Gold, Granite, Grouse, Hellroaring, Johnson, Lightning, Morris, N. Gold, Porcupine, Rattle, S. Gold, Savage, Strong, Trestle, Twin, Wellington, and W. Gold Creeks; Pack River; Sullivan Springs.
[3] East Fork Lightning, Gold, Grouse, Johnson, N. Gold, and Trestle Creeks

linkage to recovering bull trout in the entire Lower Clark Fork Geographic Region in the future. Continuing efforts to suppress non-native fish (specifically lake trout), which is largely well-funded under the Avista CFSA, will remain an important component of the recovery effort (USFWS, 2009). A recent study also concluded that lake trout eradication efforts under the Avista CFSA, as well as a moratorium on bull trout angling since 1996, have effectively addressed overfishing and non-native fish threats thereby increasing the likelihood of long-term persistence of the LPO bull trout population (McCubbins, 2016).

Recommended recovery tasks to address the primary habitat threats in tributary streams include:

- Revegetation of deficient riparian areas--priority watersheds include Pack River and Lightning Creek (located 12 to 20 miles upstream of the project action area, respectively); and
- Continued implementation of the Avista CFSA to protect habitat through acquisitions and easements, and to improve and restore degraded instream habitat in key LPO bull trout spawning and rearing tributaries (USFWS, 2015).

Table 4. LPO Matrix of Diagnostics/Pathways and Indicators

DIAGNOSTIC OR PATHWAY	INDICATORS	BASELINE CONDITIONS	COMMENTS*
Subpopulation Characteristics	Subpopulation Size	Functioning appropriately	
	Growth and Survival	Functioning appropriately	
	Life History Diversity and Isolation	Functioning appropriately	
	Persistence and Genetic Integrity	Functioning appropriately	
Water Quality	Temperature	Functioning appropriately in LPO; Functioning at risk in Pend Oreille R (POR) & some SR tributaries	Temperature and dissolved gas supersaturation impairments in Pend Oreille R., downstream of project to WA border.
	Sediment	Functioning at risk in some SR tributaries	Legacy impacts
	Chemical Contamination & Nutrients	Functioning at risk (for chemical only)	Mercury impairment in LPO. Nutrient TMDL completed for LPO nearshore. Nutrient TMDLs completed for some SR tributaries.
Habitat Access	Physical Barriers	Functioning at unacceptable risk	5 total dams, upstream on Clark Fork R. & downstream on Pend Oreille R. No constructed fish passage; trap & haul programs only.

Table 4. LPO Matrix of Diagnostics/Pathways and Indicators (cont'd.)

DIAGNOSTIC OR PATHWAY	INDICATORS	BASELINE CONDITIONS	COMMENTS*
Habitat Elements	Substrate	Functioning at risk in some SR tributaries	Legacy impacts
	Large Woody Debris	Functioning at risk in some SR tributaries	Legacy impacts
	Pool Frequency	Functioning at risk in some SR tributaries	Legacy impacts
	Pool Quality	Functioning at risk in some SR tributaries	Legacy impacts
	Off-Channel Habitat	Functioning at risk in some SR tributaries	Legacy impacts River).
	Refugia	Functioning appropriately	LPO proper
Channel Conditions and Dynamics	Average Wetted Width/Maximum Depth Ratio	Functioning at risk in some SR tributaries	Legacy impacts; residential development
	Streambank Condition	Functioning at risk in some SR tributaries	Legacy impacts; residential development
	Floodplain Connectivity	Functioning at risk in some SR tributaries	Legacy impacts; residential development
Flow/Hydrology	Peak/Base Flows	Functioning at risk in some SR tributaries	Legacy impacts
	Drainage Network Increase	Functioning at risk in SR tributaries	Seasonal fluctuations in LPO elevations; legacy impacts
Watershed Conditions	Road Density and Location	Functioning at risk in some SR tributaries	Legacy impacts
	Disturbance History	Functioning at risk in some SR tributaries	Legacy impacts
	Riparian Reserves	Functioning at risk in some SR tributaries	Legacy impacts
Integration of Species and Habitat Conditions		Indicators functioning appropriately for LPO except for physical barriers (mainstem river dams) and mercury impairment. Indicators functioning at risk in some SR tributaries.	

*Note: Legacy impacts from forest roads, logging and fires (e.g. Lightning Creek, Grouse Creek and Pack River).

3. Effects Analysis

Effects of the action consider the direct and indirect effects of an action on listed species and critical habitat, together with effects of other activities that are interrelated or interdependent with that action, and then considered along with the environmental baseline and cumulative effects to determine the overall effect to the species.

Direct effects are those that result from the proposed action and directly or immediately impact the species or its habitat. Indirect effects are those that are caused by, or will result from, the proposed action and occur later in time (USFWS BO, 2015). Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate ESA Section 7 consultation.

The project will construct both a temporary and permanent 4,874-foot-long bridges over LPO and will drive steel piles into the LPO lakebed (288 permanent 36-inch-diameter piles and 700 temporary 24-inch diameter piles). Expected effects to bull trout and/or critical habitat are related to percussive impacts, predation, benthic habitat, turbidity, and potential machine fluid contamination. Table 5 below displays project effects on population and habitat indicators and is followed by a discussion of potential direct, indirect and cumulative effects.

Table 5. Checklist for Documenting Environmental Baseline & Effects of Proposed Action(s) on Relevant Indicators

DIAGNOSTICS/ PATHWAYS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)*		
	Functioning Appropriately	Functioning at Risk	Functioning at Unacceptable Risk	Restore	Maintain	Degrade
Subpopulation Characteristics: Size	X				X	
Growth & Survival	X				X	
Life History Diversity & Isolation	X				X	
Persistence & Genetic Integrity	X				X	
Water Quality: Temperature	X (LPO only)	X			X	
Sediment		X			X	temporary

Table 5. Checklist for Documenting Environmental Baseline & Effects of Proposed Action(s) on Relevant Indicators (cont'd.)

DIAGNOSTICS/ PATHWAYS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)*		
	Functioning Appropriately	Functioning at Risk	Functioning at Unacceptable Risk	Restore	Maintain	Degrade
Chemical Contamination / Nutrients		X			X	
Habitat Access: Physical Barriers			X		X	
Habitat Elements: Substrate Embeddedness		X			X	
LWD		X			X	
Pool Frequency & Quality		X			X	
Large Pools		X			X	
Off-Channel Habitat		X			X	
Refugia	X				X	
Channel Conditions and Dynamics Wetted Width / Maximum Depth Ratio		X			X	
Streambank Conditions		X			X	
Floodplain Connectivity		X			X	
Flow/Hydrology: Change in Peak/Base Flows		X			X	
Drainage Network Increase		X			X	
Watershed Conditions: Road Density and Location		X			X	
Disturbance History		X			X	
Riparian Conservation Areas/Reserves		X			X	
Disturbance Regime		X			X	
Integration of Species and Habitat Conditions	X LPO	X Tribs/POR	X LPO (dams)		X	X temp sediment in LPO

* Compliance with the Northwest Forest Plan Aquatic Conservation Strategy (ACS) is not applicable to Idaho and has been deleted from this table.

3.1 Direct Effects

3.1.1 Baseline Habitat Conditions

Benthic Habitat:

LPO provides FMO habitat for bull trout. The project will construct a new railroad bridge over Lake Pend Oreille that will require driving 288 permanent 36-inch-diameter steel piles and up to 700 temporary 24-inch-diameter piles into the lakebed. This will result in a permanent loss of 2,036 square feet of benthic habitat, and a temporary loss of 2,200 square feet of benthic habitat (the area where the piles are installed). Given the footprint of the project where permanent benthic habitat will be lost relative to the total benthic habitat available in LPO, the effects to benthic habitat are expected to be discountable.

Shoreline/Riparian Vegetation:

Shoreline development at both ends of Bridge 3.9 has reduced shoreline vegetation and large woody debris (LWD) recruitment, displaced willow habitat, and altered wave and scour patterns adjacent to new shoreline structures. Removal of riparian vegetation can increase water temperature and reduce the supply of terrestrial insects, and removal of riparian trees reduces the potential for LWD recruitment that contributes to production of invertebrate prey for bull trout (USFWS BO, 2015). Removal of existing shoreline vegetation will be limited to the minimum necessary for construction of the project. Overall water temperature and LWD recruitment in LPO will not be affected, and removal of localized existing vegetation would be insignificant relative to the total amount of shoreline and riparian vegetation currently remaining in LPO and the project area.

3.1.2 Baseline Population Conditions

Pile Driving (percussive damage):

The project will drive steel piles up to 36 inches in diameter with vibratory pile-driving equipment and an impact hammer will be used for finishing. Approximately two 36-inch-diameter piles will be driven per day with up to 1,600 strikes per pile. The impact hammer can produce spikes of sound reaching levels than can harm or kill fish or cause behavioral effects. Impact hammers produce more intense pressure waves, and while the initial strikes may elicit a startle response in fish, the response wanes and fish may remain within the range of potentially harmful sound. Additionally, impact hammers produce short spikes of sound lasting less than a few seconds with energy outside of the infrasound range, which may not elicit an avoidance response in fishes. Therefore, fish may be exposed to harmful pressures for longer periods of time (USFWS BO, 2015).

Pile driving sound pressure levels (SEL) in excess of 150 dB RMS are expected to cause temporary changes in bull trout behavior such as a startle response, disruption of feeding, or impairment of predator detection. However, since pile driving occurs during daylight hours, there is a break of up to 12 hours overnight. Studies have shown that bull trout display little activity during the day when pile driving would occur, and peak activity is at night (McPhail, 1996).

For Bridge 3.9, the NOAA Pile Driving Calculator (see Appendix B) shows that injury to subadult and adult bull trout could occur within approximately one mile of the pile driving, and behavioral effects

could occur within approximately 4.6 miles. For Bridge 3.1, the calculator shows that injury to subadult and adult bull trout could extend approximately 0.20-mile into LPO near the mouth of Sand Creek, and behavior effects could extend over a mile southeast across LPO to the lake shoreline near Contest Point.

However, due to increased activity occurring in the immediate area of project construction, bull trout could be expected to move away from the area at, or prior to, initiation of pile driving. Additionally, there would be a break of up to 12 hours (overnight) between work periods, which is believed to be sufficient time for recovery from exposure to high noise levels (USFWS BO, 2015). Further, bull trout are known to be most active at night and thus less likely to be in the action area when pile driving occurs. Lastly, air bubble curtains will be used to attenuate sound impacts that may reduce SPLs by 10 to 30 dB and reduce the lateral extent of effects. While there is the potential for effects to some bull trout from pile driving, bull trout are not known to be found in the project vicinity in significant numbers, the effects are not typically permanent, and are not likely to adversely affect the overall robust LPO bull trout population.

Predation:

Bridge 3.9 over LPO will result in additional shading (low level) and additional pier hiding habitat (moderate). Both have the potential to create rearing and ambush habitat for native and non-native fish species that prey on subadult bull trout. Smallmouth bass and largemouth bass are two predator fish in the action area that have a strong affinity to habitat structures including bridges and pilings (USFWS BO, 2015).

Based on the presence of bull trout and predators in the action area, and the additional shading and structure created by the new Bridge 3.9, there is a potential for increased predation of bull trout. Bull trout in the action area are migratory and use the area for foraging and overwintering. However, only juvenile and subadult bull trout are susceptible to increased predation. While the number of subadult bull trout in the action area potentially lost to predation cannot be quantified, the overall LPO bull trout population is not expected to be adversely affected.

Turbidity:

While pile driving itself typically generated localized sediment displacement, the use of air bubble curtains can mobilize a higher level of sediment and increase localized areas of turbidity within the action area temporarily. Removal of piles of the temporary construction bridges also has a localized increase in turbidity. The level of turbidity within several meters of construction is likely to exceed natural background levels. Turbidity can cause stress responses in bull trout, such as gill flaring, coughing, avoidance, and an increase in blood sugar levels. However, moderate levels of turbidity can also reduce vulnerability to predators due to a camouflaging effect (USFWS BO, 2015).

Turbidity impacts will be reduced by utilizing turbidity curtains during impact driving of 36-inch-diameter piles while bubble curtains are in use, which is expected to limit the extent and magnitude of sediment transport. Additionally, the potential of bull trout remaining in the construction area would be low due to the activity and noise avoidance and turbidity dissipates. Therefore, turbidity is not expected to result in significant effects to bull trout.

Chemical Contamination:

Construction of Bridge 3.9 and the temporary construction bridge creates the potential risk of construction materials or construction equipment fluids (fuel, oil, hydraulic fluid, antifreeze, etc.) in open waters. Exposure to high levels of petroleum-based products can cause toxicity to bull trout and chronic lethal and sub-lethal effects to a wide range of aquatic organisms. Spills of wet concrete into water can potentially result in temporary localized increases in pH levels. The risk to aquatic life depends on the type of contaminant, the time of year, the amount of material spilled or leaked, and the effectiveness of containment materials (USFWS BO, 2015).

Implementation of BMPs/minimization measures discussed in Section 1.3.2, such as containment systems installed under the construction and permanent bridges to capture potential falling construction materials or debris, spill prevention planning and staging, proper storage and handling of fluids, and equipment monitoring and maintenance, are all proposed to be implemented to reduce potential impacts to water quality and bull trout.

3.2 Indirect Effects

3.2.1 Changes to Baseline Habitat Conditions

As noted in Section 3.1.1, installation of 288 permanent 36-inch-diameter steel piles into LPO results in a permanent, post-construction loss of 2,036 square feet of benthic habitat and a reduction of a food source for bull trout. However, relative to the total benthic habitat available in LPO, the effects of benthic habitat loss from the project are expected to be discountable.

3.2.2 Changes to Baseline Population Conditions

As noted in Section 3.1.2, the project will create some additional permanent shading over, and pier / piling hiding habitat in, LPO, potentially resulting in increased post-construction predation of subadult bull trout. However, the overall robust LPO bull trout population is not expected to be adversely affected.

3.3 Effects of Interrelated or Interdependent Actions

No interdependent or interrelated actions are associated with the Sandpoint Junction Connector project. The project activities are single and complete actions, and no effects from interdependent or interrelated actions would occur.

3.4 Cumulative Effects

At this time, there are no known state, tribal or local actions that are certain to occur in the action area. Private actions may include additional private docks constructed along the LPO and Pend Oreille River shorelines within the action area. These docks are not anticipated to alter any measurable amount of shoreline within the project action area.

3.5 Effects Summary

The proposed action may result in temporary direct effects to bull trout from pile driving associated with the construction of both Bridge 3.9 and its temporary construction bridge. There may be permanent indirect effects to bull trout due to the potential for increased predation associated with the increased shading and additional pier hiding habitat from Bridge 3.9 after construction.

However, the area shaded by the permanent Bridge 3.9 over LPO is very small compared to the total surface area of the lake (approximately two acres out of a total of 94,720 acres LPO surface area). Similarly, the temporary construction bridge over LPO is also very small compared to the surface area of the lake (approximately four acres out of a total of 94,720 acres LPO surface area). Bull trout are expected to generally avoid the area due to increased activity and noise during construction activities. Therefore project activities are unlikely to significantly affect subpopulation indicators at the watershed or Recovery Unit scales, either temporarily or permanently.

Other effects, such as temporary pile driving, turbidity, potential equipment fluid contamination, or temporary and permanent benthic habitat alteration, are also expected to be discountable relative to the overall area of bull trout dispersal in the lake and/or their designated critical habitat.

The project is not expected to contribute to or exacerbate the existing threats to the bull trout population in the LPO-B core area as defined in Section 2.2.1 above: (1) historic fragmentation due to dams on the lower Clark Fork River; (2) overfishing of bull trout and the presence of voracious non-native species, specifically lake trout; and (3) legacy impacts from upland/riparian land management practices.

4. Conclusion and Preliminary Determination

4.1 Bull Trout

4.1.1 Bridge 3.1 – Sand Creek and Bridge 3.9 – Lake Pend Oreille

The project **may affect** bull trout because:

- The action area includes LPO and extends a short distance into the mainstem of the Pend Oreille River.
- Bull trout have been documented in LPO and the Pend Oreille River, and both waterbodies are designated critical habitat for bull trout.
- Both adult and subadult bull trout may utilize the action area at any given time, especially during spring and fall months when movement through the area is higher.
- Year-round, in-water work is proposed.
- The project includes installation of piles with a vibratory driver and impact hammer.
- The project will occur over an approximate 3 to 3.5-year time period.
- Underwater noise levels from pile driving may exceed the injury threshold.
- The project will result in approximately two acres of additional shading over Lake Pend Oreille and increased predator hiding habitat at the piers.

The project is **not likely to adversely affect** bull trout because:

- Bull trout will likely avoid the impact area during installation of piles.
- Air bubble curtains will be used to attenuate Bridge 3.9 underwater sound pressures during the 36-inch impact pile driving.
- A containment system will be installed under the construction and permanent bridges to capture potential falling construction materials or debris.
- Open-ended steel piles reduce the duration of sound effects.
- Turbidity curtains will be used during Bridge 3.9 pile driving of the 36-inch piles thereby reducing in-water sediment levels.
- Most migrations for all size-classes of bull trout throughout the year, and most bull trout activity, occurs at night (after sunset and before sunrise) and in-water work will occur during daylight.
- Bull trout have not been documented in Sand Creek.
- Bridge 3.9 effects to bull trout from over-water shading are discountable when compared to the overall area of LPO available to the bull trout population.

- Temporary construction bridge piles will be removed with a vibratory extractor after construction is completed.
- The project will not contribute to or exacerbate the existing threats to the bull trout population in the LPO-B core area.
- The contractor will implement BMPs and other minimization and mitigation measures outlined previously in Section 1.3, and conservation measures or conditions required by the regulatory agencies.

4.2 Bull Trout – Designated Critical Habitat

4.2.1 Bridge 3.1 – Sand Creek

The project will have **no effect** on bull trout critical habitat because:

- Sand Creek is not designated as critical habitat.

4.2.2 Bridge 3.9 – Lake Pend Oreille

- Bull trout critical habitat in the action area is small compared to the over 94,000 acres of habitat designated in LPO and the Pend Oreille River.
- Effects of Bridge 3.9 pile driving and placement of piles in benthic habitat are discountable and/or temporary.
- No bull trout spawning habitat occurs in the action area.
- Bull trout foraging or rearing habitat will not be degraded by the project.
- Project impacts will not extend to any critical habitat in LPO SR tributaries.
- The contractor will implement BMPs and other minimization and mitigation measures outlined previously in Section 1.3, and additional conservation measures or conditions required by the regulatory agencies.

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5. References

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Appendix A. Reference Maps

- Aerial Overview
- Construction Staging Areas/Access Points
- Jurisdictional Impact Overview
- Jurisdictional Impacts Bridge 3.1 North End
- Jurisdictional Impacts Bridge 3.1 South End
- Jurisdictional Impacts Bridge 3.9 North End
- Jurisdictional Impacts Bridge 3.9 South End
- Jurisdictional Impacts East Algoma Turnout

Appendix B. Action Area Maps/Pile Driving Calculators

- Bridge 3.1
  - Aquatic Impacts (Acoustic)
  - NOAA Pile Driving Calculator Worksheet

- Bridge 3.9
  - Aquatic Impacts (Acoustic)
  - NOAA Pile Driving Calculator Worksheet

USCG0005381/16
Model last updated January 26, 2009

Project Title	BNSF Sandpoint Junction Connector, New Bridge 3.1
Pile information (size, type, number, pile strikes, etc.)	64 24-inch-diameter steel pipe piles, 22 below the OHWM. Maximum 1,200 strikes/pile, 1-2 hours each install; 3 piles/day Unattenuated

Fill in green cells: estimated sound levels and distances at which they were measured, estimated number of pile strikes per day, and transmision loss constant.

	Acoustic Metric			
	Peak	SEL	RMS	Effective Quiet
Measured single strike level (dB)	**207**	**178**	**194**	**150**
Distance (m)	**10**	**10**	**10**	

Estimated number of strikes	**3,600**

Cumulative SEL at measured distance
214

	Distance (m) to threshold			
	Onset of Physical Injury			Behavior
	Peak	Cumulative SEL dB**		RMS
	dB	Fish ≥ 2 g	Fish < 2 g	dB
Transmission loss constant (15 if unknown)	206	187	183	150
15	**12**	**590**	**736**	**8577**

** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)

Notes (source for estimates, etc.)

(This model was last updated January 26, 2009)

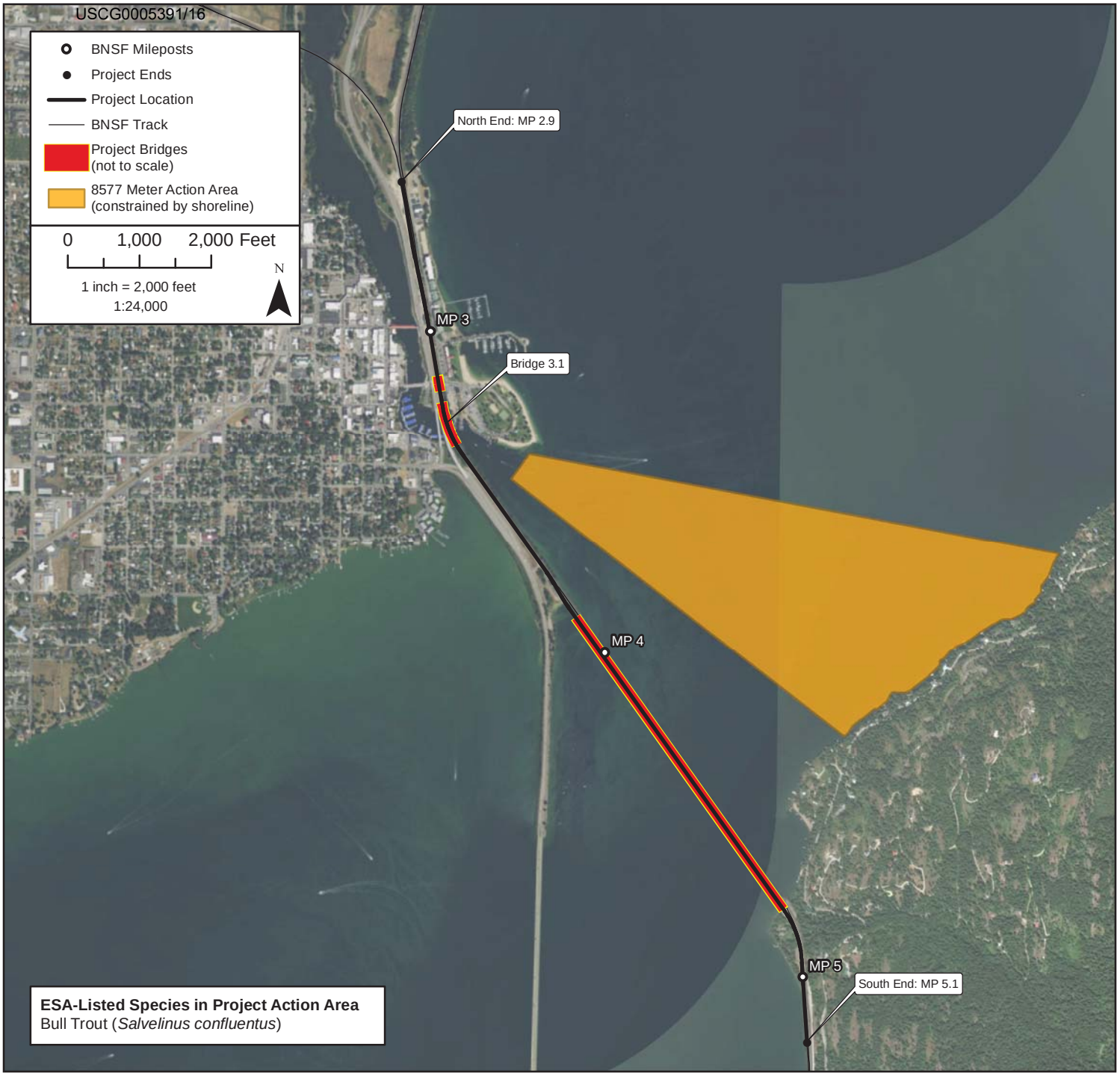
12 meters = 39 feet; 590 meters=0.37 mile; 736 meters = 0.46 mile; 8577 meters = 5.33 miles
LPO is 0.25 mile downstream of Bridge 3.1.

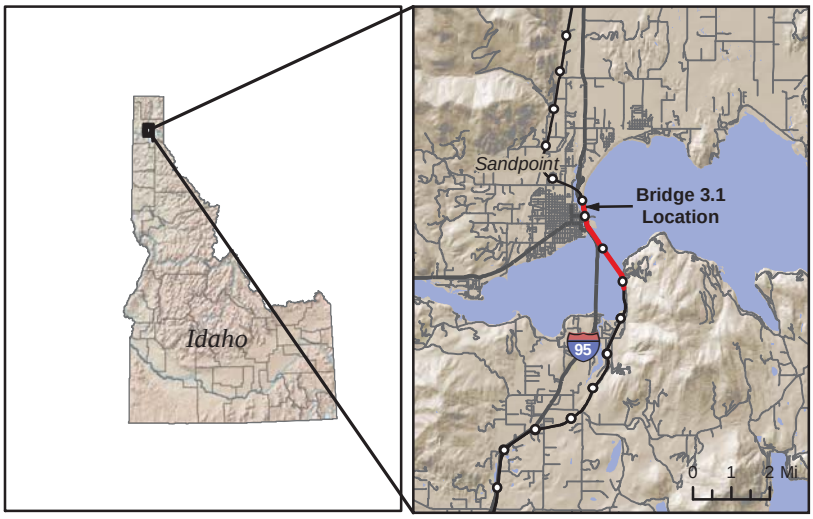
Per unmitigated/unattenuated sound pressure levels for single strikes, measured 10 m from the pile, 24-inch steel pipe pile; per WSDOT BA Preparation Advanced Training Manual Version 4-2017, Table 7-12.

Number of strikes needed/24" pile for rail load requirements - per BNSF

Dominant frequencies generated in pile driving are between 50 & 1000 Hz, so most of the energy is not propagated in wather depths of 0.4 meters (1.3 feet) or less.

Underwater noise propagation is limited by sinusoity of a system (where river bends noise is unlikely to propagate; line-of-sight rule is used to determine the extent of noise propagation in river systems.)





BRIDGE 3.1 AQUATIC ACTION AREA

PROJECT: BNSF SANDPOINT JUNCTION CONNECTOR
APPLICANT: BNSF RAILWAY CO.
BNSF LOCATION: MONTANA DIVISION, KOOTENAI RIVER SUBDIVISION, MP 2.9 - 5.1
PLSS: IN PARTS OF S15, 22, 23, 25, 26 & 36 T57 R2W - BOISE MERIDIAN
NORTH END (MP 2.9): 48°16'54.10"N, 116°32'49.35"W
SOUTH END (MP 5.1): 48°14'56.24"N, 116°31'24.02"W
WATERWAY: LAKE PEND OREILLE & SAND CREEK
CITY: SANDPOINT
COUNTY: BONNER
STATE: IDAHO
DATE: NOVEMBER 2017

DATA SOURCES: ESRI (AERIAL), NATURAL EARTH (STATE MAP), BNSF (TRACK AND MILEPOSTS)

USCG0005401/16

Model last updated January 26, 2009

Project Title	BNSF Sandpoint Junction Connector, New Bridge 3.9
Pile information (size, type, number, pile strikes, etc.)	288 36-inch-diameter steel piles; maximum 1600 strikes/pile; 2-3 hours each install; 2 piles/day Unattenuated

Fill in green cells: estimated sound levels and distances at which they were measured, estimated number of pile strikes per day, and transmision loss constant.

	Acoustic Metric			
	Peak	SEL	RMS	Effective Quiet
Measured single strike level (dB)	**210**	**183**	**193**	**150**
Distance (m)	**10**	**10**	**10**	

Estimated number of strikes	**3,200**

Cumulative SEL at measured distance
218

	Distance (m) to threshold			
	Onset of Physical Injury			Behavior
	Peak	Cumulative SEL dB**		RMS
	dB	Fish ≥ 2 g	Fish < 2 g	dB
Transmission loss constant (15 if unknown)	206	187	183	150
15	**18**	**1175**	**1585**	**7356**

** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)

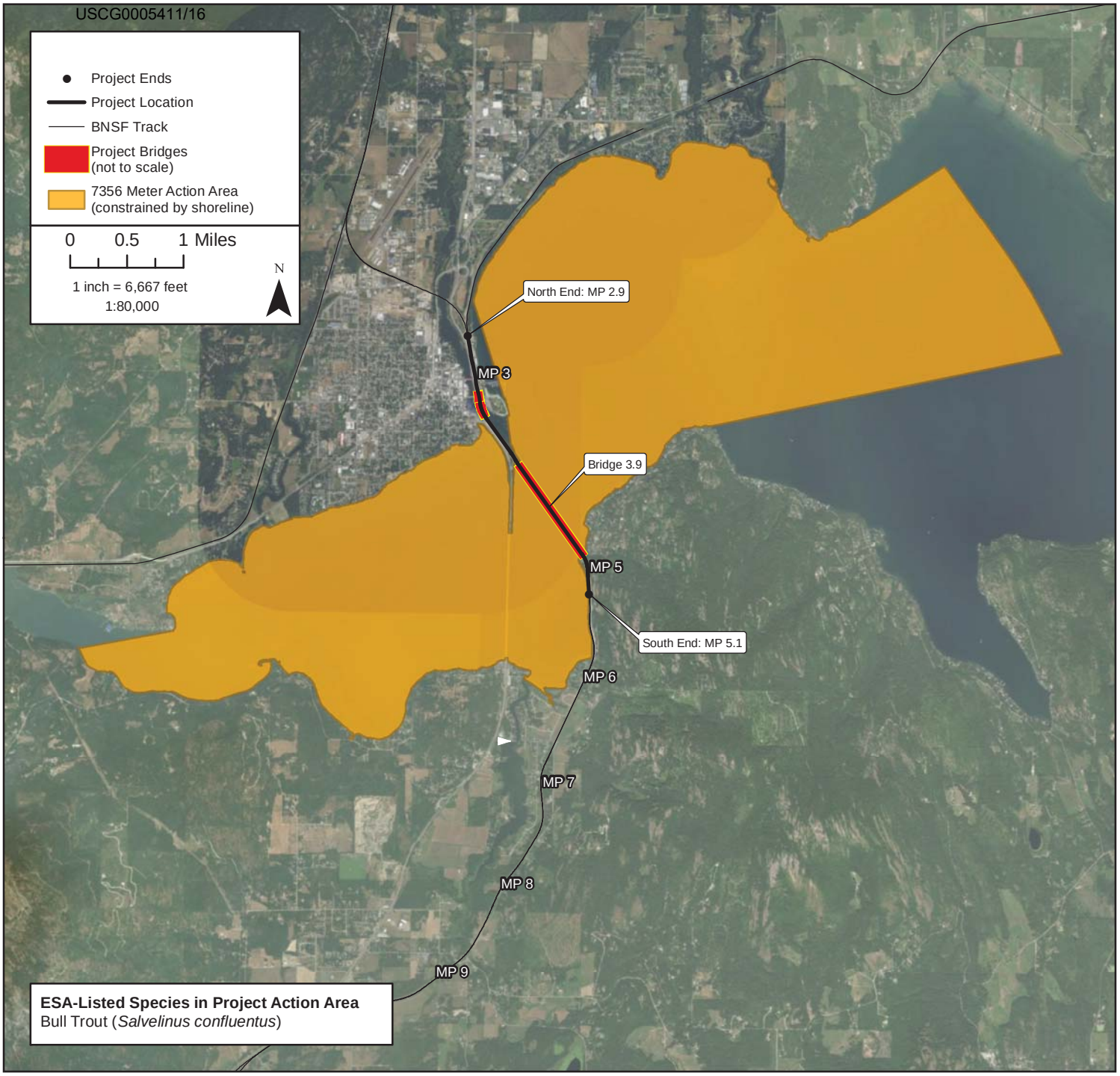
Notes (source for estimates, etc.)

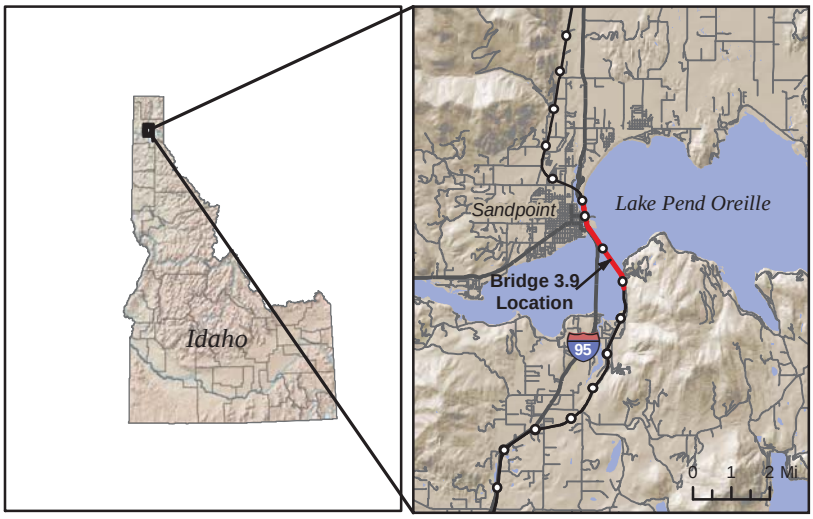
(This model was last updated January 26, 2009)

7,356 meters = 4.57 miles; 1,585 meters =0 .98 mile; 1175 meters = 0.74 mile; 18 meters = .01 mile (59 feet)

Per unmitigated sound pressure levels for single strikes, measured 10 m from the pile, 36-inch steel pipe pile; per WSDOT BA Preparation Advanced Training Manual Version 4-2017, Table 7-12.

Number of strikes needed/36" pile for rail load requirements - per BNSF





BRIDGE 3.9 AQUATIC ACTION AREA

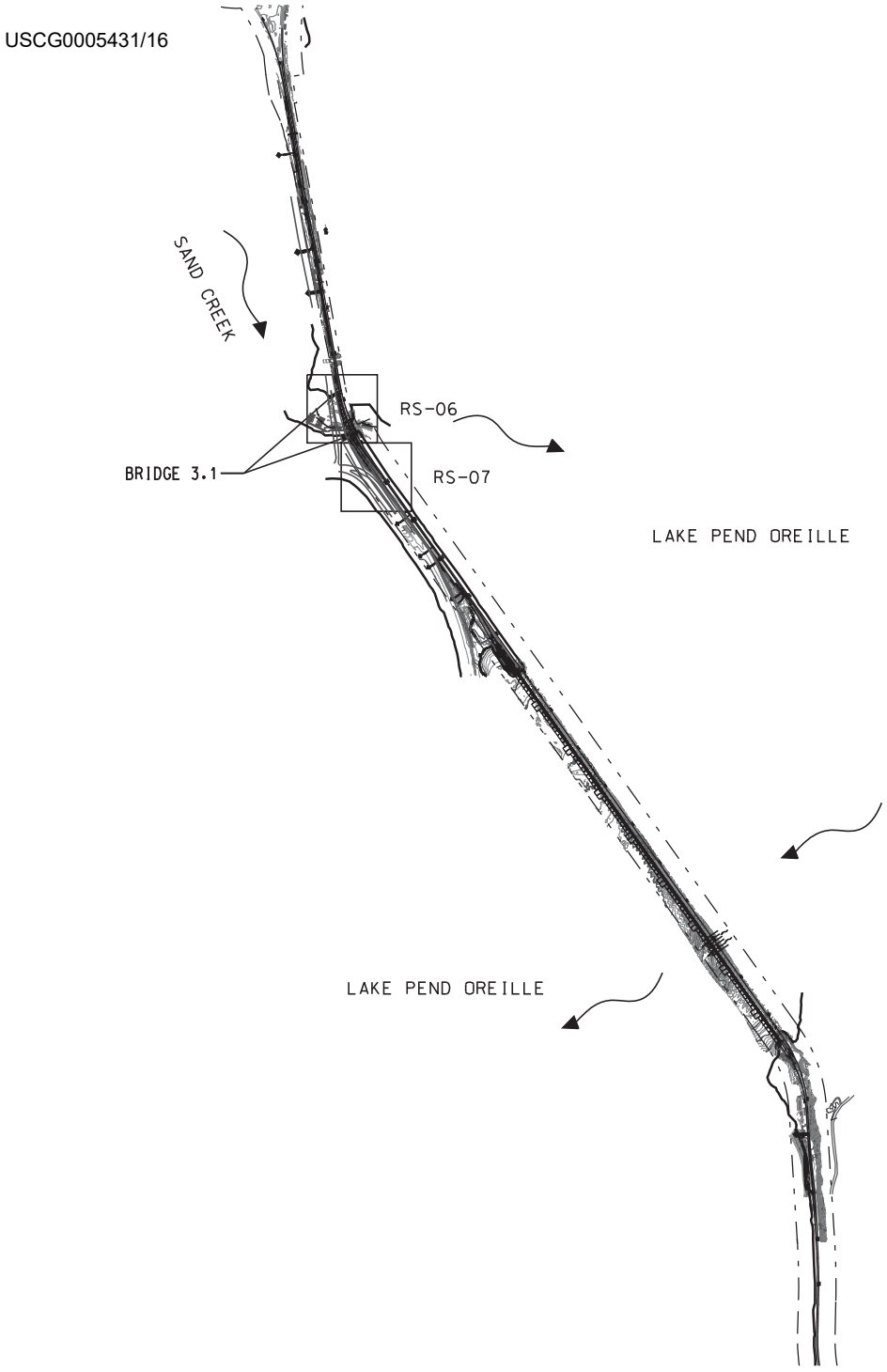
PROJECT: BNSF SANDPOINT JUNCTION CONNECTOR
APPLICANT: BNSF RAILWAY CO.
BNSF LOCATION: MONTANA DIVISION, KOOTENAI RIVER SUBDIVISION, MP 2.9 - 5.1
PLSS: IN PARTS OF S15, 22, 23, 25, 26 & 36 T57 R2W - BOISE MERIDIAN
NORTH END (MP 2.9): 48°16'54.10"N, 116°32'49.35"W
SOUTH END (MP 5.1): 48°14'56.24"N, 116°31'24.02"W
WATERWAY: LAKE PEND OREILLE & SAND CREEK
CITY: SANDPOINT
COUNTY: BONNER
STATE: IDAHO
DATE: NOVEMBER 2017

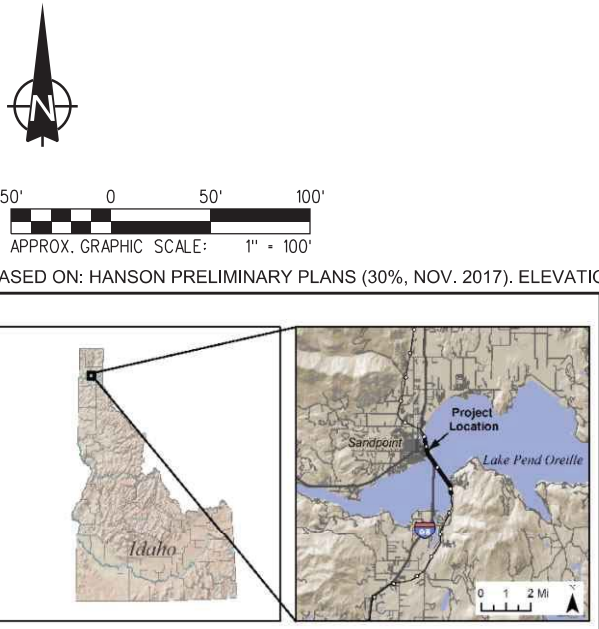
DATA SOURCES: ESRI (AERIAL), NATURAL EARTH (STATE MAP), BNSF (TRACK AND MILEPOSTS)

Appendix C. Proposed Work Plan Sheets

- Bridge 3.1
- Bridge 3.9

USCG0005431/16





50' 0 50' 100'

APPROX. GRAPHIC SCALE: 1" = 100'

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT

PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

PROJECT PLAN OVERVIEW

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.1
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.1 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.1
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 0.1
WATERWAY: LAKE PEND OREILLE, SAND CREEK
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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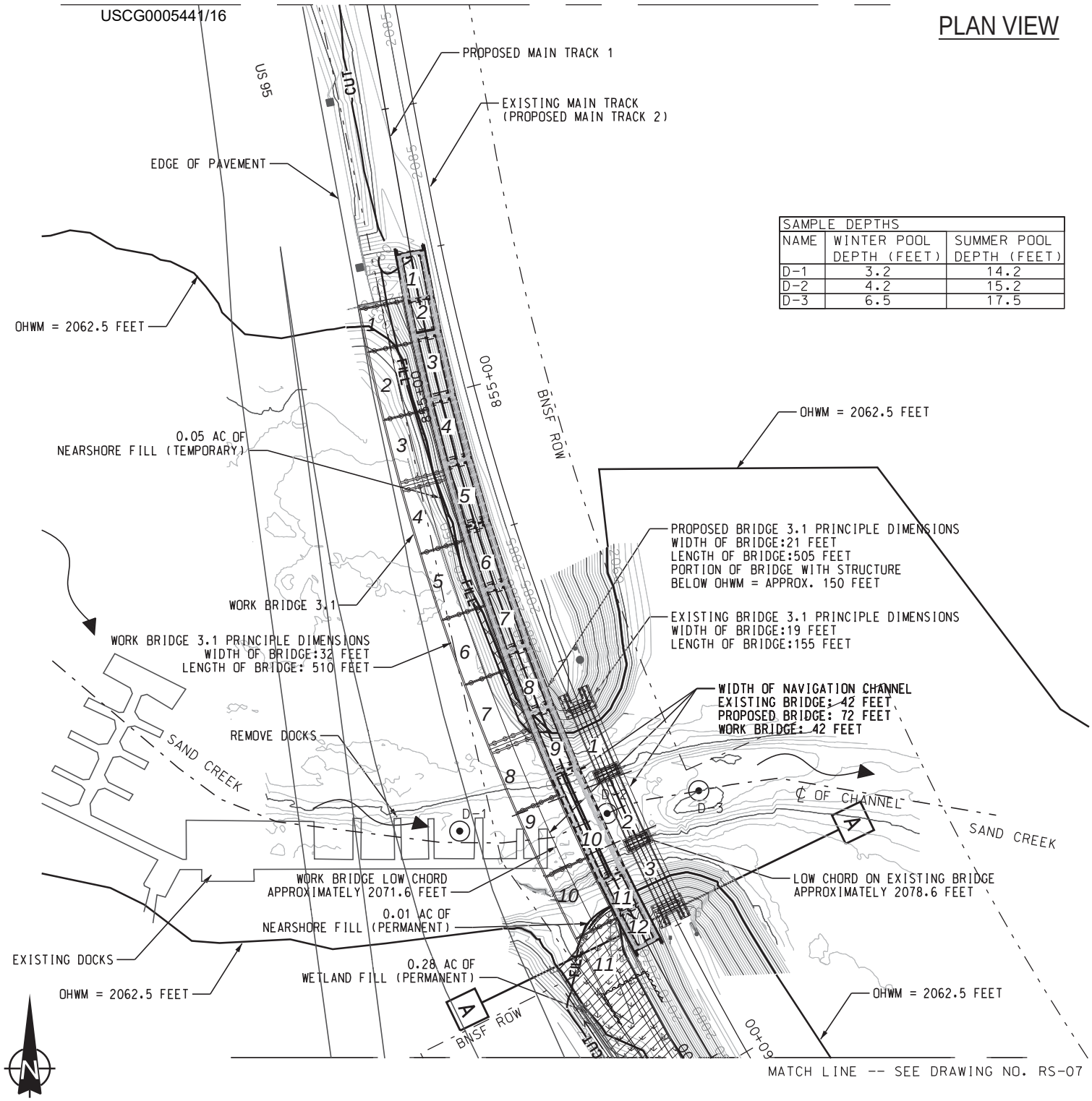
PLAN VIEW

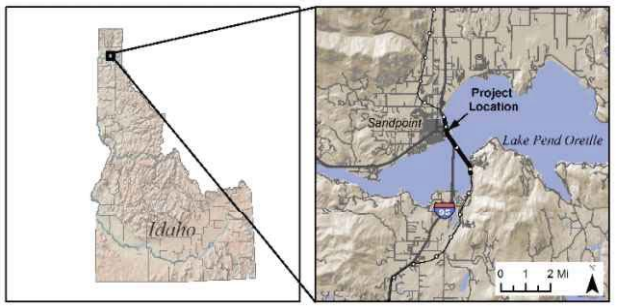


SAMPLE DEPTHS		
NAME	WINTER POOL DEPTH (FEET)	SUMMER POOL DEPTH (FEET)
D-1	3.2	14.2
D-2	4.2	15.2
D-3	6.5	17.5

50' 0 50' 100'

APPROX. GRAPHIC SCALE: 1" = 100'

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MATTHEW FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.1
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.1 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.1
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 0.1
WATERWAY: LAKE PEND OREILLE, SAND CREEK
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

Attachment - D

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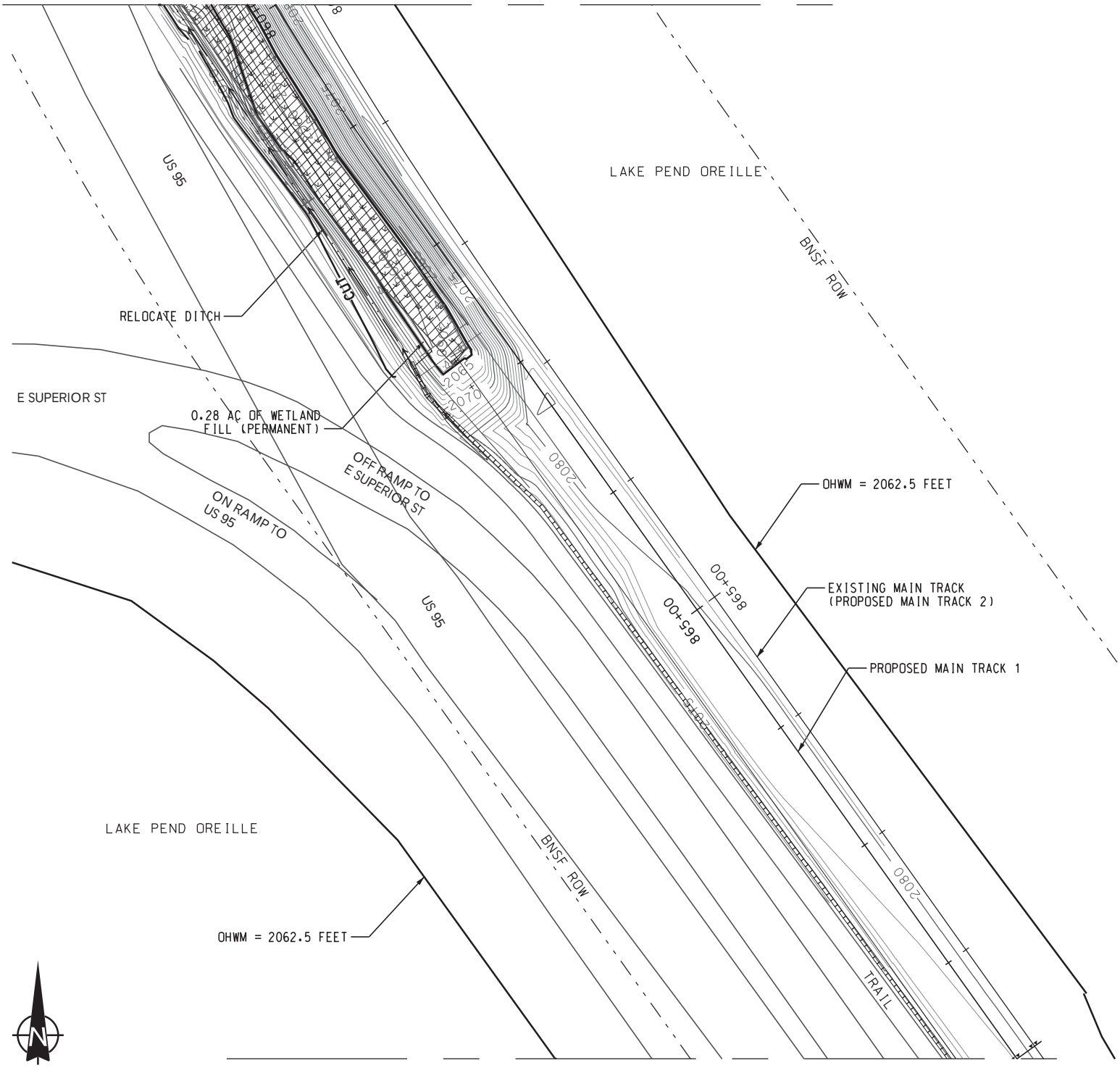
PLAN VIEW



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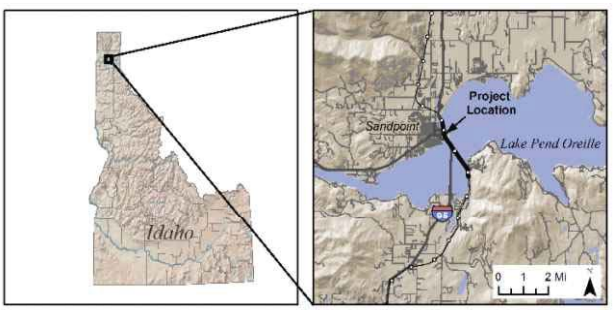

PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.1
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.1 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.1
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 0.1
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CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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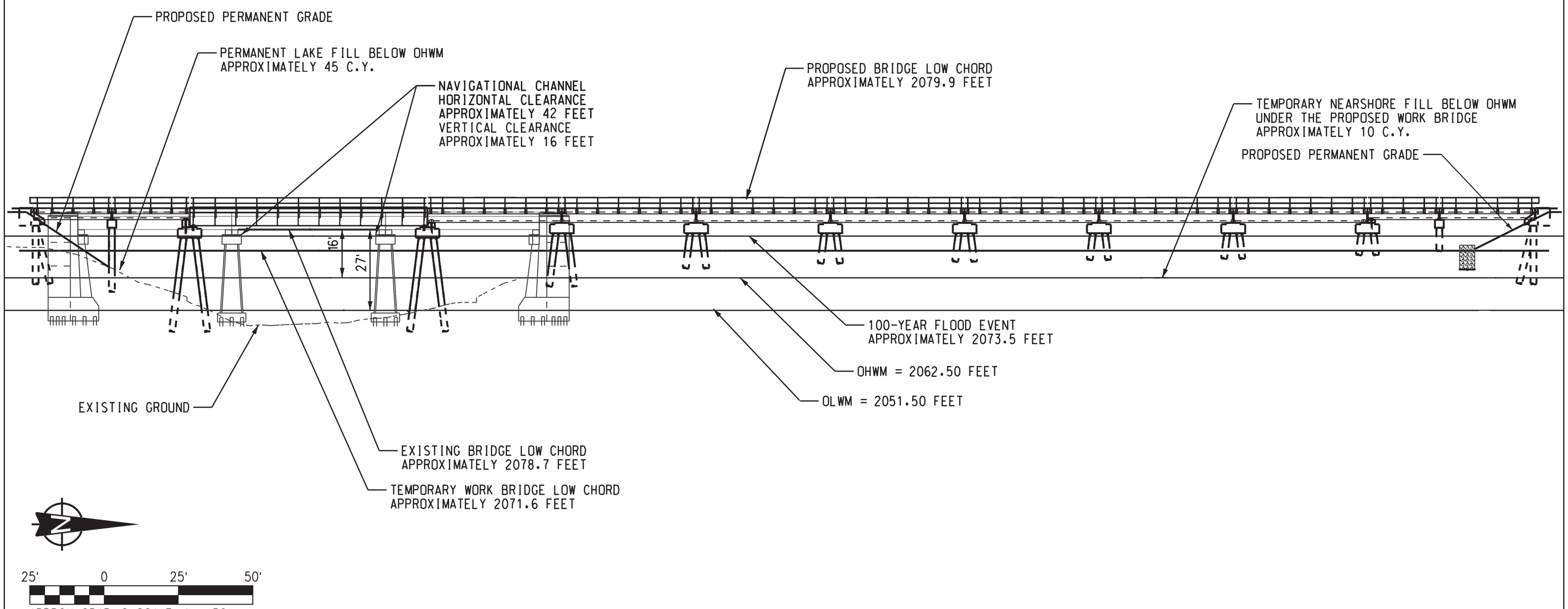
Attachment - D

DEFINED NAVIGATIONAL CHANNEL PROFILE



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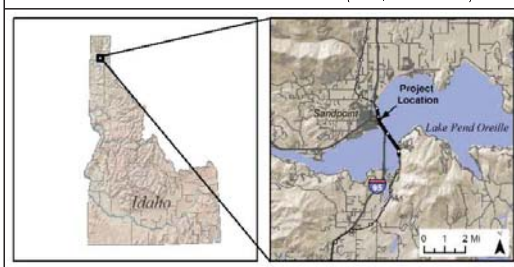

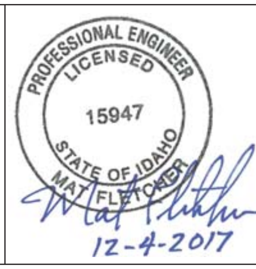

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.1
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.1 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.1
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 0.1
WATERWAY: LAKE PEND OREILLE, SAND CREEK
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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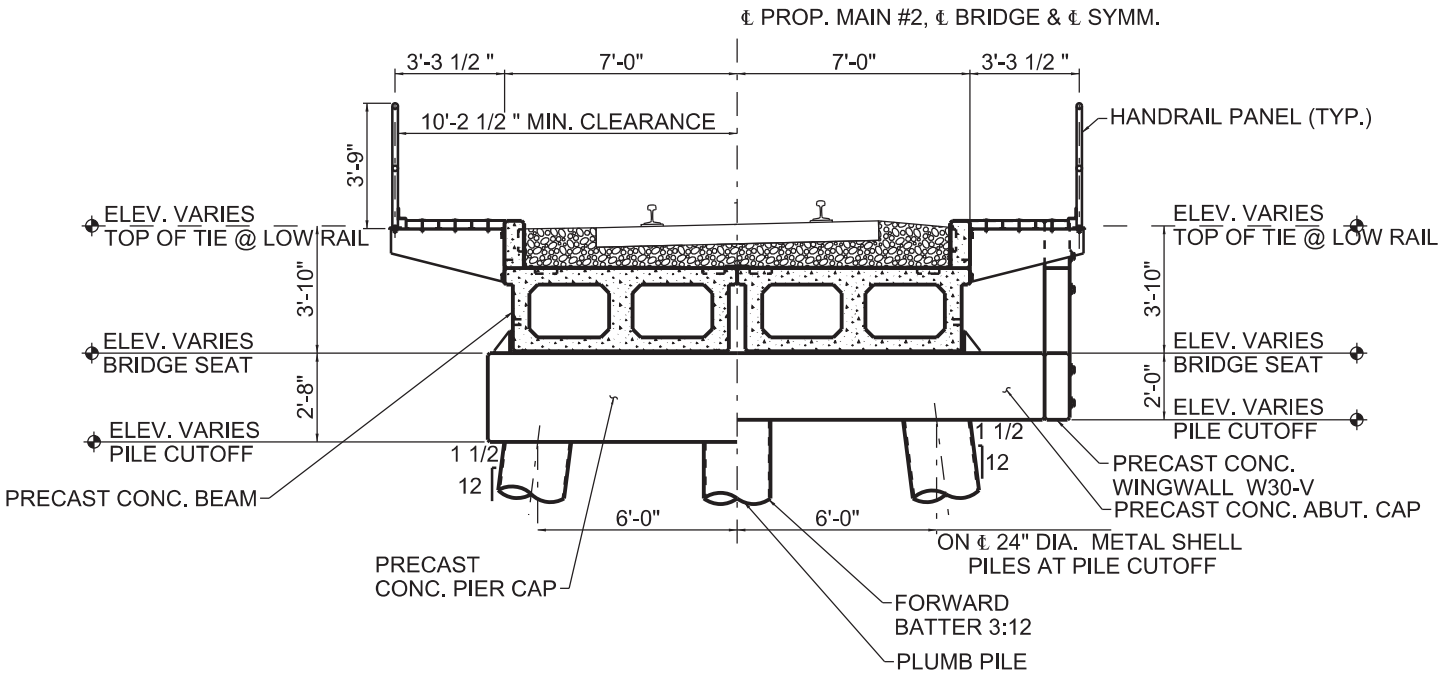
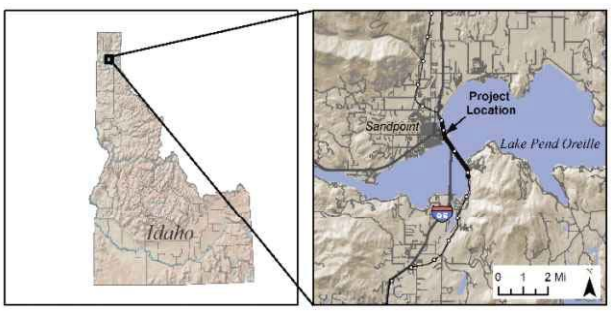
TYPICAL PIER SECTION



3' 0 3' 6'

APPROX. GRAPHIC SCALE: 1"=6'

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

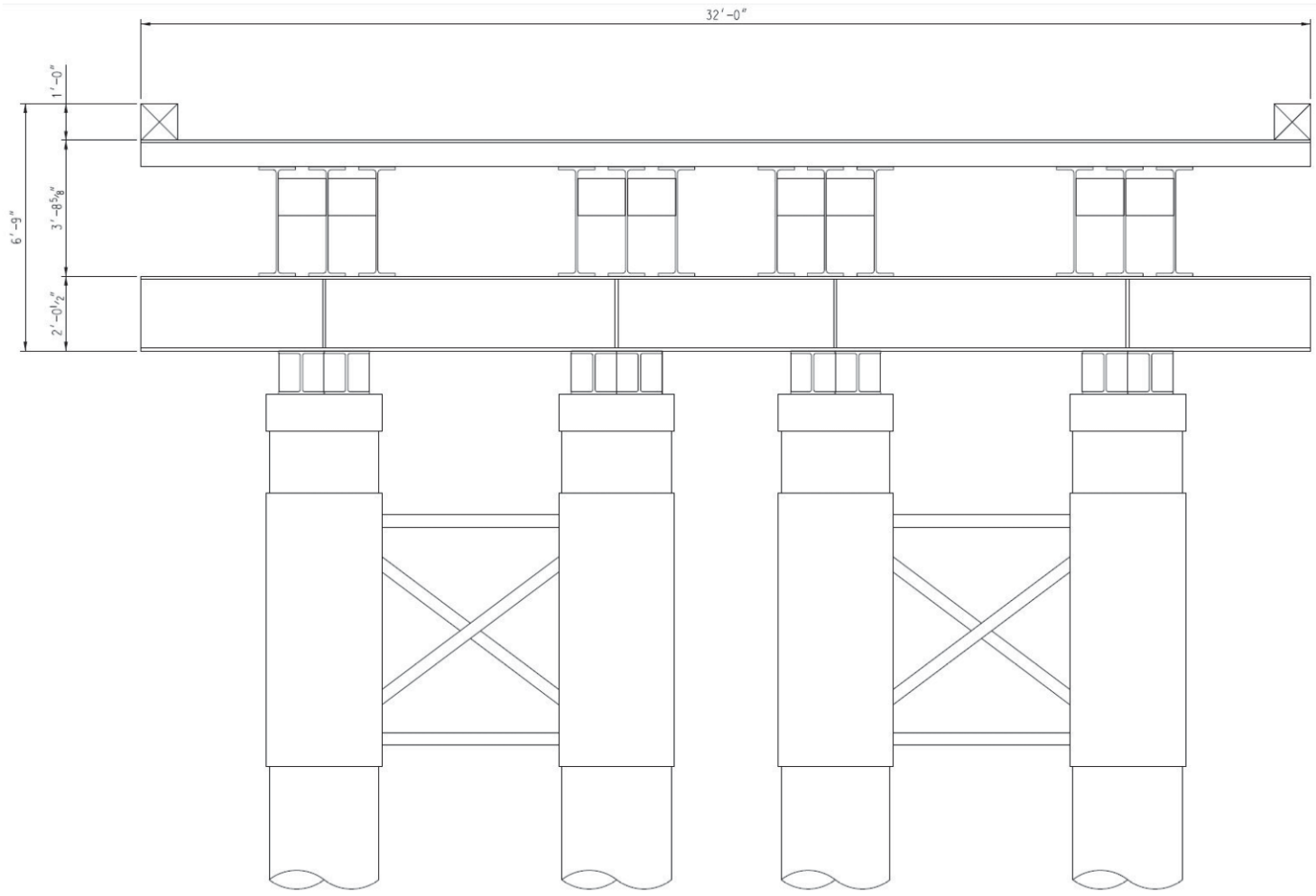
DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.1
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.1 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.1
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 0.1
WATERWAY: LAKE PEND OREILLE, SAND CREEK
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

USCG0005481/16

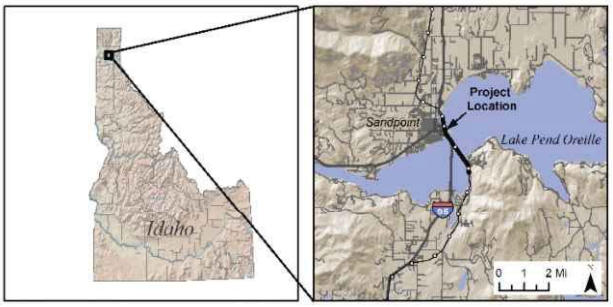
TYPICAL WORK BRIDGE SECTION



2.5' 0 2.5' 5'

APPROX. GRAPHIC SCALE: 1" = 5'

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.1
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.1 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.1
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 0.1
WATERWAY: LAKE PEND OREILLE, SAND CREEK
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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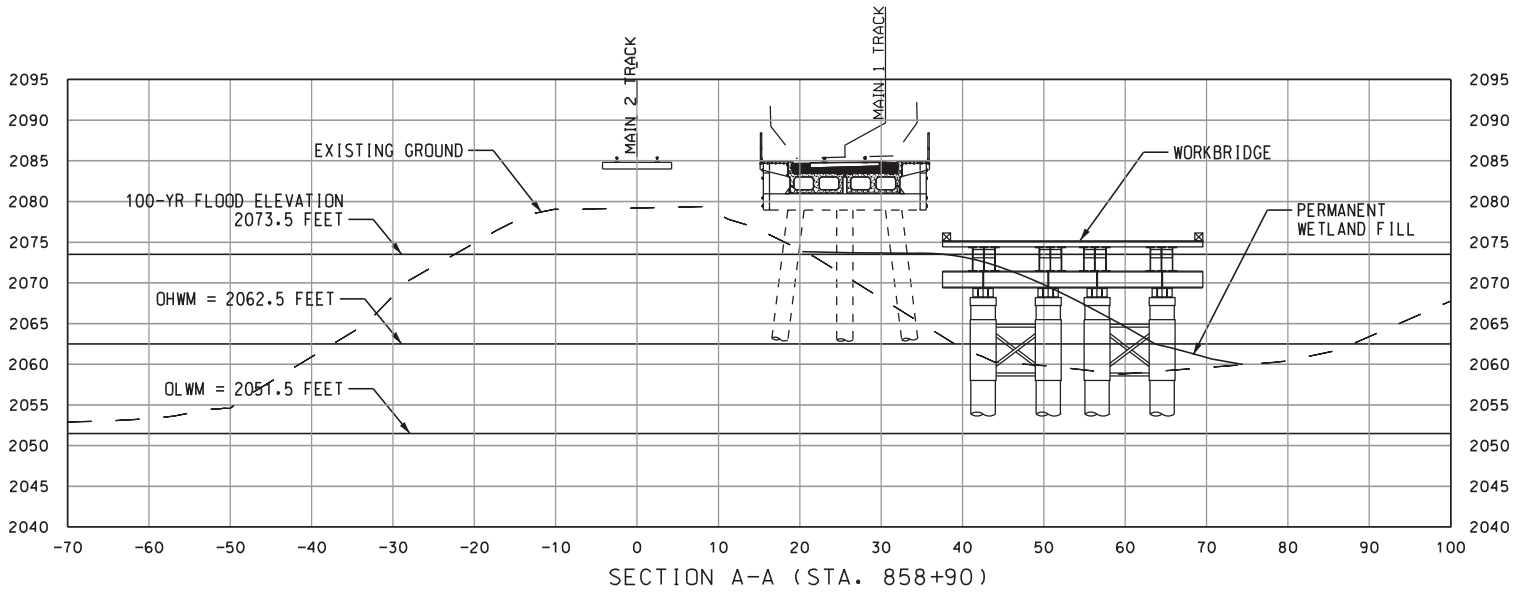
TYPICAL	6 OF 7	AS SHOWN

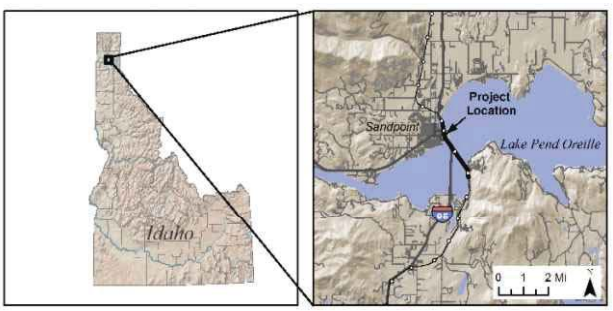
USCG0005491/16

WETLAND FILL CROSS SECTION



SECTION A-A (STA. 858+90)

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

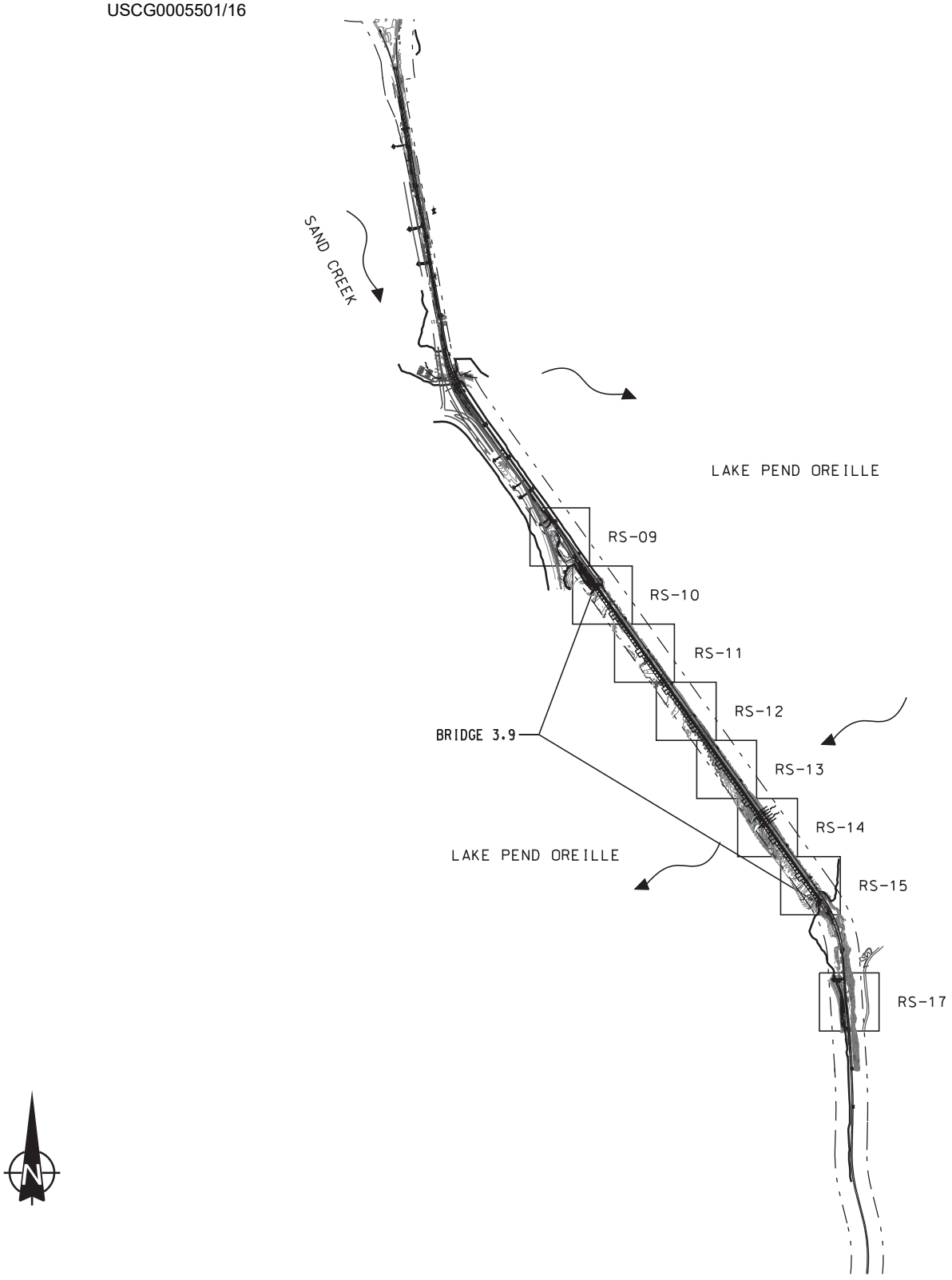
DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

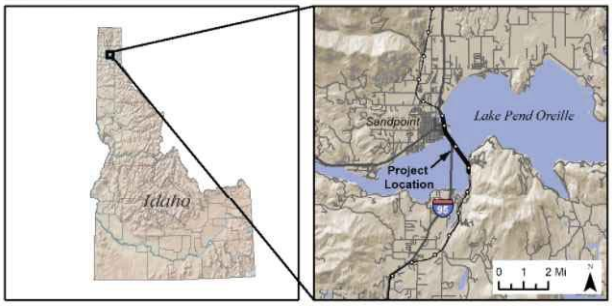
AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.1
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.1 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.1
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 0.1
WATERWAY: LAKE PEND OREILLE, SAND CREEK
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

DRAWING NO.	PAGE NO.	SCALE
TYPICAL	7 OF 7	AS SHOWN

USCG0005501/16



BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

PROJECT PLAN OVERVIEW

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.9 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.9
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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Attachment - D

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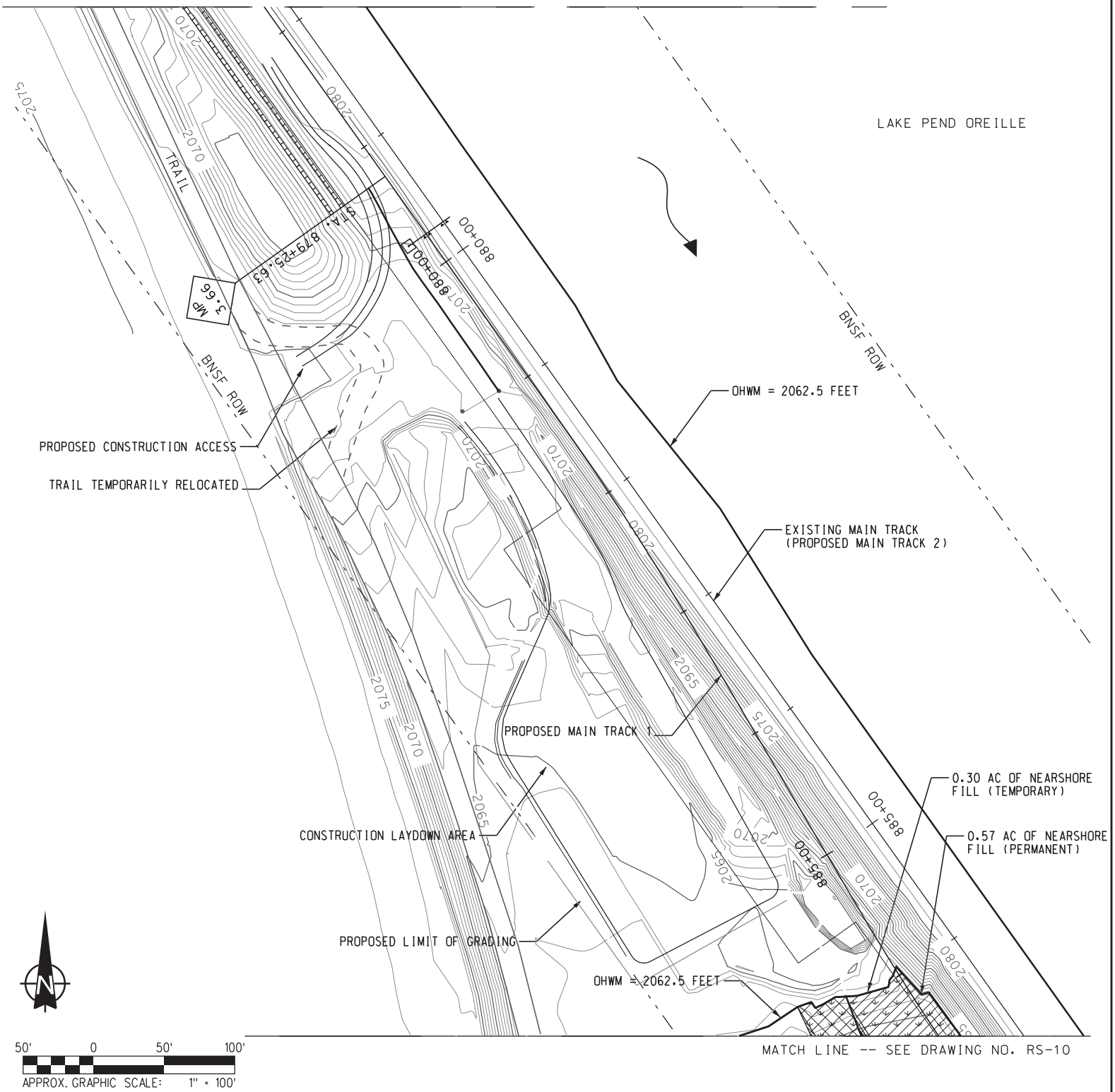
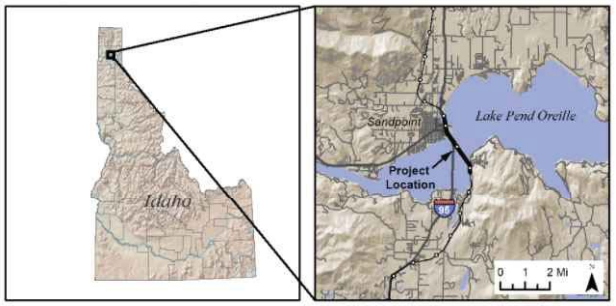
PLAN VIEW



BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MATTHEW FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.9 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.9
MILE POINT OF BRIDGE LOCATION FROM MOUNTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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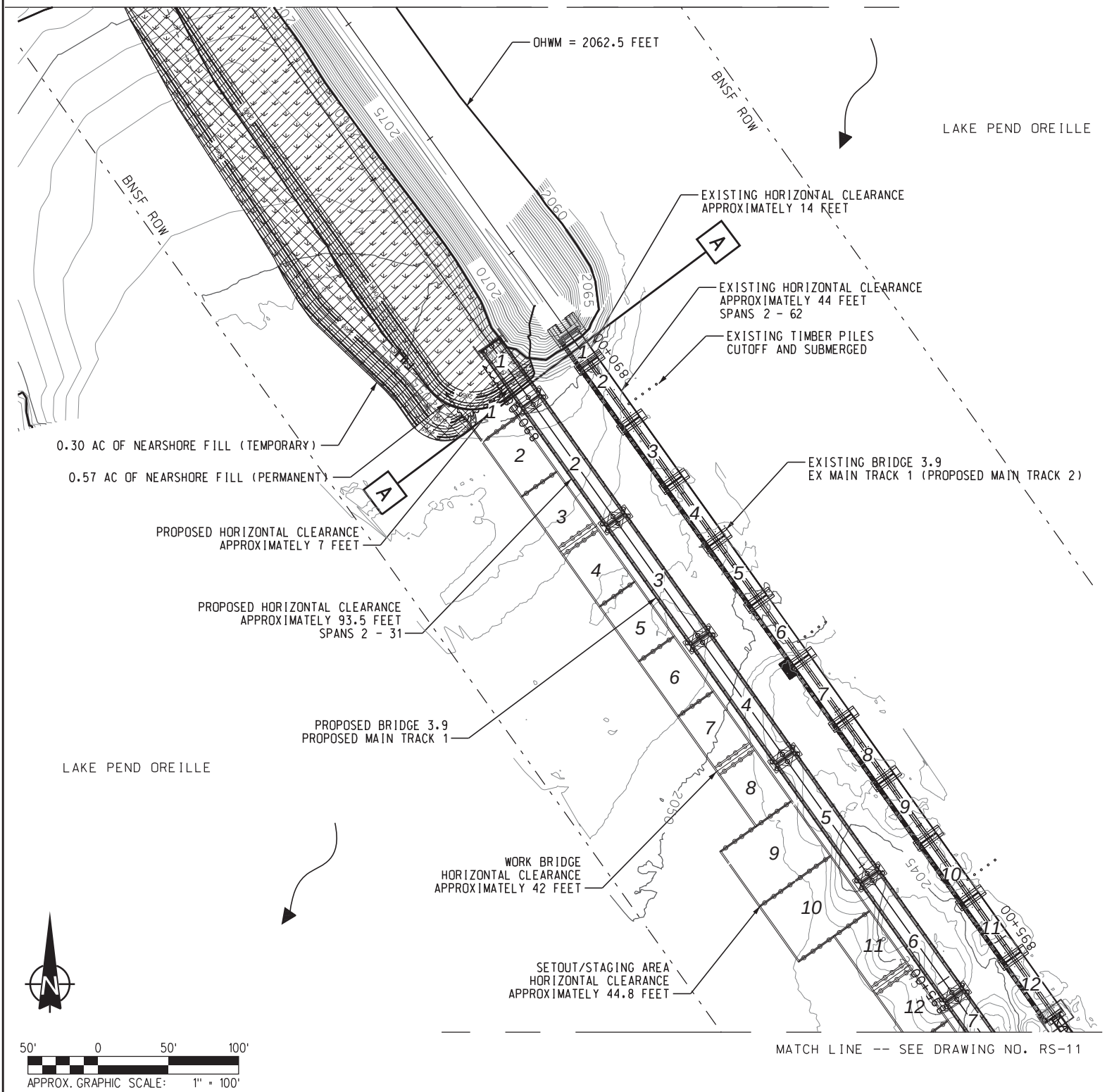
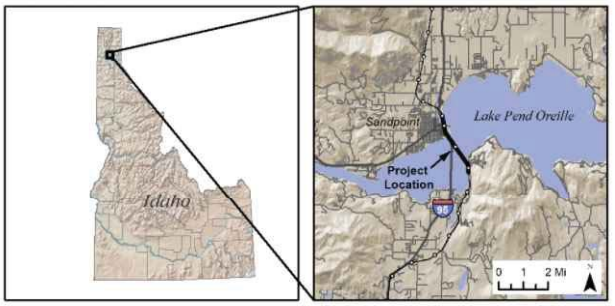
PLAN VIEW



BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MATTHEW FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.9 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.9
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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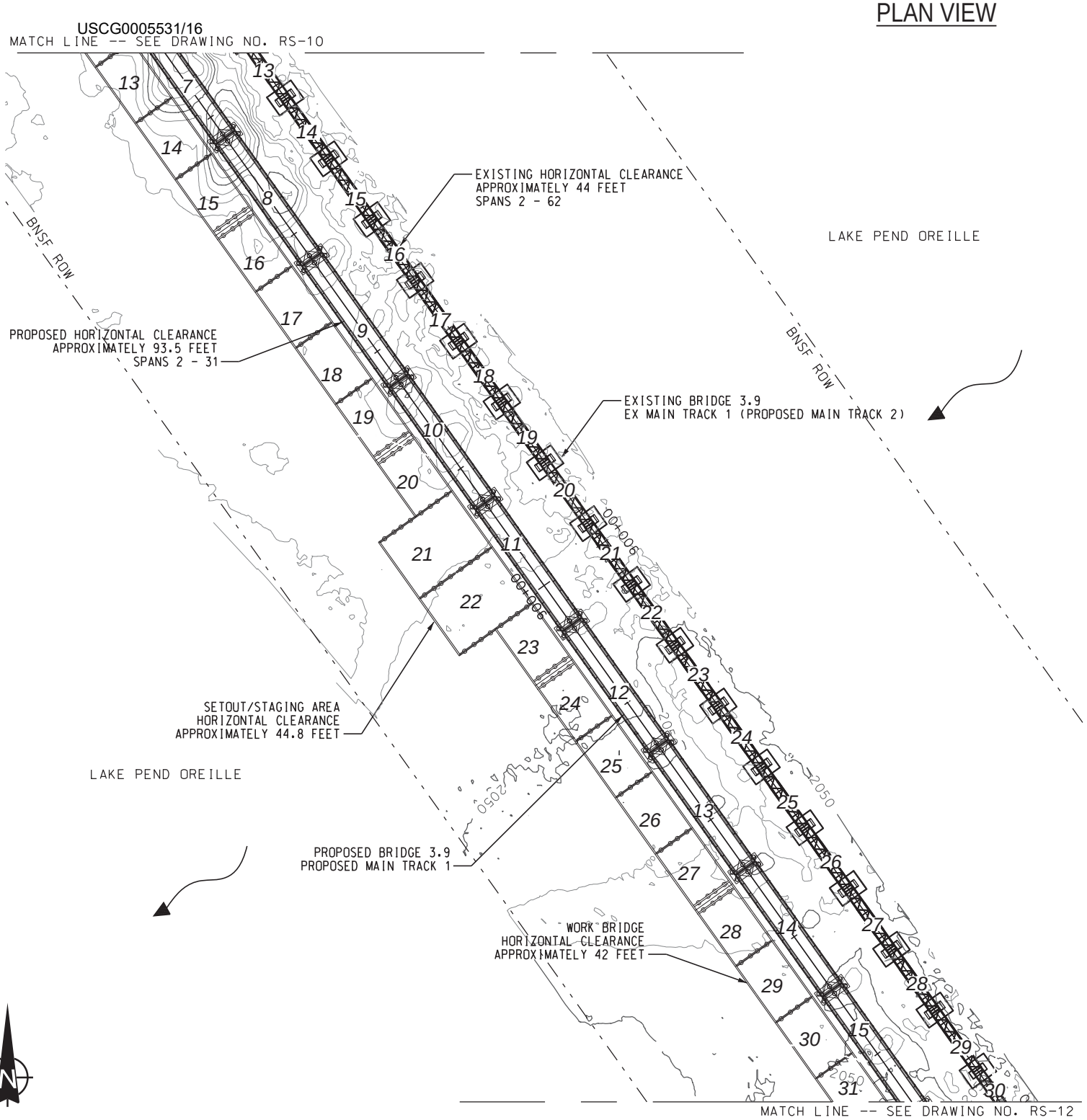
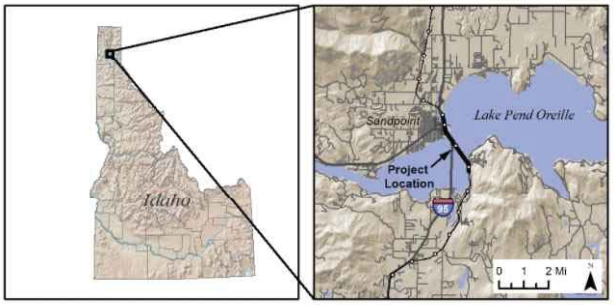
PLAN VIEW



BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
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OWNER: BNSF RAILWAY COMPANY
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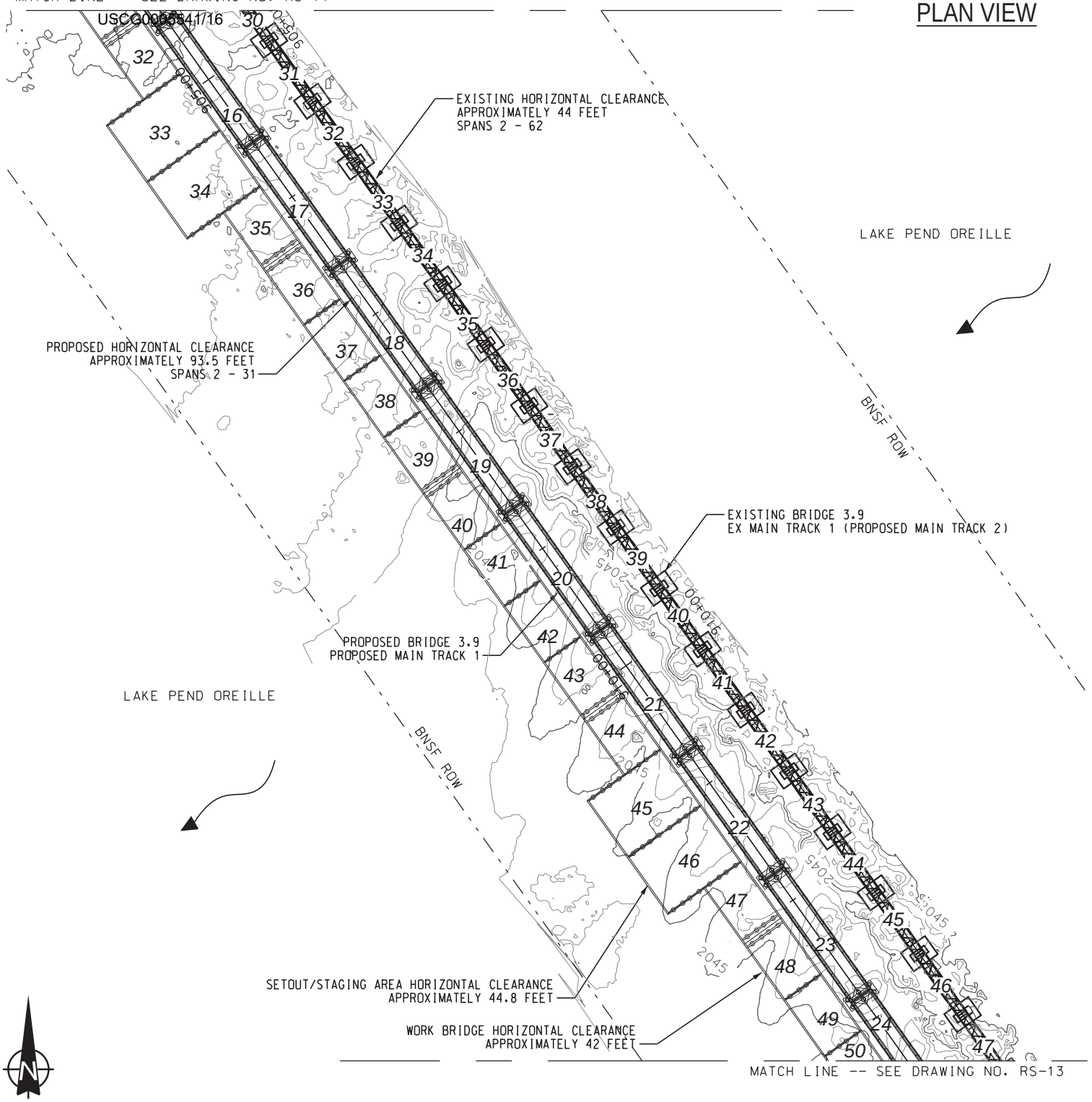
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

Attachment - D

PLAN VIEW



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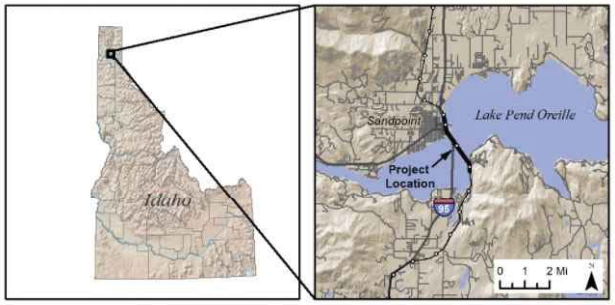

PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
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MILE POINT OF BRIDGE LOCATION FROM MOUNTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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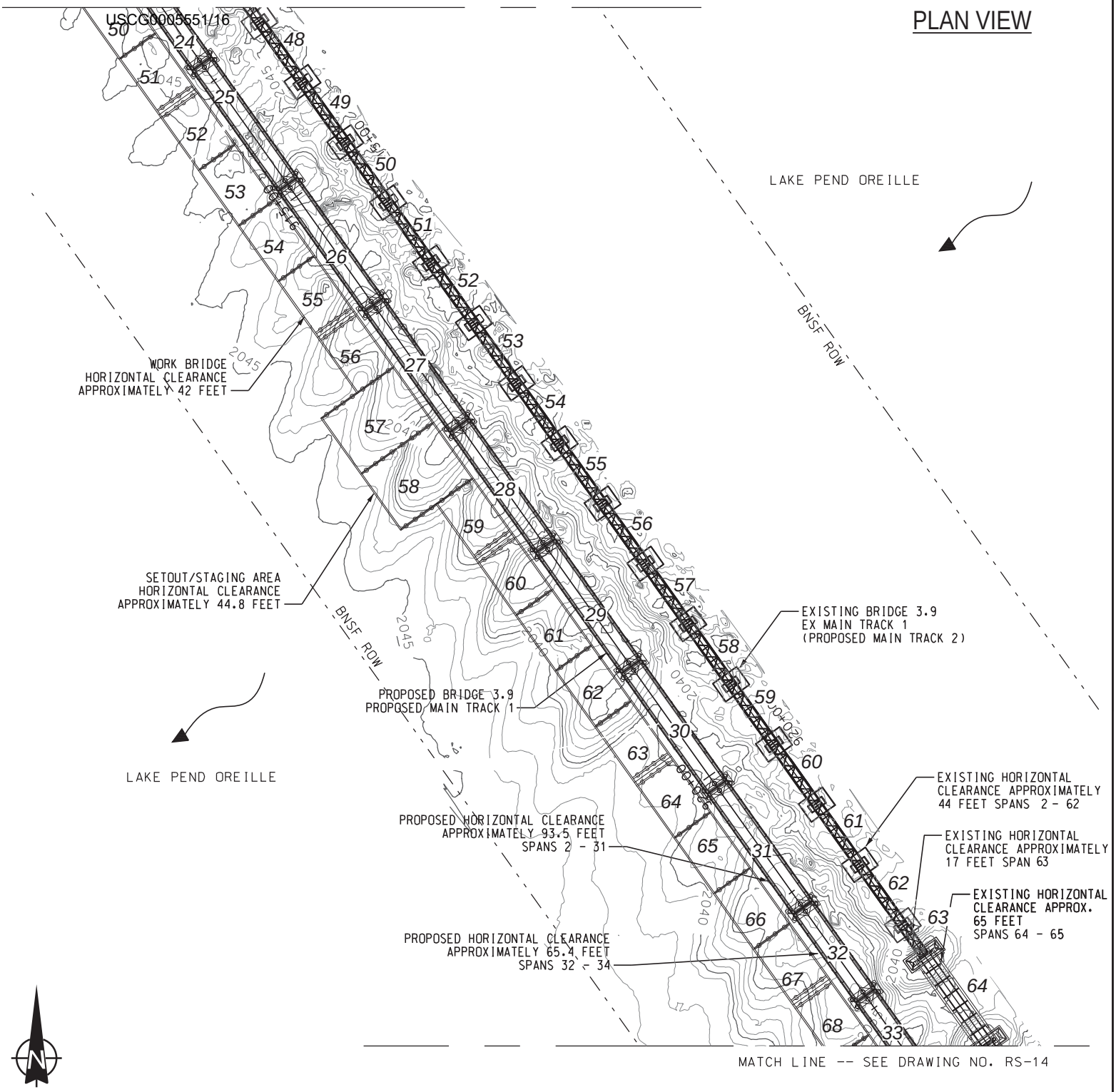
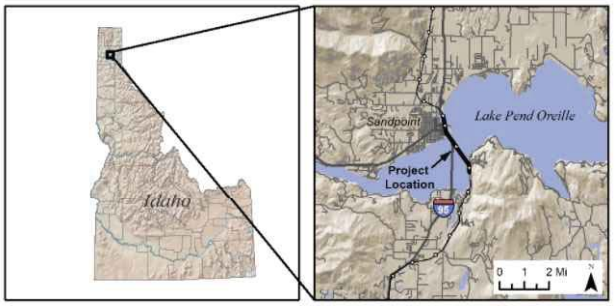
PLAN VIEW



50' 0 50' 100'

APPROX. GRAPHIC SCALE: 1" = 100'

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MATTHEW FLETCHER

12-4-2017

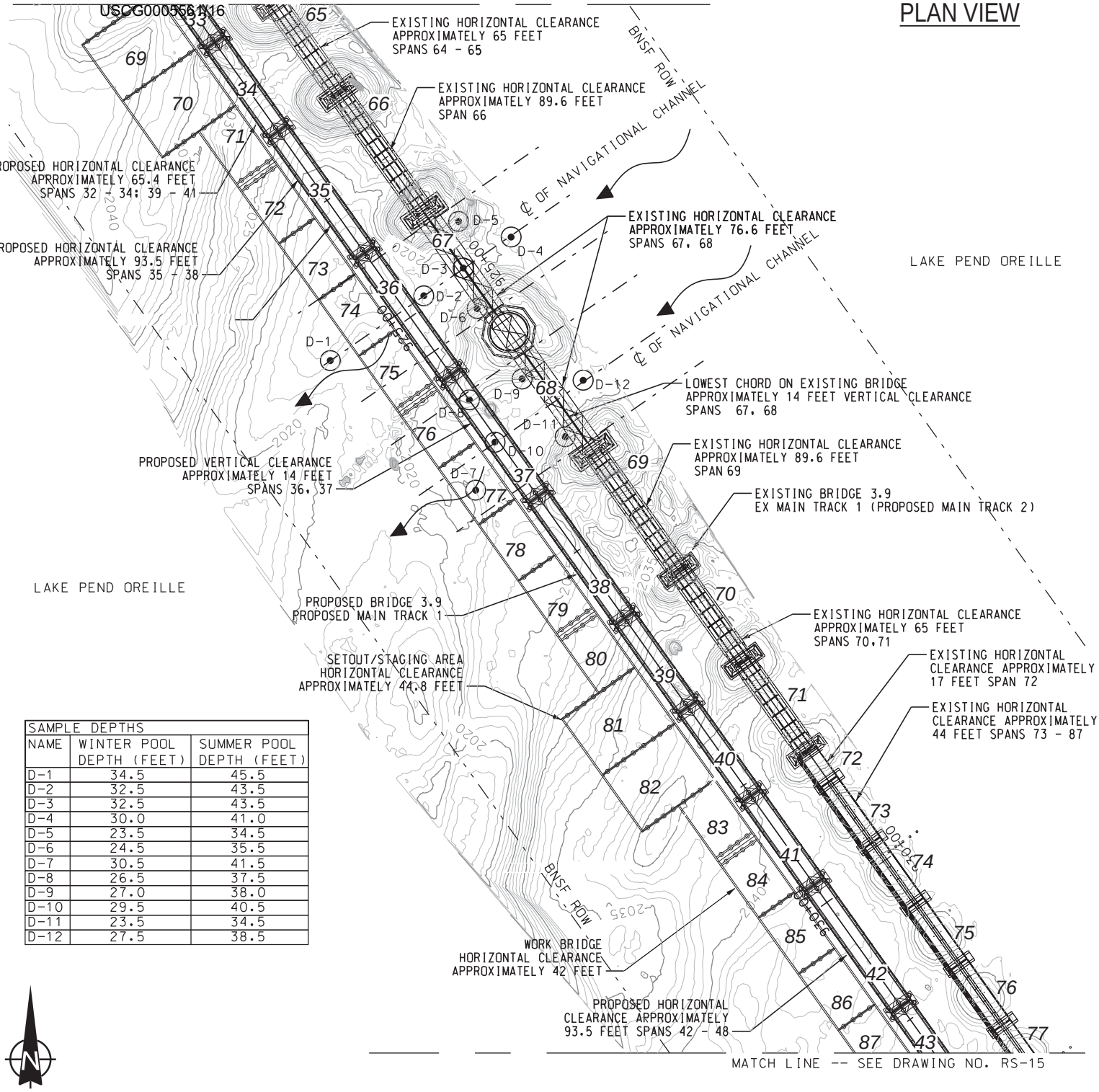
DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.9 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.9
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

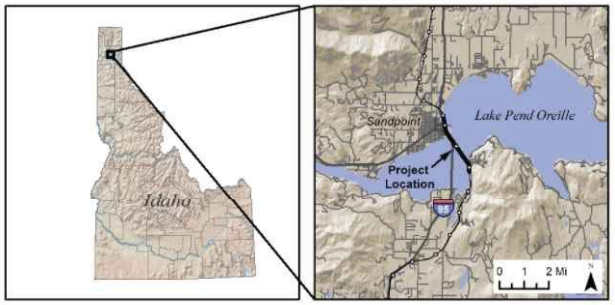
Attachment - D

PLAN VIEW



SAMPLE DEPTHS		
NAME	WINTER POOL DEPTH (FEET)	SUMMER POOL DEPTH (FEET)
D-1	34.5	45.5
D-2	32.5	43.5
D-3	32.5	43.5
D-4	30.0	41.0
D-5	23.5	34.5
D-6	24.5	35.5
D-7	30.5	41.5
D-8	26.5	37.5
D-9	27.0	38.0
D-10	29.5	40.5
D-11	23.5	34.5
D-12	27.5	38.5

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
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EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
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MILE POINT OF BRIDGE LOCATION FROM MOUTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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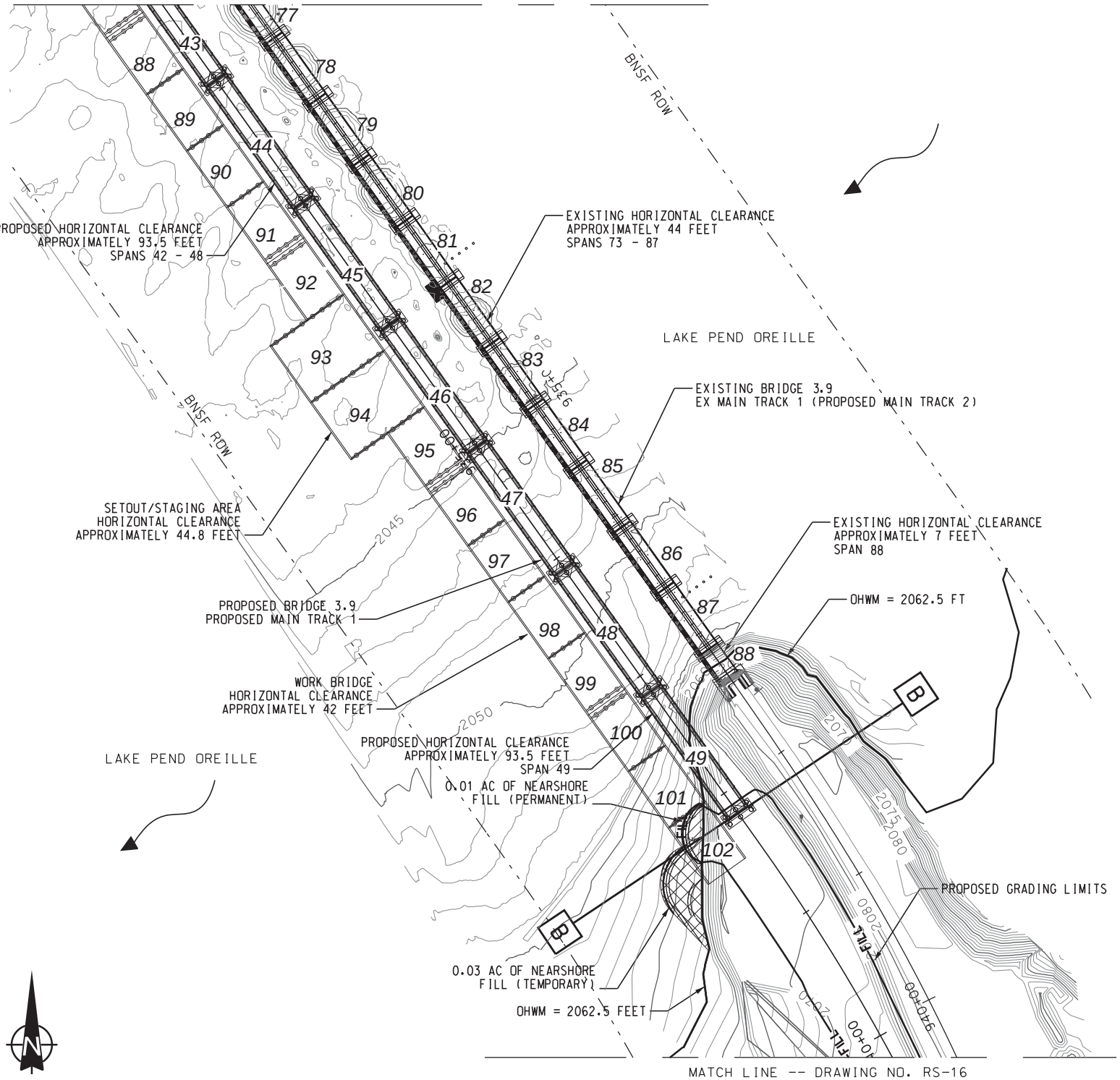
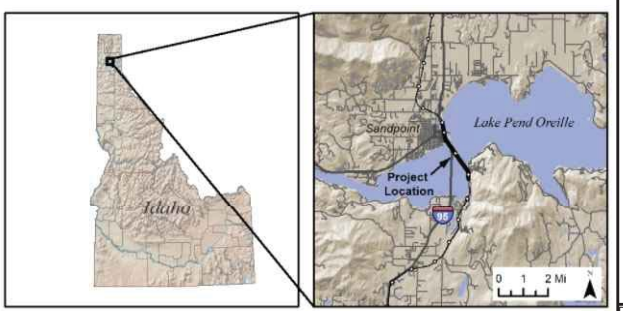
PLAN VIEW



BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.9 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.9
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

DRAWING NO.	PAGE NO.	SCALE
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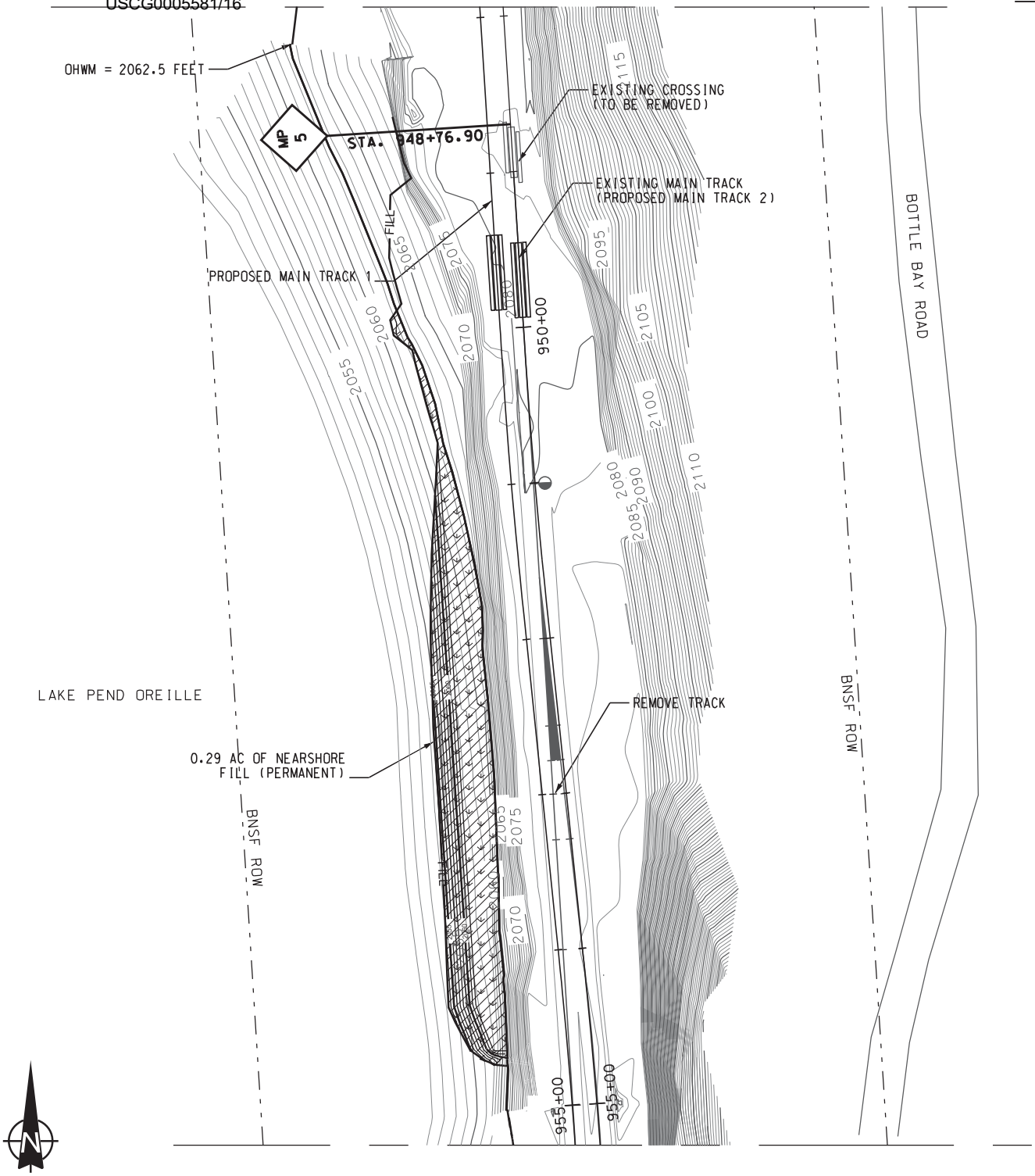
Attachment - D

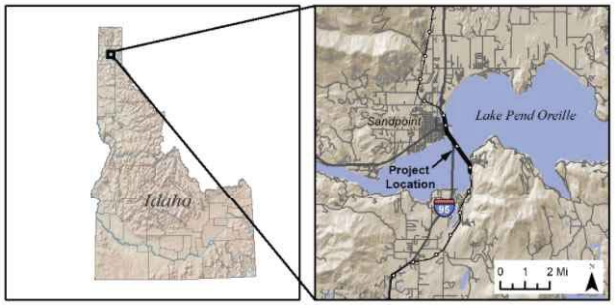
PLAN VIEW



50' 0 50' 100'

APPROX. GRAPHIC SCALE: 1" = 100'

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.9 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.9
MILE POINT OF BRIDGE LOCATION FROM MOUNTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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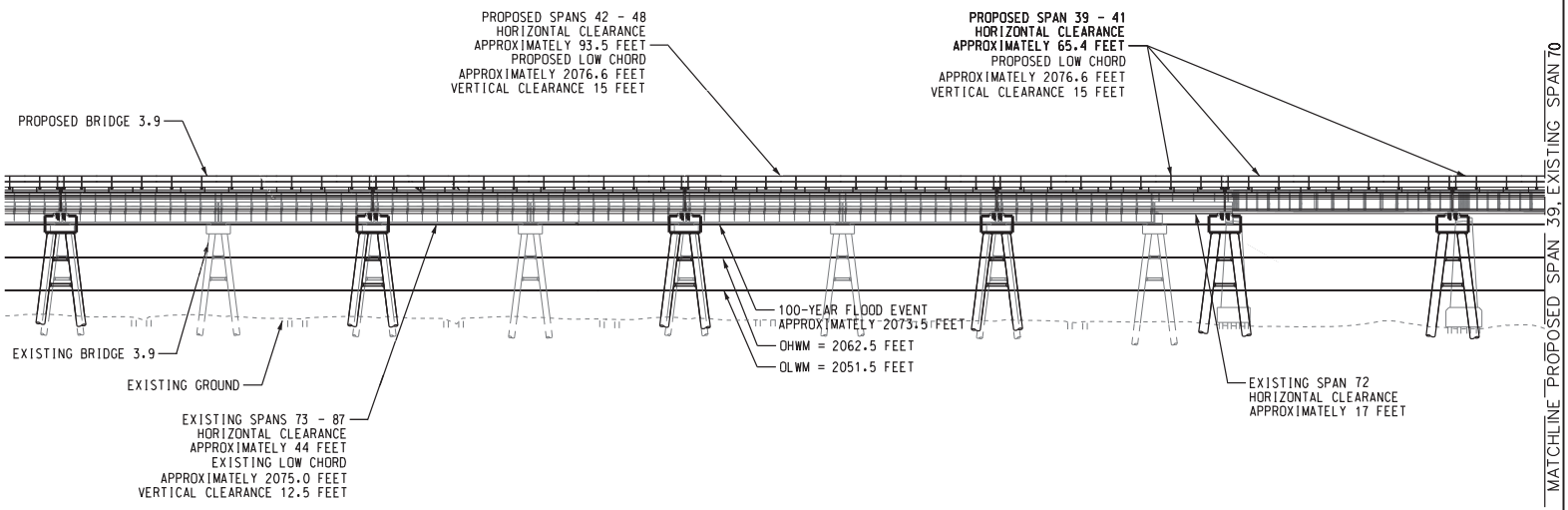
Attachment - D

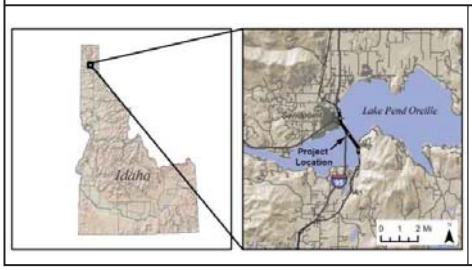
SOUTH OF NAVIGATIONAL CHANNEL PROFILE



25' 0 25' 50'

APPROX. GRAPHIC SCALE: 1" = 50'

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.9 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.9
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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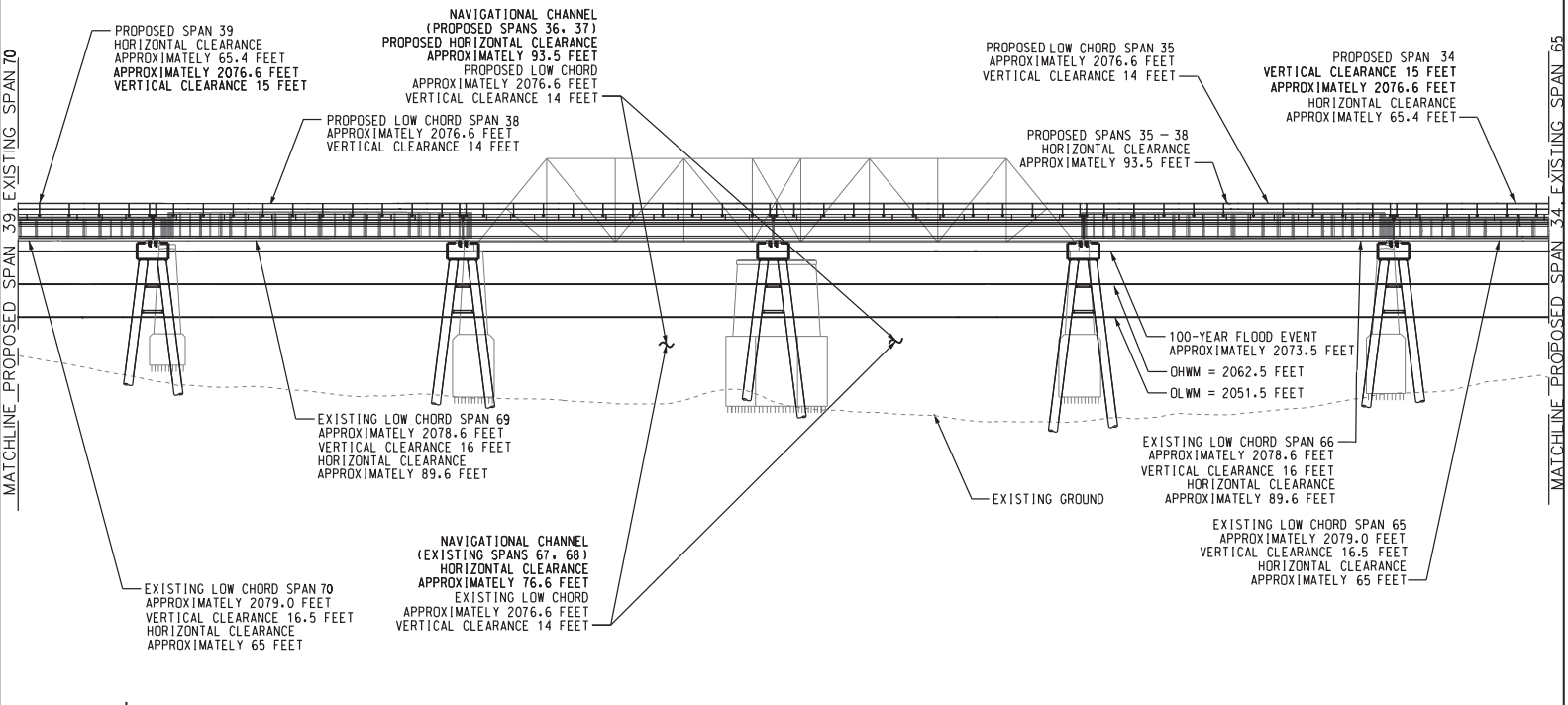
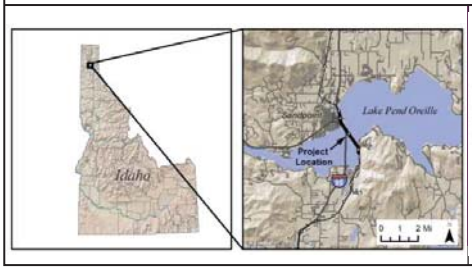
Attachment - D

DEFINED NAVIGATIONAL CHANNEL PROFILE



BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER
12-4-2017

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
OWNER: BNSF RAILWAY COMPANY
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MILE POINT OF BRIDGE LOCATION FROM MOUTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

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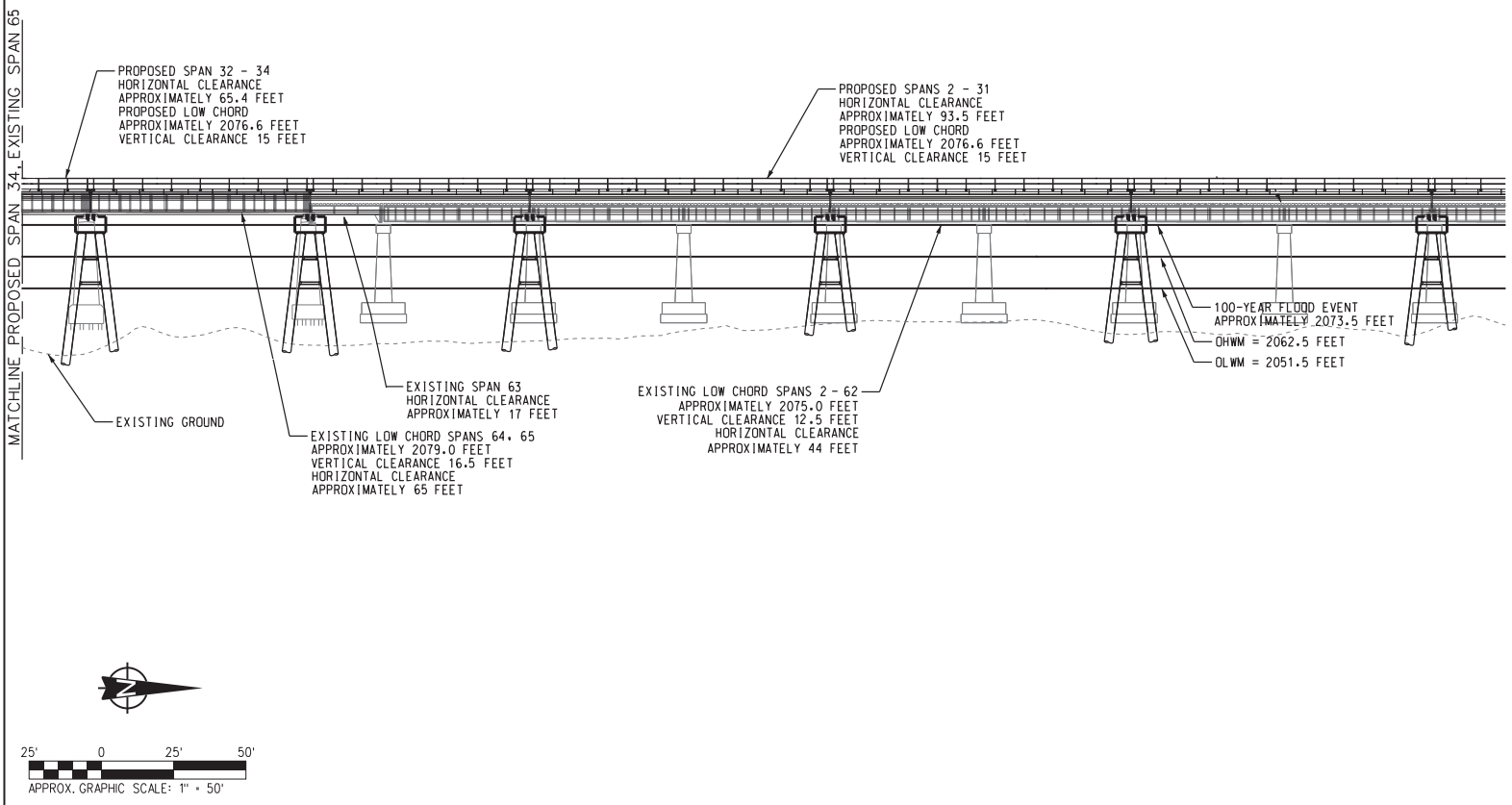
Attachment - D

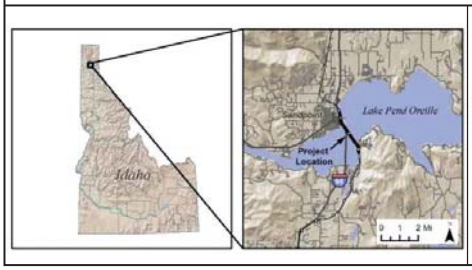
NORTH OF NAVIGATIONAL CHANNEL PROFILE



25' 0 25' 50'

APPROX. GRAPHIC SCALE: 1" = 50'

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
OWNER: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF BRIDGE 3.9 MONTANA DIVISION, KOOTENAI RIVER SUB, LINE SEGMENT 45, MP 3.9
MILE POINT OF BRIDGE LOCATION FROM MOUTH: 2.7
WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

DRAWING NO.	PAGE NO.	SCALE
ELEVATION	12 OF 16	AS SHOWN

12/4/2017 5:36:45 PM $USER$
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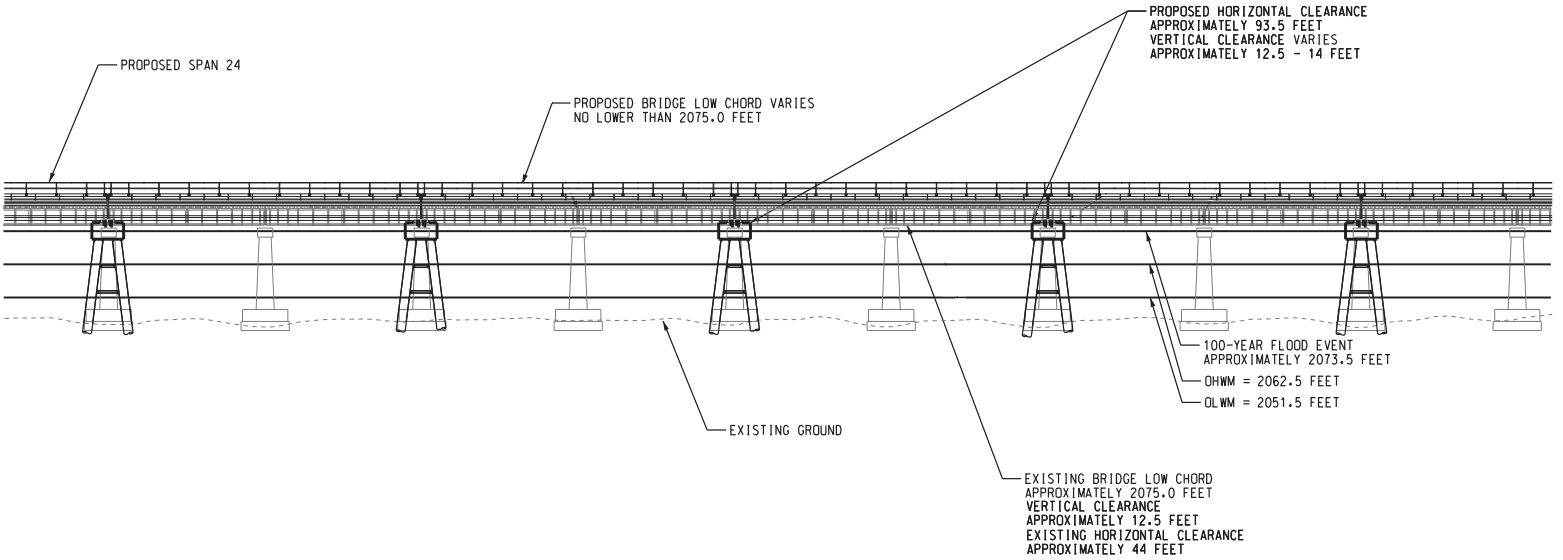
Attachment - D

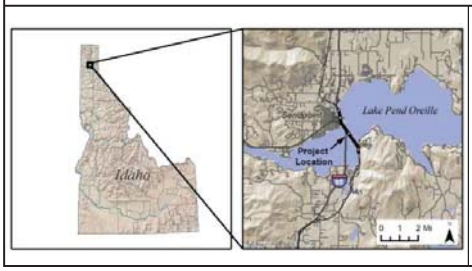
TYPICAL CHANNEL PROFILE



25' 0 25' 50'

APPROX. GRAPHIC SCALE: 1" = 50'

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
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WATERWAY: LAKE PEND OREILLE
CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

DRAWING NO.	PAGE NO.	SCALE
ELEVATION	13 OF 16	AS SHOWN

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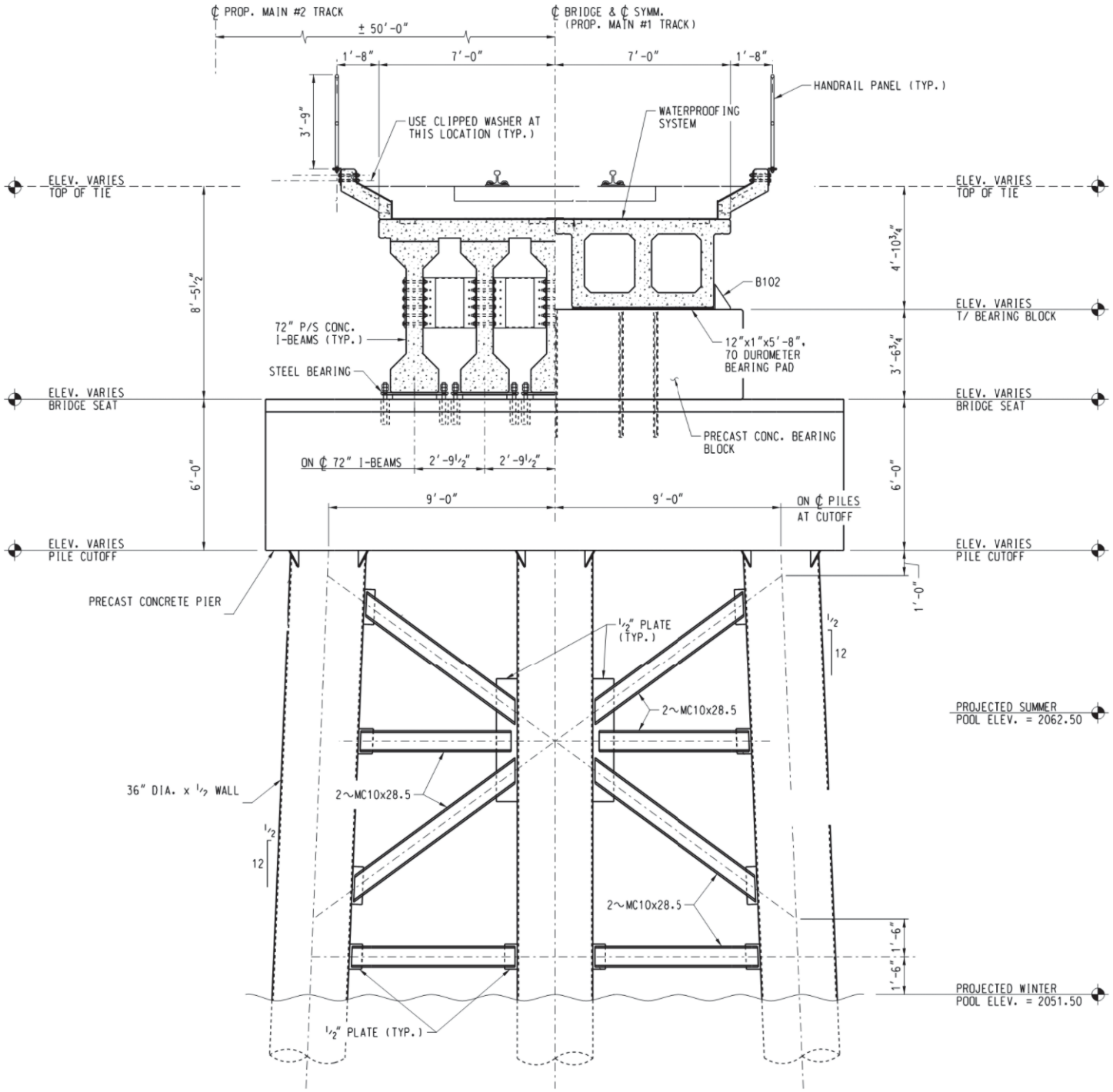
USCG0005631/16

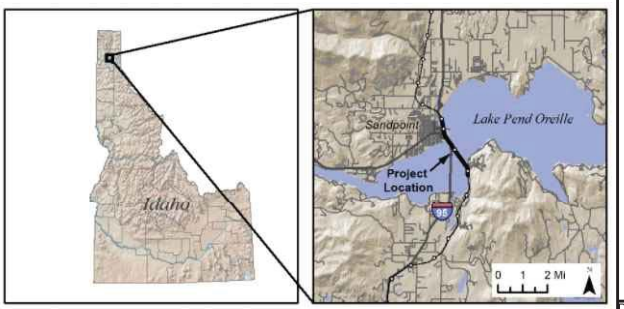
TYPICAL PIER SECTION



3' 0 3' 6'

APPROX. GRAPHIC SCALE: 1" = 6'

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO obtain COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
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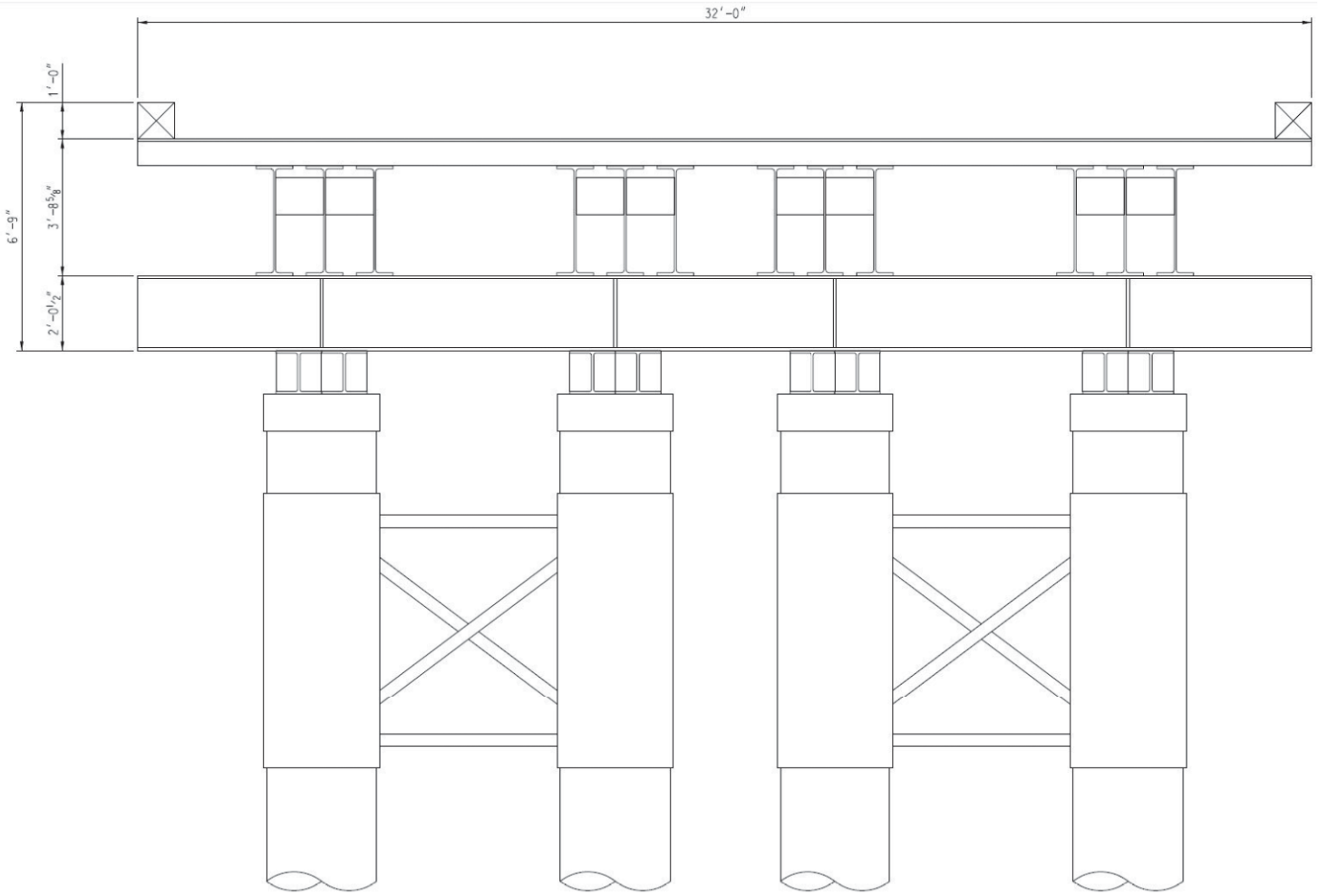
DATE: NOVEMBER 2017

DRAWING NO.	PAGE NO.	SCALE
TYPICAL	14 OF 16	AS SHOWN

USCG0005641/16

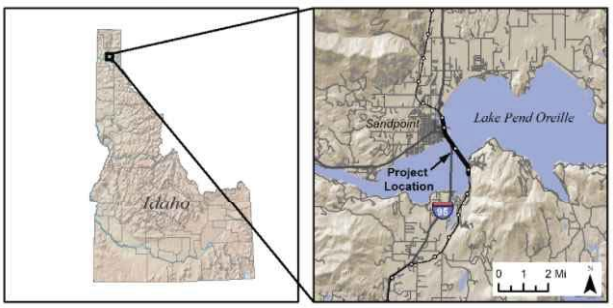
TYPICAL WORK BRIDGE SECTION



2.5' 0 2.5' 5'

APPROX. GRAPHIC SCALE: 1" = 5'

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

DRAWN BY: J. SIEMENS
CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

AGENCY REF. NO.:
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR BRIDGE 3.9
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CITY: SANDPOINT **COUNTY:** BONNER **STATE:** IDAHO
DATE: NOVEMBER 2017

DRAWING NO. TYPICAL | PAGE NO. 15 OF 16 | SCALE AS SHOWN

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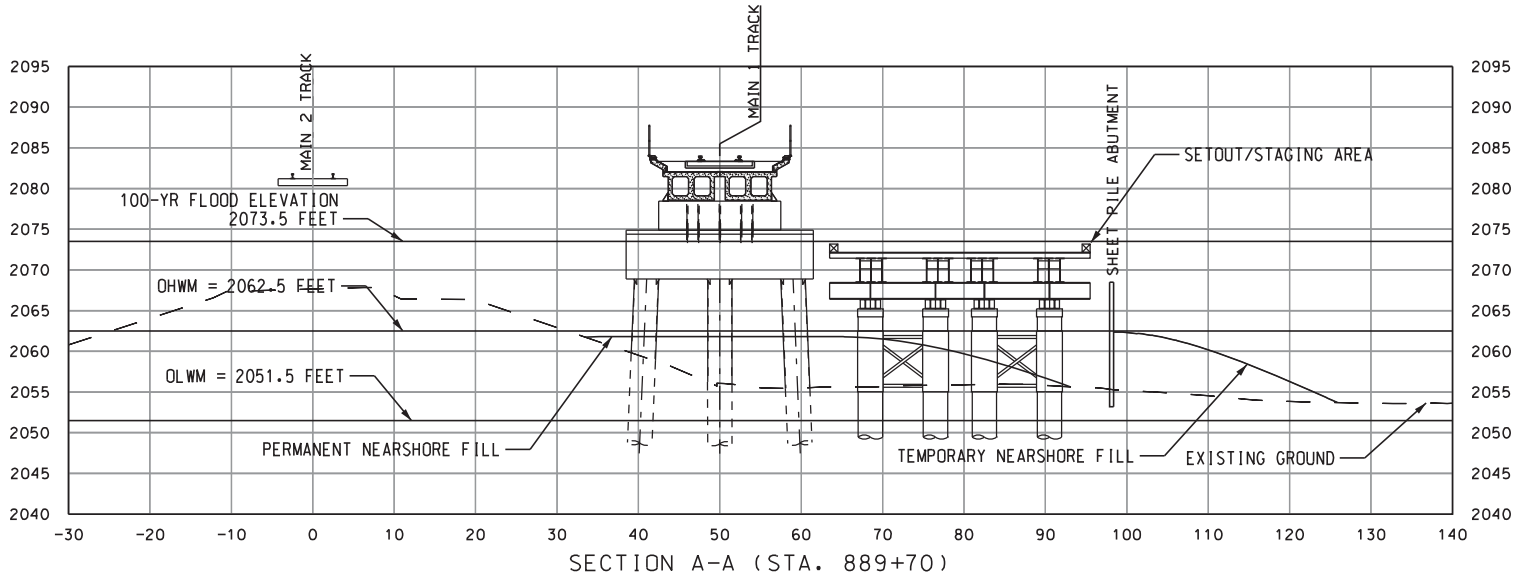
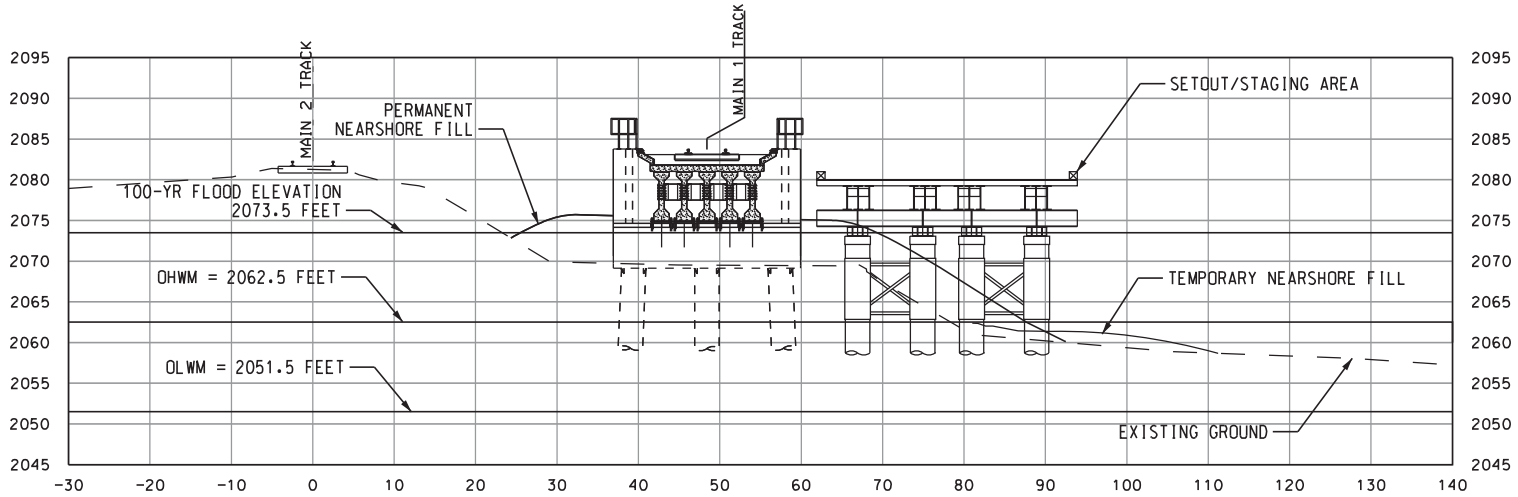
NEARSHORE FILL CROSS SECTIONS

USCG0005651/16

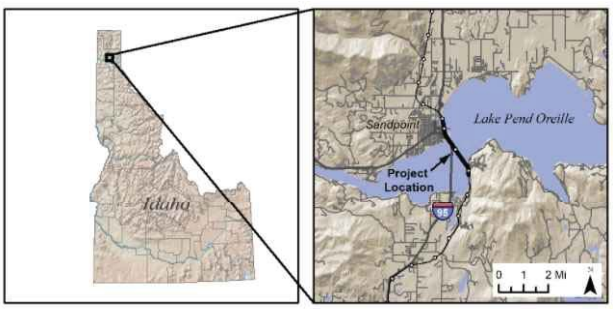


SECTION A-A (STA. 889+70)



SECTION B-B (STA. 938+20)

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88. CONCEPTUAL PLANS UTILIZED TO OBTAIN COAST GUARD BRIDGE PERMIT



PROFESSIONAL ENGINEER LICENSED 15947 STATE OF IDAHO MAT FLETCHER

12-4-2017

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CHECKED BY: S. PADELFORD
APPROVED BY: P. BORDENAVE

EXISTING CONDITIONS / PROPOSED WORK

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DRAWING NO. TYPICAL	PAGE NO. 16 OF 16	SCALE AS SHOWN