REASONABLE NEEDS OF NAVIGATION ANALYSIS FOR BRIDGE 3.9

SANDPOINT JUNCTION CONNECTOR PROJECT

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

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1. Executive Summary

1.1 Project Description

BNSF Railway Co. (BNSF) proposes to construct a second mainline track connection between its Algoma Siding track and the Sandpoint Junction, where BNSF and the Montana Rail Link (MRL) mainlines join. This action will consist of:

1. A new mainline track to the west of the existing BNSF mainline track;
2. Track, switch and signal upgrades;
3. A new bridge over Lake Pend Oreille (Bridge 3.9) adjacent to (west of) the existing rail bridge;
4. A new bridge over Sand Creek (Bridge 3.1) adjacent to (west of) the existing rail bridge;
5. A new bridge over Bridge Street (Bridge 3.0) adjacent to (west of) the existing rail bridge;
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.

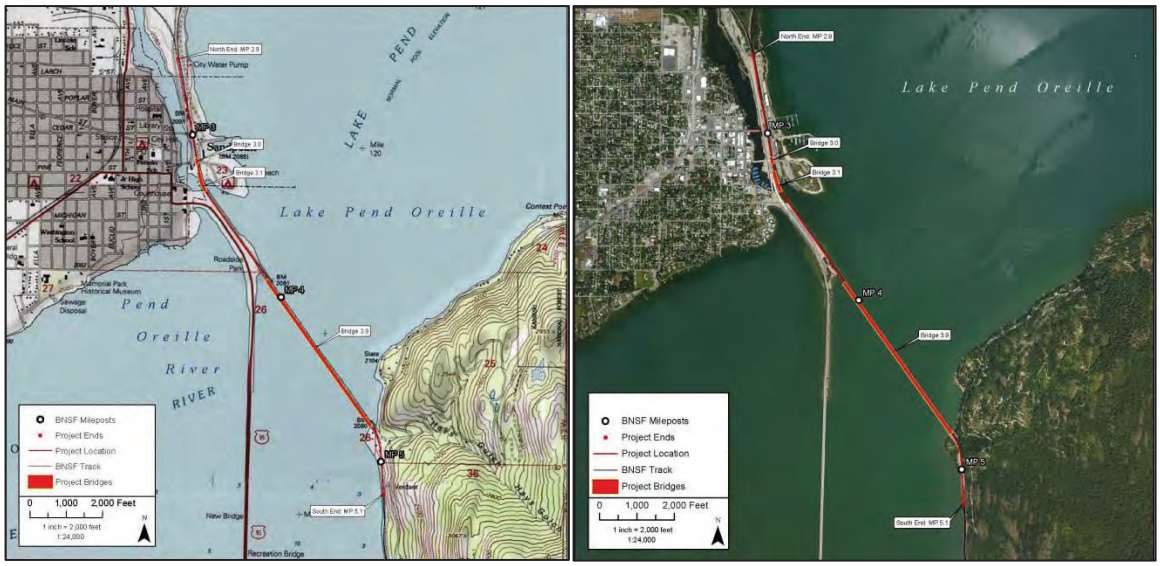

Figure 1. Project Overview

This technical report addresses the navigational evaluation and reasonable needs of navigation related to one of two over-water rail bridge applications associated with the BNSF Sandpoint Junction Connector Project; as required in accordance with 33 U.S.C. 401, 491, 525-533, 33 CFR 116.01, and the guidance in the USCG Bridge Program Reasonable Needs of Navigation White Paper (USCG; 5 October 2012).

The **Proposed Bridge 3.9** will be approximately 50 feet west of, and parallel to, the existing BNSF Bridge 3.9 over Lake Pend Oreille. The new bridge is 4,874-feet long, with 49-spans, and 48 in-water

piers comprised of six 36-inch-diameter open-ended steel pipe piles. The superstructure is a cast-in-place concrete deck, over pre-cast and pre-stressed concrete I-girders, over pre-cast concrete pier caps.

1.2 Project Purpose

The basic project purpose is to provide improvements for freight and passenger rail transportation to meet capacity needs.

The overall project purpose is to provide improved rail operations on the BNSF Kootenai River Subdivision Mainline by constructing a second mainline track connection between the BNSF Algoma Siding track south of Lake Pend Oreille, and the Sandpoint Junction, where BNSF and the Montana Rail Link (MRL) mainlines join just north of the Sandpoint Amtrak Station.

1.3 Project Need

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 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 to the point that this section of the BNSF mainline has become a constraint to interstate commerce. This project will relieve system congestion and back-up of rail traffic, and reduce hold times on railroad sidings and wait times at public at-grade crossings, both locally and regionally.

2. Existing Conditions

2.1 Setting

Lake Pend Oreille (LPO) is a natural, temperate, oligotrophic lake with seasonal impoundment elevations managed by the US Army Corps of Engineers / Albeni Falls dam, constructed in 1955 near the Idaho / Washington border (Figure 2). The dam regulates the lake's surface elevation / pool at 2062.5 feet from approximately mid-June through September, and at 2051feet to 2056 feet from mid-October to May. It is the largest natural lake in Idaho, with a surface area of 94,720 acres, a mean depth of 538 feet, and a maximum depth of 1,152 feet at its southern end. The lake 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 towns of Hope and Clark Fork (farther east); and within the unincorporated areas of Sagle (south of Sandpoint). The Pend Oreille River is the lakes only surface water outlet and it is defined as beginning adjacent to the town of Dover, Idaho, 2.7 miles to the west of BNSF Bridge 3.9. The river flows westward approximately 27 miles to the Albeni Falls Dam, then into eastern Washington, and north into Canada where it joins the Upper Columbia River system flowing back into the state of Washington.

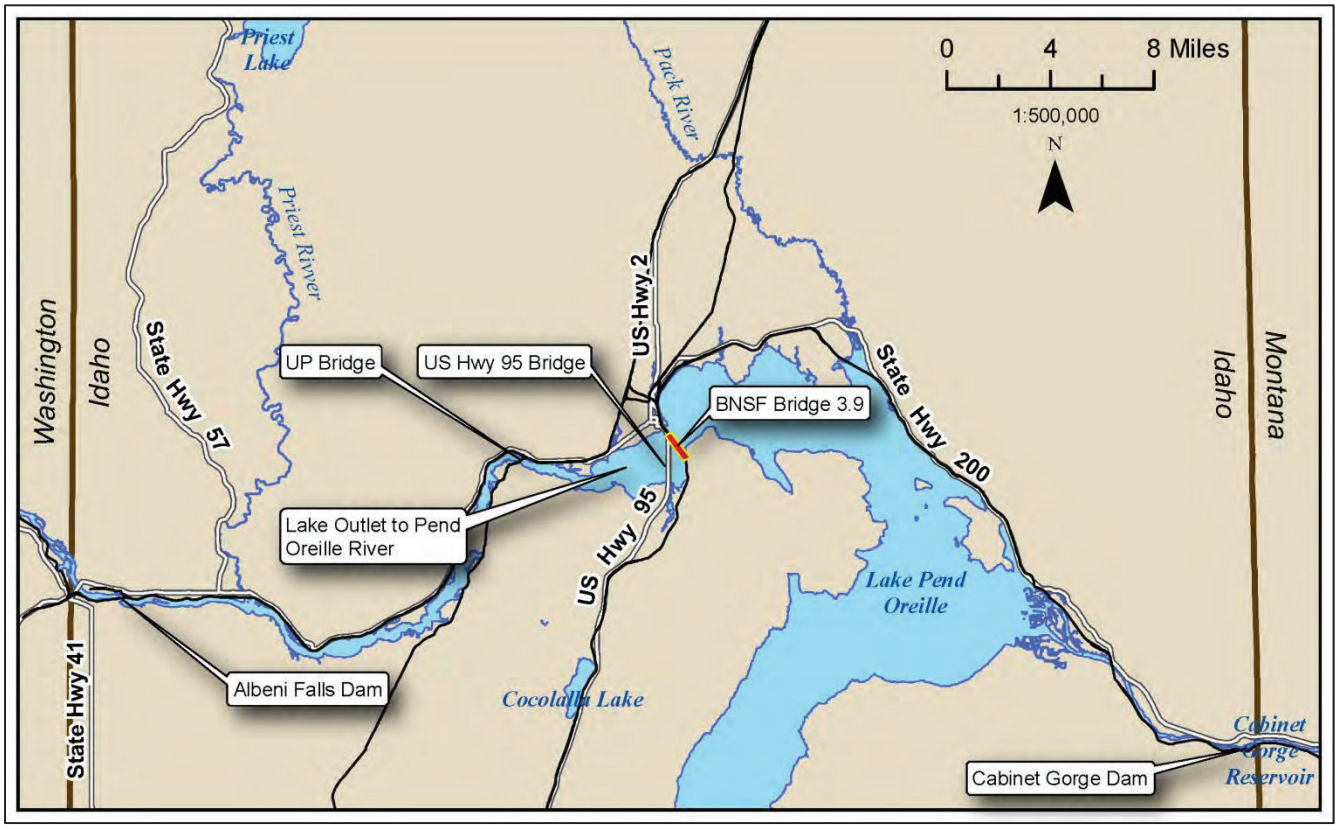

Figure 2. BNSF Bridge 3.9 Existing Conditions (Lake Pend Oreille / Pend Oreille River)

2.1.1 General Project Vicinity

The surface water elevations of the lake are regulated by the US Corps of Engineers, Civil Division's management of the Albeni Falls Dam:

- The surface elevation has a summer pool at 2062.5 feet from approximately mid-June through mid-September.
- From late September to early November the water elevation typically draws down from 2060 to 2051 feet.
- From November to early April the elevation is typically maintained at 2051feet.
- From early April through June 16 the water elevation typically draws up at irregular intervals, depending on water storage and flood potential conditions, from 2051 feet to 2062.5 feet.

Pend Oreille Lake Levels
Albeni Falls Dam Operations

(Excerpted from www.nws.usace.army.mil/Missions/Civil-Works/Locks-and-Dams/Albeni-Falls-Dam)

Summer Pool [normal full pool] (NFP)	2062 to 2062.5 feet	June 16 until third Sunday of September or September 18 (whichever is later)
September Drawdown	No lower than 2060 feet	September 30
October/November Drawdown	2060 to 2051 feet	October 1 through 1st week of November
Winter Holding/ Minimum Elevation	2051 feet	November 16 – early April **
Spring Operations*	Refill to 2056 feet	By April 30
	Refill to 2060 feet	By May 31

* Targets may change due to precipitation conditions and downstream power needs. Spring refill based on flood control as a priority. Refill to 2062 feet mid-late June depending on flood risk, forecasts and snowpack conditions in Pend Oreille River basin.

** Lake elevation may rise due to winter flood conditions; Flood risk management requires water stored above 2056 feet must be evacuated by April 1.

Figure 3. Albeni Falls Dam Lake Elevation Management Summary

2.1.2 Immediate Project Area

The **Existing BNSF Bridge 3.9** spans Lake Pend Oreille for almost a mile (4,769 feet) just south of Sandpoint, Idaho, with the highest navigational spans at the south end of the bridge, generally defined as 2.7 miles upstream (east) from the lake outlet into the Pend Oreille River, near the town of Dover.

The existing BNSF Bridge 3.9 span clearances are as follows:

Vertical Clearance:

- 14 feet at each of the two published and lighted navigation spans (Spans 67 and 68)
- 16 to 16.5 feet at the six approach spans on either side of the lighted navigation spans (Spans 64-66 and 69-71)
- 12.5 feet at all remaining spans (Spans 1-63 and 72-88)

Horizontal Clearance:

- 76.6 feet at each of the two published and lighted navigational spans (Spans 67 and 68)
- 89.6 feet for the two approach spans on either side of published and lighted navigation spans (Spans 66 and 69)
- 65 feet for four spans on either side of the above approach spans (Spans 64, 65, 70, 71)
- 14 feet for Span 1 (north end)
- 44 feet for the seventy-four main bridge spans (Spans 2-62 and 73-87)
- 17 feet on the two connector (skip) spans (Spans 63 and 72)
- 7 feet for Span 88 (south end)

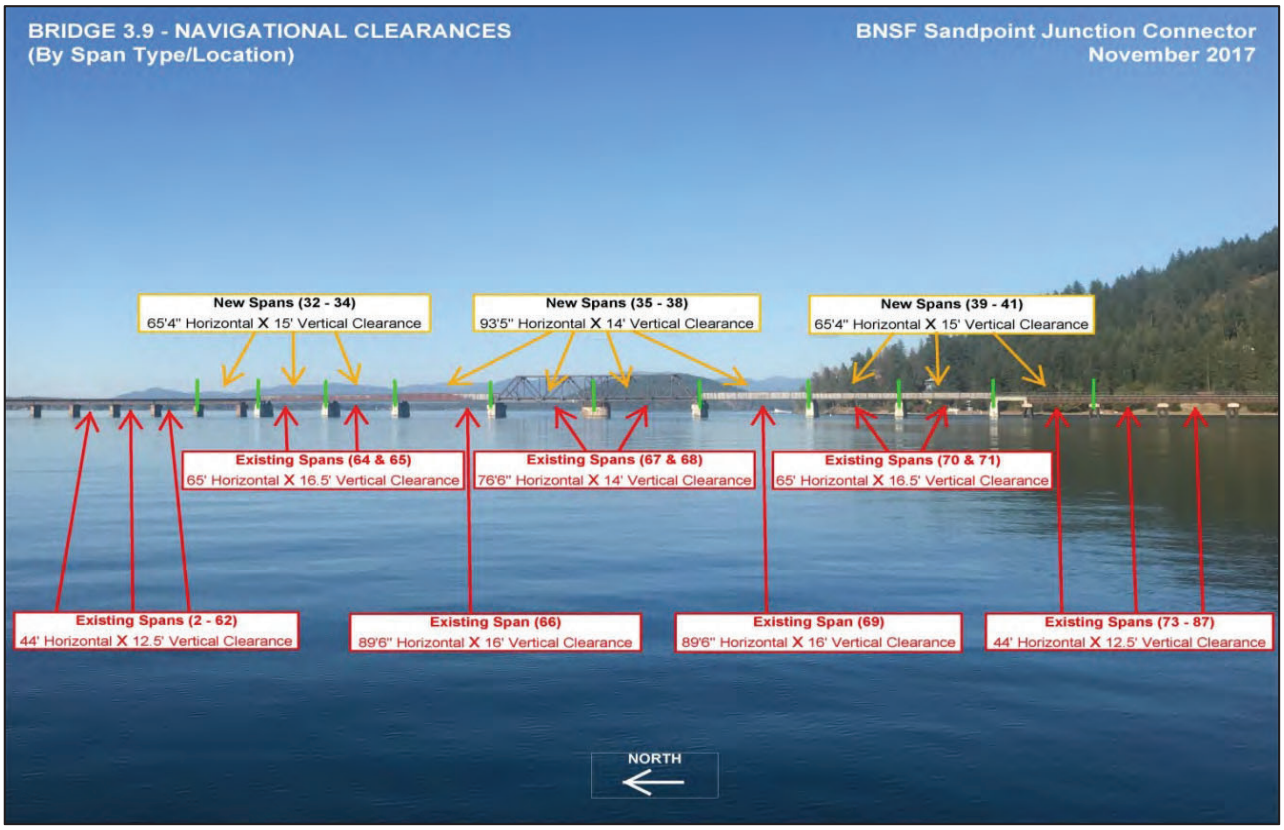

Figure 4. Bridge 3.9 Typical Navigational Clearances (By Span Type / Location)

US Highway 95 spans the lake for just over a mile (5600 feet) south of Sandpoint. The highway bridges (one vehicular, one multi use and emergency access) are west of BNSF Bridge 3.9, approximately 0.7 mile from the rail bridge lighted navigational spans to the highway lighted navigational span.

The highway bridges have 156 spans.

- Span 17 is the designated lighted navigation span with approximately 75 feet of horizontal clearance.
- 24 spans (approximately every 7th span) are cross braced and have no vessel clearance.
- The remaining 131 spans have approximately 37 feet of horizontal clearance.

The highest vertical span for the highway bridges is identified in most published data as 15 feet through the lighted navigational spans near the south end of the bridges (the 17th span from the south abutment). Because there are the two “Highway 95” bridges adjacent to each other (“new” vehicle and “old” multi-use and emergency access) with slightly differing vertical clearances, the following is clarification regarding the navigation span limiting vertical clearance.

- The easternmost “Old” Hwy 95 Bridge, permitted in1954, has an identified vertical clearance of 15.5 feet. However, that vertical clearance height is relative to an identified “Lake Storage” elevation of 2062.0 in 1954. Since then, the regulated high water (summer pool) elevation has been set as 2062.5. Thus, the actual vertical clearance for this bridge when the lake is at the normal 2062.5 summer pool elevation is 15 feet. This is the published vertical clearance and is the general understanding of the boating community.
- The “New” Hwy 95 Bridge permitted in 1976 has a 15.9 foot vertical clearance, relative to the 2062.5 regulated high water (summer pool) elevation. Thus, the combined highway bridges’ vertical-limiting vertical clearance (low-chord) is 15 feet above 2062.5.
- The spans south of the lighted navigation span have a vertical clearance ranging from the 15 feet to 10.1 feet. The spans north of the lighted navigation span range from 10.1 to 9.4 feet vertical clearance(Jacobs communications with ITD staff October 3, 2017).

Lake Pend Oreille / River water currents in this location, under both the highway and railroad bridges, flow generally from east to west. Flow speed is approximately 1-3 knots depending on the time of year. The bottom substrate is generally silt and sand with a gradient of 1 % or less.

Figure 5. Highway 95 Bridges Navigation Spans Viewed from the West

2.2 Existing Navigational Use

There is significant boat usage and passage under the BNSF bridge and nearby highway bridges, but it is widely dispersed due to the length of the bridges and the ability for most motor and human powered craft to utilize the many navigable spans throughout both bridges. Motor craft, ranging from 12-60+ feet in length, with 5-15 foot beam, and 5-10 foot height, travel through this area year round. However, the highest use period is typically from mid-May through mid-September with an average of 150 to 250 boats passages per day, with peak periods of several hundred passages during holidays and weekends.

Due to the limiting vertical clearance Low chord elevation for both the BNSF and Highway 95 bridges, most sailboats are generally limited to the portion of the lake and river west of the highway bridges and east and north of the railroad bridge. Occasionally, small sail craft and sail boards are seen in the approximately 677 acres of open water between the bridges, but they are typically launched within that area from private property and remain in that area due to the difficulty of dropping the sail masts to pass under the bridges.

Public and private marinas near Sandpoint are approximately 1 mile to the north, and the Dover Bay Marina is approximately 3 miles to the west. Both locations are full service marinas with boat launching, boat rentals, fueling, and wastewater pumping facilities, as well as both day-use mooring, public docks, and rented private dock slips.

A large proportion of the privately-held land along Lake Pend Oreille is centered around the greater Sandpoint area. There are several hundred private docks within a few miles of the BNSF Bridge 3.9 in all directions and along each shoreline. Other than some of the docks at the Dover Bay Marina, most docks are not accessible by boats due to the lake elevation draw down from October to May.

There are commercial tourist and fishing operations on Lake Pend Oreille and the Pend Oreille River. At this time, we know of no commercial activity that is unable to pass through either the railroad bridge or the highway bridges. Nor are we aware of any future proposed commercial operations that would require greater vertical or horizontal navigational clearances than what is currently available on both the railroad bridge and the highway bridges.

We were able to identify two vessels with defined limits for passage beneath the railroad and highway bridges. We discussed with their owners the specific limits. The *Shawnodese* is a privately-owned, commercial tour boat based in Sandpoint that occasionally conducts down-river cruises. However, boating conditions must be calm with smooth water for the boat to safely pass under the 15 foot vertical limits of the highway bridge. The *Ida Mae* is a privately-owned houseboat, semi-permanently moored at the Dover Bay Marina. Based on discussions with the owner, this craft has historically passed under both the highway and the railroad bridges, but only when the river / lake level is lowered in the fall or spring. The *Ida Mae* cannot pass under either the highway or rail bridges at high water (summer pool) due to a protective superstructure that has been added to the boat. Typically, neither the *Shawnodese* nor the *Ida Mae* utilize the railroad bridge lighted navigation spans (Spans 67 and 68), but can pass through the adjacent higher spans. They both use the Highway 15 foot clearance lighted navigation span.

"Ida Mae"

"Shawnodese"

Figure 6. Private Vessels Restricted by Size for Navigation Under BNSF Bridge 3.9 and Highway 95 Bridges

2.3 Limiting Structures

There are three bridges on Lake Pend Oreille and the Pend Oreille River that create restrictive navigation conditions for both commercial and private watercraft.

2.3.1 BNSF Bridge 3.9

BNSF Bridge 3.9 is identified in navigation charts as having a vertical clearance of 14 feet, which matches the vertical clearance at the two lighted navigational spans. However, it is general knowledge by local and regional marinas and boat owners that the spans adjacent to the lighted navigation spans (Spans 64-66 and Spans 69-71) have higher vertical clearance. Thus, it is also general knowledge that if they can pass under the highway bridges least limiting lighted navigation span (Span 17), they can clear the BNSF spans adjacent to its lighted navigation spans.

Although the BNSF Bridge 3.9 is generally identified as the limiting vertical structure on the lake, that only applies to its lighted navigation spans. The railroad bridges adjacent spans, with 16-16.5 foot vertical clearances, result in the highway bridges being the limiting vertical clearance span on the lake at 15 feet, when the lake is at full summer pool level of 2062.5.

2.3.2 Highway 95 Bridge and Adjacent Old Highway Bridge (multi-use pathway and emergency access bridge)

Based on the previous descriptions in 'Existing Conditions Section 2.1.2', the vertical and horizontal limiting navigational structure for both the river and the lake is the easternmost of the two highway bridges, which has a 15 foot vertical clearance and 75 foot horizontal clearance at the designated, navigation lighted span when the lake is at full summer pool level of 2062.5.

2.3.3 The Union Pacific Railroad Bridge downstream on the Pend Oreille River

The Spokane International Railroad Bridge (owned by Union Pacific Railroad - UPRR) west of Dover, Idaho, and identified as located at River Mile 111.3,has an 85-foot horizontal clearance

and 18-foot vertical clearance (relative to 2062.5) at its designated, navigational lighted span. It also has navigable adjacent spans that are slightly lower and narrower.

2.3.4 Other Bridges

None of the other bridges on the rivers (Priest River bridge on the Pend Oreille River, and Clark Fork Bridges on the Clark Fork River) have lower chord (vertical clearance) elevation or more restrictive horizontal clearances than the Highway 95 bridges, and also are at the outer perimeters of navigational use of the rivers and lake.

3. Proposed Action

Actions associated with navigation for the BNSF Bridge 3.9 portion of the BNSF Sandpoint Junction Connector project are:

- A new bridge over Lake Pend Oreille approximately 50 feet west of the existing BNSF Rail Bridge 3.9.
- Temporary nearshore fill at the north end (0.30 acre) and south end (0.03 acre) of the new bridge associated with construction access.
- Permanent nearshore fill at the north end (0.57 acre) and south end (0.01 acre) of the new bridge associated with matching the existing structural fill to meet both safety and security design criteria.

An action not directly associated with navigation, and thus addressed under a Corps of Engineers Section 10 Permit and 404 Permit, is a 0.28 acre near shore fill at the south end of the overall project to accommodate construction of the new track transition, and switch and signal changes. This near shore fill avoids extensive rock blasting and potential impacts to upslope roads and residents (See Alternatives Analysis).

3.1 Structures

3.1.1 Temporary

A temporary work bridge consisting of 102 spans is proposed to construct the new Bridge 3.9. This work bridge will be approximately 4,800 feet in length and 32 feet wide with eight staging and safety setouts of 63 feet width (Figure 7).

Vertical clearance:

- Less than 10 feet at north end temporary bridge Spans 1-16
- Gradually rising low-chord from 10 feet to15 feet for temporary bridge Spans 17-67
- 15 feet at temporary bridge Spans 68-71
- Gradually lowering low chord from 15 feet to 10 feet at south end temporary bridge spans 72-101

Horizontal clearance:

- 42-44.8 feet at temporary bridge Spans 68-71
- 42 feet for most of the remaining temporary bridge spans, except for
- 7 feet at Span 1 and less than 2 feet at Span 102

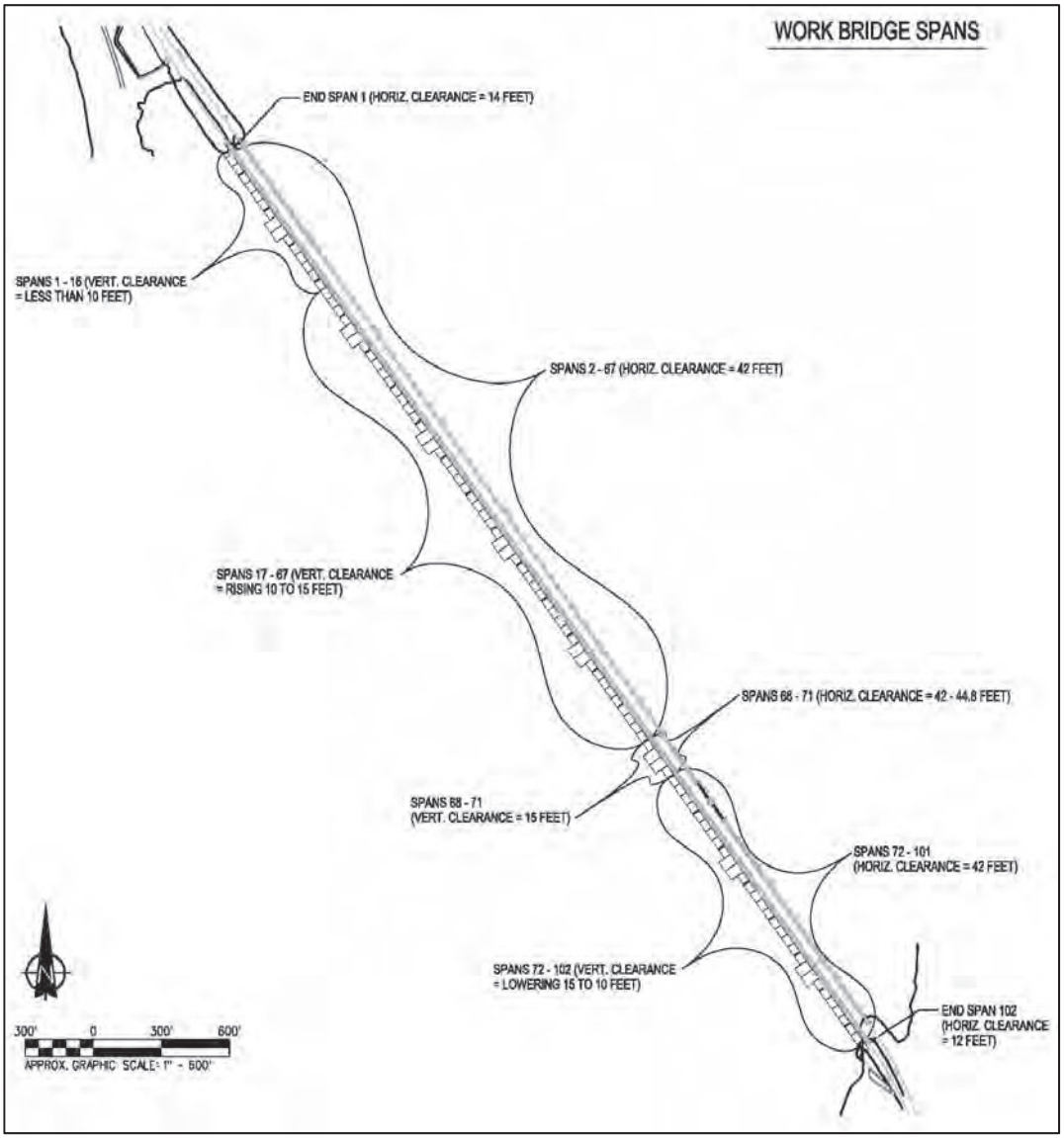

Figure 7. Bridge 3.9 Work Bridge Spans (Temporary)

3.1.2 Permanent

A new bridge adjacent to the existing BNSF over Lake Pend Oreille (Bridge 3.9).

This bridge will consist of 49 spans, approximately 50 feet to the west of, and parallel to, the existing bridge, and will be 4,874 feet long and approximately 18 feet wide (Figure 8).

Vertical clearance:

- 14 feet at the two published navigational spans (lighted) and at the two approach spans on either side of the navigation channel (Spans 35-38)
- 15 feet for 6 spans (Spans 32-34 and 39-41)
- 12.5 feet for 39 spans (Spans 1-31 and 42-49)

Horizontal clearance:

- 93.5 feet at the two published and lighted navigational spans and the two approach spans on either side of the navigation channel (Spans 35-38).
- 65.4 feet for 6 spans (Spans 32-34 and 39-41)
- 93.5 feet for spans 38 spans (Spans 2-31 and 42-49)
- 7 feet for span 1 at the north end of the bridge.

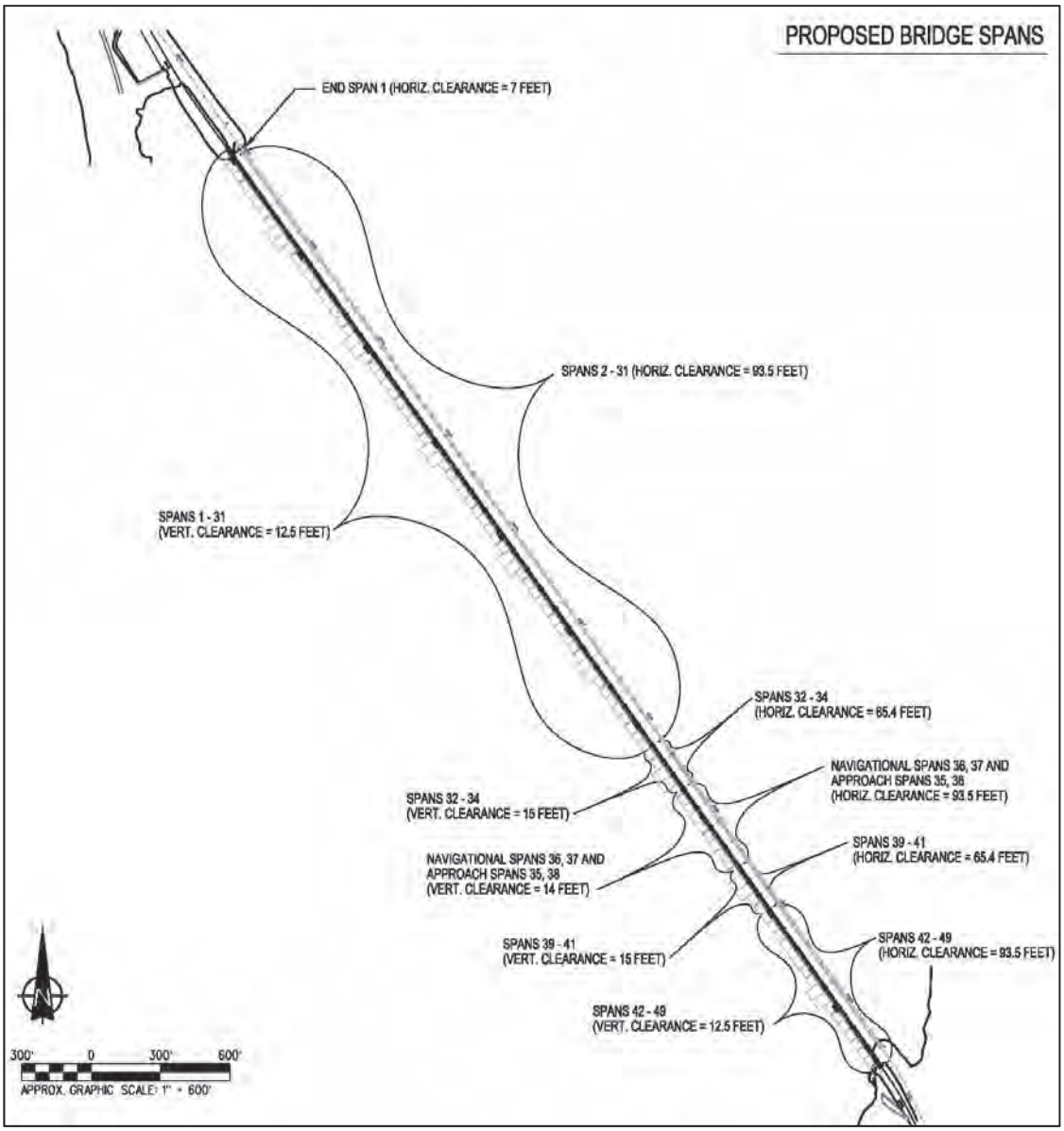

Figure 8. Bridge 3.9 New Bridge Spans (Permanent)

3.2 Timing

3.2.1 Temporary

The temporary construction bridge will be built immediately after the placement of the nearshore approach fills, and generally prior to construction of new bridge. The construction bridge will remain in place for the construction of the new bridge, up to 2.5-3 years.

3.2.2 Permanent

Work on the new permanent railroad bridge may start while the construction bridge is being completed, but generally is proposed to occur year-round once the construction bridge is completed. Construction is expected to take 2.5-3 years.

4. Navigation Evaluation

4.1 Navigational Effect of Proposed Structures

4.1.1 Temporary

The temporary construction bridge went through several design iterations to identify the least impacts to navigation while providing a safe working platform for the large heavy equipment necessary to construct a railroad bridge over a long waterway reach.

- There will be a restriction of navigation at the northernmost 16 spans (approximately 600 feet) where the construction bridge low-chord vertical clearance will restrict most vessel passage as the work bridge slowly rises to reach a 10 foot low-chord elevation at Span 17. However, these northernmost 36 spans are generally avoided by watercraft operators because of the shallow nature of that area, particularly in the winter months when shifting sand bars are exposed (Figure 9).

- At Span 17, the vertical clearance of the temporary bridge will be 10-feet, and from Spans 17-63 the low-chord vertical clearance rises from 10 to 15 feet.

- From Spans 68-71 the low-chord vertical clearance will be 15 feet.

- From Spans 72-102 at the south end of the bridge, the low-chord vertical clearance will reduce from 15 to 12.5 feet.

4.1.2 Permanent

The permanent railroad bridge also required several design iterations to minimize the navigational impacts of the new structure and ensure that it is not the limiting structure to vertical and horizontal clearance for navigation on the lake and river.

The new railroad bridge has twice the horizontal clearances for the majority of the new structure, other than the navigational spans, where it will generally match the existing spans horizontal clearance. The vertical clearances will also match the 12.5 foot vertical clearance for the majority of the existing bridge spans. For Spans 32 through 34 and Spans 39 through 41, the vertical clearance will be 15 feet. For Spans 35 through- 38 the vertical clearance will be 14 feet.

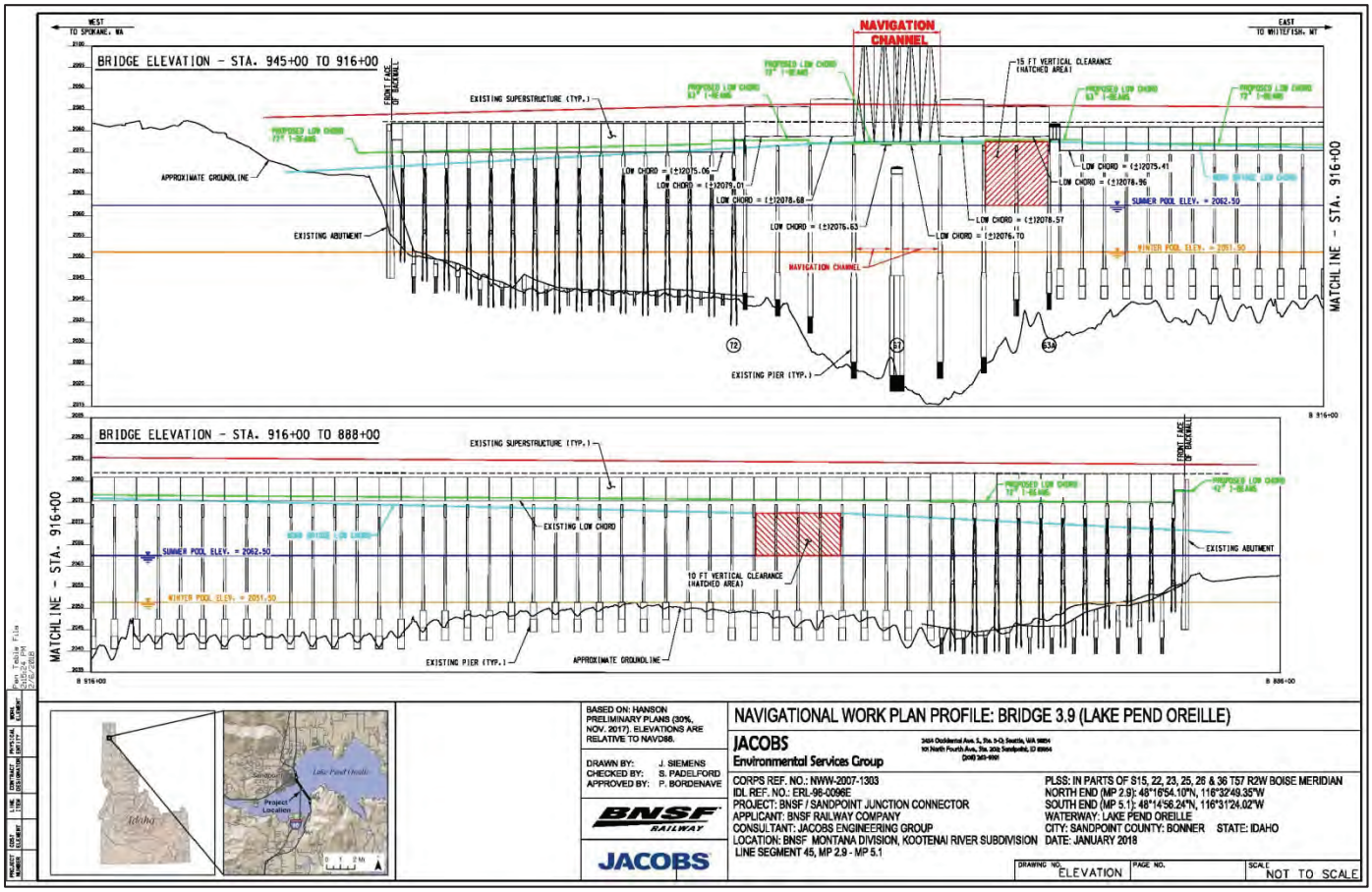

Figure 9. Bridge 3.9 Low Chord Profile Comparisons

4.2 Effect of Proposed Structures on Existing and Potential Foreseeable Navigation Needs

4.2.1 Temporary

Based on the vertical and horizontal clearances identified in Section 4.1.1, the majority of the construction bridge (approximately 60%) will retain an equivalent vertical and horizontal clearance as the existing railroad bridge throughout construction.

Although during construction there will be locations of limited navigation to keep both mariners and construction operators safe, there will be on average, over 3000 feet of minimally restrictive navigation throughout the bridge length. At all times there will be vertical clearances of 15 feet at designated spans near the existing bridge designated navigation spans

Both the construction and the existing bridges will require signage and navigational lighting to direct boaters away from construction restriction spans and towards the non-restrictive passage spans. This will be achieved by the use of floating buoys, booms, signs, and lights at night per the U.S. Department of Homeland Security, U.S. Coast Guard Office of Bridge Administration “Bridge Lighting and Other Signals” Guidelines under 33 CFR 118.

4.2.2 Permanent

Based on the vertical and horizontal clearances identified in Section 4.1.2, the majority of the bridge (approximately 90%) will retain an equivalent vertical and horizontal clearance as the existing bridge. Both the existing and new bridges will require signage and navigational lighting, per the U.S. Department of Homeland Security, U.S. Coast Guard Office of Bridge Administration “Bridge Lighting and Other Signals” Guidelines under 33 CFR 118, to provide mariners information on horizontal and vertical clearances.

The existing designated and lighted navigation spans vertical clearance will remain at 14 feet. The reduction of the two adjacent spans vertical clearance from 16 feet to 14 feet is necessary to meet modern rail loading design requirements for the new 93.4 foot bridge span lengths.

Six spans (Spans 32, 33, 34, 39, 40, and 41) will have a vertical clearance of 15 feet. The reduction from 16-16.5 feet at four of the existing spans is necessary to meet modern rail loading design requirements for the new 65.4 foot bridge span lengths.

Although the new railroad bridge results in a reduction in vertical clearance at some of the spans approaching the designated and lighted navigational spans, the proposed 15-foot vertical clearance matches the 15-foot of vertical clearance limits at the highway bridges. Thus any vessels that can or intend to clear the highway bridges will also be able to clear the new railroad bridge.

Approximately 677 acres of open-water, out of the approximately 96,000 acres of navigable waters on Pend Oreille Lake and River, are affected by this vertical clearance limit (Figure 10).

Within the area from the Bottle Bay Road Bridge (which has 10 feet of vertical clearance) to the railroad and highway bridges, we found no commercial or private vessels that exceed 15 feet in vertical clearance, based on personal survey of those areas over the past year. We are not aware of any proposed or potential vessels being constructed or launched within that 677 acre area, and it is unlikely anyone would choose to do so in the future given the published limitation of the highway bridges vertical elevation at its navigational span.

Figure 10. Navigable Waters Between the Highway and Railroad Bridges

5. Mitigation

5.1 Temporary Bridge

- Increased the low chord vertical clearance to a minimum of 10 feet for over 80% of the bridge from the original planned 25%.
- Maintained a 15 foot low chord vertical clearance for designated spans to ensure vessels capable of clearing the highway bridge are able to clear the railroad bridge throughout construction. The original plan was to meet the published low chord vertical clearance of the designated and lighted navigation span, which is14 feet.
- Use of floating buoys, booms, signs, and lights at night, per the U.S. Department of Homeland Security, U.S. Coast Guard Office of Bridge Administration “Bridge Lighting and Other Signals” Guidelines under 33 CFR 118, to direct boaters away from construction restriction spans and towards the non-restrictive passage spans.
- Provide notification and updates through Coast Guard Notice to Mariners, signage at Marinas and public boat launch facilities, state and local waterways agencies, local newspapers and publications throughout construction.

5.2 Permanent Bridge

- Retain equivalent vertical and horizontal clearances for 90% of the existing bridge.
- Maintain a 15 foot low chord vertical clearance for designated spans to ensure vessels capable of clearing the highway bridge can continue to clear the railroad bridge. The original plan was to meet the published low chord 14 foot vertical clearance of the designated and lighted navigation span.
- Provide required signage and navigational lighting, per the U.S. Department of Homeland Security, U.S. Coast Guard Office of Bridge Administration “Bridge Lighting and Other Signals” Guidelines under 33 CFR 118, to provide mariners information on horizontal and vertical clearances on both the existing and new bridges.
- Provide notification through Coast Guard Notice to Mariners, signage at Marinas and public boat launch facilities, state and local waterways agencies, local newspapers and publications.
- Given that the published navigation information now identifies the existing BNSF Bridge 3.9 as having a 14 foot navigational clearance, updates to those publications should not need updating because the designated lighted navigational span vertical and horizontal clearances will remain the same. However, clearance signage will be placed on the bridge to ensure mariners are aware of the changes to the spans adjacent to the designated and lighted navigation spans.

6. Conclusion

The Reasonable Needs of Navigation Criteria are met by the propose project though:

- Design adjustments that maximize the possible vertical clearance for navigation throughout the bridge.
- Meeting the same vertical clearance as the Highway 95 Bridge to the west on four combined rail spans to ensure the rail bridge is not the controlling structure for navigation on Pend Oreille Lake and River.
- Providing required signage and navigational lighting, per the U.S. Department of Homeland Security, U.S. Coast Guard Office of Bridge Administration “Bridge Lighting and Other Signals” Guidelines under 33 CFR 118, to provide mariners information on horizontal and vertical clearances on both the existing and new bridges.
- Provide notification through Coast Guard Notice to Mariners, signage at Marinas and public boat launch facilities, state and local waterways agencies, local newspapers and publications.

7. References

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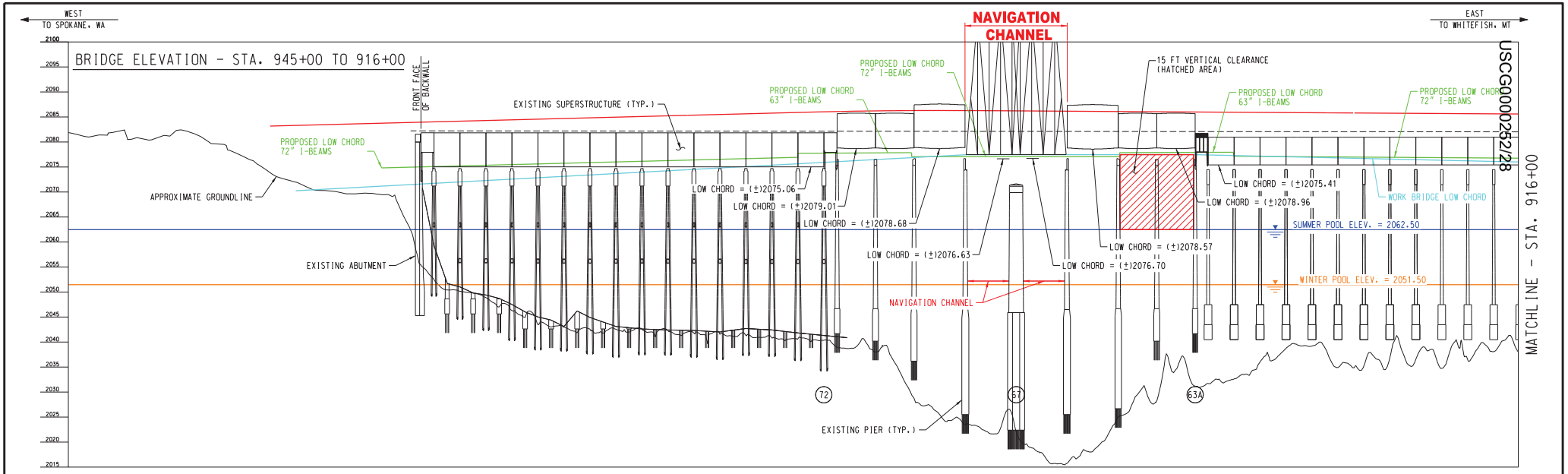

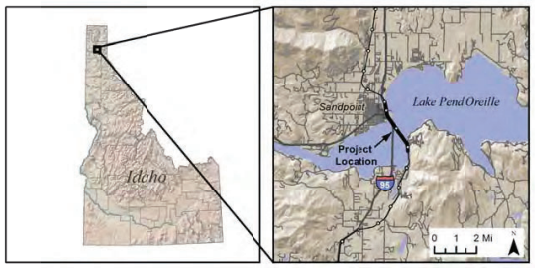

BASED ON: HANSON PRELIMINARY PLANS (30%, NOV. 2017). ELEVATIONS ARE RELATIVE TO NAVD88.

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BNSF RAILWAY

JACOBS

NAVIGATIONAL WORK PLAN PROFILE: BRIDGE 3.9 (LAKE PEND OREILLE)

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CORPS REF. NO.: NWW-2007-1303
IDL REF. NO.: ERL-96-0096E
PROJECT: BNSF / SANDPOINT JUNCTION CONNECTOR
APPLICANT: BNSF RAILWAY COMPANY
CONSULTANT: JACOBS ENGINEERING GROUP
LOCATION: BNSF MONTANA DIVISION, KOOTENAI RIVER SUBDIVISION
LINE SEGMENT 45, MP 2.9 - MP 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
CITY: SANDPOINT COUNTY: BONNER STATE: IDAHO
DATE: JANUARY 2018

DRAWING NO.	PAGE NO.	SCALE
ELEVATION		NOT TO SCALE

PROJECT NUMBER | COST ELEMENT | LINE ITEM | CONTRACT DESIGNATOR | PHYSICAL ENTITY | WORK ELEMENT

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ADDENDUM - 1

REASONABLE NEEDS OF NAVIGATION ANALYSIS FOR LAKE PEND OREILLE BRIDGE 3.9 SANDPOINT JUNCTION CONNECTOR PROJECT

BNSF Montana Division, Kootenai River Subdivision,
Line Segment 45, MP 2.9 +/- to 5.1+/-
Bonner County, Idaho
January 31, 2018

Updated 2/14/2018

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Summary

This addendum addresses a request by the Idaho Department of Lands (IDL) for the IDL non-navigational encroachment permit to provide a navigational work plan and discussion of the project's impacts to existing navigational issues during construction and post-construction.(Rule 015.13.g. of IDAPA 20.03.04)

Navigational Effect of Proposed Structures

Temporary

The temporary construction bridge's effects on Lake Pend Oreille's navigation in the project vicinity have been reviewed to identify the least impacts to navigation while providing a safe working platform for the project.

Vertical clearances throughout the temporary bridge will not be significantly different than the existing Br 3.9 vertical clearance. The low-chord vertical clearance in the identified navigation channel (spans 68 - 71) will match the existing bridge vertical clearance of 15 feet.

Temporary bridge piers that are offset, or within the horizontal span layout, from the existing bridge piers will be identified in a navigation work plan. BNSF and the project Construction Team (TBD) will develop this plan prior to construction. The plan will specifically call-out the types and kinds of lighting or markers required on piers within the navigation channel spans and throughout the project.

Components of the temporary bridge lighting and marking could include, but are not limited to the following safety navigation protocol:

- Upstream and downstream sides of the Br 3.9 navigational channel piers (piers associated with spans 68 - 71) and piers that are offset of the existing bridge piers will be marked with red lights.
    - Each red light shall show through a horizontal arc of 180 degrees.
    - The lights will be securely mounted on the pier as low as practicable, but not lower than two feet above the navigable high water so it shows 90 degrees on either side of a line parallel to the axis of the navigational channel to be visible from an approaching vessel.
- Lighting used will be:
    - Designed and placed so the light distribution pattern will not permit high intensity light that blinds or interferes with navigation, such as Fresnel lens lights.
    - Temporary lighting will be regularly inspected and maintained.
    - Lighting will be displayed or turn on from sunset to sunrise each night.

  - Lighting used will be of sufficient candlepower to be visible against the background lighting at a distance of at least 2,000 yards for 90% of the nights of the year.

- Upstream and downstream sides of piers not within the navigation channel and not offset of the existing bridge piers may be marked with red reflectors or red retroreflective material.

  - Reflective material will be affixed to the upstream and downstream channelward quadrant of the upstream and downstream sides of piers on either side of the navigational channel. This will ensure effective reflection of light from an approaching vessel.

  - Reflectors or retroreflective material should cover a minimum of 0.5 square feet in each location and be located at or above the high water line.

- BNSF and the project Construction Team will be responsible for maintaining proper temporary navigational lighting and other markings during construction.

Permanent

The new, permanent Br 3.9 will generally match the vertical clearance limits of the highway bridges. The navigation channel does match the highway bridges clearance, 15 feet, so there are no long-term expected restrictions for vessel traffic under the new bridge.

The design and placement of piers for the new bridge are generally aligned with existing Br 3.9 piers. Piers that are, however, offset or within navigation channel will comply with the lighting requirements of the U.S. Department of Homeland Security, U.S. Coast Guard Office of Bridge Administration “Bridge Lighting and Other Signals” Guidelines under 33 CFR 118 via a navigation lighting and signal plan.

BNSF and the project bridge design team will develop this plan prior to completion of the new Br 3.9 construction. The plan will be reviewed and approved by the USCG and the IDL. The plan will specifically call-out the types and kinds of lighting or markers required on piers within the navigation channel spans and at other locations throughout the project.

Components of the permanent bridge lighting and marking could include, but are not limited to the following safety navigation protocol identified in 33CFR 118:

- Upstream and downstream sides of the Br 3.9 navigational channel piers (piers associated with spans 68 - 71) and piers that are offset of the existing bridge piers will be marked with red lights.

  - Each red light shall show through a horizontal arc of 180 degrees.

  - The lights will be securely mounted on the pier as low as practicable, but not lower than two feet above the navigable high water so it shows 90 degrees on either side of a line parallel to the axis of the navigational channel to be visible from an approaching vessel.

- Lighting used will be:

  - Designed and placed so the light distribution pattern will not permit high intensity light that blinds or interferes with navigation, such as Fresnel lens lights.
  - Temporary lighting will be regularly inspected and maintained.
  - Lighting will be displayed or turn on from sunset to sunrise each night.
  - Lighting used will be of sufficient candlepower to be visible against the background lighting at a distance of at least 2,000 yards for 90% of the nights of the year.

- Upstream and downstream sides of piers not within the navigation channel and not offset of the existing bridge piers may be marked with red reflectors or red retroreflective material.
  - Reflective material will be affixed to the upstream and downstream channelward quadrant of the upstream and downstream sides of piers on either side of the navigational channel. This will ensure effective reflection of light from an approaching vessel.
  - Reflectors or retroreflective material should cover a minimum of 0.5 square feet in each location and be located at or above the high water line.
- BNSF will be responsible for maintenance of permanent lighting on Br 3.9 over Lake Pend Oreille.

References

U.S. Department of Homeland Security, U.S. Coast Guard Office of Bridge Administration “Bridge Lighting and Other Signals” Guidelines under 33 CFR 118.

U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, “Lake Pend Oreille, NOAA Chart 18554 (Booklet Chart)”

U.S. Coast Guard, Bridge Administrative Division. Presentation by Nick E. Moras, Assistant Chief at the 2nd Biennial Bridge Symposium, 11/1987, St. Petersburg, FL. “Recommendations for Temporary and Permanent Installations of Bridge Navigation Lights and Reflective Materials”