Lower White Pine
Upper Connection B+

12th Round Funding Cycle

June 30, 2011

Request from Tributary Committee:	**$250,000**
Request from SRFB:	**$162,290**
Total Request:	**$410,290**
Other Contributions/Match:	$1,750,000
TOTAL Project Budget:	$2,162,290

Proposal Checklist/Table of Contents

Project Title: Lower White Pine Upper Connection B+

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Summary of Project Changes

- The project budget request has been revised

Request from Tributary Committee: $250,000
Request from SRFB: $162,290

*Requesting match from BPA and PRCC

Additions to proposal since pre-proposal:

- A hydrograph and fish usage figure has been added to the Appendix B
- A matrices of the 5 alternative connection points was added to the Appendix C
- Figure of channel profile in the oxbow and Nason Creek - Appendix D
- Figure illustrating existing water surface in the oxbow and Nason Creek - Appendix D
- Figure illustrating influence of beaver dams on the water surface and thalweg profile - Appendix D
- Nason Creek LWP Draft Alternatives Evaluation Report has been attached to Prism and is also available upon request

Responses to SRFB Review Panel Comments:

1. Please include a profile drawing showing the differences in thalweg elevation between Nason Creek and the isolated oxbow, and the various water stages at which the oxbow and isolated floodplain will become reactivated, would also help reviewers to understand why the B+ alignment is the best location.

The water surfaces are defined for existing conditions but we need hydraulic modeling results to show what the water surfaces would be in the future. Hydraulic modeling will be completed in July, 2011 by the Bureau of Reclamation and ICF and this information will be distributed to technical reviewers.

To illustrate existing conditions see 3 figures in Appendix X of the proposal. One figure is a channel profile for the B+ alternative, the second was developed from the water surface gaging the CCNRD did last year and shows existing conditions water surface inside the oxbow and in the creek near B+. The final figure is a water surface profile and thalweg profile in the vicinity downstream of the B+ connection that shows the influence of a beaver dam on the water surface.

2. Please include relevant Bureau of Reclamation design drawings or reports as may be available as attachments to the proposal.

See Appendix X for design drawing and the Nason Creel LWP Draft Alternatives Evaluation Report is attached in Prism.

3. Please explain why techniques for raising the water surface elevation of Nason Creek at the oxbow inlet location to increase the duration of flow into the reconnected habitat (for example, using ELJs) were not included in the preferred design alternative.

The Design Team discussed this option, but the consultant was not scoped to include this level of analysis within their evaluation. This application specifically addresses construction associated with the grade separation work (bridges, access improvements, connector channel work, etc.). A separate effort is underway to obtain funding for design, permitting and construction of a weir or roughened channel structure to elevate the bed of Nason Creek adjacent to the proposed inlet at B+. A request for funding will be submitted to the Priest Rapids Coordinating Committee (PRCC) to fund this effort as well as a portion of the B+ Bridge.

Design work on the bed elevation structure will proceed as soon as funding has been obtained. Completed hydraulic modeling will inform that design process. If design and permitting processes are able to proceed rapidly, it is possible that this work could occur in 2012, but it might be preferable to wait until the B+ connection is completed and observed through different flow regimes before completing design and implementing this structure.

4. Does the project have specific hydraulic design objectives in the reactivate oxbow, such as water velocity and depth, or is the rationale that any additional flow is better than the current situation?

Hydraulic modeling will be completed in July, 2011 by the Bureau of Reclamation and ICF and this information will be distributed to technical reviewers.

5. Explain what considerations have been taken for sediment transport in the inlet design.

Hydraulic and sediment transport modeling will be completed in July, 2011 by the Bureau of Reclamation and ICF and this information will be distributed to technical reviewers.

6. Please discuss contingencies for working out potential disagreements with BNSF railroad management. For example, what happens if BNSF does not approve the final design? What leverage do the project sponsors have for negotiating design elements, bonding, maintenance fees and other project issues with BNSF?

Discussions with BNSF have occurred with both the public/governmental affairs side and the engineering side. Currently, contingencies for working out disagreements are based on the relationships developed between the project sponsor and BNSF. BNSF is a willing landowner cooperating voluntarily with us in this process.

A Coordination Team was also convened in 2010 to address project funding, long-term monitoring and maintenance responsibilities, and project partner roles due to the complexity of the project. The Coordination Team assists with problem solving and includes CCNRD, Reclamation, the Bonneville Power Administration (BPA), the Yakama Nation, Priest Rapids Coordinating Committee, Washington State Department of Wildlife, US Fish and Wildlife Service and the Upper Columbia Salmon Recovery Board. The Yakama Nation and BPA are the construction funding partners at this time and BPA has taken the lead federal agency role.

Responses to the Upper Columbia Regional Technical Team Comments:

7. Is the BNSF aware that their decision-making affects the timing of the project? Do they know about the desire to make two connection points?

Yes. The BNSF is aware of their Guidelines for Grade Separation and that the 30 day review process for Conceptual, 30%, 60%, etc. will have a bearing on funding decisions, permit submittals and ultimately project timing.

Yes. The BNSF has a copy of the conceptual design submittal which includes two connection points.

8. What is the disposition of the uppermost connection? It may be helpful to include the history of the alternative analysis of all the upstream connections. (Casey suggested including some language to clarify that the design team evaluated multiple upstream connections and B+ was the preferred alternative. The map should be modified to exclude F+ or any of the other connection points that have been rejected to avoid confusion regarding what is being proposed).

Since 2007, Nason Creek has been the focus of the U.S. Bureau of Reclamation's technical work in the Wenatchee Watershed, which included the completion of the:

- U.S. Bureau of Reclamation's Nason Creek Tributary Assessment (2008)
- Lower White Pine Reach Assessment (2009)
- Lower White Pine Reconnection Project Draft Alternatives Evaluation Report (2010) (attached in Prism)

- CCNRD convened a Design Team of engineers, biologists, restoration ecologists and others to develop alternatives in the spring of 2010.

- The CCNRD conducted an initial alternatives analysis in the spring of 2010 in coordination with the Design Team. This analysis evaluated seven alternatives ranging from full channel reconnection to a downstream only connection (ICF 2010). The preferred alternative was identified as having an upstream and downstream connection with openings allowing less than 20% diversion of flows into the disconnected area. This alternative provided the greatest hydraulic and fish access reconnection while meeting project sideboards established by adjacent landowners and BNSF and the goals of the Design Team.

- Beginning in the summer of 2010 Reclamation continued the analysis of the preferred alternative to refine the connection locations and opening sizes. This effort resulted in selecting the downstream bridge to be constructed to replace the existing blocked culverts. The upstream effort analyzed five potential connection points.

- In March 2011 the Design Team recommended that the preferred alternative is the installation of bridge structures (89-foot span) within the BNSF railroad prism at both the downstream location and at an upstream location referred to as B+.

  - B+ Connection - 89' bridge and expansion support piers at the upstream end of the project (as proposed in this application); and

  - Downstream Connection - 89' bridge and expansion support piers at the downstream end of the project (funded for construction).

B+ Upstream Inlet Connection Point (proposed)

The B+ connection points is proposed for the upstream inlet connection. The Design Team examined five potential connection locations at the upstream end of the project (A, B+, C, E, F+). Each connection location was evaluated for potential hydraulic connectivity during spring, high, and low flows, fish attraction and passage, direct and indirect impacts to wetlands, and construction feasibility. The attached matrix summarizes this analysis of all the potential connection locations (Appendix C). The B+ connection was selected as it provided the greatest flow connectivity, low wetland impacts, and construction feasibility is high.

The B+ connection will be designed to provide inflows during typical annual high flow spring events (see hydrograph Appendix B). The purpose of creating seasonal inflows is to provide flushing flows that will facilitate fish access into the oxbow habitats; and to provide enhanced connectivity between the oxbow and Nason Creek. The frequency and duration of inflows, along with a sediment transport analysis will be more accurately quantified after Reclamation completes the hydrologic modeling in July 2011.

As shown in the B+ concept profile in Appendix D the opening invert can be placed near the Nason Creek channel bottom, however the connector channel on the oxbow side will three to four feet of excavation in order to connect flows to the existing oxbow. The Design Team is also examining the potential to raise the water surface elevation on the Nason Creek side in order to achieve greater inflow connectivity through the proposed bridge opening: however, that is not a part of this proposal. The Design Team plans to examine typical concepts for raising creek bed/WSE while maintaining fish passage including but not limited to vortex weirs and roughened channels. Alternate funding sources are being pursued for the design and construction of this element.

The B+ connection will provide key annual flushing inflows and fish access at the upstream end of the 148 acre habitat complex thereby improving opportunities for colonization to the Gill Creek, Roaring Creek, and Coulter Creek habitat complexes. During summer, fall and winter flows the B+ connection will function as an outlet essentially providing a direct connection between Gill Creek and Nason Creek near the historic (pre-railroad) confluence.

Downstream Outlet Connection Point (funded)

Inflows from B+ will combine with tributary flows from Knutson, Gill, Roaring, and Coulter Creeks to re-enter Nason Creek at the downstream outlet. The downstream outlet is located where the historic Nason Creek channel would reconnect to the current Nason Creek channel. The proposed bridge structure would replace three blocked 48” diameter, 60’ long concrete pipes to provide a vastly improved hydraulic connection between Nason Creek and the disconnected oxbow habitats. Two possible connection sites were examined for the downstream reconnection located at transects N and O. The preferred site (transect N) was selected as it removes a fish passage barrier (the culverts), has the least amount of elevation difference between Nason Creek channel bottom and the oxbow bottom, and will require the least amount of excavation on the oxbow side to connect flows.

9. Is there any indication that the BNSF will actually require infrastructure for a second bridge at each crossing and the bridge replacement fee? These elements have no fish benefit and cost nearly as much as the actual connection elements.

BNSF has referred to the Guidelines for Grade Separation in regards to requiring infrastructure for a second bridge at each crossing and the bridge replacement fee. As described in the Final Proposal, CCNRD submitted Conceptual Designs to BNSF which included deviations from the Guidelines, including only constructing one bridge at each location.

CCNRD is aware that if these elements (second bridge) or some other alternative (siding) are required by BNSF to reconnect the disconnected habitat, then not including these elements in a project will equal no project and leaving the area in its current state.

Nason Creek Lower White Pine

B+ Reconnection Construction Proposal

1. Project Overview

A. Provide a brief summary of the project

The project area encompasses the entire Lower White Pine Reach of Nason Creek as defined in the Lower White Pine Reach Assessment (USBR 2009). This is a 2.1-mile-long segment of Nason Creek between river mile (RM) 11.55 and RM 9.45 in Township 26 North, Range 16 East, Sections 2, 3, 10, and 11, Willamette Meridian. The focus of this proposal is to seek funding for the upstream B+ connection at RM 10.7 and a short connector channel that will connect the B+ bridge to the existing disconnected channel (see Map Appendix A).

Construction of the Great Northern Railway in the 1890s disconnected two large channel meanders, the downstream one is 5,494 linear feet and the upstream one is 4,755 linear feet and floodplain areas totaling 148 acres. The current Burlington Northern Santa Fe (BNSF) railroad grade prevents channel migration and hydraulic connectivity into this historic floodplain which has resulted in the loss of habitat and the impoundment of runoff and groundwater. There are culverts within the railroad grade in two locations; however, these culverts limit and/or prevent fish access into the wetted habitats behind the railroad grade (USBR 2009). These culvert blockages result in the impoundment of waters.

The primary objective of this project is to provide hydraulic connectivity between isolated habitats and the mainstem of Nason Creek. This will be achieved through the construction of downstream and upstream openings in the BNSF railroad prism and the installation of 89’ span bridges. The improved hydraulic connectivity will:

- Connect surface flows from the Coulter, Roaring, Gill, and Knutson Creek basins to Nason Creek resulting in the reconnection of 14.9% of the Upper Nason Creek Basin.
- Allow juvenile and adult salmonid access to:
    - 83.1 acres of high flow and 6.8 acres of low flow rearing and refuge habitat.
    - Steelhead access to 1 mile of lower Coulter Creek.
    - Steelhead and Chinook access to 0.75 mile of lower Roaring Creek.
- Connect 148 acres of isolated Category 1 wetland/floodplain habitat representing a reconnection 38% of the disconnected floodplain in Nason Creek between river miles 4.5 and 14.3 (USBR 2008).

The preferred alternative includes both a downstream connection and an upstream (B+) connection (see map in Appendix A). A commitment to fund the downstream connection has been made by the Yakama Nation and is scheduled for construction 2012. The focus of this proposal is to seek funding for the upstream B+ connection and a short connector channel that will connect the B+ bridge to the existing disconnected channel.

The B+ connection will be designed to provide inflows during typical annual high flow spring events (see hydrograph Appendix B). The frequency and duration of inflows will be more accurately quantified after Reclamation/ICF completes the hydrologic modeling in July 2011. This connection will provide key annual flushing inflows at the upstream end of the 148 acre habitat complex thereby improving opportunities for colonization to the Gill Creek, Roaring Creek, and Coulter Creek habitat complexes. During summer, fall, and winter flows the B+ connection will function as an outlet essentially providing a direct connection between Gill Creek and Nason Creek near the historic (pre-railroad) confluence.

B. Has any part of this project been previously reviewed or funded by the SRFB?

CCNRD has received two separate SRFB grants for early parts of this project. The first SRFB grant, *BNSF Railroad and Wenatchee Basin Coordination* (07-1885), funded early discussions with BNSF Railways to explore the feasibility of project construction and provide BNSF with general project concepts and an explanation of project priorities in Nason Creek to support the project need. The second grant, *Nason Creek LWP Floodplain Reconnection Assessment* (09-1472), was used to conduct the initial alternatives analysis for project design and was completed last year.

2. Salmon Recovery Context

A. Describe the fish resources present at the site and targeted by this project.

Nason Creek is a Category 2 watershed in the Wenatchee Subbasin, which contains major spawning areas for ESA listed spring Chinook salmon and steelhead and is a bull trout core area (UCRTT 2007). The Nason Creek drainage supports the second strongest population of spawning spring Chinook in the Wenatchee subbasin (Andonaegui, 2001). Spring Chinook salmon spawning occurs from mid-August through mid-September, with the majority of spring Chinook redds located in the lower 15.8 river miles. A 2005 survey identified 186 redds in Nason Creek. Eggs remain in the gravel until hatching in December, and fry emerge in January/February. Juveniles spend about 1 year in fresh water before smolting and ocean emigration between April and June (Raekes 2008).

Steelhead enters and begin to ascend the Columbia River in June and July. Upstream migration near the Wenatchee River peaks in early September; most adult steelhead have moved into tributary streams by November. Steelhead spawning occurs from March through May. Nason Creek steelhead counts averaged 152 redds per year from 2001 to 2005. Juvenile rearing lasts about 2 to 7 years prior to ocean emigration (Raekes 2008).

Bull trout typically overwinter from December to May and migrate upstream to spawning grounds from May to mid-October, and adult bull trout migrate back to overwintering habitat from October to December. The Nason Creek bull trout population is depressed and typically has less than 15 redds each year. Spawning occurs within the upper reaches of the watershed, but not at the project reach (Raekes 2008).

Species	Life History Present in Nason Mainstem	Current Population Trend	ESA Coverage (Y/N)	Life History Target (egg, juvenile, adult)
Spring Chinook	Juveniles, Adult	Declining	Y	Juvenile
Steelhead/ Rainbow	Juveniles, Adult	Declining	Y	Egg, Juvenile, Adult
Sockeye	Adult	Stable	N	
Bull Trout	Juveniles, Adult	Declining	Y	Juvenile, Adult
Coho	Juveniles, Adult	Rising	N	Juvenile, Adult

B. Describe the nature, source, and extent of the problem that the project will address.

Ecosystem processes in Nason Creek from the confluence with the Wenatchee up to RM 14.3 and especially the Lower White Pine reach (RM 9.42 – 11.55) are in a degraded state as a result of the

removal of the floodplain and aquatic habitats by the BNSF Railroad grade and Highway 2 and the hardening of the banks with riprap (USBR 2009). These features have disconnected approximately 385 acres (41%) of the total floodplain area between river miles 4.5 and 14.3 on Nason Creek (USBR 2008). This has resulted in channel straightening and relocation which has reduced the reach length by 29% (USBR 2009). The BNSF railroad grade prevents channel migration and hydraulic connectivity into this historic floodplain which has resulted in the loss of habitat, and impoundment of runoff and groundwater.

Due to landowner constraints and the existing conditions created by the long-term impoundment of the Coulter, Roaring, and Gill Creek tributaries, a complete restoration of habitat forming processes is not possible at this location. The Design Team consisting of Bureau of Reclamation staff, consultants, and local agency representatives have adjusted the scope of the project to reconnect this historically disconnected habitat while not adversely impacting the 70 separate landowners (most of which own waterfront) and the BNSF Railroad. With that in mind, the project objectives are focused on providing the best access possible for a variety of salmonids and their life stages to this highly functional, nutrient rich, off-channel, and floodplain habitat.

C. Discuss how this project fits within your regional recovery plan or local lead entity strategy to restore or protect salmonid habitat in the watershed

Restoration of Nason Creek habitat is identified the top priority for implementation of habitat actions in the Wenatchee Basin as prioritized by the Upper Columbia Regional Technical Team (UCRTT 2009) and as in the Upper Columbia Salmon Recovery Plan (UCSRB 2007). This project will lead to the reconnection of off-channel habitats and floodplains on Nason Creek. Within Nason Creek, side-channel and/or off-channel reconnection is a Tier 1 Action (Implementation Schedule Action ID NC-1880) and top priority for addressing limiting habitat factors and the recovery and long-term viability of salmonids in Nason Creek (UCRTT 2008, UCSRB 2007). This project will directly benefit ESA-listed spring Chinook salmon, steelhead, and bull trout. These projects sites are identified in the Wenatchee Watershed Implementation Schedule as NC-1887 and NC 1888.

D. Describe the consequences of not conducting this project at this time. Consider the current level and imminence of risk to habitat in your discussion.

This type of action is the highest priority recommended for Nason Creek and is recommended to occur first before other types of actions such as instream projects. If this project is not implemented now, then lower priority projects will move forward without an understanding of how Nason Creek will respond to this large project. Implementing the upstream connection at the same time as the downstream connection maximizes design, permitting and construction efficiencies. If we come back to implement the upstream connection at a later date, we will incur significant additional costs.

Discussions with BNSF Railways has progressed from initial project feasibility in 2007 to a BNSF Engineering review process of designs (submitted in June 2011). The direction from them has been that construction needs to occur in 2012 to fit into an appropriate work window. Since the downstream connection is funded and planned for 2012 and a greater biological benefit can be achieved with the B+ connection, it's important to pursue both connections at the same time. The opportunity to do this work with the railroad exists now, along with a funding commitment from the Bureau of Reclamation to complete design and permitting and it's unknown if these will exist again in the future. If B+ is not constructed now, along with the downstream connection, the fish use and access of the wetland habitat may not be maximized.

3. Project Design
    A. Provide a detailed description of the project size, scope, design, and how it will address the problem described in Section 2B. Describe specific restoration methods and design elements you plan to employ.

In March 2011 the Design Team recommended that the preferred alternative is the installation of bridge structures (89-foot span) within the BNSF railroad prism at both the downstream location and at an upstream location referred to as B+.

1) B+ Connection - 89' bridge and expansion support piers at the upstream end of the project with connector channel (as proposed in this application); and
2) Downstream Connection - 89' bridge and expansion support piers at the downstream end of the project (funded for construction).

Reclamation has completed conceptual designs for the preferred alternative and CCNRD/ICF submitted those concepts to BNSF for review in June 2011(see Appendix E). These design concepts deviate from the below referenced BNSF Guidelines for Grade Separation by proposing to build single-track bridges to service existing conditions and constructing bridges without permanent access roads. BNSF representatives have outlined specific needs for the development of designs with BNSF which must adhere to the 2007 BNSF-UP Guidelines for Railroad Grade Separation Projects (BNSF 2007). This includes the bridge structure details, allowing for construction and ongoing maintenance access, and providing parallel bridge piers to allow for future track expansion. Following the development of the concept plans, engineering and design work will be completed at 30%, 60%, and 100% stages per BNSF requirements for their review and approval (see Timeline Appendix H).

Based on the matrix evaluation (Appendix B) the combination of the B+ and downstream alternative would provide the following metrics:

- Hydraulic reconnection of 148 acres of Category 1 wetland.
- Hydraulic reconnection of the Coulter, Roaring, Gill, and Knutson Creek basins. Accounting for a reconnection of 14.9% of the Upper Nason Creek Basin.
- Fish access to 83.1 acres of high flow and 6.8 acres of low flow rearing and refuge habitat.
- Steelhead access to 1 mile of lower Coulter Creek (proposal is currently being submitted to replace passage barrier).
- Steelhead and Chinook access to 0.75 mile of lower Roaring Creek.

The B+ connection will be designed to provide inflows during typical annual high flow spring events. This connection will allow access to the oxbow by juvenile spring Chinook, steelhead, coho and bull trout (plus other species) and will also be utilized by adults for refuge and possible spawning. Adult steelhead have the highest probability to spawn in the tributaries and will have greatly improved access to the Coulter, Roaring, Gill, and Knutson Creek. Flows from the mainstem Nason Creek are expected to enter the system, functioning as an inlet, during occasional high spring and fall events. A better estimate of how often the inlet conditions will occur will be known when hydraulic modeling is completed by the Bureau of Reclamation and ICF in late July 2011. These occasional inlet flows will greatly improve access to the oxbow by juveniles who are flushed into the system during high spring flows and fall freshet flows (see hydrograph Appendix B).

B. If restoration will occur in phases, explain individual sequencing steps, and which of these steps is included in this application.

Phasing of construction work will depend on BNSF scheduling requirements. Currently, CCNRD is operating under BNSF direction that 2012 is preferred for grade separation tasks (bridge construction). Details of construction steps will become clear during the review process.

This application specifically addresses construction associated with the grade separation work (bridges, access improvements, connector channel work, etc.). A separate effort is underway to obtain funding for design, permitting and construction of a weir/s or roughened channel structure to elevate the bed of Nason Creek adjacent to the proposed inlet at B+. A request for funding will be submitted to the Priest Rapids Coordinating Committee (PRCC) to fund this effort as well as a portion of the B+ Bridge.

Design work on the bed elevation structure will proceed as soon as funding has been obtained. Completed hydraulic modeling will inform that design process. If design and permitting processes are able to proceed rapidly, it is possible that this work could occur in 2012, but it might be preferable to wait until the B+ connection is completed and observed through different flow regimes before completing design and implementing this structure.

C. Describe the long-term stewardship and maintenance obligations for the project or acquired land.

Monitoring Plan
The Monitoring and Data Management Committee (MaDMC) developed a framework for monitoring and evaluation of Nason Creek habitat restoration projects with the goal of assisting funders, managers, RTT, and others in understanding the impacts of implementation of large-scale habitat restoration projects in Nason Creek, and increase understanding of adaptive management needs for similar projects in the future and in other places. In the February 14, 2011 MaDMC Technical Memorandum it states the monitoring objectives are to:

1. Determine the effectiveness of Nason Creek restoration projects
    - Determine the fish (local and spawning aggregate (MaSA)) response to Nason Creek projects
    - Determine the habitat (local and reach) response to Nason Creek projects
2. Capture/document adaptive management lessons learned for implementation of large projects

CCNRD in cooperation with the US Forest Service has developed a draft project effectiveness monitoring plan for the LWP project area. This plan will be coordinated with existing (and approved) programs and use the objectives and indicators from the MaDMC framework.

Pre-construction data collection has begun, including existing habitat conditions, fish densities in Nason, Roaring, Coulter and Gill Creeks, hydrology, water surface elevations and water temperature.

Long-term Stewardship and Maintenance
A Construction and Maintenance (C&M) Agreement will be negotiated between the BNSF Railroad, the project sponsor and project funders that addresses all the duties and responsibilities of each party regarding the construction of the proposed project and the maintenance requirements after construction of the structures. Projects of this size and scope are covered under the “Guidelines for

Railroad Grade Separation Projects" that includes the policies, requirements and standards for the design and construction of this type of project. Under the guidelines it states "The Applicant, at its expense, shall be solely responsible for all costs, design, construction, future replacement, maintenance and serviceability of the proposed Grade Separation Project, except as noted otherwise in the C & M". The guidelines also state "The Applicant shall own, maintain and replace the proposed Underpass Structure at no cost to the Railroad and with no interruption to Railroad operations during construction, maintenance and future replacement of the Underpass Structure. The Railroad shall, at its own expense, be responsible for ownership and maintenance of track components only". BNSF is currently considering site- and area-specific factors to determine if they warrant deviation from the guidelines for grade separation projects; however, it must be emphasized that exceptions to standard guidelines are only granted under special conditions.

4. Project Development
    A. Explain how the project's cost estimates were determined.

The cost proposal reflects an 89' span bridge with bridge abutments to allow for future BNSF prism expansion. The costs also assume only a short connection channel will be needed to connect the bridge opening to existing channel habitats. BNSF maintenance and replacement fees are also assumed costs based on BNSF guidance. The construction costs are based on engineers estimates of time and materials to construct the conceptual plan using rates typical to bids for similar local projects from 2008 – 2010, and professional engineers estimate of bridge construction costs.
BNSF Railway has been clear since the beginning that all projects must comply with their guidelines. These guidelines explicitly require that a project of this type must 1) allow for track expansion (second set of bridge abutments), 2) provide for catastrophic failure of the bridge with replacement and 3) provide for long-term maintenance of the structures (BNSF 2007). CCNRD is currently discussing with BNSF the possibility of deviating from these guidelines and included this deviation in the June 2011 Design Concept Submittal. Implementation of this project, and thus any realized biological benefit, relies on the details of the Construction and Maintenance Agreement currently being negotiated with BNSF Railway and therefore all elements of that agreement will be considered part of the full project.

    B. Describe other approaches, opportunities, and design alternatives that were considered to achieve the project's objectives.

- Since 2007, Nason Creek has been the focus of the U.S. Bureau of Reclamation's technical work in the Wenatchee Watershed, which included the completion of the U.S. Bureau of Reclamation's Nason Creek Tributary Assessment (2008) and Lower White Pine Reach Assessment (2009).
- Near the completion of the Tributary Assessment, the Wenatchee Habitat Subcommittee recognized this project opportunity as having the greatest biological benefit within Nason Creek and that implementation would be complicated with the involvement of the railroad. CCNRD began discussions with BNSF Railway at that time to determine implementation feasibility.
- CCNRD has focused on coordination efforts with the BNSF Railway, United State Forest Service (USFS) and over 70 total landowners and stakeholders. Stakeholders that have ownership or Right-of-Way within the project area include the Bonneville Power Administration, the Yakama Nation, US Forest Service, and multiple private landowners. CCNRD contacted affected landowners and has held public meetings in June of 2010 and May 2011 to discuss the project and possible landowner concerns where landowners provided considerable input to the project.

- CCNRD convened a Design Team of engineers, biologists, restoration ecologists and others to develop alternatives in the spring of 2010.
- A Coordination Team was also convened in 2010 to address project funding, long-term monitoring and maintenance responsibilities, and project partner roles due to the complexity of the project. This team consists of CCNRD, Reclamation, the Bonneville Power Administration (BPA), the Yakama Nation, PRCC and the Upper Columbia Salmon Recovery Board. The Yakama Nation and BPA are the construction funding partners and BPA has taken the lead federal agency role.

Summary of Alternatives Analysis
The CCNRD conducted an initial alternatives analysis in the spring of 2010 in coordination with the Design Team. This analysis evaluated seven alternatives ranging from full channel reconnection to a downstream only connection (ICF 2010). The preferred alternative was identified as having an upstream and downstream connection with openings allowing less than 20% diversion of flows into the disconnected area. This alternative provided the greatest hydraulic and fish access reconnection while meeting project sideboards established by adjacent landowners and BNSF and the goals of the Design Team.

Beginning in the summer of 2010 Reclamation continued the analysis of the preferred alternative to refine the connection locations and opening sizes. This effort resulted in selecting the downstream bridge to be constructed to replace the existing blocked culverts.

No Action
As shown in the Biological Benefits Matrix (Appendix B) a No Action alternative will result in the continued disconnection of aquatic habitats that could provide off-channel juvenile rearing and foraging habitat (currently a limiting factor for salmonids), and the continued disconnection of basins associated with Coulter, Roaring, Gill, and Knutson Creeks.

Downstream Only
A downstream only connection would primarily provide adult steelhead spawning access to the Coulter and Roaring Creek drainages and subsequent rearing habitat for juvenile steelhead. Due to the steep gradient between Nason Creek and the wetland complex at the downstream connection point, use of this upstream habitat by main-stem spring Chinook or steelhead juveniles is expected to be low.

Selection of the B+ Upstream Connection Location
The upstream effort analyzed five potential connection points at locations F+, E, C, A and B+ (see Alternatives Matrix and Map in Appendix C). In March 2011, the Design Team reviewed all locations selected the B+ connection as the preferred location for the upstream connection.
F+: This site provided a good attraction area on the creek side but included a long channel to connect to the oxbow habitat. The elevation difference between the oxbow habitat and the creek was the greatest of all the potential connections and would require the most grade change work (e.g., step pools, riffles) to connect. There would never be flow into the oxbow from Nason Creek, only flow out. There was a lot of concern that with this length of channel and grade change the beavers would likely block the excavated channel. Also this location has the smallest amount of tributary flow from the south hillside so the flow going out would be very small to nonexistent during summer and fall months.
E: This site was considered to have poor attraction/access on the creek side because it is at a fast flowing area and fish were likely to go by the entrance without the opportunity to enter. The elevation difference between the creek water surface and oxbow water surface were great enough to

preclude flow from the creek entering the oxbow except at the largest of flooding events, such as the 100-year flood.
C: This site had mixed attraction on the creek side, considered good during high spring runoff and flood events but very poor during normal summer, fall, winter, and early spring flows. This site also had an elevation difference between the creek and oxbow that never allowed flow to enter the oxbow from the creek.
A: This site was considered to have poor attraction/access on the creek side for the same reasons as "E". Advantages were that it reconnected the oxbow to the creek at the historic location of the Nason Creek channel, and there was substantial flow from the tributaries contributing (flowing out) throughout most of the year. The main issue with this site was based on construction and maintenance feasibility due to the proximity of overhead BPA electrical transmission lines.
B+: The main reasons for selecting B+ are that the creek side attraction is considered very good and it is possible to get flow from the creek to enter into the oxbow. Construction of the bridge or culvert is near but not directly under the BPA lines so cranes can be used for the structure, excavators will have to work under the BPA lines to create the connector channel but they will be small enough to have sufficient clearance.
Biologically, The B+ connection will provide a higher likelihood of recruiting spring Chinook juveniles to the overall wetland complex during annual spring flows. Most importantly, the B+ proximity to the Roaring Creek complex will allow fish and flows to enter the complex from upstream above beaver dams, thereby greatly improving juvenile rearing access to the largest habitat complex.

C. Have members of the community, recreational user groups, adjacent landowners, or others been contacted about this project? Describe any concerns about the project raised from these contacts and how those concerns were or will be addressed.

There are over 70 private landowners adjacent to this project location on both the oxbow (south) side of the railroad and along the Nason Creek corridor (north side of the railroad). Other adjacent landowners include the US Forest Service, Grant County PUD and the Yakama Nation. Discussions with all landowners began in the spring of 2010 with individual phone calls, emails and on-site meetings. Information about the project was mailed to all landowners and a public meeting was held in June 2010 to discuss landowner concerns. An update on project development was sent to landowners in January of 2011 and a second public meeting was help in May, 2011. Individual communication with landowners has been ongoing.

Initial landowner concerns were focused on dewatering of Nason Creek and the flooded historic channels based on summer use of waterfront, wildlife use of wetlands and potential property values. In addition, landowners have raised other concerns about increased erosion to stream banks, existing erosion issues, potential increases in downstream flooding (opening in reservoir), high cost of project, groundwater well impacts, intakes for proposed Grant County PUD hatchery, and loss of property rights due to introduction of ESA species.

The project sponsor and Design Team have incorporated these concerns into the Alternatives Evaluation and the current proposed design evolved based on many of those concerns. Project engineers will continue to address these issues in the design process. This is a complex system with current hydrology being influenced by a 100 year old dike (BNSF RR) and an extensive complex of beaver dams. Contingencies will need to be developed for post-construction issues that could arise with landowners as well as BNSF.

With all those concerns in mind, local landowner support is strong for the project. Landowners along the historic channel realize the habitat value of their property and are excited to participate in a project of this magnitude.

D. List all landowner names. Include a signed Landowner Acknowledgement Form

BNSF is the landowner and has signed a "Railroad Right-of-Entry Agreement-#10-40254" with CCNRD. This landowner agreement between BNSF Railroad and CCNRD allows access to Railroad property for pre-construction geotechnical explorations and other necessary work.

E. Describe your experience managing this type of project.

Chelan County Natural Resource Department is the project lead sponsor and has been responsible for managing numerous habitat restoration projects in the Wenatchee and Entiat subbasins including managing the design process, advertising and selecting a construction contractor, construction inspection, and pre/post project monitoring. Mike Kane and MaryJo Sanborn from the CCNRD will be the primary contacts during design, contractor selection, and construction.

Chelan County Natural Resource Department has been managing large habitat restoration projects in the Upper Columbia on private and public land and within WSDOT Right of Way since 2005. Recent projects completed as an example of this included the Nason Oxbow Reconnection in 2007 which involved closing SR 207 for 4 days to install large culverts to connect the historic channel with Nason Creek. In 2009, Chelan County NRD worked with 17 different landowners to replace 17 culverts on private and public land with bridges in the Chumstick drainage. Due to specific BNSF construction, insurance and contracting requirements, CCNRD is investigating several construction management approaches including using BPA's list of qualified construction managers to facilitate managing this project.

5. Tasks and Schedule

See Appendix H

6. Constraints and Uncertainties

- Hydraulic Modeling still needs to be completed to determine when flows will enter the oxbow and if wetland characteristics will be altered by the new bridge opening.
- Uncertain how future beaver dam building will affect the designed hydraulics
- Subsurface geotechnical exploration and associated foundation design has not been completed·
- Construction window has not been established (in reference to when BNSF will allow track closures)
- BNSF consideration of site- and area-specific factors to determine if they warrant deviation from the guidelines for grade separation projects. Primarily the guideline "the sponsor shall shall own, maintain and replace the proposed Underpass Structure at no cost to the Railroad

and with no interruption to Railroad operations during construction, maintenance and future replacement of the Underpass Structure".

7. Detailed project cost estimate.

See Appendix G

Appendix A

Map of Lower White Pine Reconnection Project

Peak Migration

March = Steelhead Adults
March-June = Spring Chinook Fry/Parr
April/May = Coho Juveniles
June/July = Steelhead Fry
September = Spring Chinook Adults
September = Bull Trout Adults
October = Coho Adults

Bridge or Culvert Location Option
Constructed Channel
Tributaries
River Miles
BNSF Railway
Chinook Redds (USFS, 2007)
Beaver Dams
Wetland Boundary

N
0 250 500
Feet

Proposed B+ Connection

F+ Alt

Downstream Connection

Gill Creek Habitat Complex

Roaring Creek Habitat Complex

Roaring Creek Habitat Complex

Coulter Creek Habitat Complex

Gill Creek

Gill Creek

Shales Creek

Roaring Creek

Coulter Cr

11.1
11
10.9
10.8
10.5
10.4
10.3
10.2
9.9
9.8
9.7
9.6
9.5
9.4

Benefits of Reconection

- Project would significantly increase high flow refugia and juvenile rearing for ESA listed species. It would also add spawning habitat in the smaller tributaries.
- The project would result in the reconnection of 148 acres of wetland and historic floodplain.
- This reconnection of the historic floodplain would reduce the amount of currently disconnected floodplain in Lower Nason Creek (RM 4-14) by 45% (reconnecting 148 of the 369 disconnected acres).
- Project would reconnect 15% of the watershed back to Nason Creek (Gill, Roaring, and Coulter tributaries).

K:\Seattle\PROJECTS\Chelan_Co\LWP_Oxbow\Mapdocs\SRFB_Preproposal

ICF INTERNATIONAL

Proposed B+ Connection
Lower White Pine Reconnection Project

Appendix B

Biological Benefit Matrix
Hydrograph with Fish Usage

NASON CREEK LOWER WHITE PINE PROJECT

- Biological Benefit Metrics and Cost -

		COULTER CREEK HABITAT COMPLEX					ROARING CREEK HABITAT COMPLEX					GILL CREEK HABITAT COMPLEX							
		Juvenile Salmonid Rearing and Refuge Habitat		Juvenile and Adult Access to Tributaries	Wetland Reconnected to Nason Creek	Watershed Connection	Juvenile Salmonid Rearing and Refuge Habitat		Juvenile and Adult Access to Tributaries	Wetland Reconnected to Nason Creek	Watershed Connection	Juvenile Salmonid Rearing and Refuge Habitat		Juvenile and Adult Access to Tributaries		Watershed Connection 1,816 ac (2.6% of Upper Nason Basin)		Wetland Reconnected to Nason Creek	
CONSTRUCTION COST [1]	RAIL PRISM CONNECTION POINT [2]	Spring Flow (32.1 acres)	Low Flow (4 acres)	Coulter Creek (~1 mile) [4]	Category I [3] (54.3 acres)	Coulter Creek Basin (4% of Upper Nason Basin) (2,868 acres)	Spring Flow (42.7 acres)	Low Flow (2 acres)	Roaring Creek (~0.75 mile) [5]	Category I [3] (73.3 acres)	Roaring Creek Basin (8.3% of Upper Nason Basin) (5,900 acres)	Spring Flow (8.3 acres)	Low Flow (0.8 acre)	Gill Creek (0 mile) [5]	Knutson Creek (0 mile) [5]	Knutson Creek Basin (716 acres)	Gill Creek Basin (1,100 acres)	Category I [3] (21 acres)	Risk of Blockage [8]
NA	No Action [7]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	High
$2.7 Million	Downstream Only	3.0	2.5	3.0	3.0	3.0	2.5	1.5	2.5	2.5	2.5	1.0	0.0	0.5	0.5	1.0	1.0	1.0	Low
$5.0 Million	Downstream and B+ [6]	4.0	2.5	4.0	3.0	3.0	3.5	1.5	3.5	2.5	2.5	3.0	1.5	3.0	2.0	2.0	3.0	3.0	High
$5.2 Million	Downstream and F+	3.5	2.5	3.5	3.0	3.0	3.0	1.5	3.0	2.5	2.5	2.5	1.5	2.0	3.0	3.0	2.0	3.0	High
$7.2 Million	Downstream and F+ and B+	4.5	2.5	4.5	3.0	3.0	4.0	1.5	4.0	2.5	2.5	3.5	2.0	3.5	3.5	3.5	3.5	3.5	High

COST

CONNECTIVITY

- 4.0 - 5.0 High
- 2.5 - 3.9 Moderate
- 1.1 - 2.4 Low
- 0.0 - 1.0 Severely Limited

NOTES

1 ICF 2/16/2011. Includes replacment and maintenance fee. Assumes DS bridge, US culverts.
2 ICF 2/16/2011. Concept Plan.
3 Washington State Wetland Rating (Ecology 2004).
4 Steelhead intrinsic potential; No Chinook potential (ICTRT 2007).
5 Steelhead and Chinook intrinsic potential (ICTRT 2007).
6 Assumes B+ connection does not function as an inlet during spring events.
7 Score reflects minimal baseline connectivity.
8 Risk of beavers blocking the connection based on the amount of predicted seasonal flushing flows.

Biological Benefit Matrix

The following features are mapped within each complex:

- Juvenile salmonid rearing and refuge habitat
    - Spring Flow
    - Low Flow
- Juvenile and adult salmonid access to tributaries.
- Extent of wetland area.
- Extent of tributary basin area draining into the complex.

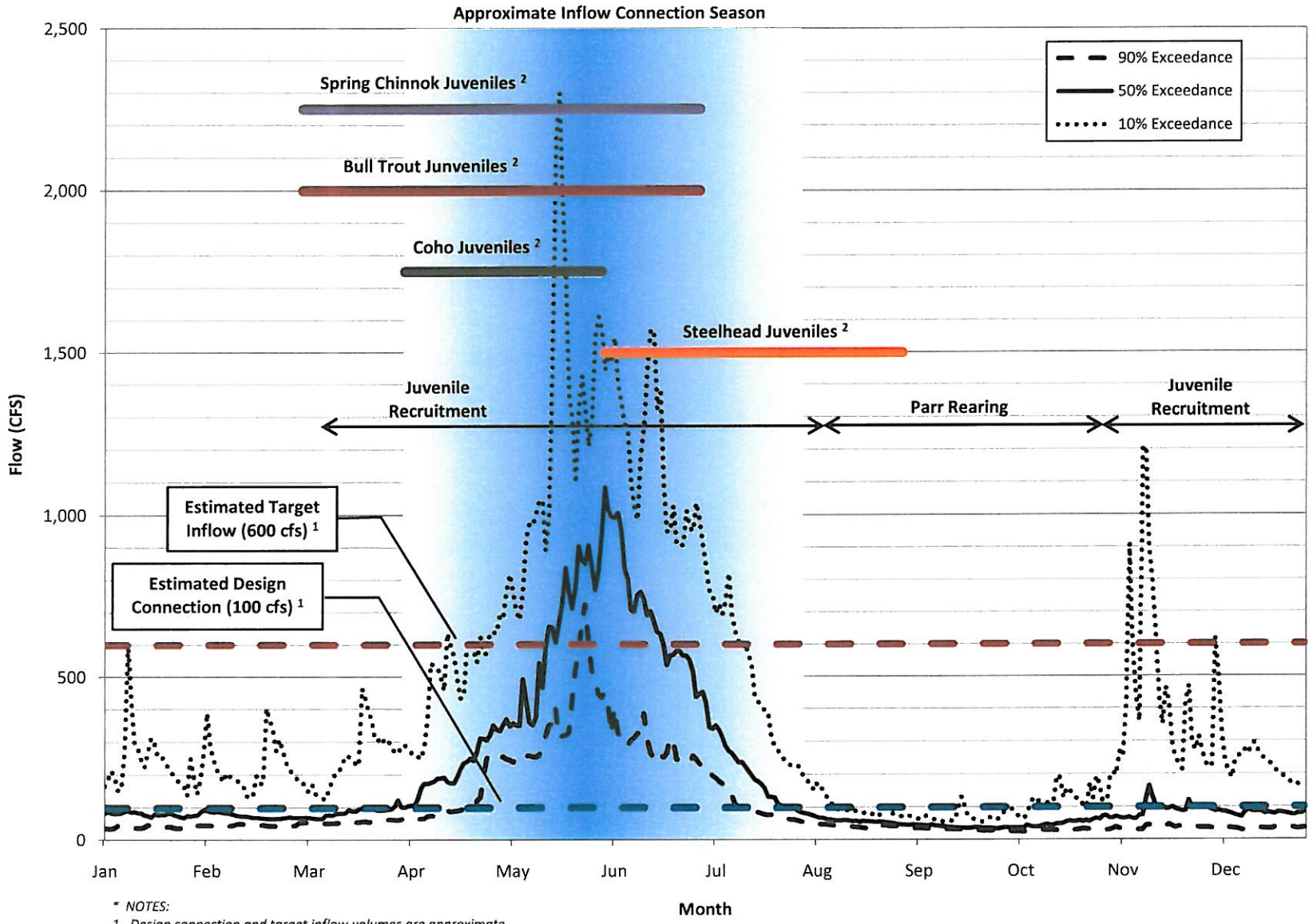
The spring and low flow habitat areas were mapped using aerial maps of spring and summer inundated areas supplemented with draft results from the 2D hydraulic model provided by Reclamation. The extent of tributary habitats was determined using steelhead and Chinook intrinsic potential maps (ICTRT 2007). Wetland boundaries were delineated by ICF in 2010, and the extent of tributary basin area was mapped using ArcGIS tools.

The main assumptions associated with the matrix evaluation are:

- Connectivity refers to hydraulic connectivity.
- Additional connections result in increased biological benefit across all habitat complexes.
- The Gill Creek and Knutson Creek currently have very little direct connectivity to Nason Creek.
- The existing culverts at the downstream end are 95% blocked and do not allow fish access.
- Low flow habitat across the project area is characterized by remnant and isolated pools.
- The Roaring Creek habitat complex is between proposed connections. That is why it scored lower on potential wetland and watershed connectivity than the Coulter or Gill creek complexes.
- F+ connectivity is primarily to areas above the B+ connection including the Knutson Creek confluence due to a large beaver dam located directly above the Gill Creek tributary confluence.
- B+ connectivity is primarily to areas below the Gill Creek confluence. which

The primary conclusions as shown in the matrix are:

- No action will result in continued disconnection of aquatic habitats and basins associated with Coulter, Roaring, Gill, and Knutson Creeks.
- A downstream only connection will primarily benefit Coulter Creek habitats, and would have very little benefit to the Gill Creek Habitat Complex.
- The B+ connection provides greater connectivity than the F+ connection.
- The B+ connection provides fish access and in-flows that will benefit the habitats associated with the Roaring Creek and Coulter Creek complexes.



* *NOTES:*

1. *Design connection and target inflow volumes are approximate. These values may be revised upon completion of hydraulic modelling.*
2. *Bands depict peak juvenile migration season by species.*

Mean Daily Flow and Juvenile Fish Usage, Upper Nason Creek
Lower White Pine Reconnection Project

Appendix C

Upstream Alternatives Map
Upstream Alternatives Matrix

B+ Potential Bridge

Nason Creek Lower White Pine Reconnection Project Alternatives Analysis

Upstream Connection Options Matrix

28-Jun-11

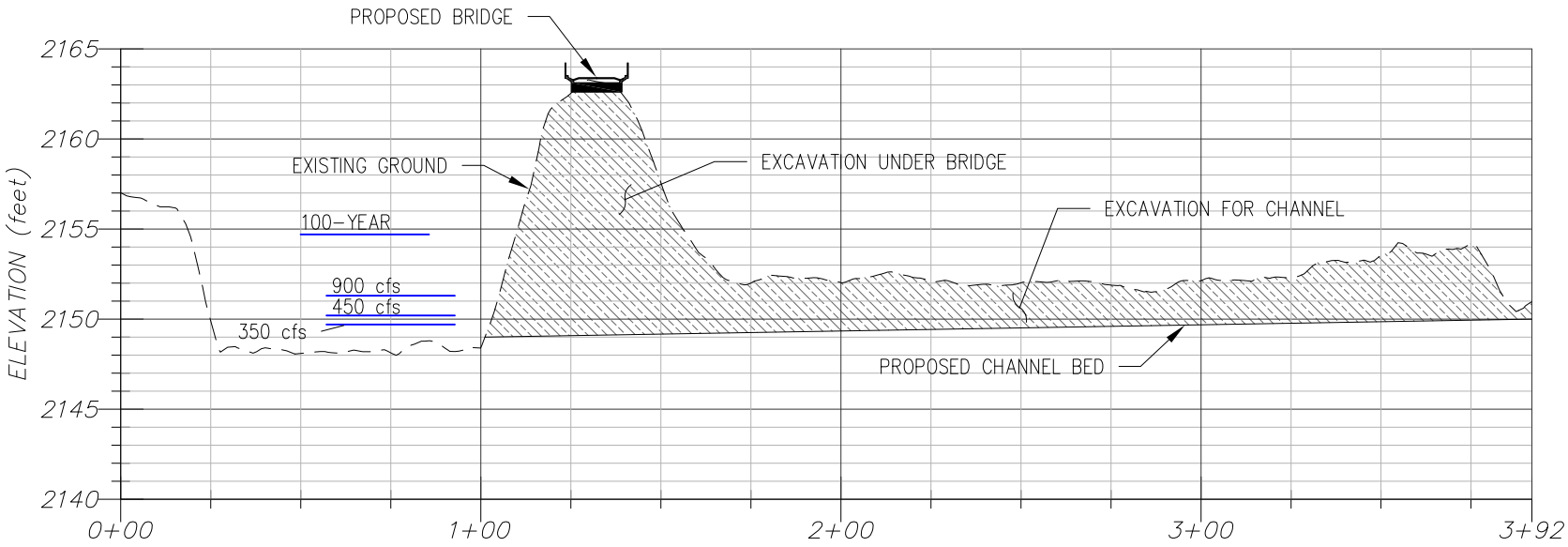
Connection Option	Hydraulic Connectivity			Fish Attraction and Passage	Impacts to Wetlands	Construction	Summary	
	Spring Flow Connectivity	*High Flow Connectivity*	*Low Flow Connectivity*	*Main channel fish attraction hydraulics and access to oxbow.*	*Overall*	*Construction Feasibility*	*Overall Advantages*	*Overall Disadvantages*
Connection @ Transect F+	**Moderate.** Requires excavation of the existing secondary channel to provide fish passable connection with the main channel, rating changes to **Low** if side channel excavation is not performed. Outflow only.	**Moderate.** Substantial flow from Knutson Creek will pass through proposed opening, Nason Creek flow inundates existing secondary channel on creek side. Outflow only.	**Low.** Excavation of existing secondary channel will be required to provide a fish passable connection, during Sept/Oct there is insufficient flow from Knutson Creek for a reliable connection. Outflow only.	**High.** A natural location on Nason Creek channel for juvenile fish usage, requires excavation of existing secondary channel for access at times less than 2-year peak, requires a long fishway/step pool channel into oxbow to maintain existing oxbow habitat.	**High.** Will impact over 1 acre of wetland during construction, may reduce area of ponding in oxbow after construction depending on final fishway layout.	**Moderate.** Requires longer culvert or bridge because there are two sets of tracks, large area of wetland impacts, excavation required on both sides of RR prism	Nason Creek side of connection at natural location for juvenile fish holding. Very good fish attraction and hydraulic connectivity if secondary channel excavation is performed. Partially reconnects Knutson Creek to Nason Creek.	Connection to oxbow will require extensive excavation in wetlands. No flushing inflows to downstream oxbow during high flow. Less reconnection of Knutson and Gill Creeks to Nason Creek than other options.
Connection @ Transect E	**Moderate.** About 10 cfs from Knutson and Gill Creeks pass through opening. Outflow only.	**High.** During 100-year peak, about 80 cfs passes from Nason Creek into oxbow, during 2-year peak about 20 cfs passes from oxbow to Nason Creek	**Moderate.**Directly connected to Nason Creek at all flows but insufficient flow during Sept/Oct from Knutson and Gill Creeks for usable fish passage. Outflow only.	**Low/Moderate.** Located on Nason Creek at a straight reach along riprap so there is high velocity, attraction could be improved by installing a structure in Nason Creek to create pool/eddy at the inlet. Good access once in opening, fishway is short and minimal elevation change.	**Low.** Less than 1/4 acre wetland impact during construction. Maintains wetland hydrology in oxbow after construction.	**Good.** Sufficient access and room for construction activities, minimal wetland excavation. Will require cofferdam in swift flow area of Nason Creek.	Provides flow connectivity to creek through maximum range of flows. Minimizes impacts to wetland or oxbow habitats during construction and ongoing. Only option that includes flusing inflows (only during very large floods). Reconnects Gill and Knutson Creek to Nason Creek during moderate floods and lower flows.	Poor mainstem fish attraction characteristics. Outflow only during targeted spring flows.

Connection @ Transect C	**Moderate.** No backwatering of proposed connection; fish will access connection through secondary channel along Nason Creek gravel bar conveying flows from oxbow. About 10 cfs from Knutson and Gill Creeks pass through opening. Outflow only.	**Moderate.** Opening backwatered from Nason Creek flows during 2-year peak and greater, also substantial flow from oxbow passing through opening. Outflow only.	**None.** Connection is to a portion of a gravel bar on Nason Creek that is higher than low flow channel, and during Sept/Oct there is insufficient flow from Knutson and Gill Creeks passing through opening to fill the secondary channel.	**Moderate.** Good attraction hydraulics provided by vegetated bar during high flows, natural location for juvenile fish to be at high flow. During flows less than 2-year peak requires fish to find the secondary channel discharge to gain oxbow access. No fishway is required with current design.	**Low to moderate.** Less than 1/4 acre wetland impact during construction. Slightly lowers wetland hydrology in oxbow after construction unless fishway is added.	**Good.** Sufficient access and room for construction activities, minimal wetland excavation. No cofferdam required on Nason Creek.	Connection behind vegetated bar creates good fish attraction and high flow connectivity. Minimal construction impacts to wetland habitats. Reconnects Gill and Knutson Creek to Nason Creek.	Poor flow connectivity during much of the year. Potential to drain significant area of existing wetland in oxbow. No flushing inflows to downstream oxbow during high flow.
Connection @ Transect B+	**High.** Gill and Knutson Creek will provide sustained outflow connectivity during spring flows. The amount of flushing inflow from Nason Creek will depend on final opening invert elevation and connector channel modifications.	**High.** High flow flows through proposed opening; connectivity to downstream oxbow will depend on connector channel design.	**Moderate.** Opening invert can be set to backwater during low flows. During Sept/Oct there is insufficient flow from Knutson and Gill Creeks to provide an effective connection into the oxbow. Outflow only.	**Moderate.** Located at tail end of vegetated gravel bar which should provide good fish attraction. Good access once in opening, minimal elevation change from opening to connector channel.	**Low to moderate.** Minimal wetland excavation required during construction, and maintains wetland hydrology within the oxbow after construction since it is located downstream of Gill Creek beaver dam impoundment.	**Moderate**. Located upstream of BPA powerlines which allows bridge construction if preferred. Can use existing BPA access corridor for construction. Minimal wetland excavation. Will require cofferdam in swift moving flow of Nason Creek	Provides flow connectivity to creek through maximum range of flows. Minimizes impacts to wetland or oxbow habitats during construction and ongoing. Reconnects Gill and Knutson Creek to Nason Creek during moderate floods and lower flows.	Connector channel excavation necessary to allow targeted spring flushing flows.

Connection @ Transect A	**High.** Gill and Knutson Creek will provide sustained outflow connectivity during spring flows. The amount of flushing inflow from Nason Creek will depend on final opening invert elevation and connector channel modifications.	**High.** High flow flows through proposed opening; connectivity to downstream oxbow will depend on connector channel design.	**Moderate.** Opening invert can be set to backwater during low flows. During Sept/Oct there is insufficient flow from Knutson and Gill Creeks to provide an effective connection into the oxbow. Outflow only.	**Low/Moderate.** Located on Nason Creek at a high velocity area, attraction could be improved by installing a structure in Nason Creek to create pool/eddy at the inlet. Good access once in opening, fishway is short and minimal elevation change.	**Low to moderate.** Minimal wetland excavation required during construction, and maintains wetland hydrology within the oxbow after construction.	**Moderate**. Poor location for construction access and BPA powerlines overhead limit construction options. Minimal wetland excavation. Will require cofferdam in swift moving flow of Nason Creek	Provides flow connectivity to creek through maximum range of flows. Minimizes impacts to wetland or oxbow habitats during construction and ongoing. Reconnects Gill and Knutson Creek to Nason Creek during moderate floods and lower flows.	Poor mainstem fish attraction characteristics. Poor area for construction. No flushing inflows to downstream oxbow during high flow.

Appendix D

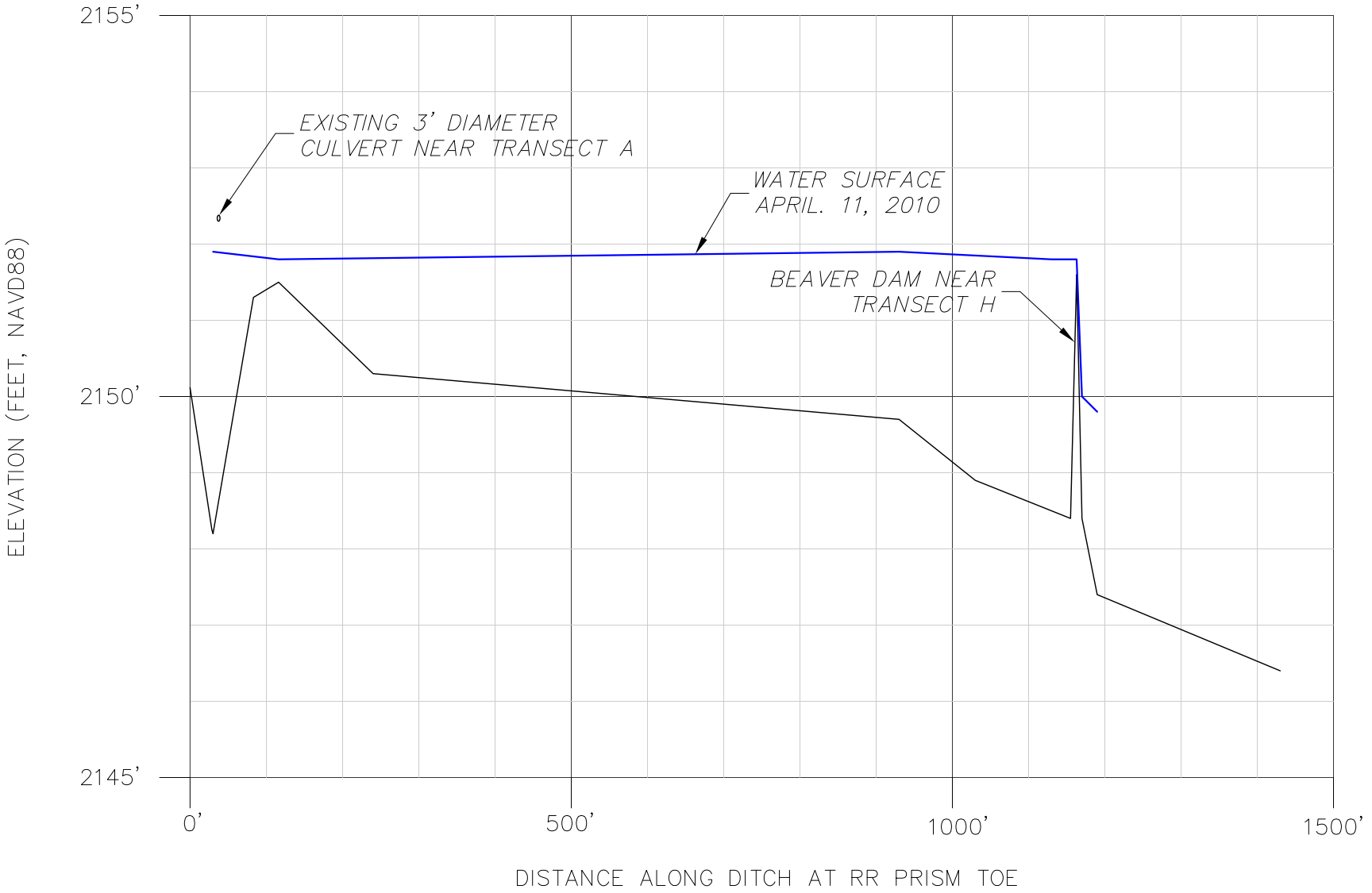
Channel Profiles



CONNECTION B+

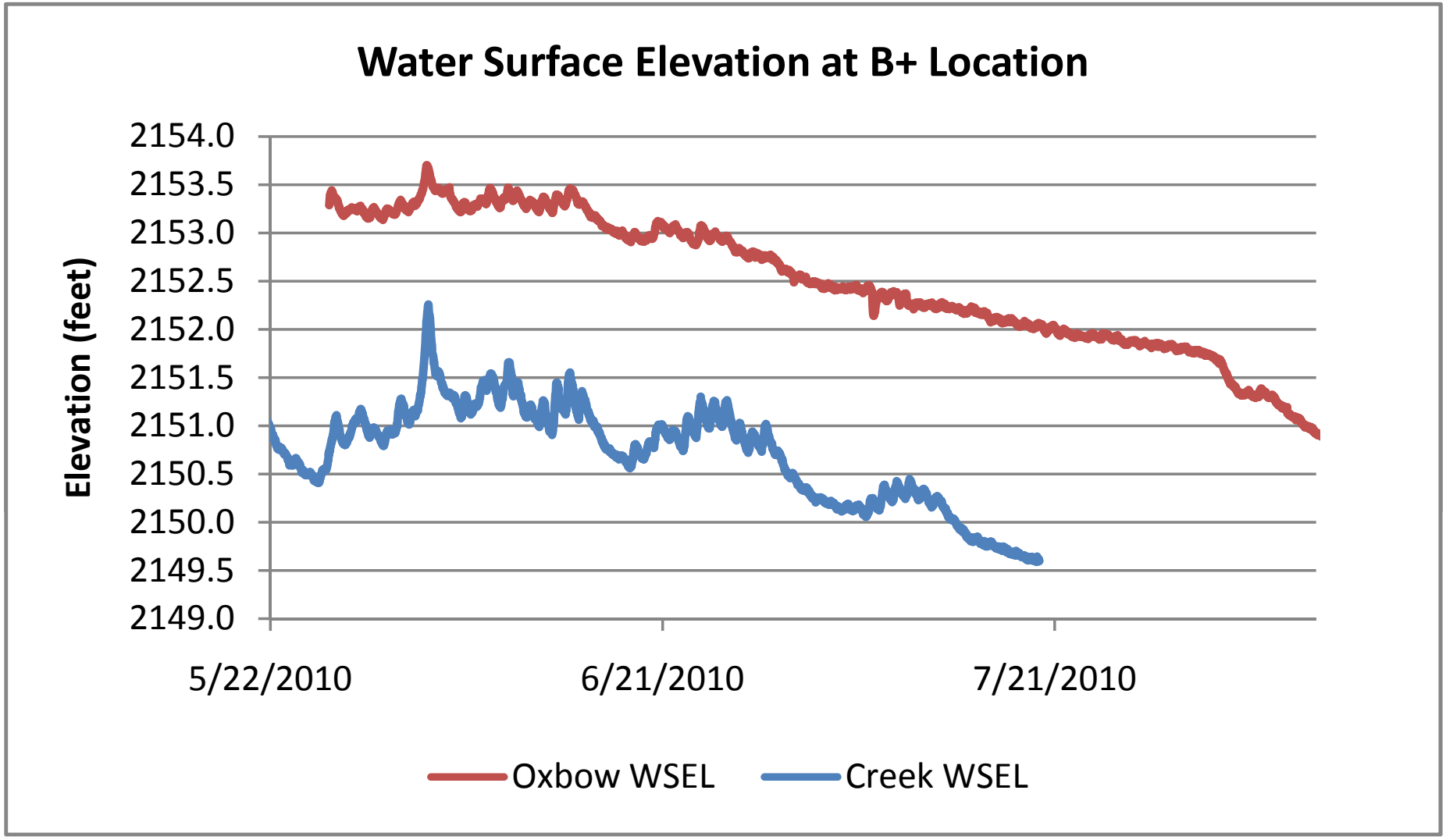
Channel Profile - B+ Alternative

Lower White Pine Oxbow Reconnection
May 2011



Channel Profile Along Toe of RR Prism - From 3' Culvert to Transect I

Lower White Pine Oxbow Reconnection
May 2011


Water Surface Elevation at B+ Location
Elevation (feet)
2154.0
2153.5
2153.0
2152.5
2152.0
2151.5
2151.0
2150.5
2150.0
2149.5
2149.0
5/22/2010
6/21/2010
7/21/2010
Oxbow WSEL
Creek WSEL

Appendix E

B+ Design Plans

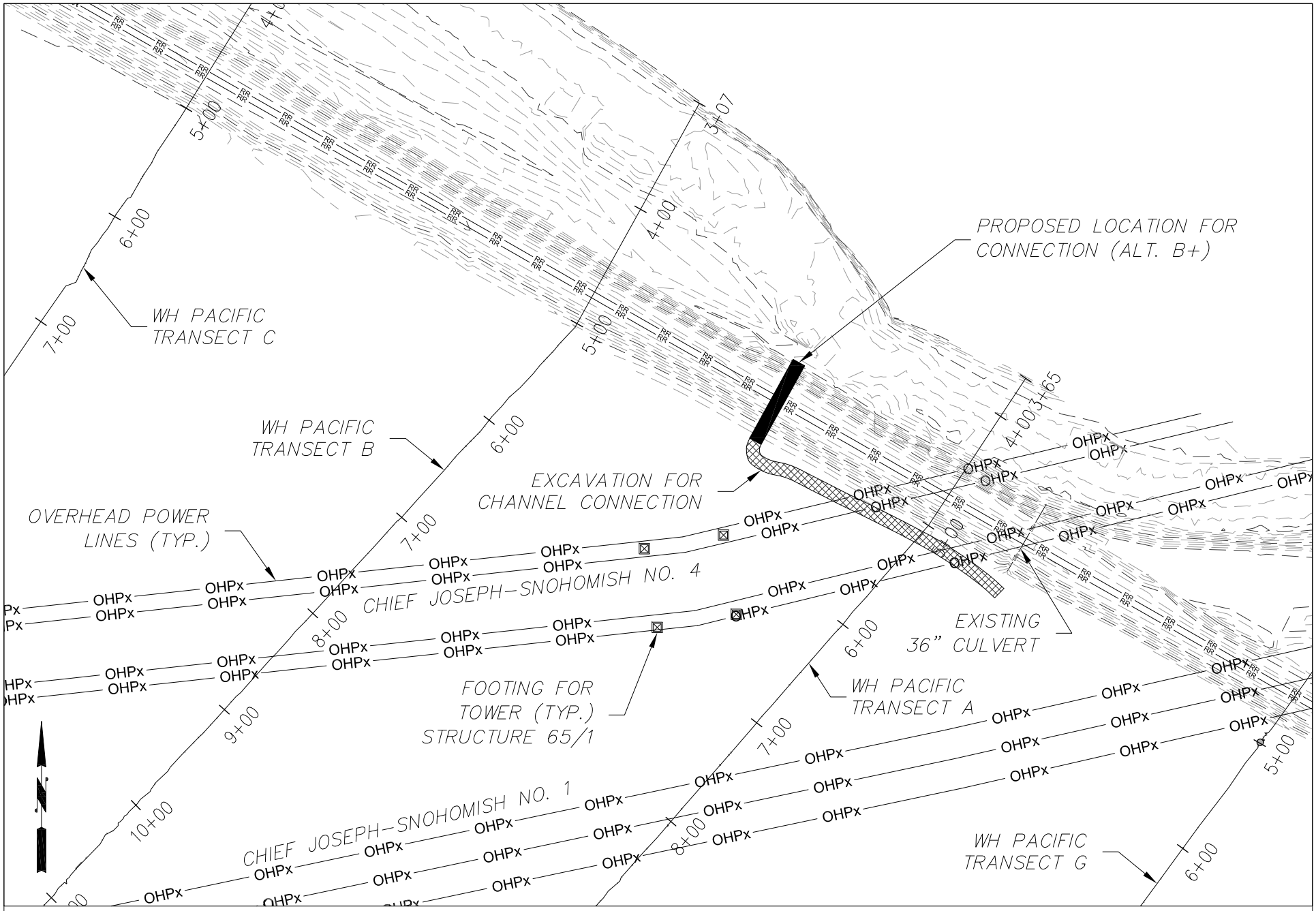


Figure 1. Upstream Oxbow/Creek Connection

Lower White Pine Oxbow Reconnection
February 2011

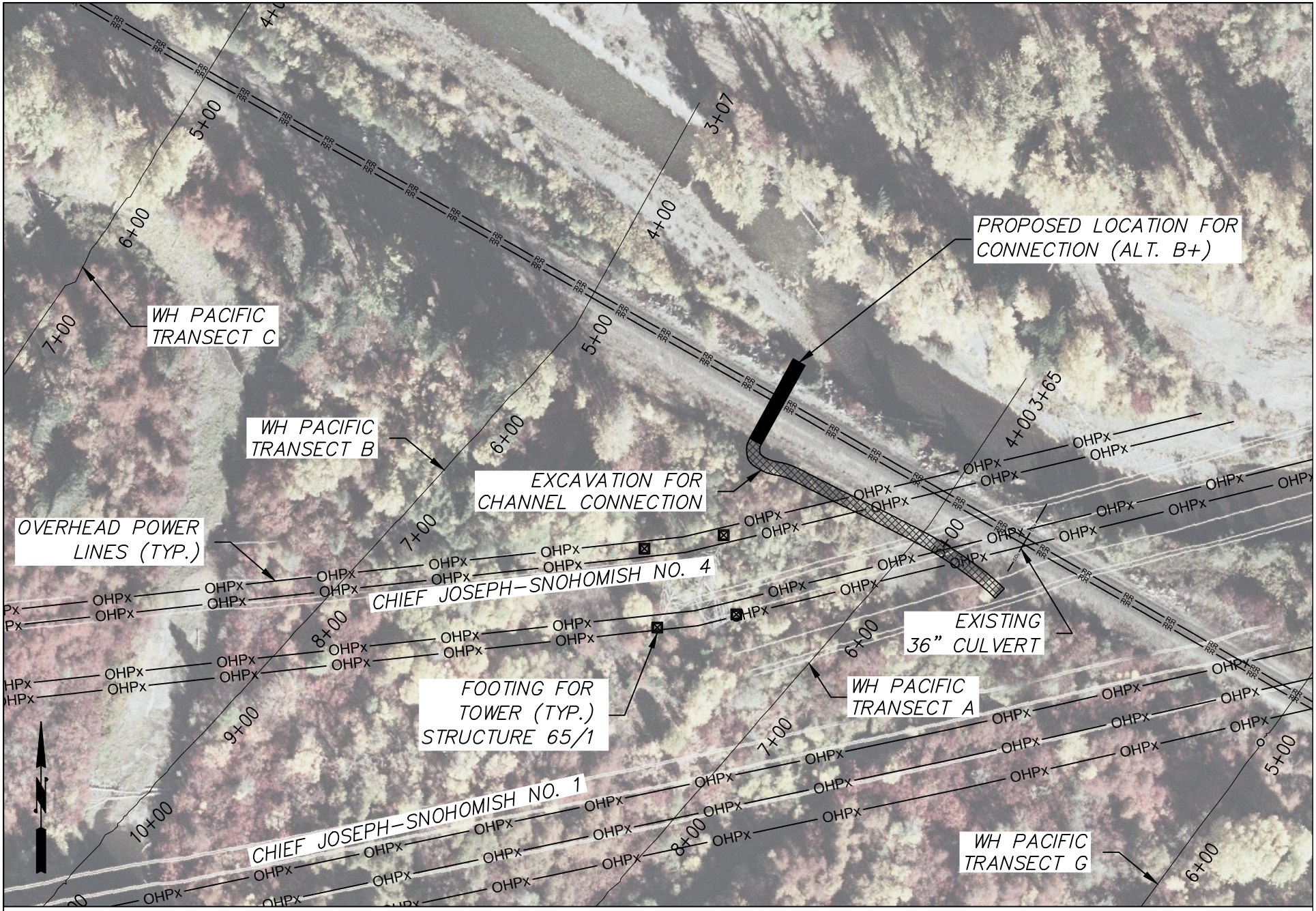


Figure 2. Upstream Oxbow/Creek Connection

Lower White Pine Oxbow Reconnection
February 2011

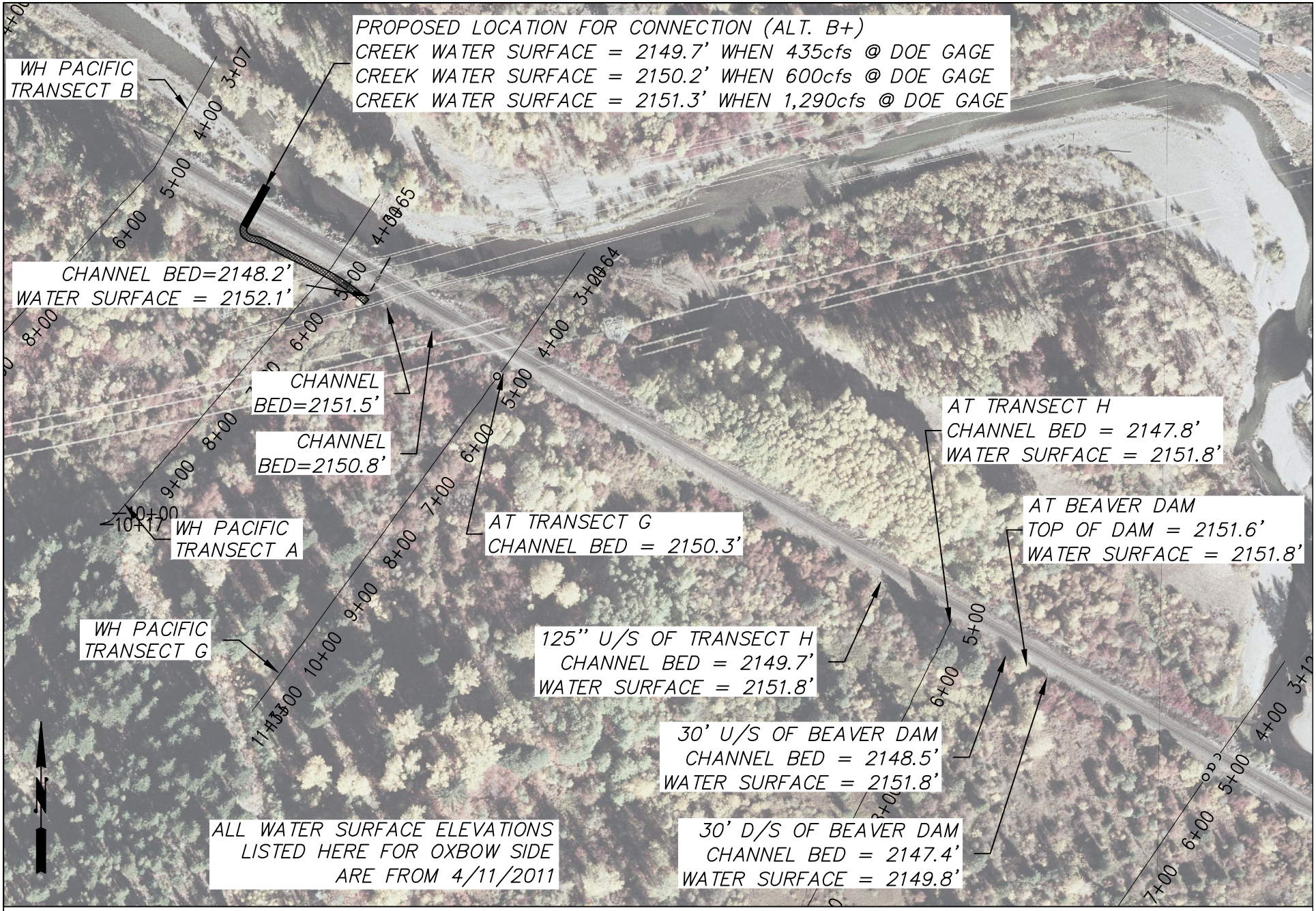


Figure 3. Upstream Oxbow/Creek Connection

Lower White Pine Oxbow Reconnection
April 2011

Appendix F

Photo Pages

Nason Creek Lower White Pine Oxbow Reconnection Project – B+ Photo Log

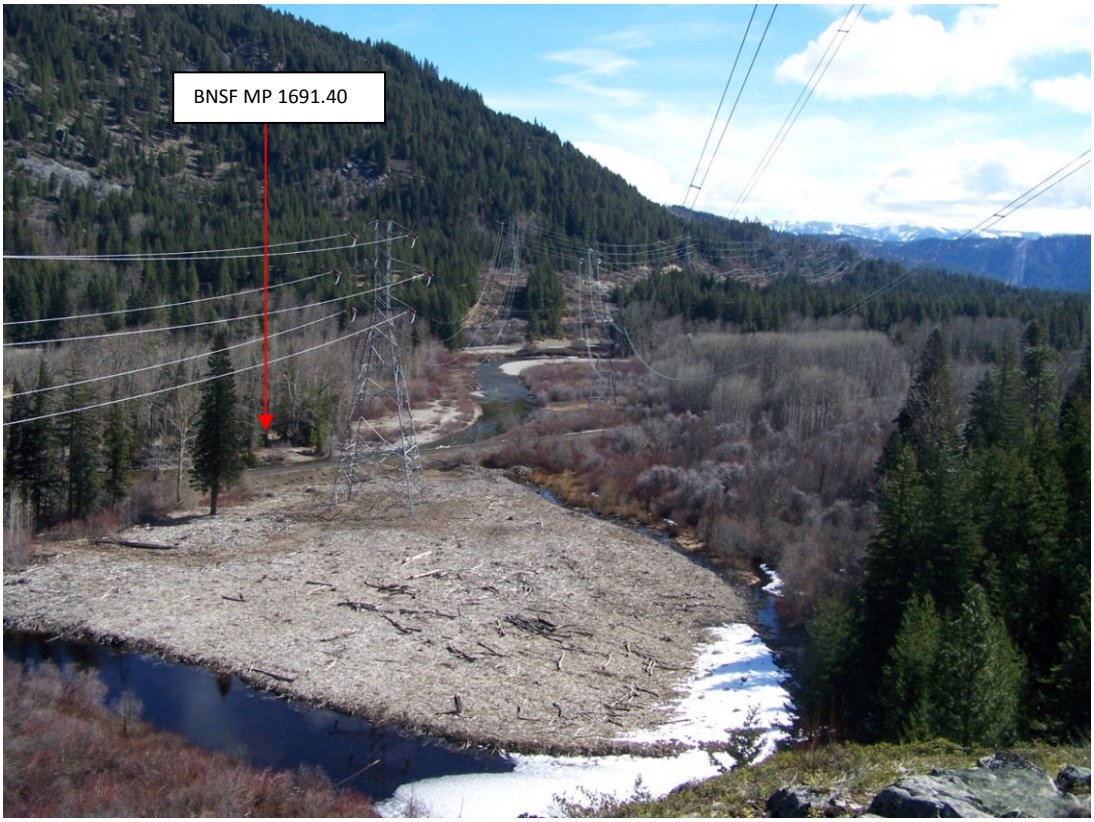


Photo 1. Upstream connection at BNSF MP 1691.40 facing northeast.

Photo 2. Upstream connection at BNSF MP 1691.40 facing northeast BPA lines.

Photo 3. Upstream connection at BNSF MP 1691.40 facing west on Nason Creek side.

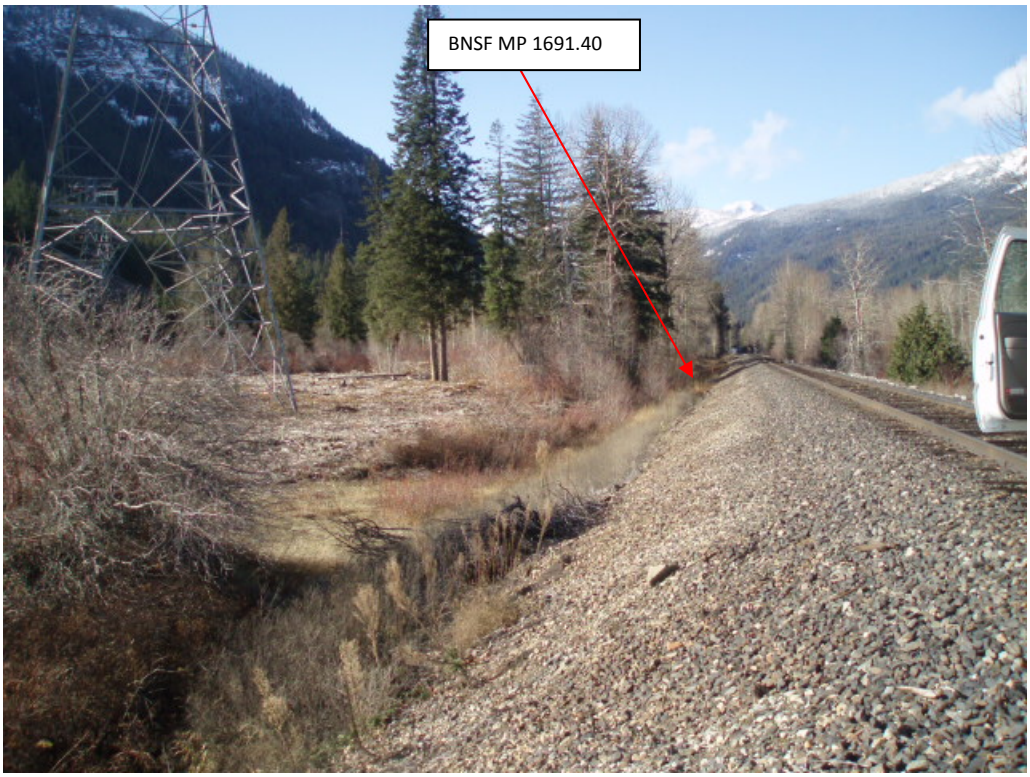


Photo 4. Upstream connection at BNSF MP 1691.40 facing west.

Photo 5. Upstream connection at BNSF MP 1691.35 facing north – existing culvert.

Photo 6. Upstream connection at BNSF MP 1691.35 facing east down rail from existing culvert - Connector Channel.

Photo 7. Upstream oxbow at BNSF MP 1691.40 facing northeast.

Appendix G

Budget Estimate

Nason Creek Lower White Pine, Chelan County, WA - Bridge Connection at B+

Construction Cost Estimates/Prepared by ICF Based on Conceptual Design 2/16/2011

Description	Units	Quantity	Unit Cost	Item Cost
Improvements to Access Road	Lump Sum	1	25,000	25,000
Bridge (active railroad line)	Each	1	385,000	385,000
Bridge (future expansion)[1]	Each	1	150,000	150,000
Railroad Track Work	Lump Sum	1	150,000	150,000
Excavate RR Embankment at Bridge	Cubic Yard	1300	25	32,500
Excavate Channel RR to Exist Channel	Cubic Yard	600	25	15,000
Riprap at Bridge Abutment Fill Slopes	Cubic Yard	250	75	18,750
Cofferdam & Dewatering	Lump Sum	1	10,000	10,000
Site Restoration (Planting, Seeding, etc.)	Lump Sum	1	20,000	20,000
Contractor Contingencies (15%)				120,938
Sales Tax (8.1%)				75,102
Contractor costs - includes labor, materials, mobilization to site, bid preparation work, pre-construction expenses, Spill Prevention and Control Plan, Temporary Erosion and Sediment Control plans preparation, bonding costs, compliance with prevailing wage rates, pre-bid walk through, hiring employees, purchasing materials.	Lump Sum	1	100,000	100,000
BNSF Flagger	Day	90	1,000	90,000
BNSF Bridge Replacement Fee	Lump Sum	1	800,000	800,000
BNSF Bridge Maintenance Fee	Lump Sum	1	100,000	100,000
Administration: Project management, contract oversite, public meetings, travel to project site, contract preparation, construction inspection, billing invoices, preparing as builts, substantial completion and final acceptance, contract closeout documentation. Coordination with BNFS, contractors, partners (USFS, YN, BPA), landowners, funders, and permit compliance.	Lump Sum	1	70,000	70,000
			Total =	**2,162,290**

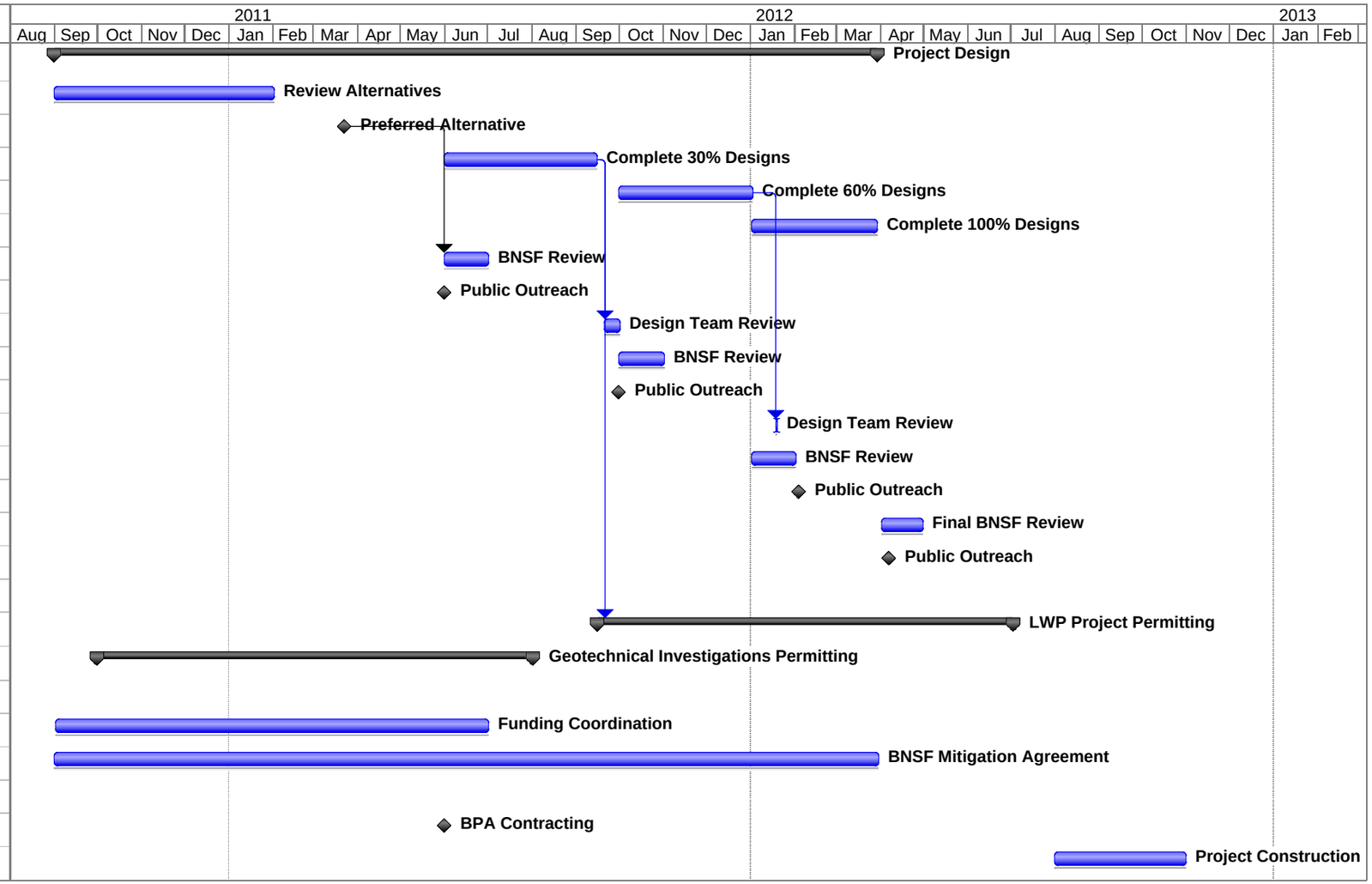
[1] Bridge Abutment/Piers Only

Appendix H

Project Timeline

Nason Creek Lower White Pine Reconnection Project Timeline

ID	Task Name	Start	Finish	Lead
1	**Project Design**	**Wed 9/1/10**	**Thu 3/29/12**	**Reclamation**
2	Review Alternatives	Wed 9/1/10	Tue 2/1/11	Design Team
3	*Preferred Alternative*	*Wed 3/23/11*	*Wed 3/23/11*	*Design Team*
4	Complete 30% Designs	Wed 6/1/11	Thu 9/15/11	Reclamation
5	Complete 60% Designs	Sat 10/1/11	Mon 1/2/12	Reclamation
6	Complete 100% Designs	Mon 1/2/12	Thu 3/29/12	Reclamation
7	BNSF Review	Wed 6/1/11	Fri 7/1/11	CCNRD
8	Public Outreach	Wed 6/1/11	Wed 6/1/11	CCNRD
9	Design Team Review	Wed 9/21/11	Sat 10/1/11	CCNRD
10	BNSF Review	Sat 10/1/11	Tue 11/1/11	CCNRD
11	Public Outreach	Sat 10/1/11	Sat 10/1/11	CCNRD
12	Design Team Review	Thu 1/19/12	Thu 1/19/12	CCNRD
13	BNSF Review	Mon 1/2/12	Wed 2/1/12	CCNRD
14	Public Outreach	Sat 2/4/12	Sat 2/4/12	CCNRD
15	Final BNSF Review	Mon 4/2/12	Mon 4/30/12	CCNRD
16	Public Outreach	Sat 4/7/12	Sat 4/7/12	CCNRD
17				
18	**LWP Project Permitting**	**Fri 9/16/11**	**Mon 7/2/12**	**Reclamation**
28	**Geotechnical Investigations**	**Fri 10/1/10**	**Mon 8/1/11**	**Reclamation**
37				
38	Funding Coordination	Thu 9/2/10	Fri 7/1/11	
39	BNSF Mitigation Agreement	Wed 9/1/10	Fri 3/30/12	CCNRD
40				
41	BPA Contracting	Wed 6/1/11	Wed 6/1/11	
42	**Project Construction**	Wed 8/1/12	Wed 10/31/12	CCNRD



Appendix I

Citations

CITATIONS

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