Connell Rail Interchange

On-Track For Growth!

EASTERN WASHINGTON'S HARVESTLAND

OPERATION

City of Connell

Connell Rail Interchange Study

Operating Basis of Design
Initial

October 2015

Table of Contents

1.0 Introduction

The Operating Basis of Design for the Connell Rail Interchange Study is developed with consideration for freight operations, safety, and accepted railroad engineering practices.

An Operating Basis of Design is a statement of the functional and operating requirements of a railroad that influences engineering design decisions. Examples of functional and operating requirements include ruling grade, average speed of trains, typical maximum length of trains, and number and type of trains per day. Engineering decisions based on these functional and operating requirements include maximum grades, maximum degree of curvature, length and number of sidings, and number of main tracks.

The basic requirement for any railroad geometric design is to provide economical and efficient transportation while maintaining safety in overall operation, maintenance, and rolling stock stability. The criteria relating to other elements of design necessitated by railroad construction, such as miscellaneous utility work, where not addressed by the American Railway Engineering and Maintenance of Way Association (AREMA), are based on the latest specifications and practices of the regulatory agencies having jurisdiction.

1.1 Purpose

This document serves to define the operating basis of design and operating characteristics that govern the design of the Connell Rail Interchange Project. This is a control document and may be updated on a periodic and as needed basis.

1.2 History

The Columbia Basin Railroad (CBRW) and BNSF Railway desire to expand and modernize the Connell Rail Interchange. This will enhance the ability of the railroads to perform interchange of longer trains while minimizing the time that interchange operations interfere with mainline operations and capacity. The improvements will allow for better service, directly affecting transit times for unit trains. A new reconfigured interchange will allow for reduced delays to automotive traffic at grade crossings within Connell.

The current interchange is limited to exchanging approximately 2,000 feet of trains without significant delays to automotive traffic and the railroad themselves. Based on an average rail car length of 60 feet, this would equate to approximately a 31-car train with two locomotives. The typical daily train that would be interchanged at Connell is 44 cars long. Periodically trains are shorter than the current average train, but at least 50% of the time one or both of the railroads are unnecessarily delayed or experience inefficiencies at the interchange.

The new proposed configuration will be more efficient for both railroads, as well as lessen the delay times experienced by automotive traffic at the public road crossings, providing enhancement related to safety. Currently some of the switch moves over the grade crossings are performed with a shove move; meaning that railroad cars are pushed across the crossing without the enhancement of the locomotives lights, horn, and bell. The new configuration will eliminate the need for shove movements over the grade crossings, and will allow the BNSF and CBRW to conduct timely train inspections in a location away from areas prone to congestion and delay. Additionally, current train operations require trains to be left unattended on a 1% grade. The new interchange will

eliminate this situation.

1.3 Application

The material contained in the following chapters provides a uniform operating basis of design and can be expected to undergo refinement and expansion during preliminary engineering and final design.

These criteria do not substitute for operating and engineering judgment and sound operations and engineering practices. Specific exceptions apply in special cases. The designers are responsible for identifying any necessary departure from the criteria contained in this document, and bringing it to the attention of the City of Connell and project stakeholders. Any changes to the criteria shall be reviewed and approved by the City of Connell prior to design. Application for change of criteria, addition to the criteria, and any other questions shall be submitted in writing to the City of Connell (see Section 1.6).

1.4 Project Goals

The basic goal of the Connell Rail Interchange Project is to provide the City of Connell and other stakeholders an improved interchange infrastructure. This will allow existing and future rail shippers to benefit from a modern interchange with greater capacity, enhancing current railroad service and providing additional capacity in the future. While an initial concept has been developed for the project, this study will examine other alternatives.

1.4.1 Key Criteria and Assumptions

Essential elements and capacity include the following:

1. Provide expanded interchange which provides adequate length for all interchange operations, including removing or reconfiguring motive power, to be performed clear of the BNSF main track. (All CBRW interchange operations occur on tracks not requiring access to BNSF main track.)
2. Provide a track configuration and capacity which allows trains traveling on the BNSF main line, from either direction at a 7500' minimum length (8600' desirable), to enter the new interchange tracks without reverse movements or breaking trains into pieces.
3. Provide a track configuration and capacity which allows BNSF or CBRW to stage a train for interchange and not block arriving or departing trains.
4. Provide the capacity to deliver the forecast maximum quantities of freight, with capacity for recovery from service interruptions.
5. Provide operational reliability, including the ability to be operated during typical weather patterns for the region, excepting extraordinary weather events.
6. Provide BNSF and CBRW a configuration that allows departures and arrivals using continuous forward movements.
7. Provide capacity for 7500' minimum length (8600' desirable) unit trains to clear the main track coming from either direction.
8. Provide second parallel track of 7500' minimum to allow locomotives to "run-around" train or be reconfigured for movement in opposite direction without fouling / occupying the main track.

9. Provide parallel continuous access road to at least one side of the two above mentioned tracks.
10. Provide one (possibly two), parallel track(s) which would provide approximately 3600' of capacity each (for staging shorter typical length trains).
11. Conform to applicable federal and state safety regulations.

Assumptions:

1. BNSF and CBRW will own and maintain new track within the limits of their respective current right-of-ways / property boundaries. Additional property acquired for the interchange will be owned by one of the railroads.
2. BNSF Standards will be used as the superior design and construction documents. CBRW has adopted and uses BNSF Standards.
3. Due to union agreements, BNSF will perform (furnish and install) some elements of the construction within its own property (such as track work).
4. Construction will not require extensive track shifts of existing / in-service tracks. Windows for construction, adjacent to existing main track, will be minimized as possible.
5. Future second main track, through the Connell area, will be built to the railroad south (compass east) of the existing main track. This includes no track shifting of existing main track to the north, at the SR 260 grade separated crossing.
6. Incorporation of new or existing tracks for setting out bad orders.

1.4.2 Description of the Recommended Proposed Concept of the Connell Rail Interchange

The recommended proposed concept (South Alternate) of the Connell Rail Interchange consists of three interchange tracks:

Track Name	Clear Length (ft)	Description
I/C Track 1	7,600	Nearest BNSF main track, connects to BNSF main track to the east through new crossover and West Lead Track to the west.
I/C Track 2	7,500	Middle Track, connects to I/C Track 1
I/C Track 3	4,000	Furthest Track from BNSF main line, connects to I/C Track 2
East Lead Track		1,370 feet connection between new I/C Track 1 and existing BNSF track 1457.
West Lead Track		360 feet connection between new I/C Track 1 to BNSF main track to the west

The main track turnouts are No 15, all others are No. 11. See Exhibit 1 for a plan view of the recommended proposed concept (South Alternate) of the Connell Rail Interchange. See Exhibit 2 for track schematic for the recommended proposed concept.

1.4.3 Service Integration, Interoperability, and Connection to the National Rail Network

The Connell Rail Interchange is to be part of the overall required transportation system. The reconfigured interchange must be standard gauge, must be interoperable with the national rail network, and must adhere to engineering, operating, interchange, and regulatory standards that enable free interchange of freight cars and trains between BNSF and CBRW.

Connection to the national rail network shall be made using powered turnouts as described above and connection to the CBRW main line and yard to the east shall (continue to) use hand thrown turnouts.

Both connection points to the BNSF main track shall be signaled and dispatcher controlled.

1.5 Changes / Updates

Proposed changes or updates to the basis of design criteria are to be forwarded to the City of Connell for consideration.

1.6 Deviation Approval Process

Any deviation from the standards and procedures presented herein shall be approved through the Deviation Approval Process as designated in Appendix A.

Exhibit 1 – Recommended Proposed Concept (South Alternate)

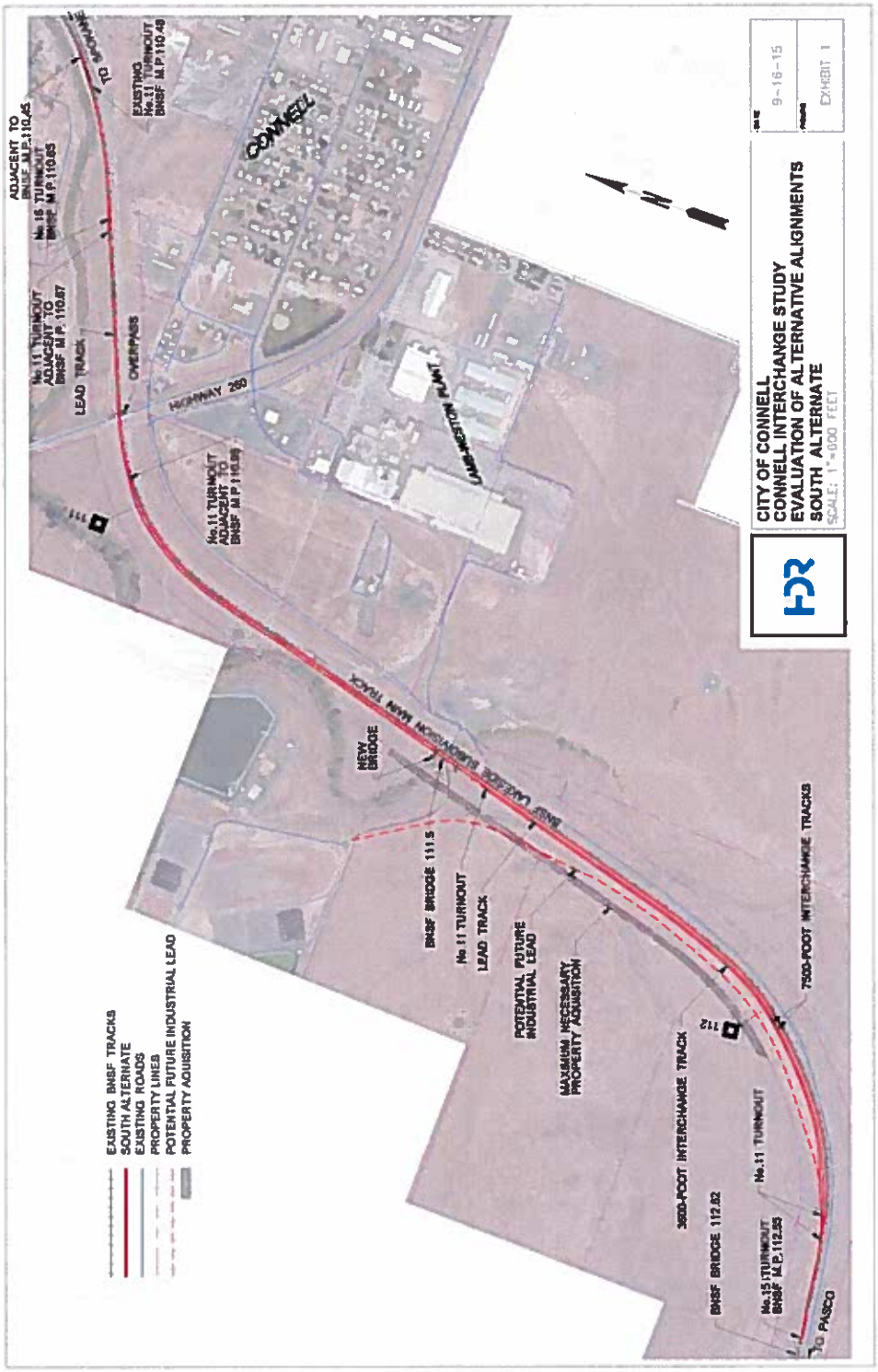
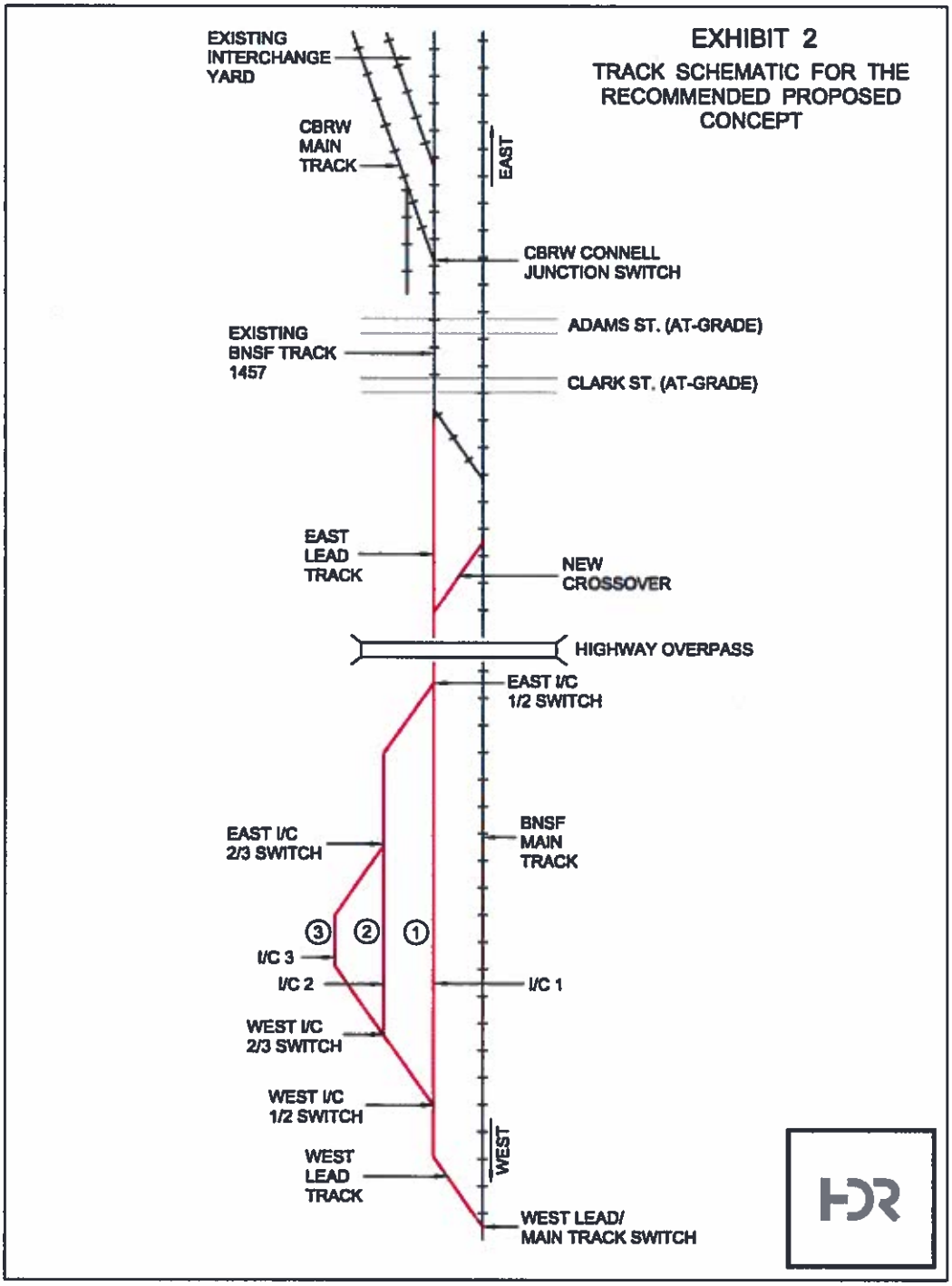


Exhibit 2 – Track Schematic for the Recommended Proposed Concept



2.0 Regulatory Requirements and Recommended Practices

The reconfigured interchange will conform to interchange requirements of the Association of American Railroads (AAR). The reconfigured interchange will follow to the greatest extent practical the recommended practices of the AAR and of AREMA.

2.1 Operating Regulations and Method of Operation

Operations of the Connell Rail Interchange will adhere to all applicable regulations of the Federal Railroad Administration (FRA), the State of Washington, and the latest edition of the General Code of Operating Rules (GCOR).

Other than at the main line connections, the interchange tracks are considered auxiliary tracks. This type of track is also called "secondary" or "other than main" track.

Tracks comprising the reconfigured interchange will be designated as non-controlled tracks and will be operated using GCOR Rule 6.28 (Other than Main Track). This rule uses visual means to occupy track, make movements, and avoid other trains.

Each end of the Connell Rail Interchange, where it connects to the BNSF main track, shall be fully signaled, bonded, and dispatcher controlled, with power-operated No. 15 turnouts and power-operated derails at each end. BNSF signal aspect and indication standards shall be used to enable full operability.

Movement between the Connell Rail Interchange and the CBRW main track shall be governed by CBRW operating rules. CBRW rules operate the main track at that location under GCOR Rule 6.13 (Yard Limits), which use visual rule as a means to occupy track, make movements, and avoid other trains (when wayside signals are not present).

2.2 Design Regulations, Codes and Standards

The design criteria presented herein follow accepted engineering practices used by BNSF Railway for diesel-electric locomotive power operations similar to other port and public industrial freight rail facilities.

The railroad design shall meet all applicable parts of the State of Washington general laws, Washington Utilities and Transportation Commission (WUTC) requirements, Federal Rail Administration (FRA) safety requirements, and the specific project requirements.

Where any conflict in criteria exists, the stricter criteria shall govern unless stated otherwise in this document, or approved in writing by the City of Connell.

Unless specifically noted otherwise in these criteria, the latest edition of the code, regulation, and standard that is applicable at the time the design is initiated shall be used. If a new edition or amendment to a code, regulation, or standard is issued before the design is completed, the design shall conform to the new requirements to the extent approved or required by the agency enforcing the code, regulation, or standard changed.

3.0 Locomotive Propulsion

The Connell Rail Interchange will use diesel-electric locomotives.

Unit trains

Unit trains are anticipated to operate with Distributed Power (locomotives interspersed within trains remotely controlled from the operating cab). The locomotive consists for unit trains are assumed to have one lead qualified unit facing east and one lead qualified unit facing west.

Freight Trains

Freight trains are anticipated to operate with two units minimum, head end power only. Units are assumed to be configured with east most unit facing east and west most unit facing west.

4.0 Train Speeds

Train speeds are governed by WAC 480-62-155 and railroad operating rules and practices. The new facilities will be operated at the same speed as the currently operated interchange: 10 mph.

New track construction on new or modified alignments shall be constructed to not less than FRA Class 5 Standards geometry tolerances and operate at FRA Class 1 speeds (10 mph). If integrated, rehabilitated track on existing alignments shall be designed and constructed to FRA Class 3 Standards geometry and operate at FRA Class 1 speed. Temporary connections, if used in construction, shall be designed to FRA Class 2 tolerances.

5.0 Train Types and Frequencies

5.1 Train Types and Lengths

It is anticipated that the Connell Rail Interchange will be a freight-only railroad. No consideration is required for passenger trains. The two freight train types anticipated to operate on the Connell Rail Interchange are (1) unit (or bulk) trains that haul a single commodity in one uniform car type for a single shipper between one origin-and-destination pair and (2) local manifest (or mixed freight) trains that haul multiple commodities in carload volumes, each carload with its own shipper and origin-and-destination pair. No intermodal or automotive trains are anticipated (however, the design would not preclude these type of trains from being operated).

The freight types anticipated to be interchanged, and the freight car types they are likely to move in, are as follows:

Canola seed, moving in covered hoppers

General carload freight, such as fertilizer, frozen foods, chemicals, rolled paper, cooking oil, grain, animal feed, and agricultural products, moving in covered and open hoppers; boxcars, tank cars; refrigerated boxcars; bulkhead, centerbeam, or plain flatcars; and/or open and covered gondolas

The freight moving on the Connell Rail Interchange is anticipated to be consolidated into unit trains and local manifest trains. Freight train lengths are estimated as follows:

Unit trains: Currently 100 to 110 cars of 60 to 62' each, plus up to four locomotives of 75' each, or 7,120' maximum overall

Local trains: Currently average 44 cars of 60' each, plus up to three locomotives of 60' each, or 2,820' overall

Locomotives are anticipated to be distributed within unit trains to avoid excessive drawbar and buff forces and to provide adequate braking characteristics when descending steep grades.

5.2 Train Frequencies

Train frequencies are estimated to be up to 2 total trains per day initially, consisting of 2 local freight trains (one CBRW and one BNSF both operated as a turns) per day and not more than 1 unit train per day. Initial annual train frequencies are estimated to be 208 local freight trains consisting of 44 cars and 24 unit trains consisting of 100 to 110 cars.

The interchange will provide for up to 100% increase in traffic. This is based on increasing number of local trains from 4 to 6 times with up to 59 cars and doubling the number of unit trains.

6.0 Train Operations

6.1 Typical Train Operation Scenarios

The new Connell Rail Interchange will allow for the following scenarios:

1. Two local manifest freight trains at once, one BNSF local and one CBRW local, each up to 4,000' in length, to operate within the interchange without conflicting with one another's movements;
2. Or two local freights , one BNSF and one CBRW each up to 4,000' in length with the simultaneous storage of one unit train of 7,600' in length that can be staged without conflict while two local freight trains are operating within the interchange (except as noted below*).
3. Arrival and departure of a unit train of up to 7,600 feet in length interchanged from BNSF to CBRW or from CBRW to BNSF. (One local freight train of up to 4,000 feet could be staged during this event.)

There are a number of possible interchange operation scenarios that are possible. Some of the possibilities are listed below. (This is not an all encompassing list of possible scenarios.) The new proposed interchange coupled with the existing interchange tracks and the new universal cross-overs that will be positioned between the two groups of interchange tracks allows for very flexible operations and numerous possible scenarios.

Typical Scenario 1a

This is a "live" meet where both BNSF and CBRW locals arrive at the same time, and trains are immediately exchanged to the other railroad and the cars do not dwell on the interchange tracks. (The BNSF local will pull a local manifest train up to 4,000' east from Pasco while the CBRW local will pull a local manifest train up to 4,000' west from Warden to the Interchange.) Train movement in this scenario:

1. BNSF local approaches the new interchange from the west and using the West Lead Track pulls their train into I/C 2 Track and pulls train east to a point clear of West I/C 2/3 Switch.
2. CBRW local approaches the new interchange from the east and pulls their train into I/C 2 Track and pull train west to a point a few hundred feet clear to the east of East I/C 2/3 Switch.
3. Using a series of moves, BNSF and CBRW locomotive consists switch positions using the east end of I/C 3 Track and the East I/C 2/3 Switch. (The BNSF locomotives are now coupled to the train CBRW delivered and the CBRW locomotives are now coupled to the train BNSF delivered.)
4. The BNSF pulls their train west into I/C 3 Track to clear the East I/C 2/3 switch.
5. Following an air test the BNSF train can proceed west to the main track as soon as authority is received from the BNSF dispatcher.
6. Following an air test the CBRW train can proceed east via the East Lead Track towards to the CBRW Junction switch and beyond to Warden.

Typical Scenario 1b

This is when CBRW precedes the arrival of the BNSF local and begins the interchange process, positions its train to be interchanged to BNSF, and waits until BNSF local arrives to complete interchange. Train movements in this scenario:

1. The moves are identical to Scenario 1a except that they are delayed between step 2 and 3.

Typical Scenario 1c

This is when BNSF local precedes the arrival of CBRW local and BNSF begins the interchange process and then proceeds to provide other local service away from the interchange yard. Train movements in this scenario:

1. BNSF local approaches the new interchange from the west and pulls their train into I/C 2 Track and pulls train east to a point clear of West I/C 2/3 Switch.
2. BNSF locomotive consist is uncoupled and proceeds to other local work.
3. Later, CBRW local approaches the new interchange from the east and pulls their train into I/C 3 Track and pulls train west to a point a few hundred feet clear to the east of West I/C 2/3 Switch.
4. After uncoupling from the train, the CBRW locomotive consist is moved west to a point clear of the West I/C 1/2 Switch.
5. The CBRW locomotive consist is moved east on I/C 1 Track to clear the East I/C 1/2 Switch.
6. The CBRW locomotive consist is moved west to the east end of the train on I/C 2 Track (left by the BNSF).
7. After the locomotives are coupled up and the train is air tested, the CBRW train can proceed east towards to the CBRW Junction switch and beyond to Warden.
8. Later, the BNSF locomotive consist can return to retrieve the train left by the CBRW in I/C 3 Track and can proceed west to the main track as soon as authority is received from the BNSF dispatcher.

It should be noted that Scenario 1 allows for one local train up to 7,600 feet to be interchanged from BNSF to CBRW or vice versa using I/C 1 Track for that train. (This assumes no unit train is staged at Connell.)

Typical Scenario 2a

This is a "live" meet where both BNSF and CBRW locals arrive at the same time, and trains are immediately exchanged to the other railroad and the cars do not dwell on the interchange tracks. Train movement in this scenario:

1. Operations are identical to Scenario 1a.

Typical Scenario 2b

This is when CBRW precedes the arrival of the BNSF local and begins the interchange process, positions its train to be interchanged to BNSF, and waits until BNSF local arrives to complete interchange. Train movements in this scenario:

1. The moves are identical to Scenario 1b except that they are delayed between step 2 and 3.

Typical Scenario 2c

This is when BNSF local precedes the arrival of CBRW local and BNSF begins the interchange process and then proceeds to provide other local service away from the interchange yard. Train movements in this scenario:

1. The moves are identical to Scenario 1c except that operations are delayed between step 3 and 4 until unit train staged on I/C 1 Track either departs (for either Warden on the CBRW or any points east or west on the BNSF.

*It is possible to perform interchange in this scenario if the existing interchange yard is used. It would require CBRW to stage the train to be delivered to BNSF in the existing interchange yard tracks, using a series of shove moves, and then the CBRW locomotive consist would move to the east end of the local train staged by the BNSF on track I/C 2 Track.

Typical Scenario 3a

This is the operation related to a unit train being interchanged from BNSF to CBRW. Current unit train operations use "run-through" power. (This means that locomotive provided by the BNSF are kept with the train and no CBRW power is used.) Unit trains are currently operated to and from the east on BNSF. (It is assumed that the unit trains have 3 to 4 locomotives total, with distributive power (DP) positioned at the rear of the train, and have at least one lead qualified unit facing east and west in their consists.)

1. BNSF crew pulls the unit train of up to 7,600' in length from the BNSF Main Track using the new right-hand cross-over into I/C 1 Track and pulls west to position the unit train between the West I/C 1/2 Switch and the East I/C 1/2 Switch.
2. Following securing the train, the BNSF crew is picked up departs by crew van.
3. CBRW crew arrives at Connell by crew van and delivered to west end of unit train.
4. Using a series of moves and the West I/C 1/2 Switch, the CBRW crew configures the power at the west end of the train for rear end DP operation.
5. The crew would then move one unit – possibly a lead qualified unit, facing east from the west end of the train to the east end of the train using I/C 2 Track.
6. Upon arrival at the east end of the train, the crew would configure the east end power for lead operation with east most unit facing east – using a series of moves at the East I/C 1/2 Switch.
7. After performing an air test, the CBRW crew proceeds east with the train towards to the CBRW Junction switch and beyond to Warden

Typical Scenario 3b

This is the operation related to a unit train being interchanged from CBRW to BNSF. (It is assumed that the unit trains have 3 to 4 locomotives total, with distributive power (DP) positioned at the rear of the train, and have at least one lead qualified unit facing east and west in their consists.)

1. CBRW crew pulls the unit train of up to 7,600' in length from the CBRW Main Track, using the CBRW Jct. switch, into I/C 1 Track and pulls west to position the unit train between the West I/C 1/2 Switch and the East I/C 1/2 Switch.
2. Following securing the train, the CBRW crew is picked up departs by crew van.
3. BNSF crew arrives at Connell by crew van and delivered to west end of unit train.
4. Using a series of moves and West I/C 1/2 Switch, the BNSF crew configures the power at the west end of the train for rear end DP operation.
5. The crew would then move one unit – possibly a lead qualified unit, facing east from the west end of the train to the east end of the train using I/C 2 Track.
6. Upon arrival at the east end of the train, the crew would configure the east end power for lead operation with east most unit facing east – using a series of moves at the East I/C 1/2 Switch.
7. After performing an air test, and obtaining permission from the BSNF dispatcher, the BNSF crew pulls the unit train to the BNSF Main Track using the west cross-over.

In the case of unit trains being delivered from BNSF from the west, the trains would simply be staged in I/C 1 Track until CBRW was ready to take the train. Reconfiguration of power would not occur.

6.2 Other Operational Observations

Other observations include:

With the current configuration, it would ordinarily not possible to interchange 2 each 7,500' unit trains simultaneously. However, with the introduction of key steps in the order of movements, it is possible. For instance:

1. CBRW could hold a (first) unit train back short (east) of the Jct. switch and then;
2. BNSF (second) train could arrive from the east and be staged in I/C 1 Track and have the power reconfigured so that the train was ready to depart to the CBRW then;
3. the first train would be moved west next and adjacent to the second train into I/C 2 Track. Then;
4. finally, the second train on I/C 1 Track would move to the Jct. switch and depart for Warden.

In looking at the details of the operation, it becomes apparent that a second 3600' (or longer) track does provide additional flexibility. This additional track could be built adjacent to the I/C 3 Track or could be built adjacent to track I/C 2 Track east of I/C 3 Track. (This is an arrangement very similar to the proposed in the initial proposed concept.)

Assuming that only one 3600' long track was built, it was noted that building that track further east would it would contribute more flexibility. (i.e. I/C 3 Track slid to the east about 3900'/ from where currently proposed.) This was not shown in the recommended alternate concept because it causes an additional bridge to be built across the coulee and extends the earthwork foot print towards the coulee as well.

7.0 Appendices

APPENDIX A

DEVIATION REQUEST FORM

City of Connell - Connell Interchange
PROJECT CHANGE RECORD

Project Name: Connell Interchange	Change Record No.:
Project Owner: City of Connell	Owner's Project No.:
Location: Connell, WA	
City or BNSF requiring approval:	Date of Issuance:
Attachment: (list of documents supporting change)	

Deviation from:

☐ Design Criteria ☐ Original Conceptual Design

Reason for deviation:	Cost Impact (net increase/decrease): Construction: $_____ ☐ Not Applicable Design & Other: $_____ ☐ Not Applicable Right-of-Way: $_____ ☐ Not Applicable Schedule Impact (net increase/decrease): Preliminary Design: 0 Days

Recommended Action:

Pro's/Con's of Recommendation: Pro's	Con's 1.) None

Action: ☐ Taken ☐ Authorized ☐ Rejected

Attach CMR 30 to ITA

Approved for Port of Vancouver by:		Date:
Accepted for BNSF by:	Bruce Sparling	Date:
Approved: (Other - when required)	Christopher D Delargy	Date:

Distribution: ☐ Owner ☐ BNSF ☐ HDR ☐ Steering Committee Distribution ☐ Other