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Prepared for:
BNSF Railway Company
Seattle, Washington

Draft 2008 Engineering Design Report

BNSF Former Maintenance and Fueling Facility – Skykomish, WA

DRAFT

The RETEC Group, Inc.
November 2007
Document No.: 01140-204-0270

Merged with ENSR in 2007
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List of Acronyms and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
AMP	Air Monitoring Plan
ANSI	American National Standards Institute
AS	Air Sparging
AST	Aboveground storage tank
BE	Biological Evaluation
BMP	Best Management Practice
CAO	Critical Area Ordinance
CD	Consent Decree
CDC	Centers for Disease Control
CMP	Compliance Monitoring Plan
CSL	Cleanup Screening Level
CUL	Cleanup Level
CWA	Clean Water Act
DAHP	Department of Archaeological Historic Preservation
DCAP	Draft Cleanup Action Plan
DFW	Department of Fish and Wildlife
DHHS	United States Department of Health and Human Services
DNS	Determination of Non-significance
DS	Determination of Significance
Ecology	State of Washington Department of Ecology
EDR	Engineering Design Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
Facility	BNSF Railway Company's Former Maintenance and Fueling Facility
FEMA	Federal Emergency Management Act
FMCZ	Former Maloney Creek Zone
FS	Feasibility Study
GMA	Growth Management Act
HABS/HAER	Historic American Buildings Survey/Historic American Engineering Record
HASP	Health and Safety Plan
HCC	Hydraulic Control and Containment
HDPE	High-Density Polyethylene
HPA	Hydraulic Project Approval
JARPA	Joint Aquatic Resource Permit Application
LNAPL	Light Non-Aqueous Phase Liquid
MTCA	Model Toxics Cleanup Act
NEDZ	Northeast Developed Zone
NFIP	National Flood Insurance Program

NFPA	National Fire Protection Association
NGS	National Geodetic Survey
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NWAA	Northwest Archaeological Associates
NWDZ	Northwest Developed Zone
OHWM	Ordinary High Water Mark
OSHA	Occupational Safety and Health Administration
P.E.	Professional Engineer
PCB	polychlorinated bi-phenyl
PHS	Public Health Services
PSCAA	Puget Sound Clean Air Agency
PSE	Puget Sound Energy
R.G.	Registered Geologist
RCW	Revised Code of Washington
RI	Remedial Investigation
RL	Remediation Level
ROW	Right of Way
RYZ	Railyard Zone
SDZ	South Developed Zone
SEPA	State Environmental Policy Act
SHF	Soil Handling Facility
SQS	sediment quality standards
SWPPP	Stormwater Pollution Prevention Plan
Town	Town of Skykomish
UBC	Uniform Building Code
UIC	Underground Injection Control
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
UST	Underground Storage Tank
WAC	State of Washington Administrative Code
WISHA	Washington Industrial Safety and Health Act
WSDOT	State of Washington Departments of Transportation

1.0 Introduction

This document presents the *2008 Engineering Design Report* (2008 EDR) for the BNSF Railway Company's Former Maintenance and Fueling Facility (facility) and surrounding area located within the Town of Skykomish (Town), Washington (site).

This 2008 EDR was prepared on behalf of the BNSF Railway Company (BNSF) pursuant to a Consent Decree (CD) between BNSF and Ecology. *State of WA v. BNSF Railway Company*, King County Cause No. 07-2-33672-9SEA. EDRs are part of the series of documents required under the Model Toxics Control Act (MTCA; Revised Code of Washington 70.105D; Washington Administration Code 173-340) cleanup process. The major documents that define the criteria and scope of remediation activities for the site are described below.

Remedial Investigation and Feasibility Studies. The *Remedial Investigation* (RI) (RETEC, 1996) and the *Supplemental RI* (RETEC, 2002) presented the results of investigations of the nature and extent of contamination at the site. The Feasibility Studies (RETEC, 1999 and 2005a) evaluated the extent of impacts and the feasibility of remedial alternatives for the site. BNSF completed the RI, Supplemental RI and the FSs pursuant to Agreed Order No. DE 91TC-N213.

Cleanup Action Plan. The Washington State Department of Ecology (Ecology) issued a site-wide Cleanup Action Plan (CAP) that guides all remediation activities at the site. The CAP is an exhibit to the CD, which became effective on October 19, 2007 when it approved by the King County Superior Court.

Master EDR. A Master EDR (ENSR, 2007a) was submitted to Ecology on October 22, 2007 pursuant to the CD. The Master EDR provides an overview of cleanup activities that will be conducted in 2008 through 2011 and beyond throughout the Town of Skykomish and supplements the information presented herein.

2008 EDR. Design, construction, and operation of the cleanup actions conducted in calendar year 2008 will be described in this 2008 EDR.

Subsequent Annual EDRs. Additional details of the design, construction, and operation of the cleanup actions conducted in each calendar year will be described in subsequent annual EDRs and drawings.

1.1 Scope

The Master EDR and 2008 EDR are interdependent and together, along with subsequent annual EDRs, will provide all of the information outlined in WAC 173-340-400(a) for the work to be completed through 2008. The Master EDR includes background and general site-wide information that will not be included in the annual EDRs and addresses all phases of the work required by the CD through at least 2012. The 2008 EDR includes information that is specific to 2008 remediation activities and not presented in the Master EDR. The 2008 EDR is not intended to be a stand-alone document, but includes sufficient information for the development and review of construction plans and specifications and documents engineering concepts and design criteria used for design of the cleanup action activities scheduled for 2008. Table 1-1 summarizes the scopes of the Master EDR and the 2008 EDR (including supporting work plans and design documents) as they pertain to the requirements of WAC 173-340-400(a).

Table 1-1 Master EDR and 2008 EDR Scopes

Information required per WAC 173-340-400(a)	Included in	
	Draft Master EDR	Annual EDRs
(i) Goals of the cleanup action including specific cleanup or performance requirements	X	X
(ii) General information on the facility including a summary of information in the remedial investigation/feasibility study updated as necessary to reflect the current conditions	X	X
(iii) Identification of who will own, operate, and maintain the cleanup action during and following construction		X
(iv) Facility maps showing existing site conditions and proposed location of the cleanup action	X	X
(v) Characteristics, quantity, and location of materials to be treated or otherwise managed, including ground water containing hazardous substances		X
(vi) A schedule for final design and construction	X	X
(vii) A description and conceptual plan of the actions, treatment units, facilities, and processes required to implement the cleanup action including flow diagrams		X
(viii) Engineering justification for design and operation parameters:		
A. Design criteria, assumptions and calculations for all components of the cleanup action;	X	X
B. Expected treatment, destruction, immobilization, or containment efficiencies and documentation on how that degree of effectiveness is determined; and	X	X
C. Demonstration that the cleanup action will achieve compliance with cleanup requirements by citing pilot or treatability test data, results from similar operations, or scientific evidence from the literature;		X
(ix) Design features for control of hazardous materials spills and accidental discharges (for example, containment structures, leak detection devices, run-on and runoff controls)		X
(x) Design features to assure long-term safety of workers and local residences (for example, hazardous substances monitoring devices, pressure valves, bypass systems, safety cutoffs)		X
(xi) A discussion of methods for management or disposal of any treatment residual and other waste materials containing hazardous substances generated as a result of the cleanup action	X	X

Information required per WAC 173-340-400(a)	Included in	
	Draft Master EDR	**Annual EDRs**
(xii) Facility specific characteristics that may affect design, construction, or operation of the selected cleanup action, including:		
A. Relationship of the proposed cleanup action to existing facility operations;	**X**	**X**
B. Probability of flooding, probability of seismic activity, temperature extremes, local planning and development issues; and	**X**	
C. Soil characteristics and ground water system characteristics	**X**	
(xiii) A general description of construction testing that will be used to demonstrate adequate quality control	**X**	**X**
(xiv) A general description of compliance monitoring that will be performed during and after construction to meet the requirements of WAC 173-340-410	**X**	**X**
(xv) A general description of construction procedures proposed to assure that the safety and health requirements of WAC 173-340-810 are met	**X**	**X**
(xvi) Any information not provided in the remedial investigation/feasibility study needed to fulfill the applicable requirements of the State Environmental Policy Act (chapter 43.21C RCW)		**X**
(xvii) Any additional information needed to address the applicable state, federal and local requirements including the substantive requirements for any exempted permits; and property access issues which need to be resolved to implement the cleanup action	**X**	**X**
(xviii) For sites requiring financial assurance and where not already incorporated into the order or decree or other previously submitted document, preliminary cost calculations and financial information describing the basis for the amount and form of financial assurance and, a draft financial assurance document	**1**	
(xix) For sites using institutional controls as part of the cleanup action and where not already incorporated into the order or decree or other previously submitted documents, copies of draft restrictive covenants and/or other draft documents establishing these institutional controls	**1**	
(xx) Other information as required by the department.	**2**	

Notes:

1. Will be included as separate documents
2. Will be included, as needed, in separate documents

1.2 Site Background and History

The site is located in the east King County Town of Skykomish (see Figure 1-1). For the purpose of this EDR, the site includes the following six zones as described in the CD:

1) Railyard Zone (RYZ)

2) Levee Zone

3) Former Maloney Creek Zone (FMCZ)

4) Northeast Developed Zone (NEDZ)

5) Northwest Developed Zone (NWDZ)

6) South Developed Zone (SDZ).

The RYZ is primarily owned by BNSF and is operated as a working railyard. The Levee Zone comprises the levee west of 5th Avenue along the South Fork of the Skykomish River and the river itself. The FMCZ includes two uninhabited areas through which Maloney Creek formerly flowed. The areas are located south of the RYZ near or adjacent to Old Cascade Highway. The NEDZ and NWDZ are located north of the RYZ between Railroad Avenue and south of the South Fork Skykomish River. These zones have been developed for residential use. Portions of the NWDZ and NEDZ, including 13 historic buildings and the Skykomish Bridge are registered in the National Register of Historic Places. The SDZ is located south of the RYZ adjacent to Old Cascade Highway.

1.2.1 Historical Site Operations

Historical activities in the RYZ since the facility opened in the late 1890s included refueling and maintaining locomotives and operating an electrical substation for electric engines. BNSF stored Bunker C and diesel fuel in the RYZ in aboveground storage tanks (ASTs) and underground storage tanks (USTs) until 1974, when BNSF discontinued most fuel handling activities at the site. The RYZ is currently used as a base of operations for track maintenance and snow removal crews and other interstate railroad activities.

1.2.2 Site Contamination and Cleanup

Some of the historic RYZ activities resulted in the release of contaminants to the surrounding environment. In early 1991, Ecology designated the site (aka BNSF Former Fueling and Maintenance Facility) as a high priority cleanup site. Later that year, BNSF indicated a desire to initiate a Remedial Investigation/ Feasibility Study (RI/FS) in accordance with MTCA. At that time, formal negotiations for Agreed Order No. DE 91TC-N213 were initiated. Negotiations were completed in mid-1993. Following a public comment period, the Agreed Order, which included detailed work plans for the RI/FS process and early interim action for cleanup work, was signed by Ecology and BNSF. BNSF and Ecology signed a separate Agreed Order (No. DE 01TCPNR-2800) in 2001 for additional interim action cleanup work near the South Fork Skykomish River and the levee west of 5th Street.

In 2006, BNSF and Ecology signed an additional Agreed Order (No. DE-2379) that outlined the interim action for cleanup work in the Levee Zone and part of the NWDZ. This interim action consisted of temporary relocation of five residences, excavation of the levee, underlying soils, and sediments along the south bank of the South Fork Skykomish River, reconstruction of the levee, and restoration of natural resources, private property, and public infrastructure that are disturbed by the remediation activities. The work required by the first two agreed orders has been completed. The work required by the 2006 order is almost complete; continuing work on levee restoration has been rolled into the CD and all of the agreed orders have been closed.

1.3 Existing Site Conditions

The following existing site conditions are summarized in the Master EDR (ENSR, 2007), Section 1.3:

- Topography
- Subsurface Soil Conditions
- Hydrogeology
- Surface Water Hydrology
- Sediments
- Wetlands
- Habitat
- Contamination
- Utilities.

1.4 Traffic Control and Pedestrian Access

The Town is accessible to vehicle and pedestrian traffic via streets owned and maintained by the Town and King County. The main thoroughfares include 1) 5th Street, which runs north-south from the WSDOT bridge across the BNSF railroad tracks to Old Cascade Highway; 2) Railroad Avenue, which runs east-west through the Town center; and 3) Old Cascade Highway, which runs east-west, south of the South Fork Skykomish River, and intersects State of Washington Highway 2 approximately one mile east of Town and approximately 3 miles west of Town near the town of Grotto. Public parking is offered in the business district along Railroad Avenue. The school is accessible via Railroad Avenue. Numerous arterials are located throughout the Town and provide access to residences and businesses. Traffic signs are posted throughout the Town to direct traffic flow. The railroad crossing at 5th Street is equipped with a crossing signal to restrict pedestrian and vehicle access as trains enter and exit Town.

1.5 Overview of 2008 Cleanup Activities

The 2008 cleanup activities include activities described in the CD for three of the six remediation zones. The actions for each zone are interdependent. Achieving cleanup in one zone depends not only upon the actions to be taken in that zone, but also upon the actions to be taken in other zones.

1.5.1 Railyard Zone

Depot Relocation: The existing Railyard Depot Building will be relocated to facilitate excavation and construction of the HCC system.

Utility Crossing Construction: A new utility crossing of the mainline tracks will be constructed within the RYZ in anticipation of installing new Town sanitary sewer conveyance piping.[1] Construction will consist of a crossing beneath the existing mainline rail and installing a casing. Close coordination with the Town will be required in order to provide a crossing suitable for the grade and location requirements of the overall sewer system design. The crossing is contingent on successful negotiation of the required easements and related agreements between the Town and BNSF. A second crossing will be constructed to provide a conduit for remediation systems – this

[1] This work is not required by the CD but will occur on the railyard during 2008 and therefore needs to be coordinated with other activities required by the CD.

second crossing will be used by the remediation systems and controls only and is not available for other utilities.

Hydraulic Control and Containment (HCC) System: An HCC system consisting of a redundant groundwater barrier and a groundwater interception trench will be constructed near the north RYZ boundary with Railroad Avenue.

HCC Water Treatment System: An HCC water treatment system will be constructed to treat groundwater recovered via the HCC system. A remediation utility corridor will be constructed in the RYZ. A conduit will be installed within the corridor underneath the railroad tracks in anticipation of installing conveyance piping for transferring HCC water to the treatment system and from the treatment system to permitted surface discharge points, injection wells, surface waters, and/or the Town stormwater system.

HCC System Treated Groundwater Injection: Treated groundwater from the HCC system will be reintroduced into the railyard subsurface at appropriate locations and by appropriate means in order to flush petroleum contamination toward the HCC system.

HCC Treated Groundwater Discharge: Treated groundwater from the HCC system may be 1) discharged to the ground surface; 2) discharged to surface water; and/or 3) discharged to the Town storm water system consistent with applicable state and local substantive requirements and with applicable permits.

Construction Dewatering Treatment: A temporary system will be constructed in the RYZ to treat water generated from construction activities.

Treated Construction Water Discharge: Treated construction water may be 1) discharged to the ground surface; 2) discharged to surface water; and/or 3) discharged to the Town storm water system consistent with applicable state and local substantive requirements and with applicable permits.

Air Sparging (AS) System Construction: An AS system, including sparging wells, underground piping, and blowers will be installed to treat impacted soil and groundwater in the NEDZ. Sparging wells and underground piping will be installed in the NEDZ. A mechanical building will be constructed in the RYZ to house AS system blowers and controls. AS system piping will be installed in trenches in the NEDZ and in the conduit installed in the remediation utility corridor to supply pressurized air from the blowers to the sparging wells.

Mechanical Building(s) Construction: One or more mechanical building(s) will be constructed in the RYZ to house equipment and controls for the HCC, water treatment, and AS systems.

Demolition of Section Building: The existing Section Building on the railyard will be demolished to allow construction of a new Section Building.[2]

New Section Building Construction: A new Section Building will be constructed on the railyard to replace the office space currently provided by the Depot. [3]

Groundwater Well Installation: Groundwater monitoring wells will be installed to support monitoring of the HCC system. Details will be provided in the *HCC Special Design Report*.

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[2] This work is not required by the CD but will occur on the railyard during 2008 and therefore needs to be coordinated with other activities required by the CD.

[3] This work is not required by the CD but will occur on the railyard during 2008 and therefore needs to be coordinated with other activities required by the CD.

Compliance Monitoring: The following compliance monitoring activities will be conducted during and after remediation activities. These activities will be described in the *2008 Compliance Monitoring Plan* (CMP).

- Protection monitoring to confirm that human health and the environment are adequately protected during remediation activities.
- Performance monitoring to assess whether or not the cleanup action has attained the designated Cleanup Levels (CULs), RLs, and other performance standards.

Right-of-Way (ROW) Restoration – ROWs that are excavated as part of remediation activities will be restored to meet current applicable King County standards as adopted by the Town, or as agreed by BNSF and the Town.

Utilities Construction and Restoration – Electrical and telecommunications services may be reconfigured as necessary to maintain these services to residences and businesses that remain inhabitable/operational during remediation activities. New permanent electrical, communications, and potable water utilities that are removed as part of remediation activities will be restored in-kind, or redeveloped as agreed by BNSF and the Town.

1.5.2 NWDZ

The following cleanup activities are planned for the NWDZ East End (area east of 5th Street) and West End (area west of 5th Street).

Building Relocation: Buildings, including the McEvoy house and the Whistling Post Tavern, will be temporarily relocated to facilitate excavation of impacted soil. Building relocation will be contingent upon obtaining access from the owners and structural survey results.

Excavation: Free product and soil with concentrations of lead exceeding 250 mg/kg and arsenic exceeding 20 mg/kg, and all free product and/or soil with concentrations of petroleum hydrocarbons exceeding 3,400 mg/kg NWTPH-Dx, as identified during previous investigations, will be excavated from the approximate area shown on Drawing C-6.

Containment structures: Excavation of impacted soil may not occur under some buildings if access is denied or if relocation of the building is not feasible. Containment structures and/or other *in situ* treatment methods will be implemented on these properties as necessary to prevent, to the maximum extent practical, recontamination of adjacent and nearby properties. Design of these containment structures will be addressed on a case-by-case basis. Containment structure design for buildings that we do not have access to within the 2008 excavation area will be described in the 2009 EDR.

Compliance Monitoring: The following compliance monitoring activities will be conducted during and after remediation activities. These activities will be described in the *2008 CMP*.

- Protection monitoring to confirm that human health and the environment are adequately protected during remediation activities.
- Performance monitoring to assess whether or not the cleanup action has attained the designated CULs, RLs, and other performance standards.

Municipal Wastewater Treatment System Construction: Infrastructure to connect to the community wastewater collection system will be constructed at the McEvoy house and the Whistling Post Tavern properties[4].

[4] This work is not required by the CD but will occur on the railyard during 2008 and therefore needs to be coordinated with other activities required by the CD.

Right-of-Way Restoration: ROWs that are excavated as part of remediation activities will be restored to meet current applicable King County standards as adopted by the Town, or as agreed by BNSF and the Town.[5]

Utilities Construction and Restoration: Electrical and telecommunications services will be reconfigured as necessary to maintain these services to residences and businesses that remain inhabitable/operational during remediation activities. New permanent electrical, communications, and potable water utilities that are removed as part of remediation activities will be restored in-kind, or constructed as agreed by BNSF and the Town.[6]

1.5.3 NEDZ

Excavation: Free product and soil with petroleum concentrations exceeding 30,000 mg/kg NWTPH-Dx, as identified during previous investigations, will be removed from the area shown on Drawing C-6. Shallow soils on the Johnson property will be sampled more extensively to determine the need for and extents of excavation to remove soil within 2 feet of the surface with concentrations of lead exceeding 250 mg/kg and/or arsenic exceeding 20 mg/kg. Soil sampling and possible excavation will not require temporary relocation of buildings located on the Johnson property.

Air Sparging (AS) System Construction: An AS system will be installed and operated in the area where petroleum concentrations remain above 3,400 mg/kg NWTPH-Dx following excavation, as identified during previous investigations.

Compliance Monitoring: The following compliance monitoring activities will be conducted during and after remediation activities. These activities will be described in the *2008 CMP*.

- Protection monitoring to confirm that human health and the environment are adequately protected during remediation activities.
- Performance monitoring to assess whether or not the cleanup action has attained the designated CULs, RLs, and other performance standards.

Vapor Mitigation: Protective measures will be designed and implemented for buildings, structures, and enclosed spaces that remain in place or are built over petroleum contamination exceeding 3,400 mg/kg NWTPH-Dx if the concentration of total petroleum hydrocarbons in indoor air exceeds the cleanup level of 1,346 µg/m^3.

Right-of-Way Restoration: ROWs that are excavated as part of remediation activities will be restored to meet current applicable King County standards as adopted by the Town, or as agreed by BNSF and the Town.[7]

Utilities Construction and Restoration – Electrical and telecommunications services may be reconfigured as necessary to maintain these services to residences and businesses that remain inhabitable/operational during remediation activities. New permanent electrical, communications,

[5] Portions of this work are not required by the CD but will occur on the railyard during 2008 and therefore needs to be coordinated with other activities required by the CD.

[6] Portions of this work are not required by the CD but will occur on the railyard during 2008 and therefore needs to be coordinated with other activities required by the CD.

[7] Portions of this work are not required by the CD but will occur on the railyard during 2008 and therefore needs to be coordinated with other activities required by the CD.

and potable water utilities that are removed as part of remediation activities will be restored in-kind, or constructed as agreed by BNSF and the Town.[8]

1.6 Associated Plans

Table 1-2 summarizes the plans that are associated with the 2008 cleanup and referenced in the 2008 EDR. The table also notes where these plans are required under the CD, by permits, by other regulatory agencies, or as stated in other project documents.

Table 1-2 EDR-Associated Plans

Plan/Report	Required by
2008 Air and Noise Monitoring Plan (incl. in CMP)	EIS
2008 Compliance Monitoring Plan	CAP
Erosion and Sediment Control Plan (incl. in SWPPP)	NPDES Permit
Health and Safety Plan (HASP)	OSHA
Hydraulic Control and Containment System Special Design Report	CAP
Stormwater Pollution Prevention Plan (SWPPP)	NPDES Permit
Spill Prevention and Emergency Cleanup Plan (included in SWPPP)	NPDES Permit

.

[8] Portions of this work are not required by the CD but will occur on the railyard during 2008 and therefore needs to be coordinated with other activities required by the CD.

2.0 Regulatory Framework

The regulatory framework for 2008 cleanup activities is described in Master EDR (ENSR, 2007), Section 2.0, and the CD, Exhibit D and E. These include 1) MTCA design requirements; 2) applicable or relevant and appropriate substantive requirements established by state, and local governments to protect public health and the environment; and 3) permitting requirements established by federal law. The regulatory framework presented in the Master EDR was established with the understanding that the referenced regulatory requirements and guidelines are subject to change over the anticipated duration of the remediation activities and that changing site condition could warrant revision of this framework. No apparent changes to applicable regulatory requirements or guidelines have been made since the submittal date of the Master EDR, and there have been no apparent significant changes to site conditions. The regulatory framework presented in the Master EDR is therefore applicable to the 2008 cleanup activities with no revision.

3.0 Design Criteria

3.1 Design Criteria Described in the Master EDR

This section lists references to the site-wide and zone-specific design requirements that were originally presented in the Master EDR and are pertinent to 2008 site activities. These criteria are explicit goals that the remediation activities must achieve in order to be successful. The zone-specific design criteria in the Master EDR were established with the understanding that they could be revised in future annual EDRs as the scope of work was further clarified or re-defined. No apparent changes to applicable regulatory requirements or guidelines have been made since the submittal date of the Master EDR, and there have been no apparent significant changes to site conditions. The overall design criteria presented in the Master EDR therefore requires no revision.

3.1.1 Site-Wide Design Requirements

Table 3-1 provides cross references to the site-wide design requirements described in Master EDR Section 3.1 which are applicable to the 2008 cleanup activities.

Table 3-1 2008 EDR/Master EDR Site-Wide Design Requirements Cross-Reference

2008 Site-Wide Design Requirement	Master EDR Section
Codes	3.1.1
Standards and Guidelines	3.1.2
Shoring and Excavation Stabilization	3.1.3
Excavation Dewatering	3.1.4
Product Recovery	3.1.5
Impacted Soil Handling and Disposal	3.1.6
Clean Overburden Handling and Onsite Reuse	3.1.7
Construction Dewatering Treatment	3.1.8
Construction Treated Water Discharge	3.1.9
Compliance Monitoring	3.1.10
Spill Control and Response	3.1.11
Building Relocation	3.1.12
Access/Haul Roads	3.1.13
Public ROW Restoration	3.1.14
Utilities Restoration	3.1.15
Cleanup Standards	3.1.16
Vapor Mitigation	3.1.17
Construction Safety	3.1.18
Traffic Control and Pedestrian Access	3.1.19
Survey Control	3.1.20

3.1.2 2008 Cleanup Activities Zone-Specific Design Requirements

Table 3-2 provides cross references to the zone-specific design requirements described in Master EDR Section 3.2 which are applicable to the 2008 cleanup activities.

Table 3-2 2008 EDR/Master EDR Zone-Specific Design Requirements Cross-Reference

2008 Zone-Specific Design Requirement	Master EDR Section
Railyard Zone	**3.2.1**
Cleanup Levels (CULs)	3.2.1.2
Excavation Extents	3.2.1.3
Hydraulic Control and Containment (HCC) System	3.2.1.4
HCC Water Treatment System	3.2.1.5
HCC Treated Water Disposal	3.2.1.6
Northwest Developed Zone	**3.2.3**
CULs	3.2.3.2
Relocate Hotel/other Buildings	3.2.3.3
Excavation Extents	3.2.3.4
Compliance Monitoring	3.2.3.8
Northeast Developed Zone	**3.2.4**
CULs	3.2.4.2
Excavation Extents	3.2.4.3
Air Sparging System	3.2.4.4
Compliance Monitoring	3.2.4.5

3.2 Supplemental 2008 Cleanup Activities Design Criteria

This section presents supplemental design criteria information with respect to the 2008 cleanup activities:

- Construction Dewatering Treatment
- Excavation
- Utility Corridor Construction
- Air Sparging System.

3.2.1 Construction Water Treatment

A treatment system will be constructed within a lined facility located in the RYZ. The treatment system will remove petroleum from water generated from construction activities and treat the water to achieve required treatment levels described in the NPDES permits applicable to the system using the processes outlined in the *Water Treatment Engineering Report-Levee Remediation Process Water Treatment and Discharge* (Retec, July 2005). The nominal capacity of the treatment system is 500 gpm, with a maximum flow of 1,000 gpm, in accordance with the NPDES permit issued for the project.

3.2.2 Excavation

Excavation will occur in much the same manner as it was completed in 2006. Full excavation dewatering is not anticipated given the extents of required removal and the general high permeability of the sand and gravel soils being removed. Excavation below the water table will be completed in the wet and excavated materials will be allowed to drain to facilitate transfer and disposal. Some screening of the excavated soils may occur on the railyard if sufficient oversized material is encountered.

Excavation Extents

The 2008 excavation limits include the following: 1) the HCC system; 2) the Railroad Avenue ROW adjacent to the north side of the HCC; 3) the Whistling Post Tavern property; 4) the McEvoy House property; 5) a portion of the church property; 6) the south end of the 4th Street ROW; and potentially 7) NEDZ metals hot spots on the Johnson property. These limits were developed based on the results of previous investigations and the following criteria:

- Remediation construction phasing requested by the Town
- Preliminary design criteria for the HCC system
- Maintaining a vehicle and pedestrian traffic corridor in the Railroad Avenue ROW
- The number of buildings that could be relocated within the construction window
- Property boundaries
- RLs and CULs described in the CD and Master EDR.

The approximate excavation limits are shown on Drawings C-6 through C-12. The limits shown on the drawings were determined based on observations during sampling and the laboratory analytical results. Observations are summarized in the boring logs included in Appendix B. Laboratory analytical results are summarized in Appendix B, Tables 1 and 2. The actual excavation extents within the 2008 remediation boundary will be determined in the field based on excavation confirmation sampling.

Additional sampling of shallow soils on the Johnson property will be performed to define the need for and extent of excavation of metals hot spots.

HCC System. The Town requested that remediation construction be phased such that Railroad Avenue is restored to the maximum extent practicable prior to the Town centennial celebration in 2009. To satisfy this request, the HCC system excavation and the adjacent Railroad Avenue ROW excavation will be completed in 2008. The HCC system must be designed as an adequate collection system and it must be designed to maintain stability of the adjacent railroad tracks. The Depot is being relocated to allow for the excavation for installation of the HCC system. The predicted lateral and vertical extents of the excavation required to construct the HCC were determined based on the preliminary design criteria for the HCC system and are shown on Drawings C-6 through C-12. The anticipated depth of the HCC excavation is 15 to 35 feet bgs. It is anticipated that the HCC system excavation could be accommodated in a stable manner using slopes of 1.5 horizontal:1 vertical above the groundwater table, and 2.5H:1V below the groundwater table. The deeper portions of the HCC system may be installed using drilling or grouting techniques so that stability of the main line tracks can be maintained. The design criteria, excavation extents, and details for the HCC will be presented in the *Hydraulic Control and Containment System Special Design Report*. The lateral and vertical extents of the HCC system excavation could change and will be revised (if necessary) in subsequent design plans. The excavation extents could also be changed based on the results of ongoing field investigations and the results of performance monitoring.

Railroad Avenue ROW. The adjacent Railroad Avenue ROW excavation extents were based on the results of previous investigations and the applicable RLs for petroleum. The section of the Railroad Avenue ROW

adjacent to the HCC system excavation is located within the NWDZ and NEDZ. The anticipated vertical extent of the Railroad Avenue ROW excavation is based on observations during sampling and the depth at which soil analytical results indicate that TPH concentrations exceed 3,400 mg/kg NWTPH-Dx (in the NWDZ) and 30,000 mg/kg NWTPH-Dx or where free product occurs (in the NEDZ). The anticipated maximum depth of the excavation to remove impacted soil is 22 feet bgs. The north excavation boundary will be located within the existing street and is based on the locations of buildings that can not be relocated in 2008. The east and west extents of the Railroad Avenue ROW excavation are the same as those for the HCC system excavation and could change if the east-west extents of the HCC system excavation change. The lateral and vertical extents are shown on Drawings C-6 through C-12. These excavation extents could change based on the results of ongoing field investigations and the results of performance monitoring. It is anticipated that the south side of the excavation could be accommodated in a stable manner using slopes of 1.5H:1V above the groundwater table, and 2.5H:1V below the groundwater table.

Some level of disruption and inconvenience for local residents is inevitable. There will be times when vehicles will need to drive either east or west on Old Cascade Highway or Highway 2 to drive around the construction activities when the crossing is closed. It is also anticipated that there may be full closure of Railroad Avenue near 2nd Street for short periods of time (i.e. 2 or 3 months) to allow removal of impacted soil. Postings of road closures will be provided early in the process so planning can occur, and individual notifications will be made prior to full lane closures. Individual resident's needs will be accommodated as much as possible. An important design criteria for the Railroad Avenue ROW excavation is that the excavation be phased and completed in such a way to accommodate both pedestrian and vehicle traffic to all portions of Town to the extent practicable. Emergency access will be provided at all times This requirement will be placed on the contractor at the time of the bid, but the general concept is that traffic will be routed around the active excavation area, or that excavations will be phased to facilitate access.

Whistling Post Tavern, McEvoy House, and Church. The 2008 excavation extents will include the Whistling Post Tavern and McEvoy House properties. A portion of the adjacent church property and 4th Street ROW will also be excavated. The anticipated vertical extent of this excavation is based on the depth at which soil analytical results indicate that TPH concentrations exceed 3,400 mg/kg NWTPH-Dx (the NWDZ petroleum RL). The anticipated maximum depth of the excavation to remove impacted soil is 20 feet bgs. The lateral excavation extents are based on property boundaries determined by the 2007 survey, the NWDZ petroleum RL, and slopes required to reach the anticipated vertical excavation extents. The lateral and vertical extents are shown on Drawings C-6 through C-12. The excavation extents could change based on the results of ongoing field investigations and the results of performance monitoring.

Metals Hot Spot. Additional sampling will be performed to determine the need for and extent of metals hot spot excavation. The lateral extents of the metals hot spot excavation on the Johnson property will be based on the lead CUL of 250 mg/kg and arsenic cleanup level of 20 mg/kg. All soil within 2 feet of the surface outside the building footprint containing lead and/or arsenic at concentrations above these CULs will be removed.

Shoring and Excavation Stabilization

Part of the 2008 northern excavation boundary will abut future excavation areas. Two primary concerns arise in these areas:

1. Minimize the potential for recontamination of the newly placed fill; and

2. Where practical and necessary, minimize the impacts of future excavation on property that is remediated in the current year.

Much evaluation was completed on this subject during the 2006 construction period, and the end result was a constructed in place shoring system that was built as backfill was placed and compacted in the excavation. A liner was also placed adjacent to the shoring to minimize the potential for recontamination. The shoring

requirements for 2008 will continue to be developed but it is anticipated that the shoring will be similar to what was used in 2006. Shoring design will be completed by the contractor to federal and state standards and will be stamped by a contractor-selected P.E. registered in the State of Washington.

3.2.3 Utility Corridor Construction

The basis of design for PSE, Verizon, and Town of Skykomish utilities is unchanged from the Master EDR. PSE, Verizon, and the Town are completing their own designs power, telephone, and sanitary sewer. KPG will be designing the water system.

3.2.3.1 Town of Skykomish Utilities

A utility corridor will be constructed at the approximate location shown on Drawing C-4 to accommodate Town utilities. The location was selected by the Town. The utility corridor will be designed and constructed in accordance with the BNSF Utility Accommodation Policy (Rev. May 5, 2007), which is included as Appendix A. The corridor will be formed by constructing of a trench of sufficient width and depth to accommodate two 30-inch diameter casings.

3.2.3.2 Hydraulic Control and Containment System/Air Sparging System/Construction Water Treatment System

A utility corridor will be constructed at the approximate location shown on Drawing C-4 to accommodate piping for the construction water treatment system, HCC water treatment system, and air sparging system. The utility corridor will be designed and constructed in accordance with the BNSF Utility Accommodation Policy (Rev. May 5, 2007), which is included as Appendix A. The corridor will be formed by constructing a trench of sufficient width and depth to accommodate one 30-inch diameter conduit.

3.2.4 Air Sparging System

Air sparging (AS) is a well-demonstrated *in situ* technology for removing and enhancing biodegradation of volatile and semi-volatile contaminants (including diesel fuel) in groundwater and vadose zone soils. Air sparging consists of injecting low pressure air into a contaminated aquifer. The injected air moves horizontally and vertically through the soil column and strips volatile and semi-volatile contaminants (including diesel fuel) from groundwater and vadose zone soils by volatilization. Injected air also introduces oxygen into groundwater and vadose zone soils, thereby increasing biological activity. The proposed AS system will consist of a blower system installed on the railyard, a network of underground piping, and vertical injection wells. The sparging system design basis and criteria for selecting air sparging system components are described below.

3.2.4.1 Cleanup Levels

Air sparging will be implemented to meet the performance standards specified in the CD, including:

1. Reducing petroleum concentrations in soil to below the *in situ* RL of 3,400 mg/kg NWTPH-Dx after excavation to remove free product and soil containing petroleum at concentrations greater that 30,000 mg/kg NWTPH-Dx is completed

2. Reducing petroleum groundwater concentrations to the CUL of 208 µg/L NWTPH-Dx and absence of sheen or free product at the conditional point of compliance immediately (within 2 years where the conditional point of compliance is at the river)

3. Reducing petroleum groundwater concentrations to 477 µg/L NWTPH-Dx and absence of sheen or free product throughout the NEDZ within a restoration time frame of 10 years.

3.2.4.2 Air Sparging Areas

Sparging wells will be installed in Area 1 as shown on Drawings C-4 and C-17. The design of the AS system will allow for the system to be expanded, as necessary, based on the results of compliance monitoring. The sparging areas were determined based on the following:

- The excavation extents for removal of soil impacted with petroleum at concentrations that exceed the RL of 30,000 mg/kg NWTPH-Dx
- The predicted extents of NEDZ soil impacted with petroleum at concentrations that exceed the 3,400 mg/kg NWTPH-Dx following excavation
- The extents of NEDZ groundwater impacted with petroleum at concentrations that exceed the RL of 477 µg/L NWTPH-Dx
- The apparent localized groundwater flow pathway, as determined based on the results of previous investigations
- The relative location of the conditional point of compliance (South Fork Skykomish River) to NEDZ soil and groundwater impacted with petroleum at concentrations that exceed the respective RLs and CUL.

Soil and groundwater isoconcentration contours and the apparent groundwater flow pathway were developed based on previous investigations and are shown on Drawing C-17. The excavation extents were developed using the criteria described in Section 3.2.2.1 and are shown on Drawing C-6. Groundwater isoconcentration contours were developed using analytical data from the second quarter 2007 groundwater sampling event. This data is presented in Appendix B Table 2.

Area 1 includes the areal extents of NEDZ soil impacted with petroleum at concentrations exceeding the RL of 3,400 mg/kg NWTPH-Dx. Sparging wells will be installed in Area 1 to reduce soil petroleum hydrocarbon concentrations where they are highest and to reduce groundwater petroleum concentrations that exceed 477 µg/L NWTPH-Dx.

3.2.4.3 Air Sparging Well Layout

The spacing of sparging wells is dependent upon the sparging well radius of influence (ROI), and the presence of aboveground and underground structures, such as buildings, septic tanks, and utilities. The ROI is based on the hydrogeologic characteristics of the sparging area and describes the areal extent of the formation that is affected by air injected through an individual sparging well. Literature suggests that the ROI may be two to three times the depth of an injection well below the water table (Marley *et al*., 1992a; P.J. Ware, 1993; Marley *et al*., 1992b; Leonard and Brown, 1992; and Felten *et al*., 1992). This empirical information suggests that the ROI of an injection well is approximately 1.5 times the distance between the water table and the top of the screened section of the well.

The approximate depth of the water table within the sparging areas varies from approximately 10 to 14 feet bgs. The target zone for injection in the NEDZ is approximately 10 feet below the low water table, or approximately 24 feet bgs. The distance between the water table and the top of the screened interval is therefore 10 feet and the estimated ROI is 15 feet. ROI calculations are included in Appendix C. The anticipated sparging well configurations are shown in Drawing C-17. The wells are spaced at 24 feet such that the estimated ROI overlap by approximately 6 feet (40% of the ROI). These design criteria result in 18 sparging wells proposed for Area 1.

3.2.4.4 Sparging Air Injection

Air will be injected into each well at a design flow rate of 3-5 standard cubic feet per minute (scfm). The design flow rate was determined based on previous experience designing and operating similar AS

systems and will be adjusted in the field during system optimization. The design flow rate will be sufficient to deliver oxygen to impacted groundwater at a concentration that typically exceeds the biological oxygen demand (BOD) of *in situ* aerobic microbes and mobilizes volatile components of impacted groundwater. Sparging air will be injected at an estimated design pressure of 7-10 psig. The pressure is sufficient to overcome hydrostatic head and minor losses at the well screen, and head losses in air piping. Blower sizing calculations are included in Appendix C.

3.2.4.5 Sparging Equipment

Air sparging blowers will be located within the mechanical equipment building on the railyard. The building will be completely enclosed to reduce ambient noise and to protect the equipment from environmental exposure. Blowers will be selected based on rated flow and pressure. Sparging air will be conveyed from the blowers to a utility vault through two headers installed in the 30-inch casing constructed across the railyard. One header will be connected to a manifold installed in the vault. The manifold will be designed to control sparging air flow and pressure to each well through an individual supply line. The second header will be capped near the vault. All underground sparging air piping will be high-density polyethylene (HDPE). HDPE is selected based on ease of construction and corrosion resistance. Vaults and underground piping will be installed in public ROWs whenever practicable. Above ground sparging air piping will be steel. Piping will be rated for a working pressure at least 2 times greater than the blower maximum operating pressure and will be sized to deliver air at the design flow rate and pressure.

3.2.4.6 Sparging Wells

Sparging wells will be constructed in accordance with the Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 WAC). Sparging wells will be constructed to deliver sparging air at a depth of approximately 10 feet below the seasonal low groundwater table using at the design flow rate and pressure with minimal losses due to short circuiting.

4.0 Scope of Work

4.1 Site-Wide Scope of Work Described in the Master EDR

This section lists references to the elements of the site-wide scope of work that were originally presented in the Master EDR and are pertinent to 2008 site activities. The site-wide scope of work was established with the understanding that it could be further clarified or re-defined over the anticipated duration of remediation activities. No changes to the scope of work have been identified since submittal of the Master EDR. Table 4-1 provides cross references to the site-wide scope of work items described in Master EDR Section 4.1 which are applicable to the 2008 cleanup activities.

Table 4-1 2008 EDR/Master EDR Site-Wide Scope of Work Cross-Reference

2008 Site-Wide Scope of Work	Master EDR Section
Drawings	4.1.1
Solicitation Package and Procurement	4.1.2
Permits	4.1.3
Mobilization and Site Preparation	4.1.4
Utility Locate	4.1.4.1
Surveying	4.1.4.2
Clearing and Grubbing	4.1.4.3
Spill Response	4.1.4.4
Temporary Facilities Construction	4.1.5
Access Agreements	4.1.6
Building Relocation	4.1.7
Relocation of Landmark and Historic Buildings	4.1.7.1
Relocation of Other Buildings	4.1.7.2
Excavation	4.1.8
Product Recovery	4.1.8.1
Wildlife Exposure Mitigation	4.1.8.2
Historic Structure Monitoring	4.1.8.3
Dewatering	4.1.8.4
Transporting Excavated Soil Onsite	4.1.8.5
Stockpiling Impacted Soil	4.1.8.6
Stockpiling Clean Overburden for Potential onsite Re-Use	4.1.8.7
Excavation Performance Sampling	4.1.8.8
Stockpile Amendment	4.1.8.9
Transportation and Disposal of Impacted Soil	4.1.8.10
Backfilling	4.1.8.11

2008 Site-Wide Scope of Work	Master EDR Section
Grading and Compaction	4.1.8.12
Dust Suppression and Mitigation	4.1.8.13
Compliance Monitoring	4.1.9
Protection Monitoring	4.1.9.1
Performance Monitoring	4.1.9.2
Confirmational Monitoring	4.1.9.3
Replacement of Relocated Structures and Restoration of Remediated Properties	4.1.10
Electrical and Telecommunications Utilities Restoration	4.1.11
Stormwater Collection System Construction	4.1.12
Wastewater Collection and Treatment System Construction	4.1.13
ROW Restoration	4.1.14

4.2 2008 Scope of Work

The following description of the 2008 scope of work supplements the information provided in the Master EDR.

4.2.1 Access Agreements

BNSF is contacting property owners to negotiate access agreements for properties where excavation is required to meet CULs or air sparging equipment must be installed to meet CULs. As described in the Master EDR, property owners may elect to not relocate and have subsurface containment put in place. Properties that require access agreements for the 2008 work are:

- Parcel number 780780-0250 (McEvoy House property) for building relocation and excavation
- Parcel number 780780-0440 (Whistling Post Tavern property) for building relocation and excavation
- Parcel number 780780-0270 (Skykomish Community Church property) for excavation
- Parcel number 780780-0140 (Johnson property) for metals investigation and potential metals excavation
- Parcel number 780780-0085 (Joselyn property) for AS system construction.

The CD requires documentation that access agreements necessary for 2008 work are provided to Ecology on or before December 31, 2007.

Access to the McEvoy House and Whistling Post Tavern properties will be necessary to relocate the buildings and to complete excavation and restoration activities. These negotiations are in progress.

Access to the Church property will be necessary to complete excavation activities. These activities could include the placement of structural supports in order to facilitate removal of petroleum impacted soil in close proximity to the building foundation. Current data suggests that underpinning of the church building will not be required in order to complete the excavation. These negotiations are in progress.

Access to the Joselyn property will be necessary to install and operate the Area 1 AS system. AS system installation will include constructing wells, trenching, and installing underground piping in the landscaped area surrounding the house. Vapor mitigation may also be required based on the long-term success of the AS system and subsequent air monitoring on this property. BNSF has an access agreement for this property.

Access to the Johnson property will be necessary to sample for metals in surface soil and, if necessary, remove contaminated surface soil. BNSF has an access agreement for this property.

4.2.2 Building Relocation

Buildings that will be relocated during the 2008 work are:

- BNSF Depot
- McEvoy House
- Whistling Post Tavern (aka Olympia Building).

All three of these buildings are on the National Register of Historic Places and will be moved and restored in accordance with the procedures described in Master EDR Section 4.1.7.1. Historical and structural surveys have been completed for each building. A Preliminary Structural Assessment report for the three buildings is included in Appendix D. Potential temporary relocation areas for these three buildings are shown on the Construction Layout Plan (Figure C-12). Building relocation guidelines will be prepared by the contractor conducting historical and structural surveys. These guidelines will be incorporated into relocation scopes of work, plans, and specifications and will be followed during relocation. Structures will be monitored in accordance with the developed guidelines during the move to the temporary storage location. Security fences will be installed around the relocated buildings for the duration of their storage and will be monitored by security personnel.

4.2.3 Resident Relocation

The required construction on the site will involve large equipment and significant truck traffic. Some level of noise, vibration and traffic congestion are unavoidable such that some residents in very close proximity to active construction areas may determine that the construction impacts and their unique living circumstances are such that relocation is desirable and warranted. These are properties where BNSF does not need access for purposes of completing the work. BNSF will consider these requests on a case-by-case basis in consultation with Ecology and will attempt to accommodate affected residents if, as and when necessary. As noted above, BNSF is negotiating access to the McEvoy House and Whistling Post Tavern and as part of those arrangements the residents will be relocated in order to facilitate remediation activities.

4.2.4 Church Services

Access to the church will be restricted during remediation activities. Church services may be temporarily relocated to Maloney's General Store, or another location in or near Skykomish acceptable to the owners of the Church property, from approximately April 2008 to October 2008. Parking for church service attendees will be provided at the temporary location, however the parking area may be modified over time as required to accommodate construction in the area. There will be pedestrian access to Maloney's General Store, or another location, for Church services.

4.2.5 Temporary Facilities Construction

Access and Haul Roads

The main access and haul roads that will be used during the 2008 work are Railroad Avenue, 5th Street, and the Old Cascade Highway, as shown on Drawing C-4. It is anticipated that trucks will enter the railyard from 5th Street and exit to Old Cascade Highway after transferring material to the soil handling facility. Other roads

and/or alternate truck routing may be used at the discretion of the contractor. These changes will be proposed to Town officials and emergency personnel for approval prior to implementation.

Equipment Decontamination Area

A heavy equipment and truck decontamination area will be constructed in the RYZ at the location shown on Drawing C-4 or at another appropriate location at the recommendation of the contractor. Decontamination water will be temporarily stored on-site and taken to an off-site licensed facility for disposal or treatment.

Construction Offices

Temporary construction offices will be located on the railyard. A temporary engineering field office may be established in Maloney's General Store on Railroad Avenue.

Temporary Electric and Communications Utilities

Existing electric and communications services will be maintained for all Skykomish residences and businesses that remain occupied during the 2008 remediation activities. PSE and Verizon have developed plans to temporarily reconfigure overhead electric and telecommunications wiring in order to maintain these services. The temporary reconfiguration is shown on the 2008 Conceptual Restoration Plan (see Appendix E). Structures that are outside of the active construction zone but vacant due to relocation of residents will also continue to be serviced by all appropriate utilities.

Temporary Potable Water Utilities

Temporary potable water piping may be constructed in ROWs as necessary to maintain services during excavation activities.

Enclosures and Fencing

Temporary chain link fencing will be installed along the perimeter of the 2008 remediation area, as shown on Drawing C-4. Warning signs will be posted at every gated entrance and at approximate 50-foot intervals along the fence line to warn the public that the fenced area contains physical and chemical hazards and that access is forbidden to unauthorized personnel.

Sediment and Erosion Controls

Sediment and erosion control measures will be implemented as described in the Stormwater Pollution Prevention Plan and Temporary Erosion and Sediment Control Measures for Levee Cleanup Action (RETEC, 2006a) and as shown in Drawing C-13.

Construction Staging Areas

Construction staging areas will be established in the RYZ at the locations shown on Drawing C-4, at other RYZ locations as agreed to by BNSF and the Contractor, or at locations outside of the RYZ as agreed to by the Town, BNSF, and the Contractor. Staging may also occur on private properties that are in the excavation area. The McEvoy House will be temporarily stored at the east end of Railroad Avenue, the Whistling Post Tavern will be stored west of its current location, and the Depot will be stored southeast of the railyard on BNSF property along Old Cascade Highway.

Spill/Emergency Response Equipment

Spill response equipment will be located in the contractor staging area shown in Drawing C-4, or at a location determined by the contractor. Spill response equipment will include oil absorbent booms and pads, as described in the Spill Response Plan (part of the SWPPP, RETEC, 2006a).

Construction Water Treatment System

A treatment system similar in function and performance to the one permitted under the existing NPDES permit and implemented for the levee remediation in 2006 will be operated during 2008 remediation activities. The water treatment system will be constructed in a lined facility located within the RYZ at the approximate location shown on Drawing C-4. Other locations on the railyard will be considered if the contractor suggests moving the location to facilitate work activities. The treatment system will remove petroleum from water generated from construction activities and treat the water to achieve required treatment levels described in the NPDES permit. Drawing C-16 presents the process and instrumentation diagram (P&ID). The water treatment system design is described in the *Draft Engineering Report – Levee Remediation Process Water Treatment and Discharge* (RETEC, 2005b). System operation and maintenance is described in the current *Draft Operations and Maintenance Manual for Water Treatment System* (RETEC, 2006b).

4.2.6 Hydraulic Containment and Control

The HCC system will be constructed as part of the 2008 remediation activities. The HCC system design will be developed in accordance with the *Hydraulic Control and Containment System Special Design Report Work Plan* (RETEC, 2007b). The HCC system 30% design will be submitted in the *Hydraulic Control and Containment Special Design Report*.

4.2.7 Excavation

Clearing and Grubbing

All surface objects, brush, roots, and other protruding obstructions, and all trees and stumps will be cleared and/or grubbed from the excavation extents as indicated on Drawing C-5. The removed vegetation and debris will be recycled or disposed of at an appropriate municipal landfill.

Demolition

Asphalt roads and concrete building foundations, slabs, and walkways located within the excavation area will be demolished and recycled or disposed of at an appropriate construction demolition waste (CDW) landfill.

Extents

Excavation will include removing soil as necessary to reach the estimated areal and vertical extents of impacted soil shown on Drawings C-6 through C-12. Based on these extents, an estimated 56,000 cubic yards of soil will be removed from the site in 2008. The excavation extents as well as the clean overburden and impacted soil volumes will be refined based on the results of ongoing field investigations and the results of performance monitoring.

Removing Utilities

At grade and underground stormwater and potable water utilities will be removed during the excavation activities and will be recycled or disposed of at an appropriate CDW landfill.

Shoring and Barriers

Shoring is anticipated to be used during the HCC excavation and Railroad Avenue ROW excavations to provide structural support at the north excavation boundary. Shoring is also anticipated to be used at the Whistling Post Tavern property for structural support and to prevent contamination of clean fill. Temporary shoring will be constructed in 2008 and surface improvements will be constructed over remediated areas adjacent to the shoring. The main purpose of the shoring will be to protect the surface improvements completed in 2008 when subsequent excavation occurs in the area. The final shoring design will be completed by the contractor, but it is anticipated that the shoring will consist of a reinforced earth wall that may or may not have lock blocks (large concrete blocks) facing the wall. Deeper portions of the wall may be constructed of controlled density fill and a

combination of reinforced earth and blocks that would remain in place as permanent backfill. In areas where shoring is used to separate clean fill from impacted soil, the shoring will remain in place until the adjacent impacted soil is removed or remediated. The shoring will be planned and designed so that future utility installation and maintenance are not adversely affected.

Impermeable barriers will be placed to prevent contamination of clean fill at the north, south, and west excavation boundaries. Construction of the HCC wall will prevent contamination of the clean fill placed north of the wall. Contamination of clean fill that is placed upgradient of areas slated for future excavation will be addressed through the use of a temporary liner similar to the one placed at the upgradient extent of the 2006 removal. The liner will be placed at the northern extent of the 2008 excavation area along areas where future excavation is planned.

Backfilling

Excavations will be backfilled with both clean overburden material and imported aggregate material. Topsoil will be placed on residential properties and on Town properties that will be restored with landscaping.

Clean Overburden Material

Overburden material with petroleum concentrations less than 3,400 mg/kg NWTPH-Dx may be used as backfill on-site as outlined in Section 6.4 of the CAP. Soil within two feet of final grade must meet the petroleum cleanup level of 1,870 mg/kg NWTPH-Dx. No soil with arsenic concentrations exceeding 20 mg/kg, lead concentrations exceeding 250 mg/kg, PCB concentrations exceeding 0.65 mg/kg, or dioxin/furan concentrations exceeding 6.67 ng/kg Total Toxicity Equivalent Concentration will be used as backfill on the site.

Imported Aggregate Material

Excavations will also be backfilled with imported aggregate material that is suitable for placement and compaction under the site conditions. Given that the excavations will not be fully dewatered, backfill placed below the water table will need to be relatively clean (little to no fines) granular material that goes in place relatively compact, and is relatively easy to compact in a thick layer when compaction equipment is placed on the fill once it extends above the water surface elevation. The water surface elevation is anticipated to change throughout the construction season as the water table drops into summer. Given that the material will be placed below the water table, compaction testing will not be possible. A large compaction effort will be required on the fill at the point where it protrudes above the water level. Material placed below the water table (stabilization aggregate) is anticipated to conform to the following grain size:

Sieve Size	Percent Passing
2 ½ square	100
2 square	65-100
¾ square	40-80
U.S. No. 4	5 (max.)
U.S. No. 100	0-2
% Fracture	75 (min.)

Backfill placed above the stabilization aggregate is called structural fill, and it will conform to the following grain size requirements:

U.S Standard Sieve Size	Allowable Percent Passing
4-inch square	100
2-inch square	75-100
No. 4	50-80
No. 40	30 max.
No. 200	15 max.
Sand Equivalent	50 min.

All percentages are by weight. Note that the quantity of fines (material passing the No. 200 sieve) may be decreased to a maximum of 5 percent if the fill is to be placed during wet weather conditions.

Sieve analyses for backfill material placed against the HCC will be specified in the *HCC Special Design Report.*

Imported aggregate materials will also be required to demonstrate that they do not contain potential contaminants with concentrations greater than:

Hazardous Substance	Maximum Concentration
Arsenic	20 mg/kg
Cadmium	2 mg/kg
Chromium VI	19 mg/kg
Chromium III	2,000 mg/kg
Lead	250 mg/kg
Mercury	2 mg/kg
NWTPH-Dx	1,870 mg/kg

Topsoil

Topsoil will be placed in residential yards and public parks. Topsoil must meet the following requirements:

Parameter	Requirements
Sieve Analysis	Screened using sieve no finer than 7/16" and no greater than ¾"
pH	5.5-7.5
Electrical Conductivity	< 3.0 mhos/cm
Carbon to Nitrogen Ratio	< 15:1
Process to Further Reduce Pathogens Certified for Hot Composting	Yes
Arsenic	< 20 mg/kg
Cadmium	< 2 mg/kg
Chromium VI	< 19 mg/kg
Chromium III	< 2,000 mg/kg
Lead	< 250 mg/kg
Mercury	< 2 mg/kg

Parameter	Requirements
NWTPH-Dx	< 1,870 mg/kg

Grading

Excavated areas will be restored to their original grade or to a suitable grade to facilitate stormwater control, as agreed to by BNSF, the Town, and property owners (where applicable). Grading plans will be presented as part of subsequent design plans. Structural fill will be placed in lifts and compacted to a minimum density of 95 percent of the maximum proctor density as determined by ASTM D-1557, Modified Proctor.

4.2.8 Air Sparging System

Mechanical Equipment

Mechanical equipment will be installed in the remediation equipment building located on the railyard at the approximate location shown on Drawing C-4. Pressurized air will be supplied by a blower system capable of delivering 150 scfm at 10 psig. Pressurized air exiting the blower system will be cooled using heat exchangers. A sparging system process and instrumentation diagram is shown in Drawing C-19.

Piping and Manifolds

Pressurized air will be conveyed from the remediation equipment building to the Area 1 utility vault through 4-inch SDR 17 HDPE headers. The headers will run through the utility corridor on the railyard conduit and in underground trenches constructed at the approximate locations shown on Drawing C-17. A manifold will be installed in the utility vault. Sparging air will be conveyed from the vault to sparging wells through 1-inch SDR 17 HDPE piping installed in a trench. Trench details will be provided in subsequent design plans.

Injection Wells

Injection wells will be installed at the locations shown on Drawing C-17. The wells will be installed to a depth of approximately 24 feet bgs, which is approximately 10 feet below the seasonal low water table. Injection wells will be constructed using 2-inch diameter Schedule 40 PVC casing. A two-foot section of well screen will be installed at the bottom of the casing. A 2-inch PVC end cap will be fitted to the bottom of each wells screen. The screened interval will be backfilled with sand or gravel. A 1-foot cement-bentonite seal will be constructed above the sand/gravel pack. The remaining well annulus will be filled with bentonite. The wellheads will be constructed below the ground surface. A typical well construction detail is provided in Drawing C-18.

Electrical Service

It is anticipated that the blower motor and other equipment located in the remediation building will be supplied with electrical power from the existing overhead service located on the railyard or Old Cascade Highway. Power requirements will be provided in construction specifications.

4.2.9 Vapor Mitigation

Based on the current excavation extents, and what is currently known about impacts in the area, the house located on Parcel #780780-0085 (Joselyn property) will remain in place in the NEDZ over soil contamination exceeding 3,400 mg/kg NWTPH-Dx. Soil and groundwater on this property will be treated using AS. As required in the Cleanup Action Plan, air monitoring described in the AMP will be conducted before and after AS system construction and startup. It is anticipated that engineered controls, such as active venting using fans, would be implemented if total petroleum hydrocarbons concentrations in the crawl space exceed the CUL of 1,346 µg/m^3. These engineered controls will be designed based on monitoring results and site conditions and constraints. The engineered controls would remain in place until monitoring demonstrates that the groundwater CUL has been achieved. Design information, plans, and specifications would be provided to Ecology and the property owner before implementation.

4.2.10 Stormwater Collection System Construction

Stormwater catch basins and underground conveyance piping will be constructed in the Railroad Avenue and 4th Street ROWs, at the approximate locations shown in the 2008 Conceptual Restoration Plan (Appendix E). The sizes and locations of catch basins and conveyance piping will be based on the stormwater capture zone boundaries. Final capture zone boundaries, catch basin locations, and conveyance piping locations and sizes will be shown in subsequent design plans.

The existing stormwater conveyance system on 4th Street does not meet current King County standards. The system consists of two catch basins and a 6-inch-diameter outfall pipe that extends out into the Skykomish River at the northern terminus of 4th Street. The total length of the system on 4th Street is approximately 140 feet. Requirements to upgrade the street improvements to King County standards within the remediation area mean that additional stormwater flow will be added to the existing system from newly installed catch basins on Railroad Avenue and on the refurbished portions of 4th Street. Since the remediation area does not extend out to the river along 4th Street, replacement of the outfall structure and piping will not be completed. Because of this, and since the outfall pipe is currently a 6-inch-diameter pipe, some water ponding similar to what currently occurs, may occur during heavy rain events. Additional evaluations will be completed to further identify and define when and where ponding should be expected.

The existing stormwater conveyance system on 3rd Street consists of a single catch basin just south of Railroad Avenue, and a 10-inch-diameter pipeline that extends around 340 feet to the north to the Skykomish River. It is anticipated that this line will have a small addition of stormwater flows due to addition of curb, gutter, and catch basins on Railroad Avenue East of 3rd Street. In addition, it is currently anticipated that any water exiting the HCC water treatment system that cannot be re-injected on the railyard could discharge to the South Fork Skykomish River through the existing 3rd Street outfall. It is anticipated that the 10-inch-diameter line will be sufficient to handle the additional flows, but additional calculations and evaluations will be completed to verify that the outfall pipe will handle the flows.

4.2.11 Wastewater Collection and Treatment System Construction

Sanitary sewer infrastructure for the community collection system will be installed at the McEvoy House and the Whistling Post Tavern, and in the excavated sections of the Railroad Avenue and 4th Street ROWs. Infrastructure may include the tanks, piping, pumps, vaults, and electrical appurtenances. Construction details will be included in subsequent design plans.

4.2.12 ROW Restoration

Town roads within the 2008 excavation area, as shown in the 2008 Conceptual Restoration Plan (Appendix E), will be restored to King County road standards, as adopted by the Town. Restoration will include backfilling and grading roadways, placing base material, asphalt paving, and installing curbs and gutters at select locations. The approximate locations of sidewalks, utilities, curbs and gutters have been determined based on the locations of existing curbs and gutters. As was the case with the 2006 restoration work, the actual locations of sidewalks, utilities, curbs and gutters will be determined based on Town comments and by agreement between the Town and BNSF and between the Town and affected landowners. Revised locations and construction details will be provided in subsequent design plans.

4.2.13 Utility Corridor Construction

Two utility corridors will be constructed across the RYZ at the approximate locations shown on Drawing C-4. One utility corridor will be provided for Town use and will consist of a 30-inch diameter casing installed in a trench. This casing will be completed in access structures on both ends, and it may extend to the south to join up with the anticipated east-west sewer line location along the northern end of the railyard. BNSF will complete the casing and access manholes on both sides, or as agreed upon by BNSF and the Town.

The second utility corridor will provided for remediation use and will include 30-inch conduits for HCCS water, construction water, and air sparging piping. Geotechnical testing is being conducted to determine the best

method for installation of the two conduits. Conduits will be installed in accordance with the BNSF Utility Accommodation Policy (BNSF, 2007).

4.2.14 Electrical and Telecommunications Utilities Restoration

BNSF is responsible for replacing utilities to their current or equivalent configuration (i.e., above ground) in accordance with applicable codes. It is the Town's desire to convert overhead electrical utilities to an underground system. Therefore, it is anticipated that the Town will enter into a Schedule 74 agreement with PSE for the conversion of overhead electrical utilities located within the 2008 remediation area and in additional areas, as shown in the 2008 Conceptual Restoration Plan (Appendix E). The conversion will include installing underground wiring and pad-mounted transformers in place of pole mounted equipment, installing wiring from transformers to residential meters, and providing stub-ups or junction boxes for connection to street lights and other appurtenances installed as part of the restoration. Per the agreement terms, 60% of design and construction costs to complete this scope of work will be paid for by PSE. Payment for the remaining 40% will be the responsibility of the Town. Design drawings for the conversion scope of work will be prepared by PSE and their contractor, Potelco, after the agreement has been established.

If BNSF and the Town come to an agreement on underground installation in lieu of overhead restoration (BNSF's current commitment for the work), then BNSF will install underground conduits for electrical services in a joint utility trench within the 2008 remediation area, as specified in PSE/Potelco plans. BNSF will also install conduit for telecommunications (telephone) and high speed internet in the same trench and concrete pads for above-ground transformers. Note that since there is no current high speed internet conduit in place in the Town, agreement between BNSF and the Town is required prior to installation of conduit for high speed internet. Trench details, conduit specifications, and transformer locations and pad specifications will be provided by PSE/Potelco after the Schedule 74 agreement has been established. Additional conversion scope of work items will be defined by PSE and the Town.

4.2.15 Replacement of Relocated Structures and Restoration of Remediated Properties

Replacement of relocated structures and restoration of remediated properties will be completed at the conclusion of excavation activities as outlined in Master EDR Section 4.1.10. A preliminary review of property surveys indicates that there is one property line issue in the 2008 construction area that may affect restoration activities. Parcel 780780-0440 contains the building called the Whistling Post Tavern. Property line surveys indicate that the eastern edge of the Whistling Post Tavern building is currently located on Town property. The encroachment distance is around 0.7 feet. While this distance does not pose a problem related to public improvements on Town property, BNSF cannot replace the privately owned building on Town property without an agreement between the owner of parcel 780780-0440 and the Town.

4.2.16 Demolition and Replacement of Section Building

BNSF has decided that the existing Section Building on the railyard will be demolished and replaced with a new Section Building sized to accommodate the all of the existing operations required at the yard. This work is not required by the CD but will occur on the railyard during 2008 and therefore needs to be coordinated with other activities required by the CD. Licensed contractors will complete asbestos and lead surveys and abatement, if necessary, prior to demolition. The demolition debris will be recycled or disposed of at an appropriate CDW landfill.

The new Section Building will be constructed on the railyard west of 5th Street and south of the tracks at the approximate location of the existing Section Building (see Drawing C-4). Construction will include forming a new foundation, installing septic system infrastructure to allow connection to the Town's community wastewater treatment system when it is available, erecting the building, and installing potable water and electrical services. The building is currently planned to be a modular pre-constructed building that will be brought onto the site and assembled in pieces.

5.0 Construction Sequencing and Phasing

Construction sequencing and phasing will generally be determined by the general contractor subject to engineer approval. Some sequencing is time critical or affects pedestrian and vehicle access throughout the Town. These items are described below. The timing of the installation of the air sparging system and the HCC water treatment system are not time critical and will be determined by the general contractor subject to engineer approval.

5.1 Depot Relocation

The Depot is directly in the pathway of the HCC construction, and therefore will be the first building requiring relocation. As such, preparation and relocation of the Depot may be completed ahead of the primary construction contract in order to prepare the site for HCC work as soon as possible. This decision will be made later in the design process.

5.2 Main Excavation Phasing

The current excavation plans call for removal of nearly all of Railroad Avenue and some areas that extend to the north of Railroad Avenue. Removal and reconstruction of this major arterial in Skykomish will require careful planning, and some inevitable street closures and inconveniences to the local residents. The construction method of the HCC is yet to be determined, but it will likely require significant time to build and potentially require concrete cure time if concrete is used in the barrier system. The HCC and excavation will also cross 5th Street, the major north-south arterial in the Town, requiring that 5th Street be closed at some point. While the details of this phasing will be left to the contractor to complete in the most effective and efficient way possible, certain restrictions on the work are anticipated. These restrictions include:

- Resident access must be maintained at all times to all houses that remain occupied. No areas can be fully blocked off from access. Access may be restricted to single traffic lanes, or in some extreme short-term cases, to guided or pedestrian access through construction zones.
- Emergency access must be maintained at all times to occupied houses.
- Fire access must be maintained to all remaining structures and to houses that are temporarily stored in staging areas.
- Minimize the time that the 5th Street railroad crossing will be closed to pedestrian and emergency traffic.
- Complete the restoration work prior to October 30.

A viable construction phasing approach was developed based on the stated restrictions. This approach may or may not be utilized by the contractor as they develop their approach to the work. However, any suggested work approach will need to follow the restrictions stated in this section to be considered a viable approach to the work. A viable approach consists of two phases of work. The first phase is completion of the HCC, completion of the southern portion of the excavation, and general site preparation activities. The second phase includes moving structures, completion of the remaining excavation, and site restoration. The following more detailed description of the phases is not intended to be all inclusive. It is intended to present the basic components of construction for each phase.

5.2.1 Phase 1

- Move the Depot to a temporary storage location if it has not already been moved.
- Prepare the McEvoy House and Whistling Post Tavern for moving: includes moving residents and contents, installation of support beams, disconnect all utilities, secure the structure so that it is ready to move.
- Install all utility bypasses.
- Construct a temporary crossing of the railroad tracks to be used for emergency vehicles.
- Construct a temporary construction crossing of the mainline tracks so that excavated material can be moved to the soil handling facility while the 5th Street crossing is closed.
- Construct the barrier portion of the HCC: includes closing the 5th Street railroad crossing for some time period while construction activities occur in the immediate vicinity of the crossing.
- Complete excavation north of the HCC while still maintaining a single lane of traffic on Railroad Avenue east of 4th Street. The 5th Street crossing will remain closed during excavation work on 5th Street. It is estimated that the crossing could be closed for several months (up to three).
- The Whistling Post Tavern may be moved to a temporary storage location (to the west a short distance from its current location) during this time period.
- Where additional future excavation to the north will be required (between 4th Street and Maloney's General Store), backfill the excavation as far north as possible while maintaining separation between the excavation and backfill faces.
- Install shoring along the north side of the backfill area between 4th Street and 5th Street, and in the backfill zone west of 5th Street and adjacent to Maloney's General Store.
- Backfill the area east of 4th Street.
- Open up 5th Street to traffic.

5.2.2 Phase 2

- Move the McEvoy House to a temporary storage location east of the construction activities on Railroad Avenue
- Establish a driving surface on the newly backfilled area adjacent to the HCC and move Railroad Avenue traffic to that surface
- Move the Whistling Post Tavern if it was not moved in Phase 1
- Complete the remaining excavation
- Install shoring where required
- Backfill the excavation area
- Complete restoration activities
- Completion of the remaining HCC features including the water treatment facility.

Phase 1 and 2 construction and traffic routing on the impacted section of Railroad Avenue are illustrated on Drawing C-20.

5.3 5th Street and Railroad Avenue Intersection

The intersection of 5th Street and Railroad Avenue may be closed for several months. During this time, traffic will be rerouted out to Highway 2 to access the Old Cascade Highway. Emergency vehicles will be given a

temporary crossing west of the HCC construction area to be able to access people and property north of the tracks in the event of an emergency.

5.4 Traffic Routing and Pedestrian Access

A significant amount of construction will occur in Town during 2008. Construction will impact the two main arterials through Town: Railroad Avenue and 5th Street. Some disruption to daily traffic patterns will therefore be unavoidable ands some level of disruption and inconvenience for local residents is inevitable.

Excavation will occur on both Railroad Avenue and 5th Street, and the 5th Street railroad crossing will be closed for a period of time. There will be times when vehicles will need to travel east or west on Old Cascade Highway or Highway 2 to drive around the construction activities when the crossing is closed. We anticipate that the 5th Street RR crossing will be closed only when school is not in session, such that impacts to pedestrian and bus traffic that typically utilizes this crossing for school access are minimal.

Access will be maintained at all times for all occupied residential structures through Town with the exception of possible very short closures of Railroad Avenue near 2nd Street. At all other times, at least one lane of travel will be provided along all the streets (except possibly along Railroad Avenue between 4th and 6th Streets) within the Town limits throughout the construction period. Alternate reasonable access for emergency personnel will be provided at all times.

Postings of road closures will be provided early in the process so planning can occur, and individual notifications will be made prior to full lane closures. Individual resident's needs will be accommodated as much as possible. Signage related to the project will be that typical of a road construction project with traffic controls and authorized personnel access.

Proposed traffic routing and pedestrian access during 2008 remediation activities is shown on Drawings C-21 and C-22. This drawing will be submitted for review by all affected agencies and persons, including the fire department, the police department (county and state), residents, and the school. This drawing will be submitted to the contractor during the bidding process, with the understanding that they will need to evaluate the drawing based on the restrictions presented in this EDR, and either accept the proposed traffic routing and pedestrian access as a viable method, or develop an alternative method that meets all requirements for approval by the Engineer. If the contractor requests revisions to the traffic control figure to accommodate their construction schedule and approach, the revisions will be reviewed by the Engineer, the Town, Ecology, and local fire and emergency personnel.

6.0 Construction Quality Assurance

6.1 Quality Assurance Monitoring Schedule

6.1.1 Construction Quality Requirements

This section discusses construction quality assurance (CQA) for the project, including the quality assurance structure, responsibilities, and requirements. CQA includes compliance with health and safety requirements and performance standards outlined herein and in subsequent annual EDRs and Plans & Specifications.

6.2 Quality Assurance Monitoring Structure

All aspects of construction will be performed under the oversight of professional engineer registered in the State of Washington or a qualified field technician operating under their direct supervision. A BNSF flagger will be on-site during construction of the HCC system and utility crossings, and during other work conducted in the RYZ, as deemed necessary by BNSF.

6.3 Construction Quality Requirements

6.3.1 Health and Safety

Personnel involved in the construction of the project will be required to comply with the health and safety training requirements commensurate with the task(s) they are performing. BNSF Contractors and subcontractors who may come into contact with hazardous materials are required to use workers trained for hazardous waste work. The contractor personnel will also obtain BNSF Contractor Orientation training and must be registered through the E-railsafe program to work in the railyard. It is the remedial contractor's responsibility to meet all the requirements of WAC 296-155, Safety Standards for Construction, and the applicable provisions of the hazardous waste operations regulations, WAC 296-62, Part P and 29 CFR 1910.120. The Contractor will also have a site health and safety (H&S) officer who will ensure that all contractor personnel adhere to H&S regulations. Prior to starting work, the BNSF Contractor will submit a HASP to the BNSF Engineer for review. The plan will include written documentation of employee training and medical certifications as required under WAC 296-62, Part P.

Documentation of the following items is required for each site worker where work falls under the requirements of WAC 296-62, Part P:

- Initial 40-hour health and safety training and annual 8-hour refresher training
- Eight-hour supervisory training, required for the field supervisor
- Medical clearance from a licensed physician certifying that the worker is fit to participate in field activities and use personal protective equipment
- Current respirator fit test certification
- Current CPR and first aid certification for at least one member of each crew
- Provision of personal protective equipment for each worker at the highest level of protection for this site (Level D).

6.3.2 Performance Standards

Performance standards address environmental and public health issues, such as emission control and compliance with environmental regulations. The onsite engineer or construction manager will coordinate

monitoring and testing in accordance with performance standards. Performance standards and monitoring and testing requirements will be defined in annual EDRs.

6.3.3 Record Keeping and Reporting

Records will be maintained by onsite RETEC/BNSF representatives to document the work performed. These records include, but are not limited to, the following:

Daily Activity Log: A daily activity log will be completed to describe general site activity and personnel working on-site. The records may be used to substantiate invoices as related to measurement and payment of site work. Health and Safety levels will also be noted in the daily logs as well as field H&S monitoring.

Material Testing Results: All material testing results will be maintained. Material testing logs will, at a minimum, include the date and time of testing, testing site and location, identification of tester and company, test results, and any relevant comments.

As-Built Report: Upon completion of remedial activities, the Engineer will submit a final completion report as required in WAC 173-340-400(b) (ii). The report will include as-built drawings, work accomplished, materials used, inspections and tests conducted, results of inspections and tests, nature of defects found (if any), and corrective actions taken.

7.0 References

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Appendix A

BNSF Utility Accommodation Policy

Appendix B

2007 Supplemental Design Investigation Data

Appendix C

Air Sparging Calculations

Appendix D

Preliminary Structural Assessment Report

Appendix E

2008 Conceptual Restoration Plan

Burlington Northern Santa Fe

UTILITY ACCOMMODATION POLICY

Engineering Services
4515 Kansas Avenue
Kansas City, KS 66106

April 16, 2004
Revised May 5, 2007

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PART 1

GENERAL POLICY

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PART 1 - GENERAL POLICY

A. Policy Application

1. Purpose

   This policy is to prescribe the accommodation, location and method of installation, adjustments, removal, relocation and maintenance of utility facilities within the property of Burlington Northern & Santa Fe Railway Company, referred to hereafter as BNSF. The policy was developed in the interest of safety, protection, utilization, and future development of BNSF with due consideration given to public and private service afforded by adequate and economical utility installations.

2. Application

   The policy concerning utility accommodations shall apply to all:

   a. New utility installations.

   b. Additions to existing utility installations.

   c. Adjustment and relocation of utilities.

   d. Existing or planned utility installations for which agreements with BNSF were entered prior to the date of the adoption of this policy.

   e. Existing utility installations that do not meet the license requirements may remain at the discretion of BNSF.

   Various types of utility lines not specifically discussed herein shall be considered within the provisions of this policy. It shall be the general practice to consider all lines carrying caustic, flammable or explosive materials under the provisions for high-pressure gas and liquid fuel lines.

3. Scope

   Utilities include lines, facilities and systems for producing, transmitting or distributing communications, power, electricity, light, heat, gas, oil, crude products, water, steam, waste, storm water and other similar commodities which are privately, publicly or cooperatively owned and which serve directly or indirectly the public or any part thereof.

   A Utility Agreement License allowing a Utility Owner the privilege of placing its facilities in or on railroad property does not constitute permanent right for such usage. Any removal, remodeling, maintenance or relocation of the facilities, whether or not required by BNSF, will be accomplished promptly by the Utility Owner at no cost to BNSF.

4. Exceptions

Exceptions to any design, location or methods of installation provisions contained in this policy must be authorized by BNSF. Requests for exceptions will be considered only where it is shown that extreme hardship and/or unusual conditions provide justification and where alternate measures can be prescribed in keeping with the intent of this policy. All requests for exceptions shall be fully documented including design data, cost comparisons and other pertinent information.

5. Liability

The Utility Owner, it successor, or assigns shall assume all risk and liability for accidents and damages that may occur to persons or property on account of this work, and shall indemnify and hold BNSF harmless from any and all costs, liabilities, expenses, suits, judgments or damages to persons or property or claims of any nature whatsoever arising out of or in connection with the permit, or the operation and performance thereunder by the utility, its agents, employees or subcontractors. In this regard, it is further understood and agreed that the utility may be required to obtain insurance coverage as determined by BNSF.

The Utility Owner agrees that if liability insurance is required, it will file with the designated office, prior to granting of the license, "Certificates of Insurance" or other evidence to show that the appropriate insurance is carried.

Insurance as may be required shall be maintained in force until the final release of the Utility Owner by BNSF from all obligations under the terms of the license. The insurance contract shall cover claims for such length of time as law permits said claims. The insurance document shall include a clause requiring the insurer to notify BNSF ten (10) days in advance of any cancellation or change in insurance contacts.

The Utility Owner is responsible for any subcontractor to be knowledgeable of the policy and to require all work to be in compliance with this policy. Subcontractors must carry a liability insurance policy unless the subcontractor is covered by the Utility Owner's insurance.

6. Replacement of Facility

Replacement of existing facility with the same facilities or facilities of a different type, or design, is to be considered as a new utility installation and all work shall adhere to this policy.

7. Change in Ownership

   It is the Utility Owner's responsibility to inform BNSF, in writing, of any name, ownership or address changes.

8. Noncompliance

   Noncompliance with any terms of this Utility Accommodation Policy or Utility License Agreements may be considered as cause for discontinuance of construction or operations until compliance is assured. Continued noncompliance will result in the revocation of the license. The cost of any work required by BNSF in the removal of non-complying construction will be assessed against the Utility Owner.

9. Discharge of Waste Material

   Applications for a Utility License Agreement for the installation of utility facilities which will discharge materials into the nation's waters, must comply with all applicable requirements of Corps of Engineers, and other federal, state or local environmental protection agencies. Identification of applicable requirements and administration of compliance procedures are the responsibility of the Utility Owner.

B. Utility License Agreement Requirements

1. General

   Utility License Agreements are required when utility facilities are installed, relocated, removed or maintained along or across all BNSF property.

   If liability insurance is required, then evidence of adequate liability insurance is to be on file with BNSF for each agreement.

2. Applications

   Approved requests to install, maintain, relocate or remove a utility within the property of BNSF shall be authorized by a Utility License Agreement. The applications for utility license agreements along with plans for the proposed installation shall be submitted to BNSF and approved before construction has commenced.

3. Location

   a. Utility lines shall be located to avoid or minimize the need for adjustments for future railroad improvements and to permit access to the utility lines for their maintenance with minimum interference to railroad traffic.

b. Pipelines shall be installed under tracks by boring, jacking, or in some cases, open-trenching. **WATER JETTING IS NOT PERMITTED.**

c. Where practical, pipelines carrying liquefied petroleum gas shall cross the railway where the tracks are carried on an embankment.

d. All high-pressure pipelines (greater than 60-psi internal pressure), except those in public roads, shall be prominently marked at the property line (on both sides of the track for under crossings) by signs which state the size of the line and its depth.

Example:

CAUTION: 30-inch diameter high-pressure Gas main 7 feet deep.

4. Design Considerations

a. The design of any utility installation will be the responsibility of the Utility Owner. An installation within the railroad property must be reviewed and approved by the railroad with regard to location and the manner of adjustment. This includes the measures to be taken to preserve the safety and flow of rail traffic, structural integrity of the roadway or structure, ease of maintenance and the integrity of the utility facility. Utility installations, on, over or under BNSF property shall conform with requirements contained herein and/or as a minimum, the appropriate requirements outlined in the following:

1) Safety Rules for the Installation and Maintenance of Electric Supply and Communication Lines-National Electric Safety Code.

2) Title 49 C.F.R. Part 192, Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards and Amendments.

3) Title 49 C.F.R. Part 195, Transportation of Liquids by Pipelines and Amendments.

4) American Society for Testing and Materials (ASTM) Specifications - latest edition.

5) Manual on Uniform Traffic Control Devices - with revisions.

6) Rules and Regulations for Public Water Systems - latest edition, published by the appropriate State Health Department.

b. All utility installations on, over or under BNSF property shall be of durable materials designed for long service life and relatively free from routine servicing and maintenance. Conformance with current applicable material specifications and codes is mandatory.

c. References given to any manual, publication or specification are intended to be the most current edition. If a conflict occurs between any publication and this manual, the most restrictive specification will be used.

d. For all boring and jacking installations under main and passing tracks, greater than 26 inches in diameter, and at a depth of between 5.5 and 10.0 feet below top of tie, a geotechnical study will need to be performed to determine the presence of granular material and/or high water table elevation, at the sole expense of the Permittee. The study will include recommendations and a plan for a procedure to prevent failure and a collapse of the bore. Generally, core samples are to be taken near the ends of tie at the proposed location, at least as deep as the bottom of the proposed horizontal bore. Test results must be reviewed and approved by BNSF, or its agent, prior to boring activities commencing. BNSF reserves the rights, based on test results, to require the Permittee to select an alternate location, or to require additional engineering specifications be implemented, at the sole expense of the Permittee, in order to utilize existing location.

C. Safety

1. A safety orientation course should be completed by all workers prior to entering BNSF property. It is the contractor's responsibility to conduct the safety training and implementation of a safety program for its employees. Training materials are available on the web site: www.contractororientation.com. The contractor must comply with all federal, state and local safety regulations.

2. Flagging

   When work is performed within twenty-five (25) feet of the centerline of the track, railroad flagging will be required.

   a. Railroad flagging will be required:

      1) During the period of construction when it is necessary for the Contractor to operate equipment in the vicinity of, or over, BNSF property which may endanger railroad operations, or

      2) Two or more railroad flagmen may be required at other times that the Railway Company Roadmaster's sole discretion shall deem necessary.

   b. Flagging services shall be performed by BNSF employees and the total cost borne by the Utility Owner.

   c. The Utility Owner will be billed monthly at a rate to be determined by BNSF to include labor and payroll associated costs plus any expenses incurred by BNSF for flagging services.

   d. A written request for flagging services will be required at least 72 hours prior to the time when such services are needed. This request is made to the BNSF Roadmaster, as noted in agreement.

3. Material Storage

   Storage of materials, parking of equipment and vehicles when not used in actual utility work will not be permitted on railroad property.

D. Maintenance and Servicing Utilities

1. Utility Owner's Responsibility

   a. Maintenance of the utility is the responsibility of the Utility Owner.

   b. Maintenance must be performed to keep the facility in an as-constructed condition, and in a good state of repair in accordance with the requirements of Federal, State and Local laws, regulatory standards and utility codes.

   c. It is the Utility Owner's responsibility to replace and stabilize all earth cover and vegetation when it has eroded over an underground utility facility where such erosion is due to, or caused by, the placement or existence of the underground utility facility.

   d. The Utility Owner shall be responsible for any settlement of backfill, fills, and embankments that may occur.

2. Emergency Maintenance

   a. Emergency maintenance of utilities located on railroad property is permissible without obtaining a Utility License Agreement if an emergency exists that is dangerous to the life, safety or welfare of the public and which requires immediate repair. The Utility Owner shall take all necessary and reasonable safety measures to protect the public and the railroad.

   b. The Utility Owner, in such and event, will advise the Railway Company's Roadmaster as soon as possible. Damage to the right-of-way and facilities will be restored to its original condition. A Utility License Agreement should be requested by the Utility Owner within the second working day provided the work is not covered under any previously granted license. Flagging requirements described earlier apply in all situations.

E. Preservation, Restoration and Cleanup

1. Disturbed Areas

   a. Areas of railroad property, disturbed by the installation, maintenance, removal and relocation of utilities shall be kept to a minimum.

   b. Disturbed areas shall be returned to normal grade and elevation, with compaction of backfill material, and all excess or undesirable material removed by the Utility Owner. The Utility Owner shall replace destroyed vegetation by sodding, or seeding, fertilizing and mulching, or a combination thereof.

   c. The Utility Owner shall provide protection against erosion in disturbed areas that are subject to erosion. Such protection may be in the form of rock riprap, wash checks, hay or straw cover, or other material that is approved and does not interfere with railroad maintenance.

2. Drainage Facilities

   Care shall be taken to avoid disturbing existing drainage facilities. Underground utility facilities shall be bedded with pervious material and outlets provided for entrapped water. Underdrains should be provided where necessary.

3. Cleanup

   Unused material or debris shall be removed from the work site area. At the end of every construction day, construction equipment and materials shall be removed as far from the operating railroad tracks as possible (minimum 25 feet from centerline).

F. Protection of Vegetation

1. Trimming, Clearing or Removal of Vegetation

   a. Consistent with the preservation of planted vegetation, consideration will be given to Utility Owners for the necessary trimming, clearing or removal of vegetation to provide adequate clearance of overhead wires. Such work will be done in accordance with established practices and standards; however, approval will not be granted for wasteful or wanton trimming, or removal in order to provide easy solutions to a difficult situation.

   b. No trees, shrubs, bushes, vines or ground cover on railroad property shall be sprayed, trimmed, cut down, rooted up, removed or mutilated in any manner unless a permit is granted by BNSF to do such work.

2. Chemical Brush Control

   a. Spraying brush and seedling tree growth to prevent re-sprouting may be permitted, and when permitted, shall be carried out with extreme caution and careful performance. The Utility Owner shall be responsible for the performance of their employees or contractors in the application of brush control and approved by BNSF Environmental Department.

   b. All spraying shall be done by a herbicide applicator that is licensed in the state where the work is to be performed.

   c. Permit applications for spraying shall list the kinds of chemical weed and brush killers that will be used. When liability insurance is required, it shall be provided by the herbicide applicator, or be insured under the liability insurance of the Utility Owner.

   d. Plants over five (5) feet in height should not be sprayed for control. Brush over five (5) feet in height, which is to be removed, should be cut and the stumps treated to prevent growth. Shrubbery type growth such as dogwood, sumac, redbud, plum, etc., should not be sprayed as a general rule. Steep slopes, where brushy growth is a major factor in preventing erosion, should not be sprayed.

3. Tree Pruning

   a. Tree pruning on railroad property for utility lines will utilize the best horticultural practices. All cut branches, dead limbs, etc., shall be removed. Such materials shall not be burned or disposed of on railroad property unless permission is granted by Utility License Agreement.

   b. Should burning be permitted, the Utility Owner will be held liable for any damage to grass, crops, native shrubs and trees arising from careless burning of such brush.

   c. Any and all limbs trimmed shall be removed with a clean cut and all limb scars over one (1) inch in diameter shall be treated with appropriate tree paint.

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PART 2

UTILITIES PARALLELING

RAILROAD PROPERTY

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PART 2 - UTILITIES PARALLELING RAILROAD PROPERTY

A. General Provisions

This section of the policy applies to all public and private utilities, including electric power, telephone (including fiber optics), telegraph, cable television, water, gas, oil, petroleum products, steam, chemicals, sewage, drainage, irrigation and similar lines that are located, adjusted or relocated within the property under the jurisdiction of BNSF. Such utilities may involve underground, surface or overhead facilities.

Any utility line greater than five hundred (500) feet in length will be considered a parallel line and is to be located on uniform alignment, within ten (10) feet or less of the property line so as to provide a safe environment and to preserve space for future railroad improvements or other utility installations. BNSF Engineering must approve any installation over one mile.

Utilities will be located so as to provide a safe environment and shall conform to the current "National Electrical Safety Code," "American Waterworks Association Specifications," Federal Pipeline Safety Regulations," and "The American Railway Engineering and Maintenance Association Specifications." Where laws or orders of public authority prescribe a higher degree of protection, then the higher degree of protection prescribed shall supersede the provisions of this manual.

B. Overhead Installations

1. Minimum four feet clearance required above signal and communication lines.

2. Poles must be located 50 feet out from the centerline of railroad main, branch and running tracks, CTC sidings, and heavy tonnage spurs. Pole location adjacent to industry tracks; must provide at least a 10-foot clearance from the centerline of track, when measured at right angles. If located adjacent to curved track, then said clearance must be increased at a rate of 1-½ inches per degree of curved track.

3. Regardless of the voltage, unguyed poles shall be located a minimum distance from the centerline of any track, equal to the height of the pole above the ground-line plus 10 feet. If guying is required, the guys shall be placed in such a manner as to keep the pole from leaning/falling in the direction of the tracks.

4. Poles (including steel poles) must be located a minimum distance from the railroad signal and communication line equal to the height of the pole above the ground-line or else be guyed at right angles to the lines. High voltage towers (34.5kV and higher) must be located off railroad right of way.

5. For proposed electrical lines paralleling tracks, BNSF may request that an inductive interference study be performed at the expense of the utility owner. Inductive interference from certain lines have the potential to disrupt the signal system in the track causing failures in the track signals and highway grade crossing warning devices. The General Director of Signals will determine the need for a study on a case-by-case basis.

C. Underground Installations

1. Underground utility installations should be located on top of the back slope at the outer limits of the railroad property.

2. If the pipeline is located forty (40) feet or less from centerline of track, the pipeline shall be encased in a steel pipe subject to approval from BNSF. No pipe may be placed closer than twenty-five (25) feet from centerline of track. Pipe must be buried with a minimum cover of three (3) feet.

    a. If less than minimum depth is necessary because of existing utilities, water table, ordinance or similar reasons, the line shall be rerouted.

    b. Locations where it will be difficult to attain minimum depth due to wet or rocky terrain shall be avoided. Any location change from plan must be approved by BNSF.

3. The use of plastic carrier pipe for sewer, water, natural gas and other liquids is acceptable under specific circumstances. The use of plastic pipe is satisfactory if the pipe is designed to meet AREMA and all applicable federal and state codes, and if the carrier pipe is properly encased with a steel casing pipe for the entire length on BNSF right of way.

4. Manholes shall be limited to those necessary for installation and maintenance of underground lines. Manholes vary as to size and shape depending on the type of utility they serve. To conserve space, their dimensions should be minimally acceptable by good engineering and safety standards. In general, the only equipment to be installed in manholes located on railroad property is that which is essential to the normal flow of the utility, such as circuit reclosers, cable splices, relays, valves and regulators. Other equipment should be located outside the limits of the railroad property. Manholes shall not protrude above the surrounding ground nor be located in the shoulder, shoulder slope, ditch, backslope, or within twenty-five (25) feet of the centerline of track without approval of BNSF.

5. Electric Power Lines

    a. A minimum depth of 3.0 feet below natural grade (BNG) will be maintained for 750 volts and less, and 4.0 feet BNG for greater than 750 volts.

    b. A 6-inch wide warning tape will be installed, 1.0 foot BNG directly over the underground power line where located on Railroad right-of-way outside the track ballast sections.

6. Fiber Optic Lines

   a. A minimum depth of 4.0 feet BNG for fiber optic cable wirelines.

   b. Whenever feasible, all cable should be laid within 5 feet from property lines.

   c. A 6-inch wide warning tape will be installed, 1.0 foot BNG directly over the underground fiber optic line where located on Railroad right-of-way outside the track ballast sections.

D. Attachment to Bridges and Other Structures

The Utility Owner will not be permitted to attach to BNSF bridges or route facilities through drainage structures or cattle passes. Utilities are not to be attached to other railroad structures without the written approval of BNSF Structures Department. As a general rule, overhead power, communication and cable television line crossings at bridges must be avoided. Pipelines laid longitudinally on railroad property shall be located as far as practical from any tracks or other important structures. If located within forty (40) feet of the centerline of any track, the carrier pipe shall be encased or be of special design as approved by BNSF Engineering.

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PART 3

UTILITIES CROSSING

RAILROAD PROPERTY

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PART 3 - UTILITIES CROSSING RAILROAD PROPERTY

A. General Provisions

This section of the policy applies to all public and private utilities, including electric power, telephone (including fiber optics), telegraph, cable television, water, gas, oil, petroleum products, steam, chemicals, sewage, drainage, irrigation and similar lines that are located, adjusted or relocated within the property under the jurisdiction of BNSF. Such utilities may involve underground, surface or overhead facilities.

Installations crossing the property of the railroad, to the extent feasible and practical, are to be perpendicular to the railroad alignment and preferably at not less than forty-five (45) degrees to the centerline of the track. Utilities shall not be placed within culverts or under railroad bridges, buildings or other important structures.

Utilities will be located so as to provide a safe environment and shall conform to the current "National Electrical Safety Code," "American Waterworks Association Specifications," Federal Pipeline Safety Regulations," and "The American Railway Engineering and Maintenance Association Specifications." Where laws or orders of public authority prescribe a higher degree of protection, then the higher degree of protection prescribed shall supersede the provisions of this manual.

B. Overhead Installations

1. Minimum four feet clearance required above signal and communication lines.

2. Poles must be located 50 feet out from the centerline of railroad main, branch and running tracks, CTC sidings, and heavy tonnage spurs. Pole location adjacent to industry tracks; must provide at least a 10-foot clearance from the centerline of track, when measured at right angles. If located adjacent to curved track, then said clearance must be increased at a rate of 1-½ inches per degree of curved track.

3. Regardless of the voltage, unguyed poles shall be located a minimum distance from the centerline of any track, equal to the height of the pole above the ground-line plus 10 feet. If guying is required, the guys shall be placed in such a manner as to keep the pole from leaning/falling in the direction of the tracks.

4. Poles (including steel poles) must be located a minimum distance from the railroad signal and communication line equal to the height of the pole above the ground-line or else be guyed at right angles to the lines. High voltage towers (34.5kV and higher) must be located off railroad right of way.

5. Crossings will not be installed under or within 500 feet of the end of any railroad bridge, or 300 feet from the centerline of any culvert or switch area.

6. Complete spanning of the property is encouraged with supportive structures and appurtenances located outside railroad property. For electric supply lines, normally the crossing span shall not exceed 150 feet with adjacent span not exceeding 1-1/2 times the crossing span length. For communication lines, the crossing span shall not exceed 100 feet in heavy loading districts, 125 feet in medium loading districts, and 150 feet in light loading districts; and the adjacent span shall not exceed 1-1/2 times the crossing span length. For heavier type construction, longer spans will be considered.

7. Joint-use construction is encouraged at locations where more than one utility or type of facility is involved. However, electricity and petroleum, natural gas or flammable materials shall not be combined. Pipe truss design and layout will need to be reviewed and approved by BNSF Engineering.

8. To ensure that overhead wire crossings are clear from contact with any equipment passing under such wires, communication lines shall be constructed with a minimum clearance above top of rail of twenty-four (24) feet, and electric lines with a minimum clearance of twenty-six and one-half (26 1/2) feet or greater above top of rail when required by the "National Electric Safety Code" or state and local regulations. Electric lines must have a florescent ball marker on low wire over centerline of track.

9. The utility owner will label the posts closest to the crossing with the owner's name and telephone number for emergency contact.

10. All overhead flammable and hazardous material lines will need BNSF Engineering approval, but should be avoided if possible.

11. For proposed electrical lines crossing tracks, BNSF may request that an inductive interference study be performed at the expense of the utility owner. Inductive interference from certain lines have the potential to disrupt the signal system in the track causing failures in the track signals and highway grade crossing warning devices. The General Director of Signals will determine the need for a study on a case-by-case basis.

C. Underground Installations

1. General

    a. All underground utility crossings of railroad trackage shall be designed to carry Cooper's E-80 Railroad live loading with diesel impact (AREMA Cooper's loading Section 8-2-8). This 80,000-lb. axle load may be distributed laterally a distance of three (3) feet, plus a distance equal to the depth from structure grade line to base of rail, on each side of centerline of single tracks, or centerline of outer track where multiple tracks are to be crossed. In no case shall railroad loading design extend less than ten (10) feet laterally from centerline of track. Longitudinally, the load may be distributed between the five-foot axle spacing of the Cooper configuration. Railroad loading criteria will also apply

where future tracks on BNSF are contemplated, to the extent this information is available.

b. All utility crossings under ditches and railroad trackage should have a minimum depth of cover of three (3) feet below the flow line of the ditch or ground surface and five and one-half (5-1/2) feet from base of rail. In fill sections, the natural ground line at the toe of slope will be considered as ditch grade. The depth of cover shall not be less than that meeting applicable industry standards.

c. For all boring and jacking installations under main and passing tracks, greater than 26 inches in diameter, and at a depth of between 5.5 and 10.0 feet below top of tie, a geotechnical study will need to be performed to determine the presence of granular material and/or high water table elevation, at the sole expense of the Permittee. The study will include recommendations and a plan for a procedure to prevent failure and a collapse of the bore. Generally, core samples are to be taken near the ends of tie at the proposed location, at least as deep as the bottom of the proposed horizontal bore. Test results must be reviewed and approved by BNSF, or its agent, prior to boring activities commencing. BNSF reserves the rights, based on test results, to require the Permittee to select an alternate location, or to require additional engineering specifications be implemented, at the sole expense of the Permittee, in order to utilize existing location.

d. The use of plastic carrier pipe for sewer, water, natural gas and other liquids is acceptable under specific circumstances. The use of plastic pipe is satisfactory if the pipe is designed to meet all applicable federal and state codes, and if the carrier pipe is properly encased within a steel casing pipe per AREMA standards. This casing must extend the full width of the right of way. Casing may be omitted only for gaseous products if the carrier pipe is steel and is placed ten (10) feet minimum below the base of rail per AREMA standards.

2. General Design and Construction Requirements

a. If the minimum depth is not attainable because of existing utilities, water table, ordinances, or similar reasons, the line shall be rerouted.

b. Locations that are considered unsuitable or undesirable are to be avoided. These include deep cuts and in wet or rocky terrain or where it will be difficult to obtain minimum depth.

c. Underground installations may be made by open-trenching from the property line to the toe of the fill slope in fill sections and to the toe of the shoulder slope in cut sections but to no closer than thirty (30) feet of the centerline of track. The remainder will be tunneled, augured, jacked or directional-bored through the roadbed. Refer to the following sections for required encasement of utilities and boring requirements.

d. Manholes should be located outside railroad property, when possible. No manhole will be located in the shoulder, shoulder slope, ditch or backslope, or within twenty-five (25)

feet of the centerline of track, and shall not protrude above the surrounding ground without approval of BNSF.

e. Utilities will not be attached to or routed through drainage structures or cattle passes. Utilities are not to be attached to other railroad structures without written approval of the BNSF Structures Department.

f. Jacking pits shall be located a minimum of thirty (30) feet from the centerline of track.

3. Pipeline Requirements

a. Pipeline designs are to specify the type and class of material, maximum working pressures and test and design pressure. Pipelines which are not constructed, operated and maintained under regulations established under US Department of Transportation Hazardous Materials Regulations Board, shall upon revisions in the class of material or an increase in the maximum operating pressure, must obtain BNSF Engineering approval.

b. Pipelines carrying oil, liquefied petroleum gas, natural or manufactured gas and other flammable products shall conform to the requirements of the current AREMA, ANSI/ASME B 31.4 Code for pressure piping - Liquid Petroleum Transportation Piping Systems; ANSI B 31.8 Code for pressure piping - Gas Transmission and Distribution Piping Systems; other applicable ANSI codes and 49 C.F.R. Part 192 or Part 195 - Transportation of Hazardous Liquids by Pipeline, except that the maximum allowable stress of design of steel pipe shall not exceed the following percentages of the specified minimum yield strength (multiplied by longitudinal joint factor) of the pipe as defined in the ANSI codes.

c. Pipelines under railroad tracks and across railroad property shall be encased in a larger pipe or conduit called “casings.” Generally, casings shall extend from right-of-way line to right-of-way line, unless otherwise approved.

d. Pipelines and casing pipes shall be suitably insulated from underground conduits carrying electric wires on railroad property.

e. Reinforced concrete pipe will need to be encased for a distance as wide as the embankment at the utility crossing. This is to protect against track failure due to joint separation.

4. Encasement of Utilities

a. Casings are oversized load-bearing conduits or ducts through which a utility is inserted:

1) To protect the railroad from damages and to provide for repair, removal and replacement of the utility without interference to railway traffic.

2) To protect the carrier pipe from external loads or shock, either during or after construction.

3) To convey leaking fluids or gases away from the area directly beneath the railroad trackage to a point of venting at the railroad property line.

b. Casings may be omitted for **gaseous products only** under the following circumstances:

1) Carrier pipe must be steel and the wall thickness must conform to E-80 loading for casing pipe shown in the tables as included in the AREMA manual Chapter 1, Part 5 for Pipeline Crossings. The length of thicker-walled pipe shall extend from railroad right-of-way line to right-of-way line. This will generally result in thicker-walled pipe on railroad right-of-way.

2) All steel pipe shall be coated and cathodically protected.

3) The depth from base of rail to top of pipe shall not be less than ten (10) feet below base of rail. The depth from ditches or other low points on railroad right-of-way shall not be less than six (6) feet from ground line to top of pipe.

c. In circumstances where it is not feasible to install encasement from right-of-way line to right-of-way line, casing pipe under railroad tracks and across railroad property shall extend to the greater of the following distances, measured at right angles to the centerline of track:

1) Two (2) feet beyond toe of slope.

2) Three (3) feet beyond ditch line.

3) Twenty-five (25) feet from centerline of outside track when casing is sealed at both ends.

4) Forty-five (45) feet from centerline of outside track when casing is open at both ends.

5) If additional track is planned for future construction, casing must extend far enough to meet above distances given the additional track requirement.

d. Pipelines and casing pipe shall be suitably insulated from underground conduits carrying electric wires on railroad property.

e. Casing pipe and joints shall be made of metal, and of leakproof construction. Casings shall be capable of withstanding the railroad loadings and other loads superimposed upon them.

f. Wall thickness designations for steel casing pipe for E-80 loading (including impact) are:

Nominal Diameter, (Inches)	Min. Thickness for Coated (Inches)	Non Coated (Inches)
14 and Under	0.188	0.188
16	0.219	0.281
18	0.250	0.312
20 and 22	0.281	0.344
24	0.312	0.375
26	0.344	0.406
28	0.375	0.438
30	0.406	0.469
32	0.438	0.500
34 and 36	0.469	0.531
38, 40 and 42	0.500	0.563
44 and 46	0.531	0.594
48	0.563	0.625
50	0.594	0.656
52	0.625	0.688
54	0.656	0.719
56 and 58	0.688	0.750
60	0.719	0.781
62	0.750	0.813
64	0.718	0.844
66 and 68	0.813	0.875
70	0.844	0.906
72	0.875	0.938

1) Steel pipe shall have minimum yield strength of 35,000 pounds per square inch.

2) All metallic casing pipes are to be designed for effective corrosion control, long service life and relatively free from routine servicing and maintenance. Corrosion control measures must include cathodic protection.

3) Cast iron may be used for casing. It shall conform to ANSI A21. The pipe shall be connected with mechanical-type joints. Plain-end pipe shall be connected with compression-type couplings. The strength of the cast iron pipe to sustain external loads shall be computed in accordance with the most current ANSI A21.1 “Manual for the Computation of Strength and Thickness of Cast Iron Pipe.”

g. The inside diameter of the casing pipe shall be such that the carrier pipe can be removed without disturbing the casing. All joints or couplings, supports, insulators or centering devices for the carrier pipe shall be considered in the selection of the casing diameter.

h. For flexible casing pipe, a minimum vertical deflection clearance of the casing pipe shall be three percent (3%) of its diameter plus one-half (1/2) inch so that no loads from the roadbed, track, railroad traffic or casing pipe are transmitted to the carrier pipe. When insulators are used on the carrier pipe, the relationship of the casing size to the size of the carrier pipe is:

Diameter of Carrier Pipe	Inside Dia. of Casing Pipe Equals Outside Dia. of Carrier Pipe Plus
0" - 8"	2"
10" - 16"	3-1/4"
Over 16"	4-1/2"

5. Casing and Pipeline Installation

a. Casing and pipeline installations should be accomplished by directional boring, jack-and-bore, tunneling or other approved methods. Tunneling construction under tracks will be permitted only under direct supervision of a BNSF Engineer. Tunneling procedures and equipment, as well as structural design, must have BNSF Structures Department approval prior to starting any work on BNSF property. Generally, tunneling shall not be considered where less than six (6) feet of cover exists, or where excessively sandy, loose or rocky soils are anticipated.

Rail elevations over the work must be monitored at intervals prescribed by BNSF to detect any track movement. Movements of over one-quarter (1/4) inch vertically shall be immediately reported to the BNSF Roadmaster. Due to the danger to rail traffic that is caused by only small amounts of track movement, BNSF forces may have to be called to surface the track several times.

The following requirements shall apply to these construction methods:

1) The use of water under pressure jetting or puddling will not be permitted to facilitate boring, pushing or jacking operations. Some boring may require water to lubricate cutter and pipe, and under such conditions, is considered dry boring.

2) Where unstable soil conditions exist, boring or tunneling operations shall be conducted in such a manner as not to be detrimental to the railroad being crossed.

3) If excessive voids or too large a bored hole is produced during casing or pipeline installations, or if it is necessary to abandon a bored or tunneled hole, prompt remedial action should be taken by the Utility Owner.

4) All voids or abandoned holes caused by boring or jacking are to be filled by pressure grouting. The grout material should be sand cement slurry with a minimum of two (2) sacks of cement per cubic yard and a minimum of water to assure satisfactory placement.

5) The hole diameter resulting from bored or tunneled installations shall not exceed the outside diameter of the utility pipe, cable or casing (including coating) by more than one and one-half (1-1/2) inches for pipes with an inside diameter of twelve (12) inches or less, or two (2) inches on pipes with an inside diameter greater than twelve (12) inches.

6) Pits for boring, tunneling or jacking will not be permitted within thirty (30) feet of the centerline of track; or closer to the track than the toe of fill slopes in fill sections, or toe of shoulder slopes in ditch sections when pipes are allowed on the railroad property.

c. Vents. In casing pipe installations, vents are appurtenances by which fluids or gases between carrier and casing may be inspected, sampled, exhausted or evacuated.

1) Vents shall be located at the high end of short casings and at both ends of casing longer than one hundred fifty (150) feet.

2) Vent standpipes shall be located and constructed so as not to interfere with maintenance of the railroad or to be concealed by vegetation. Where possible, they shall be marked and located at the property line. The markers shall give the name and address of the owner, and a phone number to contact in case of emergency.

3) Casing pipe, when sealed, shall be properly vented. Vent pipes shall be of sufficient diameter, but in no case less than two (2) inches in diameter and shall be attached near each end of casing, projecting through ground surface at property lines.

4) Vent pipes shall extend not less than four (4) feet above ground surface. Top of vent pipes shall be fitted with a down-turned elbow, properly screened; or a relief valve.

5) For pipelines carrying flammable materials, vent pipes on casings shall be at least 16 feet (vertically) from aerial electric wires. Casings shall be suitably insulated from underground conduits carrying electric wires on Railroad right-of-way.

d. Shut-Off Valves

1) The Utility Owner shall install accessible emergency shut-off valves within effective distances on each side of the railroad. Where pipelines are provided with automatic control stations, no additional valves will be required.

2) Locating a shut-off valve on railroad property should be avoided. If approval is acquired, a guardrail must protect the shut-off valve.

3) When a guardrail is required, its height shall be four (4) feet above the ground line. All four corner posts shall be driven to a minimum depth of four (4) feet below ground line. There shall be a minimum clearance of two (2) feet from the valve to the

guardrail. The steel pipes for the four corner posts and guardrail shall have a minimum diameter of four (4) inches. All joints will be welded with a one-quarter (1/4) inch fillet weld all around.

6. Water Lines

   a. Where casing pipe is used, venting is not required; however, sealing will be required if the ends of the casing are not above high water.

   b. Where non-metallic pipe is permitted and installed, steel casings are required from right of way line to right of way line.

   c. Manholes should be located outside the railroad property. Manholes shall not be located within twenty-five (25) feet of railroad trackage, in the shoulder, shoulder slope, ditch or backslope; and shall not protrude above the surrounding ground without the approval of BNSF Engineering.

   d. The Utility Owner shall place a readily identifiable and suitable marker at each railroad property line where it is crossed by a water line.

7. Sewer Lines

   a. New and relocated sewer lines shall be constructed with satisfactory joints, materials and designs which will provide protection and resistance to damage from sulfide gases and other corrosive elements to which they may be exposed.

   b. Where casing pipe is used, venting and sealing of casing will be required.

   c. Where non-metallic pipe is permitted and installed, a durable metal wire shall be concurrently installed; or other means shall be provided for detection purposes.

   d. Manholes should be located outside the railroad property. Manholes shall not be located within twenty-five (25) feet of railroad trackage, in the shoulder, shoulder slope, ditch or backslope; and shall not protrude above the surrounding ground without the approval of BNSF Engineering.

8. Electric Power Lines

   a. A minimum depth of 5.5 feet below the base of rail (BBR) will be maintained.

   b. A minimum depth of 3.0 feet below natural grade (BNG) will be maintained for 750 volts and less, and 4.0 feet BNG for greater than 750 volts.

   c. The wireline must be encased completely across the Railroad right-of-way with a rigid metallic conduit.

d. Crossings will not be installed under or within 50 feet of the end of any Railroad bridge, centerline of any culvert or switch area.

e. A BNSF signal representative must be present during installation if railroad signals are in the vicinity of wireline crossings unless signal representative authorizes otherwise.

f. Markers that identify the Utility Owner shall be placed at both property lines for utilities crossing the railroad property. For parallel lines markers shall be placed above the cable at intervals no less than 300' apart. The markers should identify the owner, type of cable and emergency telephone number. A 6-inch wide warning tape will be installed, 1.0 foot BNG directly over the underground power line where located on Railroad right-of-way outside the track ballast sections.

g. Above-ground utility appurtenances installed as a part of an underground installation shall be located at or near the railroad property line and shall not be any closer than twenty-five (25) feet to the centerline of track.

9. Fiber Optic Lines.

a. The same requirements for electric power line crossings will apply for fiber optic line crossings except for the following:

b. A minimum depth of 4.0 feet BNG for fiber optic cable wirelines.

c. BNSF Engineering must approve any specialized equipment used to install cable. No rail plow will be allowed for installation purposes.

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PART 4

PLANS, APPROVALS AND PROCEDURES

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PART 4 - PLANS, APPROVALS AND PROCEDURES

A. Plans and Approvals

1. Design

   a. The design of all utility installations will be the responsibility of the Utility Owner.

   b. The plans for the proposed installation shall be submitted to and meet the approval of BNSF Engineering before construction is initiated.

   c. Plans shall be drawn to scale showing the relationship of the proposed utility line to the railroad tracks, the angle of crossing, location of valves and vents, the railroad mile post and engineering station, railroad property lines and general layout of tracks and other railroad facilities. The plans should include a cross-section (or sections) from the field survey that will show utility placement in relation to actual profile of ground and tracks. If tunneling is proposed, method of supporting tracks or driving of tunnel shall be shown. The geotechnical study, when required, should be included.

   d. The plans should contain the following data for carrier pipe and casing pipe:

      Contents to be carried
      Inside diameter
      Pipe material
      Specifications and grade of material
      Wall thickness
      Actual working pressure
      Type of joints
      Longitudinal joint factor
      Coating
      Method of installation
      Vents-Number, Size, Height above ground
      Seals-Both ends, One end
      Cover (top of tie to top of pipe or casing)
      Cover (other than under tracks)
      Cover (at ditches)
      Cathodic protection
      Type, Size and Spacing of insulators or supports

   e. When a geotechnical study is required, the findings and protection plan shall be prepared by a licensed civil engineer and included with the plans. The geotechnical crew will need to be properly permitted to enter BNSF right-of-way and a BNSF flagman will be required when working within 25 feet of the track.

2. Approvals

a. Approval of plans and application forms is required for all installations of utilities prior to initiation of work on railroad property.

b. If surveying is necessary for the completion of an application, a "Right of Entry" or "Release of Claim and Indemnity" must be executed and referenced.

B. License Procedures

1. Applications should be submitted to:

   Staubach Global Services
   Permits Department
   3017 Lou Menk Drive, Suite 100
   Fort Worth, TX 76131-2800

2. Upon receipt of the application, a letter will be forwarded acknowledging receipt and advising of the Permit & Contract file reference number that has been assigned and the person who should be contacted for further inquiries.

3. Office Hours: 8:00 A.M. to 5:00 P.M. Monday through Friday, CT
   Phone Number: (toll free) 866-498-6647.

4. Agreements will be required for all encroachments on railroad property.

5. Generally, agreement-processing time will be thirty to sixty days. Please allow sufficient lead-time for document handling prior to desired construction date. Before construction begins, agreements must be executed by Utility Owner and returned. Verbal authorizations will not be granted or permitted. A minimum of seventy-two (72) hours advance notice after execution of an agreement will be required prior to initiation of construction.

6. License fees must be submitted at the time the agreement is executed and returned.

7. Applications are to be made on the standard application form including an Exhibit "A."

C. Construction

1. The execution of the work on railroad property shall be subject to the inspection and direction of the Roadmaster or his representative.

2. A representative of BNSF Signal Department must be present during installation if railroad signals are in the vicinity of the construction.

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PART 5

APPENDIX

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REFERENCES

American National Standards Institute (ANSI) Codes, 1430 Broadway, NY, NY 10018.

American Railway Engineering and Maintenance of Way Association (AREMA) Specifications.

American Society for Testing and Materials (ASTM) Specifications.

American Water Works Association Standards and Specifications, AWWA, 2 Park Avenue, NY, NY 10016.

Manual on Uniform Traffic Control Devices - with revisions, US Department of Transportation, Federal Highway Administration.

National Electrical Safety Code, US Department of Commerce, National Bureau of Standards.

Pipeline Safety Regulations - Code of Federal Regulations, Tile 49 - Transportation, Parts 191-192-Natural Gas; Part 195-Liquid Petroleum Gas.

Rules and Regulations for Public Water Systems - latest edition, State Health Departments.

Rules and Regulations promulgated by the Hazardous Materials Regulation Board of the US Department of Transportation.

Statutory Provisions, 23 U.S.C. 109 and 111.

DEFINITION OF TERMS

The terminology used in this Policy strives for conventional meaning and to insure uniform interpretation. To this end, the following definitions apply:

ACCESS CONTROL: Restriction of access to and from abutting lands to railroad property.

AREMA: American Railroad Engineering and Maintenance of Way Association.

ANSI: American National Standard Institute.

ASTM: American Society for Testing and Materials.

BACKFILL: Replacement of soil around and over an underground utility facility.

BORING: Piercing a hole under the surface of the ground without disturbing the earth surrounding the hole. Boring may be accomplished by any approved manner. Water jetting or puddling will not be permitted. Holes may be mechanically bored and cased using a cutting head and continuous auger mounted inside of the casing. Small diameter holes may be augured and the casing or utility facility pushed in later.

BNSF: Burlington Northern and Santa Fe Railway Company.

BURY: Placement of the utility facility below grade of roadway, ditch or natural ground to a specified depth.

CARRIER: Pipe directly enclosing a transmitted fluid (liquid or gas).

CASING: A larger pipe enclosing a carrier.

CFR: Code of Federal Regulations.

COATING: Material applied to or wrapped around a pipe.

COMMUNICATION LINE: Fiber optic, telephone cable and similar lines, not exceeding four hundred (400) volts to ground or seven hundred fifty (750) volts between any two (2) points of the circuit, the transmittal power of which does not exceed one hundred fifty (150) watts.

CONDUIT OR DUCT: An enclosed tubular runway for protecting wires or cables.

COVER: The depth of material placed over a utility. Depth of cover is measured from top of utility casing or carrier pipe (if no casing is required) to the natural ground line or construction line above the utility.

DIRECT BURIAL: Installing a utility underground without encasement, by plowing or trenching. No rail plows will be permitted.

ELECTRIC SUPPLY: Electric light, power supply, and trolley lines, irrespective of voltage used for transmitting a supply of electrical energy.

ENCASEMENT: Structural element surrounding a pipe or cable.

FLEXIBLE PIPE: A plastic, fiberglass, or metallic pipe having a large ration of diameter to wall thickness that can be deformed without undue stress. Copper or aluminum pipe shall be considered as flexible pipe.

GROUNDED: Connected to the earth or to some extended conducting bodies which intentionally or accidentally is connected with the earth.

GROUT: A cement mortar or slurry of fine sand or clay as conditions govern.

JACK-AND-BORE: The installation method whereby the leading edge of the jacked pipe is well ahead of the cutting face of the auger bit. The auger is removing waste from inside the pipe as it is being jacked. This method greatly reduces the likelihood of subsidence of granular material during installation.

JACKING: The installation of small pipes by the use of hydraulic jacks or rams to push the pipe under the traveled surface of a road, railroad roadbed, or other facility.

LICENSE:

UTILITY LICENSE AGREEMENTS are executed for all utility facilities located on railroad property.

MANHOLE: An opening to an underground utility system which workmen or other may enter for the purpose of maintaining, inspecting, or making installations.

NATURAL GAS PIPELINES:

DISTRIBUTION SYSTEM - A pipeline other than a gathering or transmission line.

SERVICE LINE - A distribution line that transports gas from a common source of supply to a customer meter.

TRANSMISSION SYSTEM - A pipeline other than a gathering line that transports gas from a gathering line or storage facility to a distribution center or storage facility. It operates at a hoop stress of twenty percent (20%) or more of the Specified Minimum Yield Strength.

NORMAL: Crossing at a right angle.

PERMITS:

PERMIT TO BE ON BNSF PROPERTY FOR UTILITY SURVEY is to be executed prior to all survey work on railroad property.

PIPE: A tubular product made as a production item for sale as such. Cylinders formed from plate in the course of fabrication of auxiliary equipment are not pipes as defined here.

PRESSURE: Relative internal pressure in PSI (pounds per square inch) gauge.

PRIVATE LINES: Any privately owned facilities which convey or transmit the commodities outlined under the definition for Utilities but are devoted exclusively to private use.

PUBLIC LINES: Those facilities which convey or transmit the commodities outlined under the definition for Utilities and directly or indirectly serve the public or any part thereof.

RIGHT OF WAY: A general term denoting land, property of interest therein, usually in a strip, acquired for or devoted to railroad transportation purposes.

SEAL: A material placed between the carrier pipe and casing to prevent the intrusion of water, where ends of casing are below the ground surface.

SHOULDER: That portion of the roadbed outside the ballast.

TRENCHED: Installed in a narrow excavation.

TUNNELING: Excavating the earth ahead of a large diameter pipe by one or more of the following processes: 1) The earth ahead of the pipe will be excavated by men using hand tools while the pipe is pushed through the holes by means of jacks, rams or other mechanical devices, 2) The excavation is carried on simultaneously with the installation of tunnel liner plates, and/or 3) The tunnel liner plates are installed immediately behind the excavation as it progresses and are assembled completely away from the inside.

UTILITY OWNER: All privately, publicly or cooperatively owned lines, facilities and systems for producing, transmitting or distributing communications, power, electricity, light, heat, gas, oil, crude products, water, steam, waste, storm water and other similar commodities, including fire and police signal systems and street lighting systems which directly or indirectly serve the public.

APPLICANT'S PIPELINE CROSSING CHECKLIST

Installation must comply with Standard Specifications.

Installation is located at least fifty (50) feet from the end of any railroad bridge or centerline of any culvert.

Steel casing must extend completely across railroad property if carrier pipe is made of plastic.

Approval for installation may be given if pipeline is uncased and commodity is gaseous and the carrier pipe is made of steel, buried a minimum of ten (10) feet below base of rail and six (6) feet below ground line for its entire length across railroad property.

A BNSF Signal representative may be present during installation if railroad signals are in vicinity of installation, unless plans have been approved prior to installation.

Applications and Policy are available on-line at:

http://www.bnsf.com/tools/realestate/

Date: _____

APPLICATION FOR PIPE LINE CROSSING OR LONGITUDINAL

The Staubach Company
Permit Department
3017 Lou Menk Dr., Ste. 100
Fort Worth, TX 76131-2800

APPLICANT'S TAX I.D. NO./SS#_____

***ATTN**: Permit Specialist for _____(State)*

We submit for your approval the following specifications for a pipe line we propose to build across **THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY** right-of-way, as shown on enclosed sketch.

Legal name of company or municipality who will own the pipeline _____
State in which incorporated _____
If not incorporated, correct name of owners or all partners: _____
Correct mailing address _____ Zip Code _____
Type of Encroachment: Crossing _____ Longitudinal _____ Telephone _____
Location of encroachment _____ 1/4 Sec _____ Twsp _____ Rng _____ MP _____ + _____
Name of nearest town on Railroad _____ County _____ State _____
Name of nearest roadway crossing Railroad _____
Within limits of public road or street ☐ Yes ☐ No **If yes, distance from center line of road or street** _____ **ft.**
Width of public road or street _____ **ft.**

	CARRIER	CASING
Contents to be handled through pipe		
Emergency Contact: _____ **Emergency Telephone:** _____		
Length of pipe on Railroad Co. property (Plastic pipe must be encased full width of right of way)	_____ ft.	_____ ft.
Inside diameter of pipe	_____ in.	_____ in.
Pipe Material		
Specification & grade (Min. yield strength casing 35,000 psi.)		
Wall Thickness (Min. wall thickness of casing pipe under 14 in.-0.188 in. E-80 Loading)	_____ in.	_____ in.
Actual working pressure	_____ psi	
Type of joint - (mechanical or welded type)		
Longitudinal Joint Factor		
Coating		
Distance Base of rail to top of pipe (Flammable, contents, steam, water or non-flammable - min. 5 1/2 ft. under main track.) (Uncased, gaseous products - min. 10' under track)		
Minimum ground cover on Railroad Co. property (min. 3 ft.)		
Cathodic protection casing-(flammable substance)		

Type of insulators or supports _____ Size _____ Space _____
Number of vents _____ Size _____ Height above ground _____
(Flammable substances require 2 vents)
Method of crossing: Jacking _____ Trench _____ Dry Bore Only _____
(If trenched - Railroad furnish flagman at applicant's expense.)
(If bored or jacked - Jacking Pit location minimum 30 ft. from centerline of nearest track.) Pit must not be open more than 48 hours. Also, it must be protected when not in use.
Does pipeline support oil or gas well? ☐ Yes ☐ No
If yes, advise distance the well is from Railway property - _____ ft. Name of well _____
Was this service requested by BNSF? Yes or No (circle one) If yes, who requested _____
Telephone # of Requestor _____.

Attached to this sheet is location plan and detail sketch. Sketch shows tie-down measurement to centerline of nearest road crossing, bridge or other railroad structure. Please authorize us to proceed with this installation or advise what changes are necessary to meet your specifications.

Signed: _____
Print Name: _____
Title: _____
Telephone: _____

April 16, 2004

Date: _____

APPLICATION FOR WIRE LINE CROSSING OR LONGITUDINAL

The Staubach Company
Permit Department
3017 Lou Menk Dr., Ste. 100
Fort Worth, TX 76131-2800

TAX I.D. NO./SS# _____

***ATTN**: Permit Specialist for _____(State)*

We submit for your approval the following specifications for a wire line we propose to build across **THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY** Right-of-way, as shown on enclosed drawing.

Legal name of company or municipality who will own the wireline _____
State in which incorporated _____
If not incorporated, correct name of owners or all partners: _____
Correct mailing address _____ Zip Code _____
Telephone _____
Location of crossing _____ 1/4 Sec _____ Twsp _____ Rng _____
Name of nearest town on Railroad _____ State _____
Type of Encroachment: Crossing ____ Longitudinal ____ Railroad Mile Post _____
Name of nearest public roadway crossing Railroad _____ County _____
Within limits of public road or street? ☐ Yes ☐ No **If yes, distance from center line of road or street _____ ft.**
Width of public road or street ____ ft.
Kind of encroachment: Electric _____ Telephone _____ Other _____
No. of wires/cables _____ Type of wires/cable _____ Volts _____ Phase _____ Cycles _____
No. of conduits _____ No. of occupied conduits _____ No. of vacant conduits _____
Length of encroachment _____ Adjacent spans _____ ft. _____ ft.
Appurtenances on Ry. Co. Property _____
Wire clearance over or under top of rail _____ ft. _____ ft.
If under track, size & kind of conduit _____
Wire clearance over Ry. Co. wire lines ft. ft.
Was this service requested by BNSF? Yes or No (circle one)
If yes, who requested? _____ Telephone: _____

Attached to this sheet is a pole head diagram (if required) and location plan. Location plan shows tie-down measurement to centerline of nearest road crossing, bridge or other railroad structure. Please authorize us to proceed with construction of this encroachment as proposed or advise what changes are necessary to meet your specifications.

Signed: _____

Print Name: _____

Title: _____

Telephone: _____

April 16, 2004

POLE HEAD AND DATA SHEET

This completed form to accompany application to construct a wire line on THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY right-of-way.

Name of Company _____

Location of encroachment _____ ft. Sec. _____ Twsp. _____ Rng. _____

Nearest Town _____ County _____

POLES
Kind _____ Size _____
Height _____
Class _____
Set-in Earth-Rock _____

GUY WIRES
Overhead _____ Down _____
Kind _____ Size _____

CROSS ARMS
Material _____
Size _____ X _____ X _____

FRONT ELEVATION

INSULATORS
Material _____
Type _____ Size _____

BRACKETS
Material _____
Type _____ Size _____

CONDUCTORS
Material _____
Kind _____ Size _____

LINE CHARACTERISTICS

Voltage _____
Phase _____ Cycle _____

SIDE ELEVATION

Table 1 Soil Sampling Data used to Develop Interpolated TPH-Dx Isoconcentration Line

			Chemical Name	Diesel Range Hydrocarbons (mg/kg)			Oil Range Hydrocarbons (mg/kg)			Diesel Range + Oil Range (mg/kg)
Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
1A-B-10	1A-B-10-16	10 - 16	7/24/2007	ND	2.09	13	**4.46**	**4.16**	**32.6**	**5.505**
1A-B-10	1A-B-10-18	10 - 18	7/24/2007	**17.1**	**1.82**	**11.4**	**18.4**	**3.62**	**28.4**	**35.5**
1A-B-11	1A-B-11-19	19	7/24/2007	**2140**	**17.3**	**108**	**2240**	**34.6**	**271**	**4380**
1A-B-11	1A-B-11-21	21	7/24/2007	ND	2.2	13.7	ND	4.38	34.3	3.29
1A-B-11	1A-B-11-24	24	7/24/2007	ND	2.04	12.7	ND	4.06	31.8	3.05
1A-B-12	1A-B-12-14-16	14 - 16	8/31/2007	ND	2.07	12.9	**7.13**	**4.13**	**32.4**	**8.165**
1A-B-12	DUP03-0807		8/31/2007	**1670**	**17.2**	**107**	**1660**	**34.2**	**268**	**3330**
1A-B-12	1A-B-12-12-14	12 - 14	8/31/2007	**4230**	**16.9**	**106**	**5350**	**67.3**	**528**	**9580**
1A-B-12	1A-B-12-10-12	10 - 12	8/31/2007	**463**	**16.9**	**106**	**560**	**33.7**	**264**	**1023**
1A-B-13	1A-B-13-0-2	0 - 2	8/30/2007	**7.22**	**1.65**	**10.3**	**18.2**	**3.3**	**25.8**	**25.42**
1A-B-13	1A-B-13-2-4	2 - 4	8/30/2007	ND	1.83	11.4	ND	3.64	28.5	2.735
1A-B-13	1A-B-13-6-8	6 - 8	8/30/2007	ND	2.27	14.2	ND	4.53	35.5	3.4
1A-B-14	1A-B-14 2-4	2 - 4	8/28/2007	ND	1.68	10.5	ND	3.35	26.2	2.515
1A-B-14	1A-B-14 4-6	4 - 6	8/28/2007	ND	2.1	13.1	ND	4.18	32.8	3.14
1A-B-14	1A-B-14 0-2	0 - 2	8/28/2007	**21.5**	**1.72**	**10.8**	**33.7**	**3.44**	**26.9**	**55.2**
1A-B-15	DUP01-091807		9/18/2007	ND	1.69	10.6	ND	3.37	26.4	2.53
1A-B-15	1A-B-15-15-17	15 - 17	9/18/2007	ND	1.89	11.8	ND	3.77	29.5	2.83
1A-B-15	1A-B-15-11-13	11 - 13	9/18/2007	ND	1.78	11.1	ND	3.54	27.8	2.66
1A-B-15	1A-B-15-9-11	9 - 11	9/18/2007	**3.93**	**2.11**	**13.2**	**14.6**	**4.21**	**33**	**18.53**
1A-B-15	1A-B-15-13-15	13-15	9/18/2007	ND	1.83	11.4	ND	3.64	28.5	2.735
1A-B-16	1A-B-16-11.5-13.5	11.5-13.5	9/18/2007	**1750**	**39.3**	**246**	**1870**	**78.4**	**615**	**3620**
1A-B-16	DUP02-091807		9/18/2007	ND	1.91	11.9	ND	3.81	29.9	2.86
1A-B-16	1A-B-16-13.5-15.5	13.5-15.5	9/18/2007	ND	1.89	11.8	**7.84**	**3.76**	**29.5**	**8.785**
1A-B-17	1A-B-17-15-17	15-17	9/17/2007	ND	1.98	12.4	ND	3.94	30.9	2.96
1A-B-17	1A-B-17-13-15	13-15	9/17/2007	ND	2.1	13.1	**4.83**	**4.18**	**32.8**	**5.88**
1A-B-17	1A-B-17-9-11	9-11	9/17/2007	**940**	**17.1**	**107**	**1070**	**34.1**	**267**	**2010**
1A-B-17	1A-B-17-11-13	11-13	9/17/2007	**8.91**	**1.66**	**10.3**	**20.3**	**3.3**	**25.9**	**29.21**
1A-B-17B	1A-B-17B-11.5-13.5	11.5-13.5	9/17/2007	**3180**	**33.9**	**212**	**3360**	**67.5**	**529**	**6540**
1A-B-17B	1A-B-17B-15.5-17.5	15.5-17.5	9/17/2007	ND	2.14	13.4	ND	4.27	33.5	3.205
1A-B-17B	1A-B-17B-9.5-11.5	9.5-11.5	9/17/2007	**1580**	**20.3**	**127**	**1850**	**40.5**	**318**	**3430**
1A-B-17B	DUP04-091707		9/17/2007	ND	1.69	10.6	ND	3.37	26.4	2.53
1A-B-17B	1A-B-17B-13.5-15.5	13.5-15.5	9/17/2007	**37.9**	**2.32**	**14.5**	**51.6**	**4.63**	**36.3**	**89.5**

Table 1 Soil Sampling Data used to Develop Interpolated TPH-Dx Isoconcentration Line

			Chemical Name	Diesel Range Hydrocarbons (mg/kg)			Oil Range Hydrocarbons (mg/kg)			Diesel Range + Oil Range (mg/kg)
Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
1A-B-17C	1A-B-17C 10-12	10-12	10/24/2007	**822**	**17.3**	**108**	**1590**	**34.5**	**270**	**2412**
1A-B-17C	1A-B-17C 12-14	12-14	10/24/2007	**2930**	**35.6**	**223**	**2860**	**71**	**556**	**5790**
1A-B-17C	1A-B-17C 14-16	14-16	10/24/2007	**3.36**	**1.79**	**11.2**	**5.27**	**3.57**	**28**	**8.63**
1A-B-17C	1A-B-17C 8-10	8-10	10/24/2007	**720**	**17**	**106**	**1190**	**33.9**	**266**	**1910**
1A-B-18	1A-B-18-7-9	7-9	9/12/2007	ND	1.67	10.5	ND	3.34	26.2	2.505
1A-B-18	1A-B-18-13-15	13-15	9/12/2007	ND	2.05	12.8	**11.4**	**4.08**	**32**	**12.425**
1A-B-18	1A-B-18-15-17	15-17	9/12/2007	ND	2.09	13.1	**5.03**	**4.17**	**32.7**	**6.075**
1A-B-18	1A-B-18-17-19	17-19	9/12/2007	ND	2.21	13.8	ND	4.4	34.5	3.305
1A-B-19	1A-B-19 8-10	8-10	8/23/2007	**1.84**	**1.66**	**10.4**	**11.2**	**3.32**	**26**	**13.04**
1A-B-19	1A-B-19 10-12	10-12	8/23/2007	ND	1.68	10.5	**5.12**	**3.36**	**26.3**	**5.96**
1A-B-19	1A-B-19 14-16	14-16	8/23/2007	ND	1.7	10.7	**5.89**	**3.4**	**26.6**	**6.74**
1A-B-19	1A-B-19 12-14	12-14	8/23/2007	ND	1.69	10.6	**6.19**	**3.37**	**26.4**	**7.035**
1A-B-19B	1A-B-19B-12-14	12-14	9/12/2007	ND	1.72	10.8	ND	3.43	26.9	2.575
1A-B-19B	DUP03-091207		9/12/2007	ND	2.13	13.3	ND	4.24	33.3	3.185
1A-B-19B	1A-B-19B-18-20	18-20	9/12/2007	ND	2.26	14.1	ND	4.51	35.3	3.385
1A-B-19B	1A-B-19B-16-18	16-18	9/12/2007	ND	2.19	13.7	**4.82**	**4.37**	**34.3**	**5.915**
1A-B-19B	1A-B-19B-14-16	14-16	9/12/2007	**558**	**17.4**	**109**	**1070**	**34.7**	**272**	**1628**
1A-B-20	1A-B-20-21-23	21-23	9/13/2007	ND	2.28	14.3	ND	4.55	35.6	3.415
1A-B-20	1A-B-20-19-21	19-21	9/13/2007	ND	2.48	15.5	ND	4.94	38.7	3.71
1A-B-20	1A-B-20-17-19	17-19	9/13/2007	**2620**	**35.2**	**220**	**2640**	**70.3**	**551**	**5260**
1A-B-20	1A-B-20-15-17	15-17	9/13/2007	**789**	**1.69**	**10.6**	**962**	**33.8**	**265**	**1751**
1A-B-20	DUP01-091307		9/13/2007	**2210**	**34.5**	**216**	**2310**	**68.8**	**539**	**4520**
1A-B-21	1A-B-21-17-19	17-19	9/13/2007	ND	2.2	13.7	ND	4.38	34.3	3.29
1A-B-21	1A-B-21-11-13	11-13	9/13/2007	**1720**	**33.4**	**209**	**2770**	**66.6**	**522**	**4490**
1A-B-21	DUP02-091307		9/13/2007	**3650**	**34.4**	**215**	**3840**	**68.6**	**538**	**7490**
1A-B-21	1A-B-21-13-15	13-15	9/13/2007	**3970**	**85.8**	**536**	**4020**	**171**	**1340**	**7990**
1A-B-22	1A-B-22-22	22	7/25/2007	**16.6**	**2.23**	**13.9**	ND	4.44	34.8	**18.82**
1A-B-22	1A-B-22-24	24	7/25/2007	ND	2.08	13	ND	4.16	32.6	3.12
1A-B-23	1A-B-23 10-12	10-12	10/24/2007	**2370**	**18.3**	**114**	**2350**	**36.5**	**286**	**4720**
1A-B-23	1A-B-23 12-14	12-14	10/24/2007	**406**	**2.03**	**12.7**	**415**	**4.04**	**31.6**	**821**
1A-B-23	1A-B-23 14-16	14-16	10/24/2007	ND	2.16	13.5	**20.9**	**4.3**	**33.7**	**21.98**
1A-B-23	1A-B-23 16-18	16-18	10/24/2007	ND	2.23	13.9	**10.1**	**4.45**	**34.9**	**11.215**

Table 1 Soil Sampling Data used to Develop Interpolated TPH-Dx Isoconcentration Line

			Chemical Name	Diesel Range Hydrocarbons (mg/kg)			Oil Range Hydrocarbons (mg/kg)			Diesel Range + Oil Range (mg/kg)
Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
1A-B-24	1A-B-24 13-15	13-15	10/25/2007	**3420**	**35.2**	**220**	**3120**	**70.2**	**550**	**6540**
1A-B-24	DUP01-102507		10/25/2007	ND	2.14	13.4	ND	4.26	33.4	3.2
1A-B-24	1A-B-24 15-17	15-17	10/25/2007	**2150**	**35.4**	**221**	**1960**	**70.5**	**553**	**4110**
1A-B-24	1A-B-24 17-19	17-19	10/25/2007	ND	2.17	13.6	ND	4.33	34	3.25
1A-B-25	1A-B-25 22-24	22-24	10/25/2007	ND	2.3	14.4	ND	4.58	35.9	3.44
1A-B-25	1A-B-25 20-22	20-22	10/25/2007	ND	2.15	13.4	ND	4.28	33.6	3.215
1A-B-25	1A-B-25 18-20	18-20	10/25/2007	**2520**	**36.5**	**228**	**2530**	**72.7**	**570**	**5050**
1A-B-6	DUP03-091807		9/18/2007	ND	2.1	13.2	ND	4.2	32.9	3.15
1A-B-6	1A-B-6-9-11	9-11	9/18/2007	**4110**	**18.6**	**116**	**4070**	**185**	**1450**	**8180**
1A-B-6	1A-B-6-7-9	7-9	9/18/2007	**1140**	**18.8**	**117**	**2600**	**37.5**	**294**	**3740**
1A-B-6	1A-B-6-13-15	13-15	9/18/2007	ND	1.66	10.4	ND	3.3	25.9	2.48
1A-B-6	1A-B-6-11-13	11-13	9/18/2007	ND	1.67	10.4	**6.23**	**3.33**	**26.1**	**7.065**
1A-B-7	1A-B-7-12-14	12-14	9/12/2007	ND	1.66	10.4	**6.16**	**3.31**	**26**	**6.99**
1A-B-7	1A-B-7-14-16	14-16	9/12/2007	ND	1.73	10.8	ND	3.46	27.1	2.595
1A-B-7	1A-B-7-16-18	16-18	9/12/2007	ND	2.23	13.9	ND	4.44	34.8	3.335
1A-B-7	DUP02-91207		9/12/2007	ND	2.24	14	ND	4.46	34.9	3.35
1A-B-8	1A-B-8-11-13	11-13	9/5/2007	ND	1.69	10.6	ND	3.37	26.4	2.53
1A-B-8	1A-B-8-13-15	13-15	9/5/2007	**61.8**	**1.66**	**10.4**	**222**	**3.31**	**25.9**	**283.8**
1A-B-8	1A-B-8-15-17	15-17	9/5/2007	**1010**	**17.4**	**109**	**1030**	**34.7**	**272**	**2040**
1A-B-8	1A-B-8-17-19	17-19	9/5/2007	ND	2.18	13.6	ND	4.35	34.1	3.265
1A-B-8	DUP01-090507		9/5/2007	ND	1.63	10.2	ND	3.25	25.4	2.44
1A-B-9	DUP04-091807		9/18/2007	ND	1.64	10.3	ND	3.28	25.7	2.46
1A-B-9	1A-B-9-15-17	15-17	9/18/2007	ND	2.09	13.1	ND	4.17	32.7	3.13
1A-B-9	1A-B-9-17-19	17-19	9/18/2007	ND	2.18	13.6	ND	4.34	34	3.26
1A-W-1	1A-W-1-15-17.5	15-17.5	12/5/2001	ND	0.57	5	ND	10	10	5.285
1A-W-1	1A-W-1-17.5-20	17.5-20	12/5/2001	ND	0.58	5	ND	10	10	5.29
1A-W-1	1A-W-1-10-12.5	10-12.5	12/5/2001	**11**	**0.47**	**5**	**54**	**10**	**10**	**65**
1A-W-1	1A-W-1-12.5-15	12.5-15	12/5/2001	ND	0.48	5	ND	10	10	5.24
1A-W-1	1A-W-1-7.5-10	7.5-10	12/5/2001	ND	0.47	5	ND	10	10	5.235
1A-W-1	1A-W-1-5-7.5	5-7.5	12/5/2001	**23**	**0.48**	**5**	**100**	**10**	**10**	**123**
1A-W-1	1A-W-1-2.5-5	2.5-5	12/5/2001	ND	0.46	5	ND	10	10	5.23
1A-W-2	1A-W-2EC-7	7	12/4/2001	NA			**11100**		**85**	**NA**

Table 1 Soil Sampling Data used to Develop Interpolated TPH-Dx Isoconcentration Line

			Chemical Name	Diesel Range Hydrocarbons (mg/kg)			Oil Range Hydrocarbons (mg/kg)			Diesel Range + Oil Range (mg/kg)
Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
1A-W-2	1A-W-2	2	12/4/2001	**2400**	**5.1**	**28**	**2000**	**56**	**56**	**4400**
1A-W-3	1A-W-3-15	3-15	12/6/2001	ND	0.62	5	ND	10	10	5.31
1A-W-3	1A-W-3-8.5	8.5	12/6/2001	**9800**	**120**	**690**	**7200**	**1400**	**1400**	**17000**
1A-W-4	1A-W-4EC-7	7	12/5/2001	ND		20	NA			NA
1A-W-4	1A-W-4-20	20	12/5/2001	ND	0.5	5	ND	10	10	5.25
1A-W-4	1A-W-4-10-12.5	10-12.5	12/5/2001	ND	0.58	5	ND	10	10	5.29
1A-W-5	1A-W-5EC-14-16	14-16	7/19/2004	ND	1.6	10	ND	3.19	25	2.395
1B-B-10	1B-B-10-16	16	7/26/2007	ND	1.78	11.1	ND	3.55	27.8	2.665
1B-B-10	1B-B-10-10	10	7/26/2007	**1380**	**8.64**	**54**	**1500**	**17.2**	**135**	**2880**
1B-B-10	1B-B-10-12	12	7/26/2007	**15.6**	**2**	**12.5**	ND	4	31.3	**17.6**
1B-B-11	1B-B-11 12-14	12-14	8/22/2007	ND	1.74	10.9	ND	3.47	27.2	2.605
1B-B-11	1B-B-11 17-19	17-19	8/22/2007	ND	1.73	10.8	ND	3.44	27	2.585
1B-B-11	1B-B-11 10-12	10-12	8/22/2007	**31.1**	**1.66**	**10.4**	**119**	**3.31**	**26**	**150.1**
1B-B-12	1B-B-12-9	9	7/26/2007	**8850**	**33.9**	**212**	**809**	**67.6**	**530**	**9659**
1B-B-12	1B-B-12-11	11	7/26/2007	**7230**	**17.2**	**108**	**877**	**34.3**	**269**	**8107**
1B-B-12	1B-B-12-15	15	7/26/2007	**14**	**1.7**	**10.6**	ND	3.39	26.6	**15.695**
1B-B-12	1B-B-12-13	13	7/26/2007	**972**	**1.75**	**10.9**	**86.9**	**3.49**	**27.3**	**1058.9**
1B-B-13	1B-B-13-16	16	7/27/2007	ND	2.09	13.1	ND	4.18	32.7	3.135
1B-B-13	1B-B-13-14	14	7/27/2007	ND	1.73	10.8	ND	3.46	27.1	2.595
1B-B-13	1B-B-13-12	12	7/27/2007	ND	1.71	10.7	ND	3.41	26.7	2.56
1B-B-13	1B-B-13-10	10	7/27/2007	ND	1.67	10.5	ND	3.34	26.1	2.505
1B-B-14	1B-B-14-12-14	12-14	9/4/2007	ND	1.7	10.6	ND	3.39	26.5	2.545
1B-B-14	1B-B-14-14-16	14-16	9/4/2007	ND	1.82	11.4	ND	3.63	28.5	2.725
1B-B-14	1B-B-14-10-12	10-12	9/4/2007	ND	1.63	10.2	ND	3.24	25.4	2.435
1B-B-14	1B-B-14 8-10	8-10	9/4/2007	ND	1.62	10.1	ND	3.23	25.3	2.425
1B-B-14B	1B-B-14B-8-10	8-10	8/31/2007	**17.1**	**1.62**	**10.1**	**118**	**3.23**	**25.3**	**135.1**
1B-B-14B	1B-B-14B-14-16	14-16	8/31/2007	**334**	**8.51**	**53.2**	**599**	**17**	**133**	**933**
1B-B-14B	1B-B-14B-16-18	16-18	8/31/2007	**296**	**1.73**	**10.8**	**118**	**3.45**	**27**	**414**
1B-B-14B	1B-B-14B-18-20	18-20	8/31/2007	ND	1.8	11.2	ND	3.59	28.1	2.695
1B-B-14B	1B-B-14B-4-6	4-6	8/31/2007	ND	1.81	11.3	ND	3.61	28.3	2.71
1B-B-15	DUP01-091907		9/19/2007	ND	1.75	10.9	ND	3.49	27.3	2.62
1B-B-15	1B-B-15-17-19	17-19	9/19/2007	ND	1.74	10.8	ND	3.46	27.1	2.6

Table 1 Soil Sampling Data used to Develop Interpolated TPH-Dx Isoconcentration Line

			Chemical Name	Diesel Range Hydrocarbons (mg/kg)			Oil Range Hydrocarbons (mg/kg)			Diesel Range + Oil Range (mg/kg)
Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
1B-B-15	1B-B-15-15-17	15-17	9/19/2007	ND	1.72	10.7	ND	3.43	26.9	2.575
1B-B-15	1B-B-15-11-13	11-13	9/19/2007	ND	1.82	11.4	ND	3.64	28.5	2.73
1B-B-15	1B-B-15-13-15	13-15	9/19/2007	ND	1.83	11.4	ND	3.64	28.5	2.735
1B-B-15B	1B-B-15B 10-12	10-12	10/25/2007	**1390**	**3.85**	**24.1**	**247**	**7.68**	**60.2**	**1637**
1B-B-15B	1B-B-15B 12-14	12-14	10/25/2007	**3.69**	**1.78**	**11.1**	**5.29**	**3.56**	**27.9**	**8.98**
1B-B-15B	1B-B-15B 8-10	8-10	10/25/2007	**5560**	**16.9**	**105**	**243**	**33.7**	**264**	**5803**
1B-B-15B	1B-B-15B 14-16	14-16	10/25/2007	**2.92**	**1.76**	**11**	**4.6**	**3.5**	**27.5**	**7.52**
1B-B-15B	DUP01-102607		10/26/2007	ND	1.65	10.3	**4.2**	**3.29**	**25.8**	**5.025**
1B-B-16	1B-B-16-16-18	16-18	9/4/2007	**15.1**	**1.64**	**10.3**	**53.4**	**3.27**	**25.7**	**68.5**
1B-B-16	1B-B-16-14-16	14-16	9/4/2007	ND	1.66	10.4	ND	3.31	25.9	2.485
1B-B-16	1B-B-16-8-10	8-10	9/4/2007	ND	1.68	10.5	ND	3.34	26.2	2.51
1B-B-16	1B-B-16-18-20	18-20	9/4/2007	ND	1.7	10.6	**5.04**	**3.39**	**26.5**	**5.89**
1B-B-16B	1B-B-16B 11-13	11-13	10/25/2007	**1.85**	**1.74**	**10.9**	**4.68**	**3.46**	**27.1**	**6.53**
1B-B-16B	1B-B-16B 13-15	13-15	10/25/2007	ND	1.74	10.9	ND	3.47	27.2	2.605
1B-B-16B	1B-B-16B 15-17	15-17	10/25/2007	ND	1.84	11.5	**4.27**	**3.67**	**28.8**	**5.19**
1B-B-16B	1B-B-16B 17-19	17-19	10/25/2007	ND	1.75	10.9	**3.81**	**3.48**	**27.3**	**4.685**
1B-B-19	1B-B-19-11-13	11-13	9/5/2007	**34.7**	**1.64**	**10.2**	**45.7**	**3.27**	**25.6**	**80.4**
1B-B-19	1B-B-19-13-15	13-15	9/5/2007	**343**	**1.67**	**10.4**	**236**	**3.32**	**26**	**579**
1B-B-19	1B-B-19-15-17	15-17	9/5/2007	**83**	**1.77**	**11**	**18.9**	**3.52**	**27.6**	**101.9**
1B-B-19	1B-B-19-17-19	17-19	9/5/2007	**16.5**	**1.75**	**10.9**	ND	3.48	27.3	**18.24**
1B-B-21	1B-B-21-16-18	16-18	9/19/2007	ND	1.85	11.6	ND	3.7	29	2.775
1B-B-21	1B-B-21-14-16	14-16	9/19/2007	ND	1.74	10.9	ND	3.47	27.2	2.605
1B-B-21	1B-B-21-18-20	18-20	9/19/2007	ND	1.75	10.9	ND	3.48	27.3	2.615
1B-B-21	DUP02-091907		9/19/2007	ND	1.76	11	ND	3.52	27.6	2.64
1B-B-21	1B-B-21-12-14	12-14	9/19/2007	ND	1.75	10.9	ND	3.49	27.3	2.62
1B-B-21B	1B-B-21B 11-13	11-13	10/25/2007	**87.5**	**1.75**	**11**	**79.9**	**3.5**	**27.4**	**167.4**
1B-B-21B	1B-B-21B 13-15	13-15	10/25/2007	**35.3**	**1.71**	**10.7**	**13.6**	**3.42**	**26.8**	**48.9**
1B-B-21B	1B-B-21B 15-17	15-17	10/25/2007	ND	1.76	11	ND	3.5	27.5	2.63
1B-B-21B	1B-B-21B 17-19	17-19	10/25/2007	ND	2.21	13.8	**4.62**	**4.41**	**34.5**	**5.725**
1B-B-22	1B-B-22-18-20	18-20	9/17/2007	**7.9**	**1.75**	**10.9**	**9.47**	**3.49**	**27.3**	**17.37**
1B-B-22	1B-B-22-14-16	14-16	9/17/2007	ND	1.7	10.6	**3.66**	**3.4**	**26.6**	**4.51**
1B-B-22	1B-B-22-16-18	16-18	9/17/2007	**107**	**2.18**	**13.6**	**42.9**	**4.35**	**34.1**	**149.9**

Table 1 Soil Sampling Data used to Develop Interpolated TPH-Dx Isoconcentration Line

			Chemical Name	Diesel Range Hydrocarbons (mg/kg)			Oil Range Hydrocarbons (mg/kg)			Diesel Range + Oil Range (mg/kg)
Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
1B-B-22B	1B-B-22B 11-13	11-13	10/25/2007	**4220**	**8.67**	**54.2**	**380**	**17.3**	**135**	**4600**
1B-B-22B	1B-B-22B 15-17	15-17	10/25/2007	**48.7**	**1.76**	**11**	**7.97**	**3.51**	**27.5**	**56.67**
1B-B-22B	1B-B-22B 8-10	8-10	10/25/2007	**1340**	**3.4**	**21.2**	**200**	**6.77**	**53.1**	**1540**
1B-B-22B	1B-B-22B 13-15	13-15	10/25/2007	**990**	**1.72**	**10.8**	**66.4**	**3.44**	**26.9**	**1056.4**
1B-B-4	1B-B-4-19	19	7/27/2007	ND	2.02	12.6	ND	4.03	31.6	3.025
1B-B-4	1B-B-4-17	17	7/27/2007	ND	1.72	10.8	ND	3.44	26.9	2.58
1B-B-4	1B-B-4-15	15	7/27/2007	ND	1.65	10.3	**63.5**	**3.29**	**25.8**	**64.325**
1B-B-4	1B-B-4-13	13	7/27/2007	ND	1.64	10.2	ND	3.27	25.6	2.455
1B-B-5	1B-B-5-19	19	7/26/2007	ND	1.66	10.4	ND	3.31	25.9	2.485
1B-B-5	1B-B-5-17	17	7/26/2007	ND	1.86	11.6	**152**	**3.7**	**29**	**152.93**
1B-B-5	1B-B-5-15	15	7/26/2007	ND	1.65	10.3	ND	3.29	25.8	2.47
1B-B-5	1B-B-5-13	13	7/26/2007	ND	1.82	11.4	ND	3.63	28.5	2.725
1B-B-6	1B-B-6-17	17	7/25/2007	ND	2.22	13.9	ND	4.42	34.7	3.32
1B-B-6	1B-B-6-19	19	7/25/2007	ND	2.19	13.7	ND	4.37	34.3	3.28
1B-B-6	1B-B-6-14	14	7/25/2007	**5230**	**34.2**	**214**	**5620**	**68.3**	**535**	**10850**
1B-B-6B	1B-B-6B 8-10	8-10	8/23/2007	ND	1.71	10.7	**3.52**	**3.4**	**26.7**	**4.375**
1B-B-6B	1B-B-6B 10-12	10-12	8/23/2007	ND	1.63	10.2	ND	3.25	25.4	2.44
1B-B-6B	1B-B-6B 12-14	12-14	8/23/2007	ND	1.68	10.5	ND	3.34	26.2	2.51
1B-B-6B	1B-B-6B 14-16	14-16	8/23/2007	ND	1.79	11.2	ND	3.57	28	2.68
1B-B-6C	DUP01-91107		9/11/2007	ND	1.68	10.5	ND	3.35	26.3	2.515
1B-B-6C	1B-B-6C-16-18	16-18	9/12/2007	**17.8**	**2.03**	**12.7**	**19.9**	**4.04**	**31.6**	**37.7**
1B-B-6C	DUP001-91107		9/12/2007	**937**	**33.3**	**208**	**2080**	**66.4**	**521**	**3017**
1B-B-6C	1B-B-6C-12-14	12-14	9/12/2007	**5730**	**34.5**	**215**	**5880**	**68.7**	**538**	**11610**
1B-B-6C	1B-B-6C-14-16	14-16	9/12/2007	**2.17**	**1.96**	**12.2**	**8.91**	**3.9**	**30.6**	**11.08**
1B-B-6C	1B-B-6C-10-12	10-12	9/12/2007	**387**	**16.4**	**102**	**724**	**32.7**	**256**	**1111**
1B-B-6D	1B-B-6D-10-12	10-12	9/11/2007	ND	1.67	10.4	**5.96**	**3.33**	**26.1**	**6.795**
1B-B-6D	1B-B-6D-12-14	12-14	9/11/2007	ND	1.68	10.5	ND	3.36	26.3	2.52
1B-B-6D	1B-B-6D-14-16	14-16	9/11/2007	ND	2	12.5	ND	3.98	31.2	2.99
1B-B-6D	1B-B-6D-16-18	16-18	9/11/2007	ND	2.21	13.8	ND	4.41	34.6	3.31
1B-B-6E	1B-B-6E 17-19	17-19	10/25/2007	ND	2.22	13.9	ND	4.43	34.7	3.325
1B-B-6E	1B-B-6E 11-13	11-13	10/25/2007	ND	1.69	10.6	ND	3.37	26.4	2.53
1B-B-6E	1B-B-6E 13-15	13-15	10/25/2007	**966**	**1.72**	**10.8**	**64.8**	**3.44**	**26.9**	**1030.8**

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			Chemical Name	Diesel Range Hydrocarbons (mg/kg)				Oil Range Hydrocarbons (mg/kg)				Diesel Range + Oil Range (mg/kg)
Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier		MDL	RDL	Result & Qualifier		MDL	RDL	
1B-B-6E	1B-B-6E 15-17	15-17	10/25/2007	ND		2.25	14.1	ND		4.48	35.1	3.365
1B-B-7	1B-B-7-18	18	7/25/2007	ND		2.12	13.2	ND		4.22	33.1	3.17
1B-B-7	1B-B-7-20	20	7/25/2007	ND		2.19	13.7	ND		4.37	34.2	3.28
1B-B-7B	1B-B-7B 14-16	14-16	8/23/2007	**286**		**1.8**	**11.2**	**361**		**3.58**	**28**	**647**
1B-B-7B	1B-B-7B 16-18	16-18	8/23/2007	**5.34**		**1.8**	**11.3**	ND		3.59	28.1	**7.135**
1B-B-7B	1B-B-7B 18-20	18-20	8/23/2007	ND		2.1	13.1	ND		4.19	32.9	3.145
1B-B-8	1B-B-8-14	14	7/25/2007	**2140**		**17.4**	**109**	**978**		**34.6**	**271**	**3118**
1B-B-8	1B-B-8-16	16	7/25/2007	ND		1.87	11.7	ND		3.74	29.3	2.805
1B-B-8	1B-B-8-18	18	7/25/2007	ND		1.8	11.3	ND		3.6	28.2	2.7
1B-B-9	1B-B-9-19	19	7/26/2007	ND		2.03	12.7	ND		4.05	31.7	3.04
1B-B-9	1B-B-9-15	15	7/26/2007	ND		1.8	11.3	**38.4**		**3.6**	**28.2**	**39.3**
1B-B-9	1B-B-9-13	13	7/26/2007	ND		1.72	10.8	**27.7**		**3.43**	**26.9**	**28.56**
1B-B-9	1B-B-9-20	20	7/26/2007	ND		2.26	14.1	ND		4.5	35.3	3.38
1B-W-1	1B-W-1-11.5	11.5	12/7/2001	**1100**	**J**	**5**	**28**	**200**	**J**	**56**	**56**	**1300**
1B-W-1	1B-W-1-21	21	12/7/2001	ND	J	0.53	5	ND	J	10	10	5.265
1B-W-1	1B-W-1-15	15	12/7/2001	**1400**	**J**	**5.1**	**28**	**220**	**J**	**57**	**57**	**1620**
1B-W-2	1B-W-2-100	100	1/8/2002	**26**		**0.54**	**5**	**41**		**10**	**10**	**67**
1B-W-2	1B-W-2-16	16	1/8/2002	**170**		**0.54**	**5**	**150**		**10**	**10**	**320**
1B-W-2	1B-W-2-10	10	1/8/2002	**20**		**0.53**	**5**	**35**		**10**	**10**	**55**
1B-W-3	1B-W-3-140	140	12/19/2001	ND		0.49	5	ND		10	10	5.245
1B-W-3	1B-W-3-19	19	12/19/2001	ND		0.57	5	ND		10	10	5.285
1B-W-3	1B-W-3-14	14	12/19/2001	ND		0.49	5	ND		10	10	5.245
1C-W-1	1C-W-1-19	19	12/17/2001	**5.2**		**0.58**	**5**	ND		10	10	**10.2**
1C-W-1	1C-W-1-13	13	12/17/2001	**1600**		**4.8**	**27**	**240**		**54**	**54**	**1840**
1C-W-1	1C-W-1EC-13	13	12/17/2001	**1900**			**17**	NA				**NA**
1C-W-1	1C-W-1-0-2	0-2	12/17/2001	ND		0.48	5	ND		10	10	5.24
1C-W-2	1C-W-2-20.5	20.5	12/10/2001	ND	J	0.58	5	ND	J	10	10	5.29
1C-W-2	1C-W-2EC-10.5	10.5	12/10/2001	ND			17	NA				NA
1C-W-2	1C-W-2-10.5	10.5	12/10/2001	ND		0.48	5	ND		10	10	5.24
1C-W-3	1C-W-3-12	12	11/8/2004	ND		1.6	10	ND		3.19	25	2.395
1C-W-4	1C-W-4-12	12	11/9/2004	**111**		**1.6**	**10**	**41.5**		**3.19**	**25**	**152.5**
2A-B-17	2A-B-17-10	10	12/3/2001	ND		0.49	5	ND		10	10	5.245

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			Chemical Name	Diesel Range Hydrocarbons (mg/kg)			Oil Range Hydrocarbons (mg/kg)			Diesel Range + Oil Range (mg/kg)
Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
2A-B-17	2A-B-17-12.5	12.5	12/3/2001	**45**	**0.53**	**5**	**41**	**10**	**10**	**86**
2A-B-17	2A-B-17-2	2	12/3/2001	**1000**	**10**	**100**	**1600**	**200**	**200**	**2600**
2A-B-17	2A-B-17-7.5	7.5	12/3/2001	**58**	**0.49**	**5**	**92**	**10**	**10**	**150**
2A-B-17	2A-B-17-2.5	2.5	12/3/2001	**340**	**5.3**	**50**	**560**	**100**	**100**	**900**
2A-B-17	2A-B-17-5	5	12/3/2001	**58**	**0.54**	**5**	**61**	**10**	**10**	**119**
2A-B-21	2A-B-21-13.5	13.5	7/26/2007	ND	2.07	12.9	ND	4.13	32.3	3.1
2A-B-21	2A-B-21-15.5	15.5	7/26/2007	ND	2.3	14.4	ND	4.58	35.9	3.44
2A-B-21	2A-B-21-9.5	9.5	7/26/2007	**25.7**	**1.62**	**10.1**	ND	3.23	25.3	**27.315**
2A-B-21	2A-B-21-11.5	11.5	7/26/2007	ND	1.72	10.8	ND	3.44	26.9	2.58
2A-B-23	2A-B-23-14	14	7/27/2007	ND	1.68	10.5	ND	3.34	26.2	2.51
2A-B-23	2A-B-23-10	10	7/27/2007	ND	1.71	10.7	ND	3.41	26.8	2.56
2A-B-23	2A-B-23-16	16	7/27/2007	ND	1.69	10.6	ND	3.37	26.4	2.53
2A-B-23	2A-B-23-12	12	7/27/2007	ND	1.71	10.7	ND	3.41	26.7	2.56
2A-B-30	2A-B-30 13-15	13-15	10/22/2007	**2050**	**17.9**	**112**	**133**	**35.7**	**280**	**2183**
2A-B-30	2A-B-30 15-17	15-17	10/22/2007	ND	2.07	12.9	ND	4.12	32.3	3.095
2A-B-30	2A-B-30 17-19	17-19	10/22/2007	ND	2.12	13.2	ND	4.22	33.1	3.17
2A-B-30	2A-B-30 19-20	19-20	10/22/2007	ND	2.12	13.2	ND	4.22	33.1	3.17
2A-B-31	2A-B-31 8-10	8-10	10/22/2007	ND	1.7	10.6	**6.76**	**3.39**	**26.6**	**7.61**
2A-B-31	DUP01-102207		10/22/2007	ND	1.68	10.5	ND	3.36	26.3	2.52
2A-B-31	2A-B-31 14-16	14-16	10/22/2007	ND	1.86	11.6	ND	3.71	29.1	2.785
2A-B-31	2A-B-31 12-14	12-14	10/22/2007	ND	1.76	11	ND	3.52	27.6	2.64
2A-B-31	2A-B-31 10-12	10-12	10/22/2007	ND	1.7	10.6	**5.26**	**3.39**	**26.6**	**6.11**
2A-B-32	2A-B-32 15-17	15-17	10/22/2007	**896**	**19.4**	**121**	**1070**	**38.7**	**303**	**1966**
2A-B-32	2A-B-32 17-19	17-19	10/22/2007	**74.6**	**1.75**	**10.9**	**100**	**3.48**	**27.3**	**174.6**
2A-B-32	2A-B-32 19-21	19-21	10/22/2007	ND	1.72	10.8	**4.41**	**3.43**	**26.9**	**5.27**
2A-B-32	DUP02-102207		10/22/2007	**793**	**9.51**	**59.5**	**936**	**19**	**149**	**1729**
2A-B-32	2A-B-32 13-15	13-15	10/22/2007	**1270**	**17.4**	**109**	**1980**	**34.8**	**272**	**3250**
2A-B-33	2A-B-33 17-19	17-19	10/22/2007	ND	2.15	13.4	ND	4.28	33.5	3.215
2A-B-33	2A-B-33 13-15	13-15	10/22/2007	**90**	**1.8**	**11.3**	**44.3**	**3.59**	**28.1**	**134.3**
2A-B-33	2A-B-33 15-17	15-17	10/22/2007	ND	1.94	12.1	ND	3.86	30.3	2.9
2A-B-34	DUP01-102307		10/23/2007	**5270**	**17.1**	**107**	**950**	**34.2**	**268**	**6220**
2A-B-34	2A-B-34 9-11	9-11	10/23/2007	**5830**	**17.2**	**107**	**1170**	**34.2**	**268**	**7000**

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			Chemical Name	Diesel Range Hydrocarbons (mg/kg)			Oil Range Hydrocarbons (mg/kg)			Diesel Range + Oil Range (mg/kg)
Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
2A-B-34	2A-B-34 11-13	11-13	10/23/2007	**8040**	**17.7**	**111**	**1640**	**35.4**	**277**	**9680**
2A-B-34	2A-B-34 13-15	13-15	10/23/2007	**2240**	**8.81**	**55.1**	**456**	**17.6**	**138**	**2696**
2A-B-34	2A-B-34 15-17	15-17	10/23/2007	**98.4**	**1.79**	**11.2**	**20.4**	**3.57**	**28**	**118.8**
2A-B-35	2A-B-35 15-17	15-17	10/23/2007	**461**	**18.7**	**117**	**531**	**37.2**	**292**	**992**
2A-B-35	2A-B-35 17-19	17-19	10/23/2007	**148**	**2.33**	**14.6**	**133**	**4.65**	**36.5**	**281**
2A-B-35	2A-B-35 19-21	19-21	10/23/2007	**46.8**	**2.11**	**13.2**	**54.9**	**4.2**	**32.9**	**101.7**
2A-B-35	2A-B-35 22-24	22-24	10/23/2007	**1.97**	**1.96**	**12.3**	**8.92**	**3.92**	**30.7**	**10.89**
2A-B-36	2A-B-36 17-19	17-19	10/23/2007	**1470**	**17.9**	**112**	**1480**	**35.6**	**279**	**2950**
2A-B-36	DUP02-102307		10/23/2007	**1210**	**18.6**	**116**	**1300**	**37**	**290**	**2510**
2A-B-36	2A-B-36 15-17	15-17	10/23/2007	**1350**	**18.3**	**114**	**1420**	**36.5**	**286**	**2770**
2A-B-37	DUP02-102507		10/25/2007	**1400**	**3.62**	**22.6**	**322**	**3.61**	**28.3**	**1722**
2A-B-37	2A-B-37 13-15	13-15	10/26/2007	ND	1.78	11.1	**4.13**	**3.55**	**27.8**	**5.02**
2A-B-37	2A-B-37 15-17	15-17	10/26/2007	**6.63**	**1.87**	**11.7**	**24.5**	**3.73**	**29.2**	**31.13**
2A-B-37	2A-B-37 8-10	8-10	10/26/2007	ND	1.62	10.1	**3.41**	**3.23**	**25.3**	**4.22**
2A-B-37	2A-B-37 10-12	10-12	10/26/2007	ND	1.69	10.6	**4.72**	**3.37**	**26.4**	**5.565**
2A-B-38	2A-B-38 8-10	8-10	10/26/2007	**2000**	**8.4**	**52.5**	**166**	**16.7**	**131**	**2166**
2A-B-38	2A-B-38 10-12	10-12	10/26/2007	**246**	**1.71**	**10.7**	**46.3**	**3.41**	**26.7**	**292.3**
2A-B-38	2A-B-38 12-14	12-14	10/26/2007	**98**	**1.76**	**11**	**22.7**	**3.5**	**27.5**	**120.7**
2A-B-38	2A-B-38 14-16	14-16	10/26/2007	**4.39**	**1.79**	**11.2**	**6.24**	**3.56**	**27.9**	**10.63**
2A-B-39	2A-B-39 20-22	20-22	10/23/2007	**834**	**1.77**	**11.1**	**766**	**17.6**	**138**	**1600**
2A-B-39	2A-B-39 22-24	22-24	10/23/2007	ND	2.17	13.5	**31**	**4.32**	**33.9**	**32.085**
2A-W-1	2A-W-1-12.5-15-2	12.5-15	12/6/2001	**7800**	**99**	**550**	**6000**	**1100**	**1100**	**13800**
2A-W-1	2A-W-1-20	20	12/6/2001	ND	0.58	5	ND	10	10	5.29
2A-W-1	2A-W-1-17	17	12/6/2001	ND	0.63	5	**12**	**10**	**10**	**12.315**
2A-W-1	2A-W-1-10-12.5	10-12.5	12/6/2001	**7600**	**52**	**290**	**5600**	**570**	**570**	**13200**
2A-W-1	2A-W-1-12.5-15	12.5-15	12/6/2001	**8300**	**50**	**280**	**5800**	**560**	**560**	**14100**
2A-W-1	2A-W-1-7.5-10	7.5-10	12/6/2001	**880**	**9.7**	**100**	**1900**	**200**	**200**	**2780**
2A-W-1	2A-W-1-0-2	0-2	12/6/2001	**54** J	**0.47**	**5**	**95** J	**10**	**10**	**149**
2A-W-1	2A-W-1-2.5-5	2.5-5	12/6/2001	ND	0.48	5	ND	10	10	5.24
2A-W-1	2A-W-1-5-7.5	5-7.5	12/6/2001	**270**	**9.9**	**100**	**530**	**200**	**200**	**800**
2A-W-2	2A-W-2-1100		12/8/2001	**10000**	**96**	**530**	**7400**	**1100**	**1100**	**17400**
2A-W-2	2A-W-2-20	20	12/8/2001	ND	0.58	5	ND	10	10	5.29

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Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
2A-W-2	2A-W-2-2-11	2-11	12/8/2001	**7000**	**94**	**520**	**5200**	**1000**	**1000**	**12200**
2A-W-2	2A-W-2-0-2	0-2	12/8/2001	**220**	**0.5**	**5**	**230**	**10**	**10**	**450**
2A-W-22	2A-W-22-15	15	7/26/2007	ND	2.21	13.8	ND	4.4	34.5	3.305
2A-W-22	2A-W-22-13	13	7/26/2007	ND	1.75	10.9	ND	3.49	27.3	2.62
2A-W-22	2A-W-22-11	11	7/26/2007	**31.9**	**1.67**	**10.4**	**47**	**3.32**	**26.1**	**78.9**
2A-W-22	2A-W-22-9	9	7/26/2007	ND	1.66	10.4	ND	3.31	25.9	2.485
2A-W-6	2A-W-60		12/9/2001	**5600**	**46**	**260**	**580**	**520**	**520**	**6180**
2A-W-6	2A-W-6-20-22.5	20-22.5	12/9/2001	ND	0.58	5	ND	10	10	5.29
2A-W-6	2A-W-6-17.5-20	17.5-20	12/9/2001	ND	0.5	5	ND	10	10	5.25
2A-W-6	2A-W-6-15-17.5	15-17.5	12/9/2001	**11**	**0.51**	**5**	ND	10	10	**16**
2A-W-6	2A-W-6-12.5-15	12.5-15	12/9/2001	**1300**	**13**	**120**	ND	250	250	**1425**
2A-W-6	2A-W-6-7.5-10	7.5-10	12/9/2001	**3900**	**46**	**260**	**410 J**	**53**	**53**	**4310**
2A-W-6	2A-W-6-10-12.5	10-12.5	12/9/2001	**1600**	**13**	**120**	ND	250	250	**1725**
2A-W-6	2A-W-6-0-2	0-2	12/9/2001	**10**	**0.49**	**5**	**38**	**10**	**10**	**48**
2A-W-6	2A-W-6-5-7.5	5-7.5	12/9/2001	**35**	**0.51**	**5**	**30**	**10**	**10**	**65**
2A-W-6	2A-W-6-2.5-5	2.5-5	12/9/2001	**22**	**0.56**	**5**	**55**	**10**	**10**	**77**
5-B-1	5-B-1-14	14	12/3/2001	ND	0.52	5	ND	10	10	5.26
5-B-1	5-B-1-11	11	12/3/2001	ND	0.49	5	ND	10	10	5.245
5-B-1	5-B-1-2	2	12/3/2001	**44**	**0.94**	**10**	**290**	**20**	**20**	**334**
5-B-1	5-B-1-4	4	12/3/2001	**9.1**	**0.47**	**5**	**46**	**10**	**10**	**55.1**
5-B-11	5-B-11-2-4	2-4	9/11/2005	**15.7 J**	**1.6**	**10**	**62.9 J**	**3.19**	**25**	**78.6**
5-B-11	5-B-11-15-20	15-20	9/11/2005	**3.21 J**	**1.6**	**10**	**19.7 J**	**3.19**	**25**	**22.91**
5-B-11	5-B-11-0-1	0-1	9/11/2005	**10.9 J**	**1.6**	**10**	**86.8 J**	**3.19**	**25**	**97.7**
5-B-12	5-B-12-30-33	30-33	9/11/2005	**36.9 J**	**1.6**	**10**	**92.6 J**	**3.19**	**25**	**129.5**
5-B-2	5-B-2-21	21	12/14/2001	ND	0.59	5	ND	10	10	5.295
5-B-2	5-B-2-11	11	12/14/2001	**4600**	**51**	**280**	**6300**	**560**	**560**	**10900**
5-B-2	5-B-2-15	15	12/14/2001	**10000**	**120**	**690**	**8000**	**1400**	**1400**	**18000**
5-B-2	5-B-2-0-2	0-2	12/14/2001	**360**	**4.8**	**50**	**860**	**100**	**100**	**1220**
5-B-21	5-B-21 (17-19.5)	17-19.5	8/27/2007	**18.8**	**1.95**	**12.2**	**27.5**	**3.89**	**30.5**	**46.3**
5-B-21	5-B-21 (12-14)	12-14	8/27/2007	ND	1.82	11.4	ND	3.63	28.5	2.725
5-B-21	5-B-21 (14-16)	14-16	8/27/2007	ND	2.05	12.8	ND	4.09	32.1	3.07
5-B-22	5-B-22 (8-10)	8-10	8/27/2007	**5.4**	**1.98**	**12.4**	**12.1**	**3.95**	**31**	**17.5**

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Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
5-B-22	5-B-22 (12-14)	12-14	8/27/2007	ND	1.8	11.3	**7.54**	**3.59**	**28.1**	**8.44**
5-B-22	5-B-22 (10-12)	10-12	8/27/2007	**13.7**	**1.74**	**10.9**	**58.9**	**3.46**	**27.1**	**72.6**
5-B-23	5-B-23 (8-10)	8-10	8/27/2007	ND	1.67	10.4	ND	3.32	26	2.495
5-B-23	5-B-23 (6-8)	6-8	8/27/2007	ND	1.68	10.5	**4.08**	**3.35**	**26.3**	**4.92**
5-B-23	5-B-23 (12-14)	12-14	8/27/2007	ND	1.78	11.1	ND	3.54	27.8	2.66
5-B-23	5-B-23 (10-12)	10-12	8/27/2007	ND	1.81	11.3	ND	3.61	28.3	2.71
5-B-25	5-B-25 12-14	12-14	8/28/2007	ND	2.03	12.7	ND	4.04	31.7	3.035
5-B-25	5-B-25 10-12	10-12	8/28/2007	**5.63**	**1.75**	**10.9**	**8.01**	**3.48**	**27.3**	**13.64**
5-B-25	5-B-25 8-10	8-10	8/28/2007	**460**	**17.2**	**108**	**542**	**34.4**	**269**	**1002**
5-B-26	5-B-26-13	13	7/25/2007	**3780**	**34**	**212**	**4390**	**67.8**	**531**	**8170**
5-B-26	5-B-26-17	17	7/25/2007	**1010**	**3.53**	**22**	**1240**	**35.1**	**275**	**2250**
5-B-26	5-B-26-19	19	7/25/2007	**616**	**1.81**	**11.3**	**768**	**18**	**141**	**1384**
5-B-26	5-B-26-15	15	7/25/2007	**15.5**	**1.78**	**11.1**	**21.1**	**3.55**	**27.9**	**36.6**
5-B-28	5-B-28-10	10	7/24/2007	**5250**	**34.1**	**213**	**5980**	**68**	**533**	**11230**
5-B-28	5-B-28-13	13	7/24/2007	**4030**	**18.4**	**115**	**4220**	**73.3**	**575**	**8250**
5-B-28	5-B-28-14	14	7/24/2007	**73.8**	**1.72**	**10.8**	**82.3**	**3.43**	**26.9**	**156.1**
5-B-28	5-B-28-16	16	7/24/2007	**787**	**3.67**	**22.9**	**762**	**14.6**	**115**	**1549**
5-B-28	5-B-28-7	7	7/24/2007	**9.39**	**1.66**	**10.4**	**108**	**3.31**	**25.9**	**117.39**
5-B-29	5-B-29-16-18	16-18	9/18/2007	ND	1.78	11.1	**4.38**	**3.54**	**27.8**	**5.27**
5-B-29	5-B-29-14-16	14-16	9/18/2007	**1120**	**16.9**	**105**	**1230**	**33.7**	**264**	**2350**
5-B-29	5-B-29-18-20	18-20	9/18/2007	**1.89**	**1.81**	**11.3**	ND	3.6	28.2	**3.69**
5-B-29	5-B-29-12-14	12-14	9/18/2007	**3410**	**42.6**	**266**	**3520**	**84.9**	**665**	**6930**
5-B-3	5-B-3-0-2	0-2	12/15/2001	**15**	**0.54**	**5**	**51**	**10**	**10**	**66**
5-B-3	5-B-3-4	4	12/15/2001	ND	0.48	5	ND	10	10	5.24
5-B-3	5-B-3EC-17	17	12/15/2001	NA			ND		109	NA
5-B-3	5-B-3-8	8	12/15/2001	**3100**	**51**	**280**	**3500**	**560**	**560**	**6600**
5-B-3	5-B-3-17	17	12/15/2001	ND	0.61	5	**17**	**10**	**10**	**17.305**
5-B-3	5-B-3EC-8	8	12/15/2001	NA			**10100**		**108**	**NA**
5-B-30	5-B-30-16-18	16-18	9/18/2007	**1210**	**17.5**	**110**	**1140**	**35**	**274**	**2350**
5-B-30	5-B-30-18-20	18-20	9/18/2007	ND	1.76	11	ND	3.51	27.5	2.635
5-B-30	DUP06-091807		9/18/2007	**1310**	**17.4**	**109**	**1280**	**34.7**	**272**	**2590**
5-B-31	5-B-31-15-17	15-17	9/18/2007	**206**	**1.76**	**11**	**214**	**3.52**	**27.6**	**420**

Table 1 Soil Sampling Data used to Develop Interpolated TPH-Dx Isoconcentration Line

			Chemical Name	Diesel Range Hydrocarbons (mg/kg)			Oil Range Hydrocarbons (mg/kg)			Diesel Range + Oil Range (mg/kg)
Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
5-B-31	5-B-31-17-19	17-19	9/18/2007	ND	2.08	13	**6.06**	**4.15**	**32.5**	**7.1**
5-B-31	DUP05-091807		9/18/2007	**248**	**2.07**	**12.9**	**250**	**4.12**	**32.3**	**498**
5-B-32	5-B-32 (6-8)	6-8	8/27/2007	ND	1.69	10.5	ND	3.36	26.3	2.525
5-B-32	5-B-32 (10-12)	10-12	8/27/2007	**89.7**	**1.72**	**10.8**	**118**	**3.43**	**26.9**	**207.7**
5-B-32	5-B-32 (12-14)	12-14	8/27/2007	ND	1.96	12.2	**4.93**	**3.9**	**30.6**	**5.91**
5-B-32	5-B-32 (8-10)	8-10	8/27/2007	**381**	**1.71**	**10.7**	**421**	**6.8**	**53.3**	**802**
5-B-33	5-B-33-6-7	6-7	7/23/2007	**16.4**	**1.67**	**10.4**	**128**	**3.33**	**26.1**	**144.4**
5-B-33	5-B-33-8-9	8-9	7/23/2007	ND	1.73	10.8	**3.87**	**3.45**	**27**	**4.735**
5-B-33	5-B-33-13-14	13-14	7/23/2007	**2.6**	**1.83**	**11.5**	**15.7**	**3.66**	**28.7**	**18.3**
5-B-34	5-B-34-10	10	7/23/2007	ND	1.75	11	**4.58**	**3.49**	**27.4**	**5.455**
5-B-34	5-B-34-11	11	7/23/2007	**6.91**	**1.78**	**11.1**	**55.8**	**3.54**	**27.7**	**62.71**
5-B-34	5-B-34-12	12	7/23/2007	**2.88**	**1.85**	**11.6**	**28.2**	**3.68**	**28.9**	**31.08**
5-B-34	5-B-34-13	13	7/23/2007	ND	1.85	11.5	**4**	**3.68**	**28.9**	**4.925**
5-B-4	5-B-4-10	10	12/3/2001	ND	0.5	5	ND	10	10	5.25
5-B-4	5-B-4-2	2	12/3/2001	**27**	**0.62**	**5**	**48**	**10**	**10**	**75**
5-B-4	5-B-4-5	5	12/3/2001	ND	0.51	5	ND	10	10	5.255
5-B-41	5-B-41 17-19	17-19	10/24/2007	**1110**	**17.9**	**112**	**1030**	**35.7**	**280**	**2140**
5-B-41	5-B-41 15-17	15-17	10/24/2007	**640**	**17.3**	**108**	**624**	**34.4**	**270**	**1264**
5-B-41	DUP01-102407		10/24/2007	**769**	**17.5**	**110**	**702**	**34.9**	**274**	**1471**
5-B-5	5-B-5-80	80	12/18/2001	ND	0.52	5	ND	10	10	5.26
5-B-5	5-B-5-19	19	12/18/2001	ND	0.51	5	ND	10	10	5.255
5-B-5	5-B-5-8	8	12/18/2001	ND	0.51	5	ND	10	10	5.255
5-B-5	5-B-5-0-2	0-2	12/18/2001	**85**	**5.2**	**50**	**650**	**100**	**100**	**735**
5-B-6	5-B-6-70	70	12/18/2001	ND	0.49	5	ND	10	10	5.245
5-B-6	5-B-6-19	19	12/18/2001	ND	0.5	5	ND	10	10	5.25
5-B-6	5-B-6-0-2	2	12/18/2001	**61**	**0.47**	**5**	**120**	**10**	**10**	**181**
5-B-6	5-B-6-7	7	12/18/2001	ND	0.49	5	ND	10	10	5.245
5-B-7	5-B-7-7.5	7.5	11/10/2004	**9430**	**92.3**	**577**	**8580**	**184**	**1440**	**18010**
5-B-7	5-B-7-20-25	20-25	9/10/2005	**383 J**	**8**	**50**	**567 J**	**16**	**125**	**950**
5-B-8	5-B-8-15-20	15-20	9/10/2005	**1550 J**	**16**	**100**	**2250 J**	**31.9**	**250**	**3800**
5-B-9	5-B-9-22	22	9/10/2005	**282 J**	**1.6**	**10**	**366 J**	**3.19**	**25**	**648**
MW-19	MW19-4	4	9/26/1990	ND	NA	5	NA	NA	NA	NA

Table 1 Soil Sampling Data used to Develop Interpolated TPH-Dx Isoconcentration Line

			Chemical Name	Diesel Range Hydrocarbons (mg/kg)			Oil Range Hydrocarbons (mg/kg)			Diesel Range + Oil Range (mg/kg)
Location ID	Sample ID	Depth (ft)	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	
MW-20	MW20-4	4	9/26/1990	ND	NA	5	NA	NA	NA	NA
MW-21	MW21-9	9	9/25/1990	**88**	NA	NA	NA	NA	NA	NA
MW-27	MW27-4.5	4.5	9/26/1990	ND	NA	5	NA	NA	NA	NA
MW-34	MW34-10	10	9/28/1993	NA	NA	NA	NA	NA	NA	NA
MW-35	MW35-10	10	9/28/1993	NA	NA	NA	NA	NA	NA	NA
MW-35	MW53-10	10	9/28/1993	NA	NA	NA	NA	NA	NA	NA
MW-37	MW37-12.5	12.5	10/21/1993	NA	NA	NA	NA	NA	NA	NA
MW-37	MW37-7.5	7.5	10/22/1993	NA	NA	NA	NA	NA	NA	NA
MW-38	MW38-7.5	7.5	10/24/1993	NA	NA	NA	NA	NA	NA	NA
MW-34	MW34B-17	17	10/23/1993	NA	NA	NA	NA	NA	NA	NA
MW-35	MW35B-17.5	17.5	10/19/1993	NA	NA	NA	NA	NA	NA	NA
MW-37	MW73-23	23	10/22/1993	NA	NA	NA	NA	NA	NA	NA
MW-37	MW37-23	23	10/22/1993	NA	NA	NA	NA	NA	NA	NA
MW-38	MW38-12	12	10/24/1993	NA	NA	NA	NA	NA	NA	NA

Jennifer Wald
11/7/2007

TPH calculated using the following criteria:

Sum = if detected then result, if ND then .5*MDL

TPH Constituents
Diesel Range Hydrocarbons
Heavy Fuel Oil
Lube Oil Range Hydrocarbons
Motor Oil Range Hydrocarbons
PHC AS DIESEL FUEL
PHC AS LUBE OIL, AKA Motor Oil

Table 2 Groundwater Sampling Data used to Develop Drawing C-17 TPH Groundwater Isoconcentration Lines

2Q07 – Groundwater TPH and TPH with Silica Gel (SG)

Summed results are non-silica gel

		Analytical Method	NWTPH-Dx w/SG			NWTPH-Dx w/SG			NWTPH-Dx				NWTPH-Dx				NWTPH-Dx
		Chemical Name	Lube Oil Range Hydrocarbons			Diesel Range Hydrocarbons			Lube Oil Range Hydrocarbons				Diesel Range Hydrocarbons				Oil Range + Diesel Range
		Unit	µg/L			µg/L			µg/L				µg/L				µg/L
Location ID	Sample ID	Sample Date	Result & Qualifier	MDL	RDL	Result & Qualifier	MDL	RDL	Result & Qualifier		MDL	RDL	Result & Qualifier		MDL	RDL	
1A-W-1	1A-W-1-0707	7/31/2007	ND	152	476	ND	38.1	238	**202**	**J**	**84.9**	**472**	**578**		**37.7**	**236**	**780**
1A-W-3	1A-W-30-0707	7/31/2007	NA			NA			**118**	**J**	**84.9**	**472**	**147**	**J**	**37.7**	**236**	**265**
1A-W-3	1A-W-3-0707	7/31/2007	NA			NA			**116**	**J**	**88.2**	**490**	**155**	**J**	**39.2**	**245**	**271**
1A-W-4	1A-W-4-0707	7/31/2007	NA			NA			ND		84.9	472	ND		37.7	236	61.3
1A-W-5	1A-W-5-0707	7/31/2007	NA			NA			ND		85.7	476	ND		38.1	238	61.9
1B-W-1	1B-W-1-0707	7/31/2007	NA			NA			**141**	**J**	**84.9**	**472**	**478**		**37.7**	**236**	**619**
1B-W-2	1B-W-2-0707	7/31/2007	NA			NA			**203**	**J**	**84.9**	**472**	**493**		**37.7**	**236**	**696**
1B-W-3	1B-W-3-0707	7/31/2007	NA			NA			ND		84.9	472	ND		37.7	236	61.3
1C-W-1	1C-W-1-0707	7/31/2007	ND	151	472	ND	37.7	236	**107**	**J**	**84.9**	**472**	**129**	**J**	**37.7**	**236**	**236**
1C-W-2	1C-W-2-0707	8/1/2007	NA			NA			ND		84.9	472	ND		37.7	236	61.3
1C-W-3	1C-W-3-0707	7/31/2007	NA			NA			ND		84.9	472	ND		37.7	236	61.3
1C-W-4	1C-W-4-0707	7/31/2007	ND	151	472	**123**	**J** **37.7**	**236**	**240**	**J**	**84.9**	**472**	**707**		**37.7**	**236**	**947**
2A-W-1	2A-W-100-0707	7/31/2007	NA			NA			**384**	**J**	**86.5**	**481**	**924**		**38.5**	**240**	**1308**
2A-W-1	2A-W-1-0707	7/31/2007	NA			NA			**425**	**J**	**84.9**	**472**	**959**		**37.7**	**236**	**1384**
2A-W-10	2A-W-10-0707	7/31/2007	NA			NA			**95.5**	**J**	**84.9**	**472**	**322**	**J**	**37.7**	**236**	**417.5**
2A-W-11	2A-W-11-0707	7/31/2007	NA			NA			**1120**	**J**	**84.9**	**472**	**884**	**J**	**37.7**	**236**	**2004**
2A-W-22	2A-W-22-0707	7/31/2007	NA			NA			ND		84.9	472	ND		37.7	236	61.3
2A-W-6	2A-W-6-0707	7/31/2007	ND	151	472	**223**	**J** **37.7**	**236**	**135**	**J**	**84.9**	**472**	**768**	**J**	**37.7**	**236**	**903**
2A-W-9	2A-W-9-0707	7/31/2007	NA			NA			**195**	**J**	**84.9**	**472**	**728**	**J**	**37.7**	**236**	**923**
2B-W-4	2B-W-4-0707	7/31/2007	NA			NA			ND		84.9	472	ND		37.7	236	61.3
5-W-14	5-W-14-0707	8/1/2007	ND	151	472	ND	37.7	236	ND		84.9	472	ND		37.7	236	61.3
5-W-15	5-W-15-0707	8/1/2007	ND	151	472	ND	37.7	236	ND		84.9	472	**182**	**J**	**37.7**	**236**	**224.45**
5-W-16	5-W-16-0707	8/1/2007	ND	151	472	ND	37.7	236	ND		84.9	472	ND		37.7	236	61.3
5-W-17	5-W-17-0707	8/1/2007	ND	151	472	ND	37.7	236	ND		84.9	472	ND		37.7	236	61.3
5-W-18	5-W-18-0707	8/1/2007	ND	151	472	**48.5**	**J** **37.7**	**236**	**248**	**J**	**84.9**	**472**	**588**	**J**	**37.7**	**236**	**836**
5-W-19	5-W-190-0707	8/1/2007	ND	151	472	ND	37.7	236	ND		84.9	472	ND		37.7	236	61.3
5-W-19	5-W-19-0707	8/1/2007	ND	151	472	ND	37.7	236	ND		84.9	472	ND		37.7	236	61.3
5-W-20	5-W-20-0707	8/1/2007	ND	151	472	**39.1**	**J** **37.7**	**236**	**216**	**J**	**84.9**	**472**	**527**	**J**	**37.7**	**236**	**743**
5-W-4	5-W-4-0707	7/31/2007	NA			NA			**193**	**J**	**85.7**	**476**	**311**	**J**	**38.1**	**238**	**504**
FIELDQC	MW-500-0707	7/31/2007	NA			NA			ND		84.9	472	ND		37.7	236	61.3
MW-16	MW-160-0707	7/31/2007	NA			NA			ND		84.9	472	ND		37.7	236	61.3
MW-16	MW-16-0707	7/31/2007	NA			NA			ND		84.9	472	ND		37.7	236	61.3
MW-19	MW-19-0707	7/31/2007	NA			NA			ND		85.7	476	ND		38.1	238	61.9
MW-3	MW-3-0707	7/31/2007	NA			NA			ND		84.9	472	**130**	**J**	**37.7**	**236**	**172.45**
MW-34	MW-34-0707	7/31/2007	NA			NA			ND		85.7	476	**48.8**	**J**	**38.1**	**238**	**91.65**
MW-35	MW-35-0707	7/31/2007	ND	152	476	**68.6**	**J** **38.1**	**238**	ND		85.7	476	**311**		**38.1**	**238**	**353.85**
MW-37	MW-37-0707	7/31/2007	NA			NA			**223**	**J**	**85.7**	**476**	**553**	**J**	**38.1**	**238**	**776**
MW-38	MW-38-0707	7/31/2007	NA			NA			ND		84.9	472	ND		37.7	236	61.3
MW-39	MW-39-0707	7/31/2007	NA			NA			**380**	**J**	**84.9**	**472**	**681**	**J**	**37.7**	**236**	**1061**
MW-4	MW-4-0707	7/31/2007	NA			NA			ND		84.9	472	ND		37.7	236	61.3

Jennifer Wald
11/14/2007

TPH calculated using the following criteria:

Sum = if detected then result, if ND then .5*MDL

Project Name	**Skykomish**
Project/Task Number	**1140204/0360**
Calculation Title	**Air Sparging System Blower Sizing**
Prepared by	**D. Arcieri**
Reviewed by	**M. Havighorst**
Completion date	**11/4/2007**

ENSR | AECOM

Objective: To determine minimum blower operating pressure for Area 1 injection wells and future potential injection wells (aka Area 2 Well) based on system head losses and subsurface conditions.

Step 1. Determine Pressure Drop in Straight Runs of Pipe due to friction, h_f

PIPING RUN	FROM	TO	PIPE DIA (in)	PIPE DIA D (ft)	PIPE LENGTH L (ft)	DESIGN FLOW[b] *Q* (SCFM)	DESIGN FLOW[1] Q (ACFM)	DESIGN VEL.[2] v (fps)	TEMP (deg F)	Re[3] (dim)	RELATIVE ROUGHNESS[4] ε/D	FRICTION FACTOR[5] *f* (ft)	HEAD LOSS[6] h_f (ft)	PRESSURE DROP[7] p_{f1} (lbf/ft^2)	PRESSURE DROP[8] p_{f2} (psi)
Area 1															
	Mech. Bldg.	Vault 1	4	0.33	550	51	66	13	80	24921	1.50E-05	2.45E-02	100	8	0.05
	Vault 1	Area 1 Wells	1	0.08	140 [a]	3	4	12	80	5864	6.00E-05	3.62E-02	133	10	0.07
Total													234	18	0.12
Area 2 [b]															
	Mech. Bldg.	Vault 2	4	0.33	730	24	31	6	80	11727	1.50E-05	2.97E-02	36	3	0.02
	Vault 2	Area 2 Wells	1	0.08	180 [c]	3	4	12	80	5864	6.00E-05	3.62E-02	172	13	0.09
Total													207	16	0.11

Notes:

a Pipe length is to the Area 1 sparging well furthest from Vault 1. Length is based on 2008 EDR drawing C-17 takeoff.

b The locations of the Area 2 vault and sparging wells have not been determined, but would likely be located north of Area 1 and near the South Fork Skykomish River. Area 2 wells and piping would be constructed similarly to those installed in Area 1.

c Pipe length was estimated based on the predicted location of the future potential Area 2 sparging well furthest from the likely future potential location of Vault 2.

Calculations

1. $Q_{ACFM} = Q_{SCFM} [P_{std} / (P_{act} - P_{sat}\Phi)](T_{act} / T_{std})$ **where**
   ACFM = Actual Cubic Feet per Minute
   SCFM = Standard Cubic Feet per Minute
   Pstd = Standard absolute air pressure (psia)
   Pact = absolute pressure at the actual level (psia)
   Psat = Saturation pressure at the actual temperature (psi)
   Φ = Actual relative humidity
   Tact = Actual ambient air temperature (R)
   Tstd = Standard temperature (R)

   Assumptions:
   1. Pact = 13.66 psi at site elevation of 2000 ft above mean sea level
   2. Φ = 0.70
   3. Tact = 80°F, 540R

2. **$v = Q(\pi D^2/4)/(60$ sec/min)**

3. **$Re = Dv/\nu$ where**
   ν = kinematic viscosity(lbf-sec/ft^2)

Assumptions:

1. ν = 0.000169 lbf-sec/ft^2 at 80^{o}F

4. ε = 0.000005 ft where
ε = roughness factor for plastic pipe (Lindeburg, Table 17.2, p. 17-4)

5. $$f = \frac{0.25}{\left[\log_{10}\left(\frac{\frac{\varepsilon}{D}}{3.7}\right) + \frac{5.74}{\mathrm{Re}^{0.9}}\right]^2}$$ (Lindeburg, Eq. 17.21)

6. $h_f = fLv^2/(2Dg)$ (Lindeburg Eq. 17.28) where
g = acceleration of gravity, 32.2 ft/sec^2

7. $p_{f1} = h_f \rho g_{air}$ (Lindeburg, Eq. 17.29(a)) where
ρg_{air} = specific weight of air at STP, 0.0752 lbf/ft^3

8. $p_{f2} = p_f(144\ in^2/ft^2)$

Step 2. Determine Pressure Drop in Fittings, h_m

Fitting Type	K	No. of Fittings	HEAD LOSS[9] h_m (ft)	PRESSURE DROP[7] p_{m1} (lbf/ft^2)	PRESSURE DROP[8] p_{m2} (psi)
Area 1					
Mechanical Building					
gate valve (4-inch)	0.19	1	0.47	0.04	0.0002
check valve (4-inch)	2.3	1	5.70	0.43	0.0030
90 elbow (4-inch)	0.9	2	4.46	0.34	0.0023
flow meter	5	1	12.39	0.93	0.0065
Vault A					
gate valve (4-inch)	0.19	1	0.47	0.04	0.0002
tee (4-inch), stem flow	1.8	1	4.46	0.34	0.0023
gate valve (1-inch) 1/2 closed	5.6	1	12.30	0.92	0.0064
tee (1-inch), stem flow	1.8	1	3.95	0.30	0.0021
flow meter	5	1	10.98	0.83	0.0057
Area A Wellheads					
90 elbow (1-inch)	0.9	1	1.98	0.15	0.0010
Total			**57.17**	**4.30**	**0.03**

Project Name	**Skykomish**
Project/Task Number	**1140204/0360**
Calculation Title	**Air Sparging System Blower Sizing**
Prepared by	**D. Arcieri**
Reviewed by	**M. Havighorst**
Completion date	**11/4/2007**

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Area 2					
Mechanical Building					
gate valve (4-inch)	0.19	1	0.47	0.04	0.0002
check valve (4-inch)	2.3	1	5.70	0.43	0.0030
90 elbow (4-inch)	0.9	2	4.46	0.34	0.0023
flow meter	5	1	12.39	0.93	0.0065
Vault B					
gate valve (4-inch)	0.19	1	0.10	0.01	0.0001
tee (4-inch), stem flow	1.8	1	0.99	0.07	0.0005
gate valve (1-inch) 1/2 closed	5.6	1	12.30	0.92	0.0064
tee (1-inch), stem flow	1.8	1	3.95	0.30	0.0021
flow meter	5	1	10.98	0.83	0.0057
Area B Wellheads					
90 elbow (1-inch)	0.9	1	1.98	0.15	0.0010
Total			**53.32**	**4.01**	**0.03**

Calculations

9. $h_m = Kv^2/2g$ **(White, Eq. 6.109)**

Step 3. Determine Air Entry Pressure, p_e

Assume air entry pressure due to screen friction is 1 psi

p_e = 1psi

Step 4. Determine Total Head Losses Area 1 and 2 Wellheads located furthest from the blower system

$P_{TOTAL} = p_{f2} + p_{m2} + p_e$

Area 1	p_{TOTAL} = 0.12 psi + 0.03 psi + 1 psi =	**1.15 psi**
Area 2	p_{TOTAL} = 0.11 psi + 0.03 psi + 1 psi =	**1.14 psi**

Project Name	**Skykomish**
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Step 5. Determine Overburden Pressure, p_o

Calculations

10. $p_o = p_h + p_s$ where **(USACE, Eq. 5-3)**

p_h = hydrostatic pressure from the water column = $\rho g_{water}(z_s - z_w)\phi$ (USACE, Eq. 5-2)

p_s = soil column pressure = $\rho g_{soil} z_s(1-\phi)$ (USACE, Eq. 5-1)

ρg_{water} = specific weight of water at STP, 62.4 lbf/ft^3

ρg_{soil} = specific weight of soil (lbf/ft$^{3)}$

z_s = depth to the top of the well screen (ft)

z_w = depth to high ground water table (ft)

ϕ = porosity

Assumptions:

1. ρg_{soil} = 100 lbf/ft^3
2. ϕ = .5

From Data:

1. z_s = 24 ft
2. z_w = 10 ft

p_o = 62.4 lbf/ft^3(24ft - 10ft)(0.5)+100 lbf/ft^3 (10ft)(0.5) =	937	lbf/ft^2
p_o = 937 lbf/ft^2 (144 in^2/ft^2) =	**6.1 psi**	

Step 6. Determine Range of Maximum Injection Pressure at Well, p_{max}

Calculations

11. $p_{max} = p_o$ (0.6 to 0.8) (USACE, Eq. 5-4)

p_{max} = 6.1 (0.6 to 0.8) = 3.7 to 4.9 psi

Step 7. Determine Minimum Blower Pressure, p_{BLOWER}, Based on Total Pressure Loss and Range of Maximum Injection Pressures

Calculations

12. $p_{BLOWER} > p_{max} + p_{TOTAL}$

Area 1	p_{BLOWER} > 4.9 psi+ 1.15 psi >	**6.05 psi**
Area 2	p_{BLOWER} > 4.9 psi+ 1.14 psi >	**6.04 psi**

Project Name	**Skykomish**
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Conclusion: the minimum blower operating pressure is approximately 6.1 psi for each sparging area.

References

1. Lindeburg, Michael R., *Civil Engineering Reference Manual*, 8th Edition, 2001
2. White, F.M., *Fluid Mechanics*, 2nd Edition, 1986
3. United States Army Corps of Engineers (USACE) Engineering Manual (EM) 1110-1-4005 (1997)

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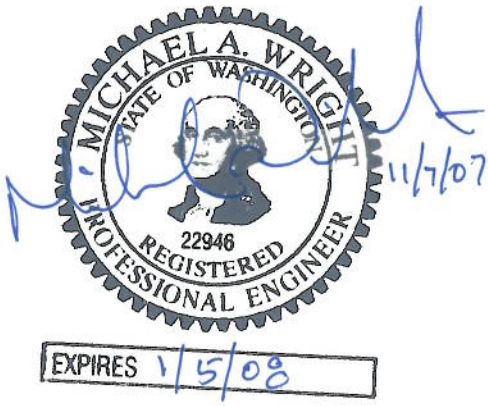
Preliminary Structural Assessment
Depot, Olympia Building, McEvoy Residence
Skykomish, WA

November 7, 2007



Introduction

The following report summarizes our preliminary findings with respect to the structural condition and suitability for lifting and temporarily relocating the Depot, Olympia Building, and McEvoy Residence all located in Skykomish, WA.

Our findings for the Depot and Olympia Building are based on our site visits and visual observations of the structures. As the owner has not granted access to the McEvoy Residence our findings are based on our visual exterior observations and review of the recent real estate appraisal dated 9/21/07 (prepared by Appraisal Group of the Northwest, LLP). No destructive probing or testing has been performed and at this time is not required to form an opinion on the suitability for lifting and relocating the structures. None of the original construction drawings or soils reports were available for review.

Further probing of the structures will most likely be required by the lifting/relocation contractor in order to properly design the lifting structure.

It should be noted that the potential exists for wood rot in the primary structure of all three buildings. If found during lifting/relocation process it will need to be evaluated by a qualified structural engineer to determine if it must be repaired prior to lifting/relocating the structure.

This report is intended for the sole use of the owner and its consultants. The scope of services performed during the execution of this investigation may not be appropriate to satisfy the needs of other users, and any use or re-use of this document or the findings and recommendations presented herein is at the sole risk of the said user.

This evaluation does not represent a warranty or guarantee on the part of M.A. Wright, LLC that other problems do not exist. M.A. Wright, LLC's professional services are performed using the degree of skill and care ordinarily exercised under similar circumstances by structural engineers practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional opinions included in this report.

Depot Building

Building Description

The Depot is best described as a single story, wood framed structure over a crawl space that measures 24 feet 4 inches by 106 feet 4 inches in plan with a wall height of 11 feet 8 inches. The roof shape is a simple gable with a 6 in 12 pitch. The building is shown in photos below.

The western half of the structure is believed to have been originally constructed in the early 1900s on a different site and relocated to the current site in the 1920s. Sometime in the 1940-1950 time frame the eastern half of the structure was added. It matches in form and exterior finishes the original eastern portion.

The exterior consists of clapboard siding over diagonal sheathing in the original portion of the structure with similar siding over straight sheathing at the addition. The doors and windows are of wood construction. The roof consists of asphalt shingles over plywood which was added over the original skip sheathing.

The walls and ceiling of the original portion of the building are covered with bead board with wood trim around the windows and doors. At some point in time, a suspended acoustic tile ceiling was added. In the eastern addition portion there is a mixture of bead board, plywood and exposed studs/joists typical of a storage facility. The floors in the original portion are hardwood with the exception of the bathrooms which have concrete like topping. The floors in the addition are primarily exposed tongue and groove decking with the exception of the easternmost 10-12 feet (a vehicle garage) which consists of gravel over dirt.

The building is currently used for offices and work rooms in the original western portion and storage in the eastern addition.

Foundation

It was not possible to observe the Depot foundations due to the limited height of the crawl space (less than 18 inches as observed in the one access opening in the boiler room) and the fact that the exterior landscape has been sloped to the height of the floor in most areas. Based on the limited observations the foundation appears to be wood posts supporting the longitudinal wood beams which in turn support wood floor joists. There does not appear to be concrete perimeter stem wall. The foundations are most likely spread footings as the structure is relatively light and there are no obvious soft soil conditions. Observation of the foundations is not required at this time to form an opinion on lifting and relocating the structure.

Primary Structure

The Depot is a wood bearing wall structure framed with typical platform framing details. The east/west running walls are the load bearing walls. The interior and exterior walls rest directly on the floor structure which is supported by a post and beam structure in the crawl space.

In the original portion of the building the roof structure consists of plywood sheathing over skip sheathing supported by 2x6 stick framed rafters and joists at 24 inches on center and supported by the interior and exterior walls. In the addition the roof structure consists of plywood over skip sheathing supported by 2x6 trusses at 24 inches on center that bear on the exterior walls.

The floor in the original portion consists of hardwood over diagonal sheathing supported by 2x10 joists at 16 inches on center supported by a series of longitudinal wood beams. The spacing of the beams was not determined due to the limited access to the crawl space, but there appeared to be a minimum of 3 beams (one at the centerline and one on the north and south ends of the building). The longitudinal beams appear to be supported by wood posts. Selective demo to determine the spacing of the beams will most likely be

required by the lifting contractor in order to size the lifting beams but is not required at this time to form an opinion about lifting and relocating the structure.

The walls in both portions consist of 2x4 studs at 16 inches on center. The sheathing in the original portion was not observed due to interior finishes but given that the floor sheathing was laid in a diagonal pattern and this portion of the structure appears relatively straight and level it is most likely diagonal sheathing. The walls in the addition have straight sheathing at the exterior with some portions towards the eastern end covered with interior plywood. At this time no destructive investigation to determine the wall sheathing is required to form an opinion on lifting and relocating the structure.

Appendages

The only exterior appendage is a single bay window on the south side in the original portion. It was not clear if it was part of the original construction but is minor in nature and should not impact lifting and relocating the structure.

There is a single interior abandoned masonry chimney in the original boiler room. The portion above the roof line has been removed. The structure is independent of the chimney, which is supported by a concrete foundation.

Structural Condition

In general the building is in fair to good structural condition. There are signs of settlement as witnessed by the sloping clapboard siding and uneven floors. The settlement appears to be worse in the eastern addition with the original portion noticeably straighter and more level. This may be an indication of wood rot in the posts and beams that support the floor joists in the area of the addition.

The roof, with the exception of the eaves, appears to be straight and level with no obvious sagging of the ridge line. The eaves appear to have some sag which could be an indication of rot in the edge board or rafter tails.

The floors in the original portion appear to be in relatively good condition given their age. The addition which mainly serves as a storage area shows signs of wear and abuse. There is a high potential for wood rot in the floor structure at the perimeter where the site soils rests directly against the structure to a height equal with the floor on the south side.

Suitability for Lifting/Relocating and Required Stabilization

Given the style of construction and the existence of a crawl space the structure is an excellent candidate for lifting and relocating. The structure could be lifted by installing steel beams in the north/south direction under the longitudinal wood beams with jacks at the exterior of the building. This will most likely require an access trench be constructed on the north and south sides of the structure. The limited height under the longitudinal beams may also require localized excavation to allow installation of the lifting beams.

The interior finishes are somewhat forgiving as no plaster or other brittle finishes exist, reducing the likelihood of damage during relocation. It is assumed that the masonry chimney, which is abandoned and does not project outside the roof, will be demolished as opposed to moving.

Any significant rot discovered in the longitudinal floor beams during installation of the lifting beams will need to be repaired before lifting the structure. The eastern most bay of the structure which does not contain a floor structure will also require localized strengthen (wall sheathing, cross ties, and hard lifting points) but should be well within the capabilities of a typical building mover.

West Elevation

Southeast Corner Looking West

East Elevation

North Elevation

Olympia Building

Building Description

The Olympia Building is best described as a wood framed structure over a crawl space. The building is divided into a single story portion and a two story attached addition. All portions of the structure have undergone significant modifications over their lifetimes. The structure as it now exists is shown in the photos below.

The original structure appears to have been constructed in the early 1900s and served as a bar. It consisted of a single story building roughly 16 feet by 40 feet in plan with a 6 foot wide porch along the full length of the West Elevation. The roof was a gable with a separate lower sloped porch roof. There was a false front (rectangular façade obscuring a gabled roof behind) on the South Elevation, which was removed in the 1970's and rebuilt in the 1980's. This portion of the structure remains and makes up the southern single story portion of the building.

The first addition (believed to be in the 1930's) was a single story addition, attached to the north of the original structure. It was roughly 29 feet 9 inches by 33 feet in plan and had a gable roof matching the portion to the south.

The next modifications appear to have occurred in the 1970s. They consisted of enclosing and expanding the covered porch on the west side of the 1900s construction. The porch was widened to match the width of the attached addition to the north. The original false front was removed and a new higher pitched roof covering the entire width of the structure was added. This new roof enclosed the original roof and can be observed in the attic of the single story portion.

In the 1980s a second story addition was added on top of the north addition. This was accomplished by removing the roof rafters but leaving the attic floor and ceiling joists in place. The new second floor was then over-framed with 18 inch deep open-web joists spanning to the exterior walls. The roof structure consists of 2x nail plate trusses spanning to the east/west bearing walls. A full width 10 foot deep deck (with storage rooms underneath) was added to the north of the building to complete this remodel.

Also in the 1980s the perimeter foundations were replaced with concrete stem walls and a new false front was added to the South Elevation.

The exterior siding is a combination of vertical board siding at the first story and T-111 sheathing at the second story addition. There is brick veneer at the bar entrance. Metal roofing is utilized at all the roofs. The interior finishes consist of hardwood floors and a combination of paneling, plaster and gypsum wallboard. The ceilings are a combination of plaster, gypsum wallboard, and suspended acoustic tile.

The building currently serves as a bar and the second floor is an apartment.

Foundation

The foundation consists of perimeter concrete stem walls and interior posts and beams supporting the floor joists. The beams run in the north south direction and occur under the original bearing walls as well as roughly mid span between the walls. The posts bear on a combination of spread footings and directly on earth.

Primary Structure

The Olympia Building is a wood bearing wall structure framed with a wide variety of details and styles which, given the number of modifications, is to be expected. The interior and exterior walls rest directly on the floor

structure that is supported by the post and beam structure or perimeter concrete stem walls. The bearing lines run in the north/south direction.

The roof structure in the original single story portion consists of the original roof (sheathing supported by stick-framed rafters and ceiling joists) and the new over-framed roof (stick framed roof with plywood sheathing). The loads are transferred to the interior and exterior north/south running bearing walls. The floor in the single story portion consists of hardwood over diagonal sheathing supported by east/west running floor joists. The joists are supported by beams running in the north/south direction and perimeter concrete stem walls.

The roof at the two story addition utilizes plywood sheathing supported by 2x trusses spanning to the east and west exterior load bearing walls. The upper floor consists of plywood spanning to 18 inch deep open web joists at 16 inches on center which span to the east and west exterior bearing walls. The first story ceiling is supported by the original ceiling joists (from the original one story addition) which clear span to the east and west exterior walls. The lower floor which is level with the floor of the original structure consists of hardwood flooring over sheathing spanning to 2x joists. The joists in turn are supported by a post and beam structure and the perimeter concrete foundation walls.

All the walls appear to be 2x4 stud walls. There is a combination of balloon, and platform framing details. None of the wall sheathing was observed due to the interior finishes.

At this time further investigation utilizing destructive probing is not required to form an opinion on lifting and relocating the building.

Appendages

The south elevation contains the western front and covered porch. There is a bathroom single-story addition at the northwest corner of the single story portion. The deck (with storage rooms underneath) and stairs extend to the north of the original north addition.

There is a full height masonry chimney at the south side of the second floor addition that is supported by a concrete foundation in the crawl space.

Structural Condition

In general the building is in fair to good structural condition. The floors are reasonably flat and level. Most of the unevenness is a result of enclosing the former sloped porches. There were no obvious signs of wood rot in the structure in the crawl space.

The exterior roofs appear to be straight and level, with no signs of sagging in the ridgeline. The eaves on the north side of the second floor addition have exposed structure which is susceptible to wood rot. The exposed structure in the wood decks is also prone to rot.

Suitability for Lifting/Relocating and Required Stabilization

The Olympia Building can be lifted and temporarily relocated. However, the large number of modifications and additions will provide challenges to the lifting/relocation contractor. There is good access to install east/west lifting beams under the north/south running floor beams. Access holes will need to be created in the concrete stem walls to allow the installation of the beams.

The primary challenge is the lack of connection of the various additions to each other. At a minimum, the contractor should plan on strengthening the connection of the second floor addition to the first story exterior bearing walls by adding plywood spanning from the ceiling top plate to the second floor bottom plate

(approximately 24 inches). Additionally a temporary wall in the first story at the south end of the second story addition may be required to stabilize the two story portion during movement.

The false front as well as the masonry chimney will most likely need to be temporarily braced to the roof during the relocation of the building. As an option it may be possible to replace the masonry chimney.

The brittle interior finishes may have minor cracking during the relocation; the amount is dependent on the skill of the moving contractor.

It is assumed that the deck to the north will be replaced as opposed to lifted and removed.

Due to the large size and configuration of the north addition, the contractor may decide it is more cost effective to move the structure in two pieces (the original single story portion and the two story addition). If this approach is taken additional temporary bracing of the two story addition at its connection to the single story original structure will be required. This bracing could take the form of a temporary wall.

South Elevation, looking northeast

East Elevation

West Elevation

Original roof, single story portion

McEvoy Residence

The following is based on our exterior observations of the structure and review of the real estate appraisal dated September 21, 2007. We have not been granted access by the home owner to either photograph the structure or observe the interior condition. As such we can not comment on the general condition and are using engineering judgment to predict the framing systems. All of our comments are subject to change once we have been granted access to the residence.

Building Description

The McEvoy Residence is best described as a single story wood framed structure originally constructed in 1897 with numerous remodels and single story additions over time. It is located in the National Historic District of Skykomish. The original structure appears to be T-shaped in plan with gable roofs. There is a bedroom addition in the NE corner of the T-shaped portion with a shed roof. A garage (with accessible attic) and utility room with gabled roofs were added directly north of the T-shaped portion, and a covered deck was added to the SE of the garage/utility room addition. See Figure 1 (taken from the real estate appraisal and modified to show the various areas).

The original 1897 structure is most likely a stick-framed structure over a crawl space. The exterior walls are most likely load- bearing. The composition roof is most likely attached to straight deck sheathing supported by 2x roof rafters in the open attic. The exterior is clapboard siding. The garage is most likely a stick-framed slab-on-grade structure with pre-engineered nail plate roof trusses. The utility room and bedroom addition are most likely stick-framed structures over a crawl space; they may, however, be slab-on-grade structures. The additions all appear to have clapboard siding and metal roofs. The covered deck is most likely a post-and-beam exposed wood structure.

The interior most likely contains a variety of brittle (plaster) and non-brittle (gypsum wall board, paneling) finishes.

The structure currently serves as a single family residence.

Foundation

The foundations have not been observed but are most likely concrete stem walls with timber post and beams in the crawl space areas. The garage most likely has concrete stem walls and slab on grade.

Primary Structure

The McEvoy Residence appears to have a wood bearing wall structure constructed with a variety of framing details. The bearing walls appear to run in both the north/south and east/west directions around the perimeter. Additional post and beam structure most likely supports the interior portion of the main floors.

Appendages

The exterior appendages consist primarily of the covered deck and the cantilevered covered porches on the south and west elevations.

There appears to be a single interior masonry chimney and fireplace in the original 1897 portion of the structure.

Structural Condition

As we have not been granted access we can not at this time comment on the structural condition of the residence.

Suitability for Lifting/Relocating and Required Stabilization

The McEvoy Residence can most likely be lifted and temporarily relocated. It will present several challenges to the lifting/relocation contractor.

The first challenge is the probable lack of floor structure in the garage. If the floor is found to be slab-on-grade, the walls may need to be sheathed and have lifting points and cross ties added. Cross ties will help to stabilize the bottom of the walls, preventing them from moving relative to each other. The garage door opening will need to be temporarily braced. Given the size and configuration of the residence it may make sense to move the garage as a separate structure.

The covered deck is most likely poorly connected to the residence with no perimeter walls In that case, bracing will be required and, in fact, it may be less expensive to demolish and replace this portion of the structure.

The original 1897 structure should be straight-forward to lift and relocate. The main challenge will be brittle finishes and the masonry chimney/fireplace. The cantilevered porches on the south and west elevations may also require additional bracing during the relocation. All of these are typical in a structure of this age and style of construction and should be within the capability of an experienced lifting/relocation contractor.

The utility room and bedroom additions, if located over crawl spaces, could be lifted and moved at the same time as the original 1897 structure. Temporary bracing to enhance the connection of these areas to the original house may be required.

Roof Plan

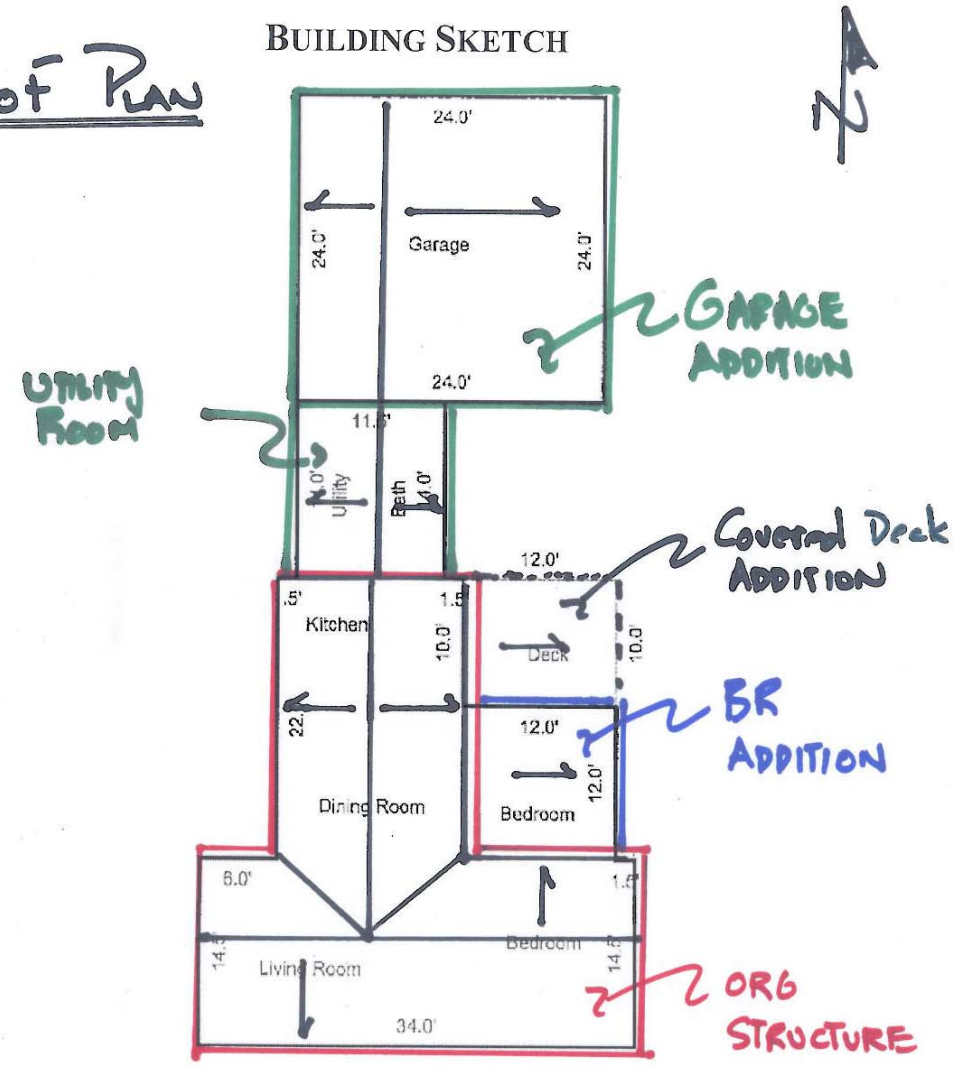
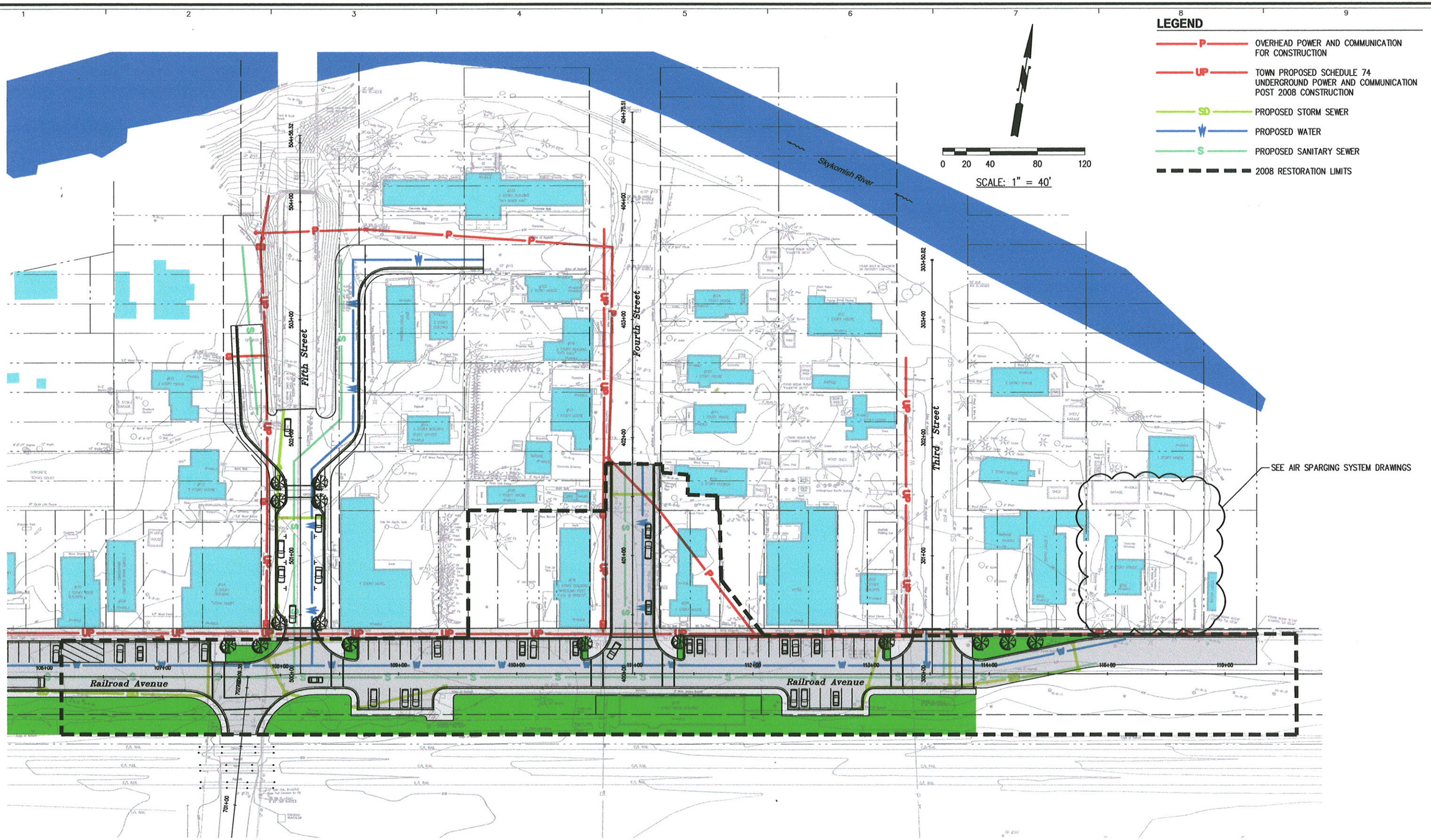


FIGURE 1

WRIGHT 11/6/07



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Architecture
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Civil Engineering
Urban Design
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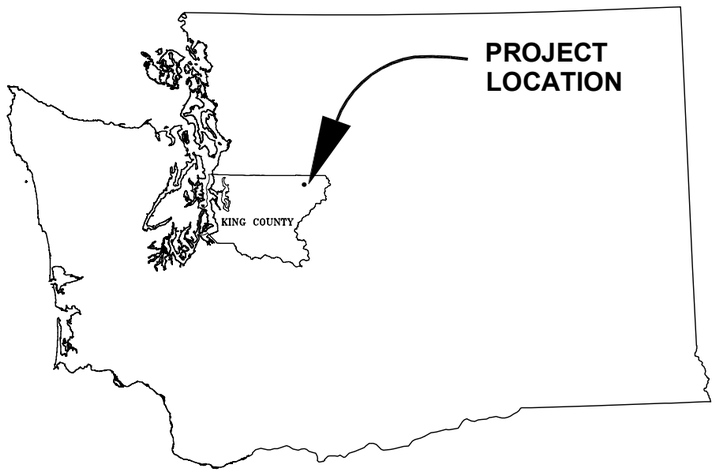
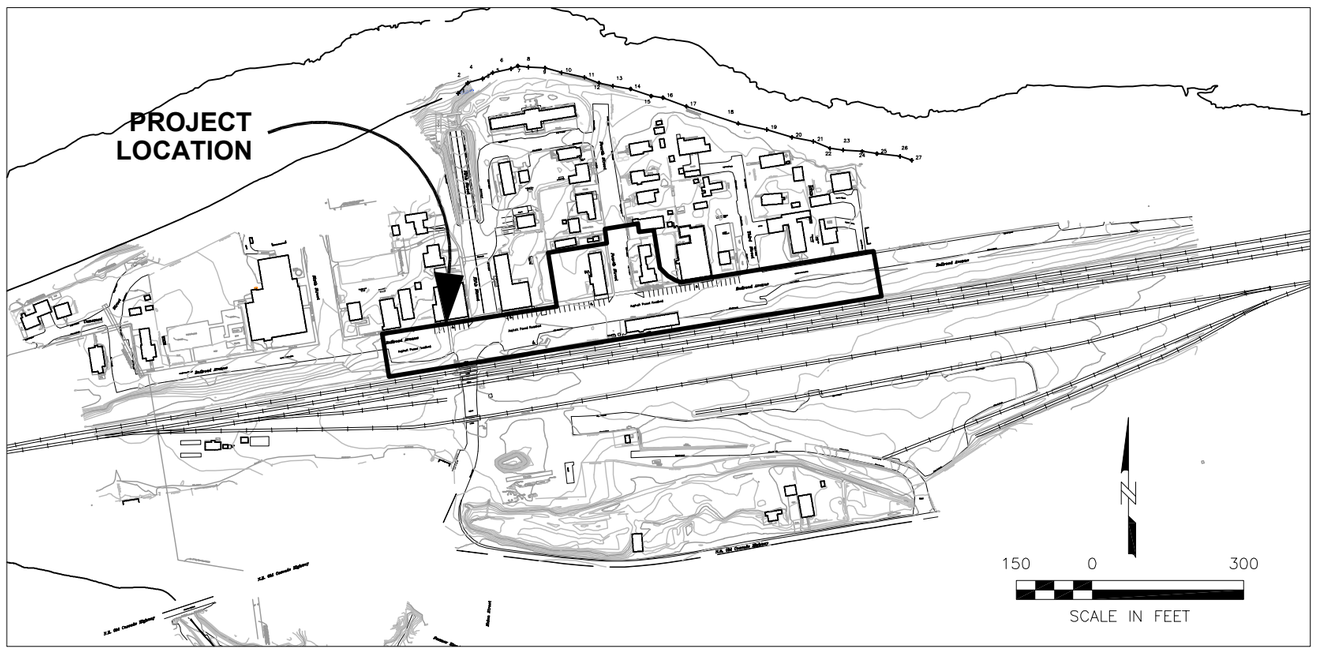
BNSF SKYKOMISH
2008 CONCEPTUAL RESTORATION PLAN
PROJECT # 0559C

CURRENT DATE	NOVEMBER 2007	2008-30%EDR FIGURE.dwg	1 OF 1	REVISION

SKYKOMISH 2008 REMEDIATION





DRAWING NO.	DESCRIPTION
C–1	TITLE SHEET
C–2	LEGEND AND GENERAL NOTES
C–3	SITE PLAN AND SURVEY CONTROL
C–4	CONSTRUCTION LAYOUT PLAN
C–5	DEMOLITION PLAN
C–6	INTERPOLATED TPH–Dx PLAN VIEW
C–7	EXCAVATION CROSS SECTION A–A'
C–8	EXCAVATION CROSS SECTION B–B'
C–9	EXCAVATION CROSS SECTION C–C'
C–10	EXCAVATION CROSS SECTION D–D'
C–11	EXCAVATION CROSS SECTION E–E'
C–12	EXCAVATION CROSS SECTION F–F'
C–13	SEDIMENT & EROSION CONTROL PLAN
C–14	SEDIMENT & EROSION CONTROL DETAILS
C–15	SEDIMENT & EROSION CONTROL DETAILS
C–16	CONSTRUCTION WATER TREATMENT SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM
C–17	AIR SPARGING SYSTEM WELL LAYOUT
C–18	AIR SPARGING SYSTEM WELL DETAIL
C–19	AIR SPARGING SYSTEM PIPING AND INSTRUMENTATION DIAGRAM
C–20	PHASES 1 AND 2 RAILROAD AVENUE EXCAVATION
C–21	PHASE 1 TRAFFIC ROUTING AND PEDESTRIAN ACCESS
C–22	PHASE 2 TRAFFIC ROUTING AND PEDESTRIAN ACCESS

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CURRENT DATE 11/14/07

SKYKOMISH 2008 REMEDIATION
TITLE SHEET, LOCATION MAPS, SHEET INDEX

DRAWING NO. C-1 REVISION

File: H:\BNSF–Skykomish\2008 remediation\30% drawings\title_sheet(C).dwg Layout: C–1 User: emarshall Plotted: Nov 14, 2007 – 2:54pm Xref's:

GENERAL NOTES:

1. HORIZONTAL DATUM IS WASHINGTON STATE PLANE (WASP) NORTH ZONE, BASED ON NORTH AMERICAN DATUM 1983/1991 (NAD83/91)
2. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88)
3. ALL DISTANCES ARE U.S. SURVEY FEET.

EROSION AND SEDIMENT CONTROL NOTES:

1. APPROVAL OF THIS EROSION/SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).

2. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.

3. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE CONTRACTOR FOR THE DURATION OF CONSTRUCTION.

4. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.

5. THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.

6. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 48 HOURS FOLLOWING A MAJOR STORM EVENT.

7. AT NO TIME SHALL MORE THAN ONE FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A TRAPPED CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT LADEN WATER INTO THE DOWNSTREAM SYSTEM.

8. ALL PAVED AREAS SHALL BE KEPT CLEAN FOR THE DURATION OF THE PROJECT.

9. TO THE EXTENT PRACTICABLE, NATURAL VEGETATION SHALL BE PRESERVED.

LEGEND:

SURFACE FEATURES:

- BUILDING FOOTPRINT
- STREAMBED/WATER CHANNEL
- FENCE
- RAILROAD TRACK
- CURB/PAVEMENT/SIDEWALK (EXIST.)
- CURB/PAVEMENT/SIDEWALK (PROPOSED)
- 925 CONTOUR (EXIST.)
- 925 CONTOUR (PROPOSED)
- VEGETATION
- BNSF PROPERTY LINE
- CHAIN LINK FENCE
- SF SILT FENCE
- PROPERTY LINE
- 2008 REMEDIATION BOUNDARY
- AIR SPARGING AREA
- BUILDING TO BE MOVED
- HCC AREA
- STORMWATER FLOW DIRECTION

SYMBOLS:

- MONITOR WELL LOCATION
- RECOVERY WELL LOCATION
- SOIL BORING LOCATION
- SURVEY CONTROL POINT
- MARKER LOCATION
- ABANDONED WELL
- TEST PIT

UTILITY FEATURES:

- FIRE DEPARTMENT CONNECTION
- FIRE HYDRANT
- WATER METER
- WATER VALVE
- HOSE BIB
- ELECTRIC METER
- GAS VALVE
- OFC OIL FILLER CAP
- STORM DRAIN MANHOLE
- CATCH BASIN
- SEWER MANHOLE
- SEWER CLEANOUT
- POWER POLE W/LUMINAIRE
- ELECTRIC MANHOLE
- TRB TELEPHONE RISER BOX
- JUNCTION BOX
- W WATER LINE
- G GAS LINE
- SD STORM DRAIN LINE
- OHP OVERHEAD POWER
- UGP UNDERGROUND POWER
- OHC OVERHEAD COMMUNICATION
- UGC UNDERGROUND COMMUNICATION

ABBREVIATIONS:

C.P.B – CONTROL PANEL BOX

30% DRAWINGS - NOT FOR CONSTRUCTION

ENSR | AECOM
Merged with ENSR in 2007
RETEC

NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
5							
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A	EM	11/14/07	30% DRAWINGS – NOT FOR CONSTRUCTION				

THE BNSF RAILWAY COMPANY
SKYKOMISH, WASHINGTON
01140-204-0370

SKYKOMISH 2008 REMEDIATION
LEGEND AND GENERAL NOTES

CURRENT DATE 11/14/07 | DRAWING NO. C-2 | REVISION

File: H:\BNSF-Skykomish\2008 remediation\30% drawings\legend-notes.dwg Layout: C-2 User: emarshall Plotted: Nov 16, 2007 - 9:05am Xref's:

TABLE OF PROJECT CONTROL POINTS

POINT #	NORTHING	EASTING	ELEVATION
101	259317.2666	1510252.1512	925.61
102	259066.6292	1509971.2047	921.75
103	259307.7987	1510120.3437	925.16
105	259420.2103	1510517.6074	928.37
106	259272.7849	1510551.7175	930.49
107	259122.0976	1510564.6601	
108	259104.5101	1510285.5817	
109	259169.2730	1510799.9373	935.51
111	259256.2817	1510857.6595	936.74
112	259446.8300	1510834.0072	935.49
113	259598.0336	1510815.4913	933.28
115	259513.9548	1510705.4390	929.32
116	259549.1949	1510642.8770	930.30
117	259378.6096	1510539.7420	931.73
119	259397.3358	1510655.4859	931.13
121	259224.6913	1511127.8968	934.86
122	259372.8530	1511108.2778	937.03
123	259300.2386	1511330.0063	935.49
124	259533.7780	1511081.6087	
127	259108.8291	1511204.5906	
134	258990.3948	1510884.3740	
135	259039.1543	1510569.0624	935.38
154	258739.3077	1511287.6759	935.24
155	259578.4946	1510482.2927	925.47
159	258509.6274	1510602.7187	
170	259334.2298	1510839.7728	936.41
171	259238.7620	1510948.7839	936.38
172	259425.4987	1511096.2824	936.95
177	259533.7608	1511081.6244	935.47
183	259271.2140	1509807.3229	927.85
185	259044.3825	1509875.1546	920.77

HORIZONTAL & VERTICAL CONTROL

1. HORIZONTAL DATUM: NAD 83/91
2. VERTICAL DATUM: NAVD 88
3. BENCHMARK: KING COUNTY MONUMENT STAMPED "1995 GPS 8823" WITH THE PUBLISHED ELEVATION OF 931.73.

30% DRAWINGS - NOT FOR CONSTRUCTION

ENSR | AECOM
Merged with ENSR in 2007
RETEC

NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
5							
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A	EM	11/14/07	30% DRAWINGS – NOT FOR CONSTRUCTION				

THE BNSF RAILWAY COMPANY
SKYKOMISH, WASHIINGTON
01140-204-270

CURRENT DATE 11/14/07

SKYKOMISH 2008 REMEDIATION
SITE PLAN AND SURVEY CONTROL

DRAWING NO. C-3

REVISION

File: H:\BNSF-Skykomish\2008 remediation\30% drawings\siteplan_survey-control(C).dwg Layout: C-3 User: emarshall Plotted: Nov 15, 2007 - 9:27am Xref's:

BUILDING IDs

1. WHISTLING POST TAVERN
2. McEVOY HOUSE
3. COMMUNITY CHURCH
4. JOSELYN PROPERTY
5. DEPOT
6. SECTION BUILDING
7. MALONEY'S GENERAL STORE
8. JOHNSON PROPERTY
9. WHISTLING POST TEMPORARY LOCATION
10. McEVOY HOUSE TEMPORARY LOCATION
11. DEPOT TEMPORARY LOCATION

LEGEND

- 2008 REMEDIATION BOUNDARY
- AIR SPARGING SYSTEM AREA
- BNSF PROPERTY LINE
- PROPERTY LINE
- WIRE FENCE
- SILT FENCE
- HCC AREA
- SOIL HANDLING AREA
- PROPOSED BUILDINGS TO BE RELOCATED
- PROPOSED STAGING AREAS
- PROPOSED PORTABLE EQUIPMENT STORAGE AREA

Fifth Street
Fourth Street
Third Street
Railroad Avenue
N.E. Old Cascade Highway
PROPOSED TOWN UTILITIES CROSSING
CONSTRUCTION WATER TREATMENT SYSTEM
GATES
PROPOSED REMEDIATION SYSTEMS CROSSING
STAGING AREA AND SOIL HANDLING AREA
PORTABLE EQUIPMENT STORAGE AREA AND CONTRACTOR TRAILERS
GATE
REMEDIATION EQUIPMENT BUILDING
SOIL HANDLING AREA EXIT ROAD
WHEEL WASH/ DECON AREA

75 0 150
SCALE IN FEET

N

30% DRAWINGS - NOT FOR CONSTRUCTION

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RETEC

NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
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A	EM	11/14/07	30% DRAWINGS – NOT FOR CONSTRUCTION				

THE BNSF RAILWAY COMPANY
SKYKOMISH, WASHINGTON
01140-204-270

CURRENT DATE 11/14/07

SKYKOMISH 2008 REMEDIATION
CONSTRUCTION LAYOUT PLAN

DRAWING NO. C-4 REVISION

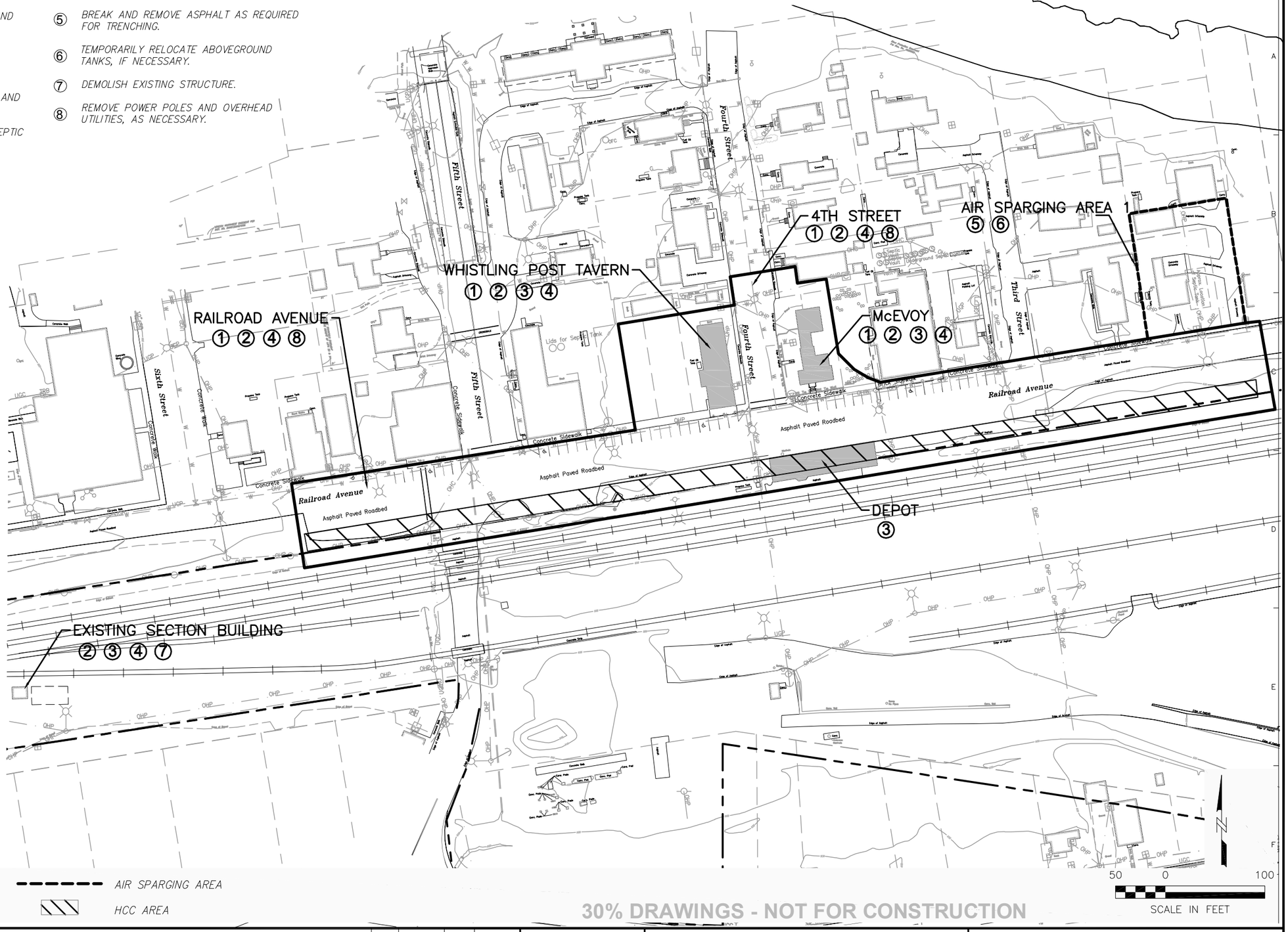
NOTES

1. BREAK AND REMOVE ASPHALT/CONCRETE ROAD AND WALKWAYS IN EXCAVATION AREA, AS NECESSARY.
2. CLEAR AND GRUB WITHIN EXCAVATION AREA, AS NECESSARY.
3. REMOVE ABOVEGROUND STRUCTURES, INCLUDING FOUNDATIONS, OIL AND PROPANE TANKS, PIPING, AND ARCHITECTURAL ELEMENTS.
4. REMOVE UNDERGROUND STRUCTURES, SUCH AS SEPTIC TANKS, OIL AND PROPANE TANKS, PIPING, CATCH BASINS, MANHOLES AND FOUNDATIONS/FOOTINGS.
5. BREAK AND REMOVE ASPHALT AS REQUIRED FOR TRENCHING.
6. TEMPORARILY RELOCATE ABOVEGROUND TANKS, IF NECESSARY.
7. DEMOLISH EXISTING STRUCTURE.
8. REMOVE POWER POLES AND OVERHEAD UTILITIES, AS NECESSARY.

- FIRE DEPARTMENT CONNECTION
- FIRE HYDRANT
- WATER METER
- WATER VALVE
- HOSE BIB
- ELECTRIC METER
- GAS VALVE
- OFC OIL FILLER CAP
- STORM DRAIN MANHOLE
- CATCH BASIN
- SEWER MANHOLE
- CO SEWER CLEANOUT
- POWER POLE W/LUMINAIRE
- ELECTRIC MANHOLE
- TRB TELEPHONE RISER BOX
- JUNCTION BOX

- W WATER LINE
- G GAS LINE
- SD STORM DRAIN LINE
- OHP OVERHEAD POWER
- UGP UNDERGROUND POWER
- OHC OVERHEAD COMMUNICATION
- UGC UNDERGROUND COMMUNICATION

- BUILDING TO BE MOVED
- PROPERTY LINE
- BNSF PROPERTY LINE
- 2008 REMEDIATION BOUNDARY
- AIR SPARGING AREA
- HCC AREA



30% DRAWINGS - NOT FOR CONSTRUCTION

NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
5							
4							
3							
2							
1							
A	EM	11/14/07	30% DRAWINGS – NOT FOR CONSTRUCTION				

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Merged with ENSR in 2007
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THE BNSF RAILWAY COMPANY
SKYKOMISH, WASHINGTON
01140-204-270

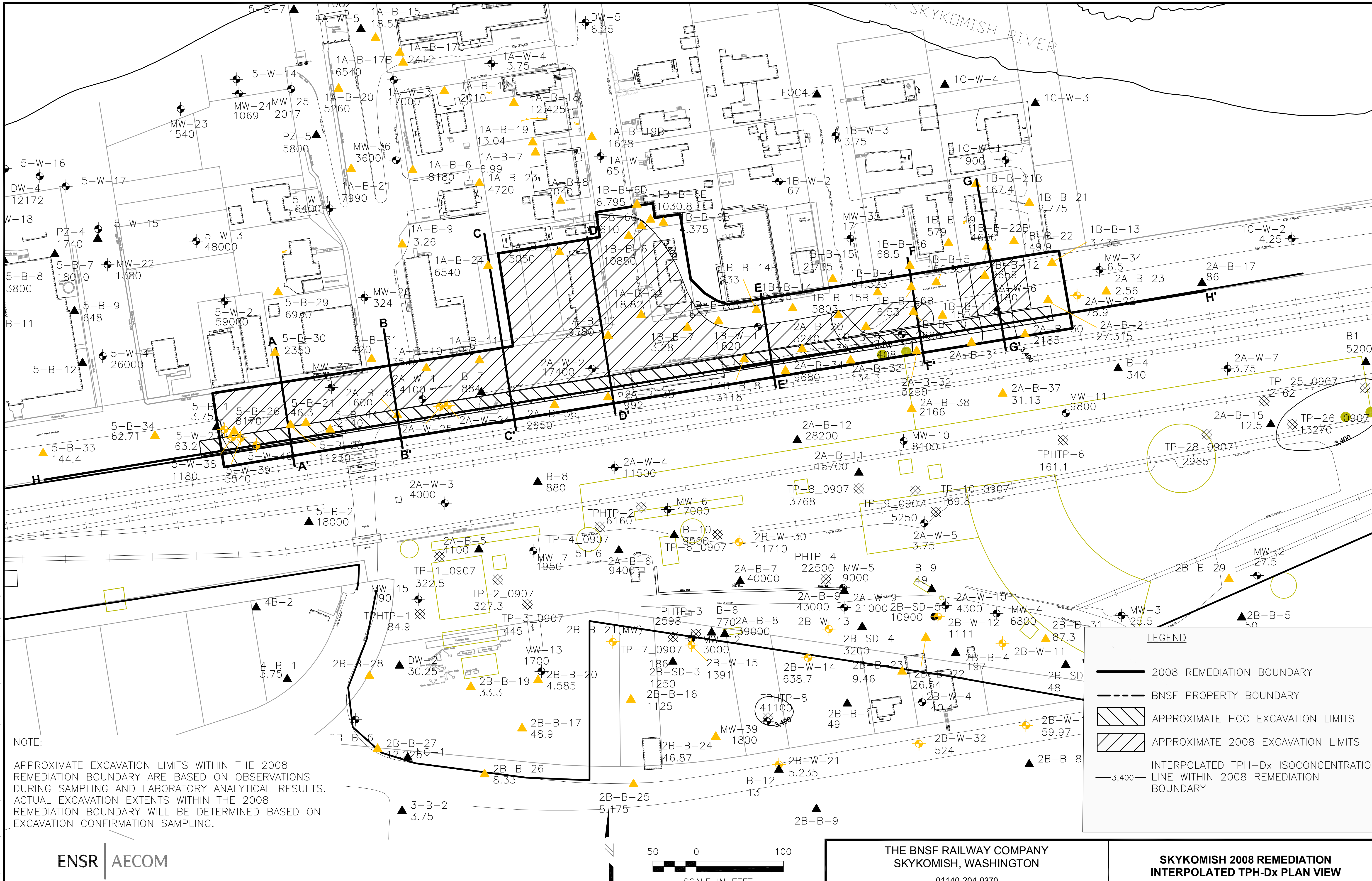
CURRENT DATE 11/14/07

SKYKOMISH 2008 REMEDIATION
DEMOLITION PLAN

DRAWING NO. C-5

REVISION

File: H:\BNSF-Skykomish\2008 remediation\30% drawings\demolition_plan(F).dwg Layout: C-5 User: emarshall Plotted: Nov 16, 2007 - 9:10am Xref's:



NOTE:

APPROXIMATE EXCAVATION LIMITS WITHIN THE 2008 REMEDIATION BOUNDARY ARE BASED ON OBSERVATIONS DURING SAMPLING AND LABORATORY ANALYTICAL RESULTS. ACTUAL EXCAVATION EXTENTS WITHIN THE 2008 REMEDIATION BOUNDARY WILL BE DETERMINED BASED ON EXCAVATION CONFIRMATION SAMPLING.

LEGEND

- 2008 REMEDIATION BOUNDARY
- BNSF PROPERTY BOUNDARY
- APPROXIMATE HCC EXCAVATION LIMITS
- APPROXIMATE 2008 EXCAVATION LIMITS
- 3,400 — INTERPOLATED TPH-Dx ISOCONCENTRATION LINE WITHIN 2008 REMEDIATION BOUNDARY

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Merged with ENSR in 2007 RETEC

THE BNSF RAILWAY COMPANY
SKYKOMISH, WASHINGTON
01140-204-0370

SKYKOMISH 2008 REMEDIATION
INTERPOLATED TPH-Dx PLAN VIEW

DATE: 11/16/07 | DRWN: E.M./SEA | **DRAWING NO. C-6**

File: H:\BNSF-Skykomish\2008 remediation\X-SECTS\plan view(D).dwg Layout: C-6 User: emarshall Plotted: Nov 16, 2007 - 1:58pm Xref's:

NORTH

A

MALONEY'S GENERAL STORE PORCH

BNSF PROPERTY BOUNDARY

CENTER LINE OF RAIL

SOUTH

A'

RAILROAD AVENUE

5-B-30 (1.98' W)

5-B-28 (2.72' E)

ASPHALT

HCC SYSTEM (TYP.)

ANNUAL HIGH WATER LEVEL

ANNUAL LOW WATER LEVEL

SAND AND SAND & GRAVEL

EXTENT OF EXCAVATION

3,400 mg/kg

2,350

2,590

117

11,230

8,250

156

1,549

MH

ML

ML

ELEVATION (FEET NAVD)
VERTICAL SCALE: 1" = 10'

935 930 925 920 915 910 905 900 895 890 885 880

0 10 20 30 40 50 60 70 80 90 100 110 120 130

LEGEND

Boulder
MH
ML
SP
GW
SM
SW

Excavation Limits

Property Boundary

3,400 mg/kg Interpolated TPH-Dx Isoconcentration Line

2,350 TPH-Dx (mg/kg)(TYP.)

NOTE: Section is projected NORTH to SOUTH

A-A' / C-6 CROSS-SECTION
HORIZONTAL SCALE" 1" = 20'

NOTE:

APPROXIMATE EXCAVATION LIMITS WITHIN THE 2008 REMEDIATION BOUNDARY ARE BASED ON OBSERVATIONS DURING SAMPLING AND LABORATORY ANALYTICAL RESULTS. ACTUAL EXCAVATION EXTENTS WITHIN THE 2008 REMEDIATION BOUNDARY WILL BE DETERMINED BASED ON EXCAVATION CONFIRMATION SAMPLING.

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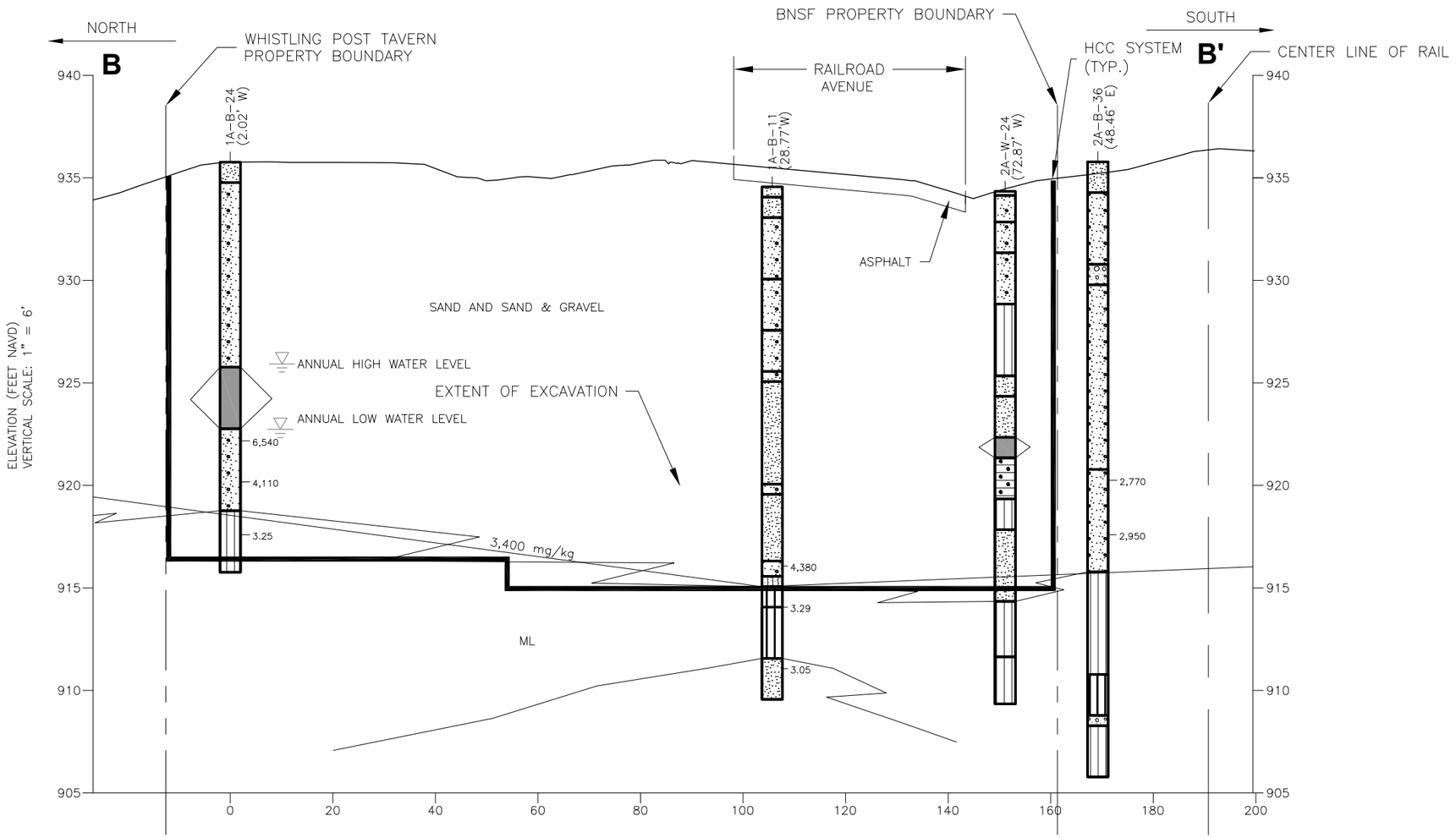
THE BNSF RAILWAY COMPANY
SKYKOMISH, WASHINGTON
01140-204-0370

DATE: 11/16/07 | DRWN: E.M./SEA

SKYKOMISH 2008 REMEDIATION
EXCAVATION CROSS SECTION A-A'

DRAWING NO. C-7

File: H:\BNSF-Skykomish\2008 remediation\X-SECTS\A-A'(D).dwg Layout: C-7 User: emarshall Plotted: Nov 16, 2007 - 11:05am Xref's:



LEGEND

SM
GM
Boulder
Asphalt
MH
ML
GW
SW
SP

Excavation Limits

Property Boundary

3,400 mg/kg — Interpolated TPH-Dx Isoconcentration Line

6,540 — TPH-Dx (mg/kg)(TYP.)

NOTE: Section is projected NORTH to SOUTH

B-B' / C-6 — **CROSS-SECTION**
HORIZONTAL SCALE" 1" = 25'

NOTE:

APPROXIMATE EXCAVATION LIMITS WITHIN THE 2008 REMEDIATION BOUNDARY ARE BASED ON OBSERVATIONS DURING SAMPLING AND LABORATORY ANALYTICAL RESULTS. ACTUAL EXCAVATION EXTENTS WITHIN THE 2008 REMEDIATION BOUNDARY WILL BE DETERMINED BASED ON EXCAVATION CONFIRMATION SAMPLING.

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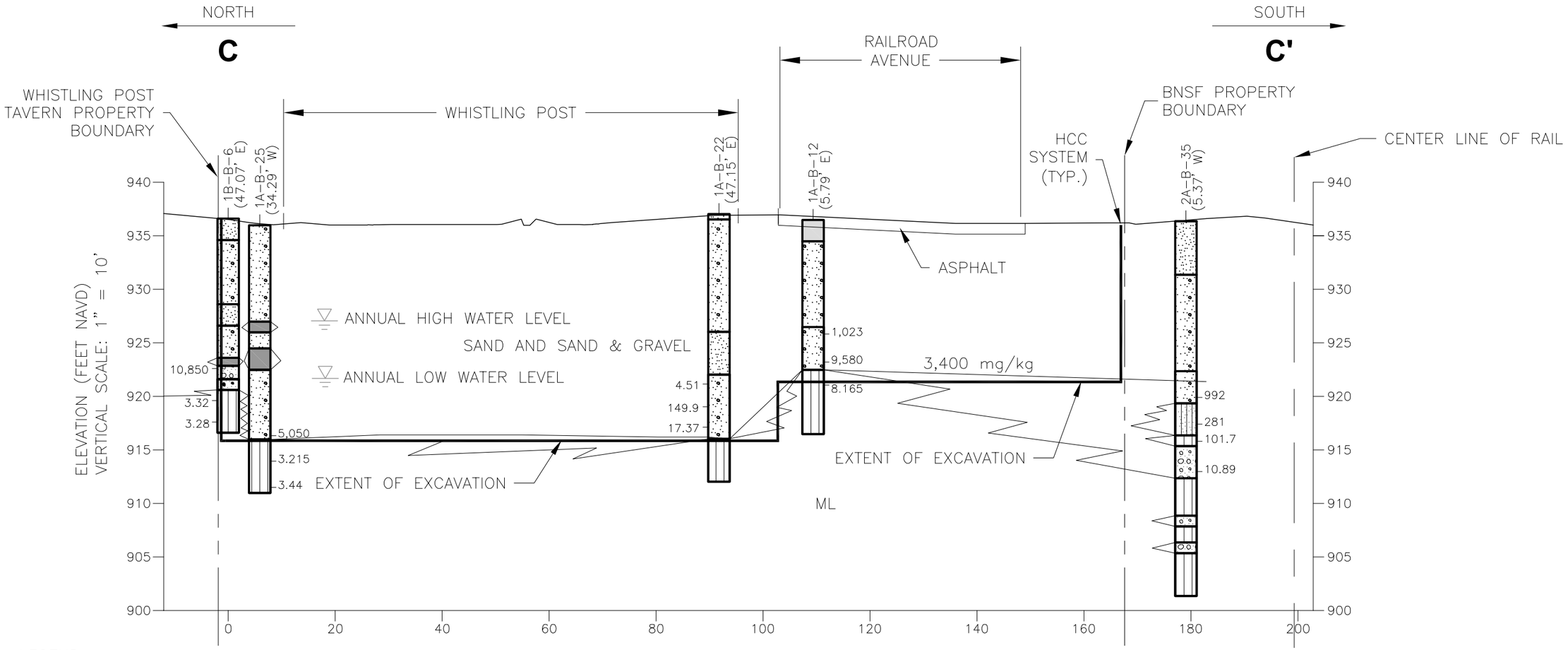
Merged with ENSR in 2007
RETEC

THE BNSF RAILWAY COMPANY SKYKOMISH, WASHINGTON 01140-204-0370			**SKYKOMISH 2008 REMEDIATION** **EXCAVATION CROSS SECTION B-B'**
DATE: 11/16/07	DRWN: E.M./SEA		**DRAWING NO.** C-8

File: H:\BNSF-Skykomish\2008 remediation\X-SECTS\B-B'(C).dwg Layout: C-8 User: emarshall Plotted: Nov 16, 2007 - 11:03am Xref's:



LEGEND

- Asphalt
- Boulder
- GW
- ML
- SM
- SW
- SP
- Excavation Limits
- Property Boundary
- 3,400 mg/kg — Interpolated TPH–Dx Isoconcentration Line
- 10,850 — TPH–Dx (mg/kg)(TYP.)

C–C' / C–6 CROSS–SECTION
HORIZONTAL SCALE" 1" = 20'

NOTE: Section is projected NORTH to SOUTH

NOTE:

APPROXIMATE EXCAVATION LIMITS WITHIN THE 2008 REMEDIATION BOUNDARY ARE BASED ON OBSERVATIONS DURING SAMPLING AND LABORATORY ANALYTICAL RESULTS. ACTUAL EXCAVATION EXTENTS WITHIN THE 2008 REMEDIATION BOUNDARY WILL BE DETERMINED BASED ON EXCAVATION CONFIRMATION SAMPLING.

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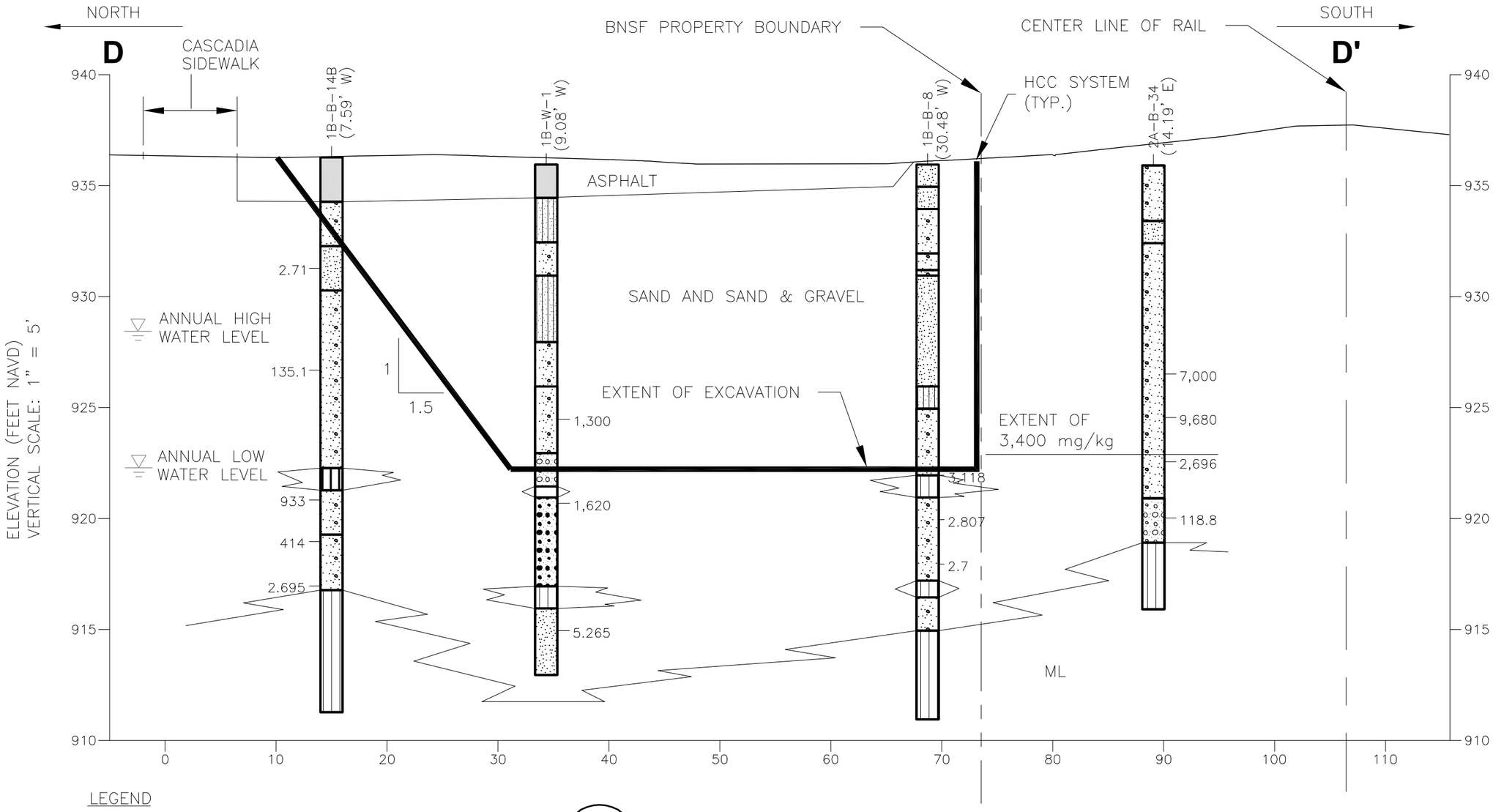
THE BNSF RAILWAY COMPANY SKYKOMISH, WASHINGTON 01140-204-0370			SKYKOMISH 2008 REMEDIATION EXCAVATION CROSS SECTION C-C'
DATE: 11/16/07	DRWN: E.M./SEA		DRAWING NO. C-9

File: H:\BNSF-Skykomish\2008 remediation\X-SECTS\C-C'(C).dwg Layout: C-9 User: emarshall Plotted: Nov 16, 2007 - 11:02am Xref's:



LEGEND

MH
GP
Asphalt
Boulder
SM
ML
GW
SP
SW

Excavation Limits

Property Boundary

3,400 mg/kg — Interpolated TPH-Dx Isoconcentration Line

2.71 — TPH-Dx (mg/kg)(TYP.)

NOTE: Section is Pprojected NORTH to SOUTH

D-D' / C-6 — CROSS-SECTION
HORIZONTAL SCALE" 1" = 10'

NOTE:

APPROXIMATE EXCAVATION LIMITS WITHIN THE 2008 REMEDIATION BOUNDARY ARE BASED ON OBSERVATIONS DURING SAMPLING AND LABORATORY ANALYTICAL RESULTS. ACTUAL EXCAVATION EXTENTS WITHIN THE 2008 REMEDIATION BOUNDARY WILL BE DETERMINED BASED ON EXCAVATION CONFIRMATION SAMPLING.

ENSR | AECOM

Merged with ENSR in 2007
RETEC

THE BNSF RAILWAY COMPANY SKYKOMISH, WASHINGTON 01140-204-0370			SKYKOMISH 2008 REMEDIATION EXCAVATION CROSS SECTION D-D'
DATE: 11/16/07	DRWN: E.M./SEA		DRAWING NO. C-10

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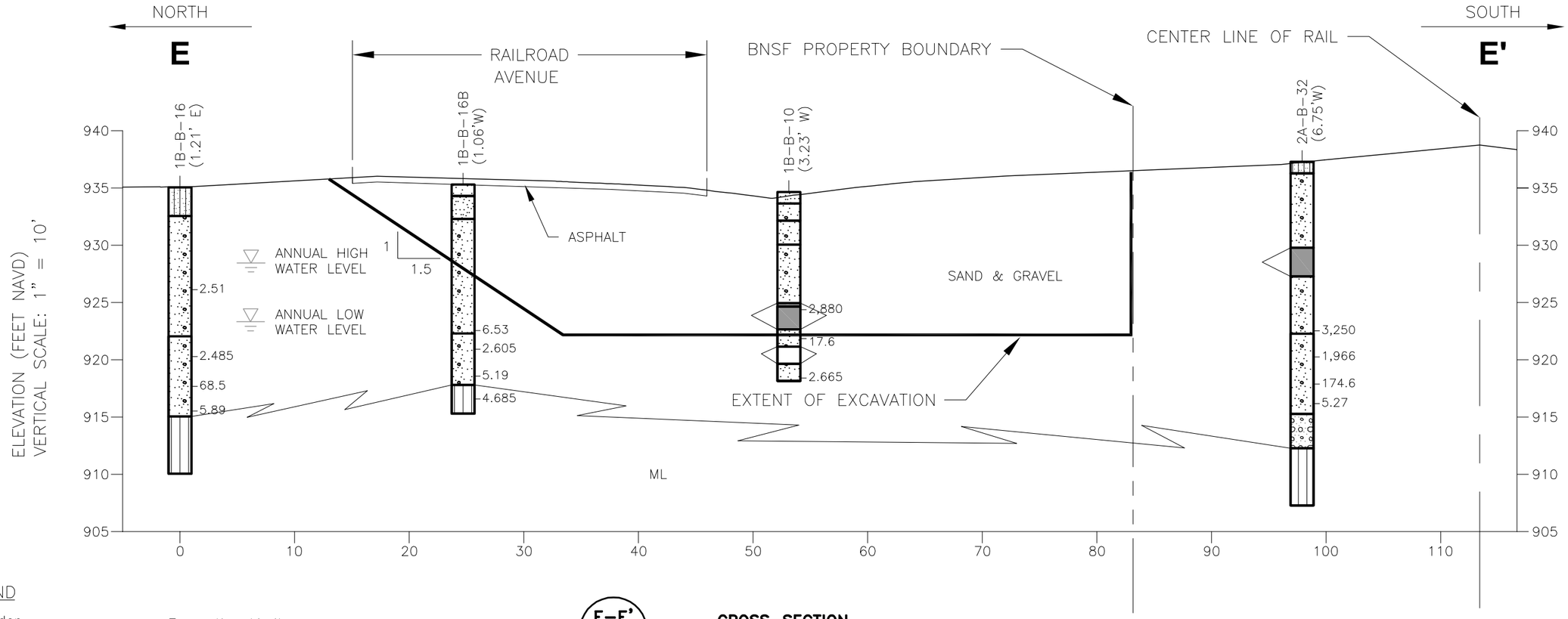


LEGEND

- Boulder
- SP
- ML
- GW
- SW
- SM

- Excavation Limits
- Property Boundary
- 3,400 mg/kg — Interpolated TPH-Dx Isoconcentration Line
- 2.51 — TPH-Dx (mg/kg)(TYP.)

E-E' / C-6 **CROSS-SECTION HORIZONTAL SCALE" 1" = 10'**

NOTE: Section is projected NORTH to SOUTH
All analytical data was below the Remediation Level of 3,400 mg/kg.

NOTE:

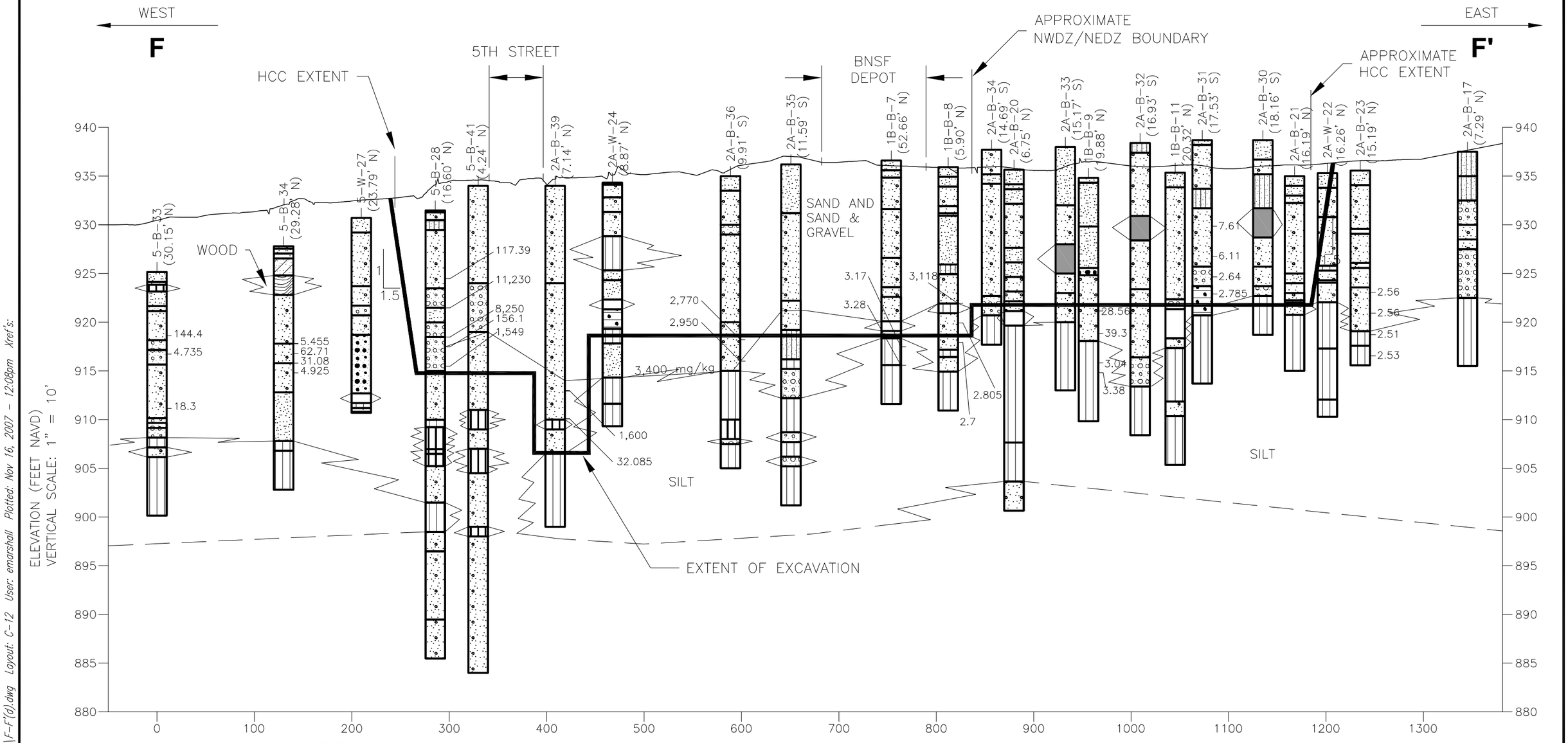
APPROXIMATE EXCAVATION LIMITS WITHIN THE 2008 REMEDIATION BOUNDARY ARE BASED ON OBSERVATIONS DURING SAMPLING AND LABORATORY ANALYTICAL RESULTS. ACTUAL EXCAVATION EXTENTS WITHIN THE 2008 REMEDIATION BOUNDARY WILL BE DETERMINED BASED ON EXCAVATION CONFIRMATION SAMPLING.

ENSR | AECOM

Merged with ENSR in 2007
RETEC

THE BNSF RAILWAY COMPANY SKYKOMISH, WASHINGTON 01140-204-0370			**SKYKOMISH 2008 REMEDIATION EXCAVATION CROSS SECTION E-E'**
DATE: 11/15/07	DRWN: E.M./SEA		**DRAWING NO. C-11**

File: H:\BNSF-Skykomish\2008 remediation\X-SECTS\E-E'(C).dwg Layout: C-11 User: emarshall Plotted: Nov 16, 2007 - 11:16am Xref's:



LEGEND

GM
Boulder
Wood
SM
SC
ML
GW
SW
GP
MH
SP

Analytical sample taken

Excavation Limits

Property Boundary

3,400 mg/kg Interpolated TPH–Dx Isoconcentration Line

144.4 TPH–Dx (mg/kg)(TYP.)

NOTE: Section is projected along BNSF Property Line
Data is truncated for presentation
All truncated data is less than 3,400 mg/kg

F–F' / C–6 CROSS–SECTION
HORIZONTAL SCALE" 1" = 100'

NOTE:

APPROXIMATE EXCAVATION LIMITS WITHIN THE 2008 REMEDIATION BOUNDARY ARE BASED ON OBSERVATIONS DURING SAMPLING AND LABORATORY ANALYTICAL RESULTS. ACTUAL EXCAVATION EXTENTS WITHIN THE 2008 REMEDIATION BOUNDARY WILL BE DETERMINED BASED ON EXCAVATION CONFIRMATION SAMPLING.

ENSR | AECOM

Merged with ENSR in 2007
RETEC

THE BNSF RAILWAY COMPANY SKYKOMISH, WASHINGTON 01140-204-0370			SKYKOMISH 2008 REMEDIATION EXCAVATION CROSS SECTION F-F'
DATE: 11/15/07	DRWN: E.M./SEA		DRAWING NO. C-12

File: H:\BNSF-Skykomish\2008 remediation\X-SECTS\F-F'(2).dwg Layout: C-12 User: emarshall Plotted: Nov 16, 2007 - 12:08pm Xref's:

BMP C223

BMP C120 AND BMP C125

SILT FENCE (BMP C223) AT PHASE 1/2 BOUNDARY

BMPC120 AND BMP C125

BMP C103

BMP C140

REMOVE AND REPLACE CATCH BASIN

CONSTRUCTION FENCE

SOIL HANDLING FACILITY BMP C123 — 1 / C-14

GATES

CONSTRUCTION WATER TREATMENT SYSTEM BMP C250 — 3 / C-15

BMP C220

PORTABLE EQUIPMENT STORAGE AREA AND CONTRACTOR TRAILERS

GATE

WHEEL WASH/DECON AREA BMP C106

2 / C-14

SOIL HANDLING AREA EXIT ROAD

Fifth Street

Fourth Street

Third Street

Railroad Avenue

Asphalt Paved Roadbed

Concrete Sidewalk

N.E. Old Cascade Highway

LEGEND

- STORM DRAIN LINE (SD)
- STORM DRAIN MANHOLE
- CATCH BASIN
- STORMWATER FLOW DIRECTION
- 2008 REMEDIATION BOUNDARY
- BNSF PROPERTY LINE
- PROPERTY BOUNDARY
- AIR SPARGING AREA 1
- WIRE FENCE
- SILT FENCE (SF)
- HCC AREA
- SOIL HANDLING AREA
- PROPOSED STAGING AREAS
- PROPOSED PORTABLE EQUIPMENT STORAGE AREA
- FEMA FLOODWAY BOUNDARY

BMPs

BMP C101 – PRESERVING NATURAL VEGETATION

BMP C103 – HIGH VISIBILITY FENCE

BMP C106 – WHEEL WASH/DECONTAMINATION PAD

BMP C120 – PERMANENT SEEDING

BMP C123 – PLASTIC COVERING

BMP C125 – TOPSOILING

BMP C140 – DUST CONTROL

BMP C220 – COVER CATCH BASINS

BMP C223 – SILT FENCE

BMP C250 – CONSTRUCTION WATER TREATMENT

50 0 100

SCALE IN FEET

N

30% DRAWINGS - NOT FOR CONSTRUCTION

ENSR | AECOM

Merged with ENSR in 2007 RETEC

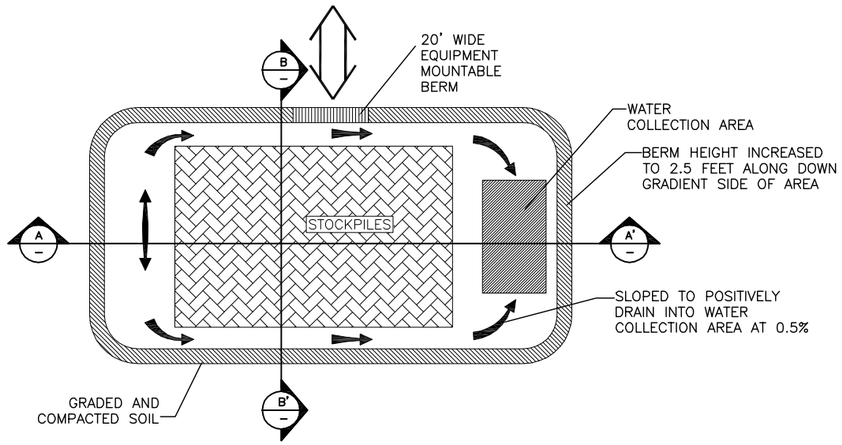
NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
5							
4							
3							
2							
1							
A	EM	11/16/07	30% DRAWINGS – NOT FOR CONSTRUCTION				

THE BNSF RAILWAY COMPANY
SKYKOMISH, WASHINGTON
01140-204-270

CURRENT DATE 11/16/07

SKYKOMISH 2008 REMEDIATION
SEDIMENT AND EROSION CONTROL PLAN

DRAWING NO. C-13 REVISION



NOTES:

1. EXISTING STOCKPILE WILL BE USED TO THE EXTENT PRACTICABLE. ALL CONSTRUCTION DETAILS AND SUBSEQUENT NOTES ARE SHOWN IN THE EVENT THAT MODIFICATION IS REQUIRED.

2. STOCKPILE AREA DIMENSIONS AND SHAPE MAY VARY. ACTUAL SIZE WILL BE DETERMINED BASED ON SITE CONDITIONS AND REQUIRED STORAGE AREA. CONTRACTOR SHALL DETERMINE FINAL SIZE OF AREA WITH APPROVAL BY SITE ENGINEER.

3. STOCKPILE AREA IS TO BE GRADED TO POSITIVELY DRAIN TOWARDS THE WATER COLLECTION AREA.

4. CONTAINMENT BERMS SHALL BE CONSTRUCTED OF UNIMPACTED SOIL. PLACE WATER CONTAINMENT BERM SOILS IN MAXIMUM OF 12" LIFTS.

5. WATER CONTAINMENT BERMS ARE TO BE MOISTURE CONDITIONED AND COMPACTED TO A FIRM, UNYIELDING CONDITION, AS DIRECTED BY THE SITE ENGINEER.

6. DAILY INSPECTION AND MAINTENANCE OF THE WATER CONTAINMENT BERMS IS REQUIRED DURING PERIODS OF PRECIPITATION.

7. CONTRACTOR SHALL REMOVE WATER FROM COLLECTION SUMP, FILTER IT FOR DISPOSAL AT THE CONSTRUCTION WATER TREATMENT SYSTEM, AND HAUL IT TO THE WATER TREATMENT SYSTEM VIA TRUCK.

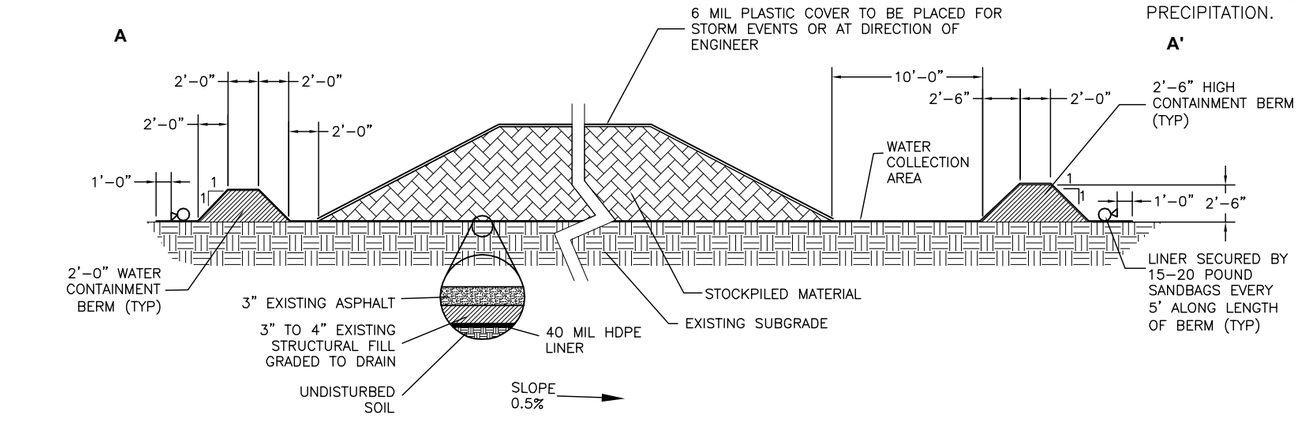
8. SOLIDS ACCUMULATED IN THE SUMP WILL BE REMOVED PERIODICALLY AND PLACED ON THE STOCKPILE.

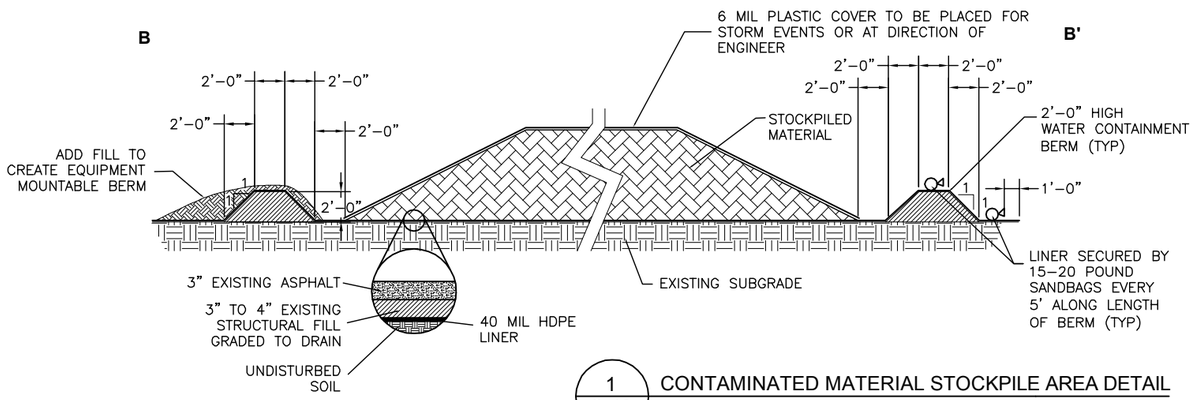
9. UPON COMPLETION OF THE WORK, THE CONTAMINATED MATERIAL STOCKPILE AREA SHALL BE REMOVED, AND THE AREA GRADED.

10. ANY DAMAGE TO CONTAMINATED MATERIAL STOCKPILE AREA MUST BE REPORTED TO THE SITE ENGINEER IMMEDIATELY.

11. ALL WELLS TO BE PROTECTED DURING INSTALLATION AND REMOVAL OF STOCKPILE AREA.

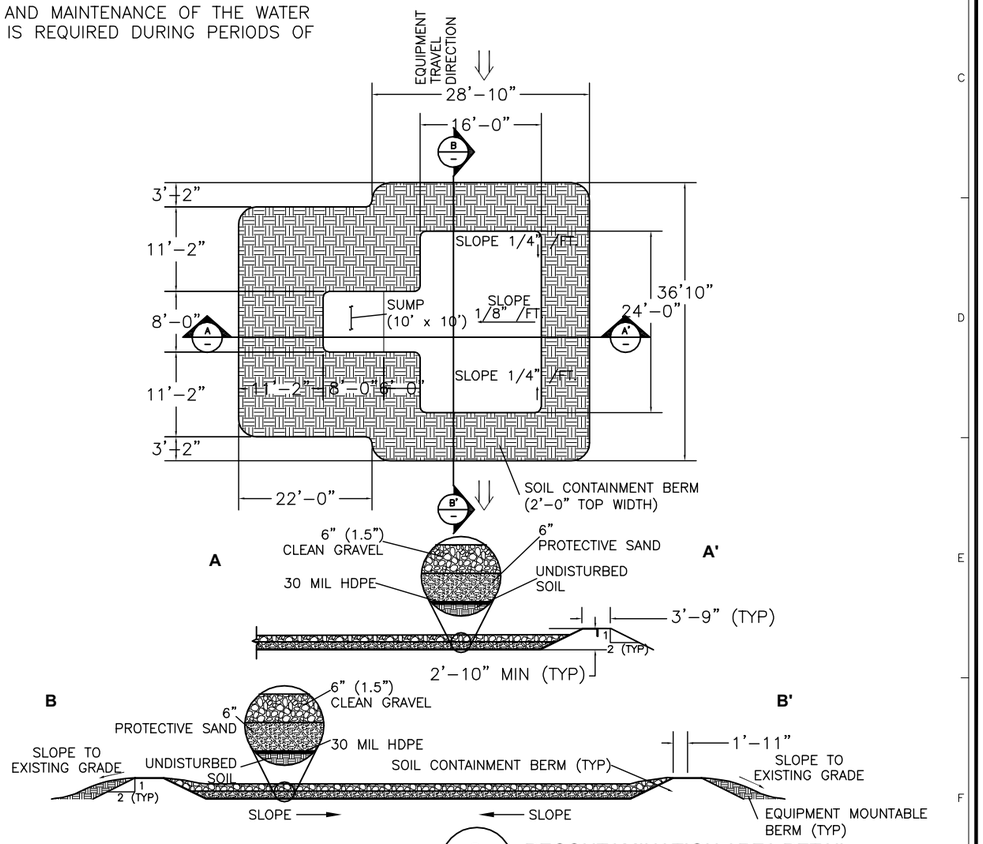
12. WATER COLLECTED FROM WHEEL WASH/DECON AREA SHOULD BE REMOVED AND DISPOSED OF OR RECYCLED AT A LICENSED FACILITY.





1 / C-13 CONTAMINATED MATERIAL STOCKPILE AREA DETAIL

SCALE: NTS



2 / C-13 DECONTAMINATION AREA DETAIL

SCALE: NTS

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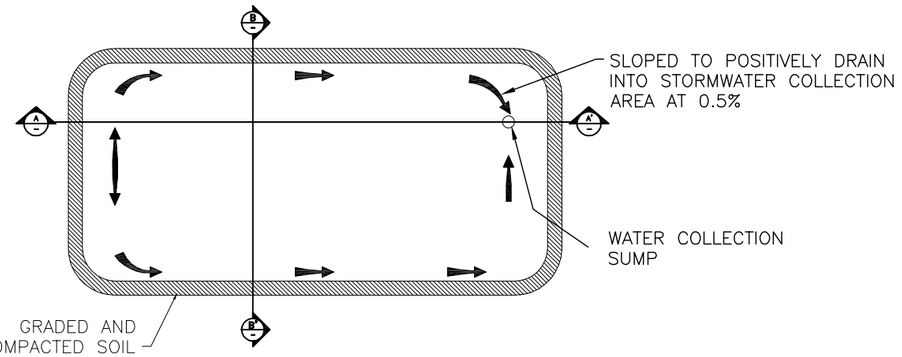
01140-204-270

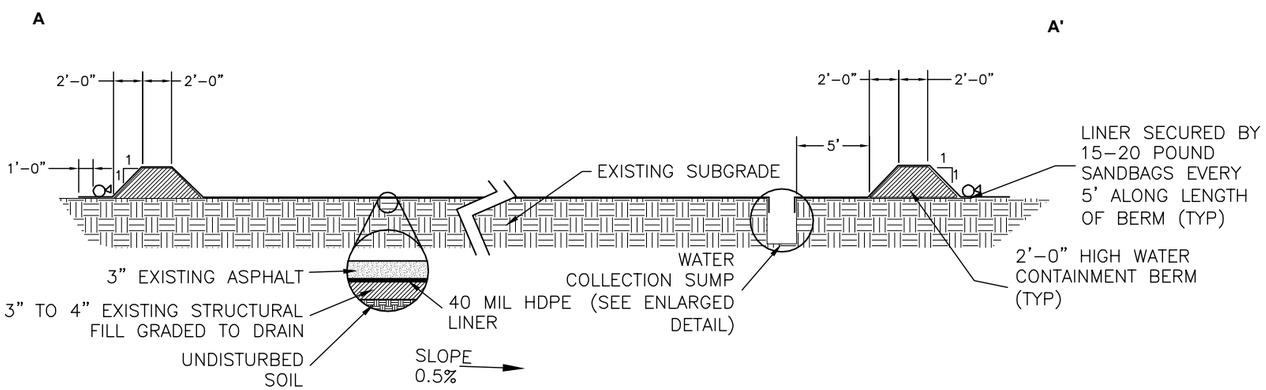
CURRENT DATE 11/15/07

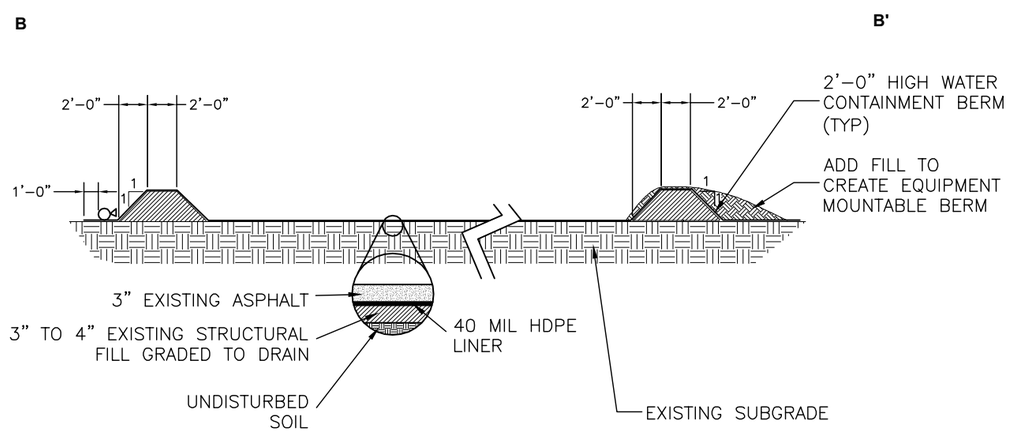
SKYKOMISH 2008 REMEDIATION
SEDIMENT AND EROSION CONTROL DETAILS
SHEET 1 OF 2

DRAWING NO. C-14 REVISION

File: H:\BNSF-Skykomish\2008 remediation\30% drawings\sediment-erosion_details(C).dwg Layout: C-14 User: emarshall Plotted: Nov 15, 2007 - 10:26am Xref's:

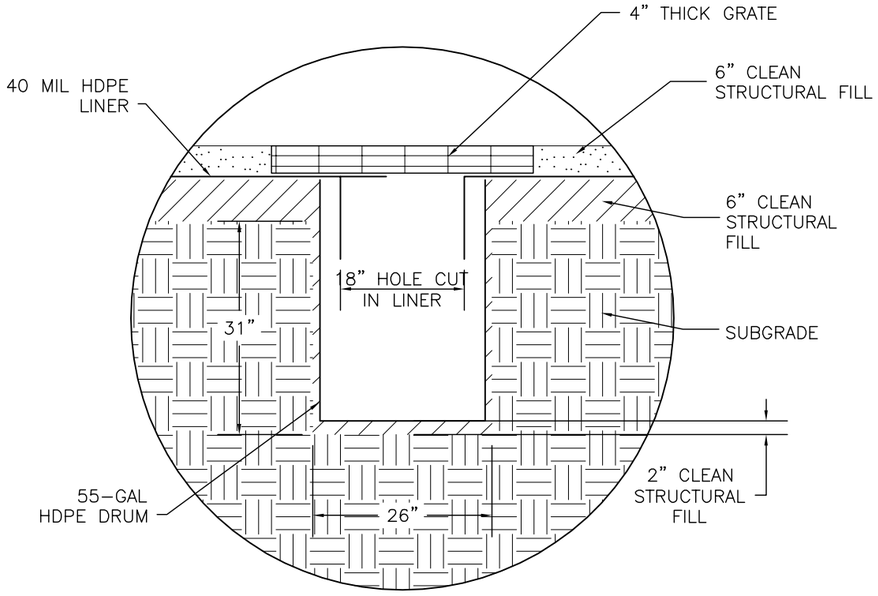






3 / C-13 WATER TREATMENT AREA DETAIL

SCALE: NTS



ENLARGED SUMP DETAIL

NOTES:

1. WATER TREATMENT PLANT AREA IS TO BE GRADED TO POSITIVELY DRAIN TOWARDS THE WATER COLLECTION SUMP.

2. CONTAINMENT BERMS SHALL BE CONSTRUCTED OF UNIMPACTED SOIL. PLACE CONTAINMENT BERM SOILS IN MAXIMUM OF 12" LIFTS. CONTAINMENT BERMS ARE TO BE MOISTURE CONDITIONED AND COMPACTED TO A FIRM, UNYIELDING CONDITION, AS DIRECTED BY THE SITE ENGINEER.

3. PERIODIC INSPECTION AND MAINTENANCE OF THE CONTAINMENT BERMS IS REQUIRED FOR THE DURATION OF THE PROJECT.

4. SOLIDS ACCUMULATED IN THE SUMP WILL BE EXCAVATED PERIODICALLY BY THE SUBCONTRACTOR AND PLACED ON THE WASTE MATERIAL STOCKPILE.

5. ANY DAMAGE TO WATER TREATMENT AREA MUST BE REPORTED TO THE SITE ENGINEER IMMEDIATELY.

6. LINER SHALL BE 40 MIL HDPE ONE SOLID SHEET OR SEAMS SHALL BE WELDED PER SPECIFICATIONS AND MANUFACTURER'S RECOMMENDATIONS. NO OVERLAP IS ALLOWED.

7. SUMP SHALL BE A 55-GALLON HDPE DRUM. A HOLE SHALL BE CUT IN THE LINER CENTERED OVER THE DRUM TO ALLOW WATER TO DRAIN INTO THE DRUM.

8. GRATE OVER SUMP WILL BE OF SUFFICIENT STRENGTH TO WITHSTAND VEHICLE TRAFFIC AND EXTEND AT LEAST 6 INCHES PAST THE SUMP EXCAVATION ON ALL SIDES. SLOPES WILL BE GRADED TO THE SUMP.

30% DRAWINGS - NOT FOR CONSTRUCTION

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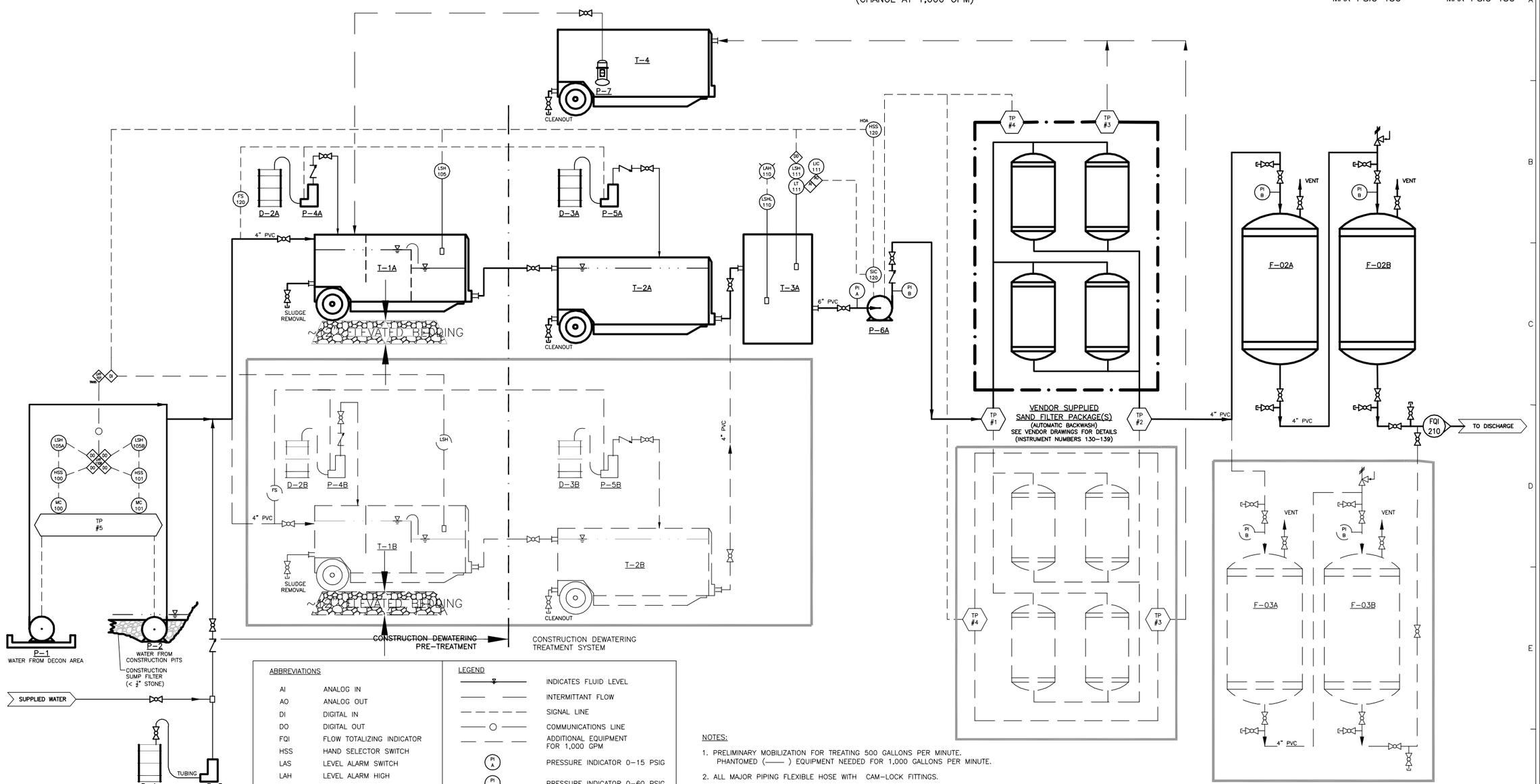
SKYKOMISH 2008 REMEDIATION
SEDIMENT AND EROSION CONTROL DETAILS
SHEET 2 OF 2

DRAWING NO. C-15 | REVISION

File: H:\BNSF-Skykomish\2008 remediation\30% drawings\sediment-erosion_details(C).dwg Layout: C-15 User: emarshall Plotted: Nov 15, 2007 - 10:27am Xref's:

P-1	P-2	D-1	P-3A/B	D-2&3 A/B	P-4&5 A/B	T-1A/B	T-2A/B	T-3A/B	P-6A	F-01	P-7	T-4	F-02A/B	F-03A/B
DECON AREA SUMP PUMP	CONSTRUCTION PIT SUMP PUMP TRASH PUMP 500 GPM GAS POWERED	DE-EMULSIFIER 55 GAL DRUM	DE-EMULSIFIER METERING PUMP	FLOCCULANT 55 GAL DRUM	CHITOSAN METERING PUMP	WEIR TANK 20,000 GAL CARBON STEEL	FRAC TANK 20,000 GAL CARBON STEEL	SURGE TANK TANK 20,000 GAL CARBON STEEL	DISCHARGE PUMP 25 HP, 3ø, 460 VAC CENTRIFUGAL 500 GPM @ 110' TDH (CHANGE AT 1,000 GPM)	SAND FILTER UNIT VENDOR PACKAGE 2 PAIRS @ 500 GPM PER PAIR	SUBMERSIBLE SUMP PUMP 30 GPM, 115 VAC, ½ HP	BACKWASH HOLDING TANK 20,000 GAL CARBON STEEL	LIQUID PHASE GRANULAR ACTIVATED CARBON 10,000 LBS MAX PSIG 150	LIQUID PHASE GRANULAR ACTIVATED CARBON 10,000 LBS MAX PSIG 150



ABBREVIATIONS

AI	ANALOG IN
AO	ANALOG OUT
DI	DIGITAL IN
DO	DIGITAL OUT
FQI	FLOW TOTALIZING INDICATOR
HSS	HAND SELECTOR SWITCH
LAS	LEVEL ALARM SWITCH
LAH	LEVEL ALARM HIGH
LHY	LEVEL HIGH RADIO RECIEVER OR TRANSMITTER
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH-HIGH
LSHL	LEVEL SWITCH HIGH/LOW
MC	MOTOR CONTACT

LEGEND

- INDICATES FLUID LEVEL
- INTERMITTANT FLOW
- SIGNAL LINE
- COMMUNICATIONS LINE
- ADDITIONAL EQUIPMENT FOR 1,000 GPM
- PI A — PRESSURE INDICATOR 0-15 PSIG
- PI B — PRESSURE INDICATOR 0-60 PSIG
- AUTO DIALER
- TP ## — EQUIPMENT TIE POINT

NOTES:

1. PRELIMINARY MOBILIZATION FOR TREATING 500 GALLONS PER MINUTE. PHANTOMED (———) EQUIPMENT NEEDED FOR 1,000 GALLONS PER MINUTE.
2. ALL MAJOR PIPING FLEXIBLE HOSE WITH CAM-LOCK FITTINGS.
3. SPARE PUMP FOR TRANSFER OR DISCHARGE TO BE ONSITE.
4. TYPICAL OF 2 SYSTEMS.
5. SYSTEM SCHEMATIC REPRESENTS CONSTRUCTION PHASE TREATMENT SYSTEM.
6. SYSTEM TO INCLUDE HOSES AND FITTINGS NEEDED FOR BACKWASH.
7. DEWATERING CONTRACTOR TO PROVIDE DRY CONTACT (5 AMP) TO DISABLE DEWATERING PUMPS DURING ALARM EVENTS.

PIPING AND INSTRUMENTATION DIAGRAM

30% DRAWINGS - NOT FOR CONSTRUCTION

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SKYKOMISH 2008 REMEDIATION
CONSTRUCTION WATER TREATMENT SYSTEM
PROCESS AND INSTRUMENTATION DIAGRAM

DRAWING NO. C-16 REVISION

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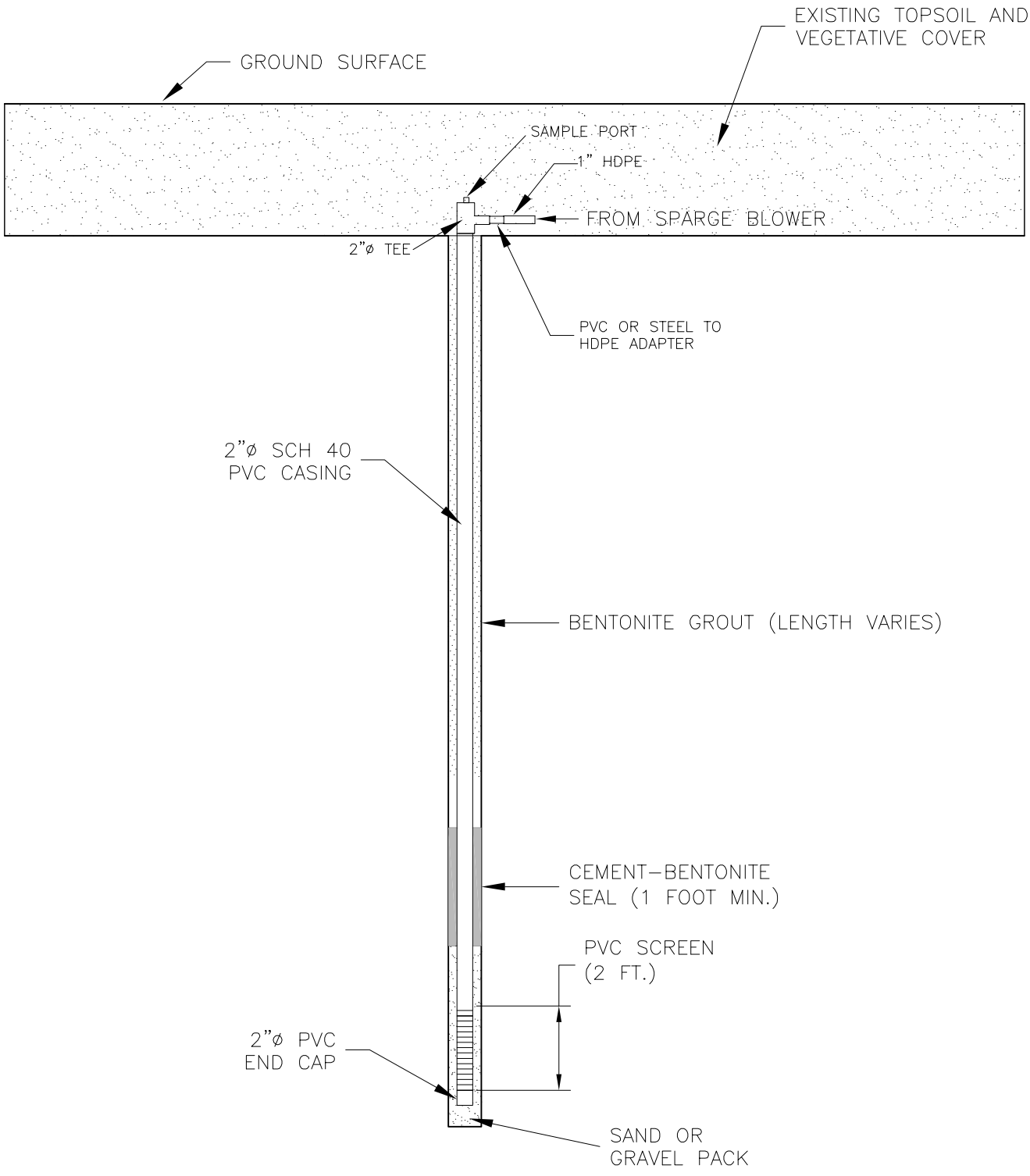
CURRENT DATE 11/16/07

SKYKOMISH 2008 REMEDIATION
AIR SPARGING SYSTEM LAYOUT

DRAWING NO. C-17

REVISION

File: H:\BNSF-Skykomish\2008 remediation\30% drawings\air_sparging_layout(0).dwg Layout: C-17 User: emarshall Plotted: Nov 16, 2007 - 9:37am Xref's:



SCALE: NOT TO SCALE

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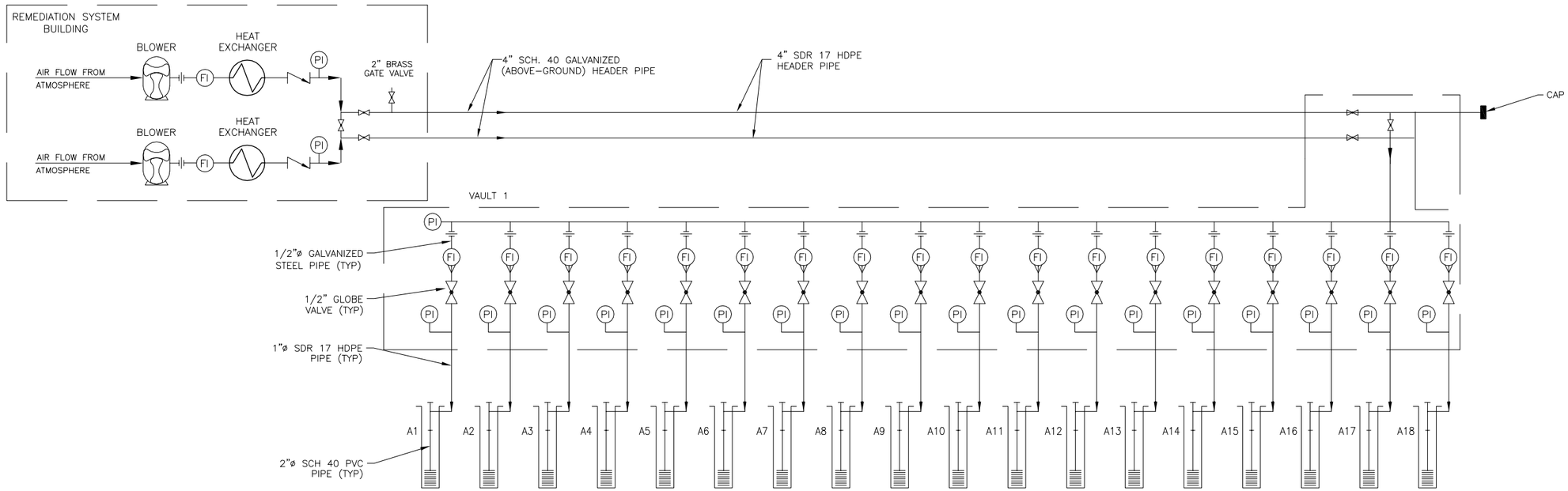
THE BNSF RAILWAY COMPANY SKYKOMISH, WASHINGTON 01140-204-270			**SKYKOMISH 2008 REMEDIATION AIR SPARGING SYSTEM WELL DETAIL**
DATE: 11/15/07	DRWN: E.M./SEA		**C-18**

File: H:\BNSF–Skykomish\2008 remediation\30% drawings\air_sparging_well(b).dwg Layout: C–18 User: emarshall Plotted: Nov 15, 2007 – 10:51am Xref's:



LEGEND

- PI — PRESSURE INDICATOR
- FI — FLOW INDICATOR
- A1–A1 — AIR INJECTION WELL (TYP.)
- CHECK VALVE
- GLOBE/GATE VALVE
- HEAT EXCHANGER
- BLOWER
- UNION

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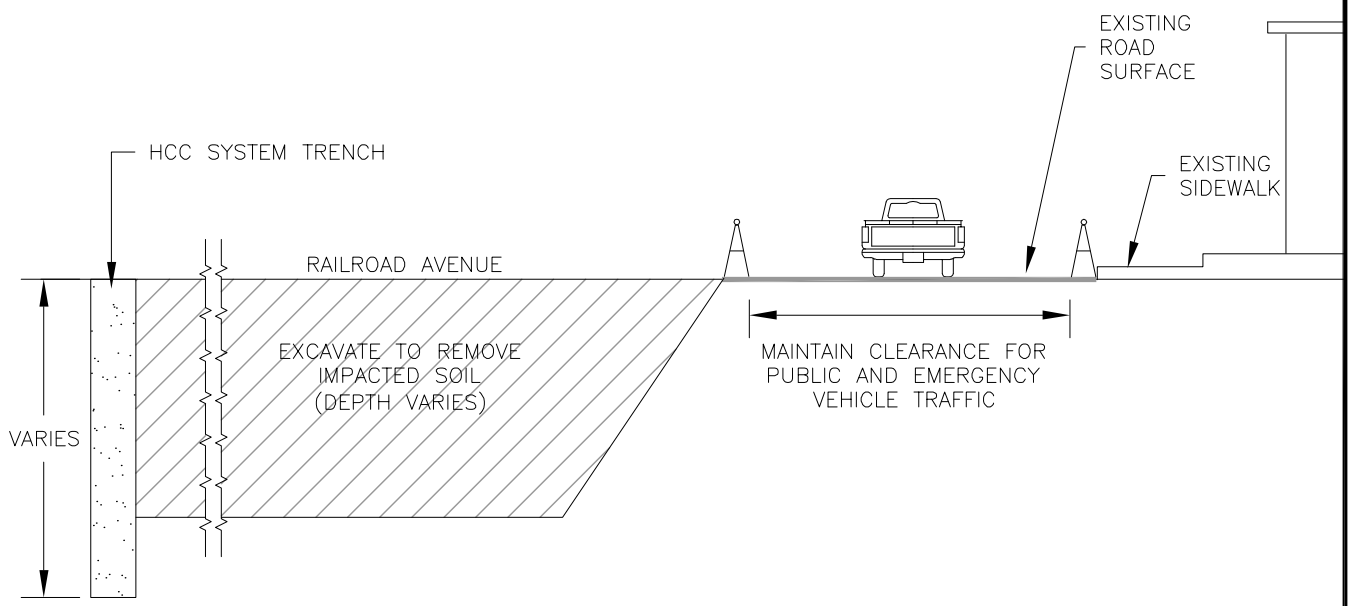
CURRENT DATE 11/16/07

SKYKOMISH 2008 REMEDIATION
AIR SPARGING SYSTEM PIPING
AND INSTRUMENTATION DIAGRAM

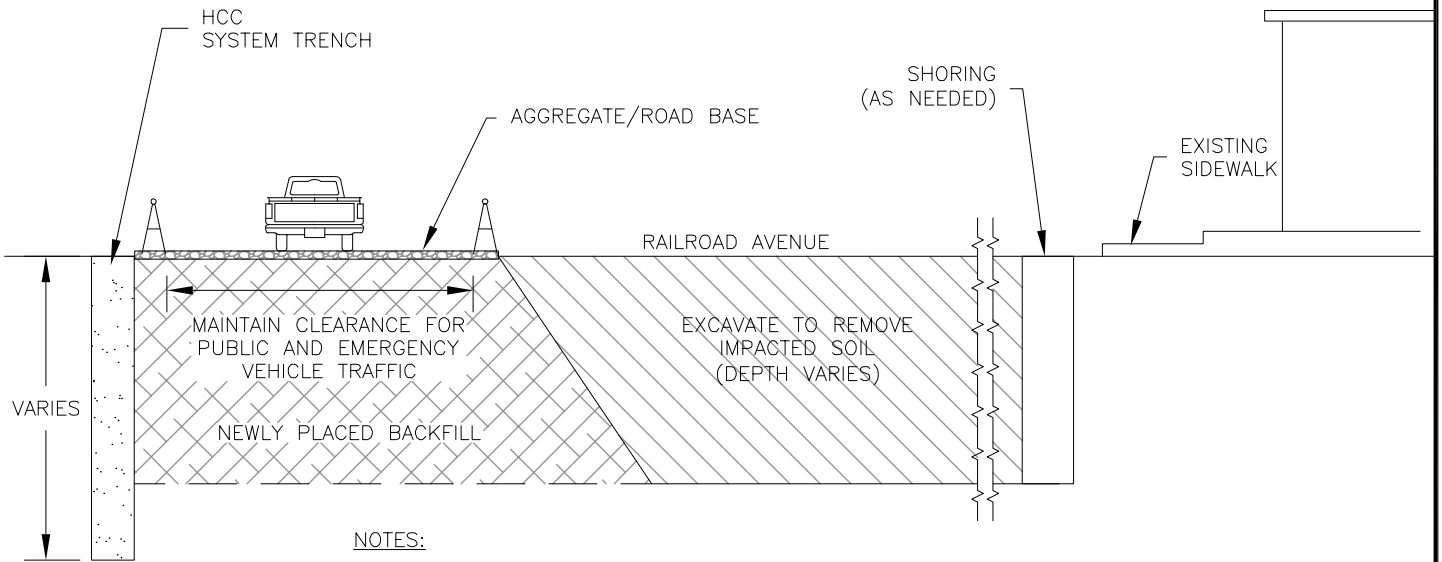
DRAWING NO. C-19 REVISION

File: H:\BNSF-Skykomish\2008 remediation\30% drawings\air_sparging_diagram(D).dwg Layout: C-18 User: emarshall Plotted: Nov 16, 2007 - 9:59am Xref's:

PHASE 1 – EXCAVATE SOUTH SIDE OF RAILROAD AVENUE



PHASE 2 – EXCAVATE NORTH SIDE OF RAILROAD AVENUE



NOTES:

NOT TO SCALE
LOCATIONS ARE APPROXIMATE
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THE BNSF RAILWAY COMPANY SKYKOMISH, WASHINGTON 01140-204-270		**SKYKOMISH 2008 REMEDIATION PHASES 1 AND 2 RAILROAD AVENUE EXCAVATION**
DATE: 11/8/07	DRWN: E.M./SEA	**C-20**

File: H:\BNSF-Skykomish\2008 remediation\30% drawings\railroad_ave_excavation(b).dwg Layout: C-19 User: emarshall Plotted: Nov 08, 2007 - 9:45am Xref's:

ACCESS OLD CASCADE HIGHWAY
VIA HIGHWAY 2

MOVE WHISTLING
POST TAVERN

PREPARE McEVOY HOUSE
FOR RELOCATION

EXCAVATION TO BE
COMPLETED DURING
LIMITED–TIME ROAD CLOSURES

APPROXIMATE PHASE 1/2
BOUNDARY

EXCAVATE AND
RESTORE

TEMPORARY CONSTRUCTION
CROSSING

GATES

GATE

MOVE DEPOT

GATES

CONSTRUCTION WATER
TREATMENT SYSTEM

EMERGENCY VEHICLE
ACCESS CROSSING

STAGING AREA AND
SOIL HANDLING AREA

GATE

REMEDIATION
EQUIPMENT
BUILDING

PORTABLE EQUIPMENT STORAGE AREA
AND CONTRACTOR TRAILERS

SOIL
HANDLING
AREA EXIT
ROAD

HIGHWAY 2
APPROX. 3 MILES

ACCESS DOWNTOWN SKYKOMISH
AND STATE HIGHWAY 2 VIA OLD
CASCADE HIGHWAY

HIGHWAY 2
APPROX. 1.2 MILES

LEGEND

- ACTIVE EXCAVATION BOUNDARY FOR PHASE 1
- AIR SPARGING SYSTEM AREA
- BNSF PROPERTY LINE
- PROPERTY LINE
- WIRE FENCE
- SF — SILT FENCE
- DESIGNATED TRAFFIC ROUTE
- HCC AREA
- SOIL HANDLING AREA
- PROPOSED BUILDINGS TO BE RELOCATED
- PROPOSED STAGING AREAS
- PROPOSED PORTABLE EQUIPMENT STORAGE AREA

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SCALE IN FEET

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THE BNSF RAILWAY COMPANY
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01140-204-270

CURRENT DATE 11/15/07

SKYKOMISH 2008 REMEDIATION
PHASE 1 TRAFFIC ROUTING AND
PEDESTRIAN ACCESS

DRAWING NO. C-21 REVISION

File: H:\BNSF–Skykomish\2008 remediation\30% drawings\traffic_plan–phase_1(B).dwg Layout: C–21 User: emarshall Plotted: Nov 16, 2007 – 10:00am Xref's:

LEGEND

- ACTIVE EXCAVATION BOUNDARY FOR PHASE 2
- AIR SPARGING SYSTEM AREA
- BNSF PROPERTY LINE
- PROPERTY LINE
- WIRE FENCE
- SF — SILT FENCE
- DESIGNATED TRAFFIC ROUTE
- SOIL HANDLING AREA
- PROPOSED BUILDINGS TO BE RELOCATED
- PROPOSED STAGING AREAS
- PROPOSED PORTABLE EQUIPMENT STORAGE AREA

RESTORE AFTER EXCAVATION

CLOSE TO ACCESS AS NEEDED

TEMPORARY CONSTRUCTION CROSSING

GATES

GATE

GATES

CONSTRUCTION WATER TREATMENT SYSTEM

EMERGENCY VEHICLE ACCESS CROSSING

STAGING AREA AND SOIL HANDLING AREA

PORTABLE EQUIPMENT STORAGE AREA AND CONTRACTOR TRAILERS

REMEDIATION EQUIPMENT BUILDING

SOIL HANDLING AREA EXIT ROAD

WHEEL WASH/ DECON AREA

Fifth Street

Fourth Street

Third Street

Railroad Avenue

Asphalt Paved Roadbed

Concrete Sidewalk

N.E. Old Cascade Highway

N

60 0 120

SCALE IN FEET

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SKYKOMISH 2008 REMEDIATION
PHASE 2 TRAFFIC ROUTING AND PEDESTRIAN ACCESS

DRAWING NO. C-22 REVISION