USDA United States Department of Agriculture
Forest Service
Mt. Hood National Forest
Barlow Ranger District
780 NE Court Street
Dufur, OR 97201
541-467-2291
FAX: 541-467-2271

Attachment A

File Code: 2710
Date: January 18, 2016

Dave Anderson
Director of Public Works
City of The Dalles
1215 West 1st Street
The Dalles, OR 97058

Dear Mr. Anderson,

The Mt. Hood National Forest, Barlow Ranger District, supports your effort to secure funding for replacement of the Dog River Pipeline through the Oregon Water Resources Department's Water Supply Development Account grant.

The Dog River pipeline is an important part of the water delivery system that starts on National Forest System lands. The City of the Dalles is a partner in maintaining the natural resources and infrastructure on the National Forest that provides over 70% of the drinking water to the residents living in The Dalles.

Within the current special use permit, the City of The Dalles is authorized to maintain and improve the infrastructure on National Forest System lands. In regard to the Dog River Pipeline, the City continues to work with the Mt. Hood National Forest to complete the necessary environmental review to replace the pipeline. The National Environmental Policy Act (NEPA) review is scheduled to be completed by September 2016. Once the review is completed, the City will be authorized to complete the necessary improvements to pipeline.

If you have any questions or would like to discuss this matter further, please contact me at (541) 467-5101.

Sincerely,

KAMERON C. SAM
District Ranger

cc: Mary Ellen Fitzgerald, Scott Kaden

Attachment B

Oregon

Kate Brown, Governor

Department of Fish and Wildlife
The Dalles District Office
3701 West 13th Street
The Dalles OR 97058
541-296-4628
(fax) 541-298-4993

January 8, 2016

Oregon Water Resources Department
Jon Unger-Water Resources Grant Administrator
725 Summer St. NE, Suite A
Salem, OR 97301

Re: Support for Dog River Pipeline Replacement Project

Dear Mr. Unger:

The Oregon Department of Fish and Wildlife (ODFW) supports the City of The Dalles grant application for the replacement of the Dog River Pipeline. The current pipeline is over 100 years old, has considerable leakage issues, and the diversion is not equipped with a fish ladder, or fish screen. This project proposes replacing the pipeline, along with constructing an ODFW approved fish ladder and screen on the diversion.

The Dog River Pipeline diverts water from Dog River, a tributary to the Hood River, where it is ultimately used by the city of The Dalles in its municipal supply. The Hood River has four fish species that are currently listed as a threatened species under the Endangered Species Act (ESA). Diminished streamflow has been identified as a key limiting factor in the recovery of ESA fish throughout the Hood River Basin. Replacement of the leaking pipeline will increase spring and early summer streamflow in Dog River up to 1.5 cubic feet per second. Additionally, water from the Dog River diversion augments streamflow in Mill Creek, which is critical habitat for ESA threatened Middle Columbia steelhead. Stream flow is also limited in Mill Creek, and any increased flow provides a benefit to the aquatic environment.

There are several miles of miles of occupied fish habitat for resident cutthroat trout upstream of the current diversion for the Dog River pipeline. The current diversion structure for the pipeline on the Dog River is not equipped with a fish screen, to prevent fish from being entrained in the pipeline, or any type of fish ladder to allow fish passage around the diversion structure. This project proposes building a fish ladder and fish screen, which prevent fish from being entrained into the pipeline, and will permit volitional passage around the diversion. This will provide a significant benefit to resident cutthroat trout residing in Dog River.

Implementation of this project has potential to provide substantial benefits to fisheries resources in the Hood River Basin, Dog River, and Mill Creek. The ODFW supports this proposal, and urges the Oregon Water Resources to consider this project for grant funding.

Sincerely,

Rod A. French
Mid-Columbia District Fish Biologist

USDA United States Department of Agriculture | Forest Service | Mt. Hood National Forest | Barlow Ranger District
780 NE Court Street
Dufur, OR 97021
541-467-2291
FAX 541-467-2271

File Code: 1950
Date: April 11, 2011

Dear Interested Citizen,

The Barlow Ranger District on the Mt. Hood National Forest is now preparing an Environmental Assessment to replace the Dog River pipeline. The project area is located in T2S, R10E, in Sections 2, 3, 4, 9, 10 and 11. To maintain gravity flow, the existing pipeline follows topographic contours along a circuitous route around Dog River Mountain and discharges into the south fork of Mill Creek.

The Dog River pipeline, which is an important component of The Dalles' public drinking water supply, was constructed in the early twentieth century. It consists of milled pieces of fir that were assembled in a circular shape and wrapped with heavy-gauge galvanized wire and coated with tar. Over the past 100 years, this pipe has deteriorated, is leaking from tree damage, and exhibiting corrosion. Because the pipeline has become so deteriorated, it no longer provides the most efficient way of conveying water to the City of The Dalles' municipal water supply. Therefore, there is a need to replace the pipeline with a 24-inch-diameter ductile iron pipe. This new pipeline would parallel the alignment of the existing pipeline as much as elevation permits.

In order to replace the pipeline, existing trees and dead wood would be cut and removed within the 25-foot right of way. Access to the project area would be provided by existing roads (mainly Forest Service Road 1700-014). Construction materials, including the pipe and sand/gravel, would be stored at previously disturbed areas, such as old landings and/or road prisms.

The existing pipeline would be needed to carry water to the south fork of Mill Creek until the new pipeline has been constructed. Therefore, a temporary bypass line would be used to convey water around the construction site. The bypass pipe would consist of an eight-inch aluminum sprinkler-type pipe, which could be moved by hand. Installation of the bypass pipe would be around existing trees, logs, and rocks.

The Barlow Ranger District is now seeking comments from individuals, organizations, local and state governments, and other federal agencies that may be interested in or affected by the proposed action. Comments may pertain to the nature and scope of the environmental, social, and economic issues, and possible alternatives to the proposed action. Your comments will help us assess the proposed action, develop alternatives and prepare an Environmental Assessment.

The Forest Service would like your scoping comments by May 13, 2011. Please send your written comments to: Michelle Lombardo, Mt. Hood National Forest, 16400 Champion Way, Sandy, Oregon 97055; FAX: (503) 668-1413. You may also hand-deliver your comments to the above address during normal business hours which are 8:00 a.m. to 11:30 a.m. and 12:30 p.m. to 4:30 p.m. Monday through Friday, excluding federal holidays. Electronic comments may be

submitted to comments-pacificnorthwest-mthood@fs.fed.us in a format such as an e-mail message, plain text (.txt), rich text format (.rtf), or Word (.doc). All those who comment will remain on our mailing list and receive future updates on this proposal.

Comments received in response to this solicitation, including names and addresses of those who comment, will be considered part of the public record for this project, available for public inspection, and released if requested under the Freedom of Information Act.

If you have any questions concerning this proposal, please contact Michelle Lombardo, Project IDT Leader, at (503) 668-1796 or mlombardo@fs.fed.us.

Sincerely,

MICHAEL J. HERNANDEZ
District Ranger

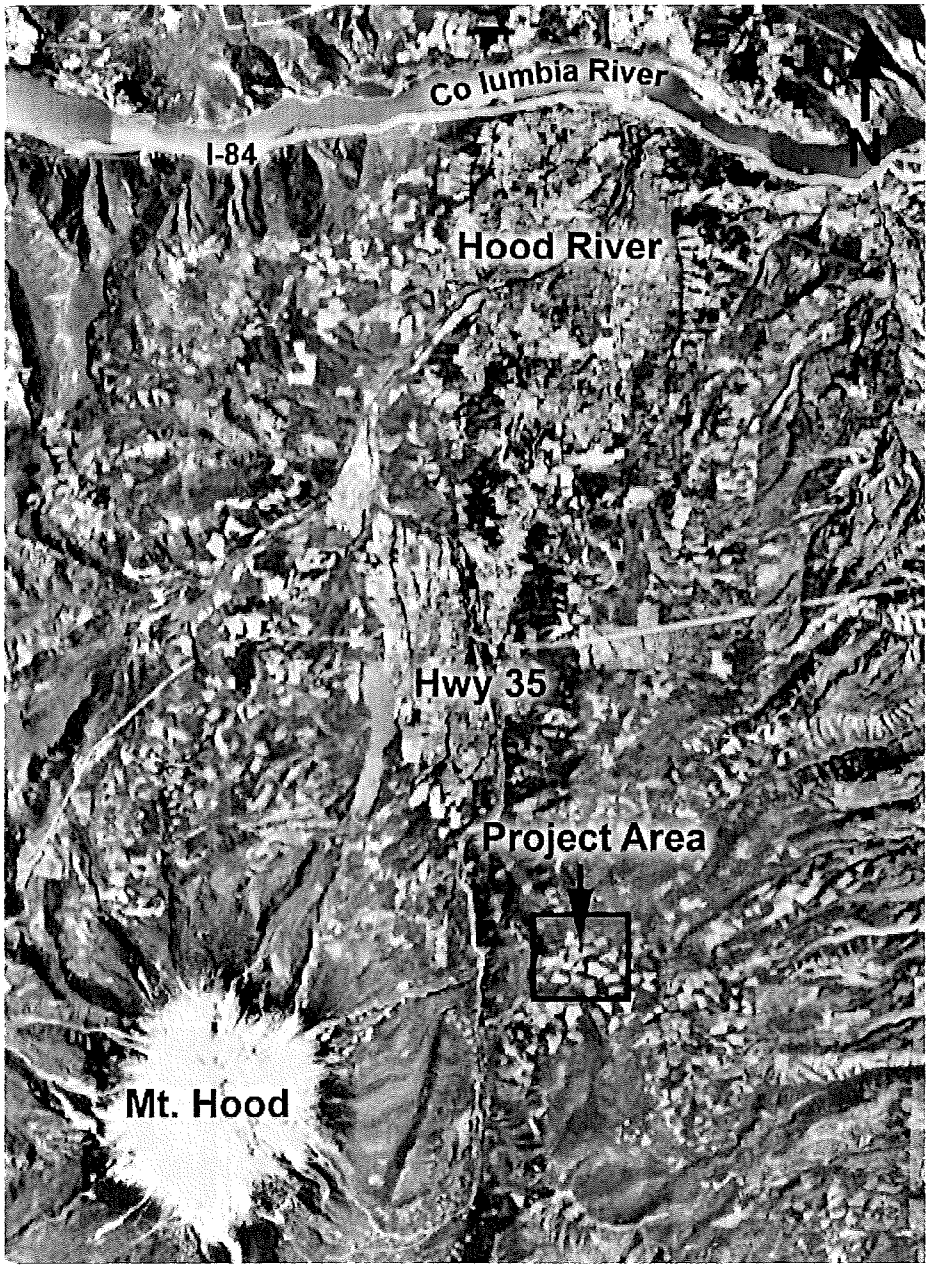
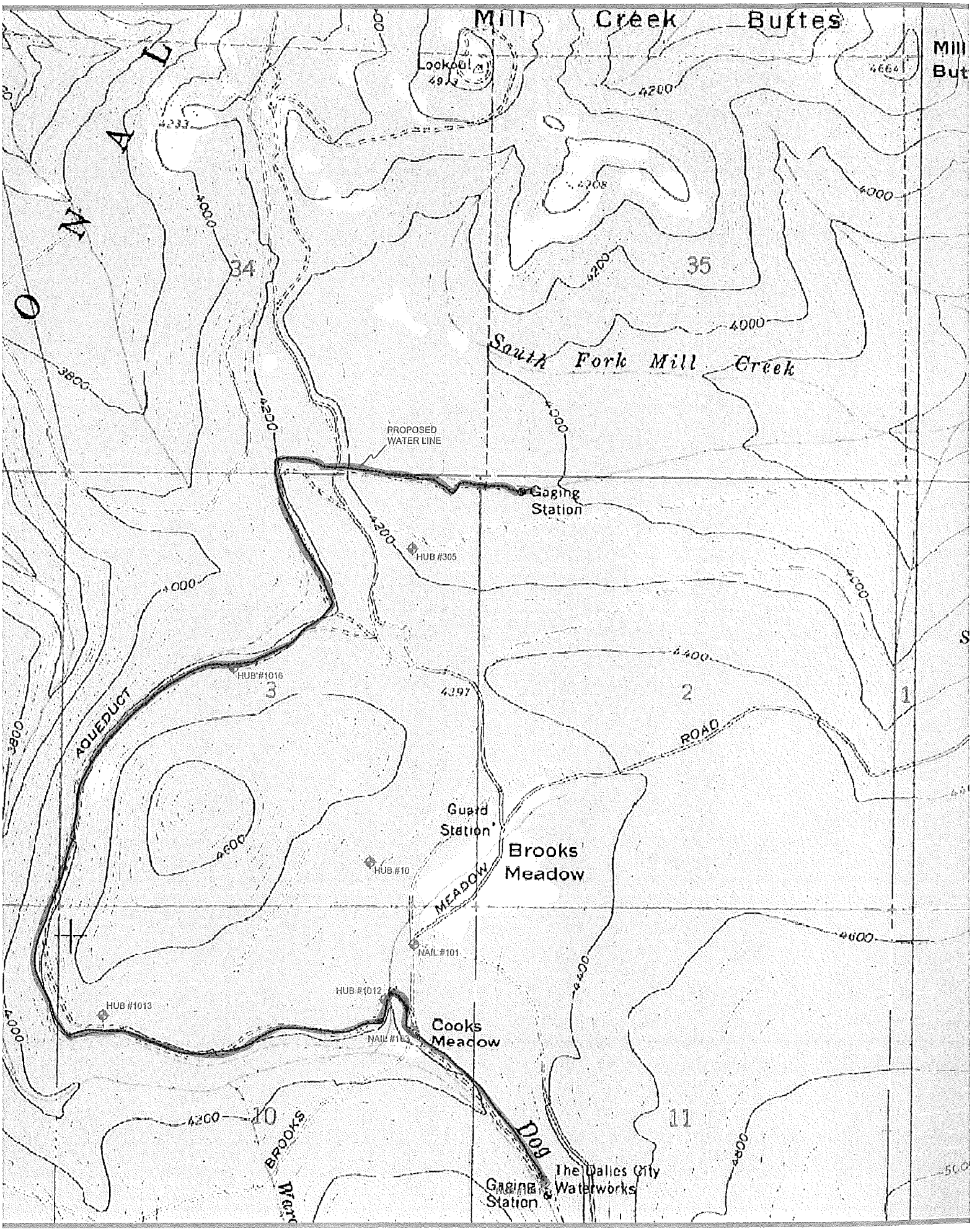
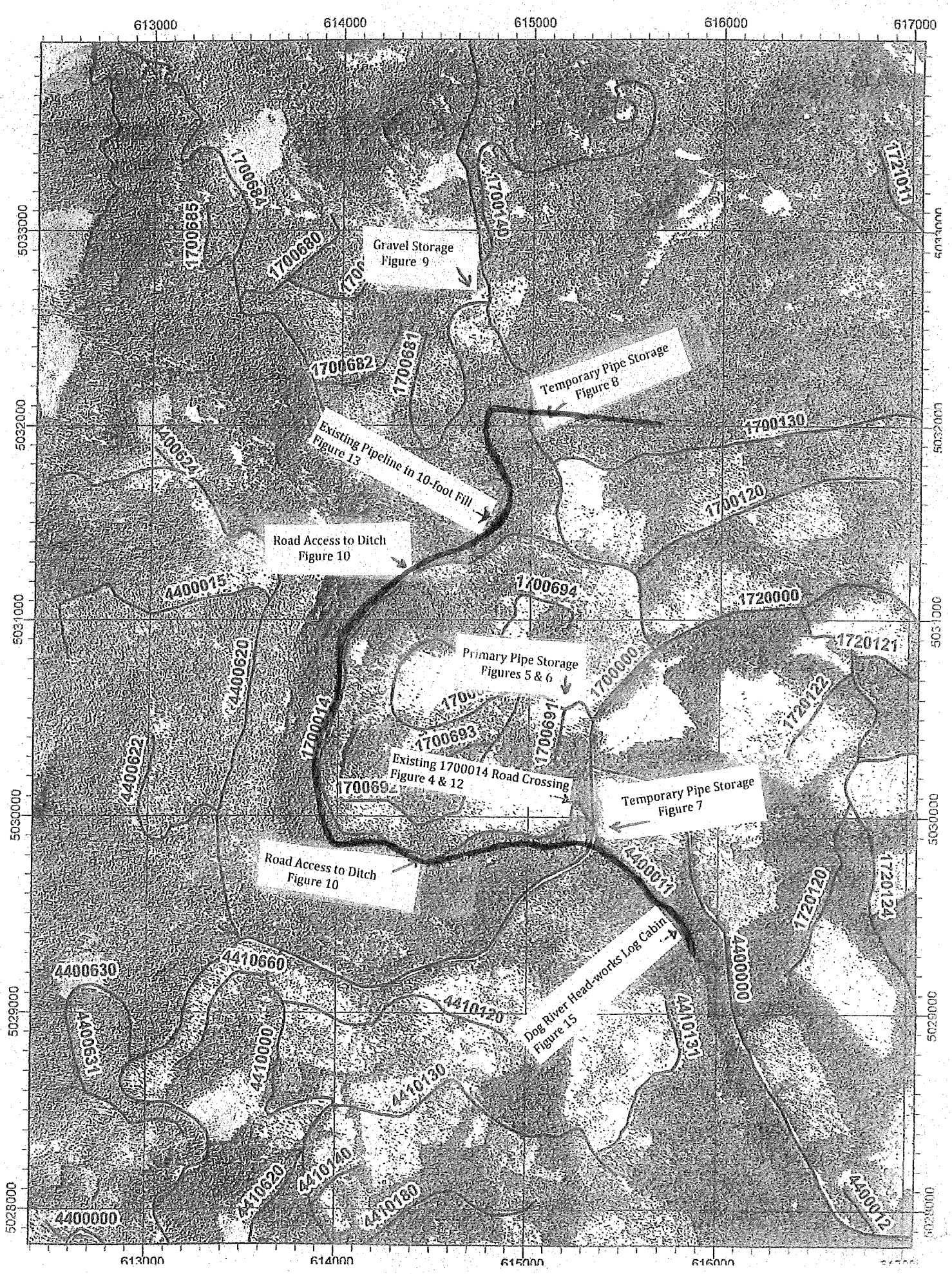


Figure 1. Vicinity map

Attachment E



Attachment F



Attachment G

APPENDIX A

Supply Versus Demands for 2025 Demands and Ultimate 12 mgd Maximum Day Demands

Using 90% Exceedence Value for South Fork Mill Creek and 50% Exceedence Value for Dog River

Month	Mill Creek (mgd)	Dog Creek (mgd)	Mill Creek plus Dog Creek Discharges (mgd)	Channel Losses, between dam and WTP intake (mgd)	Fish bypass flow (mgd)	Total available supply (mgd) = SFMC + DR - channel loss - fish bypass (mgd)	2025 Projected Average Daily Demands by Month (mgd)	Ultimate Daily Demands by Month for a 12 mgd Max Day (mgd)	Total Available Supply for 2025 demands (mgd)	Total Available Supply for 12 mgd Maximum Day (mgd)	2025 Conditions		Ultimate, 12 mgd Maximum Day Conditions	
											Surplus available for filling dam (mg)	Storage needed in dam to meet demands (mg)	Surplus available for filling dam (mg)	Storage needed in dam to meet demands (mg)
Jan	2.8	2.7	5.4	0.0	3.0	2.4	2.2	3.2	0.2	-0.8	6	0	0	24
Feb	3.7	4.9	8.6	0.0	3.0	5.6	2.4	3.5	3.2	2.1	96	0	63	0
Mar	6.5	3.7	10.1	0.0	3.0	7.1	2.4	3.5	4.7	3.7	142	0	110	0
Apr	3.8	3.7	7.5	0.0	3.0	4.5	3.1	4.5	1.4	0.0	42	0	0	0
May	6.6	9.0	15.6	0.0	3.0	12.6	4.3	6.2	8.4	6.5	251	0	194	0
Jun	6.7	11.0	17.7	0.3	1.0	16.4	5.5	8.0	10.9	8.4	327	0	253	0
Jul	4.3	4.6	8.9	0.5	1.0	7.4	6.7	9.6	0.8	-2.2	23	0	0	67
Aug	3.9	2.5	6.3	0.7	1.0	4.6	6.0	8.7	-1.4	-4.1	0	42	0	123
Sep	3.3	1.7	5.1	0.5	1.0	3.6	4.8	6.9	-1.2	-3.4	0	37	0	101
Oct	2.7	3.0	5.6	0.0	1.0	4.6	3.2	4.6	1.5	0.0	44	0	1	0
Nov	3.1	1.5	4.5	0.0	3.0	1.5	2.3	3.4	-0.8	-1.8	0	24	0	55
Dec	2.5	1.6	4.2	0.0	3.0	1.2	2.1	3.1	-1.0	-2.0	0	30	0	59
									Storage available for filling dam	Total (MG)	931		621	
										Total (AF)	2,860		1,910	
									Storage needed to meet demand projections	Total (MG)		133		429
										Total (AF)		410		1,320

Attachment H

APPENDIX A

Supply Versus Demands for 2025 Demands and Ultimate 12 mgd Maximum Day Demands

Using 90% Exceedence Values for South Fork Mill Creek and Dog River

Month	Mill Creek (mgd)	Dog Creek (mgd)	Mill Creek plus Dog Creek Discharges (mgd)	Channel Losses, between dam and WTP intake (mgd)	Fish bypass flow (mgd)	Total available supply (mgd) = SFMC + DR - channel loss - fish bypass (mgd)	2025 Projected Average Daily Demands by Month (mgd)	Ultimate Daily Demands by Month for a 12 mgd Max Day (mgd)	Total Available Supply for 2025 demands (mgd)	Total Available Supply for 12 mgd Maximum Day (mgd)	2025 Conditions: Surplus available for filling dam	2025 Conditions: Storage needed in dam to meet demands	Ultimate, 12 mgd Maximum Day Conditions: Surplus available for filling dam	Ultimate, 12 mgd Maximum Day Conditions: Storage needed in dam to meet demands
Jan	2.8	1.2	4.0	0.0	3.0	1.0	2.2	3.2	-1.2	-2.2	0	37	0	67
Feb	3.7	1.7	5.4	0.0	3.0	2.4	2.4	3.5	0.0	-1.1	1	0	0	32
Mar	6.5	1.6	8.0	0.0	3.0	5.0	2.4	3.5	2.6	1.5	78	0	46	0
Apr	3.8	1.9	5.7	0.0	3.0	2.7	3.1	4.5	-0.4	-1.8	0	12	0	54
May	6.6	3.8	10.4	0.0	3.0	7.4	4.3	6.2	3.1	1.2	94	0	37	0
Jun	6.7	5.3	12.0	0.3	1.0	10.7	5.5	8.0	5.2	2.7	156	0	82	0
Jul	4.3	2.7	7.0	0.5	1.0	5.5	6.7	9.6	-1.2	-4.2	0	36	0	125
Aug	3.9	1.8	5.7	0.7	1.0	4.0	6.0	8.7	-2.1	-4.8	0	62	0	143
Sep	3.3	1.5	4.8	0.5	1.0	3.3	4.8	6.9	-1.5	-3.6	0	45	0	109
Oct	2.7	1.3	4.0	0.0	1.0	3.0	3.2	4.6	-0.2	-1.6	0	6	0	49
Nov	3.1	1.3	4.4	0.0	3.0	1.4	2.3	3.4	-1.0	-2.0	0	30	0	61
Dec	2.5	1.0	3.6	0.0	3.0	0.6	2.1	3.1	-1.6	-2.5	0	47	0	76

		2025 Conditions		Ultimate, 12 mgd Maximum Day Conditions	
Storage available for filling dam	Total (MG)	329		165	
	Total (AF)	1,010		500	
Storage needed to meet demand projections	Total (MG)		275		716
	Total (AF)		840		2,200

BROWN AND CALDWELL

6500 SW Macadam Avenue, Suite 200
Portland, Oregon 97239

Technical Memorandum

Prepared for: City of The Dalles

Project Title: Dog River Pipeline Alternatives

Project No: 133218

Subject: Alternatives Cost Estimating

Date: April 24, 2009

To: David Anderson, Public Works Director

From: Bob Willis, Project Manager

Prepared by: Phil Roppo and Corianne Hart

Reviewed by: Bob Willis

CONTENTS

Limitations:

This document was prepared solely for the City of The Dalles in accordance with professional standards at the time the services were performed and in accordance with the contract between theCity of the Dalles and Brown and Caldwell dated May 1, 2007. This document is governed by the specific scope of work authorized by the City of the Dalles; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the City of the Dalles and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

Introduction

The existing Dog River Pipeline conveys water from the Dog River diversion dam to the South Fork of Mill Creek and provides an important component to The Dalles' public drinking water supply. This Technical Memorandum describes a conceptual level study to define the cost of replacing the Dog River Pipeline based on three alternatives assigned during an onsite evaluation. These alternatives include replacement of the existing pipeline along the current alignment, tunneling in a more direct alignment, and installation of a pump station to pump water over the east side of Dog River Mountain.

Background

The historic Dog River Pipeline was constructed in the first part of the last century. It is deteriorating and is at risk of leaking and/or disruption from tree damage and corrosion. The current alignment crosses federally-owned land and is therefore governed by a special use permit issued by the U.S. Forest Service (USFS). There are several alternatives considered for realignment which would have different impacts to the USFS land. The chosen alignment will require a complete assessment of the environmental impacts of construction. The USFS has requested that the City of The Dalles (City) determine its preferred pipeline route prior to the environmental assessment to prevent conducting the assessment for more than one route.

The Dog River watershed and the South Fork of Mill Creek watershed are separated by a hill, referred to herein as Dog River Mountain. General route alignments were assigned during an onsite evaluation conducted by Brown and Caldwell, the City, Jacobs Associates, and Forest Connections. These routes were further defined by the construction requirements and siting issues which were unique for each route. Alternative One, Replacement of Existing Pipeline, consists of replacing the existing wood stave pipe with a new pipe along or near the current alignment while maintaining gravity flow conditions. Alternative Two, Tunneling, consists of installing a new pipeline in a more direct alignment using tunneling methods to maintain gravity flow conditions. Alternative Three, Pump Station, consists of installing a new pipeline along existing roads with a pump and energy recovery system. All alternatives assume replacement with a 24-inch class 52 ductile iron pipeline. An aerial plan view of alternative alignments is shown in Figure 1 and topographical plan view is shown in Figure 2.

Dog River Historical Statistics

Available data pertaining to the historical USGS gauging station located at the City's diversion structure on the Dog River provides information about mean daily flows for the years 1960 to 1971. The daily mean flows over this period were averaged by month and summarized in Table 1. If all of the Dog River flow was diverted into the pipeline, an average flow of 7.18 cubic feet per second (cfs) would result in an average velocity of 2.28 feet per second in a 24-inch pipe.

Table 1. USGS Daily Mean Flow Averaged by Month from 1960 to 1971

	USGS daily mean averaged flow from 1960 to 1971	
Month	cfs	mgd[1]
January	5.48	3.53
February	8.71	5.61
March	6.14	3.96
April	6.38	4.12
May	15.56	10.03
June	18.16	11.71

Table 1. USGS Daily Mean Flow Averaged by Month from 1960 to 1971		
July	8.31	5.36
August	4.20	2.71
September	2.91	1.87
October	2.47	1.59
November	3.49	2.25
December	4.51	2.90
Average	7.18	4.63

[1]mgd = million gallons per day

Alternative Descriptions

A more detailed description of the alignment and profile for each alternative is provided below with commentary on environmental impacts and a planning level cost estimate, which is accurate to -50 percent to +100 percent. More detailed cost estimate information is included in Attachment A.

Alternative One—Replacement of Existing Pipeline

Alternative One includes an alignment that replaces the existing gravity flow design. This design does not include any auxiliary components such as a pump station and does not require more complex construction methods such as those for a tunnel. The alignment follows the existing around Dog River Mountain and discharges into the South Fork of Mill Creek.

Alternative One would involve replacing the existing wood stave pipeline with 24-inch class 52 ductile iron pipe. The existing alignment travels north along the Dog River Gauging Station access road to the National Forest Development (NFD) 44 Road. It traverses to the west and then to the north along the base of Dog River Mountain. Approximately 4,500 linear feet from the discharge into the South Fork of Mill Creek, the existing pipeline travels for 2,000 linear feet through a hill by way of a 40-foot hand-excavated notch. The pipeline then travels parallel to the existing access road to the South Fork of Mill Creek Gauging Station, where it discharges into the South Fork of Mill Creek. The alignment profile for Alternative One is shown in Figure 3.

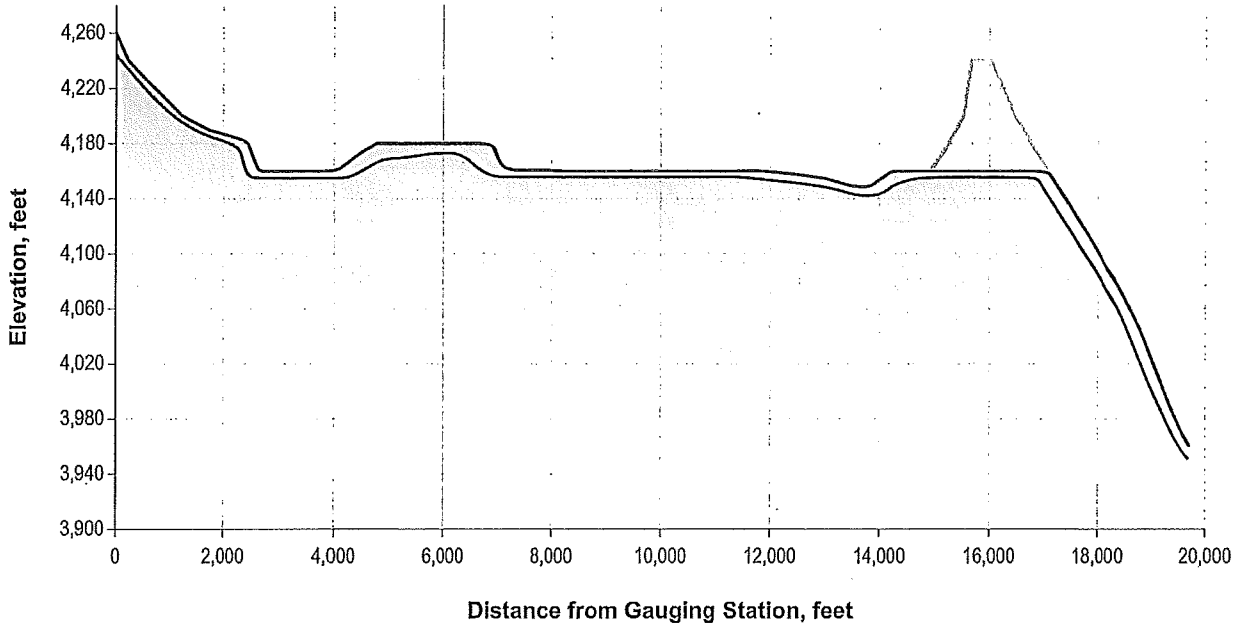


Figure 3. Profile of Alignment for Alternative One—Replacement of Existing Pipeline

Environmental Impacts

When compared to the other alternatives, this alignment would include the most linear feet of new pipeline. It would also have the greatest potential impact on USFS land because 80 percent of the alignment would be on forested USFS land. Table 2 summarizes ground conditions for Alternative One.

Table 2. Ground Conditions for Alternative One

Ground conditions	Total linear feet	Percent of total pipeline
Gravel road	4,006	20
Paved	20	<1
Trees	15,671	80
Total	19,697	100

Assuming a 25-foot-wide construction zone, potentially 313,000 square feet of forested USFS land would be impacted during construction and installation of the pipeline. To minimize the potential impact to the USFS land, while utilizing the gravity flow method, the new alignment would parallel the existing alignment on a nearby logging road as much as elevation permits. Additionally, pipeline alignment could be modified to minimize USFS tree impact, following a detailed tree survey of the existing alignment.

Cost Estimate

To ensure a successful gravity alignment, Alternative One will require additional survey of the preferred alignment. Because this survey is not available, the cost estimate for this alternative is based on the current alignment of the existing pipeline. Pipeline material is the most significant cost in this alternative. The total estimate for the construction of Alternative One is approximately $6.8 million, as listed in Table 3.

Table 3. Cost Estimate for Alternative One—Replacement of Existing Pipeline

Item	Total cost, dollars
General requirements	9,535
Site construction	2,125,493
Mechanical - pipeline	4,617,690
Total estimate	6,752,718

Alternative Two—Tunneling

In an effort to limit impact on USFS land, Alternative Two was proposed. This alignment is a more direct route between the Dog River diversion dam and the South Fork of Mill Creek by way of a 5,400-foot tunnel through Dog River Mountain at a slope that would allow conveyance of water by gravity.

Similar to Alternative One, the Alternative Two alignment runs northwest from the Dog River diversion dam to NFD 44 Road. It continues north along NFD 44 Road for approximately 500 feet to the south portal of the tunnel. The tunnel travels 5,400 feet in a northerly direction to the north portal of the tunnel. The pipeline alignment continues northeast across a clear cut/meadow until it reaches John Mills Trail Road. To limit the impact to USFS land, the alignment continues east on John Mills Trail Road until approximately due south of the South Fork of Mill Creek Gauging Station. There it leaves the road and continues to the gauging station through dense trees. The total length of pipeline, including the length of the tunnel, is approximately 11,400 linear feet. The pipeline profile for Alternative Two is shown in Figure 4.

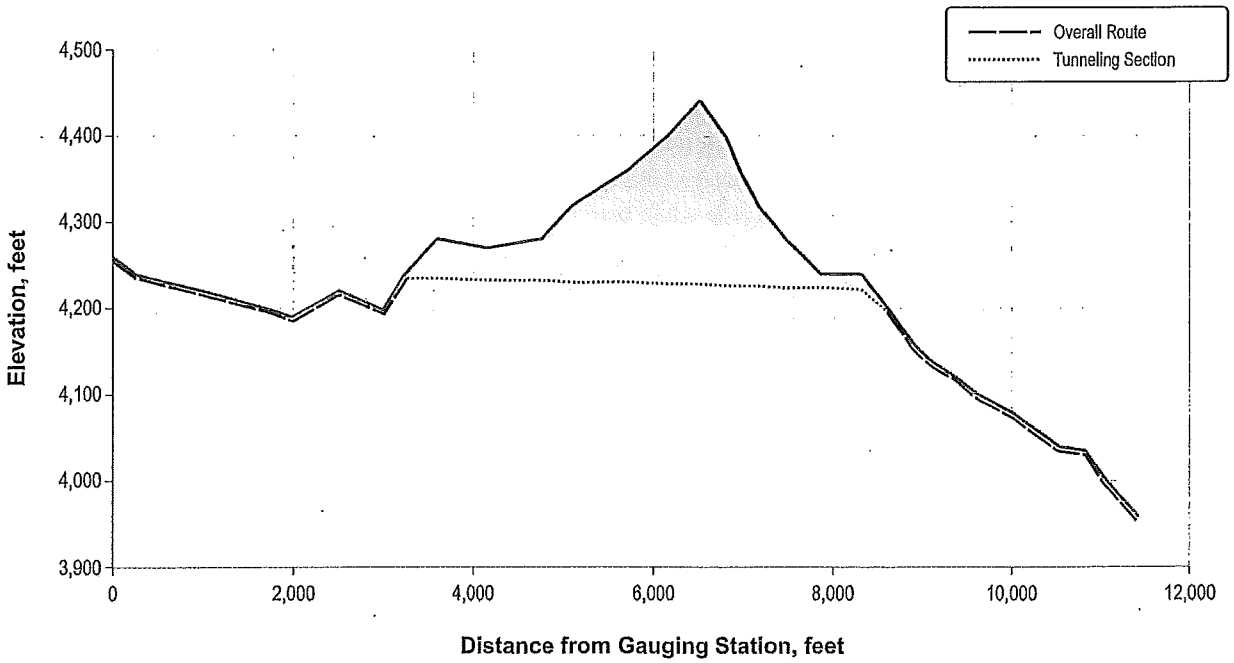


Figure 4. Profile of Alignment for Alternative Two—Tunneling

Tunneling Details

The feasibility and cost estimate for tunnel construction was provided by Jacobs Associates. This effort includes an investigation of the project site's local geology and the potential impacts the tunnel alternative would have on the surrounding environment. A more detailed description of the investigation is included in Attachment B.

Ground Conditions. Based on published geologic mapping, the tunnel alignment would be underlain with predominately hard volcanic flow rock on the southern section and basaltic andesite flow rock in the northern section. Based on surrounding geology, it is possible that the basaltic andesite flow rock may contain intermittent cinder cones of gravel or boulder-sized material, that may or may not be locally cemented, and would be expected to contain significant amounts of groundwater. In general, groundwater was estimated to be approximately 20 feet below the ground surface and above the tunnel elevation along the entire tunnel alignment. If the pipeline alignment encounters these cinder cones of gravel, groundwater infiltration into the tunnel excavation would be expected to be significant. Exploratory drilling should be completed to confirm geophysical conditions of the actual tunnel alignment.

Drilling Methods. Following review of local geology and USFS constraints, three potential tunneling methods were considered to determine the most feasible and most cost-effective method for the construction of the tunnel. Horizontal directional drilling (HDD), drill-and-blast, and tunneling boring machine were methods considered to be most applicable for this project. Of these three methods, HDD was recommended to reduce tunneling costs, shorten the project schedule, reduce duration and magnitude of impact on the surrounding areas, and reduce tunnel muck disposal quantities.

Location and Alignment. The tunnel would be located beneath a portion of NFD 44 Road and NFD 1720 Road. The tunnel would be excavated from the south portal, while tunnel lining installation would be initiated from the north portal. Both south and north portal locations would require a secured staging area. The south 1.5-acre staging area would contain the HDD drilling rig, slurry separation plant, and associated equipment. The north 1-acre staging area would contain the job trailer and equipment storage. Based on the depth of the tunnel, no specific construction constraints are expected along the 5,400-foot tunnel alignment.

Based on the estimated geology through which the tunnel would travel, the tunnel alignment may decrease or increase in elevation based on the type of material the drilling rig encounters. During the transition into lower-density material, the drill may lose grade while traveling through it. Conversely, during transition into higher-density material, the drill may gain grade. To counteract this phenomenon, an HDD guidance system would be utilized to monitor and correct the deviations in grade and would not be expected to adversely impact gravity flow of the pipeline. Additionally, if a cinder cone of gravel were encountered, a loss of drilling fluids and fluid pressure could occur. Because of this possibility, the drilling fluid would be thickened to keep liquid in close proximately to the boring.

Schedule and Cost. The drilling schedule would be dictated by USFS requirements. Possible constraints due to fire protection and snow closures may occur from the end of July through the middle of September and from the middle of December to the middle of March, respectively. Therefore, tunnel construction would most likely occur from March through December, with possible interruption due to fire.

The cost estimate for the tunnel alignment assumed construction could be completed in a single work season before the roads were closed for winter. Based on a 34-inch-diameter HDD tunnel for a 24-inch pipeline the estimated tunnel cost was between $7.8 million and $9.6 million. An average of $8.7 million was used for the total cost estimate for this alternative.

Environmental Impacts

When compared to the other alternatives, this alignment would include the second longest length of new pipeline. This alternative has the least impact on USFS land because only 5 percent of the alignment would most likely require some form of tree removal. Table 4 summarizes ground conditions for Alternative Two.

Table 4. Ground Conditions for Alternative Two

Ground conditions	Total linear feet	Percent of total pipeline
Tunnel	5,358	47
Gravel road	4,256	37
Paved	754	7
Clear cut trees (no regrowth)	454	4
Clear cut trees (medium regrowth)	580	5
Total	11,401	100

Assuming a 25-foot-wide construction zone, potentially 14,500 square feet of medium regrowth clear cut trees would need to be removed during pipeline construction and installation. There should be little or no environmental impacts to USFS land caused by tunnel-related construction activities.

Cost Estimate

The total estimated construction cost for Alternative Two is $16.4 million, as listed in Table 5. Although this alignment is approximately 8,000 linear feet shorter than the alignment in Alternative One, the cost is greater because of the higher costs associated with tunneling.

Table 5. Cost Estimate for Alternative Two—Tunneling

Item	Total cost, dollars
General requirements	3,178
Site construction (tunnel cost included)	14,932,643
Mechanical - pipeline	1,494,051
Total estimate	16,429,872

Alternative Three—Pump Station

Alternative Three uses a pump station to pump the water over the east side of Dog River Mountain. The alignment follows existing roads where possible, minimizing the impact to forested USFS land. A pump station would be installed and located at the Dog River diversion dam. Power for the pump station would be obtained either from a proposed power line or from a proposed hydropower unit and standby generator.

The Alternative Three alignment follows the access road from the Dog River diversion dam northwest to NFD 44 Road. It continues north on NFD 44 Road and NFD 17 Road until it veers east on NFD 1720 Road. The alignment continues on NFD 1720 Road until approximately due south of the South Fork of Mill Creek Gauging Station, at which point it continues to the gauging station through a combination of regrowth and dense forest. The total length of pipeline is approximately 9,800 linear feet, which is the shortest alignment of the three alternatives. The pipeline profile is shown in Figure 5.

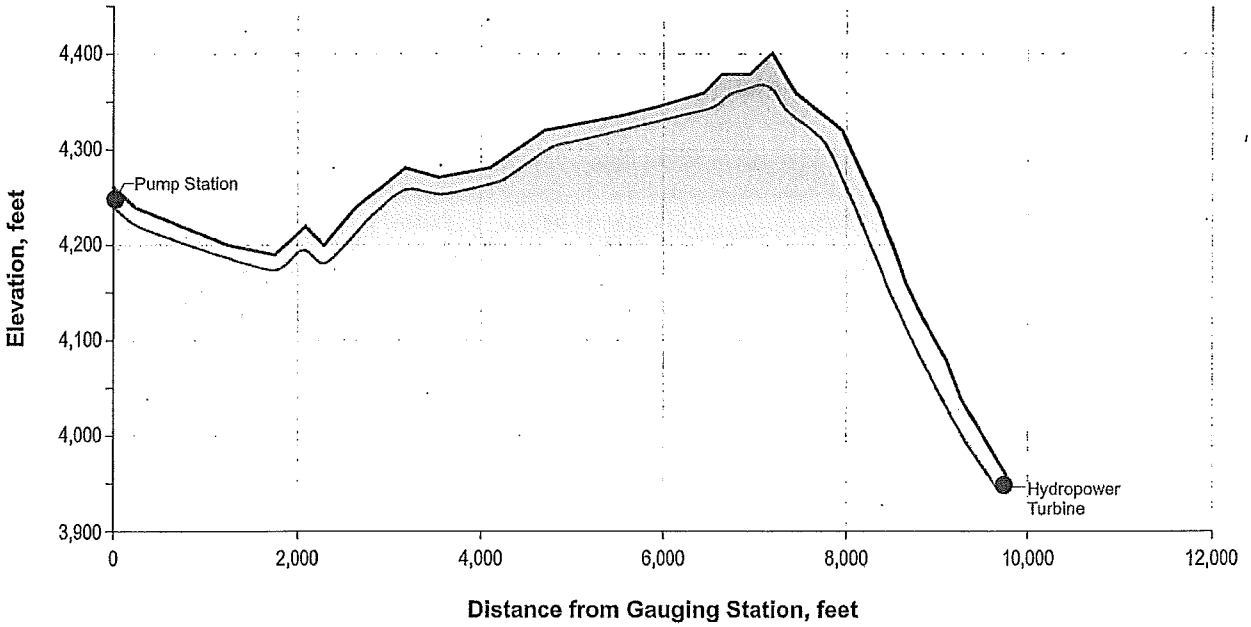


Figure 5. Profile of Alignment for Alternative Three—Pump Station

Environmental Impacts

When compared to the other alternatives, this alignment includes the shortest length of new pipeline. This alternative has relatively minor impact on USFS land because 84 percent of the alignment is located under existing USFS roads and only 16 percent requires the removal of trees. Table 6 summarizes ground conditions for Alternative Three.

Table 6. Ground Conditions for Alternative Three

Ground conditions	Total linear feet	Percent of total pipeline
Gravel road	2,304	24
Paved	5,866	60
Clear cut trees (light regrowth)	1,127	11
Clear cut trees (medium regrowth)	506	5
Total	9,803	100

Assuming a 25-foot-wide construction zone, potentially 12,600 square feet of medium regrowth of clear cut trees and 17,000 square feet of light regrowth of clear cut trees would need to be removed during construction and installation of the pipeline.

Pump Station Details

Installation of a pump station located at the Dog River diversion dam would be required for this alternative. The pump station would pump flow from Dog River, which ranges from 1.3 to 11 mgd, over a rise of 230 feet in elevation into the South Fork of Mill Creek. Due to the wide range of flows throughout the year, the pump station is designed to pump a maximum of approximately 8 mgd. This would capture the majority

of the Dog River flows, except during peak flow conditions. The pumps would be contained in a new concrete building in close proximity to the Dog River diversion dam. If this alternative is selected as the preferred option, pump selection could be modified to better reflect flow conditions based on a preferred operational methodology. Although this alternative allows for minimum impact to the USFS land and is a relatively simple design, the lack of power near the proposed pump station site adds complexity and cost. Two options for a power source include an electrical power line and a hydropower unit with a standby generator.

Cost Estimate

Preparation of the cost estimate for this alternative revealed that the two power options have a very significant cost difference. Therefore, two cost estimates for Alternative Three were prepared, one for a power line and one for a hydropower unit with standby generator.

Power Line Option. The traditional power source for a pump station site includes extension of a power line from a local utility. Under typical circumstances, obtaining power from the local grid would be simple and straight-forward. However, because the pump station would be located on USFS property in a fairly isolated area, the installation of a power line would significantly increase the total costs for this alternative.

The City of Parkdale is the closest community to the proposed site and is located 23 miles north on Highway 35. This community is currently serviced by Hood River Electric Co-op, a non-profit public utility which receives power from the Bonneville Dam. Due to the small size of the utility and the isolation of the pump station site, Hood River Electric Co-op does not have the resources to install a power line for the required distance. However, under an agreed contract, the utility would provide power and service the line once installed. Therefore, the power line would require installation by a private construction company.

Because of the restrictions on USFS land, the power line to the pump station site would almost certainly be required to be buried along Highway 35, along NFD 44 Road, and on the Dog River Gauging Station access road. Although impact to USFS land would be minimal, more information about the permit process to trench along Highway 35 and within USFS land would be required. For this alternative, the cost of a trench-buried power line would be directly related to the soil type along the alignment. The hard volcanic rock located below Dog River and its surrounding area could increase the cost to install the power line significantly.

The cost estimate for Alternative Three with power line option was influenced significantly by the cost of the installed power line. The total construction cost was estimated to be approximately $48.9 million.

Table 7. Cost Estimate for Alternative Three, Pump Station with Power Line Option

Item	Total cost, dollars
General requirements	3,178
Site construction	847,655
Concrete – pump station building	310,524
Equipment – pump equipment	3,375,492
Mechanical - pipeline	2,418,244
Electrical – 23 mile power line by subcontractor	41,995,590
Total estimate	48,950,683

Hydropower Unit Option. A more complex, but viable power option Alternative Three would be the installation of a hydropower unit located at the discharge point into the South Fork of Mill Creek.

Hydropower can be used to produce electric power when there is enough head to drive a turbine. Hydropower does not require large river flows or large amounts of excess head to be efficient or practical. When hydropower is typically used, the electric power generated is either sold back to the local power grid and used as a revenue source or used within the local operating system as means to reduce overall energy demands.

For this alternative a small hydropower unit would be installed at the end of the pipeline at the discharge into the South Fork of Mill Creek. Based on average Dog River flows and pump capacity, the hydropower unit could produce as much as 250 kilowatts of power. The unit would include a 0.65 megawatt two-nozzle Pelton wheel driving a stand-alone generator. To transfer the power to the pump station, a 2.5 mile power line connecting the hydropower unit with the pump station would be required. This power line would be installed during construction of the pipeline and would be parallel to its alignment.

The hydropower unit power option would also require the installation of generator at the pump station site because the pump would need initial supplemental power to start pumping water into the hydropower unit. Once power is generated at the hydropower unit, pump power would be transferred automatically from the generator to the hydropower unit. The generator would provide stand-by power only as needed. The generator would be exercised remotely via a supervisory control and data acquisition (SCADA) system as needed to fulfill maintenance requirements.

Although each proposed alternative discussed above includes a steep elevation drop into the South Fork of Mill Creek, installing a hydropower unit for power generation and export to a utility was not considered. The high cost of power line installation to the local power grid 23 miles north in Parkdale would result in a pay-back period that is not economical.

The cost of the hydropower unit was estimated to be approximately $8.2 million. This cost estimate includes hydropower unit, standby generator, power line, associated auxiliaries, and an integrated SCADA system. Cost for this option was most influenced by the cost of the hydropower unit and generator. The total construction cost was estimated to be approximately $15.2 million, as listed in Table 8.

Table 8. Cost Estimate for Alternative Three—Pump Station with Hydropower Option

Item	Total cost, dollars
General requirements	3,178
Site construction	847,655
Concrete – pump station building	310,524
Equipment - pump equipment	3,375,492
Mechanical - pipeline	2,418,244
Electrical – hydropower unit, generator and power line	8,221,758
Total estimate	15,176,851

When comparing the two power options for Alternative Three, it is clear that the power line option is not feasible and it is dropped from further consideration.

Alternatives Analysis and Recommendations

An analysis matrix was designed to determine the best possible alternative. In this matrix each alternative was rated against a given criterion for cost, construction risks, predicted environmental impact and maintenance requirements and ease of pipeline accessibility. The alternatives are defined as follows:

Alternative 1: Replacement of Existing Pipeline

Alternative 2: Tunneling

Alternative 3: Pump Station with Hydropower Option

Scoring Criteria

The three alternatives were compared by assigning a score to five different criteria: cost, environmental impact, maintenance, pipeline accessibility, and construction risk. The criteria scores ranged from 1 to 5, with 5 being the highest and 1 being the lowest. Additionally, each criterion was weighted on its perceived importance based on engineering judgment. The total weighted score for all criteria was summed for each alternative. The evaluation matrix and the results of this analysis are listed in Table 9.

Table 9. Evaluation Matrix for Alternative Criteria

	Criteria score	Weighting criteria	Total score
Construction cost			
Alternative One	5	50	250
Alternative Two	1		50
Alternative Three	1.5		75
Environmental impact			
Alternative One	1	20	20
Alternative Two	5		100
Alternative Three	5		100
Maintenance			
Alternative One	5	10	50
Alternative Two	5		50
Alternative Three	1		10
Pipeline accessibility			
Alternative One	3	10	30
Alternative Two	3		30
Alternative Three	5		50
Construction risks			
Alternative One	4	10	40
Alternative Two	2		20
Alternative Three	5		50
Total score			
Alternative One			390
Alternative Two			250
Alternative Three			285

Cost

The least expensive alternative was given a score of 5 with subsequent alternatives receiving a score based on their prevalent differences. Alternative One received the highest score because it was estimated to have the lowest total cost.

Environmental Impact

The alternative with the least amount of proposed tree removal was given a score of 5 with subsequent alternatives receiving a score based on their prevalent differences. It was assumed that the greater the total area of trees removed, the greater the probability to influence wildlife and spotted owl habitat. As the majority of the Alternative Two's alignment would be contained within the tunnel, it received the highest score for low environmental impact because it would require the least of amount of trees to be removed.

Maintenance

The alternative with the least perceived level of effort and cost involved to maintain equipment, if applicable, was given a score of 5 with subsequent alternatives receiving a score based on their prevalent differences. Alternatives One and Two received the highest scores because flow is maintained by gravity. Alternative Three received the lowest score because there would be maintenance on a pump, a hydropower unit, and a generator.

Pipeline Accessibility

The alternative with the easiest access to the installed pipeline was given a score of 5 with subsequent alternatives receiving a score based on their prevalent differences. It was assumed that a pipeline installed along or under existing USFS roads would allow the most convenient access. Alternatives were scored based on the percent of pipeline installed along roads. To account for the complexity of the tunnel, it was assumed the pipeline contained within the tunnel could not be accessed. Alternative Three received the highest score because most of it is constructed along existing roads.

Construction Risk

The alternative with the least amount of construction risk was given a score of 5 with subsequent alternatives receiving a score based on their prevalent differences. It was assumed that open trench construction in the roadway would have the least risk, while tunneling would have the highest risk. Alternative Three received the highest score because most of it is constructed along existing roads.

Recommendation

Alternative One scored the highest when considering cost, environmental impact, maintenance of equipment, pipeline accessibility and construction risks, and is the preferred selection.

APPENDIX A

Dog River Alternatives Cost Estimate

MEMORANDUM

53-133218-500

December 16, 2008

TO: CORIANNE HART

FROM: DON SNOWDEN, WEST MONROE

SUBJECT: DOG RIVER PIPELINE ALTERNATIVES
CONCEPTUAL LEVEL DESIGN COMPLETION
BASIS OF ESTIMATE OF PROBABLE CONSTRUCTION COST

The Basis of Estimate Report for the subject project is attached. Please call me if you have questions or need additional information.

DRS

Attachments
Summary Estimate
Detailed Estimate

cc: J. L. Matthews, Jacksonville

DOG RIVER PIPELINE ALTERNATIVES

Introduction

Brown and Caldwell (BC) is pleased to present this estimate of probable construction cost (estimate) prepared for the Dog River Pipeline Alternatives near The Dalles, Oregon.

Summary

This Basis of Estimate contains the following information:

- Scope of work
- Background of this estimate
- Class of estimate
- Estimating methodology
- Direct cost development
- Indirect cost development
- Bidding assumptions
- Estimating assumptions
- Estimating exclusions
- Allowances for known but undefined work
- Contractor and other estimate markups

Scope of Work

Work consist of three alternative routes for replacement of existing water supply pipeline. One of the alternates utilizes microtunneling, and another adds a pump station.

Background of this Estimate

The attached estimate of probable construction cost is based on documents dated December 15, 2009, received by the estimating department. These documents are described as conceptual level estimating information, based on the current design progression, additional or updated scope and/or quantities, and ongoing discussions with the project design team. Further information can be found in the detailed estimate reports.

Class of Estimate

In accordance with the Association for the Advancement of Cost Engineering International (AACE) criteria, this is a Class 5 estimate. A Class 5 estimate is defined as a Conceptual Level or Project Viability Estimate. Typically, engineering is from 0 percent to 2 percent complete. Class 5 estimates are used to prepare planning level cost scopes or evaluation of alternative schemes, long range capital outlay planning and can also form the base work for the Class 4 Planning Level or Design Technical Feasibility Estimate.

Expected accuracy for Class 5 estimates typically ranges from -50 percent to +100 percent, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. In unusual circumstances, ranges could exceed those shown.

Estimating Methodology

This estimate was prepared using quantity take-offs, vendor quotes, and equipment pricing furnished either by the design team or by the estimator. The estimate includes direct labor costs, including a shift differential if applicable, and anticipated productivity adjustments to labor, and equipment. Where possible, estimates for work anticipated to be performed by specialty subcontractors have been used.

Construction labor crew and equipment hours were calculated from production rates contained in documents and electronic databases published by R.S. Means, Mechanical Contractors Association (MCA), National Electrical Contractors Association (NECA), and Rental Rate Blue Book for Construction Equipment (Blue Book).

This estimate was prepared using BC's estimating system, which consists of a Windows-based commercial estimating software engine using BC's material and labor database, historical project data, the latest vendor and material cost information, and other costs specific to the locale of the project.

Direct Cost Development

Costs associated with the General Provisions and the Special Provisions of the construction documents, which are collectively referred to as Contractor General Conditions (CGC), were based on the estimator's interpretation of the contract documents. The estimates for CGCs are divided into two groups: a time-related group (e.g., field personnel), and non-time-related group (e.g., bonds and insurance). Labor burdens such as health and welfare, vacation, union benefits, payroll taxes, and workers compensation insurance are included in the labor rates. No trade discounts were considered.

Indirect Cost Development

Local sales tax has been applied to material and equipment rentals. A percentage allowance for contractor's home office expense has been included in the overall rate markups. The rate is standard for this type of heavy construction and is based on typical percentages outlined in Means Heavy Construction Cost Data, 2008.

The contractor's cost for builders risk, general liability, and vehicle insurance has been included in this estimate. Based on historical data, this is typically two to four percent of the overall construction contract amount. These indirect costs have been included in this estimate as a percentage of the gross cost, and are added to the net totals after the net markups have been applied to the appropriate items.

Bidding Assumptions

The following bidding assumptions were considered in the development of this estimate.

1. Bidders must hold a valid, current Oregon Contractor's license, applicable to the type of project.
2. Bidders will develop estimates with a competitive approach to material pricing and labor productivity, and will not include allowances for changes, extra work, unforeseen conditions, or any other unplanned costs.
3. Estimated costs are based on a minimum of four bidders. Actual bid prices may increase for fewer bidders or decrease for a greater number of bidders.
4. Bidders will account for General Provisions and Special Provisions of the contract documents and will perform all work except electrical, which will be performed by traditional specialty subcontractor.

Estimating Assumptions

As the design progresses through different completion stages, it is customary for the estimator to make assumptions to account for details that may not be evident from the documents. The following assumptions were used in the development of this estimate.

1. Contractor performs the work during normal daylight hours, nominally 7 a.m. to 5 p.m., Monday through Friday, in an 8-hour shift. No allowance has been made for additional shift work or weekend work.
2. Contractor has complete access for lay-down areas and mobile equipment.
3. Equipment rental rates are based on verifiable pricing from the local project area rental yards, Blue Book rates, and rates contained in the estimating database.
4. Contractor markup is based on conventionally accepted values that have been adjusted for project-area economic factors.
5. Bulk material quantities are based on manual quantity take-offs that have been entered into the estimating program.
6. Soils are of adequate nature to support the structures. No piles have been included in this estimate.
7. Clearing is 25' wide
8. Unpaved road replacement is 3" gravel, 22,' wide
9. Paved road replacement is 1½" asphalt, 22' wide
10. New power line for Pump Station option is buried in pipe trench.

Estimating Exclusions

The following estimating exclusions were assumed in the development of this estimate.

1. Hazardous materials remediation and/or disposal.
2. O&M costs for the project with the exception of the vendor supplied O&M manuals.
3. Utility agency costs for incoming power modifications.
4. Permits beyond those normally needed for the type of project and project conditions unless otherwise noted.

Allowances for Known but Undefined Work

The following allowances were made in the development of this estimate.

1. New Power Line Build
2. New Pump Station

Contractor and Other Estimate Markups

Contractor markup is based on conventionally accepted values which have been adjusted for project-area economic factors. Estimate markups are shown in Table 1.

Table 1. Estimate Markups

Item	Rate, percent
Prime Contractor	

Labor (employer payroll burden)	15
Materials and process equipment	10
Equipment (construction-related)	10
Subcontractor	5
Sales Tax (State and local for materials, process equipment and construction equipment rentals, etc.)	0
Startup, Training, O&M	2
Builder's Risk, Liability, and Vehicle Insurance	2
Material Shipping and Handling	2
Earthquake Insurance (if applicable)	0.1
Subcontractor Markups	Same as Prime
Escalation to Midpoint of Construction – Labor	0
Escalation to Midpoint of Construction – Material	0
Escalation to Midpoint of Construction – Subcontractors, Construction Equipment, etc.	0
Contingency	35
Performance and Payment Bonds	1.5

Labor Markup. The labor rates used in the estimate were derived chiefly from the latest published State Prevailing Wage Rates. These rates include costs beyond raw labor for such items as Payroll Tax and Insurance (PT&I), FICA, and Workers Compensation Insurance. In addition to these markups, the General Contractor (GC) typically adds a percentage to each raw labor dollar to cover overhead and profit, payroll and accounting costs, additional insurance, retirement, 401k contributions, and sick leave/vacation cost.

Materials and Process Equipment Markup. This markup consists of the additional cost the contractor must bear beyond the raw dollar amount for material and process equipment. This includes shop drawing preparation, submittal and/or re-submittal cost, purchasing and scheduling materials and equipment, accounting charges including invoicing and payment, inspection of received goods, receiving, storage, overhead and profit.

Equipment (Construction) Markup. This markup consists of the costs associated with operating the construction equipment used in the project. Most GCs will rent rather than own the equipment and then charge each project for its equipment cost. The equipment rental cost does not include fuel, delivery and pick-up charges, additional insurance requirements on rental equipment, accounting costs related to home office receiving invoices and payment. However, the crew rates used in the estimate do account for the equipment rental cost. Occasionally, larger contractors will have some or all of the equipment needed for the job, but in order to recoup their initial purchasing cost they will charge the project an internal rate for

equipment use which is similar to the rental cost of equipment. The GC will apply an overhead and profit percentage to each individual piece of equipment whether rented or owned.

Subcontractor Markup. This markup consists of the GC's costs for subcontractors who perform work on the site. This includes costs associated with shop drawings, review of subcontractor's submittals, scheduling of subcontractor work, inspections, processing of payment requests, home office accounting, and overhead and profit on subcontracts.

Sales Tax (Materials, Process Equipment and Construction Equipment). This is the tax that the contractor must pay according to state and local taxation laws. The percentage is applied to both the material and equipment the GC purchases as well as the cost for rental equipment. The percentage is based on the local rates in place at the time the estimate was prepared.

Contractor Startup, Training, and O&M Manuals. This cost markup is often confused with either vendor startup or owner startup. It is the cost the GC incurs on the project beyond the vendor startup and owner startup costs. The GC generally will have project personnel assigned to facilitate the installation, testing, startup, and O&M Manual preparation for equipment that is put into operation by either the vendor or owner. These project personnel often include an electrician, pipe fitter or millwright, and/or I&E technician. These personnel are not included in the basic crew makeup to install the equipment but are there to assist and trouble shoot the startup and proper running of the equipment. The GC also incurs a cost for startup for such things as consumables (oil, fuel, filters, etc.), startup drawings and schedules, startup meetings, and coordination with the plant personnel in other areas of the plant operation.

Builders Risk, Liability, and Vehicle Insurance. This percentage comprises all three items. There are many factors which make up this percentage, including the contractor's track record for claims in each of the categories. Another factor affecting insurance rates has been a dramatic price increase across the country over the past several years due to domestic and foreign influences. Consequently, in the construction industry we have observed a range of 0.5 to 1 percent for Builders Risk Insurance, 1 to 1.25 percent for General Liability Insurance, and 0.85 to 1 percent for Vehicle Insurance. Many factors affect each area of insurance, including project complexity, and contractor's requirements and history. Instead of using numbers from a select few contractors, we believe it is more prudent to use a combined 2 percent to better reflect the general costs across the country. Consequently, the actual cost could be higher or lower based on the bidder, region, insurance climate, and on the contractor's insurability at the time the project is bid.

Material Shipping and Handling. This can range from 2 percent to 6 percent, and is based on the type of project, material makeup of the project, and the region and location of the project. Material shipping and handling covers delivery costs from vendors, unloading costs (and in some instances loading and shipment back to vendors for rebuilt equipment), site paper work, and inspection of materials prior to unloading at the project site. BC typically adjusts this percentage by the amount of materials and whether vendors have included shipping costs in the quotes that were used to prepare the estimate. This cost also includes the GC's cost to obtain local supplies, e.g., oil, gaskets, and bolts that may be missing from the equipment or materials shipped.

Escalation to Midpoint for Labor, Materials and Subcontractors. Given current commodity trends and the uncertain date of project execution, no escalation has been included in these estimates.

Construction Contingency. The contingency factor covers unforeseen conditions, area economic factors, and general project complexity. This contingency is used to account for those factors that can not be addressed in each of the labor and/or material installation costs. Based on industry standards, completeness

of the project documents, project complexity, the current design stage, and area factors, construction contingency can range from 10 percent to 50 percent.

Range of Accuracy. The amount of contingency in the estimate should not be confused with the accuracy of the estimate. The Expected Accuracy Range defines the window within which the bids are expected to fall based on the project complexity, information available during the estimate process, outside influences (wage rates, material, bidding climate), and includes a level of contingency appropriate to the project definition at the time the estimate was prepared. It is important to understand that AACEI, notes on its ranges of accuracy that,

"The state of process technology and availability of applicable reference cost data affect the range markedly. The +/- value [of the ranges] represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50 percent level of confidence) for given scope."

While a 50-percent level of confidence in the contingency may seem broad, typically this results in a 90-percent confidence that the actual cost will fall within the bounds of the low and high ranges.

The caution here is that these estimates are not what are often referred to as "bid quality," i.e., estimates prepared by contractors who are receiving competitive bids from subcontractors, equipment vendors, and materials suppliers. In general, we receive reasonable budget values from those willing to provide quotations.

Performance and Payment Bonds. Based on historical and industry data, this can range from 0.75 percent to 3 percent of the project total. There are several contributing factors including such items as size of the project, regional costs, contractor's historical record on similar projects, complexity, and current bonding limits. BC uses 1 percent for each bond which we have determined to be reasonable for most heavy construction projects.

BROWN AND CALDWELL

Environmental Engineers & Consultants

SUMMARY ESTIMATE REPORT WITH MARK-UPS ALLOCATED

DOG RIVER PIPELINE REPLACEMENT ALTERNATES

Project Number:	133218-500
BC Project Manager:	Corianne Hart
BC Office:	Portland
Estimate Issue Number:	01
Estimate Original Issue Date:	January 26, 2009
Estimate Revision Number:	01
Estimate Revision Date:	Janauary 27, 2009
Lead Estimator:	Don Snowden
Estimate QA/QC Reviewer:	Butch Matthews
Estimate QA/QC Date:	December 17, 2009

PROCESS LOCATION/AREA INDEX

Description	Total Including Mark-ups
Alt 1 - Replacement Along Existing Route Option	**6,752,718**
1102 - Replacement of Existing	**6,752,718**
01 - GENERAL REQUIREMENTS	9,535
02 - SITE CONSTRUCTION	2,125,493
15 - MECHANICAL	4,617,690
Alt 2 - Directional Drill Option	**16,429,872**
1104 - Micro-Tunnel	**16,429,872**
01 - GENERAL REQUIREMENTS	3,178
02 - SITE CONSTRUCTION	14,932,643
15 - MECHANICAL	1,494,051
Alt 3 - Pump Installation w/ Local Hydro Power	**15,176,832**
1103 - Pump Installation	**15,176,832**
01 - GENERAL REQUIREMENTS	3,178
02 - SITE CONSTRUCTION	847,655
03 - CONCRETE	310,524
11 - EQUIPMENT	3,375,492
15 - MECHANICAL	2,418,224
16 - ELECTRICAL	8,221,758
Alt 4 - Pump Installation w/ 23 Mile Line Build Option	**48,950,664**
1103 - Pump Installation	**48,950,664**
01 - GENERAL REQUIREMENTS	3,178
02 - SITE CONSTRUCTION	847,655
03 - CONCRETE	310,524
11 - EQUIPMENT	3,375,492
15 - MECHANICAL	2,418,224
16 - ELECTRICAL	41,995,590

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Environmental Engineers & Consultants

DETAILED ESTIMATE REPORT

DOG RIVER PIPELINE REPLACEMENT ALTERNATES

Project Number:	133218-500
BC Project Manager:	Corianne Hart
BC Office:	Portland
Estimate Issue Number:	01
Estimate Original Issue Date:	January 26, 2009
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Estimate QA/QC Date:	December 17, 2009

PROCESS LOCATION/AREA INDEX

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	Alt 1 - Replacement Along Existing Route Option									
	1102 - Replacement of Existing									**3,699,363**
	01 - GENERAL REQUIREMENTS									
	01200 - General equipment rental									
0330	Rent trench box, 3000 lbs 6'x 8'	90.0	day				58.30		58.3	5,247
	GENERAL REQUIREMENTS Total									5,247
	02 - SITE CONSTRUCTION									
	02020 - Underground marking tape									
0020	Underground tape, detectable aluminum, 6"	199.7	Clf	2.83	7.65				10.5	2,093
	02060 - Site demolition									
0420	Site dml, pipe removal, sewer/water, no excavation, 24" dia	19,670.0	lnft	10.41			2.46		12.9	253,144
	02160 - Rubbish handling									
9998	Dump Charge, typical small town, fees only, bldg constr mat'ls	72.0	ton					25.00	25.0	1,800
	02210 - Clear and grub									
0010	Clear & grub, brush, including stumps	7.8	acre	2,384.83			3,275.60		5,660.4	43,868
	02320 - Backfill									
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	12,634.0	cuyd	0.75			1.23		2.0	25,061
	02340 - Bedding									
0010	Bedding, crushed stone 3/4" to 1/2"	8,388.0	cuyd	8.33	46.52		1.97		56.8	476,587
	02360 - Compaction									
0030	Compaction, vibratory plate, 8" lifts, common fill	1,329.0	cuyd	1.98			0.31		2.3	3,053
0030	Compaction, vibratory plate, 8" lifts, common fill	11,371.0	cuyd	1.98			0.31		2.3	26,119

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
0040	Compaction, vibratory plate, 8" lifts, select fill	7,214.0	cuyd	1.84			0.29		2.1	15,344
	02450 - Excavating, trench									
0050	Excavate trench, common earth curb, 6'-10' deep, 1-1/2 CY hyd backhoe	20,672.0	cuyd	0.96			1.12		2.1	42,849
	02460 - Hauling									
0020	Hauling, LCY, no loading, 16 c.y dump truck, 10 MI RT, 0.60 lds/hr	13,206.0	cuyd	5.66			6.50		12.2	160,611
0060	Hauling, LCY, no loading, 20 c.y dump truck, 40 MI RT, 0.25 lds/hr	190.0	cuyd	6.51			7.49		14.0	2,661
0900	Loading Trucks, F.E. Loader, 3 C.Y.	13,206.0	cuyd	0.69			0.41		1.1	14,592
0900	Loading Trucks, F.E. Loader, 3 C.Y.	190.0	cuyd	0.69			0.41		1.1	210
	02490 - Erosion control									
0040	Erosion control, silt fence, polypropylene, 3' high	39,934.0	lnft	0.84	0.34				1.2	46,940
	02600 - Base course									
0010	Base course, large areas, crushed 3/4" stone, compacted, 3" deep	11,128.0	sqyd	0.69	4.53		0.70		5.9	65,923
	SITE CONSTRUCTION Total									1,180,855
	15 - MECHANICAL									
	15010 - Misc. Mechanical									
0260	pipiing, connect to existing 24" pipe	4.0	each	1,901.44	265.26		45.44		2,212.1	8,849
	15030 - Pipe,watr dstr,ductl iron									
0610B	Piping, pipe, D.I.C.L., tyton, 24" diameter	19,967.0	lnft	13.71	105.17		3.16		122.0	2,436,740
	15255 - Valves, iron body									
0312	Combination Air / Vacuum Release Assembly (24")	3.0	each	7,482.00	11,222.00				18,704.0	56,112
	15715 - Piping, testing									
0100	Nondestructive hydraulic pressure test, 12" - 24" pipe, 1000 - 2000 LF	1.0	each	11,560.80					11,560.8	11,561
	MECHANICAL Total									2,513,261

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	Alt 2 - Directional Drill Option									
	1104 - Micro-Tunnel									9,941,696
	01 - GENERAL REQUIREMENTS									
	01200 - General equipment rental									
0330	Rent trench box, 3000 lbs 6'x 8'	30.0	day				58.30		58.3	1,749
	GENERAL REQUIREMENTS Total									1,749
	02 - SITE CONSTRUCTION									
	02020 - Underground marking tape									
0020	Underground tape, detectable aluminum, 6"	6.0	Clf	2.83	7.65				10.5	63
	02060 - Site demolition									
0420	Site dml, pipe removal, sewer/water, no excavation, 24" dia	1,650.0	lnft	10.41			2.46		12.9	21,235
	02160 - Rubbish handling									
9998	Dump Charge, typical small town, fees only, bldg constr mat'ls	6.0	ton					25.00	25.0	150
	02210 - Clear and grub									
0010	Clear & grub, brush, including stumps	0.3	acre	2,384.83			3,275.60		5,660.4	1,868
	02280 - Sheet piling									
0120	Sheet piling, steel, no wales, 15' excav., drive, extract & salvage	1,920.0	sqft	6.00	5.15		5.10		16.3	31,207
	02320 - Backfill									
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	4,012.0	cuyd	0.75			1.23		2.0	7,958
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	366.0	cuyd	0.75			1.23		2.0	726
	02340 - Bedding									
0010	Bedding, crushed stone 3/4" to 1/2"	2,849.0	cuyd	8.33	46.52		1.97		56.8	161,874
0010	Bedding, crushed stone 3/4" to 1/2"	32.0	cuyd	8.33	46.52		1.97		56.8	1,818

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	02360 - Compaction									
0030	Compaction, vibratory plate, 8" lifts, common fill	451.0	cuyd	1.98			0.31		2.3	1,036
0030	Compaction, vibratory plate, 8" lifts, common fill	3,611.0	cuyd	1.98			0.31		2.3	8,294
0030	Compaction, vibratory plate, 8" lifts, common fill	14.0	cuyd	1.98			0.31		2.3	32
0030	Compaction, vibratory plate, 8" lifts, common fill	329.0	cuyd	1.98			0.31		2.3	756
0040	Compaction, vibratory plate, 8" lifts, select fill	2,450.0	cuyd	1.84			0.29		2.1	5,211
0040	Compaction, vibratory plate, 8" lifts, select fill	28.0	cuyd	1.84			0.29		2.1	60
	02450 - Excavating, trench									
0050	Excavate trench, common earth curb, 6'-10' deep, 1-1/2 CY hyd backhoe	6,770.0	cuyd	0.96			1.12		2.1	14,033
0050	Excavate trench, common earth curb, 6'-10' deep, 1-1/2 CY hyd backhoe	579.0	cuyd	0.96			1.12		2.1	1,200
	02460 - Hauling									
0020	Hauling, LCY, no loading, 16 c.y dump truck, 10 MI RT, 0.60 lds/hr	4,451.0	cuyd	5.66			6.50		12.2	54,133
0020	Hauling, LCY, no loading, 16 c.y dump truck, 10 MI RT, 0.60 lds/hr	358.0	cuyd	5.66			6.50		12.2	4,354
0060	Hauling, LCY, no loading, 20 c.y dump truck, 40 MI RT, 0.25 lds/hr	16.0	cuyd	6.51			7.49		14.0	224
0900	Loading Trucks, F.E. Loader, 3 C.Y.	4,451.0	cuyd	0.69			0.41		1.1	4,918
0900	Loading Trucks, F.E. Loader, 3 C.Y.	16.0	cuyd	0.69			0.41		1.1	18
0900	Loading Trucks, F.E. Loader, 3 C.Y.	358.0	cuyd	0.69			0.41		1.1	396
	02490 - Erosion control									
0040	Erosion control, silt fence, polypropylene, 3' high	12,086.0	lnft	0.84	0.34				1.2	14,206
	02520 - Horizontal boring									
0150	Directional Drill Subcontract, 24" OD (Subconsultant Pricing)	1.0	lsum			8,723,500.00			8,723,500.0	8,723,500
	02600 - Base course									
0010	Base course, large areas, crushed 3/4" stone, compacted, 3" deep	10,404.0	sqyd	0.69	4.53		0.70		5.9	61,634

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	02610 - Asphltc concrete pavement									
0060	Asphaltic conc pvmt, and lg paved areas, wearing course, 1-1/2" thick	1,222.0	sqyd	0.67	3.11		0.35		4.1	5,043
	SITE CONSTRUCTION Total									9,125,948
	15 - MECHANICAL									
	15010 - Misc. Mechanical									
0260	pipiing, connect to existing 24" pipe	4.0	each	1,901.44	265.26		45.44		2,212.1	8,849
	15030 - Pipe,watr dstr,ductl iron									
0610B	Piping, pipe, D.I.C.L., tyton, 24" diameter	6,043.0	lnft	13.71	105.17		3.16		122.0	737,478
	15255 - Valves, iron body									
0312	Combination Air / Vacuum Release Assembly (24")	3.0	each	7,482.00	11,222.00				18,704.0	56,112
	15715 - Piping, testing									
0100	Nondestructive hydraulic pressure test, 12" - 24" pipe, 1000 - 2000 LF	1.0	each	11,560.80					11,560.8	11,561
	MECHANICAL Total									813,999

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	Alt 3 - Pump Installation w/ Local Hydro Power									
	1103 - Pump Installation									**9,289,378**
	01 - GENERAL REQUIREMENTS									
	01200 - General equipment rental									
0330	Rent trench box, 3000 lbs 6'x 8'	30.0	day				58.30		58.3	1,749
	GENERAL REQUIREMENTS Total									1,749
	02 - SITE CONSTRUCTION									
	02020 - Underground marking tape									
0020	Underground tape, detectable aluminum, 6"	98.0	Clf	2.83	7.65				10.5	1,028
0020	Underground tape, detectable aluminum, 6"	98.0	Clf	2.83	7.65				10.5	1,028
	02060 - Site demolition									
0420	Site dml, pipe removal, sewer/water, no excavation, 24" dia	1,650.0	lnft	10.41			2.46		12.9	21,235
	02160 - Rubbish handling									
9998	Dump Charge, typical small town, fees only, bldg constr mat'ls	6.0	ton					25.00	25.0	150
	02210 - Clear and grub									
0010	Clear & grub, brush, including stumps	0.3	acre	2,384.83			3,275.60		5,660.4	1,698
	02320 - Backfill									
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	6,455.0	cuyd	0.75			1.23		2.0	12,804
	02340 - Bedding									
0010	Bedding, crushed stone 3/4" to 1/2"	4,584.0	cuyd	8.33	46.52		1.97		56.8	260,452
	02360 - Compaction									
0030	Compaction, vibratory plate, 8" lifts, common fill	726.0	cuyd	1.98			0.31		2.3	1,668

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
0030	Compaction, vibratory plate, 8" lifts, common fill	5,809.0	cuyd	1.98			0.31		2.3	13,343
0040	Compaction, vibratory plate, 8" lifts, select fill	4,584.0	cuyd	1.84			0.29		2.1	9,750
	02450 - Excavating, trench									
0050	Excavate trench, common earth curb, 6'-10' deep, 1-1/2 CY hyd backhoe	10,892.0	cuyd	0.96			1.12		2.1	22,577
	02460 - Hauling									
0020	Hauling, LCY, no loading, 16 c.y dump truck, 10 MI RT, 0.60 lds/hr	7,161.0	cuyd	5.66			6.50		12.2	87,092
0060	Hauling, LCY, no loading, 20 c.y dump truck, 40 MI RT, 0.25 lds/hr	16.0	cuyd	6.51			7.49		14.0	224
0900	Loading Trucks, F.E. Loader, 3 C.Y.	7,161.0	cuyd	0.69			0.41		1.1	7,913
0900	Loading Trucks, F.E. Loader, 3 C.Y.	16.0	cuyd	0.69			0.41		1.1	18
	02490 - Erosion control									
0040	Erosion control, silt fence, polypropylene, 3' high	19,606.0	lnft	0.84	0.34				1.2	23,046
	02610 - Asphltc concrete pavement									
0060	Asphaltic conc pvmt, and lg paved areas, wearing course, 1-1/2" thick	1,440.0	sqyd	0.67	3.11		0.35		4.1	5,943
	SITE CONSTRUCTION Total									469,967
	03 - CONCRETE									
	03130 - Reinforcing in place									
0060	Reinforcing in place, A615 Gr 60, footings, #4 to #7	18.7	ton	987.58	1,275.00				2,262.6	42,395
	03150 - Concrete, ready mix									
0990	Concrete, ready mix, regular weight, 2000 psi w/ red dye	753.9	cuyd		143.58				143.6	108,238
	03170 - Placing concrete									
0080	Placing conc, incl vib, footings, continuous, pumped	753.9	cuyd	22.54			5.37		27.9	21,034
	CONCRETE Total									171,667
	11 - EQUIPMENT									

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	11010 - Process Equipment									
1692	Booster Pump station, 12 cfs@230' TDH, single turbine w/ surface enclosure	1.0	lsum					2,280,000.00	2,280,000.0	2,280,000
	EQUIPMENT Total									2,280,000
	15 - MECHANICAL									
	15010 - Misc. Mechanical									
0260	pipiing, connect to existing 24" pipe	2.0	each	1,901.44	265.26		45.44		2,212.1	4,424
	15030 - Pipe,watr dstr,ductl iron									
0610B	Piping, pipe, D.I.C.L., tyton, 24" diameter	9,803.0	lnft	13.71	105.17		3.16		122.0	1,196,342
	15255 - Valves, iron body									
0312	Combination Air / Vacuum Release Assembly (24")	5.0	each	7,482.00	11,222.00				18,704.0	93,520
	15715 - Piping, testing									
0100	Nondestructive hydraulic pressure test, 12" - 24" pipe, 1000 - 2000 LF	2.0	each	11,560.80					11,560.8	23,122
	MECHANICAL Total									1,317,408
	16 - ELECTRICAL									
	16105 - Wire									
0010	Generator, local hydro unit, 2.5 miles U/G powerline build (subcontract)	1.0	lsum			5,048,586.00			5,048,586.0	5,048,586
	ELECTRICAL Total									5,048,586

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	Alt 4 - Pump Installation w/ 23 Mile Line Build Option									
	1103 - Pump Installation									**30,028,263**
	01 - GENERAL REQUIREMENTS									
	01200 - General equipment rental									
0330	Rent trench box, 3000 lbs 6'x 8'	30.0	day				58.30		58.3	1,749
	GENERAL REQUIREMENTS Total									1,749
	02 - SITE CONSTRUCTION									
	02020 - Underground marking tape									
0020	Underground tape, detectable aluminum, 6"	98.0	Clf	2.83	7.65				10.5	1,028
0020	Underground tape, detectable aluminum, 6"	98.0	Clf	2.83	7.65				10.5	1,028
	02060 - Site demolition									
0420	Site dml, pipe removal, sewer/water, no excavation, 24" dia	1,650.0	lnft	10.41			2.46		12.9	21,235
	02160 - Rubbish handling									
9998	Dump Charge, typical small town, fees only, bldg constr mat'ls	6.0	ton					25.00	25.0	150
	02210 - Clear and grub									
0010	Clear & grub, brush, including stumps	0.3	acre	2,384.83			3,275.60		5,660.4	1,698
	02320 - Backfill									
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	6,455.0	cuyd	0.75			1.23		2.0	12,804
	02340 - Bedding									
0010	Bedding, crushed stone 3/4" to 1/2"	4,584.0	cuyd	8.33	46.52		1.97		56.8	260,452
	02360 - Compaction									
0030	Compaction, vibratory plate, 8" lifts, common fill	726.0	cuyd	1.98			0.31		2.3	1,668

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
0030	Compaction, vibratory plate, 8" lifts, common fill	5,809.0	cuyd	1.98			0.31		2.3	13,343
0040	Compaction, vibratory plate, 8" lifts, select fill	4,584.0	cuyd	1.84			0.29		2.1	9,750
	02450 - Excavating, trench									
0050	Excavate trench, common earth curb, 6'-10' deep, 1-1/2 CY hyd backhoe	10,892.0	cuyd	0.96			1.12		2.1	22,577
	02460 - Hauling									
0020	Hauling, LCY, no loading, 16 c.y dump truck, 10 MI RT, 0.60 lds/hr	7,161.0	cuyd	5.66			6.50		12.2	87,092
0060	Hauling, LCY, no loading, 20 c.y dump truck, 40 MI RT, 0.25 lds/hr	16.0	cuyd	6.51			7.49		14.0	224
0900	Loading Trucks, F.E. Loader, 3 C.Y.	7,161.0	cuyd	0.69			0.41		1.1	7,913
0900	Loading Trucks, F.E. Loader, 3 C.Y.	16.0	cuyd	0.69			0.41		1.1	18
	02490 - Erosion control									
0040	Erosion control, silt fence, polypropylene, 3' high	19,606.0	lnft	0.84	0.34				1.2	23,046
	02610 - Asphltc concrete pavement									
0060	Asphaltic conc pvmt, and lg paved areas, wearing course, 1-1/2" thick	1,440.0	sqyd	0.67	3.11		0.35		4.1	5,943
	SITE CONSTRUCTION Total									469,967
	03 - CONCRETE									
	03130 - Reinforcing in place									
0060	Reinforcing in place, A615 Gr 60, footings, #4 to #7	18.7	ton	987.58	1,275.00				2,262.6	42,395
	03150 - Concrete, ready mix									
0990	Concrete, ready mix, regular weight, 2000 psi w/ red dye	753.9	cuyd		143.58				143.6	108,238
	03170 - Placing concrete									
0080	Placing conc, incl vib, footings, continuous, pumped	753.9	cuyd	22.54			5.37		27.9	21,034
	CONCRETE Total									171,667
	11 - EQUIPMENT									

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	11010 - Process Equipment									
1692	Booster Pump station, 12 cfs@230' TDH, single turbine w/ surface enclosure	1.0	lsum					2,280,000.00	2,280,000.0	2,280,000
	EQUIPMENT Total									2,280,000
	15 - MECHANICAL									
	15010 - Misc. Mechanical									
0260	pipiing, connect to existing 24" pipe	2.0	each	1,901.44	265.26		45.44		2,212.1	4,424
	15030 - Pipe,watr dstr,ductl iron									
0610B	Piping, pipe, D.I.C.L., tyton, 24" diameter	9,803.0	lnft	13.71	105.17		3.16		122.0	1,196,342
	15255 - Valves, iron body									
0312	Combination Air / Vacuum Release Assembly (24")	5.0	each	7,482.00	11,222.00				18,704.0	93,520
	15715 - Piping, testing									
0100	Nondestructive hydraulic pressure test, 12" - 24" pipe, 1000 - 2000 LF	2.0	each	11,560.80					11,560.8	23,122
	MECHANICAL Total									1,317,408
	16 - ELECTRICAL									
	16105 - Wire									
0010	23 miles u/g powerline build (subcontract)	1.0	lsum			25,787,471.00			25,787,471.0	25,787,471
	ELECTRICAL Total									25,787,471

DOG RIVER PIPELINE
REPLACEMENT ALTERNATES

Category	Percent	Amount	Hours
Alt 1 - Replacement Along Existing Route Option Totals			
Labor	**1.52 %**	**802,958**	**14,262.9**
Material	**4.89 %**	**2,590,433**	
Subcontractor			
Equipment	**0.57 %**	**304,172**	**5,711.5**
Other	**0.00 %**	**1,800**	
User			
Net Costs		**3,699,363**	
Labor Mark-up	15.00 %	120,444	
Material Mark-up	10.00 %	259,043	
Subcontractor Mark-up	5.00 %		
Equipment Mark-up	10.00 %	30,417	
Sales tax	7.75 %	224,332	
Material Shipping & Handling	2.00 %	42,693	
Escalation to Midpoint	5.00 %	184,878	
Subtotal		**4,561,171**	
Contractor General Conditions	10.00 %	456,117	
Subtotal		**5,017,288**	
Start-up, training, O & M	2.00 %		
Subtotal		**5,017,288**	
Construction Contingency	30.00 %	1,505,186	
Subtotal		**6,522,474**	
Bldg Risk, Liability Auto Ins.	2.00 %	130,449	
Subtotal		**6,652,924**	
Bonds	1.50 %	99,794	

Category	Percent	Amount	Hours
Subtotal		**6,752,718**	
Subtotal		**6,752,718**	
Total Alt 1 - Replacement Along Existing Route Option		**6,752,718**	
Alt 2 - Directional Drill Option Totals			
Labor	**0.47 %**	**250,319**	**4,325.2**
Material	**1.64 %**	**869,309**	
Subcontractor	**16.47 %**	**8,723,500**	
Equipment	**0.19 %**	**98,418**	**1,649.3**
Other	**0.00 %**	**150**	
User			
Net Costs		**9,941,696**	
Labor Mark-up	15.00 %	37,548	
Material Mark-up	10.00 %	86,931	
Subcontractor Mark-up	5.00 %	436,175	
Equipment Mark-up	10.00 %	9,842	
Sales tax	7.75 %	74,999	
Material Shipping & Handling	2.00 %	13,405	
Escalation to Midpoint	5.00 %	497,077	
Subtotal		**11,097,673**	
Contractor General Conditions	10.00 %	1,109,767	
Subtotal		**12,207,440**	
Start-up, training, O & M	2.00 %		
Subtotal		**12,207,440**	
Construction Contingency	30.00 %	3,662,232	

Category	Percent	Amount	Hours
Subtotal		**15,869,673**	
Bldg Risk, Liability Auto Ins.	2.00 %	317,393	
Subtotal		**16,187,066**	
Bonds	1.50 %	242,806	
Subtotal		**16,429,872**	
Subtotal		**16,429,872**	
Total Alt 2 - Directional Drill Option		**16,429,872**	
Alt 3 - Pump Installation w/ Local Hydro Power Totals			
Labor	**0.74 %**	**390,413**	**6,750.8**
Material	**2.73 %**	**1,445,661**	
Subcontractor	**9.53 %**	**5,048,586**	
Equipment	**0.24 %**	**124,567**	**2,338.7**
Other	**4.31 %**	**2,280,150**	
User			
Net Costs		**9,289,378**	
Labor Mark-up	15.00 %	58,562	
Material Mark-up	10.00 %	144,566	
Subcontractor Mark-up	5.00 %	252,429	
Equipment Mark-up	10.00 %	12,457	
Sales tax	7.75 %	121,693	
Material Shipping & Handling	2.00 %	21,752	
Escalation to Midpoint	5.00 %	350,461	
Subtotal		**10,251,298**	
Contractor General Conditions	10.00 %	1,025,130	

DOG RIVER PIPELINE
REPLACEMENT ALTERNATES

Category	Percent	Amount	Hours
Subtotal		**11,276,428**	
Start-up, training, O & M	2.00 %		
Subtotal		**11,276,428**	
Construction Contingency	30.00 %	3,382,928	
Subtotal		**14,659,357**	
Bldg Risk, Liability Auto Ins.	2.00 %	293,187	
Subtotal		**14,952,544**	
Bonds	1.50 %	224,288	
Subtotal		**15,176,832**	
Subtotal		**15,176,832**	
Total Alt 3 - Pump Installation w/ Local Hydro Power		**15,176,832**	
Alt 4 - Pump Installation w/ 23 Mile Line Build Option Totals			
Labor	**0.74 %**	**390,413**	**6,750.8**
Material	**2.73 %**	**1,445,661**	
Subcontractor	**48.69 %**	**25,787,471**	
Equipment	**0.24 %**	**124,567**	**2,338.7**
Other	**4.31 %**	**2,280,150**	
User			
Net Costs		**30,028,263**	
Labor Mark-up	15.00 %	58,562	
Material Mark-up	10.00 %	144,566	
Subcontractor Mark-up	5.00 %	1,289,374	
Equipment Mark-up	10.00 %	12,457	

DOG RIVER PIPELINE
REPLACEMENT ALTERNATES

Category	Percent	Amount	Hours
Sales tax	7.75 %	121,693	
Material Shipping & Handling	2.00 %	21,752	
Escalation to Midpoint	5.00 %	1,387,406	
Subtotal		**33,064,072**	
Contractor General Conditions	10.00 %	3,306,407	
Subtotal		**36,370,479**	
Start-up, training, O & M	2.00 %		
Subtotal		**36,370,479**	
Construction Contingency	30.00 %	10,911,144	
Subtotal		**47,281,623**	
Bldg Risk, Liability Auto Ins.	2.00 %	945,632	
Subtotal		**48,227,255**	
Bonds	1.50 %	723,409	
Subtotal		**48,950,664**	
Subtotal		**48,950,664**	
Total Alt 4 - Pump Installation w/ 23 Mile Line Build Option		**48,950,664**	

BROWN AND CALDWELL

Environmental Engineers & Consultants

E & I DETAILED ESTIMATE REPORT

DOG RIVER ALTERNATIVES ELECTRICAL CONCEPTUAL ESTIMATE

Project Number:	133218-500
BC Project Manager:	Corianne Hart
BC Office:	Oregon
Estimate Issue Number:	01
Estimate Original Issue Date:	January 26, 2009
Estimate Revision Number:	00
Lead Estimator:	Don Snowden
Estimate QA/QC Reviewer:	Butch Matthews

PROCESS LOCATION/AREA INDEX

DOG RIVER ALTERNATIVES ELECTRICAL CONCEPTUAL ESTIMATE

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	Alt 3 - Pump Installation w/ Local Hydro Power									
	1103 - Pump Installation									**4,232,739**
	02 - SITE CONSTRUCTION									
	02320 - Backfill									
0040	Backfill, dozer backfilling, direct buried conduit	2,444.0	cuyd	0.79			1.21		2.0	4,871
	02360 - Compaction									
0110	Compaction, direct buried conduit,walk behind, vib. plate 18" wide, 6" lift	2,444.0	cuyd	2.07			0.32		2.4	5,838
	02450 - Excavating, trench									
0010	Excavation, direct buried conduit, 4'-6' D, 1-1/2 CY hyd bac	4,400.0	cuyd	1.81			1.24		3.0	13,419
	02460 - Hauling									
0005	Hauling, LCY, no loading, 12 CY dump truck, 1/8 mile RT 3.7 lds/hr	1,956.0	cuyd	0.73			0.57		1.3	2,538
0900	Loading Trucks, F.E. Loader, 3 C.Y.	1,956.0	cuyd	0.73			0.88		1.6	3,139
	SITE CONSTRUCTION Total									**29,806**
	16 - ELECTRICAL									
	16015 - Electrc&telephn site work									
0010	Undergroung tape, detectable, reinforced, alum, foil core, 6"	132.0	clf	2.95	5.00				8.0	1,050
	16030 - Condt instl direct burial									
0070	Conduit, direct burial, PVC sched 40, w/coupling, 4" dia	52,800.0	lnft	6.27	5.90				12.2	642,345
0160	Conduit, direct burial, PVC elbow sched 40, 4" dia	8.0	each	62.66	40.00				102.7	821
0250	Conduit, direct burial, PVC adapter sched 40, 4" dia	8.0	each	50.13	11.80				61.9	495
0410	Conduit, direct burial, PVC spacer, 4" dia	66.0	each	12.23	2.22				14.4	953

DOG RIVER ALTERNATIVES
ELECTRICAL CONCEPTUAL
ESTIMATE

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	16035 - Grounding									
0350	Grounding, bare copper wire stranded, 4/0	132.0	clf	175.88	184.00				359.9	47,504
0660	Grounding, connections, 4/0 wire	2.0	each	71.61	7.30				78.9	158
	16065 - Cable terminations									
0100	Cable terminations, #2	8.0	each	22.78	0.86				23.6	189
0130	Cable terminations, #4/0	24.0	each	45.57	2.95				48.5	1,164
	16105 - Wire									
0730	Wire, 600 volt, copper type XHHW, stranded, #2	528.0	clf	111.39	251.90				363.3	191,816
0780	Wire, 600 volt, copper type XHHW, stranded, 4/0	1,584.0	clf	227.84	545.07				772.9	1,224,287
	16230 - Generator set									
3000	Generator set, dsl eng,incl btry, chgr,muf,auto xfr sw&day tank,350 kW	1.0	each	6,558.28	133,000.00		2,592.00		142,150.3	142,150
9002	Generator set, hydro, 350 kW (installed)	1.0	each					1,950,000.00	1,950,000.0	1,950,000
	ELECTRICAL Total									4,202,934

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	Alt 4 - Pump Installation w/ 23 Mile Line Build Option									
	1103 - Pump Installation									**20,539,116**
	02 - SITE CONSTRUCTION									
	02320 - Backfill									
0040	Backfill, dozer backfilling, direct buried conduit	22,490.0	cuyd	0.79			1.21		2.0	44,825
	02360 - Compaction									
0110	Compaction, direct buried conduit,walk behind, vib. plate 18" wide, 6" lift	22,490.0	cuyd	2.07			0.32		2.4	53,724
	02450 - Excavating, trench									
0010	Excavation, direct buried conduit, 4'-6' D, 1-1/2 CY hyd bac	40,480.0	cuyd	1.81			1.24		3.0	123,455
	02460 - Hauling									
0005	Hauling, LCY, no loading, 12 CY dump truck, 1/8 mile RT 3.7 lds/hr	17,990.0	cuyd	0.73			0.57		1.3	23,346
0900	Loading Trucks, F.E. Loader, 3 C.Y.	17,990.0	cuyd	0.73			0.88		1.6	28,868
	SITE CONSTRUCTION Total									274,218
	16 - ELECTRICAL									
	16015 - Electrc&telephn site work									
0010	Undergroung tape, detectable, reinforced, alum, foil core, 6"	1,215.0	clf	2.95	5.00				8.0	9,662
	16030 - Condt instl direct burial									
0070	Conduit, direct burial, PVC sched 40, w/coupling, 4" dia	485,760.0	lnft	6.27	5.90				12.2	5,909,576
0160	Conduit, direct burial, PVC elbow sched 40, 4" dia	8.0	each	62.66	40.00				102.7	821
0250	Conduit, direct burial, PVC adapter sched 40, 4" dia	8.0	each	50.13	11.80				61.9	495
0410	Conduit, direct burial, PVC spacer, 4" dia	60,720.0	each	12.23	2.22				14.4	877,131

DOG RIVER ALTERNATIVES
ELECTRICAL CONCEPTUAL
ESTIMATE

Item	Item Description	Qty	Unit	Labor $/Unit	Materials $/Unit	Subs $/Unit	Equip $/Unit	Other $/Unit	Total $/Unit	Total Net Cost $
	16035 - Grounding									
0350	Grounding, bare copper wire stranded, 4/0	1,215.0	clf	175.88	184.00				359.9	437,251
0660	Grounding, connections, 4/0 wire	2.0	each	71.61	7.30				78.9	158
	16065 - Cable terminations									
0100	Cable terminations, #2	8.0	each	22.78	0.86				23.6	189
0130	Cable terminations, #4/0	24.0	each	45.57	2.95				48.5	1,164
	16105 - Wire									
0730	Wire, 600 volt, copper type XHHW, stranded, #2	4,858.0	clf	111.39	251.90				363.3	1,764,855
0780	Wire, 600 volt, copper type XHHW, stranded, 4/0	14,573.0	clf	227.84	545.07				772.9	11,263,595
	ELECTRICAL Total									20,264,898

Category	Percent	Amount	Hours
Alt 3 - Pump Installation w/ Local Hydro Power Totals			
Labor	**3.24 %**	**801,606**	**12,818.6**
Material	**5.92 %**	**1,466,511**	
Subcontractor			
Equipment	**0.06 %**	**14,622**	**307.9**
Other	**7.87 %**	**1,950,000**	
User			
Net Costs		**4,232,739**	
Labor Mark-up	15.00 %	120,241	
Material Mark-up	10.00 %	146,651	
Material Shipping & Handling	2.00 %		
Subtotal		**4,499,631**	
Contractor General Conditions	10.00 %	449,963	
Subtotal		**4,949,594**	
Start-up, training, O & M	2.00 %		
Subtotal		**4,949,594**	
Bldg Risk, Liability Auto Ins.	2.00 %	98,992	
Subtotal		**5,048,586**	
Total Alt 3 - Pump Installation w/ Local Hydro Power		**5,048,586**	
Alt 4 - Pump Installation w/ 23 Mile Line Build Option Totals			
Labor	**32.42 %**	**8,030,518**	**128,439.9**
Material	**50.05 %**	**12,397,921**	

DOG RIVER ALTERNATIVES
ELECTRICAL CONCEPTUAL
ESTIMATE

Category	Percent	Amount	Hours
Subcontractor			
Equipment	**0.45 %**	**110,678**	**2,096.8**
Other			
User			
Net Costs		**20,539,116**	
Labor Mark-up	15.00 %	1,204,578	
Material Mark-up	10.00 %	1,239,792	
Material Shipping & Handling	2.00 %		
Subtotal		**22,983,486**	
Contractor General Conditions	10.00 %	2,298,349	
Subtotal		**25,281,834**	
Start-up, training, O & M	2.00 %		
Subtotal		**25,281,834**	
Bldg Risk, Liability Auto Ins.	2.00 %	505,637	
Subtotal		**25,787,471**	
Total Alt 4 - Pump Installation w/ 23 Mile Line Build Option		**25,787,471**	

APPENDIX B

Estimate of Feasibility and Cost of Tunnel Construction

By Jacobs Associates

Dog River Pipeline

DRAFT Tunnel Feasibility Evaluation

December 16, 2008

BROWN AND CALDWELL

Prepared by:

JACOBS ASSOCIATES
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1 Introduction

1.1 Project Description

The City of the Dalles is planning to replace and potentially realign its existing over 100-year old wood stave municipal water pipeline that conveys river water between the Dog River gaging station and the gaging station at the headwaters of the South Fork of Mill Creek. The project area is located in Township 2 South (T.2.S), Range 10 East (R.10.E), in Sections 3 and 10 and is shown in Figure 1. The existing over 100-year old, wood stave pipeline follows topographic contours along a circuitous route around a hillside to maintain gravity flow. By replacing the pipeline, water flow and thus pipeline pressure will be increased within the new pipeline.

One of the replacement options under considerations includes a more direct route between gaging stations that includes an approximately 5,358-foot long gravity flow tunnel segment along the middle section of the open trenched pipeline alignment to maintain a decreasing grade south to north. The location of the tunnel alignment is shown in Figure 2. A profile of the combined pipeline and tunnel alignment is shown in Figure 3. Brown and Caldwell, prime pipeline design contractor, has retained Jacobs Associates to explore the feasibility and cost of constructing the tunnel along the new pipeline alignment.

1.2 Scope of Work

Our scope of work for the Dog River Tunnel feasibility evaluation included a site reconnaissance of the tunnel and pipeline alignment, which was performed on September 23, 2008. Representatives from the City of the Dalles Public Works Department (City), U.S. Forest Service (USFS), Brown and Caldwell (BC), and Jacobs Associates (JA) walked the pipeline and tunnel alignment addressed in this report. Surface features, construction staging area and tunnel portal locations were identified, and project constraints were discussed.

The tunnel will be sized to provide an opening for a 24 inch diameter welded steel pipe. The excavated size of the tunnel will be based on the most efficient diameter uthe selected tunneling method. Based on site reconnaissance observations, geologic research, and pipeline requirements provided by BC, the following topics were evaluated:

- Technical feasibility of a tunnel
- Anticipated tunneling conditions
- Probable construction methods and feasible tunnel size
- Probable range of tunnel construction costs
- Estimated tunnel construction duration based on preferred tunneling method

Our findings on these topics are summarized in this report which will be used to select the final pipeline alignment.

1.3 Local Geology

The project area is located directly east of Mount Hood in the Western Cascades of north central Oregon. The ground surface, which is about El. 4,240 feet at the south tunnel portal, rises to about El. 4,430 feet at the tunnel midpoint before dropping back down to about El. 4,200 at the north portal. The alignment is characterized gently sloping terrain that is includes both forested and clear cut areas.

Residual soil, colluvium, air-fall ash deposits, and possible glacial deposits mantle the bedrock along the tunnel alignment. Based on initial cut-slope observations, the overburden is anticipated to range from 5 to 15 feet deep and consist of a mixture of sand, gravel, cobbles, and boulders of basalt and basaltic andesite.

Based on published geologic mapping, the southern portion of the pipeline alignment is underlain by bedrock consisting of volcanic flow rock. This basaltic andesite and basalt flow rock erupted from vents at the headwaters of Dog River most likely within the last two million years (Sherrod and Scott, 1995[1]). The northern portion of the alignment is underlain by basaltic andesite flow rock that appears to have erupted in the vicinity of the tunnel alignment and then flowed northeastward down the South Fork of Mill Creek within the last 780,000 years. A dacite dome has been mapped directly west of the Dog River pipeline alignment. The age relationship between this dome and the adjacent basaltic andesite flows is unknown (Sherrod and Scott[1]).

Cinder cones, associated with the more recent basaltic andesite flows, are mapped on either side of the tunnel alignment in the vicinity of the alignment near the point of highest surface elevation. Tephra (cinders) that was ejected from the cinder cones during volcanic eruptions consist of red or gray angular gravel to boulder-sized material that is porous, but may be locally cemented. There is a possibility that this tephra may extend down to the tunnel horizon. Subsurface explorations combined with surface geologic mapping will be required to evaluate the depth of cinder deposits along the tunnel alignment.

1.4 Groundwater

Groundwater is estimated to be located within approximately 20 feet of the ground surface, based on the presence of the marshy Brooks Meadow on the east side of the tunnel alignment. The actual groundwater elevation, which is expected to vary along the alignment, will be determined based on subsurface investigations conducted for tunnel design.

Since the alignment is located in a north-south trending saddle between peaks, rainfall and snow melt infiltrating into the adjacent highlands appear to collect in Brooks Meadow at the center of this lowland area. Less permeable bedrock is anticipated to underlie the meadow area. Cinder cones located on either side of the saddle have high porosity and permeability. These cinders are expected to store significant amounts of groundwater.

1.5 Local Faulting and Seismicity

The project area is located within approximately three miles of the concealed alignment of the north-south trending Hood River fault zone. The 27-mmile long Hood River fault zone defines the eastern margin of a half graben that forms the Upper Hood River Valley in the high Cascades of northern Oregon. The Hood River Fault Zone, which has most likely been active within the last 1.6 million years, consists of multiple faults that span from the southeast side of Mt. Hood to the Columbia River. A fault slip rate of less than 2 mm per year has been assigned to the fault zone based on approximately 2,000 feet of offset during the last 3 million years.

The US Geological Survey has assigned a peak ground acceleration for the Dog River Pipeline project area of between 0.2g and 0.3g with a 2,500 year return interval (2% chance of exceedance in 50 years)[2].

[1] Sherrod, D.R., Scott, W.E., 1995, Preliminary geologic map of the Mount Hood 30- by 60-minute quadrangle, Northern Cascade Range, Oregon: U.S. Geological Survey Open-File Report 95-219.
[2] U.S. Geological Survey, 2006, Quaternary fault and fold database for the United States, accessed November 10, 2008, from USGS web site: http//earthquakes.usgs.gov/regional/qfaults/.

The most significant recent earthquake in the vicinity of the project area is a M 4.5 earthquake that occurred on June 29, 2002, at a depth of 3.8 miles below the ground surface. The earthquake was located 2.9 miles south of Mt. Hood and 31 miles southwest of The Dalles.

1.6 Anticipated Subsurface Conditions

As discussed in Section 1.3, the alignment surface topography is underlain by soil deposits over volcanic flow rock. The entire tunnel, with the exception of the two portals, is expected to be located within basalt to basaltic andesite flow rock; however, there is a small chance that cinder cone tephra may be encountered within the tunnel horizon. The tunnel alignment penetrates at least one flow contact which may contain soil-like deposits of open gravel to boulder-sized material. Shallow groundwater is expected at the south portal location (Figure 2) and the groundwater elevation is expected to be above the tunnel zone along the entire tunnel alignment which the exception of the north portal.

The bedrock is expected to consist of sloping, tabular flows that consist of basalt and basaltic andesite that is unweathered, moderately jointed (fractured), and hard. Rock hardness is anticipated to range from approximately 10,000 to 20,000 psi. Jointing predominantly formed as cracks as the flows cooled and the rock contracted. Joint spacing is anticipated to range from 1 to 10 feet with an average joint spacing of less than 5 feet. Based on limited outcrop observations, the jointing is blocky to broadly columnar with variably-spaced vertical and horizontal joint sets creating bedrock blocks with variable thickness. Based on surface outcrops observed to date, limited well-defined columnar jointing is expected in the bedrock.

Soil deposits (overburden), flow contact(s), and tephra zones are anticipated to be porous and permeable. Groundwater infiltration into the tunnel excavation is expected to be significant within these materials. Similarly, excavation stand-up time may be very short and flowing ground conditions, where the soil advances into the tunnel heading like a viscous fluid, may be countered.

1.7 Restrictions on Construction Activities

Since the project area is located in the Mount Hood National Forest, restrictions related to fire hazards, snow closures, and wildlife habitat requirements will control construction timing and duration. US Forest Service (USFS) requirements also impact discharge requirements for construction water discharge and traffic control requirements.

Based on preliminary information provided by the USFS, work hours must be safe and prudent to protect workers and the public and must adhere to requirements established in the Fair Labor Standards Act. Additionally, construction activities must be coordinated with log hauling, hunting seasons, or wildlife activity.

Fire closure orders occur between approximately late July to the middle of September. These Level II closure orders prohibit the use of heavy equipment or mechanized devices after 1:00 pm each day. Snow closures of the access roads to the project area generally occur between the middle of December to the middle of March.

Noise and light restrictions have not been identified at this time; however blasting activities must conform to fire closure orders. Based on information provided by the USFS, no buried utilities are expected within the south portal excavation and there are no overhead utilities along the northbound lane of NFD 44 Road in the vicinity of the south portal construction staging area.

Construction-generated water and site run-off must be settled to remove suspended material prior to discharge. The USFS is currently indicating that treated water could be broadcast across the forest floor, as long as erosion and sediment concerns are addressed to their satisfaction.

The size and location of the portal construction staging areas will need to be approved by the USFS prior to the completion of final design. Site restoration of both portal staging areas will be required by the USFS to restore the site to as close to preconstruction conditions as possible. Limited tree removal at the north portal clear cut area, if required, will most likely be approved by the USFS. The number, species, and size of the trees to be removed must be provided to the USFS in advance to disclose effects of the project as required by the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA).

Construction-related truck traffic is not expected to significantly impact traffic flow along USFS roads that provide site access or along Highway 35. Traffic control will be required at the south portal if it is located within the roadway, as discussed in Section 3.1.

2 Potential Tunneling Methods

Three potential tunneling methods were reviewed to determine the most feasible and most cost effective method for the construction of the Dog River Tunnel. This section describes tunnel excavation methods that are considered generally applicable to this project. Horizontal directional drilling (HDD), drill-and-blast and tunnel boring machine (TBM) techniques are considered the most probable methods to excavate the tunnel. The general applicability and limitations of these methods to this project are discussed in the following sections.

2.1 Horizontal Directional Drilling

Horizontal directional drilling (HDD) involves excavating an approximately 34-inch diameter tunnel along the pipeline grade by drilling a smaller (about 12.25 inch) pilot hole along the tunnel alignment and then reaming the pilot hole several times to enlarge the tunnel to final diameter. Drilling fluids, which commonly include bentonite, are used to cool the bit, remove cuttings, and keep the tunnel open during drilling. Following drilling, a 26-inch outside diameter (24-inch inside diameter) coated steel casing is welded together to create a continuous pipeline that is pulled-back from the north portal into the tunnel. The annulus between the steel pipe and the bedrock will be backfilled with grout after drilling has been completed.

HDD can be conducted in a limited space with relatively little impact on the surrounding area. Figure 4 shows two photographs of a HDD drill rig and portal area during drilling operations. Figure 5 shows the slurry separation plant that is required to separate the bentonite slurry from the excavated material (cuttings). Figure 6 shows the retrieval drilling fluid containment pit during the pull-back of multiple HDPE pipes, while Figure 7 shows welded steel pipeline segments in the lay down area ready for pullback.

2.2 Drill-and-Blast Excavation

Drill-and-blast methods are used mainly for the excavation of tunnels in hard rock. Drill-and-blast construction generally includes four general steps: 1) drilling a pattern of holes in the tunnel face and loading the holes with explosives, 2) blasting and ventilating blasting gases, 3) mucking the blasted rock, and 4) installing initial ground support as needed. An advantage of using drill-and-blast methods is that long lead times are not required to acquire the equipment needed for construction and set-up time prior to the initiation of tunneling is reduced.

The main disadvantages of drill-and-blast construction include 1) additional disturbance and loosening of the rock mass; 2) the unavoidable breaking of ground beyond the intended excavation lines which constitutes an increase in materials costs for tunnel lining and support; and 3) an uneven excavation profile which reduces the efficiency of ventilation and increases tunnel support costs. Drill and blasting is typically slower compared to other mechanical excavation techniques. Construction duration can be reduced if the tunnel is excavated from two headings. Figure 8 shows an example of a small diameter horseshoe-shaped tunnel being excavated using drill and blast methods. The minimum tunnel size for drill and blast excavation methods would be 7 to 8 feet. After the tunnel was excavated, a carrier pipe is installed along the tunnel invert. The tunnel would then be partially backfilled with concrete to encase the pipeline and for protection.

2.3 Tunnel Boring Machine (TBM) Tunnel

A hard rock TBM is includes a rotating cutterhead that is advanced through the ground by hydraulic rams supported by grippers between the main-beam of the machine and the rock wall. Initial support systems for this type of machine are installed directly behind the cutterhead and would most likely consist of steel ribs and timber lagging, as needed depending on ground conditions. Figure 9 shows a photo of a main-beam rock TBM.

TBM's can excavate a smooth, circular bore which can reduce ground support requirements and improve tunnel ventilation during construction. TBM excavation also produces aggregate-sized muck material that can be used to surface roads. Disadvantages to TBM tunnels include a minimum 7 to 8-foot diameter excavation, which increases muck quantities; high capital cost of the machine; and potentially long mobilization time.

2.4 Tunneling Recommendations

Potential tunneling methods for the Dog River Pipeline Tunnel include HDD, drill-and-blast, and TBM tunneling. The finished pipeline diameter is significantly smaller than the diameter considered necessary to efficiently excavate the tunnel using drill-and-blast and TBM tunneling. Furthermore the schedule for these methods would extend beyond one year. Table 1 summarizes the comparison of each of these methods for four general categories.

Table 1. Generalized Comparison of Potential Tunneling Methods

Method	Construction Cost	Mobilization / Set-up	Construction Duration	Excavated Muck Quantities
HDD	Lowest	Lowest	Shortest	Least
Drill-and-Blast	Moderate	Moderate	Longest	Most
TBM	Highest	Highest	Moderate	Moderate

HDD methods are recommended for the Dog River Pipeline Tunnel to reduce tunneling costs, decrease schedule, reduce duration and magnitude of impacts on the surrounding areas, and reduce tunnel muck disposal quantities. The tunnel will be located beneath a portion of NFD 44 Road and NFD 1720 Road, as shown in Figure 2. The tunnel will be excavated from the south portal, while tunnel lining installation (pipe pullbacks) will be initiated from the north portal. Based on information provided by the USFS, no utilities are buried beneath these roadways. Based on the depth of the tunnel, no specific construction constraints are expected along the tunnel alignment. The HDD length is approximately 5,350 feet based on the portal locations discussed in Section 3.

3 Construction Staging Areas

This section describes general concepts, layouts and construction consideration for the portals.

3.1 South Portal

The proposed south portal, which will be located in the northbound lane and shoulder of NFD 44 Road (Figure 10), will serve as the driving portal for HDD methods. An approximately 1.5 acre fenced and secured staging area will be required for the HDD drill rig and a lay down area for drilling equipment, job trailer, small crane, Conex container for equipment storage, slurry separation plant, Baker tanks for slurry storage, settling tanks for construction water and site run off, generator, compressor, welder, and a pull-off area for loading and unloading equipment and supplies.

If the south portal is located within the roadway, traffic control for the northbound lane closure will be required during the entire duration of construction. Since traffic levels are expected to be relatively low along NFD 44 Road, this traffic control may include signage notifying the motorist of the lane closure and alternating traffic lights on either side of the road closure to regulate one-way traffic. Another potential south portal location is in the clear-cut area on the east side of the roadway. Locating the portal in this area would reduce traffic impacts and increase the functionality of the staging area for construction activities by providing more space in the vicinity of drilling activities.

Once tunneling and pipeline installation has been completed; the portal area will be excavated along the pipeline alignment to construct the connection between the southern open cut pipeline segment and the tunnel. Blasting will be required to excavate bedrock if it is encountered within the connection excavation.

3.2 North Portal

The proposed north portal, which will be located in an existing clear cut area on the east side of NFD 17 Road (Figure 11), will serve as the receiving portal for HDD methods (Figure 2). Additionally, tunnel lining installation (pull-back) will be staged from the north portal. The actual portal will require a shallow excavation and limited temporary excavation support to contain the bentonite drilling slurry. Although the majority of the north portal excavation is expected to remain in overburden deposits, limited blasting of bedrock may be required. Once tunneling and pipeline installation activities have been completed, the connection between the northern open cut pipeline segment and the tunnel will be constructed in the north portal.

The north portal staging area will be approximately one acre in size. Site development will consist of placing aggregate over geotextile to create a driving surface for construction activities. The construction site will be fenced and secured. Site access will be from NFD 17 Road. While the majority of tunneling activities will occur at the south portal, the portal staging area will include a job trailer, Conex container for equipment storage, settling tank for construction water and site run-off, spoils stockpile and loading area, pipeline lay-down area, crane on a crane pad near portal for pipe installation, generator, compressor, welder, and a truck and trailer turn-around area. A smaller HDD rig could also be utilized at this site to provide dill and ream assistance.

4 Potential Project Impacts

4.1 Environmental Impacts

No significant environmental impacts are expected to be caused by tunnel-related construction activities. These activities include noise, night lighting at portal staging areas, site development (including placing an aggregate surface over fabric and limited tree removal), and construction water discharge. Construction activities are not currently expected to exceed USFS allowed limits that would adversely impact wildlife. Tunnel-related construction activities will occur outside of the Dog River headworks exclusion area that was established to protect spotted owls. Based on tunnel depth, diameter, and tunneling method, no impact on groundwater quality or quantity is expected during or after construction along the tunnel alignment.

4.2 Variations in Tunnel Line and Grade

A risk of using HDD techniques for tunnel construction reduces precision line and grade control and slope control. This construction method is typically accurate to 10 percent of depth, or 20 feet to both line and grade at 200 feet deep. The slope may create localized areas with no or reverse grade.

4.3 Grade Loss or Gain in Mixed Face Tunnel Conditions

The tunnel excavation can decrease in elevation (grade loss) or increase in elevation (grade gain) when the drill bit transitions into a material of higher or lower strength. Although some fluctuation in grade will not adversely impact gravity flow within the tunnel, grade variation must be minimized.

4.3.1 Transition between Flow Rock and Tephra (Cinders)

Although unlikely, there is a possibility that tephra from the adjacent cinder cone may be encountered within tunnel excavations. If lower strength cinders are encountered, there is some chance that the drill bit will lose grade across the contact. Similarly, when the drill bit transitions out of the cinders and back into the flow rock, a gain in tunnel grade can occur. The use of an HDD guidance system to monitor and correct for deviations in tunneling grade and alignment will be required to prevent any serious gains or losses from occurring.

4.3.2 Transition between Flows

Additionally, tunnel grade can be influenced when the drill bit encounters a soft interflow zone consisting of soil or fractured rock between harder upper and lower flows. There is a tendency for the bit to remain in the lower strength interflow zone, rather than transitioning into the harder overlying or underlying flow rock. Again, the use of an HDD guidance system to monitor and correct for deviations in tunneling grade and alignment will be required to prevent any serious gains or losses from occurring.

4.4 Encountering Boulders in Cinders

Boulder-sized volcanic bombs are commonly ejected from cinder cones during eruptions. These reddish, elongated, streamlined boulders are shaped and then cooled as they travel through the air. During the September 23rd site visit, a large (2 to 3 foot long) volcanic bomb was observed on the shoulder of NFD 17 Road on the east side of the tunnel alignment. This observation indicates that the presence of boulder-sized volcanic bombs should be expected within the tunnel excavation if tephra is encountered.

4.5 Loss of Drilling Fluids in Permeable Zones

If tephra is encountered during tunneling, a loss in drilling fluids and fluid pressure is expected in this permeable material. Similarly, drilling fluid loss may occur along permeable contacts between lava flows. To counteract a loss in drilling fluid pressure, the drilling fluid will most likely be thickened with bentonite to reduce infiltration beyond the limits of the boring.

4.6 Fire or Snow Closure Impacts on the Construction Schedule

Closures associated with fire protection and snow on the roadways will limit construction activities between approximately the end of July and the middle of September and between the middle of December to the middle of March. Due to these closures, tunnel construction activities will most likely be conducted during the nine month span between March and December. To avoid continuing construction under reduced daytime hours, construction activities can be moved to between 8 PM and 1 PM during the fire restriction period. This temporary shift in the work schedule, however, is expected to increase labor costs.

If exceptionally high snowfall occurs during the winter proceeding construction, the construction start date may be delayed and tunnel construction may extend into the fire protection partial shutdown period. If a fire occurs in the project area during construction, significant construction impacts are expected which include schedule delay and increased costs.

5 Probable Range of Construction Costs

The following is a preliminary budgetary construction cost estimate for using HDD techniques and one-pass lining system to construct the tunnel portion of the new Dog River Pipeline. The estimate assumes the installation of a 24-inch diameter steel carrier pipe. The annulus between the outer casing and the excavated tunnel will be backfilled with grout. The pipeline will have a ¾ inch thick wall and be coated with polyurethane coating to prevent corrosion. The interior coating will be approximately 20 mil thick, while the exterior coating will be approximately 60 mil thick to reduce pipeline abrasion during the pull back. The pipeline sections will be butt welded for increased weld strength. Welded sections will be field coated with polyurethane to maintain corrosion protection. Anodes will be installed on the pipeline for cathodic protections.

The construction cost estimate was based on crew, material, and equipment required to perform the work. Estimated labor, material, and equipment casts and production rates were used to develop the estimates. Contractor markup was estimated at 14.4%. Construction contingencies were evaluated to develop the range of budgetary cost estimates. Contingencies were applied to the total direct costs plus contractor overhead and profit.

This estimate should be considered a preliminary conservative approximation of construction costs based on limited subsurface data. Surface and subsurface investigations, including geologic mapping and geotechnical borings, will be required to refine the cost estimate by reducing uncertainty regarding ground conditions.

5.1 Key Assumptions

The cost estimate is based on the information currently provided and discussed herein and will be refined as more information becomes available. Major assumptions utilized to develop the costs are as follows:

- Crews were assumed to work 10 hours per day, six days per week. Work will be completed during a single work shift.
- This cost assumes that the tunnel can be completed in a single work season before weather-related road closures make the project area inaccessible.
- A single mobilization/ demobilization is assumed for the project.
- Two HDD drill rigs are assumed to be required to excavate the tunnel and install the casing and carrier pipe. The main rig will have a 1,200,000 lb pull back force and the auxiliary HDD rig will have a 220,000 lb pull back force.
- Excavation and pipe installation costs were based on crew and equipment costs required for the estimated schedule durations.
- Pilot hole drilling, reaming, and carrier pipe pull back durations were based on the assumed advance rates summarized in Table 2 below. Advance rates at the low end of the range area assumed for the initial HDD.
- Open-trenched pipeline trenching and pipe installation on either end of the tunnel alignment will occur concurrently with tunneling, pullback, and grouting operations. Open trenched pipeline operations will not delay tunneling activities.
- Connections between the tunnel pipeline and the open cut pipeline are not included in the budget or schedule for tunnel work.

Table 2. Assumed Advance Rates for HDD Estimate

Activity	Assumed Advance Rates
Pilot Hole Drilling[1]	150 ft/day
Reaming[1]	220 ft/day
Carrier Pipe Pullback[2]	1420 ft/day

[1] Does not include downtime for bit replacement and maintenance.
[2] Does not include time for welding and coating pipe.

5.2 Conceptual Cost Estimate

The conceptual budgetary cost estimate is summarized in Table 3. This estimate assumes the installation of a single 24-inch internal diameter steel pipe in a 34-inch diameter tunnel excavated using HDD techniques.

Table 3. Summary of HDD Cost Estimate

Task	Low	High	Cost per Foot
Mobilization	$150,000	$200,000	
Portal Development[1]	$50,000	$100,000	
Pipe Cost[2]	1,890,743		$353.41
Pilot Hole Drilling and Reaming	$2,140,000	$3,210,000	$400 to $600
Pipeline Welding, Coating, and Pull Back[3]	$1,605,000	$1,765,000	$300 to $500
Grouting	$75,000	$125,000	
Demobilization	$100,000	$150,000	
Contractor indirect costs and profit[4]	$1,813,571	$2,182,511	
Total	**$7,824,000**	**$9,623,000**	

[1] Includes both north and south portals.
[2] Estimate is based on 5,358 feet of pipe and includes interior and exterior coating.
[3] Includes costs of pipe and coatings.
[4] Includes costs related to equipment ownership, maintenance and field supervisions, bonds, insurances, taxes, and finance charges.

5.2.1 Contingencies and Escalation

Contingencies were evaluated based on a general assessment of the level of risk associated with limited subsurface information along the tunnel alignment. The construction contingency is reflected in the variations in costs for each activity shown in Table 3.

Escalation was also evaluated to assess the increase in material and labor costs in the time interval before the tunnel has been completed. We recommend including a cost escalation of 10 percent of both direct and indirect estimated construction bid amount, which ranges from $782,000 to $962,000. This escalation percentage is based on Notice to Proceed being issued in November 2009 and the tunnel pipeline completion in December 2010, with escalation calculated through the midpoint of construction. Total preliminary construction cost estimates range from $8,607,000 to $10,586,000 with escalation.

6 Preliminary Construction Schedule

Based on preliminary estimates, tunnel construction and pipeline installation can be completed within a single work season (about March 15th to December 15th). Activities such as permitting, equipment and supply purchasing, and construction submittals, which are not weather dependent, can be completed during prior to the initiation of construction. Site restoration and potentially constructing the connections between the open trenched pipeline and the tunnel may be completed the following spring. Assuming that equipment mobilization and site development can be initiated by March 15th, Table 3 includes a preliminary schedule of construction activities.

Table 4. Preliminary Construction Schedule[1]

Activity	Duration
Mobilization	1 month
Portal Development	0.5 months
Pilot Hole Excavation/Back Reaming	5 months
Pipeline Pull Back[2]	0.5 month
Grouting	0.5 month
Portal Tear Down	0.5 months
Demobilization	0.5 months
Total	8.5 months

[1] The construction schedule does not include time for permitting, purchasing equipment and supplies, submittal preparation, and portal site restoration.
[2] Pipeline welding and coating will be completed during drilling operations and are not included in the pipeline pull back operations.

7 Conclusions

A combined tunnel/pipeline option is under consideration for the replacement of the Dog River Pipeline. The proposed 5,358 foot long, approximately 34-inch inside diameter tunnel is recommended to be excavated using HDD techniques. The finished tunnel will include a steel carrier pipe. Portal locations are proposed within NFD 44 Road northbound lane and shoulder (south portal) and within a clear cut on the east side of NFD 17 Road (north portal).

Selecting a tunnel option for the Dog River pipeline replacement has the following benefits to the City of The Dalles:

- Shortest, most direct route between the Dog River intake and the South Fork Mill Creek outlet.
- Shortest construction duration—least impacted by snow closures or fire restrictions.
- Increased pipeline grade will help to inhibit formation of air pockets within the pipeline.
- Least impact on environment – open trenching is reduced and portals are located in existing clear cut area or in roadway so tree removal is extremely low.
- Blasting of bedrock for open trench and portal excavations is minimized—trench depth is reduced.
- Permits for tree removal/logging are significantly reduced.
- Schedule delay associated with permitting (including appeals) is also reduced or eliminated.
- Existing pipeline system remains in operation during construction.
- Forest stands along existing alignment are left intact.

Based on a preliminary review of published geologic information and an initial site visit, the alignment is predominantly underlain by hard volcanic flow rock, although tephra from the adjacent cinder cone may be encountered within the tunnel excavation. Groundwater levels are expected to be relatively high along the alignment, but groundwater is not expected to adversely impact construction.

Construction staging areas will be required at both the south and north tunnel portals to facilitate tunneling (south portal) and the installation of the casing and carrier pipe (north portal). Limited permanent impact to the portal areas is expected, as site restoration will be required. Construction timing and duration will be impacted with fire protection closures and snow closures. Twenty-four hour traffic control will be required during construction at the south portal.

Tunnel construction and pipeline installation are expected to be completed during a single nine month long work season. Connections between the tunnel segment and the open trenched pipeline segments are expected to be completed the following season along with site restoration. Preliminary construction activities; including submittals, permitting (as required), and the purchase of materials; will be performed prior to the work season or concurrently with construction and are not included in the on-site construction schedule.

Preliminary cost estimates for tunnel construction and pipeline installation range from about $8.6 million to $10.6 million, which includes escalation.

FIGURES

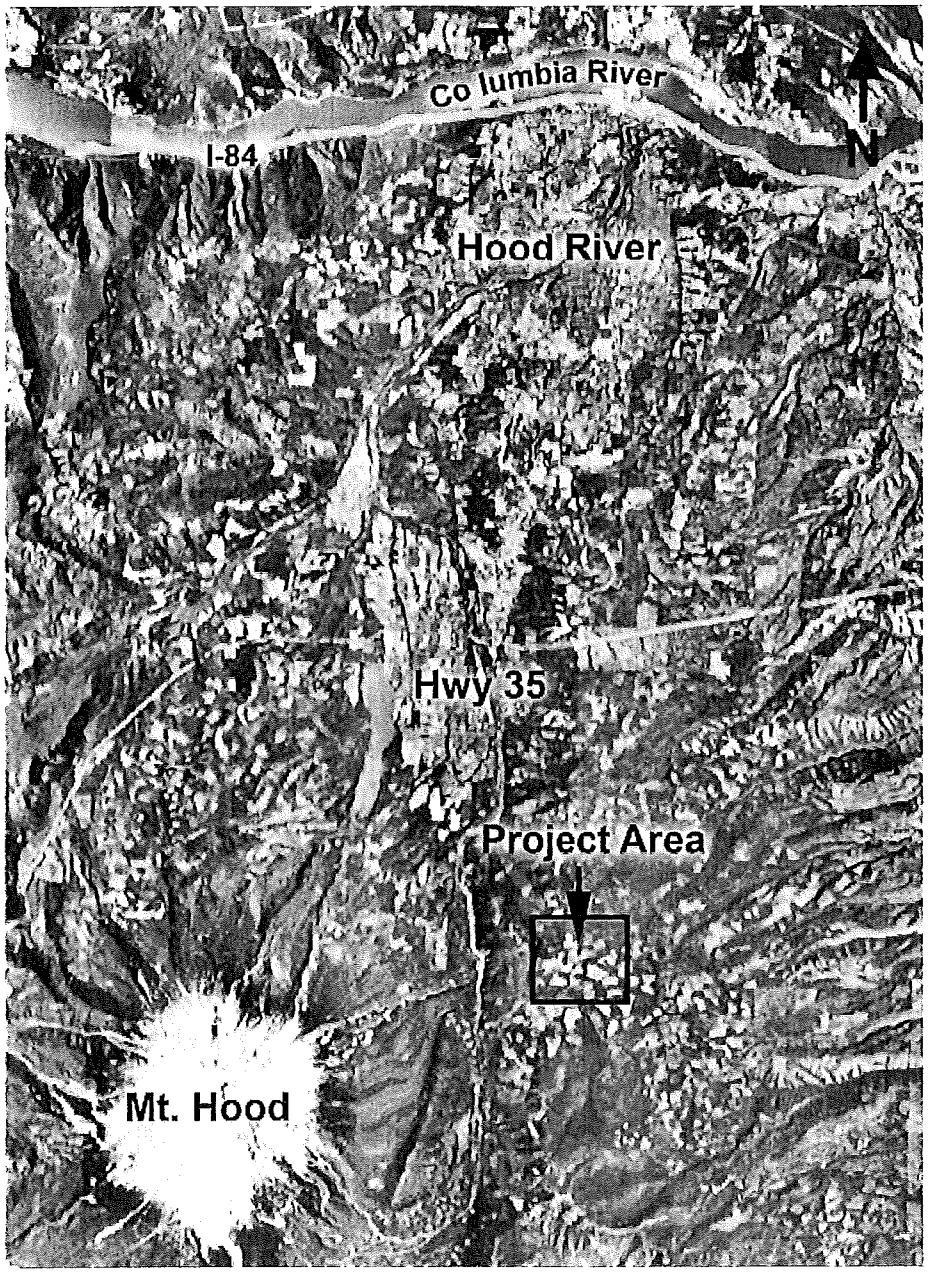


Figure 1. Vicinity map

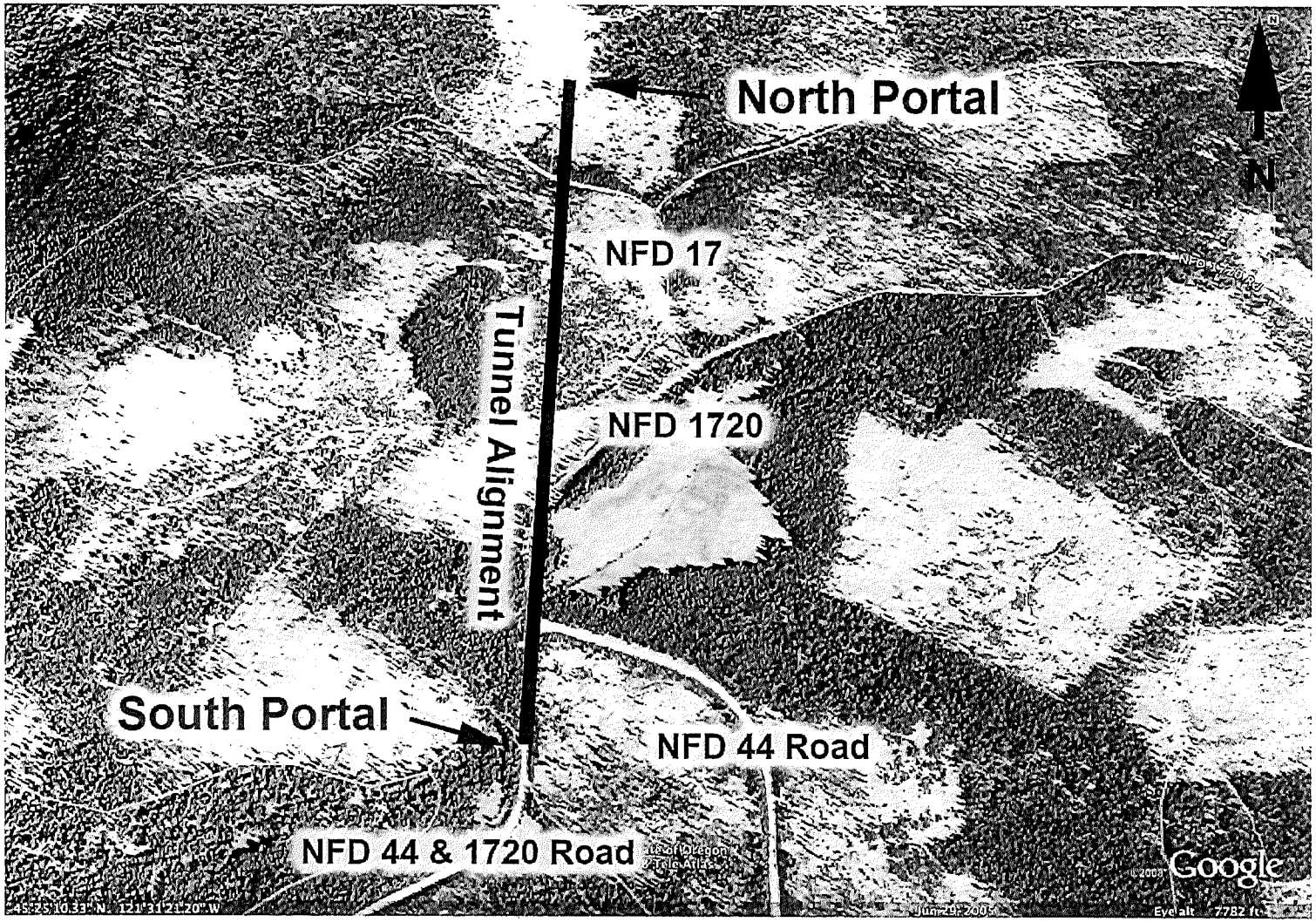


Figure 2. Tunnel alignment map

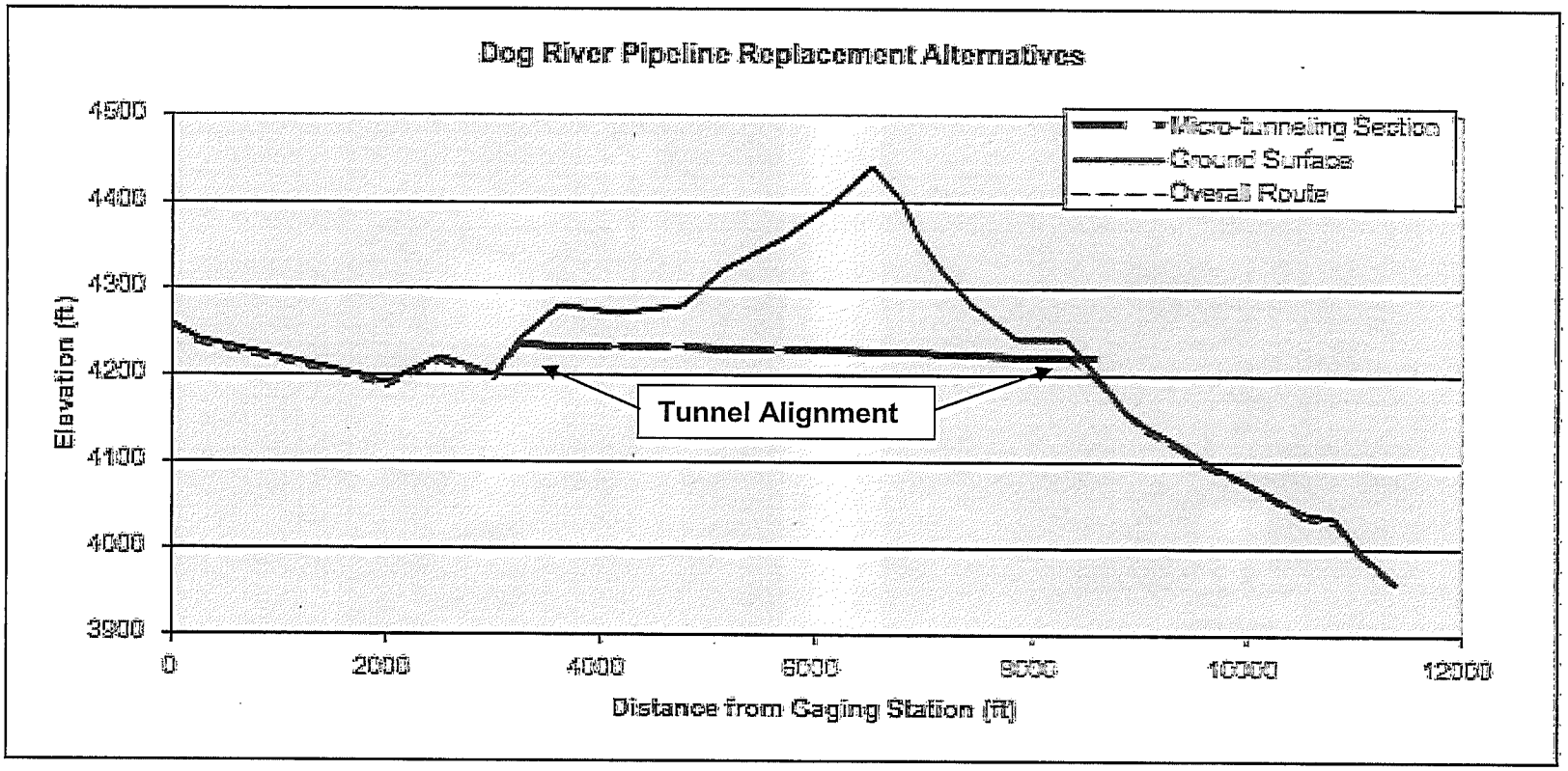


Figure 3. Dog River Pipeline profile showing tunnel alignment.

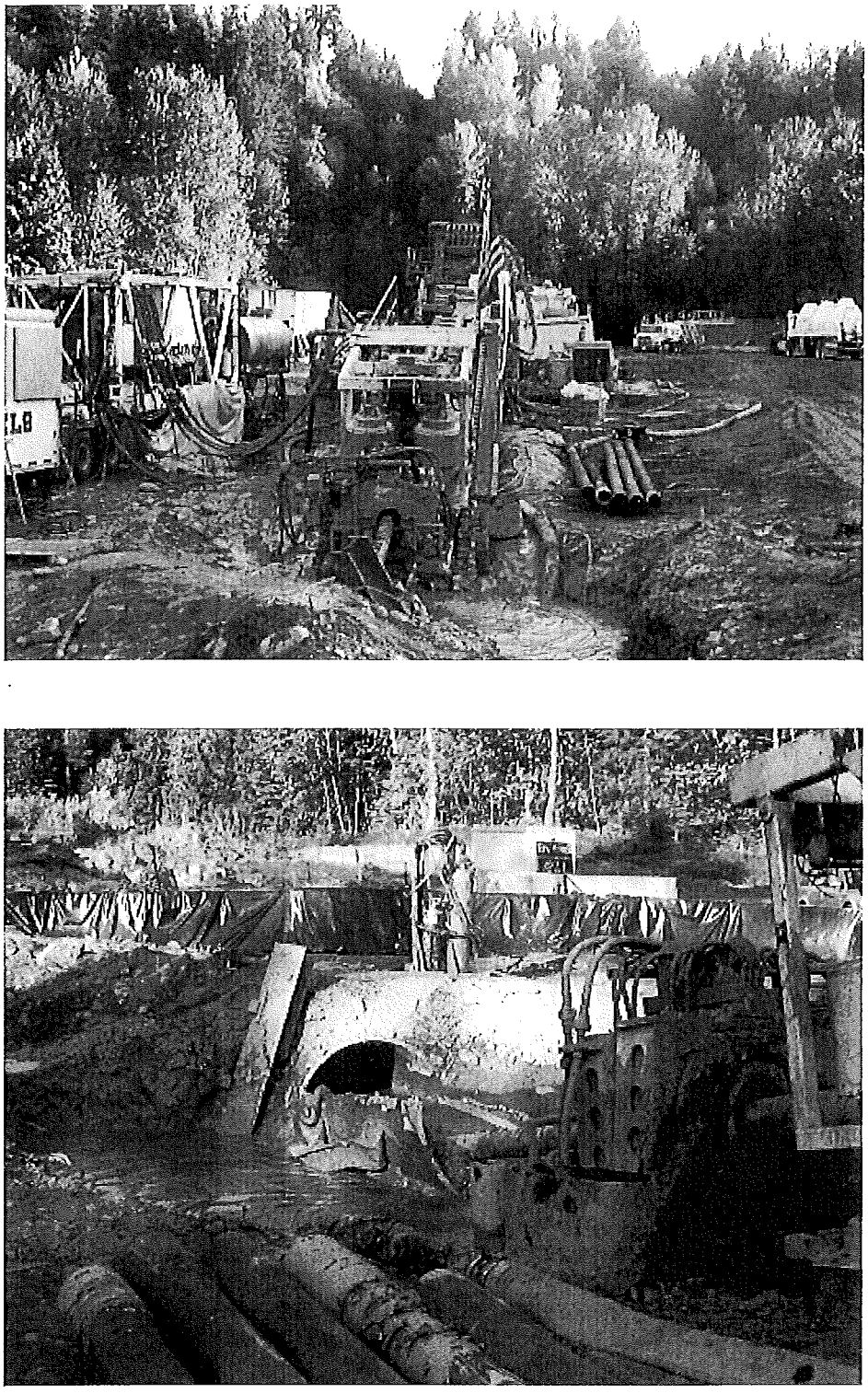


Figure 4. Horizontal directional drilling (HDD) in progress to install 30 inch steel casing.

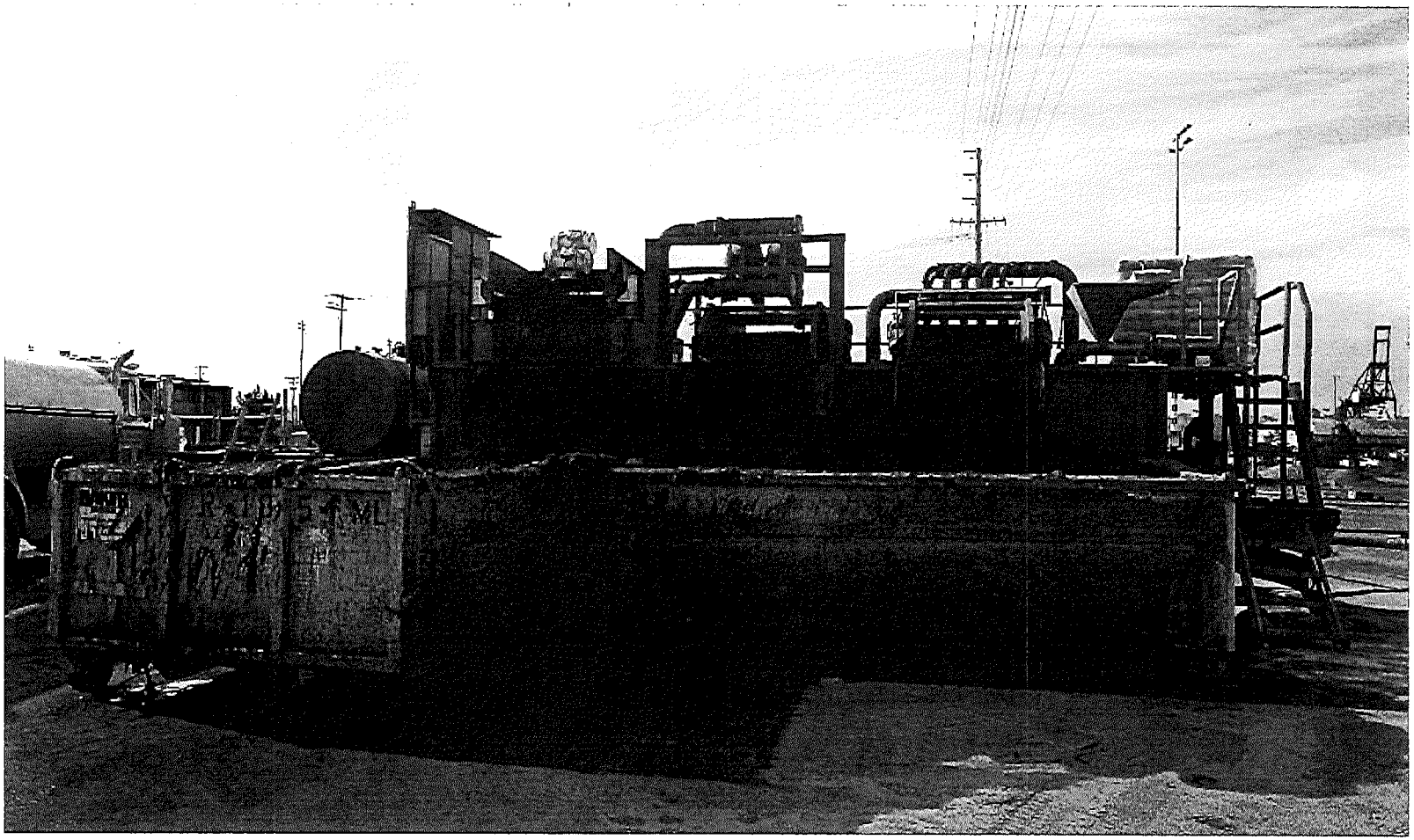


Figure 5. Separation plant for HDD drilling fluid. Rock fragments are separated from bentonite slurry before the slurry is recycled through the drill rig.

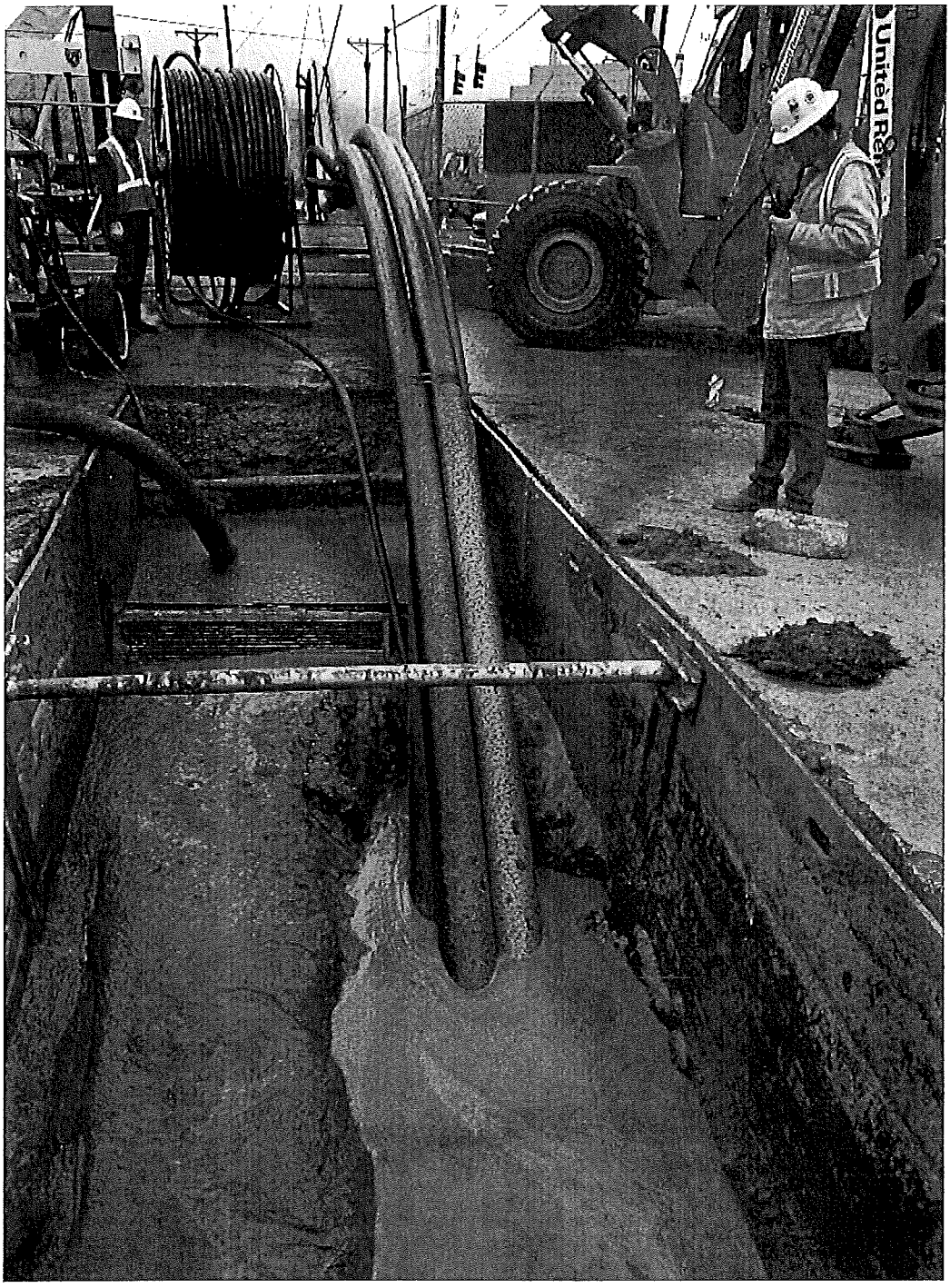


Figure 6. HDPE pipes being pulled-back through HDD tunnel.

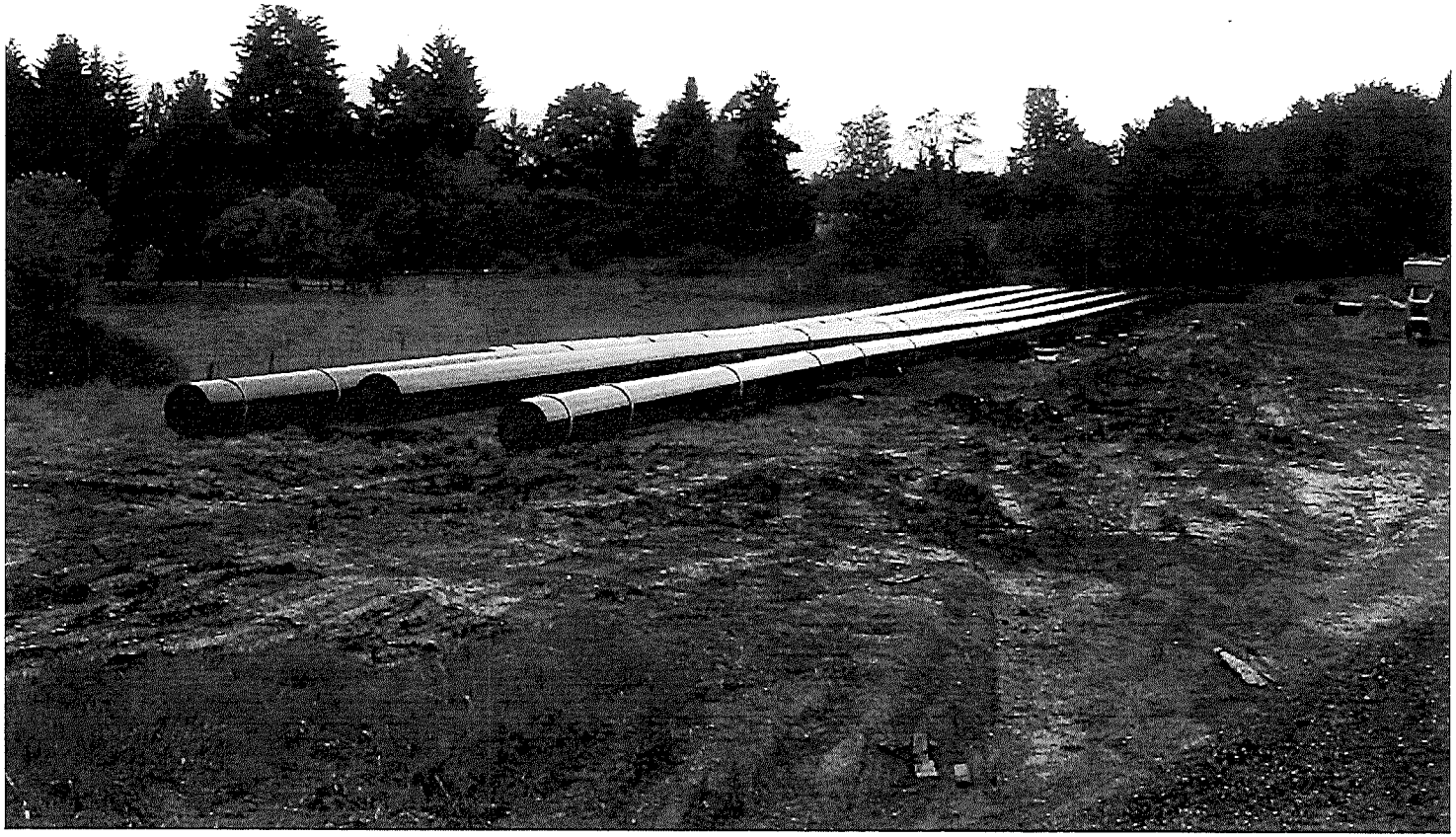


Figure 7. Multiple steel pipes in lay down area ready for pull-back into tunnel.

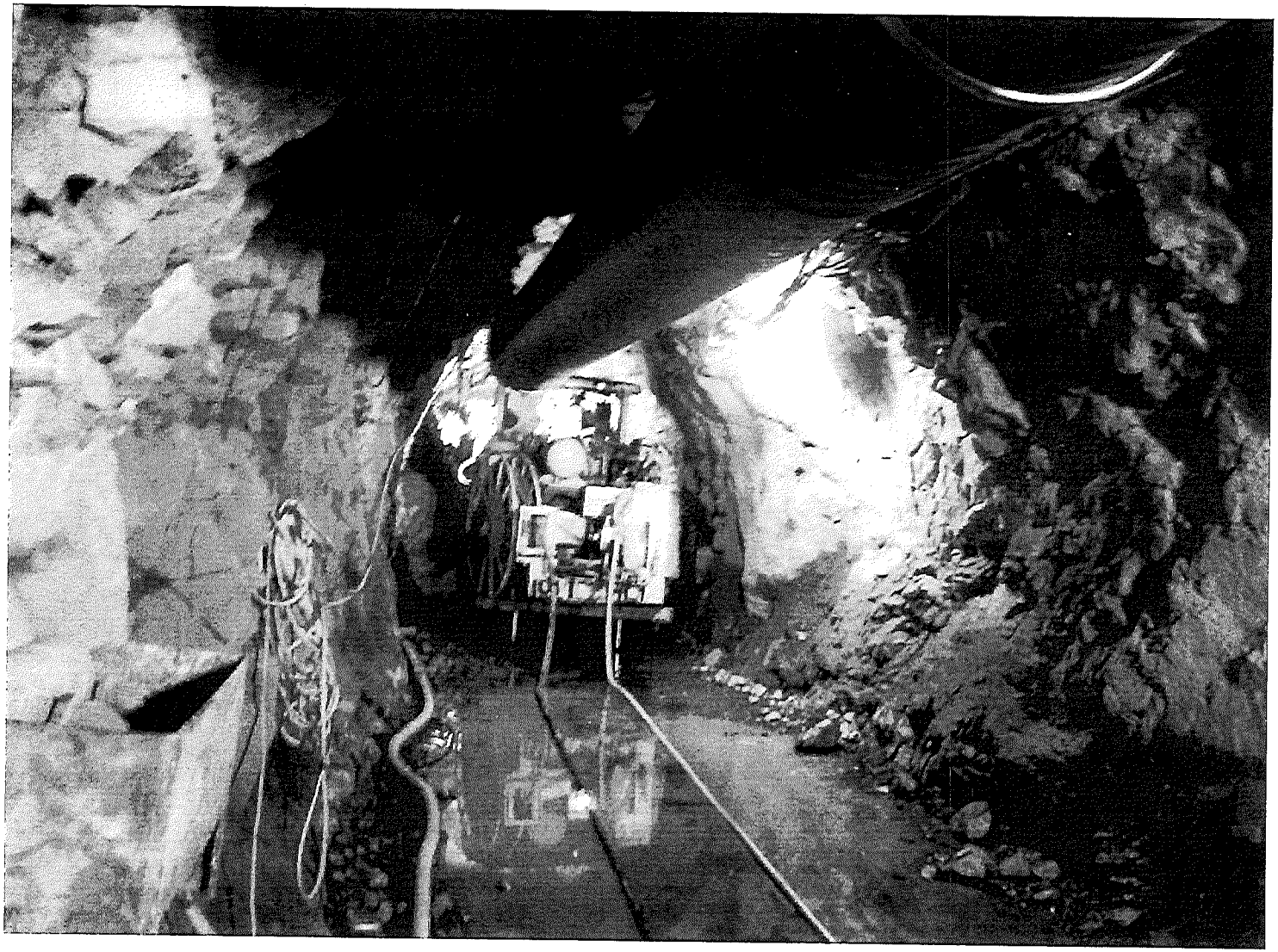


Figure 8. Excavating a small diameter horseshoe-shaped tunnel using drill and blast methods.

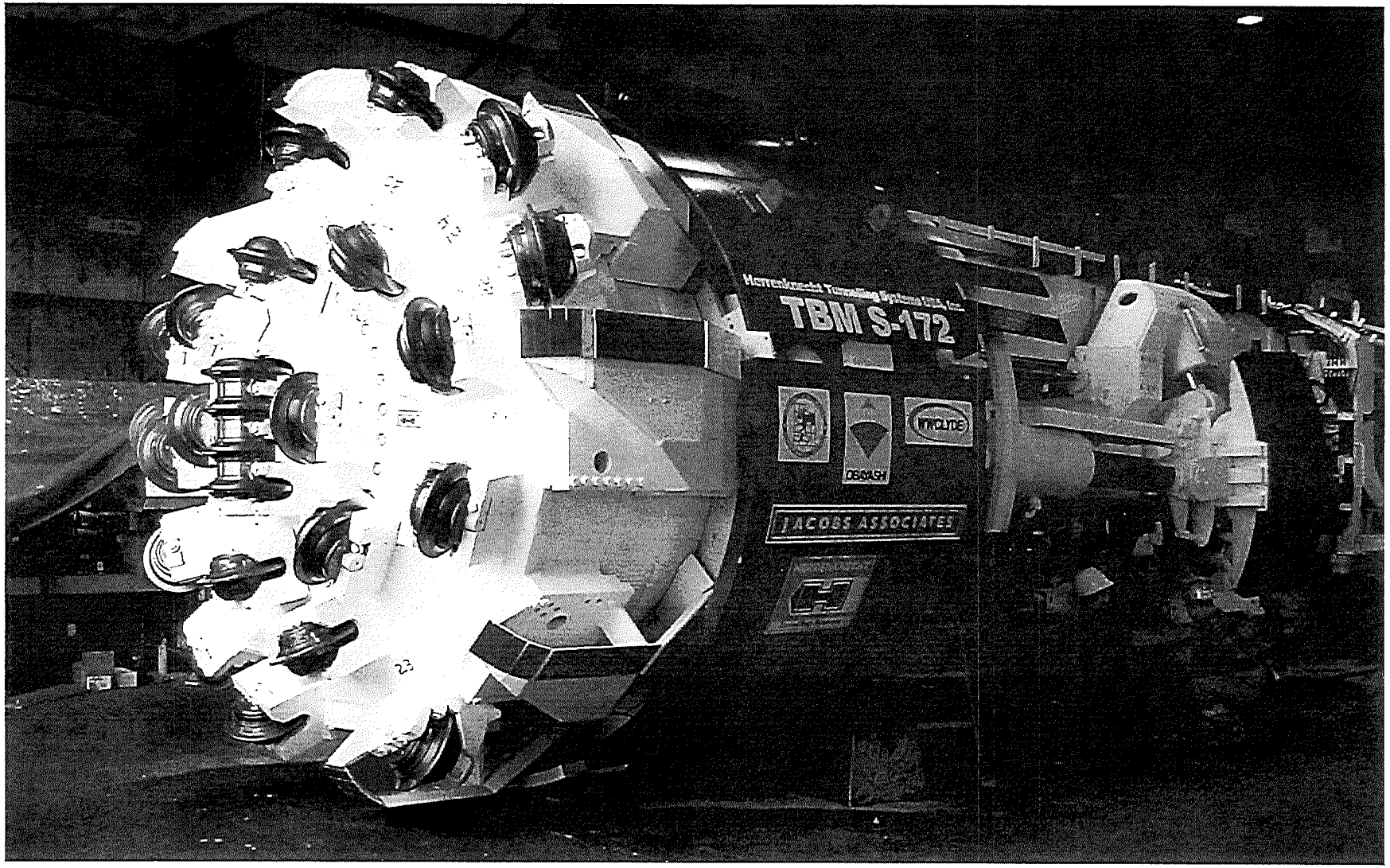


Figure 9. Typical main-beam TBM for rock excavation.

Figure 10. South portal proposed location in northbound lane and shoulder of NFD 44 Road. Portal will be located approximately where people are walking.

Figure 11. Approximate location of the north portal in a clear cut on the east side of NFD 17 Road.

APPENDIX C

Dog River Pipeline Critical Scheduling Issues

By Forest Connections, LLC

Dog River Pipeline Critical Scheduling Issues

June 18, 2009

Prepared by: Rich Thurman and Becky Nelson
Forest Connections, LLC

The following issues will need to be addressed during the planning and permitting phases of the Dog River Pipeline Replacement Project:

- A more developed proposed action is required. Information is needed on the following:
  - Access roads
  - Location and size of staging area
  - Size and number of trees to be removed
  - Cut trees disposal—sell, leave for down wood, or use for firewood
  - Exact location of new pipeline, flagged on ground

- The entire project is located in Surveyors Ridge Late Successional Reserve which may require additional time for consultation on spotted owls. Spotted Owl Surveys are required beginning 2 years in advance of construction and are good for 3 years. Two spotted owl surveys are needed, as follows:
  - Survey 1 year before the National Environmental Policy Act (NEPA) review starts
  - Second survey 1 year later during or prior to NEPA review

- A Mollusk Survey may be required to determine whether there are protected mollusks in the construction zone. More information is needed - don't need.

- Fire Restrictions during summer restrictions may cause construction delays. There is a 1 p.m. shut-down every day that may make it difficult to complete the project.

- There is recreation in the area may include road rallies, mountain biking, and hiking. Surveyors Ridge Trail may require closure or relocation during construction.

- A Heritage Resources Survey is done and a report is required for the Oregon State Historic Preservation Office. Recommendations in the report will include recovery of data, restoration of the small log cabin at the intake, possible interruptive signs near large cut, and disposition of red wood pipe.

- Botanical Surveys are required before NEPA review can be completed.

- NEPA review will take 12 to 18 months to complete.

Court—1M—12-43

Attachment J

STATE OF OREGON

COUNTY OF HOOD RIVER

CERTIFICATE OF WATER RIGHT

This Is to Certify, *That* City of The Dalles

of The Dalles, *State of* Oregon, *has a right to the use of*

the waters of Dog River

for the purpose of Municipal use for irrigation, domestic, power and stock

and that said right has been confirmed by decree of the Circuit Court of the State of Oregon for Hood River *County, and the said decree entered of record at Salem, in the Order Record of the STATE ENGINEER, in Volume* 6, *at page* 200 *; that the priority of the right thereby confirmed dates from* Aug. 1, 1870

that the amount of water to which such right is entitled, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed all the water in stream at point of diversion.

A description of the lands irrigated under such right, and to which the water is appurtenant (or, if for other purposes, the place where such water is put to beneficial use), is as follows:

Within the corporate limits of Dalles City, Oregon and by the inhabitants thereof. Place of diversion being 6627 feet south and 1399 feet east of the SE corner of Section 34, T. 1 S., R. 10 E., W. M.

And said right shall be subject to all other conditions and limitations contained in said decree.

The right to the use of the water for the purposes aforesaid is restricted to the lands or place of use herein described.

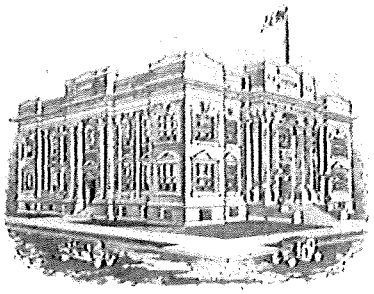
WITNESS the signature of the State Engineer, affixed

this 1st *day of* May, *19* 47.

CHAS. E. STRICKLIN
State Engineer

Recorded in State Record of Water Right Certificates, Volume 12, *page* 14954

Letters of Support



WASCO COUNTY

Board of County Commissioners
511 Washington Street, Suite 302
The Dalles, Oregon 97058-2237
(541) 506-2520
Fax: (541) 506-2521

Rod Runyon, *Commission Chair*

Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301

January 14, 2016

To Whom It May Concern:

As Chair of the Wasco County Board of Commissioners, I support the City of The Dalles' plan to replace the antiquated wooden Dog River Diversion Pipeline which currently supplies 54% of the water to over half the population and the vast majority of businesses in Wasco County. Not only would a replacement line stabilize the water supply for our citizens but it would also support the retention and development of businesses in the County's business/industrial center. In addition, the project would enable an increase of 280 acres of industrial property which would in turn create 200-500 jobs; not to mention the higher-wage jobs created by the project itself.

Dog River Pipeline loses an estimated one-million gallons of water per day – water that would remain in the East Fork Hood River and Hood River to the benefit of the fish populations. The City's plan to replace the wooden pipeline with ductile iron pipe includes the voluntary installation of fish screens and possibly upstream fish passage structures where none currently exist, further benefiting the local aquatic habitat.

Finally, the median income in The Dalles is 11% lower than the state average, with 15% of the households below the poverty level and yet pay above-average water rates. This population cannot bear the burden of the rate increases that would be required to pay for this project without grant funding.

I urge you to approve the City of The Dalles funding application for this vital project.

Sincerely,

Rod Runyon

Rod Runyon
Commission Chair
Wasco County Board of Commissioners

Public Health
Prevent. Promote. Protect.

NORTH CENTRAL PUBLIC HEALTH DISTRICT

"Caring For Our Communities"

419 East Seventh Street
The Dalles, OR 97058-2676
541-506-2600
www.ncphd.org

January 15, 2016

To Whom It May Concern:

As the Health Officer for North Central Public Health District, I am in strong support of the city of The Dalles' application for an Oregon Water Resources Department grant to aid funding the replacement of the Dog River Pipeline. North Central Public Health District serves Wasco, Sherman and Gilliam Counties. The vast majority of residents of Wasco County live in the greater The Dalles area.

In public health, we are committed to ensuring the health and safety of all the residents in our jurisdiction. Having a reliable, safe water supply is essential for the health of any community. The current pipeline, which is over 100 years old, carries more than half of The Dalles' municipal water supply. This pipeline is leaking, and at risk for complete failure. Disruption of the water supply to a city can lead to public health catastrophes.

The proposed project will eliminate the aged pipeline with a ductile iron pipe. This will correct the current leakage of approximately 1 million gallons per day (MGD) of water, and increase the capacity of the pipeline from 8 MGD to 17 MGD, to meet future water demands.

The award of the requested grant will be a direct benefit to the residents of The Dalles, many of whom are elderly and living on fixed incomes. Our residents already have higher than average water utility rates, despite the median household income in The Dalles being below the state average.

Without support from the Oregon Water Resources Department, those most vulnerable in The Dalles will see further utility rate increases. This will cause an additional strain on those already struggling to care for their families and themselves.

Thank you for consideration of the grant application. Please contact me if I can be of further assistance.

Sincerely Yours,

Miriam D. McDonell, MD, FACOG
Health Officer, North Central Public Health District
Medical Examiner, Wasco County & Sherman County
mimim@co.wasco.or.us

PORT OF THE DALLES

January 14, 2016

Dave Anderson, Public Works Director
City of The Dalles
Public Works Department
1215 West First Street
The Dalles, OR 97058

RE: Dog River Pipeline Replacement Project

Dear Dave:

The Port of The Dalles strongly supports the City of The Dalles' grant application to replace and improve the Dog River pipeline.

The City of The Dalles has continuously been a strong supporter and partner with the Port in our economic development efforts, and the City's ability to provide an adequate supply of clean water has helped the Port recruit new business to The Dalles. Just this week the Port of The Dalles received our Industrial Site Certification letter from the State of Oregon for our new 60A development, a major component of the certification addresses available and reliable capacity of the infrastructure to the site. Because the Dog River pipeline supplies a majority of the municipal water for the City, its functionality and reliability are very important to the Port, both to our existing businesses, as well as for efforts to recruit new businesses.

Thank you for your effort in this.

Sincerely,

Andrea Klaas, Executive Director

3636 Klindt Drive, The Dalles, OR 97058 | Toll Free: 800.901.7678 | Ph: 541.298.4148 | Fax: 541.298.2136 | portofthedalles.com

Mid-Columbia
MCEDD
ECONOMIC DEVELOPMENT DISTRICT

January 14, 2016

Tom Byler
Director
Oregon Water Resource Department
725 Summer St. NE Ste A
Salem, OR 97301

Subject: City of The Dalles—Dog River Pipeline Replacement Project

Dear Mr. Byler:

We are writing to express Mid-Columbia Economic Development District's (MCEDD) support for the City of The Dalles' Water Supply Development Account grant request for the Dog River Pipeline Replacement Project.

The City of The Dalles is the largest city in the Mid-Columbia, with approximately 14,500 residents, and the vast majority of industrial and commercial development in Wasco County. It is the commercial and service hub for the Mid-Columbia region as well. In order to support existing businesses and residents, a forward looking solution that addresses this failing infrastructure is needed. The Dog River Pipeline Replacement Project addresses these severe infrastructure concerns that affect over half of the City's water supply.

Completion of this project will have several significant impacts on The Dalles, and the region as a whole. It will allow for additional business investment in the over 280 acres of industrial land available for development in The Dalles, which makes up a large portion of the region's relatively constrained industrially zoned land. This project will also have positive impacts in Hood River County by addressing the current leakage of over 1 million gallons per day it ensures that our limited water resources are efficiently used and provides an opportunity for needed in-stream flow to increase in Dog River and the East Fork of the Hood River.

MCEDD annually publishes the Mid-Columbia's Comprehensive Economic Development Strategy (CEDS) that provides the framework for our work to support a strong regional economy. The CEDS identifies developing and maintaining municipal water supplies as essential to the creation of economic opportunity in the Mid-Columbia. With this in mind, we appreciate your consideration of The City of The Dalles' application and encourage funding the project.

Sincerely,

Amanda Hoey, Executive Director

Economic Development Commission

January 14, 2016

Tom Byler
Director
Oregon Water Resource Department
725 Summer St. NE Ste A
Salem, OR 97301

Subject: City of The Dalles—Dog River Pipeline Replacement Project

Dear Mr. Byler:

The Wasco County Economic Development Commission (EDC) strongly supports the City of The Dalles in its efforts to replace the over 100 year old wooden pipe that provides access to the majority of the water used in the City's water system. This project is necessary to support a strong community and economy in the City of The Dalles and throughout Wasco County.

The City of The Dalles is the largest in Wasco County, with approximately 14,500 residents currently, and the vast majority of industrial and commercial development in the County. It is the commercial hub for the Mid-Columbia region as well. In order to support existing businesses and residents, a forward looking solution that addresses this failing infrastructure is needed. Addressing the significant leakage, concerns around catastrophic failure of the current pipeline, and adding additional capacity will ensure that the water system in The Dalles remains viable into the future.

This project-and your grant investment-will have significant positive impacts in Wasco County and the region. It will accommodate the use of approximately 280 acres of to-be-developed industrial land where an efficient and reliable water system is needed for business investment. It will provide a more efficient use of our limited water resources that leaves additional in-stream flow that is desperately needed in Dog River and the East Fork of The Hood River in the Hood River Valley. Grant investment will also ensure that water rates remain relatively affordable for the significant low income population in The Dalles' rate payer base.

The EDC is a body made up of representatives throughout Wasco County and is focused on supporting community capacity and job creation. We appreciate your consideration for the City of The Dalles' application and encourage funding the project.

Sincerely,

Joan Silver

Joan Silver, Chair

515 East Second Street The Dalles, OR 97058 ♦ 541-296-2266 ♦ www.co.wasco.or.us/county/wcedc

North Wasco County School District No. 21
Office of the Superintendent

January 13th, 2016

Oregon Water Resources Department
Water Supply Development Account grant

To Whom It May Concern:

This is a letter of support for The City of The Dalles request for a grant to help complete the ***Dog River Pipeline Replacement Project***. The current pipeline is over one hundred years old and relies on antiquated wooden infrastructure. The Dog River Pipeline currently carries about 54% of the City's annual municipal water supply. This pipeline has deteriorated, is leaking, and at serious risk of catastrophic failure. It is estimated that approximately 1 million gallons per day of water leaks from the current wooden structure at high flows.

The project will replace the aged wooden pipeline with a ductile iron pipe and the project will voluntarily install fish screens on the pipeline intake and likely install upstream fish passage structures where none currently exist in Dog River. The pipeline is located on US Forest Service property and authorized through a Special Use Permit. Through this project, ***the capacity of the pipeline will be increased from 8 million gallons per day to 17 million gallons per day to meet future municipal water demands***.

This project is vital to our economy and to livability within our community. If the pipeline fails, the City loses half of its annual water supply. The environmental benefits of this project include eliminating the leakage, allowing up to 1 million gallons per day to remain in Dog River which then flows in to the East Fork Hood River and Hood River additionally benefiting the fish populations in those stream systems. It will also augment stream flows in South Fork Mill Creek which supports one of the easternmost runs of indigenous winter steelhead trout, a species listed as *"threatened"*, in the Columbia River Basin. The augmented segment of South Fork Mill Creek is the best spawning/rearing habitat in the Mill Creek system.

This project will also benefit low-income residents by providing continued access to high quality affordable water supplies provided by the City's municipal water system. Approval of this funding request especially benefits the lower-income residents since any grant funds awarded are monies that don't need to be provided by rate payers. Currently, The Dalles has higher water rates being paid by a population with a higher percentage of minorities and lower income residents as compared to state averages, therefore a greater financial burden for all residents. Approval of this funding request will help mitigate future water rate increases that directly benefit all residents, and especially our low-income community.

For all of the above reasons, North Wasco County School District 21 is very supportive of this request and hopeful ***The Oregon Water Resources Department*** will fund this project.

If you have any questions, please feel free to contact me directly at 541.506.3420.

Sincerely,

Candy Armstrong, Superintendent
North Wasco County School District 21

3632 West 10th Street • The Dalles, OR 97058
541-506-3420 • Fax 541-298-6018
www.nwasco.k12.or.us

THE DALLES MAIN STREET

thedallesmainstreet.org

Dave Anderson
City of The Dalles Public Works
1215 West First Street
The Dalles, OR 97058

Re: Dog River Pipeline Replacement Project

Dear Dave,

The Dalles Main Street Organization expresses strong support for The City of The Dalles application for a Water Supply Development Account Grant from the Oregon Water Resources Department (WRD) to help fund the replacement of the Dog River Diversion Pipeline.

The Dalles Main Street Organization is a 501©3 nonprofit that uses a National 4-point approach, tremendous support from the community, and numerous volunteers to revitalize and preserve our historic downtown.

The Dog River Pipeline is a 100+ year old wooden water transmission pipeline which clearly needs replacement to secure an adequate and constant supply of water to the Downtown. The replacement is also needed to reduce water loss and leakage. Both points are of particular concern because of our location in a dry region, recent drought conditions, and because the Downtown expects significant development and expansion in the coming years and has already begun to see such expansion.

Downtown The Dalles has over 200 businesses that rely and expect access to high quality and affordable water supplies. Our Downtown is in the midst of revitalization and growth which will result in increased demand. The upgrade of the pipeline is absolutely required for the survival and growth of our downtown.

Sincerely,

Matthew Klebes
Executive Director

404 W 2nd St. The Dalles, OR 97058 | Tel: 541-370-2966 | Fax: 541-296-1688 | Email: tdmainstreet@gorge.net

OREGON
CHERRY GROWERS

January 14, 2016

City of The Dalles
Department Public Works
Dave Anderson, Public Works Director
1215 West 1st Street
The Dalles, Oregon 97058

Dear Dave,

Oregon Cherry Growers is a Grower owned food processing cooperative with 2 operating Plants located in The Dalles. We produce fruit products that are sold throughout North America and the world. Our business has been operating in The Dalles for over 80 years and is a crucial part of the local and regional cherry industry. We are also one of the top 10 private employers in Wasco County.

Our business requires a reliable and affordable source of clean potable water for us to be able to produce our food products. Water is a key part of our food processing systems for both storage of our raw fruit and processing of our fruit into our finished food products.

The Dog River Pipeline Project would help to ensure that we can continue having the reliable, year round water supply we depend on being available to conduct our business. It would also help to support the continued economic development of our community by allowing business' like Oregon Cherry Growers to continue to grow and prosper. The environmental benefits for fish populations and social benefits to the people of The Dalles also align this project with our company values.

Oregon Cherry Growers fully supports the construction of the Dog River Pipeline Project.

Sincerely,

Marty Hutchinson | Plant Manager - Riverside
(W) 541-506-7760
P.O. Box 1577, 801 W 1st St, The Dalles, Oregon 97058

OREGON
CHERRY GROWERS, INC
http://www.oregoncherry.com | http://www.oregoncherryonline.com

Sustaining the family farms of our co-op members by returning optimum value for their fruit.

MID-COLUMBIA COUNCIL OF GOVERNMENTS

Wasco Hood River Sherman Gilliam Wheeler

January 19, 2016

Dave Anderson
Public Works Director
City of The Dalles
1215 West First Street
The Dalles, OR 97058

RE: Letter of Support for the City of the Dalles Dog River Pipeline Project

Dear Mr. Anderson:

The Mid-Columbia Council of Governments (MCCOG) is pleased to submit this letter of support for the City of the Dalles Dog River Pipeline Project. The wooden pipeline that is currently transmitting over half of the City's water is very old and inefficient. With the current drought conditions in not only the State of Oregon, but the entire country, the City of the Dalles can no longer operate a pipeline that is not operating at its peak efficiency. All we need to do is to look at the current conditions in Flint, Michigan and know that our water systems must be 100% safe for our residents.

An inefficient pipeline is also a costly operational problem. The City of the Dalles is a city with 15% of its households below the poverty level for the state, as well as 18% of its residents are senior citizens on fixed incomes. They cannot afford rate increases by the City of the Dalles to continue to maintain and operated a century-old, inefficient pipeline

The City of the Dalles wants to create jobs, opportunity, and promote the goal of sustainable resources. The Dog River Pipeline Project meets this goal because of its focus on water reduction and efficient use of resources. For the sake of the safety of the water system and continued conservation of our most precious resource, our water, MCCOG is firmly in support of this project. Thank you.

Sincerely,

Bob Francis
Executive Director

NORTHERN WASCO COUNTY PUD

PEOPLE'S UTILITY DISTRICT

January 19, 2016

Oregon Water Resources Department

To whom it may concern,

Northern Wasco County People's Utility District (NWCPUD) supports the City of The Dalles (City) Dog River Pipeline Replacement Project. NWCPUD is the electrical service provider within the City limits and urban growth boundary and share the same customer base as the City.

The Dog River Pipeline Replacement Project is important needed infrastructure improvements to the 3.5 mile long, 100+ year old wooden transmission pipeline to ensure ample supplies of water to the City. This pipeline currently carries 54% of the City's annual municipal water supply and leaks approximately 1 million gallons of water per day at high flows.

The City, in replacing the pipeline, will provide environmental benefits by eliminating leakage, allowing water to remain in the stream systems, voluntarily install fish screens on the intake and upstream fish passage structures where none currently exist.

The City has a higher population of Hispanic (17%) and residents over the age 65 (18%) as compared to the State of Oregon averages of 12% and 14% respectively (2010 Census) and median household income for The Dalles is $44,465 compared to the statewide average of $50,251 (2013 data). Approval of this funding request will especially benefit the lower-income residents of the City as this will offset any needed rate increases and decrease the financial burden for those that can least afford it.

Again NWCPUD supports the Dog River Pipeline Replacement Project and is necessary for ongoing benefit and future growth to the community.

Thank you,

Roger M. Kline
General Manager
Northern Wasco County PUD
(541) 296-2226

MCMC | A PLANETREE HOSPITAL

1700 E 19th St.
The Dalles, OR 97058
Tel. 541-296-1111
Fax 541-296-7600
www.mcmc.net

January 18, 2016

To Whom It May Concern:

I would like to personally offer my support for The City of The Dalles and the proposed Dog River Pipeline Replacement Project.

As President and CEO of the hospital here in The Dalles, I am very invested in not only the structural efforts of this revitalization project, but the economic and environmental benefits as well. The current wooden pipeline is in great need of repair not only for safety reasons, but to recapture the high level of valuable resources that are currently leaking from this structure at a high volume rate.

Our city and local governments have dedicated countless hours and resources to make this project a reality and I encourage you to approve this grant application on their behalf.

Sincerely,

Duane W. Francis
President & CEO

PEOPLE • PARKS • PROGRAMS

NWC PARKS & RECREATION DISTRICT

January 15, 2016

RE: Dog River Pipeline Replacement Project

To Whom It May Concern:

Northern Wasco County Parks & Recreation District is pleased to support the City of The Dalles in their application for the Water Supply Development Account grant for the Dog River Pipeline Replacement Project. The funding of this project will continue to allow the City of The Dalles to provide access to high quality water for the citizens of The Dalles through replacement of a century old wooden water pipeline.

Northern Wasco County Parks & Recreation District is responsible for operating parks, trails, and recreation facilities for the citizens of The Dalles. We recently opened a new 50 meter outdoor pool and aquatic center to the public and rely heavily on the City of The Dalles municipal water system to consistently supply water for our operational use. A failure of the Dog River Pipeline could significantly impact our ability to provide clean and safe facilities for the citizens of The Dalles and the surrounding community. The project will positively impact our local economy and provide environmental benefits to our watershed and habitat through the elimination of up to one million gallons of water loss per day.

I hope you will strongly consider The City of The Dalles grant request. Please feel free to contact me with any questions.

Warmest Regards,

Phil Lewis, CPRP | Executive Director
Northern Wasco County Parks & Recreation District
541-296-9533
phil@nwprd.org

Dog River Pipeline Replacement Project Budget

Category	Units	Unit Cost	# of Units	Cost
Environmental Analysis for NEPA	lump sum	$ 94,268	1	$ 94,268
Issue RFP for final design (in-kind)	hourly rate	$ 53	40	$ 2,107
Final design engineering	lump sum	$ 856,014	1	$ 856,014
COE/DSL fill/removal permits	lump sum	$ 1,000	1	$ 1,000
Advertise construction contract (in-kind)	hourly rate	$ 53	15	$ 795
Award construction contract (in-kind)	hourly rate	$ 53	10	$ 530
Purchase/install arch culvert	lump sum	$ 32,000	1	$ 32,000
Construct staging areas	lump sum	$ 20,000	1	$ 20,000
Logging of construction corridor	mbf	$ 1,000	250	$ 250,000
Install temporary piping	lump sum	$ 50,000	1	$ 50,000
Pipeline construction:				
Labor	hours	variable	14,263	$ 1,285,103
Material				$ 4,039,214
Material shipping				$ 42,693
Equipment				$ 435,816
Other				$ 1,800
Contractor General Conditions				$ 456,117
Bldg Risk/Liability Auto Insurance				$ 130,449
Bonds				$ 99,794
Install fish screen/passage systems				$ 300,000
Total				**$ 8,097,700**