REFERENCE DOCUMENTS

1. Geotechnical Data Report

Geotechnical Data Report
Judy Reservoir to Mount Vernon Transmission Pipeline - Phase 2 Project
Skagit County, Washington

November 27, 2018

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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21-1-22430-001

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GEOTECHNICAL DATA REPORT
JUDY RESERVOIR TO MOUNT VERNON TRANSMISSION PIPELINE - PHASE 2 PROJECT
SKAGIT COUNTY, WASHINGTON

1.0 INTRODUCTION

This draft geotechnical data report (GDR) presents the results of our field explorations and field and laboratory testing performed for the Judy Reservoir to Mount Vernon Transmission Pipeline - Phase 2 Project (Project). Our scope of services included drilling and sampling four borings, preparing descriptive field logs of the explorations, performing geotechnical laboratory tests on samples obtained from the field explorations, and preparing this draft GDR.

Our services to prepare this GDR were conducted in general accordance with Task 105 as described in Task Order 0006, to our Agreement with HDR Engineering, Inc., dated October 14, 2016.

2.0 SITE AND PROJECT DESCRIPTION

The purpose of the Project is to construct an approximately 5.3-mile pipeline to connect the water treatment plant at Judy Reservoir to the domestic water system serving Mount Vernon and the surrounding Skagit County area. This new, approximately 36-inch-diameter pipeline will serve as the long-term replacement for the existing 24-inch-diameter pipeline and will also satisfy increased water demands in the system and provide improved reliability. The new pipeline will extend from State Route (SR) 538 to a connection point near the Public Utility District No. 1 of Skagit County water treatment facilities at Judy Reservoir.

This report addresses the geotechnical explorations and data collected for crossings of the Nookachamps Creek and the East Fork Nookachamps Creek. The site of the Nookachamps Creek Crossing is situated in the portion of the Skagit Land Trust and Skagit Environmental Bank between SR 538 to the south and west, SR 9 to the east, and the extension of Gunderson Road to the north. The land is primarily a grassland within the elevation and reach of the Nookachamps Creek fluctuating with the seasons. The land to the north of this site is used for agriculture.

The East Fork Nookachamps Creek crossing parallels SR 9 to the north and is south and west of Babcock Road. There is an existing roadway bridge for SR 9 at the crossing. Dense trees and

vegetation populate the area surrounding the creek. The creek runs approximately 20 feet below the roadway surface at an elevation of about 32 feet.

The vertical datum for this Project is the North American Vertical Datum of 1988.

3.0 SUBSURFACE EXPLORATION PROGRAM

Shannon & Wilson conducted geotechnical explorations to evaluate the subsurface and groundwater conditions present along the Project alignment. The geotechnical explorations included collecting existing geotechnical data and performing a field exploration program.

3.1 Existing Subsurface Explorations

The collected existing subsurface explorations in the Project vicinity (Figure 1) include seven previous borings located near the SR 9 bridge. The existing exploration logs were collected from Washington State Department of Transportation files. Since these explorations were conducted by others, the information cannot be verified. Consequently, the existing exploration logs are provided for reference only and as such the Contractor should not rely exclusively on the data, interpretation, or assessments provided in these logs. The general location of the previous explorations for the SR 9 bridge is shown in the Site and Exploration Plan, Figure 1. The previous exploration logs along with the plan, elevation, and section developed for the bridge are presented in Appendix C.

3.2 Project Subsurface Explorations

A total of four geotechnical borings were drilled to characterize the subsurface conditions at the two crossings. Boretec, Inc. performed the borings under subcontract to Shannon & Wilson. The borings were performed using an EC-95 track-mounted drill rig. The EC-95 used a continuous-flight auger with a hollow stem to advance the boring. This method uses applied down pressure and rotation at the top of the continuous-flight auger. Soil samples were obtained by lowering a split-spoon sampler through the hollow stem of the auger. A Shannon & Wilson field representative observed the drilling and sampling of the borings. The locations of the borings are shown in Figure 1. The boring logs are presented in Appendix A.

Investigation-derived waste generated by this work (drilled soil cuttings) was spread on site to match existing ground surface.

3.3 Soil Sampling

Soil samples were obtained in conjunction with Standard Penetration Tests (SPTs). The SPTs were performed using a rope and cathead hammer and in accordance with the ASTM Designation: D1586-11, Test Method for Penetration Test (SPT) and Split-Barrel Sampling of Soils (ASTM, 2011). The Standard Penetration Resistance (N-value) is a useful parameter for determining the relative density or consistency of the soils. Density or consistency as it is related to the SPT N-value is shown in Figure A-1 in Appendix A. The recorded N-values are included in the boring logs in Appendix A.

After each split-spoon sampler was removed from the borehole, a Shannon & Wilson field representative opened the sampler and visually examined the soil sample. The field representative then described and classified the sample, removed it from the split-spoon sampler, and sealed the sample in a jar. The jars were stored in boxes and returned to the Shannon & Wilson laboratory for further examination and testing.

3.4 Project Boring Logs

The Project boring logs are presented in Appendix A. A boring log is a written record of the subsurface conditions encountered in the boring. It graphically shows the geologic units (layers) encountered in the boring and the Unified Soil Classification System (USCS) symbol of each geologic layer. It also includes the natural water content, penetration resistance, and the Atterberg Limits of soil samples at various depths within the boring where tests were performed. Other information shown in the boring logs includes the most recent groundwater level measurement, approximate ground surface elevation, coordinates, and types and depths of sampling. The location coordinates on the boring logs were provided by GeoEngineers, Inc. A soil description and log key for the Project boring logs is presented in Figure A-1 in Appendix A.

3.5 Observation Well Installation

Observation wells were installed in borings SW-2P and SW-4P. Each observation well was installed by a Washington State Licensed Well Driller and consisted of threaded, 2-inch inside diameter, polyvinyl chloride well casing with a slotted portion (screen) to allow for inflow of water. An end cap (sump) was attached to the bottom of the slotted section. A filter pack consisting of No. 10-20 Colorado silica sand was used around each screen. An 8-inch-diameter, flush-mounted, steel monument was placed at the ground surface to protect the top of each observation well.

4.0 GROUNDWATER MEASUREMENTS

The depth to groundwater in the observation wells was measured using an electronic water level indicator. The measured groundwater levels for the observation wells are shown in the boring logs in Appendix A.

5.0 LABORATORY TESTING

Geotechnical laboratory and corrosion tests were performed on selected soil samples retrieved from the borings. The geotechnical laboratory testing program included tests to classify the soil and provide data for engineering studies. We performed visual classification on all retrieved samples. Our laboratory testing program included water content determinations and Atterberg Limits determinations. Results from the geotechnical laboratory tests are included in Appendix B.

5.1 Visual Classification

We visually classified soil samples retrieved from the borings using a system based on ASTM D2487-17, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) (ASTM, 2017), and ASTM D2488-09a, Standard Recommended Practice for Description of Soils (Visual-Manual Procedure) (ASTM, 2011). We summarize our classification system in Appendix A. We assigned a USCS group name and symbol based on particles finer than 76.2 millimeters (3 inches). We revised visual classifications using results of the index tests discussed below.

5.2 Water Content Determinations

We determined the water content of selected samples in accordance with ASTM D2216-10, Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (ASTM, 2010a). Comparison of the water content of a soil with its index properties can be useful in characterizing soil unit weight, consistency, compressibility, and strength. We present water content test results in the Laboratory Test Summary table in Appendix B and graphically on boring logs in Appendix A.

5.3 Atterberg Limits Determination

We determined soil plasticity by performing Atterberg Limits tests on selected samples in accordance with ASTM D4318-10e1, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils, Method A (Multi-Point Liquid Limit) (ASTM, 2010b). The Atterberg Limits include liquid limit (LL), plastic limit (PL), and plasticity index (PI=LL-PL). These

limits can assist soil classification, indicate soil consistency (when compared to natural water content), provide correlation to soil properties, evaluate clogging potential, and estimate liquefaction potential.

We present soil plasticity test results in the Lab Summary Table and in plasticity charts in Appendix B. Plasticity charts provide the LL, PL, PI, USCS group symbol, the sample description, water content, and percent passing the No. 200 sieve (if a grain size distribution analysis was performed). Soil plasticity test results are also shown on the exploration logs presented in Appendix A.

5.4 Ductile Iron Pipe Research Association (DIPRA) Corrosion Testing

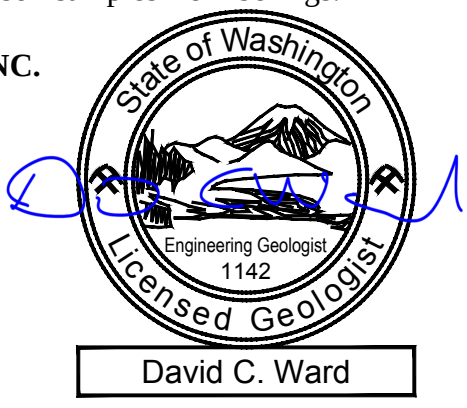
Chemical analytical testing for corrosivity was completed by GeoEngineers, Inc. under subcontract to HDR Engineering, Inc. in general accordance with the DIPRA 10-Point Soil Evaluation. The evaluation includes measurement of resistivity, pH, redox potential, sulfides, and moisture to rate the soil corrosion potential. The DIPRA results are included in Appendix B.

6.0 LIMITATIONS

This GDR presents the data from field explorations and field and laboratory testing of subsurface conditions at the specific locations and depths indicated, using the means and methods described in this report. No other representation is made. This report should be made available to the prospective contractors for information on factual data only. Subsurface conditions that are interpreted from the data included in this report may not be construed as a guarantee or warranty of such interpreted conditions.

Natural processes or human activity may alter subsurface conditions. Because a geotechnical report is based on conditions that existed at the time of subsurface explorations, construction decisions should not be based on a report whose adequacy may have been affected by time, unless verified. Unanticipated soil conditions are commonly encountered and cannot fully be determined by merely taking soil samples from borings.

SHANNON & WILSON, INC.



David Ward, PE, LEG
Senior Associate

8/10/2020

JCS:DCW/jcs

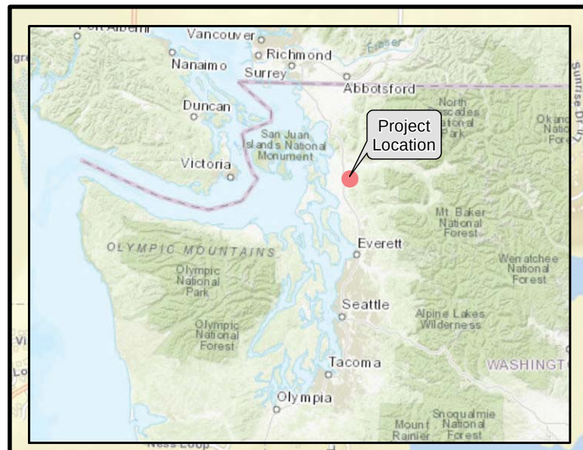
7.0 REFERENCES

ASTM, 2010a, Standard test methods for laboratory determination of water (moisture) content of soil and rock by mass, D2216-10: West Conshohocken, Pa., ASTM International, Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, 7 p., available: www.astm.org.

ASTM, 2010b, Standard test methods for liquid limit, plastic limit, and plasticity index of soils, D4318-10e1: West Conshohocken, Pa., ASTM International, Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, 16 p., available: www.astm.org.

ASTM, 2011, Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils, D1586-11, West Conshohocken, Pa., ASTM International, Annular book of standards, v. 04.08, soil and rock (I): D420 – D5876, 9 p., available: www.astm.org

ASTM, 2017, Standard practice for classification of soils for engineering purposes (unified soil classification system), D2487-17: West Conshohocken, Pa., ASTM International, Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, 12 p., available: www.astm.org.



Existing Explorations For
SR-9 Bridge Not Shown For Clarity
(See Appendix C - 21-1-22430-001)

East Fork Nookachamps Creek

SW-4P

SR 9

SW-3B

East Fork Nookachamps Creek

Nookachamps Creek

SR 538

SW-1B

SW-2P

SR 9

Barney Lake

Clear Lake

Beaver Lake

Baker Heights

Swan Rd

Chestnut Pl

Buchanan St

Mud Lake Rd

Babcock Rd

Sunday Ln

Teak Ln

Buchanan Pl

Maple Ave

Cedar St

S Front St

State Route 9

Beaver Lake Rd

Austin Rd

Fox Rd

Fonk Rd

Maple Hill Ln

Turner Creek

Doe Ln

Martin Rd

McLaughlin Rd

Autumn Way

E College Way

Gunderson Rd

Glory To Glory Ln

F Stevens Rd

Baker Heights Rd

Knapp Rd

Glenn Rd

Nookachamps River

Edgemont Pl

Monte Vista Pl

Kulshan Trail

Seneca Dr

Kiowa Dr

Pueblo Hts

E Fir St

Mt Baker Loop

Crested Butte Blvd

Panorama Rdg

Skagit Highlands Pkwy

Larabee Way

Razor Peak Dr

Timberridge Dr

Buckhorn Way

Swift Creek Dr

Hoag Memorial Park (Big Rock)

Bakerview Park

Centennial Elementary School

Skagit Valley Mobile

Cherokee Ln

Apache Dr

Mohawk Dr

Comanche Dr

Iroquois Dr

Pine Crest Dr

N Trumpeter Dr

Trumpeter Blvd

Tundra Loop

Summersun St

N 30th St

N 32nd Pl

N 33rd Pl

N 35th Pl

N 35th St

N 40th Pl

N Waugh Rd

Martin Rd

Horton Ln

N 43rd Pl

Lilac Dr

Sunset Dr

Timberland Loop

Shakti Ln

Schoch Ln

Barney Lake Rd

Club Ct

Firwood Ln

Briarwood Dr

Arbor St

Trumpeter Dr

Playfields Trl

Rita Dr

Helen Dr

Manor

Skagit Valley Mobile

Elk Dr

LEGEND

Exploration Designation & Approximate Location

Approximate Project Alignment (July 30, 2018)

N

W E

S

0 1,500

Feet

Judy Reservoir to Mount Vernon
Transmission Pipeline-Phase 2
Skagit County, Washington

SITE AND EXPLORATION PLAN

November 2018 21-1-22430-001

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FIG. 1

Filename: L:\Users\DCW\Skagit_PUD.mxd Date: 11/27/2018 brl

APPENDIX A

PROJECT SUBSURFACE EXPLORATIONS

APPENDIX A

PROJECT SUBSURFACE EXPLORATIONS

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FIGURES

A-1 Soil Description and Log Key (3 sheets)
A-2 Log of Boring SW-1B
A-3 Log of Boring SW-2P
A-4 Log of Boring SW-3B
A-5 Log of Boring SW-4P

Shannon & Wilson, Inc. (S&W), uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following pages. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

S&W INORGANIC SOIL CONSTITUENT DEFINITIONS

CONSTITUENT[2]	FINE-GRAINED SOILS (50% or more fines)[1]	COARSE-GRAINED SOILS (less than 50% fines)[1]
Major	***Silt, Lean Clay, Elastic Silt,*** or ***Fat Clay***[3]	***Sand*** or ***Gravel***[4]
Modifying (Secondary) Precedes major constituent	30% or more coarse-grained: ***Sandy*** or ***Gravelly***[4]	More than 12% fine-grained: ***Silty*** or ***Clayey***[3]
Minor Follows major constituent	15% to 30% coarse-grained: ***with Sand*** or ***with Gravel***[4]	5% to 12% fine-grained: ***with Silt*** or ***with Clay***[3]
	30% or more total coarse-grained *and* lesser coarse-grained constituent is 15% or more: ***with Sand*** or ***with Gravel***[5]	15% or more of a second coarse-grained constituent: ***with Sand*** or ***with Gravel***[5]

[1]All percentages are by weight of total specimen passing a 3-inch sieve.
[2]The order of terms is: *Modifying Major with Minor*.
[3]Determined based on behavior.
[4]Determined based on which constituent comprises a larger percentage.
[5]Whichever is the lesser constituent.

MOISTURE CONTENT TERMS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

STANDARD PENETRATION TEST (SPT) SPECIFICATIONS

Hammer:	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diam. cathead 2-1/4 rope turns, > 100 rpm NOTE: If automatic hammers are used, blow counts shown on boring logs should be adjusted to account for efficiency of hammer.
Sampler:	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value:	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less; 10 blows for 0 inches.

NOTE: Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

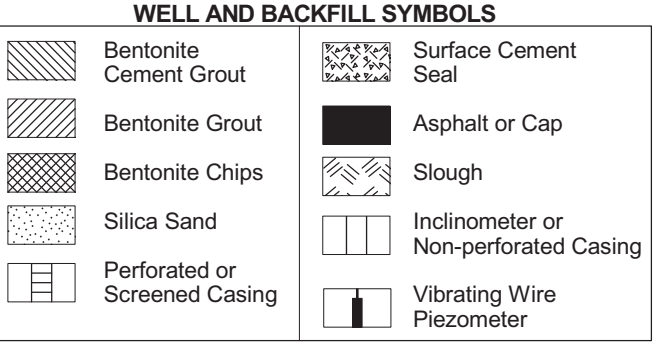
PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR APPROXIMATE SIZE
FINES	< #200 (0.075 mm = 0.003 in.)
SAND	
Fine	#200 to #40 (0.075 to 0.4 mm; 0.003 to 0.02 in.)
Medium	#40 to #10 (0.4 to 2 mm; 0.02 to 0.08 in.)
Coarse	#10 to #4 (2 to 4.75 mm; 0.08 to 0.187 in.)
GRAVEL	
Fine	#4 to 3/4 in. (4.75 to 19 mm; 0.187 to 0.75 in.)
Coarse	3/4 to 3 in. (19 to 76 mm)
COBBLES	3 to 12 in. (76 to 305 mm)
BOULDERS	> 12 in. (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
< 4	Very loose	< 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very dense	15 - 30	Very stiff
		> 30	Hard

WELL AND BACKFILL SYMBOLS



PERCENTAGES TERMS [1, 2]

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

[1]Gravel, sand, and fines estimated by mass. Other constituents, such as organics, cobbles, and boulders, estimated by volume.

[2]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

SOIL DESCRIPTION AND LOG KEY

November 2018 21-1-22430-001

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FIG. A-1
Sheet 1 of 3

SOIL_CLASS_KEY_PG1 21-22430.GPJ SHAN_WIL.GDT 8/7/18

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL		TYPICAL IDENTIFICATIONS
COARSE-GRAINED SOILS *(more than 50% retained on No. 200 sieve)*	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Gravel *(less than 5% fines)*	GW		Well-Graded Gravel; Well-Graded Gravel with Sand
			GP		Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel *(more than 12% fines)*	GM		Silty Gravel; Silty Gravel with Sand
			GC		Clayey Gravel; Clayey Gravel with Sand
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Sand *(less than 5% fines)*	SW		Well-Graded Sand; Well-Graded Sand with Gravel
			SP		Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand *(more than 12% fines)*	SM		Silty Sand; Silty Sand with Gravel
			SC		Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML		Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL		Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
		Organic	OL		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	MH		Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH		Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT		Peat or other highly organic soils (see ASTM D4427)

NOTE: No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

NOTES

1. Dual symbols *(symbols separated by a hyphen, i.e., SP-SM, Sand with Silt)* are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart. Graphics shown on the logs for these soil types are a combination of the two graphic symbols (e.g., SP and SM).

2. Borderline symbols *(symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand)* indicate that the soil properties are close to the defining boundary between two groups.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

SOIL DESCRIPTION AND LOG KEY

November 2018 21-1-22430-001

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FIG. A-1
Sheet 2 of 3

SOIL_CLASS_KEY_PG2 21-22430.GPJ SHAN_WIL.GDT 8/7/18

GRADATION TERMS

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

CEMENTATION TERMS[1]

Weak	Crumbles or breaks with handling or slight finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

PLASTICITY[2]

DESCRIPTION	VISUAL-MANUAL CRITERIA	APPROX. PLASITICITY INDEX RANGE
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.	< 4
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 to 10
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 to 20
High	It takes considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	> 20

ADDITIONAL TERMS

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

PARTICLE ANGULARITY AND SHAPE TERMS[1]

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

ACRONYMS AND ABBREVIATIONS

ATD	At Time of Drilling
Diam.	Diameter
Elev.	Elevation
ft.	Feet
FeO	Iron Oxide
gal.	Gallons
Horiz.	Horizontal
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in.	Inches
lbs.	Pounds
MgO	Magnesium Oxide
mm	Millimeter
MnO	Manganese Oxide
NA	Not Applicable or Not Available
NP	Nonplastic
O.D.	Outside Diameter
OW	Observation Well
pcf	Pounds per Cubic Foot
PID	Photo-Ionization Detector
PMT	Pressuremeter Test
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
rpm	Rotations per Minute
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q_u	Unconfined Compressive Strength
VWP	Vibrating Wire Piezometer
Vert.	Vertical
WOH	Weight of Hammer
WOR	Weight of Rods
Wt.	Weight

STRUCTURE TERMS[1]

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

[1]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

[2]Adapted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

SOIL DESCRIPTION AND LOG KEY

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-1
Sheet 3 of 3

SOIL_CLASS_KEY_PG3 21-22430.GPJ SHAN_WIL.GDT 8/7/18

Total Depth:	71.5 ft.	Northing:	~ 526,873 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	6 in.
Top Elevation:	~ 28 ft.	Easting:	~ 1,290,174 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	~	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	~	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Depth, ft. | Symbol | Samples | Screen Design | Depth, ft.

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches

0 | 20 | 40 | 60

Stiff, gray, *Fat Clay (CH)*; moist; trace fine to medium sand; medium to high plasticity fines; iron-oxide staining.

7.5

Stiff, gray, *Lean Clay (CL)* to *Fat Clay (CH)*; moist; trace fine to medium sand; medium to high plasticity fines; iron-oxide staining.

15.0

Medium stiff, gray, *Fat Clay (CH)*; moist; high plasticity fines.

17.0

Very soft to soft, gray, *Lean Clay (CL)*; moist to wet; medium to high plasticity fines; few lean clay seams.

48.0

During Drilling ▽

5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

2.0" O.D. Split Spoon Sample

▽ Ground Water Level ATD

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-1B

November 2018 | 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-2
Sheet 1 of 2

Log: JCS Rev: EAS Typ: LKN

MASTER LOG E 21-22430.GPJ SHAN_WIL.GDT 3/20/20

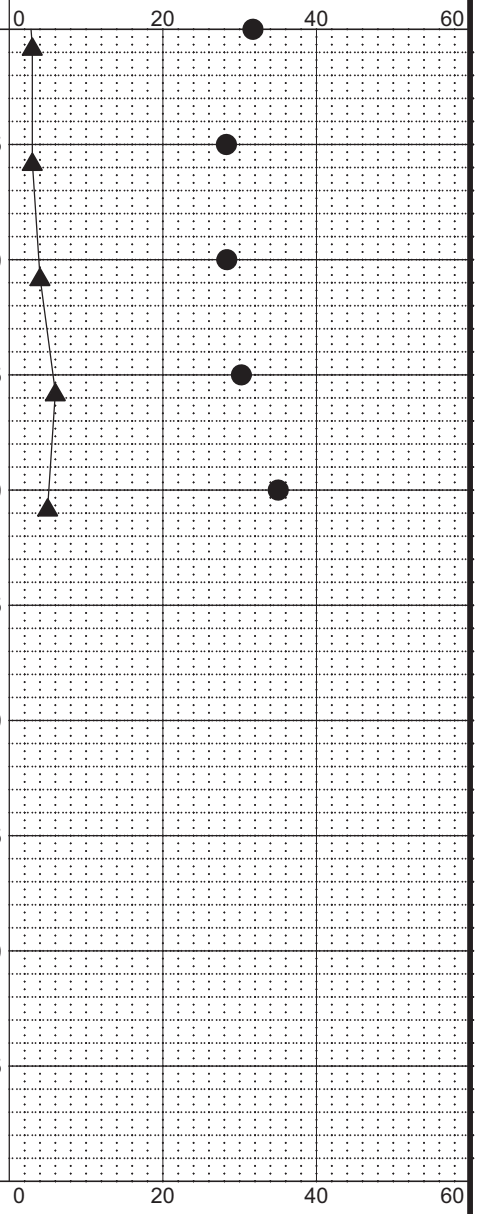
REV 3 - Approved for Submittal

Total Depth:	*71.5 ft.*	Northing:	*~ 526,873 ft.*	Drilling Method:	*Hollow Stem Auger*	Hole Diam.:	*6 in.*
Top Elevation:	*~ 28 ft.*	Easting:	*~ 1,290,174 ft.*	Drilling Company:	*Boretec*	Rod Diam.:	*AWJ*
Vert. Datum:	*NAVD 88*	Station:	~	Drill Rig Equipment:	*EC 95 Track Drill*	Hammer Type	*Rope and Cathead*
Horiz. Datum	*WA State Plane N*	Offset:	~	Other Comments:			

SOIL DESCRIPTION	Depth, ft.	Symbol	Samples	Screen Design	Depth, ft.
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.					
Soft to medium stiff, gray, *Lean Clay (CL)* to *Fat Clay (CH)*; moist; trace fine sand; medium to high plasticity fines.			10		
			11		
			12		
- Few silt seams at 65 feet.			13		
			14		
BOTTOM OF BORING COMPLETED 6/20/2018	71.5				

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



LEGEND

* Sample Not Recovered

2.0" O.D. Split Spoon Sample

Ground Water Level ATD

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-1B

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-2
Sheet 2 of 2

Log: JCS Rev: EAS Typ: LKN

MASTER LOG E 21-22430.GPJ SHAN_WIL.GDT 3/20/20

REV 3 - Approved for Submittal

Total Depth:	71.5 ft.	Northing:	526,836 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	29.0 ft.	Easting:	1,291,455 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Very stiff, mottled gray and brown, *Lean Clay (CL)* to *Silt (ML)*; moist; trace fine sand; low to medium plasticity fines; iron-oxide staining; trace organics.

10.0

Medium stiff, brown, *Lean Clay (CL)*; moist; low to medium plasticity fines.

15.0

Very soft to soft, light, *Lean Clay (CL)*; moist; medium to high plasticity fines.

38.0

Soft, gray, *Lean Clay with Sand (CL)* to *Fat Clay with Sand (CH)*; moist; fine to coarse sand; medium to high plasticity fines.

43.0

Soft to medium stiff, gray, *Fat Clay (CH)* to *Lean Clay (CL)*; moist; trace fine to coarse sand; medium to high plasticity fines.

CONTINUED NEXT SHEET

Depth, ft. | Symbol | Samples | Ground Water | Depth, ft.

Ground Water: 11/19/2018

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*

0 20 40 60

5 10 15 20 25 30 35 40 45

0 20 40 60

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

LEGEND

* Sample Not Recovered

2.0" O.D. Split Spoon Sample

Well Screen and Sand Filter

Bentonite-Cement Grout

Bentonite Chips/Pellets

Bentonite Grout

Ground Water Level in Well

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-2P

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3
Sheet 1 of 2

Log: JCS Rev: EAS Typ: LKN

MASTER LOG E 21-22430.GPJ SHAN WIL.GDT 3/18/20

REV 3 - Approved for Submittal

Total Depth:	71.5 ft.	Northing:	526,836 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	29.0 ft.	Easting:	1,291,455 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Depth, ft. | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*

0 20 40 60

10 11 12 13 14

55 60 65 70 75 80 85 90 95

71.5

BOTTOM OF BORING
COMPLETED 6/20/2018

0 20 40 60

◇ % Fines (<0.075mm)
● % Water Content
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2.0" O.D. Split Spoon Sample
Well Screen and Sand Filter
Bentonite-Cement Grout
Bentonite Chips/Pellets
Bentonite Grout
Ground Water Level in Well

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-2P

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3
Sheet 2 of 2

Log: JCS Rev: EAS Typ: LKN

MASTER LOG E 21-22430.GPJ SHAN_WIL.GDT 3/18/20

REV 3 - Approved for Submittal

Total Depth:	75.1 ft.	Northing:	530,665 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	48.97 ft.	Easting:	1,295,895 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Very stiff, brown, *Lean Clay with Sand (CL)* to *Silt with Sand (ML)*; moist; trace fine gravel; fine to medium sand; low to medium plasticity fines; trace organics; iron-oxide staining.

10.0

Medium stiff, brown, *Lean Clay (CL)* to *Fat Clay (CH)*; moist; medium to high plasticity fines; iron-oxde staining.

15.0

Soft, gray, *Lean Clay (CL)*; moist; medium plasticity fines.

24.0

Soft, gray *Silt (ML)* to *Lean Clay (CL)*; moist; low to medium plasticity fines.

28.0

Medium stiff, gray, *Sandy, Lean Clay (CL)* to *Lean Clay with Sand (CL)*; moist; few fine gravel; fine to coarse sand; medium plasticity fines.

40.0

Medium stiff to very stiff, gray, *Sandy Lean Clay (CL)* to *Lean Clay with Sand (CL)*; moist; few, fine to coarse, subrounded to subangular gravel; fine to coarse sand; low to medium plasticity fines; diamict.

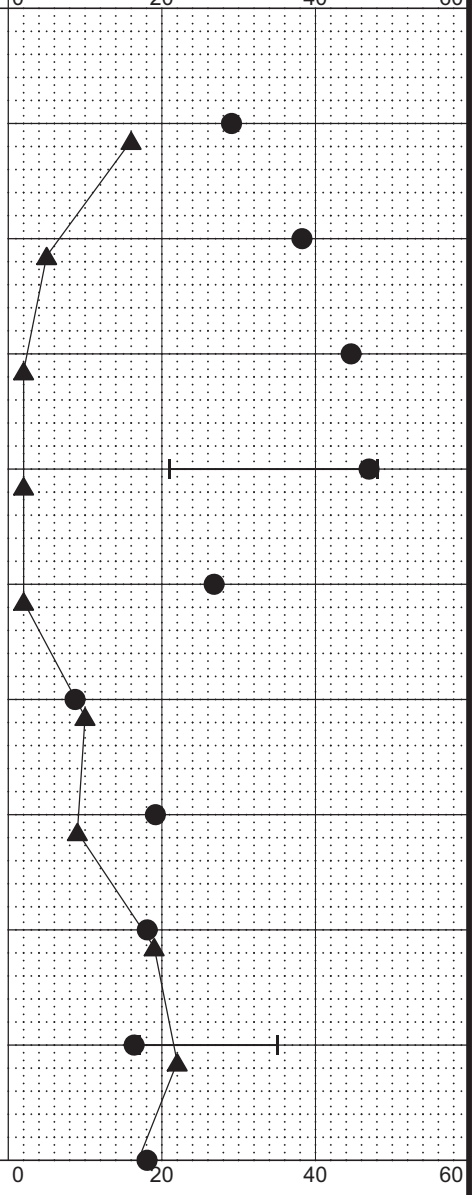
Depth, ft. | Symbol | Samples | Ground Water Depth, ft.

Samples: 1, 2, 3, 4, 5, 6, 7, 8, 9

Ground Water: None Observed During Drilling

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

⌶ 2.0" O.D. Split Spoon Sample

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-3B

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-4
Sheet 1 of 2

MASTER LOG E 21-22430.GPJ SHAN_WIL.GDT 3/18/20 Log: JCS Rev: EAS Typ: LKN

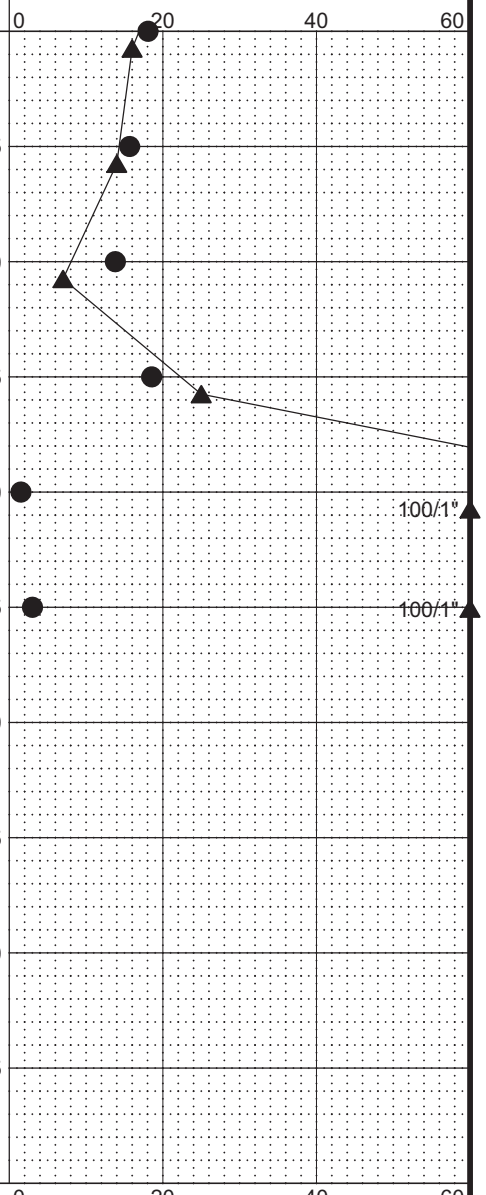
REV 3 - Approved for Submittal

Total Depth:	75.1 ft.	Northing:	530,665 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	48.97 ft.	Easting:	1,295,895 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION	Depth, ft.	Symbol	Samples	Ground Water Depth, ft.
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.				
Medium dense, gray *Silt with Sand (ML)*; moist; fine to medium sand; low plasticity fines.	63.0		10, 11, 12, 13	
Light gray, weathered bedrock.	70.0		14	
BOTTOM OF BORING COMPLETED 6/29/2018	75.1		15	

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



LEGEND

* Sample Not Recovered

2.0" O.D. Split Spoon Sample

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-3B

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-4
Sheet 2 of 2

MASTER LOG E 21-22430.GPJ SHAN_WIL.GDT 3/18/20 Log: JCS Rev: EAS Typ: LKN

REV 3 - Approved for Submittal

Total Depth:	75.1 ft.	Northing:	530,682 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	51.4 ft.	Easting:	1,296,177 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Medium dense, brown, *Sandy Silt with Gravel (ML)*; moist; fine to coarse, subrounded to subangular gravel; fine to coarse sand; low plasticity fines; trace organics; trace charcoal.

10.0

Medium stiff, gray-brown, *Lean Clay (CL)* to *Lean Clay with Gravel (CL)*; moist; fine, subrounded to subangular gravel; trace fine to coarse sand; low to medium plasticity fines; trace organics.

20.1

Soft, gray-brown, *Lean Clay (CL)* to *Fat Clay (CH)*; wet; medium to high plasticity fines.

23.0

Soft, gray, *Lean Clay (CL)*; moist; medium to high plasticity fines.

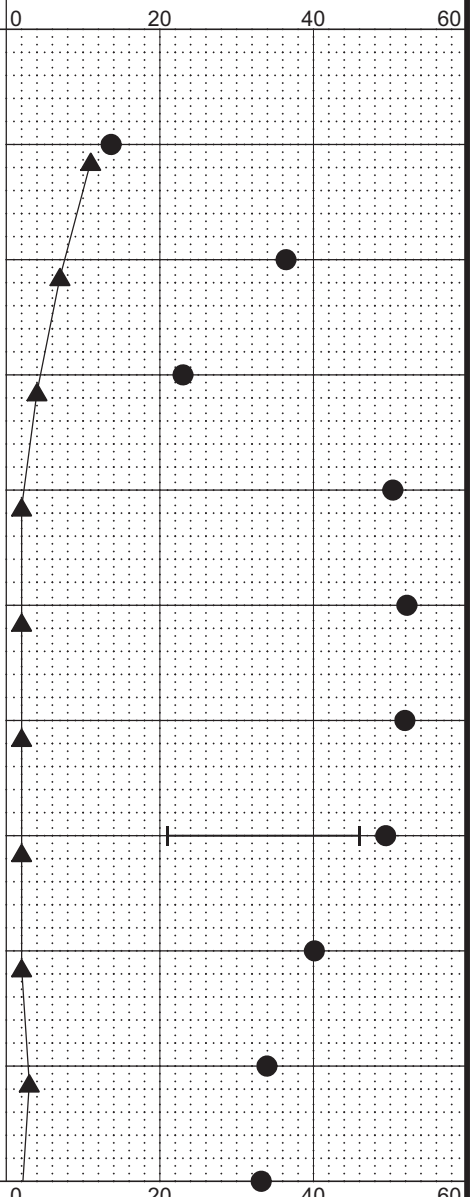
48.0

Depth, ft. | Symbol | Samples | Ground Water | Depth, ft.

Ground Water: 11/19/2018

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

2.0" O.D. Split Spoon Sample

Well Screen and Sand Filter

Bentonite-Cement Grout

Bentonite Chips/Pellets

Bentonite Grout

Ground Water Level in Well

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-4P

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-5
Sheet 1 of 2

Log: JCS Rev: EAS Typ: LKN

MASTER LOG E 21-22430.GPJ SHAN WIL.GDT 3/18/20

REV 3 - Approved for Submittal

Total Depth:	75.1 ft.	Northing:	530,682 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	51.4 ft.	Easting:	1,296,177 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Soft, gray, *Lean Clay (CL)* to *Silt (ML)*; wet; trace fine gravel; trace fine to coarse sand; low to medium plasticity fines.

53.0

Soft to medium stiff, gray, *Sandy Lean Clay with Gravel (CL)*; fine, subangular gravel; fine to coarse sand; medium plasticity fines.

68.0

Dense, *Silty Sand (SM)*; moist; fine, subangular gravel; fine to coarse sand; nonplastic fines; diamict.

75.0

Bedrock.

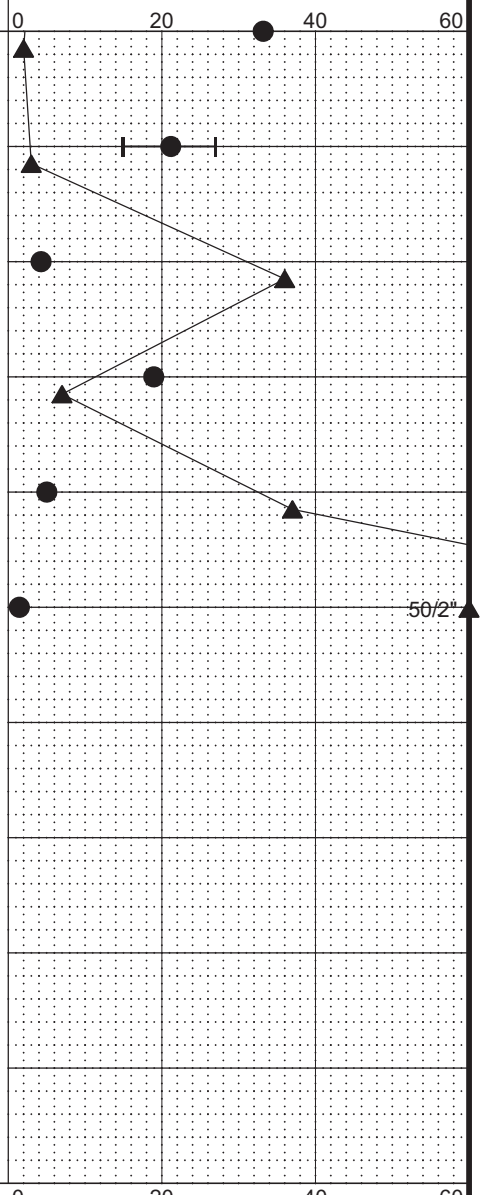
75.1

BOTTOM OF BORING
COMPLETED 6/18/2018

Depth, ft. | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



◇ % Fines (<0.075mm)
● % Water Content
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2.0" O.D. Split Spoon Sample
Well Screen and Sand Filter
Bentonite-Cement Grout
Bentonite Chips/Pellets
Bentonite Grout
Ground Water Level in Well

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-4P

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-5
Sheet 2 of 2

MASTER LOG E 21-22430.GPJ SHAN WIL.GDT 3/18/20 Log: JCS Rev: EAS Typ: LKN

REV 3 - Approved for Submittal

APPENDIX B

GEOTECHNICAL LABORATORY TEST RESULTS

APPENDIX B

GEOTECHICAL LABORATORY TEST RESULTS

TABLE OF CONTENTS

TABLE

Laboratory Test Summary

TESTS

Plasticity Chart, Boring SW-1B
Plasticity Chart, Boring SW-2P
Plasticity Chart, Boring SW-3B
Plasticity Chart, Boring SW-4P
DIPRA Test Results

LABORATORY TEST SUMMARY

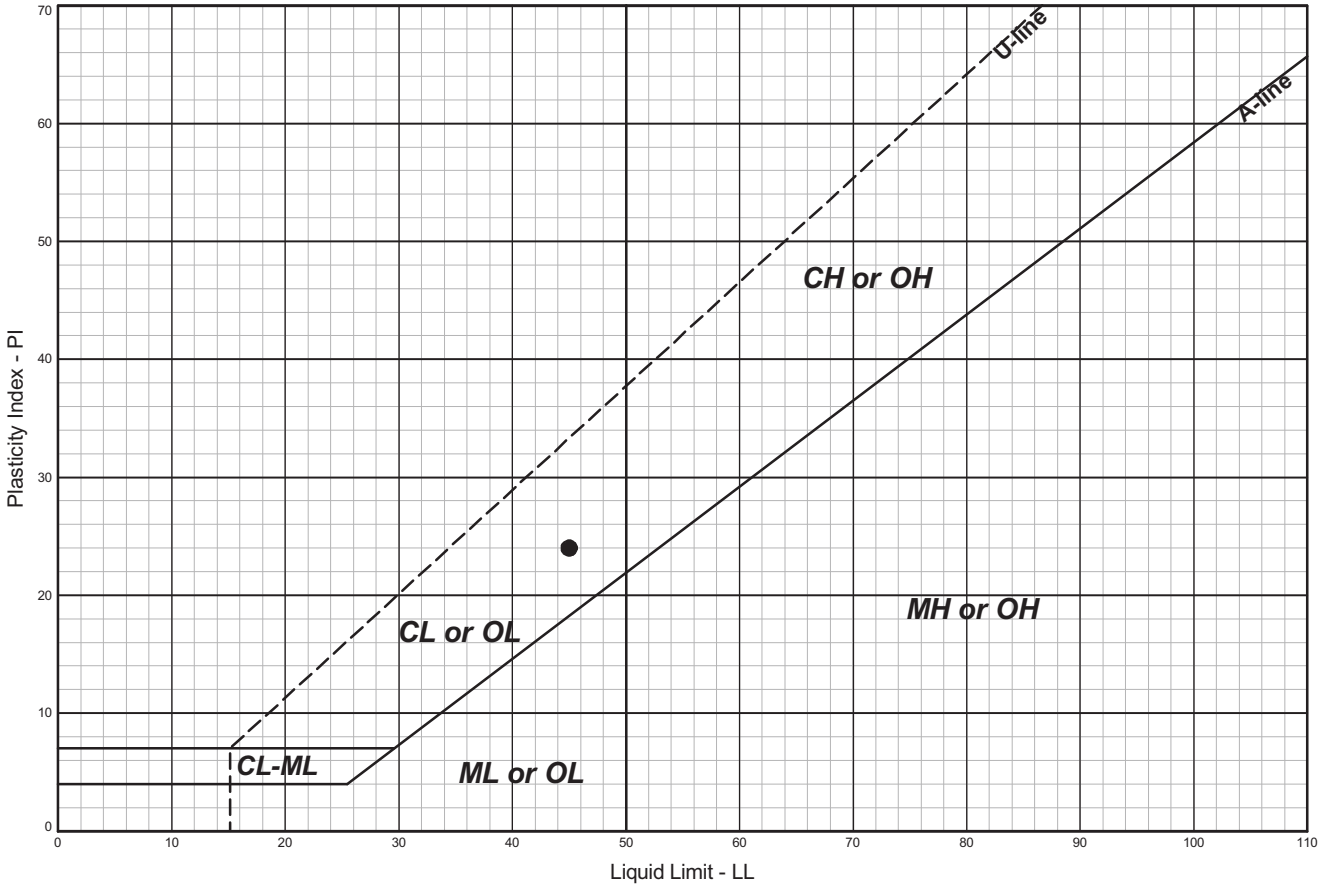
Boring	Top Depth (ft)	Sample Number	Sample Type	Blow Count	USCS	WC (%)	LL	PL	Soil Description
SW-1B	5	S-1	SPT	12		27.3			
SW-1B	10	S-2	SPT	11		27.8			
SW-1B	15	S-3	SPT	6		40.5			
SW-1B	20	S-4	SPT	3		47.3			
SW-1B	25	S-5	SPT	1		47.2			
SW-1B	30	S-6	SPT	2		44.6			
SW-1B	35	S-7	SPT	2		48.0			
SW-1B	40	S-8	SPT	1	CL	46.6	45	21	Lean Clay
SW-1B	45	S-9	SPT	2		38.2			
SW-1B	50	S-10	SPT	3		31.7			
SW-1B	55	S-11	SPT	3		28.3			
SW-1B	60	S-12	SPT	4		28.3			
SW-1B	65	S-13	SPT	6		30.2			
SW-1B	70	S-14	SPT	5		35.0			
SW-2P	5	S-1	SPT	16		29.3			
SW-2P	10	S-2	SPT	7		43.0			
SW-2P	15	S-3	SPT	3		45.0			
SW-2P	20	S-4	SPT	1		50.9			
SW-2P	25	S-5	SPT	3		46.4			
SW-2P	30	S-6	SPT	2	CL	42.7	43	20	Lean Clay
SW-2P	35	S-7	SPT	2		40.8			
SW-2P	40	S-8	SPT	3		26.8			
SW-2P	45	S-9	SPT	3		34.8			
SW-2P	50	S-10	SPT	4		35.2			
SW-2P	55	S-11	SPT	4		29.1			
SW-2P	60	S-12	SPT	4		32.0			
SW-2P	65	S-13	SPT	5		30.9			
SW-2P	70	S-14	SPT	7		26.0			
SW-3B	5	S-1	SPT	16		29.1			
SW-3B	10	S-2	SPT	5		38.2			
SW-3B	15	S-3	SPT	2		44.6			
SW-3B	20	S-4	SPT	2	CL	47.0	48	21	Lean Clay

LABORATORY TEST SUMMARY

Boring	Top Depth (ft)	Sample Number	Sample Type	Blow Count	USCS	WC (%)	LL	PL	Soil Description
SW-3B	25	S-5	SPT	2		26.8			
SW-3B	30	S-6	SPT	10		8.7			
SW-3B	35	S-7	SPT	9		19.2			
SW-3B	40	S-8	SPT	19		18.1			
SW-3B	45	S-9	SPT	22	CL	16.4	35	17	Sandy Lean Clay
SW-3B	50	S-10	SPT	16		18.1			
SW-3B	55	S-11	SPT	14		15.7			
SW-3B	60	S-12	SPT	7		13.8			
SW-3B	65	S-13	SPT	25		18.5			
SW-3B	70	S-14	SPT	100/1"		1.5			
SW-3B	75	S-15	SPT	100/1"		3.0			
SW-4P	5	S-1	SPT	11		13.6			
SW-4P	10	S-2	SPT	7		36.4			
SW-4P	15	S-3	SPT	4		23.0			
SW-4P	20	S-4	SPT	2		50.3			
SW-4P	25	S-5	SPT	2		52.2			
SW-4P	30	S-6	SPT	2		51.9			
SW-4P	35	S-7	SPT	2	CL	49.4	46	21	Lean Clay
SW-4P	40	S-8	SPT	2		40.1			
SW-4P	45	S-9	SPT	3		33.9			
SW-4P	50	S-10	SPT	2		33.2			
SW-4P	55	S-11	SPT	3	CL	21.2	27	15	Sandy Lean Clay with Gravel
SW-4P	60	S-12	SPT	36		4.3			
SW-4P	65	S-13	SPT	7		18.9			
SW-4P	70	S-14	SPT	37		5.0			
SW-4P	75	S-15	SPT	50/2"		1.4			

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

BORING SW-1B

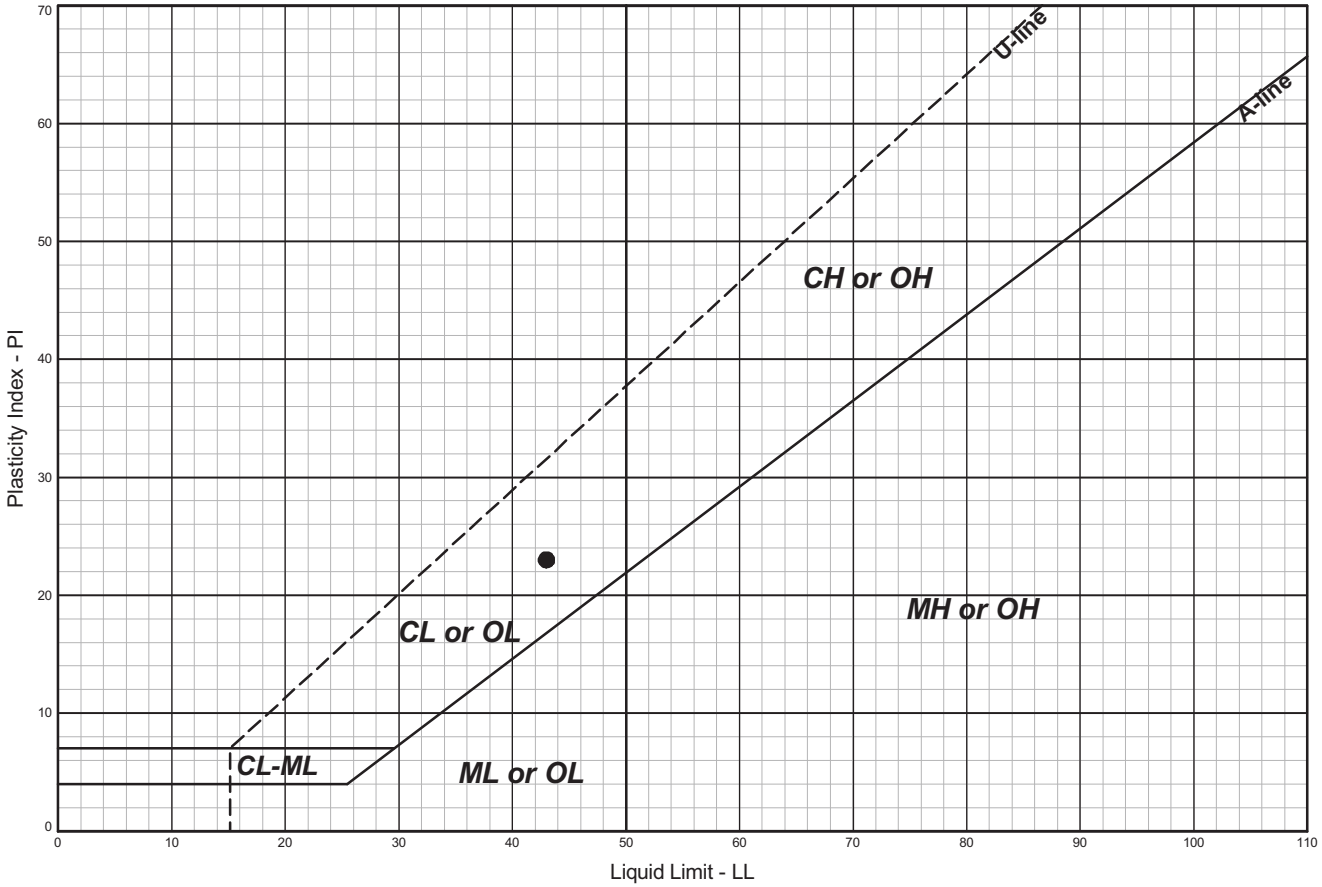


Sample Identification	Depth (ft)	USCS Group Symbol	USCS Group Name	LL	PL	PI	WC %	Gravel %	Sand %	Fines %	< 2µm %	Tested By	Review By	ASTM Std.
● SW-1B, S-8	40.0	CL	Lean Clay	45	21	24	46.6					JJS	AKV	D4318

PLASTICITY CHART

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

BORING SW-2P



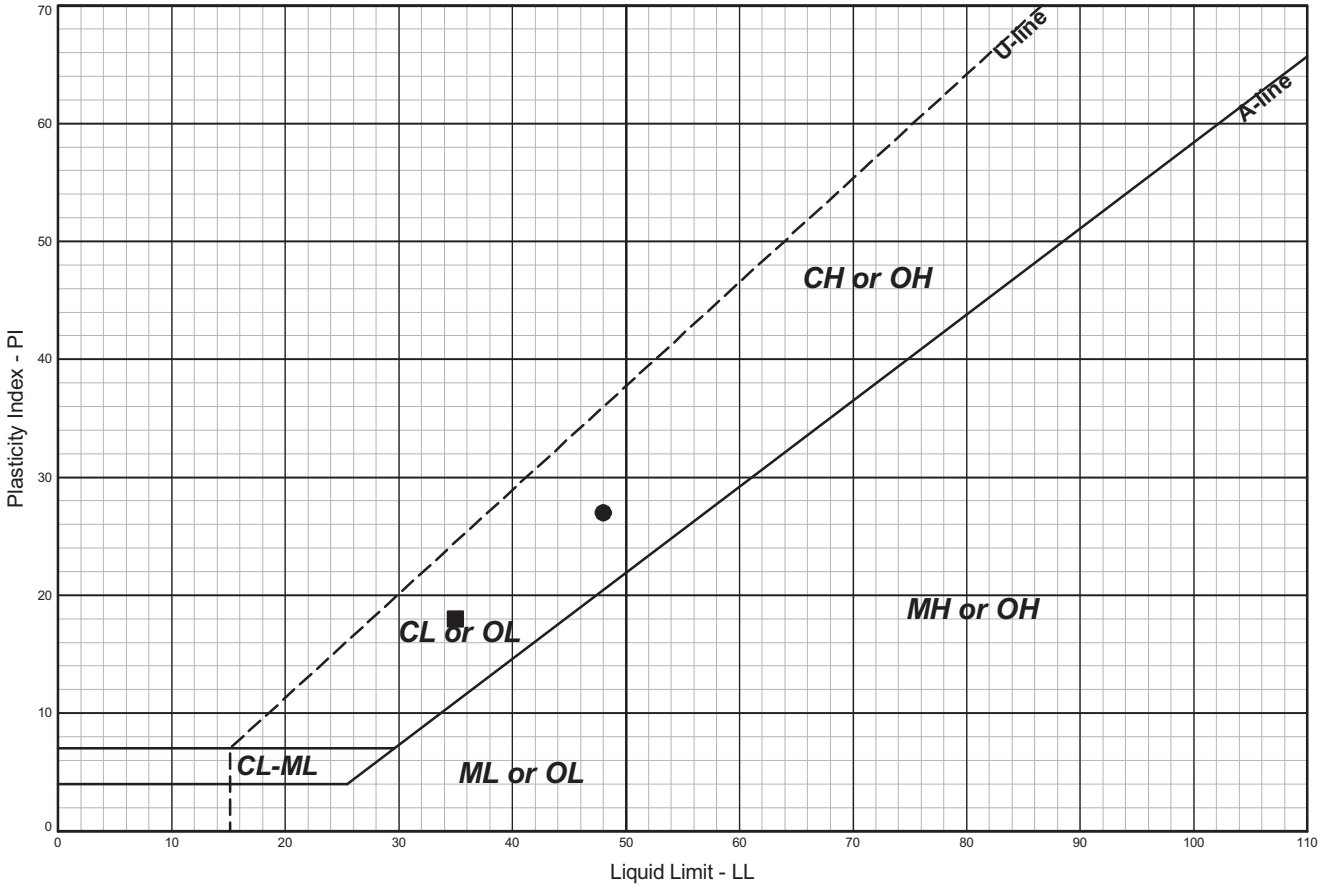
Sample Identification	Depth (ft)	USCS Group Symbol	USCS Group Name	LL	PL	PI	WC %	Gravel %	Sand %	Fines %	< 2µm %	Tested By	Review By	ASTM Std.
● SW-2P, S-6	30.0	CL	Lean Clay	43	20	23	42.7					JJS	AKV	D4318

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PLASTICITY CHART

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

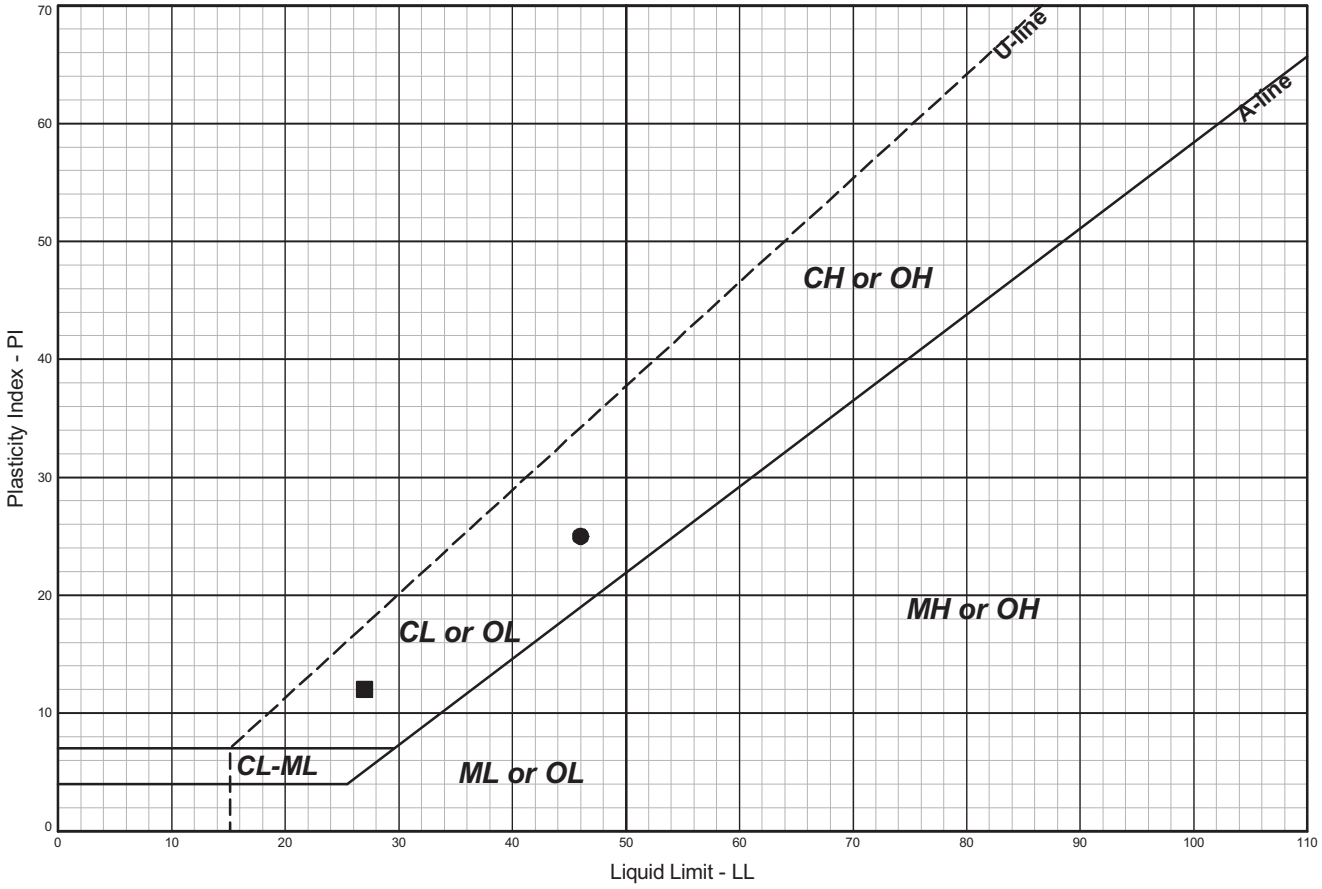
BORING SW-3B



Sample Identification	Depth (ft)	USCS Group Symbol	USCS Group Name	LL	PL	PI	WC %	Gravel %	Sand %	Fines %	< 2µm %	Tested By	Review By	ASTM Std.
● SW-3B, S-4	20.0	CL	Lean Clay	48	21	27	47.0					JJS	AKV	D4318
■ SW-3B, S-9	45.0	CL	Sandy Lean Clay	35	17	18	16.4					JJS	AKV	D4318

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

BORING SW-4P



Sample Identification	Depth (ft)	USCS Group Symbol	USCS Group Name	LL	PL	PI	WC %	Gravel %	Sand %	Fines %	< 2µm %	Tested By	Review By	ASTM Std.
● SW-4P, S-7	35.0	CL	Lean Clay	46	21	25	49.4					JJS	AKV	D4318
■ SW-4P, S-11	55.0	CL	Sandy Lean Clay with Gravel	27	15	12	21.2					JJS	AKV	D4318

DIPRA
(Ductile Iron Pipe Research Association)
10 Point Soil Evaluation

Job Name:	**Judy Reservoir Pipeline**	Job #:	**2402-020-02**	
Date:	**7/18/18**	Tested by:	MLC/NLP	
Boring #:	SW-1			DIPRA Pts.
Sample #:		Resistivity :	5200	0
Depth:	10	pH :	8.8	3
Soil Description:	Lean clay (CL)	Redox Potential :	269.4	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**4**
Boring #:	SW-2			DIPRA Pts.
Sample #:		Resistivity :	930	10
Depth:	50	pH :	9.9	3
Soil Description:	Lean clay (CL)	Redox Potential :	88.1	3.5
		Sulfides :	Negative	0
		Moisture :	Poor	2
		Total DIPRA Points:		**18.5**
Boring #:	SW-3			DIPRA Pts.
Sample #:		Resistivity :	3500	0
Depth:	10	pH :	7.7	0
Soil Description:	Lean clay (CL)	Redox Potential :	276.3	0
		Sulfides :	Negative	0
		Moisture :	Poor	2
		Total DIPRA Points:		**2**
Boring #:	SW-4			DIPRA Pts.
Sample #:		Resistivity :	1000	10
Depth:	40	pH :	9.7	3
Soil Description:	Lean clay (CL)	Redox Potential :	66.1	3.5
		Sulfides :	Negative	0
		Moisture :	Poor	2
		Total DIPRA Points:		**18.5**
Boring #:				DIPRA Pts.
Sample #:		Resistivity :		
Depth:		pH :		
Soil Description:		Redox Potential :		
		Sulfides :		
		Moisture :		
		Total DIPRA Points:		**1**
Boring #:				DIPRA Pts.
Sample #:		Resistivity :		
Depth:		pH :		
Soil Description:		Redox Potential :		
		Sulfides :		
		Moisture :		
		Total DIPRA Points:		**1**

DIPRA Point Scale

Resistivity (ohm-cm)

0 - 1500	10 pts
1500 - 1800	8 pts
1800 - 2100	5 pts
2100 - 2500	2 pts
2500 - 3000	1 pt
> 3000	0 pts

pH

0.0 - 2.0	5 pts.
2.0 - 4.0	3 pts.
4.0 - 8.5	0 pts
8.5 - 14.0	3 pts.

Redox Potential (millivolts)

>+100(mv)	0 pts
+50 to +100(mv)	3.5 pts
0 to +50(mv)	4 pts
Negative	5 pts

Sulfides

Positive	3.5 pts
Trace	2 pts
Negative	0 pts

Moisture

Poor (wet)	2 pts
Fair (moist)	1 pts
Good (dry)	0 pts

pH and Redox meters calibrated by: MLC

Date: 07/18/2018

GeoEngineers

APPENDIX C

EXISTING SUBSURFACE EXPLORATIONS

APPENDIX C

EXISTING SUBSURFACE EXPLORATIONS

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C-2 Log of Boring H-1-54 (2 sheets)
C-3 Log of Boring H-1-67 (3 sheets)
C-4 Log of Boring H-1-70 (4 sheets)
C-5 Log of Boring H-2-54 (2 sheets)
C-6 Log of Boring H-2-70 (3 sheets)
C-7 Log of Boring H-3-70 (3 sheets)
C-8 Log of Boring H-4-70 (4 sheets)

APR 15 1970

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
8	WASH.				

SEC. 11, T.34N., R.4E., W.M.

NOOKACHAMPS CREEK

N.P.R.R. Trestle No. 80

S76°46'E

198'-0" Brg. to Brg. of Fwy'd Seats

36'-0" | 76'-0" | 36'-0"

Rwy. Sta. 4281+83.8

C.C. 9+80.0 - Beginning of Channel Change

Skew 10°58' (Typ.)

℄ S.R. 9

N 89°05' E

P.O.T. Sta. 20+59.00, ℄ S.R. 9
C.C. 10+00.00

Center Line (Crown Slopes 0.02'/ft)

79°02'

S 11°52' E

Existing Bridge (To be Removed)

Elev. 183.0

Elev. 182.0

PC C.C. Sta. 10+29.56

Curb & Guard Rail Widening. (Typ.)

Radius 100'

℄ Channel Change

H-1 H-2 H-3 H-4

Profile Grade & Pivot Point

Alt Version

To Clear Lake

S.R. 9

Rwy. Sta. 22+82.70
Rwy. Sta. 4282+87.56

Approx. Toe of Slope

℄ Channel

Elev. 183.0

40'-0"

20'-0" | 20'-0"

Profile Grade

Special Channel Backfill
Light Loose Rip Rap

CHANNEL CHANGE
Sta. C.C. 9+80 to Sta. C.C. 13+50

PLAN

Notes to District

1. Will Approach Fills be placed before, during or after construction?
2. Will Approach Pvt't be Blacktop?
3. We Assume No Slash will be Required. Please advise.
4. Please furnish Normal Stage Water Elev. & Low Water Elev. if available.
5. Please furnish A.D.T. 1990 & D.H.V. 1990 information, if available.
6. Please furnish Datum.
7. Please furnish Profile Grade for channel change - hopefully not lower than El. 173.00 @ C.C. 9+80 as we have assumed for layout purposes.
8. Can you provide some - Gradient for ditch drainage & then you pick up drainage off bridge @ East end.

℄ N.P. Ry. @ Rwy. Sta. 4281, 87.83

2'-6"

min. 1½"

Clearance Diagram per A.R.E.A. 23-2-1

Elev. 201.39 @ Top of Rail Base

East Corner - North Rail Base

No. Curb Line S.R. 9

Top of So. Rail Elev. 199.94

4'-0"

5'-6"

6-H horn to ℄ Track

1'-8½" from ℄ Brg.

℄ Trk.

RAILWAY CLEARANCE

Fly'd. Sta. 21+24.00
Elev. 200.10

0.8% | +0.6%

200' V.C.

LOADING: H.S.-20
OR
2-24" AXLES @ 4' CTRS.

A.D.T. 1967 1,600
A.D.T. 1990
D.H.V. 1990
Class of Highway M-5

Bk. of Pvt'd Seat Pier No. 1
Sta. 19+81.07
Gr. El. 200.00
197.7
35.3

19+82

Pier No. 2
Sta. 20+16.00 ℄ K
Gr. El. 199.80
197.7
35.3

Pier No. 3
Sta. 20+92.30
Gr. El. 200.00
197.7
35.3

20+91

Bk. of Pvt'd Seat Pier No. 4
Sta. 21+28.90
Gr. El. 200.00
197.7
35.3

21+25

Original Ground Line 16' Lt of ℄ S.R. 9.

Elev. 183.0
197.7
35.3

℄ Proposed Channel

Elev. 173.0
197.7
35.3

Elev. 170.0 = 20.3

1½:1 Slope Typ. to ℄ Proposed Channel (Typ.)

Elev. 188.9
197.7
35.3

1½:1 Slope Norm. to ℄ Proposed Channel (Typ.)

Original Ground Line 16' Rt. of ℄ S.R. 9.

Light Loose Rip Rap (Typ. both Sides)

Special Channel Backfill

DATUM

197.7 = Assumed Elevation

ELEVATION

Grade alterations shown are finish grades on ℄ Bridge and are equal to Profile Grade.

Design 80 Grades.

DATE	REVISION	BY	APP'D

SR 9 JOB NO. 1502 SHEET 1

Designed By | Detailed By | Drawn By | Checked By | Quantities By | Checked By

Layout By J.T.A. | Layout Checked By Y.R.C. | Traced By

APP'D Engineer of Bridge Design | Supervising Bridge Engr. | Reviewed By

BY

3-70 | 3-70

C.S. 2939R ~ AREA U ~ PROJ. L 3415 A ~ FUNCT. AT 233 ~ UNIT 10 ~ GRP. 01 ~ DIST. 1 ~ SEC. 11 ~ S.R. 9 ~ EAST FORK NOOKACHAMPS CREEK BRIDGE

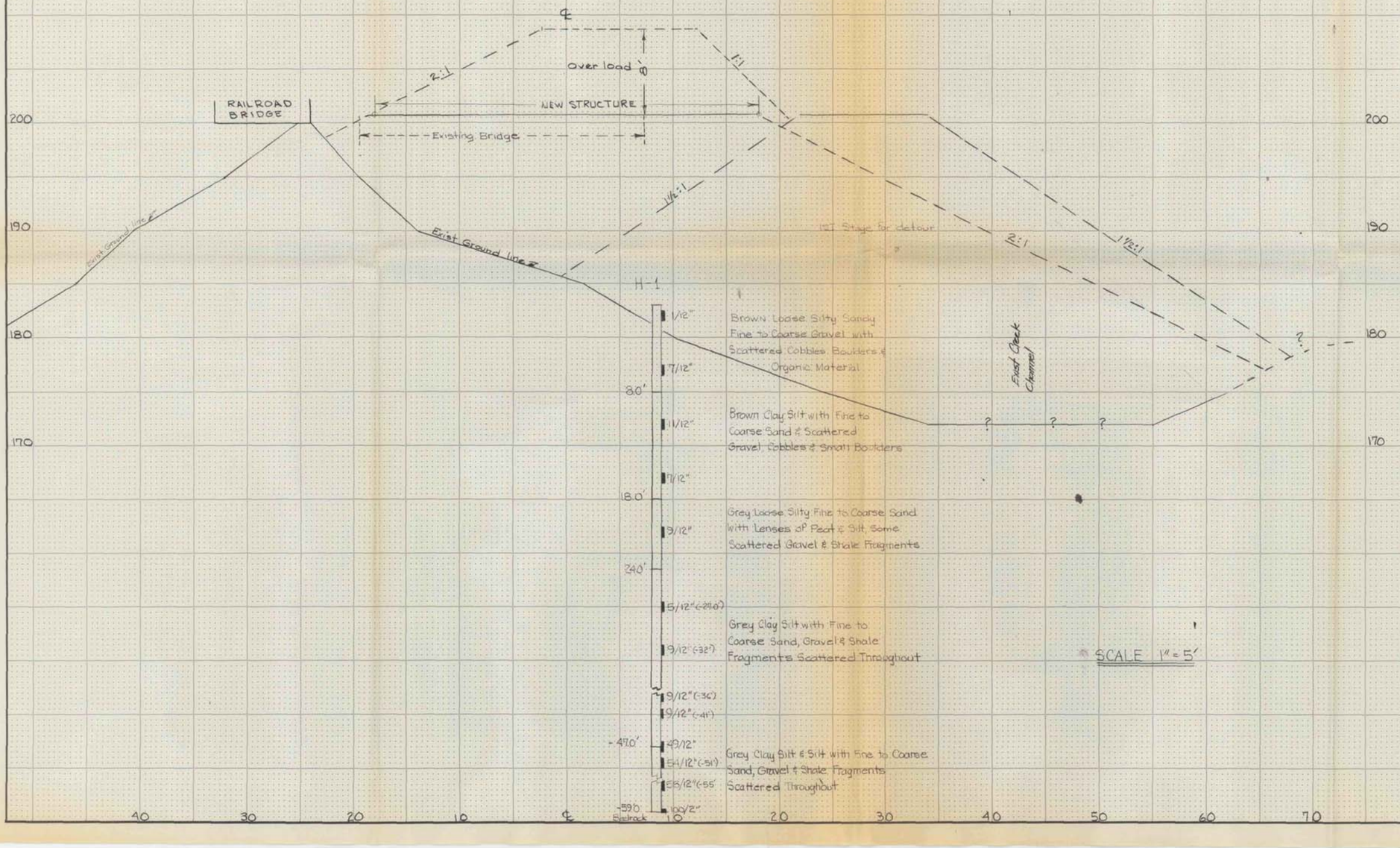
Fig. C-1

FED. ROAD DIV. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
8	WASH.			

GROUND LINE PLOTTED BY DATE
GROUND LINE CHECKED
TEMPLATE PLOTTED
TEMPLATE CHECKED

DRAWN BY DATE
TRACED
CHECKED

SECTION PARALLEL TO SKEW OF NEW STRUCTURE @ PIER 4



SCALE 1" = 5'

E. FORK NOOKACHAMPS CR. BRIDGE

L-3415 SR-9

October, 1970

Fig. C-1

H. F. 26.66.

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STATE HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS

LOG OF TEST BORING

One Copy with Samples
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One Copy to Materials Engr
Bridge Engr

P. S. H. / S. S. H. No. 1-A Section NooKaChamps Creek Bridge Job No. SL-417
Hole No. 1 Station West End Offset Ground Elev. 52.5'
Type of Boring Jet Size Casing 3"
Inspector Bob Power Date 5-26-54 Sheet No. 1

DEPTH	BLOWS PER FT	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL	SAMPLE WEIGHT
				Clean Loose Sand	
				Casing Blows/FT 5 20 16 Hammer	
5		X			
	5			#1 2" Std. Test	
	6			13 blows/Ft.	
	6			Brown Clay	
	6			Note: The Brown Clay is stiff, dry and crumbles easily into horizonal layers. It is quite stiff to -11'	
10	6				
	6			#2 2" Std. Test	
	7			9 blows/Ft.	
	6	X			
	4				
15	5				
				#3 Undisturbed	
		T-114-	1 G	6 Tubes	
			2 F	16'8"-17'0"	
			3 E	17'4"-17'8"	
			4 D	17'0"-17'4"	
			5 C	17'8"-18'0"	
			B	18'0"-18'4"	
20			6	18'4"-18'8"	
	4			#4 2" Std. Test	
	4			2 blows/Ft.	
	4				
	4			Blue Clay	
25	7				
	7				
	4	T-115-	1 G	approx. Creek Level #5 ~~2" Std. Test~~	
	5		2 F	Undisturbed	
	6		3 E	6 Tubes	
30	8		4 B		
	7		5	25'8"-26'0"	
			6	26'4"-26'8"	
				26'0"-26'4"	
				26'8"-27'0"	
				#6 2" Std. Test	
	10			5 blows/Ft.	
	10			26'8"-27'4"	
35	10			27'0"-27'8"	
				27'4"-27'8"	

Fig. C-2

H. F. 26.66.

3

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DEPARTMENT OF HIGHWAYS

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Bridge Engr.

~~P. S. H.~~ S. S. H. No. 1-A Section Nooksack Champs Creek Bridge Job No. SL-417.
Hole No. 1 Station West End Offset Ground Elev. 52.5'
Type of Boring Jet Size Casing 3"
Inspector Bob Power Date 5-26-54 Sheet No. 2

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL	SAMPLE WEIGHT
	11				
				#7 2" Std. Test	
	20			Blue Clay 9 blows / Ft.	
	19				
40	14			Note: Sand pockets from -28' to -42'	
	15				
	15	X		#8 2" Std. Test	
				33 blows / Ft.	
				Bedrock	
45				#9 2" Std. Test	
				50 blows / 0.3'	
				Note: The Bedrock appears to be made up of a graphite schist and quartz veins.	

Fig. C-2

H. F. 26.66 (Rev. 5-67)

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STATE HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS

Original to Materials Engineer
Copy to Bridge Engineer
Copy to District Engineer
Copy to _____

LOG OF TEST BORING

S S.H. 1-A S.R. 9 Section Nookachamps Creek Br. 1-A/105 Job No. L - 3415-R
Hole No. H-1 Sub Section Bridge No. 105 ~~26.83 Rt~~ Cont. Sec. 2939
Station 6+47 ~~Bridge 18+94 19+76~~ Offset 45' Lt. ℄ ~~47.34 Rt~~ Ground El. ~~53.1~~ 53.1
Type of Boring Augers Casing 8" Hollow Flight Augers to 59' W.T. El. 47.1
Inspector R.G. Bannett Date 9-20-67 Sheet 1 of 3

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
	11		6 STD. 4 PEN. 7 1 11	SILTY SAND AND FINE GRAVEL - Loose, Dry Brown
5			U2	SILTY FINE SAND - Damp Loose, Brown
	9		3 STD. 4 PEN. 5 3 6	CLAY - Mottled Blue to Brown, Soft, Damp Scattered Fine Gravel
10			U4 B C D	
	4		2 STD. 2 PEN. 2 5 3	(Color Change to Blue Gray)
15			U 6 C D E	
	2		3 STD. 1 PEN. 1 7 2	CLAY - Very Soft, Blue Gray, Partings of Silt and Extremly fine sand, Scattered fine Gravel.
20				

Fig. C-3

H. F. 26.66-A (Rev. 5-67)

Hole No. H - 1 Sub Section Bridge No. 105 Sheet 2 of 3

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			U 8	
			C	
			D	
			E	
			2 STD.	
			1 PEN.	
	2		1 9	
			2	
25				
			U 10	
			B	
			C	
			D	
			2 STD.	
			2 PEN.	
	4		2 11	
			2	
30				
			U12	
			D	
			E	CLAY - Slightly Sandy, Stiff, Fairly Dry
			5 STD.	
			6 PEN.	Scattered Fine Gravel
	15		9 13	
			11	
35				
			2 STD.	
	8		3 PEN.	(Damp & Soft)
			5 14	
			5	
40				CLAYEY SANDY GRAVEL - All Grades - Dense
			11 STD.	
			23 PEN.	
	71		48 15	
			52/2"	
				Talc Schist = Very Hard-Dark Gray
45				

Fig. C-3

H. F. 26.66-A (Rev. 5-67)

Hole No. H - 1 Sub Section Bridge No. 105 Sheet 3 of 3

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
	101/5"		101 ↕ STD. PEN. 16	
50	101/3"		101 ↕ STD. PEN. 17	
55	101/2"		101 ↕ STD. PEN. 18	
60	101/3"		101 ↕ STD. PEN. 19	TEST BORING STOPPED 59.3' W.T. : - 6.0' Below Ground Elevation

dmw

Fig. C-3

H. F. 26.66 (Rev. 5-67)

WASHINGTON
STATE HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS

Original to Materials Engineer
Copy to Bridge Engineer
Copy to District Engineer
Copy to _____

LOG OF TEST BORING

S.H. _____ S.R. 9 Section East Fork Nookachamps Creek Bridge & Approaches Job No. L-3415
Hole No. H-1 Sub Section East Fork Nookachamps Creek Bridge Pier #4 Cont. Sec. 2939
Station 21+31 Offset 8' Rt. ℄ SR 9 Ground El. 36.3'
Type of Boring Wash. Bore Rotate Casing NX 60.0' W.T. El. 25.5 9:30 a.m. 5-1-70
Inspector Donald L. Nebgen Date April 30, 1970 Sheet 1 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			1 Std.	
	1		1 Pen.	SAND & GRAVEL - Silty fine to coarse with
			1 1	scattered cobbles & small boulders & bits
				organic material - Very loose to loose
				Brown
5				
			2 Std.	
	7		3 Pen.	
			4	
			9 2	
				SILT - Clayey with fine to coarse sand & scattered
				gravels, cobbles and small boulders - brown - stiff
10				
			22 Std.	
	11		6 Pen.	
			5	
			8 3	
15				
			U-4	
			6 Std.	
			4 Pen.	
	7		3 5	
			6	
				SAND - Very silty fine to coarse sand with scattered
				lenses silt, peat and organic material - gravels and shale
20				fragments - gray - loose

Fig. C-4

Hole No. H-1 Sub Section East Fork Nookachamps Creek Bridge Sheet 2 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			4 Std. 4 Pen.	
	9		5 7 6	
25				SILT - Clayey with scattered fine to medium sand,
			B C D U-7	gravels and shale fragments - gray - very soft to soft
			2 Std. 2 Pen.	
	5		3 8	
			3	
30				
			ID Sample U-9	
			10 Std. 8 Pen.	
	9		6 3 10	
35				
			3 Std. 4 Pen.	
	9		5 7 11	
40				
			3 Std. 4 Pen.	
	9		5 7 12	
45				

Fig. C-4

Hole No. H-1 Sub Section East Fork Nookachamps Creek Bridge Sheet 3 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			B U-13	
			C D	
			6 Std.	SILT - Sandy clayey with all size granules sand gravel
			14 Pen.	
	49		35 14	and shale fragments scattered throughout - gray
			47	
				Hard
50				
			24 Std.	
			30 Pen.	
	54		24	
			33 15	
55			90 Std.	
			33 Pen.	
	58		25 16	
			50/3"	
60				SLATE - Highly fractured sandy slate
	100/2"		100/2" Std. Pen.	
			17	with calcite seams and clay gouges - dark gray
				very dense material
			Std. Pen.	
65	100/1"		100/1" 18	
			C	
			O	
			95% R	
			REC. E	
70			19	

Fig. C-4

Hole No. H-1 Sub Section East Fork Nookachamps Creek Bridge Sheet 4 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			C-19	
				TEST BORING STOPPED AT 72.0'
75				

Fig. C-4

H. F. 26.66.

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Bridge Engr

P. S. H. / S. S. H. No. 1-A Section Nooksack Champs Creek Bridge Job No. SL-417
Hole No. 2 Station East Side Offset Ground Elev. 41.3
Type of Boring Jet Size Casing 3"
Inspector Bob Power Date 6-3-54 Sheet No. 1

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL	SAMPLE WEIGHT
	Blows/Ft. 14 Hammer			(6-2-54) Rod 68'	
				Clayey Sandy Gravel	
5	Casing 5'20	X			
			#10	2" Std. Test	
				5 blows/Ft.	
	6				
10	5				
	5			Brown Gravelly Clay	
	5				
	6		#11	2" Std. Test	
	9			8 blows/Ft.	
15	6				
	4				
	7				
	5				
	4				
20	10		#12	2" Std. Test	
	7			9 blows/Ft.	
	7	X		No Recovery	
	6				
	8			Blue Clay - (Contains Layers of Peat & Sand)	
25	13		#13	Undisturbed	
	15	T-116	1/2 D C	4 Tubes	
	10		3/4 B A		
	12	X		Note: Scattering of Sand from	
	19			-22' to -39', Log at -32'	
30	15				
	15		#14	2" Std. Test	
	10			Blue Gravelly Clay 5 blows/Ft.	
	8				
	8		(6-2-54)	#15 2" Std. Test	
35	16		(6-3-54)	11 blows/Ft.	

Fig. C-5

H. F. 26.66.

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P. S. H. S. S. H. No. 1-A Section Nookachamps Creek Bridge Job No. SL-417
Hole No. 2 Station East Side Offset Ground Elev. 41.3
Type of Boring Jet Size Casing 3"
Inspector Bob Power Date 6-3-54 Sheet No. 2

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL	SAMPLE WEIGHT
	15		↓	#15 2" Std. Test	
	12			11 blows/Ft.	
	19			Blue Gravelly Clay	
rock →	40	X	↕	#16 2" Std. Test	
40	12		↓	2 blows/Ft.	
	15				
	11			Blue Clayey silt	
	9				
	9				
45	9	X			
	15				
	16				
	22				
	35				
50				Blue Clay (Contains Sand & Gravel Traces)	
			↕	#17 2" Std. Test	
55			↓	12 blows/Ft.	
		X			
60			↕	#18 2" Std. Test	
				60/12" (Ft.)	
				Blue Gravelly Sandy Clay (Very hard)	
65			↕	#19 2" Std. Test	
				40 blows/0.4'	

Fig. C-5

Note: The material from -58' to the bottom of the hole was extremely hard containing some graphite schist fragments found in hole #1.

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LOG OF TEST BORING

S.H. _____ S.R. 9 Section East Fork Nookachamps Creek Bridge & Approaches Job No. L-3415
Hole No. H-2 Sub Section East Fork Nookachamps Creek Bridge Pier #3 Cont. Sec. 2939-U
Station 20+92 Offset On ℄ SR 9 Ground El. 26.1'
Type of Boring Wash. Bore Rotate Casing NX 35.0' BX 55.0' W.T. El. 25.4' 9:30 a.m. May 1, 1970
Inspector Donald L. Nebgen Date May 5, 1970 Sheet 1 of 3

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
	2		1 Std. 1 Pen.	SAND & GRAVEL - Silty fine to coarse with organic
			5 1 1	material - brown - very loose
				SAND & GRAVEL - Silty fine to coarse with organic
5				material and shale fragments - loose - gray
			13 9 Std. Pen.	
	9		3 6 2	
				CLAYEY SILT - with scattered fine to coarse sand
10				gravel and shale fragments - gray - stiff
			U-3	
			C D	
	12		3 5 Std. Pen.	
			7 8 4	
15				
			U-5 B	
			C 4 Std.	
	13		5 8 Pen. 6	
			10	
20				

Fig. C-6

Hole No. H-2 Sub Section East Fork Nookachamps Creek Bridge Pier #3 Sheet 2 of 3

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			3 Std. 5 Pen.	
	11		6 9 7	
25				
			3 Std. 5 Pen.	
	12		7 10 8	
30				
			4 Std. 6 Pen.	
	14		8 9 9	
35				
			10 Std. 11 Pen.	
	21		100/3" 10	SANDY CLAYEY SILT - with all sizes sand
				gravel and shale fragments scattered throughout -
				gray - hard to very hard
40				
			17 Std. 23 Pen.	
	56		33 43 11	
45				

Fig. C-6

Hole No. H-2 Sub Section East Fork Nookachamps Creek Bri[illegible]e Pier #3 Sheet 3 of 3

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			39 Std. 42 Pen.	
	95		53 12	
50				
	100/5"		100/5" Std. Pen. 13	
				ROCK - Highly fractured sandy slate with
				clay gouges and calcite seams - soft rock
55			Std. Pen. 14	very dense material
	100/1"		100/1" C	
			O	
			95% R	
			REC. E	
60			15	
			C	
			O	
			95% R	
			REC. E	
65			16	
	50/0"			TEST BORING STOPPED AT 66.0'
				Std. Pen. 17 66.0' 50/0"
70				

Fig. C-6

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LOG OF TEST BORING

S.H. _____ S.R. 9 Section East Fork Nookachamps Creek Bridge & Approaches Job No. L-3415
Hole No. H-3 Sub Section E. Fork Nookachamps Cr. Bridge Pier #2 Cont. Sec. 2939-U
Station 20+12 Offset 5' Lft. ℄ SR 9 Ground El. 35.3'
Type of Boring Wash. Bore Rotate Casing NX 45.0' W.T. El. 25.1' 3:00 p.m. 5-7-70
Inspector Donald L. Nebgen Date May 8, 1970 Sheet 1 of 3

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			U-1	TOPSOIL - silt with organic material - brown - very soft
			B C D	SANDY SILT - with scattered fine to medium
			2 3 Std. Pen.	gravels - brown - soft
	7		4 4 2	CLAY - silty with fine sand partings
5				grayish brown - very soft
			B C U-3	
			D 2 Std.	SANDY SILT - gray - very soft
	4		2 2 Pen. 4	
			3	
10				CLAYEY SILT - with fine to coarse sand gravels
			U-5	cobbles and shale fragments scattered throughout
			4 Std.	gray - stiff
	11		5 6 Pen. 6	
			7	
15				
			A U-7	
			4 Std.	
	15		6 9 Pen. 8	
			10	
20				

Fig. C-7

Hole No. H-3 Sub Section East Fork Nookachamps Creek Bri[illegible]e Pier #2 Sheet 2 of 3

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
	12		3 Std. 5 Pen. 7 10 9	
25	17		4 Std. 8 Pen. 9 12 10	
30	16		7 Std. 7 Pen. 9 12 11	
35	20		6 Std. 9 Pen. 11 13 12	
40	19		4 Std. 8 Pen. 11 15 13	
45				SANDY CLAYEY SILT - with all sizes sand gravel cobbles & shale fragments scattered throughout - gray - very hard

Fig. C-7

Hole No. H-3 Sub Section East Fork Nookachamps Creek Bri[illegible] Pier #2 Sheet 3 of 3

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
	91		56 Std. 38 Pen. 53 14	
				ROCK - highly fractured sandy slate with
50				scattered clay seams & calcite seams - dark gray
	100/2"		100/2" Std. Pen 15	very dense material
55				
	100/1"		100/1" Std. Pen. 16	
60				
	100/1"		100/1" Std. Pen. 17	
65				
			CORE	
			100%	
			Rec. 18	
				TEST BORING STOPPED AT 69.0'
70				

Fig. C-7

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LOG OF TEST BORING

S.H. _____ S.R. 9 Section East Fork Nookachamps Creek Bridge & Approaches Job No. L-3415
Hole No. H-4 Sub Section E. Fork Nookachamps Creek Bridge Pier#1 Cont. Sec. 2939-U
Station 19+76 Offset 9' Lt. ℄ SR 9 Ground El. 52.3'
Type of Boring Wash. Bore Rotate Casing NX 53.0' W.T. El. Note bottom log
Inspector Donald L. Nebgen Date May 13, 1970 Sheet 1 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			U-1	FILL - Very silty fine to coarse sand and gravel
				with organic material - brown - very loose
			1 Std.	
	1		1 Pen.	
			1 2	
5				
			1 Std.	
	4		2 Pen.	SILT - Sandy with organic material
			2 3 3	light brown
				CLAY - Silty with fine sand partings
10				light brown to gray - soft
			B U-4	
			C	
			3 Std.	
			4 Pen.	
	9		5 5	
			7	
15				SILT - Sandy with fine gravels - gray - very soft
			B U-6	CLAY - Silty with fine sand partings
			C D	
			1 Std.	gray - very soft
			1 Pen.	
	2		1 7	
			2	
20				

Fig. C-8

Hole No. H-4 Sub Section [redacted]. Fork Nookachamps Creek Bridge [redacted]ier #1 Sheet 2 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			B C D U-8	
			1 Std. 1 Pen.	
	2		1 1 9	
25				SILT - Clayey with fine to coarse sand gravel cobbles
			B U-10	and shale fragments imbedded throughout material
			2 Std.	gray - stiff
	12		5 Pen. 7 11	
			10	
30				
			4 Std. 5 Pen.	
	12		7 11 12	
35				
			C_D U-13	
			5 Std.	
			7 Pen.	
	15		8 14	
			8	
40				
			5 Std. 5 Pen.	
	12		7 7 15	
45				

Fig. C-8

Hole No. H-4 Sub Sectio[illegible]. Fork Nookachamps Creek Bridg[illegible] Pier #1 Sheet 3 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			C_D U-16	
			6 Std.	
			9 Pen.	
	20		11 17	
			12	
				ROCK FRAGMENTS - All sizes shale fragments sand and gravel
50				in sandysilt - gray - very stiff
			13 Std.	
	25		13 Pen.	
			12	
			50 18	ROCK - Highly fractured to shattered sandy slate with
				calcite seams - dark gray to black -
				very dense material
55				
			C	
			O	
			100% R	
			REC. E	
60			19	
			C	
			O	
			100% R	
			REC. E	
65			20	
			C	
			O	
			100% R	
			REC. E	
70			21	

Fig. C-8

Hole No. H-4 Sub Sectio[redacted]. Fork Nookachamps Creek Bridg[redacted]Pier #1 Sheet 4 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			C-21	TEST BORING STOPPED AT 71.0'
75				
80				
				Water Table - Artesian water pressure
				50.0' to bottom of core hole
				4.0' Head 53.0' Case
				2 gallons per minute flow with
				2.5' head

Fig. C-8

2. Revised Geotechnical Data Report

Revised Geotechnical Data Report

Judy Reservoir to Mount Vernon
Water Transmission Pipeline—Phase 2
Skagit County, Washington

for
HDR Engineering, Inc.

August 12, 2020

GeoEngineers
Earth Science + Technology

Revised Geotechnical Data Report

Judy Reservoir to Mount Vernon
Water Transmission Pipeline—Phase 2
Skagit County, Washington

for
HDR Engineering, Inc.

August 12, 2020

GeoEngineers

600 Dupont Street
Bellingham, Washington 98225
360.647.1510

Revised Geotechnical Data Report

Judy Reservoir to Mount Vernon Water Transmission Pipeline—Phase 2 Skagit County, Washington

File No. 2402-020-02

August 12, 2020

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1.0 INTRODUCTION AND SCOPE

This geotechnical data report presents the results of our geotechnical explorations and a summary of existing soil and groundwater conditions for the proposed Judy Reservoir to Mount Vernon Water Transmission Pipeline – Phase 2 in Skagit County, Washington. The project location is shown in the Vicinity Map and Site Exploration Plan, Figure 1.

The Public Utility District No. 1 of Skagit County (the District) is planning to construct a new water transmission pipeline from the Judy Reservoir to Mount Vernon. Under HDR Engineering, Inc. (HDR), GeoEngineers worked on the preliminary design phase of the project in 2007 and 2008 and completed a geotechnical design report for the original proposed pipeline alignment in November 2008. The District elected to break up the project into phases and completed Phase 1 of the project alignment within the Mount Vernon city limits. The Phase 2 project will extend the pipeline from its current terminus at the intersection of State Route (SR) 538 (East College Way) and North 43rd Place in Mount Vernon to Judy Reservoir approximately 5 miles to the northeast.

A large portion of the proposed Phase 2 alignment has changed since the completion of our 2008 geotechnical report. The proposed pipeline route has shifted from an alignment that would parallel the existing Judy Reservoir to Mount Vernon water transmission pipeline, to an alignment that follows a former Burlington Northern Santa Fe Railway (BNSF) railroad grade before rejoining the existing pipeline alignment south of Clear Lake. New explorations were completed along the currently proposed Phase 2 alignment.

GeoEngineers has been contracted to provide geotechnical engineering recommendations for the cut-and-cover portions of the proposed Phase 2 pipeline alignment. Shannon & Wilson (S&W) is completing geotechnical data collection and design for the pipeline crossings at Nookachamps Creek, the East Fork Nookachamps Creek, SR 538 and SR 9. Geotechnical data from S&W explorations has been included in this geotechnical data report.

This report provides exploration logs and a summary of our recent explorations for the Phase 2 project, and also includes previous explorations that were completed along in the currently proposed alignment.

2.0 BASIS OF STATIONING

The stationing referenced in this report is based on the pipeline alignment figure provided by HDR dated February 21, 2020. This pipeline alignment has been incorporated into Figures 1 through 7.

The pipeline stationing referenced herein and shown in the figures of this report represent a preliminary phase of the design that may have been superseded by the pipeline stationing presented in the project bid drawings developed by HDR. The location of subsurface exploration points, relative to the pipeline stationing, will be presented in the project drawings by HDR.

3.0 SITE CONDITIONS

3.1. Geology

We reviewed a 1989 U. S. Geological Survey (USGS) geologic map for the project area, titled “Surficial Geologic Map of the Port Townsend 30- by 60-Minute Quadrangle, Puget Sound Region, Washington”. The

geologic soil deposits are the result of both glacial and non-glacial processes that have occurred during the last 12,000 years. The most recent glacial event includes the Vashon Stade of the Fraser Glaciation. Sea level fluctuated significantly relative to the land surface and present-day sea level, in response to the glacial advance and retreat (melting). The following geologic units are mapped along the project alignment, listed from youngest to oldest.

3.1.1. Artificial Fill

Artificial fill/modified land is mapped along the project alignment in smaller-scale geologic mapping (Dethier 1981 and Whetten 1980), and is identified between approximate Stations 120+50 and 133+00 and between Stations 184+00 and 213+50. The artificial fill is interpreted to be associated with grading from the construction of the historical railroad grade and is inferred to overly the nearby mapped geologic units.

3.1.2. Alluvium

Alluvial deposits are mapped in the vicinity of the project alignment between approximate Stations 90+00 to 110+00, and Stations 185+00 to 278+50. These areas encompass portions of the alignment near Nookachamps Creek, East Fork Nookachamps Creek, and the lowland area near Clear Lake and Beaver Lake. Alluvium in the project vicinity consists of moderate to well sorted silt, clay and sand deposited from rivers and creeks, with the local texture predominately silt and clay, according to the geologic map. Disseminated organic material is common in alluvial deposits. The thickness of this deposit in the vicinity can range from 3 feet to 30 feet or greater.

3.1.3. Recessional Marine Drift

Recessional marine drift is mapped in the vicinity of the project alignment between approximate Stations 82+11 to 90+00, Stations 110+00 to 135+00, and Stations 174+00 to 185+00. Recessional marine drift is also found underlying shallow thicknesses of alluvium. Recessional marine drift is a glaciomarine drift that typically consists of unsorted, unstratified silt and clay with varying amounts of sand, gravel, cobbles and occasional boulders. Recessional marine drift is derived from sediment melted out of floating glacial ice that was deposited on the sea floor during periods of glacial retreat, while the land surface was depressed 500 to 600 feet from previous glaciations. This material locally contains shells and wood, and large erratics can be present sporadically or even in a cluster.

3.1.4. Recessional Continental Deposits

Recessional continental deposits are mapped in the vicinity of the project alignment between Stations 335+50 to 362+00. These soils consist of well graded to poorly graded, sand, gravel, and silt, deposited predominantly by meltwater from the receding Vashon-age ice sheet. Recessional continental deposits include ice-contact deposits, outwash deposits, and alluvial fan deposits. These deposits have not been consolidated by glacial advance. The thickness of the recessional continental deposits generally ranges from 6 feet to 30 feet, according to the geologic map.

3.1.5. Glacial Till

Glacial till is mapped in the vicinity of the project alignment between approximate Stations 135+00 to 174+00 and Stations 278+00 to 335+50. Glacial till consists of an unsorted mixture of silt, sand and

gravel that was deposited under the glaciers. Large erratics (very large boulders) occur sporadically. These deposits were consolidated by the weight of the advancing glacier and are therefore very dense.

3.1.6. Bedrock

We also reviewed a USGS geologic map for the project area, titled "Bedrock Geologic Map of the Port Townsend 30- by 60-Minute Quadrangle, Puget Sound Region, Washington" (Whetten et al., 1988) and a USGS geologic map for the project area, titled "Preliminary Geologic Map of the Clear Lake NW Quadrangle, Skagit County, Washington" (Whetten et al., 1980). Undifferentiated rocks of the Haystack Thrust Plate are mapped in the project vicinity. This group consists of Jurassic-age greenstone, metasedimentary rock, serpentinite, and silica carbonate rock. The Shuksan Unit is mapped to the north of this section near Judy Reservoir. The Shuksan unit is predominantly Darrington phyllite which is probably Late Permian to Early Triassic in age. The phyllite contains metasandstone with either flattened grains of sand or thin lamellae of quartz and plagioclase separated by fine graphitic material.

Bedrock is mapped in the vicinity of the alignment east of the area between Stations 132+00 to 138+00, north of the area between Stations 185+00 to 198+00, south of the area between Stations 278+50 and 284+50, and north of the alignment beginning near Station 350+00.

3.2. Surface Conditions and Subsurface Soil and Groundwater Explorations

3.2.1. Subsurface Explorations Overview

Subsurface soil and groundwater conditions along the proposed Phase 2 pipeline alignment were evaluated with a phased exploration program of borings, test pits and cone penetration tests (CPTs). The exploration program consisted of 15 new borings completed on May 14 and 15, 2018, and December 12 and 13, 2019, 17 new test pits completed on May 7 and June 5, 2018, and December 17, 2019, and three CPTs completed on December 12, 2019 and January 17, 2020. The new explorations were completed in areas where the pipeline alignment had changed from the preliminary phase of work or where there were otherwise gaps in exploration coverage. Borings from this phase of exploration are identified as GEI-xB (where "x" indicates a sequential number). Borings completed with groundwater monitoring piezometers are identified as GEI-xP. Test pits from this phase of exploration are identified as GEI-xTP. Cone penetration test are identified as GEI-xC.

Thirteen borings were completed to depths ranging from 10 to 21½ feet below the existing ground surface (bgs) with an EC-95 track-mounted drill rig operated by Boretec1 Drilling, Inc. Two borings, partially completed using rock coring methods, were completed to depths of 25 feet bgs using a D-50 track rig operated by Holocene Drilling. Fourteen test pits were completed to depths ranging from 9½ to 15½ feet bgs with a rubber-tired backhoe or 140 series excavator operated by Blackburn Earthworks; three test pits (GEI-29TP, 30TP, and 31TP) were completed using an excavator provide by the District. Cone penetration tests were completed to depths of 17 to 80 feet bgs using a track CPT rig operated by InSitu Engineering. A summary of the explorations completed as part of the Phase 2 exploration program is provided in Table A-1 of Appendix A, Summary of Phase 2 Explorations Completed by GeoEngineers. Details of the field exploration program and the exploration logs for Phase 2 explorations are presented in Appendix B, Field Explorations. A summary of the laboratory testing program and the test results are presented in Appendix C, Laboratory Testing.

3.2.2. Previous Geotechnical Explorations and Explorations by Others

GeoEngineers completed 61 boring, test pit, and hang-auger explorations for the previous phase of the pipeline project in 2007 and 2008 as part of the following geotechnical report:

- "Geotechnical Data Report, Judy Reservoir–Mount Vernon Pipeline, Mount Vernon, Washington," for HDR Engineering, Inc., dated November 17, 2008.

Select explorations from this preliminary phase report that remain within the current pipeline alignment have been included in Appendix A, Table A-2 and are also shown in Figures 1 through 7. The logs of these explorations are presented in Appendix D. Borings from the previous phase of exploration are identified as B-x (where "x" indicates a sequential number), and B-xP where a piezometer was installed at the boring location. Test pits from the previous phase of exploration are identified at TP-x.

As part of the design of trenchless pipeline crossings for the project, S&W completed two borings (SW-1B and SW-3B) and two borings with piezometers (SW-2P and SW-4P) included in the following geotechnical report:

- "Geotechnical Data Report, Judy Reservoir to Mount Vernon Transmission Pipeline – Phase 2 Project, Skagit County, Washington," for HDR Engineering, Inc., dated November 27, 2018.

Details of the S&W borings have been included in Appendix A, Table A-3 and exploration logs of these four borings are included in Appendix D of this report. The approximate exploration locations are shown in Figures 1 through 3.

3.2.3. Groundwater Monitoring

The groundwater conditions observed in the test pits and groundwater levels observed in the borings at the time of exploration are shown in the individual logs in Appendix B and are summarized in Appendix A, Table A-1. Piezometers were installed in seven borings (GEI-7P, GEI-11P, GEI-20P, GEI-25P, GEI-26P, GEI-27P, and GEI-28P) as also shown in the individual logs. A summary of the groundwater level readings completed in the Phase 2 GeoEngineers piezometers to date is presented in the attached in Appendix A, Table A-4. A summary of the groundwater level readings completed for our 2008 report for piezometers in the Phase 2 alignment is presented in the attached in Appendix A, Table A-5. A summary of the groundwater level readings completed in the Phase 2 piezometers completed by S&W is presented in the attached in Appendix A, Table A-6.

Groundwater monitoring was completed in 2018 and 2019 by GeoEngineers and the District in piezometers GEI-7P, GEI-11P, GEI-20P, SW-2P, SW-4P, B-9P, and B-29P. Plots of the long-term groundwater monitoring are displayed in Figure A-1 for piezometers GEI-11P and GEI-20P, Figure A-2 for SW-2P and SW-4P, and Figure A-3 for piezometer B-29P. The groundwater elevation observed in GEI-7P and B-9P did not fluctuate during the monitoring period.

3.2.4. Surface Conditions and Explorations in Pipeline Segment 1 – Station 81+91.86 to Station 114+00

The Phase 2 portion of the project begins at the eastern terminus of the Phase 1 project, approximately 700 feet east of the intersection of SR 538 and North 43rd Place. At this location, the pipeline will cross SR 538 and begin to drop into Nookachamps Creek flood plain. The alignment starts at about Elevation 55 feet at SR 538, drops to about Elevation 23 feet at Nookachamps Creek, and rises back to

Elevation 67 feet at pipeline Station 114+00. This segment of the alignment would typically be parallel to easements for Cascade Natural Gas and Puget Sound Energy. Aside from the area immediately adjacent to SR 538, this portion of the alignment is undeveloped. Vegetation in this segment is variable and includes field grass, shrubs, and deciduous trees, with agricultural fields present in the eastern portion of this segment.

Explorations completed in Pipeline Segment 1 include test pit GEI-1TP, GEI-29TP, and GEI-30TP and previous explorations B-8, B-9P, and TP-2. S&W completed two new borings, SW-1B and SW-2P, in this segment near Nookachamps Creek.

3.2.5. Surface Conditions and Explorations in Pipeline Segment 2 – Station 114+00 to Station 174+00

In Pipeline Segment 2, the pipeline alignment transitions to the former BNSF railroad grade. A majority of this pipeline segment alignment follows adjacent to SR 9 on an embankment raised above the East Fork Nookachamps Creek lowlands but lower than the roadway surface at SR 9. The ground surface along this segment gently drops going north, from about Elevation 70 feet near GEI-2TP to about Elevation 50 at the banks of the East Fork Nookachamps Creek crossing. This segment is generally forested; vegetation is variable and includes field grasses, weeds, shrubs, and small- to medium-sized deciduous trees.

Explorations completed in Pipeline Segment 2 include test pits and borings GEI-2TP through GEI-10TP, and GEI-31TP and GEI-32C, and previous borings B-15 and B-16. S&W completed two new borings, SW-3B and SW-4P, in this segment at the East Fork Nookachamps Creek crossing.

3.2.6. Surface Conditions and Explorations in Pipeline Segment 3 – Station 174+00 to Station 198+00

As proposed, the pipeline will cross SR 9 near the SR 9 and Babcock Road intersection near pipeline Station 174+00. Pipeline Segment 3 continues to follow the former BNSF railroad alignment adjacent to SR 9 on the northbound (east) side of the highway. This segment is somewhat more developed than Segment 1 and Segment 2 with increased driveways within the alignment and increased single-family residences, outbuildings and agricultural fields adjacent to the alignment. This portion of the alignment is relatively level, with elevations typically in the range of Elevation 50 to 55 feet. This segment is somewhat forested in some areas; vegetation is variable and includes field grass, shrubs, bushes, and small- to medium-sized deciduous trees.

Explorations completed in Pipeline Segment 3 include explorations GEI-11P through GEI-15TP.

3.2.7. Surface Conditions and Explorations in Pipeline Segment 4 – Station 198+00 to Station 213+50

North of pipeline Station 198+00, the pipeline alignment crosses into the lowlands southwest of Clear Lake. In Pipeline Segment 4, the pipeline continues to follow the former railroad grade, which is supported on an embankment above the floodplain. The top of the embankment is typically in the range of Elevation 45 to 50 feet, while the bottom "toe" of the embankment drops from about Elevation 47 feet at Station 199+00 to Elevation 35 feet at about Station 206+00 to Station 213+50. The embankment is vegetated with shrubs, bushes, small- to medium-sized deciduous trees, and occasionally some larger trees. The adjacent lowlands consist of agricultural field vegetated with grass, and no nearby structures or residences.

Explorations completed in this segment include test pits GEI-16TP through GEI-18TP and GEI-33C.

3.2.8. Surface Conditions and Explorations in Pipeline Segment 5 – Station 213+50 to Station 278+50

At Station 213+50, the pipeline alignment turns due east and crosses the lowlands near Clear Lake and Beaver Lake. This pipeline segment crosses Turner Creek Canal, Austin Road, Beaver Lake Road, Clear Lake Tributary and Fox Road. Near the Beaver Lake Road crossing, the proposed pipeline alignment meets, and begins to parallel, the existing pipeline alignment. The ground surface of this segment is relatively level and varies from approximately Elevation 32 to 42 feet. This segment of the pipeline alignment is located in an agricultural setting with fields being used for a combination of livestock grazing, crops, and some open field areas. Large portions of the area are under standing water during periods of wet weather. The fields are vegetated with grasses.

Explorations completed in this segment include Phase 2 borings GEI-20P and GEI-21B, GEI-25P through 28P, and GEI-34C and previous borings B-24P, B-25 and B-26.

In-situ slug testing was conducted in piezometers GEI-20P and GEI-25P through GEI-28P. The results of slug testing are presented in Appendix B.

3.2.9. Surface Conditions and Explorations in Pipeline Segment 6 – Station 278+50 to Station 361+00

At Station 278+50, the pipeline alignment ascends out of the lowland area and into the upland area east of Clear Lake. The ground surface along this segment of the pipeline alignment is at a higher elevation relative to the rest of the alignment. This segment of the pipeline passes through a mixture of livestock pastures with field grass, treed areas with deciduous and evergreen trees, and near single family residences and outbuildings. The ground surface slopes up from Elevation 43 feet at Station 278+50 to approximately Elevation 425 feet at the end of the pipeline at Station 361+00. In this segment, the proposed pipeline parallels the existing pipeline from Station 278+50 to Station 340+00 and follows Old Day Creek Road from Station 340+00 to the Judy Reservoir treatment facility (Station 361+00).

GeoEngineers completed four new supplemental borings in this segment, GEI-23B and GEI-24B and GEI-35B and GEI-36B. The remainder of the proposed pipeline alignment in this segment has remained unchanged from our 2008 geotechnical report. Previous explorations in this segment include borings B-28 through B-34P and test pits TP-11 through TP-15 and TP-17 through TP-19.

3.2.10. Vandegrift Subroute Alternative (between Station 161+00 to Station 178+50)

The Vandegrift Subroute Alternative is a proposed alternative route for the pipeline between Station 161+00 and Station 178+50 that would provide an alternative pipeline crossing of the East Fork Nookachamps Creek. The proposed subroute would turn the proposed pipeline east at Station 161+00 for approximately 1,300 feet, and then route the pipeline north approximately 450 feet crossing East Fork Nookachamps Creek and reconnecting with the former BNSF railroad grade at Station 178+50. The proposed subroute would parallel the existing water transmission pipeline for the initial 1,300 feet east of Station 161+00.

Preliminary phase borings B-17P, B-18 and B-36 and test pits TP-5 and TP-6 were completed for a portion of this subroute (the portion that parallels the existing pipeline). At the time of this report the Vandegrift Subroute is not a part of the preferred alignment alternative.

3.2.11. Additional Explorations near Service Connections

Previous explorations TP-7, TP-8, B-22, and B-38 were completed in areas planned for service line work as part of this project. These explorations are included in Appendix C and shown in Figure 1 and Figures 3 through 5.

3.3. Slug Testing

GeoEngineers completed pneumatic slug testing in piezometers GEI-20P and GEI-25P through GEI-28P on December 18 and 19, 2019 to estimate the hydraulic conductivity of the aquifer in Segment 5. In a pneumatic slug test, the water level in a piezometer is disturbed by pressurizing the air in the piezometer casing and suddenly releasing the pressure. The initial pressurization forces the water level to drop in the casing and the response to the release of the induced pressure, where the head in the piezometer rises to the previous equilibrium, is recorded by a data logging sensor located near the bottom of the piezometer. The resulting data can be analyzed to provide estimations of hydraulic conductivity of the screened subsurface immediately surrounding the piezometer.

Details of the test results and analysis methods are presented in Appendix B. The test results are presented in Figures B-37 through B-63.

3.4. Soil Corrosion Potential

Corrosion potential of soil samples selected by GeoEngineers and HDR was conducted based on laboratory chemical testing performed by GeoEngineers' soil lab in Redmond, Washington. A 10-point Ductile Iron Pipe Research Association (DIPRA) soil evaluation was conducted. The 10-point DIPRA testing included pH, moisture, sulfide, redox potential, and resistivity. Soils with a total DIPRA score higher than 10 are generally considered corrosive. The results of DIPRA 10-point testing are included in Appendix C.

4.0 LIMITATIONS

We have prepared this geotechnical data report for HDR Engineering, Public Utility District No. 1 of Skagit County, and members of the design team for use in preliminary planning of the Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2 project in Skagit County, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. The conclusions, recommendations, and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty or other conditions, express or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table and/or figure), if provided, and any attachments should be considered a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Please refer to Appendix E titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this data report.

5.0 REFERENCES

Dethier, D.P. and J.T. Whetten. 1981. Preliminary Map of the Mount Vernon 7.5-Minute Quadrangle, Skagit County, Washington. United States Geological Survey. Map OF-81-105.

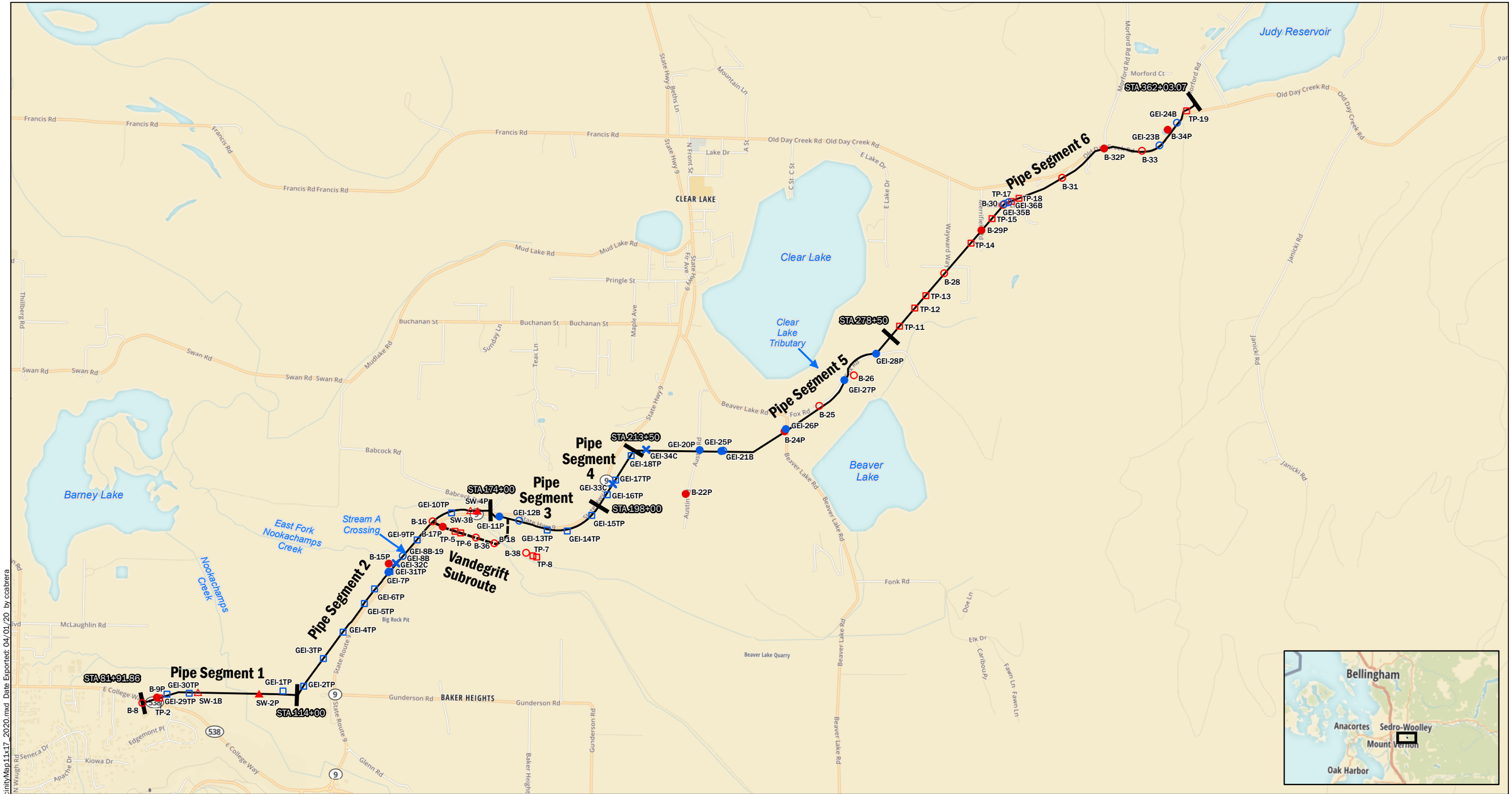
Pessl F., Jr., D.P. Dethier, D.B. Booth and J.P. Minard. 1989. Surficial Geologic Map of the Port Townsend 30- by 60- Minute Quadrangle, Puget Sound Region, Washington. United States Geological Survey. Map I-1198-F

Whetten, J.T., D.P. Dethier and P.R. Carroll. 1980. Preliminary Geologic Map of the Clear Lake NW Quadrangle, Skagit County, Washington. United States Geological Survey. OFR 80-247.

Whetten, J.T., P.I. Carroll, H.D. Grower, E.H. Brown and F. Pessl Jr. 1988. Bedrock Geologic Map of Port Townsend 30- by 60-Minute Quadrangle, Puget Sound Region, Washington. United States Geological Survey. Map I-1198-G.

FIGURES

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Notes:
1. The locations of all features shown are approximate.
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Data Source: Pipeline alignment provided by HDR Engineering, Inc., file date February 21, 2020. ESRI

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

Phase 2 Explorations (2018/2019/2020)		Preliminary Phase Explorations (2007)		Explorations by Others (2018)	
GEI-xB	Boring	B-x	Boring	SW-xB	Boring by Shannon and Wilson
GEI-xP	Boring w/Piezometer	B-xP	Boring w/Piezometer	SW-xP	Boring with Piezometer by Shannon and Wilson
GEI-xTP	Test Pit	TP-x	Test Pit		Preferred Alignment
GEI-xC	Cone Penetration Test	STA 82+12	Approximate Station Number Along Pipe Alignment		Vandegrift Subroute Alignment

N W E S

2,000 0 2,000
Feet

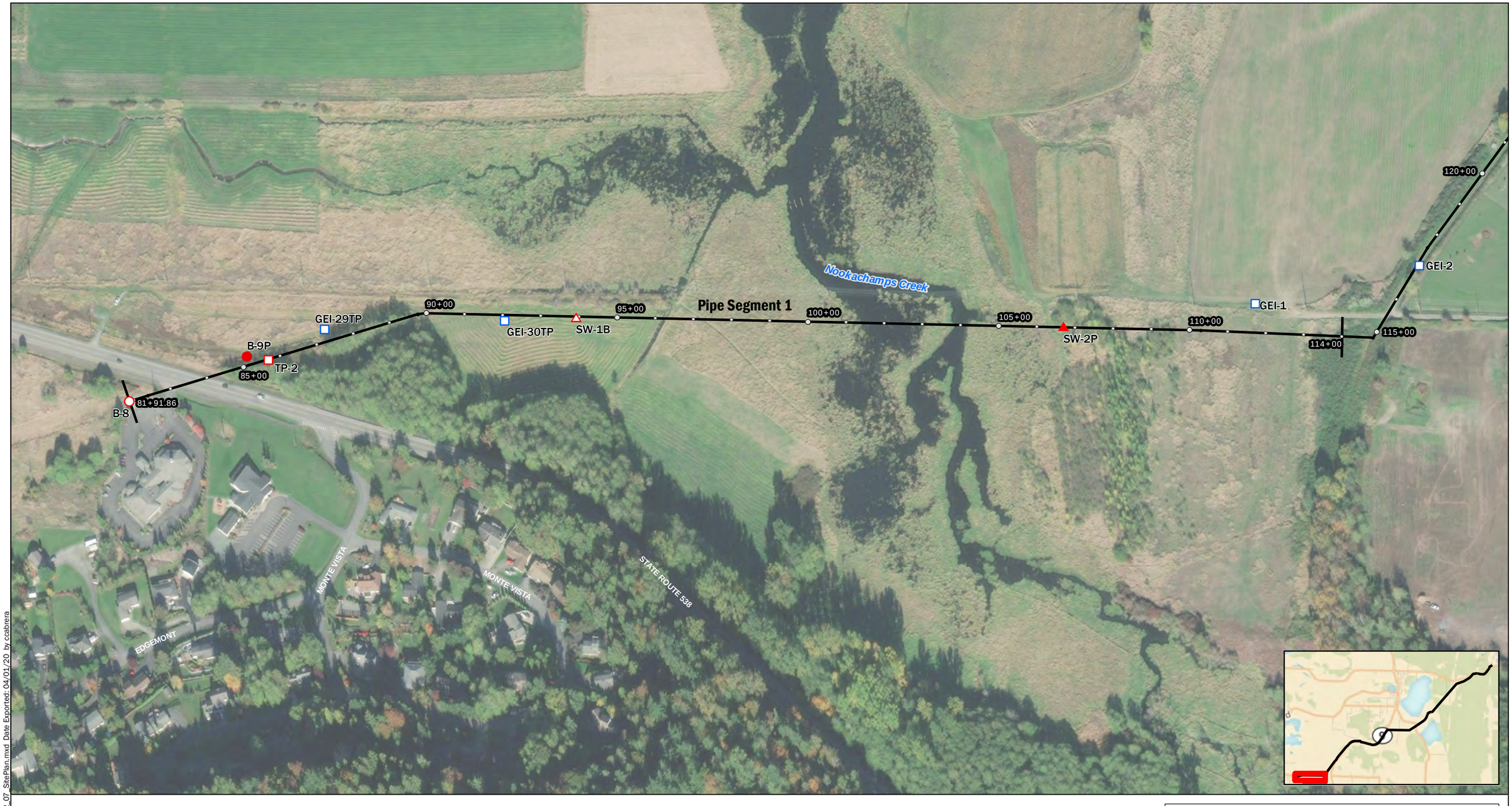
Vicinity Map and Site Exploration Plan

Judy Reservoir to Mount Vernon Transmission Pipeline Phase 2
Skagit County, Washington

GeoEngineers

Figure 1

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Data Source: Pipeline alignment provided by HDR Engineering, Inc., file date February 21, 2020. Roads from Skagit County GIS. ESRI.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

Phase 2 Explorations (2018/2019/2020)		Preliminary Phase Explorations (2007)		Explorations by Others (2018)	
GEI-xB	Boring	B-x	Boring	SW-xB	Boring by Shannon and Wilson
GEI-xP	Boring w/Piezometer	B-xP	Boring w/Piezometer	SW-xP	Boring with Piezometer by Shannon and Wilson
GEI-xTP	Test Pit	TP-x	Test Pit		Preferred Alignment
GEI-xC	Cone Penetration Test	85+00	Approximate Station Number Along Pipe Alignment		

N W E S

250 0 250
Feet

Site Exploration Plan
Pipe Segment 1: STA 82+91.86 to 114+00

Judy Reservoir to Mount Vernon Transmission Pipeline Phase 2
Skagit County, Washington

GeoEngineers

Figure 2

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Data Source: Pipeline alignment provided by HDR Engineering, Inc., file date February 21, 2020. Roads from Skagit County GIS. ESRI.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

Phase 2 Explorations (2018/2019/2020)

- GEI-xB — Boring
- GEI-xP — Boring w/Piezometer
- GEI-xTP — Test Pit
- GEI-xC — Cone Penetration Test

Preliminary Phase Explorations (2007)

- B-x — Boring
- B-xP — Boring w/Piezometer
- TP-x — Test Pit
- 85+00 — Approximate Station Number Along Pipe Alignment

Explorations by Others (2018)

- SW-xB — Boring by Shannon and Wilson
- SW-xP — Boring with Piezometer by Shannon and Wilson
- Preferred Alignment

N W E S

500 0 500

Feet

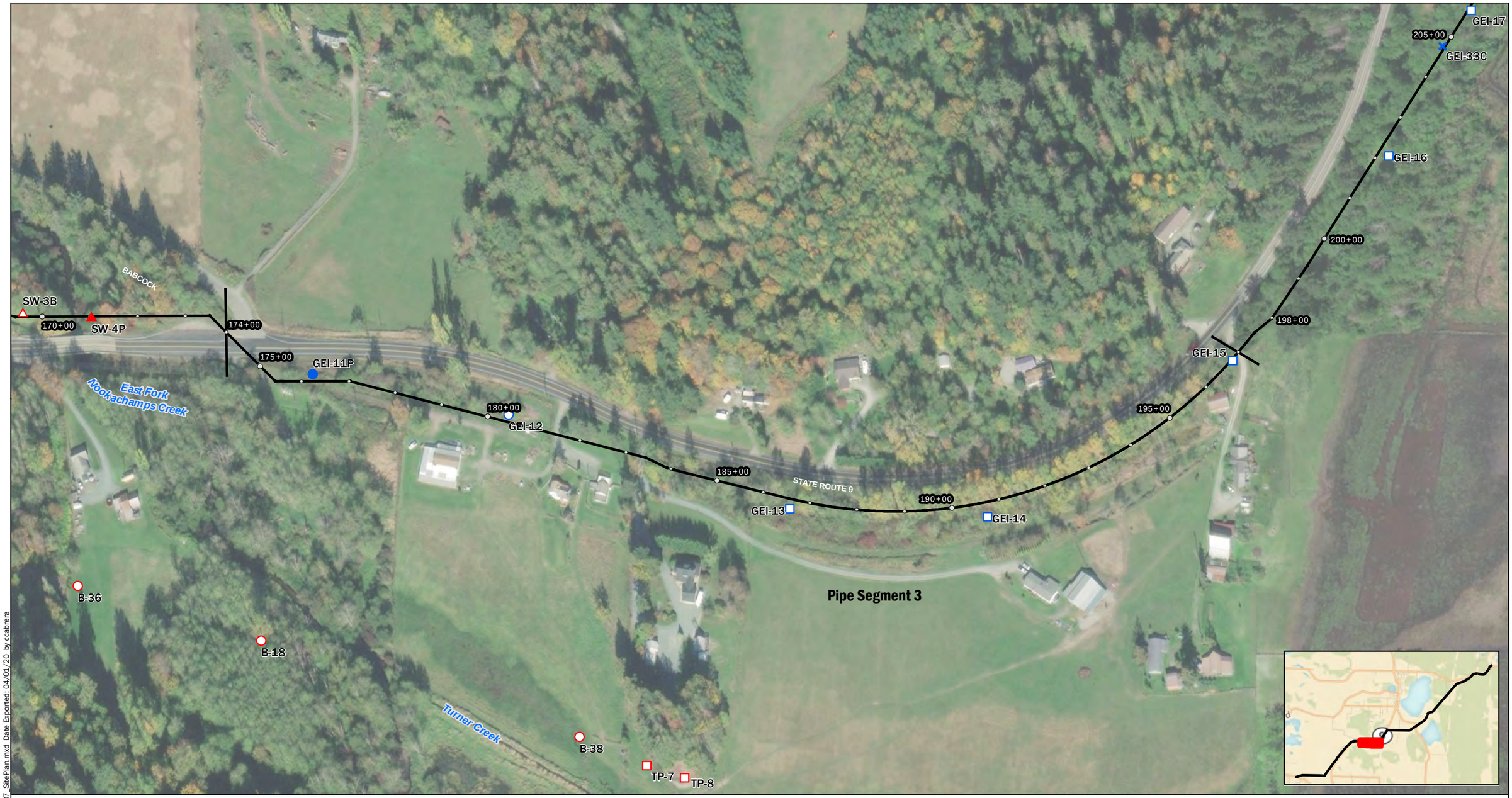
Site Exploration Plan
Pipe Segment 2: STA 114+00 to 174+00

Judy Reservoir to Mount Vernon Transmission Pipeline Phase 2
Skagit County, Washington

GeoEngineers

Figure 3

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Data Source: Pipeline alignment provided by HDR Engineering, Inc., file date February 21, 2020. Roads from Skagit County GIS. ESRI.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

Phase 2 Explorations (2018/2019/2020)

- GEI-xB — Boring
- GEI-xP — Boring w/Piezometer
- GEI-xTP — Test Pit
- GEI-xC — Cone Penetration Test

Preliminary Phase Explorations (2007)

- B-x — Boring
- B-xP — Boring w/Piezometer
- TP-x — Test Pit
- 185+00 — Approximate Station Number Along Pipe Alignment

Explorations by Others (2018)

- SW-xB — Boring by Shannon and Wilson
- SW-xP — Boring with Piezometer by Shannon and Wilson
- Preferred Alignment

N W E S

200 0 200
Feet

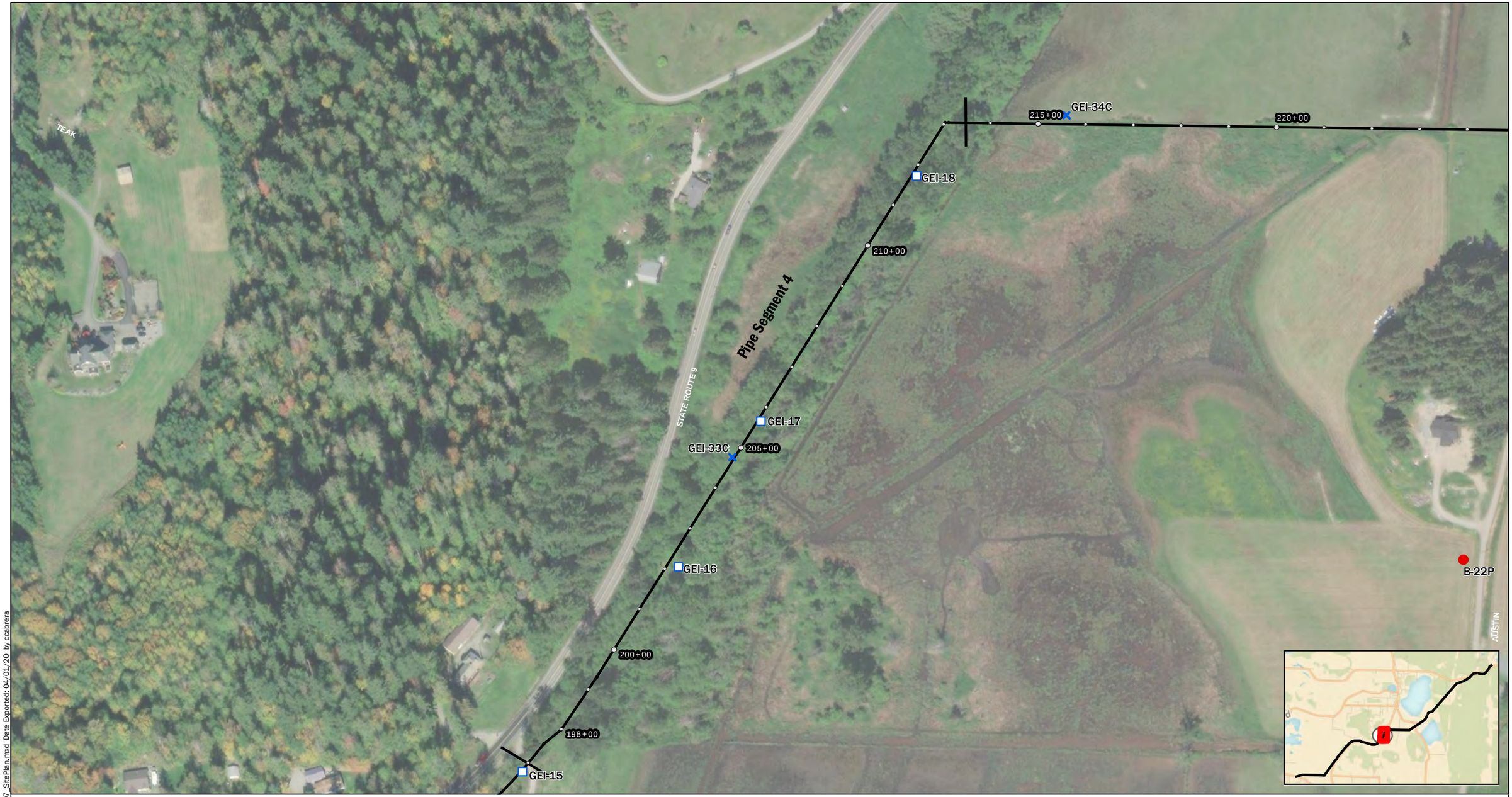
Site Exploration Plan
Pipe Segment 3: STA 174+00 to 198+00

Judy Reservoir to Mount Vernon Transmission Pipeline Phase 2
Skagit County, Washington

GeoEngineers

Figure 4

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Data Source: Pipeline alignment provided by HDR Engineering, Inc., file date February 21, 2020. Roads from Skagit County GIS. ESRI.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

Phase 2 Explorations (2018/2019/2020)

- GEI-xB — Boring
- GEI-xP — Boring w/Piezometer
- GEI-xTP — Test Pit
- GEI-xC — Cone Penetration Test

Preliminary Phase Explorations (2007)

- B-x — Boring
- B-xP — Boring w/Piezometer
- TP-x — Test Pit
- 65+00 — Approximate Station Number Along Pipe Alignment

Explorations by Others (2018)

- SW-xB — Boring by Shannon and Wilson
- SW-xP — Boring with Piezometer by Shannon and Wilson
- Preferred Alignment

N W E S

200 0 200
Feet

Site Exploration Plan
Pipe Segment 4: STA 198+00 to 213+50

Judy Reservoir to Mount Vernon Transmission Pipeline Phase 2
Skagit County, Washington

GeoEngineers

Figure 5

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Data Source: Pipeline alignment provided by HDR Engineering, Inc., file date February 21, 2020. Roads from Skagit County GIS. ESRI.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

Phase 2 Explorations (2018/2019/2020)		Preliminary Phase Explorations (2007)		Explorations by Others (2018)	
GEI-xB	Boring	B-x	Boring	SW-xB	Boring by Shannon and Wilson
GEI-xP	Boring w/Piezometer	B-xP	Boring w/Piezometer	SW-xP	Boring with Piezometer by Shannon and Wilson
GEI-xTP	Test Pit	TP-x	Test Pit		Preferred Alignment
GEI-xC	Cone Penetration Test	65+00	Approximate Station Number Along Pipe Alignment		

N W E S

350 0 350
Feet

Site Exploration Plan
Pipe Segment 5: STA 213+50 to 278+50

Judy Reservoir to Mount Vernon Transmission Pipeline Phase 2
Skagit County, Washington

GeoEngineers

Figure 6

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Data Source: Pipeline alignment provided by HDR Engineering, Inc., file date February 21, 2020. Roads from Skagit County GIS. ESRI.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

Phase 2 Explorations (2018/2019/2020)		Preliminary Phase Explorations (2007)		Explorations by Others (2018)	
GEI-xB	Boring	B-x	Boring	SW-xB	Boring by Shannon and Wilson
GEI-xP	Boring w/Piezometer	B-xP	Boring w/Piezometer	SW-xP	Boring with Piezometer by Shannon and Wilson
GEI-xTP	Test Pit	TP-x	Test Pit		Preferred Alignment
GEI-xC	Cone Penetration Test	85+00	Approximate Station Number Along Pipe Alignment		

N W E S

600 0 600

Feet

Site Exploration Plan
Pipe Segment 6: STA 278+50 to 362+03.07

Judy Reservoir to Mount Vernon Transmission Pipeline Phase 2
Skagit County, Washington

GeoEngineers

Figure 7

APPENDICES

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APPENDIX A
Summary of Field Explorations and Groundwater Monitoring Data

APPENDIX A
SUMMARY OF FIELD EXPLORATIONS AND GROUNDWATER MONITORING DATA

This appendix includes summary tables of geotechnical exploration data collected during Phase 2 and the preliminary phase of the Judy Reservoir to Mount Vernon Water Transmission Pipeline project. The following tables and figures are included in this appendix.

- Table A-1. Summary of Phase 2 Explorations Completed by GeoEngineers
- Table A-2. Summary of Previous Explorations on Pipeline Alignment
- Table A-3. Summary of Phase 2 Explorations Completed by Shannon & Wilson (S&W)
- Table A-4. Summary of Measured Groundwater Observations – Phase 2 Piezometers
- Table A-5. Summary of Measured Groundwater Observations – Preliminary Phase Piezometers
- Table A-6. Summary of Measured Groundwater Observations – Phase 2 Piezometers Completed by S&W
- Figure A-1. Groundwater Data Plots: GEI-11P and GEI-20P
- Figure A-2. Groundwater Data Plots: SW-2P and SW-4P
- Figure A-3. Groundwater Data Plot: B-29P

Table A-1

Summary of Phase 2 Explorations Completed by GeoEngineers

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2

Skagit County, Washington

Exploration No. [a]	Exploration Type	Date Completed	Approximate Station No. [b]	Easting	Northing	Approximate Surface Elevation (ft)	Depth Explored (ft, bgs)	Depth to Groundwater Seepage at Time of Exploration (ft, bgs)[c]	Soil Profile Encountered
GEI-1TP	Test Pit	5/7/2018	111+75	1291952	526902	50	10	NE	Fill Recessional Marine
GEI-2TP	Test Pit	5/7/2018	117+20	1292382	527008	72	10.5	7.5[d]	Fill Recessional Marine
GEI-3TP	Test Pit	5/7/2018	124+20	1292799	527588	67	10	NE	Fill Recessional Marine
GEI-4TP	Test Pit	5/7/2018	131+00	1293203	528157	63	10	NE	Fill Recessional Marine
GEI-5TP	Test Pit	5/7/2018	139+50	1293633	528741	59	10	9	Fill Recessional Marine
GEI-6TP	Test Pit	5/7/2018	142+00	1293894	529061	57	9.5	NE	Fill
GEI-7P	Boring with Piezometer	5/15/2018	146+80	1294165	529376	54.89	16.5	7.5	Fill Glacial Till
GEI-8B-18	Boring	5/15/2018	151+00	1294430	529691	52	21.5	11	Fill Alluvium
GEI-8B-19	Boring	12/13/2019	151+50	1294465	529732	51	35.5	17	Fill Alluvium Recessional Marine Glacial Till
GEI-9TP	Test Pit	5/7/2018	156+00	1294768	530091	53	10	NE	Fill Recessional Marine
GEI-10TP	Test Pit	5/7/2018	165+50	1295463	530664	49	9	NE	Fill Recessional Marine
GEI-11P	Boring with Piezometer	5/14/2018	176+70	1296445	530555	53.15	16.5	15	Fill Recessional Marine
GEI-12B	Boring	5/14/2018	180+80	1296906	530513	53	11.5	NE	Fill Recessional Marine
GEI-13TP	Test Pit	6/4/2018	187+00	1297532	530300	52	11	0[d]	Fill Recessional Marine
GEI-14TP	Test Pit	6/4/2018	191+00	1297930	530302	52	10.5	0[d] and 9.5	Fill Recessional Marine
GEI-15TP	Test Pit	6/4/2018	197+25	1298414	530593	51	10	1	Fill Recessional Marine
GEI-16TP	Test Pit	6/5/2018	202+25	1298730	531024	49	11	NE	Fill
GEI-17TP	Test Pit	6/5/2018	207+00	1298939	531362	46	10.5	NE	Fill
GEI-18TP	Test Pit	6/4/2018	212+50	1299261	531864	45	15.5	13	Fill Alluvium
GEI-19B	Deleted Exploration								
GEI-20P	Boring with Piezometer	5/14/2018	227+30	1300695	531940	39.95	16.5	3	Alluvium
GEI-21B	Boring	5/14/2018	232+00	1301190	531937	37	11.5	3	Alluvium
GEI-22B	Deleted Exploration								
GEI-23B	Boring	5/14/2018	349+50	1310324	538330	383	11.5	9.5	Fill
GEI-24B	Boring	5/14/2018	355+50	1310704	538807	394	10.2	NE	Fill Glacial Till Bedrock
GEI-25P	Boring with Piezometer	12/13/2019	231+50	1301143	531933	38	21.5	0	Alluvium
GEI-26P	Boring with Piezometer	12/12/2019	246+00	1302499	532394	38	21.5	0	Fill Alluvium
GEI-27P	Boring with Piezometer	12/12/2019	263+00	1303722	533423	41	21.5	4	Fill Alluvium
GEI-28P	Boring with Piezometer	12/12/2019	272+50	1304391	533976	38	21.5	1	Fill Alluvium
GEI-29TP	Test Pit	12/17/2019	87+20	1289515	526842	44	11	4	Topsoil Recessional Marine
GEI-30TP	Test Pit	12/17/2019	92+00	1289987	526864	31	11.5	2[d] and 10.5	Topsoil Recessional Marine
GEI-31TP	Test Pit	12/17/2019	147+00	1294193	529414	55	11.5	8	Fill Alluvium Glacial Till
GEI-32C	CPT	12/12/2019	150+00	1294319	529586	51	16.9	8	Fill Alluvium Glacial Till

Exploration No. [a]	Exploration Type	Date Completed	Approximate Station No. [b]	Easting	Northing	Approximate Surface Elevation (ft)	Depth Explored (ft, bgs)	Depth to Groundwater Seepage at Time of Exploration (ft, bgs)[c]	Soil Profile Encountered
GEI-33C	CPT	12/12/2019	204+80	1298862	531250	47	66.8	8	Fill Alluvium Recessional Marine Drift
GEI-34C	CPT	1/17/2020	215+50	1299562	531967	36	80.5	ND	Alluvium Recessional Marine Drift
GEI-35B	Boring	2/6/2020	313+50	1307076	537115	335	25	1[d]	Fill Bedrock
GEI-36B	Boring	2/6/2020	314+50	1307162	537148	334	25	1[d]	Fill Glacial Till Bedrock

Notes

[a] The following explorations were deleted from the exploration program: GEI-19B and GEI-22B.

[b] Station along the proposed transmission pipeline per drawing by HDR, Inc., February 21, 2020.

[c] See Table 3 for groundwater measurements at installed piezometers and text for detailed discussion groundwater conditions.

[d] Groundwater observed is representative of a perched groundwater condition.

Elevation based on NAVD88 datum

NE = Not encountered at time of exploration

ND = Not determined at time of exploration

Table A-2

Summary of Previous Explorations on Phase 2 Pipeline Alignment

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2

Skagit County, Washington

Exploration No.	Exploration Type	Date Completed	Approximate Station No. [a]	Easting	Northing	Approximate Surface Elevation (ft)	Depth Explored (ft)	Depth to Groundwater Seepage at Time of Exploration (ft)	Soil Profile Encountered
B-8	Boring	4/23/2007	081+70	1289003.526	526651.84	52.2	26.5	NE	Recessional Marine
B-9P	Boring with Piezometer	4/16/2007	085+00	1289311.469	526769.427	48	31.5	22	Recessional Marine
TP-2	Test Pit	5/17/2007	085+50	1289367.46	526761.47	49.5	14	9	Recessional Marine
B-15P	Boring with Piezometer	4/17/2007	150+00	1294172.175	529574.388	38	16.5	4	Alluvium
B-16	Boring	4/18/2007	161+00	1295094.432	530460.081	51.2	26.5	NE	Recessional Marine Bedrock
B-24P	Boring with Piezometer	4/18/2007	246+50	1302471.876	532349.058	36.7	16.5	1.9	Alluvium
B-25	Boring	4/19/2007	255+50	1303197.01	532879.35	41	16.5	4.5	Alluvium
B-26	Boring	5/31/2007	265+50	1303925.887	533522.057	36.1	16.5	2	Alluvium
TP-11	Test Pit	5/18/2007	279+40	1304875.194	534551.968	73.2	10	9	Fill Glacial Till
TP-12	Test Pit	5/17/2007	284+40	1305199.367	534932.641	189.9	9.5	NE	Recessional Marine Glacial Till
TP-13	Test Pit	5/17/2007	287+80	1305428.022	535197.799	231.8	9.9	NE	Recessional Continental Glacial Till
B-28	Boring	4/19/2007	293+90	1305815.558	535660.091	290.2	11.5	NE	Fill Glacial Till
TP-14	Test Pit	5/18/2007	302+30	1306375.388	536295.563	323.1	8.2	NE	Glacial Till
B-29P	Boring with Piezometer	4/19/2007	305+75	1306594.795	536562.616	336.5	10.2	NE	Fill/Glacial Till Bedrock
TP-15	Test Pit	5/18/2007	309+10	1306818.955	536809.261	332.7	9.2	NE	Glacial Till
B-30	Boring	5/31/2007	312+75	1307049.612	537097.351	332.8	16.5	NE	Fill Recessional Continental Bedrock
TP-17	Test Pit	5/18/2007	314+70	1307223.765	537171.477	335.4	8	7.2	Recessional Continental Bedrock
TP-18	Test Pit	5/18/2007	316+50	1307387.259	537233.884	332.2	10	8	Recessional Continental
B-31	Boring	4/19/2007	326+50	1308288.736	537662.889	368.8	11.5	NE	Fill Glacial Till
B-32P	Boring with Piezometer	4/19/2007	337+50	1309174.098	538277.565	378.1	16.5	NE	Fill Glacial Till
B-33	Boring	5/31/2007	345+50	1309962.625	538227.862	381.2	16.5	12	Fill Recessional Continental Glacial Till
B-34P	Boring with Piezometer	5/31/2007	353+50	1310503.233	538667.175	379.8	9	NE	Fill Recessional Continental Glacial Till Bedrock
TP-19	Test Pit	5/18/2007	358+00	1310898.232	539066.2277	406.5	10.2	7.2	Fill Alluvium
B-17P	Boring with Piezometer	4/17/2007	VS[b]	1295304.474	530346.802	61.7	26.5	4	Fill Recessional Marine Bedrock
TP-5	Test Pit	5/17/2007	VS[b]	1295560.9	530257.659	69.9	10.2	NE	Recessional Marine
TP-6	Test Pit	5/18/2007	VS[b]	1295680.08	530219.961	69.9	14	NE	Recessional Marine Glacial Till
B-36	Boring	5/30/2007	VS[b]	1296000.6	530118.58	96.9	15.2	ND	Recessional Marine Bedrock
B-18	Boring	4/18/2007	VS[b]	1296385.017	530003.765	43.3	61.5	NE	Fill Recessional Marine
B-38	Boring	5/30/2007	NA[c]	1297052.606	529801.548	33.5	41.5	ND	Alluvium Recessional Marine
TP-7	Test Pit	5/18/2007	NA[c]	1297193.49	529741.389	39.3	10	NE	Fill Recessional Marine
TP-8	Test Pit	5/18/2007	NA[c]	1297272.606	529716.227	46.2	5	NE	Fill Bedrock
B-22P	Boring with Piezometer	4/19/2007	NA[c]	1300395.319	531035.431	40	16.5	7	Alluvium Glacial Till

Notes

[a] Station along the proposed transmission pipeline per drawing by HDR, Inc., February 21, 2020

[b] Exploration along the Vandegrift Subroute alternative

[c] Exploration is in an area of service line work

Elevation based on NAVD88 datum

NE = Not encountered at time of exploration

ND = Not determined at time of exploration

Table A-3

Summary of Phase 2 Explorations Completed By Shannon & Wilson (S&W)

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2

Skagit County, Washington

Exploration No.	Exploration Type	Date Completed	Approximate Station No. [a]	Easting	Northing	Approximate Surface Elevation (ft)	Depth Explored (ft)	Depth to Groundwater Seepage at Time of Exploration (ft)	Soil Profile Encountered
SW-1B	Boring	5/7/2018	93+50	1290174	526873	28	71.5	17	Recessional Marine
SW-2P	Boring with Piezometer	5/7/2018	107+00	1291455	526836	29	71.5	17	Recessional Marine
SW-3B	Boring	5/7/2018	169+50	1295895	530665	49	75.1	NE	Fill Recessional Marine Bedrock
SW-4P	Boring with Piezometer	5/7/2018	172+50	1296177	530682	51	75.1	15	Fill Recessional Marine Bedrock

Notes

[a] Station along the proposed transmission pipeline alignment per drawing by HDR, Inc., February 21, 2020

Elevation based on NAVD88 datum

NE = Not encountered at time of exploration

Table A-4

Summary of Measured Groundwater Observations - Phase 2 Piezometers Completed by GeoEngineers

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2

Skagit County, Washington

Date Measured	Measured Groundwater Depth Below Ground Surface(ft)							Measured Groundwater Elevation (ft)						
	GEI-7P[a]	GEI-11P[a]	GEI-20P	GEI-25P	GEI-26P	GEI-27P	GEI-28P	GEI-7P	GEI-11P	GEI-20P	GEI-25P	GEI-26P	GEI-27P	GEI-28P
Ground Surface Elevation (ft)	54.89	53.15	39.95	38	38	41	38	54.89	53.15	39.95	38	38	41	38
5/18/2018	0	12.32	5.13	–	–	–	–	54.89	40.83	34.82	–	–	–	–
7/20/2018	0	6.81	6.89	–	–	–	–	54.89	46.34	33.06	–	–	–	–
9/26/2018	0	7.98	6.83	–	–	–	–	54.89	45.17	33.12	–	–	–	–
11/19/2018	0	6.81	6.89	–	–	–	–	54.89	46.34	33.06	–	–	–	–
1/8/2019	0	5.15	3.08	–	–	–	–	54.89	48	36.87	–	–	–	–
2/22/2019	0	4.93	3.63	–	–	–	–	54.89	48.22	36.32	–	–	–	–
3/27/2019	0	4.73	3.93	–	–	–	–	54.89	48.42	36.02	–	–	–	–
4/25/2019	0	4.38	4.06	–	–	–	–	54.89	48.77	35.89	–	–	–	–
5/21/2019	0	4.88	4.48	–	–	–	–	54.89	48.27	35.47	–	–	–	–
6/11/2019	0	4.93	5.23	–	–	–	–	54.89	48.22	34.72	–	–	–	–
6/26/2019	0	5.7	6.23	–	–	–	–	54.89	47.45	33.72	–	–	–	–
7/23/2019	0	6.53	6.48	–	–	–	–	54.89	46.62	33.47	–	–	–	–
8/27/2019	0	7.78	7.33	–	–	–	–	54.89	45.37	32.62	–	–	–	–
9/30/2019	0	6.13	4.83	–	–	–	–	54.89	47.02	35.12	–	–	–	–
10/28/2019	0	5.33	3.68	–	–	–	–	54.89	47.82	36.27	–	–	–	–
11/25/2019	0	4.98	3.63	–	–	–	–	54.89	48.17	36.32	–	–	–	–
12/18/2019	–	–	NA[b]	0.7	0.54	3.24	0.24	–	–	NA[b]	37.3	37.46	37.76	37.76
12/27/2019	0	3.03	3.38	–	–	–	–	54.89	50.12	36.57	–	–	–	–

Notes

[a] Groundwater observed is likely representative of a perched groundwater condition

[b] Measurement potentially inaccurate and not presented

Elevation based on NAVD88 datum

Table A-5

Summary of Measured Groundwter Observations - Preliminary Phase Piezometers

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2

Skagit County, Washington

Date Measured	Measured Groundwater Depth Below Ground Surface(ft)						Measured Groundwater Elevation (ft)					
	B-9P	B-17P	B-24P	B-29P[a]	B-32P	B-34P	B-9P	B-17P	B-24P	B-29P	B-32P	B-34P
Ground Surface Elevation (ft)	48	61.7	36.7	336.5	378.1	379.8	48	61.7	36.7	336.5	378.1	379.8
5/16/2007	0	3.91	2.05	Dry	8.44	--	48	57.8	34.7	--	369.7	--
6/14/2007	0	4.17	2.37	9.3	8.98	5.33	48	57.5	34.3	327.2	369.1	374.5
8/8/2007	0	5.28	2.66	9.02	9.09	5.38	48	56.4	34	327.5	369	374.4
10/3/2007	0	4.8	1.5	8.8	6.9	4.8	48	56.9	35.3	327.7	371.2	375
11/14/2008	0	--	--	--	--	--	48	--	--	--	--	--
7/20/2018	--	--	--	9.62	--	--	--	--	--	326.9	--	--
9/26/2018	0	--	--	Dry	--	--	48	--	--	--	--	--
11/19/2018	--	--	--	7.29	--	--	--	--	--	329.6	--	--
1/8/2019	--	--	--	6.92	--	--	--	--	--	329.6	--	--
2/22/2019	0	--	--	7.22	--	--	48	--	--	329.3	--	--
3/27/2019	0	--	--	9.1	--	--	48	--	--	327.4	--	--
4/25/2019	0	--	--	7.95	--	--	48	--	--	328.6	--	--
5/21/2019	0	--	--	9.57	--	--	48	--	--	326.9	--	--
6/11/2019	0	--	--	9.42	--	--	48	--	--	327.1	--	--
6/26/2019	0	--	--	9.07	--	--	48	--	--	327.4	--	--
7/23/2019	0	--	--	9.62	--	--	48	--	--	326.9	--	--
8/27/2019	0	--	--	9.66	--	--	48	--	--	326.8	--	--
9/30/2019	0	--	--	8.72	--	--	48	--	--	327.8	--	--
10/28/2019	0	--	--	6.32	--	--		--	--	330.2	--	--
11/25/2019	0	--	--	6.42	--	--		--	--	330.1	--	--
12/27/2019	0	--	--	7.02	--	--		--	--	329.5	--	--

Notes

[a] Groundwater observed is likely representative of a perched groundwater condition

Elevation based on NAVD88 datum

Table A-6

Summary of Measured Groundwater Observations - Phase 2 Piezometers Completed by Shannon & Wilson (S&W)

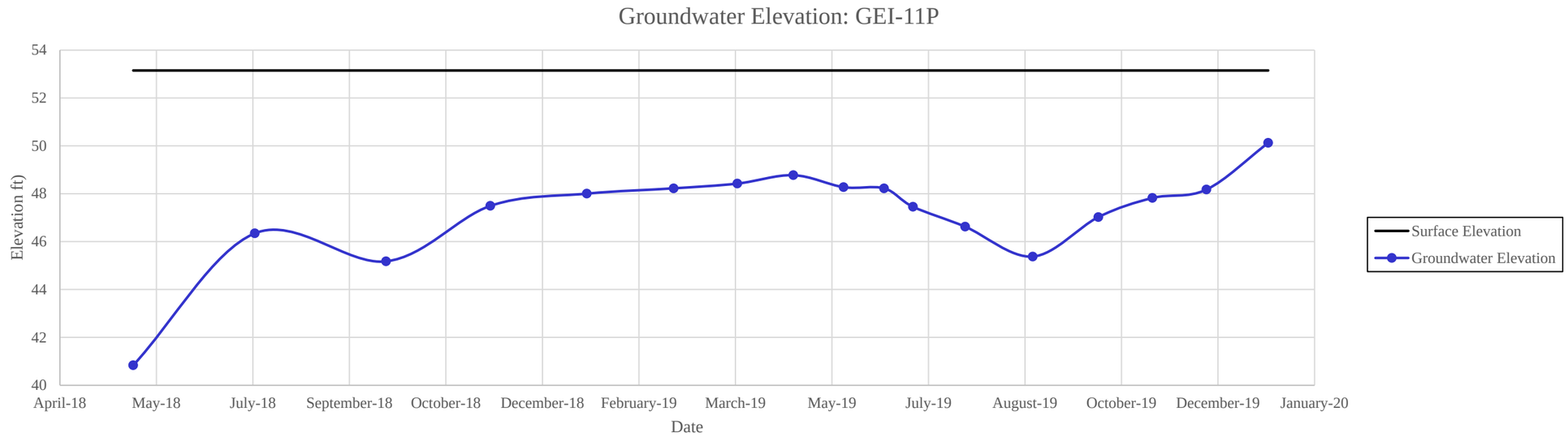
Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2

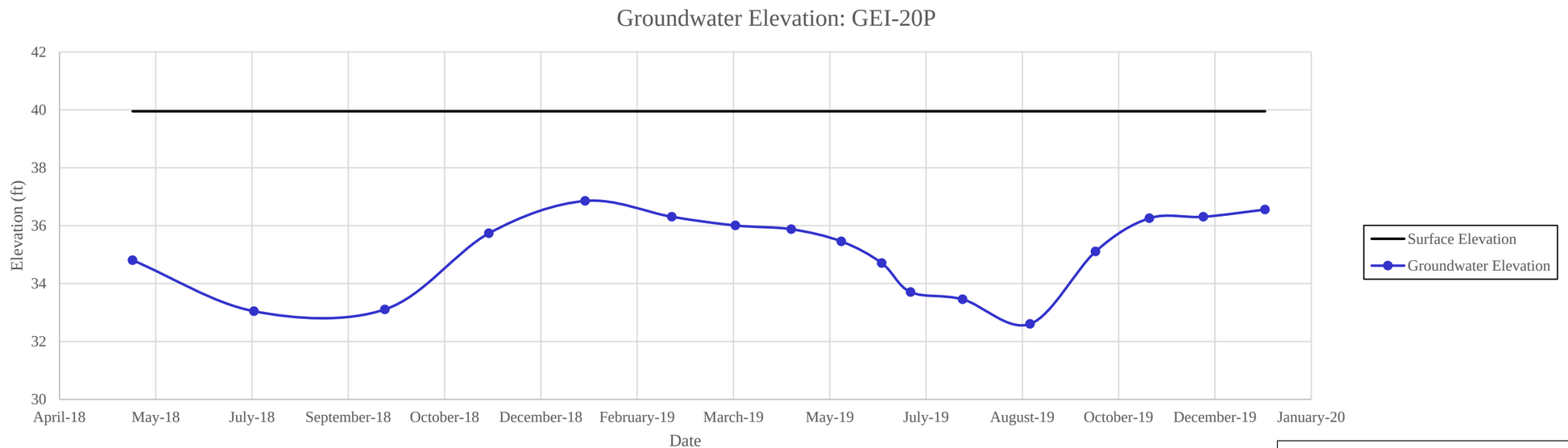
Skagit County, Washington

Date Measured	Measured Groundwater Depth Below Ground Surface(ft)		Measured Groundwater Elevation (ft)	
	SW-2P	SW-4P	SW-2P	SW-4P
Ground Surface Elevation (ft)	29	51	29	51
5/18/2018	--	--	--	--
7/20/2018	--	--	--	--
9/26/2018	8.38	17.73	21	33
11/19/2018	8.7	11.83	20	39
1/8/2019	7.01	11.21	22	40
2/22/2019	5.3	10.94	24	40
3/27/2019	4.03	10.90	25	40
4/25/2019	3.14	10.94	26	40
5/21/2019	2.58	10.78	26	40
6/11/2019	1.93	11.28	27	40
6/26/2019	1.73	11.13	27	40
7/23/2019	1.10	11.15	28	40
8/27/2019	3.72	11.84	25	39
9/30/2019	0.38	14.14	29	37
10/28/2019	0.38	14.83	29	36
11/25/2019	0.22	11.3	29	40
12/27/2019	0.22	11.08	29	40

Notes

Elevation based on NAVD88 datum





Notes:

1. Points on the groundwater elevation plot represent actual groundwater measurements. The connecting lines are interpolated.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source:

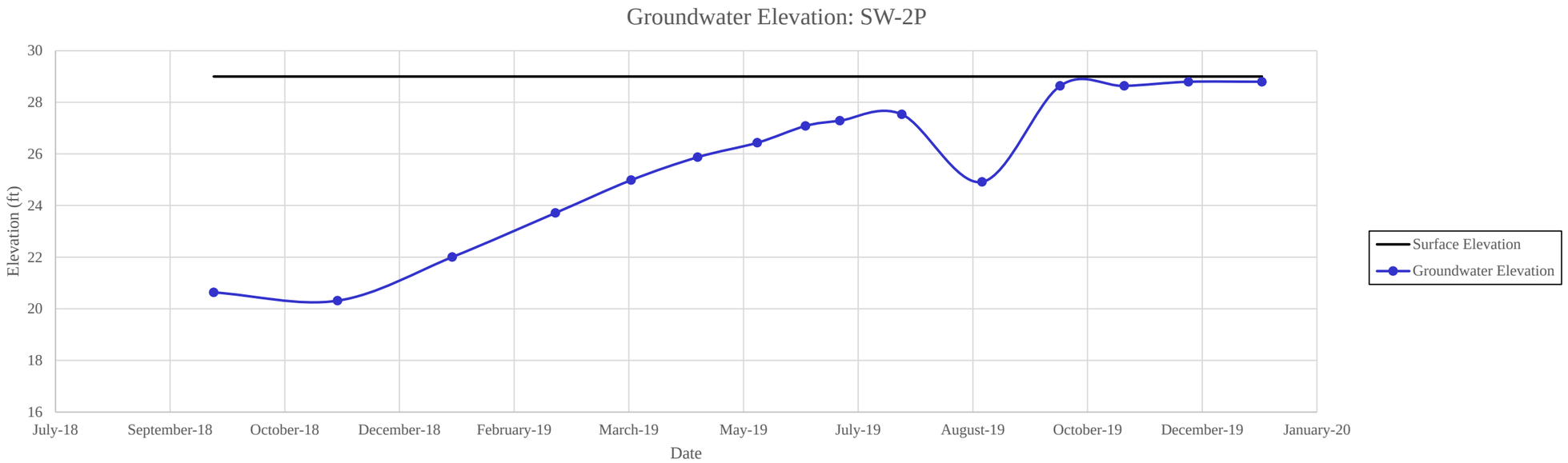
Groundwater Data Plots: GEI-11P and GEI-20P

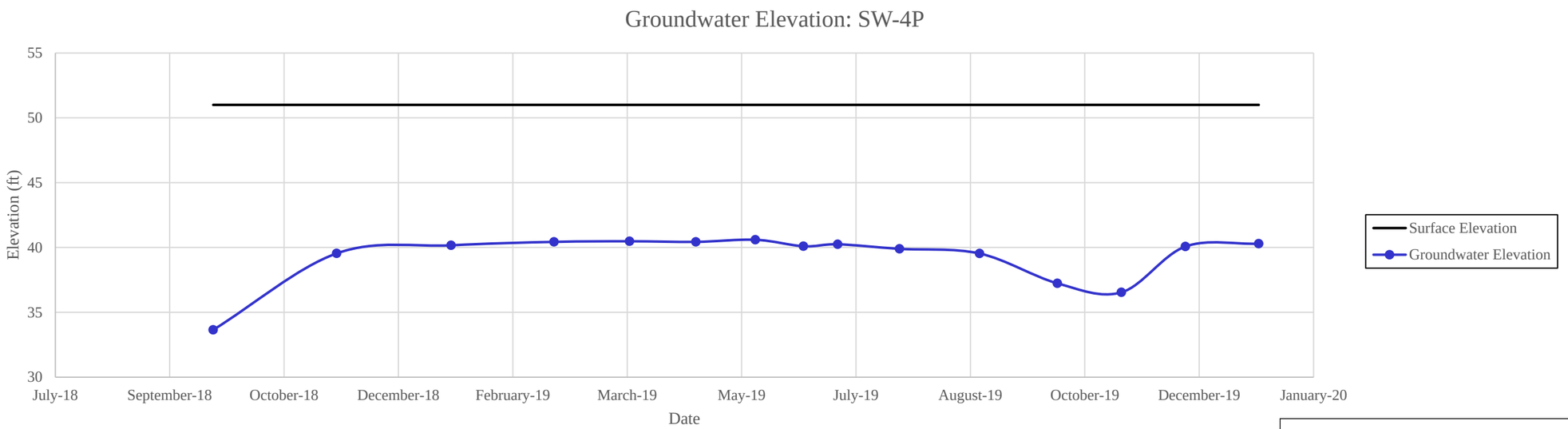
Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure A-1

0659-018-00 Date Exported: 03/12/2019





Notes:

1. Points on the groundwater elevation plot represent actual groundwater measurements. The connecting lines are interpolated.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source:

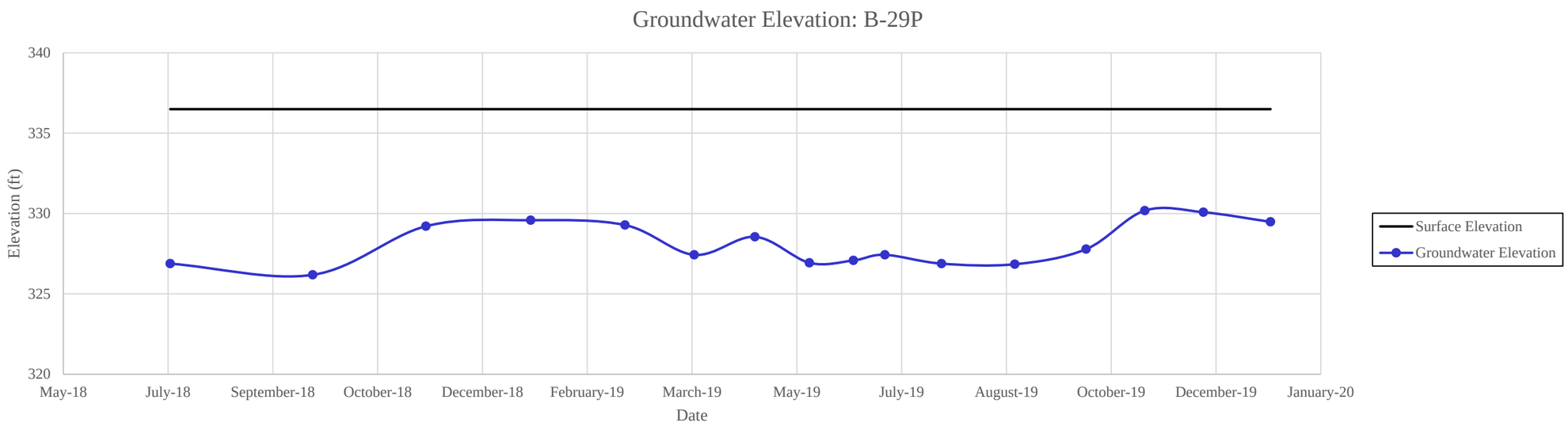
Groundwater Data Plots: SW-2P and SW-4P

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure A-2

0659-018-00 Date Exported: 03/12/2019



Notes:

1. Points on the groundwater elevation plot represent actual groundwater measurements. The connecting lines are interpolated.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source:

Groundwater Data Plots: GEI-29P

Judy Reservoir to Mount Vernon Transmission
Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure A-3

0659-018-00 Date Exported: 03/12/2019

APPENDIX B
Field Explorations and Testing

APPENDIX B
FIELD EXPLORATION AND TESTING

Field Explorations

Subsurface soil and groundwater conditions were evaluated with an exploration program of borings, test pits, and cone penetration tests (CPTs) along the proposed new water transmission line. The approximate locations of the explorations are shown in Figure 1 through Figure 7 of this report. A majority of the locations of the borings were determined by professional survey and coordinates provided to GeoEngineers after completion of the explorations; the locations of certain explorations were determined by GPS units. The locations shown in the figures should be considered accurate to the degree implied by the methods used.

The logs of the borings and test pits completed for the geotechnical evaluation are presented in Figures B-2 through B-33. Note that explorations GEI-19B and GEI-22B were planned explorations, but were not completed due to access restrictions. The exploration logs are based on our interpretation of the field and laboratory data and indicate the various types of soils encountered. They also indicate the depths at which these soils or their characteristics change, although the change might actually be gradual. If the change occurred between samples in the borings the depth was inferred.

The borings and test pits were continuously monitored by a geologist from our firm who examined and classified the soils encountered, obtained representative soil samples, observed groundwater conditions, and prepared a detailed log of each exploration. Soils encountered were classified visually in general accordance with ASTM International (ASTM) D-2488-90, which is described in Figure B-1. The exploration logs are based on our interpretation of the field and laboratory data and indicate the various types of soils encountered. They also indicate the depths at which these soils or their characteristics change, although the change might actually be gradual. If the change occurred between samples in the explorations, it was interpreted.

Soil and Rock Borings

A total of 15 borings were completed between May 2018 and February 2020 to depths of 10 to 35½ feet bgs. Borings GEI-35P and GEI-36P were completed with a Diedrich D-50 track drill rig operated by Holocene Drilling. All other borings were completed with an EC-95 track-mounted drill rig operated by Boretec1 Drilling, Inc. with both firms subcontracted to GeoEngineers, Inc.

Soil samples from the borings were obtained using the Standard Penetration Test (SPT) method. This method involves driving a split-spoon sampler a total of 18 inches using a 140-pound rope and cathead or automatic hammer free falling 30 inches. The number of blows required to drive the sampler the last 12 inches are recorded on the boring logs.

Bedrock coring was performed for a portion of GEI-35B and GEI-36B using NQ3 wireline rock coring tooling. Due to very poor recovery, determination of Rock Quality Designation (RQD) of the rock cores was not feasible.

The borings were backfilled in general accordance with procedures outlined by the Washington State Department of Ecology.

Test Pits

A total of 17 test pits were completed between May 2018 and December 2019 to depths of 9½ to 15½ feet bgs. Test pits GEI-29TP through GEI-31TP were completed using a John Deere 850 excavator provided by

the District. All other test pits were completed using a John Deere 310 backhoe or Kobelco 140 series excavator operated by Blackburn Earthworks and subcontracted to GeoEngineers.

Disturbed soil samples were generally obtained from the sides of the test pits and the bucket of the excavator. The samples were placed in plastic bags to maintain the moisture content and transported back to our laboratory for analysis and testing. The test pits were backfilled with the excavated material upon completion and tamped with the excavator bucket.

Cone Penetration Tests

Three CPTs were completed in December 2019 and January 2020 to depths of 16.9 to 80.5 feet bgs. The CPTs were completed by InSitu Engineering under subcontract to GeoEngineers. The CPT explorations measure the resistance encountered by 1½-inch-diameter rod as the cone at the end of the rod is pushed through the soil strata. The CPT specifically measures tip resistance, side friction, and pore water pressure encountered while the cone is pushed into the soil. As no samples are collected during the CPT explorations, the correlation between these parameters was used to determine an inferred "soil behavior type" for classification of the various soils encountered. The CPT soundings were backfilled in general accordance with procedures outlined by the Washington State Department of Ecology.

Groundwater Measurements

Piezometers were installed in borings GEI-7P, GEI-11P,GEI-20P and GEI-25P through GEI-28P. Details regarding the piezometer construction are shown in the individual logs in this appendix. If groundwater was observed during drilling it is indicated by a solid triangle on the piezometer log. Groundwater levels were subsequently measured in all the piezometers. Groundwater measurements to date are shown in Appendix A, Table A-4. The groundwater levels are indicated by a solid triangle on the piezometer logs.

Pneumatic Slug Testing

In a pneumatic slug test, the water level in a piezometer is disturbed by pressurizing the air in the piezometer casing and suddenly releasing the pressure. The initial pressurization forces the water level to drop in the casing and the response to the release of the induced pressure, where the head in the piezometer rises to the previous equilibrium, is recorded by a data logging sensor located near the bottom of the piezometer. The resulting data can be analyzed to provide estimations of hydraulic conductivity of the screened subsurface immediately surrounding the piezometer. Pneumatic slug tests are preferable to traditional (sealed weight) slug tests in highly permeable systems because the change in head can be induced quicker allowing for more recovery data to be collected. On December 18 and 19, 2019, slug tests were performed in five piezometers: GEI-20P, GEI-25P, GEI-26P, GEI-27P, GEI-28P.

Slug Test Procedure

Each slug test was performed in two stages, a pressurization stage followed by a de-pressurization stage. Due to the permeable nature of the subsurface, the water level in three of the piezometers (GEI-20P, GEI-25P and GEI-26P) was measured and recorded at 0.25-second intervals and the remaining two piezometers (GEI-27P and GEI-28P), which are screened in slightly less permeable material, were measured at 1.0-second intervals using a decontaminated submerged water-level sensor consisting of a piezoelectric pressure transducer and automated datalogger (transducer/datalogger) programmed to record water pressure (head) above the sensor.

The pressurization stage involves attaching pneumatic apparatus to the top of the piezometer casing. This apparatus allows access of an automated datalogger to monitor the water level in the piezometer, can become airtight while pressurizing and vent to the atmosphere to release pressure. To pressurize the casing, additional air is forced into the casing via a pump attached to an incorporated valve on the apparatus. The datalogger at the bottom of the piezometer reads the increased pressure in the casing as an increase in the height of the water column, even though the actual water column is being compressed and forced lower into casing by the pressurized air above. Next is the de-pressurization stage, when the desired induced pressure is reached, a release valve is opened, and the casing is vented to the atmosphere. The pressure drops to atmospheric almost instantaneously, and the previously compressed water column rises to the equilibrium level. The data recorded during this rising stage is analyzed as a rising head slug test.

Slug Test Results

The data from all slug tests were downloaded from the transducer/datalogger, processed using spreadsheet software and then plotted to identify the type of hydraulic response.

In moderate to low permeability soils, the recovery of the water level back to its pre-test static level is typically in the form of a sloping trend of varying steepness, for example the response of piezometer GEI-20P presented in Figures B-37 through B-42. All piezometers tested, except for GEI-25P, exhibited this signature response and were analyzed using the method of Bouwer and Rice (1976). Piezometer GEI-25P displayed a recovery signature indicative of high permeability soils (Figures B-43 through B-49) and was analyzed using the method of Butler and Garnett (2000). The results of all rising head pneumatic slug tests are presented in Figures B-37 through B-63.

The hydraulic conductivity (K) values were calculated based on aquifer thickness and the slope of the fitted lines to falling and rising head data (Bouwer and Rice, 1976; Butler and Garnett, 2000). Aquifer thicknesses at each location were based on stratigraphy observed during drilling.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point lead test
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

GeoEngineers

Figure B-1

Date Excavated	5/7/2018	Total Depth (ft)	10	Logged By MWR Checked By SWC	Excavator Blackburn Earthworks Equipment John Deere 310J Backhoe	Groundwater not observed Caving not observed
Surface Elevation (ft) Vertical Datum	50 NAVD88	Easting (X) Northing (Y)	1291952 526902	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
49	1		1		ML	Dark brown silt with occasional sand and rootlets (soft to medium stiff, moist) (topsoil/agricultural layer)			
48	2		2		ML	Gray-brown clayey silt with rootlets, mottled coloring (stiff, moist) (weathered recessional drift)			
47	3				CH	Gray-brown fat clay with occasional sand and gravel (stiff to very stiff, moist) (recessional marine drift)			
46	4		3 AL				27		AL (LL = 59, PI = 31)
45	5								
44	6		4 MC, DIPRA				28		DIPRA = 1
43	7								
42	8		5						
41	9								
40	10		6						

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-1TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-2
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library\GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	5/7/2018	Total Depth (ft)	10.5	Logged By MWR Checked By SWC	Excavator Blackburn Earthworks Equipment John Deere 310J Backhoe	See "Remarks" section for groundwater observed Caving not observed
Surface Elevation (ft) Vertical Datum	72 NAVD88	Easting (X) Northing (Y)	1292382 527008	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
71	1		1		SOD	2 inches sod			
					GP	Brown fine to coarse gravel with sand and cobbles (medium dense, moist) (fill)			
70	2		2		SM	Gray-brown silty fine to coarse sand with gravel (loose, moist) (fill)			
69	3				ML	Gray-brown sandy silt with occasional gravel (medium stiff, moist)			
68	4		3						
67	5								
66	6		4 MC, DIPRA				19		DIPRA = 1
65	7					Becomes gray-blue			
					SM	Gray-brown silty fine to coarse sand with gravel (loose, moist to wet)			Rapid/isolated groundwater seepage observed from 7½ to 9½ feet
64	8		5						
63	9		6 MC		CL	Gray-brown clay with occasional sand and wood debris (medium stiff, wet)	30		Wood debris observed from 8½ to 9½ feet
						Becomes wet			
62	10		7 MC		CL	Gray-brown clay with occasional sand (very stiff, moist) (recessional marine drift)	29		

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-2TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-3
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	5/7/2018	Total Depth (ft)	10	Logged By Checked By	MWR SWC	Excavator Equipment	Blackburn Earthworks John Deere 310J Backhoe	Groundwater not observed Caving not observed
Surface Elevation (ft) Vertical Datum	67 NAVD88			Easting (X) Northing (Y)	1292799 527588	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
66	1		1		SOD	2 inches sod			
					SM	Gray-brown silty fine to medium sand with gravel (medium dense, moist) (fill)			
65	2				ML	Gray-brown sandy silt with occasional gravel, trace rootlets and wood fragments (stiff, moist)			
64	3		2 MC				13		
63	4								
62	5		3 MC				25		
61	6		4 DIPRA		SP	Gray-brown fine to medium sand with gravel (loose, moist)			DIPRA = 1
60	7								
59	8				ML	Gray-brown silt with sand and trace fibers, iron staining (stiff to medium stiff, moist)			
58	9		5 MC				28		
			6		ML	Dark brown silt with wood fragments (soft, moist) (relic topsoil)			
57	10		7 MC		ML	Gray-brown silt with sand and occasional gravel (stiff to very stiff, moist) (recessional marine drift)	42		

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-3TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-4
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library\GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	5/7/2018	Total Depth (ft)	10	Logged By MWR Checked By SWC	Excavator Blackburn Earthworks Equipment John Deere 310J Backhoe	Groundwater not observed Caving not observed
Surface Elevation (ft) Vertical Datum	63 NAVD88	Easting (X) Northing (Y)	1293203 528157	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
62	1		1		SOD	2 inches sod			
					GP	Brown fine to coarse gravel with sand and rootlets (medium dense, moist) (fill)			
61	2		2		ML	Gray-brown silt with sand, occasional gravel, rootlets and trace wood debris (stiff, moist)			
60	3								
59	4		3 MC; DIPRA			With increased sand content	15		DIPRA = 1
58	5				CL	Gray-brown clay with sand, mottled coloring (stiff to very stiff, moist) (recessional marine drift)			
57	6		4 MC				14		
56	7								
55	8		5 MC				25		
54	9								
53	10		6						

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-4TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-5
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library\GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	5/7/2018	Total Depth (ft)	10	Logged By MWR Checked By SWC	Excavator Blackburn Earthworks Equipment John Deere 310J Backhoe	See "Remarks" section for groundwater observed Caving not observed
Surface Elevation (ft) Vertical Datum	59 NAVD88	Easting (X) Northing (Y)	1293633 528741	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
58	1		1		GP	Dark brown fine to coarse gravel with sand and rootlets (medium dense, moist) (fill)			
57	2		2		SM	Gray-brown silty fine to medium sand with gravel (medium dense, moist) (weathered glaciomarine drift)			
56	3								
55	4		3 AL		CL	Gray-brown silty clay with sand and gravel (stiff to very stiff, moist) (recessional marine drift)	19		AL (LL = 35, PI = 12)
54	5								
53	6		4 MC; DIPRA				17		DIPRA = 1
52	7								
51	8		5						
50	9				GM	Gray-brown silty fine to coarse gravel with sand (medium dense, wet)			Very slow groundwater seepage observed from 9 to 10 feet
49	10		6						

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-5TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-6
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	5/7/2018	Total Depth (ft)	9.5	Logged By	MWR	Excavator	Blackburn Earthworks
				Checked By	SWC	Equipment	John Deere 310J Backhoe

Groundwater not observed
See "Remarks" section for caving observed

Surface Elevation (ft)	57	Easting (X)	1293894	Coordinate System	WA State Plane North
Vertical Datum	NAVD88	Northing (Y)	529061	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
56	1		1		SP	Brown fine to coarse sand with gravel, trace silt and trace rootlets (medium dense, moist) (fill)			
55	2		2		GM	Gray-brown silty fine to coarse gravel with sand and rock fragments (medium dense, moist)			
54	3				SP	Brown fine to medium sand with gravel (medium dense, moist)			
53	4		3						
			4 MC		ML	Gray-brown silt with sand and occasional gravel (stiff, moist)	18		
52	5								
51	6								
50	7		5 DIPRA		SP	Brown fine to coarse sand with gravel, trace silt and wood debris (loose, moist)			Severe caving observed from 6½ to 9½ feet DIPRA = 1
49	8								
48	9		6 MC		GP-GM	Brown fine to coarse gravel with silt, sand and wood debris (loose, moist to wet)	8		

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-6TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-7
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
5/15/2018	5/15/2018	16.5	MWR / SWC	Boretec1, LLC	Hollow-stem Auger

Hammer Data	Rope & Cathead 140 (lbs) / 30 (in) Drop	Drilling Equipment	EC 95 Track Rig
Surface Elevation (ft) Vertical Datum	54.89 NAVD88	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)	1294165 529376	Horizontal Datum	WA State Plane North NAD83 (feet)

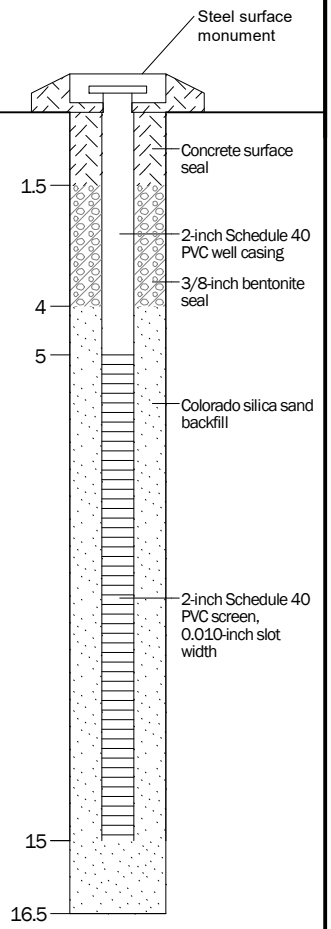
DOE Well I.D.: BJN 100
A 2-in well was installed on 5/15/2018 to a depth of 15 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/27/2019	Refer to Table A-4	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	0							SM	Brown silty fine to coarse sand with gravel and rootlets (loose, moist) (fill)		
		3	6		1 2						
50	5	9	4		3 DIPRA			ML	Gray-brown sandy silt with occasional gravel and wood fragments (soft, moist to wet) (DIPRA = 1)		
		9	6		4 MC				Becomes medium stiff and wet	28	
45	10	3	3		5			SM/ML	Gray-brown silty fine to medium sand to sandy silt with gravel (very loose/soft, wet)		
		12	33		6 SA			SM	Gray-brown silty fine to coarse sand with gravel (dense, wet) (glacial till)	9	18
40	15	12	26		7						

WELL LOG



Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Monitoring Well GEI-7P

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-8
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_WELL_%F

Drilled Start 5/15/2018 End 5/15/2018	Total Depth (ft) 21.5	Logged By MWR Checked By SWC	Driller Boretec1, LLC	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 52 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment EC 95 Track Rig	
Easting (X) 1294430 Northing (Y) 529691		System Datum WA State Plane North NAD83 (feet)		See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
50	0			1		SP-SM	Brown fine to coarse sand with silt, gravel and rootlets (loose, moist) (fill)			
		12	8	2		ML	Brown sandy silt with occasional gravel and rootlets (medium stiff, moist)			
						SM	Gray silty fine to coarse sand with occasional gravel and rock fragments (loose, moist)			
	5	15	6	3 DIPRA		SM/ML	Gray-brown silty fine to coarse sand to sandy silt with rock fragments and occasional gravel (loose/medium stiff, moist)			DIPRA = 1
45		9	22	4		SP-SM	Gray-brown fine to medium sand with silt and occasional gravel (medium dense, moist)			
	10	18	10	5 SA		SM	Gray-brown silty fine to coarse sand with gravel (loose to medium dense, moist to wet)	11	18	Groundwater observed at 11 feet during drilling
40						ML	Gray-brown sandy silt with organic matter and wood fragments (medium stiff, wet) (alluvium)			
	15	18	6	6 SA				64	68	
35						SP-SM	Gray fine to medium sand with silt (loose, wet)			
	20	18	5	7A 7B		ML	Gray silt with sand (medium stiff, wet)			

Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring GEI-8B-18

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-9
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_STANDARD_%F_NO_GW

Drilled Start 12/13/2019 End 12/13/2019	Total Depth (ft) 35.5	Logged By AF2 Checked By SWC	Driller Boretec1, LLC	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 51 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment EC 95 Track Rig	
Easting (X) 1294465 Northing (Y) 529732		System Datum WA State Plane North NAD83 (feet)		See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
50	0				1		GC	Brown clayey fine to coarse gravel with sand and organics (rootlets, organic matter) (loose to medium dense, moist) (fill)			
							SM	Gray-brown silty fine to coarse sand with rock fragments and occasional gravel (medium dense, moist)			
45	5	4	19		2			With rootlets and organic matter			
40	10	10	10		3A 3B		SM/GM	Brown silty fine to coarse sand to silty fine to coarse gravel (loose to medium dense, moist)			
							CL	Gray clay with organic matter (medium stiff, moist)			
35	15		13*		4A 4B MC		PT	Dark brown peat with sand, silt and wood fragments (medium stiff, moist) (alluvium)	272		*Blow count overstated
							SM	Gray-brown silty fine sand (loose, wet)			Grounwater observed at 19 feet during drilling
30	20	18	8		5 SA				31	26	
							SC	Brown clayey fine to medium sand with gravel and rootlets/fibers (stiff, wet) (glacial transition zone)			
	25										

Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_STANDARD_%F_NO_GW

Log of Boring GEI-8B-19

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-10
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
25	25	18	12		6 %F				20	47	
							CL	Brown clay with sand and gravel (very stiff, wet) (glaciomarine drift)			
20	30	20	26		7						
							SP	Gay fine to coarse sand with occasional gravel (very dense, wet) (glacially consolidated deposits)			Driller noted gravel from 32 to 34 feet
	35	15	50/5"		8						Possible artesian groundwater encountered at 35 feet

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Log of Boring GEI-8B-19 (continued)

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-10
Sheet 2 of 2

Date Excavated	5/7/2018	Total Depth (ft)	10	Logged By	MWR	Excavator	Blackburn Earthworks
				Checked By	SWC	Equipment	John Deere 310J Backhoe

Groundwater not observed
See "Remarks" section for caving observed

Surface Elevation (ft)	53	Easting (X)	1294768	Coordinate System	WA State Plane North
Vertical Datum	NAVD88	Northing (Y)	530091	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
52	1		1		SP	Brown fine to coarse sand with trace silt, gravel and rootlets (medium dense, moist) (fill)			Minor caving observed from surface to 1 foot
51	2		2		GP-GM	Blue-gray fine to coarse gravel with silt, sand and rock fragments (medium dense, moist)			
			3		SP-SM	Gray-brown fine to coarse sand with silt and gravel (medium dense, moist)			
50	3								
49	4		4 AL		CL	Gray-brown silty clay with sand and occasional gravel (very stiff, moist) (recessional marine drift)	18		AL (LL = 41, PI = 17)
48	5								
47	6		5 MC; DIPRA				13		DIPRA = 1
46	7								
45	8		6						
44	9								
43	10		7						

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-9TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-11
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	5/7/2018	Total Depth (ft)	9	Logged By MWR Checked By SWC	Excavator Blackburn Earthworks Equipment John Deere 310J Backhoe	Groundwater not observed Caving not observed

Surface Elevation (ft) Vertical Datum	49 NAVD88	Easting (X) Northing (Y)	1295463 530664	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
48	1		1		SP	Brown fine to coarse sand with gravel, trace silt and rootlets (medium dense, moist) (fill)			
47	2		2		ML/CL	Gray-brown clayey silt to silty clay with occasional sand and rootlets (soft to medium stiff, moist)			
46	3				CL	Brown clay with occasional sand and wood fibers (soft, moist)	56		
45	4		3 MC		CL	Gray-brown clay with occasional sand (very stiff, moist) (recessional marine drift)			
44	5		4 DIPRA						DIPRA = 1
43	6								
42	7								
41	8		5 MC				30		
40	9		6						

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-10TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-12
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library\GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/14/2018	5/14/2018	16.5	MWR	SWC	Boretec1, LLC	Hollow-stem Auger

Hammer Data	Rope & Cathead 140 (lbs) / 30 (in) Drop	Drilling Equipment	EC 95 Track Rig
Surface Elevation (ft) Vertical Datum	53.15 NAVD88	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)	1296445 530555	Horizontal Datum	WA State Plane North NAD83 (feet)

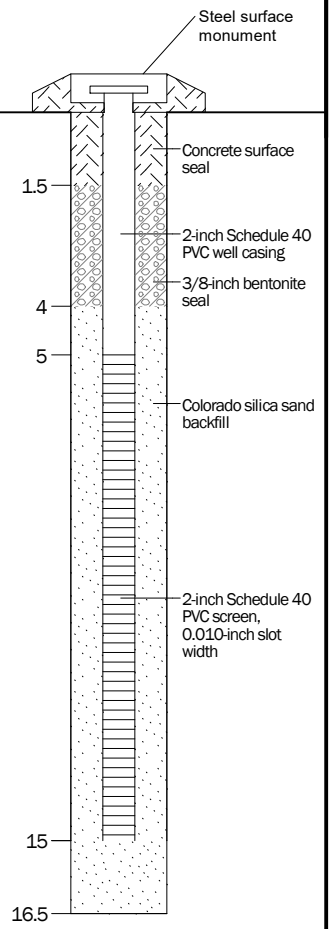
DOE Well I.D.: BJN 099
A 2-in well was installed on 5/14/2018 to a depth of 15 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/27/2019	Refer to Table A-4	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	0								SOD	3 inches sod		
						1			SP-SM	Brown fine to medium sand with silt, gravel and trace rootlets (medium dense, moist) (fill)		
50			3	19		2	▼					
	5		18	15		3 AL			CL	Gray-brown clay with occasional sand and gravel (stiff to very stiff, moist) (recessional marine drift) AL (LL = 46, PI = 22)	18	
45			18	17		4 MC; DIPRA				(DIPRA = 1)	25	
	10		18	10		5 MC					29	
40												
	15		18	4		6				Grades to gray, becomes soft and wet		

WELL LOG



Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Monitoring Well GEI-11P

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-13
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_WELL_%F

Drilled Start 5/14/2018 End 5/14/2018	Total Depth (ft) 11.5	Logged By MWR Checked By SWC	Driller Boretec1, LLC	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 53 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment EC 95 Track Rig	
Easting (X) 1296906 Northing (Y) 530513		System Datum WA State Plane North NAD83 (feet)		Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0				1		SM	Brown silty fine to medium sand with gravel and rootlets (loose to medium dense, moist) (fill)			
50		6	15		2 MC		ML	Gray-brown silt with sand and occasional gravel (stiff, moist)	17		
	5	18	10		3A 3B MC; DIPRA		ML	Gray-brown silt with sand and occasional gravel (stiff, moist) (recessional marine drift)	24		DIPRA = 1
45		6	15*		4 MC		CL	Gray-brown clay with sand and occasional gravel (stiff, moist)	24		*Blow count overstated; drilling on a rock
	10	18	8		5		CL	Brown clay with occasional gravel (medium stiff to stiff, moist)			

Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring GEI-12B

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-14
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/LibraryGEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_STANDARD_%F_NO_GW

Date Excavated	6/5/2018	Total Depth (ft)	11	Logged By MWR Checked By SWC	Excavator Blackburn Earthworks Equipment Kobelco 140 Excavator
See "Remarks" section for groundwater observed See "Remarks" section for caving observed					

Surface Elevation (ft) Vertical Datum	52 NAVD88	Easting (X) Northing (Y)	1297532 530300	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
51	1		1 MC		CL	Brown clay with sand, organic matter (wood fibers, rootlets) and debris (very soft, wet) (fill)	92		Moderate groundwater seepage observed from o to 2 feet Moderate caving observed from 0 to 2 feet Wood, brick and concrete debris at surface
50	2								
49	3		2 AL		ML/CL	Gray-brown clayey silt to silty clay with occasional sand (medium stiff, moist) (recessional marine drift)			AL (LL = 47, PI = 17)
48	4								
47	5								
46	6								
45	7		3 DIPRA				41		DIPRA = 1
44	8								
43	9								
42	10		4 MC				41		
41	11								

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-13TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-15
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	6/5/2018	Total Depth (ft)	10.5	Logged By MWR Checked By SWC	Excavator Blackburn Earthworks Equipment Kobelco 140 Excavator
See "Remarks" section for groundwater observed See "Remarks" section for caving observed					

Surface Elevation (ft) Vertical Datum	52 NAVD88	Easting (X) Northing (Y)	1297930 530302	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
51	1		1 MC		SC/CL	Gray-brown clayey fine to coarse sand to sandy clay with gravel, rootlets and wood debris (loose/soft, wet)((fill)	105		Very slow, isolated groundwater seepage observed from 0 to 2 feet Moderate caving observed from 0 to 2 feet
50	2								
49	3		2 MC		ML/CL	Gray clayey silt to silty clay with occasional sand and trace rootlets (medium stiff, moist) (recessional marine drift)	81		
48	4		3 MC; DIPRA				32		DIPRA = 2
47	5								
46	6								
45	7		4 MC				39		
44	8								
43	9								
42	10		5 SA		SC-SM	Gray fine to coarse sand with clay and gravel (loose, wet)	12	13	Moderate groundwater seepage observed at 9½ feet

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-14TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-16
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library\GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	6/5/2018	Total Depth (ft)	10	Logged By MWR Checked By SWC	Excavator Blackburn Earthworks Equipment Kobelco 140 Excavator	See "Remarks" section for groundwater observed See "Remarks" section for caving observed

Surface Elevation (ft) Vertical Datum	51 NAVD88	Easting (X) Northing (Y)	1298414 530593	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
50	1		1 MC		SM	Gray-brown silty fine to coarse sand with gravel and rootlets (loose, moist) (fill)	22		Minor caving observed from 0 to 2½ feet Moderate, isolated groundwater seepage observed from 1 to 2½ feet
49	2								
48	3		2 MC		ML/CL	Gray-brown clayey silt to silty clay with occasional sand (stiff, moist) (recessional marine drift)	32		
47	4		3 MC				31		
46	5								
45	6								
44	7		4 AL; DIPRA			Grades to gray			AL (LL = 48, PI = 19); DIPRA = 6
43	8								
42	9				CL	Gray clay with gravel and occasional sand (stiff, moist)	18		
41	10		5 MC						

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-15TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-17
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	6/5/2018	Total Depth (ft)	11	Logged By MWR Checked By SWC	Excavator Blackburn Earthworks Equipment Kobelco 140 Excavator	Groundwater not observed See "Remarks" section for caving observed

Surface Elevation (ft) Vertical Datum	49 NAVD88	Easting (X) Northing (Y)	1298730 531024	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
48	1		1		SP-SM	Brown fine to coarse sand with silt, gravel and rootlets (loose to medium dense, moist) (fill)			Minor caving observed from 0 to 3 feet
					SP	Brown fine to coarse sand with gravel and cobbles (loose, moist)			
47	2								
46	3		2 MC		CL	Brown clay with sand, occasional gravel and trace rootlets (medium stiff, moist)	30		
45	4								
44	5				SP	Gray-brown fine to coarse sand with gravel (loose, moist)			Minor caving observed from 4½ to 6 feet
43	6		3						
			4 MC; DIPRA		CL	Gray-brown clay with occasional sand and wood fragments, iron staining (medium stiff, moist)	27		DIPRA = 1
42	7								
41	8				CL	Gray-brown clay with sand, occasional gravel and trace wood fragments, slight iron staining (medium stiff, moist)			
40	9		5 MC				35		
39	10								
38	11		6 MC			With increased wood fragments and roots	19		

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-16TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-18
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library\GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	6/5/2018	Total Depth (ft)	10.5	Logged By MWR Checked By SWC	Excavator Blackburn Earthworks Equipment Kobelco 140 Excavator	Groundwater not observed See "Remarks" section for caving observed
Surface Elevation (ft) Vertical Datum	46 NAVD88	Easting (X) Northing (Y)	1298939 531362	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
45	1		1		GP	Brown fine to coarse gravel with sand, trace silt and rootlets (medium dense, moist) (fill)			Minor caving observed from 0 to 1 foot
					CL	Brown clay with occasional sand and gravel (stiff, moist)			
44	2		2 MC				33		
43	3								
42	4		3 MC			With increased sand content	28		
41	5								
40	6				SP	Brown fine to coarse sand with gravel (loose, moist)			Minor caving observed from 6 to 7 feet
39	7		4 DIPRA						DIPRA = 1
38	8				ML/CL	Gray-brown clayey silt to silty clay with sand (medium stiff, moist)			
37	9		5 AL						AL (LL = 48, PI = 19)
36	10		6 MC				37		

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-17TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-19
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library\GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	6/6/2018	Total Depth (ft)	15.5	Logged By MWR Checked By SWC	Excavator Blackburn Earthworks Equipment Kobelco 140 Excavator	See "Remarks" section for groundwater observed See "Remarks" section for caving observed
Surface Elevation (ft) Vertical Datum	45 NAVD88	Easting (X) Northing (Y)	1299261 531864	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
			1		SP-SM	Brown fine to coarse sand with silt, gravel and rootlets (loose, moist) (fill)			Minor caving from 0 to 2 feet
44	1		2 MC		CL	Brown clay with sand and occasional gravel (stiff, moist)	26		
43	2								
42	3								
41	4		3 MC			With increased sand and rootlets	26		
40	5								
39	6		4 MC				30		
38	7					3-inch sand lens at 7 feet			
37	8								
36	9								
35	10		5 %F; DIPRA		ML	Gray-brown non-plastic silt with rootlets (medium stiff to stiff, moist) (alluvium)	32	95	DIPRA = 1
34	11								
33	12		6 AL						AL (non-plastic)
32	13					Grades with sand, wet			Rapid groundwater seepage observed at 13 feet
31	14				ML	Gray silt with sand and trace organic matter (soft to medium stiff, wet)			
30	15		7						

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-18TP

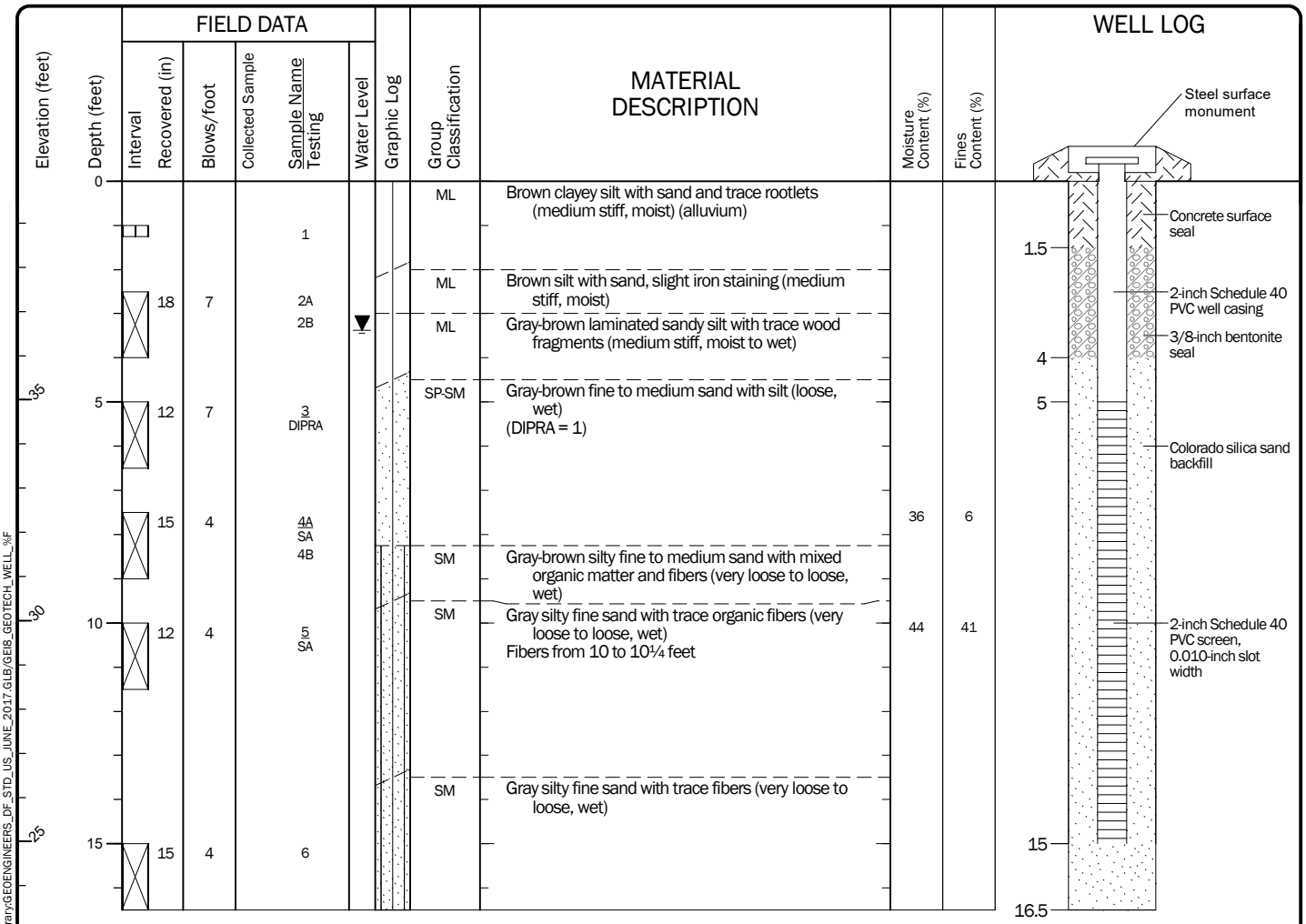
GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-20
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Drilled Start 5/14/2018 End 5/14/2018	Total Depth (ft) 16.5	Logged By MWR Checked By SWC	Driller Boretec1, LLC	Drilling Method Hollow-stem Auger	
Hammer Data: Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment: EC 95 Track Rig		DOE Well I.D.: BJN 098 A 2-in well was installed on 5/14/2018 to a depth of 15 ft.	
Surface Elevation (ft) Vertical Datum: 39.95 NAVD88		Top of Casing Elevation (ft)		Groundwater Date Measured: 12/27/2019	Depth to Water (ft): Refer to Table A-4 — Elevation (ft)
Easting (X) 1300695 Northing (Y) 531940		Horizontal Datum: WA State Plane North NAD83 (feet)			
Notes:					



Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Monitoring Well GEI-20P

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-21
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_GEOTECH_WELL_%F

Drilled Start 5/14/2018 End 5/14/2018	Total Depth (ft) 11.5	Logged By MWR Checked By SWC	Driller Boretec1, LLC	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 37 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment EC 95 Track Rig	
Easting (X) 1301195 Northing (Y) 531937		System Datum WA State Plane North NAD83 (feet)		See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						ML	Gray-brown silt with sand and rootlets (soft, moist) (alluvium)			
35					1						
		18	3		2			Becomes wet at 3 feet			Groundwater seepage observed at 3 feet
	5	18	3		3A DIPRA		SM	Gray-brown silty fine sand (very loose, wet)			DIPRA = 2
30					3B		SP	Gray fine to medium sand (very loose, wet)			
		18	4		4 SA		SM	Gray silty fine to medium sand (loose, wet)	26	18	
	10	18	6		5 SA		SP	Gray fine to medium sand (loose, wet)	22	3	

Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring GEI-21B

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-22
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_STANDARD_%F_NO_GW

Drilled Start 5/14/2018 End 5/14/2018	Total Depth (ft) 11.5	Logged By MWR Checked By SWC	Driller Boretec1, LLC	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 383 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment EC 95 Track Rig	
Easting (X) 1310324 Northing (Y) 538330		System Datum WA State Plane North NAD83 (feet)		See "Remarks" section for groundwater observed	
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						AC	8 inches asphalt concrete pavement			
							SP-SM	Gray fine to medium sand with silt and gravel (loose, moist) (fill)			
380		9	1		1A 1B MC		SM	Brown silty fine to coarse sand with occasional gravel (very loose, moist)	47		
	5	4	6		2 MC		ML	Brown sandy clayey silt with occasional gravel, trace fibers and wood fragments (medium stiff, moist)	27		
375		9	9		3 DIPRA						DIPRA = 2
	10	12	9		4A MC 4B		SM	Brown silty fine to coarse sand with occasional gravel (loose, wet)	17		Groundwater seepage observed at 9½ feet during drilling
							ML	Brown sandy clayey silt (stiff, wet)			

Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring GEI-23B

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-23
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_STANDARD_%F_NO_GW

Drilled Start 5/14/2018 End 5/14/2018	Total Depth (ft) 10.25	Logged By MWR Checked By SWC	Driller Boretec1, LLC	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 394 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment EC 95 Track Rig	
Easting (X) 1310704 Northing (Y) 538807		System Datum WA State Plane North NAD83 (feet)		Groundwater not observed at time of exploration	
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						AC	7 to 8 inches asphalt concrete pavement			
					1		SP-SM	Gray-brown fine to medium sand with silt and gravel (medium dense, moist) (fill)			
390		6	6		2 MC		SM	Brown silty fine to medium sand with gravel, trace wood fragments and rootlets (loose, moist)	17		
	5	18	46		3 MC; DIPRA		SM	Gray-brown silty fine to medium sand with gravel (dense, moist) (glacial till)	5		Driller noted harder drilling at 4 feet DIPRA = 1
385		15	86/9"		4						
	10	2	50/2"		5		SLST	Gray siltstone fragments (hard, moist) (phyllite)			

Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/LibraryGEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_STANDARD_%F_NO_GW

Log of Boring GEI-24B

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-24
Sheet 1 of 1

Drilled Start 12/13/2019 End 12/13/2019	Total Depth (ft) 21.5	Logged By AF2 Checked By MWR	Driller Boretec1, LLC	Drilling Method Hollow-stem Auger
Hammer Data: Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment: EC 95 Track Rig		DOE Well I.D.: BJI 203 A 2-in well was installed on 12/13/2019 to a depth of 20 ft.
Surface Elevation (ft) Vertical Datum: 38 NAVD88		Top of Casing Elevation (ft)		Groundwater: Date Measured 12/18/2019; Depth to Water (ft) Refer to Table A-4; Elevation (ft)
Easting (X) 1301143 Northing (Y) 531933		Horizontal Datum: WA State Plane North NAD83 (feet)		

Notes:

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
35	0				1	▼		ML	Gray-brown sandy silt with rootlets (soft, wet) (alluvium)		
	5		3		2				With decreased sand content		
30			4		3			SP	Gray fine to medium sand with trace silt (very loose to loose, wet)		
	10		3		4 SA					24	3
25			6		5				With rootlets, becomes loose		
	15		4		6 SA			SP-SM	Gray fine to medium sand with silt (very loose to loose, wet) With trace silt	24	6
20			4		7						
	20		5		8						

WELL LOG

- Steel surface monument
- Concrete surface seal (2)
- 3/8-inch bentonite seal
- 2-inch Schedule 40 PVC well casing
- 20/30 sand backfill (8 to 10)
- 2-inch Schedule 40 PVC screen, 0.010-inch slot width
- 2-inch Schedule 40 PVC end cap (20 to 20.25)
- 21.5

Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Monitoring Well GEI-25P

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-25
Sheet 1 of 1

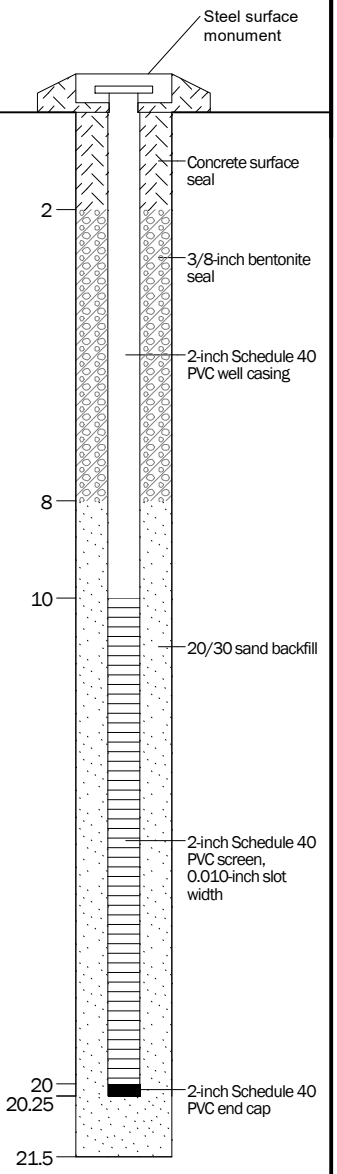
Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_WELL_%F

Drilled Start 12/12/2019 End 12/12/2019	Total Depth (ft) 21.5	Logged By AF2 Checked By MWR	Driller Boretec1, LLC	Drilling Method Hollow-stem Auger
Hammer Data: Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment: EC 95 Track Rig		DOE Well I.D.: BJN 050 A 2-in well was installed on 12/12/2019 to a depth of 20 ft.
Surface Elevation (ft) Vertical Datum: 38 NAVD88		Top of Casing Elevation (ft)		Groundwater: Date Measured 12/18/2019; Depth to Water (ft) Refer to Table A-4; Elevation (ft)
Easting (X) 1302499 Northing (Y) 532394		Horizontal Datum: WA State Plane North NAD83 (feet)		

Notes:

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	0				1	▼		GC	Brown clayey fine to coarse gravel with sand (loose, wet) (fill)		
35		4	2		2						
	5	6	2		3A 3B			GP-GM	Brown fine to coarse gravel with silt and sand (loose, wet)		
								SM	Gray silty sand (very loose, wet) (alluvium)		
30		5	3		4				Grades to gray-brown		
	10	16	3		5 SA					33	45
25		18	3		6A 6B			SM	Gray-brown silty fine to medium sand (very loose, wet)		
								SP	Gray fine to medium sand (very loose to loose, wet)		
	15	18	4		7 SA					23	4
20		18	2		8 SA			SM	Gray silty fine to medium sand (very loose, wet)	22	32
	20		4		9				Becomes loose		

WELL LOG



Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Monitoring Well GEI-26P

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-26
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_WELL_%F

Drilled Start 12/12/2019	End 12/12/2019	Total Depth (ft) 21.5	Logged By AF2 / Checked By MWR	Driller Boretec1, LLC	Drilling Method Hollow-stem Auger

Hammer Data	Rope & Cathead 140 (lbs) / 30 (in) Drop	Drilling Equipment	EC 95 Track Rig
Surface Elevation (ft) Vertical Datum	41 NAVD88	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)	1303722 533423	Horizontal Datum	WA State Plane North NAD83 (feet)

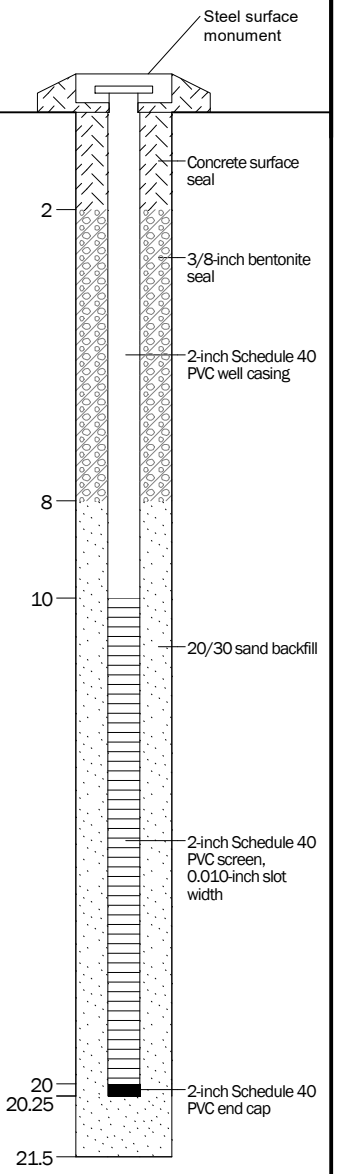
DOE Well I.D.: BKH 400
A 2-in well was installed on 12/12/2019 to a depth of 20 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/18/2019	Refer to Table A-4	

Notes:

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
40	0				1			CL	Brown clay with sand, occasional gravel and rootlets (medium stiff, moist) (fill)		
								SM	Brown silty fine sand; iron staining (loose, moist) (alluvium)		
		15	9		2	▼					
35	5	16	4		3			ML	Gray-brown silt with sand (soft, wet)		
		16	1		4				Becomes very soft		
30	10	18	1		5 SA					42	73
			5		6A 6B				With increased sand content, becomes medium stiff		
25	15		5		7						
								SP-SM	Gray fine to medium sand with silt (loose, wet)		
			4		8 SA					24	8
20	20		5		9						

WELL LOG



Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Monitoring Well GEI-27P

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-27
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_WELL_%F

Drilled Start 12/12/2019	End 12/12/2019	Total Depth (ft) 21.5	Logged By AF2 / Checked By MWR	Driller Boretec1, LLC	Drilling Method Hollow-stem Auger

Hammer Data	Rope & Cathead 140 (lbs) / 30 (in) Drop	Drilling Equipment	EC 95 Track Rig
Surface Elevation (ft) Vertical Datum	38 NAVD88	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)	1304391 533976	Horizontal Datum	WA State Plane North NAD83 (feet)

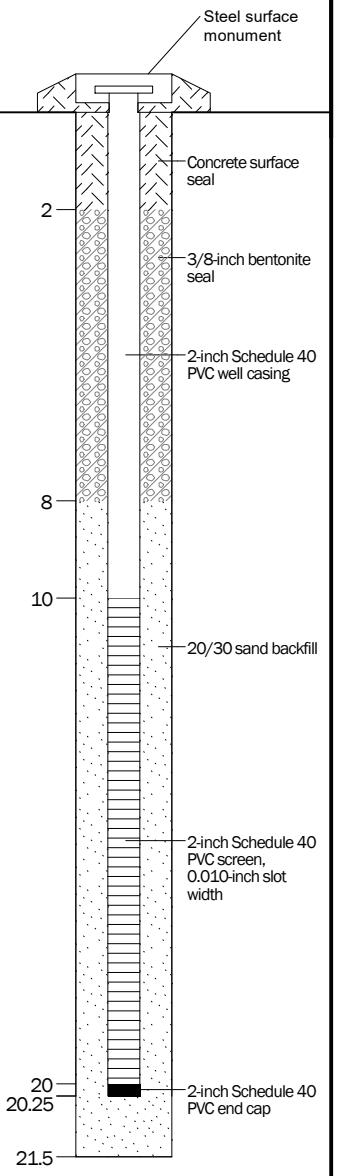
DOE Well I.D.: BKH 399
A 2-in well was installed on 12/12/2019 to a depth of 20 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/18/2019	Refer to Table A-4	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	0				1	▼		GM	Gray-brown silty fine to coarse gravel with sand and rootlets (loose, moist) (fill)		
		15	6		2			SM	Gray-brown silty fine sand (loose, wet) (alluvium)		
	5	13	2		3			ML	Gray-brown silt with sand (soft, wet)		
		8	2		4			SM	Gray-brown silty fine sand (very loose, wet)		
	10		4		5				Becomes very loose to loose		
			2		6 SA					34	35
	15		3		7						
			4		8			ML	Gray sandy silt (soft, wet)		
	20		4		9 SA					39	55

WELL LOG



Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Monitoring Well GEI-28P

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-28
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_WELL_%F

Date Excavated	12/17/2019	Total Depth (ft)	11	Logged By AF2 Checked By MWR	Excavator Skagit County PUD No. 1 Equipment John Deere 850 Excavator
See "Remarks" section for groundwater observed See "Remarks" section for caving observed					

Surface Elevation (ft) Vertical Datum	44 NAVD88	Easting (X) Northing (Y)	1289515 526864	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
					SOD	3 to 7 inches sod			Minor caving observed below surface
43	1		1		CL	Dark brown sandy clay with organic matter (rootlets) (soft to medium stiff, moist) (topsoil)			
42	2		2		CL	Brown and gray clay with sand and organic matter (rootlets) (soft to medium stiff, moist) (reworked native soils)			
41	3		3		CL	Brown-gray clay with sand; iron stained (medium stiff, moist) (weathered recessional marine drift)			
40	4		4		CL	Gray-brown clay with sand (stiff, moist to wet)			Isolated slow to moderate groundwater seepage observed at 4 feet
39	5								
38	6								
37	7		5			Grades to gray, decreased sand content			
36	8								
35	9		6						
34	10					Becomes medium stiff			
33	11		7						

Test pit left open for 10 minutes upon completion; 2 inches water accumulation

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on Locational Survey. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-29TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-29
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library\GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	12/17/2019	Total Depth (ft)	11.5	Logged By AF2 Checked By MWR	Excavator Skagit County PUD No. 1 Equipment John Deere 850 Excavator

See "Remarks" section for groundwater observed
See "Remarks" section for caving observed

Surface Elevation (ft) Vertical Datum	31 NAVD88	Easting (X) Northing (Y)	1289987 536864	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
					SOD	6 to 10 inches sod			Minor caving observed below surface
30	1		1		CL	Dark brown clay with sand and organic matter (rootlets) (soft to medium stiff, moist to wet) (topsoil/worked native soil)			
29	2								Slow groundwater seepage observed from 2 to 4 feet
28	3				CL	Gray-brown clay with occasional sand; iron stained (medium stiff, moist to wet) (recessional marine drift)			
27	4		2						
26	5		3		CL	Gray clay with occasional sand; slight iron staining (stiff, moist to wet)			
25	6								
24	7		4						
23	8								
22	9		5						
21	10								Moderate groundwater seepage observed at 10½ feet
20	11		6						

Test pit left open for 10 minutes upon completion; 7 inches water accumulated

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on Locational Survey. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-30TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-30
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated 12/17/2019	Total Depth (ft) 11.5	Logged By AF2 Checked By MWR	Excavator Skagit County PUD No. 1 Equipment John Deere 850 Excavator	See "Remarks" section for groundwater observed See "Remarks" section for caving observed	
Surface Elevation (ft) 55 Vertical Datum NAVD88		Easting (X) 1294193 Northing (Y) 529414		Coordinate System WA State Plane North Horizontal Datum NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
54	1		1		GM	Dark brown silty fine to coarse gravel with sand and organic matter (rootlets) (loose, moist) (fill)			
			2		GP-GM	Brown fine to coarse gravel with silt and sand (medium dense, moist)			
53	2		3		GM	Brown silty fine to coarse gravel with sand and occasional quarry spalls (medium dense, moist)			
52	3		4		CR	Gray crushed phyllite rock fragments with silt (dense, moist)			
51	4		5		CL	Brown clay with sand and gravel (stiff, moist)			Minor caving observed from 4 to 11½ feet
50	5								
49	6		6		SM	Gray-brown silty fine to medium sand with mixed clay and gravel (loose, moist to wet)			
48	7		7						
47	8		8 MC		PT	Dark brown peat with organic matter and wood debris (logs) (soft, moist) (alluvium)	288		Slow groundwater seepage observed from 8 to 10 feet
46	9								
45	10		9		CL	Brown-gray clay with sand, gravel, wood fragments and organic matter (medium stiff, wet) (alluvium/glacial transition zone)			
44	11		10		SM/GM	Gray-brown silty fine to coarse sand to silty fine to coarse gravel (medium dense to dense, wet) (glacially consolidated deposits)			

Notes: See Figure B-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit GEI-31TP

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-31
Sheet 1 of 1

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary/Library\GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_TESTPIT_1P_GEOTEC_%F

Drilled: Start 2/6/2020 End 2/6/2020	Total Depth (ft) 25	Logged By AF2 Checked By SWC	Driller Holocene Drilling	Drilling Method Hollow-stem Auger/ NQ3 Coring	
Surface Elevation (ft) 335 Vertical Datum NAVD88		Hammer Data Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment Diedrich D50 Turbo Track Rig	
Easting (X) 1307076 Northing (Y) 537115		System Datum WA State Plane North NAD83 (feet)		Groundwater not observed at time of exploration	
Notes:					

Elevation (feet)	Depth (feet)	Interval Recovered Soil (in)/Rock (%)	Blows/foot	Sample/Run Testing	RQD %	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0			1			SOD	1 inch sod			Hollow-stem auger drilling
							SM	Brown silty fine to coarse sand with gravel and crushed rock (loose to medium dense, wet) (fill)			
		14	23	2			RX/ML	Dark gray fractured slate with silt to brown sandy silt with fractured rock (very stiff, moist) (possible fill/weathered rock)			
330	5	18	37	3				2-inch fracture infilled with interbedded silt			
		14	9	4				Becomes stiff			
325	10	16	10	5							Driller noted smooth, soft drilling
		10	50/4"	6			Phyllite	Phyllite; dark gray, high fractured (hard, moist) (weathered rock)			
320	15	4	50/4"	7							Driller noted chatter at 17 feet
315	20	11.7		Run 1	19		Phyllite	Phyllite; dark gray, visually fresh, fine grained, fractured along foliations less than ¼-inch-thick			Driller switched to NQ3 coring
310	25										

Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Locational Survey. Vertical approximated based on USGS Topo.

Date:4/17/20 Path:\\GEOENGINEERS.COM\WAN\PROJECTS\2\2402020\02\GINT\240202002.GPJ DBLibrary:LibraryGEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEIB_GEOTECH_SOIL_ROCK_%F_NO_GW

Log of Boring GEI-35B

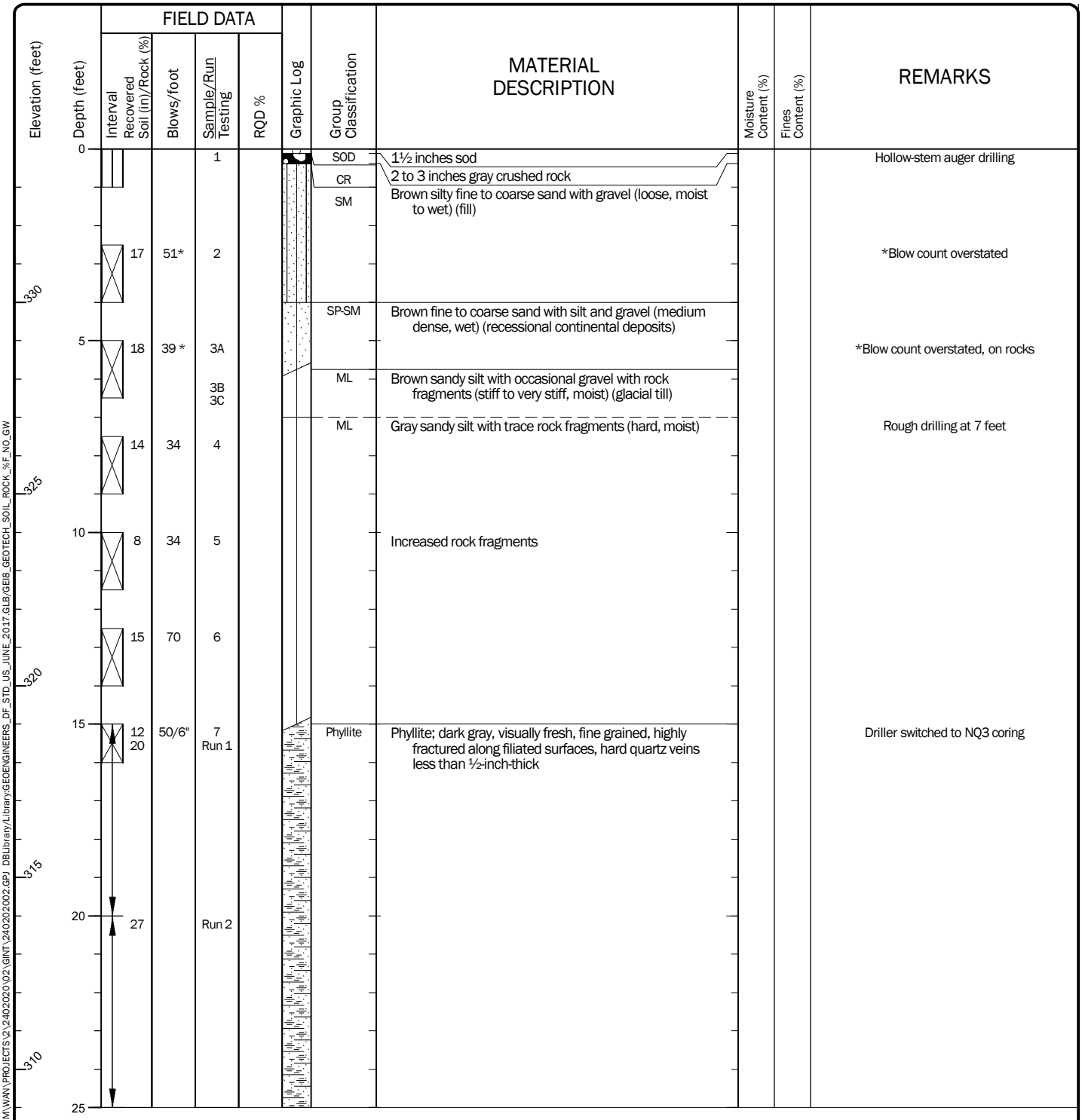
GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

Figure B-32
Sheet 1 of 1

Drilled: Start 2/6/2020 End 2/6/2020	Total Depth (ft): 25	Logged By: AF2 Checked By: SWC	Driller: Holocene Drilling	Drilling Method: Hollow-stem Auger/ NQ3 Coring	
Surface Elevation (ft) / Vertical Datum: 334 NAVD88		Hammer Data: Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment: Diedrich D50 Turbo Track Rig	
Easting (X): 1307162 Northing (Y): 537148		System Datum: WA State Plane North NAD83 (feet)		Groundwater not observed at time of exploration	

Notes:



Note: See Figure B-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Locational Survey. Vertical approximated based on USGS Topo.

Log of Boring GEI-36B

GeoEngineers

Project: Judy Reservoir to Mount Vernon Water Transmission Pipeline-Phase 2
Project Location: Mt. Vernon, Washington
Project Number: 2402-020-02

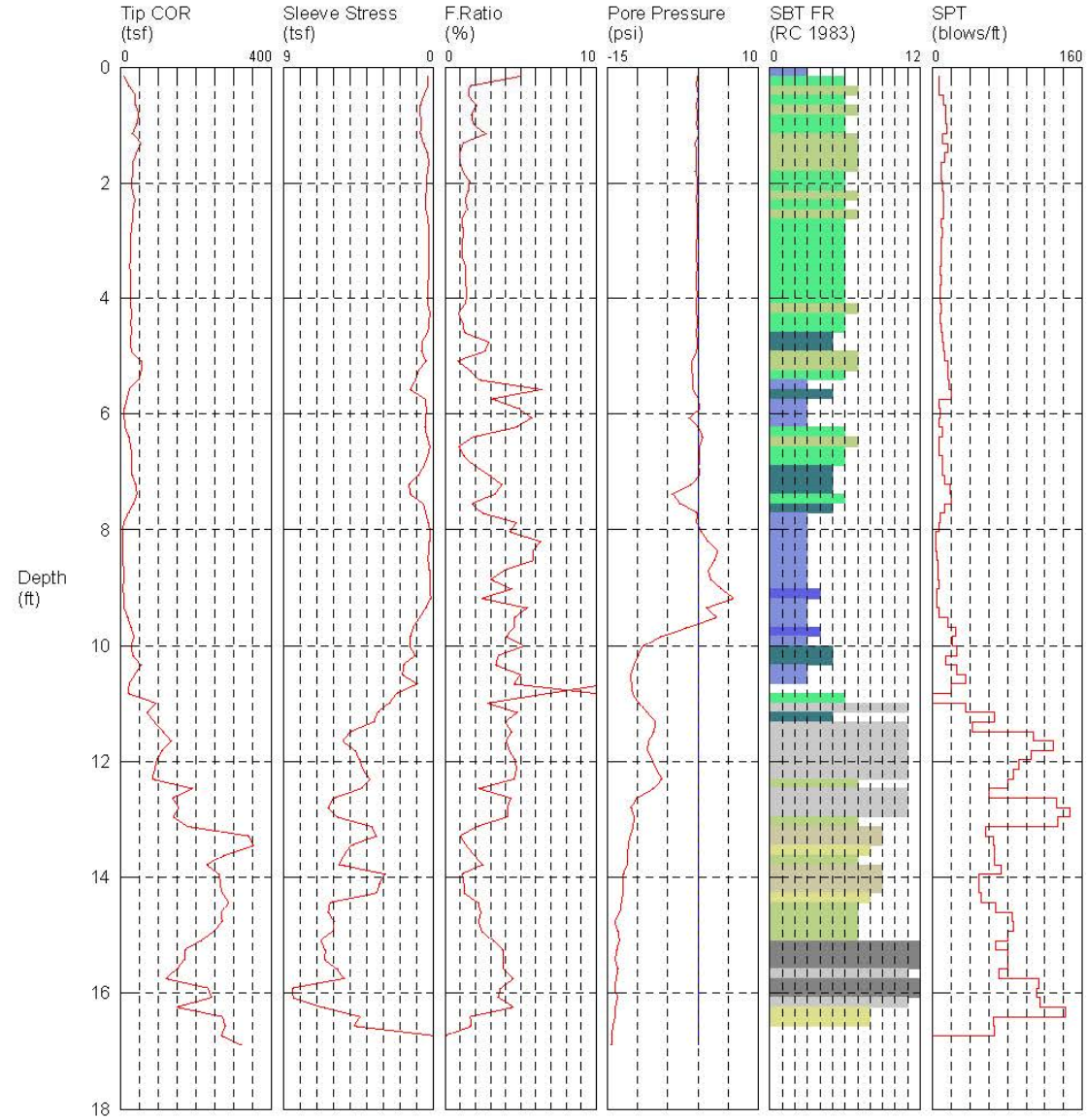
Figure B-33
Sheet 1 of 1

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GEI-32C

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: GeoEngineers Inc
LOCATION: Mt. Vernon
JOB NUMBER: 2402-020-02
COMMENT: Judy Reservoir Pipeline Phase 2
COMMENT:

OPERATOR: Okbay
CONE ID: DDG1394
TEST DATE: 12/12/2019 9:22:32 AM
PREDRILL : N/A
BACKFILL: Bentonite Chips
SURFACE PATCH: N/A



Cone Penetration Test

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

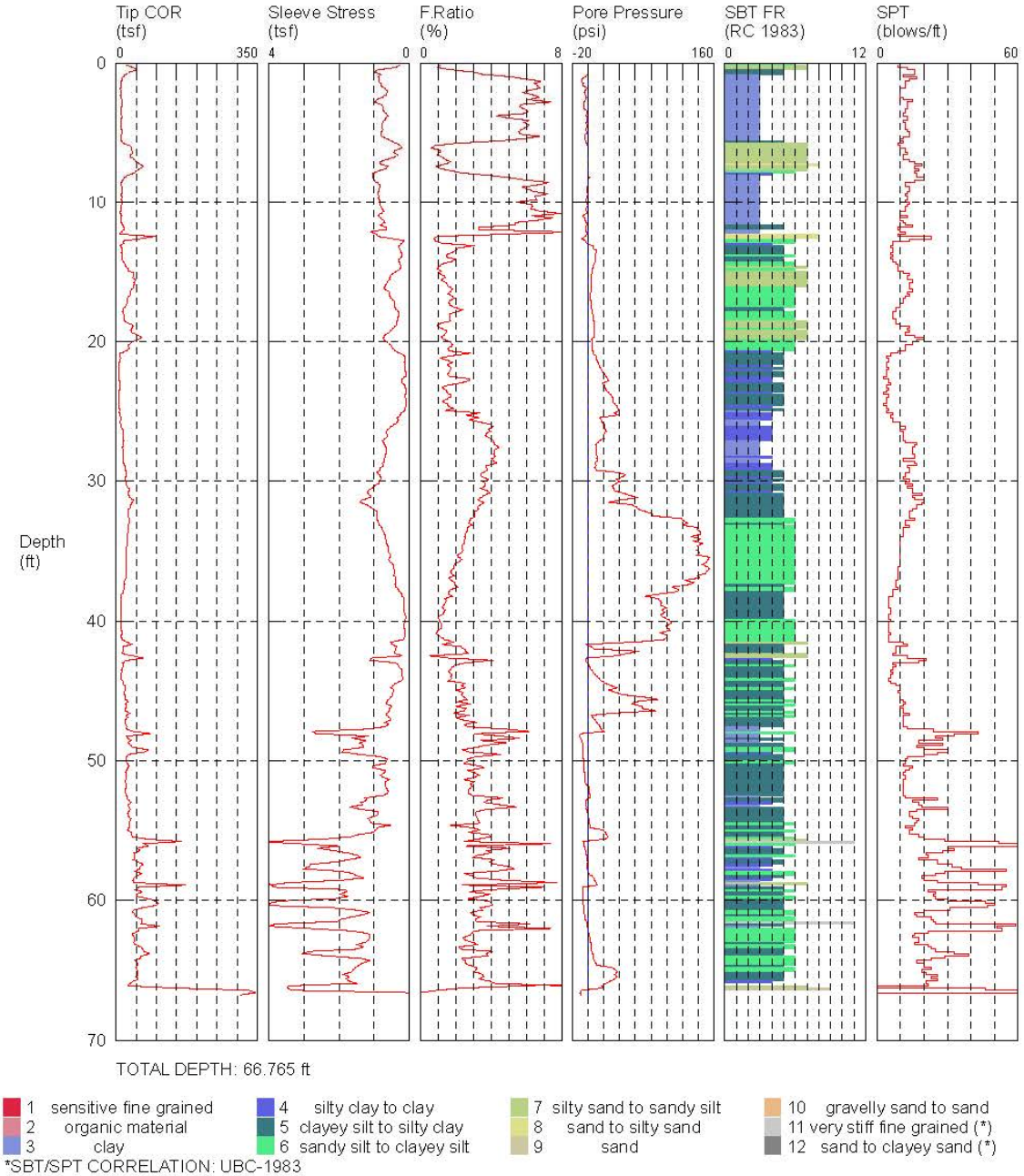
Figure B-34

XXXX-XXX-XX Date Exported: 04/09/15

GEI-33C

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: GeoEngineers Inc
LOCATION: Mt. Vernon
JOB NUMBER: 2402-020-02
COMMENT: Judy Reservoir Pipeline Phase 2
COMMENT:

OPERATOR: Okbay
CONE ID: DDG1394
TEST DATE: 12/12/2019 11:14:30 AM
PREDRILL : N/A
BACKFILL: Bentonite Chips
SURFACE PATCH: N/A



Cone Penetration Test

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

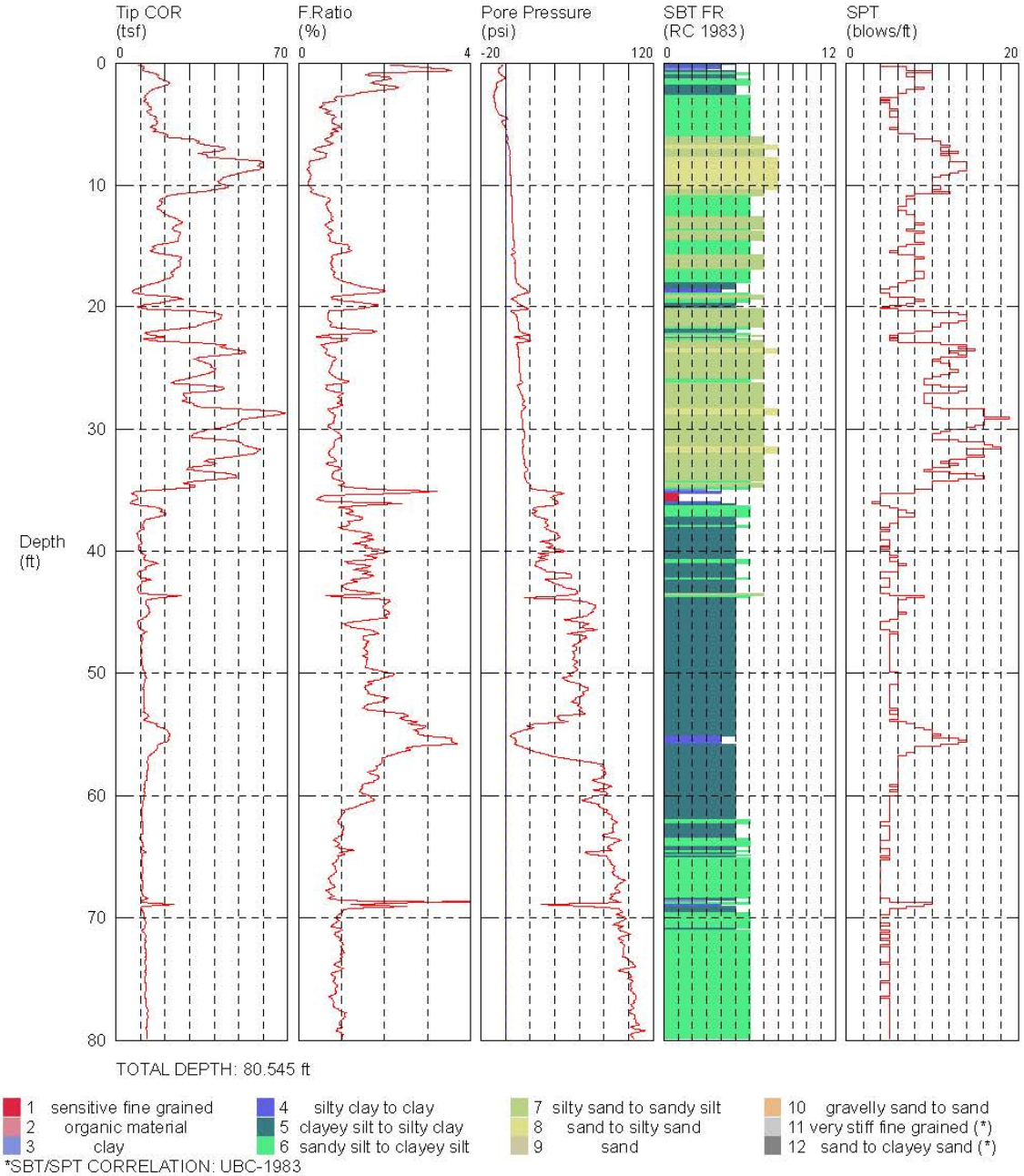
Figure B-35

XXXX-XXX-XX Date Exported: 04/09/15

GEI-34C

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: GeoEngineers
LOCATION: Mt Vernon
JOB NUMBER: 2402-020-02
COMMENT: Judy Reservoir Pipeline Phase 2
COMMENT:

OPERATOR: Okbay
CONE ID: DDG1394
TEST DATE: 1/17/2020 10:01:08 AM
PREDRILL : N/A
BACKFILL: Bentonite Chips
SURFACE PATCH: N/A



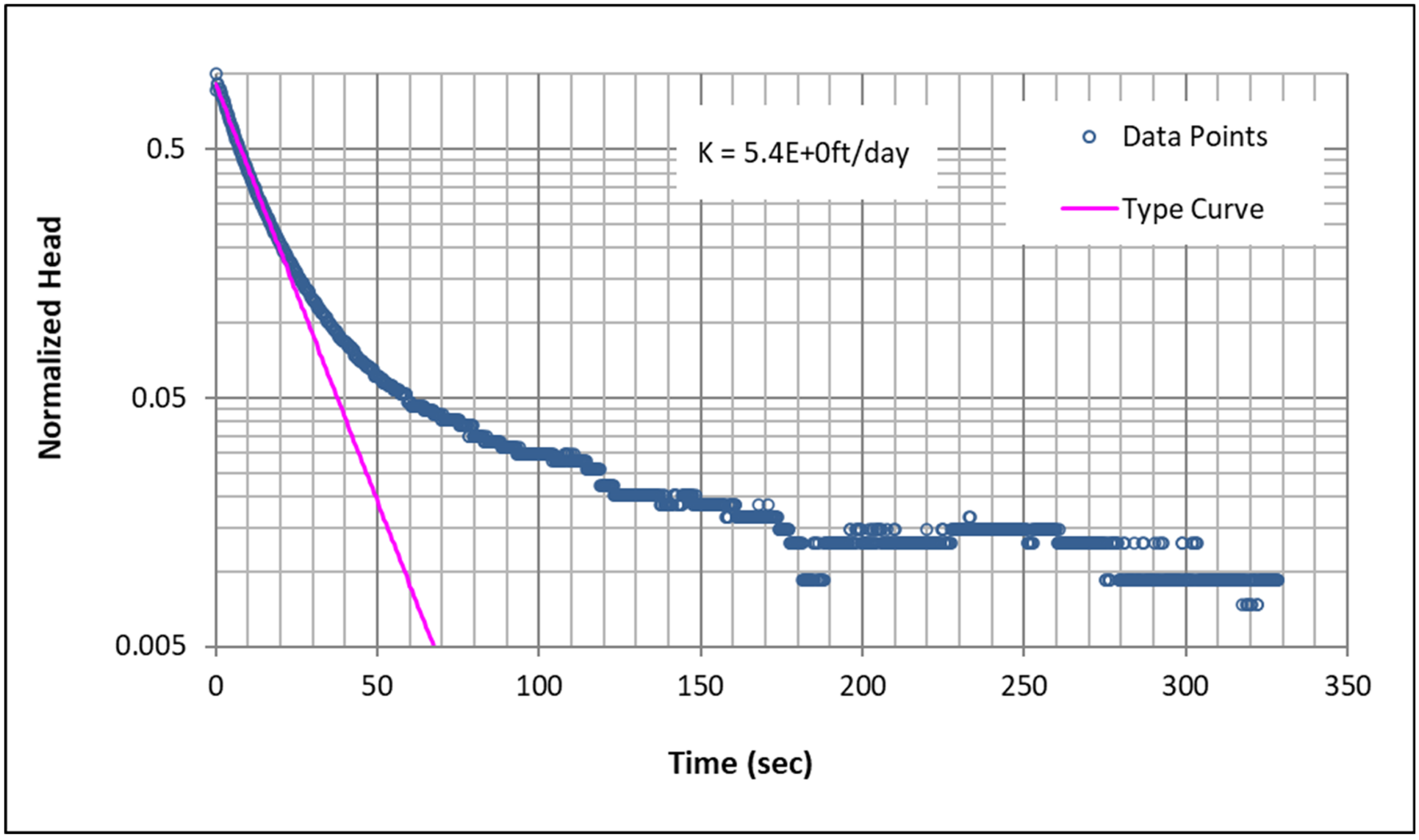
Cone Penetration Test

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-36

XXXX-XXX-XX Date Exported: 04/09/15



Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source:

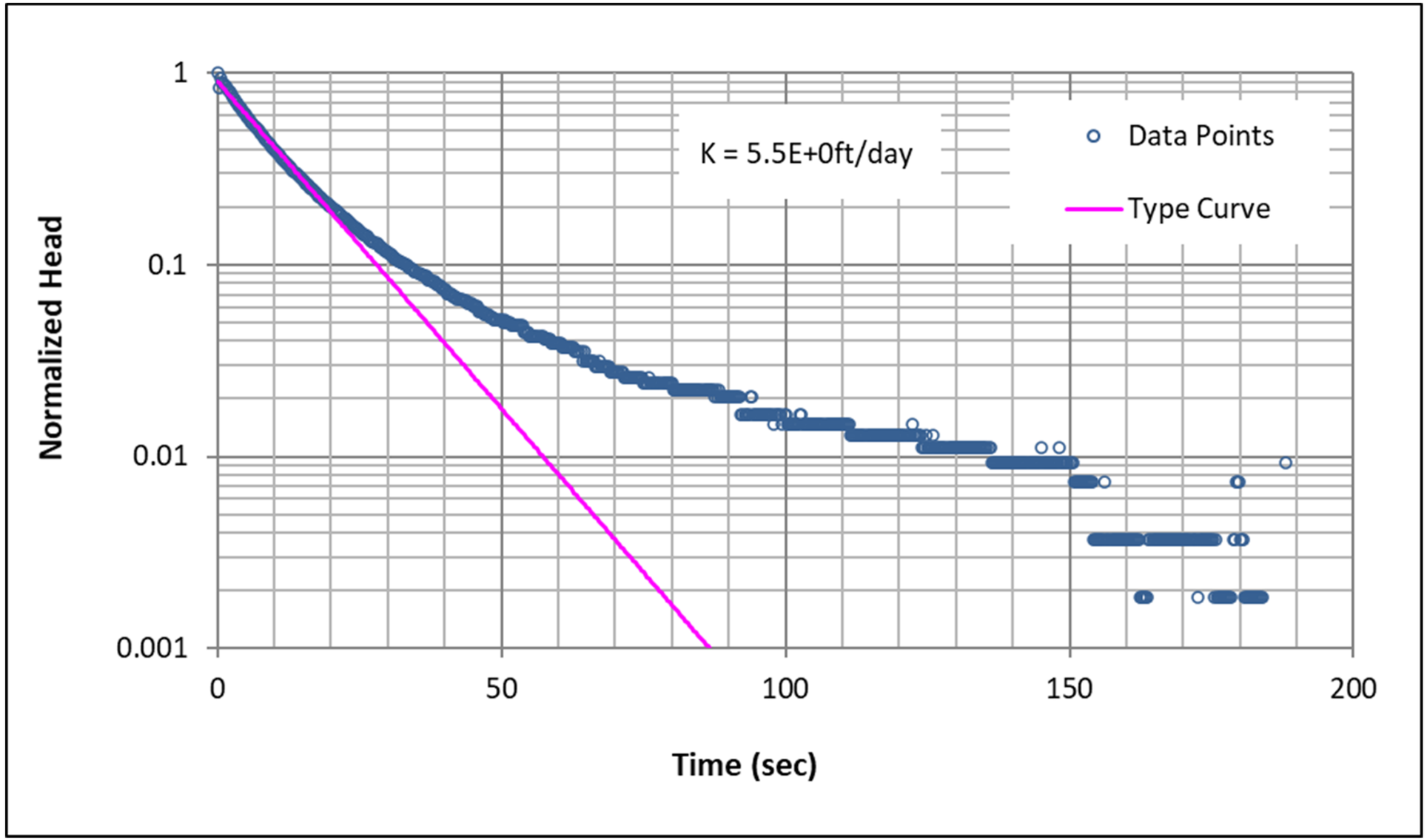
GEI-20P– Rising Head 1

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-37

0356-161-00 Date Exported: 04/09/15



Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source:

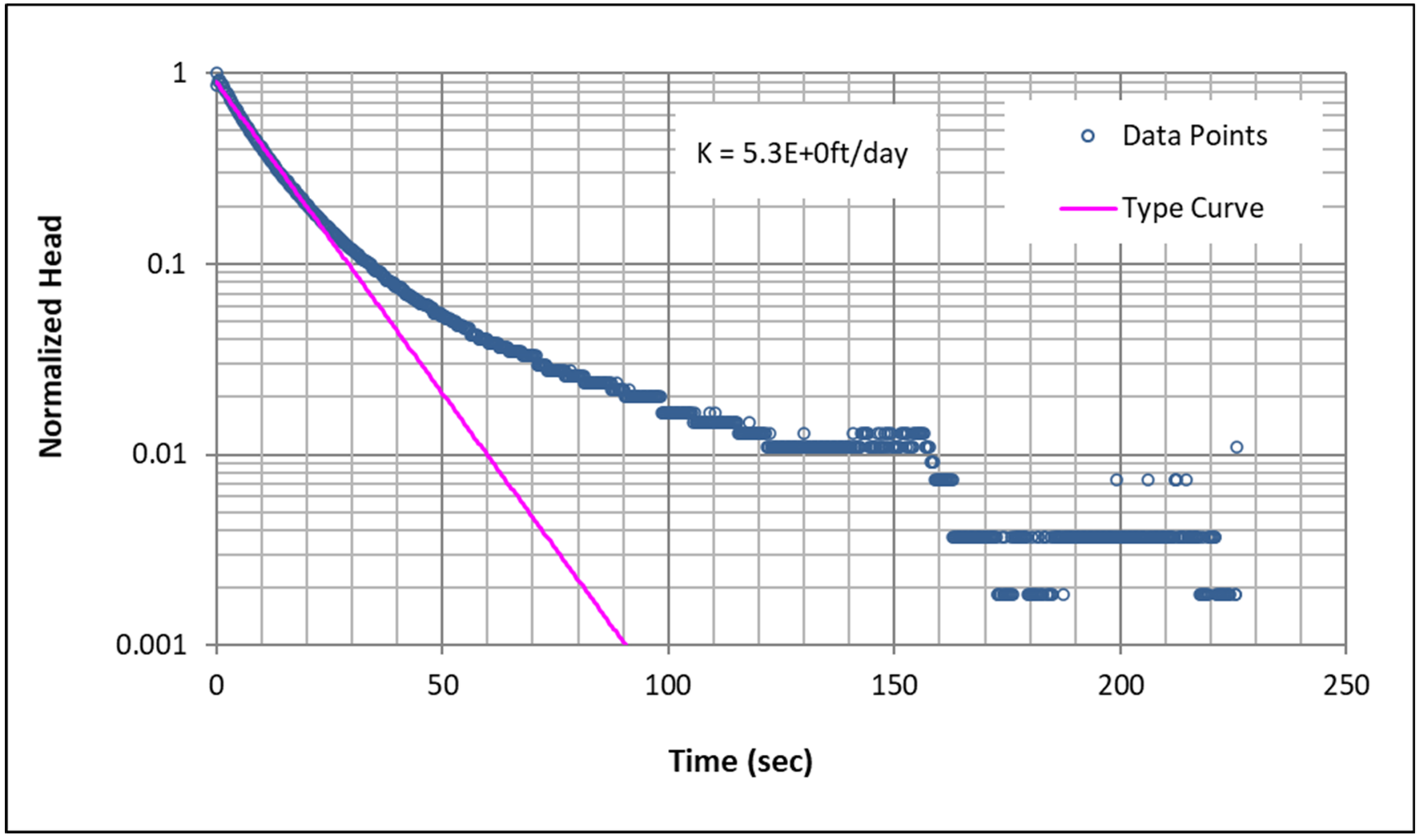
GEI-20P– Rising Head 2

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-38

0356-161-00 Date Exported: 04/09/15



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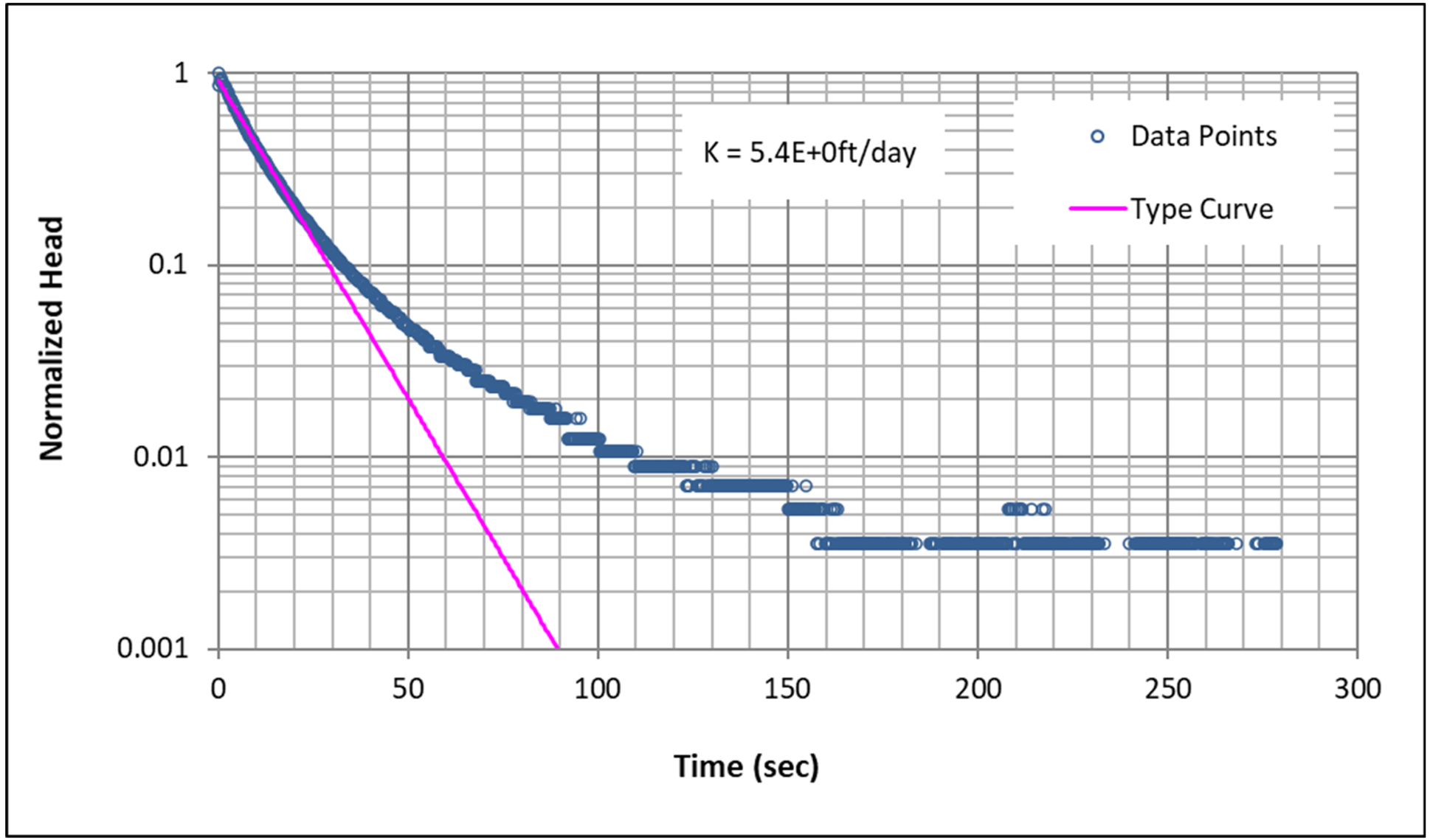
GEI-20P– Rising Head 3

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-39

0356-161-00 Date Exported: 04/09/15



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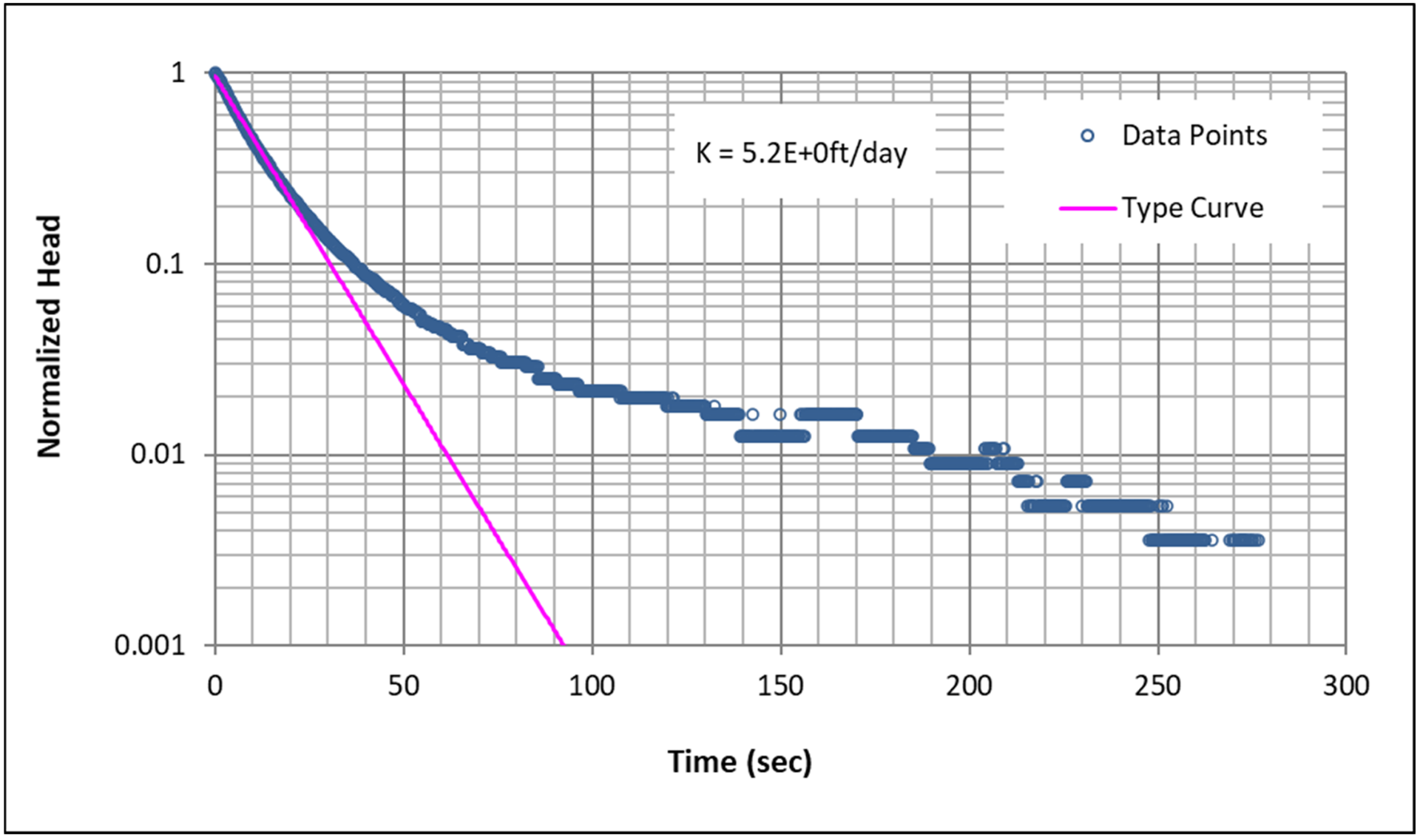
GEI-20P– Rising Head 4

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-40

0356-161-00 Date Exported: 04/09/15



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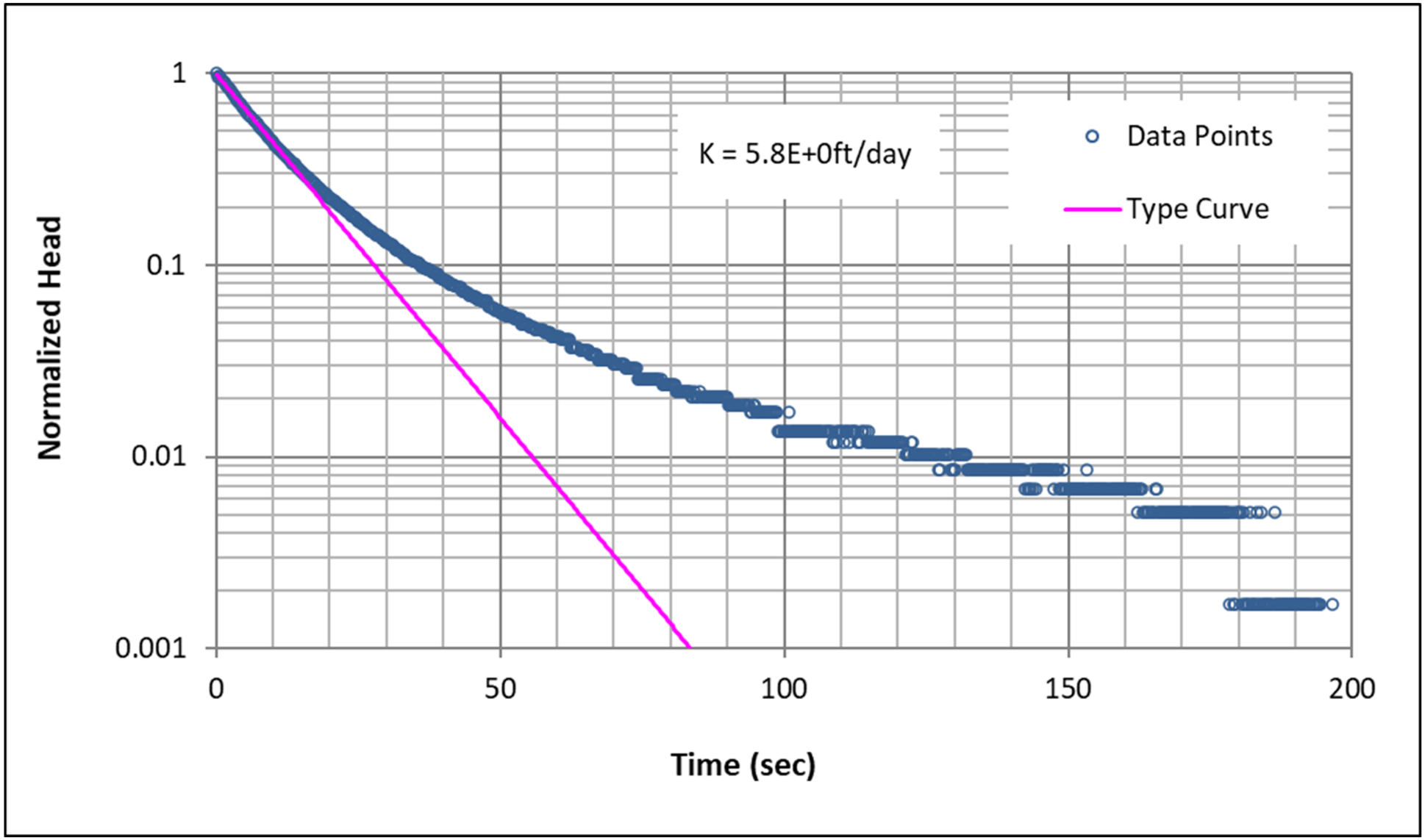
GEI-20P– Rising Head 5

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-41

0356-161-00 Date Exported: 04/09/15



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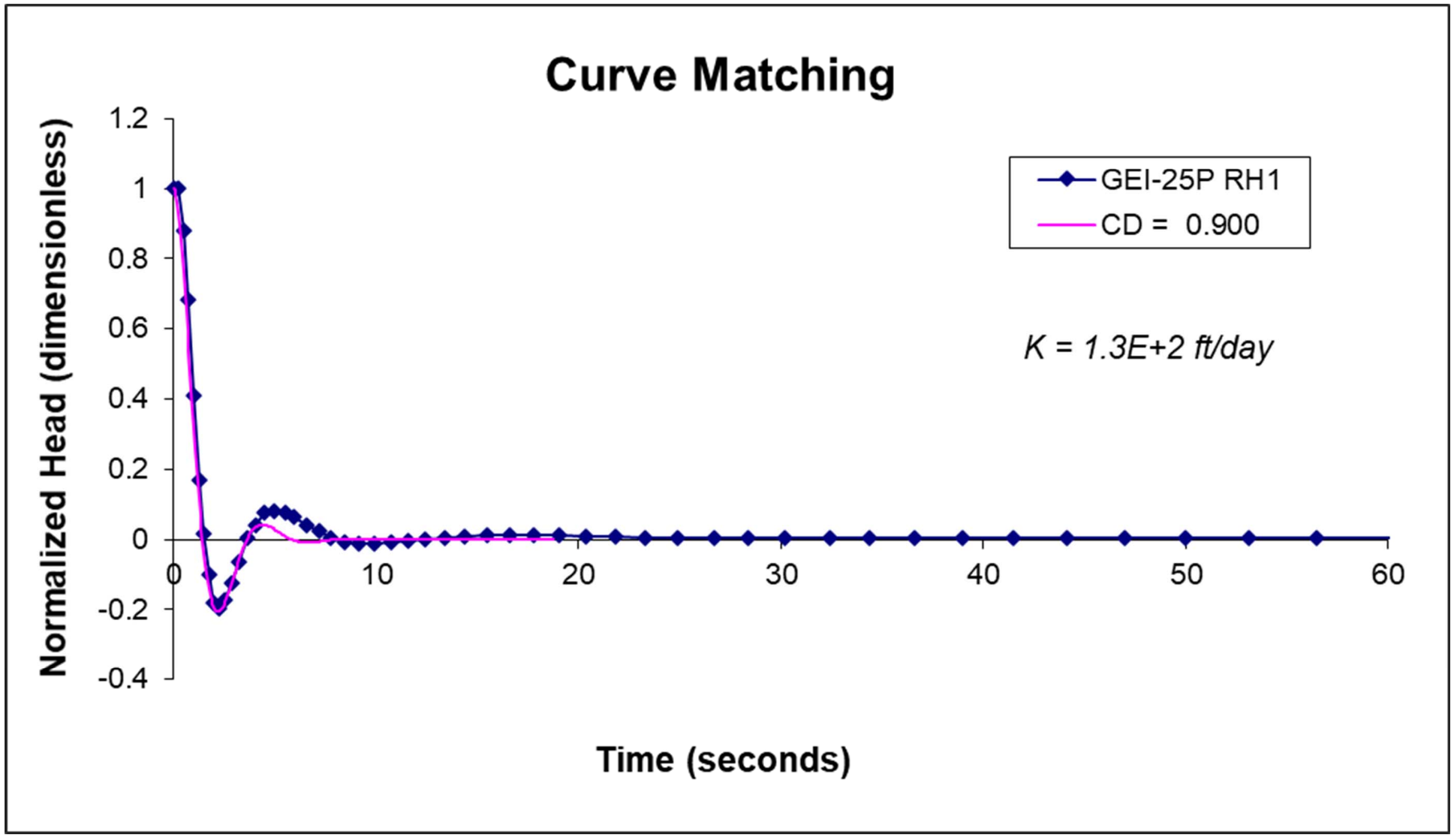
GEI-20P– Rising Head 6

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-42

0356-161-00 Date Exported: 04/09/15



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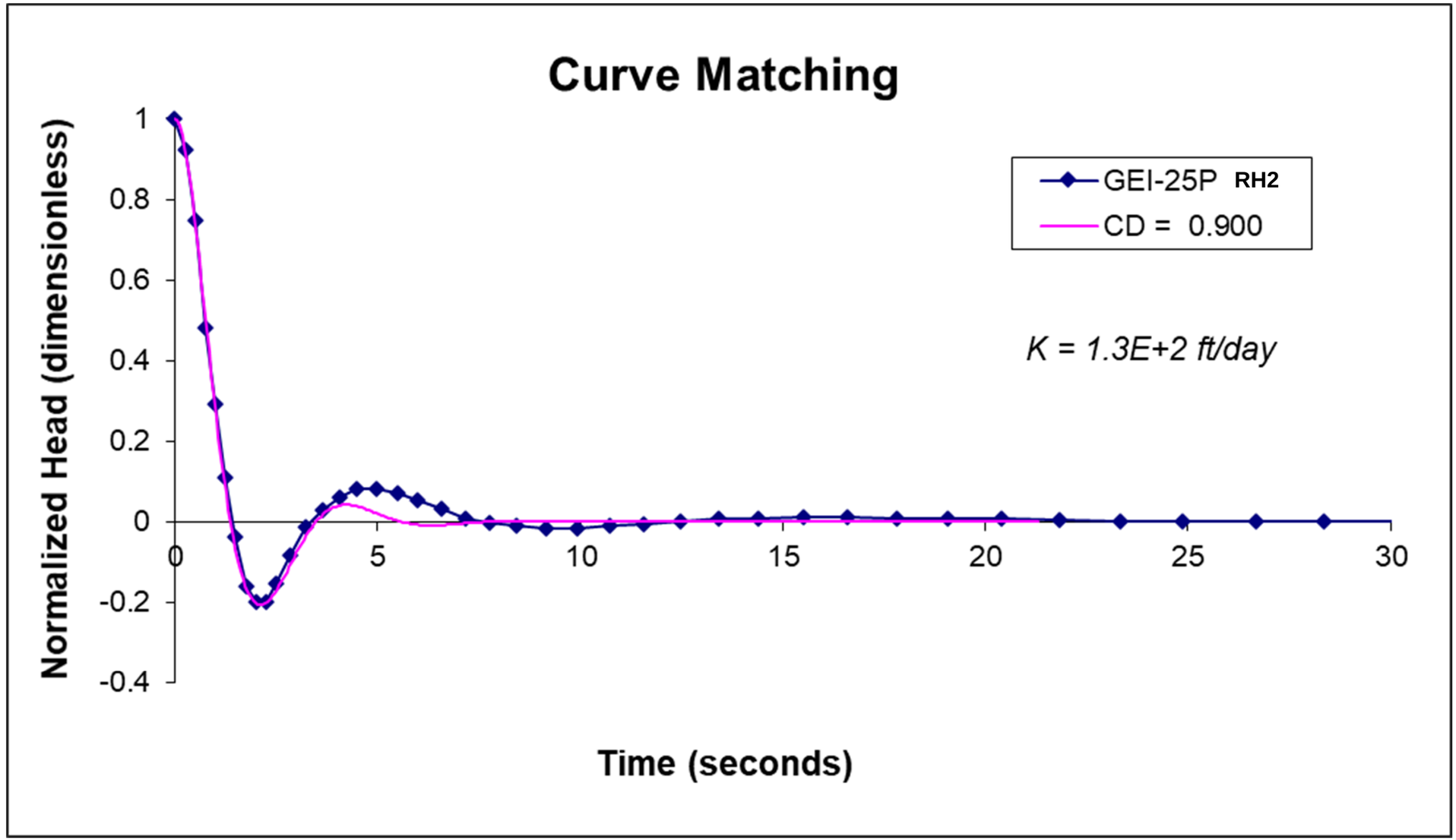
GEI-25P– Rising Head 1

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-43

0356-161-00 Date Exported: 04/09/15



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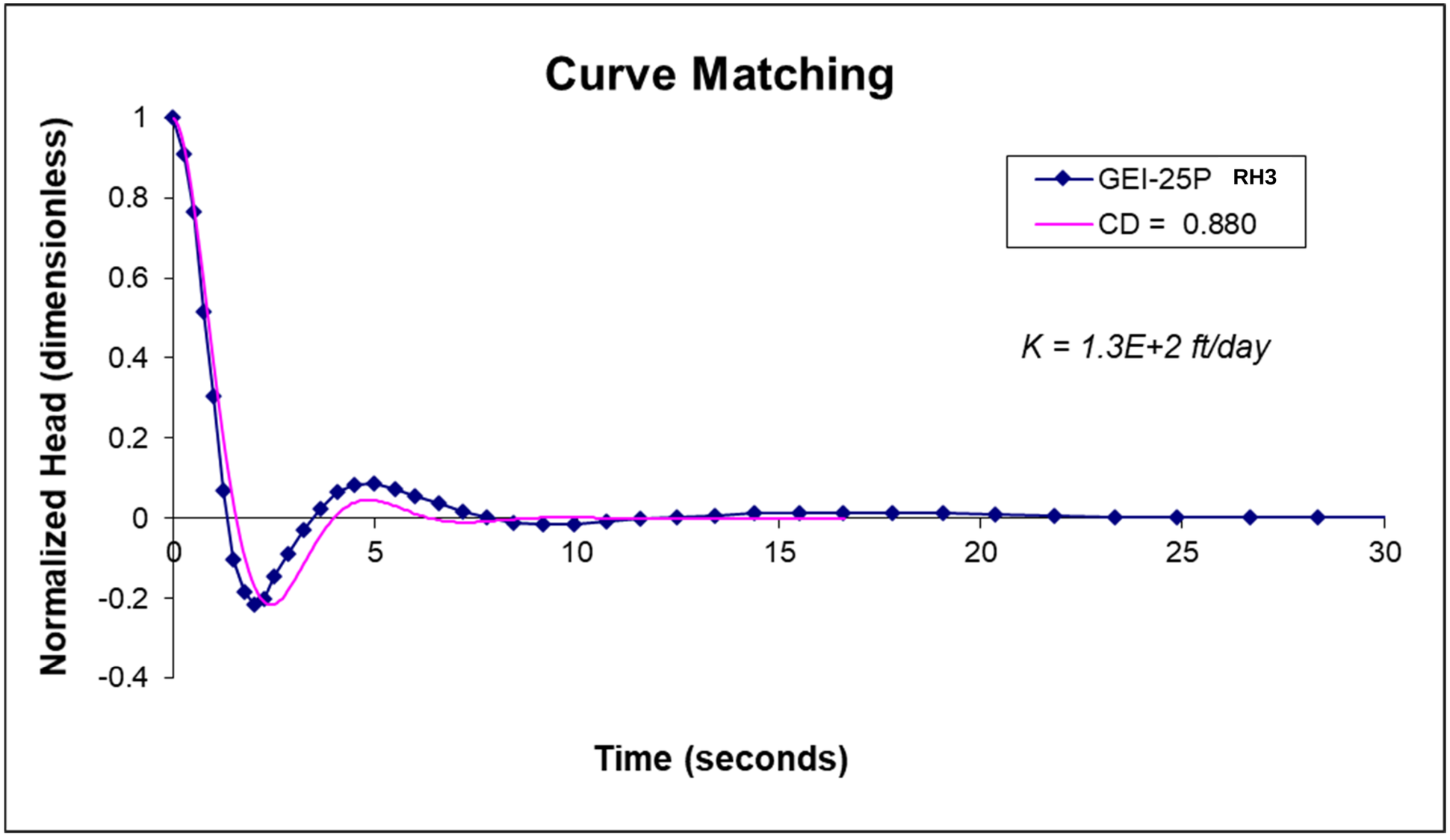
GEI-25P– Rising Head 2

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-44

0356-161-00 Date Exported: 04/09/15



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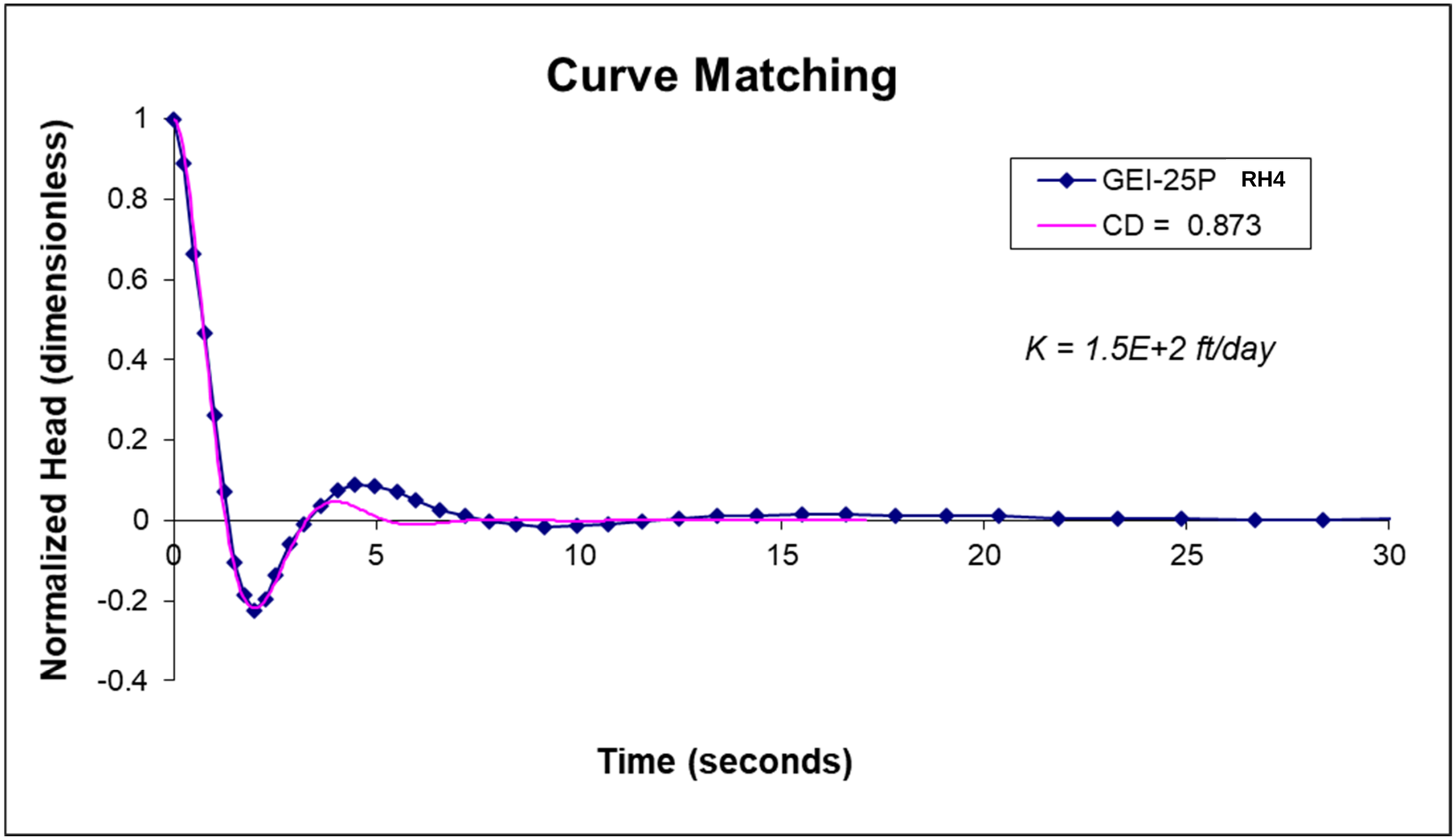
GEI-25P– Rising Head 3

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-45

0356-161-00 Date Exported: 04/09/15



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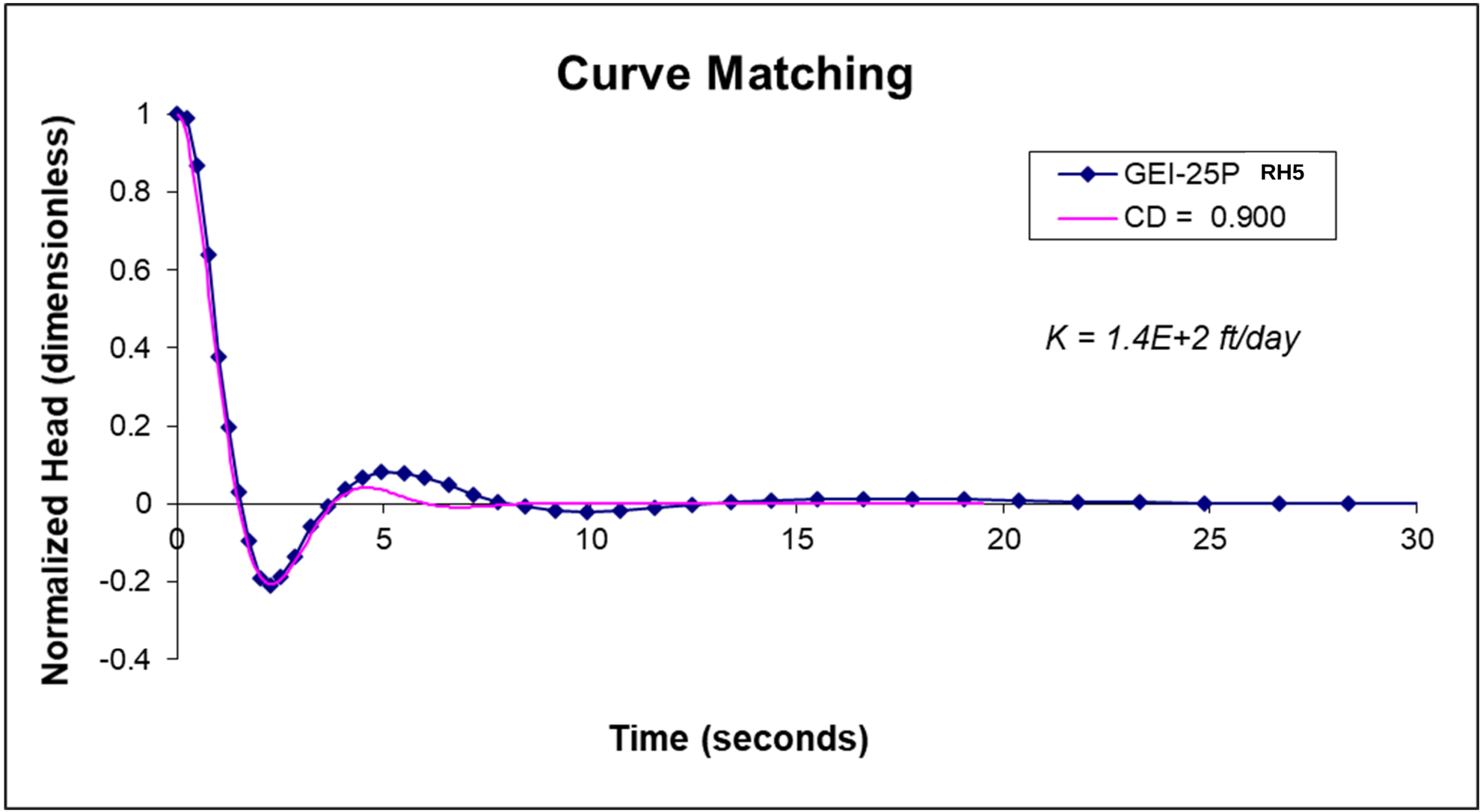
GEI-25P– Rising Head 4

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-46

0356-161-00 Date Exported: 04/09/15



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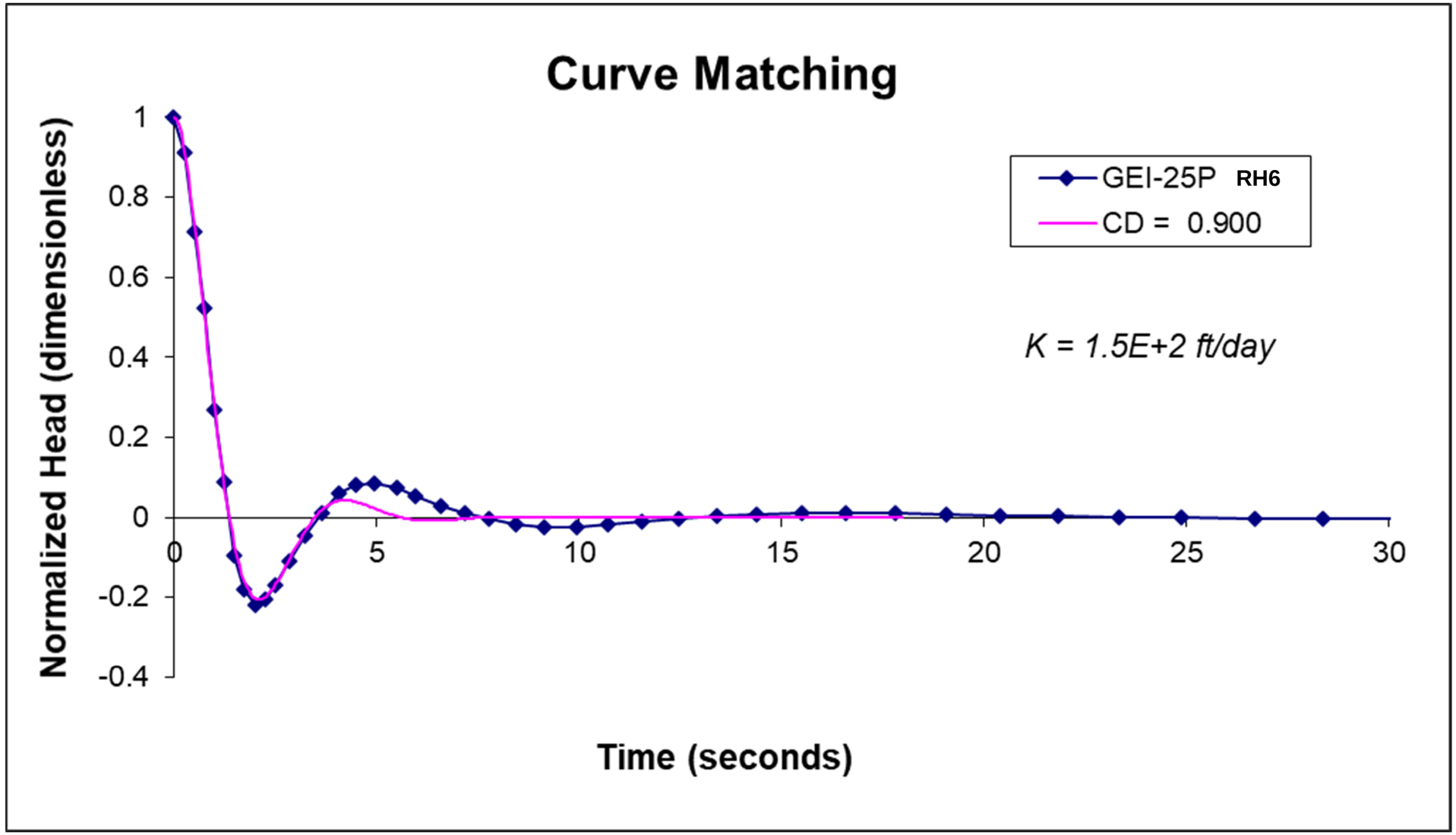
GEI-25P– Rising Head 5

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-47

0356-161-00 Date Exported: 04/09/15



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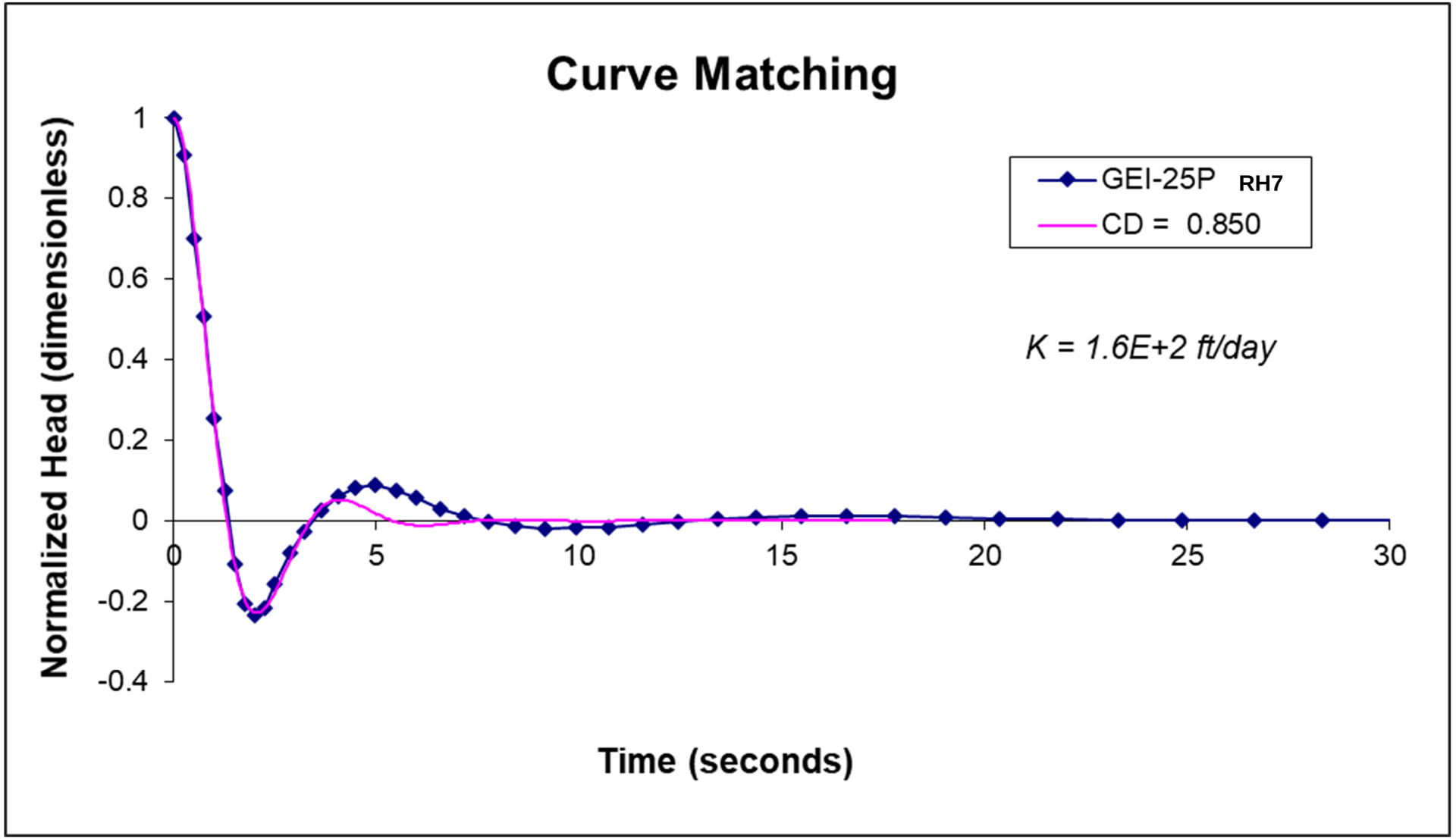
GEI-25P– Rising Head 6

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-48

0356-161-00 Date Exported: 04/09/15



Notes:
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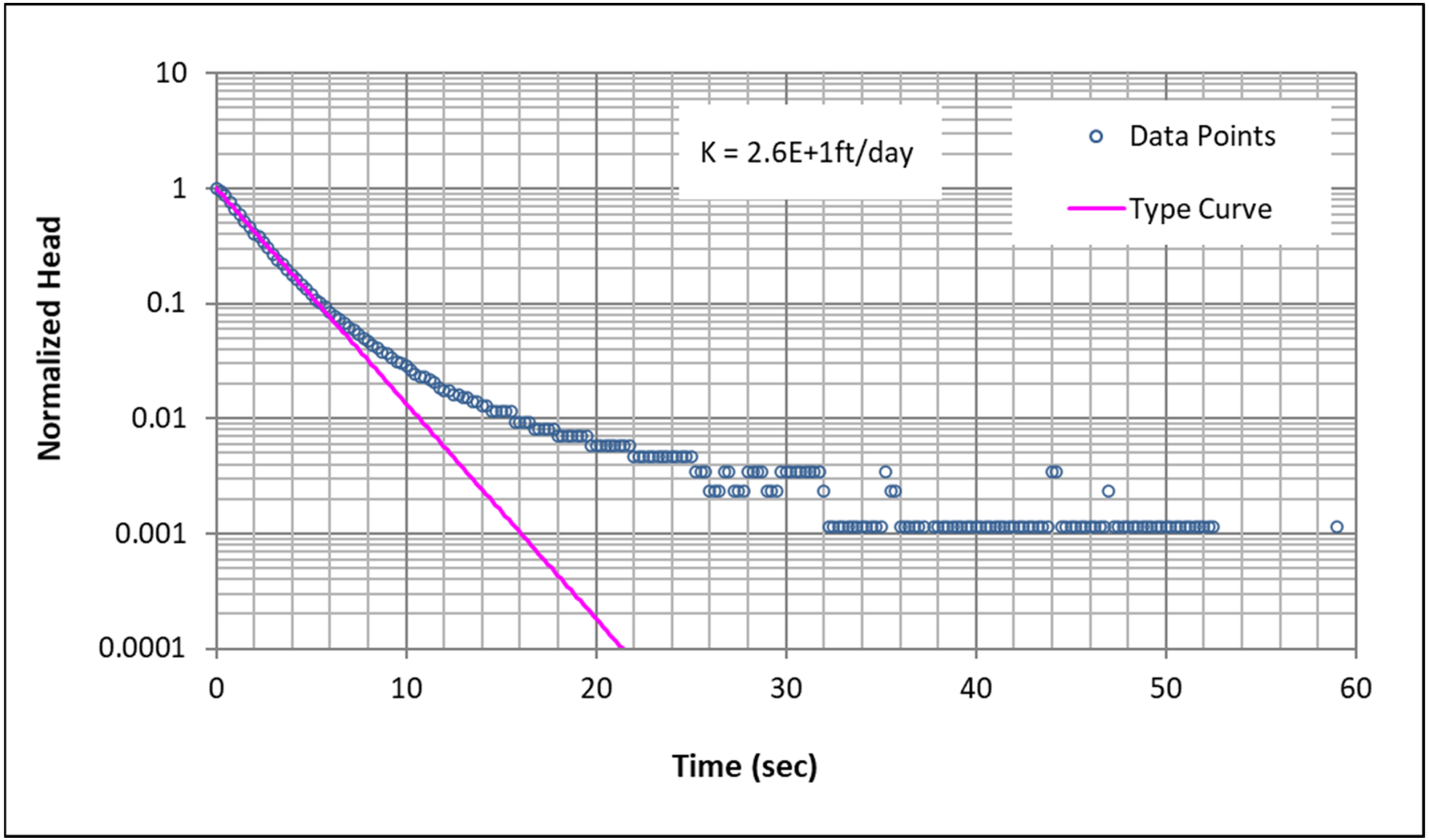
GEI-25P– Rising Head 7

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-49

0356-161-00 Date Exported: 04/09/15



GEI-26P– Rising Head 1

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

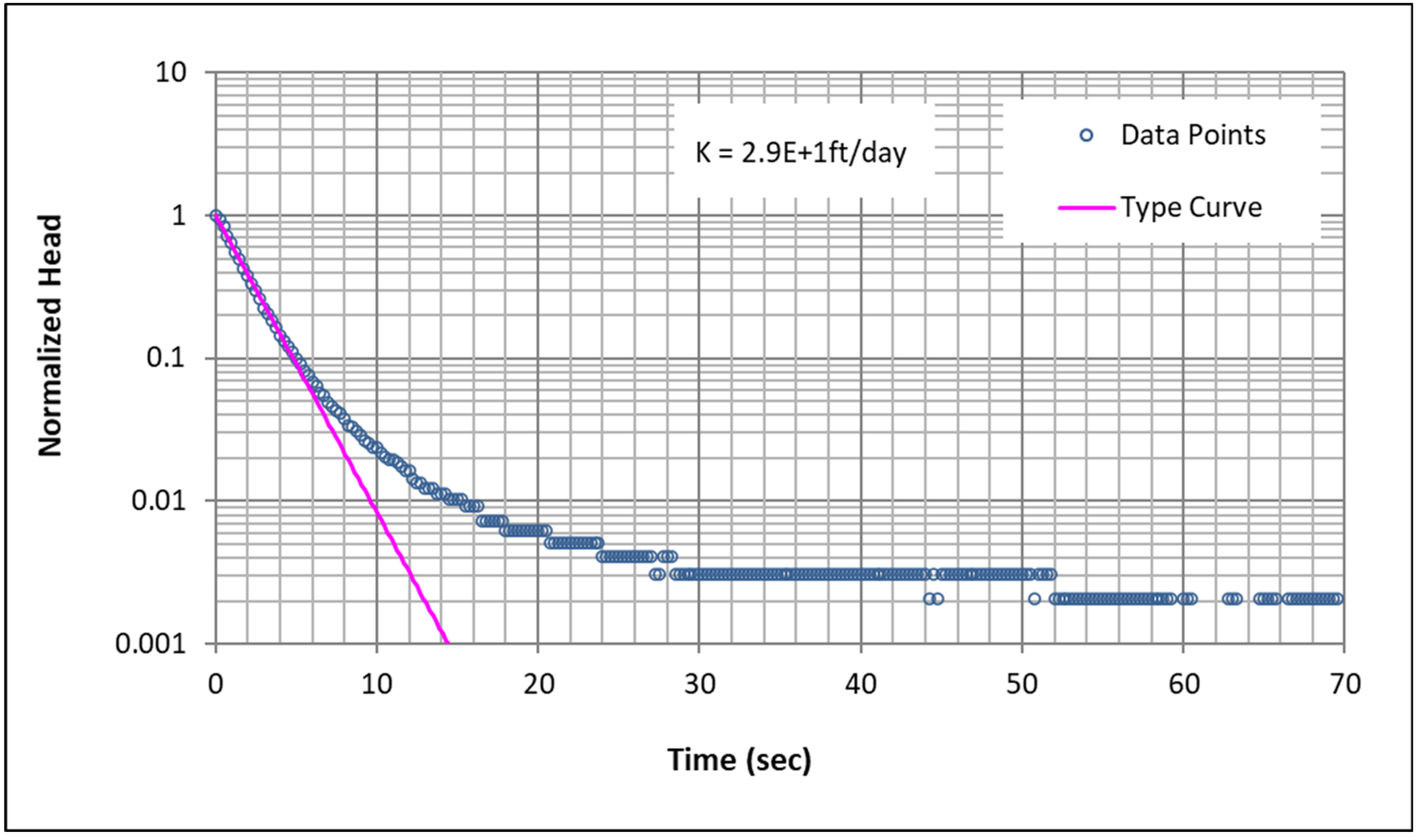
GeoEngineers

Figure B-50

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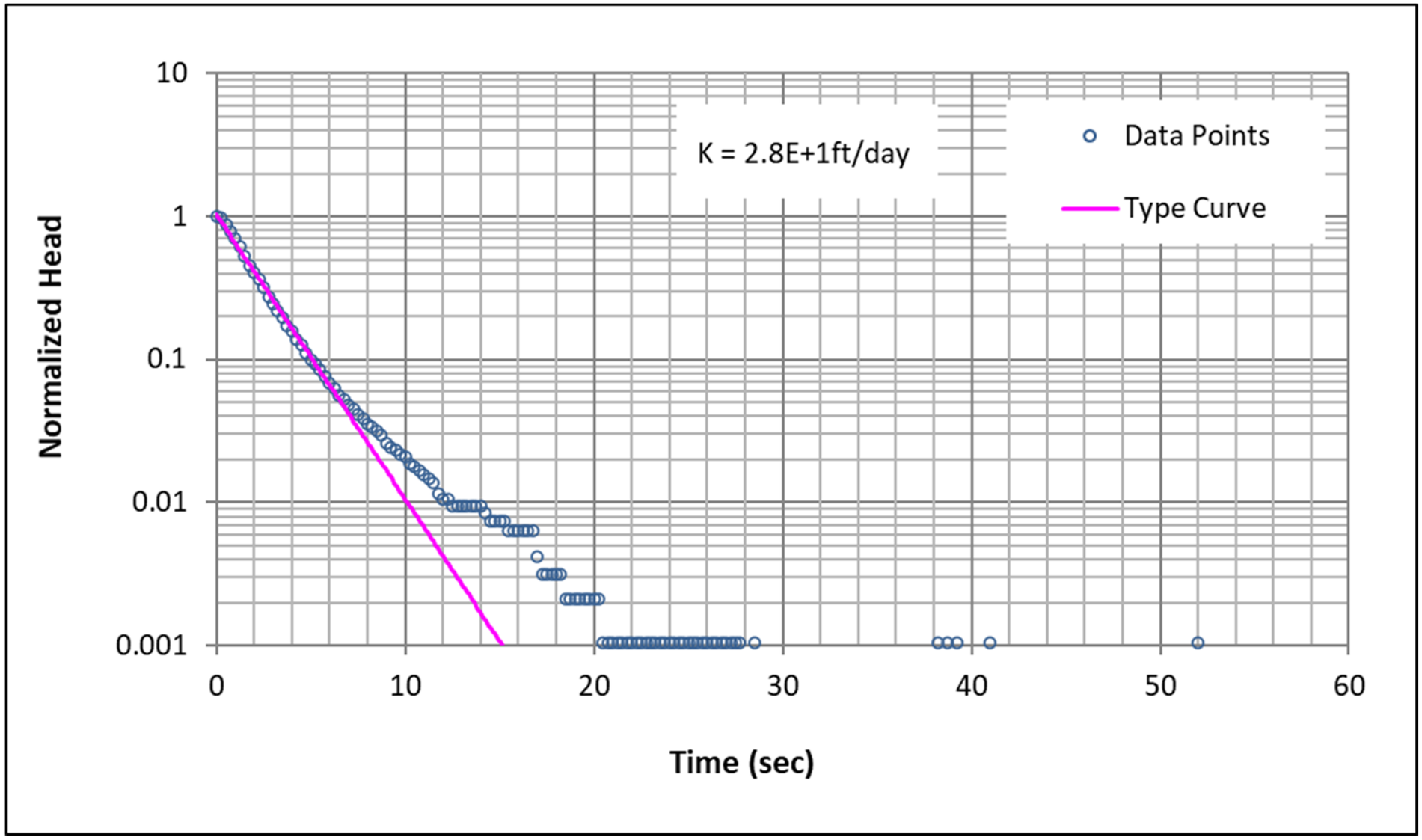
GEI-26P– Rising Head 2

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-51

0356-161-00 Date Exported: 04/09/15



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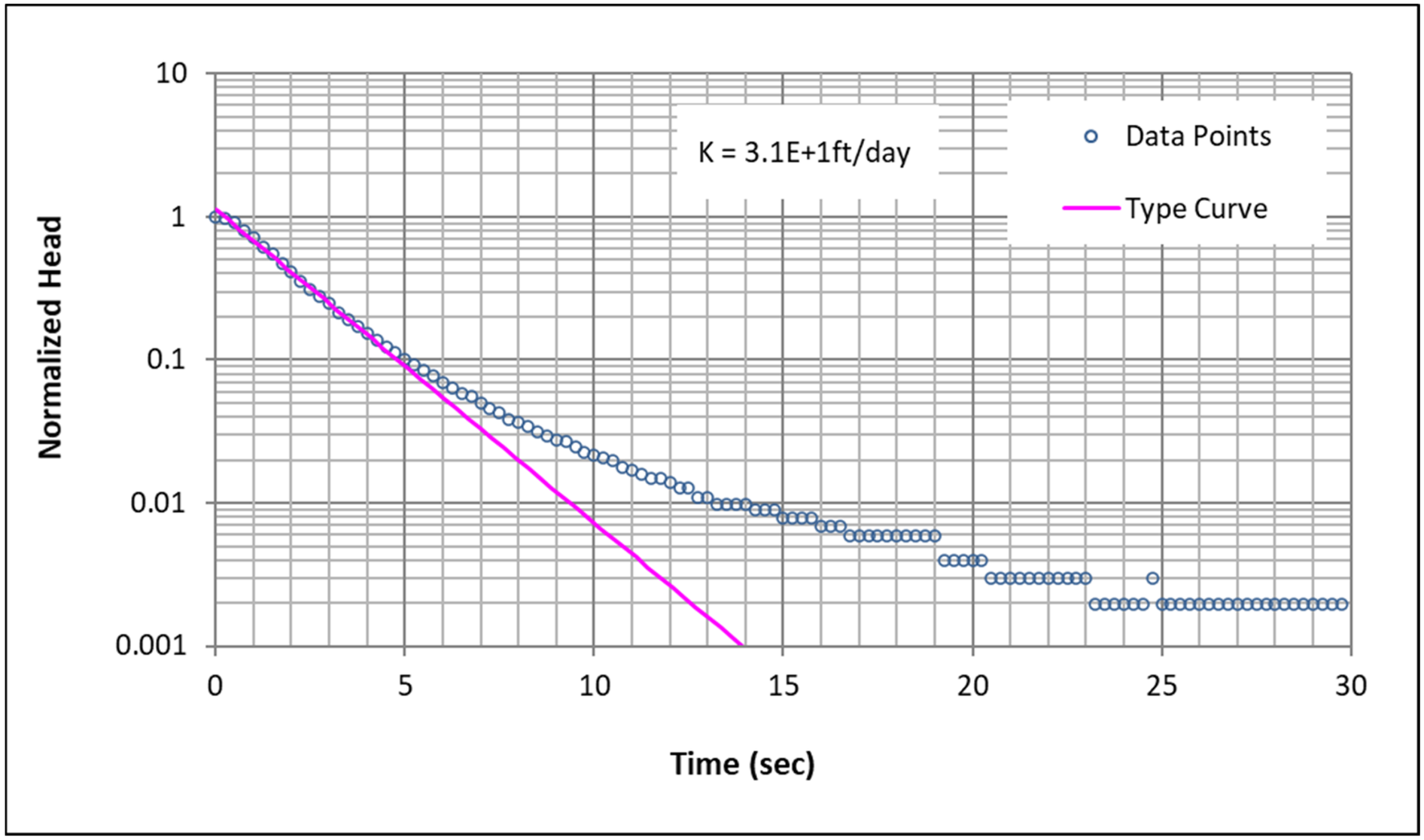
GEI-26P– Rising Head 3

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-52

0356-161-00 Date Exported: 04/09/15



Notes:

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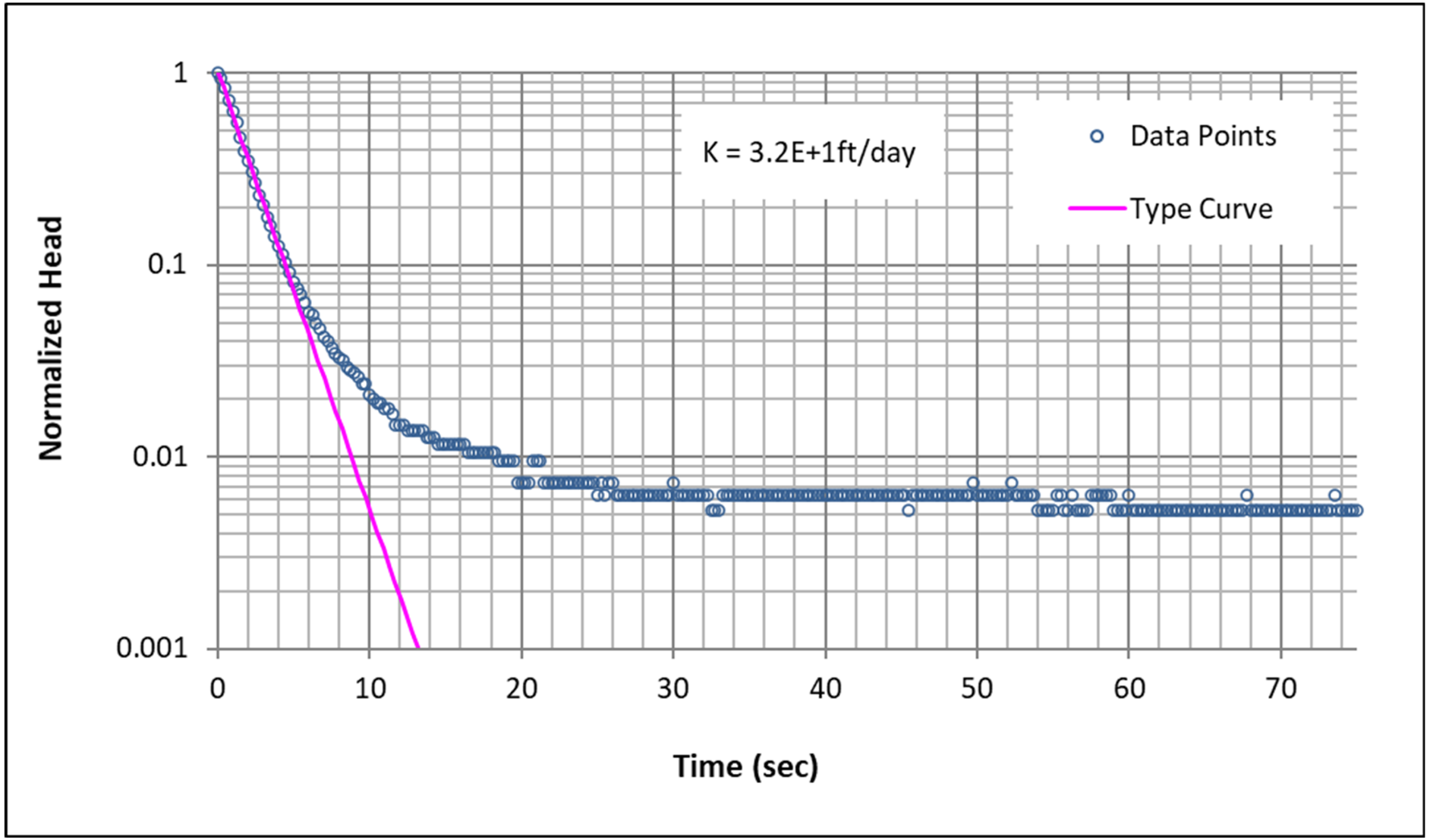
GEI-26P– Rising Head 4

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-53

0356-161-00 Date Exported: 04/09/15



GEI-26P– Rising Head 5

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

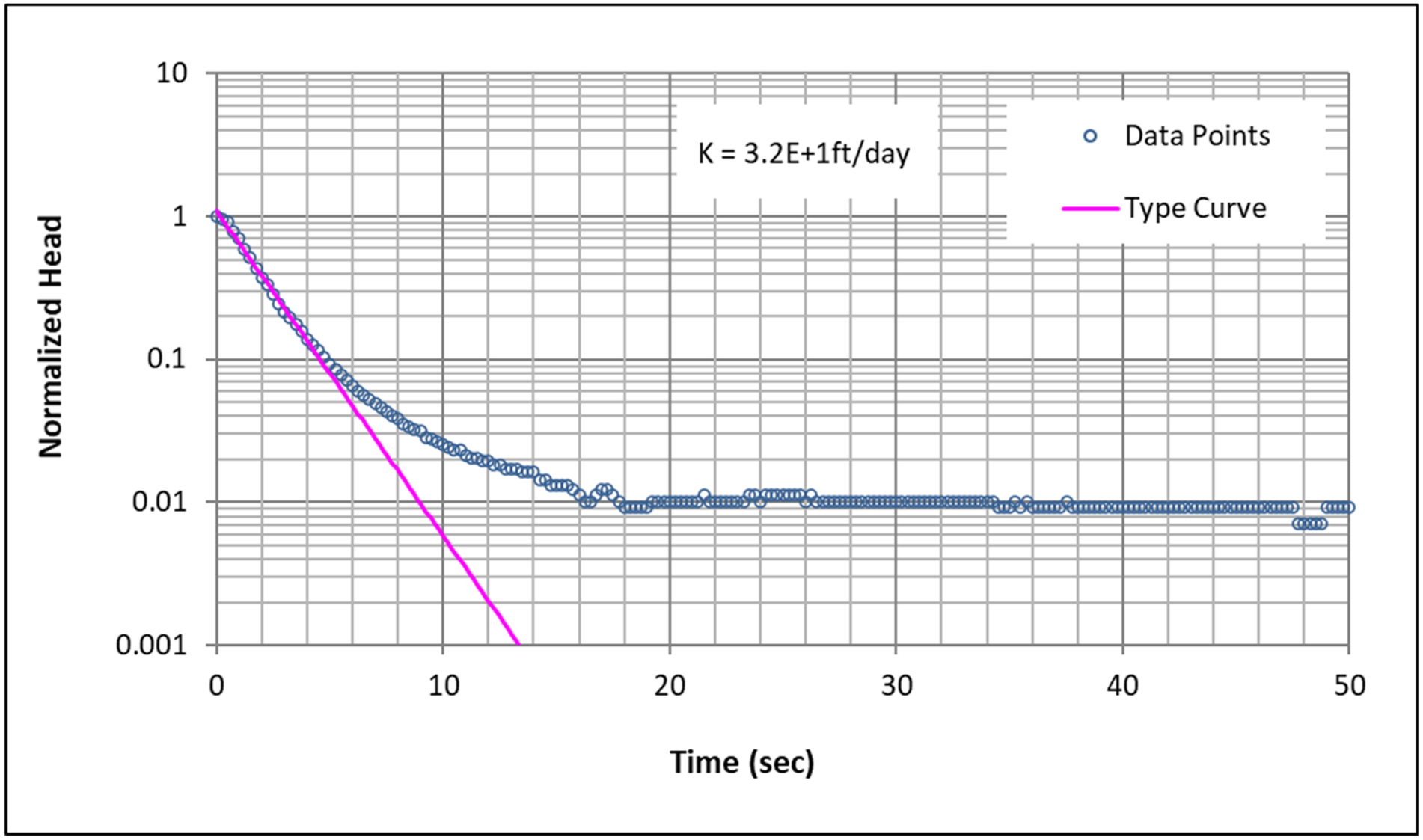
GeoEngineers

Figure B-54

Notes:
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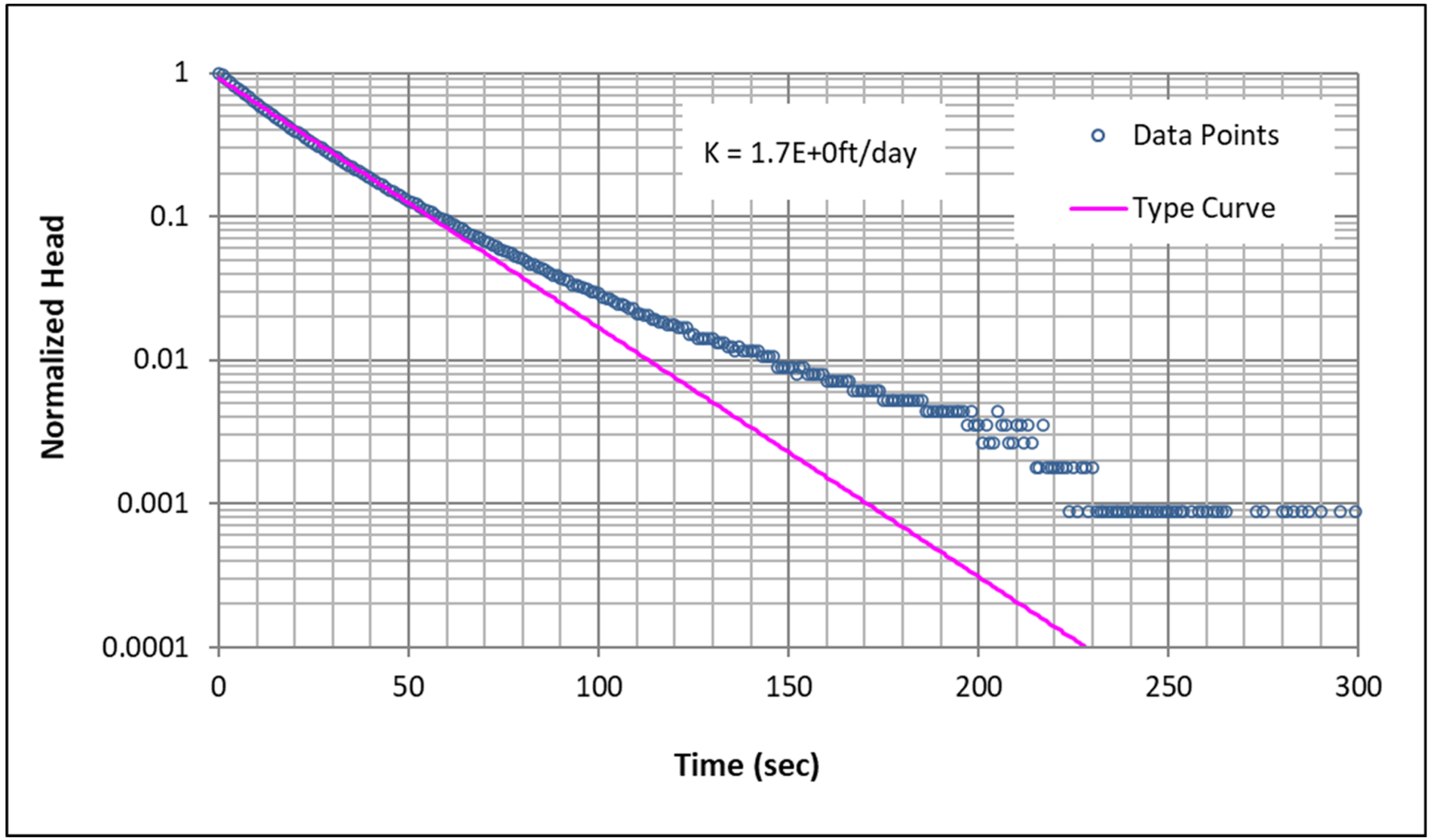
GEI-26P– Rising Head 6

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-55

0356-161-00 Date Exported: 04/09/15



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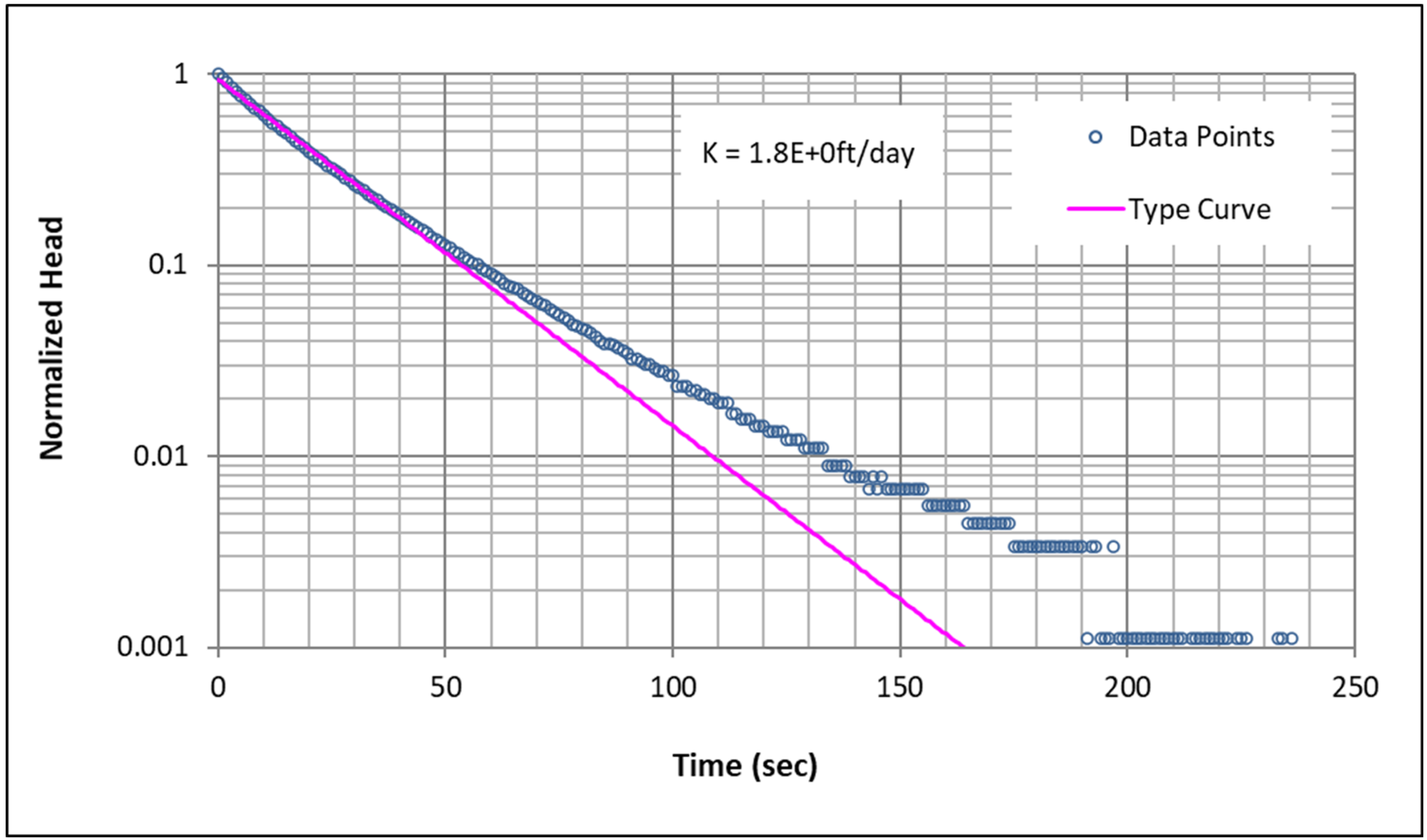
GEI-27P– Rising Head 1

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-56

0356-161-00 Date Exported: 04/09/15



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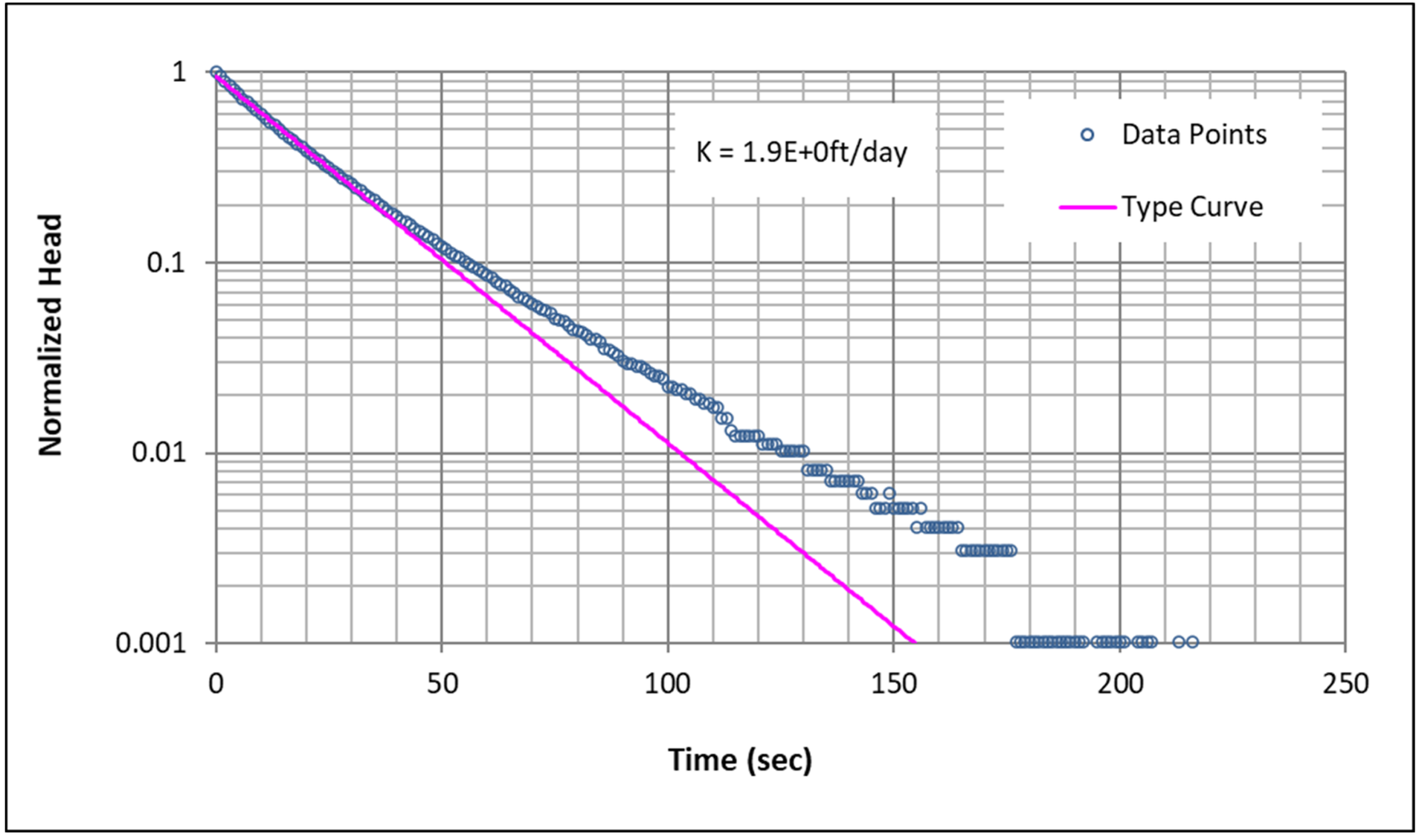
GEI-27P– Rising Head 2

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-57

0356-161-00 Date Exported: 04/09/15



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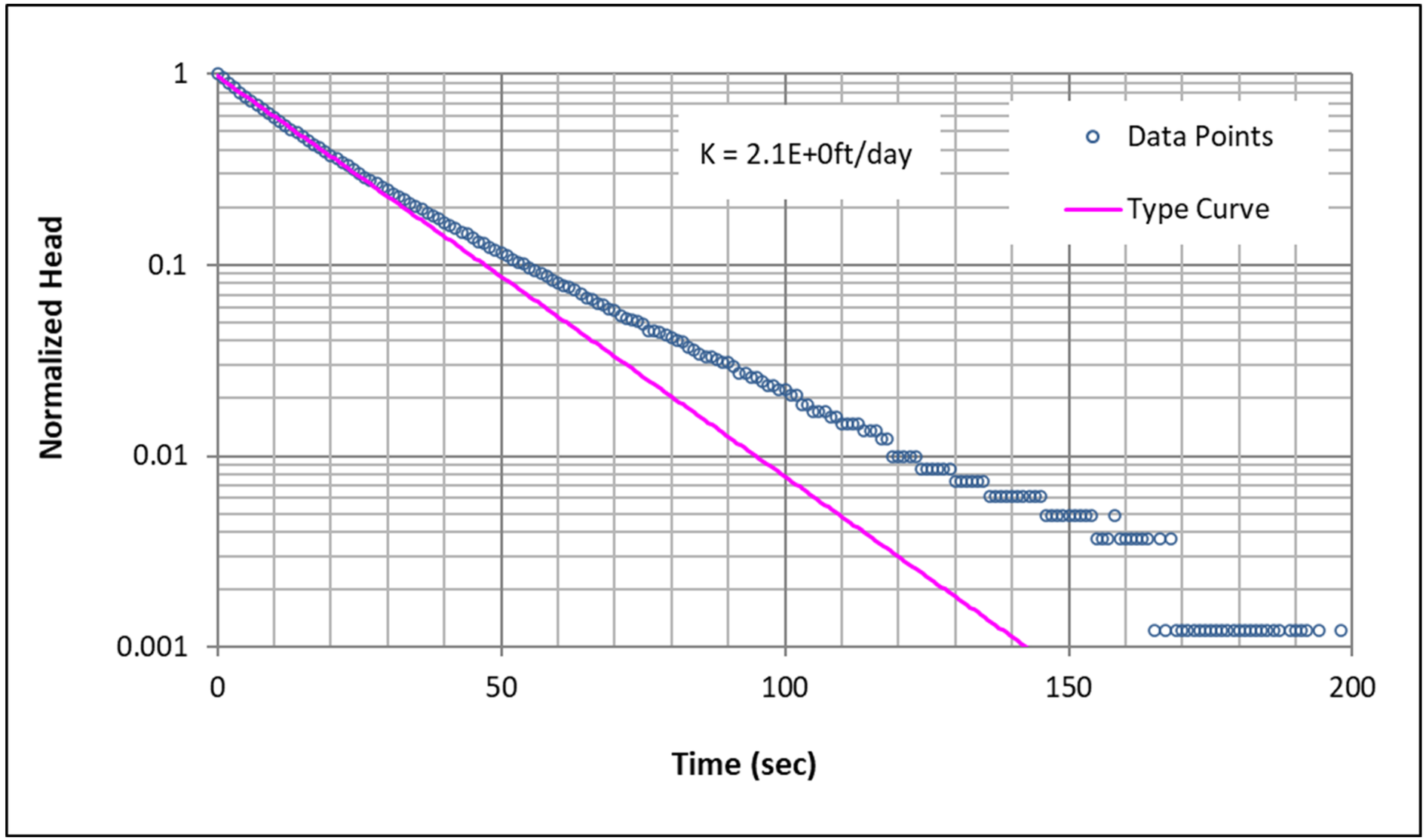
GEI-27P– Rising Head 3

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-58

0356-161-00 Date Exported: 04/09/15



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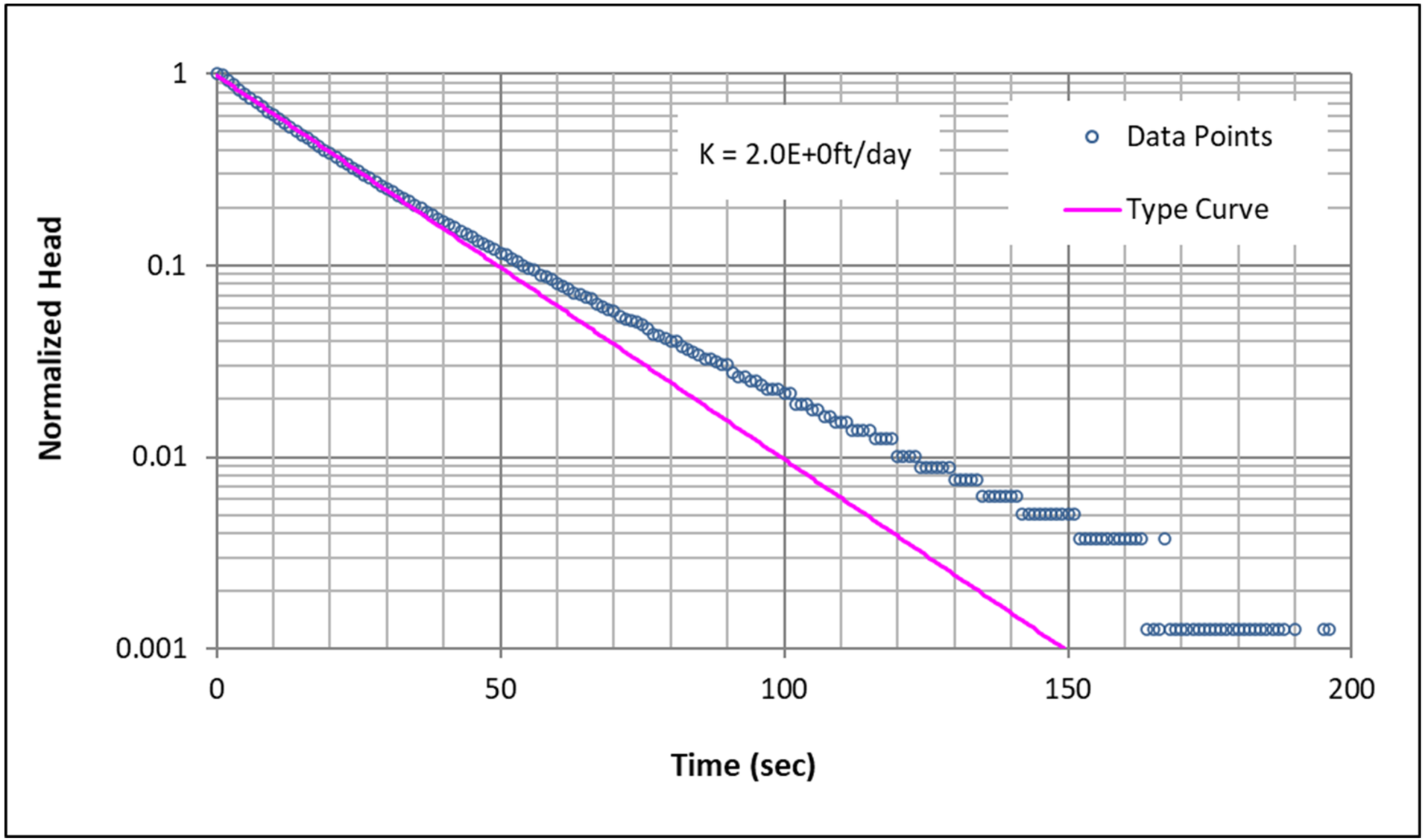
GEI-27P– Rising Head 4

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-59

0356-161-00 Date Exported: 04/09/15



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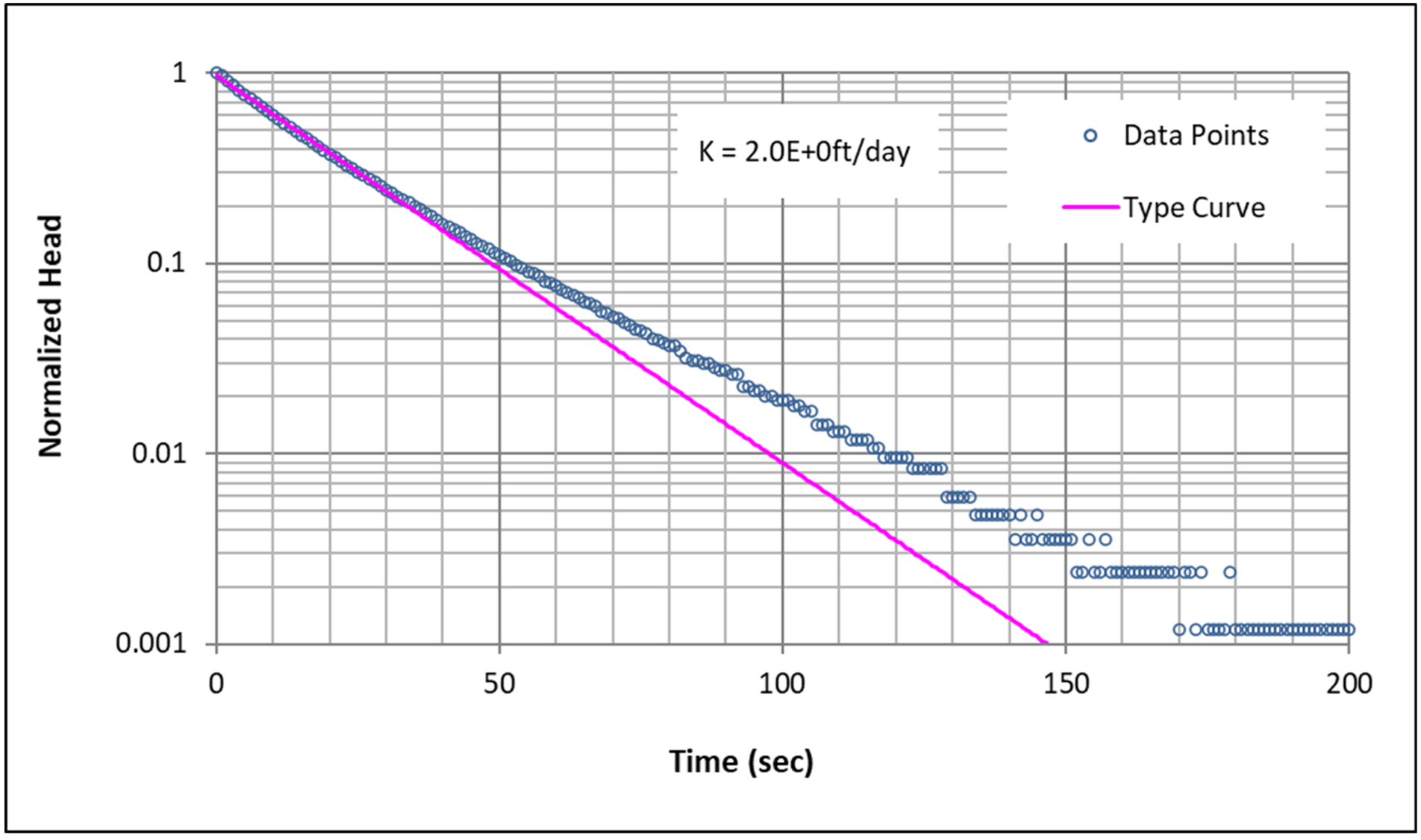
GEI-27P– Rising Head 5

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-60

0356-161-00 Date Exported: 04/09/15



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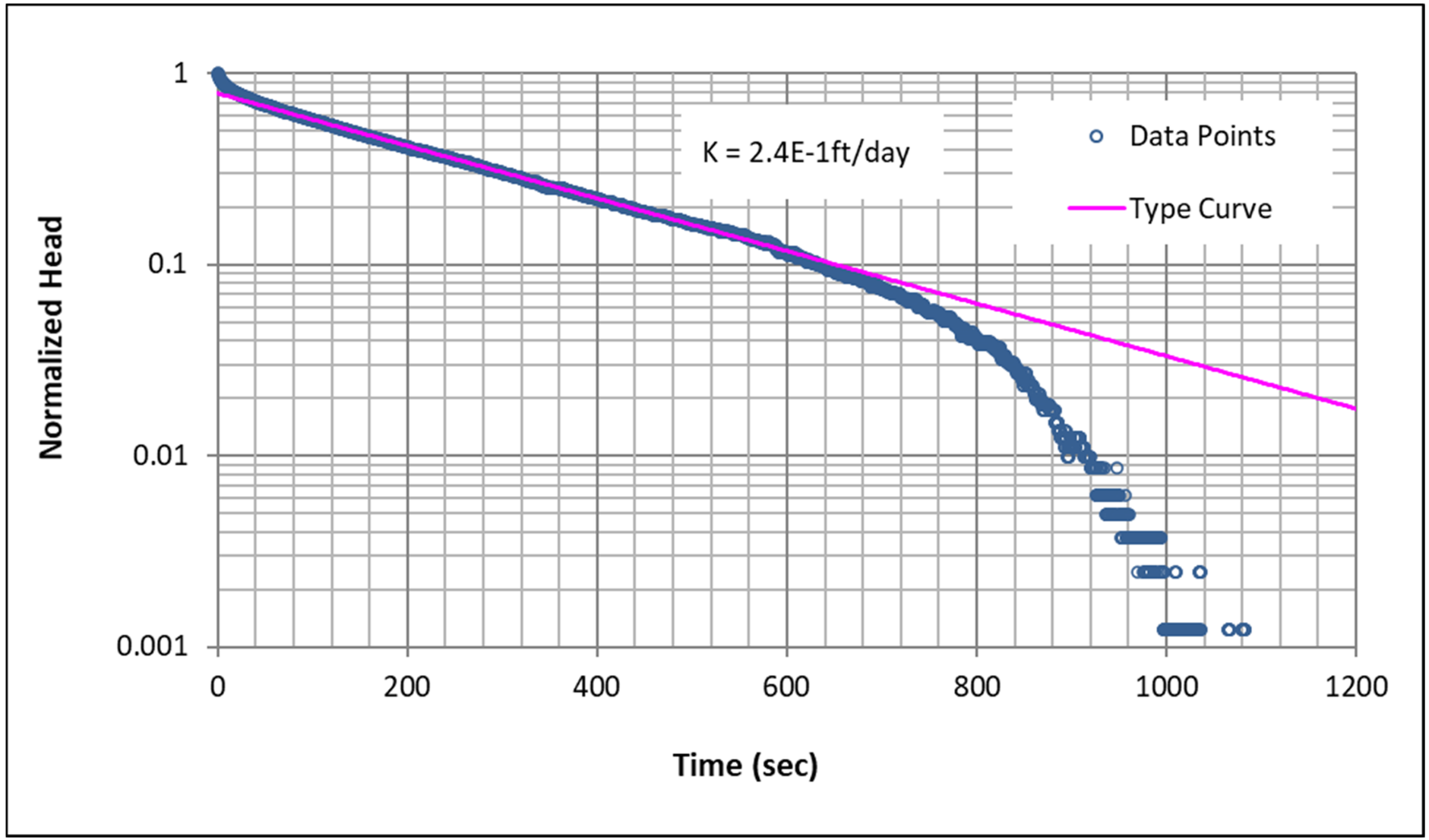
GEI-27P– Rising Head 6

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-61

0356-161-00 Date Exported: 04/09/15



GEI-28P– Rising Head 1

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

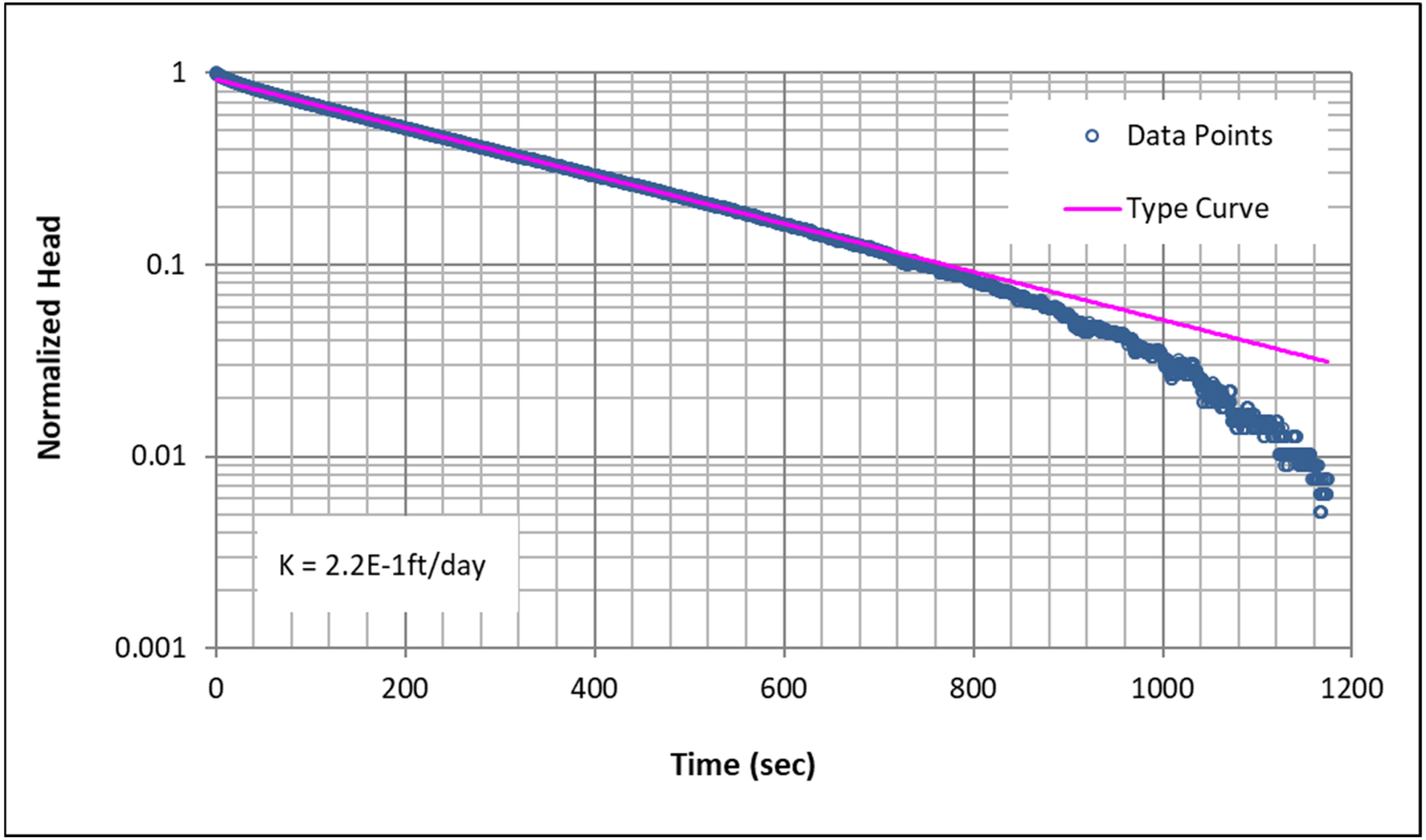
GeoEngineers

Figure B-62

Notes:
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Data Source:

GEI-28P– Rising Head 2

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure B-63

0356-161-00 Date Exported: 04/09/15

APPENDIX C
Laboratory Testing

APPENDIX C
LABORATORY TESTING

Soil samples obtained from the explorations were transported to our laboratory and examined to confirm or modify field classifications, as well as to evaluate index properties of the soil samples. Representative samples were selected for laboratory testing consisting of the determination of the moisture content, percent fines determination, sieve analysis, and Atterberg limit determinations. The tests were performed in general accordance with test methods of ASTM International (ASTM) or other applicable procedures.

Moisture Content Testing

The natural moisture contents of selected soil samples obtained from the exploratory borings were determined in general accordance with ASTM D 2216 test procedures. The results from the moisture content determinations are presented in the boring logs.

Percent Passing U.S. No. 200 Sieve

Selected samples were "washed" through the No. 200 mesh sieve to determine the relative percentages of coarse and fine-grained particles in the soil. The percent passing value represents the percentage by weight of the sample finer than the U.S. No. 200 sieve. These tests were conducted to verify field descriptions and to determine the fines content for analysis purposes. The tests were conducted in general accordance with ASTM D1140, and the results are shown on the exploration logs.

Sieve Analyses

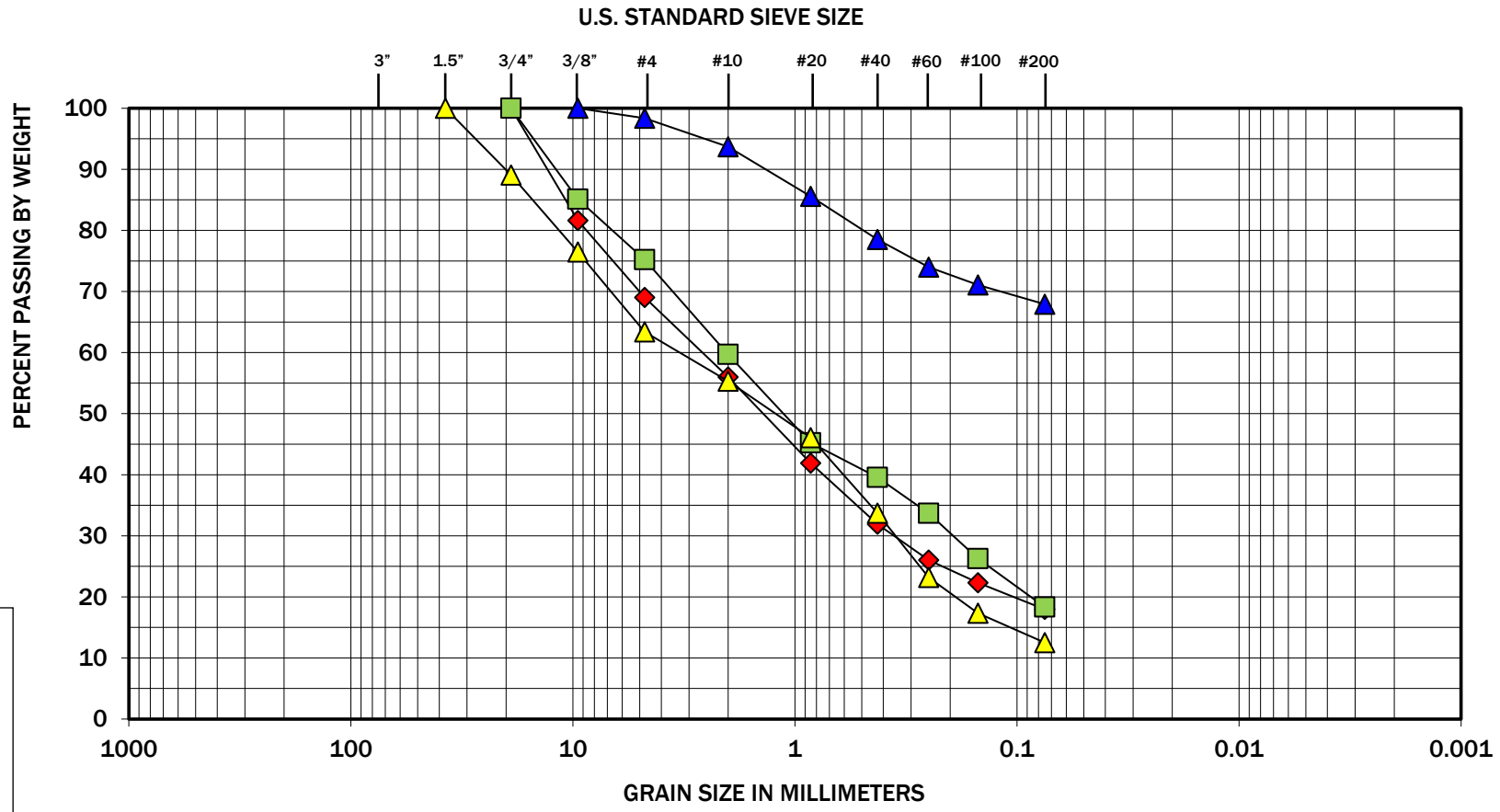
Sieve analyses were performed on 20 selected samples in general accordance with ASTM D 422 to determine the sample grain size distribution. The wet sieve analysis method was used to determine the percentage of soil greater than the U.S. No. 200 mesh sieve. The results of the sieve analyses were plotted, classified in general accordance with the Unified Soil Classification System (USCS), and are presented in Figures C-1 through C-5.

Atterberg Limits

Atterberg limit tests were completed for eight soil samples. The tests were used to classify the soil as well as to aid in evaluating index properties and consolidation characteristics of the fine-grained soil deposits. The liquid limit and the plastic limit were obtained in general accordance with ASTM D 4318. The results of the Atterberg limits are summarized in Figures C-6 and C-7.

DIPRA Corrosion Testing

Chemical analytical testing for corrosivity was completed in general accordance with the Ductile Iron Pipe Research Association (DIPRA) 10-Point Soil Evaluation. The evaluation includes measurement of resistivity, pH, redox potential, sulfides, and moisture to rate the soil corrosion potential. The results of these tests are presented in Figures C-8 through C-12 in this Appendix.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	GEI-7P	12.5	9	Silty sand with gravel (SM)
■	GEI-8B-18	10	11	Silty sand with gravel (SM)
▲	GEI-8B-18	15	64	Sandy silt (ML)
△	GEI-14TP	10	12	Silty sand with gravel (SM)

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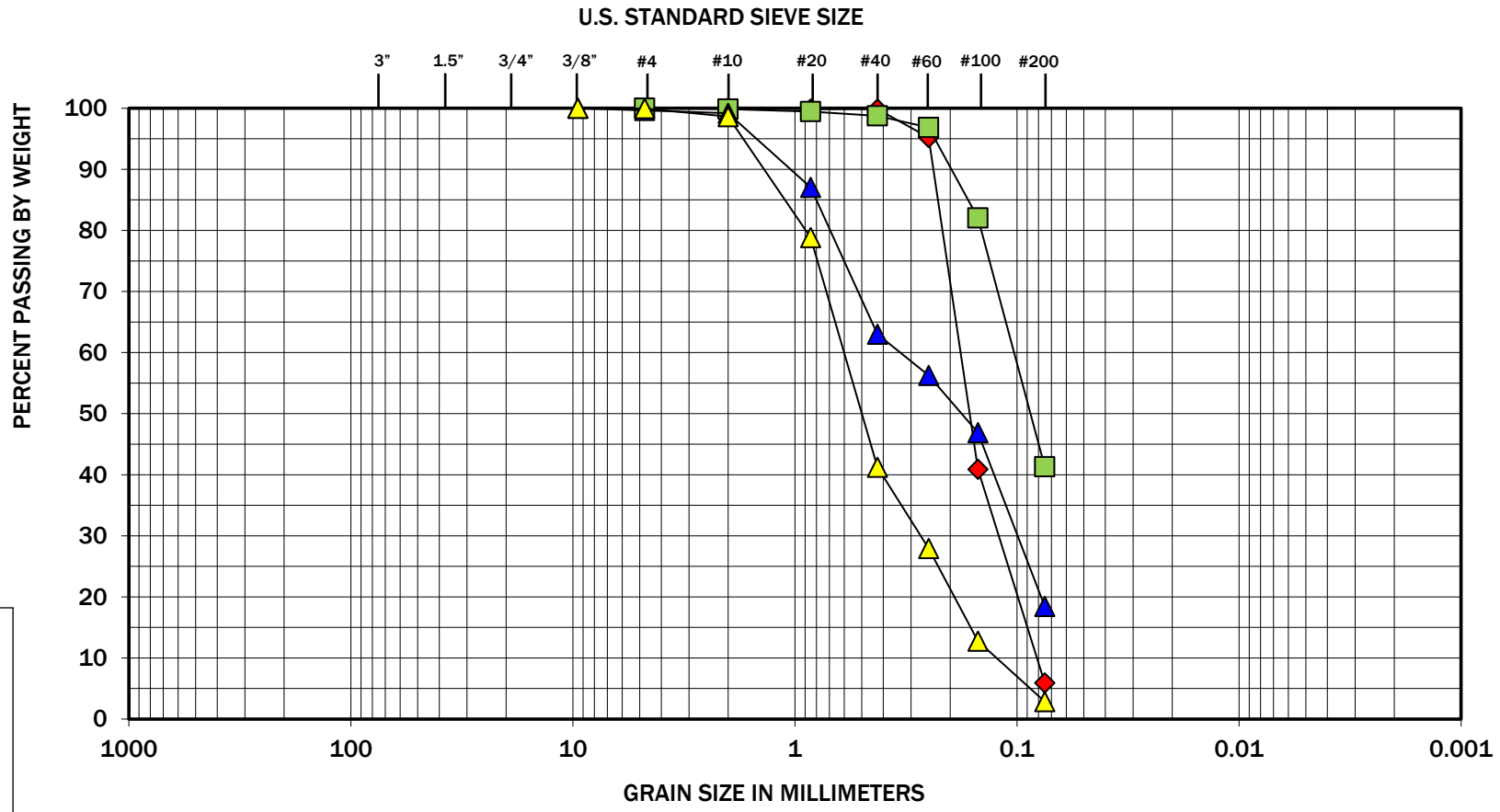
The grain size analysis results were obtained in general accordance with ASTM D 6913.

GeoEngineers

Figure C-1

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

Sieve Analysis Results



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	GEI-20P	7.5	36	Fine to medium sand with silt (SP-SM)
■	GEI-20P	10	44	Silty sand (SM)
▲	GEI-21B	7.5	26	Silty sand (SM)
△	GEI-21B	10	22	Fine to medium sand (SP)

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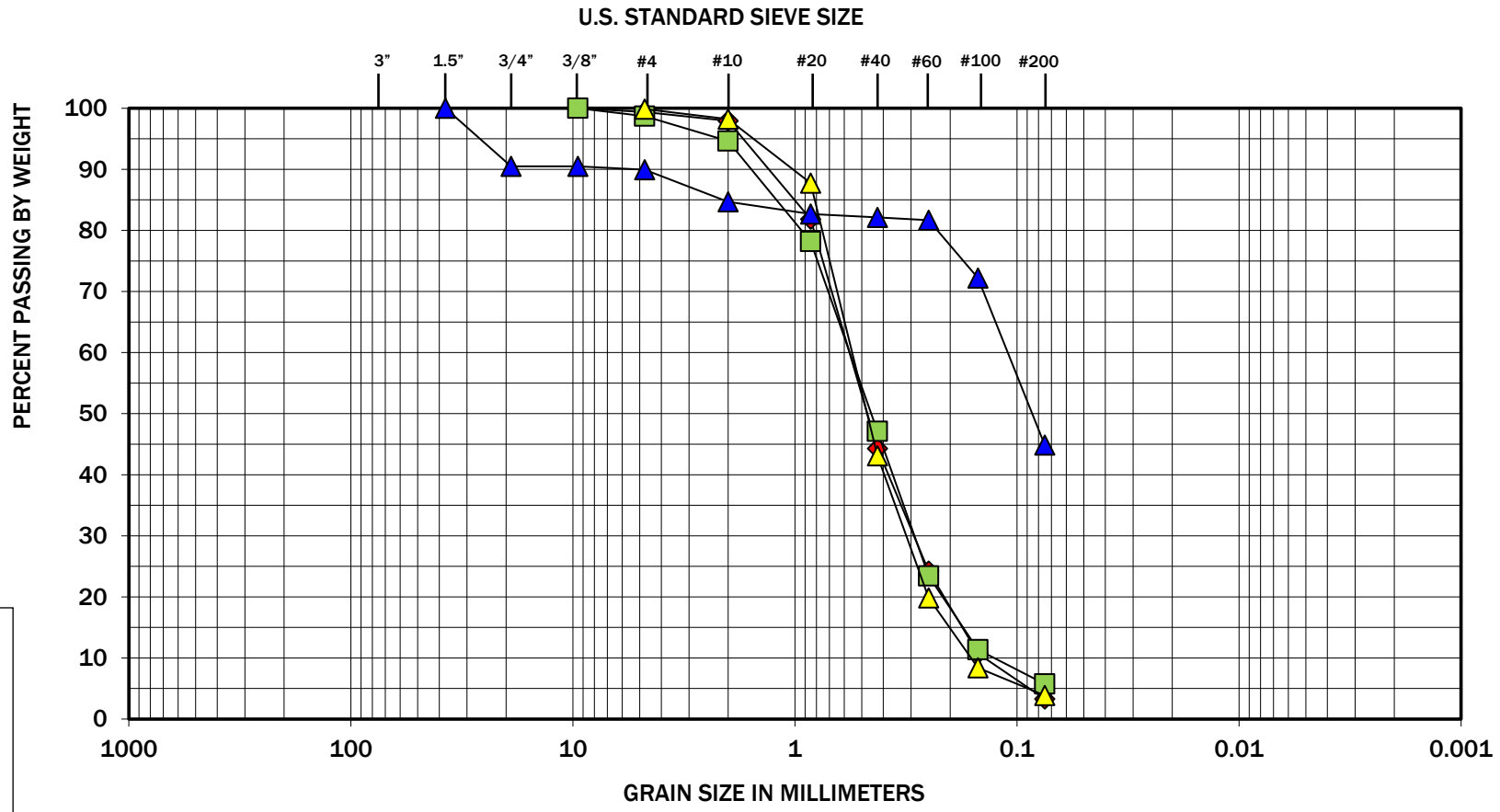
The grain size analysis results were obtained in general accordance with ASTM D 6913.

Sieve Analysis Results

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure C-2



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	GEI-25P	10	24	Fine to medium sand (SP)
■	GEI-25P	15	24	Fine to medium sand with silt (SP-SM)
▲	GEI-26P	10	33	Silty fine sand (SM)
△	GEI-26P	15	23	Fine to medium sand (SP)

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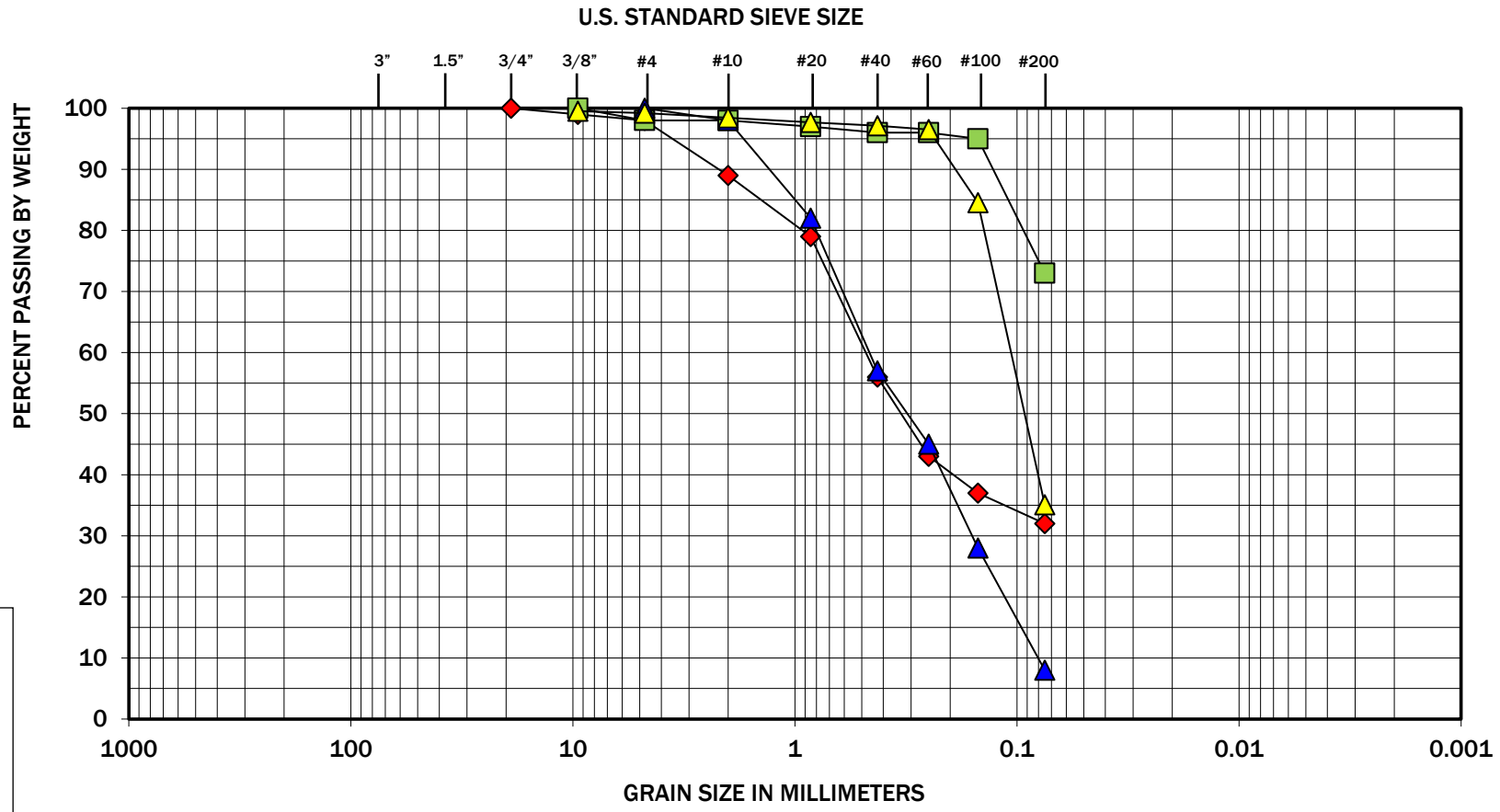
The grain size analysis results were obtained in general accordance with ASTM D 6913.

Sieve Analysis Results

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure C-3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	GEI-26P	17.5	22	Silty fine to medium sand (SM)
■	GEI-27P	10	42	Silt with sand (ML)
▲	GEI-27P	17.5	24	Fine to medium sand with silt (SP-SM)
△	GEI-28P	12.5	34	Silty fine sand (SM)

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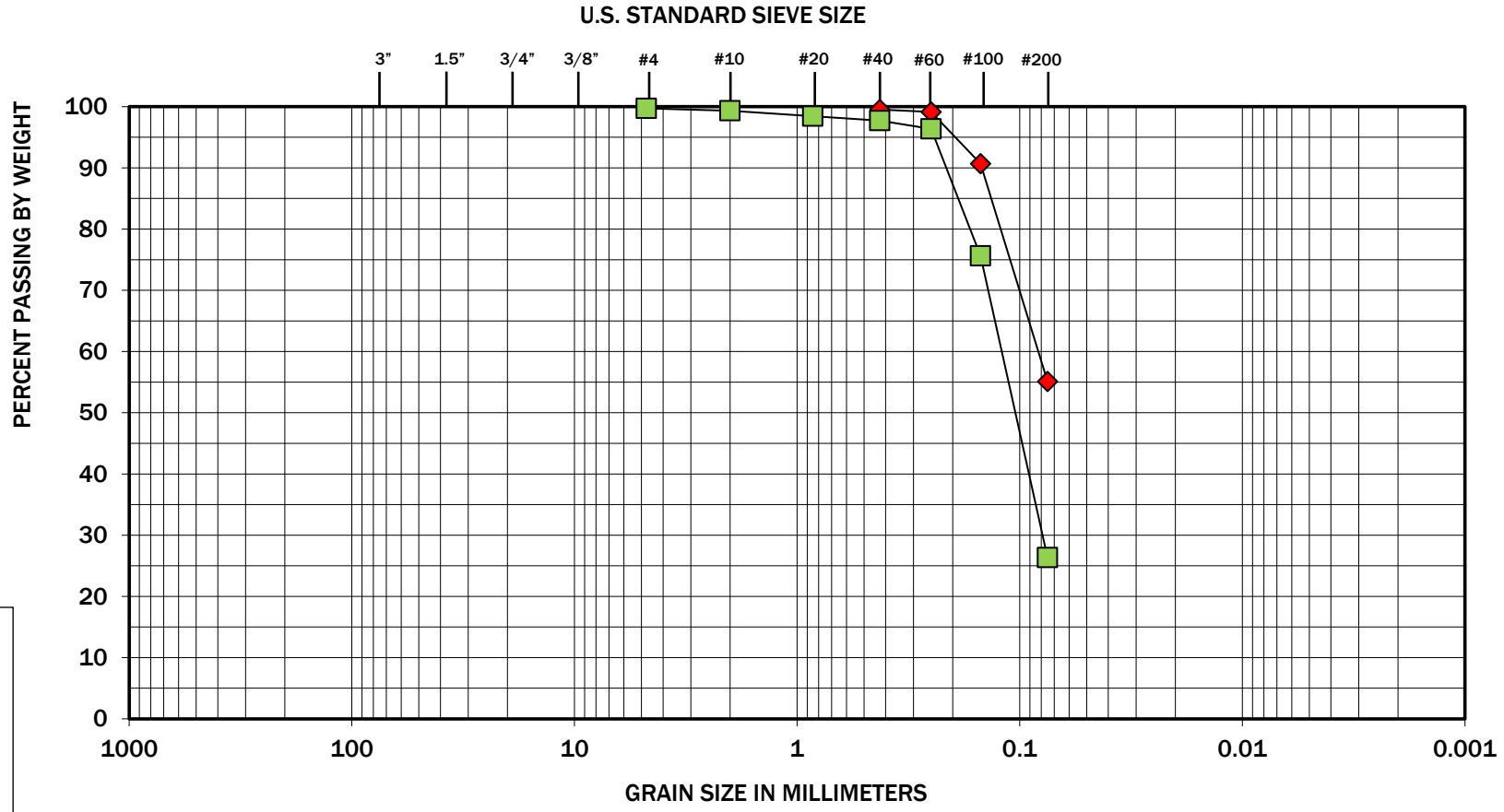
The grain size analysis results were obtained in general accordance with ASTM D 6913.

Sieve Analysis Results

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure C-4



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	GEI-28P	20	39	Sandy silt (ML)
■	GEI-8B-19	20	31	Silty fine sand (SM)

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The grain size analysis results were obtained in general accordance with ASTM D 6913.

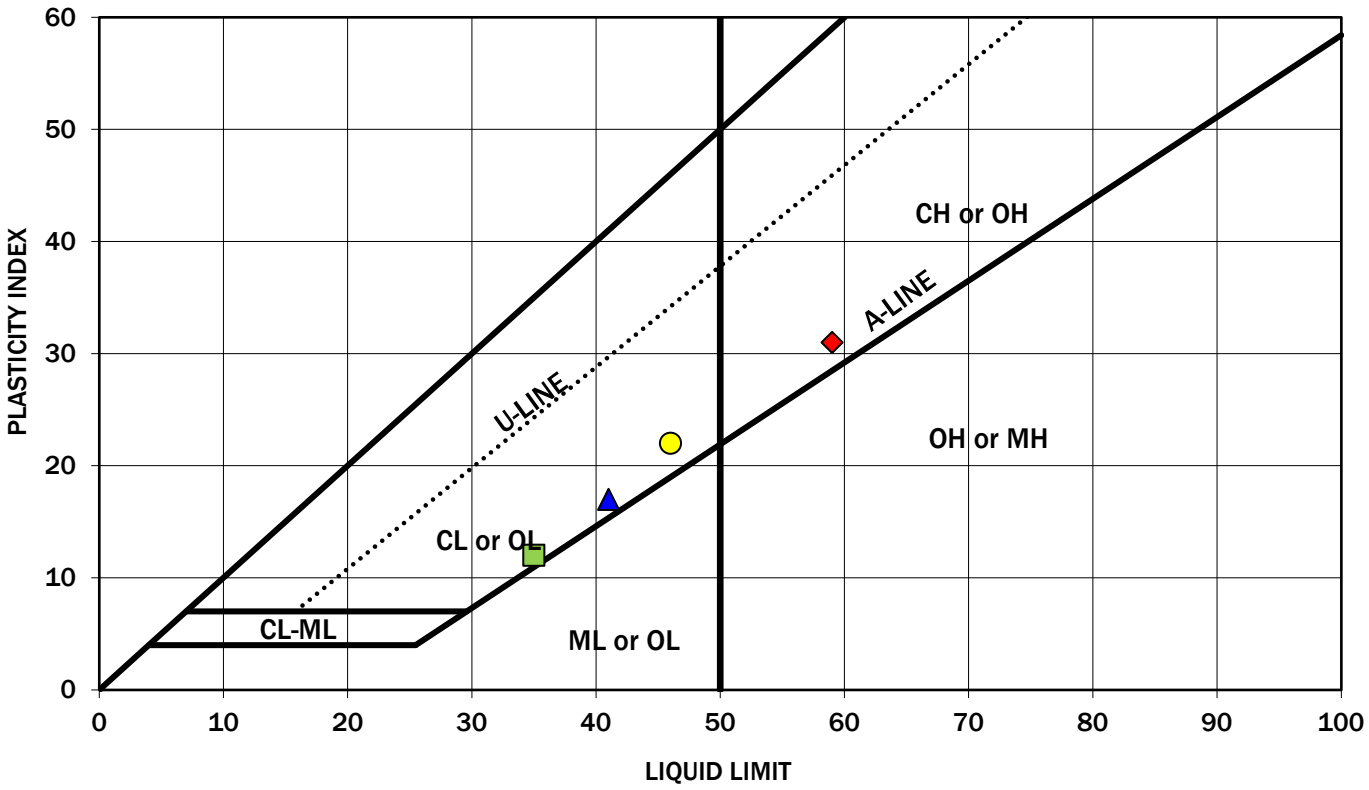
Sieve Analysis Results

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure C-5

PLASTICITY CHART



Symbol	Boring Number	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Soil Description
◆	GEI-1TP	3.5	27	59	31	Fat clay (CH)
■	GEI-5TP	3.5	19	35	12	Lean clay (CL)
▲	GEI-9TP	3.5	18	41	17	Lean clay (CL)
●	GEI-11P	5	28	46	22	Lean clay (CL)

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The liquid limit and plasticity index were obtained in general accordance with ASTM D 4318.

Atterberg Limits Test Results

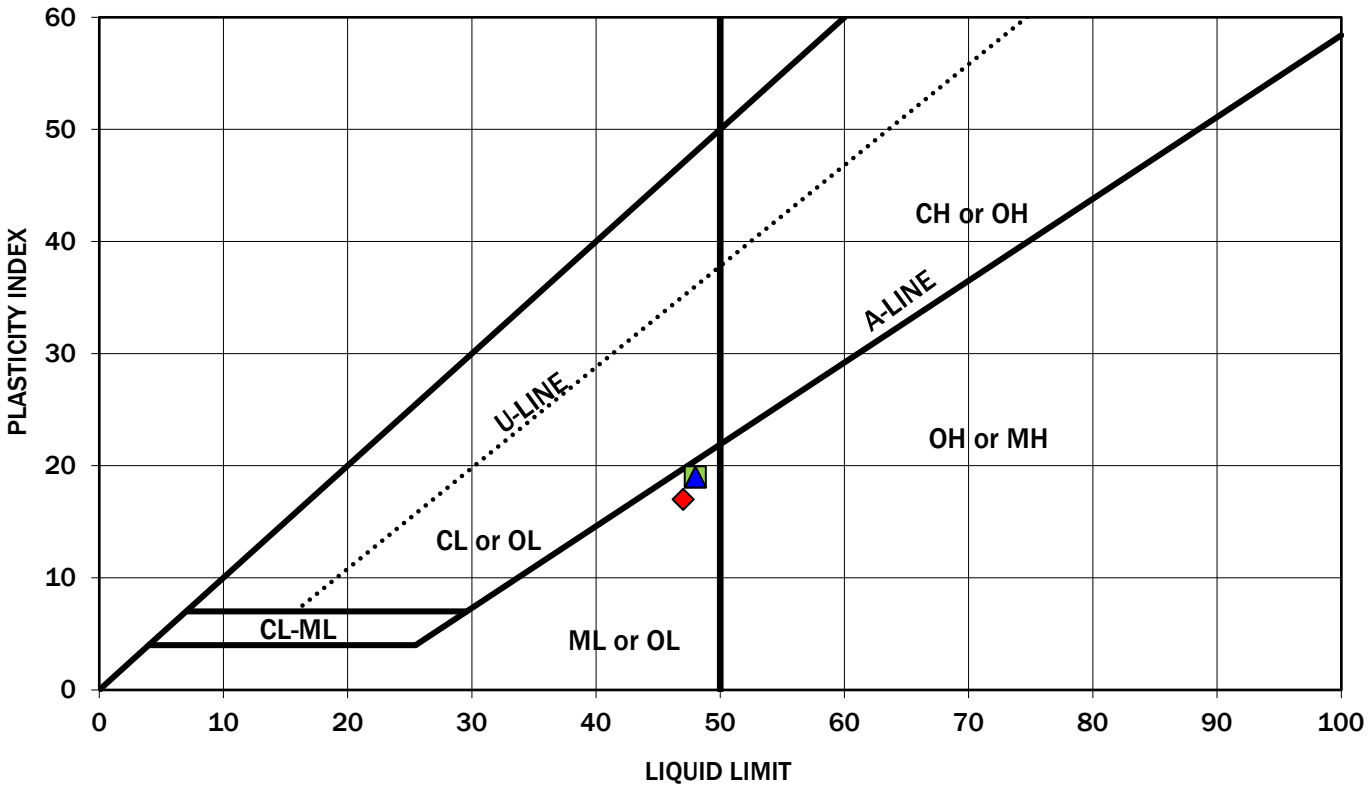
Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure C-6

2402-020-02 Date Exported: 6/29/18

PLASTICITY CHART



Symbol	Boring Number	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Soil Description
◆	GEI-13TP	3	34	47	17	Silt (ML)
■	GEI-15TP	7	36	48	19	Silt (ML)
▲	GEI-17TP	8.5	32	48	19	Silt (ML)
●	GEI-18TP	12	36	N/A	N/A	Non-plastic silt (ML)

Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes.

The liquid limit and plasticity index were obtained in general accordance with ASTM D 4318.

Atterberg Limits Test Results

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure C-7

2402-020-02 Date Exported: 06/29/18

Date:	6/1/18	Tested by:	MLC/SAS	
Boring #:	GEI-1TP			DIPRA PTS.
Sample #:	4	Resistivity :	3300	0
Depth:	5.5	pH :	7.2	0
Soil Description:	Clay with occasional sand (CH)	Redox Potential :	316	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-2TP			DIPRA PTS.
Sample #:	4	Resistivity :	3500	0
Depth:	5.5	pH :	7.9	0
Soil Description:	Sandy silt (ML)	Redox Potential :	209	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-3TP			DIPRA PTS.
Sample #:	4	Resistivity :	36000	0
Depth:	6	pH :	7.5	0
Soil Description:	Fine to medium sand (SP)	Redox Potential :	325	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-4TP			DIPRA PTS.
Sample #:	3	Resistivity :	25000	0
Depth:	3.5	pH :	6.4	0
Soil Description:	Sandy silt with occasional gravel (ML)	Redox Potential :	369	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-5TP			DIPRA PTS.
Sample #:	4	Resistivity :	7200	0
Depth:	6	pH :	6.2	0
Soil Description:	Lean clay with sand (CL)	Redox Potential :	370	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-6TP			DIPRA PTS.
Sample #:	5	Resistivity :	40000	0
Depth:	7	pH :	6.9	0
Soil Description:	Fine to coarse sand with occasional gravel (SP)	Redox Potential :	353	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**

DIPRA 10 Point Soil Evaluation Test Results

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure C-8

2402-020-02 Date Exported: 07/12/2018

Date:	6/1/18	Tested by:	MLC/SAS	
Boring #:	GEI-7P			DIPRA PTS.
Sample #:	3	Resistivity :	4600	0
Depth:	5	pH :	6.2	0
Soil Description:	Sandy silt (ML)	Redox Potential :	333	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-8B			DIPRA PTS.
Sample #:	3	Resistivity :	11000	0
Depth:	5	pH :	7.5	0
Soil Description:	Silty fine to coarse sand with gravel (SM)	Redox Potential :	285	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-9TP			DIPRA PTS.
Sample #:	5	Resistivity :	5700	0
Depth:	6	pH :	7.3	0
Soil Description:	Lean clay with sand and occasional gravel (CL)	Redox Potential :	313	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-10TP			DIPRA PTS.
Sample #:	4	Resistivity :	15000	0
Depth:	4.5	pH :	6.5	0
Soil Description:	Lean clay with occasional sand (CL)	Redox Potential :	329	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-11P			DIPRA PTS.
Sample #:	4	Resistivity :	4800	0
Depth:	7.5	pH :	6.9	0
Soil Description:	Lean clay with occasional sand (CL)	Redox Potential :	332	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-12B			DIPRA PTS.
Sample #:	3b	Resistivity :	4100	0
Depth:	5.25	pH :	7.1	0
Soil Description:	Sandy silt (ML)	Redox Potential :	320	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**

DIPRA 10 Point Soil Evaluation Test Results

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure C-9

2402-020-02 Date Exported: 07/12/2018

Date:	6/18/18	Tested by:	MLC	
Boring #:	GEI-13TP			DIPRA Pts.
Sample #:	3	Resistivity :	3300	0
Depth:	7	pH :	8.3	0
Soil Description:	Clayey silt to silty clay (ML/CL)	Redox Potential :	289.9	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-14TP			DIPRA Pts.
Sample #:	3	Resistivity :	2900	1
Depth:	4	pH :	8.3	0
Soil Description:	Clayey silt to silty clay (ML/CL)	Redox Potential :	296.8	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**2**
Boring #:	GEI-15TP			DIPRA Pts.
Sample #:	4	Resistivity :	2400	2
Depth:	7	pH :	8.8	3
Soil Description:	Clayey silt to silty clay (ML/CL)	Redox Potential :	207.8	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**6**
Boring #:	GEI-16TP			DIPRA Pts.
Sample #:	4	Resistivity :	3500	0
Depth:	6	pH :	7.1	0
Soil Description:	Lean clay with occasional sand (CL)	Redox Potential :	311	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-17TP			DIPRA Pts.
Sample #:	4	Resistivity :	56000	0
Depth:	6.5	pH :	7.8	0
Soil Description:	Finew to coarse sand with gravel (SP)	Redox Potential :	335.1	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-18TP			DIPRA Pts.
Sample #:	5	Resistivity :	16000	0
Depth:	10	pH :	6.6	0
Soil Description:	Silt with O/M (ML)	Redox Potential :	378.6	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**

DIPRA 10 Point Soil Evaluation Test Results

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure C-10

2402-020-02 Date Exported: 07/12/2018

Date:	6/1/18	Tested by:	MLC/SAS	
Boring #:	GEI-20P			DIPRA PTS.
Sample #:	3	Resistivity :	30000	0
Depth:	5	pH :	7.4	0
Soil Description:	Fine to medium sand with silt (SP-SM)	Redox Potential :	285	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**
Boring #:	GEI-21B			DIPRA PTS.
Sample #:	3a	Resistivity :	18000	0
Depth:	5	pH :	6.4	0
Soil Description:	Silty fine sand (SM)	Redox Potential :	324	0
		Sulfides :	Negative	0
		Moisture :	Wet	2
		Total DIPRA Points:		**2**
Boring #:	GEI-23B			DIPRA PTS.
Sample #:	4	Resistivity :	16000	0
Depth:	7.5	pH :	7.4	0
Soil Description:	Sandy silt with occasional gravel (ML)	Redox Potential :	254	0
		Sulfides :	Negative	0
		Moisture :	Wet	2
		Total DIPRA Points:		**2**
Boring #:	GEI-24B			DIPRA PTS.
Sample #:	3	Resistivity :	7200	0
Depth:	5	pH :	8.2	0
Soil Description:	Silty fine to medium sand with gravel (SM)	Redox Potential :	219	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**1**

2402-020-02 Date Exported: 07/12/2018

DIPRA 10 Point Soil Evaluation Test Results

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure C-11

Date:	7/18/18	Tested by:	MLC/NLP	
Boring #:	SW-1B			DIPRA Pts.
Sample #:		Resistivity :	5200	0
Depth:	10	pH :	8.8	3
Soil Description:	Lean clay (CL)	Redox Potential :	269.4	0
		Sulfides :	Negative	0
		Moisture :	Fair	1
		Total DIPRA Points:		**4**
Boring #:	SW-2P			DIPRA Pts.
Sample #:		Resistivity :	930	10
Depth:	50	pH :	9.9	3
Soil Description:	Lean clay (CL)	Redox Potential :	88.1	3.5
		Sulfides :	Negative	0
		Moisture :	Poor	2
		Total DIPRA Points:		**18.5**
Boring #:	SW-3B			DIPRA Pts.
Sample #:		Resistivity :	3500	0
Depth:	10	pH :	7.7	0
Soil Description:	Lean clay (CL)	Redox Potential :	276.3	0
		Sulfides :	Negative	0
		Moisture :	Poor	2
		Total DIPRA Points:		**2**
Boring #:	SW-4P			DIPRA Pts.
Sample #:		Resistivity :	1000	10
Depth:	40	pH :	9.7	3
Soil Description:	Lean clay (CL)	Redox Potential :	66.1	3.5
		Sulfides :	Negative	0
		Moisture :	Poor	2
		Total DIPRA Points:		**18.5**

DIPRA 10 Point Soil Evaluation Test Results

Judy Reservoir to Mount Vernon Transmission Pipeline-Phase 2
Skagit County, Washington

GeoEngineers

Figure C-12

2402-020-02 Date Exported: 07/12/2018

APPENDIX D
Previous Site Explorations and Explorations by Others

APPENDIX D
PREVIOUS SITE EXPLORATIONS AND EXPLORATIONS BY OTHERS

Selected exploration logs from GeoEngineers' geotechnical data report for the preliminary phase of the project pipeline are included in this appendix.

- Appendix A figures of the "Geotechnical Data Report, Judy Reservoir–Mount Vernon Pipeline, Mount Vernon, Washington," for HDR Engineering, Inc., dated November 17, 2008.

These logs have been presented in their original form. The order of the previous explorations logs presented in this appendix is the same as the order shown in Table A-2. Note that the approximate station presented on these logs was applicable only for the preliminary phase of the Judy Reservoir to Mount Vernon Water Transmission Pipeline project and stations presented on these logs are not applicable to the Phase 2 pipeline alignment stationing.

As part of the design of trenchless pipeline crossings for the Phase 2 project, Shannon & Wilson (S&W) completed four borings within the pipeline alignment as detailed in the following report:

- "Geotechnical Data Report, Judy Reservoir to Mount Vernon Transmission Pipeline – Phase 2 Project, Skagit County, Washington," for HDR Engineering, Inc., dated November 27, 2018.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE			GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	CC	Cement Concrete
	AC	Asphalt Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Measured groundwater level in exploration, well, or piezometer

Groundwater observed at time of exploration

Perched water observed at time of exploration

Measured free product in well or piezometer

Stratigraphic Contact

Distinct contact between soil strata or geologic units

Gradual change between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

Figure A-1

Date(s) Drilled	4-23-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Depth (ft)	26.5	Surface Elevation (ft)	52.2	Groundwater Elevation (ft)	Not Determined
Station	081+70	Datum/ System		Easting(x): Northing(y):	1289003.526 526651.84

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0						TS	Dark brown organic silty fine sand to fine sandy silt (loose/medium stiff, moist) (topsoil)			
							ML/CL	Gray-brown silty clay to clayey silt with fine sand and occasional organic matter; iron staining (stiff, moist) (recessional marine drift)			
50		16	11	1					28		
	5	18	15	2				AL; LL=42, PI=17	28		
								CT			
45								CT			
							CH	Gray clay (medium stiff, moist)			
	10	18	6	3					38		
40											
	15	18	2	4				- grades to very soft	37		
35											
	20										

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

LOG OF BORING B- 8

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 8
Sheet 1 of 2

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	20	18	1	5				AL; LL=51. PI=26; CT - grades to fat clay	51		
	25	18	1	6					63		
	30										
	35										
	40										

LOG OF BORING B- 8 (continued)

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

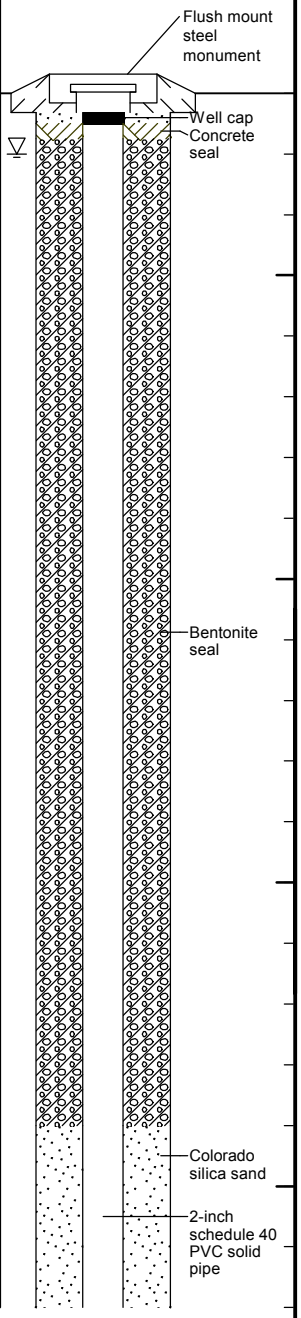
Figure: A- 8
Sheet 2 of 2

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-16-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Exploration Depth (ft)	31.5	Ground Surface Elevation (ft)	48	Groundwater Elevation (ft)	47
Station	085+00	Datum/ System		Easting(x): Northing(y):	1289311.469 526769.427

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³
	0					SOD	6 inches sod		
						CL	Gray silty clay with occasional organic matter (stiff, moist) (recessional marine drift)		
45									
	5	5	9	1			CT	30	
40									
						CL	Gray silty clay (soft to medium stiff, moist)		
	10	6	5	2			CT	36	
35									
	15	8	4	3			- organic matter grades out CT	36	
30									
	20								

WELL CONSTRUCTION



Note: See Figure A-1 for explanation of symbols.

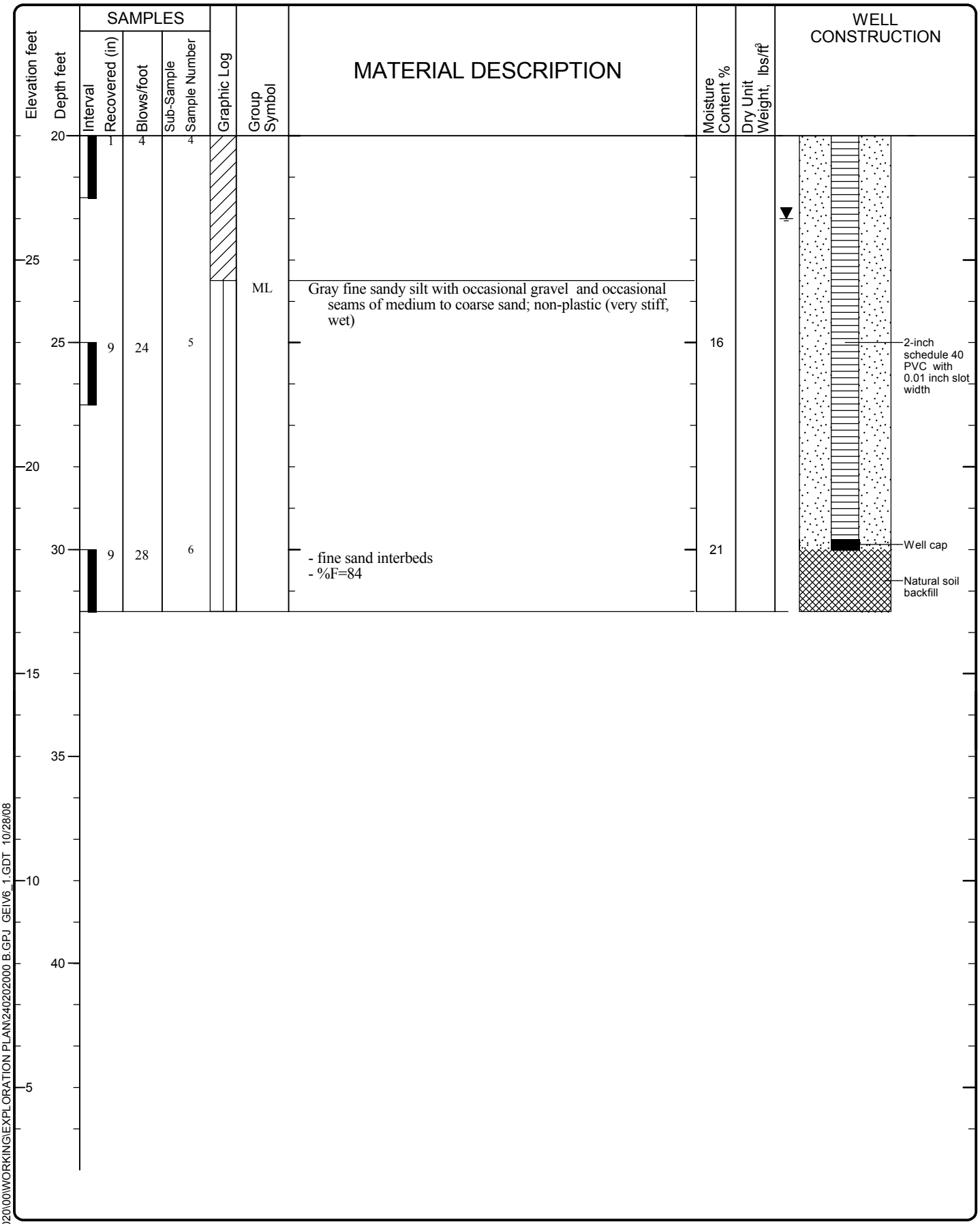
V6_GTWELL P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

LOG OF BORING B- 9P

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 9
Sheet 1 of 2



LOG OF BORING B- 9P (continued)

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 9
Sheet 2 of 2

V6_GTWELL P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/17/07 Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe Surface Elevation (ft): 49.5

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
	0				SOD	6 inches of sod		
		☒	1		ML	Gray and brown fine sandy silt to silt with fine sand; iron staining (stiff, moist) (recessional marine drift)		
		☒	2					
		☒	3				20	
		☒	4			%F=78	26	
45								
	5				CL	Gray clay with silt and occasional organic matter (stiff, moist) CT		
		☒	5					
		☒	6			- becomes wet	30	
40								
	10							
		☒	7			- becomes medium stiff		
		☒	8				27	
35						Slow groundwater seepage observed at 9 feet No caving observed [Station 085+50]		
	15							

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP- 2

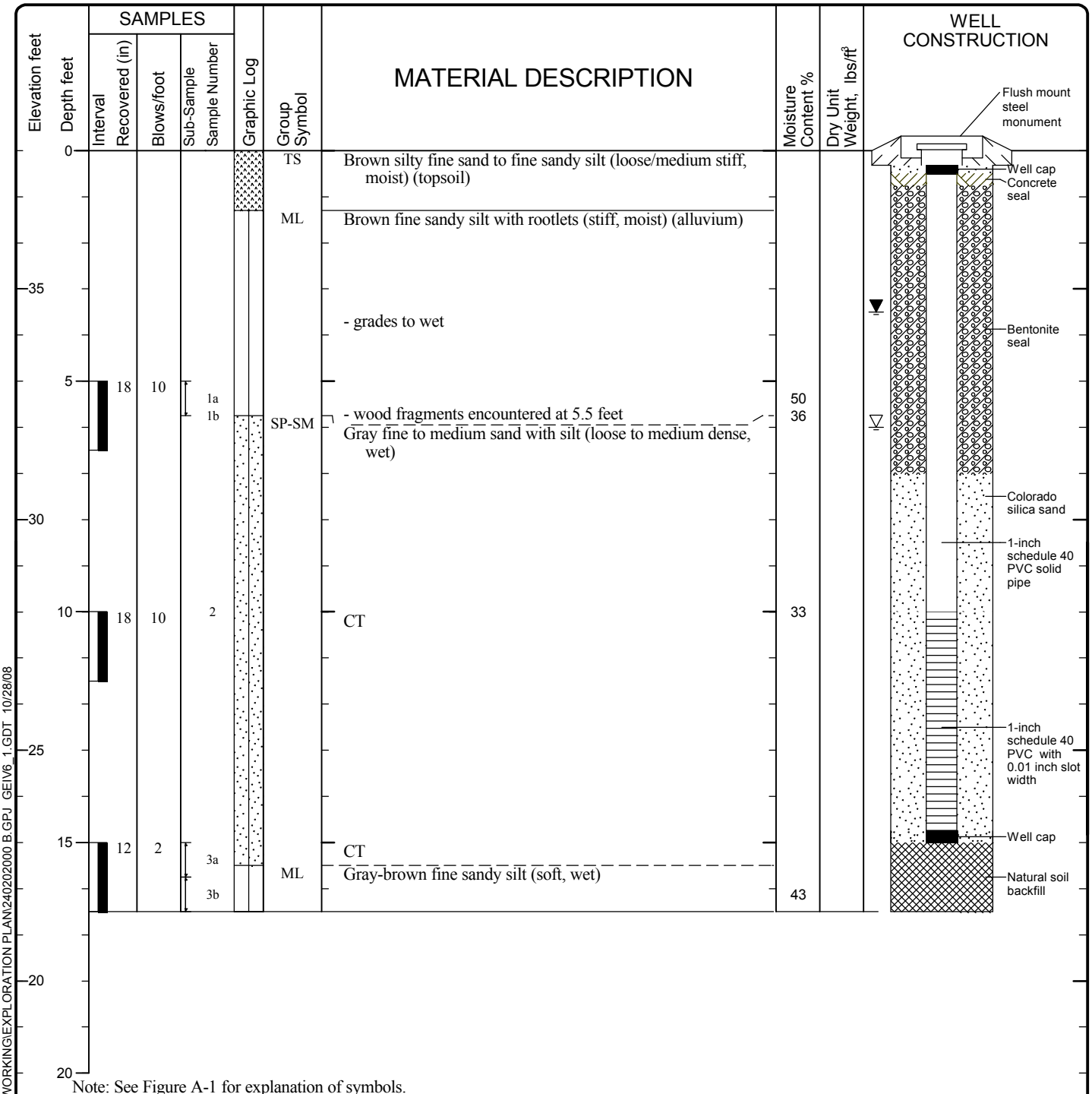
GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 39
Sheet 1 of 1

V6_GTTPIT P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-17-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Exploration Depth (ft)	16.5	Ground Surface Elevation (ft)	38	Groundwater Elevation (ft)	32
Station	141+50	Datum/ System		Easting(x): Northing(y):	1294172.175 529574.388



Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-15P

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 15
Sheet 1 of 1

V6_GTWELL P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-18-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Depth (ft)	26.5	Surface Elevation (ft)	51.2	Groundwater Elevation (ft)	Not Determined
Station	154+62	Datum/ System		Easting(x): Northing(y):	1295094.432 530460.081

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
50	0						TS	Dark brown silty fine sand to fine sandy silt with organic matter (medium dense/stiff, moist) (topsoil)			
							ML	Brown-gray fine sandy clayey silt with occasional gravel (stiff to hard, moist) (recessional marine drift)			
45	5	18	14	1				SA; %F=51	15		
40	10	0	39	2				- no recovery CT			
							RX	Gray-green rock (serpentinite)			
35	15	1	50/5"	3							
	20										

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-16

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 16
Sheet 1 of 2

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Elevation feet	Depth feet	SAMPLES: Interval	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample	SAMPLES: Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	20		6	86		4							
30													
	25		9	48		5				- grades to gray			
25													
	30												
20													
	35												
15													
	40												
10													

LOG OF BORING B-16 (continued)

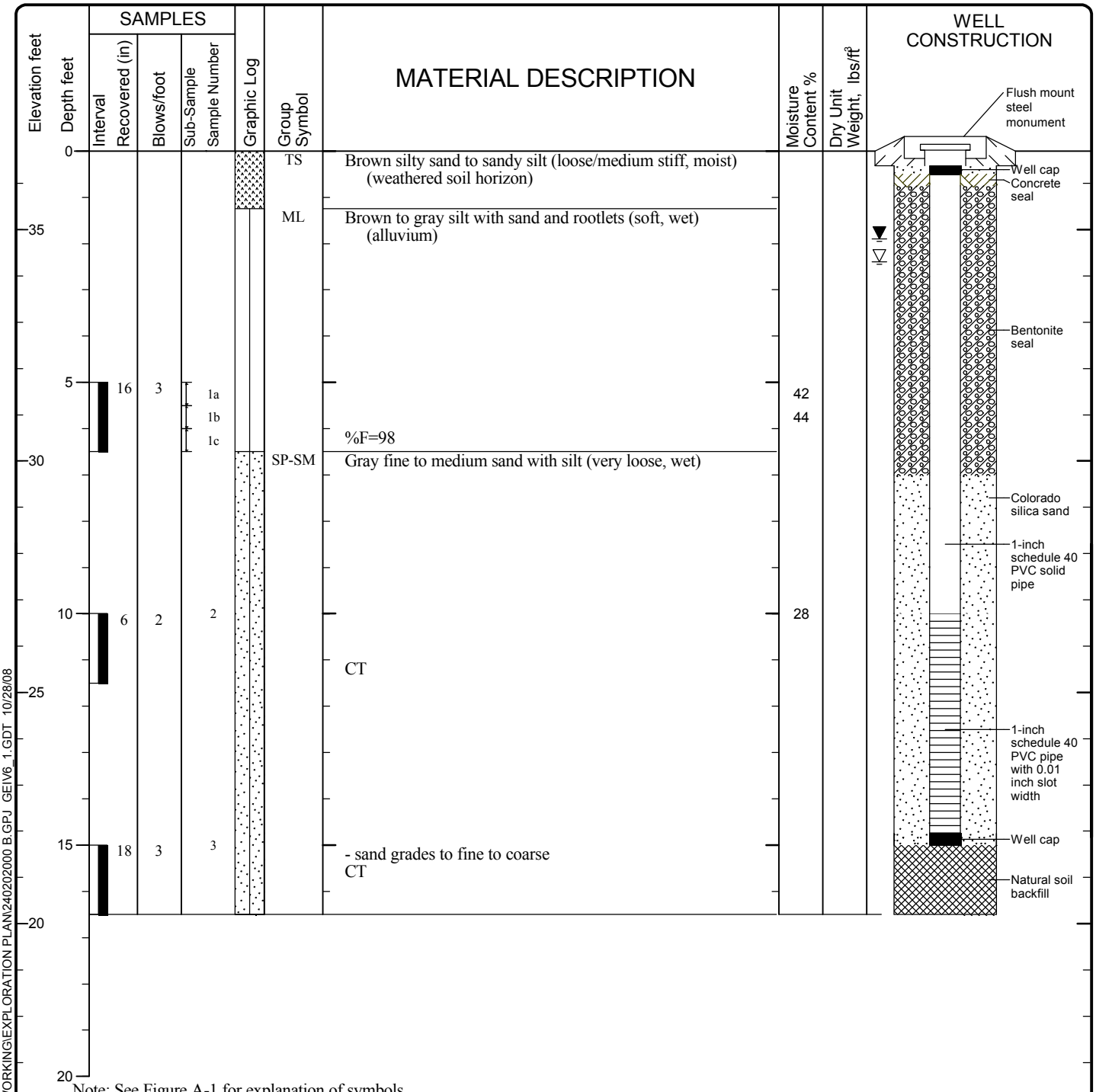
GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 16
Sheet 2 of 2

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-18-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Exploration Depth (ft)	16.5	Ground Surface Elevation (ft)	36.7	Groundwater Elevation (ft)	34.3
Station	233+00	Datum/ System		Easting(x): Northing(y):	1302471.876 532349.058



Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-24P

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 24
Sheet 1 of 1

V6_GTWELL P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-19-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Depth (ft)	16.5	Surface Elevation (ft)	41	Groundwater Elevation (ft)	36.5
Station	239+00	Datum/ System		Easting(x): Northing(y):	1303197.01 532879.35

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							GP	Gravel surfacing			
40								SM	Brown silty fine sand (very loose to loose, moist to wet) (alluvium)			
			10	7	1					17		
	5		16	4	2				%F=22 CT	32		
35												
	10		18	1	3					41		
30												
	15		18	3	4				- silt content increases with depth	40		
25												
	20											

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-25

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 25
Sheet 1 of 1

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	5/31/07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Depth (ft)	16.5	Surface Elevation (ft)	36.1	Groundwater Elevation (ft)	34.1
Station	252+00	Datum/ System		Easting(x): Northing(y):	1303925.887 533522.057

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0				▼		TS	Dark brown fine sandy clayey silt with rootlets (medium stiff, moist) (topsoil)			
35		16	2	1			SM/ML	Gray silty fine sand to fine sandy silt (very loose to loose/soft, wet) (alluvium) %F=74	40		
	5	18	8	2				CT - with occasional organic matter; increasing sand content	37		
30							SP	Gray medium to coarse sand with occasional gravel (loose to medium dense, wet)			
	10	18	8	3				GS; %F=1	17		
25											
	15	18	10	4							
20											
	20										

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-26

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 26
Sheet 1 of 1

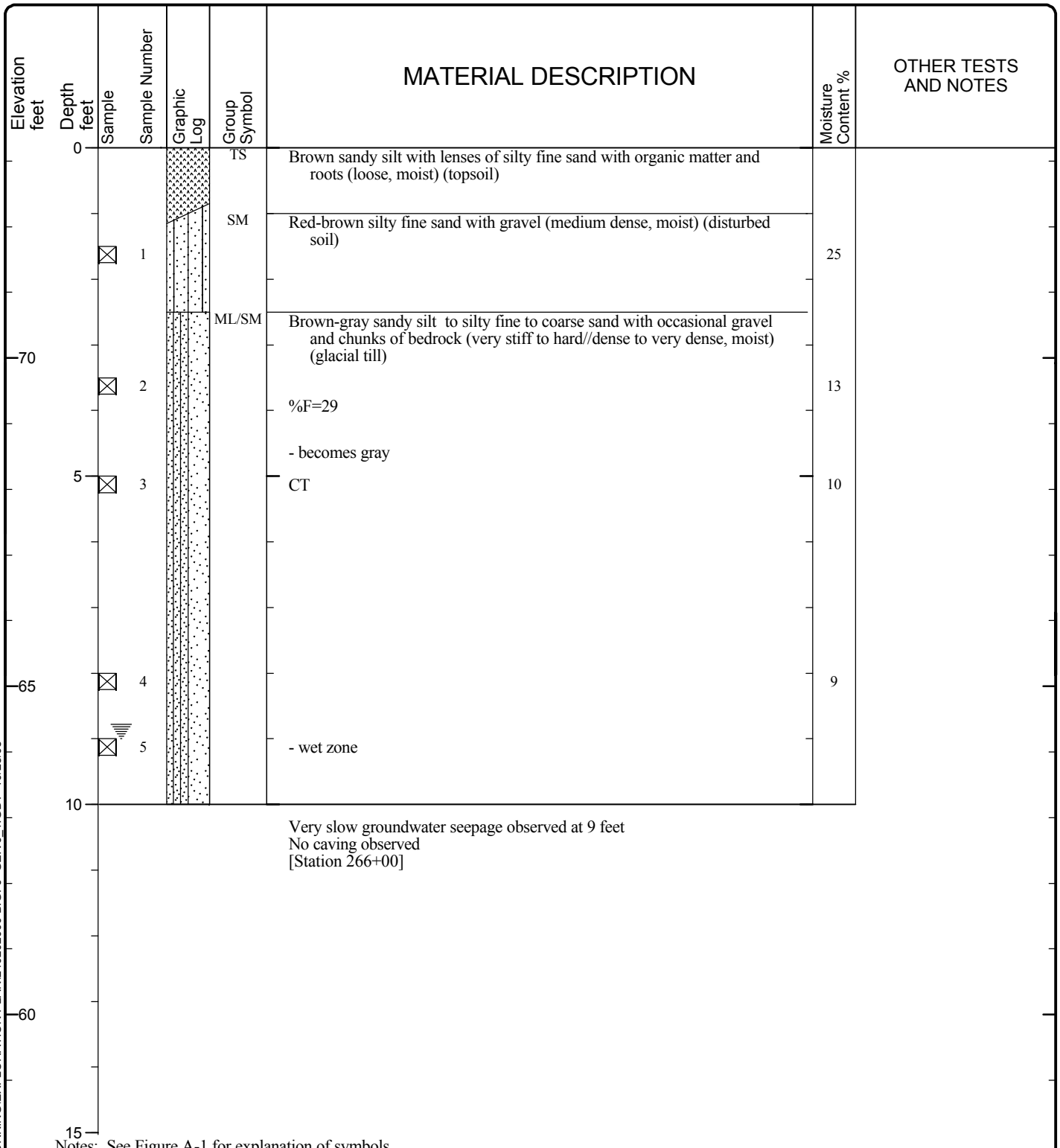
V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/18/07

Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe

Surface Elevation (ft): 73.2



Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-11

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line

Project Location: Skagit County, Washington

Project Number: 2402-020-00

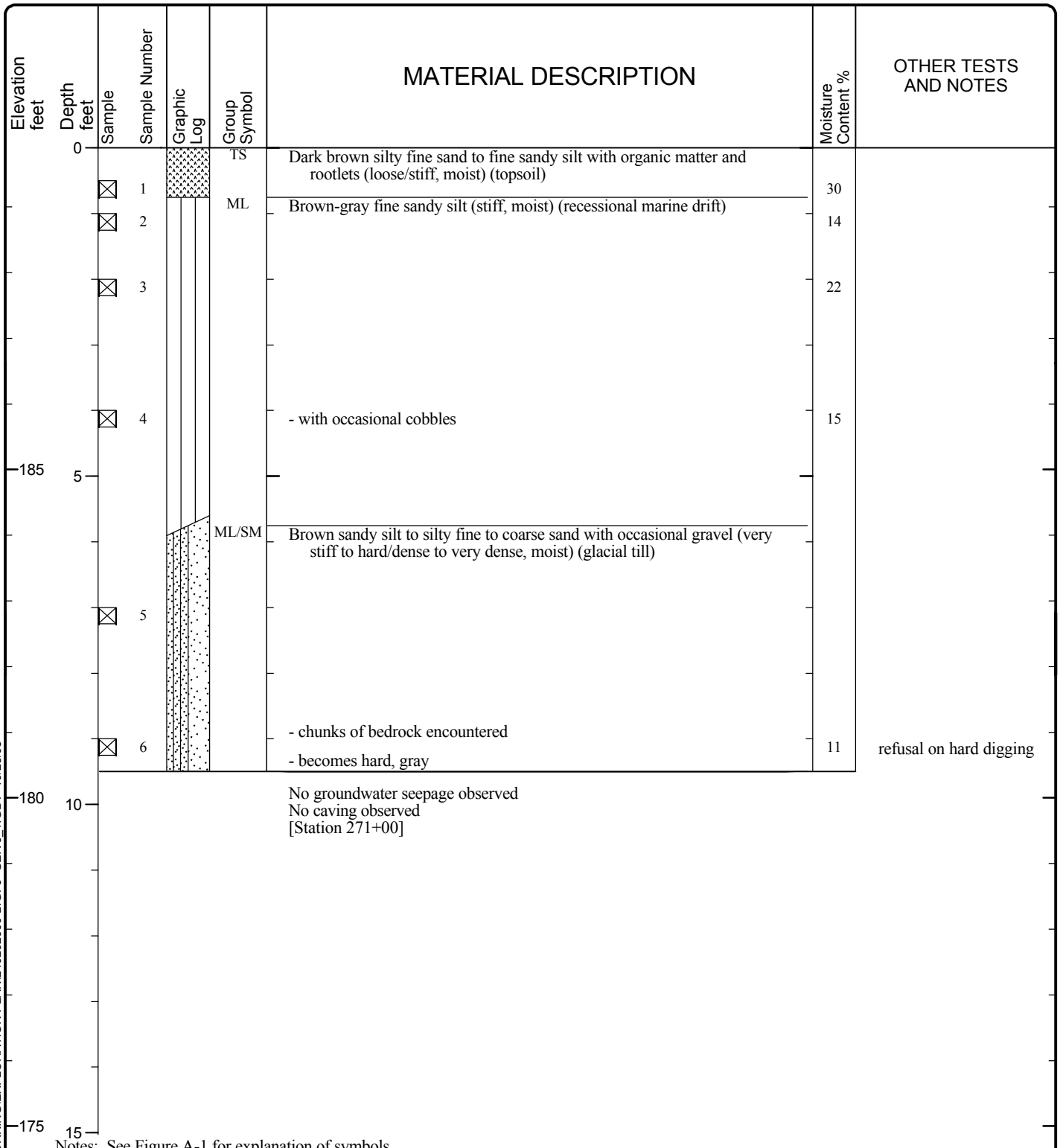
Figure: A- 47

Sheet 1 of 1

V6_GTTPIT P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/18/07 Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe Surface Elevation (ft): 189.9



Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-12

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 48
Sheet 1 of 1

V6_GTTPIT P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/18/07 Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe Surface Elevation (ft): 231.8

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
	0				TS	Dark brown silty fine sand to fine sandy silt with organic matter and roots (loose to medium dense/medium stiff, moist) (topsoil)		
		☒	1				42	
230					ML	Brown-gray fine sandy silt with occasional gravel; with iron staining and pockets of silty fine sand (stiff, moist) (recessional continental deposit)		
		☒	2				12	
					ML/SM	Gray sandy silt to silty fine to coarse sand with gravel and chunks of bedrock (hard/very dense, moist) (glacial till)		
		☒	3			%F=49	9	
	5							
225		☒	4			- becomes brown		very hard digging
		☒	5				10	
						- grades to brown-gray		
		☒	6					
	10							
220						No groundwater seepage observed No caving observed [Station 274+50]		
	15							

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-13

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 49
Sheet 1 of 1

V6_GTTPIT P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-19-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Depth (ft)	11.5	Surface Elevation (ft)	290.2	Groundwater Elevation (ft)	Not Determined
Station	280+50	Datum/ System		Easting(x): Northing(y):	1305815.558 535660.091

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
290	0							SM	Brown silty gravelly fine to coarse sand (medium dense, moist) (fill)			
			9	19	1					15		
285	5		6	50/6"	2				- blowcount possibly overstated on gravel SA; %F=36; CT	12		
			2	50/2"	3			SM	Brown silty fine to coarse sand with occasional gravel (very dense, moist) (glacial till)			very rough drilling
280	10											
275	15											
	20											

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-28

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 27
Sheet 1 of 1

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/18/07

Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe

Surface Elevation (ft): 323.1

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
	0				TS	Red-brown silty fine sand with occasional gravel and cobbles (medium dense, moist) (topsoil)		
					SM	Brown silty fine to coarse sand with occasional gravel and cobbles; weathered red-brown in upper 0.75 foot (very dense, moist) (glacial till)		
		☒	1				39	
		☒	2				10	
320								
	5	☒	3			%F=18	8	very hard digging
		☒	4				9	
315								
						No groundwater seepage observed No caving observed [Station 289+00]		
	10							
310								
	15							

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-14

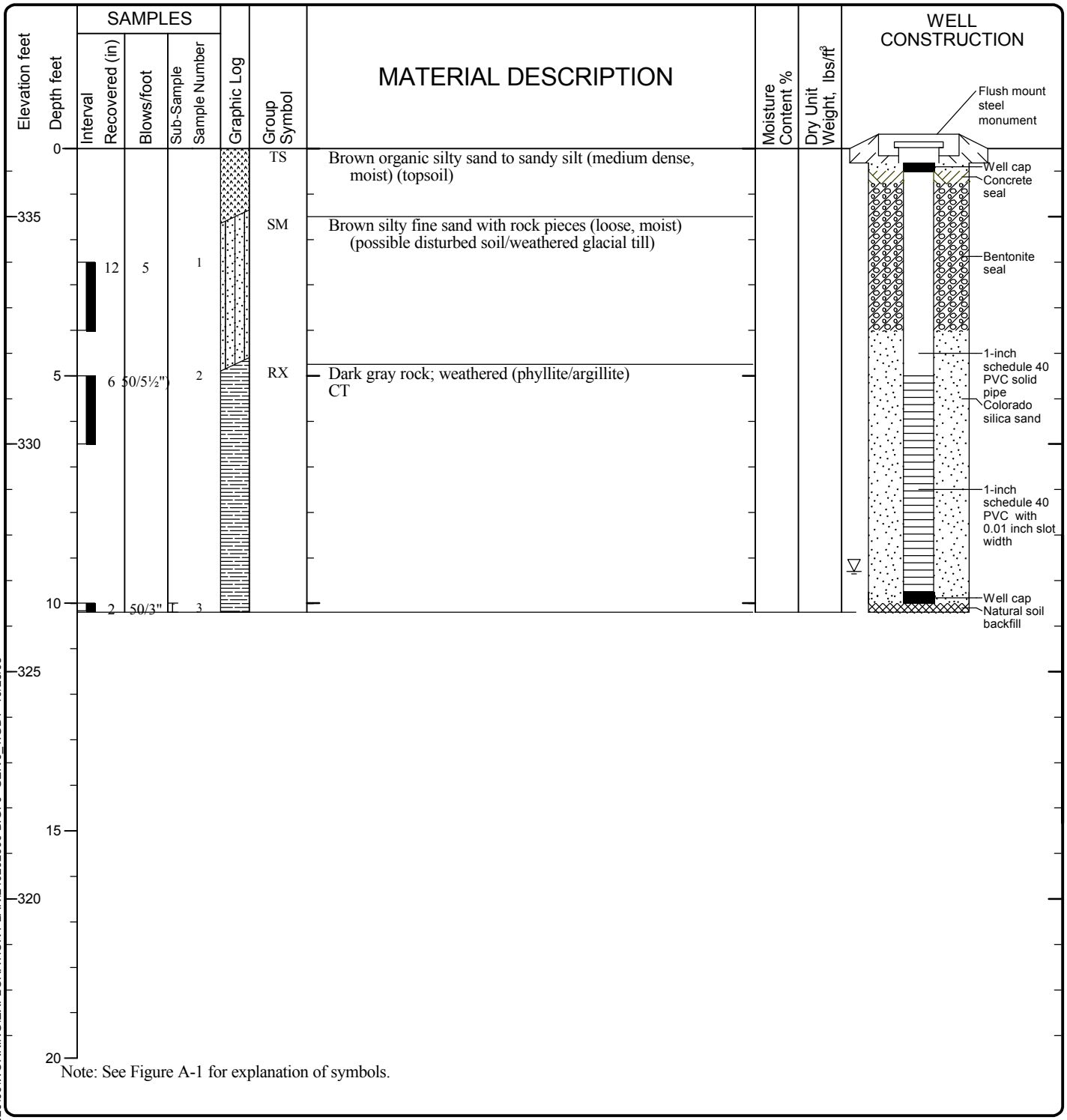
GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 50
Sheet 1 of 1

V6_GTTPIT P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-19-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Exploration Depth (ft)	10.2	Ground Surface Elevation (ft)	336.5	Groundwater Elevation (ft)	327.2
Station	292+25	Datum/ System		Easting(x): Northing(y):	1306594.795 536562.616



Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-29P

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 28
Sheet 1 of 1

V6_GTWELL P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/18/07 Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe Surface Elevation (ft): 332.7

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
	0				TS	Brown silty fine sand with occasional gravel and roots (loose, medium dense, moist) (topsoil)		
		☒	1		ML	Gray silt with sand and occasional gravel; weathered red-brown in upper 1.5 feet (very dense, moist) (glacial till)	13	
330		☒	2					
		☒	3				14	
	5							
		☒	4			CT - with pieces of bedrock		very hard digging
325								
		☒	5				9	
	10					No groundwater seepage observed No caving observed [Station 295+70]		
320								
	15							

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-15

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 51
Sheet 1 of 1

V6_GTTPIT P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	5/31/07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Depth (ft)	12.5	Surface Elevation (ft)	332.8	Groundwater Elevation (ft)	Not Determined
Station	299+60	Datum/ System		Easting(x): Northing(y):	1307049.612 537097.351

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample	Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0								GP	Gravel surfacing			
									SM	Brown silty fine to coarse sand with gravel (dense, moist) (fill)			
330			6	17		1			SM	Brown silty fine to coarse sand with occasional gravel (medium dense, moist) (recessional continental deposit)	14		
	5		18	25		2				- with occasional gravel, weathered bedrock and rock fragments			
325													
	10		18	32		3a				- becomes dense			
						3b				- with numerous chunks of weathered rock	15		
									RX	Gray bedrock (phyllite/argillite)			
320			0	50/0"		4							refusal on hard drilling
	15												
315													
	20												

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-30

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 29
Sheet 1 of 1

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/18/07

Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe

Surface Elevation (ft): 335.4

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
335	0				TS	Brown silty fine sand with occasional gravel and rock fragments (dense, moist) (topsoil)		
		☒	1		SM	Rust-brown silty fine sand with occasional gravel (medium dense, moist) (recessional continental deposit)	15	
		☒	2				18	
		☒	3				16	
						%F=35		
						- becomes gray		
330	5							
		☒	4			- with numerous bedrock fragments		
					RX	Dark gray rock (phyllite)		refusal on bedrock
325	10							
	15							

Slow groundwater seepage observed at 7.2 feet
No caving observed
[Station 301+25]

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-17

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 52
Sheet 1 of 1

V6_GTTPIT P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/18/07 Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe Surface Elevation (ft): 332.2

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
	0				TS	Dark brown silty fine sand to fine sandy silt with organic matter, roots and chunks of rock (medium dense, moist) (topsoil)		
		☒	1				19	
					SM	Brown silty fine to coarse sand (loose, moist) (recessional continental deposit)		
330								
		☒	2			CT	12	
	5							
		☒	3			- with gravel	11	%F=12
325						%F=12		
		▼				- silt content decreases with depth, becomes wet		
					SP-SM	Brown fine to coarse sand with silt and gravel (loose, wet)		
		☒	4				19	
	10							
						Moderate to rapid groundwater seepage observed at 8 feet Minor caving observed below 8 feet [Station 303+00]		
320								
	15							

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-18

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 53
Sheet 1 of 1

V6_GTTPIT P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-19-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Depth (ft)	11.5	Surface Elevation (ft)	368.8	Groundwater Elevation (ft)	Not Determined
Station	313+00	Datum/ System		Easting(x): Northing(y):	1308288.736 537662.889

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							TS	Brown organic silty sand (loose, moist) (topsoil)			
								SM	Red-brown silty fine sand to fine sandy silt with organic matter (loose/medium stiff, moist) (fill/disturbed soil)			
365			9	4	1					38		
	5							SM	Gray-brown silty fine to coarse sand with gravel and pieces of bedrock (medium dense, moist) (weathered glacial till)			
			10	13	2					17		
360								CT				
	10											
			6	22	3				SA; %F=21	8		
355												
	15											
350												
	20											

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-31

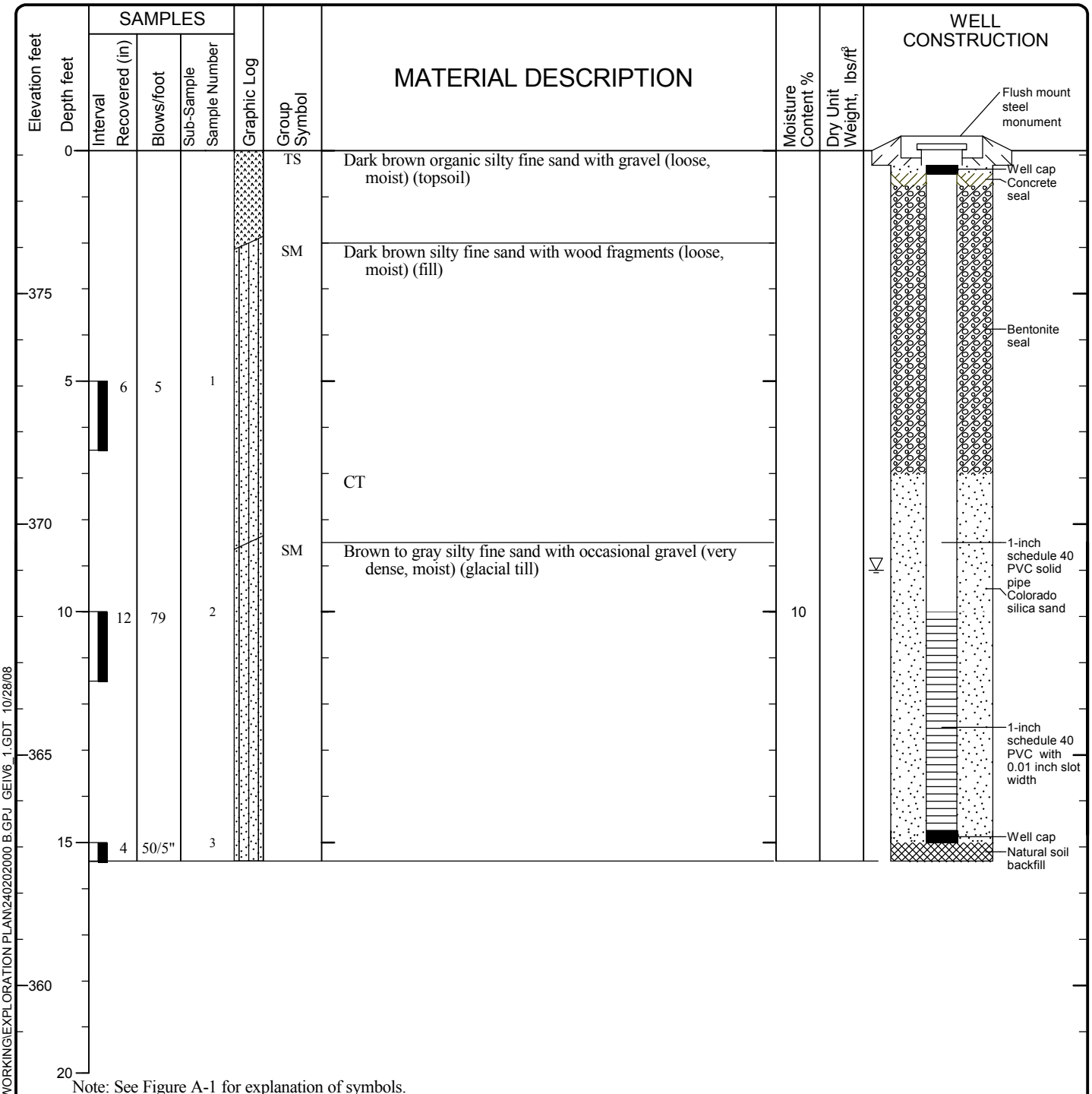
GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 30
Sheet 1 of 1

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-19-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Exploration Depth (ft)	15.4	Ground Surface Elevation (ft)	378.1	Groundwater Elevation (ft)	369
Station	323+85	Datum/ System		Easting(x): Northing(y):	1309174.098 538277.565



Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-32P

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 31
Sheet 1 of 1

V6_GTWELL P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	5/31/07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Depth (ft)	16.5	Surface Elevation (ft)	381.2	Groundwater Elevation (ft)	369.2
Station	332+00	Datum/ System		Easting(x): Northing(y):	1309962.625 538227.862

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							GP	Gravel surfacing			
380								SM	Gray silty fine to medium sand with gravel (medium dense, moist) (fill)			
			6	4	1			SM	Rust brown silty fine sand (loose, moist) (recessional continental deposit)			
	5		9	11	2				- grades to brown with gravel and pockets of clay - becomes medium dense CT	17		
375								SM	Brown silty fine to medium sand with occasional gravel (dense, moist) (glacial till)			
	10		6	38	3				- becomes wet			
370												
	15		9	40	4							
365												
	20											

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-33

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

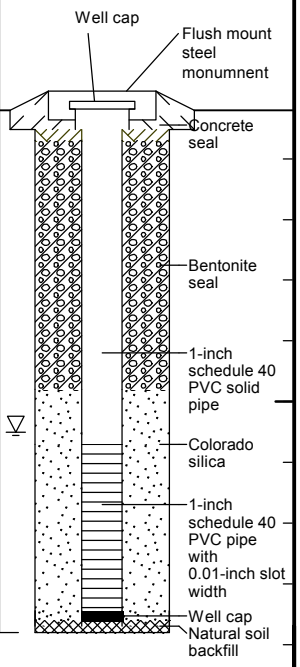
Figure: A- 32
Sheet 1 of 1

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	5/31/07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Exploration Depth (ft)	8.6	Ground Surface Elevation (ft)	379.8	Groundwater Elevation (ft)	374.5
Station	339+50	Datum/ System		Easting(x): Northing(y):	1310503.233 538667.175

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	Blows/foot	Sub-Sample Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³
	0					SM	Dark brown silty fine sand with occasional gravel (medium dense, moist) (fill/disturbed soil)		
		6	10	1		SM	Rust brown silty fine to medium sand (medium dense, moist) (recessional continental deposit)	29	
375	5	12	38	2		SM	Gray-brown silty fine to coarse sand with occasional gravel (dense, moist) (glacial till) GS; %F=18	10	
		0	50/1"	3		RX	Gray bedrock (phyllite/argillite) - refusal on hard drilling		
370	10								
365	15								
360	20								

WELL CONSTRUCTION



Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-34P

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 33
Sheet 1 of 1

V6_GTWELL P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/18/07 Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe Surface Elevation (ft): 406.5

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
	0				TS	Brown fine sandy silt with occasional gravel and roots (medium dense, moist) (topsoil)		
		☒	1		GM/SM	Brown silty fine gravel with sand to coarse sand with gravel; iron staining (medium dense, moist) (fill)	13	
405		☒	2					
		☒	3					
		☒	4					
	5							
400		▼						
		☒	5			- mixed with sandy silt, roots, wood debris, and rock chunks %F=22	23	
					ML/SM	Brown sandy silt to silty fine to medium sand (medium stiff/loose to medium dense, wet) (alluvium)		
	10	☒	6					
395								
	15							

Slow groundwater seepage observed from 7.2 to 9 feet
No caving observed
[Station 345+50]

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-19

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

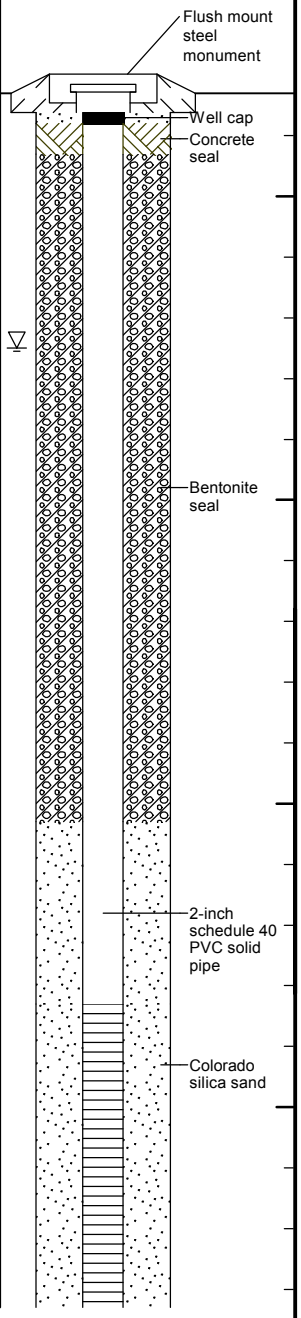
Figure: A- 54
Sheet 1 of 1

V6_GTTPIT P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-17-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Exploration Depth (ft)	26.5	Ground Surface Elevation (ft)	61.7	Groundwater Elevation (ft)	57.5
Station	157+00	Datum/ System		Easting(x): Northing(y):	1295304.474 530346.802

Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³
60	0						SM/ML	Brown mixed sand and silt (loose/medium stiff, moist) (fill)		
55	5		9	15	1		ML/CL	Gray-brown fine sandy silty clay with occasional gravel (stiff, moist) (recessional marine drift)	24	
								CT		
							CL	Brown clay with slight iron staining (stiff, moist)		
50	10		18	11	2			AL; LL=48, PI=21	32	
								- grades to gray		
45	15		18	5	3		CL	Gray clay laminated with lenses of silt (soft to medium stiff, moist to wet)	36	
								CT		
	20									

WELL CONSTRUCTION



Note: See Figure A-1 for explanation of symbols.

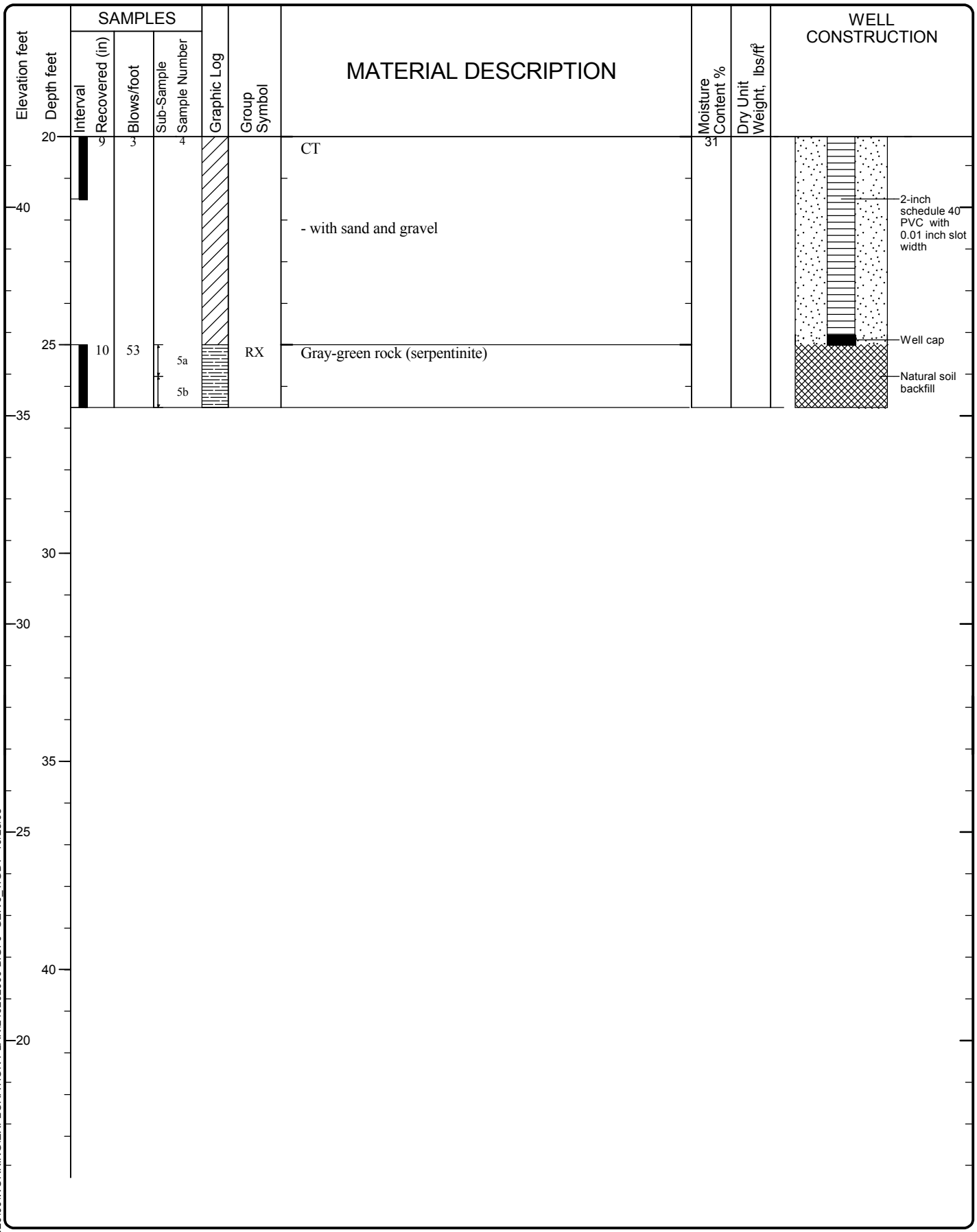
V6_GTWELL P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

LOG OF BORING B-17P

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 17
Sheet 1 of 2



LOG OF BORING B-17P (continued)

GeoEngineers

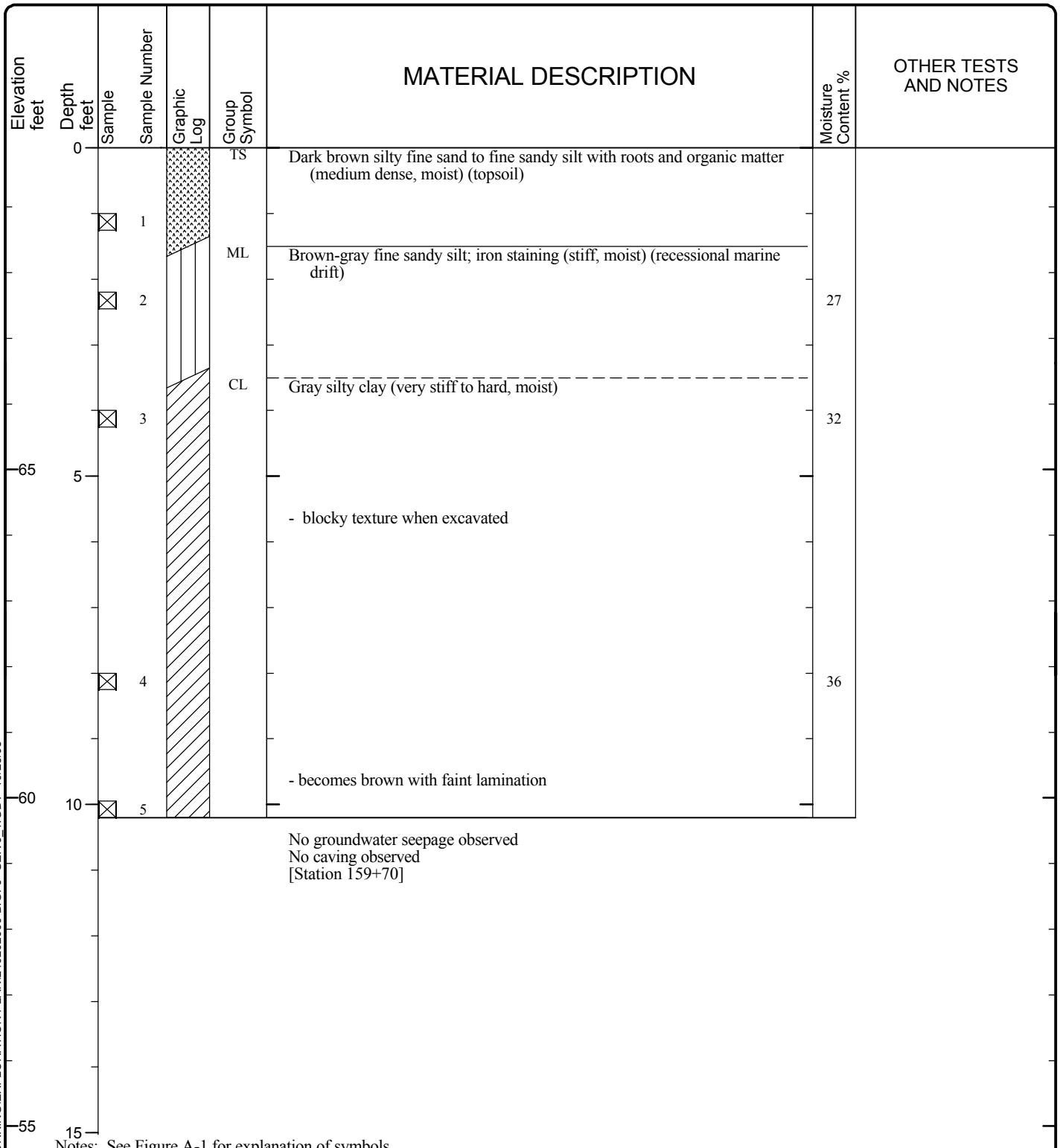
Project:	Judy Reservoir Mount Vernon Water Transmission Line
Project Location:	Skagit County, Washington
Project Number:	2402-020-00

Figure: A- 17
Sheet 2 of 2

V6_GTWELL P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/17/07 Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe Surface Elevation (ft): 69.9



No groundwater seepage observed
No caving observed
[Station 159+70]

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP- 5

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 42
Sheet 1 of 1

V6_GTTPIT P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/18/07 Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe Surface Elevation (ft): 69.9

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
	0				TS	Dark brown silty fine sand to fine sandy silt with organic matter (loose, moist)		
		☒	1				36	
					ML	Brown fine sandy clayey silt (stiff, moist) (recessional marine drift)		
		☒	2				29	
						- sand content decreases with depth		
65	5							
					CL	Brown clayey silt to silty clay with occasional gravel (very stiff, moist)		
		☒	3				29	
						- blocky texture when excavated		
60	10							
						- increased fine gravel content		
		☒	4				20	
		☒	5		ML	Blue-gray clayey silt with fine sand and occasional gravel (very stiff, moist) (glacial till)	15	
55	15							

No groundwater seepage observed
No caving observed
[Station 161+00]

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP- 6

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 43
Sheet 1 of 1

V6_GTTPIT P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	5/30/07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Depth (ft)	15.2	Surface Elevation (ft)	96.9	Groundwater Elevation (ft)	Not Determined
Station	162+50	Datum/ System		Easting(x): Northing(y):	1296000.6 530118.58

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample	Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0								TS	Brown, sandy silt with organic matter (medium stiff, moist) (topsoil)			
95			18	17		1			ML/CL	Brown clayey silt to silty clay with sand (stiff to very stiff, moist) (recessional marine drift)	28		
	5		18	15		2					31		
90									ML	Brown silt with fine sand; faint lamination (stiff, moist to wet)			
	10		18	11		3					33		
85													
			1	50/1"		4a			RX	Gray rock (phyllite/serpentinite)			refusal on hard drilling
15						4b							
80													
	20												

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-36

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 35
Sheet 1 of 1

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-18-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Depth (ft)	61.5	Surface Elevation (ft)	43.3	Groundwater Elevation (ft)	Not Determined
Station	165+00	Datum/ System		Easting(x): Northing(y):	1296385.017 530003.765

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0						CL	Dark brown and light brown mixed clay with silt, fine sand and occasional organic matter; wood pieces and charcoal (medium stiff, moist) (fill/disturbed soil)			
40											
	5	18	5	1					27		
							CL	Brown to gray clay with silt and occasional organic matter; iron staining (medium stiff to stiff, moist) (recessional marine drift)			
35											
	10	18	14	2					30		
30											
	15	18	5	3					40		
25											
							CL-CH	Gray clay (very soft to soft, moist)			
	20										

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-18

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 18
Sheet 1 of 3

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
20	20	18	2	4							
	25	18	2	5				AL; LL=51, PI=27	53		
15	30	18	1	6							
10	35	18	0	7					54		
5	40	18	0	8							
0											

LOG OF BORING B-18 (continued)

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 18
Sheet 2 of 3

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
45		18	2	9					44		
-5											
50		18	2	10				CT			
-10											
55		18	3	11					36		
-15											
60		18	5	12				- becomes medium stiff			
-20											
65											
-25											

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

LOG OF BORING B-18 (continued)

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 18
Sheet 3 of 3

Date(s) Drilled	5/30/07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Depth (ft)	41.5	Surface Elevation (ft)	33.5	Groundwater Elevation (ft)	Not Determined
Station	172+00	Datum/ System		Easting(x): Northing(y):	1297052.606 529801.548

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							TS	Brown sandy silt with organic matter (medium stiff, moist) (topsoil)			
								ML	Brown fine sandy silt with clay, silty fine sand seams and occasional organic matter (medium stiff, moist) (alluvium)			
30			18	5	1					38		
	5							ML/CL	Brown clayey silt to silty clay with fine sand (stiff, moist) (recessional marine drift)			
			18	11	2					31		
25												
	10								- increasing clay content			
			18	8	3					39		
20								CL-CH	Gray silty clay (soft, moist to wet)			
	15		18	3	4					48		
15												
	20											

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-38

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 37
Sheet 1 of 2

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	20	18	5	5				- medium stiff at 20 feet			
10											
	25	18	2	6				- becomes very soft to soft	57		
5											
	30	18	2	7							
0											
	35	18	1	8							
-5											
	40	18	2	9					47		
-10											

V6_GTBORING P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

LOG OF BORING B-38 (continued)

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 37
Sheet 2 of 2

Date Excavated: 5/18/07

Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe

Surface Elevation (ft): 39.3

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
	0				ML	Brown to red-brown sandy silt with occasional organic matter and roots (medium dense, moist) (disturbed soil)		
		☒	1					
		☒	2				27	
					ML/CL	Brown-gray fine sandy silt with clay to silty clay (stiff, moist) (recessional marine drift)		
		☒	3			%F=71	22	
35								
	5							
		☒	4			- becomes very stiff to hard; CT	28	
30								
		☒	5				36	
	10							
25						No groundwater seepage observed No caving observed [Station 173+50]		
	15							

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP- 7

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line

Project Location: Skagit County, Washington

Project Number: 2402-020-00

Figure: A- 44

Sheet 1 of 1

V6_GTTPIT P:\2\240202000\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date Excavated: 5/18/07 Logged by: A. Fickeisen

Equipment: Rubber-tired backhoe Surface Elevation (ft): 46.2

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
45	0	☒	1		ML	Brown fine sandy silt with occasional gravel and chunks of rock (dense, moist) (disturbed soil)		
		☒	2					
					RX	Dark gray bedrock (phyllite)		
		☒	3					refusal on very hard digging
	5					No groundwater seepage observed No caving observed [Station 174+50]		
40								
	10							
35								
	15							

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP- 8

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

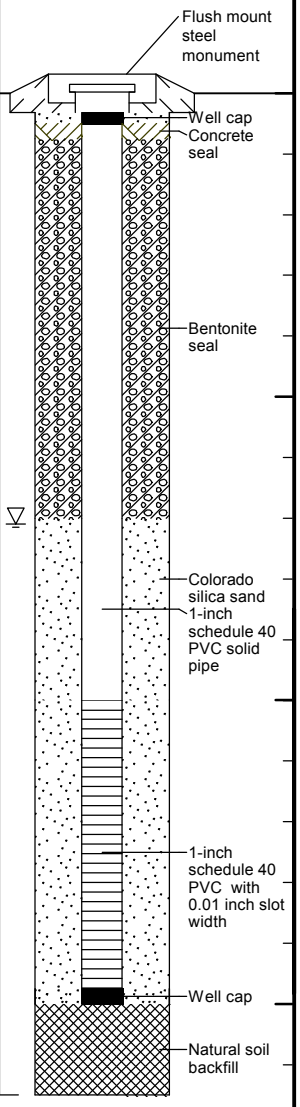
Figure: A- 45
Sheet 1 of 1

V6_GTTPIT P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Date(s) Drilled	4-19-07	Logged By	A. Fickeisen	Checked By	S. Cool
Drilling Contractor	Boretec, Inc.	Drilling Method	Hollow Stem Auger	Sampling Methods	SPT
Auger Data	3½ inches ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	M55 Track-mounted Drill Rig
Total Exploration Depth (ft)	16.5	Ground Surface Elevation (ft)	40	Groundwater Elevation (ft)	32.9
Station	208+25	Datum/ System		Easting(x): Northing(y):	1300395.319 531035.431

Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³
40	0						TS	Brown organic silty sand to sandy silt with occasional fine to course gravel (loose/medium stiff, moist) (topsoil)		
							ML	Brown fine sandy silt with organic matter (stiff, moist) (alluvium)		
		1	12	9	1				36	
							ML/SM	Brown-gray fine sandy clayey silt to silty fine to coarse sand with gravel (very stiff/dense, moist) (glacial till)		
35	5	2	16	28	2				20	
30	10	3	18	52	3			SA; %F=36 CT	12	
								- rough drilling		
25	15	4	12	46	4			CT	16	
20	20									

WELL CONSTRUCTION



Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-22P

GeoEngineers

Project: Judy Reservoir Mount Vernon Water Transmission Line
Project Location: Skagit County, Washington
Project Number: 2402-020-00

Figure: A- 22
Sheet 1 of 1

V6_GTWELL P:\2\240202\00\WORKING\EXPLORATION PLAN\240202000 B.GPJ GEIV6_1.GDT 10/28/08

Shannon & Wilson, Inc. (S&W), uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following pages. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

S&W INORGANIC SOIL CONSTITUENT DEFINITIONS

CONSTITUENT[2]	FINE-GRAINED SOILS (50% or more fines)[1]	COARSE-GRAINED SOILS (less than 50% fines)[1]
Major	***Silt, Lean Clay, Elastic Silt,*** or ***Fat Clay***[3]	***Sand*** or ***Gravel***[4]
Modifying (Secondary) Precedes major constituent	30% or more coarse-grained: ***Sandy*** or ***Gravelly***[4]	More than 12% fine-grained: ***Silty*** or ***Clayey***[3]
Minor Follows major constituent	15% to 30% coarse-grained: ***with Sand*** or ***with Gravel***[4]	5% to 12% fine-grained: ***with Silt*** or ***with Clay***[3]
	30% or more total coarse-grained *and* lesser coarse-grained constituent is 15% or more: ***with Sand*** or ***with Gravel***[5]	15% or more of a second coarse-grained constituent: ***with Sand*** or ***with Gravel***[5]

[1]All percentages are by weight of total specimen passing a 3-inch sieve.
[2]The order of terms is: *Modifying Major with Minor*.
[3]Determined based on behavior.
[4]Determined based on which constituent comprises a larger percentage.
[5]Whichever is the lesser constituent.

MOISTURE CONTENT TERMS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

STANDARD PENETRATION TEST (SPT) SPECIFICATIONS

Hammer:	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diam. cathead 2-1/4 rope turns, > 100 rpm NOTE: If automatic hammers are used, blow counts shown on boring logs should be adjusted to account for efficiency of hammer.
Sampler:	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value:	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less; 10 blows for 0 inches.

NOTE: Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

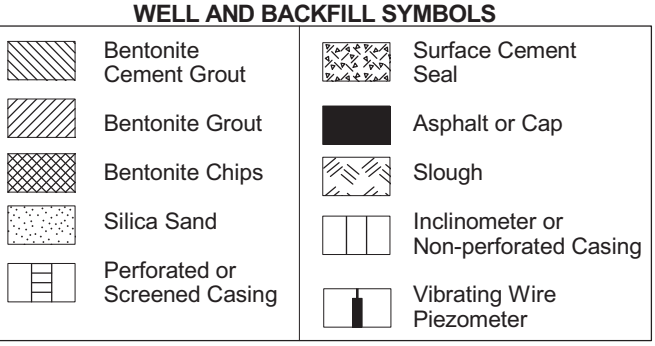
PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR APPROXIMATE SIZE
FINES	< #200 (0.075 mm = 0.003 in.)
SAND	
Fine	#200 to #40 (0.075 to 0.4 mm; 0.003 to 0.02 in.)
Medium	#40 to #10 (0.4 to 2 mm; 0.02 to 0.08 in.)
Coarse	#10 to #4 (2 to 4.75 mm; 0.08 to 0.187 in.)
GRAVEL	
Fine	#4 to 3/4 in. (4.75 to 19 mm; 0.187 to 0.75 in.)
Coarse	3/4 to 3 in. (19 to 76 mm)
COBBLES	3 to 12 in. (76 to 305 mm)
BOULDERS	> 12 in. (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
< 4	Very loose	< 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very dense	15 - 30	Very stiff
		> 30	Hard

WELL AND BACKFILL SYMBOLS



PERCENTAGES TERMS [1, 2]

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

[1]Gravel, sand, and fines estimated by mass. Other constituents, such as organics, cobbles, and boulders, estimated by volume.

[2]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

SOIL DESCRIPTION AND LOG KEY

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-1
Sheet 1 of 3

SOIL_CLASS_KEY_PG1 21-22430.GPJ SHAN_WIL.GDT 8/7/18

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL		TYPICAL IDENTIFICATIONS
COARSE-GRAINED SOILS *(more than 50% retained on No. 200 sieve)*	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Gravel *(less than 5% fines)*	GW		Well-Graded Gravel; Well-Graded Gravel with Sand
			GP		Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel *(more than 12% fines)*	GM		Silty Gravel; Silty Gravel with Sand
			GC		Clayey Gravel; Clayey Gravel with Sand
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Sand *(less than 5% fines)*	SW		Well-Graded Sand; Well-Graded Sand with Gravel
			SP		Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand *(more than 12% fines)*	SM		Silty Sand; Silty Sand with Gravel
			SC		Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML		Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL		Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
		Organic	OL		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	MH		Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH		Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT		Peat or other highly organic soils (see ASTM D4427)

NOTE: No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

NOTES

1. Dual symbols *(symbols separated by a hyphen, i.e., SP-SM, Sand with Silt)* are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart. Graphics shown on the logs for these soil types are a combination of the two graphic symbols (e.g., SP and SM).

2. Borderline symbols *(symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand)* indicate that the soil properties are close to the defining boundary between two groups.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

SOIL DESCRIPTION AND LOG KEY

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-1
Sheet 2 of 3

SOIL_CLASS_KEY_PG2 21-22430.GPJ SHAN_WIL.GDT 8/7/18

GRADATION TERMS

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

CEMENTATION TERMS[1]

Weak	Crumbles or breaks with handling or slight finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

PLASTICITY[2]

DESCRIPTION	VISUAL-MANUAL CRITERIA	APPROX. PLASITICITY INDEX RANGE
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.	< 4
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 to 10
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 to 20
High	It takes considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	> 20

ADDITIONAL TERMS

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

PARTICLE ANGULARITY AND SHAPE TERMS[1]

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

ACRONYMS AND ABBREVIATIONS

ATD	At Time of Drilling
Diam.	Diameter
Elev.	Elevation
ft.	Feet
FeO	Iron Oxide
gal.	Gallons
Horiz.	Horizontal
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in.	Inches
lbs.	Pounds
MgO	Magnesium Oxide
mm	Millimeter
MnO	Manganese Oxide
NA	Not Applicable or Not Available
NP	Nonplastic
O.D.	Outside Diameter
OW	Observation Well
pcf	Pounds per Cubic Foot
PID	Photo-Ionization Detector
PMT	Pressuremeter Test
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
rpm	Rotations per Minute
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q_u	Unconfined Compressive Strength
VWP	Vibrating Wire Piezometer
Vert.	Vertical
WOH	Weight of Hammer
WOR	Weight of Rods
Wt.	Weight

STRUCTURE TERMS[1]

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

[1]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

[2]Adapted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

SOIL DESCRIPTION AND LOG KEY

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-1
Sheet 3 of 3

SOIL_CLASS_KEY_PG3 21-22430.GPJ SHAN_WIL.GDT 8/7/18

Total Depth:	71.5 ft.	Northing:	~ 526,873 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	6 in.
Top Elevation:	~ 28 ft.	Easting:	~ 1,290,174 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	~	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	~	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Depth, ft. | Symbol | Samples | Screen Design | Depth, ft.

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches

0 | 20 | 40 | 60

Stiff, gray, *Fat Clay (CH)*; moist; trace fine to medium sand; medium to high plasticity fines; iron-oxide staining.

7.5

Stiff, gray, *Lean Clay (CL)* to *Fat Clay (CH)*; moist; trace fine to medium sand; medium to high plasticity fines; iron-oxide staining.

15.0

Medium stiff, gray, *Fat Clay (CH)*; moist; high plasticity fines.

17.0

Very soft to soft, gray, *Lean Clay (CL)*; moist to wet; medium to high plasticity fines; few lean clay seams.

48.0

During Drilling ▽

5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

2.0" O.D. Split Spoon Sample

▽ Ground Water Level ATD

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-1B

November 2018 | 21-1-22430-001

SHANNON & WILSON, INC.
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FIG. A-2
Sheet 1 of 2

Log: JCS Rev: EAS Typ: LKN

MASTER LOG E 21-22430.GPJ SHAN_WIL.GDT 3/20/20

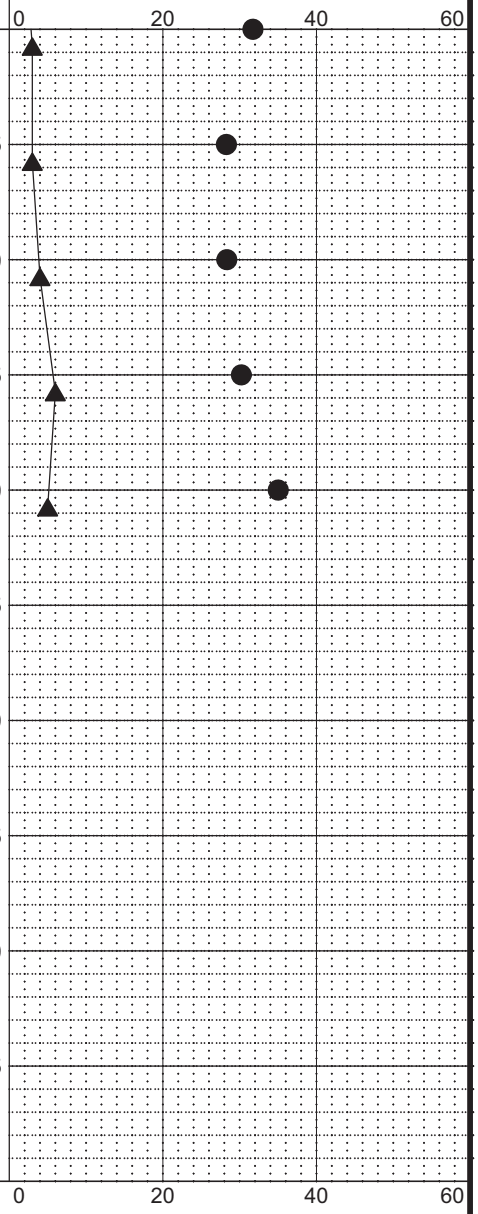
REV 3 - Approved for Submittal

Total Depth:	*71.5 ft.*	Northing:	*~ 526,873 ft.*	Drilling Method:	*Hollow Stem Auger*	Hole Diam.:	*6 in.*
Top Elevation:	*~ 28 ft.*	Easting:	*~ 1,290,174 ft.*	Drilling Company:	*Boretec*	Rod Diam.:	*AWJ*
Vert. Datum:	*NAVD 88*	Station:	~	Drill Rig Equipment:	*EC 95 Track Drill*	Hammer Type	*Rope and Cathead*
Horiz. Datum	*WA State Plane N*	Offset:	~	Other Comments:			

SOIL DESCRIPTION	Depth, ft.	Symbol	Samples	Screen Design	Depth, ft.
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.					
Soft to medium stiff, gray, *Lean Clay (CL)* to *Fat Clay (CH)*; moist; trace fine sand; medium to high plasticity fines.			10		
			11		
			12		
- Few silt seams at 65 feet.			13		
			14		
BOTTOM OF BORING COMPLETED 6/20/2018	71.5				

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



LEGEND

* Sample Not Recovered

2.0" O.D. Split Spoon Sample

Ground Water Level ATD

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-1B

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-2
Sheet 2 of 2

Log: JCS Rev: EAS Typ: LKN

MASTER LOG E 21-22430.GPJ SHAN_WIL.GDT 3/20/20

REV 3 - Approved for Submittal

Total Depth:	71.5 ft.	Northing:	526,836 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	29.0 ft.	Easting:	1,291,455 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Very stiff, mottled gray and brown, *Lean Clay (CL)* to *Silt (ML)*; moist; trace fine sand; low to medium plasticity fines; iron-oxide staining; trace organics.

10.0

Medium stiff, brown, *Lean Clay (CL)*; moist; low to medium plasticity fines.

15.0

Very soft to soft, light, *Lean Clay (CL)*; moist; medium to high plasticity fines.

38.0

Soft, gray, *Lean Clay with Sand (CL)* to *Fat Clay with Sand (CH)*; moist; fine to coarse sand; medium to high plasticity fines.

43.0

Soft to medium stiff, gray, *Fat Clay (CH)* to *Lean Clay (CL)*; moist; trace fine to coarse sand; medium to high plasticity fines.

CONTINUED NEXT SHEET

Depth, ft. | Symbol | Samples | Ground Water | Depth, ft.

Ground Water: 11/19/2018

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*

0 20 40 60

5 10 15 20 25 30 35 40 45

0 20 40 60

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

LEGEND

* Sample Not Recovered

2.0" O.D. Split Spoon Sample

Well Screen and Sand Filter

Bentonite-Cement Grout

Bentonite Chips/Pellets

Bentonite Grout

Ground Water Level in Well

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-2P

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3
Sheet 1 of 2

Log: JCS Rev: EAS Typ: LKN

MASTER LOG E 21-22430.GPJ SHAN WIL.GDT 3/18/20

REV 3 - Approved for Submittal

Total Depth:	71.5 ft.	Northing:	526,836 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	29.0 ft.	Easting:	1,291,455 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Depth, ft. | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*

0 20 40 60

10 11 12 13 14

55 60 65 70 75 80 85 90 95

71.5

BOTTOM OF BORING
COMPLETED 6/20/2018

0 20 40 60

◇ % Fines (<0.075mm)
● % Water Content
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2.0" O.D. Split Spoon Sample
Well Screen and Sand Filter
Bentonite-Cement Grout
Bentonite Chips/Pellets
Bentonite Grout
Ground Water Level in Well

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-2P

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3
Sheet 2 of 2

Log: JCS Rev: EAS Typ: LKN

MASTER LOG E 21-22430.GPJ SHAN_WIL.GDT 3/18/20

REV 3 - Approved for Submittal

Total Depth:	75.1 ft.	Northing:	530,665 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	48.97 ft.	Easting:	1,295,895 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Very stiff, brown, *Lean Clay with Sand (CL)* to *Silt with Sand (ML)*; moist; trace fine gravel; fine to medium sand; low to medium plasticity fines; trace organics; iron-oxide staining.

10.0

Medium stiff, brown, *Lean Clay (CL)* to *Fat Clay (CH)*; moist; medium to high plasticity fines; iron-oxde staining.

15.0

Soft, gray, *Lean Clay (CL)*; moist; medium plasticity fines.

24.0

Soft, gray *Silt (ML)* to *Lean Clay (CL)*; moist; low to medium plasticity fines.

28.0

Medium stiff, gray, *Sandy, Lean Clay (CL)* to *Lean Clay with Sand (CL)*; moist; few fine gravel; fine to coarse sand; medium plasticity fines.

40.0

Medium stiff to very stiff, gray, *Sandy Lean Clay (CL)* to *Lean Clay with Sand (CL)*; moist; few, fine to coarse, subrounded to subangular gravel; fine to coarse sand; low to medium plasticity fines; diamict.

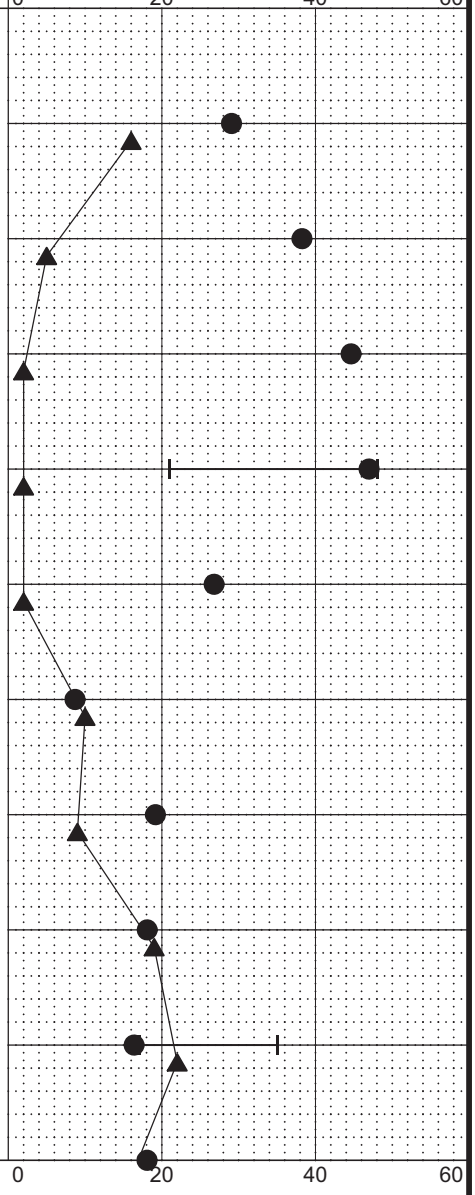
Depth, ft. | Symbol | Samples | Ground Water Depth, ft.

Samples: 1, 2, 3, 4, 5, 6, 7, 8, 9

Ground Water: None Observed During Drilling

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

⌶ 2.0" O.D. Split Spoon Sample

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-3B

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-4
Sheet 1 of 2

MASTER LOG E 21-22430.GPJ SHAN_WIL.GDT 3/18/20 Log: JCS Rev: EAS Typ: LKN

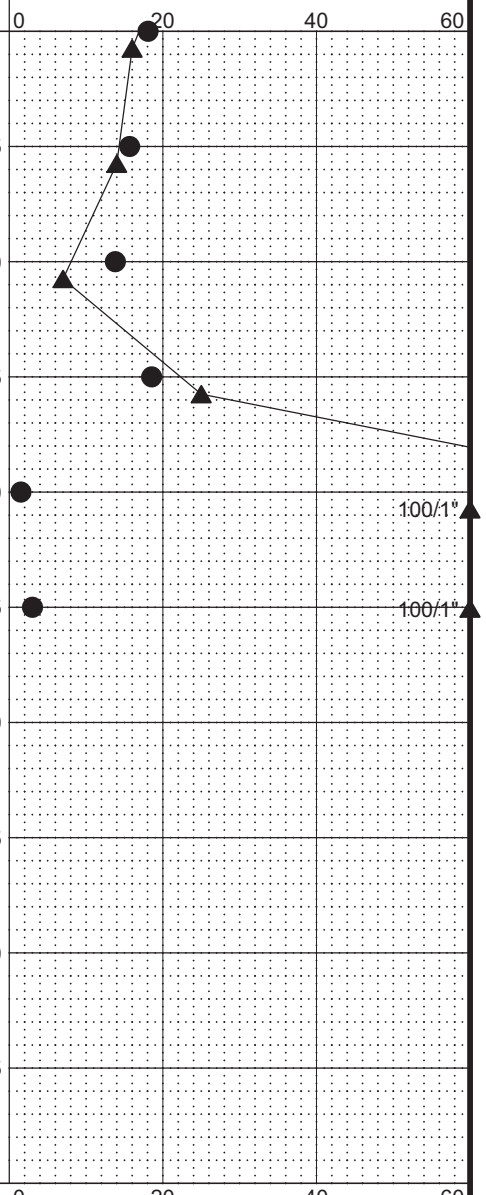
REV 3 - Approved for Submittal

Total Depth:	75.1 ft.	Northing:	530,665 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	48.97 ft.	Easting:	1,295,895 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION	Depth, ft.	Symbol	Samples	Ground Water Depth, ft.
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.				
Medium dense, gray *Silt with Sand (ML)*; moist; fine to medium sand; low plasticity fines.	63.0		10, 11, 12, 13	
Light gray, weathered bedrock.	70.0		14	
BOTTOM OF BORING COMPLETED 6/29/2018	75.1		15	

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



LEGEND

* Sample Not Recovered

2.0" O.D. Split Spoon Sample

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-3B

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-4
Sheet 2 of 2

MASTER LOG E 21-22430.GPJ SHAN_WIL.GDT 3/18/20 Log: JCS Rev: EAS Typ: LKN

REV 3 - Approved for Submittal

Total Depth:	75.1 ft.	Northing:	530,682 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	51.4 ft.	Easting:	1,296,177 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Medium dense, brown, *Sandy Silt with Gravel (ML)*; moist; fine to coarse, subrounded to subangular gravel; fine to coarse sand; low plasticity fines; trace organics; trace charcoal.

10.0

Medium stiff, gray-brown, *Lean Clay (CL)* to *Lean Clay with Gravel (CL)*; moist; fine, subrounded to subangular gravel; trace fine to coarse sand; low to medium plasticity fines; trace organics.

20.1

Soft, gray-brown, *Lean Clay (CL)* to *Fat Clay (CH)*; wet; medium to high plasticity fines.

23.0

Soft, gray, *Lean Clay (CL)*; moist; medium to high plasticity fines.

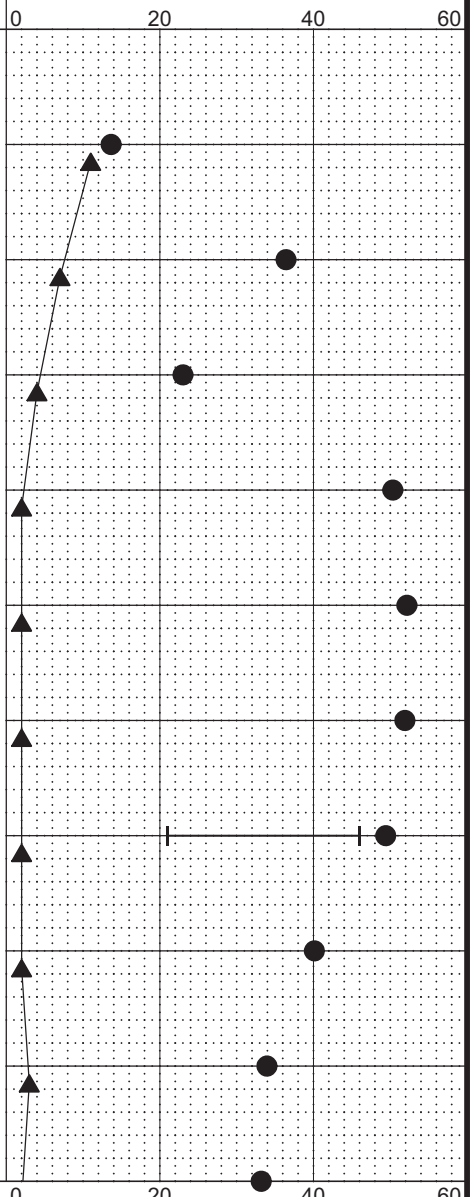
48.0

Depth, ft. | Symbol | Samples | Ground Water | Depth, ft.

Ground Water: 11/19/2018

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

2.0" O.D. Split Spoon Sample

Well Screen and Sand Filter

Bentonite-Cement Grout

Bentonite Chips/Pellets

Bentonite Grout

Ground Water Level in Well

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-4P

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-5
Sheet 1 of 2

Log: JCS Rev: EAS Typ: LKN

MASTER LOG E 21-22430.GPJ SHAN WIL.GDT 3/18/20

REV 3 - Approved for Submittal

Total Depth:	75.1 ft.	Northing:	530,682 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	51.4 ft.	Easting:	1,296,177 ft.	Drilling Company:	Boretec	Rod Diam.:	AWJ
Vert. Datum:	NAVD 88	Station:	-	Drill Rig Equipment:	EC 95 Track Drill	Hammer Type	Rope and Cathead
Horiz. Datum	WA State Plane N	Offset:	-	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Soft, gray, *Lean Clay (CL)* to *Silt (ML)*; wet; trace fine gravel; trace fine to coarse sand; low to medium plasticity fines.

53.0

Soft to medium stiff, gray, *Sandy Lean Clay with Gravel (CL)*; fine, subangular gravel; fine to coarse sand; medium plasticity fines.

68.0

Dense, *Silty Sand (SM)*; moist; fine, subangular gravel; fine to coarse sand; nonplastic fines; diamict.

75.0

Bedrock.

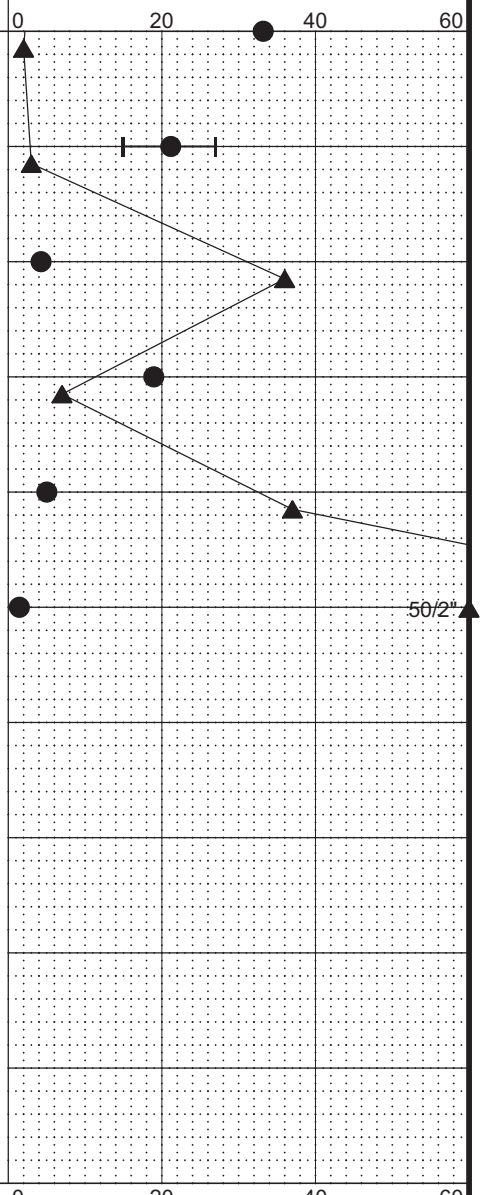
75.1

BOTTOM OF BORING
COMPLETED 6/18/2018

Depth, ft. | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



◇ % Fines (<0.075mm)
● % Water Content
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2.0" O.D. Split Spoon Sample
Well Screen and Sand Filter
Bentonite-Cement Grout
Bentonite Chips/Pellets
Bentonite Grout
Ground Water Level in Well

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Judy Reservoir to Mount Vernon
Transmission Pipeline - Phase 2
Skagit County, Washington

LOG OF BORING SW-4P

November 2018 21-1-22430-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-5
Sheet 2 of 2

MASTER LOG E 21-22430.GPJ SHAN WIL.GDT 3/18/20 Log: JCS Rev: EAS Typ: LKN

REV 3 - Approved for Submittal

APPENDIX E
Report Limitations and Guidelines for Use

APPENDIX E
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Report Use and Reliance

This report has been prepared for HDR Engineering, Inc, Public Utility District No. 1 of Skagit County, and their authorized agents, and for the project specifically identified in the report. The information contained herein is not applicable to other sites or projects. GeoEngineers structures its services to meet the specific needs of its clients. No party other than HDR Engineering, Inc., Public Utility District No. 1 of Skagit County, and their authorized agents may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed scope of services for the Project, and its schedule and budget, our services have been executed in accordance with our Agreement with HDR Engineering, Inc. dated January 25, 2018 and generally accepted geotechnical practices in this area at the time this report was prepared. We do not authorize, and will not be responsible for, the use of this report for any purposes or Projects other than those identified in this report.

If changes to the project or property occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations in the context of such changes. Based on that review, we can provide written modifications or confirmation, as appropriate.

Information Provided by Others

GeoEngineers has relied upon certain data or information provided or compiled by others in the performance of our services. Although we use sources that we reasonably believe to be trustworthy, GeoEngineers cannot warrant or guarantee the accuracy or completeness of information provided or compiled by others.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Conditions Can Change

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as construction on or adjacent to the site, new information or technology that becomes available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our report or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this report for its intended purpose so

[1] Developed based on material provided by GBA, GeoProfessional Business Association; www.geoprofessional.org.

that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Professional Judgment

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) rely on professional judgment and opinion to a greater extent than other engineering and natural science disciplines, where more precise and/or readily observable data may exist. To help clients better understand how this difference pertains to its services, GeoEngineers includes these explanatory "limitations" provisions in its reports. Please confer with GeoEngineers if you need to know how these "Report Limitations and Guidelines for Use" apply to your Project or site.

GeoEngineers

3. Environmental Soils Sampling Report

Environmental Soils Sampling Summary
Judy Reservoir to Mt. Vernon Transmission Pipeline

Prepared For:

Skagit PUD
1415 Freeway Drive
PO Box 1436
Mt. Vernon, WA 98273
Attn: Mike Benton
Project Manager

GEOTEST
1.888.251.5276
Bellingham | Arlington | Oak Harbor
www.geotest-inc.com

August 12, 2019
Project No. 19-0262

Skagit PUD
1415 Freeway Drive
PO Box 1436
Mt. Vernon, WA 98273

Attention: Mike Benton
Project Manager

Regarding: Environmental Soil Sampling Report
Judy WTP to Mt. Vernon Transmission Pipeline
Skagit County, Washington

Dear Mr. Benton:

As requested, GeoTest Services, Inc. (GTS) is pleased to present this summary report regarding environmental soil sampling along the abandoned railroad right of way in order to characterize the site soils. 6 sample locations were identified by Skagit PUD for sampling. The sample locations were located along the abandoned railway alignment adjacent to Highway 9 between Clear Lake and College Way.

We appreciate the opportunity to provide Environmental Sampling services on this project and look forward to assisting you during the construction phase. Should you have any further questions regarding the information contained within the report, or if we may be of service in other regards, please contact the undersigned.

Respectfully,
GeoTest Services, Inc.

L. Bennett

State of Washington
Engineering Geologist
2420
Licensed Geologist
Tim Chylla

Lynni Bennett, GIT
Environmental Specialist
Refinery Services Project Manager

Tim Chylla, LEG
Environmental Specialist

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PURPOSE AND SCOPE OF SERVICES

The purpose of our services was to perform environmental sampling of existing site soils. Our work entailed discrete grab sampling of site soils in order to assess the locations for the potential of petroleum products, heavy metals and/or other compound contamination that may be found within a railroad right-of-way. Subject site soils were sent to an independent analytical laboratory. Discrete sample depths varied based on distinct soil horizons encountered in the field.

Specifically, the scope of our services included the following:

- Discrete grab samples per the State of Washington Department of Ecology's Guidelines for Sampling as outlined in the Guidance for Remediation of Petroleum Contaminated Sites Toxics Cleanup Program.
- Periodic field screening, using a photo ionization detector, during soil collection and sample collection operations.
- The obtained soil samples were analyzed for the following list of compounds using a qualified independent analytical laboratory:

    - TPH - Gasoline Range Organics with BTEX, MTBE Combination (NWTPH-Gx, EPA 8021),
    - TPH - Diesel and Oil Range Organics (NWTPH-Dx)
    - Volatile Organic Compounds (VOCs – Includes HVOC's, EPA 8260)
    - Semi-Volatile Organic Compounds (SVOC's, EPA 8270, includes PAH's)
    - Herbicides, Chlorinated (EPA 8150)
    - Polychlorinated Biphenyls (PCB's, EPA 8082)
    - Polycyclic Aromatic Hydrocarbons (PAH's, EPA 8270 SIM)
    - Pesticides, Chlorinated (EPA 608/8081)
    - Target Analyte List (EPA 6020)

All soil samples were submitted for analytical testing to ALS Analytical Laboratories, Inc., located in Everett, Washington. Standard laboratory turnaround time was 10 working days. Please reference the attached analytical sheets for more detail with regards to the individual analysis conducted for each sample.

Analysis results will be utilized for characterization of the site at the request of Skagit PUD.

PROJECT DESCRIPTION

GTS understands that Skagit PUD would like to characterize subsurface soils along the historic railway alignment at various locations in anticipation of possible future development. This portion of environmental soil sampling occurred along the railway alignment adjacent to Highway 9 between the Mt. Vernon College Way round about and the south end of the town of Clear Lake. The sample collection depths were

dependent upon observed soil horizons within the soil column at each location. Skagit PUD provided an operator and equipment to excavate test pits. Skagit PUD called in utility locates prior to field work.

FIELD SAMPLING

Per our pre-work sampling plan, environmental sampling locations were determined by Skagit PUD prior to arrival onsite. Sample locations/depths within the soil column were determined based on distinct soil horizons observed in the field. Discrete shallow soil samples at depths less than four feet below present ground (BPG) were obtained from the test pit side walls. Samples obtained from depths greater than 4 feet BPG were discrete grab samples collected directly from the middle of the excavator bucket.

Soil Sampling Methodology

Field work occurred on June 25th and July 17th, 2019. A total of 18 samples were taken from 6 potholed locations. Two to three samples were obtained at each pothole location based on observed soils conditions at each location. At the request of Skagit PUD, one sample from each location was submitted for analysis. The remaining samples were stored at ALS Analysis pending initial analytical results. Two additional samples were later added to serve as confirmation samples for two of the original samples. Excavations were conducted with an excavator at various locations as predetermined by Skagit PUD along the historic railway alignment.

Our field screening consisted of visual inspection of the soils within the excavations, olfactory “sniff test”, as well as the use of a hand-held photoionization detector (PID) for the presence of potential petroleum contamination.

Where discrete grab samples were collected from the pothole sidewalls, sample locations were prepared by removing material from sidewalls of the excavation to expose undisturbed soil. Sidewall sample locations were collected several inches below the surface to reduce the potential loss of volatile contaminants. and placed into the appropriate laboratory containers. Samples obtained at depths greater than 4 feet BPG were grabbed directly from the excavator bucket, using clean gloves at each location. Freshly exposed areas were immediately field screened for volatile contaminants using a photoionization detector (PID). PID readings provide broad-range readings for VOCs and provide the aggregate signal from all the detectable VOCs present in the monitored environment but are not capable to provide substance specific readings.

Sampling equipment was cleaned, and gloves were changed between each collection point to prevent cross-contamination. The soil sample containers consisted of two standard 8 oz. wide mouth glass jars with Teflon lined lids. The soil sample containers for TPH gasoline, BTEX and VOC analysis were 40 ml glass vials, and were sampled using a disposable syringe by Method 5035. Sample containers were appropriately

prepared with preservatives, as applicable, by the analytical laboratory. The samples were labeled, immediately placed in a cooler and chilled to approximately 4 degrees Celsius. Samples were delivered to ALS Laboratory Group, located in Everett, Washington, within 24 hours of field collection. Standard sample collection methodology, handling, chain of custody records and protocols were maintained throughout the project.

Samples were collected at the following locations:

TABLE 1
SKAGIT PUD JUDY WTP TO MT. VERNON PIPELINE
SAMPLING DETAILS

Sample ID	Sample Location	Type	Analyzed	PID
TP-1 @ 3" (Soil)	Lat: 48.43608047 Lon: -122.26690239	Discrete Grab	No	0.00
TP-1 @ 3.3' (Soil)	Lat: 48.43608047 Lon: -122.26690239	Discrete Grab	**Yes**	0.00
TP-1 @ 7' (Soil)	Lat: 48.43852957 Lon: -122.26430589	Discrete Grab	No	0.00
TP-2 @ 0.5' (Soil)	Lat: 48.43852957 Lon: -122.26430589	Discrete Grab	**Yes**	0.00
TP-2 @ 3.5' (Soil)	Lat: 48.43852957 Lon: -122.26430589	Discrete Grab	No	0.00
TP-2 @ 7.10' (Soil)	Lat: 48.43852957 Lon: -122.26430589	Discrete Grab	No	0.00
TP-3 @ 1' (Soil)	Lat: 48.44283075 Lon: -122.25942299	Discrete Grab	No	0.00
TP-3 @ 3.5' (Soil)	Lat: 48.44283075 Lon: -122.25942299	Discrete Grab	**Yes**	0.00
TP-3 @ 7.3' (Soil)	Lat: 48.44283075 Lon: -122.25942299	Discrete Grab	No	0.00
TP-4 @ 1.5' (Soil)	Lat: 48.44521202 Lon: -122.2565253	Discrete Grab	**Yes**	0.00
TP-4 @ 1.5' (*Resample*) (Soil)	Lat: 48.44521202 Lon: -122.2565253	Discrete Grab	**Yes**	0.00
TP-4 @ 5' (Soil)	Lat: 48.44521202 Lon: -122.2565253	Discrete Grab	No	0.00
TP-5 @ 2' (Soil)	Lat: 48.44681117 Lon: -122.24163307	Discrete Grab	No	0.00
TP-5 @ 3.1' (Soil)	Lat: 48.44681117 Lon: -122.24163307	Discrete Grab	**Yes**	0.00
TP-5 @ 3.1' (*Resample*) (Soil)	Lat: 48.44681117 Lon: -122.24163307	Discrete Grab	**Yes**	0.00
TP-5 @ 7.5' (Soil)	Lat: 48.44681117 Lon: -122.24163307	Discrete Grab	No	0.00
TP-6 @ 1' (Soil)	Lat: 48.44786587 Lon: -122.24065885	Discrete Grab	No	0.00
TP-6 @ 2.5' (Soil)	Lat: 48.44786587 Lon: -122.24065885	Discrete Grab	**Yes**	0.00

Subsurface Soil Conditions

Six inches of ballast was overlying native continental glacial drift at pothole location PH-1 to termination depth of 8.4 feet BPG. Approximately 2 – 6 inches of topsoil was present over granular structural fill ranging in thickness of 0.7 to 2 feet before encountering native continental glaciomarine drift to termination depths at test pit locations PH2, TP-5 & TP-6. Termination depths at these locations ranged from 7.10 to 9.8 feet BPG. Weathered becoming hard bedrock interpreted as Darrington Phyllite or indistinguishable from Darrington Phyllite is overlain by approximately 0.4 – 0.5 feet of topsoil at test pit locations TP-3 & TP-4. Weathered bedrock varied in thickness from 5.5 feet at TP-3 and 3.8 feet at location TP-4. Unweathered bedrock was encountered at 7.0 feet BPG at location TP-3 and was encountered at 5.5 feet BPG at location TP-4. Groundwater was not observed at any of the exploratory locations.

Field Screening Results

No apparent petroleum odors were observed within the pothole locations during our field sampling. PID readings at all locations were consistently 0.00 ppm.

ANALYTICAL ANALYSIS RESULTS

Metals

Various metals, including Vanadium and Chromium III, were identified in all the soil samples; however, metals are naturally occurring and common in all soils and results above the laboratory reporting limits are expected for most metals. All identified metal concentration would appear to be consistent with natural background levels expected within the site and general vicinity based on the reference tables provided by the Washington State Department of Ecology and the US Geological Survey.

Petroleum Related Contaminants:

One sample sent for analysis resulted in detectable contaminant compounds above the laboratory detection limits for some Petroleum and Petroleum related contaminants. This is described in detail below:

Sample TP-4 @ 1.5’ returned a result of TPH-Volatile Range (NWTPH-Gx) of 6.1 MG/KG, far below the referenced MTCA Method A Cleanup Standards for Unrestricted Land Uses. ALS reports this analyte to likely be Highly Weathered Gasoline based on Chromatogram indicators. MTCA Method A Soil Cleanup Levels for Unrestricted Land Uses for Gasoline Range Organics is 100 MG/KG. This sample also returned results for petroleum constituents Benzene (6.1 MG/KG), Toluene (0.42 MG/KG) and Xylenes (0.31 MG/KG). MTCA Method A Soil Clean Up Levels for Unrestricted Land Uses for Benzene is 0.03 MG/KG, for Toluene is 7 MG/KG and for Xylenes is 9 MG/KG.

Based on the reported analysis results, GTS returned to the sample site and obtained a second sample [PH-4 @ 1.5' (Retest)] located in close proximity of the original test pit location and at the same sample depth for confirmation analysis of reported analytes TPH-Gx and BTEX. The confirmation sample did not return results above analyte reporting limits for the analytes (Analyte Reporting Limits: NWTPH-Gx: 3.0 MG/KG, Benzene: 0.030 MG/KG, Toluene: 0.05 MG/KG, Xylenes: 0.20 MG/KG).

Polyaromatic and Aromatic Hydrocarbons (PAH's)

Soil sample TP-4 @ 1.5' analytical results returned negligible values for PAH's 1-Methylnaphalene (0.035 MG/KG) and 2-Methalnaphthalene (0.029 MG/KG). Trace amounts of the aromatic hydrocarbon Chrysene (0.020 MG/KG) and Phenanthrene (0.051 MG/KG) were also detected in this sample. These compounds are not listed in the Method A Tables. Confirmation analysis for these analytes [Sample PH-4 @ 1.5' (Retest)] did not return results above the reporting limits for the analytes. The lab noted that the sample was analyzed for PAH's outside of the holding time at the request of GTS. And, as such, results should be considered estimated.

Polychlorinated Biphenyls (PCB's)

Soil sample TP-5 @ 3.1' analytical results returned a value for PCB-1016 of 0.29 MG/KG. MTCA Method A Soil Cleanup Levels for Unrestricted Land Uses for PCB Mixtures is 1 MG/KG. A confirmation sample [TP-5 @3.1' (Retest)] was obtained in close proximity to the initial soil sample at the same approximate depth. Analytical Results of the confirmation sample did not yield results above the minimum reporting limit of 0.10 MG/KG.

The following table provides a summary of sampling results:

TABLE 2
SKAGIT PUD JUDY WTP TO MT. VERNON PIPELING
SUMMARY OF ANALYTICAL LABORATORY ANALYSIS.
All soil sample results and limits are in milligrams per kilogram (MG/KG) or (ppm) or micrograms per kilogram (UG/KG or (ppb). Please refer to the individual analytical laboratory result sheets for a complete list of analysis and results.

Sample #	Method	Analyte	Results	Action Level
TP-1 @ 3.3' (Soil)	EPA-9045	Mercury*	0.034	2
	EPA-6020	Aluminum*	14,000	80,000
	EPA-6020	Arsenic*	4.6	20
	EPA-6020	Barium*	69	16,000
	EPA-6020	Beryllium*	0.22	160
	EPA-6020	Cadmium*	0.12	2
	EPA-6020	Calcium*	5,000	NA
	EPA-6020	Chromium III*	57	2,000
	EPA-6020	Cobalt*	12	NA
	EPA-6020	Copper*	27	3,200
	EPA-6020	Iron*	21,000	56,000
	EPA-6020	Lead*	3.8	250
	EPA-6020	Magnesium*	8,200	NA
	EPA-6020	Manganese*	430	11,200
	EPA-6020	Nickel*	71	880

	EPA-6020	Potassium*	780	NA
	EPA-6020	Sodium*	350	NA
	EPA-6020	Vanadium*	45	400
	EPA-6020	Zinc*	46	24,000
TP-2 @ 0.5' (Soil)	EPA-9045	Mercury*	0.022	2
	EPA-6020	Aluminum*	13,000	80,000
	EPA-6020	Antimony*	0.18	32
	EPA-6020	Arsenic*	5.1	20
	EPA-6020	Barium*	68	16,000
	EPA-6020	Beryllium*	0.22	160
	EPA-6020	Cadmium*	0.14	2
	EPA-6020	Calcium*	2900	NA
	EPA-6020	Chromium III*	29	2,000
	EPA-6020	Cobalt*	9.1	NA
	EPA-6020	Copper*	34	3,200
	EPA-6020	Iron*	19,000	56,000
	EPA-6020	Lead*	7.6	250
	EPA-6020	Magnesium*	6,500	NA
	EPA-6020	Manganese*	430	11,200
	EPA-6020	Nickel*	46	880
	EPA-6020	Potassium*	770	NA
	EPA-6020	Sodium*	200	NA
	EPA-6020	Vanadium*	39	400
	EPA-6020	Zinc*	44	24,000
TP-3 @ 3.5' (Soil)	EPA-9045	Mercury*	0.11	2
	EPA-6020	Aluminum*	18,000	80,000
	EPA-6020	Antimony*	0.16	32
	EPA-6020	Arsenic*	9.8	20
	EPA-6020	Barium*	67	16,000
	EPA-6020	Beryllium*	0.22	160
	EPA-6020	Cadmium*	0.25	2
	EPA-6020	Calcium*	5,400	NA
	EPA-6020	Chromium III*	51	2,000
	EPA-6020	Cobalt*	16	NA
	EPA-6020	Copper*	68	3,200
	EPA-6020	Iron*	30,000	56,000
	EPA-6020	Lead*	11	250
	EPA-6020	Magnesium*	11,000	NA
	EPA-6020	Manganese*	480	11,200
	EPA-6020	Nickel*	73	880
	EPA-6020	Potassium*	740	NA
	EPA-6020	Silver*	0.14	400
	EPA-6020	Sodium*	220	NA
	EPA-6020	Vanadium*	43	400
	EPA-6020	Zinc*	76	24,000
TP-4 @ 1.5' (Soil)	NWTPH-G_x	TPH – Volatile Range	6.1	100
	EPA-8021	Benzene	0.25	0.03
	EPA-8021	Toluene	0.42	7
	EPA-8021	Xylenes	0.31	9
	EPA- 8270 SIM	2-Methylnaphthalene	0.029	320
	EPA- 8270 SIM	1-Methylnaphthalene	0.035	5,600
	EPA- 8270 SIM	Chrysene	0.02	137
	EPA- 8270 SIM	Phenanthrene	0.051	NA
	EPA-9045	Mercury*	.0.029	2
	EPA-6020	Aluminum*	12,000	80,000
	EPA-6020	Antimony*	0.42	32
	EPA-6020	Arsenic*	3.6	20
	EPA-6020	Barium*	210	16,000
	EPA-6020	Beryllium*	0.38	160
	EPA-6020	Calcium*	3,700	NA
	EPA-6020	Chromium III*	33	2,000
	EPA-6020	Cobalt*	7.3	NA
	EPA-6020	Copper*	40	3,200

	EPA-6020	Iron*	16,000	56,000
	EPA-6020	Lead*	34	250
	EPA-6020	Magnesium*	5,700	NA
	EPA-6020	Manganese*	290	11,200
	EPA-6020	Nickel*	45	880
	EPA-6020	Potassium*	500	NA
	EPA-6020	Sodium*	200	NA
	EPA-6020	Vanadium*	37	400
	EPA-6020	Zinc*	30	24,000
TP-4 @ 1.5' **(RESAMPLE)** (Soil)	NWTPH-Gx	TPH – Volatile Range	U	100
	EPA-8021	Benzene	U	0.03
	EPA-8021	Toluene	U	7
	EPA-8021	Xylenes	U	9
	EPA- 8270 SIM	2-Methylnaphthalene	U	320
	EPA- 8270 SIM	1-Methylnaphthalene	U	5,600
	EPA- 8270 SIM	Chrysene	U	137
	EPA- 8270 SIM	Phenanthrene	U	NA
TP-5 @ 3.1' (Soil)	EPA-8082	PCB-1016	0.29	1.0
	EPA-9045	Mercury*	0.068	2
	EPA-6020	Aluminum*	25,000	80,000
	EPA-6020	Arsenic*	4.9	20
	EPA-6020	Barium*	130	16,000
	EPA-6020	Beryllium*	0.34	160
	EPA-6020	Calcium*	6.600	NA
	EPA-6020	Chromium III*	94	2,000
	EPA-6020	Cobalt*	17	NA
	EPA-6020	Copper*	30	3,200
	EPA-6020	Iron*	36,000	56,000
	EPA-6020	Lead*	7.2	250
	EPA-6020	Magnesium*	9,900	NA
	EPA-6020	Manganese*	580	11,200
	EPA-6020	Nickel*	62	880
	EPA-6020	Potassium*	1,300	NA
	EPA-6020	Silver	0.14	400
	EPA-6020	Sodium*	250	NA
	EPA-6020	Vanadium*	73	400
	EPA-6020	Zinc*	57	24,000
TP-5 @ 3.1' **(RESAMPLE)** (Soil)	EPA-8082	PCB-1016	U	1.0
TP-6 @ 2.5' (Soil)	EPA-9045	Mercury*	0.056	2
	EPA-6020	Aluminum*	25,000	80,000
	EPA-6020	Antimony*	0.11	32
	EPA-6020	Arsenic*	8.0	20
	EPA-6020	Barium*	110	16,000
	EPA-6020	Beryllium*	0.40	160
	EPA-6020	Cadmium*	0.14	2
	EPA-6020	Calcium*	7,300	NA
	EPA-6020	Chromium III*	62	2,000
	EPA-6020	Cobalt*	19	NA
	EPA-6020	Copper*	52	3,200
	EPA-6020	Iron*	39,000	56,000
	EPA-6020	Lead*	7.9	250
	EPA-6020	Magnesium*	12,000	NA
	EPA-6020	Manganese*	1,000	11,200
	EPA-6020	Nickel*	78	880
	EPA-6020	Potassium*	1,900	NA
	EPA-6020	Sodium*	480	NA
	EPA-6020	Vanadium*	79	400
	EPA-6020	Zinc*	86	24,000

Key: Highlighted - Indicates analyte present but below the referenced cleanup action level.

RED – Indicates **analyte present above** MTCA Method A Soil Clean Up for Unrestricted Land Use

NA - Indicates Action Level has not been determined

* - Priority Pollutant Metals + Vanadium + Chromium III analytical results were near the natural background levels expected for the geographic region per the Natural Background Soil Metals Concentrations in Washington State report published by the Washington State Department of Ecology in 1994 and the Background Concentrations of Metals in Soils from Selected Regions in the State of Washington published by the US Geological Survey in 1985.

U - Analyte analyzed but not detected above reporting limit.

Action Level - Indicates minimum level of contaminates within the soil or groundwater which may require cleanup action by the Washington State Department of Ecology, Model Toxics Control Act (MTCA) Cleanup Regulation Chapter 173-340 WAC, (Amended 2013), Tables 720-1 and 740-1 cleanup levels. For substances not listed in the Method A Tables, Method B values listed in the Cleanup Levels and Risk Calculations (CLARC) under the MTCA Regulation, updated 2015, were referenced.

Not all analytes tested for are included in Table 1. Please refer to individual analytical lab results, attached with this report, for more detail.

CONCLUSIONS

As requested, GeoTest Services, Inc. conducted environmental soil sampling to characterize subsurface soils along the historic railway alignment at various locations in anticipation of possible future development. This portion of environmental soil sampling occurred along the railway alignment adjacent to Highway 9 between the Mt. Vernon College Way roundabout and the south end of the town of Clear Lake. Based on the analytical laboratory results reported and corresponding follow up confirmation sampling, the areas meet the clean soil standards outlined by the Washington State Department of Ecology MTCA Method A for Unrestricted Land Uses or Method B values listed in the Cleanup Levels and Risk Calculations under the MTCA Cleanup Regulation, where applicable. GTS interprets any initial analytes identified to be anomalous and could not be reproduced with subsequent sampling and analysis. If required, the site soils may be disposed of at a local non-regulated dumpsite or be reused onsite. We recommend that this report and attached analytical laboratory results be provided to the applicable dumpsite owner/operator for their review and approval prior to any soils being hauled to their facility.

Material Reuse

According to Washington State Department of Ecology's Guidance for Remediation of Petroleum Contaminated Sites Table 12.1: *Guidelines for Reuse of Petroleum-Contaminated Soil*, site soils, as sampled, are defined as Soil Category 1. Category 1 soils are have no detectable/quantifiable levels of petroleum hydrocarbons or constituents using analytical methods and are not suspected of being contaminated with any other hazardous substances.

Acceptable Uses:

- Can be used anywhere the use is allowed under other regulations
- Any use allowed for Category 2, 3 & 4 soils.

Limitations:

- These soils should be odor free.

LIMITATIONS

Our conclusions are based on the described data, site visit, and subsurface observations described. Our study area included the areas of the site described in this report only. We assume the encountered subsurface conditions are representative of the subject site. However, the client should be aware that subsurface conditions may vary between sampling locations. We have prepared this report exclusively for the use of Skagit P.U.D. and their representatives. Use of this report by others is at their own risk. The information contained herein is not applicable to other sites.

The analyses, conclusions, and recommendations provided in this report are based on sampling performed by GeoTest Services Inc., state and federal regulatory guidelines and our experience and judgment. Our work has been performed in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in this area. No warranty, expressed or implied, is made.

As a condition of our services, it is understood that, to the fullest extent permitted by law, our clients agree to defend, indemnify and hold harmless GeoTest Services, Inc., its owners, employees, subcontractors and agents, from any (past, present, or future) pollution-related claims or damages at the site, including potential claims from third parties that may name GeoTest Services, Inc., as a claimant.

Attachments:	Figure 1	Vicinity Map
	Figure 2	Sample Locations
	Figure 3	Soil Classification Sheet
	Figures 4 – 6	Test Pit Logs
		ALS Laboratory Testing (77 pages)

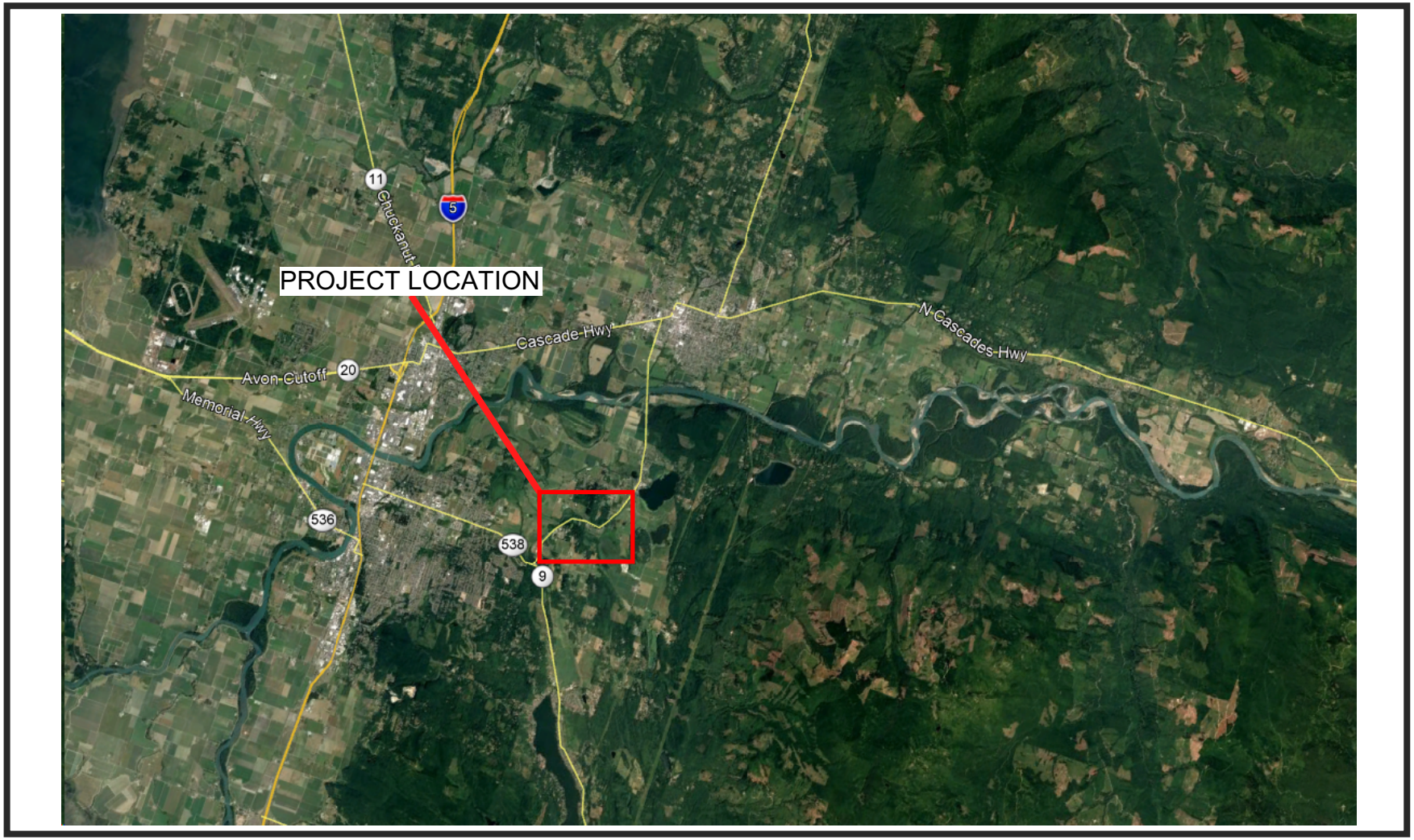


IMAGE PROVIDED BY GOOGLE EARTH

N

GEOTEST SERVICES, INC.
741 Marine Drive
Bellingham, WA 98225
phone: (360) 733-7318
fax: (360) 733-7418

Date: 7/31/2019	By: LEB	Scale: NTS	Project 19-0262

SITE LOCATION AND VICINITY
JUDY WTP TO MT. VERNON TRANSMISSION PIPELINE
SPUD WO #1006
SKAGIT COUNTY, WASHINGTON

Figure 1



= Approximate Testpit Locations

DRAWING COURTESY GOOGLE EARTH

Scale: 0 1/8 mi. 1/4 mi.

N

GEOTEST SERVICES, INC.
741 Marine Drive
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phone: (360) 733-7318
fax: (360) 733-7418

Date: 7-25-19	By: LEB	Scale: As Shown	Project 19-0262

SITE AND EXPLORATION PLAN
JUDY WTP TO MT. VERNON TRANSMISSION PIPELINE
SPUD WO #1006
SKAGIT COUNTY, WASHINGTON

Figure 2

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL	TYPICAL DESCRIPTIONS[1][2]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

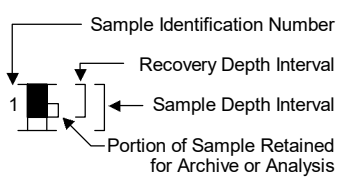
OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. Soil descriptions are based on the general approach presented in the *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*, as outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the *Standard Test Method for Classification of Soils for Engineering Purposes*, as outlined in ASTM D 2487.
2. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
	> 12% and ≤ 30% - "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 12% - "slightly gravelly," "slightly sandy," "slightly silty," etc.
	≤ 5% - "trace gravel," "trace sand," "trace silt," etc., or not noted.

Drilling and Sampling Key

SAMPLE NUMBER & INTERVAL



SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Other - See text if applicable

Groundwater

▽ ATD — Approximate water elevation at time of drilling (ATD) or on date noted. Groundwater levels can fluctuate due to precipitation, seasonal conditions, and other factors.

Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

GEOTEST

Judy WTP to Mt. Vernon Transmission Pipeline
WO#1006
Skagit County, WA

Soil Classification System and Key

Figure 3

TP-1

SAMPLE DATA			SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft):	
0		d			GP	Ballast	Groundwater not encountered.
					SM/ ML	Stiff to Very Stiff, Gray, Slightly Damp, Sandy, Gravelly, SILT (Native Continental Glacial Drift).	
2						-5.8' ~1.5' Thick Pocket of Medium Dense, Dark Gray, Moist, SAND and GRAVEL with trace Silt.	
4		d					
6		d					
8							
10							

Test Pit Completed 06/25/19
Total Depth of Test Pit = 8.4 ft.

TP-2

SAMPLE DATA			SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft):	
0		d			ML/ OL	Topsoil	Groundwater not encountered.
						1.7' Granular Structural Fill (Pit Run).	
2					GW/ SM SP/ SM	Medium Dense to Dense, Tan/Brown, Dry, Silty, Gravelly, SAND, Slightly Mottled (Native Continental Glacial Drift).	
4		d			SP	Loose to Medium Dense, Brown, Slightly Damp, Medium to Coarse Grained Gravelly SAND (Native Continental Glacial Drift).	
6					SP/ SM	Mediuim Dense to Dense, Brown, Damp, Silty, Gravelly SAND (Native Continental Glacial Drift).	
8		d					

Test Pit Completed 06/25/19

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

19-0262 8/12/19 C:\USERS\LYNNIB\DESKTOP\GINT\SKAGIT PUD JUDY WWT TO MT V.GPJ TEST PIT LOG

GEOTEST

Judy WTP to Mt. Vernon Transmission Pipeline
WO#1006
Skagit County, WA

Log of Test Pits

Figure 4 (1 of 3)

TP-3

SAMPLE DATA			SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft):	
0					ML/ OL	Topsoil	Groundwater not encountered.
		d			GW/ SM	1' Imported Granular Structural Fill (Pit Run)	
2					PHT	Highly Weathered Darrington Phyllite or Indistinguishable from Darrington Phyllite Bedrock. Includes Some Light Brown Pockets of Mottled Silty, Gravelly Sand.	
		d					
4						-7' Becomes Unweathered, Hard Darrington Phyllite or Indistinguishable from Darrington Phyllite Bedrock.	
6							
		d					
8							

Test Pit Completed 06/25/19
Total Depth of Test Pit = 7.5 ft.

TP-4

SAMPLE DATA			SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft):	
0					ML/ OL	Topsoil	Groundwater not encountered.
		d			PHT	Black Weathered Darrington Phyllite or Indistinguishable from Darrington Phyllite Bedrock. Includes Some Light Brown Pockets of Mottled Silty, Gravelly Sand.	
2						-1.7' Becomes Unweathered, Hard Darrington Phyllite or Indistinguishable from Darrington Phyllite Bedrock.	
4		d					
6							

Test Pit Completed 06/25/19
Total Depth of Test Pit = 5.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

19-0262 8/12/19 C:\USERS\LYNNIB\DESKTOP\GINT\SKAGIT PUD JUDY WWT TO MT V.GPJ TEST PIT LOG

GEOTEST

Judy WTP to Mt. Vernon Transmission Pipeline
WO#1006
Skagit County, WA

Log of Test Pits

Figure 5 (2 of 3)

TP-5

SAMPLE DATA			SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft):	
0					ML/ OL	Topsoil	Groundwater not encountered.
					GW/ SM	2' of Imported Granular Structural Fill (Pit Run).	
2		d			SM/ ML	Stiff to Very Stiff, Tan, Damp, Sandy, Gravelly, SILT, Mottled (Native Continental Glacial Drift).	
		d					
4					CL/ CH	Soft, Gray, Damp, Gravelly, CLAY, Mottled, Pockets of Gray Coarse Grained Clayey Sand (Native Continental Glacial Drift).	
6					SM/ ML	Stiff to Very Stiff, Tan-Brown, Slightly Damp, Sandy SILT, Mottled Throughout (Native Continental Glacial Drift).	
8		d					
10							

Test Pit Completed 06/25/19

TP-6

SAMPLE DATA			SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft):	
0					ML/ OL	Topsoil	Groundwater not encountered.
		d			GW/ SM	1' Imported Granular Structural Fill	
2		d			SM/ ML	Stiff Becoming Hard, Gray, Slightly Damp Sandy, Gravelly SILT, Mottled (Native Continental Glacial Drift).	
4						-3' Tree Roots, Charcoal vein.	
6						-6.5' Loose, Brown, Damp Medium Grained SAND Pocket.	
8							
10							

Test Pit Completed 06/25/19

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

19-0262 8/12/19 C:\USERS\LYNNIB\DESKTOP\GINT\SKAGIT PUD JUDY WWT TO MT V.GPJ TEST PIT LOG

GEOTEST

Judy WTP to Mt. Vernon Transmission Pipeline
WO#1006
Skagit County, WA

Log of Test Pits

Figure 6 (3 of 3)

July 8, 2019

Ms. Lynni Bennett
Geotest Services, Inc.
741 Marine Dr.
Bellingham, WA 98225

Dear Ms. Bennett,

On June 26th, 16 samples were received by our laboratory and assigned our laboratory project number EV19060182. The project was identified as your 19-0262 S.P.U.D.. The sample identification and requested analyses are outlined on the attached chain of custody record.

No abnormalities or nonconformances were observed during the analyses of the project samples.

Please do not hesitate to call me if you have any questions or if I can be of further assistance.

Sincerely,

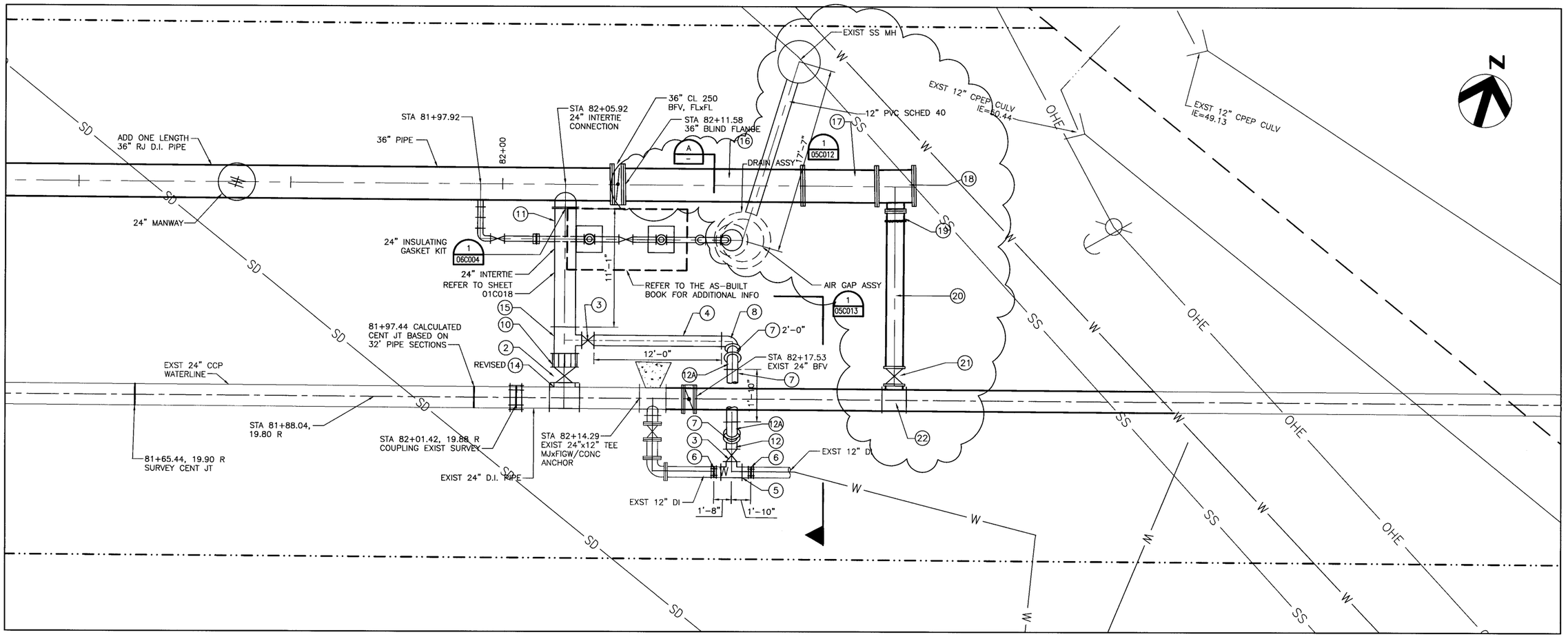
ALS Laboratory Group

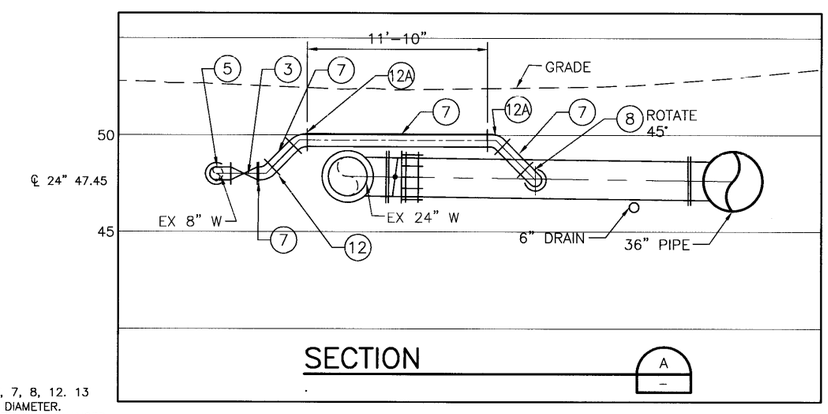
Rick Bagan
Laboratory Director

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 98208 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

Environmental www.alsglobal.com
RIGHT SOLUTIONS RIGHT PARTNER

4. Record Drawing for Existing 36-inch-diameter Water Transmission Pipeline (Phase 1) at College Way, CO





MARK NUMBERS 3, 4, 5, 6, 7, 8, 12. 13 CHANGED FROM 8" TO 12" DIAMETER.
MARK NUMBER 15 OUTLET BRANCH CHANGED FROM 8" TO 12" DIAMETER.

DATUM
HORIZONTAL DATUM: NAD '83/91, WASHINGTON STATE PLANE, NORTH ZONE
VERTICAL DATUM: NAVD '88

	MATERIAL LIST	QUANTITY
1	24" TAPPING SLEEVE EPOXY COATED	1
2	HOT TAP 24" GATE VALVE, INSTALLED HORIZONTALLY FLxFL	1
3	GATE VALVE, 12" FLxMJ	2
4	PIPE, 12" DI CL 350, PE	Field Fit – 12'-0"
5	TEE, 12"x12" MJxFL	1
6	SLEEVE, 12" MJxMJ	2
7	PIPE, 12" DI CL 350, PExPE	Field Fit
8	ELL, 90° 12" MJxMJ	2
9	PIPE, 24" PExPE	Field Fit
10	FLANGED COUPLING ADAPTER, 24" FLxPE	1
11	PIPE, 24" FLxPE	3 Field Fit
12	ELL, 45° 12" FLxMJ	3
12A	ELL, 45° 12" MJXMJ	2
13	DELETED	
14	TEE, STAINLESS STEEL TAPPING TEE	2
15	REDUCING TEE, 24" MJ x 12" FL	1

	MATERIAL LIST	QUANTITY
16	36" DI CL50, SPOOL 16.5' LONG, FLxFL	
17	36" DI CL50, SPOOL 7.5' LONG FLxFL	
18	TEE, DI, 36"x18"	1
19	RESTRAINED FLANGE COUPLING ADAPTER, 18"	1
20	PIPE, 18" DI CL50	
21	GATE VALVE, 18", FLxFL	1
22	24" x 18" FL, STL TAPPING SLEEVE, WELDED IN FIELD	1

NOTES:

1. RESTRAIN ALL PIPE JOINTS AND FITTLINGS.
2. 24" CCP WATERLINE IS APPROX. 32' SECTIONS, JOINT TO JOINT.
3. CONTRACTOR TO LOCATE EXISTING PIPE JOINTS AND PROVIDE LOCATION AND DEPTH INFORMATION TO OWNER. SEE SPECIFICATIONS SECTION 01030 PART 1.7.A AND SECTION 01660 PART 1.2.C.

BASE DRAWING: CO 4385

RECORD DRAWINGS

ISSUE	REVISIONS	BY	DATE
1.	RECORD DRAWINGS	MCH	12/18/18

811 Know what's below. Call before you dig.

MARK C. HANDZLIK — STATE OF WASHINGTON — 39691 — REGISTERED PROFESSIONAL ENGINEER

DATUM: HOR: NAD 83 VERT: NAVD 88	DSGN BY: MCH; DWN BY: JLB; APPVD BY: MCH
DATE PRINTED: 12/18/18	SEC: 15; TWP: 34 N; RGE: 4 E

Skagit PUD — PUBLIC UTILITY DISTRICT

PUBLIC UTILITY DISTRICT NO. 1 of SKAGIT COUNTY
1415 Freeway Drive
P O BOX 1436
Mount Vernon, WA 98273
(360) 424-7104
www.SkagitPud.org

30TH STREET TRANSMISSION LINE AND DIGBY ROAD PIPELINE PROJECT PHASE 1

FORCE MAIN BYPASS AT COLLEGE WAY
PLAN AND PROFILE

SCALE: 1"=5'	W.O. 15-03601	SHEET: 7 OF 15
	C.O. 4753	

5. Record Drawing for Existing Water Treatment Plant (WTP)

PUBLIC UTILITY DISTRICT NO. 1
OF SKAGIT COUNTY

WATER TREATMENT PLANT
AS-BUILT

C.O. # 3234; W.O. # 86-1666

AUGUST 1990

ABBREVIATIONS LIST

@	AT
AB	ANCHOR BOLT
ABDN.(A)	ABANDON
ABT	ABOUT
ABV	ABOVE
AC	ASBESTOS CEMENT, ASPHALTIC CONCRETE
ACST	ACOUSTIC
ACT	ACOUSTICAL CEILING TILE
ACU	AIR-COOLED CONDENSING UNIT
ADD'L	ADDITIONAL
ADJ	ADJACENT, ADJUSTABLE
AFL	ABOVE FLOOR LINE
AHR	ANCHOR
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUGTION
AL	ALUMINUM
ALM	ALARM
ALTN	ALTERNATE
ALY	ALLOY
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATE
APVD	APPROVED
ARCH.	ARCHITECTURE
ARV	AIR RELEASE VALVE
ASPH	ASPHALT
ASSN	ASSOCIATION
ASSY	ASSEMBLY
ASU	AIR SUPPLY UNIT
AUTO.	AUTOMATIC
AUX	AUXILLARY
AVAIL.	AVAILABLE
AVG	AVERAGE
B	BELL
B & S	BELL AND SPIGOT
BC	BOOSTER HEATING COIL
BD	BOARD, BUTTERFLY DAMPER
BETW	BETWEEN
BF	BOTTOM FACE, BOILER FEED SYSTEM
BG	LOW WALL GRILLE
BKGD	BACKGROUND
BL	BASE LINE
BLDG	BUILDING
BLK	BLOCK
BLR	BOILER
BLT	BOLT
BLW	BELOW
BM	BEAM, BENCH MARK
B/O	BOTTOM OF
BOT	BOTTOM
BR	LOW WALL REGISTER
BRG	BEARING
BS	BLACK STEEL
BSMT	BASEMENT
BTU	BRITISH THERMAL UNIT
BV	BUTTERFLY VALVE
BW	BOTH WAYS
C TO C	CENTER TO CENTER
CAB.	CABINET
CARV	COMBINATION AIR RELEASE VALVE
CB	CATCH BASIN
CCP	CONCRETE CYLINDER PIPE
CD	CEILING DIFFUSER
CFM	CUBIC FOOT PER MINUTE
CFS	CUBIC FOOT PER SECOND
CG	CEILING GRILLE
CH	CHILLER
CHBD	CHALKBOARD
CI	CAST IRON
CIF	CAST IRON FLANGED
CIMJ	CAST IRON MECHANICAL JOINT
CIPC	CAST-IN-PLACE CONCRETE
CISP	CAST IRON SOIL PIPE
CHKD	CHECKED
CJ	CONSTRUCTION JOINT
Cl_2	CHLORINE
CLDI	CEMENT LINED DUCTILE IRON PIPE
CL & C	CENTER LINE
CLG	CEILING
CLO	CLOSET
CLR	CLEAR, CLEARANCE
CMP	CORRUGATED METAL PIPE
CMPSN	COMPOSITION (COMPOSITE)
CMU	CONC. MASONRY UNITS
CND	CONDUIT
CO	CLEANOUT
COL	COLUMN
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUE, CONTINUOUS
CONTR.	CONTRACT, CONTRACTOR
COP.	COPPER
COR	CORNER
CORP	CORPORATION
CORR	CORRUGATED
CP	CONTROL POINT
CPLG	COUPLING
CPT	CARPETING
CR	CEILING REGISTER
CSMT	CASEMENT
CT	COOLING TOWER, CERAMIC TILE
CTR(S)	CENTER(S)
CTSK	COUNTERSUNK
CUH	CABINET UNIT HEATER
CVG	CHLORINE GAS VACUUM
CWP	CHILLED WATER PUMP
CYL	CYLINDER
D	DRAIN
DBA	DEFORMED BAR ANCHOR
DET	DETAIL
DG	DOOR GRILLE
DI	DUCTILE IRON
DIA	DIAMETER
DIAG	DIAGONAL
DIF	DUCTILE IRON FLANGED
DIM.	DIMENSION
DIMJ	DUCTILE IRON MECHANICAL JOINT
DIR	DIRECTION
DISCH	DISCHARGE
DIST	DISTANCE
DN	DOWN
DS	DOWNSPOUT
DWG	DRAWING
EA	EACH
EB	EXPANSION BOLT
ECC	ECCENTRIC
EDH	ELECTRIC DUCT HEATER
EF	EACH FACE, EXHAUST FAN
EL	ELEVATION
ELB	ELBOW
EOL SP	EQUALLY SPACED
EQPT.EQUIP.	EQUIPMENT
EW	EACH WAY
E-W	EAST-WEST
EWC	ELECTRIC WATER COOLER
EXH	EXHAUST
EXP	EXPANSION
EXP JT	EXPANSION JOINT
EXST	EXISTING
EXT	EXTERIOR
FAB	FABRICATE
FB	FLAT BAR
FC	FLEXIBLE COUPLING, FLEXIBLE CONNECTION
FCA	FLANGED COUPLING ADAPTER
FCO	FLOOR CLEANOUT
FCTY	FACTORY
FD	FLOOR DRAIN
FDN	FOUNDATION
FEXT	FIRE EXTINGUISHER
FG	FINISH GRADE, FLOOR GRILLE
FGL	FIBER GLASS
FL	FLOOR, FLOW, FLASHING
F/L	FLOOR LINE
FLD	FUSIBLE LINK DAMPER
FLG	FLANGE
FLL	FLOW LINE
FNSH	FINISH
FOC	FACE OF CONCRETE
FOF	FACE OF FINISH
FOM	FACE OF MASONRY
FOS	FACE OF STUDS
FPM	FOOT PER MINUTE
FPS	FOOT PER SECOND
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FOOT, FEET
FTG	FOOTING
FX	VEHICLE FUME EXHAUST SYSTEM
FXTR	FIXTURE
GA	GAGE
GALV	GALVANIZED STEEL (HOT DIP)
GB	GRAB BAR
GL	GLASS, GLAZING
GLCI	GLASS LINED CAST IRON PIPE
GND	GROUND
GPM	GALLON PER MINUTE
GPS	GALLON PER SECOND
GR	GRADE
GS	GRATING SUPPORT
GSB	GYPSUM SOFFIT BOARD
GTV	GATE VALVE
GVL	GRAVEL
GWB	GYPSUM WALL BOARD
GYP.	GYPSUM
HAS.	HEADED ANCHOR STUD
HB	HOSE BIBB
HC	HOLLOW CORE
HCG	HIGH CAPACITY CEILING GRILLE
HD	HUB DRAIN
HDNR	HARDENER
HDR	HEADER
HDW	HARDWARE
HGR	HANGER
HGT	HEIGHT
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HP	HORSEPOWER, HIGH POINT
HR	HOSE RACK, HOUR
HU	HUMIDIFIER
HV	HOSE VALVE, HAND VALVE
HVAC	HEATING/VENTILATING/ AIR CONDITIONING
HW	HOT WATER
HWH	HOT WATER HEATER
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN.	INCH
INCL	INCLUDE (D) (ING)
INSTL	INSTALLATION
INSUL	INSULATION
INTR	INTERIOR
INVT	INVERT
IPT	IRON PIPE THREAD
JAN	JANITOR
JT	JOINT
L	ANGLE
LAB.	LABORATORY
LAM	LAMINATE(D)
LAV	LAVATORY
LBS	POUNDS
LG	LONG
LL	LIVE LOAD
LLH	LONGER LEG HORIZONTAL
LLV	LONGER LEG VERTICAL
LNTL	LINTEL
LONGIT	LONGITUDINAL
LVR	LOUVER
MATL	MATERIAL
MAX	MAXIMUM
MB	MACHINE BOLT
MCC	MOTOR CONTROL CENTER
MD	MOTORIZED DAMPER
MDO	MEDIUM DENSITY OVERLAY PLYWOOD
MECH	MECHANICAL
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
ML	MOTORIZED LOUVER
MO	MASONRY OPENING
MOD	MODULAR
MSL	MEAN SEA LEVEL
MTD	MOUNTED
NA	NOT APPLICABLE
NIC	NOT IN CONTRACT
NO.	NUMBER
NOM	NOMINAL
N-S	NORTH-SOUTH
NTS	NOT TO SCALE
O TO O	OUT TO OUT
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF.	OUTSIDE FACE, OVERFLOW
OPNG	OPENING
OPP	OPPOSITE
ORIG	ORIGINAL
OSHA	OCCUPATIONAL HEALTH AND SAFETY ADMINISTRATION
P.S.	PUMP STATION
PC	PIECE
PE	PLAIN END
PEN.	PENETRATION
PH	PIPE HANGER
P & ID	PROGESS AND INSTRUMENTATION DIAGRAM
PJF	PREMOLDED JOINT FILLER
PL	PLATE, PROPERTY LINE
PLG	PILING
PLYWD	PLYWOOD
PNL	PANEL
PP	POLYPROPYLENE
PROST	PRECAST
PRESS	PRESSURE
PRV	PRESSURE-REDUCING VALVE
PS	PAINT SYSTEM, PIPE SUPPORT
PSF	POUNDS PER SQUARE FOOT
PSIG	POUNDS PER SQUARE INCH, GAUGE
PSL	PIPE SLEEVE
PVC	POLYVINYL CHLORIDE
PV	PLUG VALVE
PVMT	PAVEMENT
R	RISER
RA	RETURN AIR
RAD	RADIUS
RBR	RUBBER
RC	REINFORCED CONCRETE
RCP	REINFORCED-CONCRETE PIPE
RD	RAIN DRAIN, ROOF DRAIN
RDCR	REDUCER
RECM	RECOMMENDED
REINF	REINFORCE
REPL	REPLACE
REQD	REQUIRED
RFG	ROOFING
RM	ROOM
RMV	REMOVE
RO	ROUGH OPENING
RJ	RESTRAINED JOINT
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
RST	REINFORCING STL
RTNG	RETAINING
SS	SANITARY SEWER
(S)	SALVAGE
SA	SOUND ATTENUATOR
SC	SELF CONTAINED AIR-CONDITIONING UNIT, SOLID CORE
SCHED	SCHEDULE
SDWK	SIDEWALK
SEC	SECONDARY
SECT.	SECTION
SERV	SERVICE
SYMM	SYMMETRICAL
SF	SUPPLY FAN
SH	SHEET
SHTHG	SHEATHING
SIM	SIMILAR
SL	STRUCTURAL LINE
SLR	SEALER
SP, SPG	SPACING
SPEC	SPECIFICATION
SQ	SQUARE
SST	STAINLESS STEEL
STA	STATION
STD	STANDARD
STIF	STIFFENER
STL	STEEL
STOR	STORAGE
STR	STRAIGHT
STRL	STRUCTURAL
STRUCT	STRUCTURE
SUBMG	SUBMERGED
SUCT	SUCTION
SUSP	SUSPENDED
SYMM	SYMMETRICAL
SYS	SYSTEM
T	TREAD
T&B	TOP AND BOTTOM
TAC	THERMAL AIR CONDITIONER
TB	THRUST BLOCK
TBM	TEMPORARY BENCH MARK
TC	TOP OF CONCRETE, TOP OF CURE
TCU	THERMAL AIR CONTROL UNIT
TEMP	TEMPORARY, TEMPERATURE
TF	TOP FACE
TG	HIGH WALL GRILLE
THK	THICK
THKNS	THICKNESS
TOW.	TOP OF WALL
TP	TEST PIT
TPD	TOILET PAPER DISPENSER
TR	HIGH WALL REGISTER
TRANSV	TRANSVERSE
TST	TOP OF STEEL
TT	THRUST TIE
TYP	TYPICAL
UH	UNIT HEATER
(V)	VERIFY IN FIELD
V	VENT
VAC	VACUUM
VERT	VERTICAL
VTR	VENT THROUGH ROOF
WC	WATER CLOSET
WCU	WATER-COOLED CONDENSING UNIT
WD	WOOD
WDO	WINDOW
WH	WATER HEATER
W OF WF	WIDE FLANGE (BEAM)
W/	WITH
W/O	WITHOUT
WP	WORKING POINT, WATER PROOFING
W/R	WATER RESISTANT
WS	WATER SURFACE, WATERSTOP, WELDED STEEL
WTR	WATER
WTRTT	WATERTIGHT
WWF	WELDED WIRE FABRIC

RECORD DRAWINGS

Revisions Drawn by CMB Date 8/90

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NOTES:

1. FOR ELECTRICAL LEGEND AND ABBREVIATIONS, SEE SHEET E-1.
2. FOR ABBREVIATIONS NOT LISTED SEE "ABBREVIATIONS FOR USE ON DRAWINGS AND TEXT", PUBLISHED BY THE AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI Y1.1).
3. FOR FLOW STREAM ABBREVIATIONS, SEE SHEET G-4.
4. FOR INSTRUMENTATION AND CONTROL LEGEND, SEE SHEETS I-1.
5. FOR PLUMBING FIXTURE ABBREVIATIONS, SEE SHEET HP-6.
6. FOR MISCELLANEOUS SPECIALTY ABBREVIATIONS, SEE SPECIFICATIONS.

NORMAN C. WARD — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

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CHK S. TRUSLER					
APVD N. WARD					
	NO.	DATE	REVISION	BY	APVD
	1	8/90	RECORD DRAWING	CMB	PM

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SKAGIT COUNTY P.U.D.
SKAGIT WATER TREATMENT PLANT

ABBREVIATIONS LIST

SHEET G-2
DWG NO. 2
DATE JAN. 1988
PROJ NO. S21482.A1

AV SCREEN
O.I.NO. CONTRACT

HEATING, VENTILATING, AND AIR CONDITIONING SYMBOLS

- WALL REGISTER OR GRILLE (SUPPLY) — TGS
- CEILING DIFFUSER OR REGISTER (SUPPLY) — CD, CR, HCG
- CEILING REGISTER OR GRILLE (RETURN AND EXHAUST) — CG, CR
- WALL REGISTER OR GRILLE (RETURN AND EXHAUST) — BG, BR, TG, TR
- FG — FLOOR GRILLE (SUPPLY AND RETURN)
- TURNING VANES
- EXTRACTOR VANES
- SOUND ATTENUATED DUCT
- FD — FIRE DAMPER
- SPLITTER DAMPER
- MANUAL OPPOSED-BLADE DAMPER
- MANUAL BUTTERFLY DAMPER
- MOTORIZED DAMPER — M
- SD — SMOKE DAMPER
- FLEXIBLE CONNECTION
- FLEXIBLE DUCTWORK
- R — INCLINED RISE IN DUCT
- D — INCLINED DROP IN DUCT
- SUPPLY DUCT (SECTION)
- INTAKE, RETURN OR EXHAUST DUCT (SECTION)
- T — THERMOSTAT
- H — HUMIDISTAT
- MMP — MECHANICAL MOUNTING PANEL
- VIBRATION ELIMINATOR
- (200) — 200 CFM

TOPOGRAPHIC LEGEND AND NOTES

NOTES

IN GENERAL, EXISTING STRUCTURES AND FACILITIES ARE NOTED AS "EXISTING" AND ARE SHOWN IN LIGHT LINE WEIGHTS, OR AS SCREENED BACKGROUND. NEW STRUCTURES ARE SHOWN IN HEAVY LINE WEIGHTS.

LEGEND

- PROPERTY LINE/RIGHT OF WAY
- X—X—X EXISTING FENCE
- NEW FENCE
- EXISTING A.C. PAVEMENT
- NEW A.C. PAVEMENT
- GRAVEL SURFACE
- CONCRETE WALK OR PAVEMENT
- DRAINAGE DITCH
- X 45.0 EXISTING GRADE
- ⊗ 45.0 FINISH GRADE
- 45 EXISTING CONTOUR
- 45 NEW CONTOUR
- **CATCH BASIN**
- EXISTING CATCH BASIN
- 3:1 EXISTING EMBANKMENT -SLOPE AS INDICATED
- 4:1 NEW EMBANKMENT - SLOPE AS INDICATED
- LIMITS OF TOPSOIL AND SURFACE SEEDING (UNLESS OTHERWISE NOTED)
- EDGE OF EXISTING TREES OR LIMITS OF CLEARING
- SIGN
- FOR LOCATION IN PLAN, SEE SH C-1 — TP TEST PIT
- EXISTING MONUMENT
- EXISTING UTILITY POLE
- NEW UTILITY POLE
- DENOTES ITEMS OR DIMENSIONS TO BE FURNISHED BY EQUIPMENT MANUFACTURERS, PART OF PACKAGE SYSTEM.
- MATCH LINE
- N550.00 / E330.00 — LOCATION BY PLANE COORDINATE SYSTEM (SEE SH C-1 FOR BASE LINE LOCATIONS)

ARCHITECTURAL LEGEND

MATERIAL SYMBOLS

- CONCRETE
- BRICK VENEER
- WOOD IN PLAN
- CMU-SECTION
- CMU-PLAN
- GYPSUM WALL BOARD
- RIGID INSULATION
- PLYWOOD
- ACOUSTICAL TILE
- WOOD, ROUGH CONTINUOUS
- WOOD, ROUGH NON-CONTINUOUS
- WOOD, FINISHED
- STEEL
- BATT INSULATION

SYMBOL LEGEND

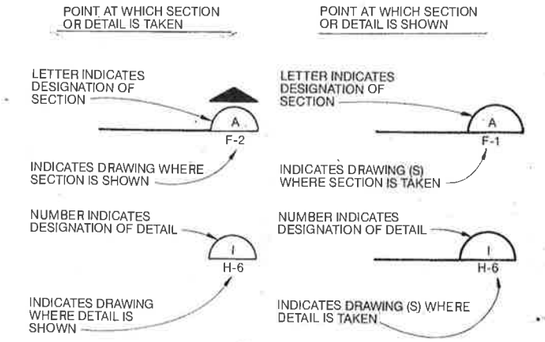
- 102 — ROOM NUMBER
- (102) — DOOR NUMBER
- W-3 — WINDOW NUMBER
- A — COLOR
- F. EXT. — FIRE EXTINGUISHER
- ACTIVE / INACTIVE — INDICATES PAIR OF DOORS
- PARTITION TYPE

SECTION AND DETAIL DESIGNATION

431 — NUMBER DESIGNATES STANDARD DETAIL NUMBER (SEE STANDARD DETAIL SHEETS)

DETAIL NUMBER	GROUP	SEE SHEETS
1-99	ARCHITECTURAL	A-9, A-10
200-299	STRUCTURAL	S-25 THRU S-29
300-399	MECHANICAL	M-29 THRU M-34
400-499	ELECTRICAL	E-22, E-23
600-699	INSTRUMENTATION & CONTROL	I-58, I-59

3 — NUMBER 1 TO 16 DESIGNATES PIPE FITTING SYMBOL (SEE SHEET G-4)



NOTES:

1. SYMBOL, LEGEND, AND USE IDENTIFICATION WHICH ARE SHOWN ON THIS DRAWING ARE FOLLOWED THROUGHOUT THE PLANS WHENEVER APPLICABLE. ALL OF THE VARIOUS SYMBOLS, LEGENDS AND USE IDENTIFICATIONS ARE NOT NECESSARILY UTILIZED IN THE PROJECT.
   STANDARD DETAIL NUMBERS ARE NOT CONTINUOUS ON THE STANDARD DETAIL SHEETS. SOME NUMBERS ARE NOT USED.
2. SEE SHEET I-1 FOR I & C LEGEND.
3. SEE SHEET E-1 FOR ELECTRICAL LEGEND.

RECORD DRAWINGS

Revisions Drawn by CMB Date 8/90

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SKAGIT COUNTY P.U.D.
SKAGIT WATER TREATMENT PLANT

LEGEND
CIVIL, ARCH, & HVAC

SHEET	G-3
DWG NO.	3
DATE	JAN. 1988
PROJ NO.	S21482.A1

O.I.NO. CONTRACT NO. SCREEN

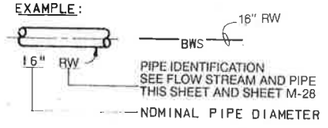
PIPE AND FITTING SYMBOLS

DOUBLE LINE | SINGLE LINE

- WELDED JOINT
- FLANGED JOINT
- MECHANICAL JOINT
- PUSH-ON
- FLANGED COUPLING ADAPTER
- FLEXIBLE COUPLING
- FLEXIBLE COUPLING WITH THRUST TIES SEE STANDARD DETAIL (310)
- ELBOW UP
- ELBOW DOWN
- TEE UP
- TEE DOWN
- LATERAL UP
- LATERAL DOWN
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- UNION

PIPING DESIGNATION

EXAMPLE:



PIPE FITTING SYMBOLS

1. 90° ELBOW
2. 90° LONG RADIUS ELBOW
3. 90° REDUCING ELBOW
4. 45° ELBOW
5. 22-1/2° ELBOW
6. 11-1/4° ELBOW
7. 90° SIDE OUTLET ELBOW
8. TEE
9. FLEXIBLE COUPLING
10. CROSS
11. WYE
12. WYE (TRUE)
13. CONCENTRIC REDUCER
14. ECCENTRIC REDUCER
15. BLIND FLANGE
16. FLANGED COUPLING ADAPTER OR FLEXIBLE COUPLING W/THRUST TIES PER (310)

VALVE SYMBOLS

- FIRE HYDRANT
- GATE
- SHEAR GATE
- BUTTERFLY
- GLOBE
- BALL
- VEE BALL
- SEAT PORT
- ECCENTRIC PLUG
- PLUG OR COCK
- NEEDLE
- DIAPHRAM
- PINCH
- WAFER CHECK
- SWING CHECK
- BALL CHECK
- HOSE VALVE (HV-X) X = NO. IN SPECS
- NON FREEZE HOSE VALVE X = NO. IN SPECS
- SAMPLE
- PRESSURE RELIEF
- AIR AND/OR VACUUM RELEASE
- REGULATED SIDE
- PRESSURE CONTROL
- SOLENOID

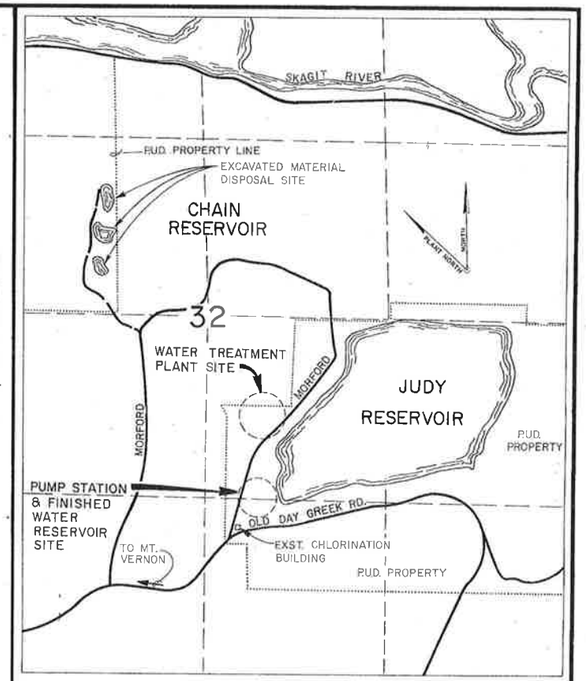
MISCELLANEOUS PIPING SYMBOLS

- 40.00 — PIPE CENTERLINE ELEVATION
- HOSE RACK
- FD-X — FLOOR DRAIN (FD-X) X= NO. IN SPECS
- CO — CLEANOUT
- FCO — FLOOR CLEANOUT
- HD — HUB DRAIN
- STRAINER
- SIGHT GLASS
- FLEXIBLE (ELASTOMER) PIPE CONNECTION
- UNION
- PRESSURE GAUGE WITH COCK, SEE (360)
- ROTAMETER
- VALVE OPERATOR LOCATION
- PS 26-1-2 — TYPICAL INSTRUMENT SYMBOL (SEE I&C LEGEND)

MECHANICAL LEGEND AND NOTES

GENERAL PIPING NOTES

1. LAY PIPE TO UNIFORM GRADE BETWEEN INDICATED ELEVATION POINTS.
2. SIZE OF FITTINGS SHOWN ON DRAWINGS SHALL CORRESPOND TO ADJACENT STRAIGHT RUN OF PIPE UNLESS OTHERWISE INDICATED. TYPE OF JOINT AND FITTING MATERIAL SHALL BE THE SAME AS SHOWN FOR ADJACENT STRAIGHT RUN OF PIPE.
3. LOCATION AND NUMBER OF PIPE HANGERS AND PIPE SUPPORTS SHOWN IS ONLY APPROXIMATE. FINAL SUPPORT REQUIREMENTS SHALL BE DETERMINED IN THE FIELD AND APPROVED BY THE ENGINEER PRIOR TO INSTALLATION. MAXIMUM SPACING SHALL BE AS SPECIFIED.
4. ALL JOINTS SHALL BE WATERTIGHT. STANDARD WALL PIPE DETAILS AS SHOWN ON THE DRAWINGS SHALL BE USED WHEREVER PIPING PASSES FROM A STRUCTURE TO BACKFILL.
5. ALL FLEXIBLE CONNECTORS OR FLANGED COUPLING ADAPTERS SHALL BE PROVIDED WITH THRUST TIES, BLOCKS, OR ANCHORS, UNLESS OTHERWISE NOTED. THRUST PROTECTION SHALL BE ADEQUATE FOR TEST PRESSURES SPECIFIED.
6. SYMBOLS, LEGENDS, AND PIPE USE IDENTIFICATIONS SHOWN SHALL BE FOLLOWED THROUGHOUT THE DRAWINGS WHEREVER APPLICABLE. ALL OF THE VARIOUS PIPING APPLICATIONS ARE NOT NECESSARILY USED IN THE PROJECT.
7. ALL BURIED PIPING SPECIFIED TO BE PRESSURE TESTED, EXCEPT FLANGED, WELDED, OR SCREWED PIPING SHALL BE PROVIDED WITH CONCRETE THRUST BLOCKS AT ALL DIRECTION CHANGES, UNLESS OTHERWISE NOTED. SEE THRUST DETAILS AND NOTES ON SH M-30.
8. NUMBER AND LOCATION OF UNIONS SHOWN ON DRAWINGS IS ONLY APPROXIMATE. PROVIDE ALL UNIONS NECESSARY TO FACILITATE CONVENIENT REMOVAL OF VALVES AND MECHANICAL EQUIPMENT.
9. WHERE A FLANGED COUPLING ADAPTER IS SHOWN A STANDARD FLANGE SHALL BE USED TO JOIN THE COUPLING ADAPTER.
10. THE SPECIFICATIONS HAVE PRECEDENCE OVER THE DRAWINGS REGARDING CONFLICTS BETWEEN JOINT AND VALVE TYPES SHOWN AND SPECIFIED.



LOCATION MAP

NTS

EXCAVATED MATERIAL DISPOSAL SITE

FLOW STREAM AND PIPING LEGEND

A	AIR
AL	ALUM
AM	AMMONIA LIQUID
BWS	BACKWASH SUPPLY
BWW	BACKWASH WASTE
C	CARBON SLURRY
CAP	COAGULANT AID POLYMER
CD	CHEMICAL DRAIN
CD	CONDENSATE DRAIN
CDS	CHLORINE DIOXIDE SOLUTION
CGP	CHLORINE GAS (PRESSURE)
CGV	CHLORINE GAS (VACUUM)
CS	CHLORINE SOLUTION
D	DRAIN
DW	DEIONIZED WATER
FAP	FILTER AID POLYMER
FE	FILTER EFFLUENT
FI	FILTER INFLUENT
FTW	FILTER TO WASTE
FW	FINISHED WATER
HW	HOT WATER
LC	LIQUID CAUSTIC
NAC	SODIUM CHLORITE SOLUTION
OF	OVERFLOW
PE	PLANT EFFLUENT
RC	RECYCLE
RD	ROOF DRAIN
RW	RAW WATER
SS	SANITARY SEWER (GRAVITY)
SA	SAMPLE
SL	SLUDGE
SD	STORM DRAIN OR CULVERT
SPD	SUMP PUMP DISCHARGE
SW	SURFACE WASH
TW	TREATED WATER
UD	UNDERDRAIN (FOUNDATION)
V	VENT
VTR	VENT THRU ROOF
W1	NO. 1 (POTABLE) WATER
W2	NO. 2 (UNPOTABLE) WATER
WLC	WASTE LIQUID CAUSTIC
WR	HOT WATER SUPPLY
WS	HOT WATER RETURN

RECORD DRAWINGS

Revisions Drawn by CMB Date 8/90

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NORMAN C. WARD — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

CH2M HILL

DSGN J. MILLER					
DR R.K. LATTA					
CHK S. TRUSLER					
APVD N. WARD	NO.	DATE	REVISION	BY	APVD
		8/90	RECORD DRAWING	CMB	PM

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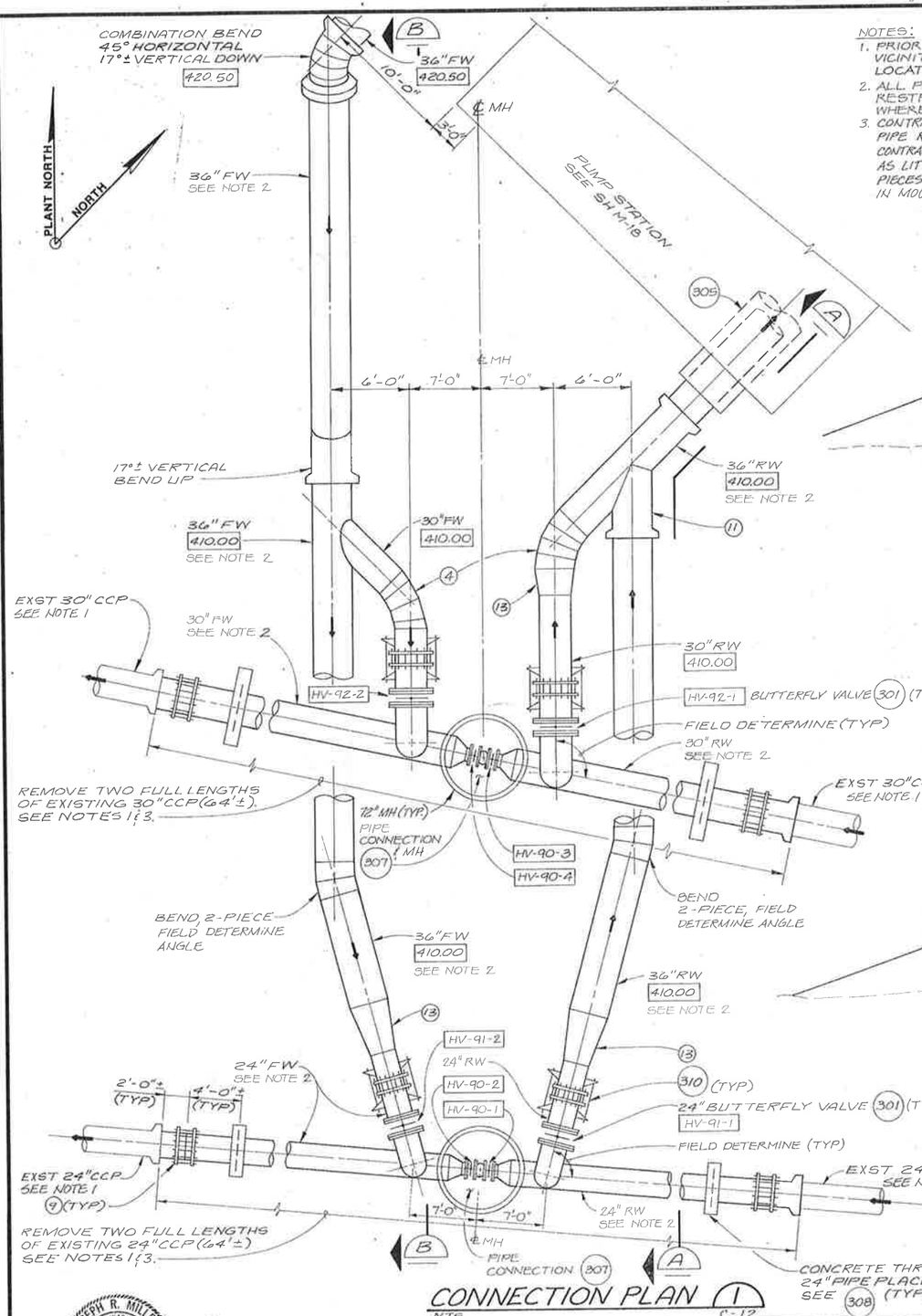
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SKAGIT COUNTY P.U.D.
SKAGIT WATER TREATMENT PLANT

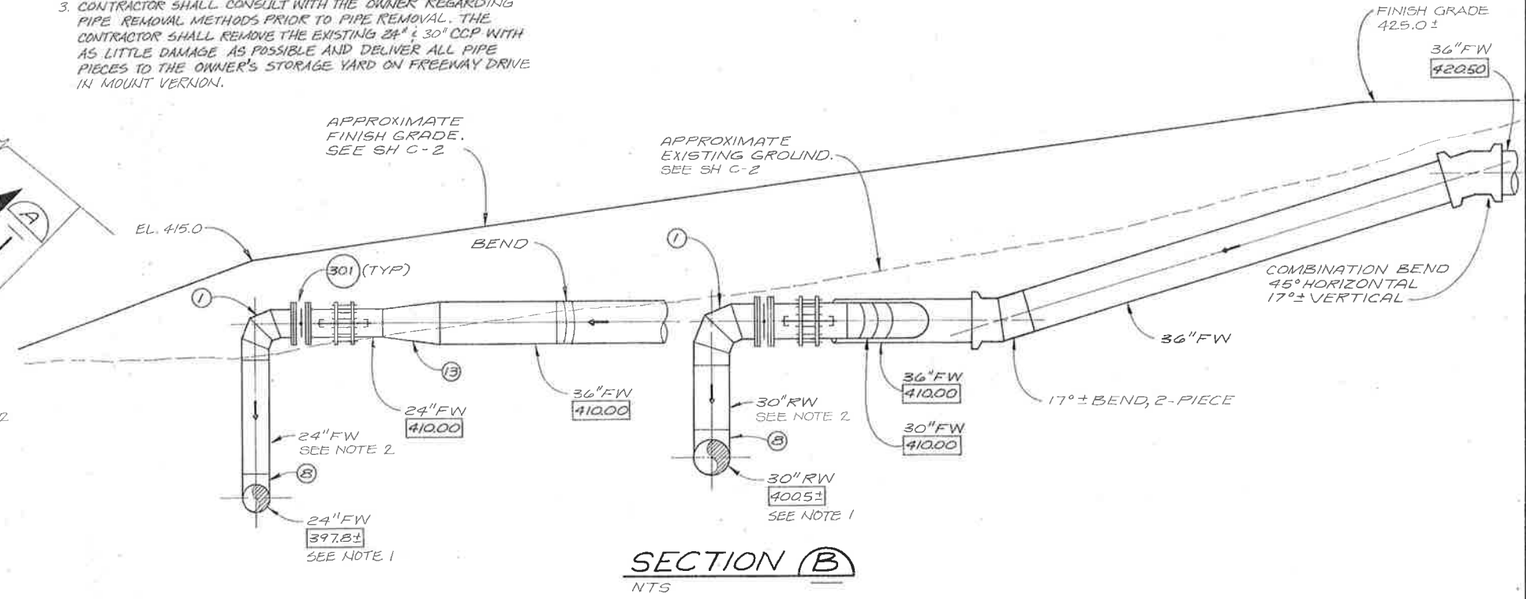
LEGEND MECHANICAL

SHEET	G-4
DWG NO.	4
DATE	JAN. 1988
PROJ NO.	S21482.A1

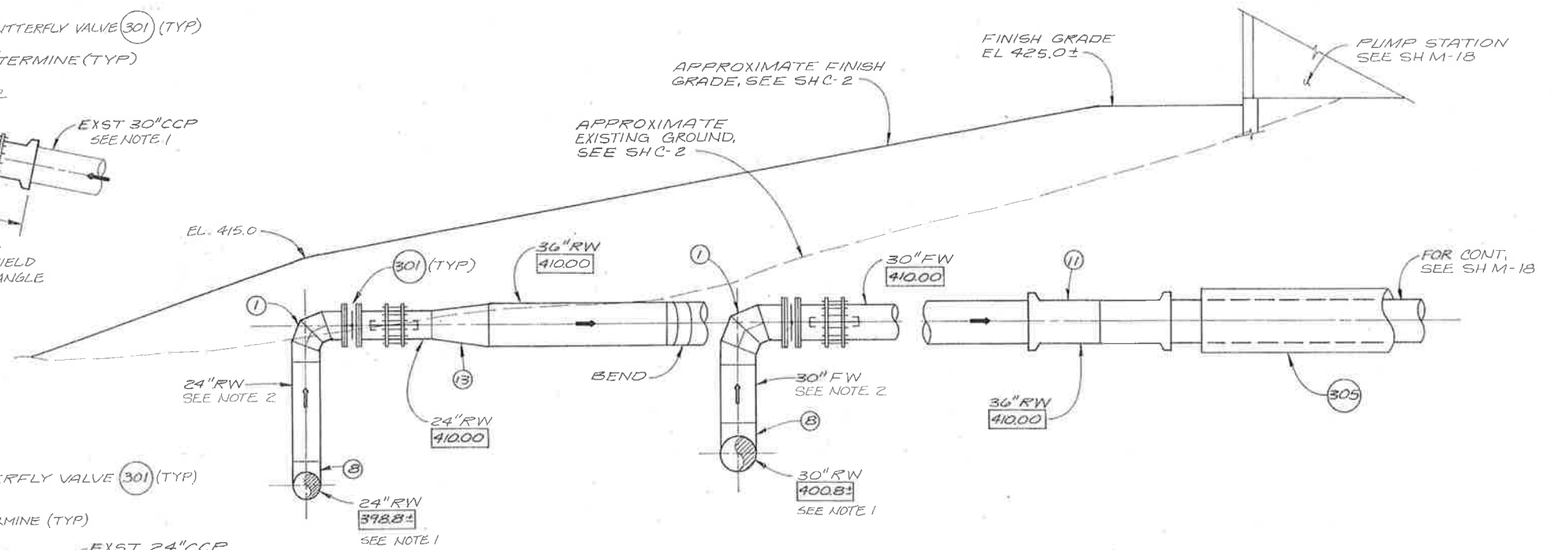
NOTES:
1. PRIOR TO PIPE FABRICATION, EXPOSE EXISTING JOINTS IN VICINITY OF PROPOSED CONNECTION TO DETERMINE LOCATION OF FITTINGS, JOINTS AND PIPE ANGLES.
2. ALL PIPE AND FITTING JOINTS, SHALL BE WELDED RESTRAINED JOINTS AS SPECIFIED, EXCEPT WHERE FLANGES OR COUPLINGS ARE SHOWN.
3. CONTRACTOR SHALL CONSULT WITH THE OWNER REGARDING PIPE REMOVAL METHODS PRIOR TO PIPE REMOVAL. THE CONTRACTOR SHALL REMOVE THE EXISTING 24" & 30" CCP WITH AS LITTLE DAMAGE AS POSSIBLE AND DELIVER ALL PIPE PIECES TO THE OWNER'S STORAGE YARD ON FREEWAY DRIVE IN MOUNT VERNON.



CONNECTION PLAN 1
NTS
C-12



SECTION B
NTS



SECTION A
NTS

RECORD DRAWINGS

Revisions Drawn by MS Date 8/90

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JOSEPH R. MILLER — STATE OF WASHINGTON — 16423 — REGISTERED PROFESSIONAL ENGINEER

CH2MHILL

DSGN	J. MILLER
DR	CM BLACKWELL
CHK	S. TRUSLER
APVD	N. WARD

NO.	DATE	REVISION	BY	APVD
1	8/90	RECORD DRAWING	MS	PM

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SKAGIT COUNTY P.U.D.
SKAGIT WATER TREATMENT PLANT

YARD PIPING — DETAILS

SHEET	C-15
DWG NO	21
DATE	JAN. 1988
PROJ NO.	S21482.A1

1 SERVICE	LEGEND	2 TEST PRESSURE OR HEAD AND TYPE (X-Y)	SIZE (IN)	3 PIPE MATERIAL	SPEC NO.	4 5 INSTALLATION	REMARKS
ALUM	AL	75 PSI-P	≤ 4	PVC	15400	I	
AMMONIA LIQUID	AM	75 PSI-H	≤ 4	PVC	15400	I	
BACKWASH SUPPLY	BWS	100 PSI-H	20-30 24	WS CCP	15002	I B	6 8 11
BACKWASH WASTE	BWW	30 FT-H	30-36 36	WS CCP	15002	C,I B	6 11
CULVERT	CMP	NONE	24	CMP	2601	B	
COAGULANT AID POLYMER	CAP	75 PSI-H	≤ 4	PVC	15400	I	
CHEMICAL DRAIN	CD	SEE REMARKS	≤ 6	PP	15400	I,C,B	TEST AS REQUIRED BY PLUMBING CODE
CHLORINE DIOXIDE SOLUTION	CDS	75 PSI-H	≤ 4	PVC	15400	I	
CHLORINE GAS (VACUUM)	CGV	50 PSI-P	≤ 1	BS PVC	15400	IN CHASES I	
CHLORINE SOLUTION	CS	75 PSI-H	≤ 4	PVC	15400	I	
DRAIN	D	SEE REMARKS	≤ 4 4-18 6-8 18	CISP PVC DI WS	15400 15002 15002 15002	UNDER STRUCTURES B UNDER STRUCTURES C	INSULATE INSIDE TEST AS REQUIRED BY PLUMBING CODE
FILTER AID POLYMER	FAP	75 PSI-H	≤ 4	PVC	15400	I	
FILTER EFFLUENT	FE	28 FT-H	24-48	WS	15002	I	8 11
FILTER INFLUENT	FI	6 FT-H	48	WS	15002	I	8 11
FUEL OIL	FO	5 PSI-P	≤ 4	BS	15605	B,I	
FILTER TO WASTE	FTW	25 FT-H	8-16	WS	15002	I	8 11
FINISHED WATER	FW	30 PSI-H	18-36	WS CCP	15002	C B	6
HOT WATER	HW	150 PSI-H	≤ 1	C	15400	I	INSULATE ALL PIPES
LIQUID CAUSTIC	LC	75 PSI-H	≤ 4	CPVC	15400	I,O	
SODIUM CHLORITE SOLUTION	NAC	75 PSI-H	≤ 4	PVC	15400	I	
OVERFLOW	OF	9	12-18 18 30-36	PVC WS RCP	15002	B C B	
PLANT EFFLUENT	PE	30 PSI-H	36-48	WS CCP	15002	C,I B	6 8 11
RECYCLE	RC	50 PSI-H	≤ 12 12	SST DI	15002	S B	7
RAW WATER	RW	10	12-36 24-36 24	WS CCP DI	15002	I,C B C,S	6 8 11
SANITARY SEWER (GRAVITY)	SS	SEE REMARKS	≤ 4	PVC	15002	B	TEST AS REQD BY PLUMBING CODE
SAMPLE	SA	50 PSI-H	≤ 2	PVC	15400	ALL LOCATIONS	INSULATE WHEN OUTSIDE EXPOSED
STORM DRAIN	SD	NONE REQUIRED	4-6 8-12	CISP PVC	15400 15002	B	
SURFACE WASH	SW	150 PSI-H	3-10 4-6	DI SST	15002 15002	B,I S	7
TREATED WATER	TW	75 PSI-H	24	WS	15002	I	8 11
UNDERDRAIN FOUNDATION)	UD	NONE REQUIRED	4	PVC	15002	B	SLOTTED
VENT (PROCESS)	V	SEE REMARKS	≤ 4	SEE REMARKS	15400	I,O	SAME AS ADJACENT PIPE
VENT THRU ROOF	VTR	SEE REMARKS	≤ 4	CISP	15400	I,O	TEST AS REQUIRED BY PLUMBING CODE
NO. 1 WATER (POTABLE)	W1	150 PSI-H	≤ 3 4-10	C DI	15400 15002	I,B B,I	7 INSULATE AS SPECIFIED
NO. 2 WATER (NON POTABLE)	W2	150 PSI-H	≤ 3 4-8	C DI	15400 15002	I,B I,B	7
WASTE LIQUID CAUSTIC	WLC	SEE REMARKS	≤ 4	PVC	15400	B,I	TEST AS REQUIRED BY PLUMBING CODE

NOTES:

1. LABEL DESIGNATION FOR PIPES. SEE SPECIFICATIONS.
2. X = TEST PRESSURE (PSI) OR TEST HEAD (FT)
   Y = PNEUMATIC (P) OR HYDROSTATIC (H).
3. CMP – CORRUGATED METAL PIPE
   C – COPPER
   DI – DUCTILE IRON
   CCP – CONCRETE CYLINDER PIPE
   CISP – CAST IRON SOIL PIPE
   CPVC – CHLORINATED POLYVINYL CHLORIDE
   PVC – POLYVINYL CHLORIDE
   PP – POLYPROPYLENE
   RCP – REINFORCED CONCRETE PIPE
   SST – STAINLESS STEEL
   BS – BLACK STEEL
   WS – WELDED STEEL
4. B – BURIED
   I – INSIDE EXPOSED (HEATED)
   O – OUTSIDE EXPOSED (UNHEATED)
   C – ENCASED IN CONCRETE (UNDER STRUCTURES)
   S – SUBMERGED (WATER HOLDING BASINS)
5. PROVIDE PIPE LABELS PAINTING AND FLOW DIRECTION ARROWS FOR ALL EXPOSED (I & O) PIPE. SEE SPECIFICATIONS. ALL EXPOSED PIPE SHALL BE PAINTED AS SPECIFIED.
6. PRETENSIONED CONCRETE CYLINDER PIPIE AND FITTINGS REQUIRE WELDED RESTRAINED JOINTS AS SPECIFIED.
7. BURIED DUCTILE IRON PIPE AND FITTINGS REQUIRE RESTRAINED JOINTS (RJ) AS SPECIFIED AND AS IDENTIFIED ON THE DRAWINGS.
8. EXPOSED WELDED STEEL PIPING REQUIRE THRUST RESTRAINT WITH THRUST RODS AS SHOWN ON DETAIL (310).
9. FOR OVERFLOW TEST BY PLUGGING OUTLET AND FILLING TO TOP OF INLET.
10. FOR RAW WATER TEST AT
    50 PSI-H AT PUMP SUCTION
    75 PSI-H AT PUMP DISCHARGE
11. EXPOSED WELDED STEEL ELBOWS SHALL BE SMOOTH BUTT WELDED TYPE AS SPECIFIED.
12. FOR LC IN SCRUBBER ROOM AND OUTSIDE, PIPE MATERIAL SHALL BE CPVC. FOR LC AT OTHER LOCATIONS, PIPE MATERIAL SHALL BE PVC.

RECORD DRAWINGS

Revisions Drawn by CMB Date 8/90

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Joseph R. Miller, 15403, Registered Professional Engineer

CH2MHILL

DSGN	DR	CHK	APVD	NO.	DATE	REVISION	BY	APVD
J. MILLER	R.K. LATTA	S. TRUSLER	N. WARD	1 17	8/90 7/19/89 2/5/88	RECORD DRAWING CHANGE ORDER 29A ADDENDUM NO 1	CMB	PM

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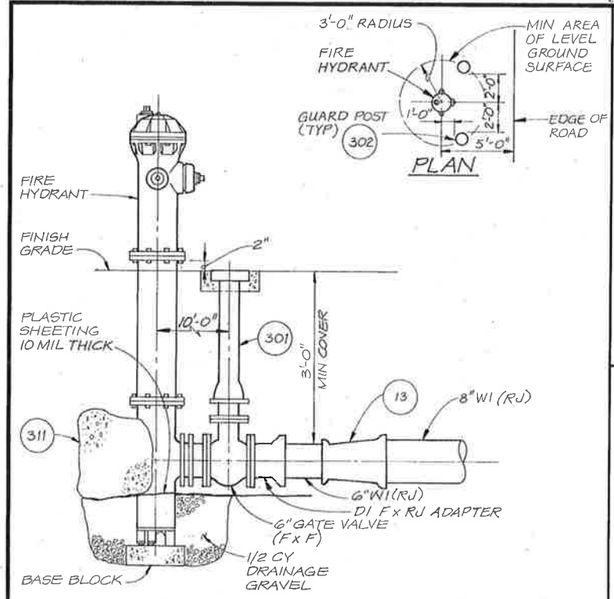
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SKAGIT COUNTY P.U.D.
SKAGIT WATER TREATMENT PLANT

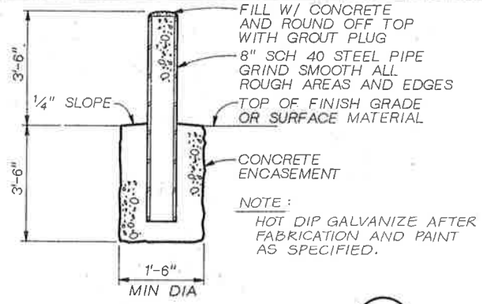
PIPING SCHEDULE

SHEET M-28
DWG NO. 93
DATE JAN. 1988
PROJ NO. S21482.A1



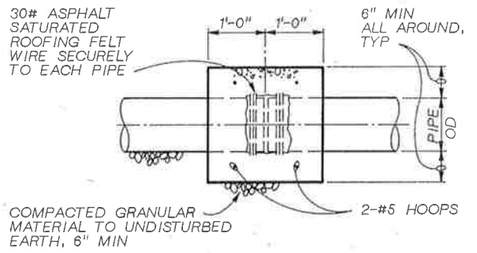
FIRE HYDRANT 300

NTS



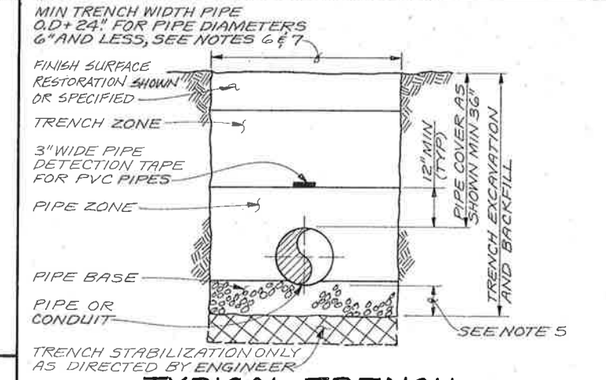
GUARD POST 302

NTS



CONCRETE CLOSURE COLLAR 303

NTS



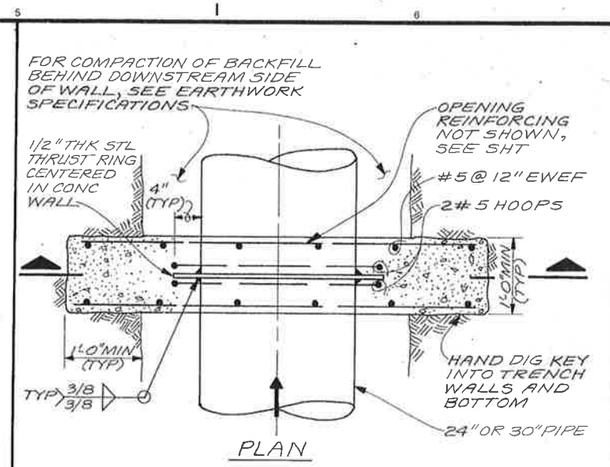
TYPICAL TRENCH

NOTES:

1. TRENCH DETAIL DOES NOT APPLY TO UNDERDRAIN PIPES.
2. ACTUAL SLOPE OF TRENCH SIDES ABOVE TOP OF PIPE TO BE DETERMINED BY CONTRACTOR TO FIT METHOD OF CONSTRUCTION AND ALL SAFETY REQUIREMENTS.
3. COMPACT MATERIAL IN TRENCH ZONE AS REQUIRED BY SPECIFICATIONS DEPENDING UPON FINISHED SURFACE CONDITIONS.
4. TRENCHES SHALL PROVIDE SUFFICIENT SPACE TO PLACE AND COMPACT PIPE BASE AND PIPE ZONE MATERIAL AS SPECIFIED; IN ADDITION, TRENCH WIDTH SHALL BE NO LESS THAN SHOWN.
5. FOR PIPES 16 INCHES AND SMALLER PLACE 4 INCHES (MINIMUM) COMPACTED PIPE BASE. FOR PIPES 18 INCHES AND LARGER PLACE 6 INCHES (MINIMUM) PIPE BASE.
6. FOR PIPES AND CONDUIT LESS THAN OR EQUAL TO 6 INCHES BUT GREATER THAN 2 INCHES IN DIAMETER, MINIMUM TRENCH WIDTH SHALL BE 18 INCHES.
7. FOR PIPES 2 INCHES AND SMALLER, MINIMUM TRENCH WIDTH SHALL BE 6 INCHES AND PIPE ZONE SHALL BE BACKFILLED AS SPECIFIED.
8. SEE SPECIFICATIONS.
9. UNDER STRUCTURES, ROADS, SIDEWALKS, OR PARKING AREAS, BACKFILL TRENCH ZONE WITH GRANULAR FILL.

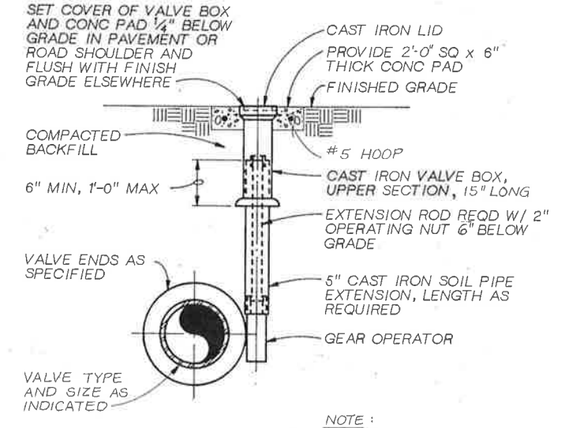
TYPICAL TRENCH BACKFILL 306

NTS



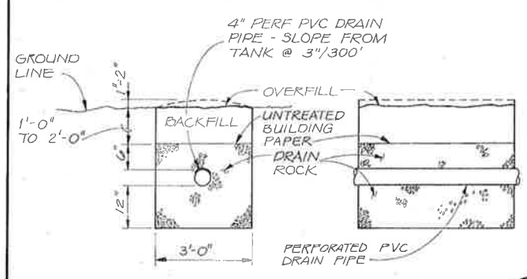
CONCRETE THRUST WALL 308

NTS



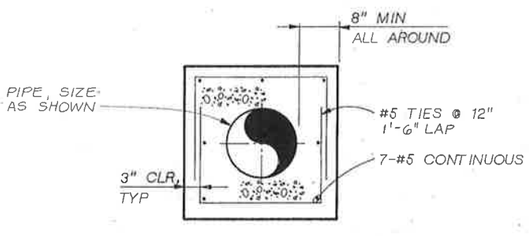
BURIED VALVE BOX 301

NTS



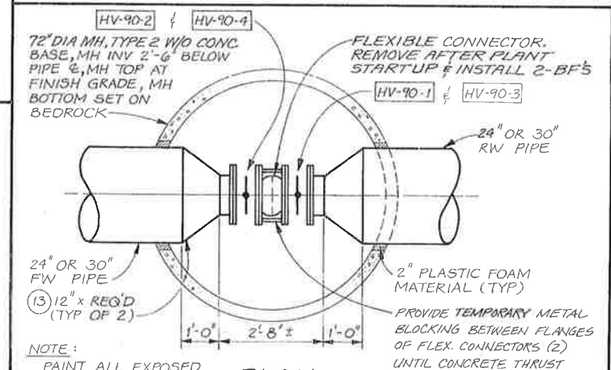
DRAIN FIELD TRENCH 304

NTS



PIPE ENCASEMENT 305

NTS



PIPE CONNECTION 307

1/2" = 1'-0"

RECORD DRAWINGS

Revisions Drawn by CMB Date 8/90

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NOT USED 309

JOSEPH R. MILLER — STATE OF WASHINGTON — 10423 — REGISTERED PROFESSIONAL ENGINEER

CH2MHILL

DSGN	J.R. MILLER
DR	C.S. HOWELL
CHK	S. TRUSLER
APVD	N. WARD

NO.	DATE	REVISION	BY	APVD
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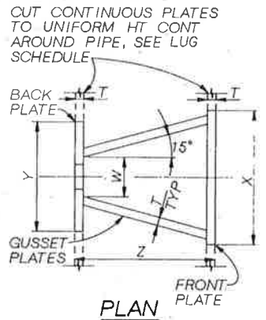
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SKAGIT COUNTY P.U.D.
SKAGIT WATER TREATMENT PLANT

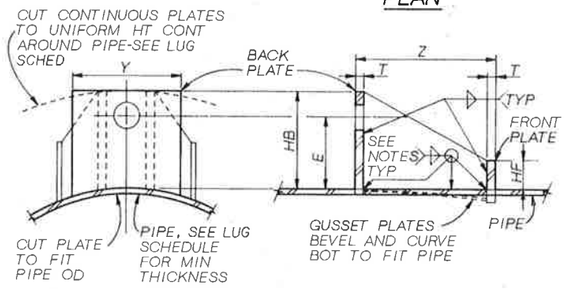
STANDARD DETAILS — MECHANICAL

SHEET NO.	M-29
DWG NO.	94
DATE	JAN. 1988
PROJ NO.	S21482.A1



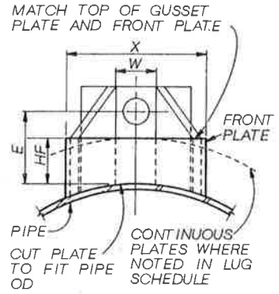
PLAN

LUG SCHEDULE										
STUD DIA	LUG TYPE	T	W	X	Y	Z	HB	E	HF	L
5/8	I	3/8	1-3/8	4-1/16	4-1/2	3-3/8	3-7/8	3	1-3/4	3
3/4	I	3/8	1-1/2	5	4-1/2	5	4-1/8	3-1/8	1-3/4	3
7/8	I	1/2	1-5/8	5-1/2	4-1/2	5-1/8	4-1/4	3-1/8	1-3/4	4
1	II	1/2	1-3/4	5-3/4	Cont	6	4-1/2	3-1/4	2	4
1-1/4	II	5/8	2	7-1/4	Cont	7-5/8	5	3-3/4	2	4
1-1/2	II	3/4	2-1/4	9	Cont	10-1/8	5-1/2	3-7/8	2	4
1-3/4	III	1	2-1/2	Cont	Cont	11-7/8	5-7/8	4	2-1/4	4
2	III	1	2-3/4	Cont	Cont	13-7/8	6-1/4	4-1/4	2-1/2	4



BACK ELEVATION

SECTION

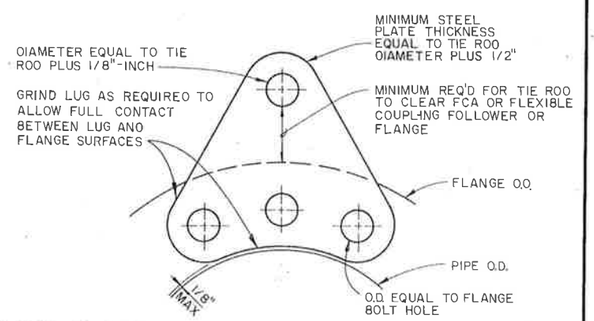


FRONT ELEVATION

TIE ROD LUG FOR WS OR CCP PIPE

NTS

*SEE NOTES	TIE ROD SCHEDULE											
TEST PRESSURE		25 PSI		50 PSI		100 PSI		150 PSI		225 PSI		375 PSI	
PIPE DIAMETER (IN.)	MINIMUM PIPE WALL THICKNESS (IN.)*	TIE RODS		TIE RODS		TIE RODS		TIE RODS		TIE RODS		TIE RODS	
		DIA (IN.)	NO. REQD	DIA (IN.)	NO. REQD	DIA (IN.)	NO. REQD	DIA (IN.)	NO. REQD	DIA (IN.)	NO. REQD	DIA (IN.)	NO. REQD
3,4,6	3/16	5/8	2	5/8	2	5/8	2	5/8	2	5/8	2	5/8	2
8	3/16	5/8	2	5/8	2	5/8	2	5/8	2	5/8	2	3/4	2
10	3/16	5/8	2	5/8	2	5/8	2	5/8	2	3/4	2	7/8	2
12	3/16	5/8	2	5/8	2	5/8	2	5/8	2	3/4	2	7/8	4
14	3/16	5/8	2	5/8	2	3/4	2	3/4	2	3/4	4	1	4
16	3/16	5/8	2	5/8	2	3/4	2	7/8	2	7/8	4	1	4
18	1/4	5/8	2	5/8	2	7/8	2	1	2	1	4	1-1/4	4
20	1/4	5/8	2	3/4	2	7/8	2	7/8	4	1	4	1-1/4	4
22	1/4	5/8	2	3/4	2	3/4	4	7/8	4	1	4	1-1/2	4
24	1/4	5/8	2	3/4	2	7/8	4	1	4	1	6	1-1/2	6
30	1/4	5/8	4	3/4	4	7/8	6	1	6	1	8	1-1/2	8
36	1/4	3/4	4	7/8	4	1	6	1	8	1-1/4	8	1-1/2	10
42	1/4	3/4	4	1	4	1	8	1-1/4	8	1-1/2	8	1-3/4	10
48	5/16	7/8	4	7/8	8	1	10	1-1/4	10	1-1/2	10	1-3/4	12
54	1/4	3/4	4	1	4	1	8	1-1/2	8	1-3/4	8	2	12

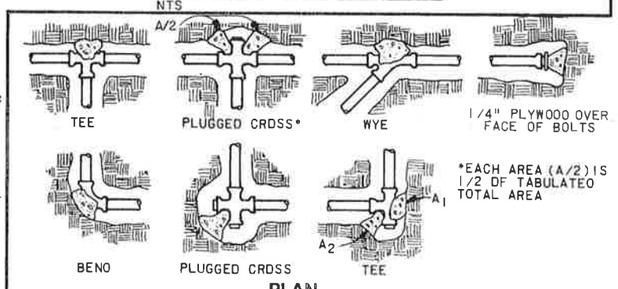


NOTES FOR TIE ROD FLANGE LUG:

1. TIE ROD FLANGE LUGS SHALL BE INSTALLED ON OPPOSITE SIDE OF FLANGES FROM FCA OR FLEXIBLE COUPLING.
2. FOR NUMBER AND SIZE OF TIE RODS SEE TIE ROD SCHEDULE ABOVE.
3. TIE ROD LENGTH SHALL ALLOW NOT LESS THAN 2-INCHES OF THREADS PAST NUT ON EACH END.
4. THREE FLANGE BOLTS SHALL BE USED TO ATTACH EACH FLANGE LUG ON 16-INCH AND LARGER PIPE. TWO FLANGE BOLTS SHALL BE USED ON 14-INCH AND SMALLER PIPE.

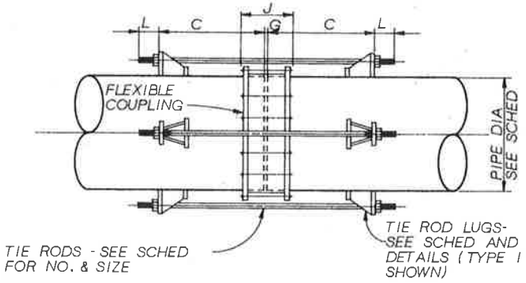
TIE ROD FLANGE LUG

NTS



PLAN

NTS



NOTES FOR FLEXIBLE COUPLING:

1. THE MIDDLE RING LENGTH OF THE FLEXIBLE COUPLING SHALL BE AS SPECIFIED.
2. THE CONTRACTOR SHALL DETERMINE THE LENGTH "J" (COUPLING BOLT LENGTH) FROM MANUFACTURER'S CATALOGS USING THE SPECIFIED MIDDLE RING LENGTH.
3. G = MANUFACTURER'S RECOMMENDED SPACE BETWEEN ENDS OF PIPE.
4. C = J+Z+1 INCH, (ROUND THIS VALUE UP TO NEXT EVEN INCH), MINIMUM. (SEE LUG SCHEDULE FOR Z DIMENSION)
5. TIE ROD LENGTH = 2L+2C+G
6. INSERT FLARED NYLON BUSHING IN LUGS TO ISOLATE TIE RODS AND NUTS FROM PIPE WHERE INSULATED COUPLINGS ARE SHOWN.

NOTES FOR TIE ROD LUG FOR WS OR CCP PIPE:

1. LUG SCHEDULE DIMENSIONS IN INCHES.
2. TIE RODS SHALL CONFORM TO ASTM A193 GRADE B7.
3. NUTS SHALL CONFORM TO ASTM A194 GRADE 2H.
4. PLATE SHALL CONFORM TO ASTM A283 GRADE D.
5. TIE ROD NUTS SHALL BE TIGHTENED GRADUALLY AND EQUALLY IN STAGES TO PREVENT UNEVEN ALIGNMENT AND TO ALLOW EQUAL STRESS ON ALL TIE RODS UNDER PRESSURE. TIGHTEN UNTIL SNUG. THREADS SHALL PROTRUDE FROM NUTS. PEEN THREADS AFTER TIGHTENING NUTS.
6. TIE ROD LUGS SHALL BE SPACED EQUALLY AROUND PIPE.
7. FILLET WELDS SHALL MEET THE MINIMUM REQUIREMENTS OF THE AISC SPECIFICATION EXCEPT AS FOLLOWS: FILLET WELDS SHALL BE 1/4-INCH MINIMUM EXCEPT WHEN WELDING 3/16-INCH PLATE WHERE THEY SHALL BE 3/16-INCH.
8. CATHODIC PROTECTION FOR FLEXIBLE COUPLINGS REQUIRED WHERE NOTED ON PLANS OR IN THE SPECIFICATIONS.
9. CONTRACTOR SHALL USE DATA FOR ONLY THOSE PIPE SIZES AND TEST PRESSURES SPECIFIED IN THIS CONTRACT.
10. LUG TYPE I IS AS SHOWN IN DETAIL. LUG TYPE II HAS A CONTINUOUS BACK PLATE AROUND PIPE. LUG TYPE III HAS CONTINUOUS FRONT AND BACK PLATES AROUND PIPE.
11. TIE RODS SHALL NOT BE ATTACHED TO A PIPE WHEN THE WALL THICKNESS IS LESS THAN THE MINIMUM SHOWN ON THE TIE ROD SCHEDULE.

NOTES FOR THRUST TYING MATERIALS FOR DUCTILE IRON PIPE:

1. THRUST TYING MATERIALS FOR 12" INCH AND SMALLER PIPE SHALL CONSIST OF THRUST TIE RODS THROUGH THE FLANGED COUPLING ADAPTER TO THE NEXT FLANGE SHOWN.
2. THRUST TYING MATERIALS FOR 16"INCH AND LARGER PIPE SHALL CONSIST OF TIE RODS AND FLANGE LUGS.
3. ROD NUMBER AND SIZE SHALL BE SHOWN IN THE ROD SCHEDULE FOR THE TEST PRESSURE SHOWN IN THE PIPING SCHEDULE.
4. THRUST TYING MATERIALS SHALL BE AS SPECIFIED TIE ROD LUGS AND TIE ROD FLANGE LUG.

RECORD DRAWINGS

Revisions Drawn by CMB Date 8/90

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED BY OTHERS. THEY ARE NOT INTENDED TO REPRESENT IN DETAIL THE EXACT LOCATION, TYPE OF COMPONENT NOR MANNER OF CONSTRUCTION. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THE RECORD DRAWINGS.

TYPICAL THRUST TIE DETAIL

NTS

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THRUST BLOCK NOTES AND DETAILS

THRUST BLOCK NOTES

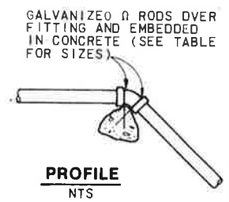
1. KEEP CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
2. CONCRETE THRUST BLOCKING SHALL BE POURED AGAINST UNDISTURBED EARTH.
3. REQUIRED VOLUMES OR BEARING AREAS AT FITTINGS SHALL BE AS INDICATED BELOW, ADJUSTED TO CONFORM TO THE TEST PRESSURE(S) AND ALLOWABLE SOIL BEARING STRESS PER SQUARE FOOT AS SPECIFIED.
4. THRUST BLOCK VOLUMES FOR VERTICAL BENDS HAVING UPWARD RESULTANT THRUSTS ARE BASED ON TEST PRESSURE OF 150 PSIG AND THE WEIGHT OF CONCRETE = 4050 LBS/CU YD. TO COMPUTE VOLUMES FOR DIFFERENT TEST PRESSURES, USE THE FOLLOWING EQUATION: VOLUME = (TEST PRESS./150) x (TABLE VALUE).
5. BEARING AREAS FOR HORIZONTAL BEND THRUST BLOCKS ARE BASED ON TEST PRESSURE OF 150 PSIG AND AN ALLOWABLE SOIL BEARING STRESS OF 2000 LBS/SQ FT. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES, USE THE FOLLOWING EQUATION: BEARING AREA = (TEST PRESS./150) x (2000/SOIL BEARING STRESS) x (TABLE VALUE).
6. THRUST BLOCKS FOR VERTICAL BENDS HAVING DOWNWARD RESULTANT THRUSTS SHALL BE THE SAME AS FOR HORIZONTAL BENDS.
7. BEARING AREAS, VOLUMES, AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER THIS STANDARD.
8. BEARING AREA OF THRUST BLOCK SHALL NOT BE LESS THAN 1.0 SQ.FT.
9. VERTICAL BENDS THAT REQUIRE A THRUST BLOCK VOLUME EXCEEDING 5 CUBIC YARDS REQUIRE SPECIAL BLOCKING DETAILS. SEE PLANS.
10. USE CONCRETE THRUST BLOCKS ONLY WHERE SHOWN OR DIRECTED BY THE ENGINEER.

BEARING AREA OF THRUST BLOCKS IN SQ. FT. (HORIZONTAL BENDS)							
FITTING SIZE	TEE, WYE, PLUG, OR CAP	90° BEND, PLUGGED CROSS	TEE PLUGGED ON RUN		BEND ANGLE		
			A1	A2	45°	22 1/2°	11 1/4°
4	1.0	1.4	1.9	1.4	1.0	-	-
6	2.1	3.0	4.3	3.0	1.6	1.0	-
8	3.8	5.3	7.6	5.4	2.9	1.5	1.0
10	5.9	8.4	11.8	8.4	4.6	2.4	1.2
12	8.5	12.0	17.0	12.0	6.6	3.4	1.7
14	11.5	16.3	23.0	16.3	8.9	4.6	2.3
16	15.0	21.3	30.0	21.3	11.6	6.0	3.0
18	19.0	27.0	38.0	27.0	14.6	7.6	3.8
20	23.5	33.3	47.0	33.3	18.1	9.4	4.7
24	34.0	48.0	68.0	48.0	26.2	13.6	6.8

VOLUME OF THRUST BLOCK IN CUBIC YARDS (VERTICAL BENDS)			
FITTING SIZE	BEND ANGLE		
	45°	22 1/2°	11 1/4°
4	1.1	0.4	0.2
6	2.7	1.0	0.4
8	4.0	1.5	0.6
10	6.0	2.3	0.9
12	8.5	3.2	1.3
14	11.5	4.3	1.8
16	14.8	5.6	2.3

SEE NOTE NO. 9

FITTING SIZE	ROD SIZE	EMBEDMENT
12" AND LESS	# 6	30"
14"-16"	# 8	36"



PROFILE

NTS

THRUST BLOCK DETAIL

NTS

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JOSEPH R. MILLER, STATE OF WASHINGTON, 16023, REGISTERED PROFESSIONAL ENGINEER

CH2M HILL

DSGN J. MILLER
DR R.K. LATTA
CHK S. TRUSLER
APVD N. WARD

NO.	DATE	REVISION	BY	PM
	8/90	RECORD DRAWING	CMB	APVD

REUSE OF DOCUMENTS

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VERIFY SCALES

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

SKAGIT COUNTY P.U.D.
SKAGIT WATER TREATMENT PLANT

STANDARD DETAILS — MECHANICAL

SHEET M-30
DWG NO. 95
DATE JAN. 1988
PROJ NO. S21482.A1

6. Record Drawing for Existing 30-inch-diameter Judy Reservoir Sedro Woolley (JRSW)

NOTES:

1. CONTRACTOR TO INSTALL PERMANENT CONCRETE POSTS, 1'-6" ABOVE GROUND, PAINTED WHITE AND MARKED "WATER" LOCATED @ EACH POINT WHERE THE PIPE LINE ENTERS AND LEAVES THE BPA - RIGHT OF WAY AND @ ANGLE POINTS WITHIN UNPAINTED POSTS BY OWNER. (STA. 7+55 (±); 9+85.98 APPROX.; 17+00.61; 17+26.38; 30+13.92 APPROX.; 32+30)
2. PROVIDE SURFACE WATER DIVERSION DITCHES AS SHOWN IN DETAIL (73 C-9) ACROSS MAIN LINE TRENCH AFTER BACKFILL IS COMPACTED BETWEEN THE FOLLOWING STATIONS:

FROM STA. 32+00 TO 42+00 @ 100' O.C.
FROM STA. 65+00 TO 73+00 @ 100' O.C.
FROM STA. 73+00 TO 78+00 @ 50' O.C.

NOTES:

1. ELEV. ARE U.S.C. & G.S. DATUM
2. FOR CONVERSION TO LAMBERT GRID, ROTATE THESE BEARINGS 0° 52' CLOCKWISE

M.P. – MARKER POST (PAINTED WHITE)

GRAPHIC SCALE

PLAN 0 50 100 200 1" = 100'

PROFILE 0 50 100 200 1" = 100' HORIZ.

0 5 10 20 1" = 10' VERT.

NOTE: FOR PLAN & PROFILE DETAILS OF PIPE LINE SEE SHOP DRAWINGS

No.	Revision	By	Appr.	Date
1	SKAGIT STONEHURST ISSUED FOR CONSTRUCTION	RDH		7-10-69

R. W. BECK and ASSOCIATES

ANALYTICAL AND CONSULTING ENGINEERS

Seattle, Washington — Denver, Colorado

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON

WATER TRANSMISSION LINE
JUDY RES. TO SEDRO WOOLLEY

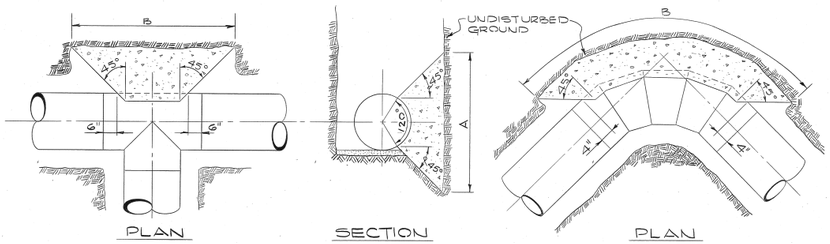
PLAN - PROFILE
PLATE 1 OF 3

LOCATION SURVEY AND BASE MAP by HAROLD P. RADER ASSOC. INC. BURLINGTON, WASHINGTON

DRAWING CONFORMED TO CONSTRUCTION RECORDS
Date 7-31-70 By [illegible]
R. W. Beck and Associates

Des. RDH	Dwn. J.M.	Scale—As Shown	309-C-1.1
Chd. [illegible]	Rev.	Date MAY-15-1969	
App'd. [illegible]		File SW-1165-JS-AAD	

CO. 2159



PLAN SECTION PLAN

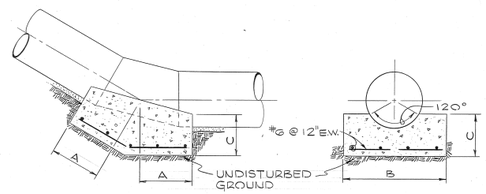
TYPICAL CONCRETE ANCHOR BLOCK DETAIL (1)

NO SCALE

TABLE 1

ANCHOR BLOCKS			
STATION	A x B = AREA REQ'D (SQ.FT.)	STATION	A x B = AREA REQ'D (SQ.FT.)
		58+09.28	4
0+76.24(-)	4	58+20	30
5+94.60	99	58+50	10
9+85.98	31	58+60	30
17+00.81	23.5	70+73.92	23.5
23+11.37	11.5	72+21.92	24.5
43+41.69	29	75+17.96	8.75
47+15.28	47		
49+45	10		
55+80	15 (COMBINED ANCHOR)		

1



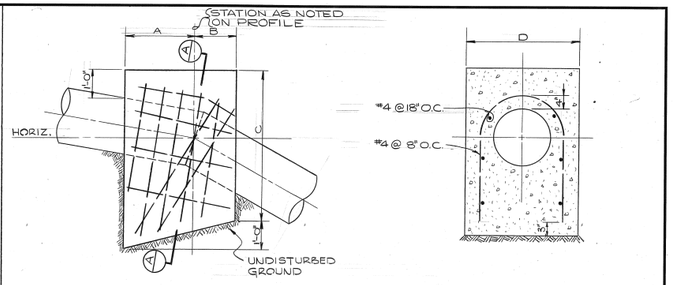
ELEVATION SECTION

TYPICAL CONCRETE THRUST PAD DETAIL (2)

NO SCALE

TABLE 2

THRUST PADS			
STATION	A	B	C
70+65	1'-0"	2'-6"	1'-4"
72+13	1'-1"	3'-0"	1'-4"
76+13	3'-6"	3'-9"	1'-4"
77+35	2'-0"	3'-9"	1'-4"
78+83.25	SPECIAL ANCHOR, SEE DETAIL		



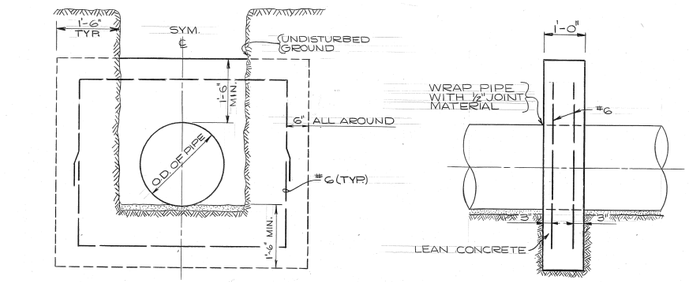
ELEVATION SECTION A-A

TYPICAL CONCRETE THRUST ANCHOR DETAIL (3)

NO SCALE

TABLE 3

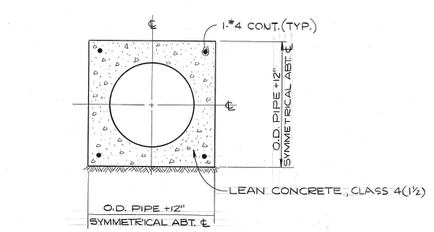
THRUST ANCHORS					
STATION	PIPE DIA.	A	B	C	D
10+50	30"	1'-6"	2'-0"	4'-6"	4'-0"
36+60	30"	1'-6"	2'-0"	4'-6"	4'-0"
69+80	20"	1'-4"	1'-6"	4'-0"	3'-6"
71+50	20"	3'-3"	2'-6"	4'-6"	4'-0"
73+10	20"	2'-10"	2'-0"	5'-0"	5'-0"
75+83	20"	SPECIAL ANCHOR, SEE DETAIL			
78+77	20"				



ELEVATION SECTION

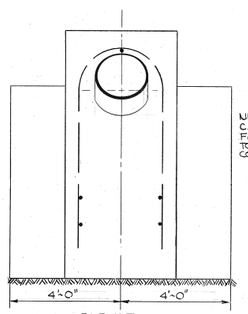
TYP. WATERSTOP DETAIL (4)

SCALE: ¾" = 1'-0"



CONCRETE ENCASEMENT (5)

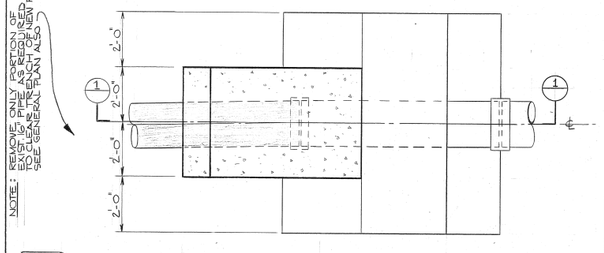
SCALE: ¾" = 1'-0"



ELEVATION

LOOKING NORTH

NOTE: REMOVE ONLY PORTION OF EXIST. 16" PIPE AS REQUIRED (SEE GENERAL PLAN) TO INSTALL NEW PIPE.



PLAN

NEW PIPE

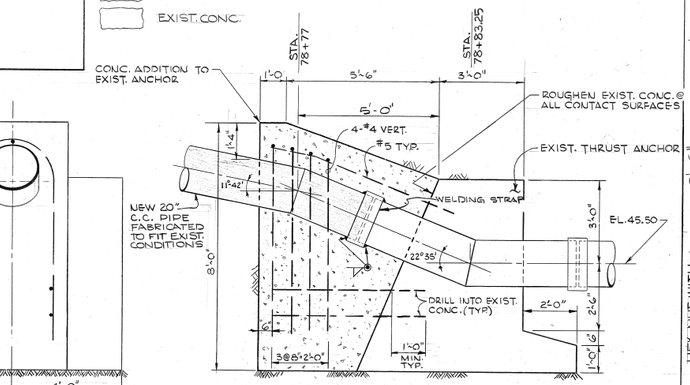
EXIST. PIPE

NEW CONC.

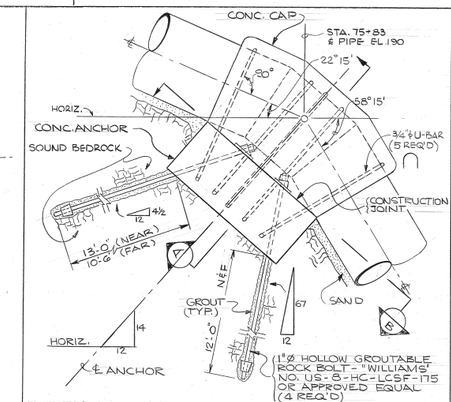
EXIST. CONC.

THRUST ANCHOR STA. 78+77 DETAIL (7, C-3)

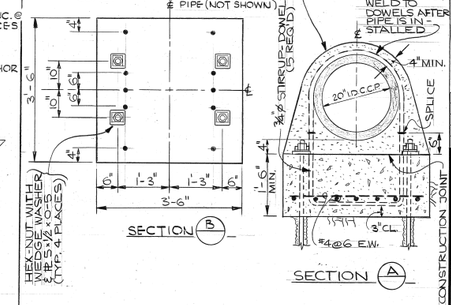
SCALE: ½" = 1'-0"



SECTION 1



NOTE: TEST EACH ROCK BOLT TO 30K LOAD AND BACK-OFF TO 20K BEFORE INSTALLING PIPE & CONC.



SECTION B

SECTION A

THRUST ANCHOR STA. 75+83, DETAIL (6, C-3)

SCALE: ¾" = 1'-0"

GENERAL STRUCTURAL NOTES:

1. TABLES 1 & 2 ARE BASED ON ALLOWABLE SOIL PRESSURE OF 1500 LBS/SQ.FT.
2. AT BENDS WHERE THRUST BLOCKS ARE NOT REQUIRED, BACKFILL SHALL BE MECHANICALLY COMPACTED TO ONE FOOT ABOVE PIPE.
3. DESIGN STRESSES:
   CONCRETE SHALL BE OF THE FOLLOWING STRENGTHS, BASED UPON 28-DAY COMPRESSIVE UNLESS NOTED OTHERWISE ON THE DRAWINGS:
   VERTICAL THRUST ANCHORS, PADS AND STRUCTURAL CONCRETE - 3,000 PSI
   HORIZONTAL THRUST ANCHORS AND CONCRETE PLACED IN SACKS (SANDBAGS) 2,500 PSI
   REINFORCING STEEL - F_y = 40,000 PSI
4. BAR SPLICES SHALL BE LAPPED AT LEAST 24 BAR DIA.
5. COVER FOR RE-BARS (UNLESS NOTED OTHERWISE ON DWGS.)

CONC. PLACED AGAINST EARTH	3"
FORMED SURFACES, EARTHFACE:	
BARS LARGER THAN #5	2"
BARS #5 OR SMALLER	1½"
INSIDE FACES OF WALLS AND SLABS	¾"

DRAWING CONFORMED TO CONSTRUCTION RECORDS

Date 7/31/70 By [illegible]

R. W. Beck and Associates

No.	Revision	By	Appr.	Date
1	REVISED ANCHORS; ISSUED FOR CONSTRUCTION	DJH		7-10-68

R. W. BECK and ASSOCIATES

ANALYTICAL AND CONSULTING ENGINEERS

Seattle, Washington Denver, Colorado

PUBLIC UTILITY DISTRICT NO. 1

SKAGIT COUNTY, WASHINGTON

WATER TRANSMISSION LINE

JUDY RES. TO SEDRO WOOLLEY

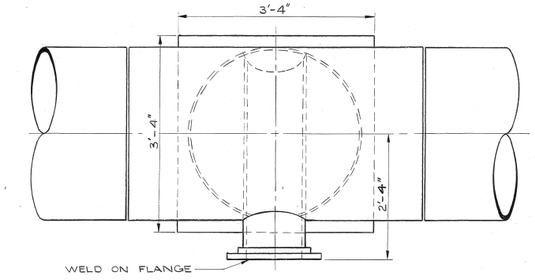
MISCELLANEOUS DETAILS

PLATE 1 OF 3

Des. RJH	Dwn. V.L.W	Scale—As Shown	
Chd.	Rev.	Date MAY-15-1969	309-C-4.1
App'd. 8/1/65		File SW-1165-J5-AAD	

C.O. 2159

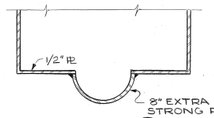
DIETZGEN-POST 100 21118 (3-68)



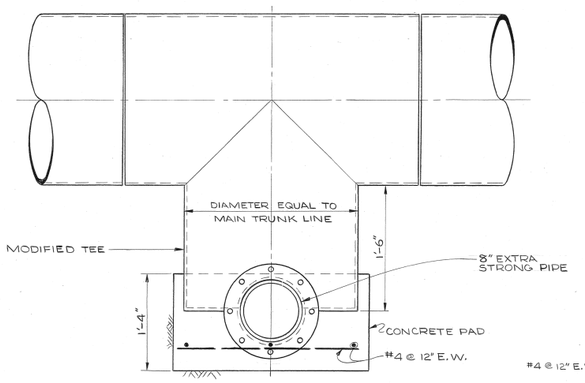
PLAN

NOTES:

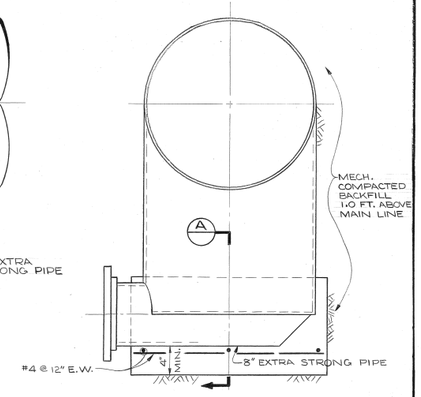
1. ALL BLOW-OFF OUTLETS TO BE COATED WITH SAME MATERIAL AS MAIN LINE.
2. DELETE CONCRETE PAD UNDER BLOW-OFF WHEN THRUST PAD IS REQUIRED.
3. GATE VALVES USED ON BLOWOFFS SHALL BE SUITABLE FOR OPERATION AT THE REQUIRED PRESSURE.



SECTION (A)



ELEVATION



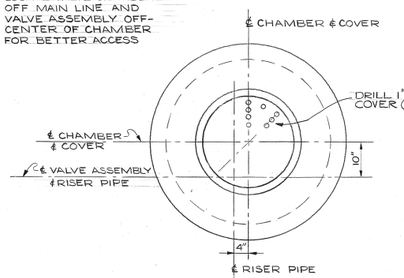
ELEVATION

BLOW-OFF SADDLE CONNECTION DETAIL (8)

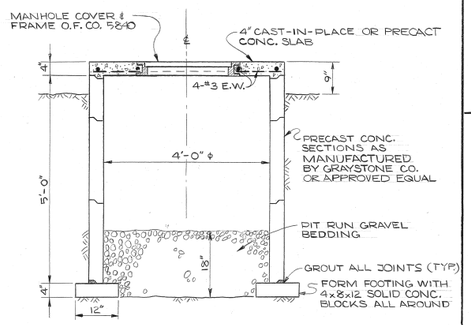
NO SCALE

NOTE
SEE SHOP DWGS FOR AS BUILT CHANGES

NOTE:
LOCATE VALVE CHAMBER OFF MAIN LINE AND VALVE ASSEMBLY OFF-CENTER OF CHAMBER FOR BETTER ACCESS



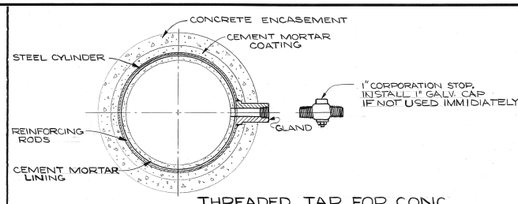
PLAN



ELEVATION

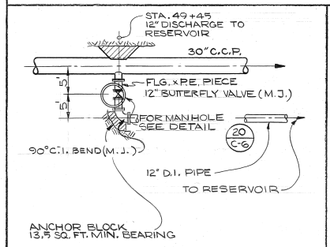
VACUUM & RELIEF VALVE CHAMBER DETAIL (10)

SCALE: 3/4" = 1'-0"



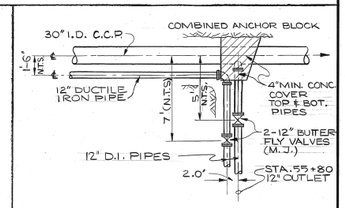
THREADED TAP FOR CONC. CYLINDER PIPE; DETAIL (11)

NO SCALE



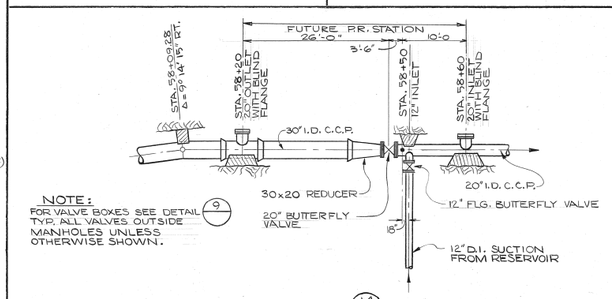
PLAN DETAIL (12) C-2

SCALE: 1" = 10'-0"



PLAN DETAIL (13) C-2

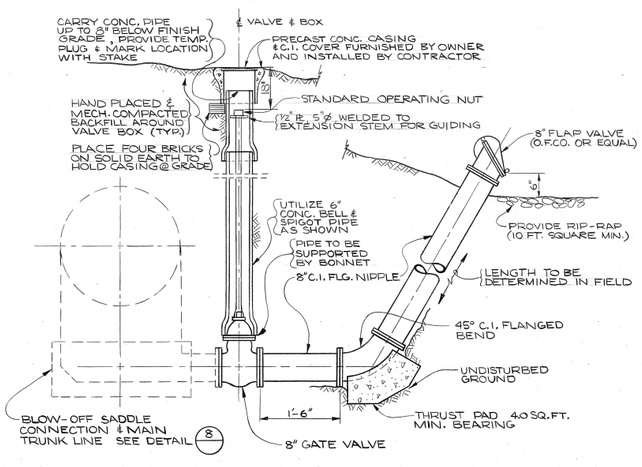
SCALE: 1" = 10'-0"



NOTE:
FOR VALVE BOXES SEE DETAIL (9) TYP. ALL VALVES OUTSIDE MANHOLES UNLESS OTHERWISE SHOWN.

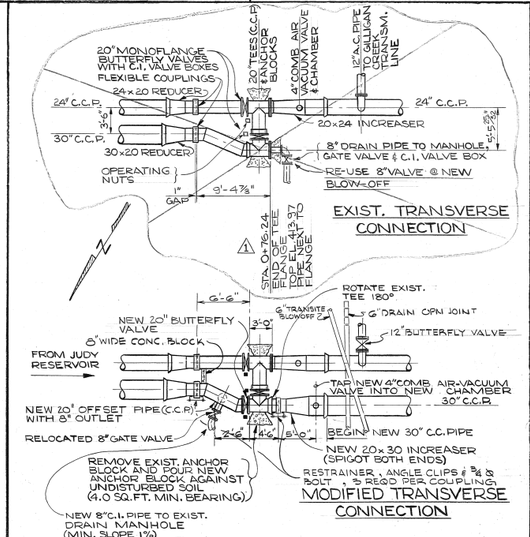
PLAN DETAIL (14) C-2

SCALE: 1" = 10'-0"



BLOW-OFF OUTLET PIPING DETAIL (9)

NO SCALE

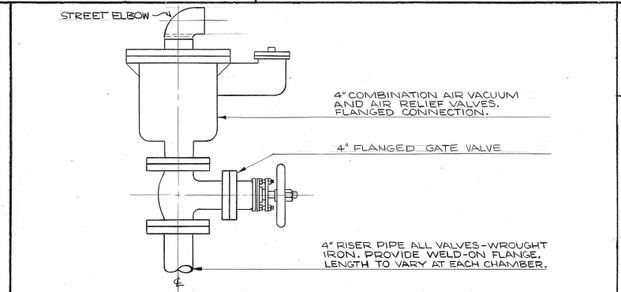


MODIFIED TRANSVERSE CONNECTION

CONNECTION DETAIL (15) C-1

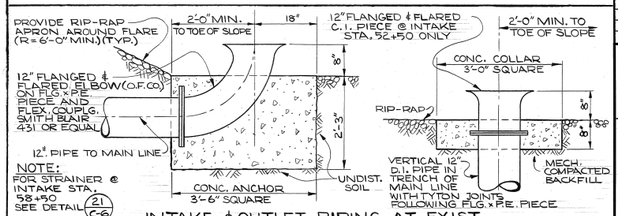
⚠ STA. 0+76.24 (-)

NO SCALE



VACUUM & RELIEF VALVE ASSEMBLY DETAIL (16)

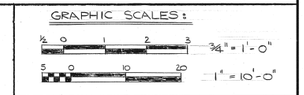
NO SCALE



INTAKE & OUTLET PIPING AT EXIST. RESERVOIRS; DETAIL (17) C-2

SCALE: 3/4" = 1'-0"

GRAPHIC SCALES:



DRAWING CONFORMED TO CONSTRUCTION RECORDS
Date 7/1/70 By [illegible]
R. W. Beck and Associates

No.	Revision	By	Appr.	Date
⚠	REVISED ALIGNMENT; ISSUED FOR CONSTRUCTION	RDW		7-10-69

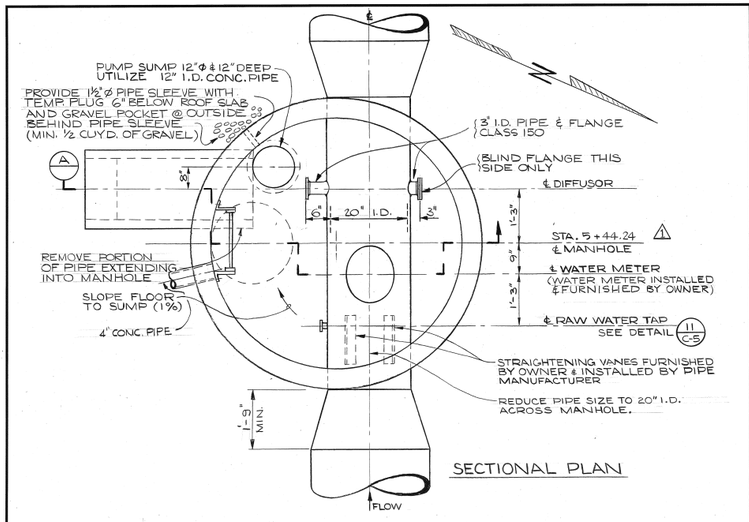
R. W. BECK and ASSOCIATES
ANALYTICAL AND CONSULTING ENGINEERS
Seattle, Washington — Denver, Colorado

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
WATER TRANSMISSION LINE
JUDY RES. TO SEDRO WOOLLEY
MISCELLANEOUS DETAILS
PLATE 2 OF 3

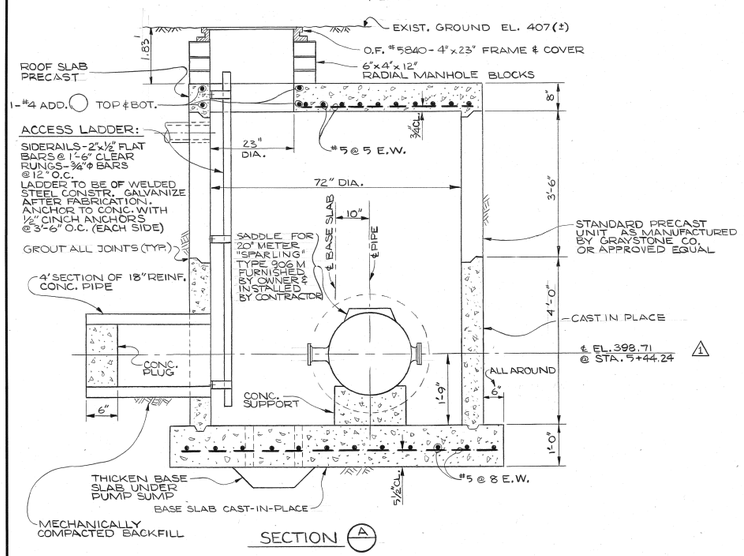
Des. RDH	Dwn. V.L.W	Scale — As Shown	309-C-5.1
Chd. RDW	Rev.	Date MAY-15-1969	
Appd. RDW		File SW-1165-25-AAD	

C.O. 2159

DIETZGEN-POST 100 31118 (3-66)



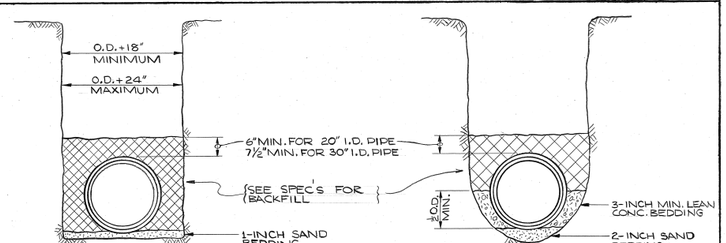
SECTIONAL PLAN



SECTION A

CHLORINATION CHAMBER ; DETAIL 18 C-1

SCALE: ¾"=1'-0"

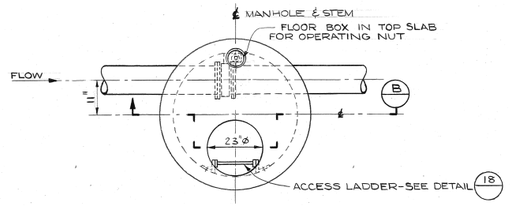


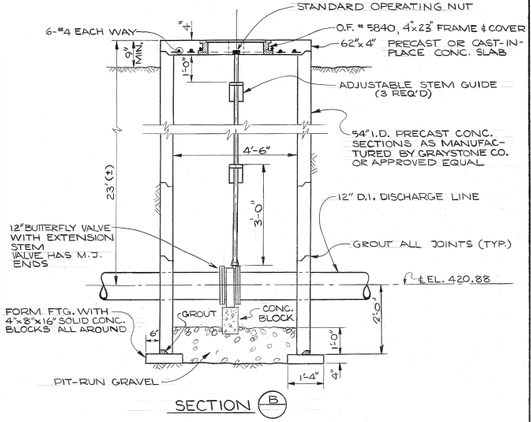
CLASS "C" BEDDING & BACKFILL

CLASS "A" BEDDING & BACKFILL

DETAIL 19

NO SCALE

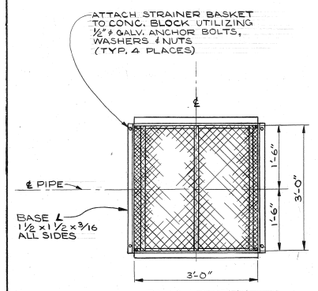




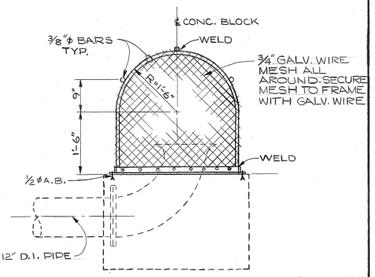
SECTION B

MANHOLE STA. 49+45 ; DETAIL 20 C-5

SCALE: ½"=1'-0"



PLAN VIEW



NOTE: GALVANIZE STRAINER FRAME AFTER FABRICATION.

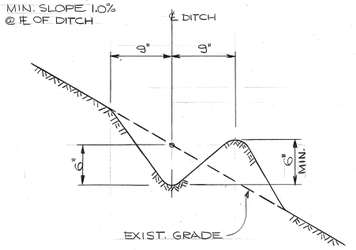
SECURE MESH TO BASE ∠ WITH GALV. WIRE THRU HOLES IN ∠ LEG (TYP. 4 SIDES)

ELEVATION

REMOVABLE STRAINER BASKET @ INTAKE STA. 58+50 ; DETAIL 21 C-5

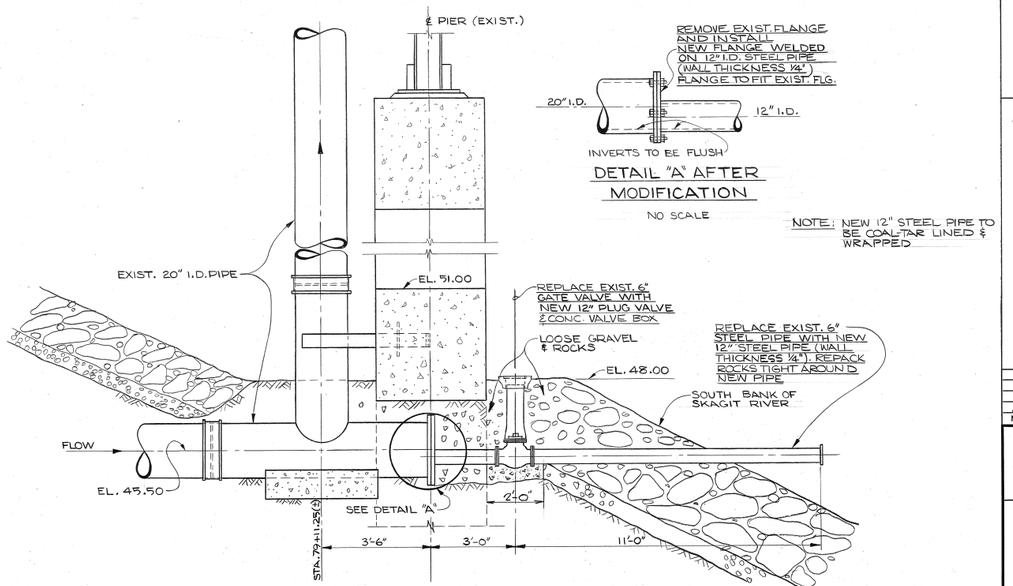
SCALE: ¾"=1'-0"

NOTE: LENGTH OF DITCH 60'(±), O.C. MAIN TRENCH
MIN. SLOPE 1.0% @ ℄ OF DITCH



SECTION THRU SURFACE WATER DIVERSION DITCH ; 23

NO SCALE



DETAIL "A" AFTER MODIFICATION

NO SCALE

NOTE: NEW 12" STEEL PIPE TO BE COAL-TAR LINED & WRAPPED

EXIST. CONNECTION AND MODIFICATION @ SOUTH END SKAGIT RIVER CROSSING; DETAIL 22 C-3

SCALE: ½"=1'-0"

GRAPHIC SCALES:
½" = 1'-0"
¾" = 1'-0"

DRAWING CONFORMED TO CONSTRUCTION RECORDS
Date 9/61 By RCH
R. W. Beck and Associates

No.	Revision	By	Appr.	Date
1	REVISED ALIGNMENT; ISSUED FOR CONSTRUCTION	SDH		7-10-69

R. W. BECK and ASSOCIATES
ANALYTICAL AND CONSULTING ENGINEERS
Seattle, Washington — Denver, Colorado

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
WATER TRANSMISSION LINE
JUDY RES. TO SEDRO WOOLLEY
MISCELLANEOUS DETAILS
PLATE 3 OF 3

Des. RJH	Dwn. VLW	Scale—As Shown	
Ckd. RJH	Rev.	Date MAY-15-1969	309-C-6.1
App'd.		File SW-1165-JS-AAD	

CO. 2139

DISTRICH-PORT 100 21118 (2-68)

7. American Pipe and Construction Company Pipe Layout for Existing 30-inch-diameter JRSW Water Transmission Line

AMERICAN CONCRETE CYLINDER PIPE PROJECT

LOCATION: SEDRO WOOLEY, WASH.
OWNER: PUD No. 1, SKAGIT COUNTY, WASH.
DESCRIPTION: 30" TRANSMISSION MAIN, JUDY RESERVOIR TO SEDRO WOOLEY

INDEX

SHEET No.	DESCRIPTION
1	TITLE SHEET
2	PIPE DESIGN
3-9	LAYOUT

ENGINEER
R. W. BECK & ASSOCIATES
200 TOWER BUILDING
SEATTLE, WASHINGTON

CONTRACTOR
B & B CONTRACTING CORP.
POST OFFICE BOX 226
SEDRO WOOLEY, WASH.

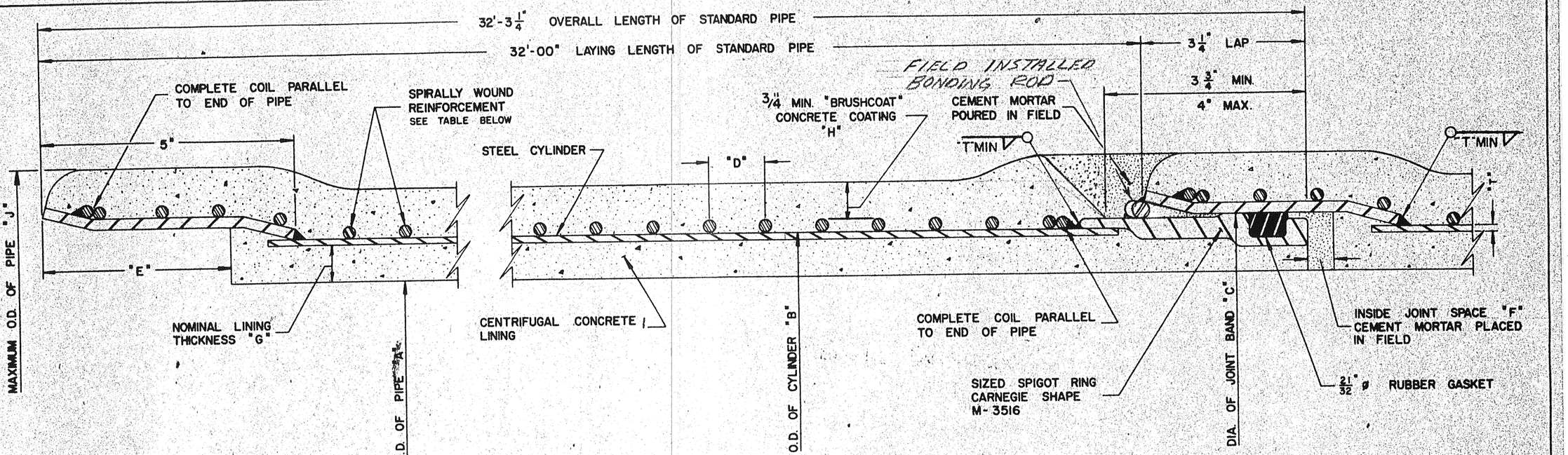
AMERICAN PIPE AND CONSTRUCTION COMPANY

NORTHWEST DIVISION
PORTLAND, OREGON

GENERAL ARRANGEMENT REVIEWED
SHOP DRAWINGS SUITABLE SUBJECT TO CORRECTIONS NOTED, IF ANY
THIS GENERAL REVIEW IS FOR FUNCTION AND ARRANGEMENT ONLY AND DOES NOT RELEASE THE CONTRACTOR FROM FULL COMPLIANCE WITH THE TERMS AND CONDITIONS OF HIS CONTRACT.
R. W. BECK AND ASSOCIATES
ANALYTICAL AND CONSULTING ENGINEERS
WW-1165
W.O. JS-AAM Date 8-15-69 By

F.O. 9-1-0234	Dwg. No. B-3739	Sht. 1 of 9 Shts.

FORM 18-10



ASSEMBLED JOINT SECTION

NOTE:
HOLD COATING FOR BONDING JUMPERS. ALL JOINTS.
SEE D.S. # 28

PRETENSIONED CONCRETE CYLINDER PIPE

MANUFACTURING DATA

I.D. OF PIPE "A"	DESIGN PRESSURE OR CLASS PSI	TOTAL A_s PER LINEAR FOOT SQ. IN.	STEEL CYLINDER					SPIRALLY WOUND REINFORCEMENT				JOINT RING DIAMETER "C"	BELL RING THICKNESS	DEPTH OF SOCKET "E"	NOMINAL LINING THICKNESS "G"	COATING THICKNESS "H"
			O.D. OF CYLINDER "B"	GAGE OR THICKNESS "T"	COIL OR SHEET WIDTH	A_s PER LINEAR FOOT SQ. IN.	PLANT CYL. TEST PRESSURE f_s = 22,000	ROD DIA.	SPACING C TO C "D"	COILS PER LINEAR FOOT	A_s PER LINEAR FOOT SQ. IN.					
30"	150	1.73	31 7/8"	12 GA.	36"	1.26	145	9/16"	1.96	6.13	0.47	32 3/8	3/16	3 1/4	3/4	3/4

INSTALLATION DATA

MAXIMUM O.D. OF PIPE "J"	INSIDE JOINT SPACE "F"	MAXIMUM ANGLE OF DEFLECTION AT A STANDARD JOINT		MINIMUM RADIUS WITH 32' PIPE	APPROXIMATE WEIGHT OF 32' PIPE
		MAXIMUM ANGLE	OFFSET IN 32' FEET		
35"	1/2"	1°46'	0.99	1037'	7680#

MARK	BY	DATE	REVISION

F.O. 9-1-0954
DR. BY: CBK
CHECKED:
DATE: 7/31/69

PIPE DESIGN
30" WATER TRANS. MAIN - JUDY RES. TO SEDRO WOOLLEY - PUD No. 1 SKAGIT COUNTY - B&B CONTRACTING Cont.

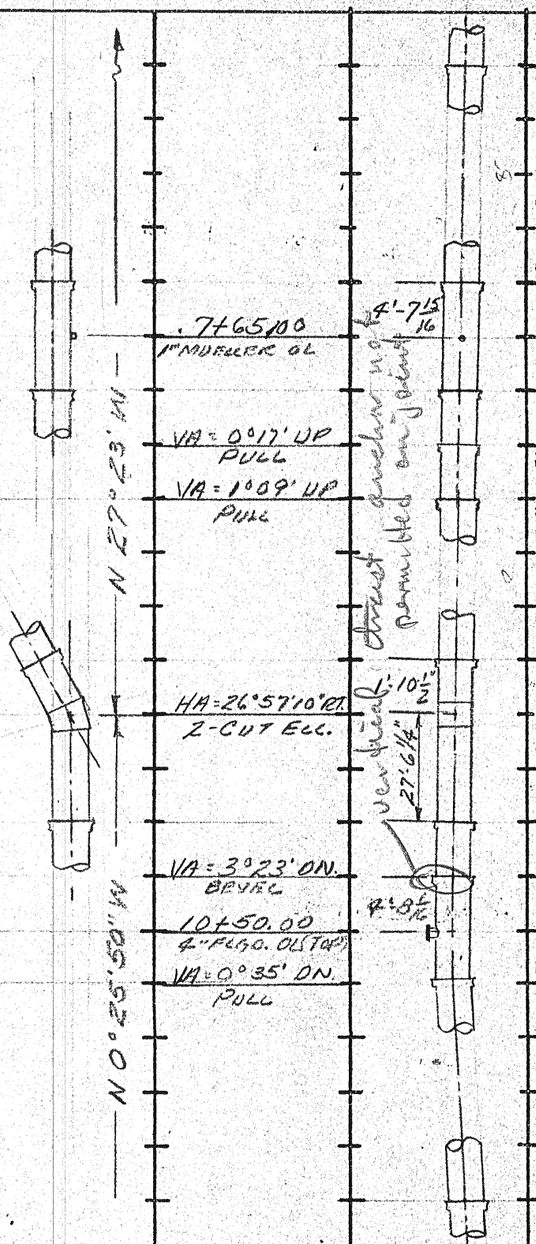
AMERICAN PIPE & CONSTRUCTION CO.
NORTHWEST DIVISION PORTLAND, OREGON
DWG. NO. B-3739 SHEET 2 OF 9 SHEETS

FORM 11-27

30" ACCO-150 PSI

CLASS	PIPE OR PIECE NO.	No. of Pieces	REMARKS	DET. SHT. NO.	
	266		CONT'D. ON SHT. 8		
	265	5	STD. SECTIONS	1	
	THRU				
	261				
	260	1	SPEC. W/ 1" MUELLER OL.	6	
	259	1	STD. SECTION	1	
	258	1	STD. SECTION	1	
	257	4	STD. SECTIONS	1	
	THRU				
	254				
	253	1	SPEC. 2-CUT ELL.	12	
	252	1	SPEC. W/ BEVEL (17⅞")	2	
	251	1	SPEC. W/ 4" FLG'D. OL.	6	
	250	16	STD. SECTIONS	1	
	THRU				
	235				
	234		CONT'D. FR. SHT. 6		

PLAN (Looking in the direction of laying) / TURN-PULL or DESCRIPTION / PROFILE (Note: View from rt. side of pipe)



Sec. No.	SLOPE DISTANCE	℄ STATION	HORIZ. DISTANCE	℄ ELEV.	ANGLE SLOPE	Cosine Tangent
266		6+00.41		398.00	+1°93	99955 03007
265	160.00		159.93			
261 THRU						
260	32.00	7+60.34	31.99			
259	32.00	7+92.33	31.99	404.73	+1°43'	99955 03007
258	32.00	8+24.32	31.98	405.84	+2°00'	99939 03470
257	128.00	8+56.30	127.81		+3°09'	99849 05500
254 THRU						
253	1.8750	9+84.11	1.87			
	27.5208	9+85.98	27.48			
252	31.9219	10+13.46	31.87	406.24	+3°09'	99849 05500
251	32.00	10+45.33	32.00		-0°14'	99999 00406
250	512.00	10+77.33	511.95	416.11	-0°49	99990 01416
235 THRU						
234		15+89.28		408.86	-0°99'	99990 01416

↑ NOTE: READ UP ↑

MARK	NO	DATE

F.O. 9-1-0954
Dr. by CBK
Chkd.
Date 7/28/69

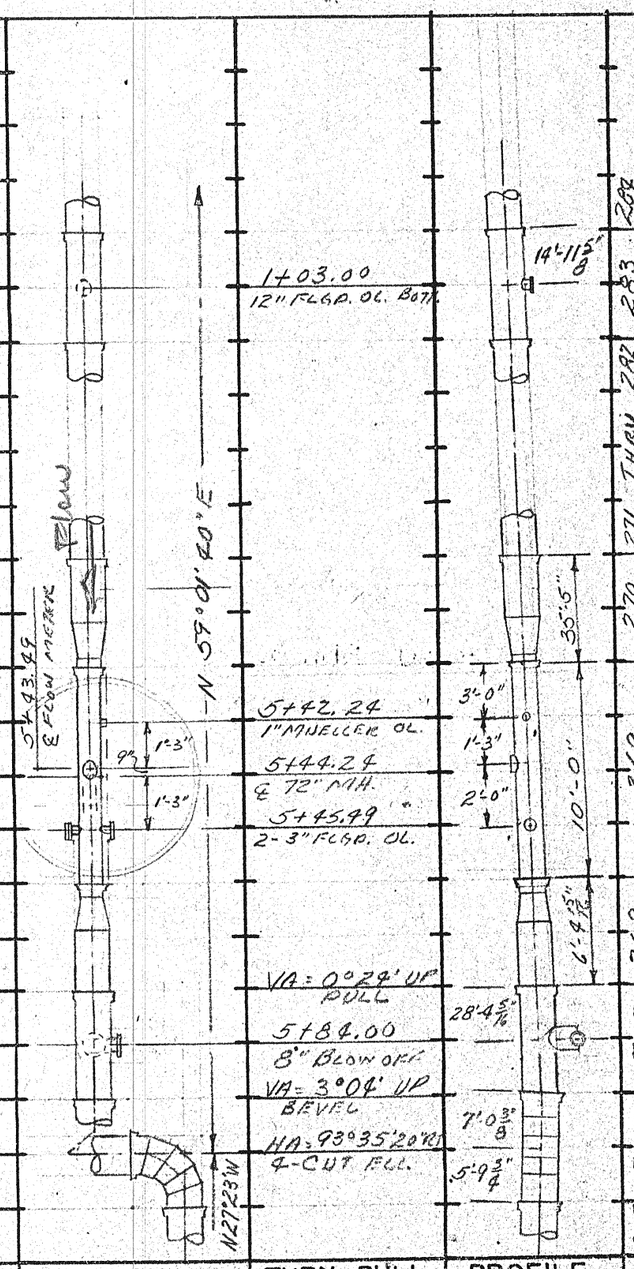
LAYOUT SHEET
30" WATER TRANS. MAIN
JUDY RES. TO SEDRO WOOLLEY
PUD. No. 1 SKAGIT COUNTY
B & B CONTRACTING CORP.

AMERICAN PIPE & CONSTRUCTION CO.
Northwest Division Portland, Oregon
Dwg. No. B-3739
Sht. 7 of 9 Shts.

FORM 11-28

SHANNON & CO. - 1000 H-B CLEARPRINT

CLASS	PIPE OR PIECE NO.	No. of Pieces	REMARKS	DET. SHT. NO.	PLAN Looking in the direction of laying	TURN- PULL or DESCRIPTION	PROFILE Note: View from rt. side of pipe	Sec. No.	SLOPE DISTANCE	℄ STATION	HORIZ. DISTANCE	℄ ELEV.	ANGLE	Cosine Tangent SLOPE
150 PSI	284		CONT'D. ON SHT. 9					284		0+88.04		412.63	-1°45'	99953 03052
	283	1	SPEC. W/ 12" FLG'D. OL BOTT.	10		1+03.00 12" FLG'D. OL. BOTT.	14'-11 5/8"	283	32.00		31.98			
										1+20.02				
	282	12	STD. SECTIONS	1				282	384.00		383.82			
	THRU													
	271							271		5+03.84				
	270	1	SPEC. W/ 30" X 20" REDCR.	15				270	35.4167		35.40			
			ATTACHED.							5139.24		399.13		
	269	1	SPEC. 20" W/ 1" THR. OL.,	18				269	10.00		10.00			
			METER SADDLE, 2-3"									398.98		
			FLG'D. OL'S. 1-3" BLOFFS							5+49.24		398.83		
	268	1	SPEC. W/ 30" X 20" REDCR.	15				268	6.7115		6.41			
			ATTACHED							5+55.65		398.36	-1°45'	99953 03052
	267	1	SPEC. W/ BEVEL (1 3/4")	9		VA = 0°29' UP PULL 5+84.00	28'-4 5/16"	267	31.9271		31.92		-1°21'	99972 02349
			& 8" BLOWOFF ASSY.			8" BLOW OFF VA = 3°04' UP BEVEL				5+87.57		397.61		
	266	1	SPEC. 4-CUT ELL.	14		HA = 93°35'20"RT 4-CUT ELL.	7'-0 3/8" 5'-9 3/4"	266	7.0313	5+94.60	7.03		+1°43'	99955 03007
									5.8125	6+00.41	5.81	398.00		
	265		CONT'D. FR. SHT. 7					265					+1°43'	99955 03007



NOTE: READ UP

MARK	NO	DATE

F.O. 9-1-0954
Dr. by CBK
Chkd.
Date 7/30/69

LAYOUT SHEET
30" WATER TRANS. MAIN
JUDY RES. TO SEORO WOOLLEY
PUD No. 1 SKAGIT COUNTY
B & B CONTRACTING CORP.

AMERICAN PIPE & CONSTRUCTION CO.
Northwest Division Portland, Oregon

Dwg. No. B-3739 Sht. 8 of 9 Shts.

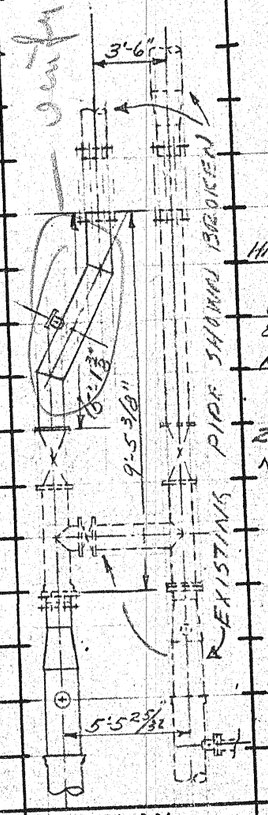
FORM 11-28

SHANNON & CO. - 1000 H-B CLEARPRINT

CLASS	PIPE OR PIECE NO.	No. of Pieces	REMARKS	DET. SHT. NO.
				1
	286	1	SPEC. 20" OFFSET ECC. W/ 20" FLG X 20" PLAIN END & 8" FLGD. OUTLET	17
			BF VALVE (NOT BY APEC)	
			EXIST. TEE	
	285	1	SPEC. 20" SLIDING SPIGOT CLOSURE	19
	284	1	SPEC. W/ 30" X 20" REDUCER & 4" FLGD. OL. & 2' TRIM.	16
	283			

30" ϕ 28" - ACCP 150 PSI

PLAN
Looking in the direction of laying



TURN- PULL or DESCRIPTION

CUSTOMER VERIFY O.D. OF EXISTING PIPE AND ALL DIMENSIONS SHOWN.

HA = 39°28' LT.
1- CUT

0+68.69
8" FLGD. OL.

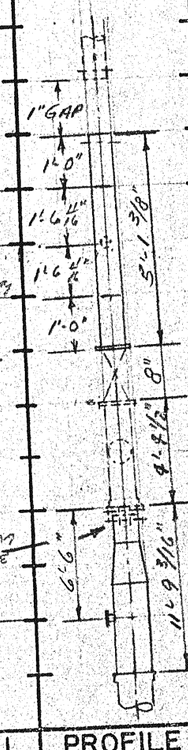
HA = 39°28' RT.
1- CUT

20" BF VALVE NOT BY APEC

2'- FLG. TRIM ALLOWANCE

0+82.78
4" FLGD. OL.

PROFILE
Note: View from rt. side of pipe



Sec. No.	SLOPE DISTANCE	STATION	HORIZ. DISTANCE	ELEV.	ANGLE SLOPE	Cosine Tangent
		0+66.13		413.30		
286	5.1146		5.11		-1°45'	99953 03052
		0+71.24				
		0+71.91				
		0+76.28		412.99		
285	11.7656 (CALC.)		11.76			
284	13.7656 W/ 2' TRIM					
		0+88.04		412.63	-1°45'	99953 03052
283						

NOTE: READ UP

MARK	NO	DATE

F.O. 9-1-0958
Dr. by CBK
Chkd.
Date 7/30/69

LAYOUT SHEET
30" WATER TRANS. MAIN
JUDY RES. TO SEDRO WOOLLEY
PUD No. 1 SKAGIT COUNTY
B & B CONTRACTING CORP.

AMERICAN PIPE & CONSTRUCTION CO.
Northwest Division Portland, Oregon

Dwg. No. B-3739

Sht. 9 of 9 Shts.

SHANNON & CO. 1000 H-B CLEARPRINT

8. American Pipe and Construction Company Individual Pipe Cut Sheets for Existing 30-inch-diameter JRSW Water Transmission Line

AMERICAN PIPE & CONSTRUCTION CO.

ENGINEERING DESIGN OR DETAIL SHEET

CUSTOMER B & B CONTRACTING CORP. SHEET NO. 1

PROJECT 30" MAIN - SKAGIT COUNTY PUD #1 FACTORY ORDER 9-10959

DATE AUG. 8, 1969 REV. MADE BY CBK

30" ACCP - 150 PSI

TO COVER LAYING SHEET NO. B-3739 SHTS 3-9

MAKE 178 STD. SECS. 30" ACCP 32'-3-1/4" LG.

AS SHOWN ON DWG. B-3739 SHT 2.

USE 1264 X 36" SKELP

161 SEC. TO REMAIN STANDARD.

	MARK			MARK			MARK	
7	102 THRU	108	5	261 THRU	265		THRU	
18	110 THRU	127	12	271 THRU	282			
7	129 THRU	135						
11	137 THRU	147						
12	149 THRU	160						
3	162 THRU	164						
3	167 THRU	169						
18	171 THRU	188						
26	186 THRU	211						
18	213 THRU	230						
19	232 THRU	250						
6	254 THRU	259						

USE 17 SEC. TO MAKE SPECIALS

AS SHOWN ON DETAIL SHEET NO. 1 THRU 16

GENERAL ARRANGEMENT REVIEWED
SHOP DRAWINGS SUITABLE SUBJECT TO CORRECTIONS NOTED, IF ANY.
THIS GENERAL REVIEW IS FOR FUNCTION AND ARRANGEMENT ONLY AND DOES NOT RELEASE THE CONTRACTOR FROM FULL COMPLIANCE WITH THE TERMS AND CONDITIONS OF HIS CONTRACT.

R. W. BECK AND ASSOCIATES
ANALYTICAL AND CONSULTING ENGINEERS
WW-1165
W.O. JS-AAM Date 8-15-69 By

11-72

AMERICAN PIPE & CONSTRUCTION CO.

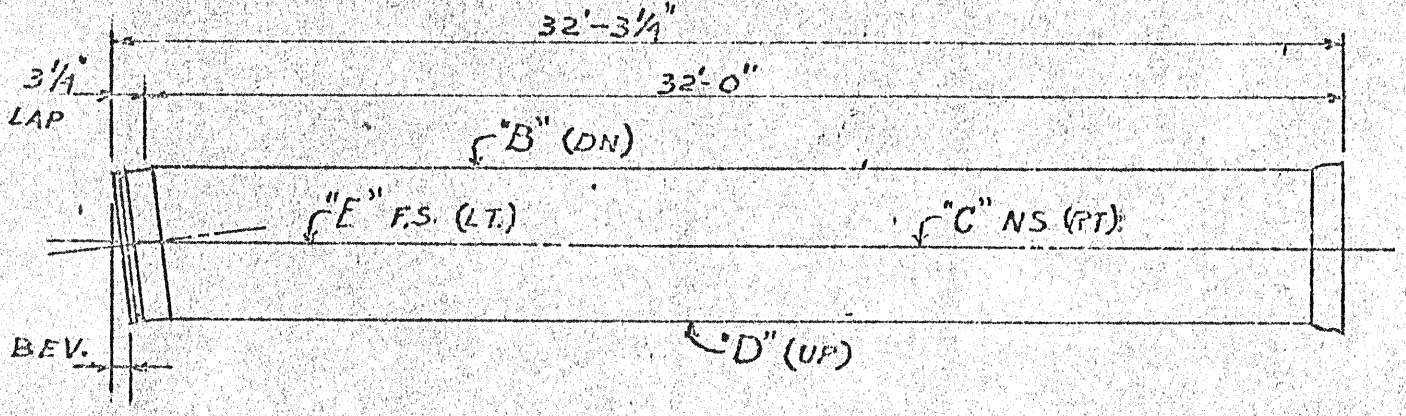
ENGINEERING DESIGN OR DETAIL SHEET

CUSTOMER B & E CONTRACTING CORP. SHEET NO. 2

PROJECT 30" MAIN - SKAGIT COUNTY PUD #1 FACTORY ORDER 9-1-0954

DATE 8-7-69 REV. / MADE BY CSK

30" ACCP - 150 PSI



BEVEL SCHEDULE

SEC. NO.	NO REQD	BEV.	"B" (DN)	"C" (RT)	"E" (LT)	"D" (UP)	FOR ℄ DS
170	1	2¼	170	See Plans - Profile Sht.			
252	1	1⅞	252				
TOTAL	2						

11-22

AMERICAN PIPE & CONSTRUCTION CO.

ENGINEERING DESIGN OR DETAIL SHEET

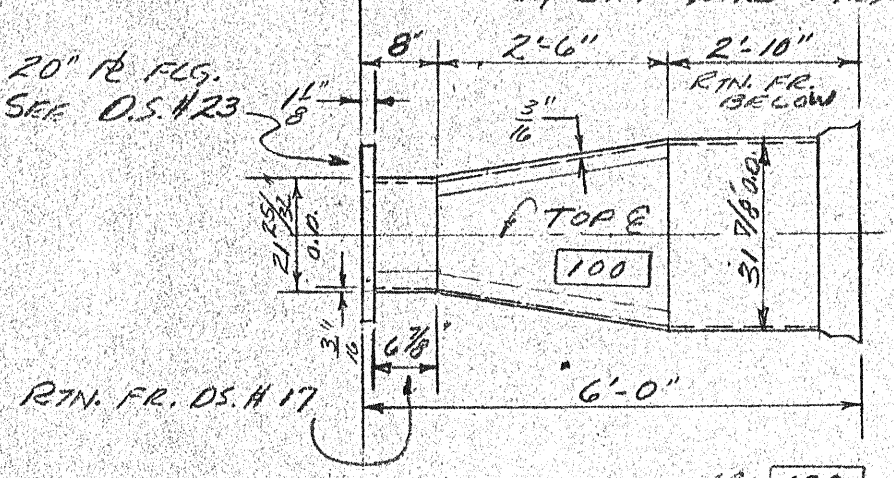
CUSTOMER B & B. CONTRACTING CORP. SHEET NO. 3

PROJECT 30" MAIN - SKAGIT COUNTY PUD #1 FACTORY ORDER 9-1-0757

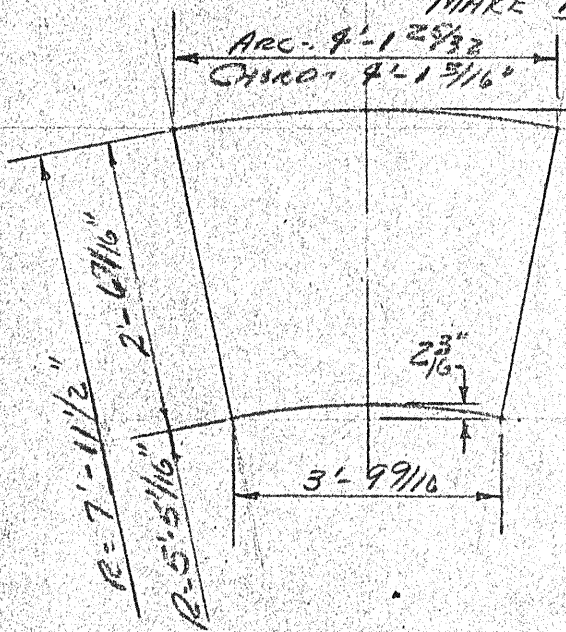
DATE JULY 31, 1969 REV. MADE BY CBK

30" ACCP - 150 PSI

CONC. LINING & COATING REINF. W/ 2X4 WIRE MESH.

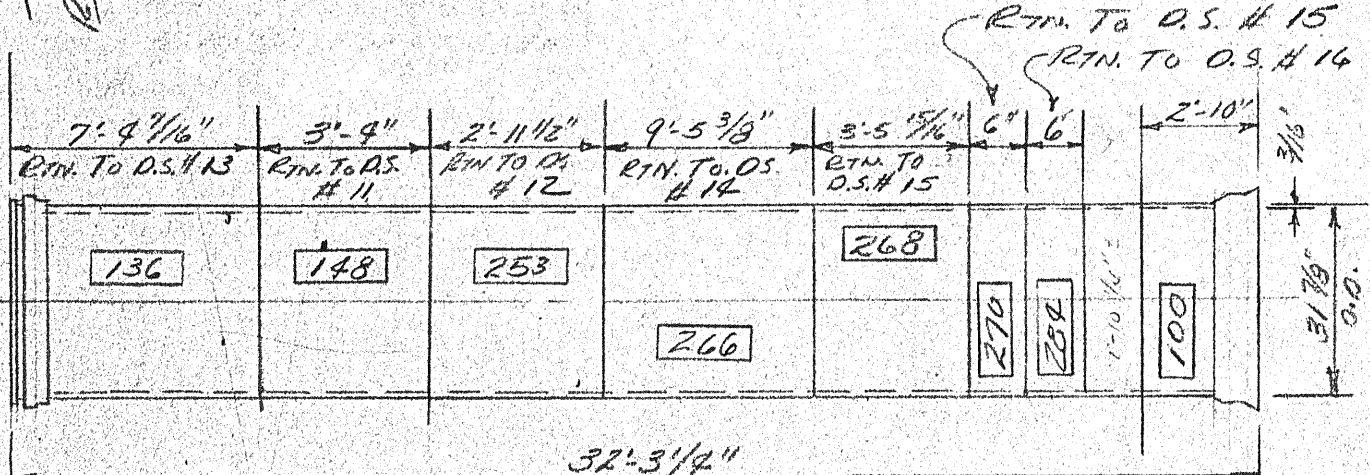


MAKE 1 - THUS MK 100



HALF CONE LAYOUT
2 - REQD. FOR 1 - CONES
4 - R 3/16" X 32 5/8" X 91 7/16" A-285-C

RTN 1 - CONE TO DS # 16 FOR 284
RTN 2 - CONES TO DS # 15 FOR, 268
270



MAKE 1 THUS USING 3/16" X 98" SKELP
MACHINE LINE AND CUT AS SHOWN
FOR FITTINGS.

11-22

AMERICAN PIPE & CONSTRUCTION CO.

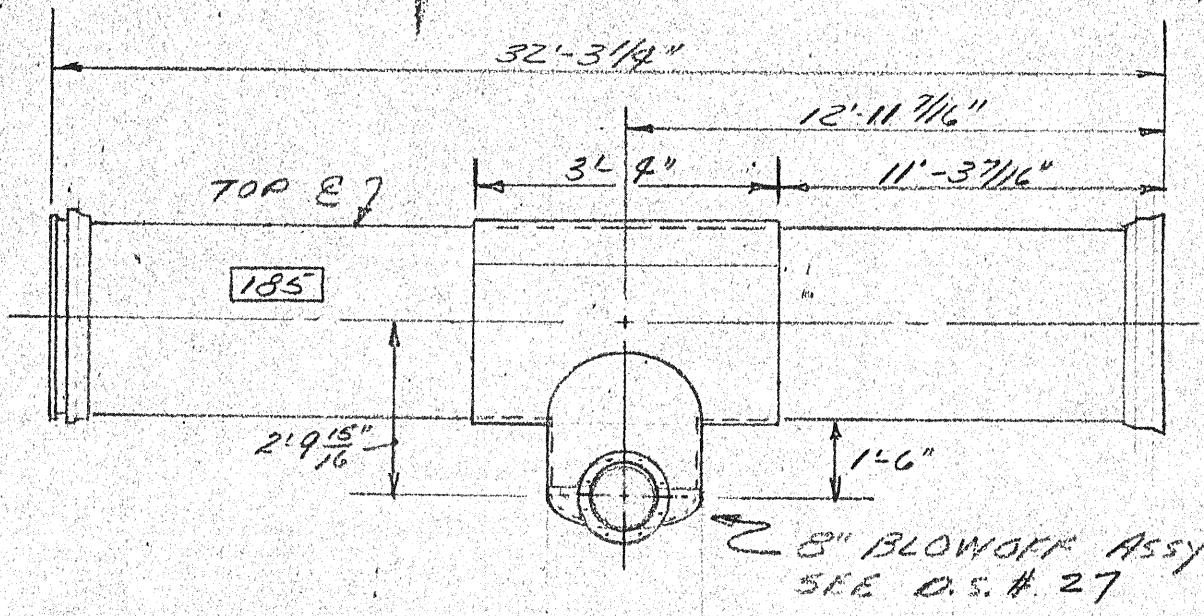
ENGINEERING DESIGN OR DETAIL SHEET

CUSTOMER B & B CONTRACTING CORP. SHEET NO. 9

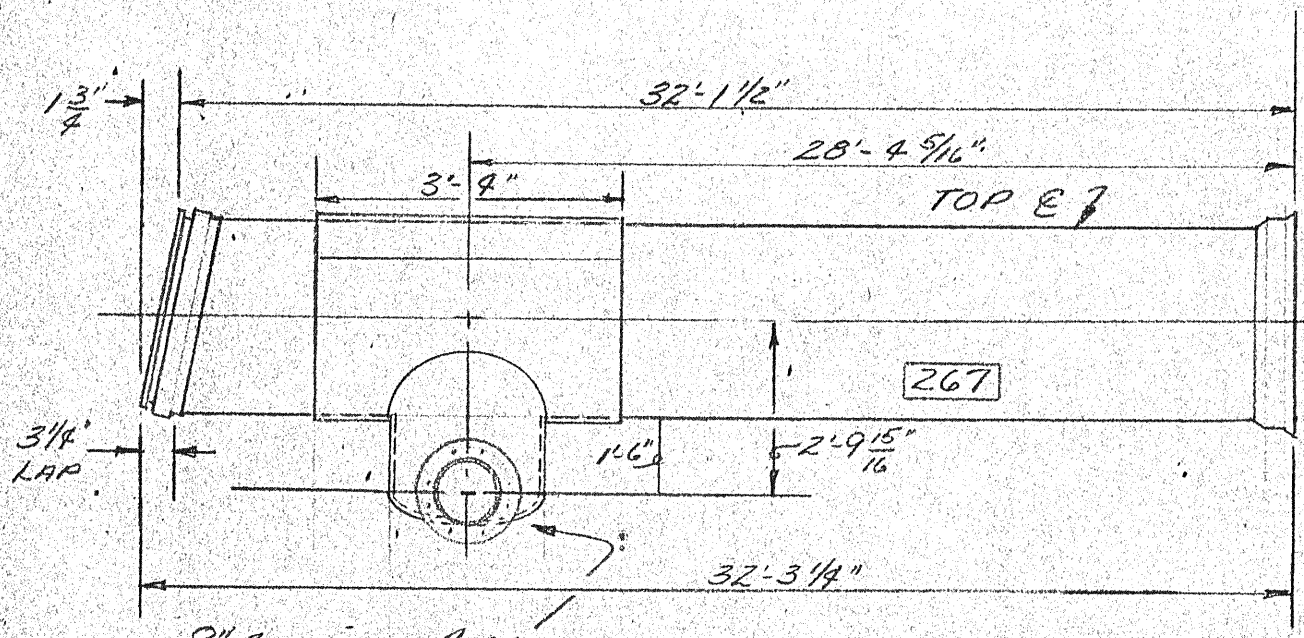
PROJECT 30" MAIN - SKAGIT COUNTY PUD #1 FACTORY ORDER 9-1-0859

DATE AUG. 5, 1969 REV. MADE BY CBK

30" ACCP - 150 PSI



MAKE 1 - THUS MK 185



MAKE 1 - THUS MK 267

11-22

AMERICAN PIPE & CONSTRUCTION CO.

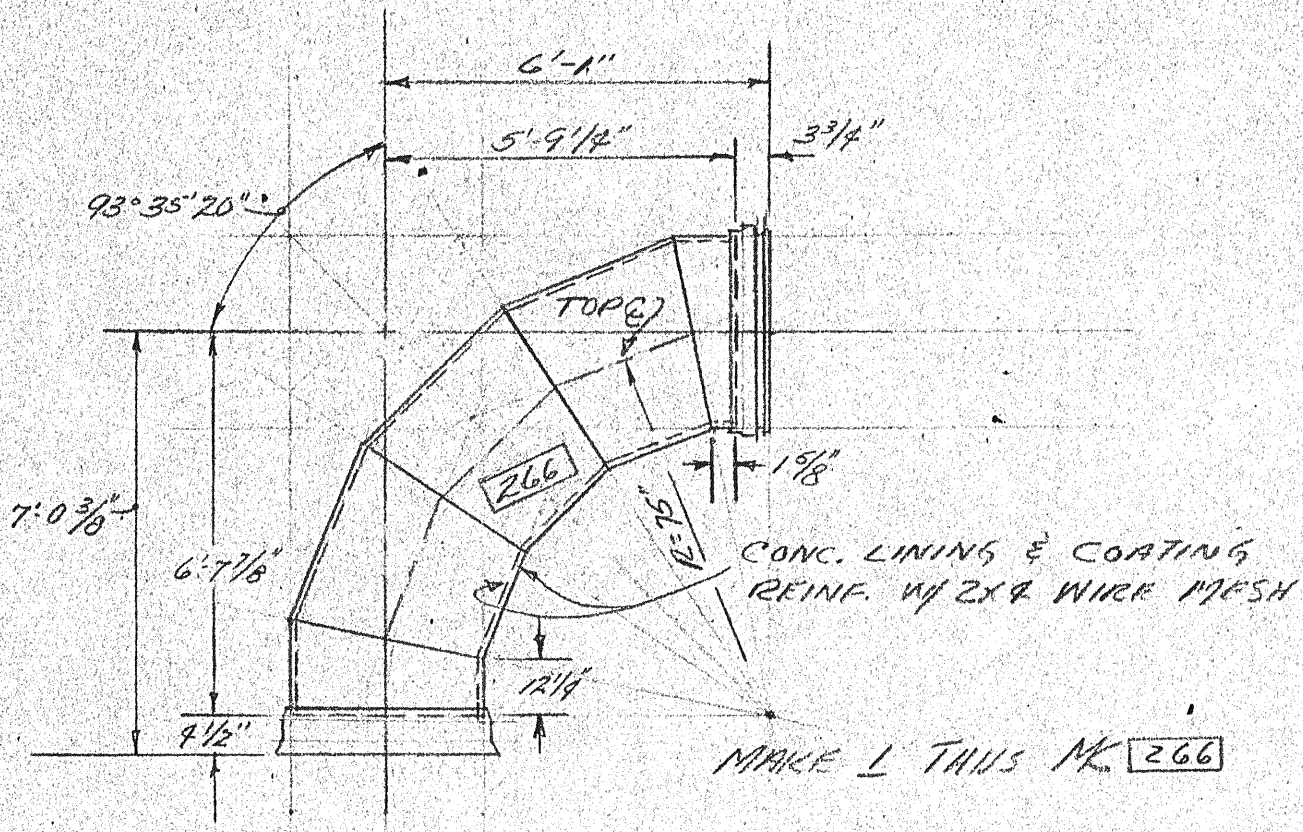
ENGINEERING DESIGN OR DETAIL SHEET

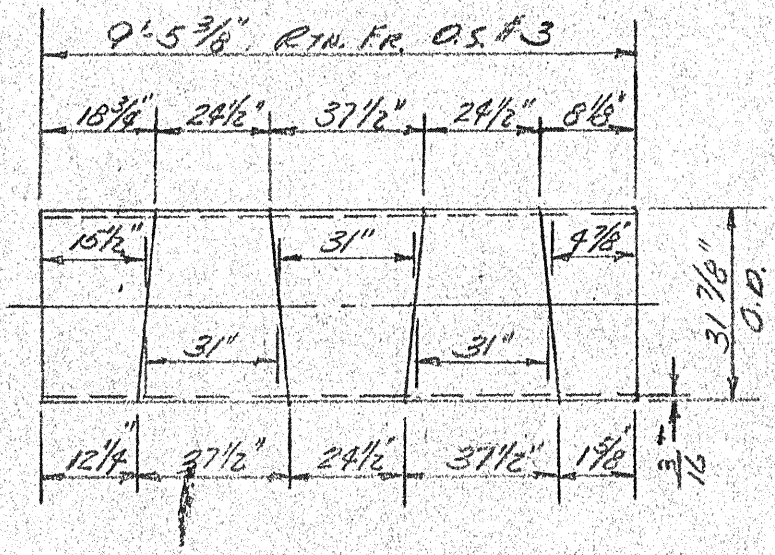
CUSTOMER B & B CONTRACTING CORP. SHEET NO. 14

PROJECT 30" MAIN - SKAGIT COUNTY ADD #1 FACTORY ORDER 9-1-0959

DATE AUG. 4, 1969 REV. MADE BY CBK

30"-ACCP-150 PSI





CUTTING SKETCH FOR 266

AMERICAN PIPE & CONSTRUCTION CO.

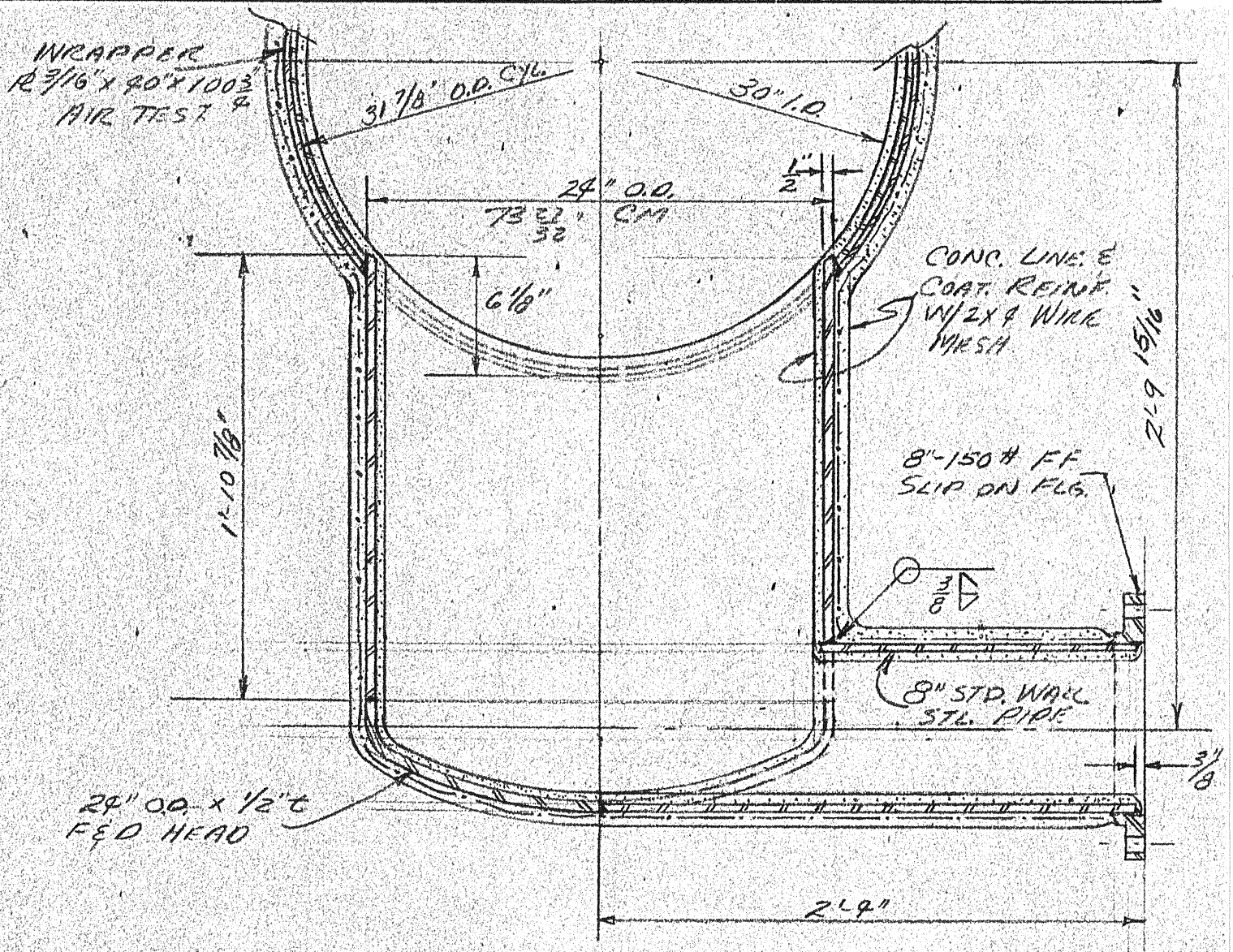
ENGINEERING DESIGN OR DETAIL SHEET

CUSTOMER B & B CONTRACTING CORP. SHEET NO. 27

PROJECT 30" MAIN - SKAGIT COUNTY PUD #1 FACTORY ORDER 9-1-0952

DATE AUG. 6, 1969 REV. MADE BY CBF

30" ACCP - 150 PSI



DETAIL

8" BLOWOFF ASSY.

2 - REQD. ON MK 185 267, DS # 9

11-22

9. Record Drawing for Existing 8-inch-diameter Waterline at Austin Road, CO

MATCH LINE STATION 13+00

13+04 Tel 4, 7.5' W
13+06 Fence, 16.3' E & 9.1' W
13+06 WEP, 5.5' W
13+07 E EP, 10.5' E
13+08 12" Power pole, #8758, 11.5' W

13+87 Fence, 10.0' W
13+88 Tel 4, 8.8' W
13+89 WEP, 6.1' W
13+90 Fence, 14.9' E
13+91 E EP, 10.3' E

14+94 EPPC, 8.7' E
14+99 EPPC, 7.1' W
15+25 Fence, 14.5' W
15+32 Tel 4 N-E, 10.9' W, 15" Power pole, #3759, 12.5' W
15+33 EPPOC, 8.5' W & 6.5' E
15+36 Tel 4 W-S, 8.5' E
15+45 SW Corner Fence, 15.0' E
15+49 4" Tree, 19.9' E
15+53 Water Meter to 13559, 14.7' E
15+62 Tel 4, 7.4' E
15+64 EPPT, 7.0' E
15+65 EPPT, 9.9' W
15+70 Fence, 24.8' W
15+77 N End 4" Treeline, 17.1' W
16+21 Tel 4, 7.7' E
16+22 6' Diameter Landscape, 13.9' E
16+25 WEP, 11.5' W
16+33 E EP-CL 12' Gravel Drive, 6.2' E
16+44 NW Corner Landscaping, 16.9' E
16+75 S End 4" Treeline, 17.6' W
16+76 WEP, 10.2' E, Tel 4 to Pedestal, 8.0' E
16+77 E EP, 5.4' E
16+78 Tel 5 From Pedestal, 20.6' E
16+79 Tel Pedestal #2014, 13.6' E
16+80 12" Power pole #453165/166050, 13.3' E
16+81 Tel 4 From Pedestal, 7.1' E
16+90 SW Corner Landscaping, 18.3' E
16+96 SE Corner Fence, 24.1' W

17+09 Tel 4, 7.5' W, E EP, 6.2' E
17+11 W EP-CL 14' Gravel Drive, 10.8' W
17+25 NE Corner 10' Landscaping, 15.1' W

17+80 Water Meter to 13568, 16.9' W
17+92 E EP, 8.7' E, Tel 4, 9.9' E
17+95 W EP, 6.9' W, SE Corner 10' Landscaping, 12.1' W

18+11 E End 4' Steps, 16.5' W
18+14 NE Corner Landscaping, 21.4' W

18+34 Angle point Landscaping, 20.4' W
18+37 Angle point Landscaping, 15.8' W
18+47 Angle point Landscaping, 15.3' W
18+52 SE Corner Landscaping, 19.7' W

18+75 NE Corner Shed, 12.0' W

18+99 SE Corner Shed, NE cor landscaping, 11.5' W

19+08 Tel 4 to Pedestal, 10.7' E
19+12 Tel Pedestal #2016, 16.5' E
19+14 12" Power pole #8741, 15.9' E
19+15 Tel 4 from Pedestal, 11.4' E
19+18 SE Corner Landscaping, W end rock wall, 10.8' W
E End Rock Wall, 6.4' W, W EP-CL 30' Gravel Drive, 6.4' W
19+57 Toe Slope, 25.5' E
19+58 NE Corner Treeline, 2.5' W
19+59 W EP, 0.7' W, Top Slope, 15.4' E, E EP - Tel 4, 12.5' E

20+45 E EP - Tel 4 - Top Slope, 10.7' E
20+46 E Edge Treeline, 3.9' W, & 4.1' W, W EP, 1.9' W & 0.9' W
Toe Slope, 25.9' E & 25.5' E

21+55 E EP-Tel 4 - Top Slope, 11.2' E

22+07 E Edge Treeline, 1.6' W
22+08 W EP, .08' E
22+11 E EP-Tel 4 - Top Slope, 13.0' E, 12" Power pole #8742, 15.8' E
Toe Slope, 24.5' E
22+72 Toe Slope, 28.5' E
22+74 E Edge Treeline, 0.7' E, W EP, 4.5' E,
E EP - Tel 4 - Top Slope, 16.5' E
22+93 SE Corner Treeline, 1.1' E

23+44 Toe Slope, 31.5' E
23+46 W EP, 5.6' E, E EP - Tel 4 - Top Slope, 19.4' E
23+96 W EP, 0.4' E
23+97 E EP - Tel 4 - Top Slope, 12.7' E
23+99 Toe Slope, 28.6' E
24+09 Blow-off valve, 17.3' E
24+12 Water valve, 16.8' E (Abandoned)
24+26 Water valve, 16.0' E (Abandoned)
24+28 Water Vault 2 x 3 Conc, 15.9' E (Abandoned)
24+42 W EP, 4.5', W
24+44 E EP - Tel 4 - Top Slope, 6.4' E
24+51 12" Power pole, 8.9' E
24+54 Toe Slope, 21.4' E
24+62 PRV Manhole, 15.1' E
24+69 Water valve, 17.7' E
24+66 W EP, 5.6' W, E EP - Tel 4, 4.7' E
24+68 Water Meter to 15759, 11.8' E (off 24" transmission)
24+70 Meter box with PRV, 11.7' E

25+42 N End Fence, 10.7' W, Tel 4, 6.6' W, W EP, 4.9' W
25+45 E EP, 11.1' E
25+52 N End Fence, 17.7' E

26+08 Fence N-S, 9.6' W
26+09 Tel 4, 5.6' W, W EP, 4.6' W
26+10 12" Power pole to #8608, 11.6' W, E EP, 12.5' E
26+11 Fence N-S, 15.9' E

29+08 Fence N-S, 7.8' W, Tel 4, 5.5' W
29+09 W EP, 3.2' W
29+10 E EP, 12.6' E

30+08 S End Fence, 18.9' E
30+09 Tel 4, 4.9' W, W End 12" CMC, 9.0' W, E EP, 13.6' E
30+10 E End 12" CMC, 20.5' E
30+11 Fence N-S, 7.7' W
30+12 W EP, 2.2' W

30+54 12" Power pole #8757, 10.5' W
30+58 N End Fence, 18.2' E

31+71 Tel 4, 5.6' W
31+72 Fence, 7.6' W, W EP, 3.5' W
31+80 E EP, 11.4' E
31+90 Fence, 15.3' E

-0+11 E EP, 11.175' W
0+09 W EP, 19.8' S
0+21 E EP, 24.8 N
0+30 Tel 1, 22.6' S, Tel 3, 17.6' S
0+31 Hydrant, 41.4' N
0+32 EPPC, 10.7' S
0+37 Hydrant valve, 44.4' N
0+39 Tel 1, 15.5' S
0+41 Water valve, 48.2' N
0+42 Water valve, 52.2' N
0+46 Tel 5, 7.5' N
0+49 Tel 1, 0.5' S
0+54 E EP, 70.0' N
0+59 EPPOC, 2.5' E, Tel 1, 19.9' N
0+62 Tel 5 to pedestal, 30.5' N
0+66 Tel 2, 35.1' N
0+67 Tel 2 to pedestal, 31.8' N
0+68 Tel 1, 55.9' N
0+69 EPPC, 48.7' N
0+70 EPPOC, 26.5' N
0+72 Tel 4 to pedestal, 26.8' N, 12" Power pole #8486, 27.9' N
0+74 Tel 2, 49.0' N, Tel pedestal, 28.7' N
0+75 Tel 1, 48.5' N
0+77 Water Meter to 15524, 38.8' N
0+78 Prop Corner, 29.9' N
0+79 SE Fence corner, 30.6' N, Guy anchor, 20.0' N
0+80 Tel 4, 16.1' N
0+83 Pressure reducing Valve, 22.6' N
0+85 EPPT, 11.9' N
0+88 W EP, 84.4' N
0+89 Blow valve, 14.5' N
0+90 EPPT, 7.9' S
0+97 Tel 4, 10.6' N
1+00 Water valve, 14.6' N
1+35 N EP, 9.5' N
1+42 EPPC, 81.' S
1+54 Tel 4, 9.9' N
1+61 EPPOC, 6.5' S
1+71 11" Power pole #8505, 14.6' S
1+78 EPPC, 9.4' N
1+84 Tel 4, 10.3' N
1+85 EPPOC, 7.6' S
2+07 EPPOC, 154.1' S
2+15 EPPOC-CL 24' Gravel Dr, 5.8' N, W End fence, 28.8' N
2+14 Tel 4, 5.1' N
2+22 EPPOC-CL 12' Gravel Dr, 0.2' S
2+28 EPPOC, 27.9' S
2+59 Tel 4, 10.7' S

From Stationing 15+00 to Station 17+00 move pipe 2' West

Hydrant moved 10' South

STA 15+49, 16' LT
INSTALL FIRE HYDRANT
UNDER J.O. 2995

6" AC, 37" COVER, 11' E

STA 1+90, 10' LT
1-ELL, 22-1/2°, 8" MJ

13298

STA 2+90, 30' LT
1-ELL, ~~45°~~, 8" MJ
22-1/2°

STA 0+77, 38.8' N
RELOCATE METER TO
STA 3+70. CLOSE CORP
AT MAIN

STA 0+83, 22' RT
SALVAGE EXISTING PRESSURE
REDUCING VALVE

STA 0+42, 52.2' RT
EXISTING VALVE TO BE
CLOSED TIGHT & VALVE
BOX REMOVED WHEN
PROJECT IS COMPLETED.

DEFLECT PIPE STA 15+00, 16' E
TO STA 16+00, 14' E

13539

13304

STA 3+28, 10' LT
1-ELL, 22-1/2° 8" MJ
BLOCKING

6" AC, 36" COVER, 12' E

13324

6" AC, 33" COVER, 11' E

STA 3+70, 18' LT
RELOCATE METER FOR
#13324 FROM BEAVER
LAKE ROAD. TIE-IN
PRIVATE SERVICE LINE

6" AC, 34" COVER, 13' E

13342

13347

13362

6" AC, 30" COVER, 14.3' E

STA 7+75, 10' LT
2-ELL, 22-1/2° 8" MJ
CROSS UNDER EXIST 6" AC
TO 16' LT

Move alignment from 10' to 12' to save asphalt

Swung pipe over AC 3' cover

6" AC, 42" COVER, 15.3' E

STA 0+50, 10' LT
1-ELL, ~~45°~~ 8" MJ
22-1/2°
BLOCKING

APPROX STA 0+17, 8' RT
1-TEE, 8" x 8" FLG x FLG
2-VALVES, 8" FLG x MJ
1-ADAPTOR, 8" FLG x MJ
1-8" MJ SLEEVE
BLOCKING

PROP 8" DI CL50 PIPE

2+60 CL 12' Gravel Dr, 6.7' W
2+69 Water Meter to 13504, 0.05' W
2+85 EPPOC, 10.0' E
2+97 Tel 4, 1.2' E
3+01 Guy Anchor, 14.4' W
3+14 EPPOC, 14.5' E
3+15 Tel 4 to pedestal, 6.5' W
3+16 11" Power pole, 14.4' W
3+17 Tel pedestal #2012, 14.4' W
3+18 Tel 4 from pedestal, 12.9' W
3+19 EPPOC, 5.0' W, Tel 4, 6.6' W
3+40 5' Diameter Bush, 17.9' W
3+50 Tel 4, 9.6' W
3+52 EPPT, 6.9' E
3+58 EPPOC-CL 20' Gravel Dr, 9.4' W
3+72 E End 5' Side Walk, 16.3' W
3+78 10' Diameter Landscape, 15.7' W
3+80 EPPT, 8.0' W
3+90 Tel 4, 9.6' W

4+12 W EP, 7.5' W
4+28 E EP, 7.5' E
4+35 Tel 4, 9.2' W
4+62 W EP, 8.5' W
4+89 W EP-CL 28' Gravel Dr, 7.5' W
4+92 Tel 4, 9.8' W
4+94 E EP, 7.5' E
5+07 E EP-CL 12' Gravel Dr, 10.0' E
5+12 W EP, 7.7' W
5+27 Water Meter to 13547, 15.0' E
5+36 12" Tree, 17.5' E
5+43 W EP, 7.9' W Tel 4, 10.2' W
5+44 E EP, 5.9' E
5+51 15' Diameter Bush, 12.4' E
5+55 W EP-CL 18' Gravel drive, 8.5' W
5+58 Power, 37.4' W
5+65 Power, 29.5' W
5+70 4' Dual Birch, 27.0' E
5+78 Power to pole, 15.3' W
5+79 Tel 4 to pedestal, 9.0' W
5+80 Power to East, 9.0' W, 5.4' E, & 17.6' E
5+81 12" Power pole-Power conduit N side of pole, 15.0' W
Tel E-W to Pedestal, 0.6' E, Tel to East, 17.7' E
5+82 Tel Pedestal, 15.0' W
5+86 Power - Tel to Power pole, 32.4' W

6+06 NE Corner concrete slab, 18.7' W
6+10 W EP-CL 30' Gravel drive, 6.0' W
6+14 E EP, 7.8' E
6+28 SE Corner concrete slab, 19.5' W
6+36 NW Corner Shed, 14.5' E
6+49 SW Corner Shed, 15.3' E
6+72 CL E End 6' Landscape, 10.5' W
6+74 W EP, 4.9' W
6+75 Tel 4 to pedestal, 6.9' W
6+75 E EP, 9.5' E
6+90 8" Tree, 20.8' E

7+42 N End Fence, 10.7' W, Tel 4, 6.6' W, W EP, 4.9' W
7+45 E EP, 11.1' E
7+52 N End Fence, 17.7' E

8+08 Fence N-S, 9.6' W
8+09 Tel 4, 5.6' W, W EP, 4.6' W
8+10 12" Power pole to #8608, 11.6' W, E EP, 12.5' E
8+11 Fence N-S, 15.9' E

9+08 Fence N-S, 7.8' W, Tel 4, 5.5' W
9+09 W EP, 3.2' W
9+10 E EP, 12.6' E

10+08 S End Fence, 18.9' E
10+09 Tel 4, 4.9' W, W End 12" CMC, 9.0' W, E EP, 13.6' E
10+10 E End 12" CMC, 20.5' E
10+11 Fence N-S, 7.7' W
10+12 W EP, 2.2' W

10+54 12" Power pole #8757, 10.5' W
10+58 N End Fence, 18.2' E

11+71 Tel 4, 5.6' W
11+72 Fence, 7.6' W, W EP, 3.5' W
11+80 E EP, 11.4' E
11+90 Fence, 15.3' E

6' AC, 33" COVER, 13.5' E

6" AC, 36' COVER, 13.5' E

6" AC, 34' COVER, 13' E

MATCH LINE STATION 13+00

6" AC, 48" COVER, 18.5' E

Moved pipe 2' West

Moved 1' East to 3' East

STA 23+00, 14' LT
INSTALL STD 2" BLOW
ASSEMBLY

NOTE:
6" AC NOT LOCATED
MR. AUSTIN SAID HE PUT
IN 3' OF FILL OVER 6" PIPE.
(MAY HAVE ±6' OF COVER.)

NOTE:
PROPOSED HOUSE LOCATION
BY DON AUSTIN
NEXT SPRING, 2002

CALL 48 HOURS
BEFORE YOU DIG
1-800-424-5555

RENEW AND RECONNECT SERVICES
AND INSTALL 3/4" PRESSURE
REDUCING VALVES AT:
STA. 2+69 15+53
3+70 17+80
5+27

CONSTRUCTION NOTES:

1. RELOCATE EXISTING METER FOR 13324 AUSTIN ROAD, PRESENTLY LOCATED ON BEAVER LAKE ROAD, TO FRONT OF HOUSE ON AUSTIN ROAD. LOCATION MARKED BY STAKE. CONNECT PRIVATE SERVICE LINE TO METER.
2. REPLACE EXISTING FENCE POSTS BETWEEN STA. 7+00 AND STA. 8+00; IF NECESSARY TO REMOVE DURING CONSTRUCTION.
3. PROPERTY OWNER HAS GIVEN PERMISSION TO REMOVE AND DISPOSE OF REMAINS OF DILAPITATED FENCE LINE FROM STA. 8+10 SOUTH TO STA. 15+50.
4. INSTALL FIRE HYDRANT AT STA. 15+49. FIRE HYDRANT ASSEMBLY IS PROVIDED BY CLEAR LAKE FIRE DISTRICT AND IS STORED BEHIND THE CLEAR LAKE FIRE STATION. CHARGE HYDRANT TEE, VALVE, LABOR AND EQUIPMENT FOR HYDRANT INSTALLATION, TO J.O. 2995.

COMMENTS

REVISIONS	BY	DATE

START COMPLETED AS BUILT

C.O. 4140 W.O. 01-2760
SYSTEM MT VERNON RURAL
SCALE 1"=40' DATE 5/3/2002

PUBLIC UTILITY DISTRICT NO. 1 SKAGIT COUNTY WASHINGTON

AUSTIN ROAD
BEAVER LAKE ROAD SOUTH
Replace Approximately 2,450' of 6" AC with 2,300' of 8" CL50 DI pipe

NO. 1 of SKAGIT COUNTY
1415 Freeway Dr., Mt. Vernon, WA (360-424-7104)

DWN. BY SMJ DSGN BY DF APPVD BY GJP
SEC. 12 TWP. 34 N. RGE. 4 E., W.M. PAGE 1/2

AS BUILT
7/8/02

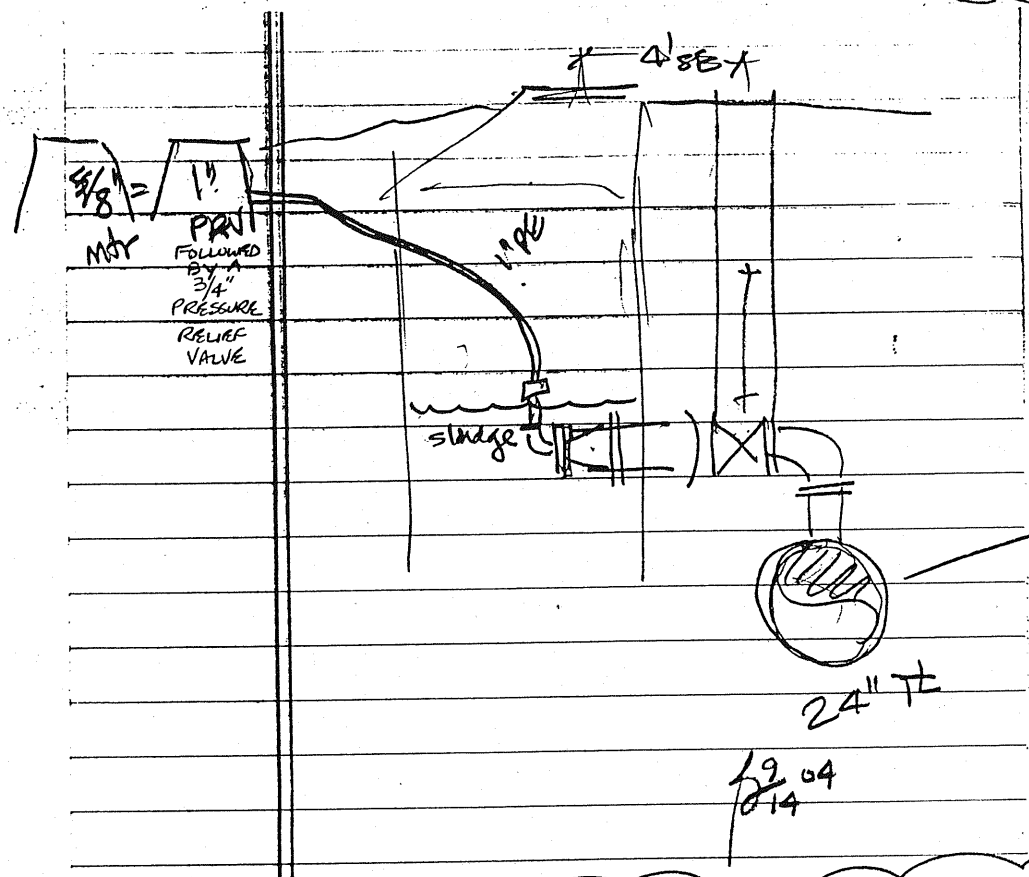
10. Record Drawing for Existing Appurtenances at Austin Road, CO

OVR PSI MAX @

DON AUSTIN'S SVC
@ 13759 AUSTIN ROAD

OUT OF
CO 1844 FILE

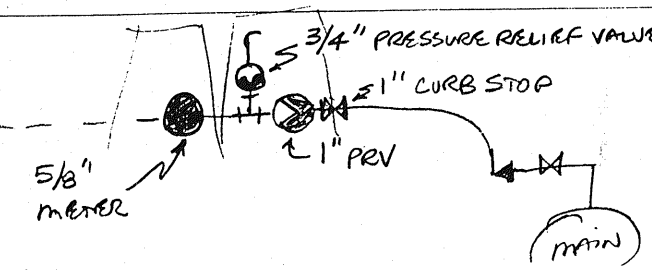
DON D. FOUND PRV TO BE DOWNSTREAM OF METER.
5-22-06
TH



12/9/04
12/14

DON, PLEASE RELOCATE THE 1" PRV TO BE UPSTREAM OF METER AS SHOWN ABOVE; IMMEDIATELY FOLLOWING PRV, INSTALL A TEE BRANCH UP WITH A 3/4" PRESSURE RELIEF VALVE; THEN METER.

THANX, TIM 5-24-06



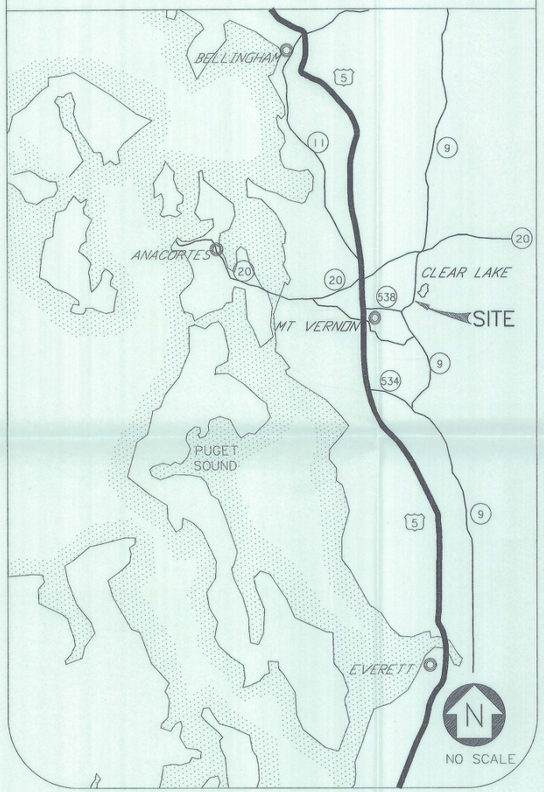
11. Record Drawing for Existing 8-inch-diameter Waterline at Beaver Lake and Fox Road, CO

CONTRACT DRAWINGS

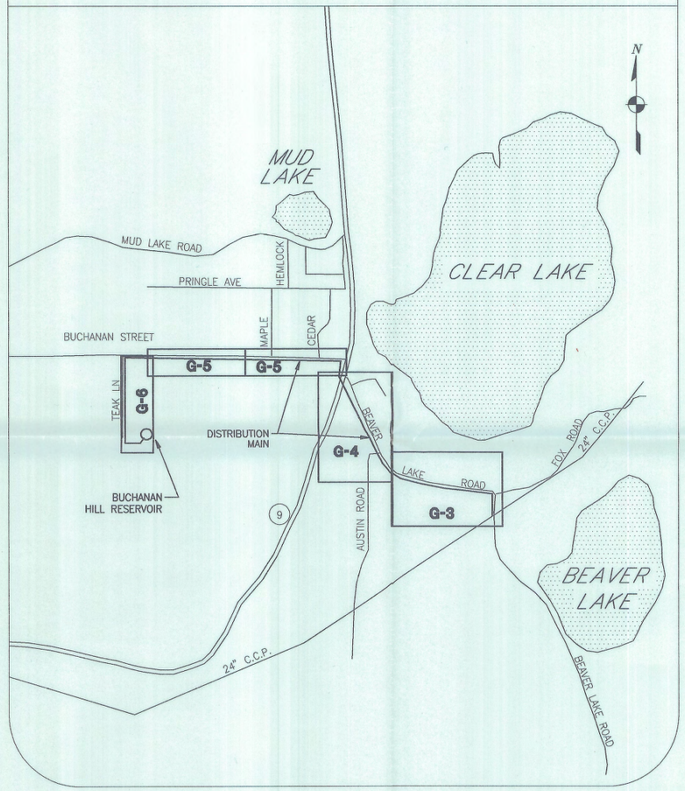
PUBLIC UTILITY DISTRICT No. 1 OF SKAGIT COUNTY

BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT

VICINITY MAP



PROJECT LOCATION



LIST OF DRAWINGS

G-1	COVER SHEET, VICINITY MAP AND LIST OF DRAWINGS
G-2	ABBREVIATIONS, LEGEND, GENERAL SYMBOLS & NOTES
G-3	STA 0+00 TO STA 17+50
G-4	STA 17+50 TO STA 35+50
G-5	STA 35+50 TO STA 48+25 & STA 48+25 TO STA 64+00
G-6	STA 64+00 TO STA 83+50 AND TEAK ROAD PROFILE
G-7	WATER MAIN DETAILS
G-8	MISCELLANEOUS DETAILS
C-1	RESERVOIR SITE PLAN
C-2	RESERVOIR PLAN AND SECTION
C-3	RESERVOIR DETAILS
C-4	RESERVOIR DETAILS
C-5	EROSION/SEDIMENTATION CONTROL DETAILS

AS BUILT

RECORD DRAWING

THIS DRAWING HAS BEEN REVISED TO REFLECT CHANGES AND CLARIFICATION THAT OCCURRED DURING CONSTRUCTION. CHANGES SHOWN REFLECT INFORMATION THAT WAS PROVIDED TO THE ENGINEER BY OTHERS.

Kennedy/Jenks Consultants
Federal Way, Washington
Project: 946032.00 Drawing: P5G001R

COMMENTS

REVISIONS	BY	DATE
START	COMPLETED	AS BUILT

PUBLIC UTILITY DISTRICT NO. 1 SKAGIT COUNTY WATER SERVICE

C.O. 3560	W.O. 93-2125
SYSTEM CLEAR LAKE	
SCALE: NONE	DATE 5/94

BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT

COVER SHEET, VICINITY MAP AND LIST OF DRAWINGS

P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104

DWN BY KKH	DSGN BY KSP	APPRVD BY	
SEC. TWP. N. RGE. E.W.M.	PAGE	SHT No. G-1	

ABBREVIATIONS

&	AND
@	AT
X	BY
℄	CENTERLINE
[	CHANNEL
ø	DIAMETER
#	NUMBER, POUND
ℙ	PROPERTY LINE, PLATE
□	SQUARE
∠	STRUCTURAL ANGLE
AC	ASPHALTIC CONCRETE
ADJ	ADJACENT
ANCH.	ANCHOR
AL.	ALUMINUM
APPROX.	APPROXIMATE
APWA	AMERICAN PUBLIC WORKS ASSOCIATION
ARCH.	ARCHITECTURAL
ARV	AIR RELEASE VALVE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
ATS	AUTOMATIC TRANSFER SWITCH
AVV	AIR/VACUUM VALVE
AWWA	AMERICAN WATER WORKS ASSOCIATION
BC	BEGINNING OF CURVE
BF	BLIND FLANGE
BFP	BACKFLOW PREVENTER
BFV	BUTTERFLY VALVE
BLDG	BUILDING
BM	BEAM, BENCHMARK
BO	BLOWOFF
BOT	BOTTOM
B & S	BALL AND SOCKET
C.B.	CATCH BASIN
C.C.	CENTER TO CENTER
CCP	CONCRETE CYLINDER PIPE
CHK'D	CHECKED
CHKR	CHECKERED
CL	PIPE CLASS, CENTERLINE
CLR.	CLEAR, CLEARANCE
CMP	CORRUGATED METAL PIPE
CO.	COMPANY
COL.	COLUMN
CONC.	CONCRETE
CONST.	CONSTRUCTION
CONT.	CONTINUOUS
CPLG.	COUPLING
CPVC	CHLORINATED POLYVINYL CHLORIDE
DI	DUCTILE IRON
DIA.	DIAMETER
DIP	DUCTILE IRON PIPE
E	ELECTRIC, EAST
EA	EACH
EC	END OF CURVE
EF	EACH FACE
EL, ELEV.	ELEVATION
ELECT	ELECTRICAL
ENCL.	ENCLOSURE
E.O.P.	EDGE OF PAVEMENT
EQ.	EQUAL
EQUIP	EQUIPMENT
E.W.E.F.	EACH WAY EACH FACE
(E), EXIST.	EXISTING
EXP.	EXPANSION
EXT.	EXTERIOR, EXTENSION
FB	FLAT BAR
FCA	FLANGE COUPLING ADAPTER
FD	FLOOR DRAIN
FF	FINISHED FLOOR
FH	FLAT HEAD OR FIRE HYDRANT
FIN.	FINISH
FL	FLOW LINE
FLEX.	FLEXIBLE
FLG, FL	FLANGE
FM	FORCE MAIN
FT	FEET
FTG	FOOTING
G	GAS
G.S.,GALV.STL	GALVANIZED STEEL
GA.	GAUGE
GAL	GALLON
GPM	GALLONS PER MINUTE
GR	GRADE, GROUND
G.V.	GATE VALVE
HOR	HORIZONTAL
HR	HOUR
HT	HEIGHT
H.B.	HOSE BIBB
HDPE	HIGH DENSITY POLYETHYLENE
HGL	HYDRAULIC GRADE LINE
HP	HORSEPOWER, HIGH POINT
H.W.	HIGHWATER, HOT WATER
I.D.	INSIDE DIAMETER
I.E.	INVERT ELEVATION
IN.	INCH
INV.	INVERT
IPS	IRON PIPE SIZE
JT.	JOINT
L	ANGLE
LB	POUND
LF	LINEAL FEET
LP	LOW POINT
LT.WT.	LIGHT WEIGHT
L.W.	LOW WATER
LT	LEFT
MACH	MACHINE
MAT'L	MATERIAL
MAX	MAXIMUM
MECH.	MECHANICAL
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MISC.	MISCELLANEOUS
MJ	MECHANICAL JOINT
MON.	MONUMENT
N	NORTH
(N)	NEW
N.A.D.	NORTH AMERICAN DATUM
NO.	NUMBER
NOM	NOMINAL
NRS	NON-RISING STEM
NTS	NOT TO SCALE
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
O.F.	OUTSIDE FACE
OPER.	OPERATOR
OPNG.	OPENING
OS&Y	OUTSIDE SCREW & YOKE
PE	PLAIN END, POLYETHYLENE
PERIM.	PERIMETER
PIP	PLASTIC IRRIGATION PIPE
PL	PLATE
POC	POINT OF CONNECTION
PP	POWER POLE
PRESS.	PRESSURE
PRV	PRESSURE REDUCING VALVE
PS	PUMP STATION
PSI	POUND PER SQUARE INCH
PSF	POUND PER SQUARE FOOT
PT	POINT
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PW	PLANT WATER
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RED.	REDUCER
REF.	REFERENCE
REINF.	REINFORCING
REQ'D	REQUIRED
RJ	RESTRAINED JOINT
RPM	REVOLUTIONS PER MINUTE
R/W	RIGHT OF WAY
S	SEWER, SOUTH, SLOPE
SCH.	SCHEDULE
SDR	STANDARD DIMENSION RATES
SEC	SECOND
SHT	SHEET
SPEC.	SPECIFICATIONS
SQ.	SQUARE
S.S.	STAINLESS STEEL
STA.	STATION
STL	STEEL
STORM	STORM DRAIN
STD.	STANDARD
STRUCT.	STRUCTURAL
T	TELEPHONE
T & B	TOP AND BOTTOM
TGE	TOP OF GRATING ELEV.
TYP.	TYPICAL
VERT.	VERTICAL
W	WEST
W/	WITH
W/O	WITHOUT
W.M	WATER METER
WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WS	WATER SURFACE
WSS	WASHINGTON STATE STANDARD WSDOT/APWA STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION
WTP	WATER TREATMENT PLANT
YD	YARD

GENERAL LEGEND

8" — WATER LINE IN PLAN AND PIPE SIZE

EXISTING UNDERGROUND UTILITIES

T — UNDERGROUND TELEPHONE LINE

P — UNDERGROUND POWER LINE

MAPPING

250 — INDEXED CONTOUR INTERVAL

1' CONTOUR INTERVAL

CATCH BASIN

X252.5 — EXISTING ELEVATION

52.5 — FINISHED GRADE SPOT ELEVATION

X—X—X—X — FENCE

WATER METER

FIRE HYDRANT

POWER POLE

CULVERT

MONUMENT IN CASE

GUY ANCHOR

PAD MOUNTED TRANS.

P — POWER VAULT

STRUCTURE

TREES OR SHRUBS

RAILROAD TRACK

MISCELLANEOUS

RIGHT-OF-WAY

LOT LINES

ROAD CENTERLINE

SECTION LINE

EDGE OF PAVEMENT

MONUMENT

TPI — TEST PIT AND NUMBER

CONCRETE IN SECTION

METAL OR REINFORCED MASONRY IN SECTION

FINISH GRADE IN SECTION OR UNDISTURBED SOIL

WATER SURFACE

REINFORCING STEEL BAR

GENERAL SYMBOLS

SINGLE LINE	DESCRIPTION
⋈	GATE VALVE
	FLUSHING ASSEMBLY
	TEE
	90° ELBOW
	45° ELBOW
	22 1/2° ELBOW
	11 1/4° ELBOW
	AIR/VACUUM ASSEMBLY
▷	REDUCER
	ADAPTER
	FIRE HYDRANT ASSEMBLY
	PRESSURE GAUGE
	PRESSURE REDUCING VALVE

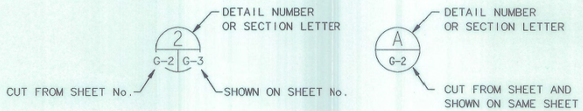
BENCH MARKS FOR PROJECT

1. NORTH RIM OF MONUMENT CASE AT N.W. CORNER OF SECTION 12, T34N, R4E., AT INTERSECTION OF BUCHANAN HILL ROAD AND TEAK LANE.
   N 534625.8971, E 297242.6185 ELEVATION 222.31
2. NORTH RIM OF MONUMENT CASE AT NORTH 1/4 CORNER OF SECTION 12, T34N, R4E. AT INTERSECTION OF BUCHANAN HILL ROAD AND WESTERLY EDGE OF SPRUCE AVE.
   N 534592.1825, E 299913.9873 ELEVATION 79.84

GENERAL NOTES

1. THESE DRAWINGS SHALL BE COORDINATED AND USED IN CONJUNCTION WITH THE SPECIFICATIONS, BID DOCUMENTS AND FAVORABLY REVIEWED SHOP DRAWINGS.
2. THE KNOWN EXISTING UNDERGROUND UTILITY LINES ARE SHOWN ON THE DRAWINGS IN THEIR APPROXIMATE LOCATION. THERE IS NO GUARANTEE, EXPRESS OR IMPLIED, THAT ALL UTILITY LINES ARE SHOWN OR THAT LOCATIONS SHOWN ARE ACCURATE. THE CONTRACTOR SHALL UNCOVER ALL INDICATED PIPING WHERE CROSSINGS, INTERFERENCES, OR CONNECTIONS OCCUR, PRIOR TO TRENCHING OR EXCAVATING FOR ANY PIPE OR STRUCTURES, TO DETERMINE ACTUAL LOCATIONS AND SHALL MAKE THE APPROPRIATE PROVISION FOR THE PROTECTION OF SAID FACILITIES. THE CONTRACTOR SHALL NOTIFY THE UTILITY AGENCIES AND ARRANGE FOR FIELD LOCATION OF THEIR FACILITIES BEFORE CONSTRUCTION. CALL: 1-800-424-5555 FOR BURIED UTILITY INFORMATION 48 HOURS BEFORE EXCAVATION.
3. ALL PIPE SHALL BE BEDDED AS INDICATED IN THE DETAILS.
4. ALL STATIONING IS BASED ON CENTERLINE OF ROADS AND DOES NOT REFLECT TRUE DISTANCE OF PIPELINES. PAY QUANTITIES SHALL BE MEASURED (SLOPE DISTANCE) WITH A MEASURING WHEEL ALONG THE CENTERLINE OF THE WATER LINE.
5. THE UNDERGROUND UTILITIES DEPICTED ARE FROM UTILITY LOCATED PAINT MARKS ON THE SURFACE; THE ACTUAL LOCATIONS ARE TO BE DETERMINED IN THE FIELD.
6. THE LOTS AND BLOCKS OF THE VARIOUS "ADDITIONS" TO THE TOWN OF CLEAR LAKE ARE ONLY A GRAPHICAL REPRESENTATION OF THE OFFICIAL PLATS, THE TRUE LOT DIMENSIONS CAN ONLY BE DETERMINED BY A FIELD SURVEY.
7. DATUM - BASED UPON NAD 29.

REFERENCE SYMBOLS



AS BUILT

RECORD DRAWING

THIS DRAWING HAS BEEN REVISED TO REFLECT CHANGES AND CLARIFICATION THAT OCCURRED DURING CONSTRUCTION. CHANGES SHOWN REFLECT INFORMATION THAT WAS PROVIDED TO THE ENGINEER BY OTHERS.

Kennedy/Jenks Consultants
Federal Way, Washington

COMMENTS

REVISIONS	BY	DATE

SKAGIT COUNTY WATER SERVICES

c.o. 3560 | w.o. 93-2125
SYSTEM CLEAR LAKE
NONE | 5/94

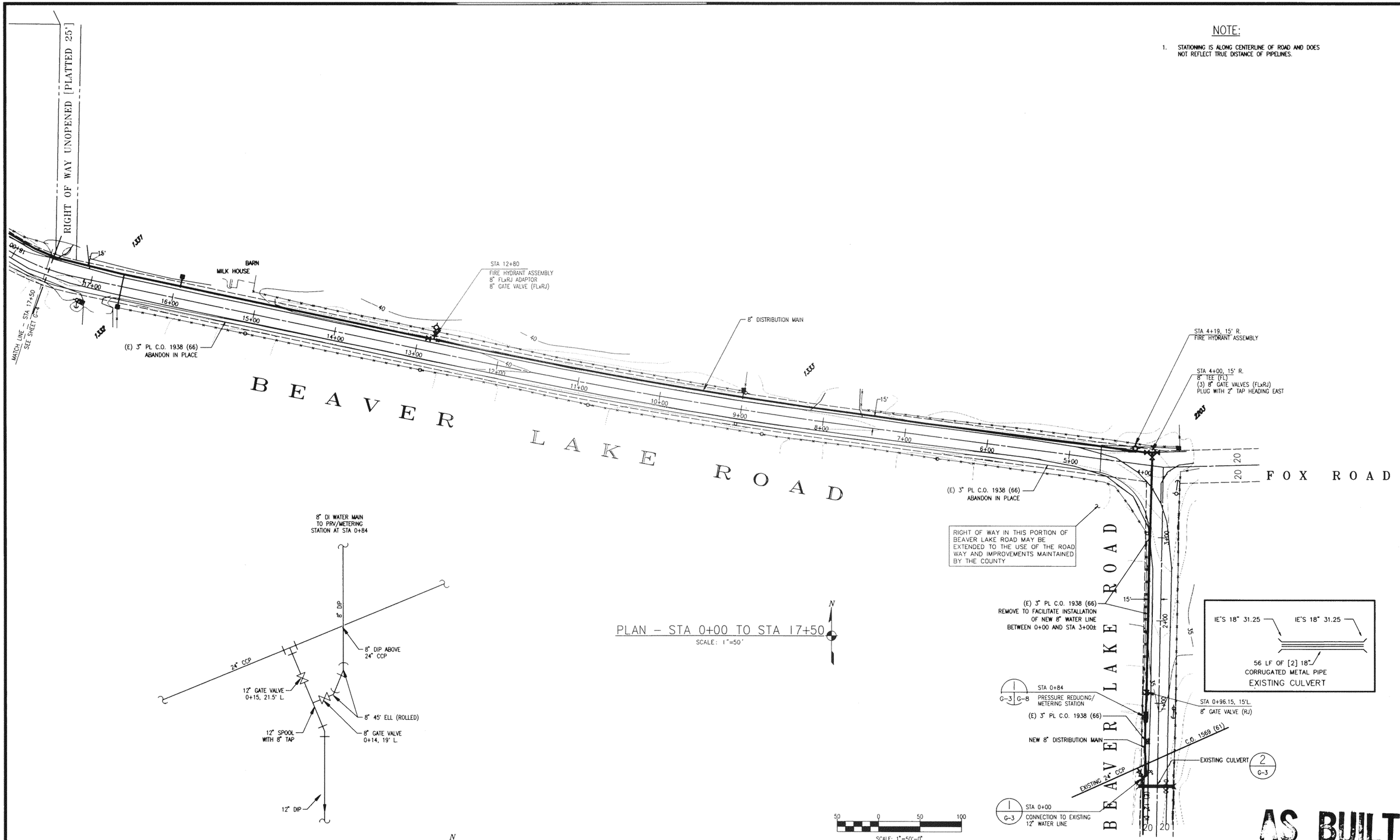
BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT
ABBREVIATIONS, LEGEND, GENERAL SYMBOLS & NOTES
P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104

DWN BY KKH | DSGN BY KSP | APPRVD BY

G-2

NOTE:

1. STATIONING IS ALONG CENTERLINE OF ROAD AND DOES NOT REFLECT TRUE DISTANCE OF PIPELINES.



PLAN – STA 0+00 TO STA 17+50

SCALE: 1"=50'

CONNECTION TO 12" WATER LINE

SCALE: NONE

SCALE: 1"=50'-0"

AZIMUTH NORTHWEST, INC.
1595 WOOD ROAD
BOW, WA, 98232
[206] 724-7326

RECORD DRAWING

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Kennedy/Jenks Consultants
Federal Way, Washington
Project: 946032.00 Drawing: P5G003R

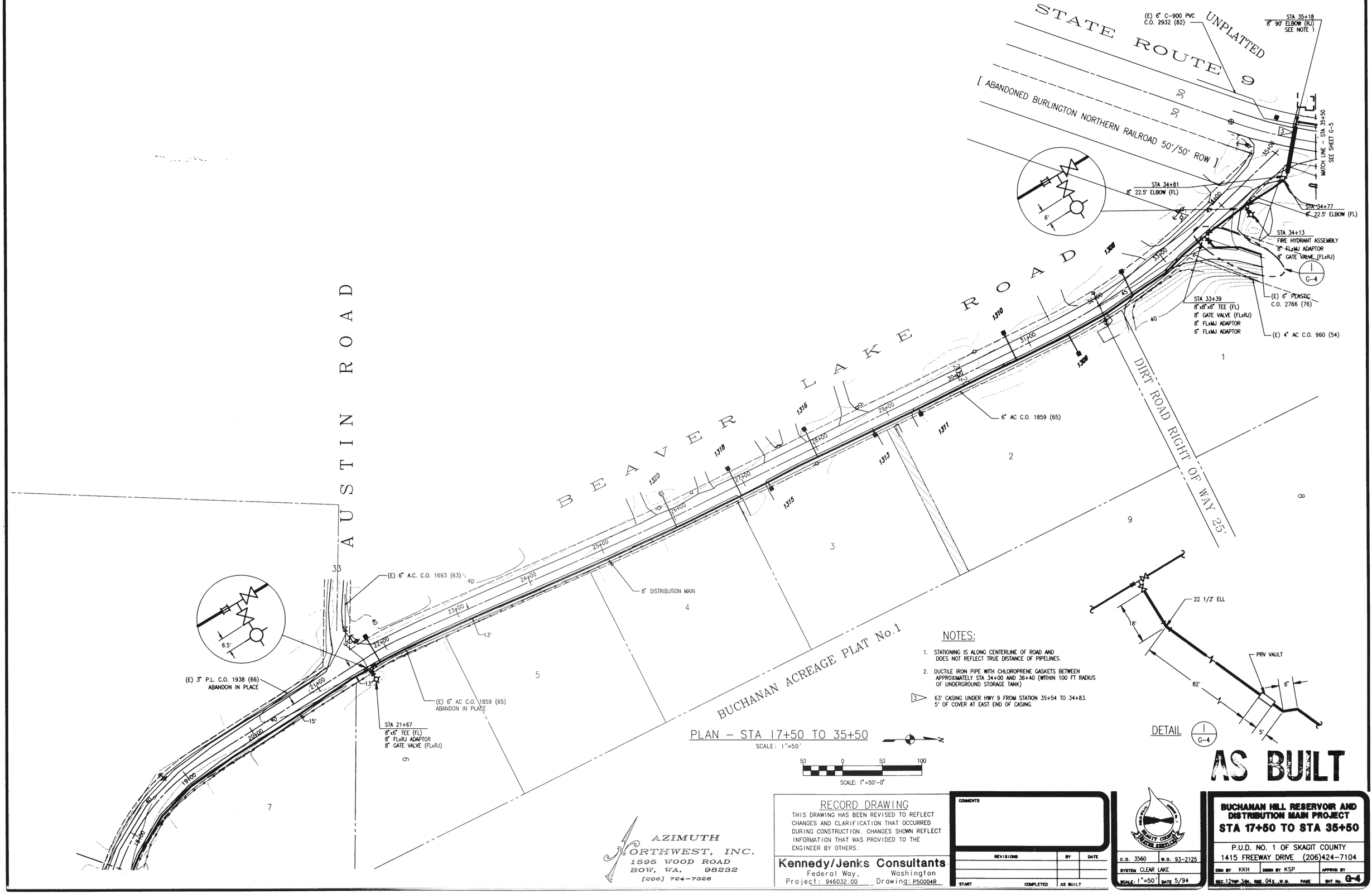
COMMENTS		
REVISIONS	BY	DATE
START COMPLETED	AS BUILT	

AS BUILT

BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT
STA 0+00 TO STA 17+50

P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104

C.O. 3560	W.O. 93-2125		
SYSTEM CLEAR LAKE			
SCALE: 1"=50'	DATE 5/94	DSN BY KKH	DRN BY KSP
APPRVD BY		SEC. 12 TWP. 34N RGE. 04E W.M.	PAGE SHT No. G-3



PLAN – STA 17+50 TO 35+50

SCALE: 1"=50'

SCALE: 1"=50'-0"

NOTES:

1. STATIONING IS ALONG CENTERLINE OF ROAD AND DOES NOT REFLECT TRUE DISTANCE OF PIPELINES.
2. DUCTILE IRON PIPE WITH CHLOROPRENE GASKETS BETWEEN APPROXIMATELY STA 34+00 AND 36+40 (WITHIN 100 FT RADIUS OF UNDERGROUND STORAGE TANK)

3 63' CASING UNDER HWY 9 FROM STATION 35+54 TO 34+83. 5' OF COVER AT EAST END OF CASING.

DETAIL 1/G-4

AS BUILT

AZIMUTH
NORTHWEST, INC.
1595 WOOD ROAD
BOW, WA. 98232
[206] 724-7326

RECORD DRAWING

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Kennedy/Jenks Consultants
Federal Way, Washington
Project: 946032.00 Drawing: P5G004R

COMMENTS

REVISIONS	BY	DATE
START COMPLETED	AS BUILT	

C.O. 3560 W.O. 93-2125
SYSTEM CLEAR LAKE
SCALE: 1"=50' DATE 5/94

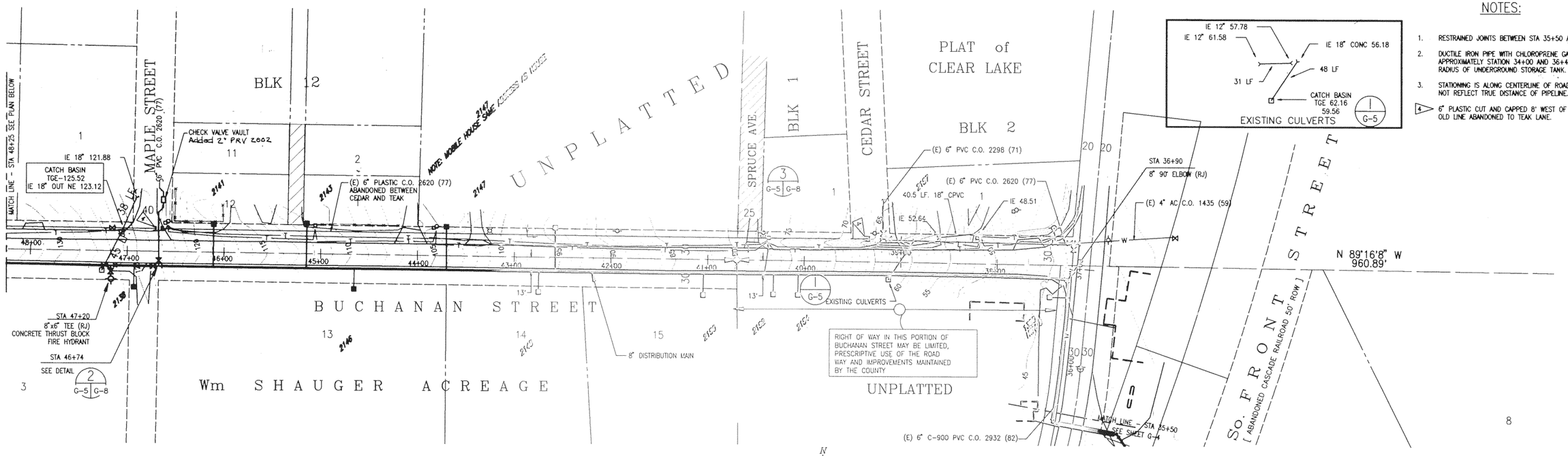
BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT

STA 17+50 TO STA 35+50

P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104

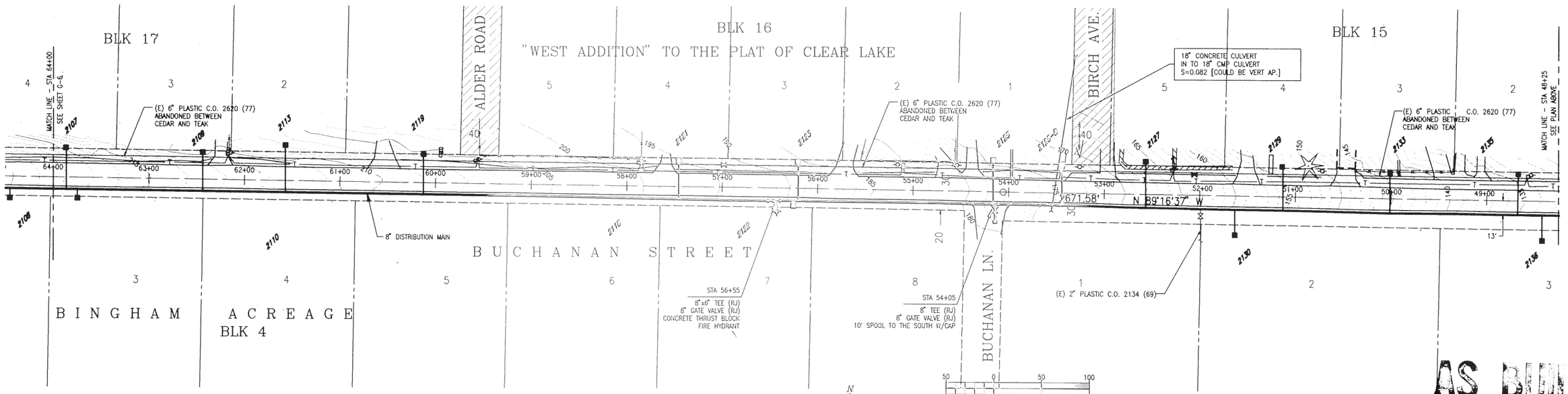
DSN BY KKH DRWN BY KSP APPRVD BY

SEC.12 TWP. 34N. RGE. 04E. W.M. PAGE SHT No. G-4



PLAN – STA 35+50 TO 48+25

SCALE: 1"=50'



PLAN – STA 48+25 TO 64+00

SCALE: 1"=50'

NOTES:

1. RESTRAINED JOINTS BETWEEN STA 35+50 AND STA 37+60.
2. DUCTILE IRON PIPE WITH CHLOROPRENE GASKETS BETWEEN APPROXIMATELY STATION 34+00 AND 36+40 (WITHIN 100 FT RADIUS OF UNDERGROUND STORAGE TANK.
3. STATIONING IS ALONG CENTERLINE OF ROAD AND DOES NOT REFLECT TRUE DISTANCE OF PIPELINE.
4. 6" PLASTIC CUT AND CAPPED 8' WEST OF VALVE AT CEDAR STREET. OLD LINE ABANDONED TO TEAK LANE.

AS BUILT

RECORD DRAWING

THIS DRAWING HAS BEEN REVISED TO REFLECT CHANGES AND CLARIFICATION THAT OCCURRED DURING CONSTRUCTION. CHANGES SHOWN REFLECT INFORMATION THAT WAS PROVIDED TO THE ENGINEER BY OTHERS.

AZIMUTH NORTHWEST, INC.
1595 WOOD ROAD
BOW, WA, 98232
(206) 724-7326

Kennedy/Jenks Consultants
Federal Way, Washington
Project: 946032.00 Drawing: P50005R

COMMENTS

REVISIONS	BY	DATE
START	COMPLETED	AS BUILT

P.U.D. NO. 1 OF SKAGIT COUNTY

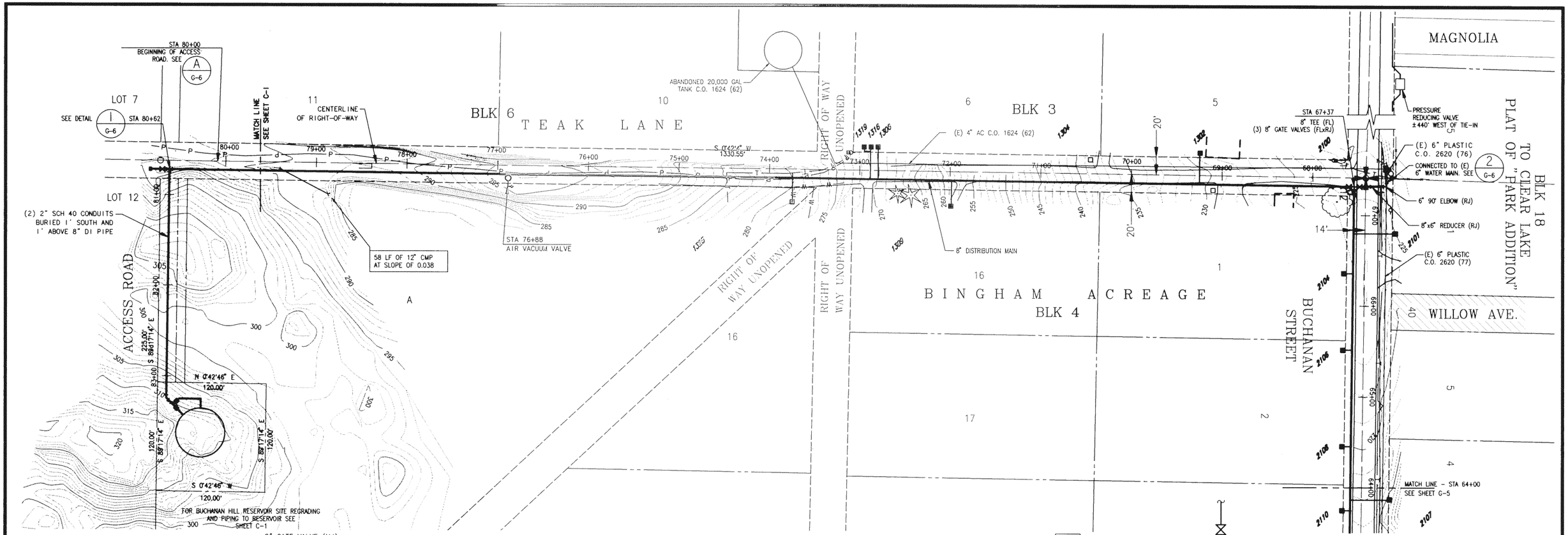
C.O. 3560	W.O. 93-2125
SYSTEM CLEAR LAKE	
SCALE: 1"=50'	DATE 5/94

BUCHANAN HILL RESERVOIR AND TRANSMISSION MAIN PROJECT

STA 35+50 TO 48+25 & STA 48+25 TO STA 64+00

P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104

DESIGN BY KKH	DRAWN BY KSP	APPROVED BY
SEC. 1, TWP. 34N., RGE. 04E., W.M.	PART	SHT No. G-5



AZIMUTH NORTHWEST, INC.
1595 WOOD ROAD
BOW, WA. 98232
(206) 724-7326

RECORD DRAWING
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Kennedy/Jenks Consultants
Federal Way, Washington
Project: 946032.00 Drawing: P5G006R

COMMENTS		
REVISIONS	BY	DATE
START	COMPLETED	AS BUILT

C.O. 3560 W.O. 93-2125
SYSTEM CLEAR LAKE
SCALE: 1"=50' DATE 5/94

BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT
STA 64+00 TO 83+50 AND TEAK LANE PROFILE
P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104

DSN BY KKH	DSGN BY KSP	APPRVD BY
1.2.11.12		
SEC. TWP. 34N. RGE. 04E., W.M.	PAGE	SHT No. G-6

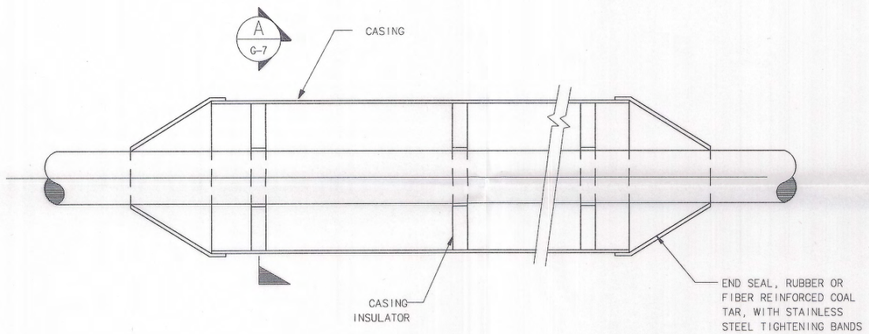
CASING NOTES:

1. ALL PIPE JOINTS INSIDE CASING SHALL BE RESTRAINED JOINTS

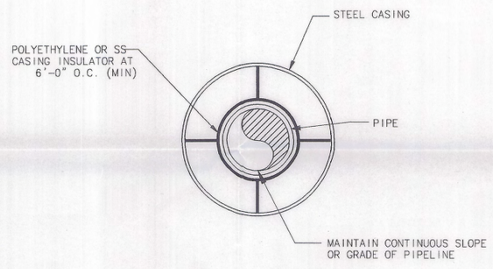
2. CASING DIAMETER = 16"
   THICKNESS = 0.25"
   LENGTH = 32'

3. ENCASED PIPE SHALL SLOPE CONTINUOUSLY IN DIRECTION OF FLOW NO HIGH POINTS ARE ALLOWED. CONTRACTOR SHALL CORRECT ANY GRADE PROBLEMS AT HIS OWN EXPENSE. CORRECTION MAY INCLUDE INSTALLING A NEW CASING.

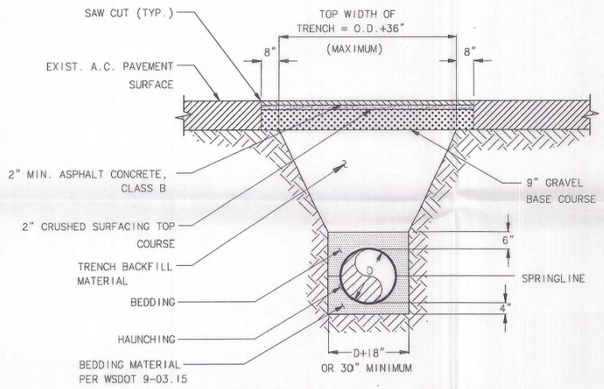
4. CASING DIAMETER AND THICKNESS ARE MINIMUMS. PROVIDE LARGER CASING AND/OR WALL THICKNESS IF NECESSARY TO WITHSTAND CONTRACTOR'S INSTALLATION METHOD AND MEET SPECIFIED TOLERANCES.



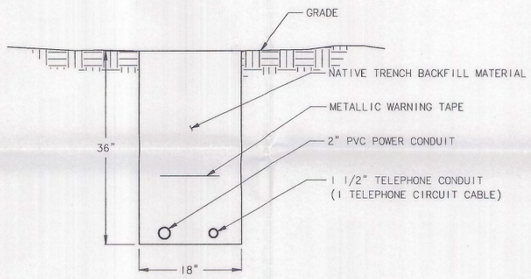
DETAIL – CASING (I / G-3 | G-7)
SCALE: NONE



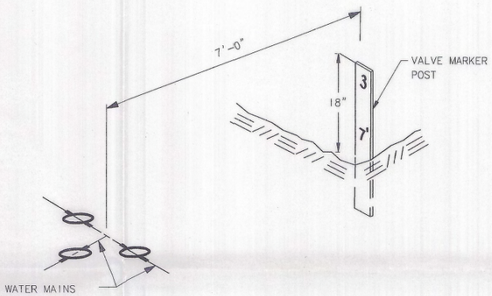
SECTION – CASING (A / G-7)
SCALE: NONE



TRANSMISSION MAIN TRENCH DETAIL
SCALE: NONE



UTILITY CONDUIT TRENCH DETAIL
SCALE: NONE



NOTES:
1. VALVE MARKER POST SHALL BE A FLEXIBLE FIBERGLASS MARKER POST AS MANUFACTURED BY CARSONITE OR APPROVED EQUAL. THE POST SHALL BE SET AT RIGHT ANGLES TO THE ROADWAY FROM THE VALVE AND SHALL BE SITUATED IN A SAFE AND REASONABLY CONSPICUOUS LOCATION.

2. STENCIL NUMBER OF VALVES AND DISTANCE TO THE LINE VALVE CAPS IN 2" BLACK LETTERS.

VALVE MARKER POST DETAIL
SCALE: NONE

AS BUILT

RECORD DRAWING
THIS DRAWING HAS BEEN REVISED TO REFLECT CHANGES AND CLARIFICATION THAT OCCURRED DURING CONSTRUCTION. CHANGES SHOWN REFLECT INFORMATION THAT WAS PROVIDED TO THE ENGINEER BY OTHERS.

Kennedy/Jenks Consultants
Federal Way, Washington

COMMENTS

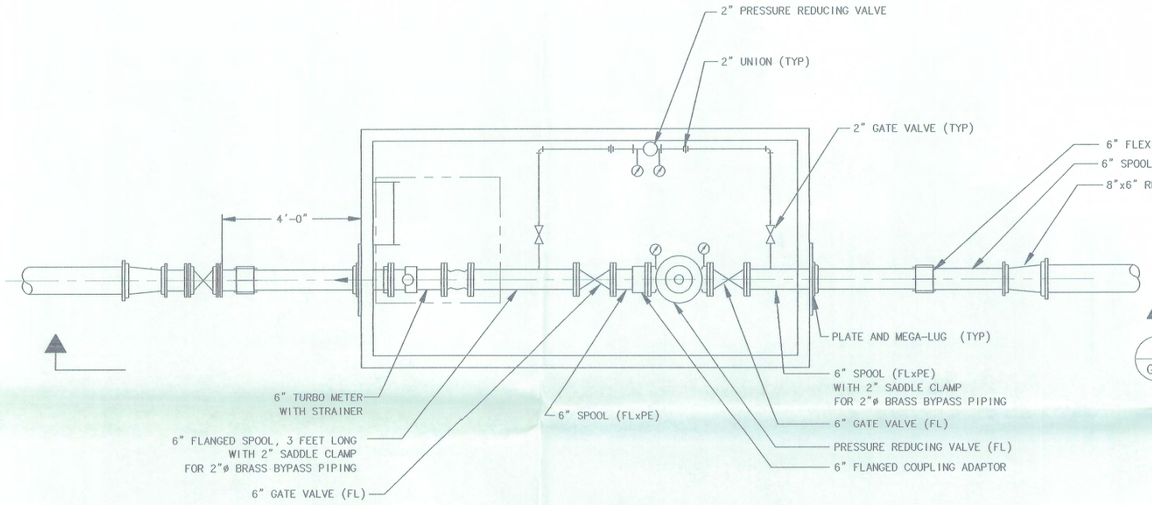
REVISIONS	BY	DATE

c.o. 3560 | w.o. 93-2125
SYSTEM CLEAR LAKE

BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT
WATER MAIN DETAILS
P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104

DWN BY	DSGN BY	APPRVD BY
KKH	KSP	

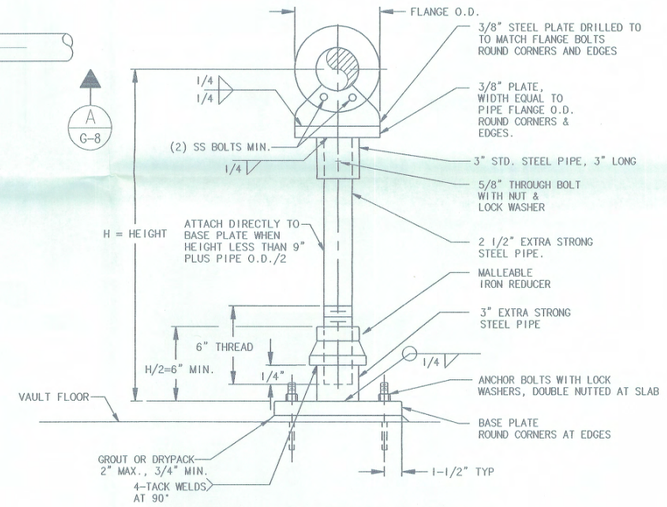
G-7



PLAN-PRESSURE REDUCING/ METERING STATION AT STA 1+00

SCALE: 1/2"=1'-0"

G-3 | G-8



LOCATION	H (MAX.)	MEMBER	
		BASE PLATE	ANCHOR BOLTS
FLOOR	3'-0"	3/8"x9"x9"	(4) 5/8"

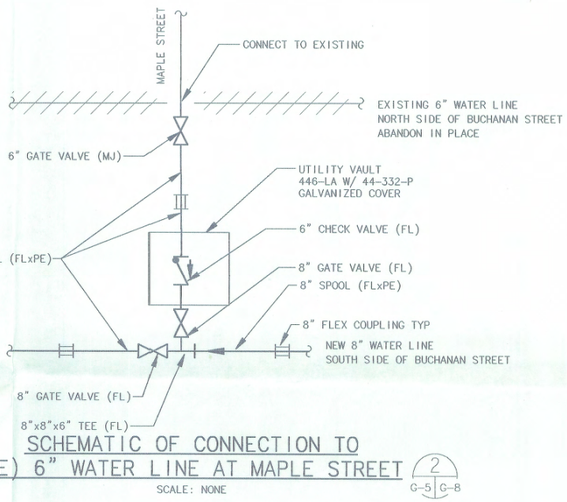
NOTES:

1. AS AN ALTERNATE, IF ADJUSTMENT IS NOT NECESSARY, DELETE 2 1/2" PIPE AND REDUCER AND WELD 3" STEEL PIPE DIRECTLY TO 3/8" PLATE.
2. DO NOT CUT OR WELD AFTER GALVANIZING. PIPE SUPPORT MAY BE ORIENTATED IN ANY DIRECTION.

PIPE SUPPORT

SCALE: NONE

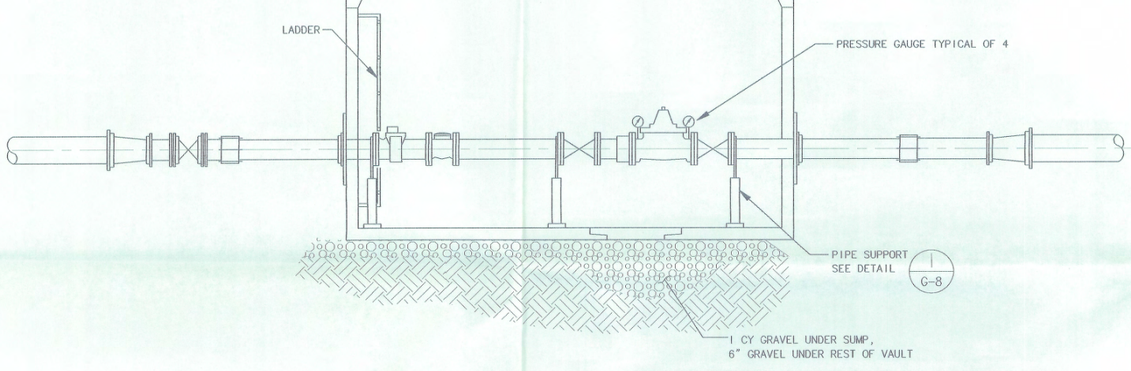
1 / G-8



SCHEMATIC OF CONNECTION TO (E) 6" WATER LINE AT MAPLE STREET

SCALE: NONE

2 / G-5 | G-8



SECTION-PRESSURE REDUCING/ METERING STATION AT STA 1+00

SCALE: 1/2"=1'-0"

A / G-8

RECORD DRAWING

THIS DRAWING HAS BEEN REVISED TO REFLECT CHANGES AND CLARIFICATION THAT OCCURRED DURING CONSTRUCTION. CHANGES SHOWN REFLECT INFORMATION THAT WAS PROVIDED TO THE ENGINEER BY OTHERS.

Kennedy/Jenks Consultants
Federal Way, Washington
Project: 946032.00 Drawing: P5G008R

COMMENTS

REVISIONS	BY	DATE
START	COMPLETED	AS BUILT

P.U.D. NO. 1 OF SKAGIT COUNTY WATER SERVICE

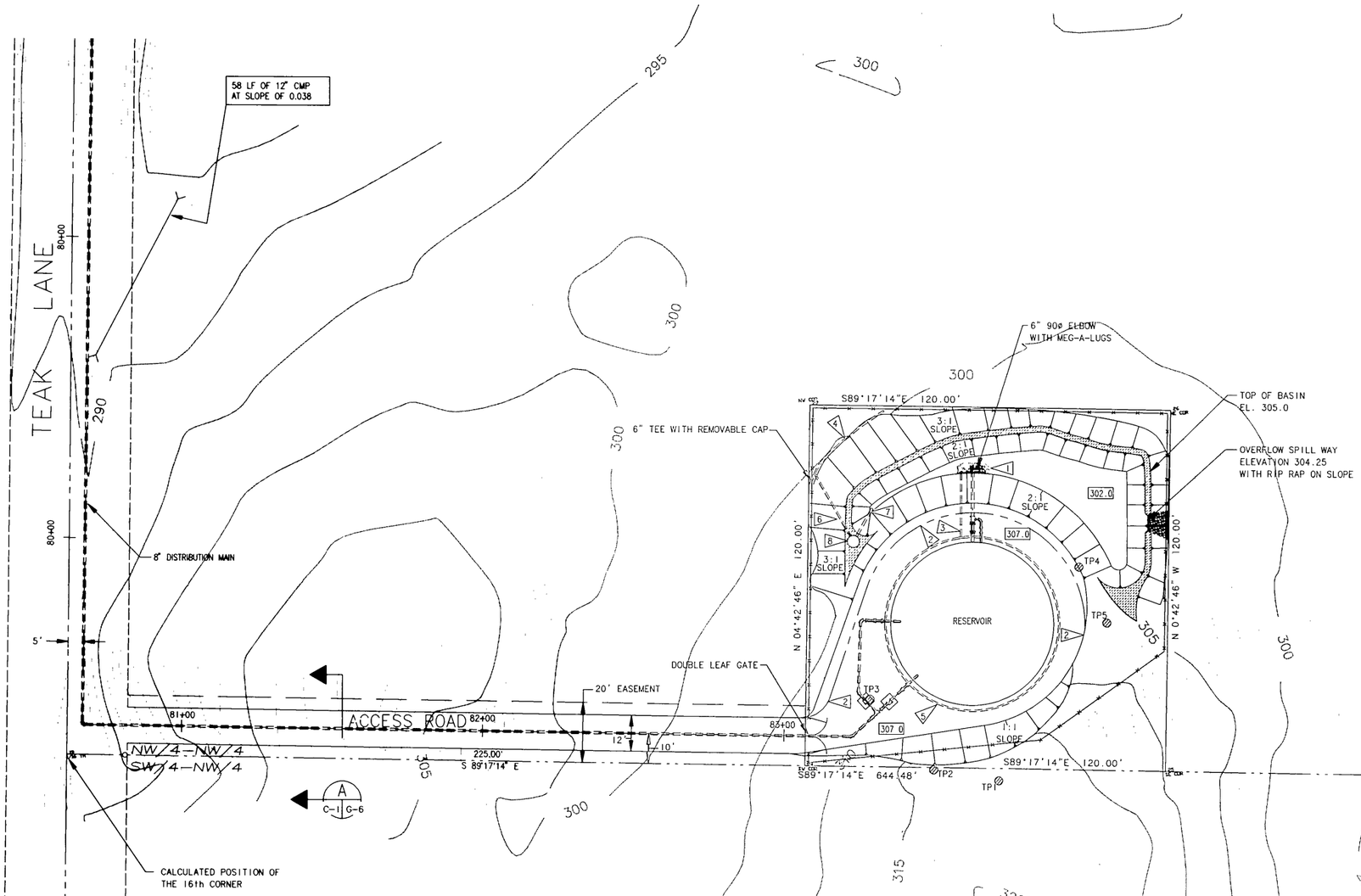
C.O. 3560	W.O. 93-2125
SYSTEM CLEAR LAKE	
SCALE: NOTED	DATE 5/94

BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT

MISCELLANEOUS DETAILS

P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104

DWN BY KKH	DSGN BY KSP	APPRVD BY
SEC. TWP. N, RGE. E., W.M.	PAGE	SHT No. G-8



LEGEND

- CONTOUR INTERVAL
- 305 — INDEX CONTOUR INTERVAL [5']
- AREA OF LOCAL DEPRESSION
- TP1 ⊘ — TEXT PIT SITE APPROXIMATE LOCATION
- TOP OF BERM (EL. 305.0)

20 60
0 40

SCALE 1" = 20'
CONTOUR INTERVAL = 1'

A PORTION OF THE NORTHWEST QUARTER OF
SECTION 12, TOWNSHIP 34 NORTH, RANGE 4 EAST, W.M.

NOTES

1. APPROXIMATELY 1 CUBIC YARD HAND PLACED RIPRAP (9-13.2)
2. GRAVELED AREA (EL. 307.0)
3. 6" SOLID PVC PIPE DRAIN INTO DETENTION POND FROM FOOTING DRAIN PIPING. OUTLET AT POND IE. 302.0
4. 30' 6" POLY PIPE.
5. 6" PERFORATED POLY PIPE FOOTING DRAIN WITH FILTER FABRIC COVER ADS DRAIN GUARD, OR EQUAL.
6. 6" SOLID PIPE, RESTRICTOR MANHOLE OUTLET.
7. 8" PVC PIPE, POND DRAIN INTO RESTRICTOR MANHOLE WITH 1/2 CUBIC YARD HAND PLACED RIPRAP AROUND INLET.
8. 48" FLOW RESTRICTOR MANHOLE WITH LOCKING CI FRAME AND COVER PER SKAGIT P.U.D. FIG 6-1 AND FIG 6-1A. SEE SPECIFICATIONS.
   TOP OF GRATE: 305.5±
   INTERIOR OVERFLOW: 304.5
   INLET AND OUTLET: IE 302.0

AZIMUTH NORTHWEST, INC.
1595 WOOD ROAD
BOW, WA. 98232
[206] 724-7326
JULY 10,1993

AS BUILT

RECORD DRAWING
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Kennedy/Jenks Consultants
Federal Way, Washington
Project: 946032.00 Drawing: P5C001R

COMMENTS

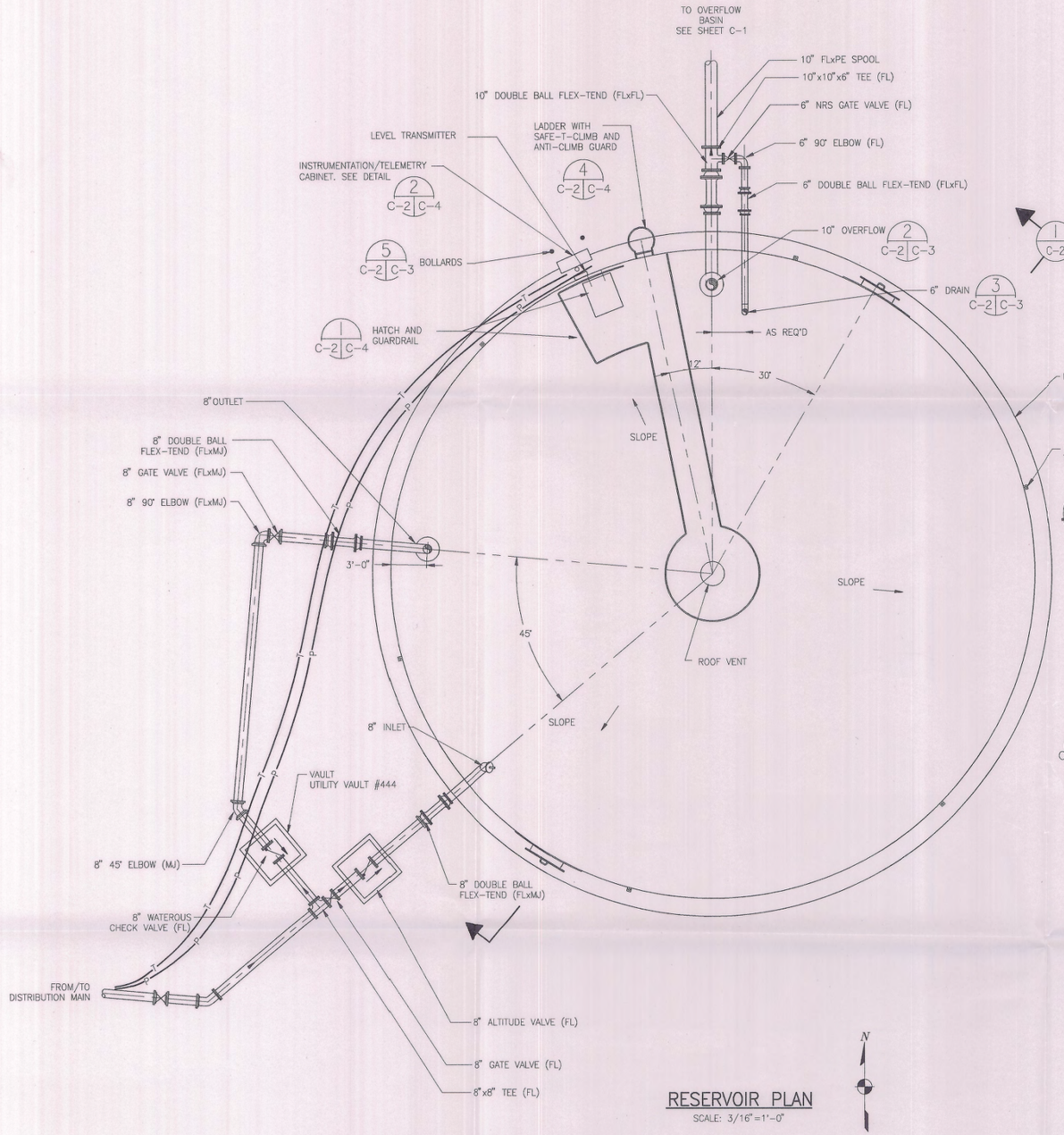
REVISIONS	BY	DATE
START COMPLETED AS BUILT		

C.O. 3560 W.O. 93-2125
SYSTEM CLEAR LAKE
SCALE 1"=20' DATE 5/94

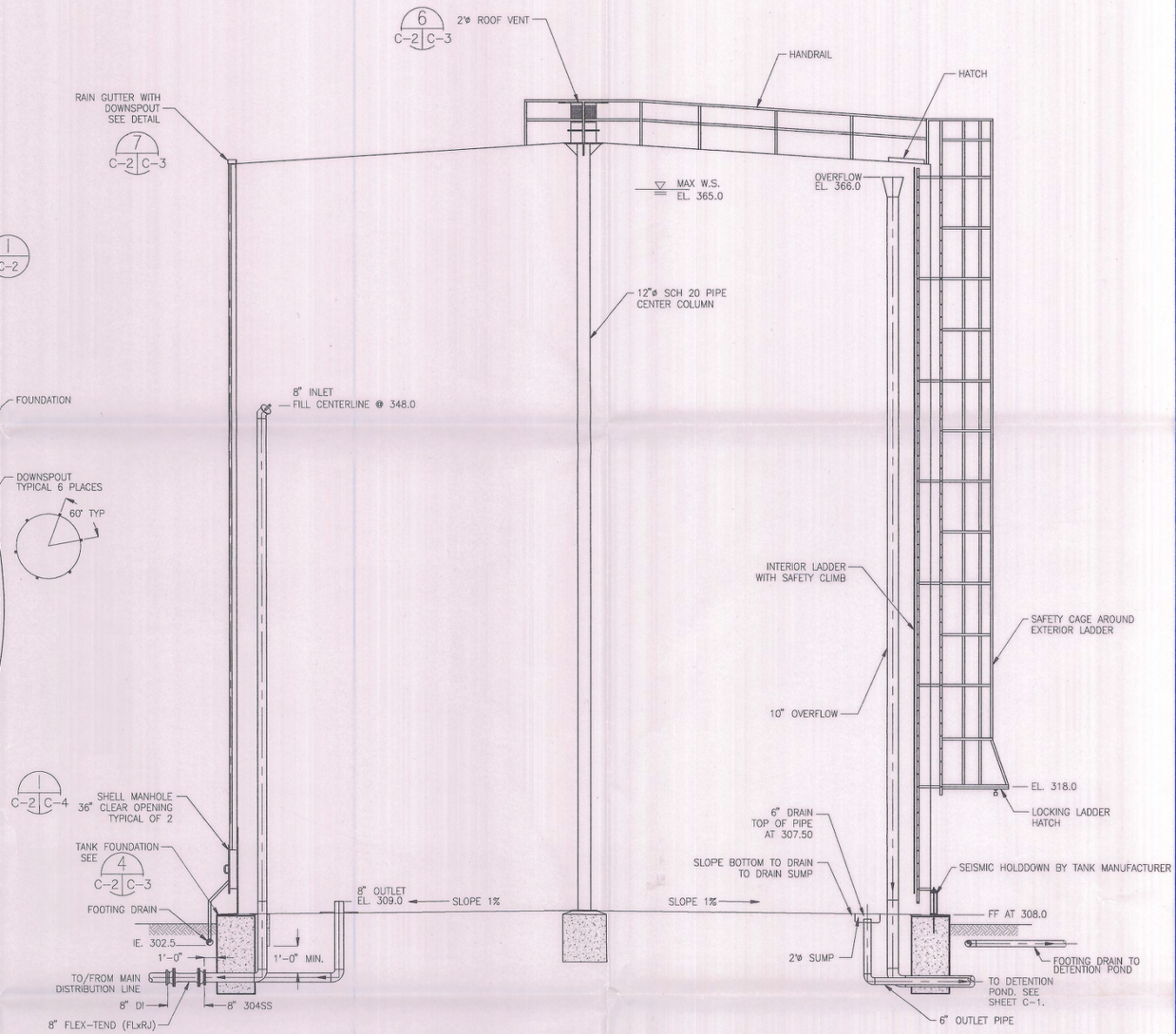
BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT
RESERVOIR SITE PLAN
P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104

DRN BY	DSGN BY	APPRVD BY
KKH	KSP	

SEC TWP N, RGE E W M PAGE SHT No C-1



RESERVOIR PLAN
SCALE: 3/16"=1'-0"



ILLUSTRATIVE SECTION 1 C-2
SCALE: 3/16"=1'-0"

AS BUILT

RECORD DRAWING
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Kennedy/Jenks Consultants
Federal Way, Washington

COMMENTS

REVISIONS	BY	DATE

P.U.D. NO. 1 SKAGIT COUNTY WATER SERVICE

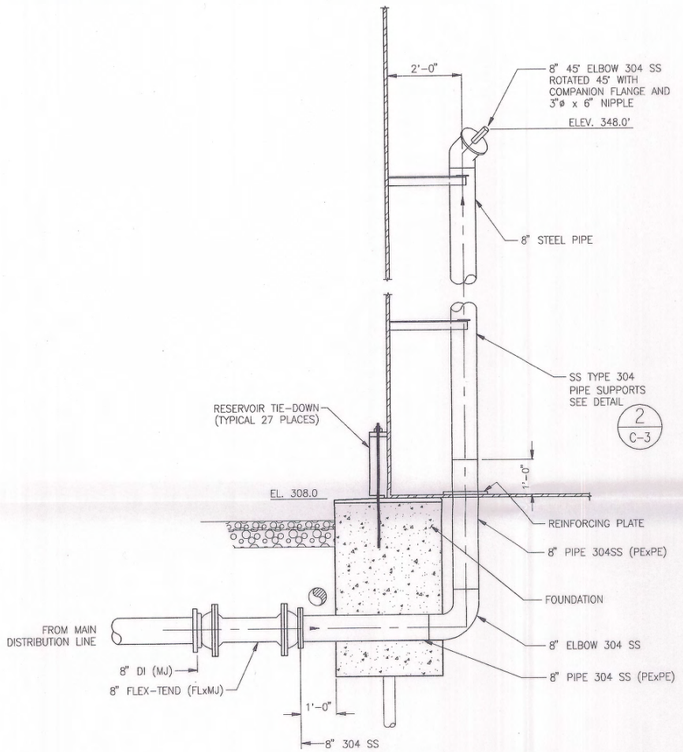
c.o. 3560 | w.o. 93-2125
SYSTEM CLEAR LAKE

DWN BY	DSGN BY	APPRVD BY
KKH	KSP	

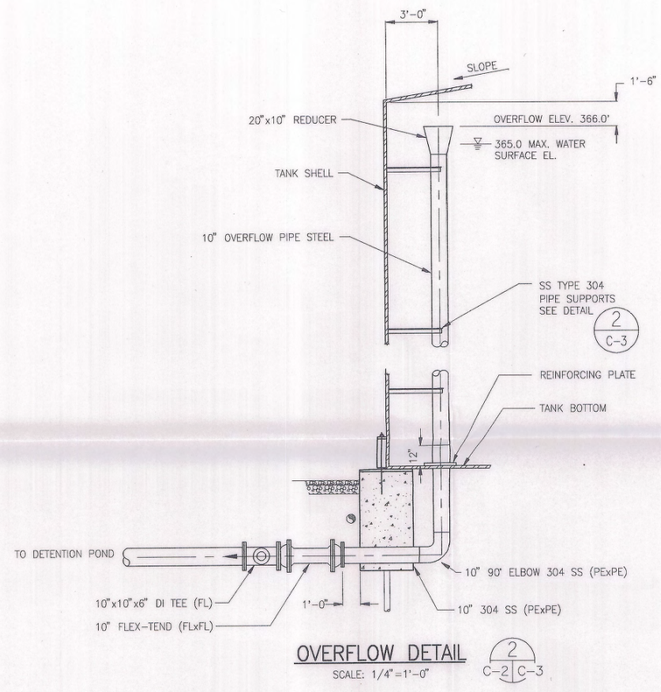
BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT

RESERVOIR PLAN AND SECTION

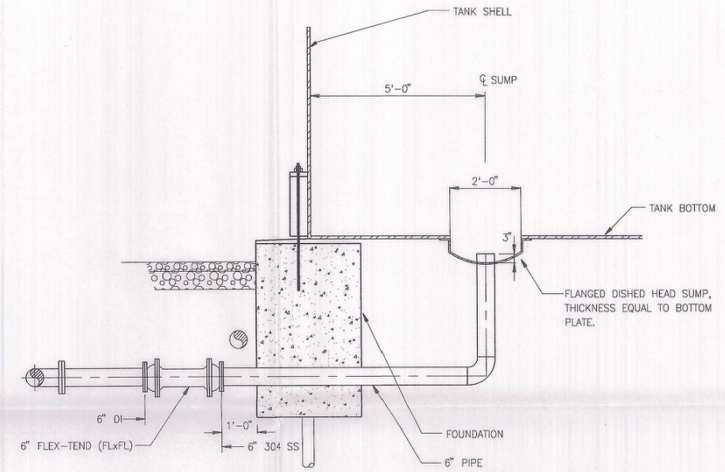
P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104



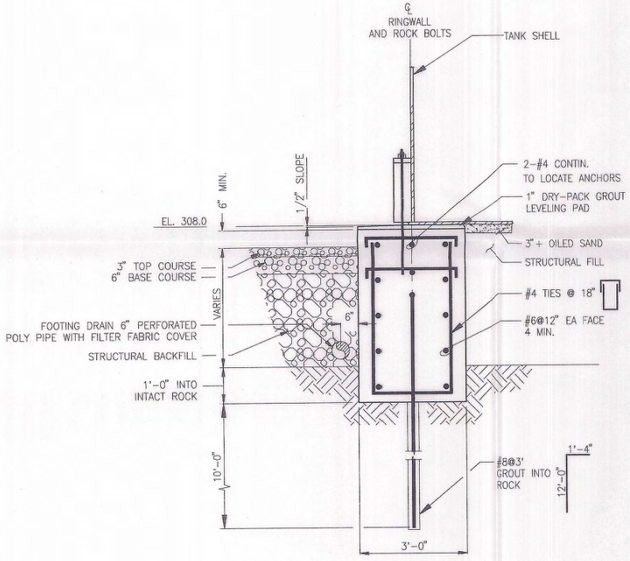
INLET (FILL) PIPING 1 C-2 | C-3
SCALE: 1/2"=1'-0"



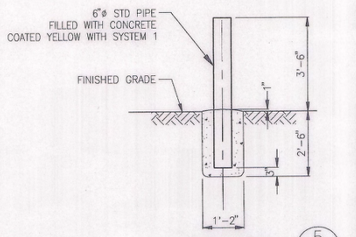
OVERFLOW DETAIL 2 C-2 | C-3
SCALE: 1/4"=1'-0"



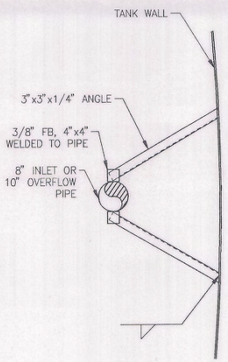
DRAIN DETAIL 3 C-2 | C-3
SCALE: 1/2"=1'-0"



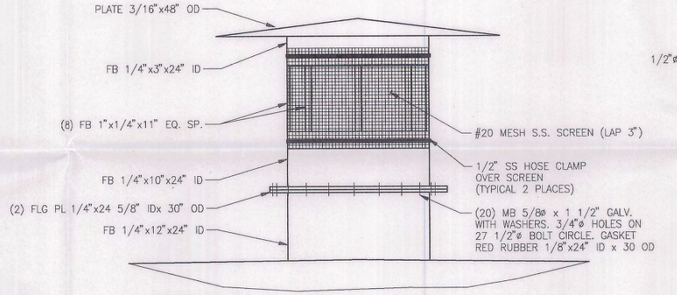
RESERVOIR FOUNDATION 4 C-2 | C-3
SCALE: NONE



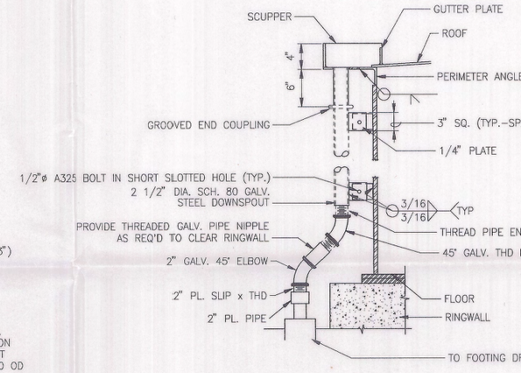
BOLLARD 5 C-2 | C-3
SCALE: NONE



PIPE SUPPORT INSIDE TANK 2 C-3
SCALE: NONE



ROOF VENT DETAIL 6 C-2 | C-3
SCALE: NONE



SCUPPER/DOWNSPOUT DETAIL 7 C-2 | C-3
SCALE: 1"=1'-0"

AS BUILT

RECORD DRAWING
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Kennedy/Jenks Consultants
Federal Way, Washington

COMMENTS

REVISIONS	BY	DATE

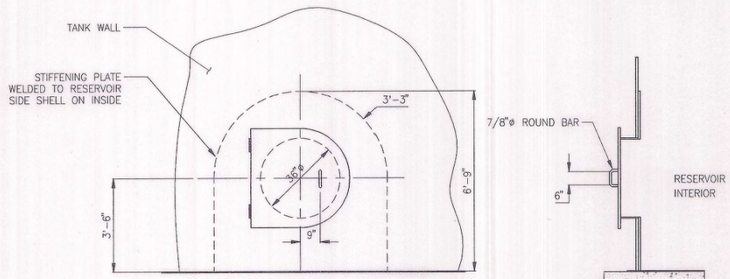
SKAGIT COUNTY PUBLIC UTILITY DISTRICT WATER SERVICES

C.O. 3560	W.O. 93-2125		
SYSTEM CLEAR LAKE			
DWN BY KKH	DSGN BY KSP	APPRVD BY	C-3

BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT

RESERVOIR DETAILS

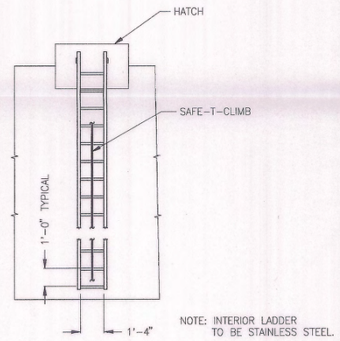
P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104



MANHOLE DETAIL

SCALE: NONE

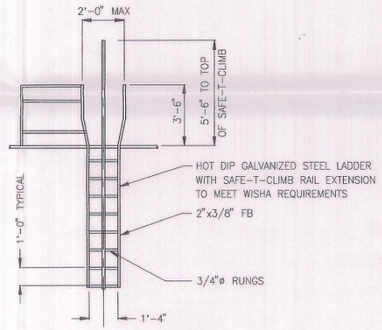
C-2 | 1 | C-4 (TWO REQUIRED AT 180° OPPOSITION)



NOTE: INTERIOR LADDER TO BE STAINLESS STEEL.

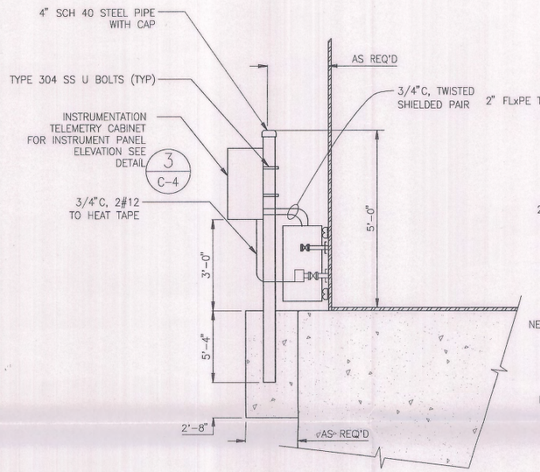
LADDER–INTERIOR

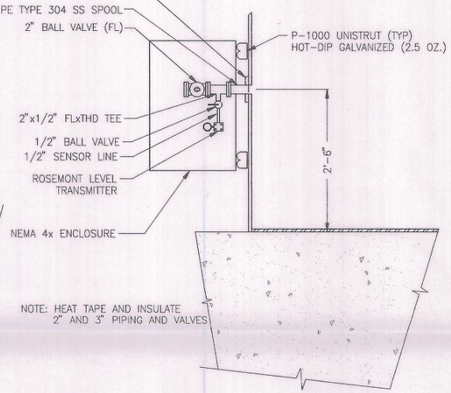
SCALE: NONE



LADDER–EXTERIOR

SCALE: NONE

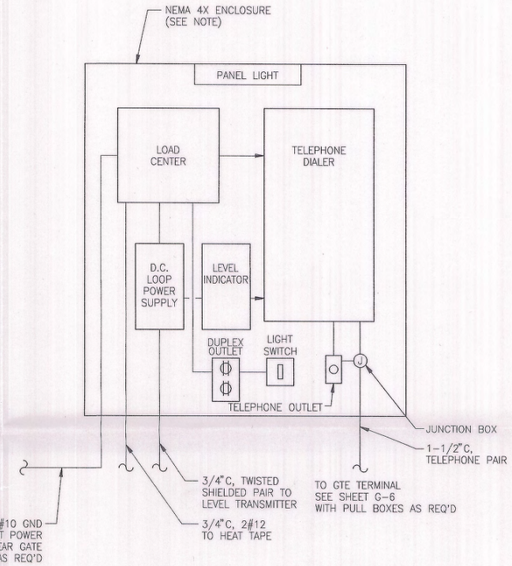




INSTRUMENTATION/TELEMETRY CABINET INSTALLATION AND LEVEL TRANSMITTER DETAIL

C-2 | 2 | C-4

SCALE: NONE

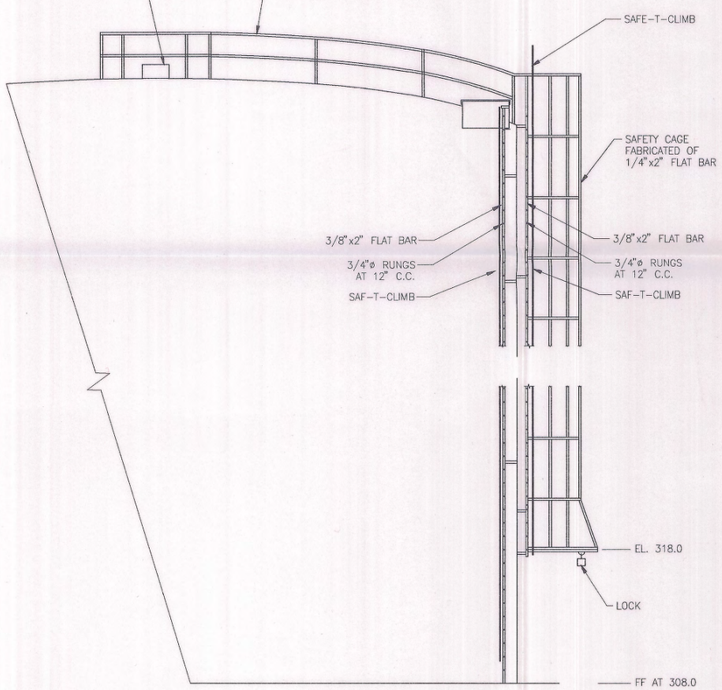


NOTE: SIZE CONTROL PANEL AND ENCLOSURE TO SUIT EQUIPMENT. DOOR NOT SHOWN.

INSTRUMENT PANEL ELEVATION DETAIL

3 | C-4

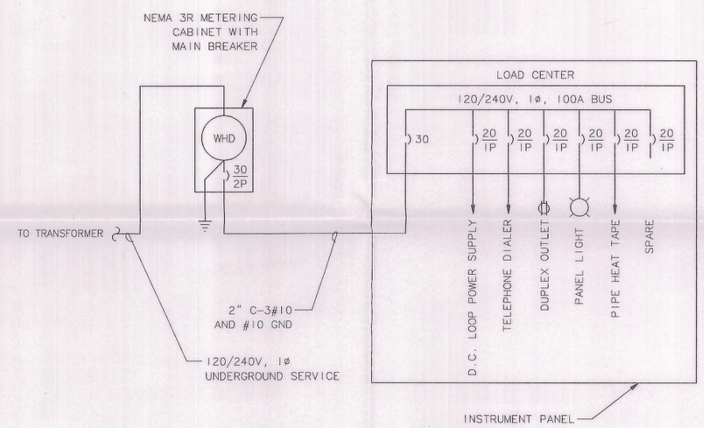
SCALE: NONE



LADDER–INTERIOR AND EXTERIOR

SCALE: NONE

4 | C-2 | C-4

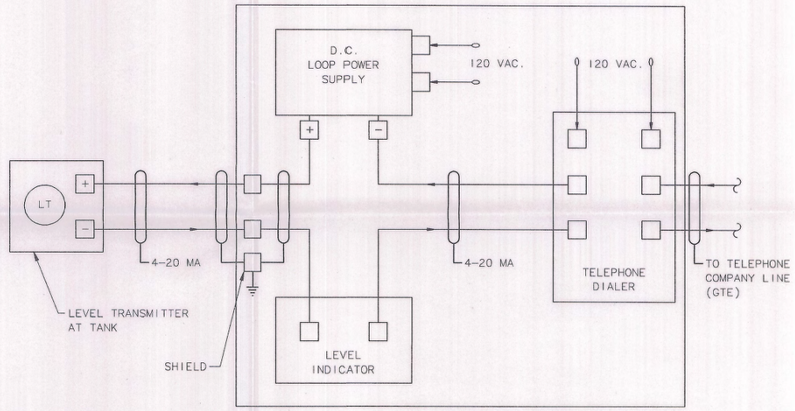


WHD = WATT HOUR DEMAND METER

RESERVOIR INSTRUMENTATION SINGLE LINE DIAGRAM

5 | C-4

SCALE: NONE



RESERVOIR INSTRUMENT LOOP DIAGRAM DETAIL

6 | C-4

SCALE: NONE

AS BUILT

RECORD DRAWING

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Kennedy/Jenks Consultants
Federal Way, Washington

COMMENTS

REVISIONS	BY	DATE

PUBLIC UTILITY DISTRICT NO. 1 SKAGIT COUNTY WATER SERVICES

C.O. 3560 | W.O. 93-2125
SYSTEM CLEAR LAKE

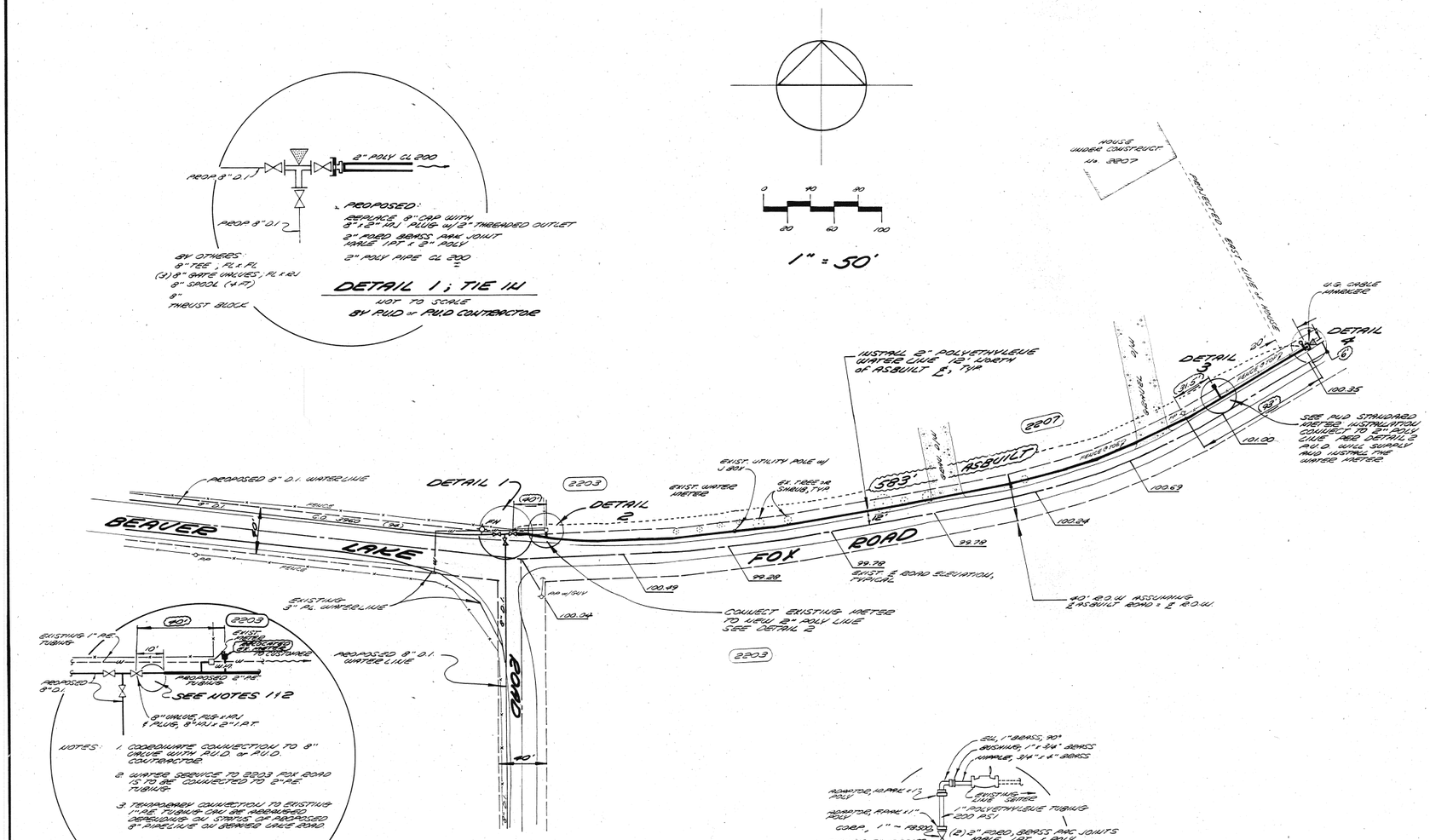
BUCHANAN HILL RESERVOIR AND DISTRIBUTION MAIN PROJECT

RESERVOIR DETAILS

P.U.D. NO. 1 OF SKAGIT COUNTY
1415 FREEWAY DRIVE (206)424-7104

DWN BY	DSGN BY	APPRVD BY
KKH	KSP	

12. Record Drawing for Existing 2-inch-diameter Waterline at Fox Road, CO



NO.	NOMENCLATURE	REQ'D
	WATER MAIN	
1	CLAMP, SERVICE, DOUBLE STRAP X 1" I.P.T., ALL BRASS, (FORD #S008)*	1
2	CORP., 1", (FORD #FB-500)*	1
3	ADAPTOR, BRASS PAK JOINT, 1" FEM. I.P.T. X POLY, (FORD #C16-44)*	1
4	ADAPTOR, BRASS, 3/4 THD X 1" INSERT, (FORD #PTM-21)*	1
5	CLAMP, 1", ALL STAINLESS - STUB ONLY*	2
6	TUBING, 1" POLYETHYLENE, 200 P.S.I., (SUPERLON)* **	15
7	LINESETTER, 3/4", FORD #LSV88-233W	1
8	METER, SENSUS, 5/8"X 3/4", SR II WITH REMOTE READER	1
9	ADAPTOR, BRASS PAK JOINT, 3/4" I.P.T. X 1" POLY, (FORD #C66-34)*	1
10	METER BOX & COVER, (BROOKS #1419 WITH CAST IRON HINGED READER COVER)*	1
11	EXTENSION, METER BOX, (BROOKS #1419 TEE)*	1
12	BOTTOM, METER BOX, (BERG VAULT #1)*	1
13	INSERT, STIFFENER, 1" (FORD #72)*	2
14	WIRE, #10 COPPER, BLUE INSULATED, EXTEND 18" INTO BOX	1
15	PLUG, 1" P.V.C. INSERT	1
16		

* OR EQUIVALENT APPROVED BY THE DISTRICT

* IF THE METER IS LOCATED IN ASPHALT OR CONCRETE AREA A TRAFFIC BOX (FOG-TITE #1-O WITH COLD STEEL LID)* WILL BE REQUIRED. IN LAWN OR LANDSCAPED AREAS A PLASTIC BOX (BROOKS #1419)* WITH EXTENSIONS MAY BE CONSIDERED. SET LINESETTER FLUSH, PLUMB AND CENTERED IN THE BOX.

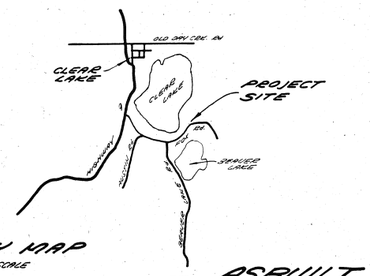
** IF THERE ARE PETROLEUM BASED SOIL CONTAMINANTS PRESENT THE PIPELINE WILL BE OF TYPE K COPPER WITH BRASS AND COPPER FITTINGS. SEE STANDARD P.U.D. COPPER SERVICE DETAIL.

WATER LINE NOTES

1. Contractor shall notify and coordinate with the Skagit County P.U.D. No. 1 prior to start of construction and prior to any water shut-off or turn-on affecting the water system. "Contractor shall not operate any valves. These will be operated by P.U.D. personnel."
2. Contractor shall furnish a water-tight plug of the appropriate size which shall be installed in the end of the water main anytime work is delayed or stopped.
3. All water installations require a 36" minimum cover and 42" maximum cover to existing or anticipated finish grade above the pipe.
4. The Contractor shall keep the P.U.D. advised of the progress of all the work so that they can inspect all construction.
5. Minimum 1 foot vertical clearance between water line and all other utilities.
6. Contractor shall restore off-site construction area to original condition.
7. Before being placed in service, all pipe and fittings shall be chlorinated to the satisfaction of Skagit County P.U.D., and a satisfactory bacteria sample received. Chlorination, disinfection, flushing and bacteriologic test shall be conducted in accordance with APWA/WSDOT Standard Specifications. No physical connection shall be made to the existing system until the proposed waterline revision has been sampled and a good bacteriological sample has been returned to the P.U.D. The Contractor shall be required to pay for the bacteriological samples. These samples shall be taken by P.U.D. Personnel and analyzed by the Skagit County Health Department laboratories or other approved laboratory. Reports of the samples shall be filed with the P.U.D. The Contractor shall add sufficient chlorine to the proposed pipeline in order to provide a 50 ppm residual initially with a 25 ppm residual remaining after 24 hours. As per Section 7-11.3(12)B.
8. 2" Polyethylene pipe shall meet AWWA Specifications, 200 PSI
9. Gate valves shall conform to AWWA C-509 Specifications and shall be iron body, bronze mounted double disc, parallel seat RS valves non-rising stem, "O" ring stem seal, and have standard 2" operating nuts. All valves shall be provided with cast iron valve boxes.
10. A valve marker post shall be furnished for each valve and shall be a 42" portable traffic delineator post with two reflector strips. They shall be new and buried 24" deep. The letter "V" and the distance to the valve in feet shall be stenciled on the post in black enamel paint. The post shall be Carsonite P.V.C., not concrete, * CUM 375
11. Water services to the property line shall be 1" minimum diameter.
12. Concrete reaction or thrust block shall be provided at valve, tee and fittings where changes occur in direction in accordance with APWA/WSDOT 1994 Standard Specifications and in compliance with the following: (See detail)
    - A. Bearing area of concrete thrust-block based on 200 psi pressure and safe soil bearing load of 2,000 pounds per square foot.
    - B. Bearing area must be adjusted for other pipe sizes, pressures and soil conditions.
    - C. Concrete blocking shall be cast in place.
    - D. Block shall bear against fittings only and shall be clear of joints to permit taking up or dismantling of joint.
    - E. Contractor shall install blocking adequate to withstand full test pressure as well as to continuously withstand operation pressure under all conditions of service.
13. Backfill to a minimum compacted depth of 6 inches above the top of the pipeline shall be free-draining granular material conforming to APWA/WSDOT 9-03.15. Above this level the use of native material is acceptable provided that it is compatible with the specifications in said APWA/WSDOT Standard Specifications and the State of Washington, and also provided that the native material does not contain highly plastic soils, roots, wood particles and/or other deleterious materials.
14. The County may require special bedding procedures and material. Minimum depth of bedding under any portion of pipe shall be 4" for stable soil conditions, 6" for rock excavation and 12" for clay, peat or other such materials, or as directed by the County or Engineer.
15. Tracer wire for nonmetallic water lines shall be required. See Service Detail. (#10 Copper Wire, Blue Insulated)
16. Bell holes excavated to an extent sufficient to permit accurate work in making and inspecting all joints and connections. Trench width shall be 24" MIN. All water installations require a 36" minimum cover and 42" maximum cover.
17. Bedding material for the poly pipe may be select native granular material free from wood waste, organic material and other extraneous or objectionable materials and shall have a maximum particle dimension of two inches. It shall be carefully rammed and tamped around the pipe by use of shovels or other approved hand held tools, so as to provide firm and uniform support for the full length of all pipe, valves and fitting to prevent shift and/or settlement.
18. After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 150 psi over normal operating pressure, 290 psi. As per Section 7-11.3(11).

PUD NOTE: MAP DOES NOT SCALE. RETURN'D SERVICE LAKE ROAD 1" DIAMETER LOOPED TO 2003, MANIFOLD TO BE OFF 8" MAINLINE. 200 FEET.

KHA ASSOC. NOTE: AS-BUILT DIMENSIONS ARE BASED UPON P.U.D. INSPECTION NOTES. KHA ASSOCIATES ASSUMES NO LIABILITY RELATING TO THE ACCURACY OF THESE NOTES AND/OR DIMENSIONS.



RECEIVED
JAN 25 1995
SKAGIT P.U.D.

C.O. 3656 W.O. 94-2227 ASBUILT

DARL W. KVASAGER STATE OF WASHINGTON 15728 REGISTERED PROFESSIONAL ENGINEER
EXPIRES 3/96
9/15/94

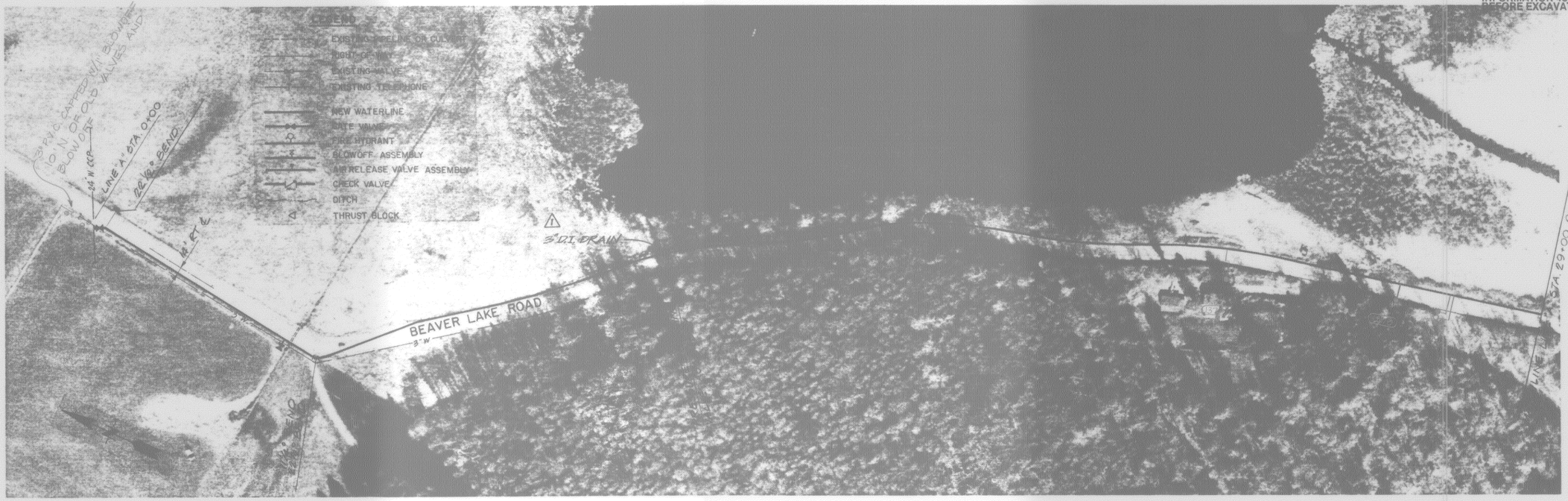
PROPOSED WATER LINE EXTENSION
IN GOVT LOT 2, SECTION 7, T.34N., R.5E., W.M.
SKAGIT COUNTY, WASHINGTON
FOR: JOE FOX

K.H. ASSOCIATES
1856 CHANTERELLE LANE
MOUNT VERNON, WA 98273
206 422-9008

1"=50' | JULY '94
DRAWN: S.G. CHK: D.E.
SHEET 1 OF 1

13. Record Drawing for Existing 12-inch-diameter Waterline at Beaver Lake Road, CO

CALL: 1-800-424-5555
FOR BURIED UTILITY
INFORMATION 48 HOURS
BEFORE EXCAVATION



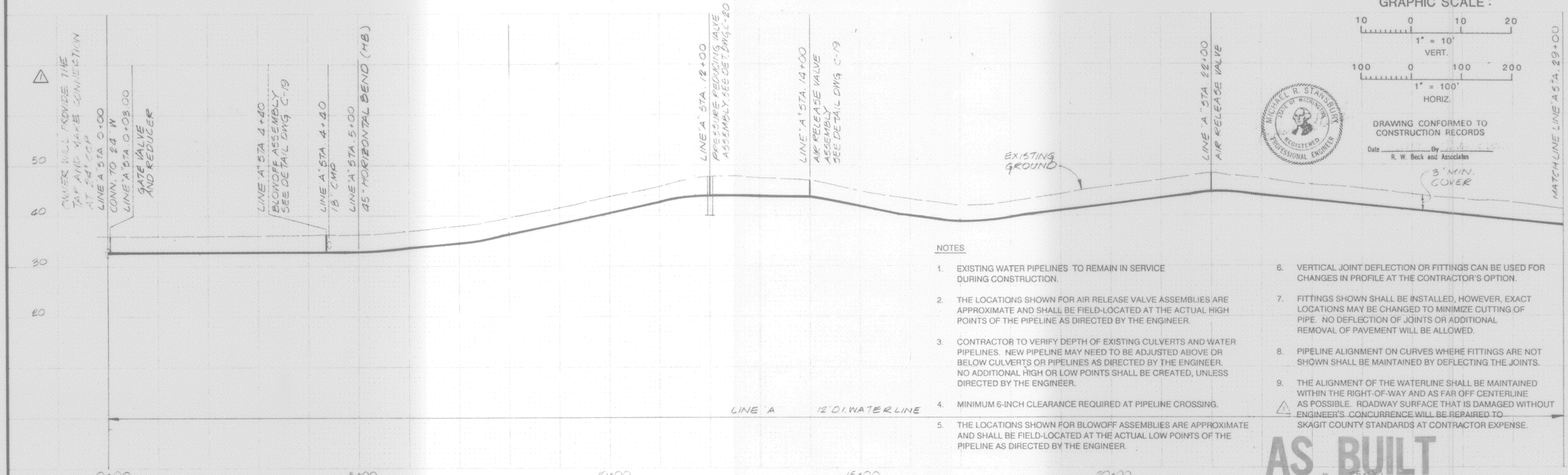
GRAPHIC SCALE :

10 0 10 20
1" = 10' VERT.

100 0 100 200
1" = 100' HORIZ.

DRAWING CONFORMED TO CONSTRUCTION RECORDS
Date _____ By _____
R. W. Beck and Associates

MITCHEL R. STANSBURY
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER



NOTES

1. EXISTING WATER PIPELINES TO REMAIN IN SERVICE DURING CONSTRUCTION.
2. THE LOCATIONS SHOWN FOR AIR RELEASE VALVE ASSEMBLIES ARE APPROXIMATE AND SHALL BE FIELD-LOCATED AT THE ACTUAL HIGH POINTS OF THE PIPELINE AS DIRECTED BY THE ENGINEER.
3. CONTRACTOR TO VERIFY DEPTH OF EXISTING CULVERTS AND WATER PIPELINES. NEW PIPELINE MAY NEED TO BE ADJUSTED ABOVE OR BELOW CULVERTS OR PIPELINES AS DIRECTED BY THE ENGINEER. NO ADDITIONAL HIGH OR LOW POINTS SHALL BE CREATED, UNLESS DIRECTED BY THE ENGINEER.
4. MINIMUM 6-INCH CLEARANCE REQUIRED AT PIPELINE CROSSING.
5. THE LOCATIONS SHOWN FOR BLOWOFF ASSEMBLIES ARE APPROXIMATE AND SHALL BE FIELD-LOCATED AT THE ACTUAL LOW POINTS OF THE PIPELINE AS DIRECTED BY THE ENGINEER.
6. VERTICAL JOINT DEFLECTION OR FITTINGS CAN BE USED FOR CHANGES IN PROFILE AT THE CONTRACTOR'S OPTION.
7. FITTINGS SHOWN SHALL BE INSTALLED, HOWEVER, EXACT LOCATIONS MAY BE CHANGED TO MINIMIZE CUTTING OF PIPE. NO DEFLECTION OF JOINTS OR ADDITIONAL REMOVAL OF PAVEMENT WILL BE ALLOWED.
8. PIPELINE ALIGNMENT ON CURVES WHERE FITTINGS ARE NOT SHOWN SHALL BE MAINTAINED BY DEFLECTING THE JOINTS.
9. THE ALIGNMENT OF THE WATERLINE SHALL BE MAINTAINED WITHIN THE RIGHT-OF-WAY AND AS FAR OFF CENTERLINE AS POSSIBLE. ROADWAY SURFACE THAT IS DAMAGED WITHOUT ENGINEER'S CONCURRENCE WILL BE REPAIRED TO SKAGIT COUNTY STANDARDS AT CONTRACTOR EXPENSE.

AS BUILT

COPYRIGHT 1989, R.W. BECK AND ASSOCIATES, ALL RIGHTS RESERVED

REV.	DATE	BY	CKD.	APPROVAL	DESCRIPTION
E	10-17-91				DRAWING CONFORMED TO CONSTRUCTION RECORDS
1	8-1-90				ADDED ADDENDUM NO. 1 AND ISSUED FOR CONSTRUCTION
0	2-2-90				ISSUED FOR BIDS

DRAWING REVISION RECORD

DES. MGL ENG. REV. ELEC. REV.
DWN. DH MECH. REV. STRUC. REV.
APPD. DATE 2-2-90

R.W. BECK AND ASSOCIATES

PUBLIC UTILITY DISTRICT NO. 1 OF SKAGIT COUNTY
GUNDERSON ROAD WATER SUPPLY SYSTEM PROJECT
PLAN AND PROFILE

W.O. WV-1165-EA3-AA
CW. NO. 862-C-1.2

C.O. 3287 W.O. 87-1806

14. Record Drawing for Existing 8-inch-diameter Waterline at Wayward Way, CO

STA 6+59, 25' LT
INSTALL STANDARD
2" FLUSHING ASSEMBLY
WITH 8" VALVE AND
THRUST BLOCKING
(PER DETAIL SHEET C 16)

THERE MUST BE A MINIMUM OF 24" OF COVER FROM BOTTOM OF DITCH TO TOP OF WATERLINE

20' DRAINAGE ESMT

30' SKAGIT COUNTY P.U.D. UTILITY ACCESS ESMT

STA 4+65, 25' LF
PRIVATE CONTRACTOR TO INSTALL TYPICAL 1" PE SERVICE STUB TO SERVE LOT 1 (PER DATAIL SHEET C 16) & LOT 3

PROPOSED 593' LF, 8" D.I. WATERLINE

593 LF 8" DI

EXIST POWER VAULT

STA 0+70, 35' LT
STA 0+10, 25' RT
STREET SIGN

STA 0+65, 35' LT
HYD ASSEMBLY
PER SHEET C16

INV=497.5

EXIST 18" CMP

PROPOSED GRAVEL DRIVE

10' UTILITY ESMT

30' SKAGIT COUNTY P.U.D. UTILITY ACCESS ESMT

STA 0+75 35' LF
STA 0+75 25' LT
PRIVATE CONTRACTOR TO INSTALL TYPICAL 1" PE SERVICE STUB TO SERVE LOT 4 (PER DATAIL SHEET C 16)

50' UTILITY AND ACCESS ESMT

LOT 1 · LOT 3 · LOT 4

MATCHLINE SHEET C11

EXISTING ACCESS ROAD

STA 0+70, 35' LT
STA 0+10, 25' RT
STREET SIGN

STA 0+65, 35' LT
HYD ASSEMBLY
PER SHEET C16

INV=497.5

O/H POWER LINE
O/H POWER POLE
WAYWARD WAY

50' PUD WATERLINE ESMT AF NO 694619

24" CCP CO 1553 (1990)

STA 1+05, 8' LT
1 - ELL, 8" MJ 90° THRUST BLOCKING

INV=289.96

EXISTING GRAVEL ROAD

WAYWARD WAY

PROPOSED 440 LF, 8" D.I. WATERLINE

STA 0+35, 85' LF
STA 0+35, 75' LT
PRIVATE CONTRACTOR TO INSTALL TYPICAL 1" PE SERVICE STUB TO SERVE LOT 4 (PER DATAIL SHEET C 16)

INV=288.46

INV=287.76

INV=288.06

GREENBELT

6' of cover

8" DI CO 4014 (99)

PROPOSED GRAVEL DRIVE

184.93

219.97

50' UTILITY AND ACCESS ESMT

STA 0+98, 5' LT
CONTRACTOR TO EXCAVATE EXIST 24" WATERLINE AND DEFLECT NEW 8" DI EITHER OVER OR UNDER EXIST, WHICHEVER WAY FITS FIELD CONDITIONS.
NOTE:
IF A HIGH POINT IS CREATED ANYWHERE ON THE WATER SYSTEM, A COMBINATION AIR VALVE MAY HAVE TO INSTALLED

15' DRAINAGE ESMT

STA 1+45, 27' RT
1" WATER SERVICE STUB PER DETAIL SHEET C16
PRIVATE CONSTRACTOR TO INSTALL TYPICAL 1" AS SERVICE STUB TO SERVE LOTS 5 & 6

THE PRIVATE CONTRACTOR IS TO CONNECT TO THE EXISTING 8" VALVE AFTER SATISFACTORY TESTING OF THE PROPOSED 8" DUCTILE IRON WATERLINE

LOT 5 · LOT 6

MATCHLINE SHEET C11

THE PRIVATE CONTACTOR IS TO INSTALL TWO 2" PE SERVICE STUBS. THE ENDS OF THE 1" PE SERVICE STUBS SHOULD BE LOCATED IN THIS AREA. (PER DETAIL SHEET C 16). SKAGIT COUNTY P.U.D CREWS WILL INSTALL THE WATER METERS, AT THIS LOCATION, AT A LATER DATE.

WATER SERVICE LINES SHOULD STUB UP ABOUT 3' TO 4' SOUTH OF EDGE OF GRAVEL ROAD

N89°59'01"W 497.24

STA 2+84 30 RT
BY PRIVATE CONTRACTOR
2-3/4" x 3/4" SINGLE WATER SERVICE STUBS TO SERVE LOTS 9 & 10 PER DETAIL SHEET C16

(2) 1" P.E.

312.31

50' PSP&L ESMT AF NO 177540

100' PSP&L ESMT AF NO 692443

0+00= 4+88.53 16.07' LT WAYWARD WAY

GATE

PRIVATE WATERLINE

MATCHLINE SHEET C10

30' ACCESS AND UTILITY ESMT

20' GREEN BELT

SHEET C2

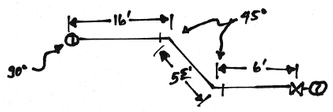
CONSTRUCTION NOTES

1. ASBUILT LOCATION FOR POWER, TELEPHONE AND CABLE TV ARE NOT SHOWN ON THESE PLANS. CONTRACTOR SHALL RELY ON UTILITY LOCATE SERVICE FOR THESE UTILITIES
2. CONSTRUCT 12' GRAVEL DRIVEWAY PER DETAIL (D C15)
3. RELOCATE GRAVEL DRIVEWAY INTO 20' ACCESS AND UTILITY EASEMENT. CONSTRUCT PER DETAIL (D C15)
4. CONSTRUCT 24' WIDE ROADWAY PER DETAIL (E C15)
5. EXISTING GRAVEL ROAD
   CONTRACTOR TO VERIFY THAT THE 12' WIDTH AND THICKNESS OF SURFACE COURSE MEETS SKAGIT COUNTY'S DRIVEWAY ROAD CONSTRUCTION STANDARDS SEE DETAIL (E C15)
6. CONSTRUCT 24' WIDE ACCESS ROAD PER DETAIL (E C15)

WIDEN SHOULDER ON ONE SIDE OF ROADWAY. CLEARING, GRUBBING AND BUILDING SUBGRADE FOR NEW ROAD SECTION PER SPECIFICATIONS

7. CONSTRUCT 12' WIDE DRIVEWAY ACCESS PER DETAIL
8. INSTALL END OF ROAD SIGN PER SKAGIT COUNTY ROAD STANDARDS "END OF COUNTY ROAD".
9. PROVIDE BUFFER TREES PLANTED IN THE GREEN BELT ALONG THE EXISTING ROAD. TREES AND SPACING SHALL BE PER SKAGIT COUNTY CODE. RETAIN EXISTING NATURAL TREES AND BRUSH TO SCREEN.

TIE-IN, SIDE VIEW FACING EAST
N.T.S.



*All Joints Restrained

Asbuilts
9/11/06

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

RECEIVED
SEP 12 2006
P.U.D. No. 1 Eng Dept

C.O. 4409 W.O. 05-3068

APPROVED FOR CONSTRUCTION
BY: _____ for DATE: 3-17-05
SKAGIT COUNTY
DIRECTOR OF PUBLIC WORKS

APPROVAL EXPIRES: _____

3/14/05
DOUGLAS E. SCHMID
STATE OF WASHINGTON
25023
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 12/19/05

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

DESCRIPTION	REVISED	BY	CHK

DRIVEWAY DESIGN FOR CHUCK DRALLE

SECTION 6 & 7, T 34 N, R 5 E, W.M.

DATE Feb, 2005
SCALE 1"=20'
DRAWN BY pm
CHECKED BY des

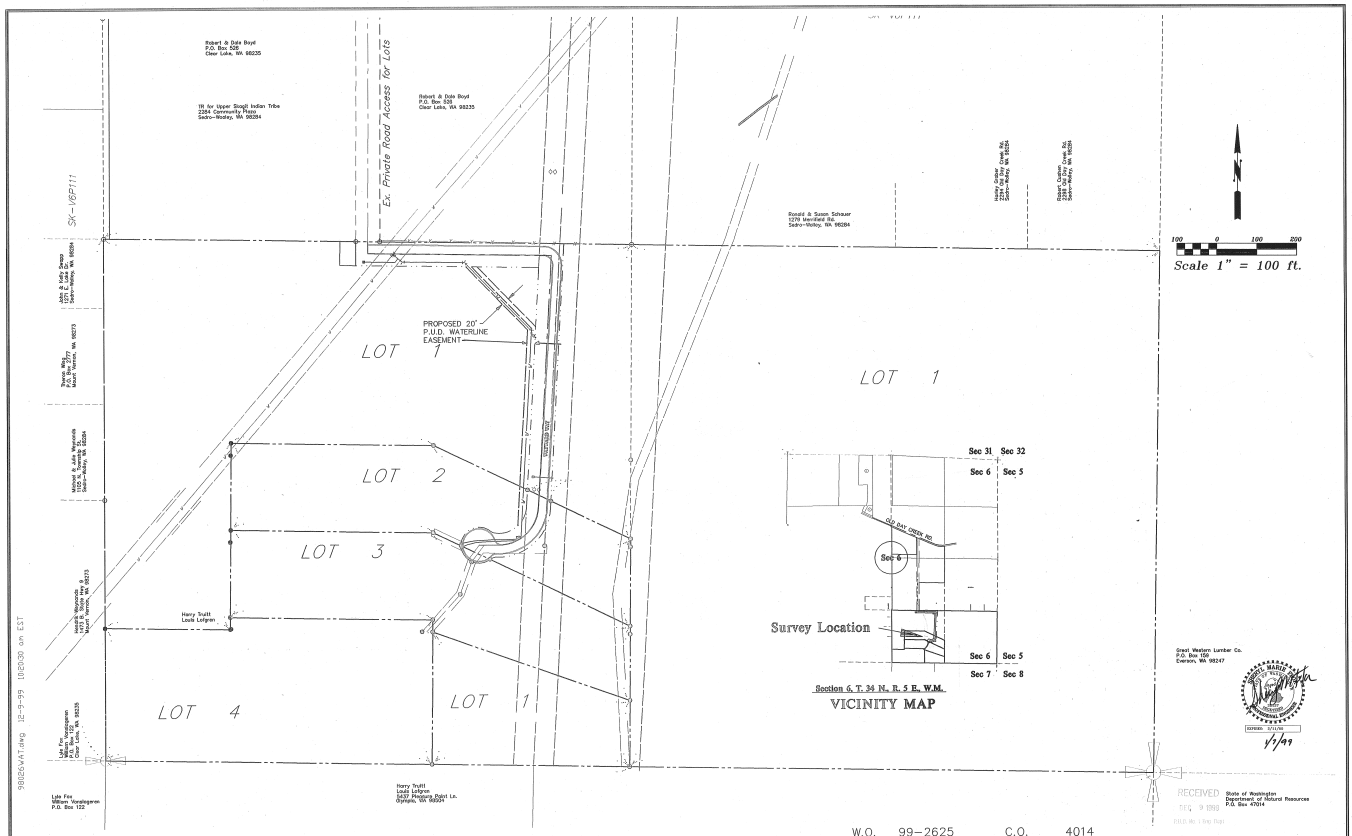
NORTHWEST DATUM & DESIGN, Inc.
CIVIL ENGINEERING AND SURVEYING SOLUTIONS
160 CASCADE PLACE, SUITE 102
BURLINGTON, WASHINGTON 98233
PH: (360) 404-2020 FAX: (360) 404-2021
DOUGLAS E. SCHMID P.E., P.L.S.

WAYWARD WAY TO WEST
WAYWARD WAY TO EAST
C.O. 4409

PROJECT 02006
DRAWING 02006.dwg
SHEET C9 OF C17

E:\Projects\dd\02006\dwg\02006-const.dwg, 03/16/2005 12:12:39 PM

15. Record Drawing for Existing 8-inch-diameter Waterline at Wayward Way, CO



W.O. 99-2625 C.O. 4014

DESCRIPTION	REVISED	BY:	CHK:
SKAGIT PUD NO. 1 ASBUILTS	12/08/99	SMF	DES

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

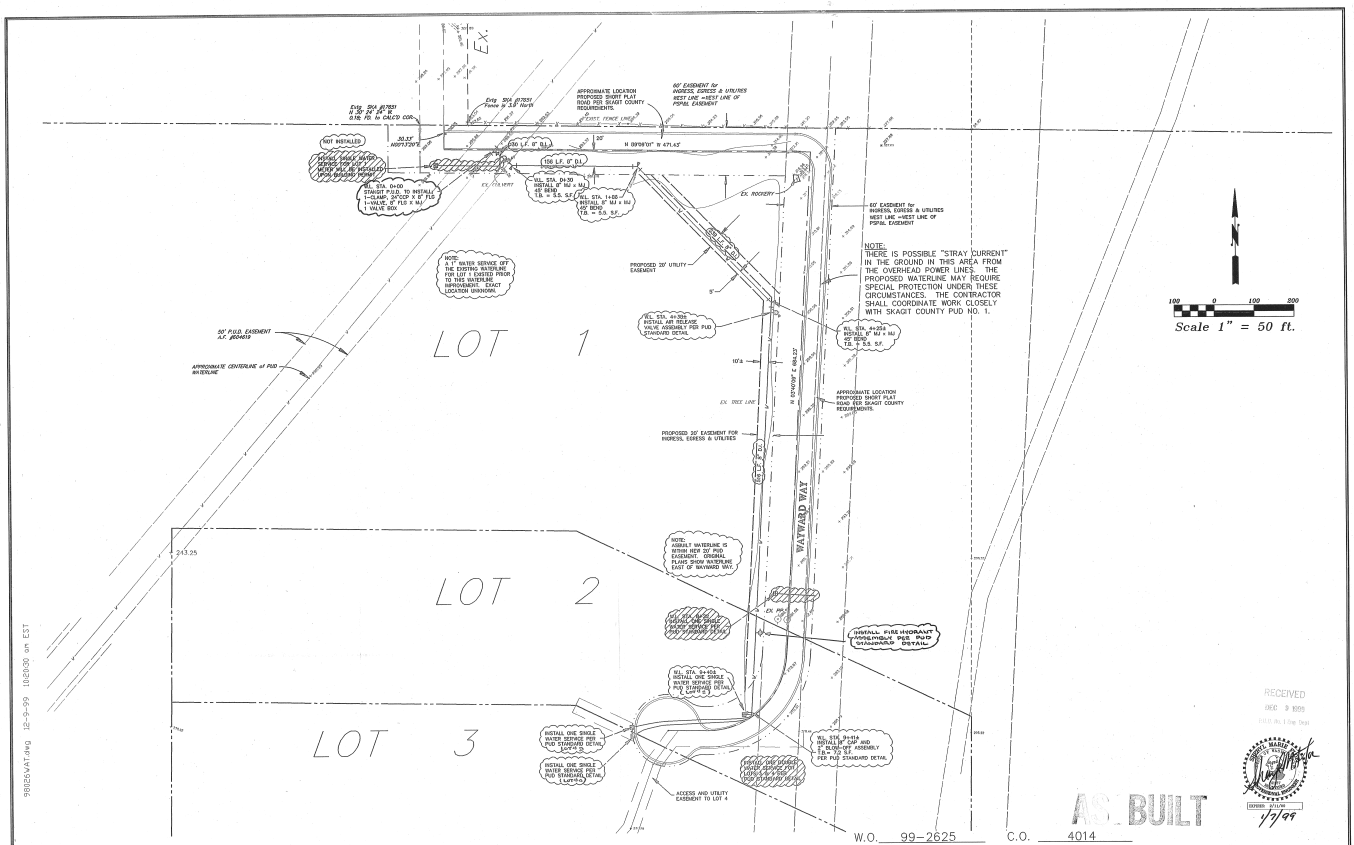
COVER SHEET

NORTHWEST DATUM & DESIGN, Inc.
CIVIL ENGINEERING AND SURVEYING SOLUTIONS
193 CASCADE PLACE, SUITE 102
BURLINGTON, WASHINGTON 98233
PH: (360) 404-2020 FAX: (360) 404-2021
DOUGLAS R. GERMOND P.E., P.L.S.
DENNIS W. PEED, P.E.

WATERLINE IMPROVEMENTS FOR CHUCK & MICHELLE DRALLE SHORT PLAT
SECTION 6, TOWNSHIP 34 N, RANGE 5 E, W.M.

PROJECT: 98026
DRAWING NAME: 98026WAT.DWG
SHEET NO. 1 OF 3.

12-9-99



W.O. 99-2625 C.O. 4014

DESCRIPTION	REVISED	BY:	CHK:
SKAGIT PUD NO. 1 ASBUILTS	12/08/99	SMF	DES

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

WATERLINE PLAN

NORTHWEST DATUM & DESIGN, Inc.
CIVIL ENGINEERING AND SURVEYING SOLUTIONS
160 CASCADE PLACE, SUITE 102
BURLINGTON, WASHINGTON 98233
PH: (360) 404-2020 FAX: (360) 404-2021
DOUGLAS E. DERRICK P.E. P.L.S.
PERRY N. FOX, P.E.

WATERLINE IMPROVEMENTS FOR CHUCK & MICHELLE DRALLE SHORT PLAT

SECTION 6, TOWNSHIP 34 N, RANGE 5 E, W.M.

PROJECT 98026
DRAWING NAME: 98026WAT.DWG
SHEET NO. 2 OF 3

12-9-99

98026WAT.dwg 12-9-99 10:03:00 am EST

WATERLINE

PUD WATER SPECIFICATIONS
GENERAL NOTES (MINIMUM REQUIREMENTS)

1. STANDARD SPECIFICATIONS TO BE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION 1998 STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION, APWA CURRENT STANDARDS AND THE SKAGIT PUD REQUIREMENTS AS OUTLINED IN RESOLUTION NO. 1626-94.

2. A PRE-CONSTRUCTION CONFERENCE WILL BE SCHEDULED BY THE PRIVATE CONTRACTOR WITH THE DISTRICT ENGINEERING DEPARTMENT (360) 424-7104 PRIOR TO CONSTRUCTION.

3. ANY PERMITS OR OTHER REQUIREMENTS THAT WILL BE NEEDED TO COMPLETE THIS PROJECT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AND/OR THE DEVELOPER AND A COPY OF THE PERMIT SUBMITTED TO THE DISTRICT.

4. CONTRACTOR SHALL NOTIFY AND COORDINATE WITH SKAGIT PUD PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOT OPERATE ANY VALVES WITHOUT APPROVAL AND COORDINATION WITH SKAGIT PUD.

5. CONTRACTOR TO COORDINATE ALL TIE-INS, SHUTDOWN, FLUSHING AND HEALTH SAMPLES WITH SKAGIT PUD INSPECTORS.

6. ALL MATERIALS ARE TO BE APPROVED BY SKAGIT PUD PRIOR TO CONSTRUCTION; SUBMIT MAKE, MODEL AND SIZE.

7. DUCTILE IRON PIPE TO BE CLASS 50 ANSI / AWWA C151 / A21.51. ALL JOINTS TO BE RUBBER GASKETS WITH TYTON OR MECHANICAL TYPE JOINTS MEETING AWWA SPECIFICATIONS.

8. ALL DUCTILE IRON PIPES MUST BE WRAPPED WITH POLYETHYLENE PIPE ENCASEMENT, THAT IS A MINIMUM OF 8 MIL THICK AND INSTALLED PER WSDOT STANDARDS AND IN ACCORDANCE WITH AWWA C105.

9. CONTRACTOR TO INSTALL SERVICE LINES PER PUD DETAIL.

10. ALL VALVES TO BE RESILIENT WEDGE GATE VALVES.

11. ALL FIRE HYDRANTS TO BE CLOW MEDALLION OR IOWA COREY FIRE HYDRANTS AND INSTALLED AS PER DETAILS ON THE PLANS. BRAND OF FIRE HYDRANTS WILL VARY DEPENDING ON THE FIRE DEPARTMENT OR DISTRICT.

12. ALL WATER PIPELINE INSTALLATIONS REQUIRE A 36" MINIMUM AND 48" MAXIMUM TRENCH DEPTH TO EXISTING OR ANTICIPATED FINISH GRADE.

13. MINIMUM 1 FOOT VERTICAL AND 5' HORIZONTAL CLEARANCE BETWEEN WATER PIPELINES AND ALL OTHER UTILITIES.

14. WHEN INSTALLING WATER PIPELINE ACROSS EXISTING OR PROPOSED SANITARY SEWER, A FULL LENGTH OF PIPE SHOULD BE INSTALLED WITH MIDSPAN OF PIPE OVER THE SEWER. MINIMUM 10' HORIZONTAL SEPARATION BETWEEN WATERLINE AND SANITARY SEWER PIPELINE, UNLESS APPROVED BY SKAGIT PUD.

15. BEDDING MATERIALS FOR THE DUCTILE IRON PIPE MAY BE SELECTED NATIVE MATERIAL FREE FROM WOOD WASTE ORGANIC MATERIAL OR OTHER EXTRANEOUS OR OBJECTIONABLE MATERIALS. THE MATERIALS SHALL HAVE A MAXIMUM PARTICLE DIMENSION OF 2" OR SHALL BE OF OTHER APPROVED PIPE BEDDING MATERIAL PER WSDOT SPECIFICATION SECTION 7-10.3(9). PLACEMENT AND COMPACTION OF BEDDING MATERIAL SHALL BE PER WSDOT SPECIFICATION SECTION 7-10.3(9).

16. BLOCK ALL FITTINGS WITH POURED CONCRETE ACCORDING TO THE SKAGIT PUD STANDARD DETAIL.

17. BACKFILL TRENCH IN PAVEMENT AREAS WITH PIT-RUN GRAVEL COMPACTED TO A DENSITY OF 95 PERCENT PER WSDOT SPECIFICATIONS SECTION 7-10.3(11).

18. DISINFECTION AND FLUSHING OF THE WATERLINES TO BE PER WSDOT SPECIFICATION. USE DECHLORINATION EQUIPMENT WHEN FLUSHING OR FLUSH INTO SANITARY SEWER MANHOLES. DO NOT FLUSH INTO OR ALLOW TO DRAIN INTO ANY CREEK, WETLANDS, OR CATCH BASINS.

19. PRESSURE TEST NEW PIPELINE, INCLUDING SERVICE LINE(S), AT 240 PSI AND AS PER WSDOT STANDARDS.

TEST DATE_____, TEST PRESSURE_____;

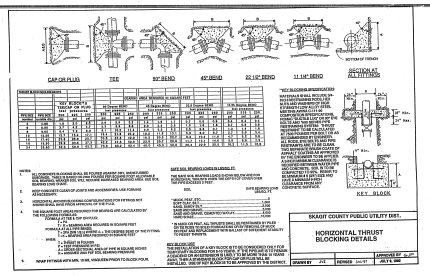
TIME START_____, TIME END_____;

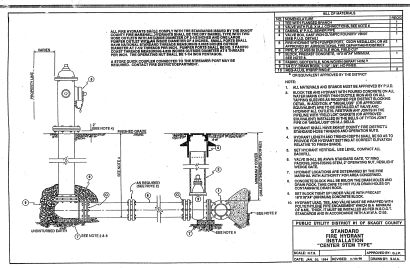
PRESSURE DROP_____, MAKE UP WATER_____.

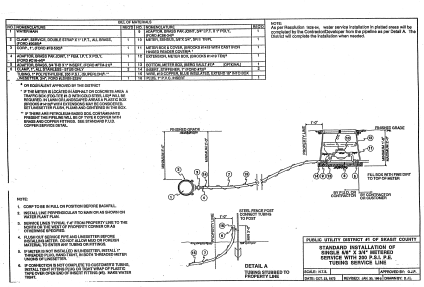
20. CONTRACTOR WILL MAKE ALL PAVEMENT REPAIRS AND PERFORM ALL CLEAN UP.

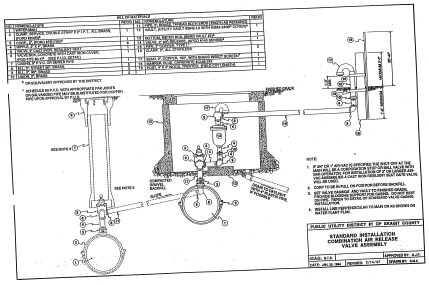
21. THE UTILITY LOCATIONS MARKED ON THE MAP ARE APPROXIMATE. THE CONTRACTOR IS TO VERIFY ACTUAL LOCATION AND DEPTH, PRIOR TO CONSTRUCTION.

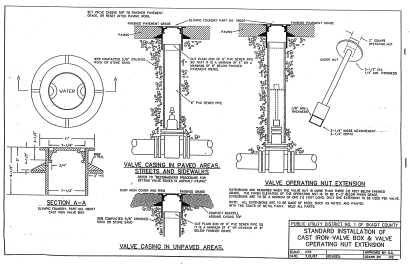
22. INSTALL STANDARD COMBINATION AIR RELEASE VALVE ASSEMBLY AT HIGH POINT IN WATERLINE, IF APPLICABLE, AS PER SKAGIT PUD STANDARD DETAIL.

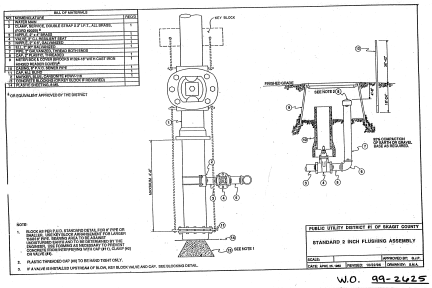












RECEIVED
DEC 8 1999
Skagit Co. Utility Dept.

W.O. 99-2625 C.O 9019

1/1/99

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555	DESCRIPTION	REVISED	BY:	CHK
	SKAGIT PUD NO. 1 ASBUILTS	12/9/99	SMT	DES

WATERLINE DETAILS AND SPECIFICATIONS

NORTHWEST DATUM & DESIGN, Inc.
CIVIL ENGINEERING AND SURVEYING SOLUTIONS
1601 CASCADE PLACE, SUITE 102
BURLINGTON, WASHINGTON 98233
PH: (360) 404-2020 FAX: (360) 404-2021
DOUGLAS F. KEMPPAINEN P.E. P.L.S.
KRISTEL M. PUHR P.E.

WATERLINE IMPROVEMENTS FOR CHUCK & MICHELLE DRALLE SHORT PLAT

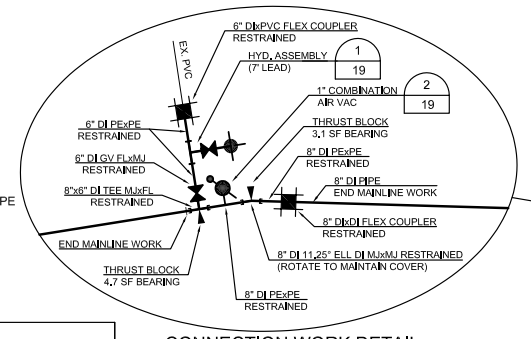
SECTION 6, TOWNSHIP 34 N, RANGE 5 E, W.M.

PROJECT 99026
DRAWING NAME: 9902655PC.DWG
SHEET NO. 3 OF 3

12-9-99

9902655PC.dwg 12-9-99 10:26:19 am EST

16. Record Drawing for Existing 8-inch-diameter Waterline at Great Western Lumber Co, CO

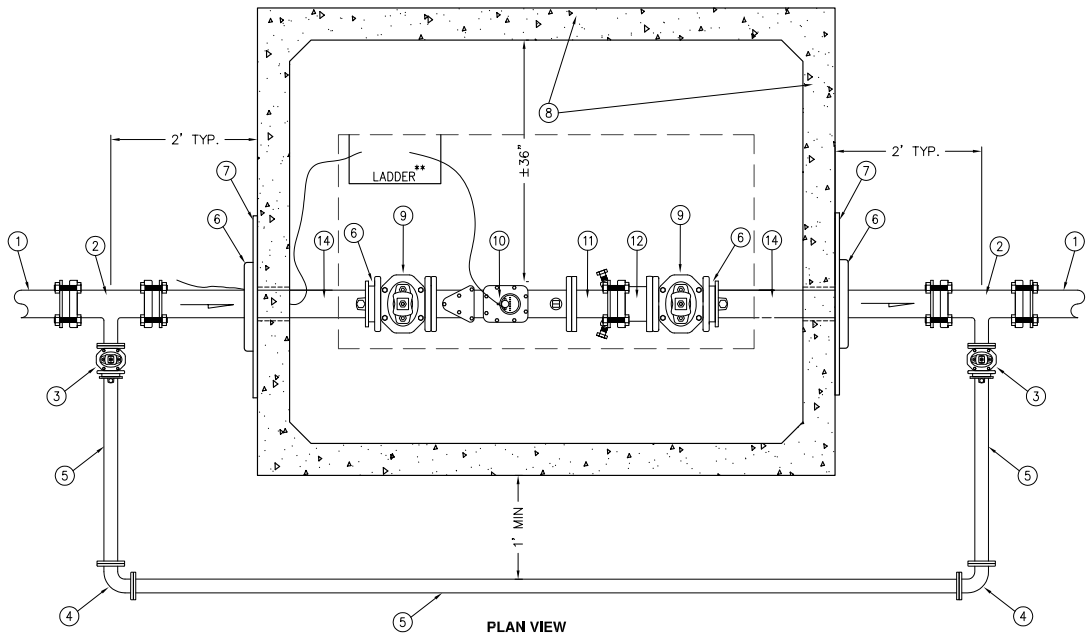


CONNECTION WORK DETAIL

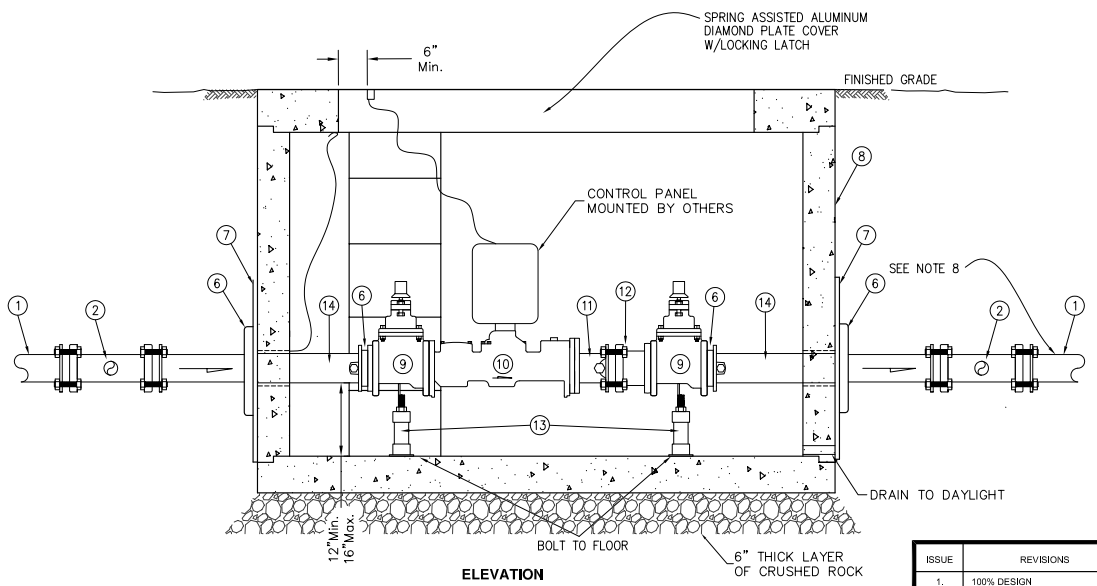
NOTE:
CUT, CAP & REMOVE EXISTING LENGTH OF PIPE & FITTINGS ALONG ALIGNMENT OF NEW PIPE

BILL OF MATERIALS		
NO.	NOMENCLATURE	REQ'D.
1	8" DI PIPE MAIN	
2	8"x4" DI TEE MJxFL RESTRAINED	2
3	4" DI GV FLxMJ RESTRAINED	2
4	4" DI 90° ELL MJxMJ RESTRAINED	2
5	4" DI PIPE PExPE RESTRAINED JOINTS	2
6	8" RETAINER GLAND, 8" MEGALUG EBAA OR EQUAL	2
7	3"x3"x1/2" STEEL PLATE, HOT DIPPED GALVANIZED OR TREATED W/ MASTIC	2
8	UTILITY VAULT 675LA W/#675-TL-2-332P COVER[a] (SPRING ASSISTED) AND LADDER (BILCO LADDER-UP SAFETY POST)[a,**]	1
9	VALVE, 8" DUCTILE IRON, RESILIENT WEDGE, FLxMJ	2
10	METER, BADGER, 8" MAGNETIC SERIES 2000 WITH REMOTE FLxFL	1
11	SPOOL, 8" CL 50 D.I., FLxPE, 12" LONG (FIELD CUT TO LENGTH)	11
12	RESTRAINED FLANGE COUPLING ADAPTER, 8" ROMAC IND. INC.[a]	12
13	PIPE SUPPORT (MATERIAL RESOURCES #S92 OR #S89)	2
14	8" DI PIPE PExPE FIELD CUT RESTRAINED	2

CONNECTION WORK DETAIL



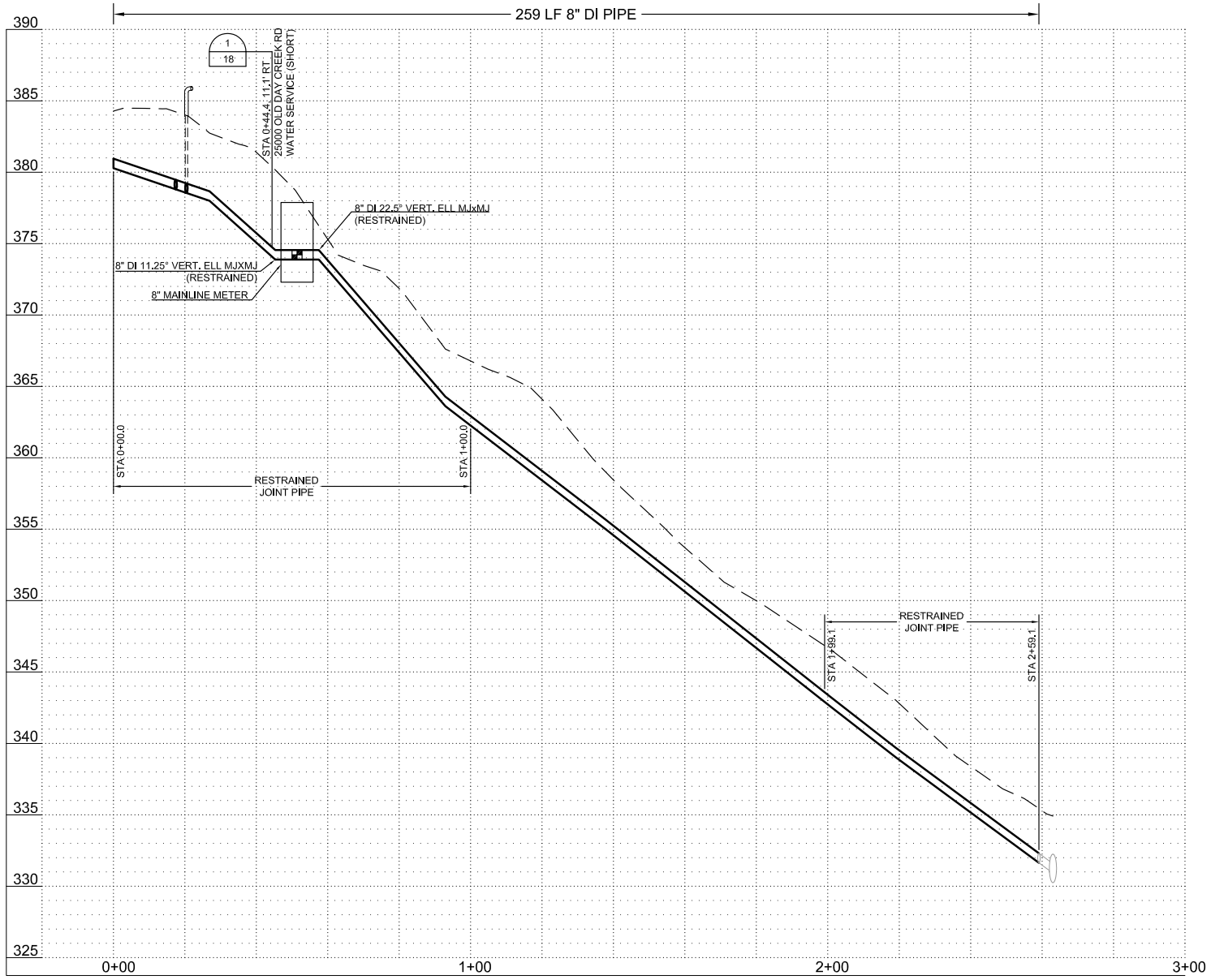
PLAN VIEW



ELEVATION

8" MAINLINE METER &VAULT DETAIL

1
15



ISSUE	REVISIONS	BY	DATE
1.	100% DESIGN	MCH	7/15/14
2.	ISSUE FOR BIDDING	MCH	7/24/14

811 Know what's below. Call before you dig.

GEORGE J. STIER STATE OF WASHINGTON 37933 REGISTERED PROFESSIONAL ENGINEER

DATUM:	DSGN BY:	MCH
HOR: ASSUMED	DWN BY:	MDO
VERT: NGVD 29	APPVD BY:	GJS

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

DATE PRINTED:	SEC: 1 & 6
7/25/14	TWP: 34 N
	RGE: 4 E & 5 E

Skagit PUD PUBLIC UTILITY DISTRICT

PUBLIC UTILITY DISTRICT NO. 1 of SKAGIT COUNTY
1415 Freeway Drive
P.O BOX 1436
Mount Vernon, WA 98273
(360) 424-7104
www.SkagitPud.org

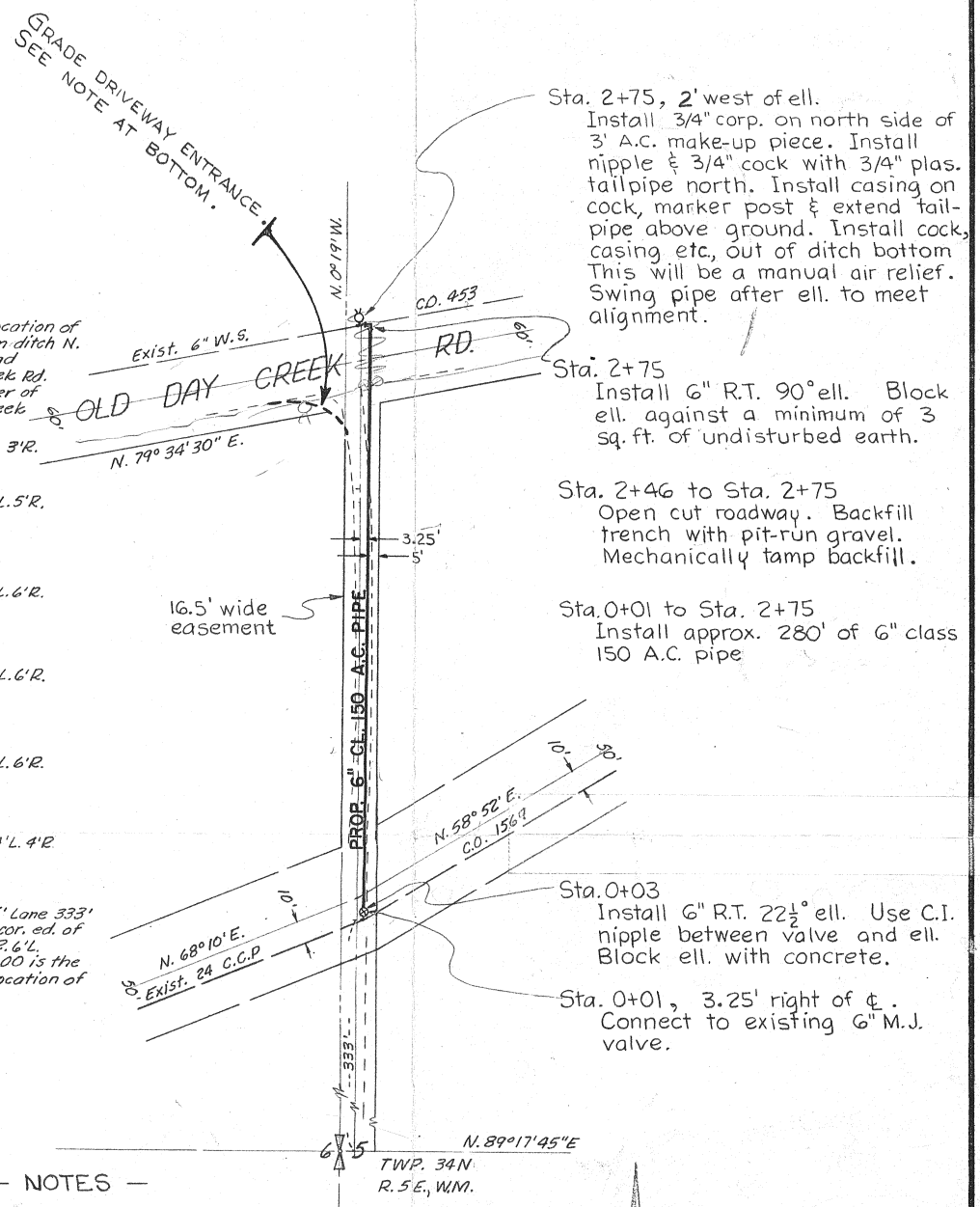
OLD DAY CREEK ROAD
"A" STREET TO TRANSMISSION LINE

PLAN AND PROFILE
OLD DAY CREEK ROAD TO
24" TRANSMISSION LINE

SCALE : HOR. - 1" = 20'	W.O. 13-3480	SHEET:
VER. - 1" = 5'	C.O. 4787	15 OF 20

17. Record Drawing for Existing 6-inch-diameter Asbestos Cement (AC) Waterline at Great Western Lumber Co, CO

Plug Line East



Sta. 2+75, 2' west of ell. Install 3/4" corp. on north side of 3' A.C. make-up piece. Install nipple & 3/4" cock with 3/4" plas. tailpipe north. Install casing on cock, marker post & extend tail-pipe above ground. Install cock, casing etc, out of ditch bottom This will be a manual air relief. Swing pipe after ell. to meet alignment.

Sta. 2+75
Install 6" R.T. 90° ell. Block ell. against a minimum of 3 sq. ft. of undisturbed earth.

Sta. 2+46 to Sta. 2+75
Open cut roadway. Backfill trench with pit-run gravel. Mechanically tamp backfill.

Sta. 0+01 to Sta. 2+75
Install approx. 280' of 6" class 150 A.C. pipe

Sta. 0+03
Install 6" R.T. 22½° ell. Use C.I. nipple between valve and ell. Block ell. with concrete.

Sta. 0+01, 3.25' right of ℄.
Connect to existing 6" M.J. valve.

— NOTES —

1. Vertical ells should not be necessary. Dig trench deeper at south edge of County Road so grade change can be made gradually in pipe joints. Use half lengths of pipe if necessary. Min. cover over pipe shall be 3'-0" except as necessary on north side of road.

2. Full width of 16.5' driveway right-of-way is to be cleared by P.U.D. from County Road to quarter corner, approx. 550' long. Remove all brush stumps by grading with tractor or "Cat" blade. Level grade all of road. Haul and spread good road base gravel after all pipe work is completed. Make a good gravel roadway in straight alignment min. of 8' wide. Grade a gradual entrance into the driveway off the Day Creek Road coming from the west only.
   Apply ground sterilant full width of drive-way next spring.

ROBERT A. YALE — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

9-17-69

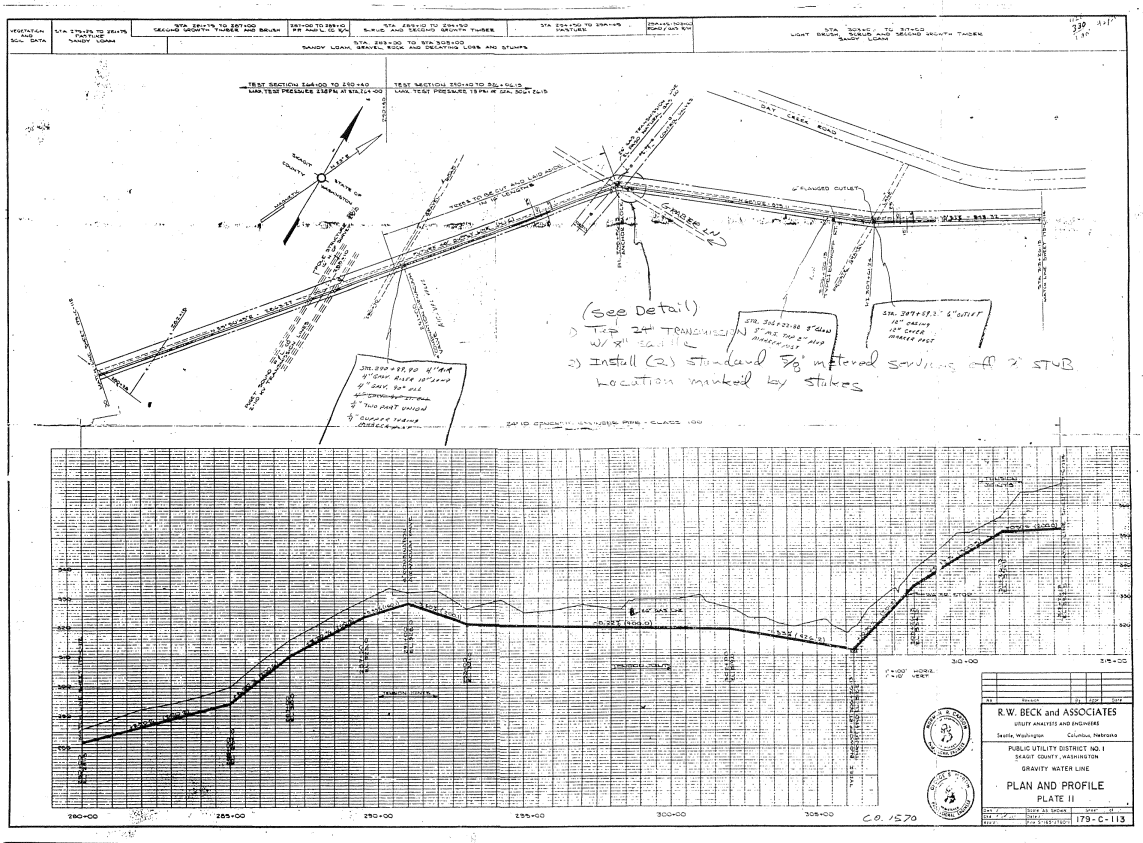
SKAGIT COUNTY PUBLIC UTILITY DIST.

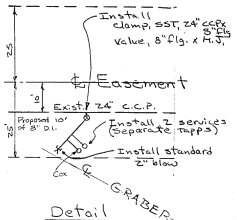
MERRIFIELD LANE
CLEAR LAKE SUPPLY LINE

Install approx. 280' of 6" class 150 A.C. pipe

SCALE 1" = 50'	W. O. 69-732	C. O. No. 2138
DRAWN BY J.L. & D.B.	SYSTEM CLEAR LAKE	APPROVED BY R.A.Y.
DATE August 15, 1969	SEC. 5 TWP. 34N R. 5E	PAGE 1/1

18. Record Drawing for Existing Service Lanes at Graber Lane, CO





Note:

1. Tap, pipeline & blow assembly to be charged to W.O. 94-2206
2. Water meters to normal water service account 94-34

LOCATE 500' E. OF MERRIFIELD RD. ON GRABER LANE EAST SIDE OF NATURAL GAS PIPE LINE.

AS-BUILT 5-6-94

SKAGIT COUNTY PUBLIC UTILITY DIST.

GRABER LANE

Tap 24-inch transmission pipeline to install services

SCALE SEE ABOVE	W.O. 94-2206	C.O. No. 3639
DRAWN BY	SYSTEM S.W.	APPROVED BY
DATE 7-15-94	SEC. 21 TWP. 35N R3E, WM PAGE 1/1	

19. Record Drawing for Existing 6-inch-diameter Waterline at Old Day Creek Road, CO

DESIGNED BY :
RADER AND LEONARD & ASSOCIATES, INC.
CIVIL ENGINEERS AND LAND SURVEYORS
BURLINGTON , WASHINGTON

N.W. CORNER SECTION 5

OLD DAY CREEK ROAD

EXISTING 6" A.C.

EXISTING 6" VALVE

EXISTING 6" A.C.

Fredericks

6165

1/4 CORNER BETWEEN SECTIONS 5 & 6

STA. 0+00 INSTALL 6" PVC TEE WITH 6" PVC TRANSITION GASKET ON EAST LEG OF TEE. CONNECT TO EXISTING 6" A.C. WATER LINE WITH 6" PVC TRANSITION COUPLING

STA. 0+20 INSTALL 6" GATE VALVE WITH HYDRANT ASSEMBLY

By ROAD.

Sta. 0+20 to Hydrant Sta. 0+30 Swing Pipe from 12' Rt. to 15' Rt.

INSTALL 776' - CL 200 - 6" PVC

TELEPHONE

CABLE

EXISTING

T, cable 1' from new pipeline.

2-3/4" PL

STA 7+75 ± 25' DEEP SPRUCE SPRINGBOARD

75000
10/31/06

NOTES:
1. DISTANCES SHOWN FROM ROAD CENTERLINE ARE FIELD DISTANCES FROM AS-BUILT CENTERLINE.

Services

SKAGIT COUNTY PUBLIC UTILITY DIST. NO. 1

WATER LINE EXTENSION
OLD DAY CREEK ROAD

SCALE: 1"= 50'	W.O.	CO. NO. C 0 2773
DRAWN BY: B.L.S.	SYSTEM:	APPROVED BY:
DATE: JAN. 1978	SEC. 5 TWP. 34 N., R. 5 E.	PAGE 1/2

78014

20. Record Drawing for Existing 4-inch-diameter Waterline at Timber Lane, CO

LEGAL DESCRIPTION

The Southeast quarter of Government Lot 1 and that portion of the East half of the Southeast quarter of the Northeast quarter of the existing County Road, all in Section 6, lying northerly of the existing County Road, all in Section 6, Township 34 North, Range 5 East, W.M., and also

That portion of the West 52 rods of the Southwest quarter of the Northwest quarter lying northerly of the County Road in Section 5, Township 34 North, Range 5 East, W.M., and also

That portion of the West 52 rods of the Southwest quarter of the Northwest quarter lying southerly of the County Road in Section 6, Township 34 North, Range 5 East, W.M., EXCEPT the West one (1) rod thereof.

○ - Denotes iron pipe set
■ - Denotes stake set

As Built: 2-6-78

SKAGIT COUNTY PUBLIC UTILITY DIST.

OLD DAY CREEK ROAD
EXTENSION TO THEODORATUS

Install 216' of 4" class 200 plastic pipe and 340' of 2" class 200 plastic pipe.

SCALE 1"=100'	W. O. 76-1075	C. O. No. 2621	
DRAWN BY J.R.L.	SYSTEM	APPROVED BY R.A.V.	
DATE 10-25-76	SEC. 6	TWP. 34 R 5E	PAGE 111

NORTH
SCALE: 1"=100'

Sta. 0+10 to Sta. 2+26 Install 216' of 4" class 200 plastic pipe.

Sta. 0+10 = P.U.D. 24"C.C.P. to top waterline and install 4" mechanical joint x Tbone gate valve with 4" plastic x A.C. adapter.

Connect to 4" mechanical joint valve installed by P.U.D.

Sta. 0+12, 26' E. of ℄ Install 4" M.J. 45° ell. up and 4" M.J. 45° ell. at grade of pipeline. Use D.I. pipe between ells. and 4" valve. Block ells. with poured concrete.

Sta. 0+13 Install 4" plastic 22½° ell. at 8' E. of ℄.

Sta. 0+80, 34.5°, of Angle point of road ℄.

Sta. 0+80 to Sta. 1+71 Swing 4" plastic pipe at 2' E. of edge of blacktop.

Sta. 1+71. Angle point in E. of road. Install 4" plastic pipe at 19' E.

Sta. 1+71 to Sta. 2+36 Swing 4" pipe around curve in the road from 19' E. to 31' E.

Sta. 2+26 to Sta. 5+68 Install 340' of 2" class 200 plastic pipe in line with N. property line of lot 2 extended to radius point of cul-de-sac. Flow assumed is to be installed as shown on detailed drawing supplied by P.U.D.

Sta. 5+38, 16', 30, of ℄. Install 2" plastic 45° ell. to the N.W.

Sta. 2+50 to 5+38 Maintain an alignment of 16', 30, of ℄, swing around angle point.

Sta. 2+50, 16', 30, of Westerly ℄, 30', S.W. of N.W.-S.E. ℄. Install 2" plastic 45° ell. to the west.

Sta. 2+44 = angle point of the ℄ of road from north and the ℄ of the road going west.

Sta. 2+36, 5' E of ℄. Install 2" plastic 45° ell. to the So.

Sta. 2+26 Install 4" M.J. x 4" flanged tee, branch N.E. Install 4" mechanical joint valve, 4 ductile iron holding spool and 4" hydrant. Install 4" M.J. x top 2" plug in 30, run of hydrant tee and 2" slip x thread plastic adapter in 2" top plug Block plug with concrete

Note: Pipe must have a min. of 30" of cover after final grading.

Machine backfill, native material.

Imported backfill material, free of large rocks, installed under and 12" next to pipe, tamped around and over pipe.

TYPICAL SECTION.
No Scale.

Note: Stake out alignment from survey points and mark between stakes with lime or something similar.

Distance from ℄ of road easement and not blacktop

VARIES

GOVT. LOT 1

S 88° 36' 10" E. 666.35

S 87° 49' 55" E. 590.37

N 0° 26' 33" W. 599.36

S 89° 22' 30" E. 666.80

N. 88° 17' 45" E. 858.08

N 0° 26' 31" W. 814.75

N 0° 28' 49" W. 682.55

N 0° 28' 49" W. 557.61

N. 89° 17' 45" E. 678.02 858.02

N. 89° 17' 45" E. 471.52

N. 39° 12' 15" W. 398.72

N. 10° 33' 05" W. 128.15

N. 0° 28' 49" W. 560.49

1000.59

1308.59

Approximate location of P.U.D. Water line

4" Pl. PIPE

2" pl. pipe, Sta. 2+44

2" pl. 45 ell, Sta. 2+44

Sta. 0+30

Sta. 5+38

DECLARATION OF EASEMENT A.F.# 791758

Sub. paid V/1378

EASEMENT FOR ROAD AND UTILITIES A.F.# 791758 (722)

OLD DAY CREEK ROAD

1 2 3 4

SURVEYOR'S CERTIFICATE

This map correctly represents a survey made under my direction, in conformance with the requirements of the Survey Recording Act at the request of George Theodoratus and Willard Henderson.

Donald R. Semrau L.S.
Rader and Leonard & Assoc., Inc.
Professional Engineers & Land Surveyors
Burlington, Washington
Certificate No. 9622

AUDITOR'S CERTIFICATE

Filed for record this 6th day of March, 19 78 at 10:15 A.M., in book 7 of Surveys at page 54 at the request of Rader and Leonard & Assoc., Inc.

Auditor

Skagit County Auditor

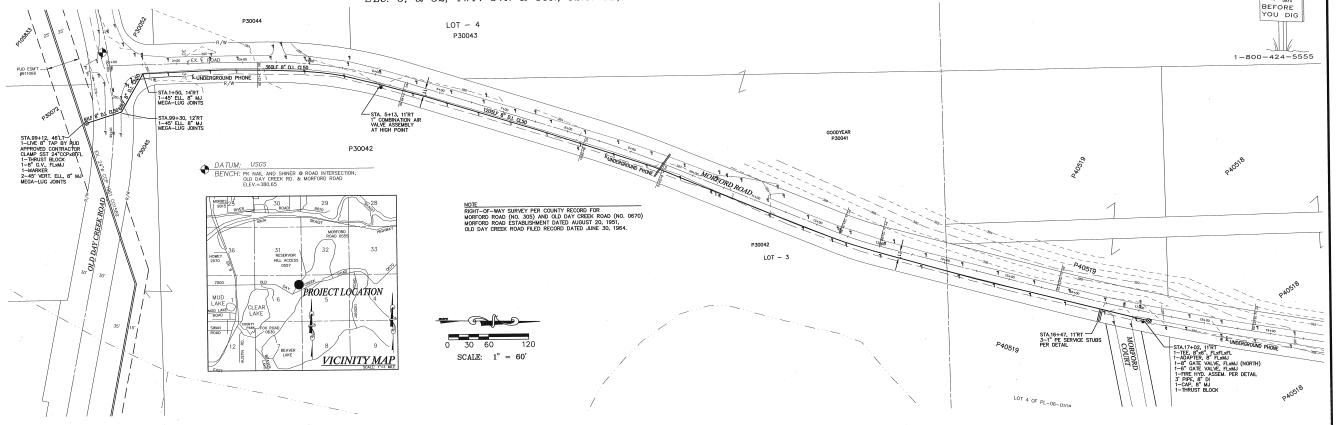
By Deputy

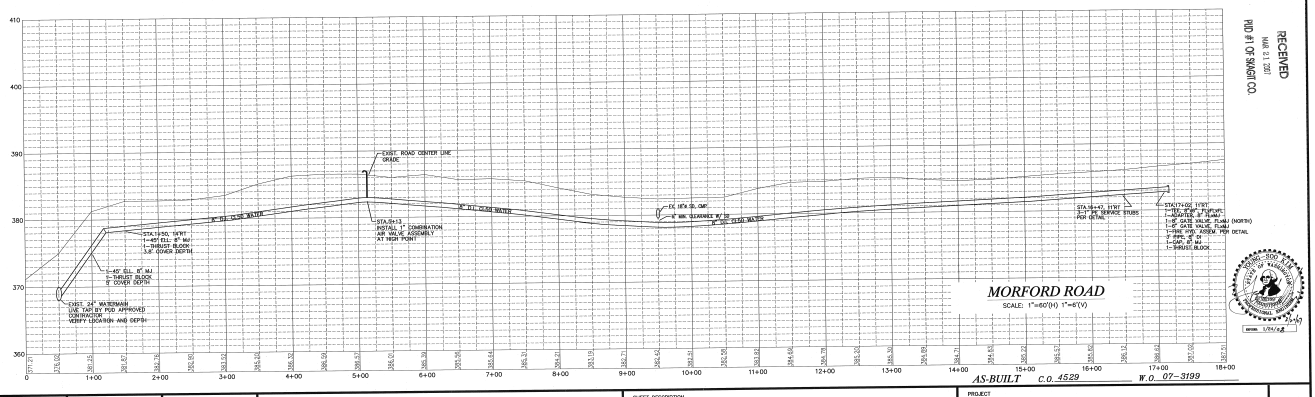
Job No. 73049 T/62

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21. Record Drawing for Existing 8-inch-diameter Waterline at Morford Road, CO

SEC. 5, & 32, TWP. 34N & 35N, RNG. 5E, W.M. SKAGIT COUNTY





RECEIVED
MAR 21 2007
PUD #1 OF SKAGIT CO.

AS-BUILT C.O. 4529 W.O. 07-3199

FILENAME: 06252 PLOT AT: 1"=100' LAST EDIT DATE: OCT.-10-06	DESIGNED BY: Y.S.KIM DRAWN BY: Y.S.KIM CHECKED BY: -	REVISIONS / DATE PUD REVIEW / 1/11/07	SUMMIT Engineers & Surveyors, Inc. 2218 Old Highway 99 So. Mount Vernon WA. 98273 Phone: (360) 416-4999 Fax: (360) 416-4949	SHEET DESCRIPTION WATERMAIN EXTENSION PLAN & PROFILE	PROJECT MORFORD ROAD WATERMAIN EXTENSION	CW.1

SEC. 5, & 32, TWP. 34N & 35N, RNG. 5E, W.M. SKAGIT COUNTY

DISTRICT PLANS GENERAL NOTES

1. Unless stated otherwise, all work is to be performed in accordance with the most current Washington State Department of Transportation (WSDOT) 2024 Standard Specifications for road, bridge and municipal construction and the District requirements as outlined in District Resolution No. 1828-94.

2. The contractor shall schedule a pre-construction conference with the District Engineering Department (CMG048-7104), a minimum of 48 hours prior to construction.

3. All permits necessary for the installation of the proposed water system improvements will be the responsibility of the Developer, Engineer, or Contractor to acquire. A copy of the permit will be submitted to the District, prior to construction. All rights shall be granted to, or transferred to, the District.

4. All tie-ins, shutdown, flushing, and health samples shall be coordinated with the District. The contractor shall not operate any valves without District approval. The contractor is responsible for returning the valves to their proper positions, as directed by the District.

5. All materials are to be approved by the District prior to construction. A list of materials including shop drawings for all portions of the water system improvements will be submitted to the District and approved before any construction.

6. Ductile iron pipe will be minimum class 50 AWWA C151 per WSDOT standard specifications 9-30.1 and 9-30.1(1). All Ductile iron water pipe and fittings shall be completely wrapped with a minimum of eight-mil polyethylene pipe encasement and installed in accordance with AWWA C105 and WSDOT standard specifications 7-08.3(17) and 9-30.1(2).

7. All valves to be resilient seated gate valves, AWWA C509 or C515.

8. Restrained joints may be used in place of concrete blocking as directed by the Project's Design Engineer and accepted by the District.

9. Contact the municipal fire department or Skagit County Fire Marshal for acceptable fire hydrants and Storz adaptor fitting requirements.

10. A #10 solid copper wire with blue insulation is to be installed with/and attached to all water service pipelines and service pipelines. Refer to District Details for installation requirements.

11. Unless otherwise specified, all water pipeline installations require a 36-inch minimum cover and 48-inch maximum trench depth to existing or future finish grade and a minimum of 10-foot horizontal separation between water pipelines and sanitary sewer and all other utilities unless otherwise specified. Water pipeline horizontal and vertical alignments are required to be staked on a maximum 50-foot interval, or as required by the District.

12. When installing water pipeline across existing or proposed sanitary sewer, a full length of pipe shall be installed with mid-span of the water pipe over the sewer to provide a 10-foot horizontal separation between water pipelines and sanitary sewer pipelines is required, unless an alternative proposal from the design engineer is submitted to and approved by the District.

13. Bedding material for the Ductile Iron pipe shall be select, native, granular material free from wood waste, organic material or other extraneous or objectionable materials and shall be a maximum size of 1 1/2-inches or approved pipe bedding per WSDOT Specification 7-08.3(9) and 9-03.12(3). Pea gravel and backshot are not acceptable.

14. Backfill trenches in pavement areas with pit-run gravel compacted to at least 95 percent minimum density per WSDOT Specification 7-08.3(11). The contractor shall make all pavement repairs and perform all restoration.

15. Disinfection and flushing of the water pipelines are to be per WSDOT Specifications. Use dechlorination equipment when flushing or, with permission of the appropriate sewer utility, flush into sanitary sewer manholes. Do not flush into or allow chlorinated water to drain into any creek, wetland, or ostich basin. The total estimated amount of water used for filling and flushing of the water pipeline is .

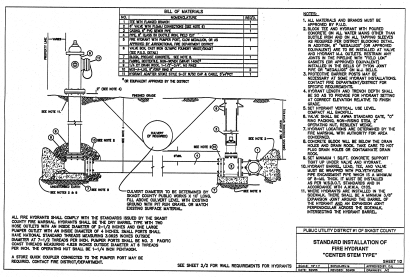
16. Pressure test new pipeline, including fire hydrants and service lines as per WSDOT Specifications.
Test Date: 3/14/07 Test Pressure: 200 psi
Time Start Time End
Pressure Drop -0- Make-Up Water ___cu.ft.

17. All salvaged usable District owned materials are to be delivered to the District Office at 1415 Freeway Drive, Mount Vernon, or as directed by the District.

18. The utility locations marked on this map are approximate. The contractor is to verify actual location and depth prior to construction. Call the underground utility locate center at 1(800) 424-5555.

19. All private fire sprinklers or private fire hydrant pipelines are required to be installed with a Washington State Department of Health (WSDOH) approved double check detector assembly(ies) or reduced pressure detector assembly(ies), with an Invensys 200 TR/PL meter with a remote touch-read pad installed within 5-inches of the vault lid's hinge and brass plugs in the test ports.

20. A Washington State approved reduced pressure backflow prevention assembly shall be installed at temporary pipeline connections between the existing pipelines and new water pipelines for filling and flushing of the improvements. The assembly shall have been tested and approved a maximum of every six months and the test report provided to the District. Before connection to the existing water system, all new water pipelines and repaired pipelines shall be pressure tested and flushed and a bacteriological sample with satisfactory bacteriological report obtained. The District will connect all new pipelines to the existing system, unless the connections by the contractor are approved by the District.



THRUST BLOCK – TABLE
FOR 11 1/4 – 22 1/2 – 30 BENDS

PIPE SIZE	V @	DU FT	A	B	L
4"	11 1/4	8	2.0'	3/4"	1.5'
	22 1/2	11	2.7'		2.0'
	30	17	2.8'		
6"	11 1/4	11	2.2'	3/4"	2.0'
	22 1/2	25	2.9'		
	30	41	3.3'		
8"	11 1/4	18	2.5'	3/4"	2.0'
	22 1/2	47	3.8'		
	30	70	4.1'	3/4"	2.5'
12"	11 1/4	32	3.2'	3/4"	2.5'
	22 1/2	80	4.5'	7/8"	3.0'
	30	132	5.1'		
16"	11 1/4	70	4.1'	3/4"	3.0'
	22 1/2	184	5.7'	1 1/8"	4.0'
	30	279	6.5'	1 1/4"	
20"	11 1/4	91	4.5'	7/8"	3.0'
	22 1/2	225	6.1'	1 1/4"	4.0'
	30	330	6.9'	1 3/8"	4.5'
24"	11 1/4	126	5.0'	1"	3.5'
	22 1/2	320	6.8'	1 3/8"	4.5'
	30	480	7.9'	1 5/8"	5.5'

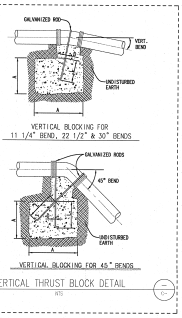
VERT. THRUST BLOCK DETAIL TABLE (CONTINUED)

VERTICAL BLOCKING FOR 45 BENDS

4"	45	30	2.1'	3/4"	2.0'
6"		66	4.1'		
8"		125	5.0'		
12"		232	6.1'	3/4"	2.5'
16"		456	7.8'	1 1/8"	4.0'
20"		580	8.2'	1 1/4"	
24"		820	8.4'	1 3/8"	4.5'

NOTES:
1. CONCRETE FOR THRUST BLOCKS SHALL BE THOROUGHLY MIXED PRIOR TO PLACEMENT.
2. THESE TABLES ARE BASED ON A STANDARD 5-SACK CONCRETE MIX, 3000 PSI RATING.
3. THE BLOCK SHALL HAVE A MINIMUM BEARING AREA OF 1/4 SQ. FT. AGAINST THE FITTING AND SHALL BE WRAPPED IN PLASTIC PRIOR TO THE BLOCKS BEING POURED.
4. BEARING AREA OF CONCRETE THRUST-BLOCKS IS BASED ON 200 PSI PRESSURE AND A SOIL BEARING LOAD OF 2000 LBS. PER SQ. FT. CONTRACTOR SHALL INSTALL ADEQUATE BLOCKING FOR THE ACTUAL CONDITIONS.

DETAIL (CONTINUED)



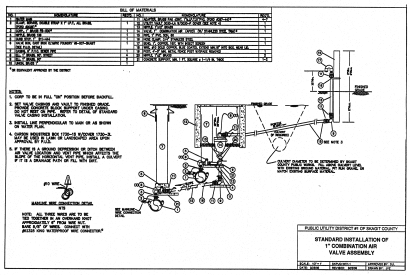
VERTICAL THRUST BLOCK DETAIL

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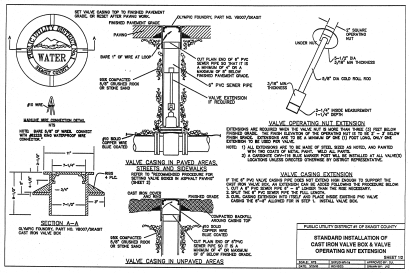
AS-BUILT C.O. 4529 W.O. 07-3199 1/24/07

FILENAME: 09252 PLOT AT: 1"=100' LAST EDIT DATE: OCT.-10-06	DESIGNED BY: Y.S.KIM DRAWN BY: Y.S.KIM CHECKED BY:	REVISIONS PUD REVIEW	DATE 1/11/07	SUMMIT Engineers & Surveyors, Inc. 2218 Old Highway 99 So. Mount Vernon WA. 98273 Phone: (360) 416-4999 Fax: (360) 416-4949	SHEET DESCRIPTION WATERMAIN EXTENSION DETAILS	PROJECT MORFORD ROAD WATERMAIN EXTENSION	CW.2

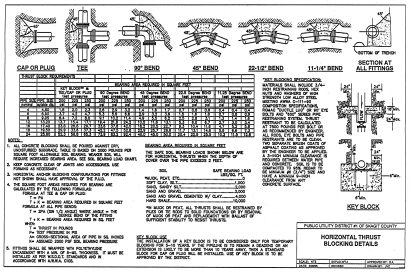
SEC. 5, & 32, TWP. 34N & 35N, RNG. 5E, W.M. SKAGIT COUNTY



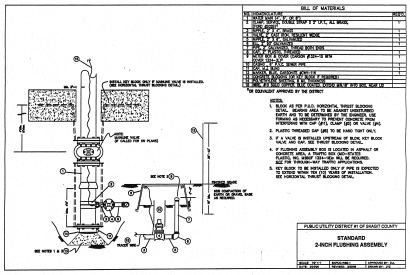
STANDARD INSTALLATION OF 1" COMBINATION AIR VALVE ASSEMBLY



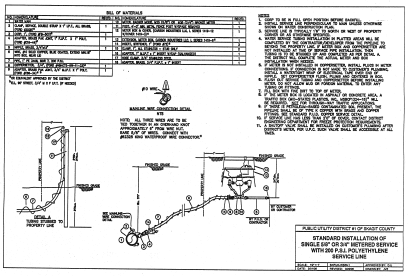
STANDARD INSTALLATION OF CAST IRON VALVE BOX & VALVE OPERATING NUT EXTENSION



HORIZONTAL THRUST BLOCKING DETAILS



STANDARD 2-INCH FLUSHING ASSEMBLY



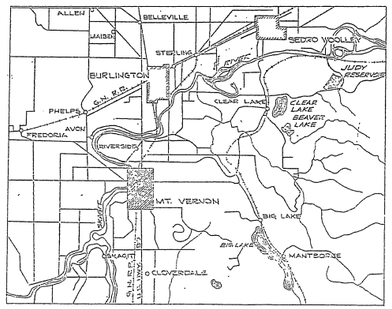
STANDARD INSTALLATION OF SINGLE 5/8" OR 3/4" METERED SERVICE WITH 200 P.S.I. POLYETHYLENE SERVICE LINE

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MAR 21 2007
PUD #1 OF SKAGIT CO.

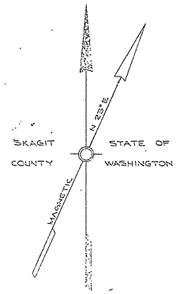
AS-BUILT C.O. 4529 W.O. 07-3199

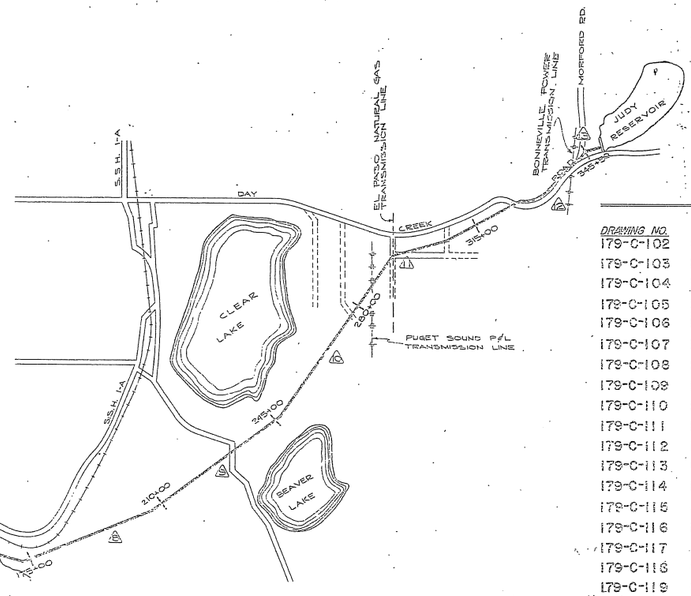
FILENAME: 06252 PLOT AT: 1"=100' LAST EDIT DATE: OCT-10-06	DESIGNED BY: Y.S.KM DRAWN BY: Y.S.KM CHECKED BY:	REVISIONS PUD REVIEW	DATE 1/11/07	SUMMIT Engineers & Surveyors, Inc. 2218 Old Highway 99 So. Mount Vernon WA. 98273 Phone: (360) 416-4999 Fax: (360) 416-4949	SHEET DESCRIPTION WATERMAIN EXTENSION PLAN & PROFILE	PROJECT MORFORD ROAD WATERMAIN EXTENSION	CW.3

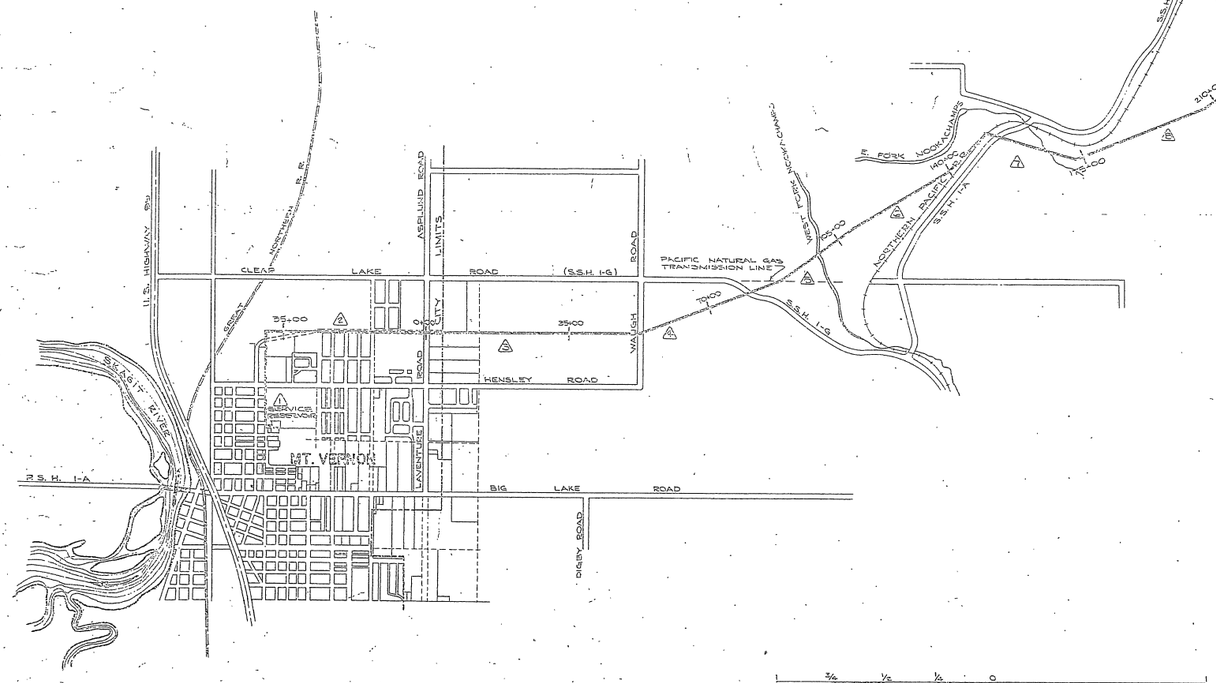
22. Record Drawing for Existing 24-inch-diameter Waterline, CO



VICINITY MAP







INDEX

DRAWING NO.	TITLE
179-C-102	GENERAL PLAN AND INDEX MAP
179-C-103	PLAN AND PROFILE - PLATE 1
179-C-104	PLAN AND PROFILE - PLATE 2
179-C-105	PLAN AND PROFILE - PLATE 3
179-C-106	PLAN AND PROFILE - PLATE 4
179-C-107	PLAN AND PROFILE - PLATE 5
179-C-108	PLAN AND PROFILE - PLATE 6
179-C-109	PLAN AND PROFILE - PLATE 7
179-C-110	PLAN AND PROFILE - PLATE 8
179-C-111	PLAN AND PROFILE - PLATE 9
179-C-112	PLAN AND PROFILE - PLATE 10
179-C-113	PLAN AND PROFILE - PLATE 11
179-C-114	PLAN AND PROFILE - PLATE 12
179-C-115	PLAN AND PROFILE - PLATE 13
179-C-116	BLOW-OFF DETAILS
179-C-117	ANCHOR DETAILS
179-C-118	CONNECTIONS - MISCELLANEOUS DETAILS
179-C-119	CONNECTION TO SERVICE RESERVOIR
179-C-124	INTAKE TOWER - STRUCTURAL
179-C-125	INTAKE TOWER - MISCELLANEOUS DETAILS
179-C-126	INTAKE TOWER - FOOT BRIDGE

LEGEND

- Plan And Profile Plate Numbers
- New Water Line
- & Easement
- Blow-Off
- Air Vacuum Valve
- Fence
- Building
- Valve Pit
- Corrugated Metal Pipe Sleeve
- Anchor Block
- Pavement
- Power And Telephone Lines
- Power Transmission Lines

4-29-19 - UPDATED 24" TL RECORD DRAWINGS TO INCLUDE ALL ACTUAL PLUNGED OUTLETS AS PER THE DIPE DRAWINGS
Mike Benton
MIKE BENTON

RECORD DRAWINGS
CO:1569

INDEX FILE NO.
MICROFILMED
0165-0074

No.	Revision	Date	Appr.	Date

R.W. BECK and ASSOCIATES
ANALYTICAL AND CONSULTING ENGINEERS
Seattle, Washington — Omaha, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
GRAVITY WATER LINE
GENERAL PLAN AND INDEX

Des.	Scale AS SHOWN	Sheet	of
Ckd.	Date	179 - C	102
Appd.	File		

VEGETATION AND SOIL DATA	CLAY LOAM SCATTERED TIMBER AND BRUSH	ASPHALT STREET SURFACE	CLAY LOAM, LIGHT BRUSH AND SCRUB TIMBER, CLEARED FROM STA. 41+35	ABANDONED R.R. GRADE GRAVEL LOAM, SCRUB TIMBER AND BRUSH
64+30 ASPHALT 62+76	53+77	45+90	39+35	35+00

TEST SECTION STA. 64+46 TO 41+40
MAXIMUM TEST PRESSURE 235 psi @ STA. 41+40

TEST SECTION STA. 64+46 TO 41+40
MAXIMUM TEST PRESSURE 235 psi @ STA. 41+40

TEST SECTION STA. 41+40 TO 41+00 MAX.
TEST PRESSURE 213 PSI @ 28+60

41+40

16" CONC. CYL. PIPE

LINE DRAIN

16" GATE VALVE

2" COMBINATION AIR-VACUUM VALVE

20 x 20 x 16" TEE

CONC. ANCHOR (1)

BLIND FLANGE

39+94.94

CONC. ANCHOR (2)

20" CONC. CYL. PIPE

NOTE: FOR ANCHOR DETAILS SEE SHEET 179-C-117.

HIGHLAND ST.

8TH ST.

FOR CONNECTION DETAIL SEE SHEET 179-C-115

63+50.05

EVERGREEN ST.
N. EDGE BLACKTOP

BARBEQUE PIT

SPRUCE ST.

CEDAR ST.

16" CEDAR

6" PINE

CONC. CURB

STA. 53+35.75

EDGE OF ASPHALTIC PAVEMENT

47.10 4" FL OUTLET

45+90 BEGIN ASPHALT

22" MAPLE

CEDAR CLUMP

4" MAPLE

16" CEDAR

14" CEDAR

40+01.52

50' EASEMENT

TEE

PI 39+94.94
ANCHOR BLOCK

2.5%

8" VALVE PIT
STA. 40+03.94

40+01.52

MANHOLE
8" SAN. SEWER

P.U.D. 1.0 MG CONC. RESERVOIR

63+89.25

G4+46

STA 63+54
8" FL OUTLET

STA 63+57
8" FL OUTLET

S 0°27'30"E - 9335

S 0°45'30"W - 1356.81

S 53°08'15"E - 133.93
FUTURE 45° SUPPLY LINE (N 11°01'45" W)

50' EASEMENT

STA 35+00
MATCH LINE SHEET 179-C-104

MAGNETIC

N 23°E

SKAGIT COUNTY

WASHINGTON STATE 49

16" CONCRETE CYLINDER PIPE - CLASS 150

16" I.D. CONCRETE CYLINDER PIPE - CLASS 180

16" I.D. CONC. CYL. PIPE CLASS 200

20" I.D. CONCRETE CYLINDER PIPE CLASS 200

SERVICE RESERVOIR

64+00
℄ VALVE PIT

+23.28% (13.3)

+5.28% (94.9)

+1.23 % (285.3)

+2.71 % (350.1)

+2.96 % (650.3)

+2.68 % (1120.0)

+0.45 % (1120.0)

EL. 1200.0

EL. 1150.0

EL. 1100.0

EL. 1050.0

EL. 1000.0

EL. 950.0

EL. 900.0

EL. 850.0

EL. 800.0

EL. 750.0

EL. 700.0

EL. 650.0

EL. 600.0

EL. 550.0

EL. 500.0

EL. 450.0

EL. 400.0

EL. 350.0

EL. 300.0

EL. 250.0

EL. 200.0

EL. 150.0

EL. 100.0

EL. 50.0

EL. 0.0

SYSTEM HYDRAULIC GRADE LINE (SHGL) 40 PSI

63+00 60+00 55+00 50+00 45+00 40+00 35+00

1" = 100' HORIZ.
1" = 10' VERT.

INDEX FILE NO.
ARCHIVED
0165-00142

CO. 1569

No.	Revision	By	Appr.	Date

NORMAN R. CARLSON — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

GEORGE S. MARTIN — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

R.W. BECK and ASSOCIATES
UTILITY ANALYSTS AND ENGINEERS
Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
GRAVITY WATER LINE

PLAN AND PROFILE
PLATE 1

Dwn.	Scale AS SHOWN	Sheet 2 of 21
Ck'd.	Date March 1961	179-C-103
App'd.	File S-165-JTBD-1	

0165-00142

VEGETATION AND SOIL DATA	35+00	ABANDONED R.R. GRADE GRAVEL LOAM, SCRUB TIMBER AND BRUSH	27+00	EXCAVATED R.R. GRADE GRAVEL CLAY, CLEARED FOR STREET	16+70	ABANDONED R.R. GRADE GRAVEL LOAM SCRUB TIMBER	GRAVEL RD.	13+00	ABANDONED R.R. GRADE GRAVEL LOAM, SCRUB TIMBER AND BRUSH	3+94	SULLY GRAVEL CLAY CLEARED	2+28	ABANDONED R.R. GRADE GRAVEL CLAY	0+28 AHD	ASPHALT SURFACE	0+30 BK

TEST SECTION STA. 41+40 TO 0+00
MAX. TEST PRESSURE 273 psi @ STA. 25+60

SKAGIT COUNTY — STATE OF WASHINGTON

N 23° E MAGNETIC

VALVE PIT
SEE DRWG. NO. 179-C-118
STA. 01+22

0+00

MANHOLE SAN. SEWER

FUTURE 48" SUPPLY LINE (N.I.C.)

S 89° 30' 08" E - 800.12

LAVENTURE ROAD

MATCH LINE SHEET 179-C-105

STA 35+00 MATCH LINE SHEET 179-C-103

FUTURE 48" SUPPLY LINE (N.I.C.)

S 89° 05' 15" E - 1331.93

33+39

20198 6" FL (S)
2-20" x 20" TYPE B BLOWOFF LT.

℄ OUTLET
26+33.91

MANHOLE SAN. SEWER LATERALS N.S./E.

MANHOLE SAN. SEWER LATERALS E.W./S.

MANHOLE SAN. SEWER LATERALS E.W./S.

MANHOLE SAN. SEWER LATERALS S./W.

14TH ST.
15TH ST.
16TH ST.
17TH ST.
18TH ST.
15TH ST.
20TH ST.

NOT OBTAINED

S 89° 01' 50" E - 2162.89

STA 13107 6" FL OUTLET ℄ PIPE (S)

6+70

P.I. 5+00.12

4-20" ∅ COMBINATION AIR-VACUUM VALVE

2-20" x 20" TYPE B BLOWOFF LT.

STA 2 6" FL (LT) OUTLET (TYPE II BLOW)

2+00 LONG = 0+00 BK.

20" I.D. CONCRETE CYLINDER PIPE - CLASS 200

20" I.D. CONCRETE CYLINDER PIPE - CLASS 180

STA 35+00 MATCH LINE SHEET 179-C-103

TENSION JOINTS

20198 6" FL (S) OUTLET

2-20" x 20" TYPE B BLOWOFF LT.

-0.45 % (1020.0)

-3.33 % (450.0)

-0.25% (700.0)

-2.86 % (420.0)

-1.43 % (700.0)

-0.57 % (1530.0)

2.00% (900.0)

TENSION JOINTS

DEFLECTION 11°-15'-18" RT.

STA 13107 6" FL OUTLET (S) PIPE

STA 1 6" FL (LT) OUTLET (TYPE II BLOW)

NO. 1 CONCRETE THRUST BLOCK

NO. 2 CONCRETE THRUST BLOCK

TENSION JOINTS

DEFLECTION 11°-15'-18" LT.

TENSION JOINTS

2-20" x 20" TYPE B BLOWOFF LT.

2-20" x 20" TYPE B BLOWOFF LT.

WATER STOP

SHO EL. 46.0

3+60 EL. 46.0

1+70 EL. 47.0

35+00 30+00 25+00 20+00 15+00 10+00 5+00 0+00

1" = 100' HORIZ.
1" = 10' VERT.

0165-00143

No.	Revision	By	Appr.	Date

NORMAN R. CARSON — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

GEORGE S. MARTIN — STATE OF WASH. — REGISTERED PROFESSIONAL ENGINEER

R.W. BECK and ASSOCIATES

UTILITY ANALYSTS AND ENGINEERS

Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON

GRAVITY WATER LINE

PLAN AND PROFILE
PLATE 2

Dwn. R.V.	Scale AS SHOWN	Sheet 2 of 27
Ckd. A.H.M.	Date May 16 1961	179-C-104
App'd. N.R.C. Carson	File S-165-JTBD-1	

CO 1569

0165-00143

VEGETATION AND SOIL DATA | ROAD 0+30 | 2+60 | STA. 2+60 TO STA. 12+20 LIGHT BRUSH AND SCRUB TIMBER | 12+20 | 15+00 DRAIN DITCH 4' DEEP 15+35 | STA. 0+30 TO STA. 35+00 ABANDONED R.R. GRADE, CONSISTING OF GRAVEL AND CROSSTIES IN ADVANCED STAGES OF DECAY | 35+00

TEST SECTION STA 0+00 TO 62+00
MAX. TEST PRESSURE 245 psi @ STA. 49+50

STA 0+32
8" FL OUTLET
(NORTH)

SEE DETAIL SHEET 179-C-116

LAVENTURE ROAD

MT. VERNON

CITY LIMITS

MATCH LINE SHEET 179-C-104
0+00 BK = 0+00 AHD

STA. 9+00 2" COMBINATION AIR-VACUUM VALVE

STA 9+15.55
4" FL OUTLET
TOP

3+85

13+15

16+36

18+04

FUTURE 48" SUPPLY LINE (N.I.C.)

S 88° 31' 30" E - 2622.1'

45° PK. @ STA. 15+18
30' DRAINAGE DITCH

STATE GAME REFUGE

FUTURE 48" SUPPLY LINE (N.I.C.)

25'

50' EASEMENT

S 89° 28' 30" E. 877.9'

SAVE COTTONWOOD TREES

23+00

P.I. 26+22.10

34+50

STA. 35+00

MATCH LINE 179-C-103

6' DRAINAGE DITCH
APPX. @ STA. 21+15

SKAGIT COUNTY

STATE OF WASHINGTON

MAGNETIC N 23° E

24" I.D. CONCRETE CYLINDER PIPE - CLASS 150

ELEV. 100

90

80

70

60

0+00

5+00

10+00

15+00

20+00

25+00

30+00

35+00

EL. 100.0

EL. 99.0

EL. 97.0

EL. 95.0

EL. 93.0

EL. 91.0

EL. 89.0

EL. 87.0

EL. 85.0

EL. 83.0

EL. 81.0

EL. 79.0

EL. 77.0

EL. 75.0

EL. 73.0

EL. 71.0

EL. 69.0

EL. 67.0

EL. 65.0

EL. 63.0

EL. 61.0

EL. 59.0

EL. 57.0

EL. 55.0

EL. 53.0

EL. 51.0

EL. 49.0

EL. 47.0

EL. 45.0

EL. 43.0

EL. 41.0

EL. 39.0

EL. 37.0

EL. 35.0

EL. 33.0

EL. 31.0

EL. 29.0

EL. 27.0

EL. 25.0

EL. 23.0

EL. 21.0

EL. 19.0

EL. 17.0

EL. 15.0

EL. 13.0

EL. 11.0

EL. 9.0

EL. 7.0

EL. 5.0

EL. 3.0

EL. 1.0

EL. -1.0

EL. -3.0

EL. -5.0

EL. -7.0

EL. -9.0

EL. -11.0

EL. -13.0

EL. -15.0

EL. -17.0

EL. -19.0

EL. -21.0

EL. -23.0

EL. -25.0

EL. -27.0

EL. -29.0

EL. -31.0

EL. -33.0

EL. -35.0

EL. -37.0

EL. -39.0

EL.

VEGETATION AND SOIL DATA	35+00	STA. 39+33 TO STA. 49+00 HEAVY UNDERBRUSH AND 4" TO 12" TIMBER	39+33	49+00	STA. 49+00 TO STA 52+20 LIGHT BRUSH AND 4" TO 12" TIMBER	52+20	GRAVEL ROAD	52+75	STA. 52+75 TO STA. 67+25 LIGHT BRUSH AND SCRUB TIMBER STA. 35+00 TO STA. 67+20 ABANDONED E.R. GRADE CONSISTING OF GRAVEL AND CROSSTIES IN ADVANCED STAGES OF DECAY	67+20	67+25	STA. 67+25 TO 70+00 PASTURE STA. 67+20 TO 70+00 ABANDONED E.R. GRADE AND SANDY LOAM	70+00

TEST SECTION STA. 0+00 TO 62+00
MAX. TEST PRESSURE 245 psi @ STA. 49+20

TEST SECTION STA. 62+00 TO 111+50
MAX. TEST PRESSURE 267 psi @ STA. 100+50

STA 49+30 6" BLOW (SOUTH)

STA 52+29 6" FL OUTLET (NORTH)

SKAGIT COUNTY — STATE OF WASHINGTON

MARKER

N 23° E

MATCH LINE SHEET 179-C-105 STA. 35+00

FUTURE 48" SUPPLY LINE (N.I.C.) — S 83° 28' 30" E — 2953.34'

35+20 — 42+50 — 49+30 TYPE II BLOWOFF ASSY. — 52+42

REMOVE WOOD CULVERT AND REPLACE WITH CONC. CULVERT OF EQUIV. SIZE

6" OUTLET

EL 457.94 FL. PIPE

APPX. 6" STA. 49+15 — 12" BIRCH

24" I.D. CONCRETE CYLINDER PIPE - CLASS 150

PIPE CURVE DATA
R = 800.97
I = 27°57'
A = 27°57'15"
L = 390.77

N 56° 16' 30" E — 218.11'

FUTURE 48" SUPPLY LINE (N.I.C.)

PIPE CURVE DATA
R = 1599.93'
I = 7°33'
A = 12°58'30"
L = 362.41'

64+25 — 64+74 — 65+19

61+91.51 — 24" CONNECTION AIR AND VACUUM VALVE — 1" FL OUTLET TOP — 1" NIPPLE

62+00

68 62+10.11

MATCH LINE SHEET 179-C-106 STA. 70+00

35+00 — 40+00 — 45+00 — 50+00 — 55+00 — 60+00 — 65+00 — 70+00

MATCH LINE SHEET 179-C-105

EL 432.0

-0.43% (1430.0)

20' CONC. ENCASEMENT

THRUST BLOCK

49+30 6" DIA. TYPE III BLOWOFF ASSY.

EL 435.0

EL 457.94 FL. PIPE

6" VACUUM VALVE

EL 436.0

+0.65% (770.0)

+0.50% (500.0)

-0.94% (1650.0)

EL 425.5

EL 440.0

TENSION JOINTS

20' CONC. ENCASEMENT

MATCH LINE SHEET 179-C-106

1" = 100' HORIZ.
1" = 10' VERT.

MICROFILMED
0165-00145

No.	Revision	By	Appr.	Date

R.W. BECK and ASSOCIATES
UTILITY ANALYSTS AND ENGINEERS
Seattle, Washington — Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON

GRAVITY WATER LINE

PLAN AND PROFILE
PLATE 4

Dwn. R.V.	Scale AS SHOWN	Sheet 5 of 21	
Ckd. [illegible]	Date May 16, 1961	179-C-106	
App'd [illegible]	File S-165-JTBD-1		

NORMAN R. CARSON — REGISTERED PROFESSIONAL ENGINEER — STATE OF WASHINGTON

GEORGE S. MARTIN — REGISTERED PROFESSIONAL ENGINEER — STATE OF WASHINGTON

C0.1569

0165-00145

VEGETATION AND SOIL DATA	70+00	70+50	71+41 PRIVATE GRAVEL LANE	71+51 TO 72+00 GARDEN	STA. 72+00 TO STA. 81+25 GRAIN FIELD STA. 70+00 TO STA. 81+25 ABANDONED R.R. GRADE AND SANDY LOAM	81+25	CONCRETE PAVEMENT	82+01	STA. 82+01 TO 86+18 LIGHT BRUSH DECAYING - CROSSTIES & GRAVEL	86+18	86+51	STA 86+51 TO STA 100+00 MARSH GRASSES MARSH EXCEPT STA 89+73 TO STA 90+50 CONSISTING OF ABANDONED HIGHWAY GRADE GRAVEL	100+00	102+00	STA. 102+00 TO 105+00 MARSH PASTURE SANDY CLAY LOAM	105+00

24" CONC. CYL. PIPE
SAND CUSHION
36" CORRUGATED METAL PIPE.

SECTION A-A

PROFILE
HIGHWAY CROSSING - S.S.H. I-G
SCALE: 1"=10' HORIZ.
1"=5' VERT.

NOTE: WELD ALL JOINTS THAT FALL INSIDE SLEEVE FOR HIGHWAY AND RAILROAD CROSSINGS.

SKAGIT COUNTY
N 23° E
MAGNETIC
STATE OF WASHINGTON

SZ 538 (Concrete conc.)
STA 81+32 (6" FL TOP)
STA 100+38 6" Blow
S.S.H. I-G
TO CLEAR LAKE
TRANSMISSION LINE
TELEPHONE LINE
GENERAL TELEPHONE LINE
POWER LINE
MATCH LINE SHEET 179-C-106 STA 70+00
12" CULVERT 72+00
72+08
FUTURE 48" SUPPLY LINE (N.I.C.)
N 72° 15' E 2223.3'
40' SLEEVE
APPROX. ℄ DRAINAGE DITCH STA 79+50
6' TOP OUTLET-EDGE R/W ℄ RD. 81+62
ABANDONED R/W PUGET SOUND & CASCADE R.R.
APPROXIMATE LOCATION 4" GAS LINE PACIFIC NATURAL GAS DEPTH UNKNOWN
Pt. 90+53.25 ANCHOR BLOCK
N 72° 15' E 1524.43 (FUTURE 48" SUPPLY LINE (N.I.C.))
102+00 TYPE II BLOWOFF ST. NOOKACHAMPS CREEK 101+00
MATCH LINE SHEET 179-C-105 STA 105+00

24" I.D. CONCRETE CYLINDER PIPE- CLASS 150
24" I.D. CONCRETE CYLINDER PIPE- CLASS 200

MATCH LINE SHEET 179-C-106 ELEV. 53.0 STA 70+00
2.00 % (50.0')
1.00 % (390.0')
0.48 % (880')
MATCH LINE
20' CONC. ENCASEMENT
TENSION JOINTS
6" BLOW OUT
24" CONC. CYL. PIPE
36" CMP
40' SLEEVE
6" DRAINAGE OUTLET
6" BLOW OUT ELEV. 41.20
24" CONC. CYL. PIPE
0.63 % (990.0')
20' CONC. ENCASEMENT
TENSION JOINTS
100+38 6" BLOW OUT
HIGH POINT ELEV. 53.0
1.56 % (450.0')
50' CONC. ENCASEMENT
MATCH LINE SHEET 179-C-105 ELEV. 53.0 STA 105+00
70+00
75+00
80+00
85+00
90+00
95+00
100+00
105+00

1"=100' HORIZ.
1"=10' VERT.

0165-00146

No.	Revision	By	Appr.	Date

R.W. BECK and ASSOCIATES
UTILITY ANALYSTS AND ENGINEERS
Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
GRAVITY WATER LINE
PLAN AND PROFILE
PLATE 5

Dwn. RLH	Scale AS SHOWN	Sheet 2 of 27	
Chkd. [illegible]	Date Nov 16 1961	179-C-107	
App'd [illegible]	File S-165-JTBD-1		

NORMAN R. CARRON REGISTERED PROFESSIONAL ENGINEER
GEORGE S. MARTIN REGISTERED PROFESSIONAL ENGINEER

CO:1569

0165-00146

VEGETATION AND SOIL DATA

OPEN FIELD - GRASS AND GRAIN CROPS
SANDY LOAM

PASTURE
SANDY LOAM

TEST SECTION STA. 62+00 TO 111+50
MAX. TEST PRESSURE 267 psi @ STA. 100+50

TEST SECTION STA. 111+50 TO 162+00
MAX. TEST PRESSURE 258 psi @ STA. 142+50

111+50

LOT C-1561

MATCH LINE SHEET 179-C-107

STA. 135+00

P.I. 134+49.84

P.I. 137+61.73

12°

N 56°02'E - 687.75'

FUTURE 48" SUPPLY LINE (N.I.C.)

N 59°49'E 2444.09'

50' EASEMENT

25'

FUTURE 48" SUPPLY LINE (N.I.C.)

122+05

135+00

P.I. 139+61.76'
ANCHOR BLOCK

MATCH LINE SHEET 179-C-109

SKAGIT COUNTY MAGNETIC

N 23° E

STATE OF WASHINGTON

ABANDONED R/W
P.S. & C.R.R.

RAILWAY

PACIFIC

NORTHERN

24" I.D. CONCRETE CYLINDER PIPE - CLASS 200

+0.35 % (300.0')

+1.14 % (350.0')

+0.07 % (2850.0')

ELEVATION IN FEET

0
10
20
30
40
45

105+00
110+00
115+00
120+00
125+00
130+00
135+00
140+00

1"=100' HORIZ.
1"=10' VERT.

INDEX FILE NO
MICROFILMED
016 - 00147

No.	Revision	By	Appr.	Date

NORMAN R. CARSON
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER

GEORGE S. MARTIN
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER

C0:1569

R.W. BECK and ASSOCIATES
UTILITY ANALYSTS AND ENGINEERS
Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON

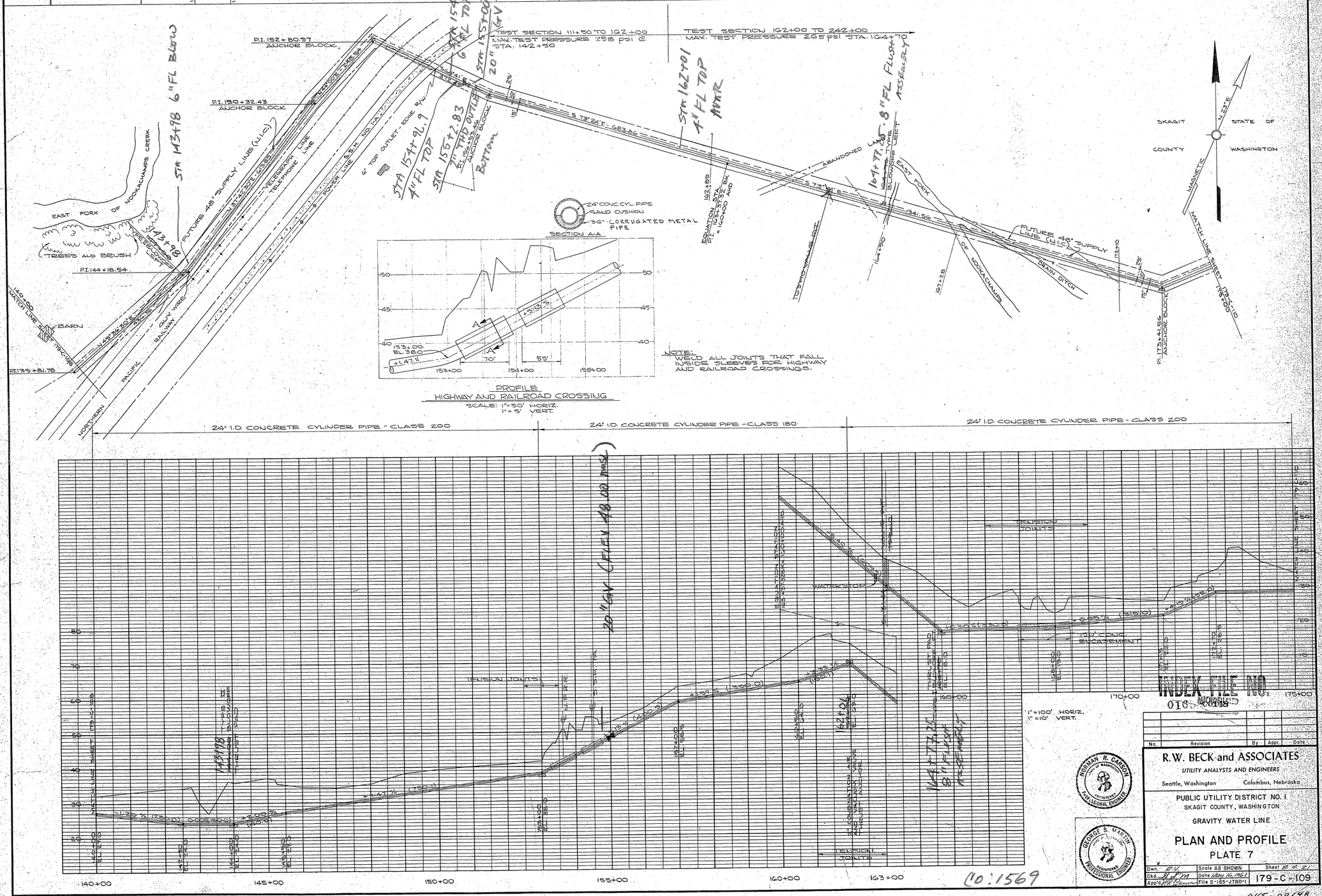
GRAVITY WATER LINE

PLAN AND PROFILE
PLATE 6

Dwn. R.V.	Scale AS SHOWN	Sheet 7 of 21
Ckd. J.F.M.	Date May 16, 1961	179-C-108
App'd. H.P.Brown	File S-165-JTBD-1	

0165-00147

VEGETATION AND SOIL DATA	PASTURE - APPLE ORCHARD SANDY LOAM	SCRUB TIMBER DENSE BRUSH 144+08	OLD R.R. GRADE GRAVEL FILL 145+16	PASTURE LAND	153+00	RAILROAD AND HIGHWAY	154+63	STA 154+63 TO 163+00 BRUSH AND SCRUB TIMBER	159+50	CLEARED PASTURE SANDY LOAM	164+40	MARSHY BRUSH AND GRASS SANDY LOAM AND GRAVEL	CREEK DRAIN DITCH	OPEN PASTURE MARSH	GRASSY KNOLL CLAY AND ROCK



No.	Revision	By	Appr.	Date

R.W. BECK and ASSOCIATES
UTILITY ANALYSTS AND ENGINEERS
Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
GRAVITY WATER LINE

PLAN AND PROFILE
PLATE 7

Dwn. RV	Scale AS SHOWN	Sheet 8 of 21
Ckd. RWB	Date May 11, 1961	179-C-109
App'd W Plans	File S-165-JTBO-1	

NORMAN R. CARSON — REGISTERED PROFESSIONAL ENGINEER
GEORGE S. MARTIN — REGISTERED PROFESSIONAL ENGINEER

0165-00148

VEGETATION AND SOIL DATA	OPEN PASTURE CLAY, SAND AND GRAVEL	185+12	BARNYARD AND PASTURE SANDY LOAM	187+90 BRUSH 187+25	PASTURE AND HAY CROP 187+25 TO 210+00 SANDY LOAM	198+00	SCRUB TIMBER AND BRUSH	200+25	CULTIVATED DRAIN FIELD

NORTHERN PACIFIC RAILWAY
P. S. & C. RR. (ABANDONED)

MATCH LINE SHEET 179-C-109

179+00

25'
15'

N 67° 56' E 2351.54

FUTURE 48" SUPPLY LINE

184+62 BARN

188+40 DITCH

188+22 TYPE 1 BLOWOFF ST. DRAINAGE

8" BLOW (SOUTH)

STA 182+06.34 4" FL OUTLET TOP INVR

182+00 STATION AIR-VACUUM VALVE

DRAINAGE DITCH

197+50

N 62° 39' 30" E - 1087.50

STA 207+98.60 6" FL OUTLET TOP (INVERT 5' VC NOW ?)

SKAGIT COUNTY

N 23° E

MAGNETIC

STATE OF WASHINGTON

AUSTIN ROAD

6" TOP OUTLET OUTSIDE FENCE

AS 207+98.60 PROJECTED BLOCK

30'

25'

STA 212+00 ± MATCH LINE SHEET 179-C-111

24" I.D. CONCRETE CYLINDER PIPE - CLASS 200

+0.03% (560.0)
+4.06% (370.3)
+0.80% (250.0)
-5.84% (140.3)
-3.93% (165.1)
-0.06% (1170.0)
TENSION JOINTS
+0.33% (900.0)

STA 182+06.34 4" FL OUTLET TOP INVR

182+00 STATION AIR-VACUUM VALVE

184+62 BARN

188+22 TYPE 1 BLOWOFF ST.

188+40 DITCH

DRAINAGE DITCH

ELEV. 240.0

ELEV. 236.0

ELEV. 232.0

ELEV. 228.0

ELEV. 224.0

ELEV. 220.0

ELEV. 216.0

ELEV. 212.0

ELEV. 208.0

ELEV. 204.0

ELEV. 200.0

TENSION JOINTS

TENSION JOINTS

TENSION JOINTS

25' CONC. ENCASEMENT

COUPLING ENCASEMENT

50'

STA 207+98.60 6" FL OUTLET TOP (INVERT 5' VC NOW ?)

AUSTIN ROAD

6" TOP OUTLET OUTSIDE FENCE

AS 207+98.60 PROJECTED BLOCK

MATCH LINE SHEET 179-C-111

175+00 180+00 185+00 190+00 195+00 200+00 205+00 210+00

1" = 100' HORIZ.
1" = 10' VERT.

No.	Revision	By	Appr.	Date

NORMAN R. CARSON — REGISTERED PROFESSIONAL ENGINEER

GEORGE S. MARTIN — REGISTERED PROFESSIONAL ENGINEER

R.W. BECK and ASSOCIATES
UTILITY ANALYSTS AND ENGINEERS
Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON

GRAVITY WATER LINE

PLAN AND PROFILE

PLATE 8

Dwn. RV	Scale AS SHOWN	Sheet 7 of 21
Ckd. [illegible]	Date Nov 16 1961	179-C-110
App'd. [illegible]	File S-165-JTBD-1	

CO: 1569

0165-00149

VEGETATION AND SOIL DATA

PASTURE SANDY LOAM

ROAD

PASTURE SANDY LOAM

CLEAR LAKE

TEST SECTION 192+00 TO 242+00
MAX. TEST PRESSURE 265 psi @ 194+70

TEST SECTION 242+00 TO 264+00 MAX. TEST PRESSURE 264 psi @ 249+80

STA 223+45 2" OUTLET TOP

STA 231+82.50 6" FL OUTLET DISTRIBUTION

SKAGIT COUNTY

N 23° E (MAGNETIC)

STATE WASHINGTON

MATCH LINE SHEET 179-C-110

210+00

2" FL OUTLET

N 56° 38' E - 2467.90

FUTURE 48" SUPPLY LINE (N.I.C.)

25'

15'

2" FL OUTLET

STA 242+00 1" FL OUTLET TOP ANVIL

N 54° 49' E - 1439.93

25'

10'

15'

MATCH LINE SHEET 179-C-112

24" I.D. CONCRETE CYLINDER PIPE CLASS 200

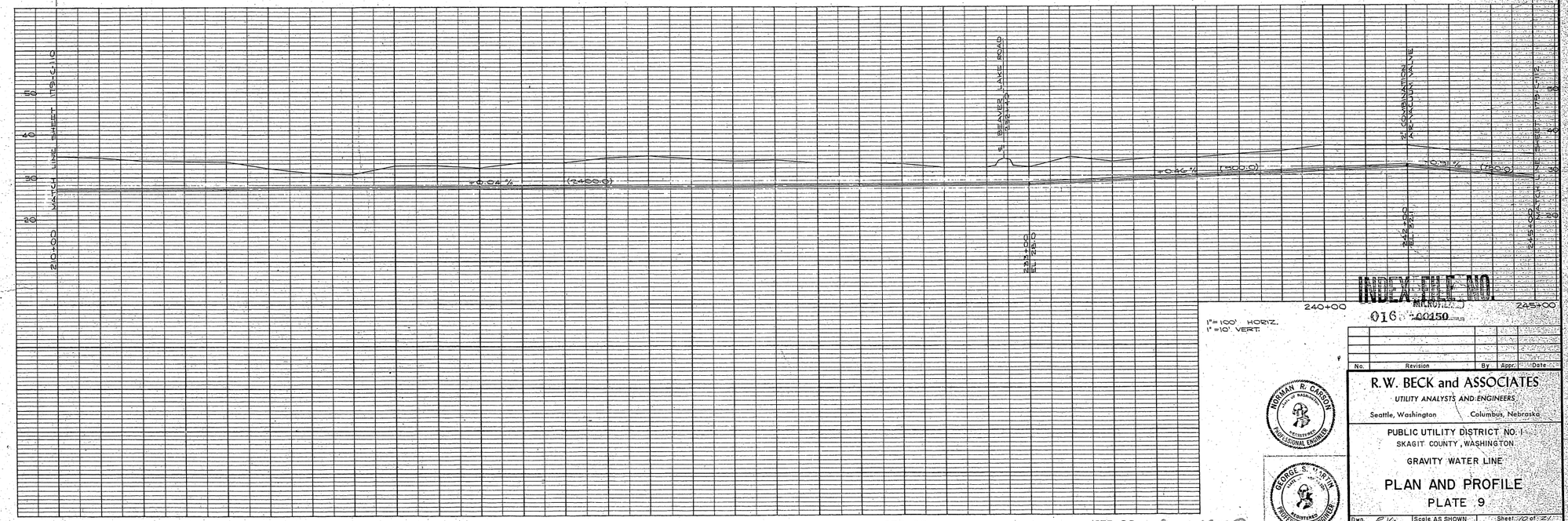
BENHAM LAKE ROAD

PI 232+46.50

24" I.D. CONCRETE CYLINDER PIPE

13" ASPHALTIC PAVEMENT

242+00 24" I.D. CONCRETE AIR-VACUUM VALVE



INDEX FILE NO. 016-00150

1" = 100' HORIZ.
1" = 10' VERT.

No.	Revision	By	Appr.	Date

NORMAN R. CARLSON STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

GEORGE S. MARTIN STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

R.W. BECK and ASSOCIATES
UTILITY ANALYSTS AND ENGINEERS
Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON

GRAVITY WATER LINE

PLAN AND PROFILE
PLATE 9

Dwn. R.V.	Scale AS SHOWN	Sheet 10 of 21
Ckd. G.S.M.	Date March 15, 1961	179-C-111
App'd. N.R. Carlson	File S-165-JTBD-1	

Co. 1569

0165-00150

VEGETATION AND SOIL DATA	PASTURE SANDY LOAM		PASTURE SANDY LOAM		SECOND GROWTH CEDAR, ALDER, FIR AND BRUSH. SANDY LOAM AND DECAYING LOGS	CLEARED PASTURE SANDY LOAM AND ROCK	PASTURE, PARTIALLY CLEARED SCRUB TIMBER, SANDY LOAM, ROCKS AND STUMPS
		254+45 GRAVEL RD		263+97			

TEST SECTION 242+00 TO 264+00
MAX. TEST PRESSURE 264 PSI STA. 249+80

TEST SECTION 264+00 TO 290+40
MAX. TEST PRESSURE 228 PSI AT STA. 264+00

264+00

SKAGIT COUNTY

N 23° E

MAGNETIC

STATE OF WASHINGTON

STA 249+80 10 8" FL OUTLET (SOUTH) BLOW

MATCH LINE SHEET 179-C-111

APPX. S. CANAL STA. 248+80

245+00

246+98.43 ANCHOR BLOCK

249+60 TYPE 1 BLOWOFF ET

254+38

GRAVEL LINE

254+45

N 39°27'E - 2334.43

261+92

263+97

FUTURE 46" SUPPLY LINE (N.I.C.)

274+22

N 30°50'45"E - 2863.27

P.I. 270+22.96

25'

15'

MATCH LINE SHEET 179-C-115

280+00

24" I.D. CONCRETE CYLINDER PIPE - CLASS 200

24" I.D. CONC. CYLINDER PIPE - CLASS 150

24" I.D. CONCRETE CYLINDER PIPE - CLASS 100

EL. 345.00 TOP OF PIPE AT STA. 245+00

EL. 344.00 FLOW LINE AT STA. 245+00

-0.21% (780.0)

EL. 342.36 TOP OF PIPE AT STA. 249+60

EL. 341.36 FLOW LINE AT STA. 249+60

249+80 CL OF 15' CONC ENCASEMENT

-0.37% (6200)

EL. 319.02 TOP OF PIPE AT STA. 264+00

EL. 318.02 FLOW LINE AT STA. 264+00

+0.61% (6000)

EL. 355.00 TOP OF PIPE AT STA. 270+22.96

EL. 354.00 FLOW LINE AT STA. 270+22.96

+0.61% (1500)

EL. 363.15 TOP OF PIPE AT STA. 280+00

EL. 362.15 FLOW LINE AT STA. 280+00

WATER STOP

245+00 250+00 255+00 260+00 265+00 270+00 275+00 280+00

INDEX FILE NO.
016-00151

1" = 100' HORIZ.
1" = 10' VERT.

No.	Revision	By	Appr.	Date

R.W. BECK and ASSOCIATES
UTILITY ANALYSTS AND ENGINEERS
Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON

GRAVITY WATER LINE

PLAN AND PROFILE
PLATE 10

Dwn. BV	Scale AS SHOWN	Sheet 11 of 57	
Ck'd. [illegible]	Date MAY 16 1961	179-C-112	
App'd. [illegible]	File S-165-JTBD-1		

NORMAN R. CASSOR REGISTERED PROFESSIONAL ENGINEER

GEORGE S. TYRTIVA REGISTERED PROFESSIONAL ENGINEER

C01569

016-00151

VEGETATION AND SOIL DATA	STA. 279+75 TO 281+75 PASTURE SANDY LOAM	STA. 281+75 TO 287+00 SECOND GROWTH / TIMBER AND BRUSH	287+00 TO 289+10 P.P. AND L. CO. R/W	STA. 289+10 TO 294+50 SCRUB AND SECOND GROWTH TIMBER	STA 294+50 TO 298+45 PASTURE	298+45-303+00 ROAD / GAS R/W	STA. 303+00 TO 317+00 LIGHT BRUSH, SCRUB AND SECOND GROWTH TIMBER SANDY LOAM
	STA. 263+00 TO STA 303+00 SANDY LOAM, GRAVEL, ROCK AND DECAYING LOGS AND STUMPS						

TEST SECTION 264+00 TO 290+40
MAX. TEST PRESSURE 228 PSI AT STA. 264+00

TEST SECTION 290+40 TO 326+06.13
MAX. TEST PRESSURE 73 PSI AT STA. 306+26.13

290+40

SKAGIT COUNTY — STATE OF WASHINGTON — N 23° E — MAGNETIC

STA 290+69.90
4" FL OUTLET
TOP MARK

GRAVEL ROAD — MEWITT

TREES TO BE CUT AND LAID ASIDE IN 16' LENGTHS

FUTURE 48" SUPPLY LINE (N.I.C.)

POLE STRUCTURE (O.H. P.P. SURVEY) 1,886,110

N 33° 50 45" E - 2643.27

282+18

282+28

MATCH LINE SHEET 178-C-112

COURSE

PUGET SOUND P.P.C. CO. 2-110 KV TRANSMISSION LINES

285+70

STA 290+89.90
24" GATE VALVE
ABERNATHY AVENUE

P.I. 298+86.13
ANCHOR BLOCK

24" GAS TRANSMISSION LINE
8" BOND WATER GAS CONTROL VALVES

N 68°10'E - 875.11

DAY CREEK ROAD

STA 307+59.25
6" FL OUTLET

6" FLANGED OUTLET

CASE

N 58° 52'E - 845.32

P.I. 307+61.24

PRIVATE ROAD

306+22.88
TYPE I BLOWOFF ASSY.

STA. 313+26.13
MATCH LINE SHEET 178-C-114

24" I.D. CONCRETE CYLINDER PIPE - CLASS 100

STA 290+69.90
4" COMBINATION AIR VALVE & MANHOLE
EL. 326.0

STA 290+89.90
24" GATE VALVE
EL. 326.0

STA 306+22.88
8" OUTLET ELBOW

TYPE I BLOWOFF ASSY.
EL. 319.0

+2.50% (500.2)
+3.33% (150.1)
+5.00% (500.2)
+5.78% (250.2)
-0.22% (900.0)
-1.53% (426.2)
+10.71% (100.0)
+4.54% (200.0)
+3.33% (150.2)

TENSION JOINTS

8" WATER LINE SHEET 178-C-114

8" WATER STOP

EL. 344.0
EL. 342.0

280+00 EL. 241.15
285+00 EL. 252.0
287+00 EL. 252.0
289+00 EL. 263.0
290+00 EL. 263.0
295+00 EL. 302.0
300+00 EL. 324.00
305+00 EL. 319.0
310+00
315+00

340
330
320
310
300
290
280

1" = 100' HORIZ.
1" = 10' VERT.

INDEX FILE NO.
MICROFILMED
016 - 00152

No.	Revision	By	Appr.	Date

NORMAN R. CARSON — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

GEORGE S. WORTHEN — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

C0.1569

R.W. BECK and ASSOCIATES
UTILITY ANALYSTS AND ENGINEERS
Seattle, Washington · Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
GRAVITY WATER LINE

PLAN AND PROFILE
PLATE II

Dwn. EVM	Scale AS SHOWN	Sheet 12 of 21
Chd. EVM	Date May 16, 1961	179-C-113
App'd. NRC	File S-165-JTBD-1	

016-00152

VEGETATION AND SOIL DATA

PARTIALLY CLEARED, SCRUB ALDER AND BRUSH SANDY LOAM

325+00 ROAD 325+50

SCRUB ALDER AND BRUSH SANDY LOAM

342+50

TEST SECTION 290+40 TO 326+06.13
MAX. TEST PRESSURE 73 PSI AT STA. 306+26.13

326+06.13

TEST SECTION 326+06.13 TO 351+70.38
MAX. TEST PRESSURE 48 PSI AT STA. 327+50

STA 328+16.48 8" BLOW OFF

326+05.23 4" FL OUTLET

326+06.18 - 2" COMBINATION AIR & VACUUM VALVE
PT. 326+44.82

325+25

DAY

FUTURE 48" SUPPLY LINE (N.I.C.)

N 42° 28' 30" E 497.96

N 58° 52' E = 845.32

N 75° 01' 30" E = 540.37

STA 313+62 2" THD OUTLET

P.I. 343+17.26

P.I. 340+28.26

P.I. 339+07.85

P.I. 321+04.52

P.I. 316+06.56

STA 313+62 2" THD OUTLET

TRANSMISSION LINE

MORFORD ROAD

N 64° 41' 30" E = 284.59

N 33° 53' 30" E 268.80

N 11° 21' E = 250.31

N 36° 05' = 208.69

R = 330.02

Δ = 78° 44' 58"

T = 337.78

L = 351.15

PIPE CURVE DATA
Δ = 65° 00'
R = 529.19
L = 601.26
T = 337.78

P.I. 329+04.26

P.I. 325+50.31

STA 328+16.48 8" BLOW OFF

STA 326+05.23 4" FL OUTLET

326+05.20 TYPE K BLOW-OFF LEFT

CREEK

327+50 48" CULVERT

NOTE:
EXTEND 48" CULVERT NOT LESS THAN 8' NORTH OF PIPELINE

ROAD

ROMMELVILLE POWER ADMINISTRATION

STA 345+50 MATCH LINE SHEET 179-C-115

SKAGIT COUNTY

STATE OF WASHINGTON

MAGNETIC

24" I.D. CONCRETE CYLINDER PIPE - CLASS 100

STA 313+62 2" THD OUTLET

MATCH LINE SHEET 179-C-113

MATCH LINE SHEET 179-C-115

TENSION JOINTS

+0.22 % (550.0)

-1.33 % (600.0)

+0.50 % (200.0)

-1.52 % (200.0)

-2.29 % (700.0)

+0.24 % (700.0)

+2.22 % (400.0)

+3.22 % (400.0)

313+00 315+00 320+00 325+00 330+00 335+00 340+00 345+00

400 390 380 370 360 350 410

1" = 100' HORIZ.
1" = 10' VERT.

INDEX FILE NO.
C0:1569

MICROFILMED
016 - 00153

No.	Revision	By	Appr.	Date

R.W. BECK and ASSOCIATES
UTILITY ANALYSTS AND ENGINEERS
Seattle, Washington Columbus, Nebraska

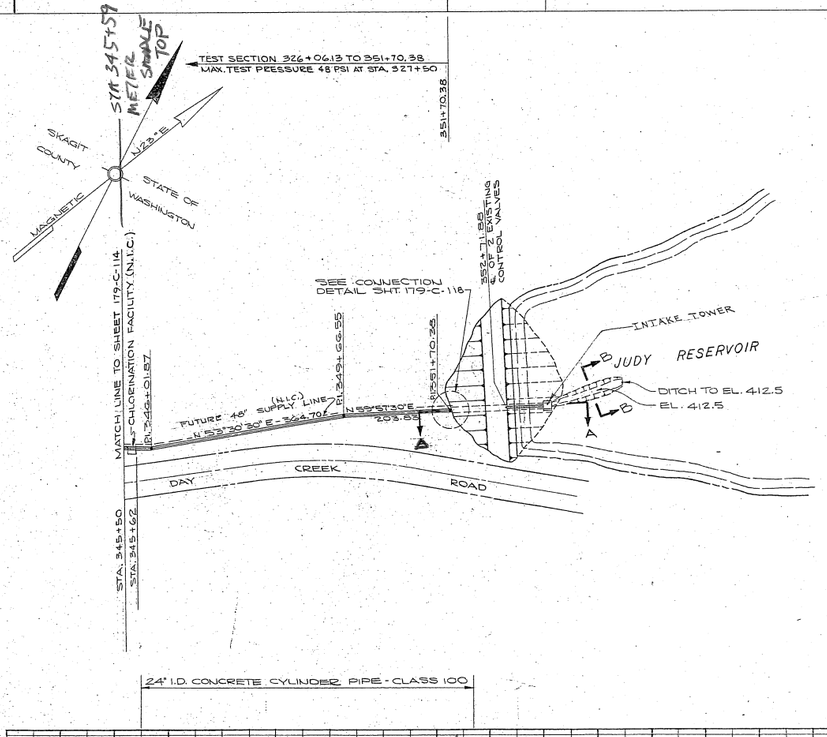
PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
GRAVITY WATER LINE

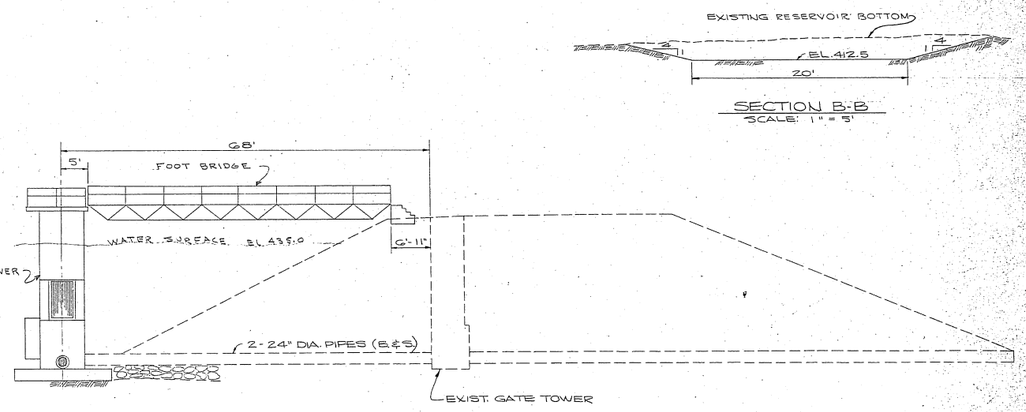
PLAN AND PROFILE
PLATE 12

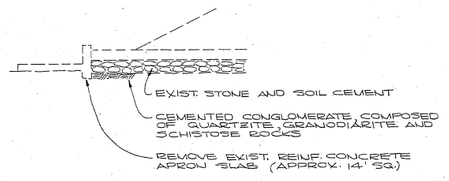
Dwn. E.V.	Scale AS SHOWN	Sheet 13 of 27
Chkd. [illegible]	Date May 16 1966	179-C-114
Appd. N.R. Carson	File S-165-JTBD-1	

0165 - 00153

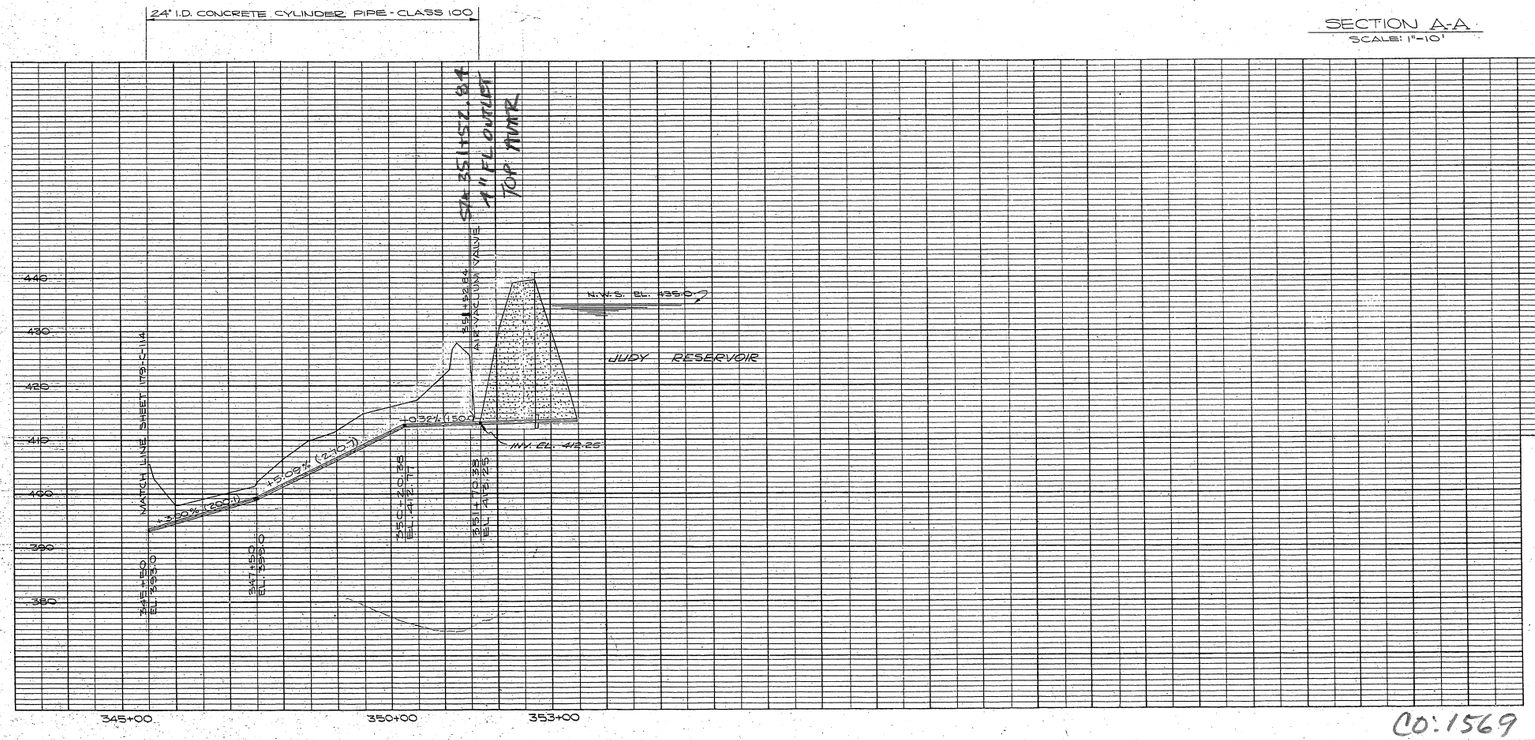
VEGETATION AND SOIL DATA	SECOND GROWTH TIMBER AND BRUSH SANDY LOAM, DECAYING LOGS AND STUMPS	EARTH DAM	RESERVOIR







SECTION A-A
SCALE: 1"=10'



INDEX FILE NO.
0165-00154
UNCATALOGUED

No.	Revision	By	Appr.	Date

NORMAN R. CARSON
REGISTERED PROFESSIONAL ENGINEER

GEORGE S. MARTIN
REGISTERED PROFESSIONAL ENGINEER

R.W. BECK and ASSOCIATES
UTILITY ANALYSTS AND ENGINEERS
Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON

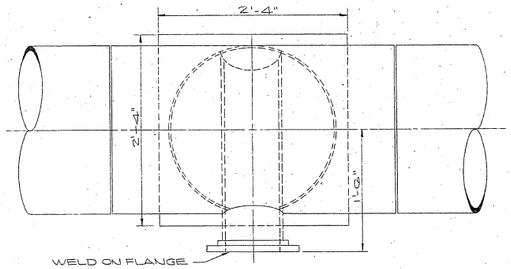
GRAVITY WATER LINE

PLAN AND PROFILE
PLATE 13

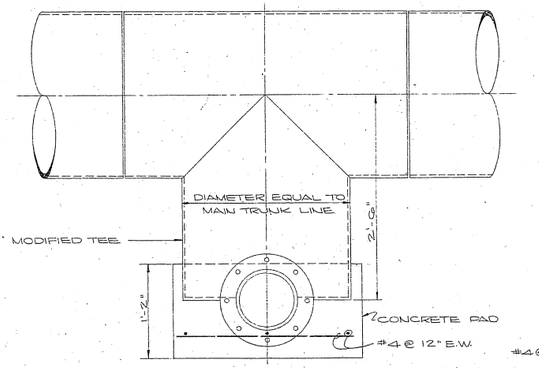
Dwn.	Scale AS SHOWN	Sheet 14 of 27
Ckd.	Date	179-C-115
App'd	File S-165-JTBD-1	

00:1569

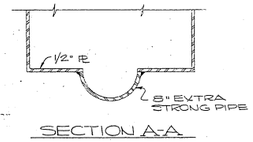
0165-00154



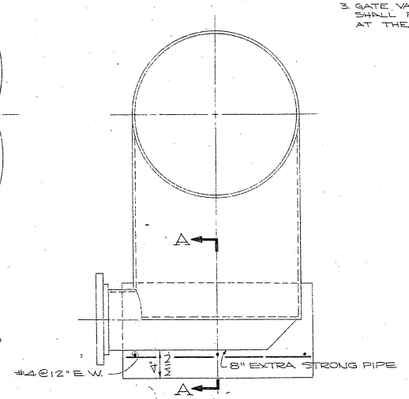
PLAN



ELEVATION



SECTION A-A



ELEVATION

TYPE I

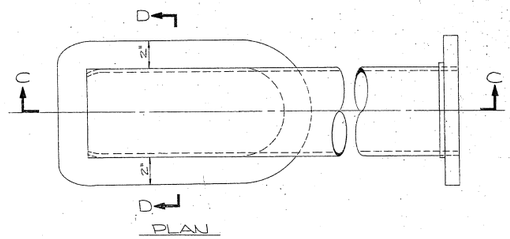
BLOW-OFF SADDLE CONNECTION DETAILS

SCALE: 1½"=1'-0"

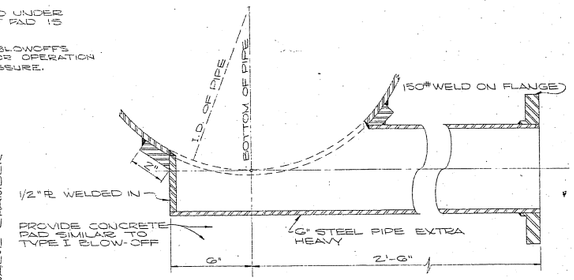
GRAPHIC SCALE
0 1 2
SCALE IN FEET

NOTES:

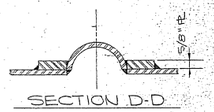
1. ALL BLOW-OFF OUTLETS TO BE COATED WITH SAME MATERIAL AS MAIN LINE.
2. DELETE CONCRETE PAD UNDER BLOW-OFF WHEN THRUST PAD IS REQUIRED.
3. GATE VALVES USED ON BLOWOFFS SHALL BE SUITABLE FOR OPERATION AT THE REQUIRED PRESSURE.



PLAN



SECTION C-C



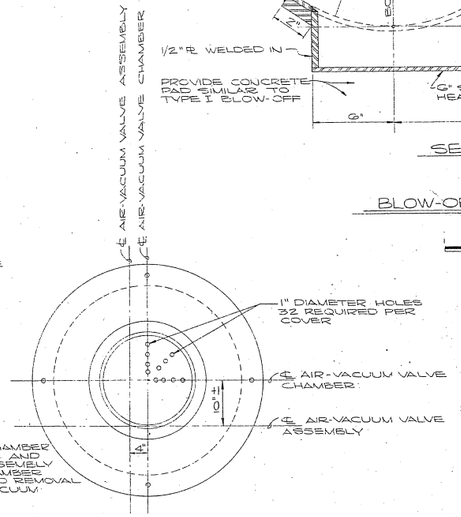
SECTION D-D

TYPE II

BLOW-OFF SADDLE CONNECTION DETAILS

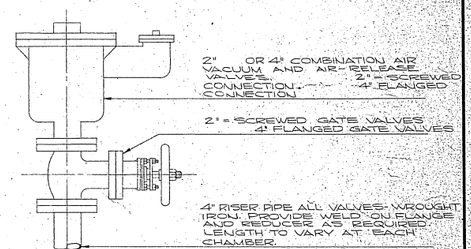
SCALE: 3"=1'-0"

GRAPHIC SCALE
0
SCALE IN FEET



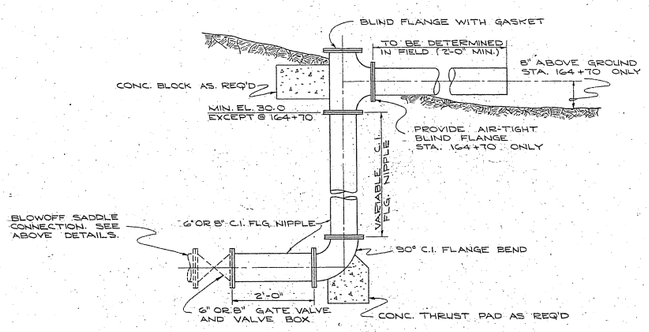
PLAN

LOCATE AIR VALVE CHAMBER OFF-CENTER OF PIPE AND AIR-VACUUM VALVE ASSEMBLY FOR ACCESS INTO CHAMBER FOR MAINTENANCE AND REMOVAL OF COMPLETE AIR-VACUUM VALVE ASSEMBLY



AIR-VACUUM VALVE ASSEMBLY

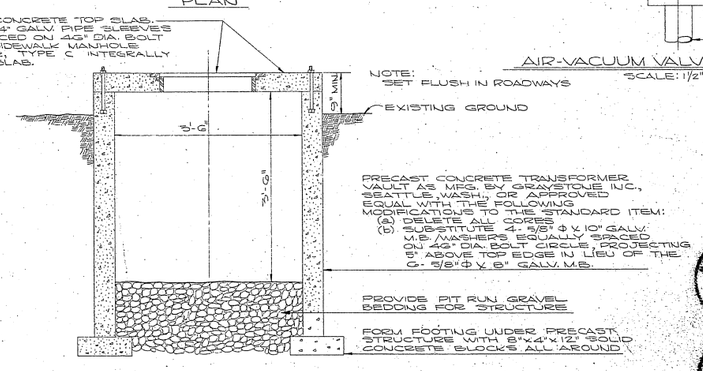
SCALE: 1½"=1'-0"



6" OR 8" BLOWOFF OUTLET PIPING

NOT TO SCALE

4' PRECAST CONCRETE TOP SLAB. PROVIDE 4-¾" GALV PIPE SLEEVES EQUALLY SPACED ON 45" DIA. BOLT CIRCLE AND SIDEWALK MANHOLE FRAME/COVER. TYPE C INTEGRALLY CAST WITH SLAB.



ELEVATION

AIR-VACUUM VALVE CHAMBER

SCALE: 1"=1'-0"

INDEX FILE NO.
MICROFILMED
016 - 00155

No.	Revision	By	Appr.	Date

R. W. BECK and ASSOCIATES
ANALYTICAL AND CONSULTING ENGINEERS
Seattle, Washington — Columbus, Nebraska

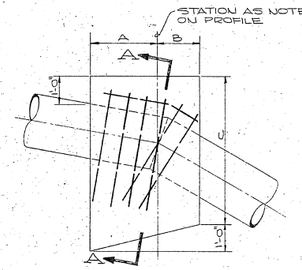
PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
GRAVITY WATER LINE

BLOW-OFF DETAILS

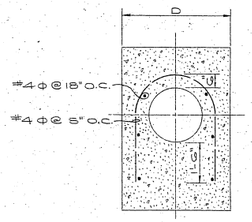
Des. M.A.W.	Scale AS SHOWN	Sheet 15 of 21
Ckd. [illegible]	Date May 15, 1981	179-C-116
App'd. [illegible]	File S-165-3TBD-1	

CO! 1569

016 - 00155



ELEVATION

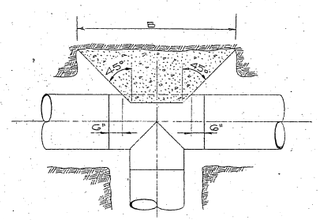


SECTION AA

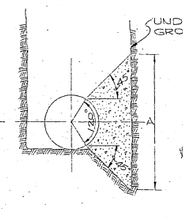
TYPICAL CONCRETE THRUST ANCHOR DETAILS

NO SCALE

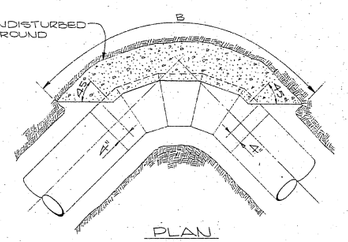
THRUST ANCHOR TABLE					
STATION	PIPE SIZE	A - FT.	B - FT.	C - FT.	D - FT
41+40	16"	5	2	5.5	5
29+50	20"	3.5	2.5	4.0	4.0
4+20	20"	3.5	2.5	4.5	5.0
2+00	20"	3.0	2.5	4.0	3.0
192+00	24"	2.5	2.5	4.0	4.5
326+06.13	24"	2.0	2.0	4.0	3.0



PLAN



SECTION



PLAN

TYPICAL CONCRETE ANCHOR BLOCK DETAILS

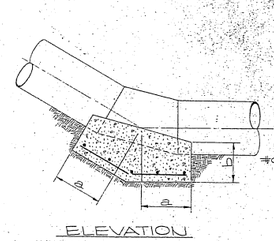
NO SCALE

ANCHOR BLOCK TABLE				
	STATION	A×B = AREA REQ'L.	STATION	A×B = AREA REQ'D.
	63+50.03	29.0	152+80.97	87.0
	63+85.35	10.0		
(1)*	39+94.94	53.0	185+53.42	11.0
(2)*	39+94.94	34.0	173+41.76	52.0
	90+53.25	28.0	193+93.10	8.0
	139+81.78	14.0	207+80.60	9.0
	144+18.54	16.0	246+85.43	21.0
	150+32.43	9.0	256+84.13	4.0
			351+58.84	4.0
			351+56.84	4.0
			351+56.84	4.0

(4)Δ(3)

NOTES:

1. TABLE BASED ON ALLOWABLE SOIL BEARING OF 1500 LBS. PER SQUARE FOOT.
2. AT BENDS WHERE THRUST BLOCKS ARE NOT SHOWN, BACKFILL SHALL BE MECHANICALLY COMPACTED TO ONE FOOT ABOVE PIPE.
3. * SEE DETAIL ON DRWG. 179-C-103
   Δ SEE DETAIL ON DRWG. 179-C-118



ELEVATION

SECTION

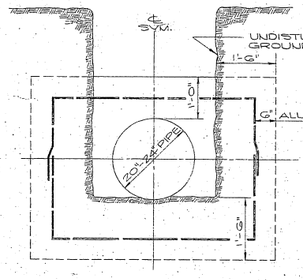
TYPICAL CONCRETE THRUST PAD DETAILS

NO SCALE

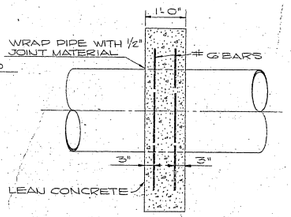
THRUST PAD TABLE			
PIPE SIZE	a	b	c
16"	2'-0"	1'-2"	3'-6"
20"	1'-6"	1'-4"	3'-9"
24"	1'-0"	1'-6"	3'-9"

NOTES:

1. AT STATION 264+00 CHANGE DIMENSION "a" TO 2'-4".
2. WHEN PIPE IS TO BE ENCASED PLACE THRUST PAD PRIOR TO ENCASING PIPE WITH CONCRETE.



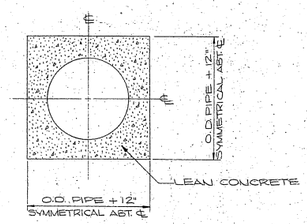
ELEVATION



SECTION

WATERSTOP DETAILS

SCALE: 3/4"=1'-0"



CONCRETE ENCASEMENT

SCALE: 3/4"=1'-0"

GRAPHIC SCALE

1 0 1 2 3 4 5

SCALE IN FEET

INDEX FILE NO.

MICROFILMED

0165-00156

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R. W. BECK and ASSOCIATES

ANALYTICAL AND CONSULTING ENGINEERS

Seattle, Washington — Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1

SKAGIT COUNTY, WASHINGTON

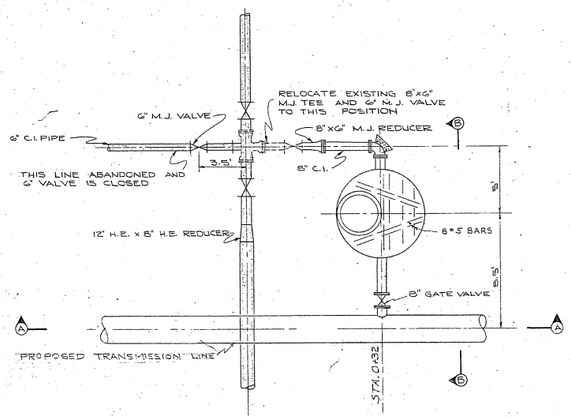
GRAVITY WATER LINE

ANCHOR DETAILS

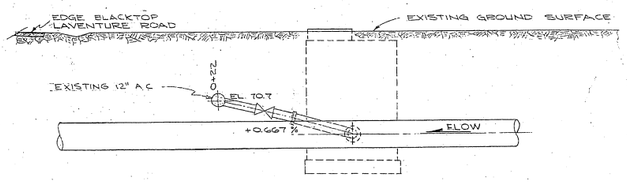
Des. M.A.L.	Scale AS SHOWN	Sheet 12 of 21
Ckd. [illegible]	Date 2/26/82	179-C-117
App'd. [illegible]	File S-165-JTBD-1	

Co:1569

0165-00156



PLAN



SECTION A-A

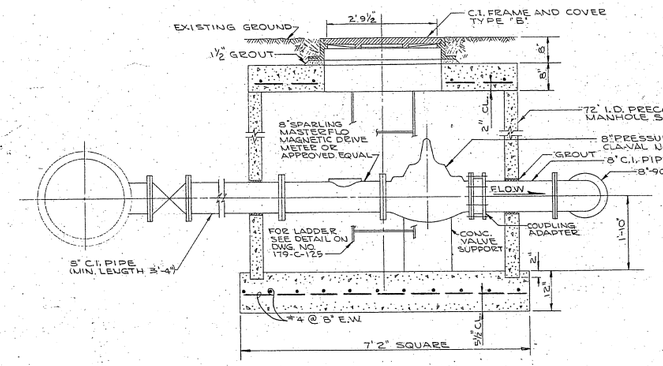
LAVENTURE ROAD PIPING

SCALE: 1" = 4'

GRAPHIC SCALE

0 2 4 6 8 10 12 14

SCALE IN FEET

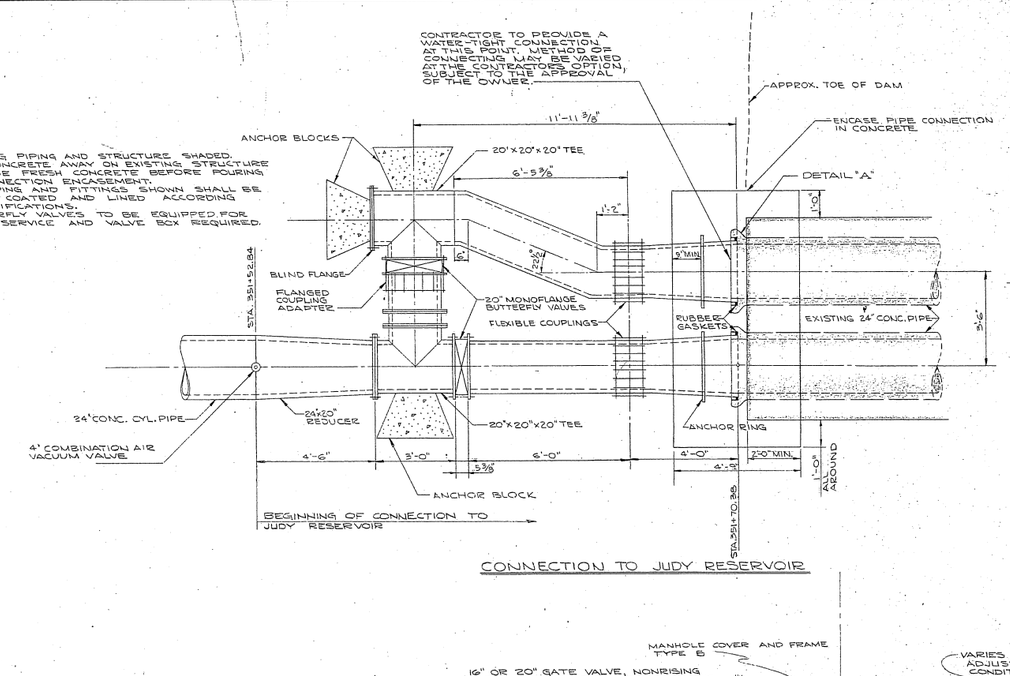


SECTION B-B

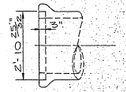
PRESSURE REDUCING VALVE

SCALE: 3/4"=1'-0"

NOTES:
1. EXISTING PIPING AND STRUCTURE SHADED.
2. CHIP CONCRETE AWAY ON EXISTING STRUCTURE TO EXPOSE FRESH CONCRETE BEFORE POURING PIPE CONNECTION ENCASEMENT.
3. ALL PIPING AND FITTINGS SHOWN SHALL BE MORTAR COATED AND LINED ACCORDING TO SPECIFICATIONS.
4. BUTTERFLY VALVES TO BE EQUIPPED FOR BURIED SERVICE AND VALVE BOX REQUIRED.

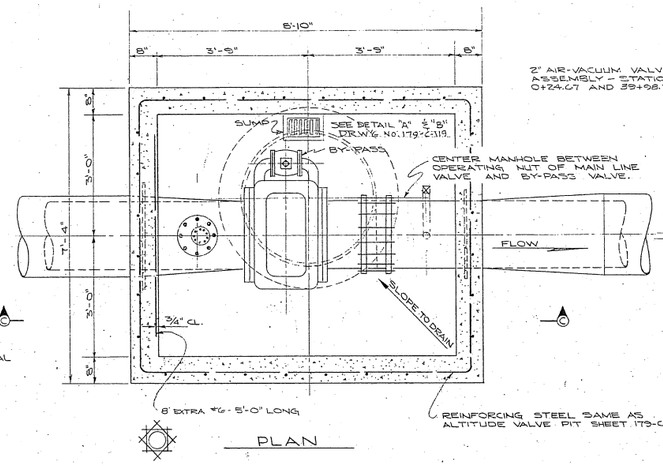


CONNECTION TO JUDY RESERVOIR

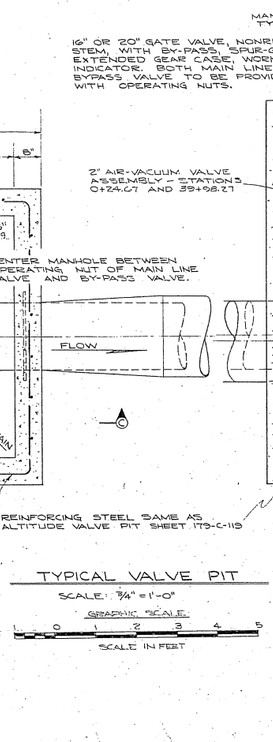


DETAIL "A"

SCALE: 1/2"=1'-0"



PLAN



SECTION C-C

TYPICAL VALVE PIT

SCALE: ¾" = 1'-0"

GRAPHIC SCALE

0 1 2 3 4 5

SCALE IN FEET

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R. W. BECK and ASSOCIATES

ANALYTICAL AND CONSULTING ENGINEERS

Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY WASHINGTON

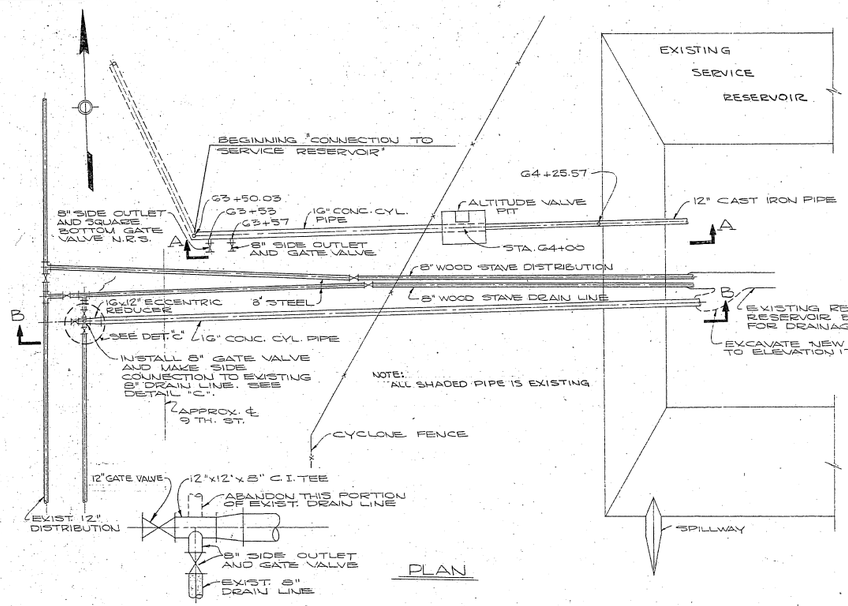
GRAVITY WATER LINE

CONNECTIONS-MISCELLANEOUS

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Ckd.	Date: May 16, 1961	179-C-118	
App'd:	File: S:165-JTB01		

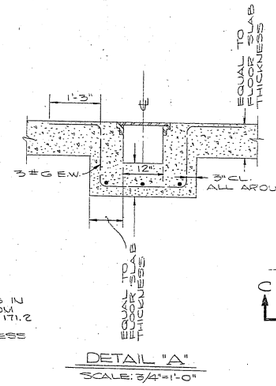
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0165-00157

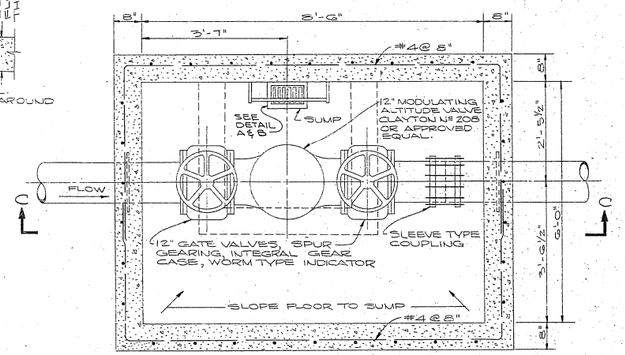


PLAN

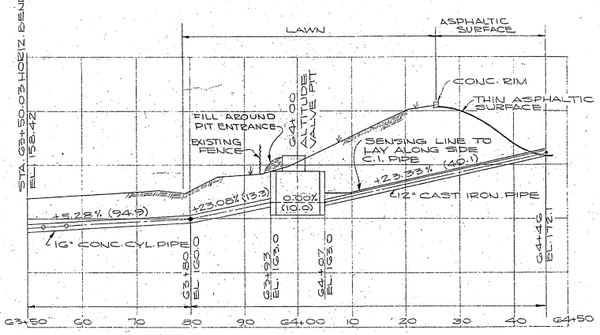
DETAIL "C"
N.T.S.



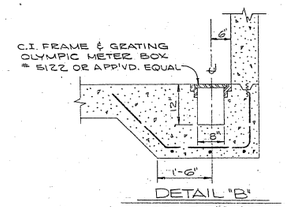
DETAIL "A"
SCALE: 3/4"=1'-0"



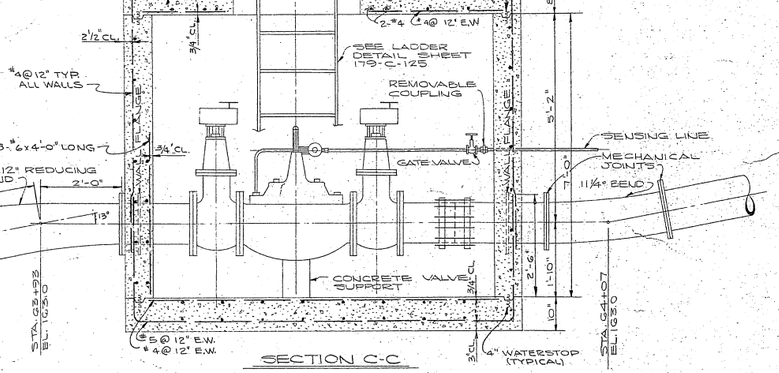
PLAN



SECTION A-A

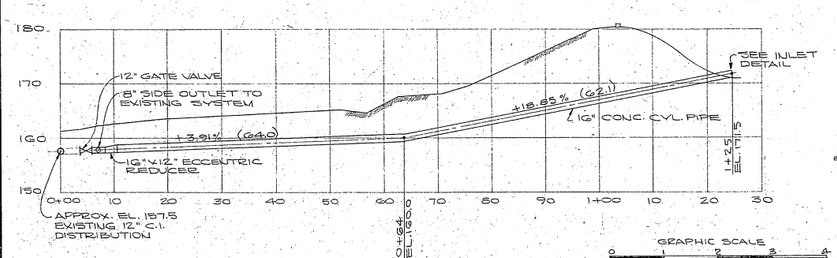


DETAIL "B"
SCALE: 3/4"=1'-0"



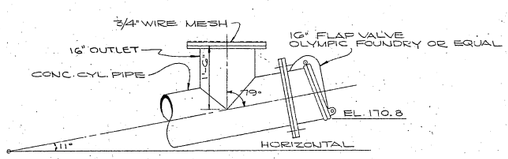
SECTION C-C

ALTITUDE VALVE PIT
SCALE: 3/4"=1'0"



SECTION B-B
CONNECTION TO SERVICE RESERVOIR
SCALE: 1"=10' HORIZ.
1"=10' VERT.

GRAPHIC SCALE
SCALE: 1"=10'



NOTE: TACK WELD 3/4" WIRE MESH TO FLANGE AND GALVANIZE AFTER FABRICATION.

INLET DETAIL
SCALE: 3/4"=1'-0"

GRAPHIC SCALE
SCALE: 3/4"=1'0"

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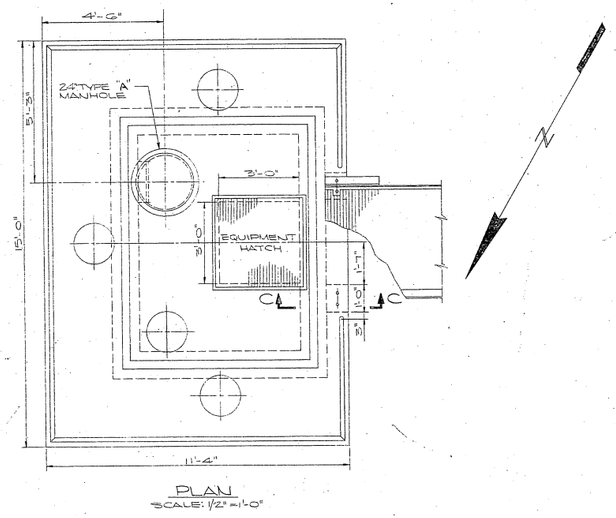
R. W. BECK and ASSOCIATES
ANALYTICAL AND CONSULTING ENGINEERS
Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
GRAVITY WATER LINE
CONNECTION TO SERVICE RESERVOIR

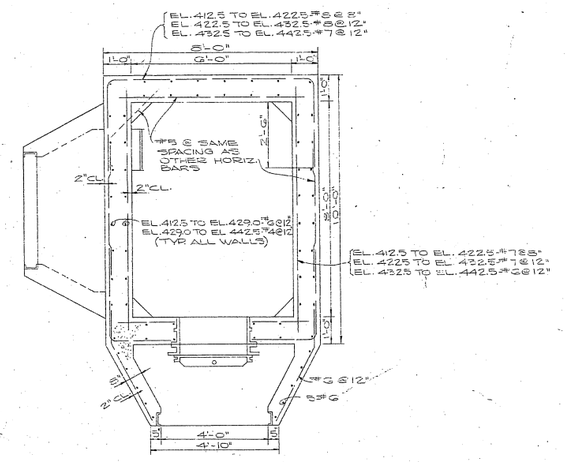
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Chk. Griffin	Date Nov. 16, 1959	179-C-119	
App'd. W.C. Reuter	File 5-155-1T80		

CO: 1569

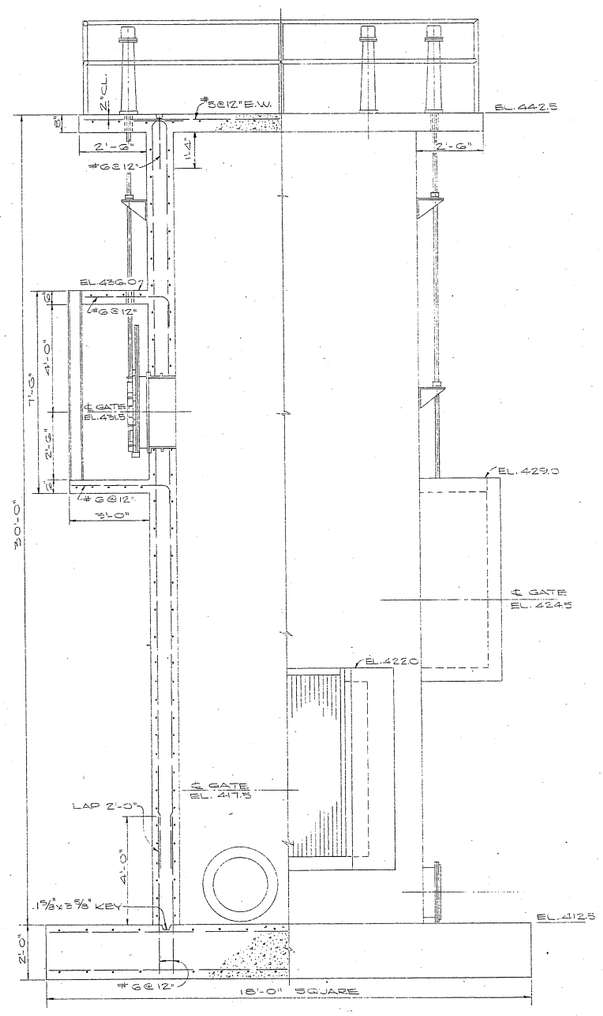
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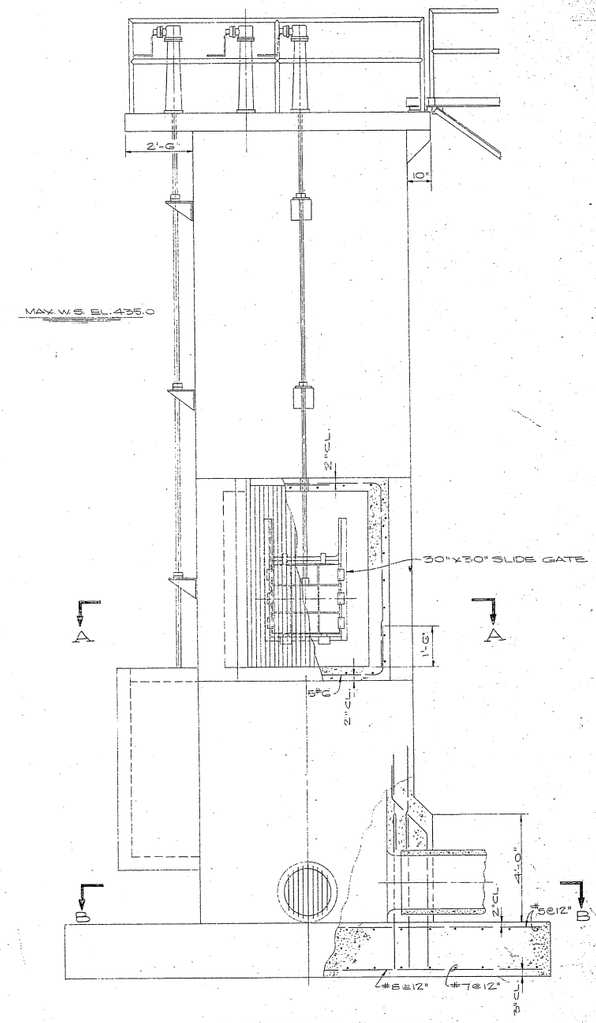
PLAN
SCALE: 1/2" = 1'-0"



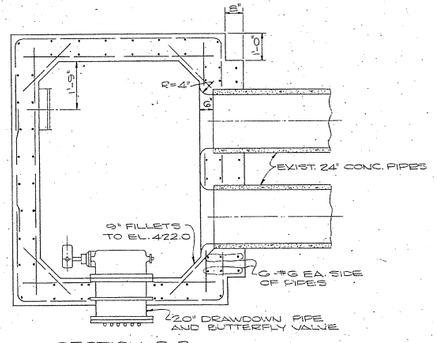
SECTION A-A
SCALE: 1/2" = 1'-0"



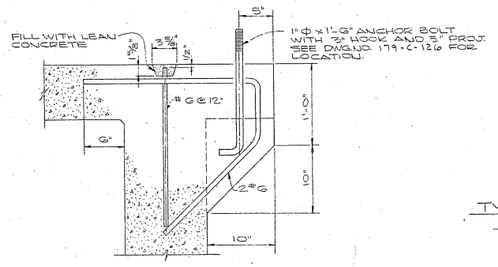
SOUTHWEST ELEVATION
SCALE: 1/2" = 1'-0"



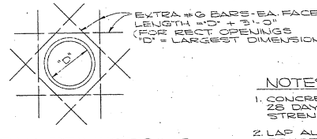
SOUTHEAST ELEVATION
SCALE: 1/2" = 1'-0"



SECTION B-B
SCALE: 1/2" = 1'-0"



SECTION C-C
SCALE: 1/2" = 1'-0"



TYPICAL REINFORCING AROUND OPENINGS
N.T.S.

GRAPHIC SCALE
0 1 2 3 4 5 6 7 8 9 10
SCALE: 1/2" = 1'-0"

NOTES:
1. CONCRETE SHALL HAVE A 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI.
2. LAP ALL REINFORCING STEEL SPLICES 24 BAR DIAMETERS UNLESS OTHERWISE NOTED.
3. ALL EXPOSED INTERIOR AND EXTERIOR CORNERS TO HAVE A 3/4" x 45° CHAMFER.

NORMAN R. GARRISON STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

GEORGE S. McCLELLAN STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

CO. 1569

INDEX FILE NO.
MICROFILMED
0165-00163

No.	Revision	By	Appr.	Date

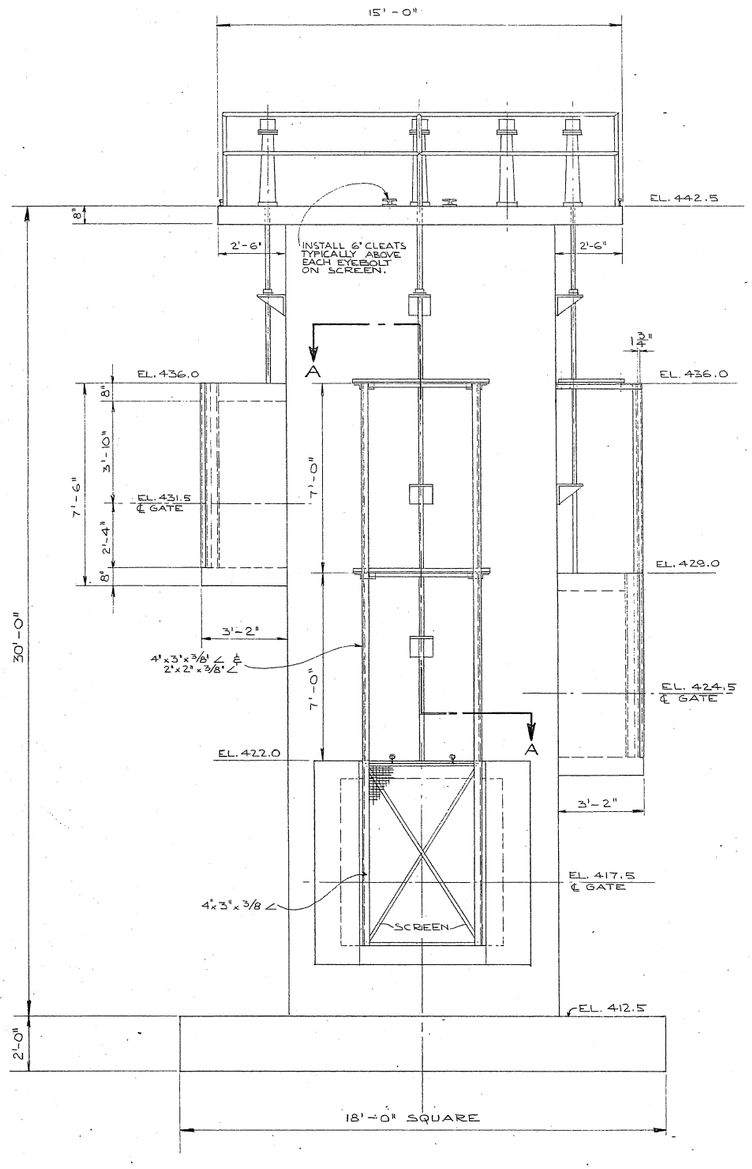
R. W. BECK and ASSOCIATES
ANALYTICAL AND CONSULTING ENGINEERS
Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
GRAVITY WATER LINE

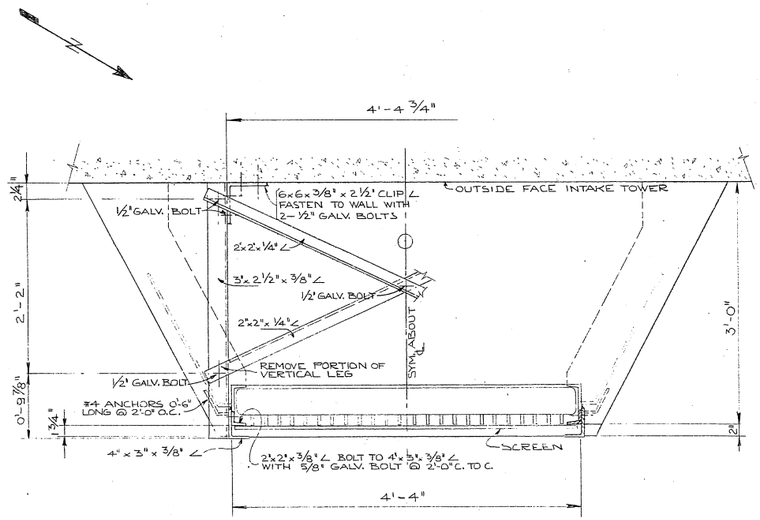
INTAKE TOWER STRUCTURAL

Dwn. M.A.N.	Scale AS SHOWN	Sheet 19 of 21
Chd. A.P.M.	Date May 16, 1961	179-C-124
App'd. N.R.G.	File S-165-JTBD-1	

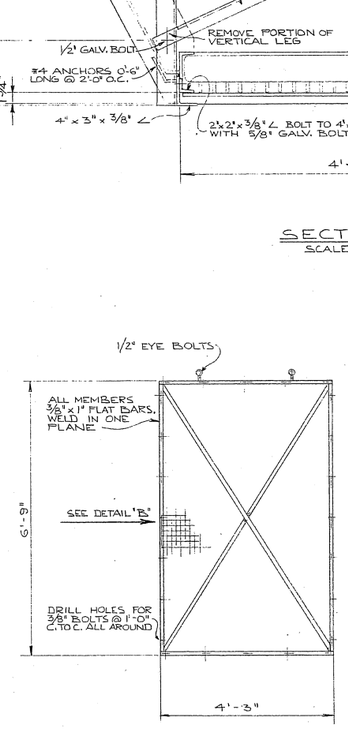
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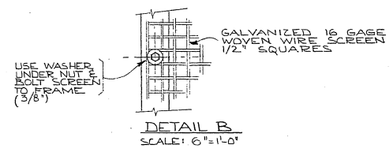
ELEVATION INTAKE TOWER
SCALE: 1/2" = 1'-0"



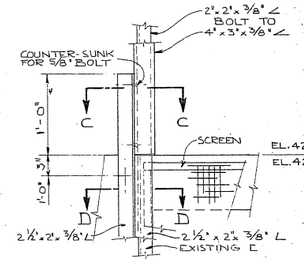
SECTION A-A
SCALE: 1½"=1'-0"



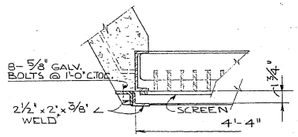
SCREEN
SCALE: 3/4"=1'-0"



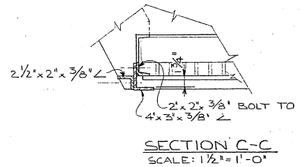
DETAIL B
SCALE: 6"=1'-0"



ALTERNATE GUIDE IN FRONT OF TRASH RACKS
SCALE: 1½"=1'-0"



SECTION D-D
SCALE: 1½"=1'-0"



SECTION C-C
SCALE: 1½"=1'-0"

NOTES

1. ALL STRUCTURAL STEEL & BOLTS TO BE GALVANIZED AFTER FABRICATION.

INDEX FILE NO.
0165-00162

No.	Revision	By	Appr.	Date

R. W. BECK and ASSOCIATES
ANALYTICAL AND CONSULTING ENGINEERS
Seattle, Washington — Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
GRAVITY WATER LINE EXTENSION

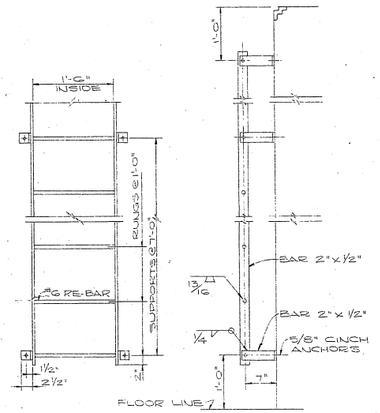
INTAKE SCREENS & GUIDES

Dwn. L.S.	Scale AS SHOWN	Sheet 1 of 1
Ckd.	Date 1-4-62	179-C-124
App'd.	File S-165-JTBD-1	

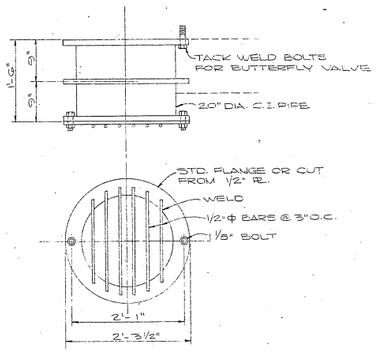
CO. 1569

0165-00162

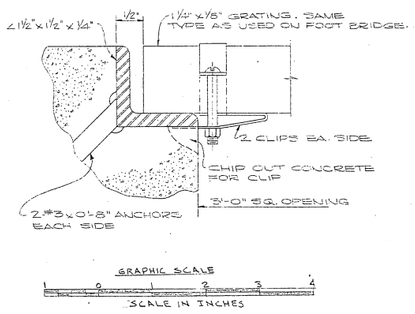
AMERICAN BLUEPRINT CO.



LADDER DETAIL
SCALE: 1"=1'-0"
NOTE: GRIND ALL ROUGH EDGES SMOOTH AND GALVANIZE AFTER FABRICATION

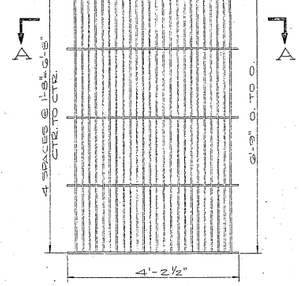


DRAWDOWN PIPE DETAIL
SCALE: 1"=1'-0"

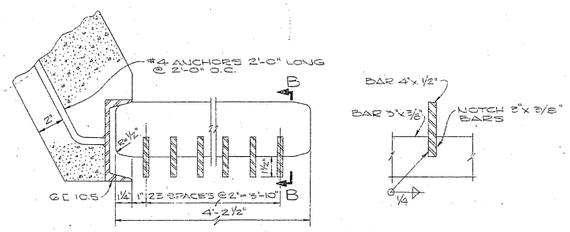


EQUIPMENT HATCH DETAIL
FULL SIZE

GRAPHIC SCALE
1 0 1 2 3 4
SCALE IN FEET



ELEVATION
SCALE: 3/4"=1'-0"



SECTION A-A
SCALE: 3"=1'-0"

SECTION B-B
SCALE: 3"=1'-0"

GRAPHIC SCALE
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SCALE IN FEET

TRASH RACK DETAILS

INDEX FILE NO.
0165 Miscellaneous Data

No.	Revision	By	Appr.	Date

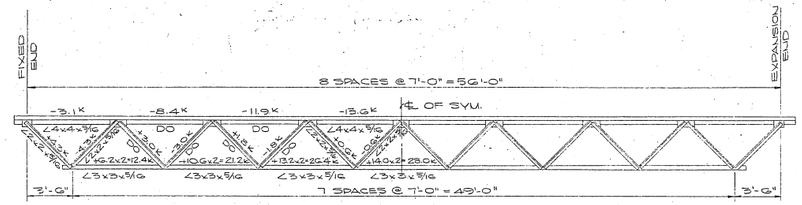
R. W. BECK and ASSOCIATES
ANALYTICAL AND CONSULTING ENGINEERS
Seattle, Washington Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON
GRAVITY WATER LINE
INTAKE TOWER
MISCELLANEOUS DETAILS

Dwn. M.A.N.	Scale AS SHOWN	Sheet 20 of 41
Ckd. [illegible]	Date Nov 12, 1981	179-C-125
App'd [illegible]	File 3-165-JTBD-1	

C.O. 1569

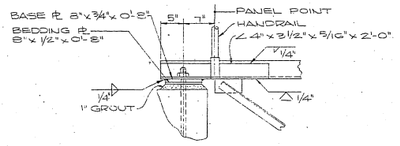
0165-00164



SIDE TRUSS VIEW

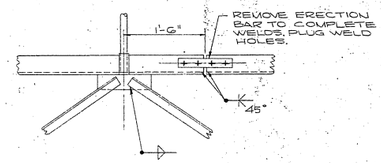
+ TENSION
- COMPRESSION

NO SCALE



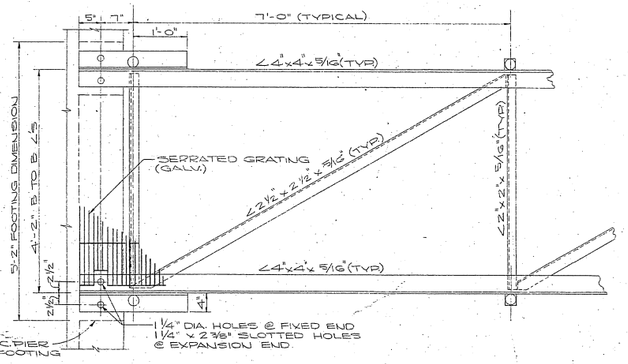
END SUPPORT DETAILS

SCALE: 1"=1'-0"



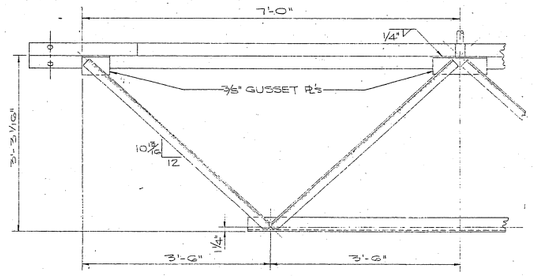
TYPICAL FIELD SPLICE DETAIL

SCALE: 1"=1'-0"



PLAN

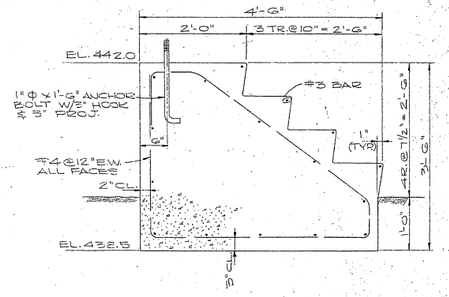
SCALE: 1"=1'-0"



ELEVATION OF SIDE TRUSS

(LOOKING UP)

SCALE: 1"=1'-0"



APPROACH FOOTING DETAIL

SCALE: 1" = 1'-0"

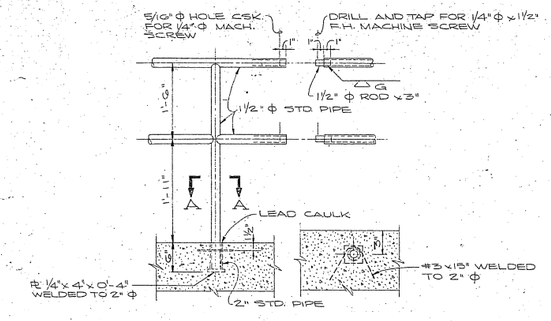
GRAPHIC SCALE

0

SCALE IN FEET

NOTES:

1. FOOT BRIDGE DESIGNED FOR LIVE LOAD OF 25 # PER SQUARE FOOT.
2. TRUSSES TO BE OF ALL WELDED CONSTRUCTION. WELD TO DESIGN STRESSES SHOWN OR FIFTY PERCENT OF THE STRENGTH OF THE MEMBER WHICHEVER IS GREATER.
3. PROVIDE CAMBER OF 3/8" IN PLANE OF SIDE TRUSSES.



ELEVATION SECTION A-A

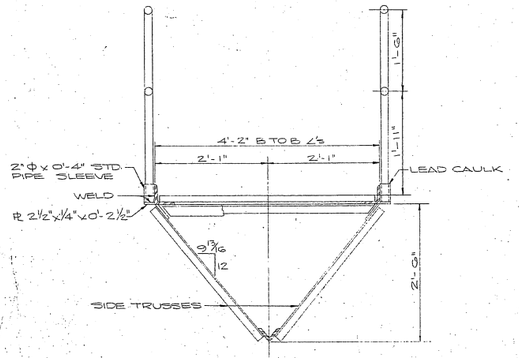
PIPE RAILING DETAILS

SCALE: 1"=1'-0"

GRAPHIC SCALE

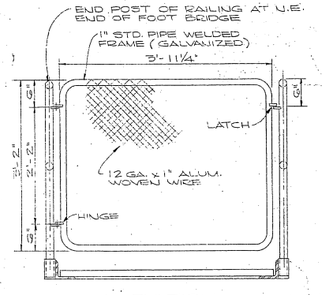
0 1 2 3 4

SCALE IN FEET



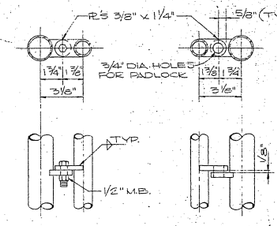
TYPICAL SECTION

SCALE: 1"=1'-0"



ELEVATION

SCALE: 1"=1'-0"



HINGE DETAIL SCALE: 3"=1'-0"

LATCH DETAIL SCALE: 3"=1'-0"

GATE DETAILS

ONE REQUIRED

INDEX FILE NO.

0165-[illegible]

No.	Revision	By	Appr.	Date

R. W. BECK and ASSOCIATES

ANALYTICAL AND CONSULTING ENGINEERS

Seattle, Washington — Columbus, Nebraska

PUBLIC UTILITY DISTRICT NO. 1
SKAGIT COUNTY, WASHINGTON

GRAVITY WATER LINE

INTAKE TOWER
FOOT BRIDGE

Des. M.P.H.	Scale AS SHOWN	Sheet 21 of 76	
Ckd. [illegible]	Date Nov. 16, 1967	179-C-126	
App'd. [illegible]	File S-165-JTBG-1		

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0165-0011