Appendix A: Extracted Tables and Figures from Previous Investigations

APPENDIX A.1
Historical Aerial Photographs

Attachment A.1 Contains Excerpted Information from the Following References:

Year	Author Abbreviation	Author	Document Title
2015	Google	Google Earth	Historical Aerial Photographs downloaded from Google Earth
2015b	COT	City of Tacoma	Historical Aerial Photographs downloaded from the City of Tacoma's GovMe website: http://www.govme.org. Files downloaded on October 2, 2015.

City of Tacoma 1936

http://govME.org/map

Property

Address

Parcel

Street

Abc Street Name

Street Centerline

Aerial Photo 1931

3 foot pixel

City Backgrounds

SCALE 1 : 9,000

500 0 500 1,000 1,500

FEET

N

Friday, October 2, 2015 9:33 AM

City of Tacoma 1940

http://govME.org/map

Property

Address

Parcel

Street

Abc **Street Name**

Street Centerline

3 foot pixel

City Backgrounds

SCALE 1 : 9,000

500 0 500 1,000 1,500

FEET

N

Friday, October 2, 2015 9:34 AM

STATE 1 V
16′
2823
2822
ROAD ENDS 0.7 MI.
15′
2821
TACOMA 2.7 MI.

City of Tacoma 1950

http://govME.org/map

Property

- **Address**
- **Parcel**

Street

- Abc **Street Name**
- **Street Centerline**

Aerial Photo 1950

- **3 foot pixel**

City Backgrounds

SCALE 1 : 9,000

500 0 500 1,000 1,500

FEET

N

Friday, October 2, 2015 9:35 AM

City of Tacoma 1973

http://govME.org/map

Property

- Address
- Parcel

Street

- Abc Street Name
- Street Centerline

- 6 foot pixel

City Backgrounds

- Tacoma
- Federal Way
- Fife
- Fircrest
- Lakewood
- Ruston
- University Place

SCALE 1 : 9,000

500 0 500 1,000 1,500

FEET

N

Friday, October 2, 2015 9:36 AM

City of Tacoma 1990

http://govME.org/map

Property

- Address
- Parcel

Street

- Abc Street Name
- Street Centerline

Aerial Photo 1990

- 6 foot pixel

City Backgrounds

- Tacoma
- Federal Way
- Fife
- Fircrest
- Lakewood
- Ruston
- University Place

SCALE 1 : 9,000

500 0 500 1,000 1,500

FEET

N

Friday, October 2, 2015 9:37 AM

Google earth

feet 1000
meters 500

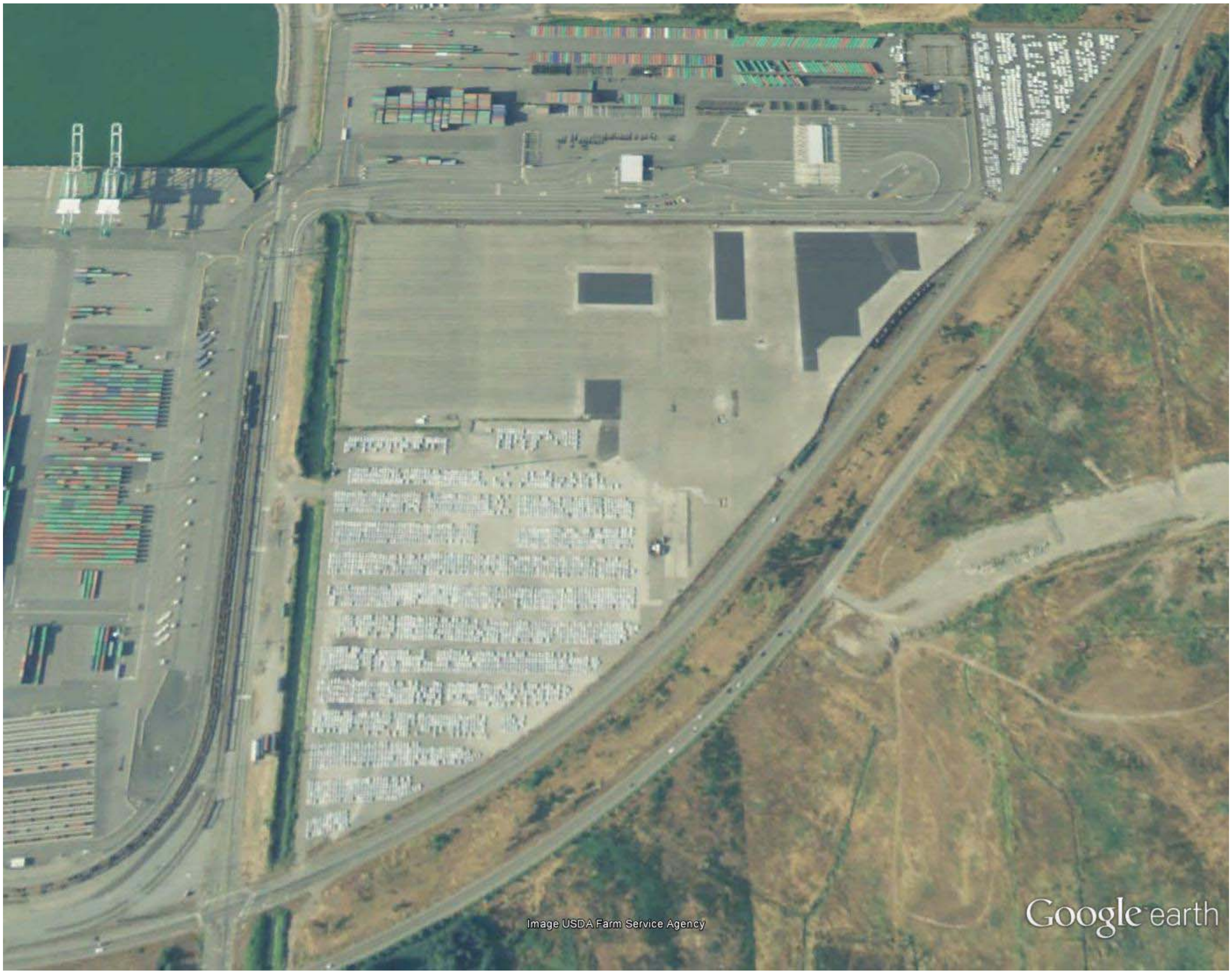
Google earth

feet 1000
meters 500

Google earth

feet 1000

meters 500



Google earth

feet 1000
meters 500

Google earth

feet 1000
meters 500

feet 1000
meters 500

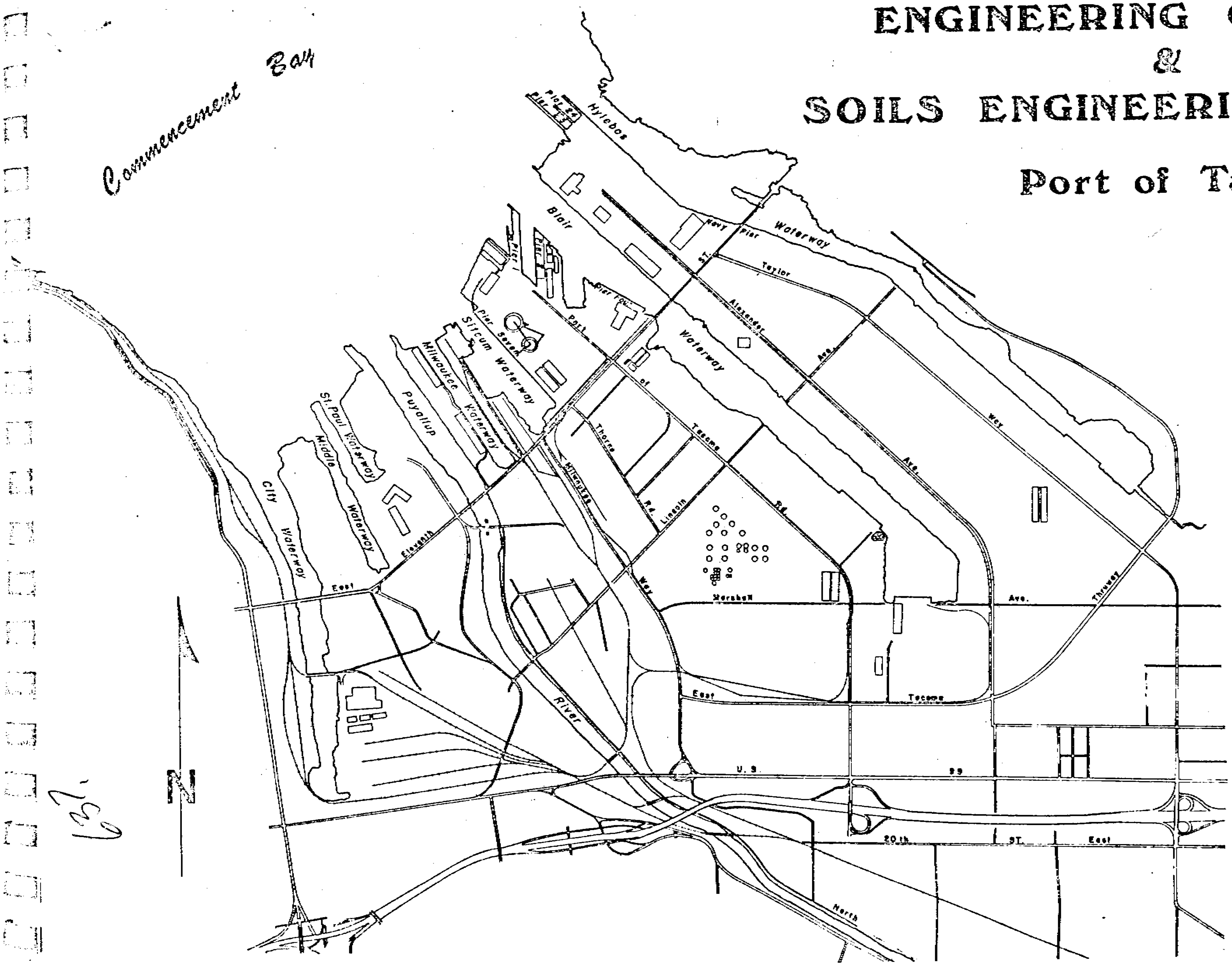

Google earth
Google earth
feet
1000
meters
500

APPENDIX A.2
Site Geology

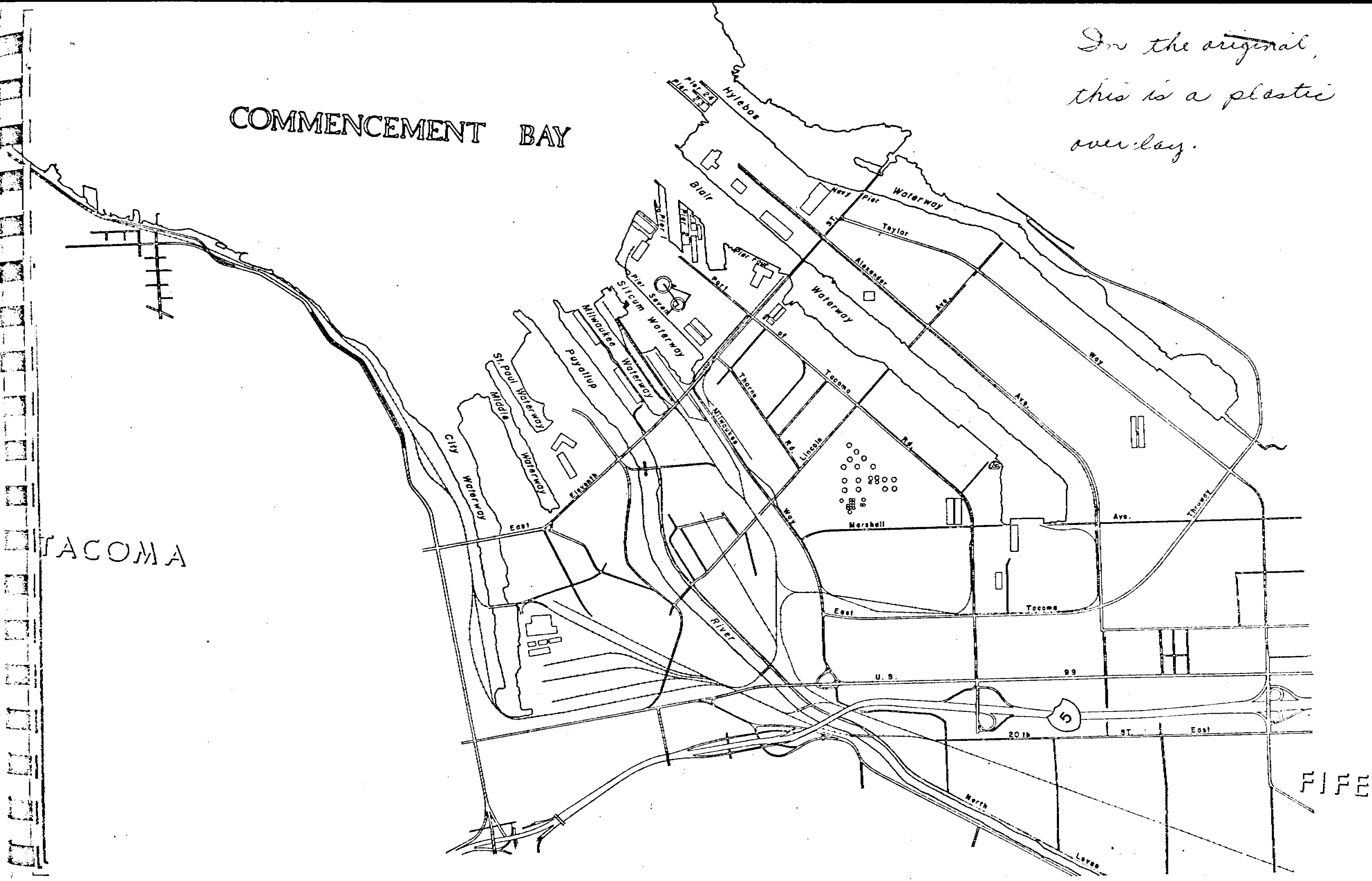
Attachment A.2 Contains Excerpted Information from the Following References:

Year	Author Abbreviation	Author	Document Title
1974	D&M	Dames & Moore	Report of Soils Investigation Proposed Sawmill (West Coast Orient Lumber Mills Site)
1976	HC	Hart Crowser, Inc. (HC)	Geology Study of the Port of Tacoma
1987	HC	Hart Crowser, Inc. (HC)	Portac Log Yard, Groundwater Assessment (See #117 & 125)
1988	HC	Hart Crowser, Inc. (HC)	Portac Log Sort Yard, Phase I Material Characterization
1988	HC	Hart Crowser, Inc. (HC)	Portac Log Sort Yard Remediation Plan, Volume I and II Appendices
2003	GeoEngineers	GeoEngineers	Site Investigation, Port of Tacoma Parcel 14. Tacoma, WA. Prepared for Grertte Associates LLC and Port of Tacoma.
2008	CDM	CDM	Facility Closure Assessment Former Portac Lumber Facility
2008	CDM	CDM	Facility Closure Assessment Second Phase Former Portac Lumber Facility
2009	WES	Whitman Environmental	Log yard Ramp Demolition - Portac, Inc. - 4215 N. Frontage Road, Tacoma, WA. (Draft)
2009	WES	Whitman Environmental	Lumber Mill Demolition - Environmental Cleanup and Testing Report - Former Portac Inc. Site - Tacoma, WA. Prepared
2014	AQEA	Anchor QEA (AQEA)	Log Yard Soil Testing Report. Former Portac Inc. Site. Tacoma, WA. Prepared for Portac and Port of Tacoma.
2014	Landau	Landau Associates Inc.	North Lead Rail Improvements - Portac Cap Subsurface Investigation - Port of Tacoma, Washington

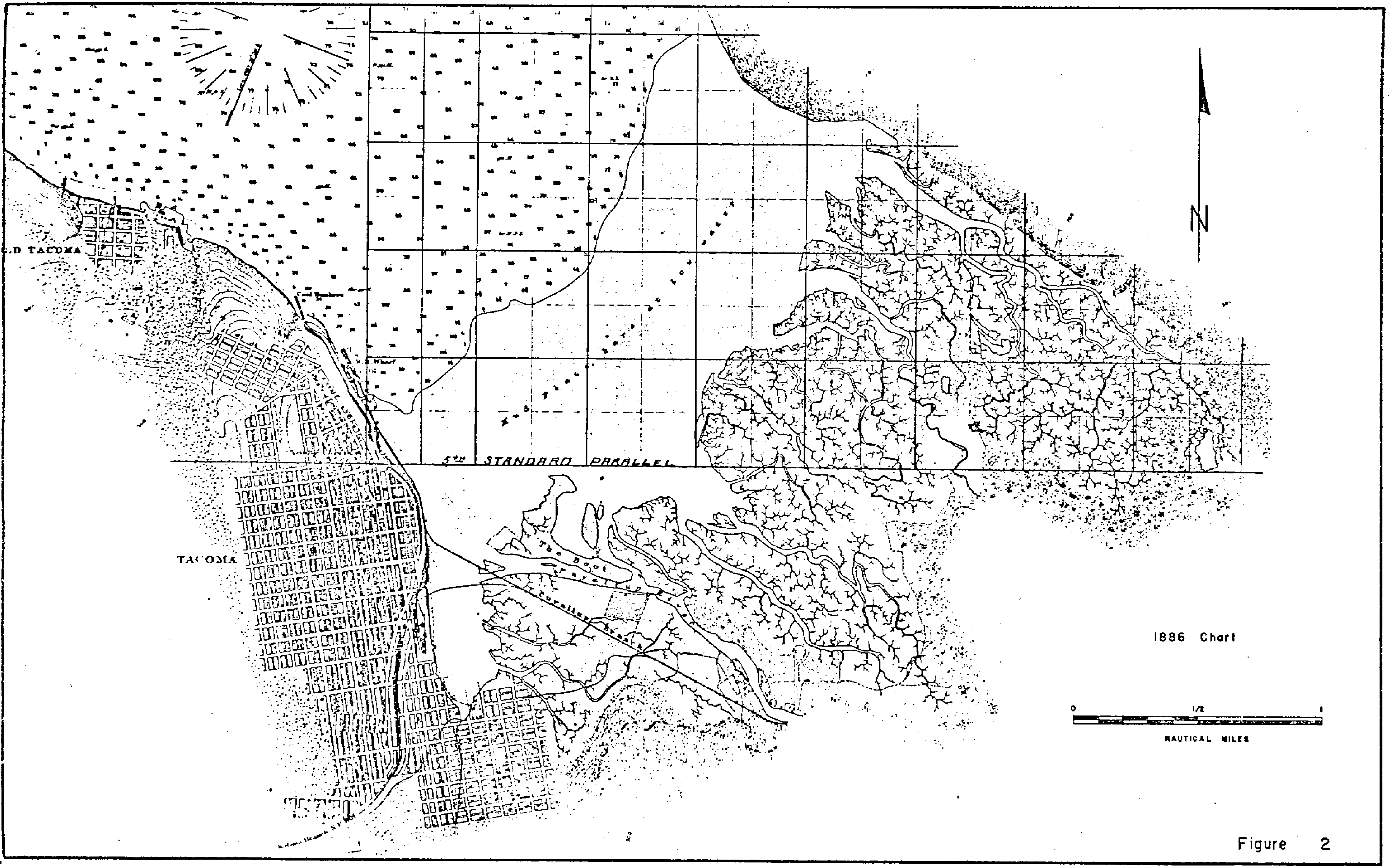
ENGINEERING GEOLOGY
&
SOILS ENGINEERING STUDY
Port of Tacoma



HART CROWSER & associates inc. GEOTECHNICAL ENGINEERING



In the original, this is a plastic overlay.

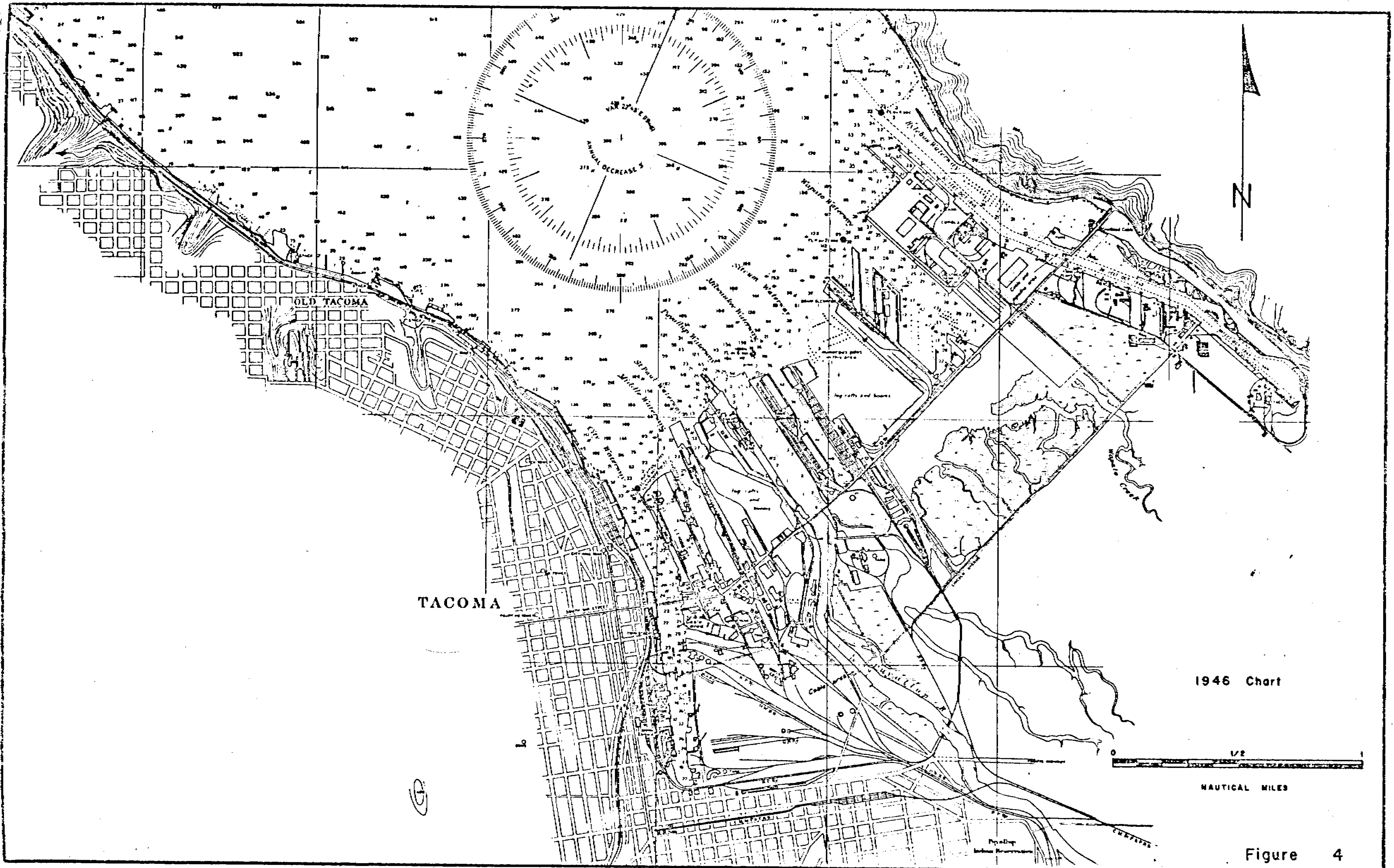


1886 Chart

Figure 2

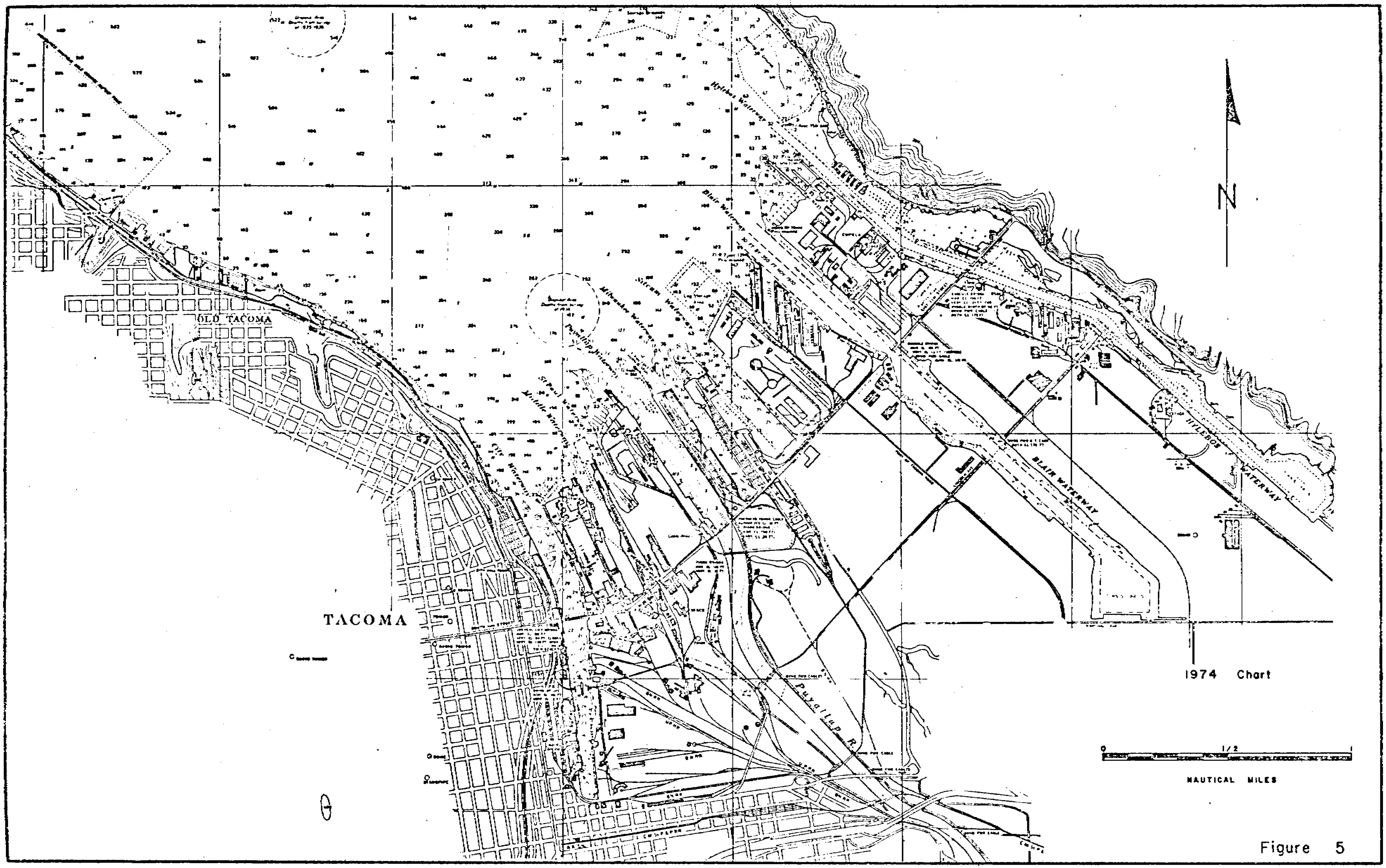

N
TACOMA
OLD TACOMA
Cable and pipeline area
Cable area
1923 Chart
0
1/2
1
NAUTICAL MILES

Figure 3



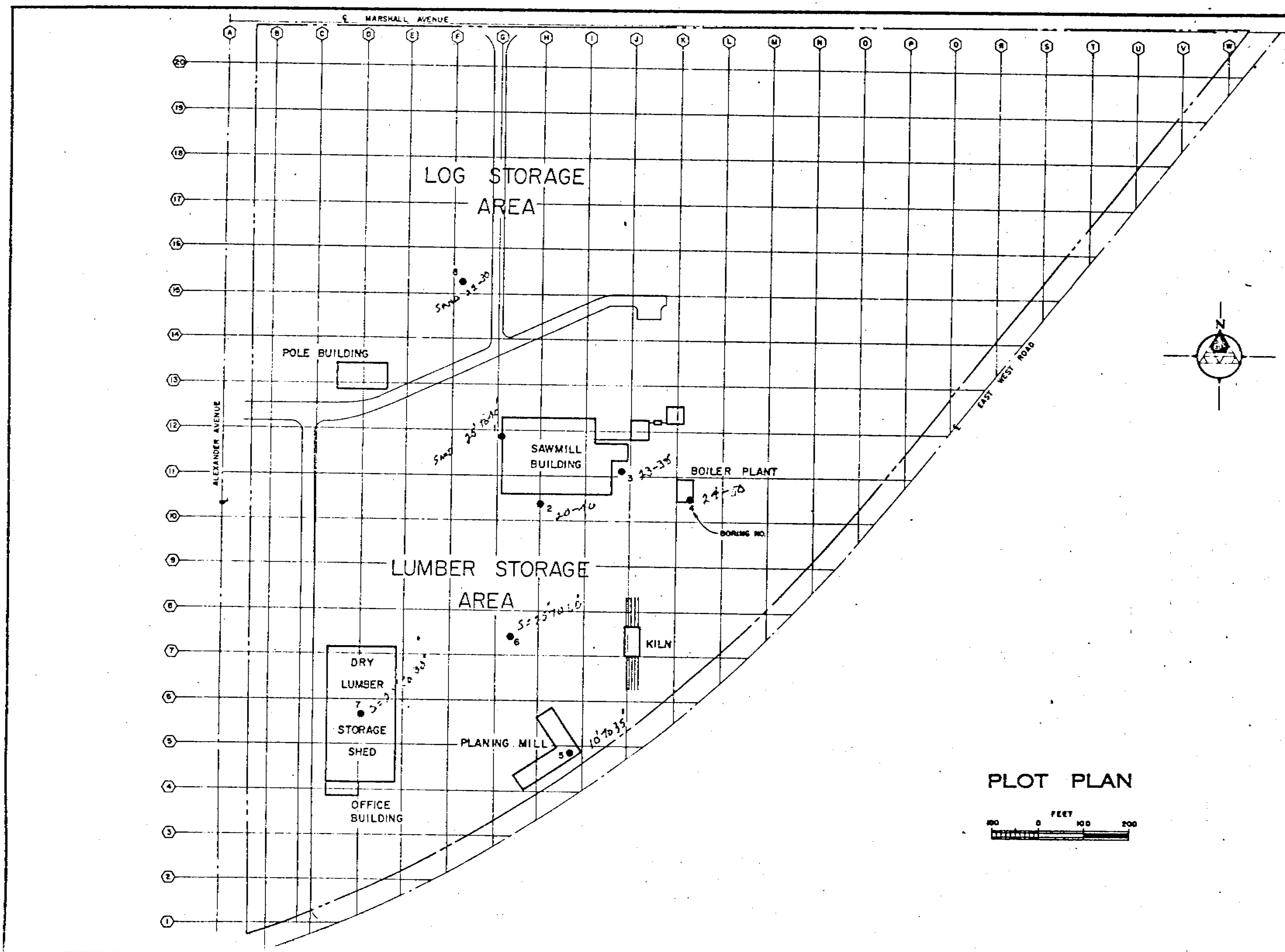
1946 Chart

Figure 4

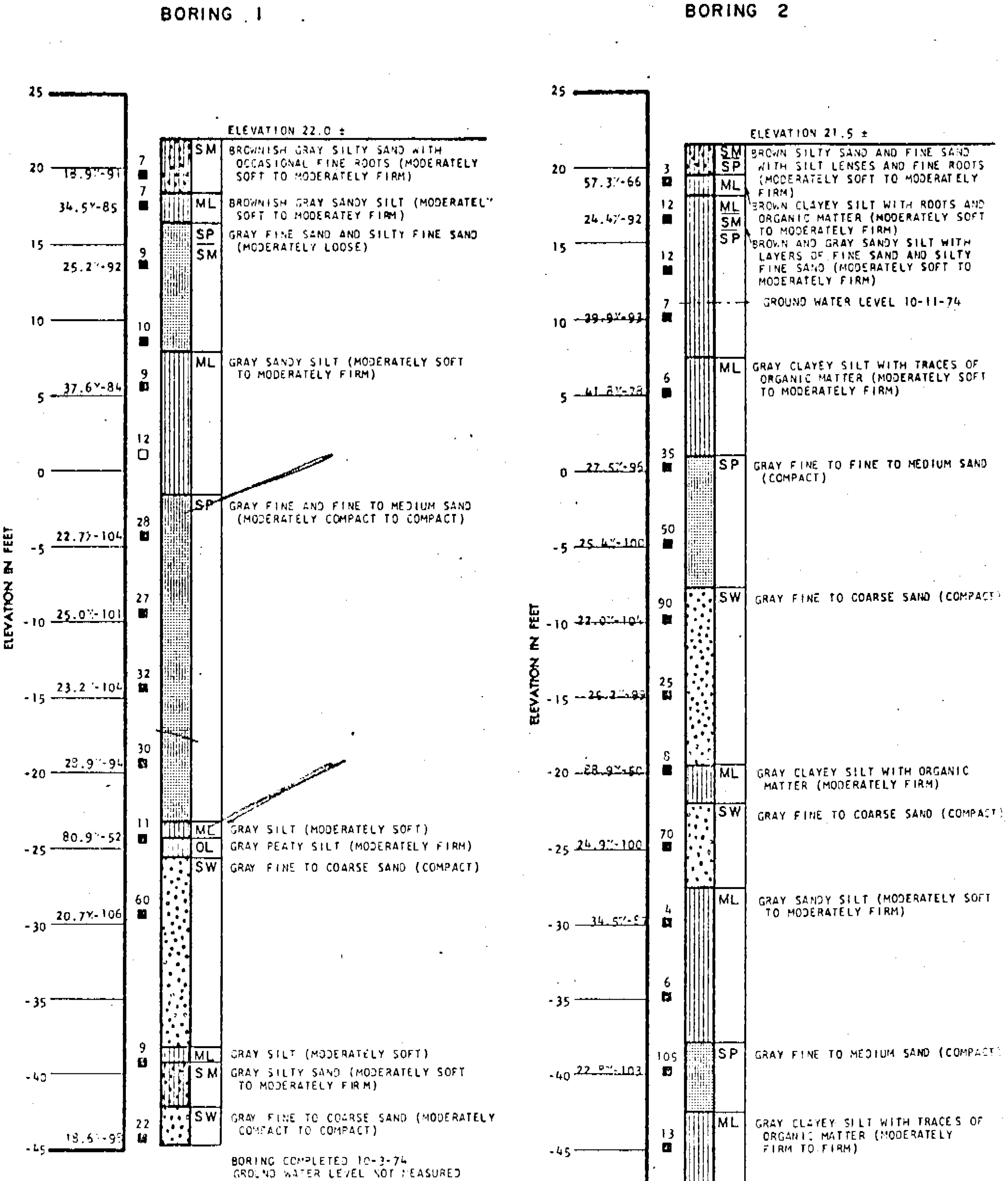


OLD TACOMA
TACOMA
Hylebos Waterway
Blair Waterway
Sitcum Waterway
Milwaukee Waterway
Puyallup Waterway
St Paul Waterway
Middle Waterway
City Waterway
BLAIR WATERWAY
HYLEBOS WATERWAY
Puyallup R.
N
1974 Chart
0
1/2
NAUTICAL MILES

Figure 5



MARSHALL AVENUE
ALEXANDER AVENUE
EAST WEST ROAD
LOG STORAGE AREA
POLE BUILDING
SAWMILL BUILDING
BOILER PLANT
BORING NO.
LUMBER STORAGE AREA
KILN
DRY LUMBER STORAGE SHED
OFFICE BUILDING
PLANING MILL
N
PLOT PLAN
FEET
100 0 100 200



KEY:

MOISTURE CONTENT 18.6%-98 DRY DENSITY IN PCF

BLOWS REQUIRED TO DRIVE SAMPLER ONE FOOT WEIGHT = 350 LBS., STROKE = 20 INCHES.

■ INDICATES DEPTH AT WHICH UNDISTURBED SAMPLE WAS EXTRACTED.

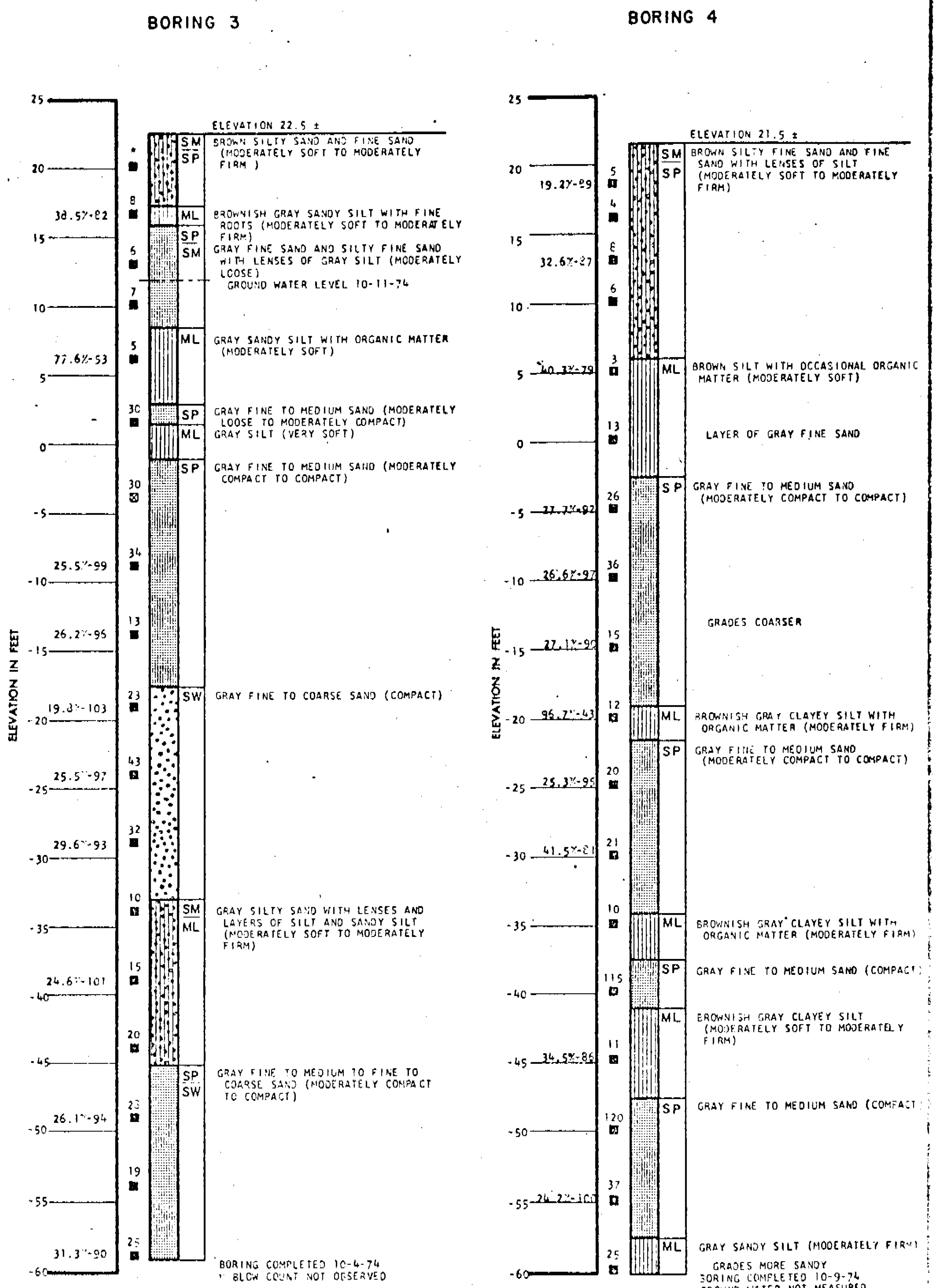
⊠ INDICATES DEPTH AT WHICH DISTURBED SAMPLE WAS EXTRACTED.

□ INDICATES DEPTH OF SAMPLING ATTEMPT WITH NO RECOVERY.

THE DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF THE NATURE OF THE SUBSURFACE MATERIALS.

LOG OF BORINGS

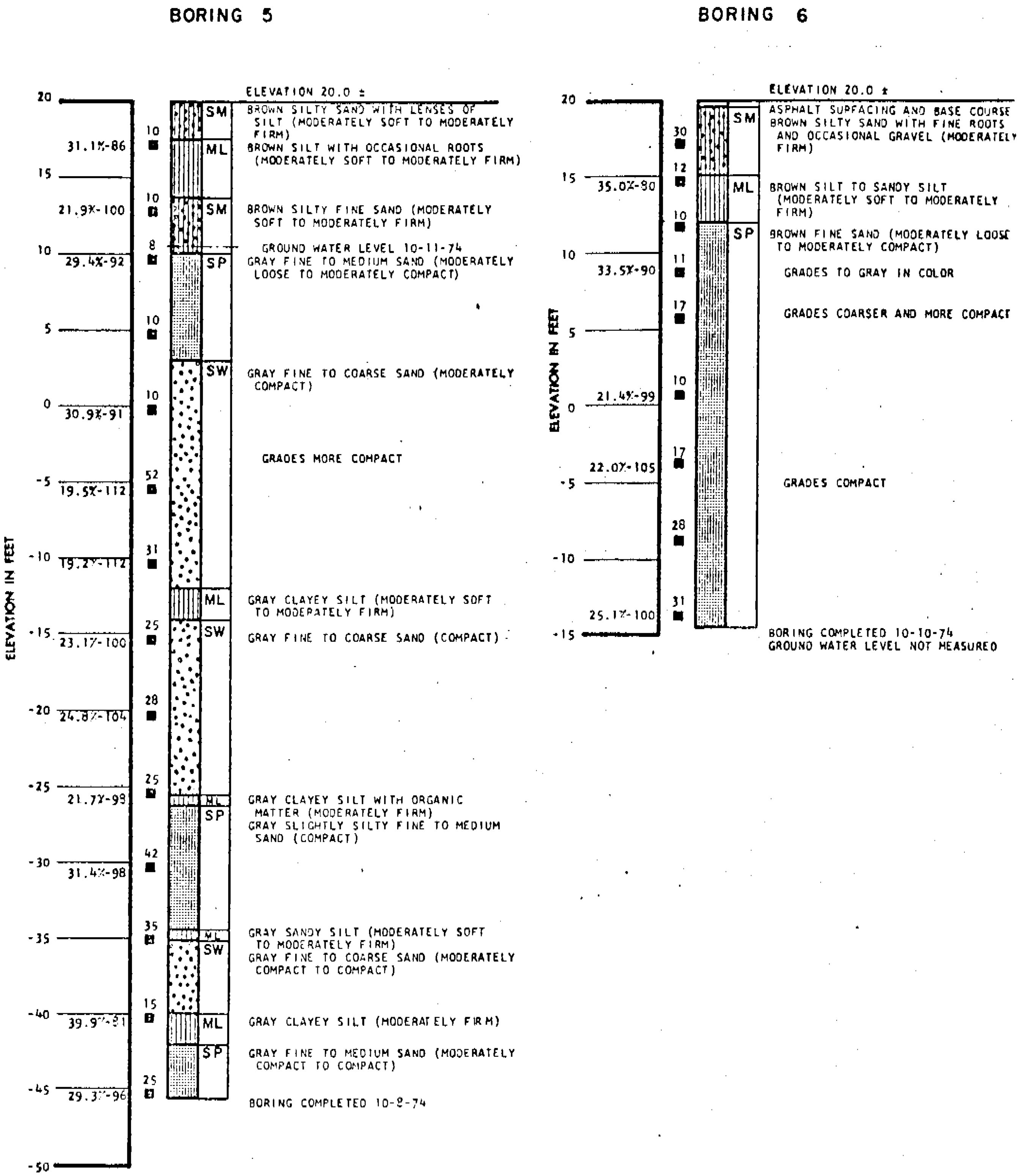
DAMES & MOORE



LOG OF BORINGS

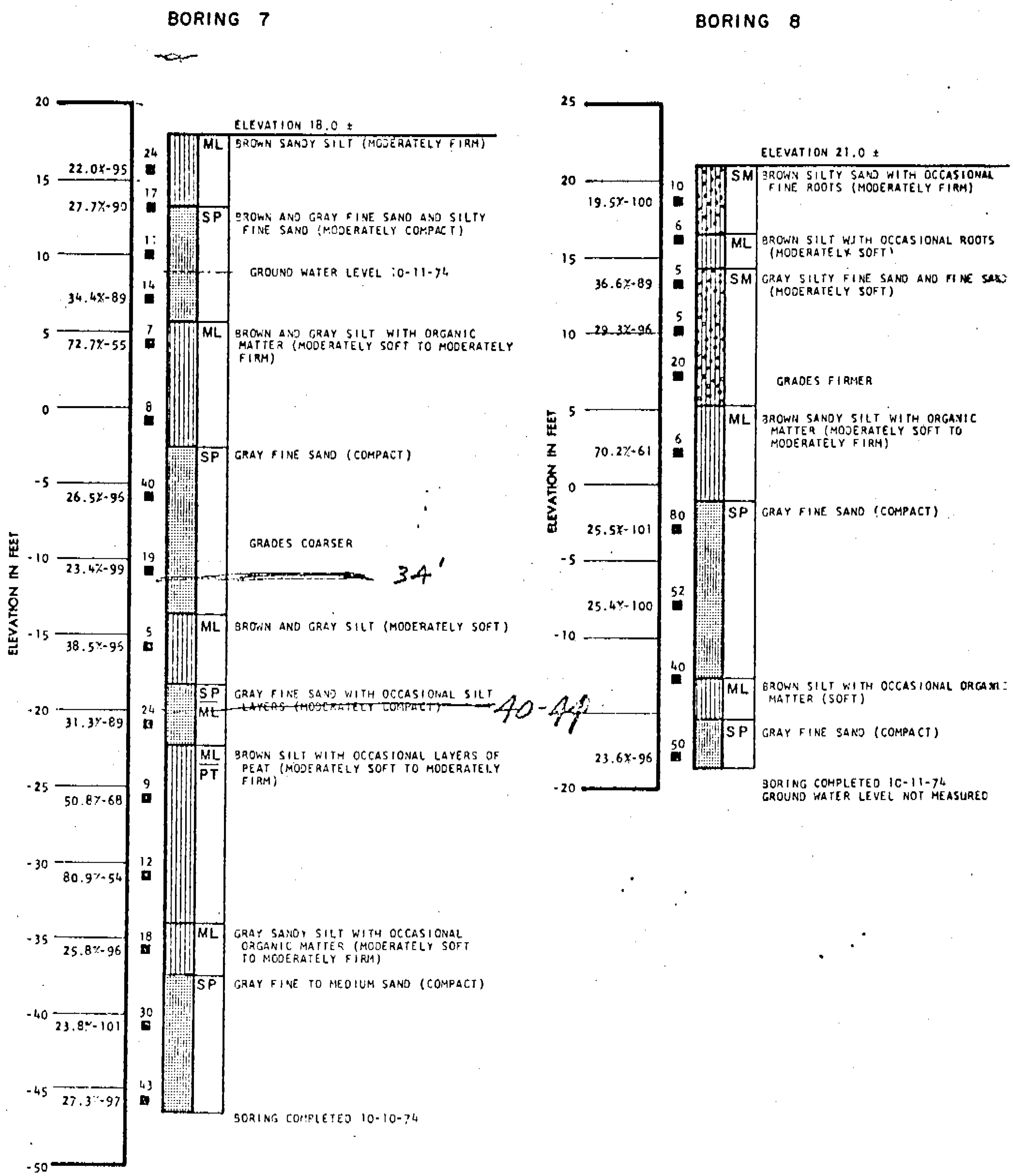
DAMES & MOORE

PLATE A-2



LOG OF BORINGS

DAMES & MOORE



LOG OF BORINGS

DAMES & MOORE

PLATE A-4

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	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
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50 % OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	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 AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR 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
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
MORE THAN 50 % OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICTY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

SOIL CLASSIFICATION CHART

UNIFIED SOIL CLASSIFICATION SYSTEM

DAMES & MOORE

BY DLB DATE 10-24-74 FILE 7917-001 West Coast Orient Lumber

CHECKED BY

REVISIONS

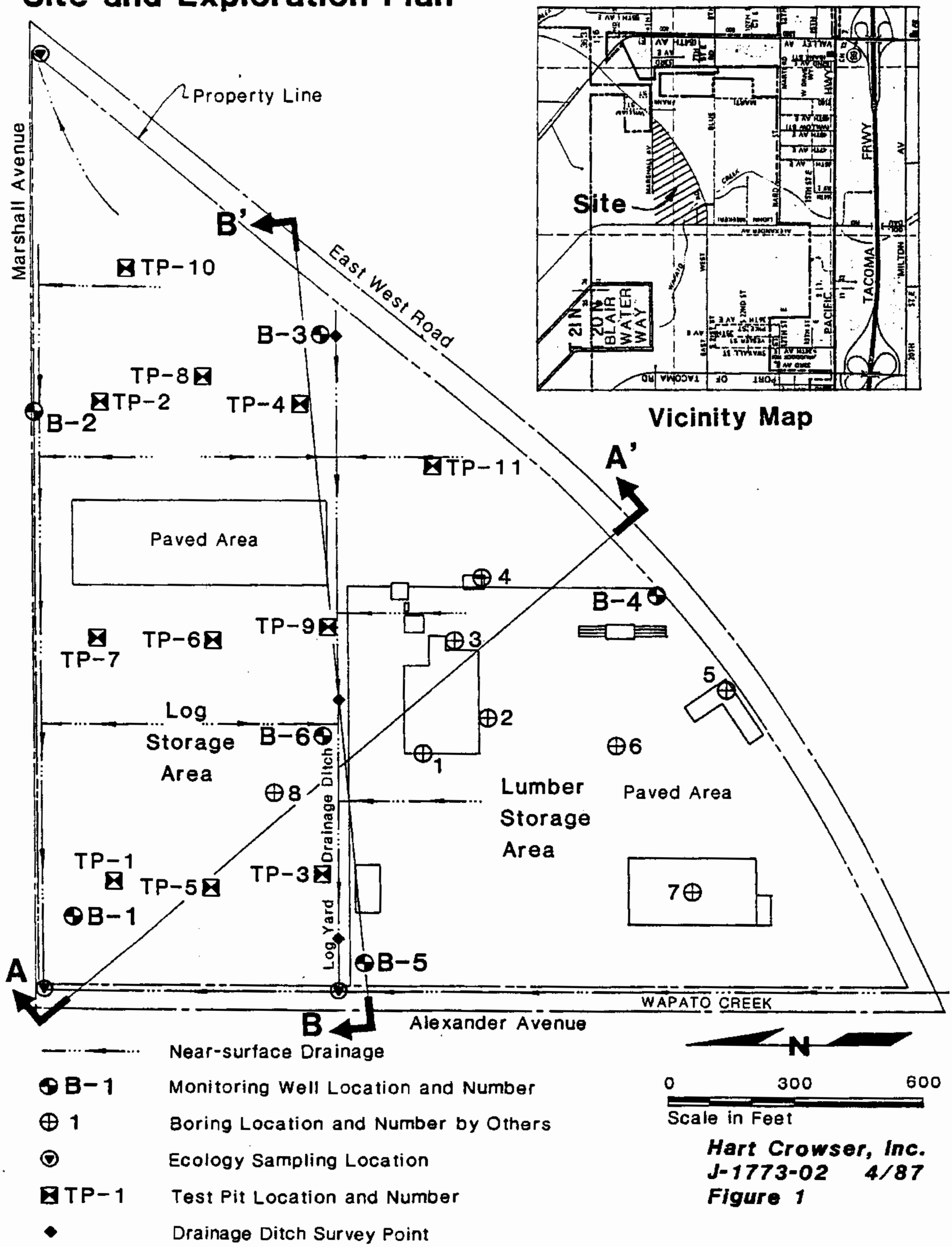
BY DATE

BORING	ELEVATION	SOIL TYPE	MOISTURE CONTENT % OF DRY WEIGHT	DRY DENSITY LBS./CU.FT.	NORMAL PRESSURE LBS./SQ.FT.	YIELD PT. SHEAR STRENGTH LBS./SQ.FT.
1	+20.0	SILTY SAND	18.9	91	1200	800
1	+20.0	SILTY SAND	18.9	91	400	350
1	+18.0	SANDY SILT	34.5	85	500	300
1	+18.0	SANDY SILT	34.5	85	1500	700
1	-4.0	FINE TO MEDIUM SAND	22.7	104	1000	800
1	-14.0	FINE TO MEDIUM SAND	23.2	104	2000	1600
1	-29.0	FINE TO COARSE SAND	20.7	106	4000	3500
2	+19.5	CLAYEY SILT WITH ROOTS AND ORGANIC MATTER	57.3	66	300	200
2	+19.5	CLAYEY SILT WITH ROOTS AND ORGANIC MATTER	57.3	66	900	400
3	-8.5	FINE TO MEDIUM SAND	25.5	99	1500	1100
3	-18.5	FINE TO COARSE SAND	19.8	103	3000	2500
4	+19.0	SILTY FINE SAND AND FINE SAND	19.2	89	1000	600
4	+19.0	SILTY FINE SAND AND FINE SAND	19.2	89	350	250
7	+16.0	SANDY SILT	22.0	95	800	800
7	+16.0	SANDY SILT	22.0	95	200	400
7	+13.5	FINE SAND AND SILTY FINE SAND	27.7	90	1800	900
7	+13.5	FINE SAND AND SILTY FINE SAND	27.7	90	600	400

SUMMARY OF DIRECT SHEAR TEST DATA

DAMES & MOORE

Site and Exploration Plan



Hart Crowser, Inc.
J-1773-02 4/87
Figure 1

Key to Exploration Logs

Sample Descriptions

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance in Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 - 4	Very soft	0 - 2	<0.125
Loose	4 - 10	Soft	2 - 4	0.125 - 0.25
Medium dense	10 - 30	Medium stiff	4 - 8	0.25 - 0.5
Dense	30 - 50	Stiff	8 - 15	0.5 - 1.0
Very dense	>50	Very stiff	15 - 30	1.0 - 2.0
		Hard	>30	>2.0

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

Minor Constituents

	Estimated Percentage
Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

Legends

Sampling

BORING SAMPLES

- Split Spoon
- Shelby Tube
- Cuttings
- Core Run
- * No Sample Recovery
- P Tube Pushed, Not Driven

TEST PIT SAMPLES

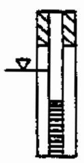
- Grab (Jar)
- Bag
- Shelby Tube

Test Symbols

GS	Grain Size Classification
CN	Consolidation
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained
QU	Unconfined Compression
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits

Water Content in Percent
Liquid Limit
Natural
Plastic Limit

Ground Water Observations



Surface Seal

Ground Water Level on Date (ATD) At Time of Drilling

Observation Well Tip or Slotted Section

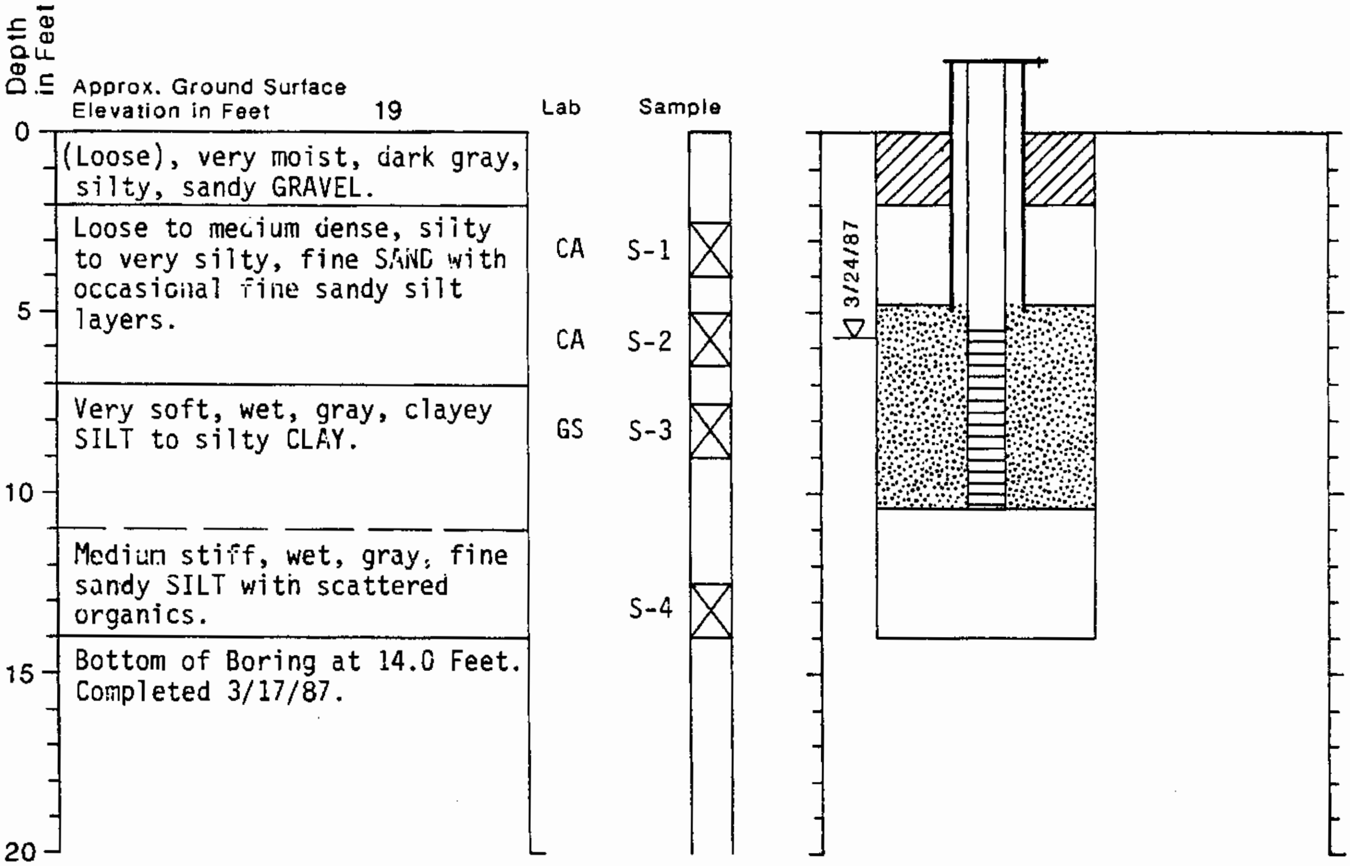
Ground Water Seepage (Test Pits)

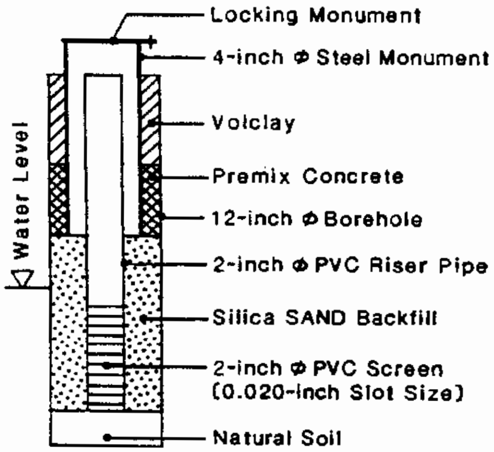
J-1772-03 April 1987
HART-CROWSER & associates, inc.
Figure A-1

Boring Log and Construction Data for Monitoring Well B-1

Geologic Log

Monitoring Well Design





CA Chemical Analysis

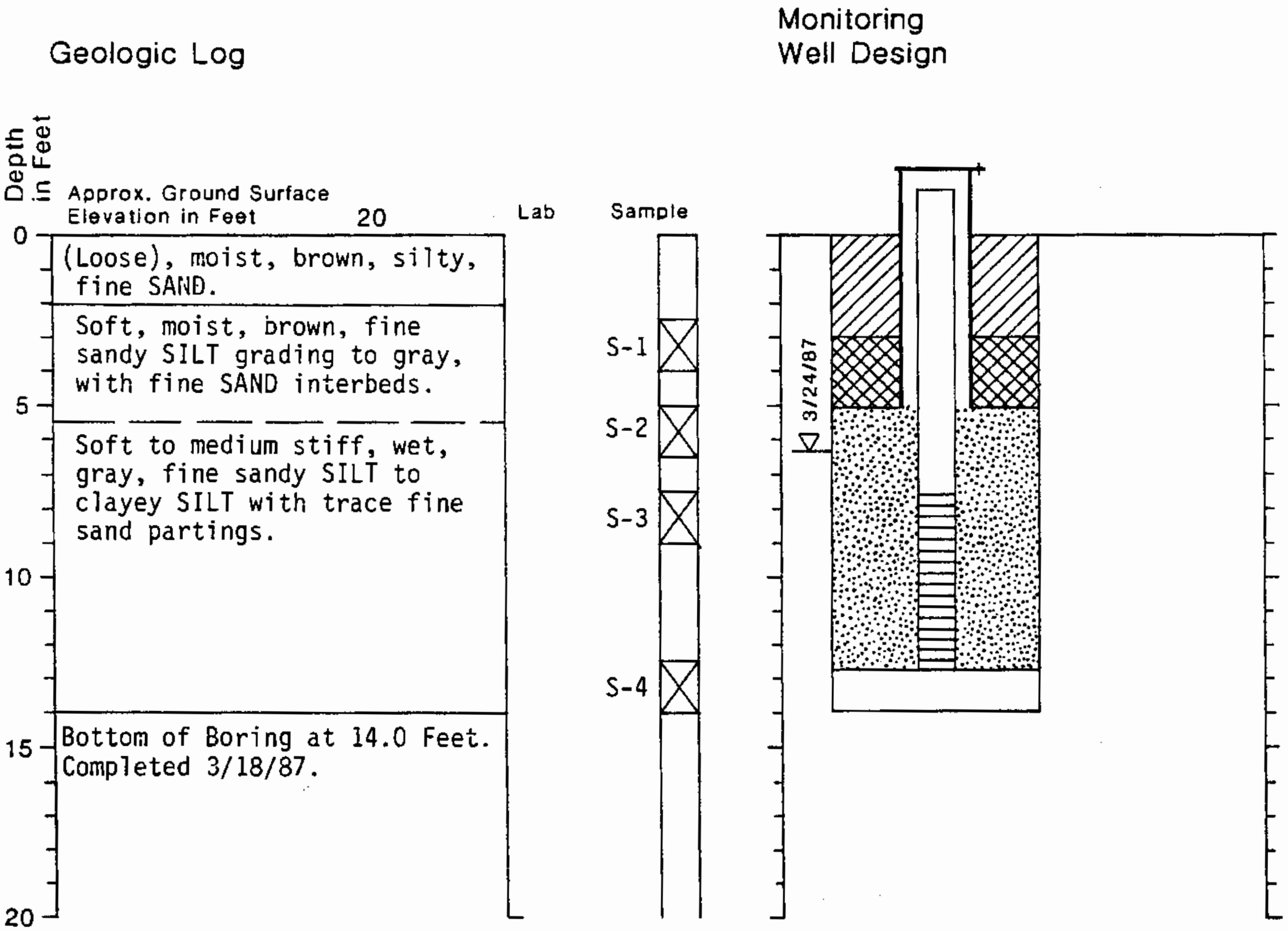
GS Grain Size Analysis

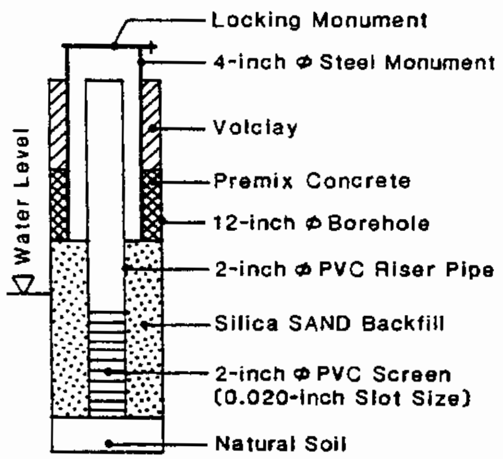
NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling.

J-1773-02 April 1987
HART CROWSER & associates inc.
Figure A-2

Boring Log and Construction Data for Monitoring Well B-2





CA Chemical Analysis

GS Grain Size Analysis

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling.

J-1773-02 April 1987
HART CROWSER & associates inc.
Figure A-3

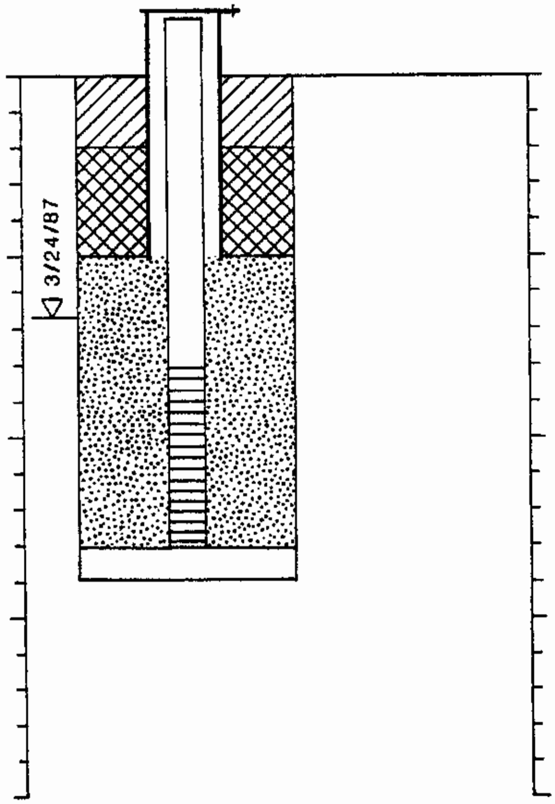
Boring Log and Construction Data for Monitoring Well B-3

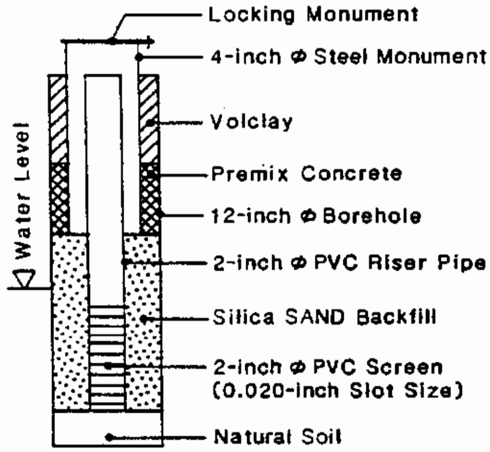
Geologic Log

Approx. Ground Surface Elevation in Feet 22

Depth in Feet	Description	Lab	Sample
0	(Loose to medium dense), moist, dark gray, silty, sandy GRAVEL with cobbles. (SLAG)	CA	S-1
5	Medium dense, moist, gray, very silty, fine SAND with root fragments.	CA	S-2
			S-3
	Soft to stiff, moist to wet, gray, fine sandy SILT with clayey SILT zone at 7 to 9-foot-depth.		S-4
10			
			S-5
15	Bottom of Boring at 14.0 Feet. Completed 3/18/87.		
20			

Monitoring Well Design





CA Chemical Analysis

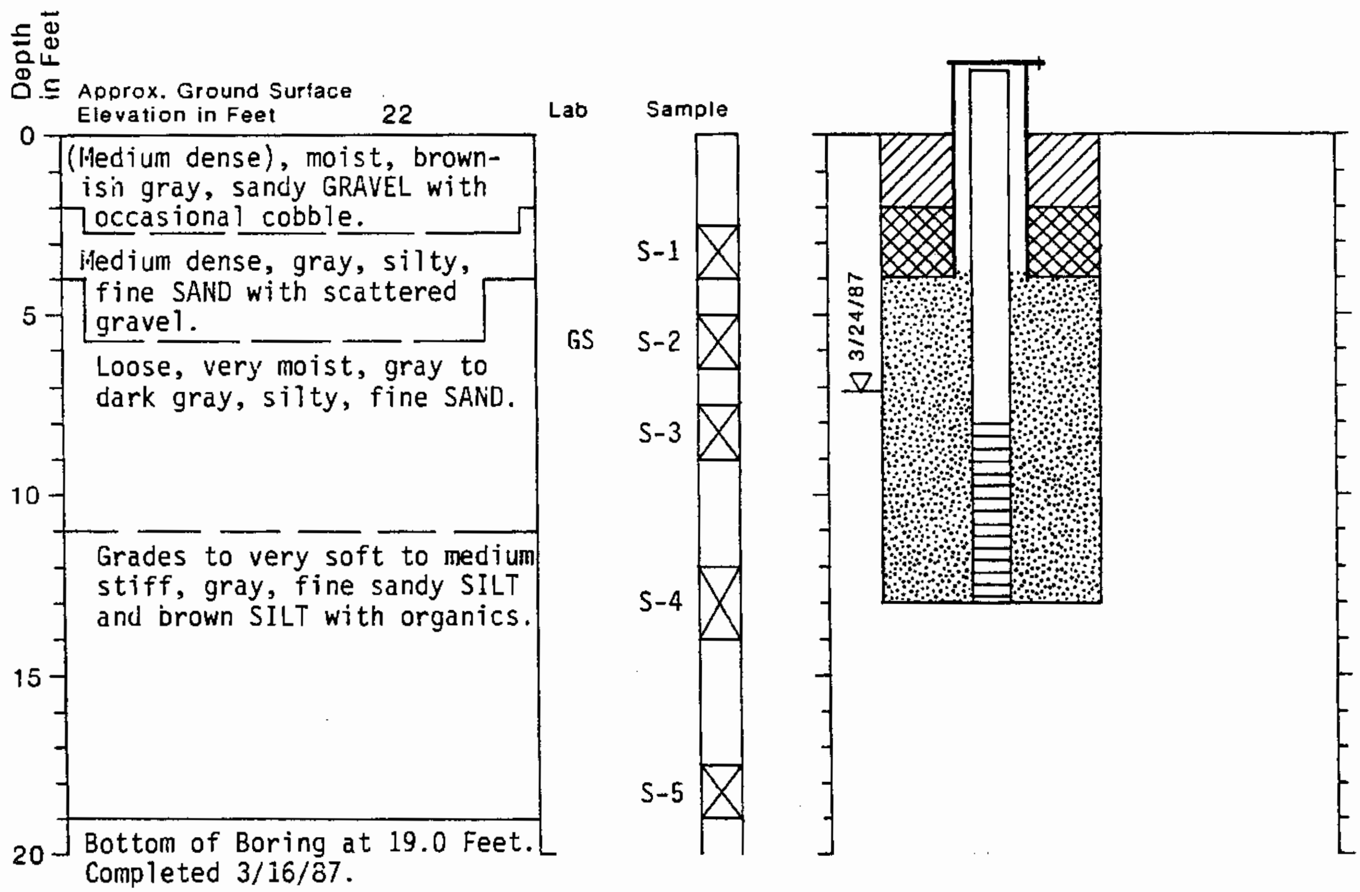
GS Grain Size Analysis

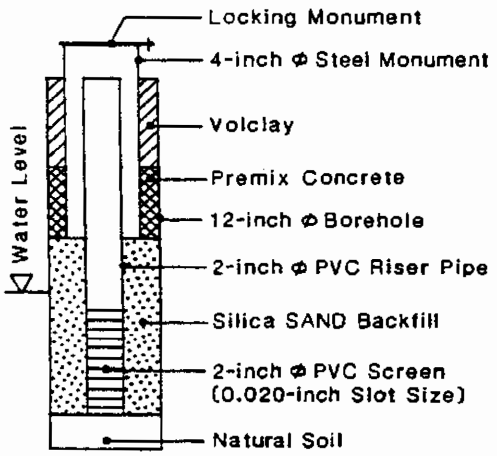
NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling.

J-1773-02 April 1987
HART CROWSER & associates inc.
Figure A-4

Boring Log and Construction Data for Monitoring Well B-4





CA Chemical Analysis

GS Grain Size Analysis

NOTES:

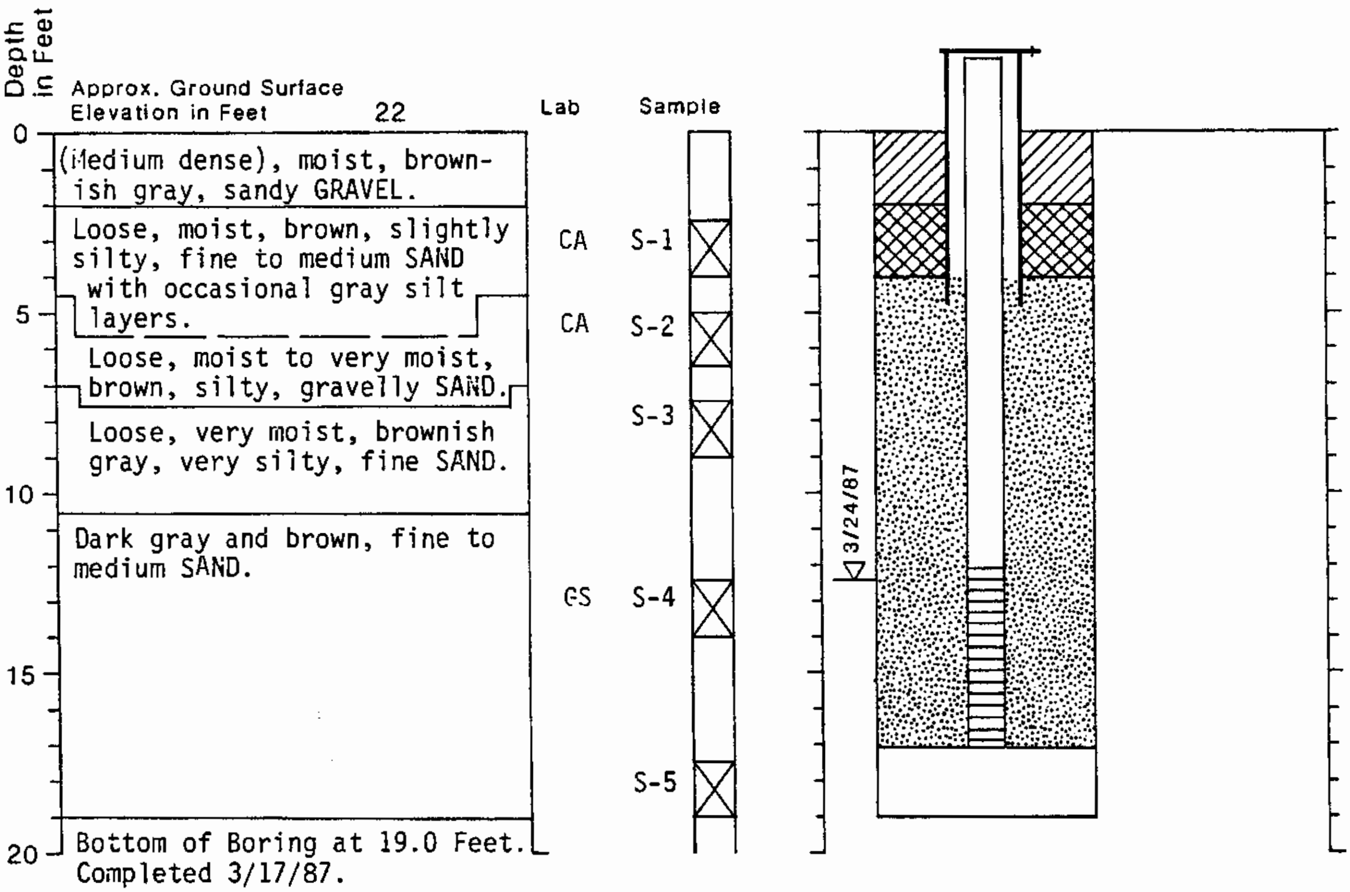
1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling.

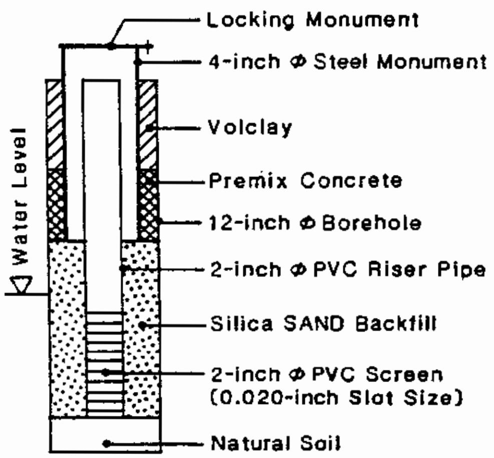
J-1773-02 April 1987
HART CROWSER & associates inc.
Figure A-5

Boring Log and Construction Data for Monitoring Well B-5

Geologic Log

Monitoring Well Design





CA Chemical Analysis

GS Grain Size Analysis

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling.

J-1773-02 April 1987

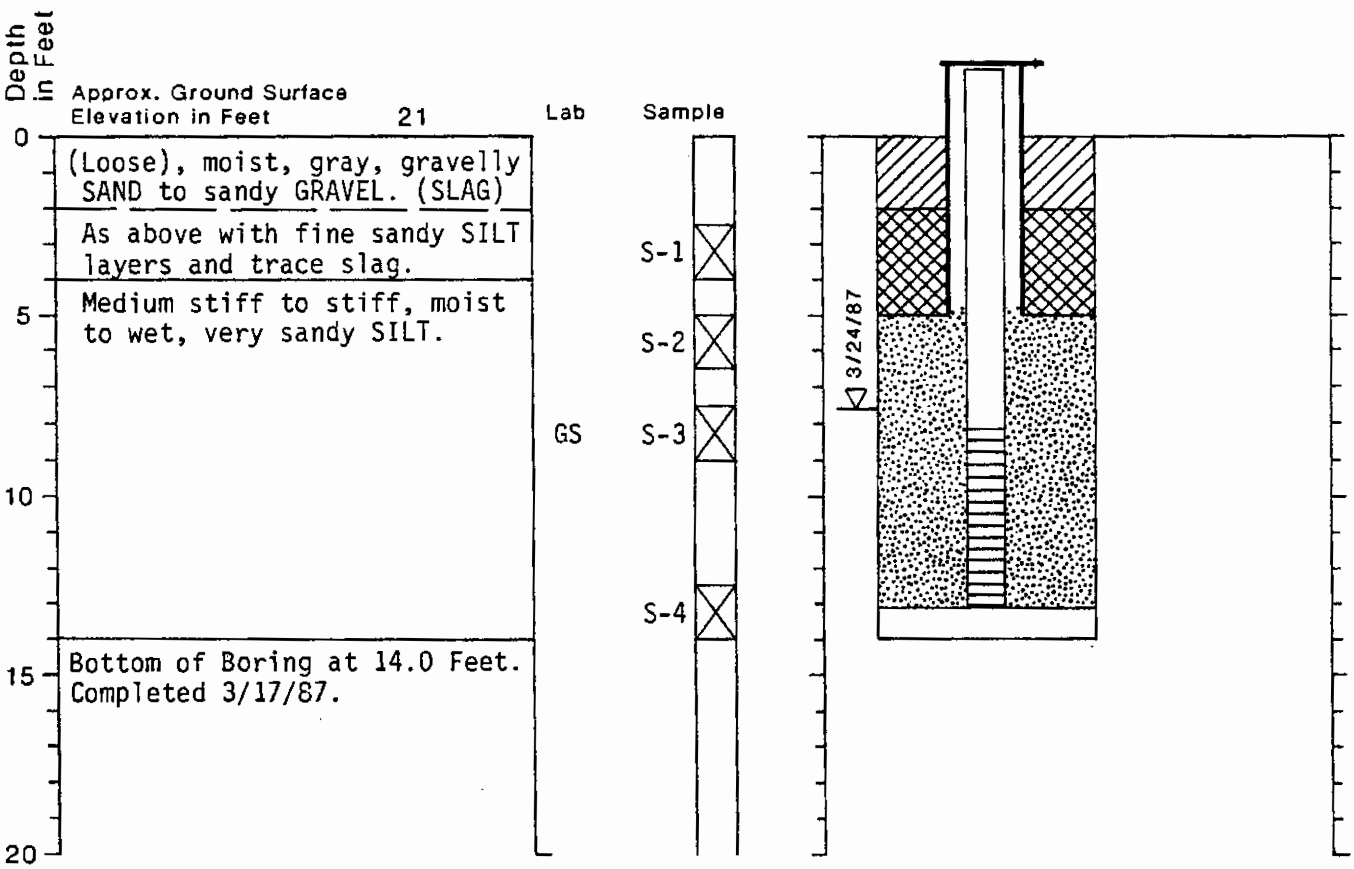
HART CROWSER & associates inc.

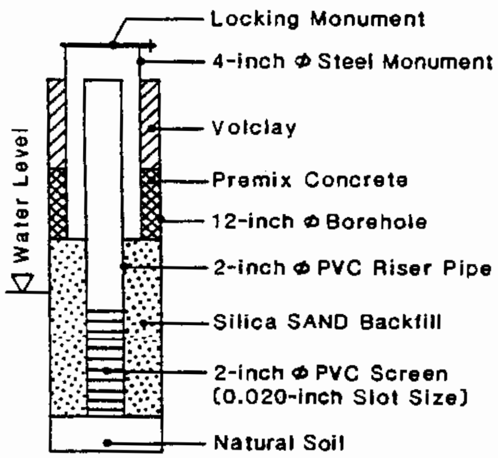
Figure A-6

Boring Log and Construction Data for Monitoring Well B-6

Geologic Log

Monitoring Well Design





CA Chemical Analysis

GS Grain Size Analysis

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling.

J-1773-02 April 1987

HART CROWSER & associates inc.

Figure A-7

GEOLOGY OF THE PORT OF TACOMA

#69A

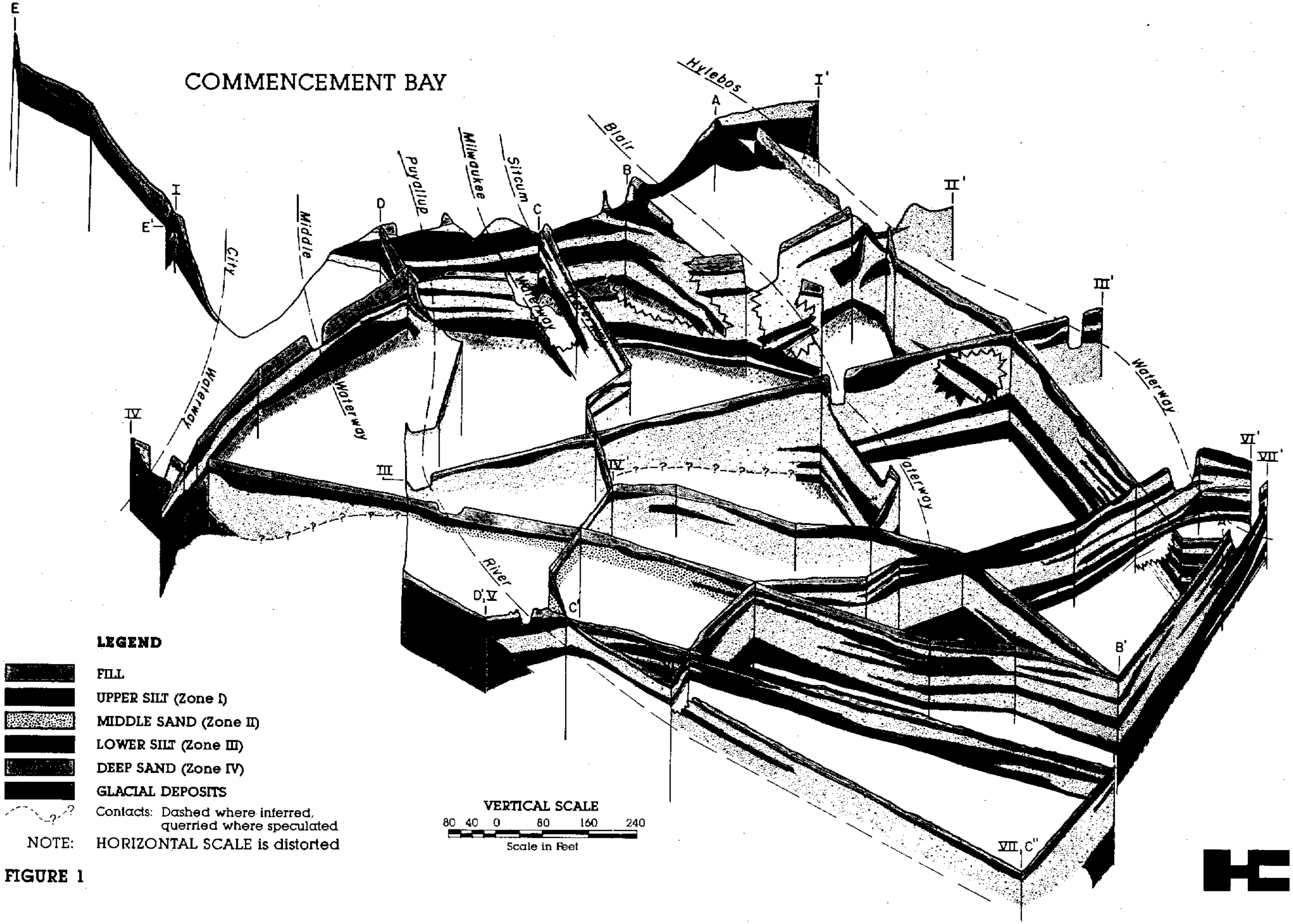
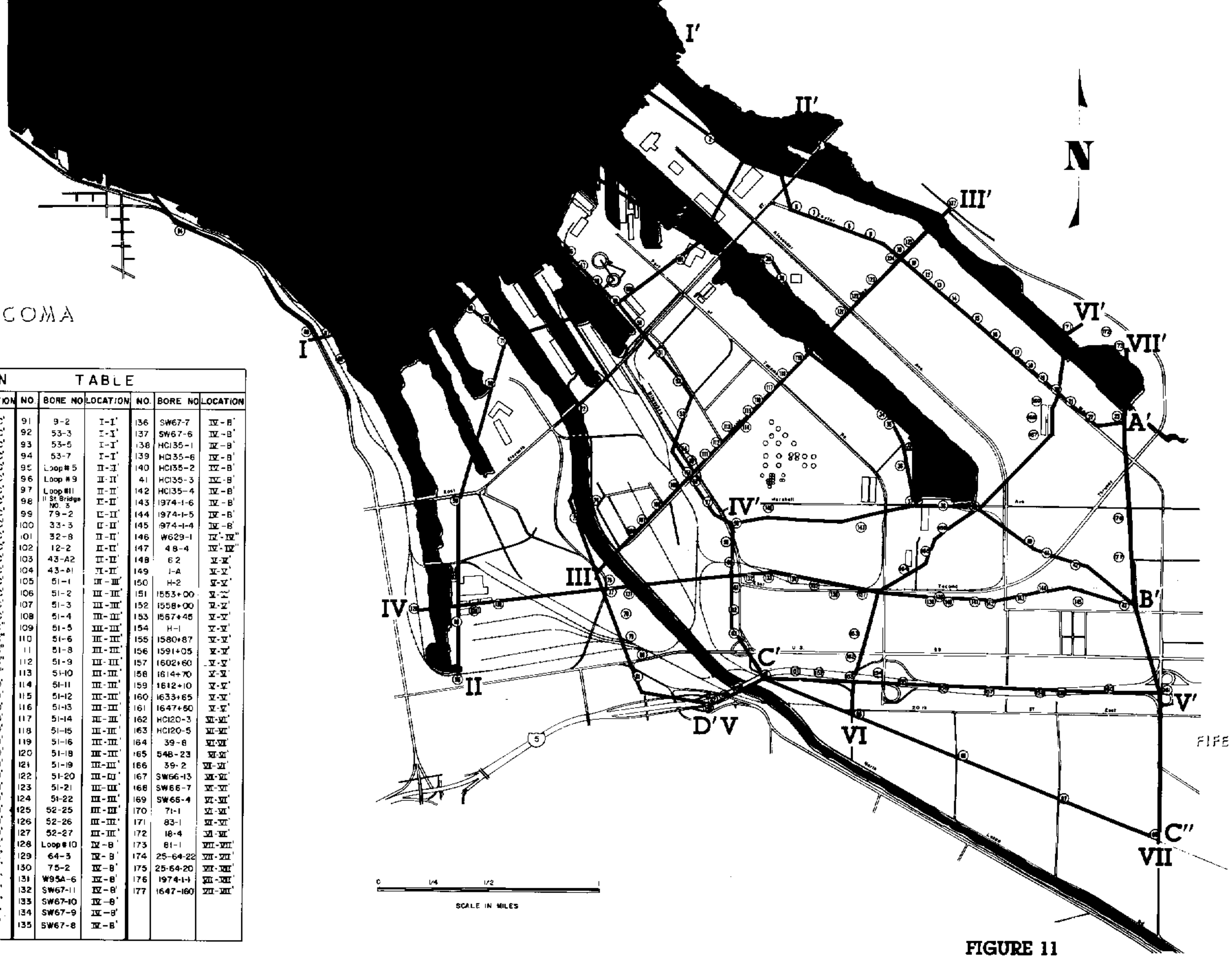


FIGURE 1

HART CROWSER & associates inc.
GEOTECHNICAL CONSULTANTS

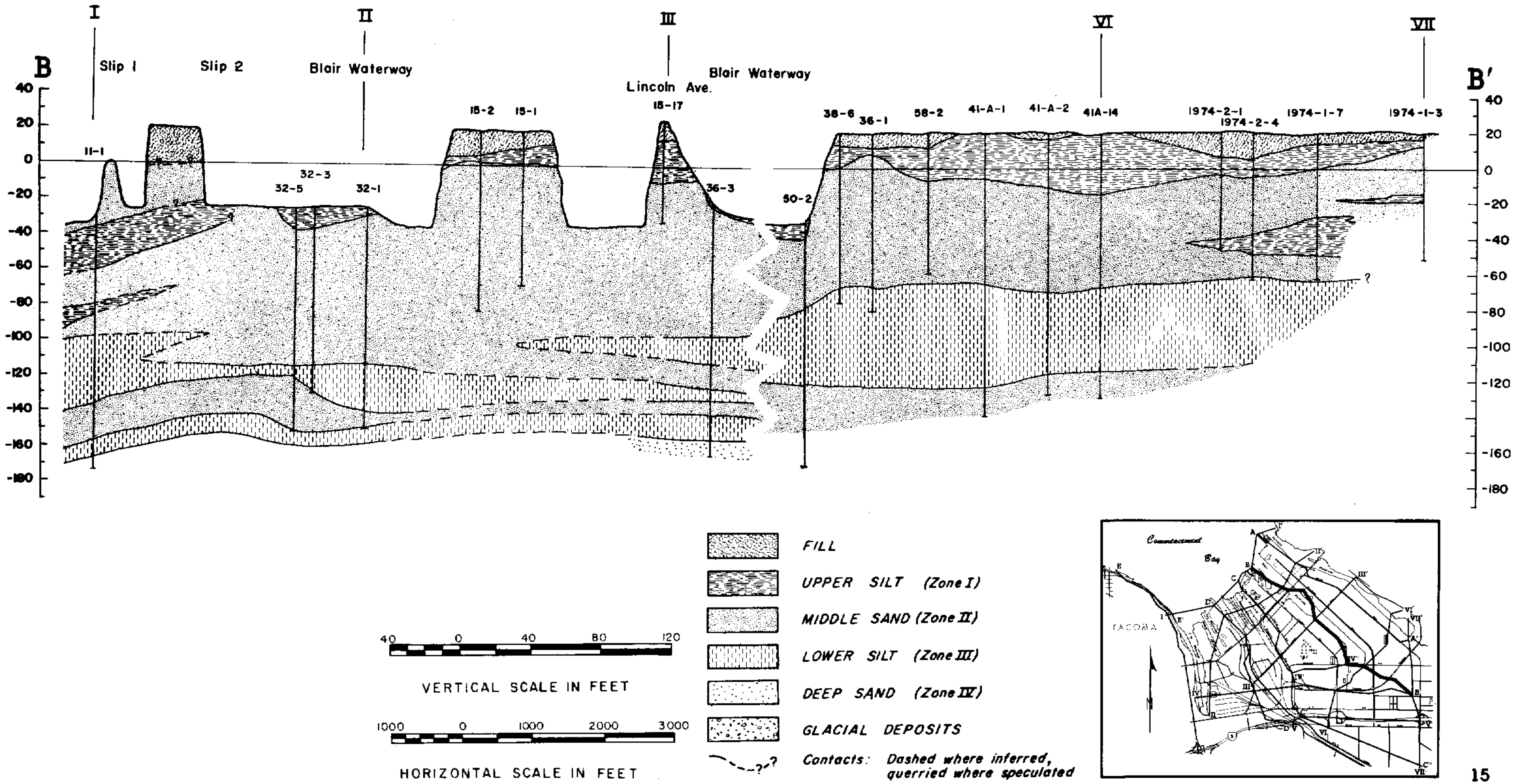
CROSS SECTION LOCATION PLAN



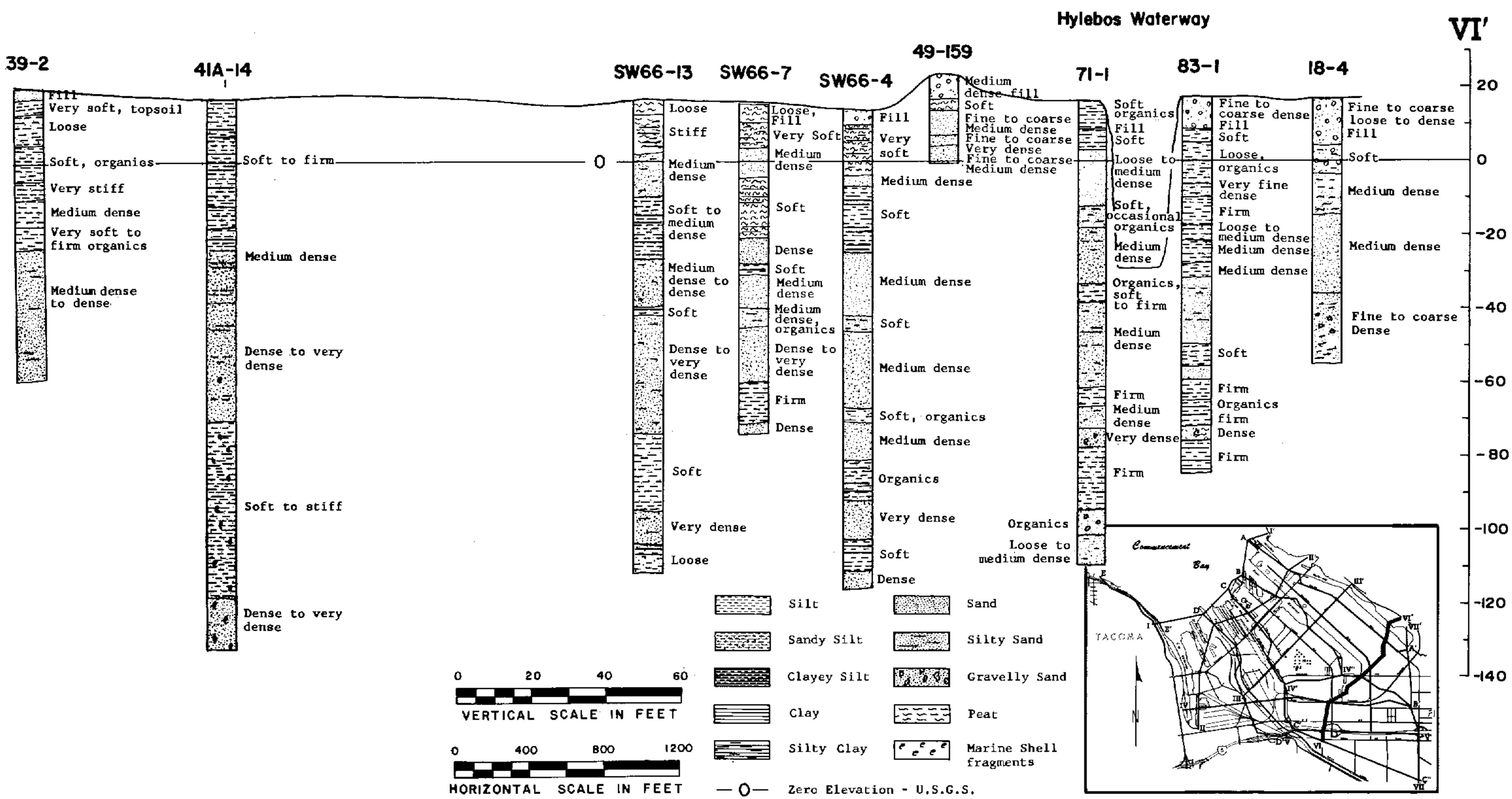
TABULATION TABLE											
NO.	BORE NO	LOCATION	NO.	BORE NO	LOCATION	NO.	BORE NO	LOCATION	NO.	BORE NO	LOCATION
1	62-1	A-A'	46	35-7	C-C'	91	9-2	I-I'	136	SW67-7	IV-B'
2	67-1	A-A'	47	35-6	C-C'	92	53-3	I-I'	137	SW67-6	IV-B'
3	SW56-1	A-A'	48	20-7	C-C'	93	53-5	I-I'	138	HC135-1	IV-B'
4	SW56-5	A-A'	49	6-3	C-C'	94	53-7	I-I'	139	HC135-6	IV-B'
5	SW56-7	A-A'	50	6-4	C-C'	95	Loop # 5	II-II'	140	HC135-2	IV-B'
6	49-168	A-A'	51	JPM-6	C-C'	96	Loop # 9	II-II'	41	HC135-3	IV-B'
7	49-167	A-A'	52	JPM-5	C-C'	97	Loop #11	II-II'	142	HC135-4	IV-B'
8	49-165	A-A'	53	73-1-4	C-C'	98	11 St. Bridge NO. 3	II-II'	143	1974-1-6	IV-B'
9	49-164	A-A'	54	JPM-EM2	C-C'	99	79-2	II-II'	144	1974-1-5	IV-B'
10	49-163	A-A'	55	JPM-EM1	C-C'	100	33-3	II-II'	145	1974-1-4	IV-B'
11	49-150	A-A'	56	JPM-EM9	C-C'	101	32-8	II-II'	146	W629-1	IV'-IV''
12	49-151	A-A'	57	JPM-EM10	C-C'	102	12-2	II-II'	147	48-4	IV'-IV''
13	49-152	A-A'	58	48-2	C-C'	103	43-A2	II-II'	148	62	V-V'
14	49-153	A-A'	59	JPM-EM13	C-C'	104	43-A1	II-II'	149	1-A	V-V'
15	49-155	A-A'	60	JPM-EM14	C-C'	105	51-1	III-III'	150	H-2	V-V'
16	49-156	A-A'	61	JPM-EM15	C-C'	106	51-2	III-III'	151	1553+00	V-V'
17	49-157	A-A'	62	JPM-EM16	C-C'	107	51-3	III-III'	152	1558+00	V-V'
18	49-158	A-A'	63	80-3	C-C'	108	51-4	III-III'	153	1567+45	V-V'
19	49-159	A-A'	64	Puyallup River No.3	C'-C''	109	51-5	III-III'	154	H-1	V-V'
20	49-160	A-A'	65	W1044-1	C'-C''	110	51-6	III-III'	155	1580+87	V-V'
21	49-161	A-A'	66	W1044-2	C'-C''	11	51-8	III-III'	156	1591+05	V-V'
22	49-162	A-A'	67	W1044-3	C'-C''	112	51-9	III-III'	157	1602+60	V-V'
23	SW61A-1	A-A'	68	W1044-4	C'-C''	113	51-10	III-III'	158	1614+70	V-V'
24	11-1	B-B'	69	77-2	D-D'	114	51-11	III-III'	159	1612+10	V-V'
25	32-5	B-B'	70	78-3	D-D'	115	51-12	III-III'	160	1633+65	V-V'
26	32-3	B-B'	71	78-2	D-D'	116	51-13	III-III'	161	1647+60	V-V'
27	32-1	B-B'	72	90-1	D-D'	117	51-14	III-III'	162	HC120-3	VI-VI'
28	15-2	B-B'	73	90-5	D-D'	118	51-15	III-III'	163	HC120-5	VI-VI'
29	15-1	B-B'	74	90-6	D-D'	119	51-16	III-III'	164	39-8	VI-VI'
30	25TH-5	B-B'	75	90-1A-4	D-D'	120	51-18	III-III'	165	548-23	VI-VI'
31	51-17	B-B'	76	W158-1	D-D'	121	51-19	III-III'	166	39-2	VI-VI'
32	50-2	B-B'	77	W158A-6A	D-D'	122	51-20	III-III'	167	SW66-13	VI-VI'
33	25-64-8	B-B'	78	W158A-5A	D-D'	123	51-21	III-III'	168	SW66-7	VI-VI'
34	38-6	B-B'	79	W158A-4A	D-D'	124	51-22	III-III'	169	SW65-4	VI-VI'
35	36-3	B-B'	80	W158-4	D-D'	125	52-25	III-III'	170	71-1	VI-VI'
36	36-1	B-B'	81	W158-14	D-D'	126	52-26	III-III'	171	83-1	VI-VI'
37	58-2	B-B'	82	61	D-D'	127	52-27	III-III'	172	18-4	VI-VI'
38	41A-1	B-B'	83	70-1-53	E-E'	128	Loop #10	IV-B'	173	81-1	VII-VII'
39	41A-2	B-B'	84	70-1-2	E-E'	129	64-3	IV-B'	174	25-64-22	VII-VII'
40	41A-14	B-B'	85	59-1-5	E-E'	130	75-2	IV-B'	175	25-64-20	VII-VII'
41	1974-2-4	B-B'	86	47-8	E-E'	131	W95A-6	IV-B'	176	1974-1-1	VII-VII'
42	1974-1-7	B-B'	87	47-7	E-E'	132	SW67-11	IV-B'	177	1647-160	VII-VII'
43	1974-1-3	B-B'	88	47-9	E-E'	133	SW67-10	IV-B'			
44	5-7	C-C'	89	47-4	I-I'	134	SW67-9	IV-B'			
45	35-5	C-C'	90	5-9	I-I'	135	SW67-8	IV-B'			

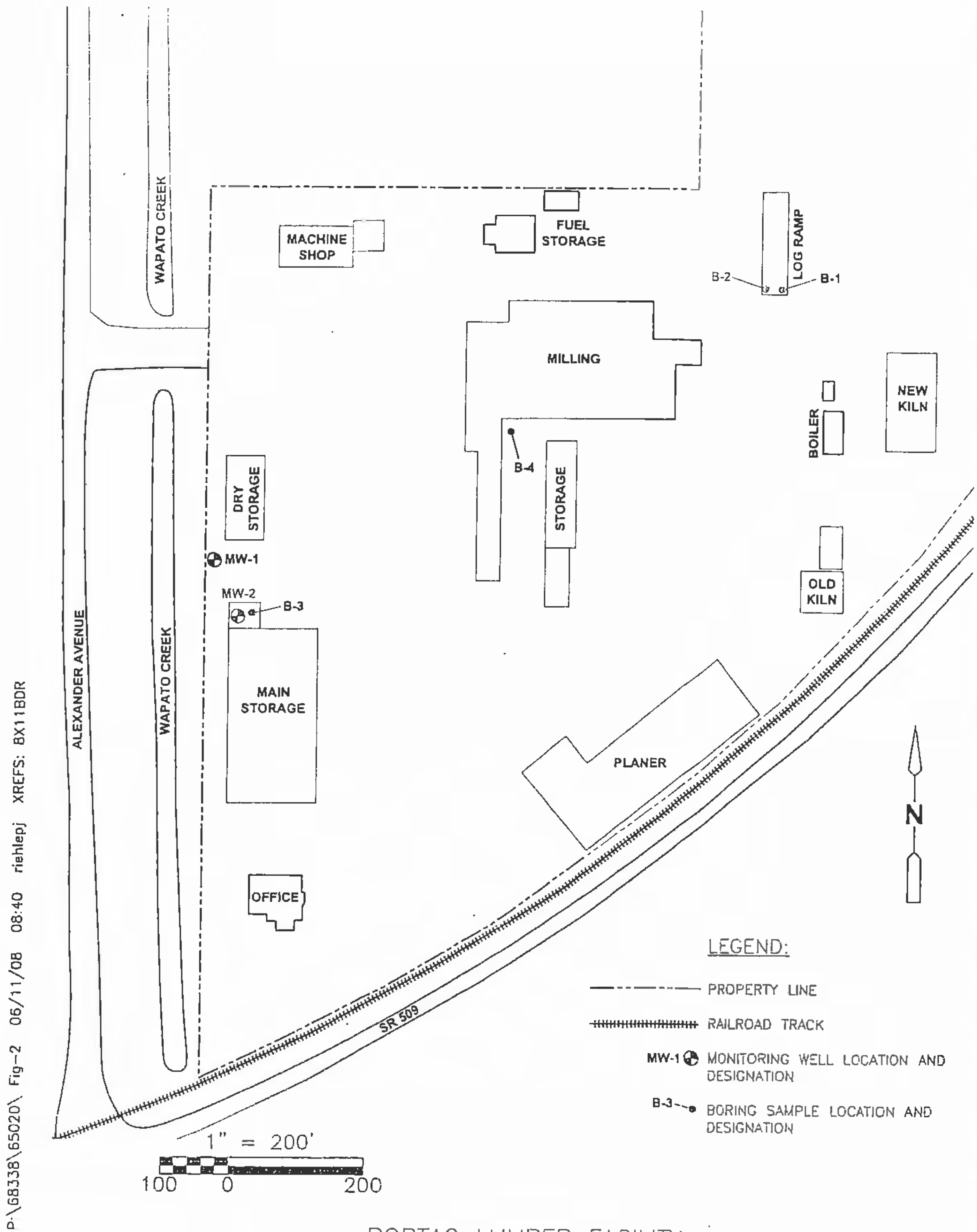
FIGURE 11

GEOLOGIC CROSS SECTION B-B'



BORE HOLE LOGS VI-VI'





PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

Figure No. 2
Site Plan

SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVELS More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM	Silty sand, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

SAMPLE TYPE SYMBOLS

- Disturbed bag or jar sample
- Std. Penetration Test (2.0" OD)
- Type U Ring Sampler (3.25" OD)
- California Sampler (3.0" OD)
- Undisturbed Tube Sample
- Grab Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)

CONTACT BETWEEN UNITS

- Change in geologic unit
- Soil type change within geologic unit
- Obscure or gradational change

DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing		Structure		General Attitude	
Parting:	less than 1/16 in (1/6 cm)	Pocket	Erratic, discontinuous deposit of limited extent	Near horizontal:	0 to 10 deg.
Seam:	1/16 to 1/2 in (1/6 to 1 1/4 cm)	Lens:	Lenticular deposit	Low angle:	10 to 45 deg.
Layer:	1/2 to 12 in. (1 1/4 to 30 1/2 cm)	Varved:	Alternating seams of silt and clay	High angle.	45 to 80 deg.
Stratum.	> 12 In. (30 1/2 cm)	Laminated:	Alternating seams	Near Vertical:	80 to 90 deg.
Scattered.	< 1 per ft. (30 1/2 cm)	Interbedded.	Alternating layers		
Numerous:	> 1 per ft. (30 1/2 cm)				

MOISTURE DESCRIPTION

Dry - Free of moisture, dusty

Moist - Damp but no visible free water

Wet - Visible free water, saturated

STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogeneous	Same color and appearance throughout

WELL COMPLETIONS

RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	Over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

PHYSICAL PROPERTY TEST

- AL - Atterberg Limits
- FC - Fines Content
- GSD - Grain Size Distribution
- MC - Moisture Content
- MD - Moisture Content/Dry Density
- Comp - Compaction Test (Proctor)
- SG - Specific Gravity
- CBR - California Bearing Ratio
- RM - Resilient Modulus
- Perm - Permeability
- TXP - Triaxial Permeability
- Cons - Consolidation
- Chem - Analytical Chemical Analysis
- Corr - Corrosion
- VS - Vane Shear
- DS - Direct Shear
- UC - Unconfined Compression
- TX - Triaxial Compression
- UU - Unconsolidated, Undrained
- CU - Consolidated, Undrained
- CD - Consolidated, Drained

Notes:

1. Sample descriptions in this report are based on visual field and laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.

2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines

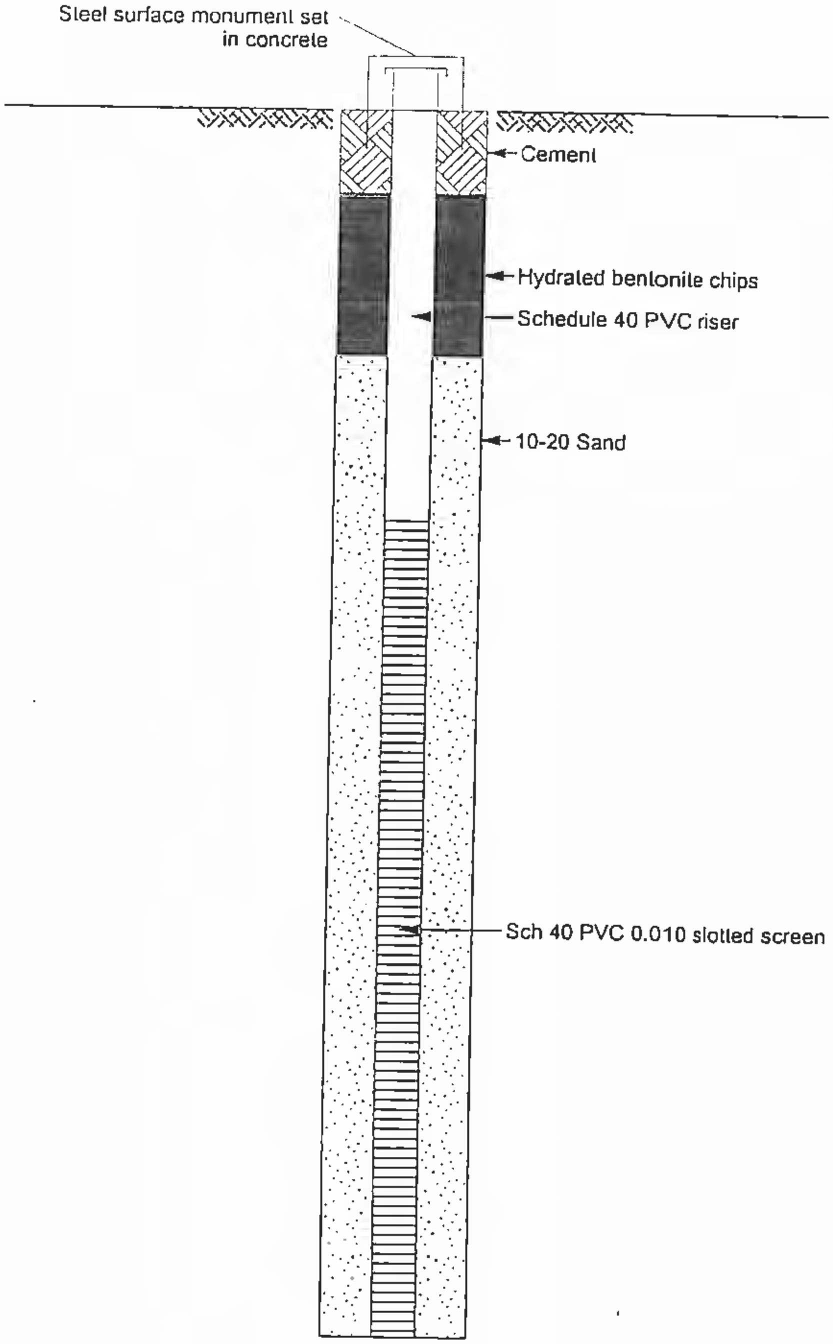
3. WOR = weight of rod.

SOIL CLASSIFICATION/LEGEND 68338-65020 BL GPJ CDM_BLLV.GDT 7/14/08 REV.

CDM

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

Project No: 68338.65020 Figure: 1



MONITORING WELL CONSTRUCTION 68338-65020 BL.GPJ CDM_BLLV.GDT 7/9/08 REV.

CDM

TYPICAL MONITORING WELL CONSTRUCTION

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

Project No: 68338.65020 Figure: 2
1 of 1

Boring Log B1

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / 6 in)	Depth (feet)	Sample	USCS	DESCRIPTION	Elev (feet)
						0–3.5			Asphalt.	
				0	42 23 56	2.5–4				
				0	22 27 35	5–6.5		GW	Slightly Silty, Sandy GRAVEL (GW), light brown to brown, fine to coarse, well graded, subangular to subrounded sand, subangular to rounded, fine to medium, well graded gravel, trace silt, dry. 2" asphalt layer at 5 ft bgs.	
				0	12 15 17	7.5–9		GW	Becomes brown.	
				0	21 19 19	10–11.5		GW		
				0	21 21 30	12–13.5		GW	With coarse rounded gravel.	
						13.5–15			Concrete layer.	
				0	7 14 12	15–16.5		SM	Silty SAND (SM), yellow-red, fine to medium, poorly graded, subangular to subrounded sand, moist. Becomes reddish, purplish gray, wet.	
						16.5			Boring terminated at 16.5 ft bgs. No groundwater encountered. Backfilled with hydrated bentonite chips.	

Location:

Surface Elevation:

Logged By: KMB

Drill Rig: 18" Split Spoon

Equipment/Hammer: /

Date Completed: 4-30-08

CDM

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

Boring Log B1
Project No: 68338.65020

Figure: 3
1 of 1

Boring Log B2

Other Tests	Sample No	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / 6 in)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev (feet)
										2' Asphalt.	
				0	6 27 40	2				Slag, black, vitreous.	
						4		GW		Silty, Sandy GRAVEL (GW), brown, fine to coarse, subangular to subrounded, well graded sand, fine to medium, angular to subrounded gravel, dry, with chunks of slag.	
				0	21 60 43					Slag.	
				0	33 40 37	6 8		SP		Silty, Gravelly SAND (SP), light brown, fine to coarse, subangular to subrounded sand, fine to medium, angular to subrounded gravel, dry, yellow precipitate.	
				0	34 21 28	10				Shattered volcanic rock.	
								SP		Silty, Gravelly SAND (SP), similar to 5.5-6.5 ft bgs.	
				0		12 14		GP		Silty, Sandy GRAVEL (GP), brown to dark brown, fine to coarse, subangular to subrounded, well graded sand, fine to medium, angular to subrounded gravel, dense, moist, orange staining.	
				0	9 17 22	16				With shattered concrete 15 to 16.5 ft bgs.	
						18 20 22 24				Boring terminated at 16.5 ft bgs. No groundwater encountered. Backfilled with hydrated bentonite chips.	

Location:
Surface Elevation:
Logged By: KMB

Drill Rig: 18" Split Spoon
Equipment/Hammer: /
Date Completed: 4-30-08

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

CDM

Boring Log B2
Project No: 68338.65020

Figure: 4
1 of 1

Boring Log B3

Other Tests	Sample No	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev (feet)
				0				SP		Silty, Gravelly SAND (SP), fine to medium, subangular to subrounded, poorly graded sand, subangular, fine to medium, poorly graded gravel, dry.	
				0		2		SM		Silty SAND (SM), gray, fine to medium, subrounded, poorly graded sand, moist, organic debris (roots and grass).	
				0		4		ML		SILT (ML), gray, trace fine sand, moist, rocks and grass.	
				0		6		CL-ML		Silty CLAY (CL-ML), gray-olive, medium stiff, low plasticity clay, moist.	
				0		8					
				0		10		ML		Sandy SILT (ML), gray, fine, subrounded, poorly graded sand, wet.	
						12					
				0		14					
						16				Boring terminated at 15 ft bgs. Groundwater encountered at 9 ft bgs. Backfilled with hydrated bentonite chips.	
						18					
						20					
						22					
						24					

Location: ________

Surface Elevation: ________

Logged By: KMB

Drill Rig: LAR Sonic

Equipment/Hammer: /

Date Completed: 4-30-08

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

CDM

Boring Log B3
Project No: 68338.65020

Figure: 5
1 of 1

LOG OF BORING WITH WELL 68338-65020 BL.GPJ CDM_BLLV.GDT 7/14/08 REV

Boring Log B4

Other Tests	Sample No	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev (feet)
										Wood chips.	
				0		2		SW		Silty, Gravelly SAND (SW), brown, fine to coarse, well graded, subangular to subrounded sand, fine to medium, angular to subrounded, poorly graded, gravel, moist.	
				0		4		ML		Slightly Gravelly, Sandy SILT (ML), dark brown, fine to coarse, subangular to subrounded sand, fine to medium, angular to subrounded gravel (rock and slag), organic material (roots and wood).	
				0		6		ML		Slightly Sand SILT (ML), olive-gray to gray, fine, well graded, subrounded sand, wet, iron oxide mottling from 5.0 to 6.0 ft bgs.	
				0		8		SM		Silty SAND (SM), dark gray, fine to medium, subangular to subrounded, well graded sand, wet.	
						10				Boring terminated at 10 ft bgs. No groundwater encountered. Backfilled with hydraced bentonite chips.	
						12					
						14					
						16					
						18					
						20					
						22					
						24					

Location: ______
Surface Elevation: ______
Logged By: KMB

Drill Rig: ______
Equipment/Hammer: /
Date Completed: 4-30-08

CDM

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

Boring Log B4
Project No: 68338.65020

Figure: 6
1 of 1

Boring Log MW1

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev (feet)	Well or Piezometer Completion
						0				2" Asphalt.		
										Silty SAND (SM), olive-gray, fine to medium, subrounded, poorly graded sand, debris, organic debris (roots and grass).		
				0	6 7 8	2–4		SM				
				0	2 2 3	4–6				Becomes dark gray.		
						6		ML		SILT (ML), dark gray, trace fine sand, moist, organics (lenses of organic material and roots).		
										Silty SAND (SM), gray to olive gray, fine, subrounded, poorly graded sand, moist to wet.		
				0	6 7 8	8						
				0	2 1 0	10		SM				
				0	1 1 0	12–14						
						15				Boring terminated at 15 ft bgs. Groundwater encountered at 10 ft bgs.		

Location:
Surface Elevation:
Logged By: KMB

Drill Rig: 18" Split Spoon
Equipment/Hammer: /
Date Completed: 4-30-08

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

CDM

Boring Log MW1
Project No: 68338.65020

Figure: 7
1 of 1

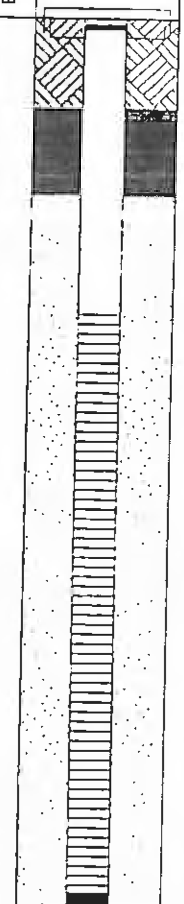
Boring Log MW2

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION
				0.2				6" Concrete.
							SP	SAND (SP), gray-brown, fine to medium grained, moist.
				0.6		6		Becomes slightly gravelly sand, gray, medium grained sand, subrounded gravel, moist to wet.
							ML	SILT (ML), brown, wit rootlets, moit to wet.
						8		Becomes moist at 8 ft bgs.
							SP	SAND (SP), brown-gray, fine to medium grained, moist.
						10	SM	Silty SAND (SM), brown, moist.
							SP	SAND (SP), brown, fine grained, saturated.
							SM	Silty SAND (SM), brown, wet to saturated.
				0.6			ML	SILT (ML), brown, moist.
						12	SP	SAND (SP), brown-yellow, saturated.
				0.9			SM	Silty SAND (SM), brown, fine to medium grained, wet to saturated.
							SP	SAND (SP), brown, medium grained, saturated.
						14	SM	Silty SAND (SM), brown, wet to saturated.
				0.6			SP	SAND (SP), brown, fine to medium grained, saturated.
							SM	Silty SAND (SM), brown, wet.
						16		Boring terminated at 15 ft bgs. Groundwater encountered at 10.5 ft bgs.

Depth scale (feet): 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

Elev (feet)

Well or Piezometer Completion



Location:

Surface Elevation:

Logged By: AEM

Drill Rig: DPT

Equipment/Hammer: /

Date Completed: 6-20-08

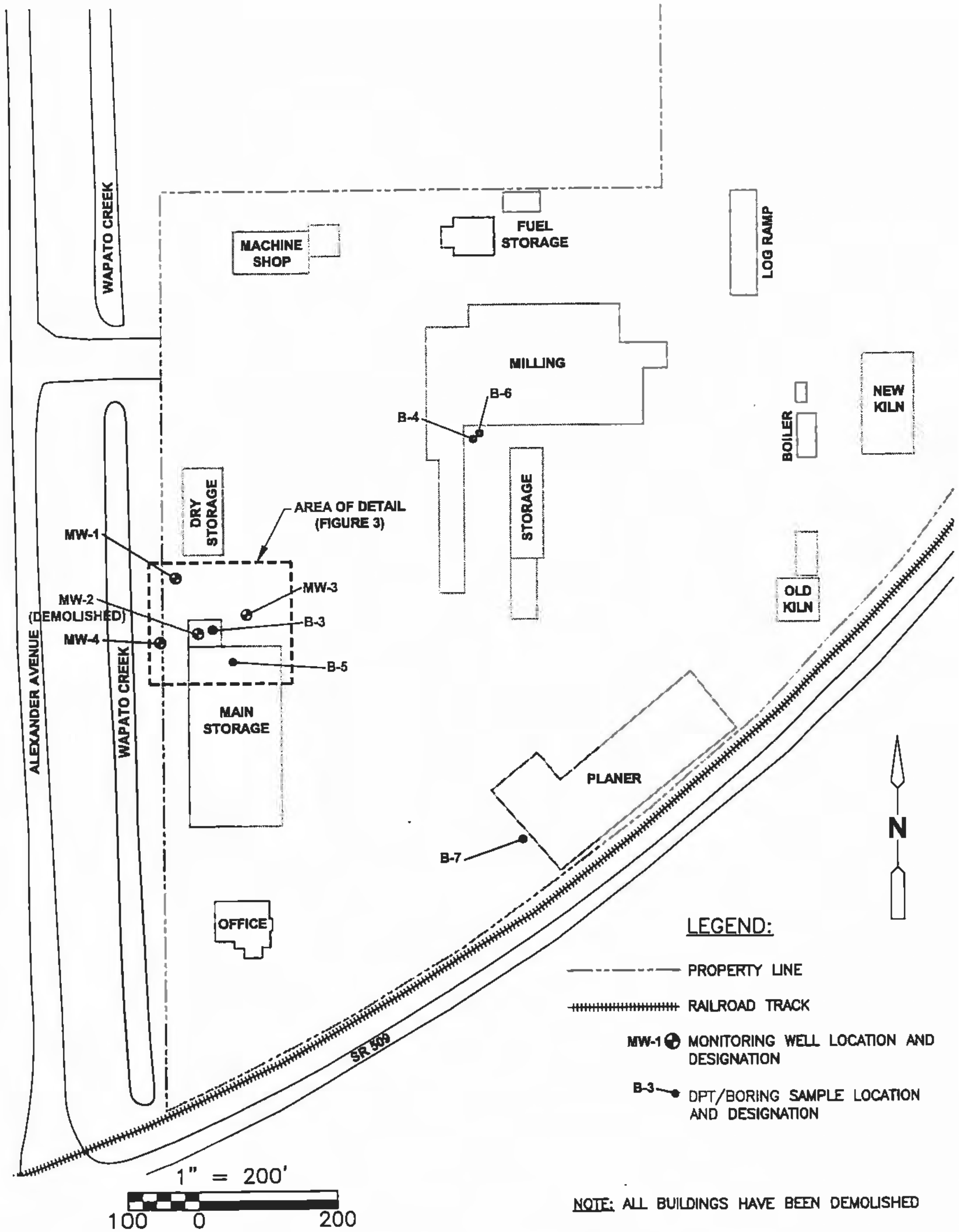
Portac Lumber
Portac Lumber Facility
Tacoma, Washington

CDM

Boring Log MW2
Project No: 68338.65020

Figure: 8
1 of 1

LOG OF BORING WITH WELL 68338-65020 BL.GPJ CDM_BLLV.GDT 7/14/08 REV



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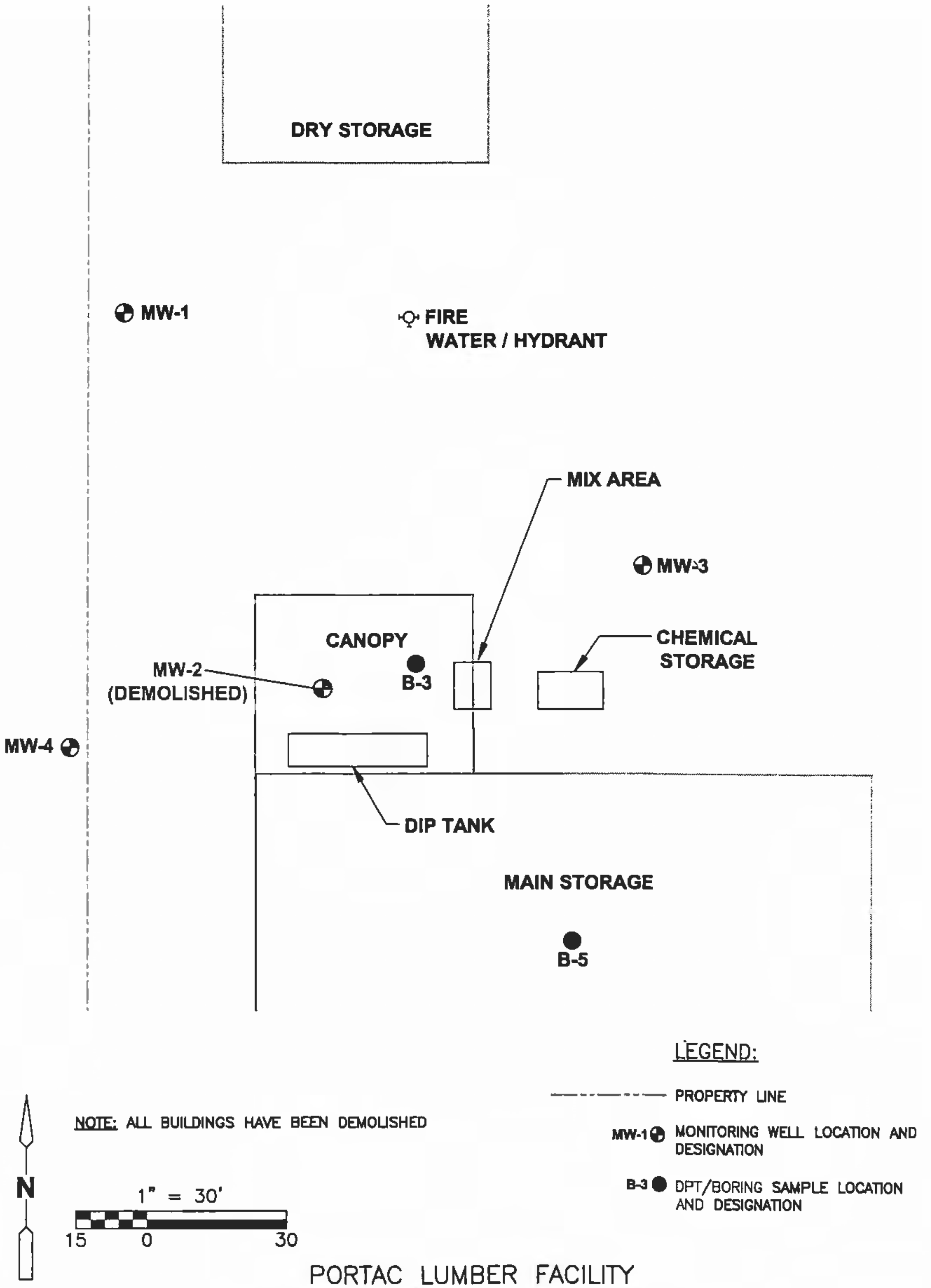
PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

Figure No. 2
Site Plan And
Exploration Map



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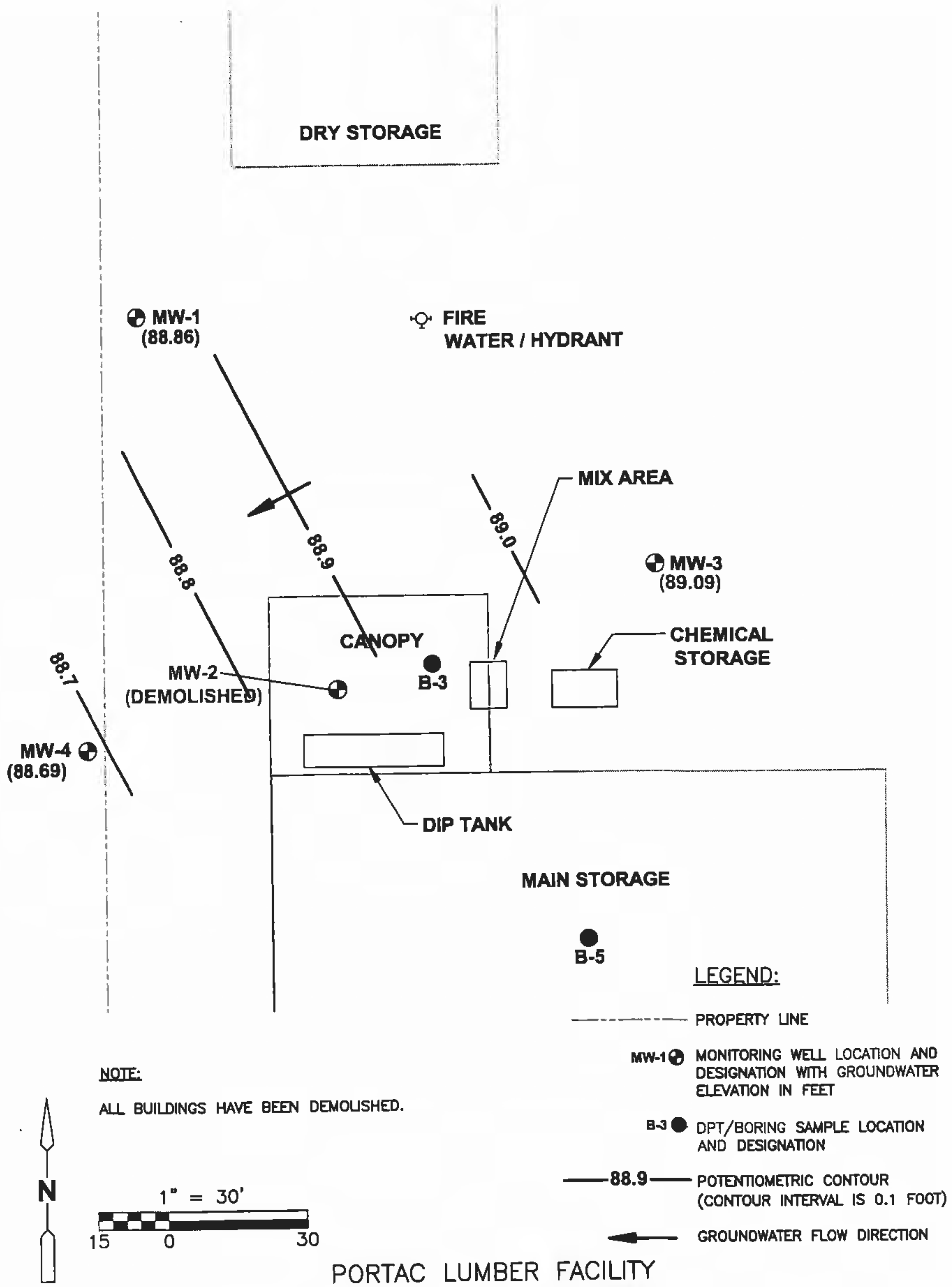
PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

Figure No. 3
Exploration Locations
Surrounding Dip Tank



NOTE:

ALL BUILDINGS HAVE BEEN DEMOLISHED.

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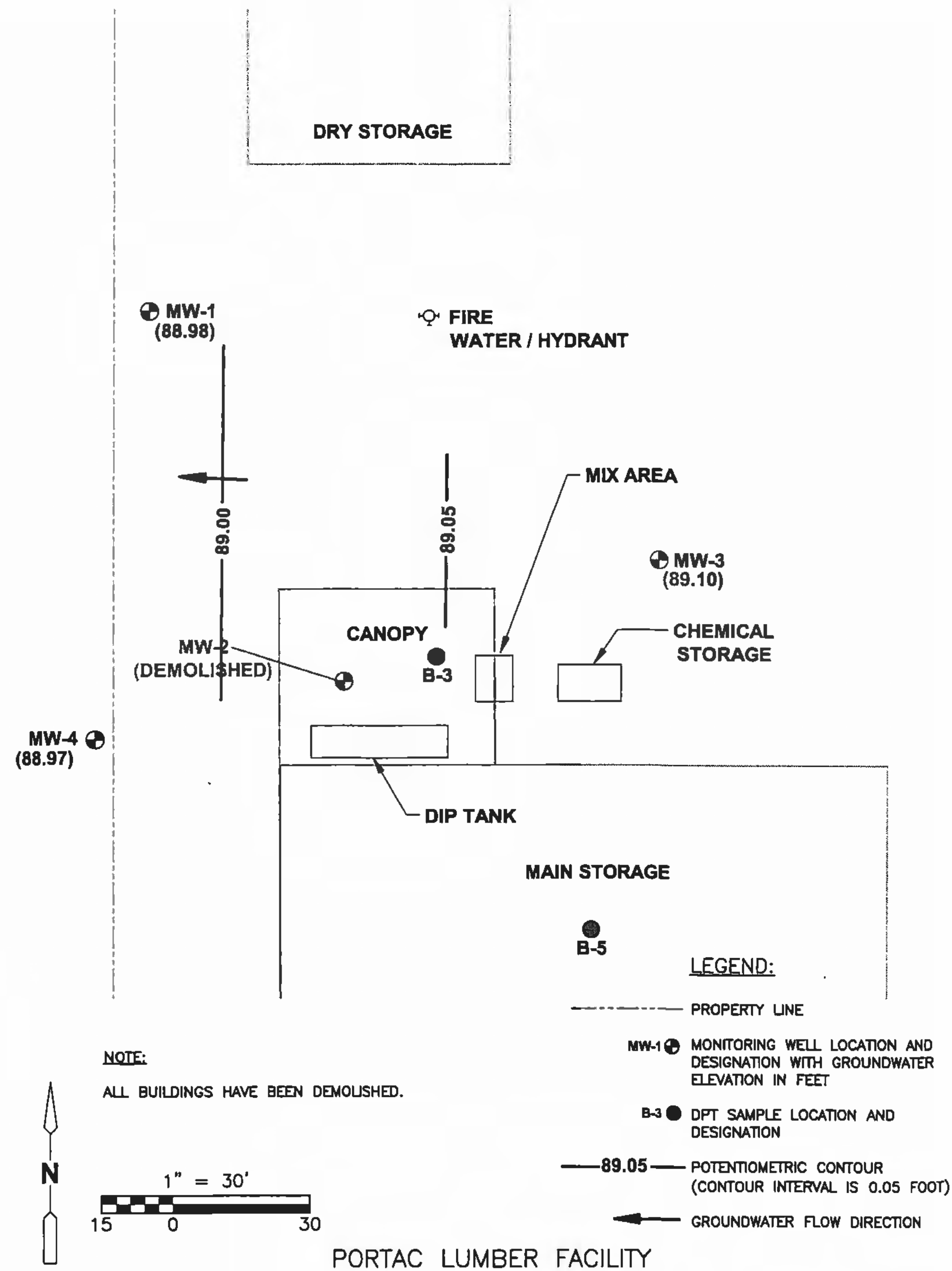
PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

Figure No. 4
Potentiometric Surface Map –
Low Tide Sept 23, 2008



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PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

Figure No. 5
Potentiometric Surface Map –
High Tide Sept 23, 2008

SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVELS More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM	Silty sand, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

SAMPLE TYPE SYMBOLS

- Disturbed bag or jar sample
- Std. Penetration Test (2.0" OD)
- Type U Ring Sampler (3.25" OD)
- California Sampler (3.0" OD)
- Undisturbed Tube Sample
- Grab Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)

CONTACT BETWEEN UNITS

- Change in geologic unit
- Soil type change within geologic unit
- Obscure or gradational change

DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing

Parting:	less than 1/16 in. (1/6 cm)
Seam:	1/16 to 1/2 in. (1/6 to 1 1/4 cm)
Layer:	1/2 to 12 in. (1 1/4 to 30 1/2 cm)
Stratum:	> 12 in. (30 1/2 cm)
Scattered:	< 1 per ft. (30 1/2 cm)
Numerous:	> 1 per ft. (30 1/2 cm)

Structure

Pocket:	Erratic, discontinuous deposit of limited extent
Lens:	Lenticular deposit
Varved:	Alternating seams of silt and clay
Laminated:	Alternating seams
Interbedded:	Alternating layers

General Attitude

Near horizontal:	0 to 10 deg.
Low angle:	10 to 45 deg.
High angle:	45 to 80 deg.
Near Vertical:	80 to 90 deg.

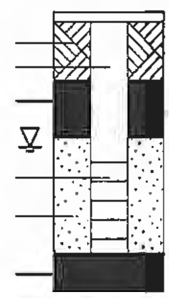
MOISTURE DESCRIPTION

- Dry - Free of moisture, dusty
- Moist - Damp but no visible free water
- Wet - Visible free water, saturated

STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogeneous	Same color and appearance throughout

WELL COMPLETIONS



RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str. (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	Over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

PHYSICAL PROPERTY TEST

- AL - Atterberg Limits
- FC - Fines Content
- GSD - Grain Size Distribution
- MC - Moisture Content
- MD - Moisture Content/Dry Density
- Comp - Compaction Test (Proctor)
- SG - Specific Gravity
- CBR - California Bearing Ratio
- RM - Resilient Modulus
- Perm - Permeability
- TXP - Triaxial Permeability
- Cons - Consolidation
- Chem - Analytical Chemical Analysis
- Corr - Corrosion
- VS - Vane Shear
- DS - Direct Shear
- UC - Unconfined Compression
- TX - Triaxial Compression
- UU - Unconsolidated, Undrained
- CU - Consolidated, Undrained
- CD - Consolidated, Drained

Notes:

1. Sample descriptions in this report are based on visual field and laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.

2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines.

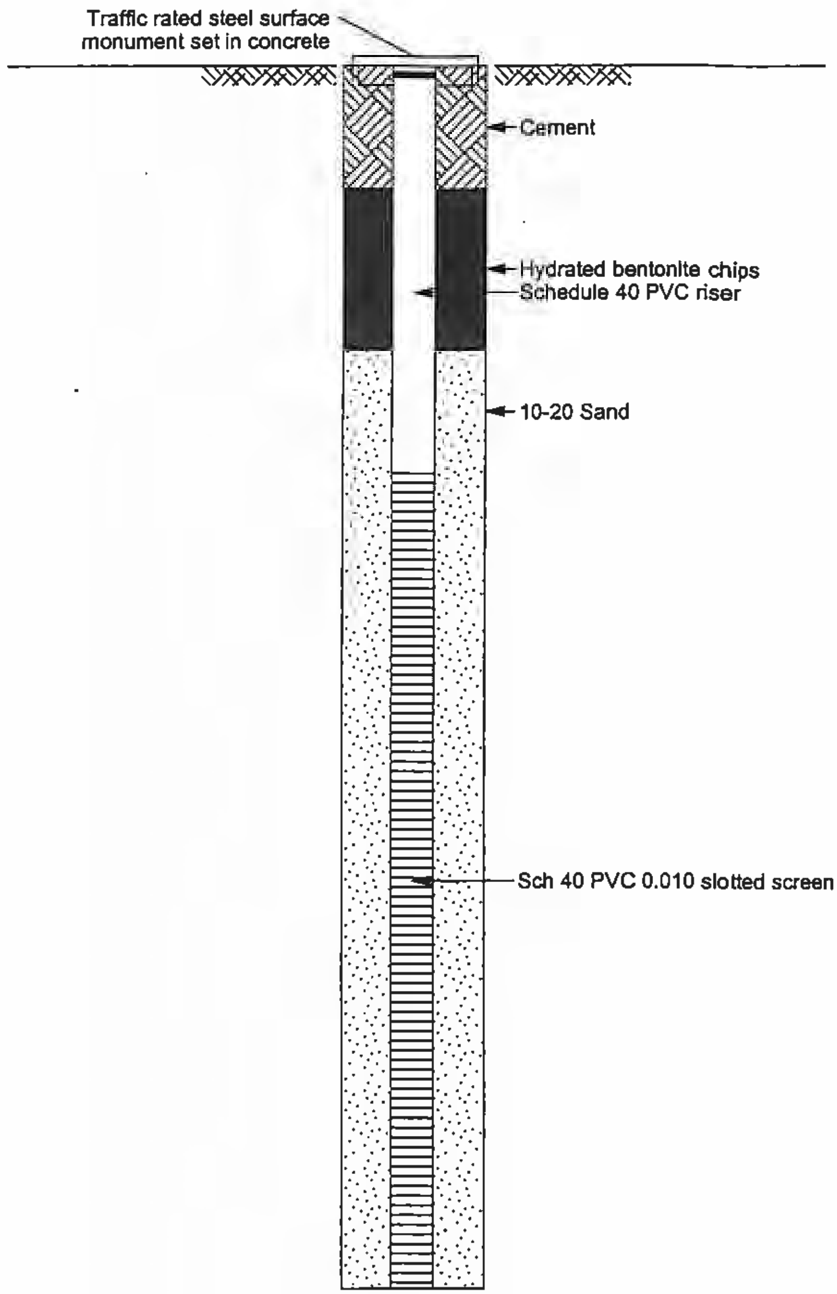
3. WOR = weight of rod.

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

Project No: 68338.65020 Figure: B1

CDM

SOIL CLASSIFICATION/LEGEND 68338-65020 BL.GPJ CDM BLLV.GDT 10/7/08 REV.



MONITORING WELL CONSTRUCTION 68338-65020 BL.GPJ CDM_BLLV.GDT 10/7/08 REV.

TYPICAL MONITORING WELL CONSTRUCTION

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

Project No: 68338.65020 Figure: B2
1 of 1

CDM

Boring Log MW3

Other Tests	Sample No	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
						0–2.5		GM		Sandy GRAVEL (GM), gray, dense, dry.		
				0		2.5–5		SP		SAND (SP), dark gray, fine grained, moist.		
				0		5–7.5		ML		SILT (ML), dark gray, medium stiff, moist, some fine organics.		
						7.5				Seepage at 7.5 ft bgs.		
				0		7.5–14.5		SP		SAND (SP), dark gray, fine grained, medium dense.		
				0		10				Becomes saturated, some silt.		
						12.5				Occasional silt lenses.		
						14.5–15		ML		SILT (ML), dark gray, some fine sand, soft, wet.		
						15				Boring terminated at 15 ft bgs. Groundwater encountered at 10 ft bgs.		

Depth scale: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

Location:
Surface Elevation:
Logged By: PJM

Drill Rig: DPT
Equipment/Hammer: /
Date Completed: 9-8-08

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

CDM

Boring Log MW3
Project No: 68338.65020

Figure: B3
1 of 1

Boring Log MW4

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0–2	SP	Gravelly SAND (SP), gray, fine to coarse grained, trace silt, fine to medium rounded gravel, medium dense, dry.	
				0		2–5	SP	SAND (SP), brown, fine grained, trace silt, moist.	
						5–6	ML	SILT (ML), gray-brown, stiff, moist, with organic mottling and fine organics.	
				0		6–7	SP	SAND (SP), gray-brown, fine grained, loose, moist, iron mottled.	
				0		7–8.5	ML	SILT (ML), gray, with very fine sand, soft, wet, few very fine organics.	
						8.5–15	SP	SAND (SP), dark gray, fine grained, loose, saturated. With silty SAND interlayers, pocket of iron staining. With occasional fine gravel.	
						15		Boring terminated at 15 ft bgs. Groundwater first observed at 8.5 ft bgs.	

Well or Piezometer Completion

Location:
Surface Elevation:
Logged By: PJM

Drill Rig: DPT
Equipment/Hammer: /
Date Completed: 9-8-08

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

CDM

Boring Log MW4
Project No: 68338.65020

Figure: B4
1 of 1

LOG OF BORING WITH WELL 68338-65020 BL.GPJ CDM_BLLV.GDT 10/8/08 REV.

Boring Log B5

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						0–0.2				Asphalt.	
								GP		GRAVEL (GP), coarse.	
						2		SP		SAND (SP), dark gray, fine grained, medium dense, moist (first 6" silty).	
				1							
						4					
				1				ML		SILT (ML), dark brown, medium stiff, moist, with fine organics and black mottling.	
						6				Sandy at 6-7 ft bgs.	
										Becomes mottled.	
				1		8					
						10		SM		Interlayered SAND/Silty SAND (SP-SM), dark gray, fine gravel, loose, saturated. Greenish discoloration at 10 ft bgs.	
						12					
						14					
						16				Boring terminated at 15 ft bgs. Groundwater encountered at 10 ft bgs. Temporary well screen set at 12-15 ft bgs.	
						18					
						20					
						22					
						24					

Location: ________

Surface Elevation: ________

Logged By: PJM

Drill Rig: DPT

Equipment/Hammer: /

Date Completed: 9-8-08

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

Boring Log B5
Project No: 68338.65020

Figure: B5
1 of 1

CDM

Boring Log B6

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0		No recovery.	
						6	SP	SAND (SP), dark gray, fine grained, trace silt, loose, moist.	
				2		7	ML	SILT (ML), dark gray, medium dense, moist.	
				2		8		Becomes wet at 8 ft bgs.	
						10.5	SP	SAND (SP), dark gray, fine grained, some silt, loose, saturated.	
						13		With silty interlayers.	
						15		Boring terminated at 15 ft bgs. Groundwater encountered at approximately 10 ft bgs. Temporary well screen set at 10-15 ft bgs.	

Location: ________
Surface Elevation: ________
Logged By: PJM

Drill Rig: DPT
Equipment/Hammer: /
Date Completed: 9-8-08

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

CDM

Boring Log B6 — Figure: B6
Project No: 68338.65020 — 1 of 1

Boring Log B7

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						0				Asphalt.	
								GP		Gravel.	
						2		ML		SILT (ML), brown, mottled, medium stiff, moist.	
				0		4					
				0		6		SP		SAND (SP), brown, fine grained, trace silt, loose, moist.	
										4" silt lens at ~7 ft bgs.	
						8				Becomes gray-brown, trace silt.	
						10				Becomes dark gray, saturated.	
						15				Boring terminated at 15 ft bgs. Temporary well screen set at 10-15 ft bgs.	

Depth scale: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

Location:
Surface Elevation:
Logged By: PJM

Drill Rig: DPT
Equipment/Hammer: /
Date Completed: 9-8-08

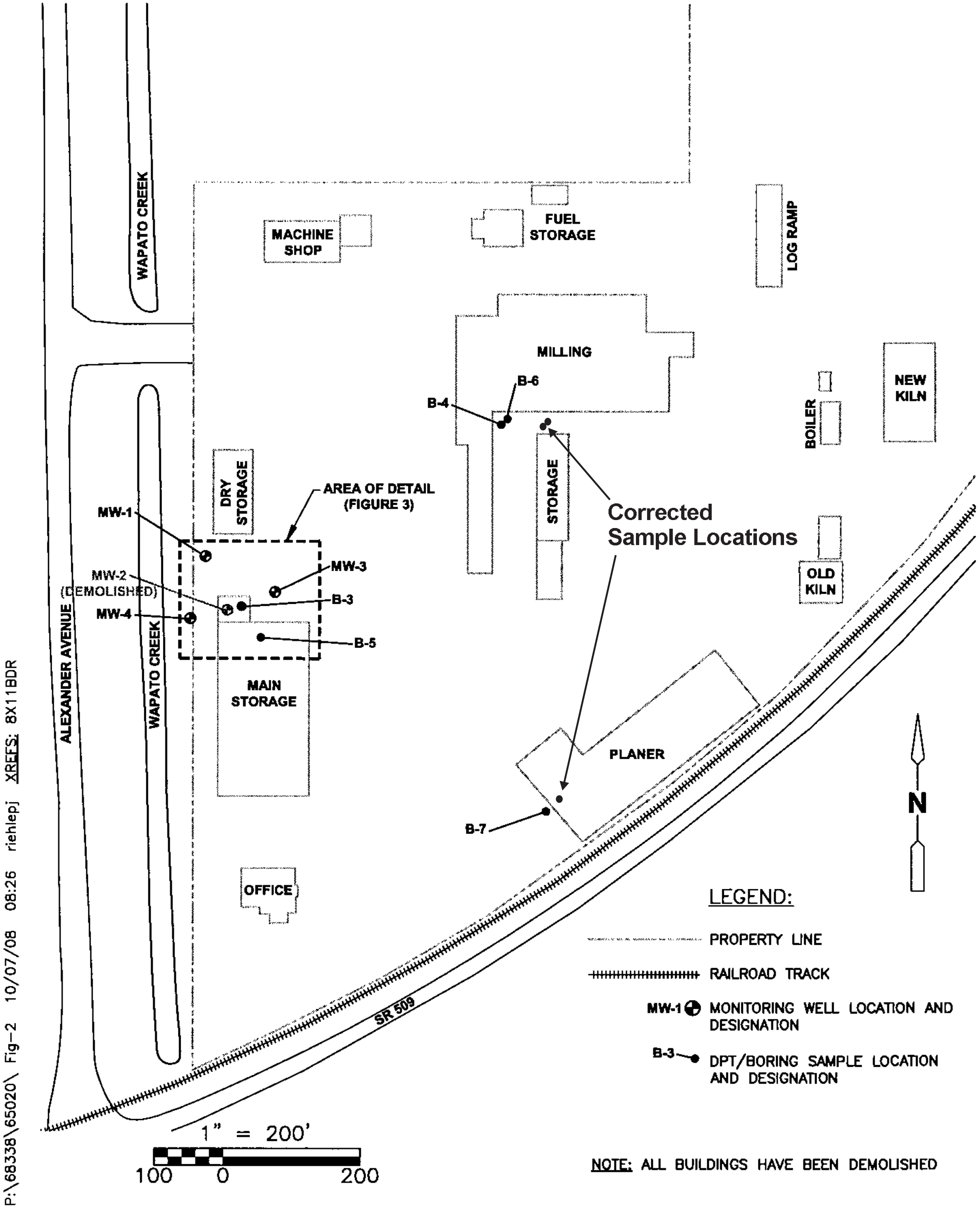
CDM

Portac Lumber
Portac Lumber Facility
Tacoma, Washington

Boring Log B7
Project No: 68338.65020

Figure: B7
1 of 1

LOG OF BORING WITH WELL 68338-65020 BL.GPJ CDM_BLLV.GDT 10/7/08 REV.



PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

REVISED

Figure No. 2
Site Plan And
Exploration Map

WES Figure 3

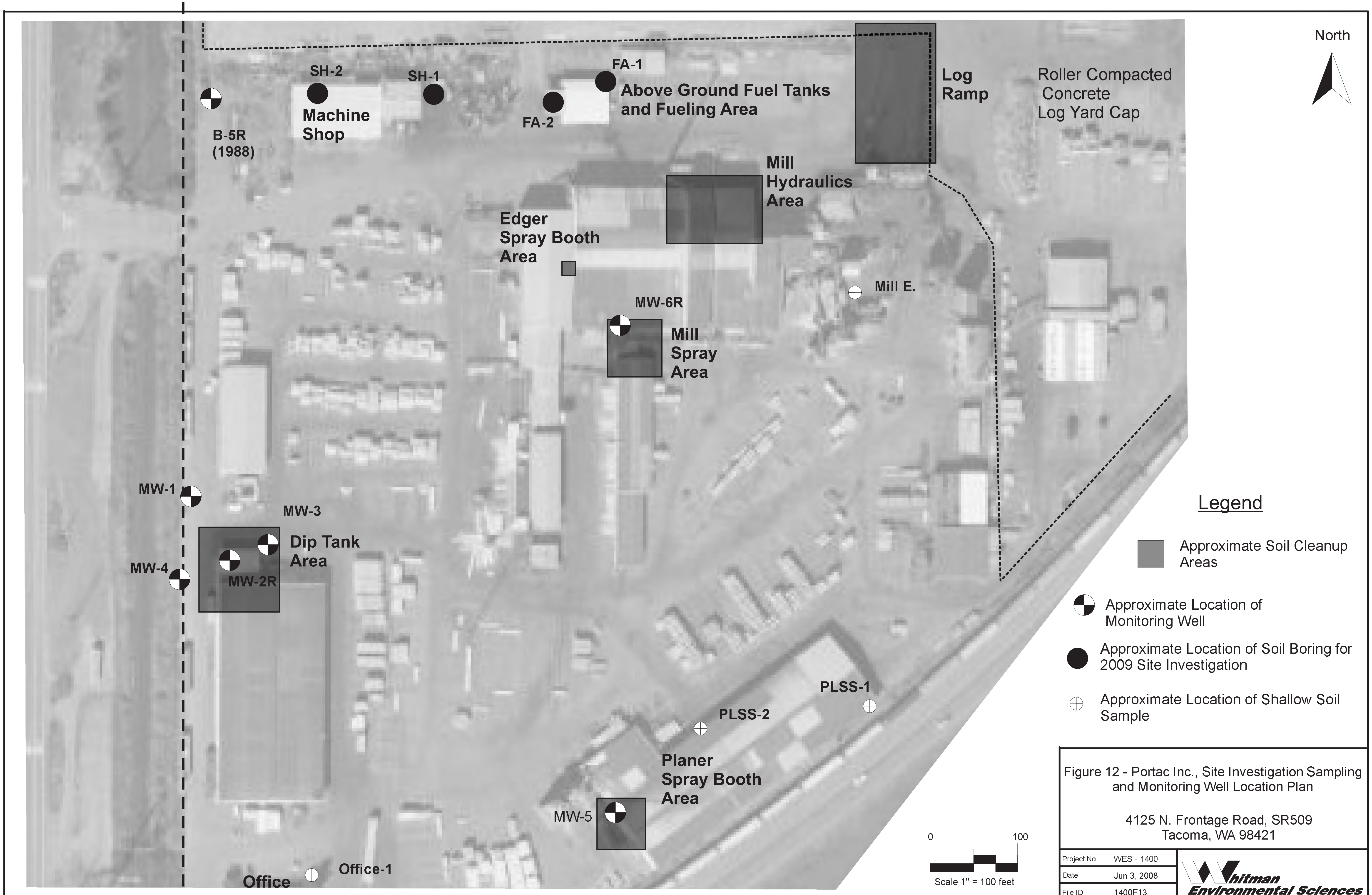


Figure 12 - Portac Inc., Site Investigation Sampling and Monitoring Well Location Plan

4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project:	Client:	Boring: MW-5
Portac Inc. Planer Building 4215 N. Frontage Rd., SR 509 Tacoma, WA 98424	Portac Inc.	
	Driller: Holocene Drilling / Method: Hollow-Stem Auger	Project No. WES-1400
	Elevation: 99.04 / Reference: MW-4 = 100.00	

Soil Description

No.	Type	Depth	Recovery	N	Lab Sample
1	SS	5.0 – 6.5	12"	4	NA
2	SS	10.0 – 11.5	6"	6	NA
3	SS	15.0 – 16.5	12"	10	NA

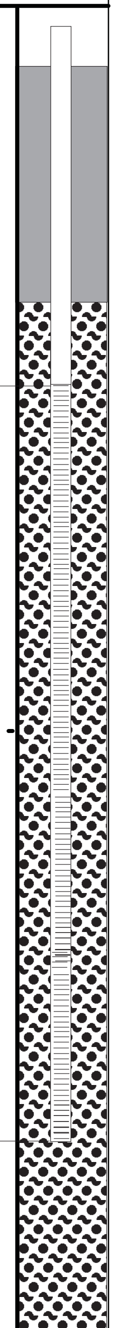
Greyish brown SAND with trace silt, moist. FILL. Layers of clean, poorly graded fine to medium sand No discoloration, odors or sheen.

Greyish brown SILT, interlayered with zones of fine SAND,with root fibers and organics. Large wood piece in sampler. Drill action indicates wood from 10-13' bgs. Moist to wet. Natural tide flats deposits.

Installed 2" PVC monitoring well with 10 ft long screen section, surrounded by #10-20 silica sand filter material. Bentonite seal and steel monument installed at ground surface.

End of Boring at 17.5 Feet Below Ground Surface.

Depth scale: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19



Date Drilled: 10-11-2008

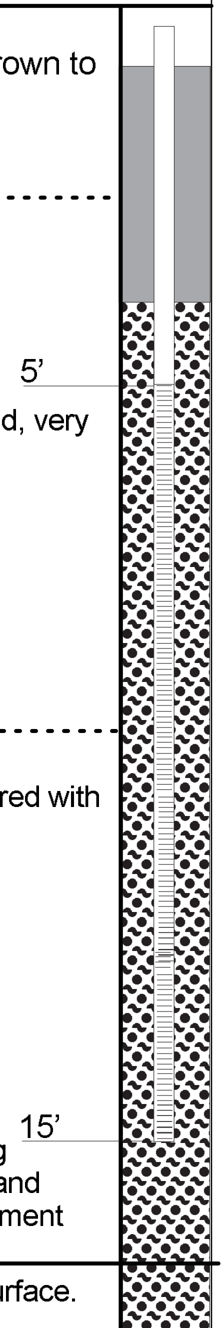
Water Level Data	Depth	Date/Time
First Encountered:	11'	10/11/08
Stabilized:	8.98' btop	12-3-08/1:10pm

Whitman Environmental Sciences

Project:	Client:	Boring: MW-6
Portac Inc. Sawmill Building 4215 N. Frontage Rd., SR 509 Tacoma, WA 98424	Portac Inc.	
	Driller: Holocene Drilling / Method: Hollow-Stem Auger	Project No. WES-1400
	Elevation: -- / Reference: MW-4 = 100.00	

Sample Data					Lab	Soil Description
No.	Type	Depth	Recovery	N	Sample	
						Silty fine to coarse SAND with gravel, brown to greyish brown. Moist. FILL.
1	SS	5.0–6.5	18"	1	NA	Dark greyish brown clayey SILT with fine sand, very moist. Some layering of silty fine sand.
2	SS	10.0–11.5	18"	1	NA	Dark greyish brown silty fine SAND, interlayered with zones of silt. Moist to wet. Natural tide flats deposits.
3	SS	15.0–16.5	12"	3	NA	Installed 2" PVC monitoring well with 10 ft long screen section, surrounded by #10-20 silica sand filter material. Bentonite seal and steel monument installed at ground surface.
						End of Boring at 16.5 Feet Below Ground Surface.

Depth scale: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19



MONITORING WELL DESTROYED BY EXCAVATION ON 11-6-08

Date Drilled:	Water Level Data	Depth	Date/Time
10-11-2008	First Encountered:	10'	10/11/08
	Stabilized:		

Whitman Environmental Sciences

Project:	Client:		Boring:
Portac Inc. Sawmill Building 4215 N. Frontage Rd., SR 509 Tacoma, WA 98424	Portac Inc.		MW-6R
	Driller: Holocene Drilling	Method: Hollow-Stem Auger	Project No. WES-1400
	Elevation: --	Reference: MW-4 = 100.00	

Sample Data

No.	Type	Depth	Recovery	N	Lab Sample
1	SS	2.5–4.0	6”	18	Lead, Arsenic
2	SS	5.0–6.5	3”	5	NA
3	SS	7.5–9.0	8”	4	NA
4	SS	10.0–11.5	12”	6	Penta chloro phenol
5	SS	12.0–13.5	18”	16	NA
6	SS	15.0–16.5	12”	23	NA

Soil Description

Depth scale (ft): 1–19

0–2: Crushed concrete fill with silty fine to coarse sand and gravel. Greyish brown. Moist. FILL.

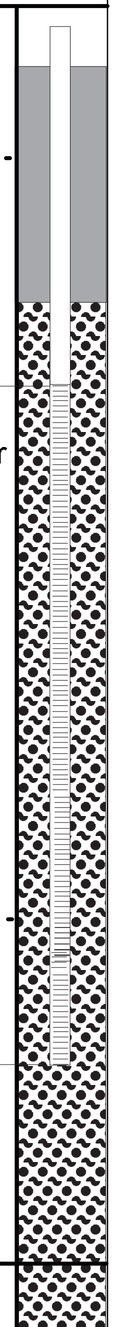
2–12: Dark black to greyish brown clayey fine SAND, with organics, very moist. Some layering of SILT. No odor or discoloration.

12–16.5: Dark greyish brown medium SAND, trace silt, inter-layered with zones of silt. Possible dredge spoils. Moist to wet.

Installed 2” PVC monitoring well with 9 ft. long screen section, surrounded by #10-20 silica sand filter material. Bentonite seal and steel monument installed at ground surface.

End of Boring at 16.5 Feet Below Ground Surface.

5’



14’

Date Drilled: 4-22-2009

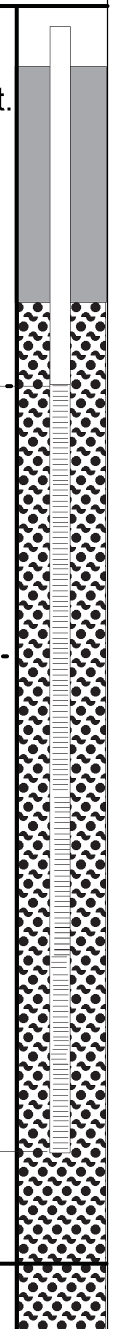
Water Level Data	Depth	Date/Time
First Encountered:	10’	4/22/09
Stabilized:		

Whitman Environmental Sciences

Project:	Client:	Boring:
Portac Inc. Dip Tank Area 4215 N. Frontage Rd., SR 509 Tacoma, WA 98424	Portac Inc.	MW-2R
	Driller: Holocene Drilling / Method: Hollow-Stem Auger	Project No.
	Elevation: -- / Reference: MW-4 = 100.00	WES-1400

Sample Data No.	Type	Depth	Recovery	N	Lab Sample	Soil Description
						Crushed concrete fill with silty fine to coarse sand and gravel. Brown to greyish brown. Moist. FILL.
1	SS	2.5 – 4.0	3”	17	NA	
						5’
2	SS	5.0 – 6.5	0	10	NA	Coarse rounded gravel in cuttings (excavation backfill), no recovery during sampling.
3	SS	7.5 – 9.0	0	14	NA	Driller notes smoother drill action at 8.5’.
4	3” SS	10.0 – 11.5	12”	15	PCP/ Dioxins	Dark greyish brown clayey fine SAND, very moist to wet. No odor or discoloration.
5	3” SS	12.0 – 13.5	18”	9	NA	
						15’
6	SS	15.0 – 16.5	18”	7	NA	
						End of Boring at 16.5 Feet Below Ground Surface.
						Installed 2” PVC monitoring well with 10 ft. long screen section, surrounded by #10-20 silica sand filter material. Bentonite seal and steel monument installed at ground surface.

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19



Date Drilled:

4-22-2009

Water Level Data	Depth	Date/Time
First Encountered:	10’	4/22/09
Stabilized:		

Whitman Environmental Sciences

Project:	Client:	Boring:
Portac Inc. Machine Shop 4215 N. Frontage Rd., SR 509 Tacoma, WA 98424	Portac Inc.	SH-1
	Driller: Holocene Drilling / Method: Hollow-Stem Auger	Project No. WES-1400
	Elevation: -- / Reference: MW-4 = 100.00	

Sample Data No.	Type	Depth	Recovery	N	Lab Sample	Depth (ft)	Soil Description
						0	4” Asphalt Surface
						1–2	Crushed gravel base layer with silty fine to coarse sand. Greyish brown. Moist. FILL.
1	3” SS	2.5–4.0	12”	34	Lead, Arsenic TPH-G VOCs TPH-D	2–4.5	Grey to greyish brown silty fine SAND, interlayered with thin silty sand zones, moist. No odor or discoloration. Possible FILL.
						4.5–5.5	Grey clayey SILT, moist to wet. No odor or discoloration. Possible dredge spoils FILL.
2	3” SS	5.0–6.5	3”	13	NA	5.5–7	Black clayey organic SILT with root fibers, moist to wet, slight organic musty odor. Possible buried topsoil layer.
3	3” SS	7.5–9.0	8”	22	NA	7–9	Grey to greyish brown silty fine SAND and inter-layered SILT, wet. No odor or discoloration. Most likely native tideflats sediment.
						9	End of Boring at 9 Feet Below Ground Surface.
						15	Backfilled boring with bentonite chips, concrete plug at ground surface.

Date Drilled: 4-22-2009

Water Level Data	Depth	Date/Time
First Encountered:	9’	4/22/09
Stabilized:		

Whitman Environmental Sciences

Project:	Client:	Boring:
Portac Inc. Machine Shop 4215 N. Frontage Rd., SR 509 Tacoma, WA 98424	Portac Inc.	SH-2
	Driller: Holocene Drilling / Method: Hollow-Stem Auger	Project No. WES-1400
	Elevation: -- / Reference: MW-4 = 100.00	

Sample Data No.	Type	Depth	Recovery	N	Lab Sample	Depth (ft)	Soil Description
						0–1.5	Crushed concrete layer with silty fine to coarse sand. Greyish brown. Moist. FILL.
1	3" SS	2.5–4.0	18"	25	NA	1.5–7	Brown fine to medium SAND, trace silt (Individual sand grains clearly visible). Moist. No odor or discoloration. Possible dredge spoils FILL.
2	3" SS	5.0–6.5	18"	21	NA		
3	3" SS	7.5–9.0	12"	13	TPH-G VOCs TPH-D	7–9	Dark grey SILT with silty fine SAND layers, root fibers. Moist to wet, no odor or discoloration.
						9	End of Boring at 9 Feet Below Ground Surface.
						15	Backfilled boring with bentonite chips, concrete plug at ground surface.

Date Drilled: 4-22-2009

Water Level Data	Depth	Date/Time
First Encountered:	9'	4/22/09
Stabilized:		

Whitman Environmental Sciences

Project:	Client:	Boring:
Portac Inc. Fueling Area 4215 N. Frontage Rd., SR 509 Tacoma, WA 98424	Portac Inc.	FA-1
	Driller: Holocene Drilling / Method: Hollow-Stem Auger	Project No. WES-1400
	Elevation: -- / Reference: MW-4 = 100.00	

No.	Type	Depth	Recovery	N	Lab Sample	Depth (ft)	Soil Description
						0–2.5	Crushed concrete layer with silty fine to coarse sand. Greyish brown. Moist. FILL.
1	3" SS	2.5–4.0	18"	22	TPH-G, BTEX, TPH-D	2.5–5	Dark grey to black silty fine SAND, with trace organic. 3" layer of discolored black soil near top of the sample, slight petroleum odor limited to that portion of sample. Possible FILL.
2	3" SS	5.0–6.5	15"	7	NA	5–9	Dark grey to greyish brown clayey fine SAND, with interlayered SILT, moist to wet. No odor or discoloration.
3	3" SS	7.5–9.0	18"	12	NA		Wet at 7.5' - 9' sample.
						9	End of Boring at 9 Feet Below Ground Surface.
						15	Backfilled boring with bentonite chips, concrete plug at ground surface.

Date Drilled: 4-22-2009

Water Level Data	Depth	Date/Time
First Encountered:	8'	4/22/09
Stabilized:		

Whitman Environmental Sciences

Project:	Client:	Boring:
Portac Inc. Fueling Area 4215 N. Frontage Rd., SR 509 Tacoma, WA 98424	Portac Inc.	FA-2
	Driller: Holocene Drilling; Method: Hollow-Stem Auger	Project No. WES-1400
	Elevation: --; Reference: MW-4 = 100.00	

Sample Data No.	Type	Depth	Recovery	N	Lab Sample	Depth (ft)	Soil Description
						1	Crushed concrete layer with silty fine to coarse sand. Greyish brown. Moist. FILL.
1	3" SS	2.5 – 4.0	18"	20	NA	2–5	Dark grey to greyish brown SILT, with organics, moist. Some layering of fine silty SAND. No odor or discoloration.
2	3" SS	5.0 – 6.5	15"	19	NA	5–9	Dark grey SILT, with fine sand, moist to wet. No odor or discoloration.
3	3" SS	7.5 – 9.0	18"	12	TPH-G BTEX TPH-D		Wet at 7.5' - 9' sample.
						9	End of Boring at 9 Feet Below Ground Surface.
						15	Backfilled boring with bentonite chips, and concrete plug at ground surface.

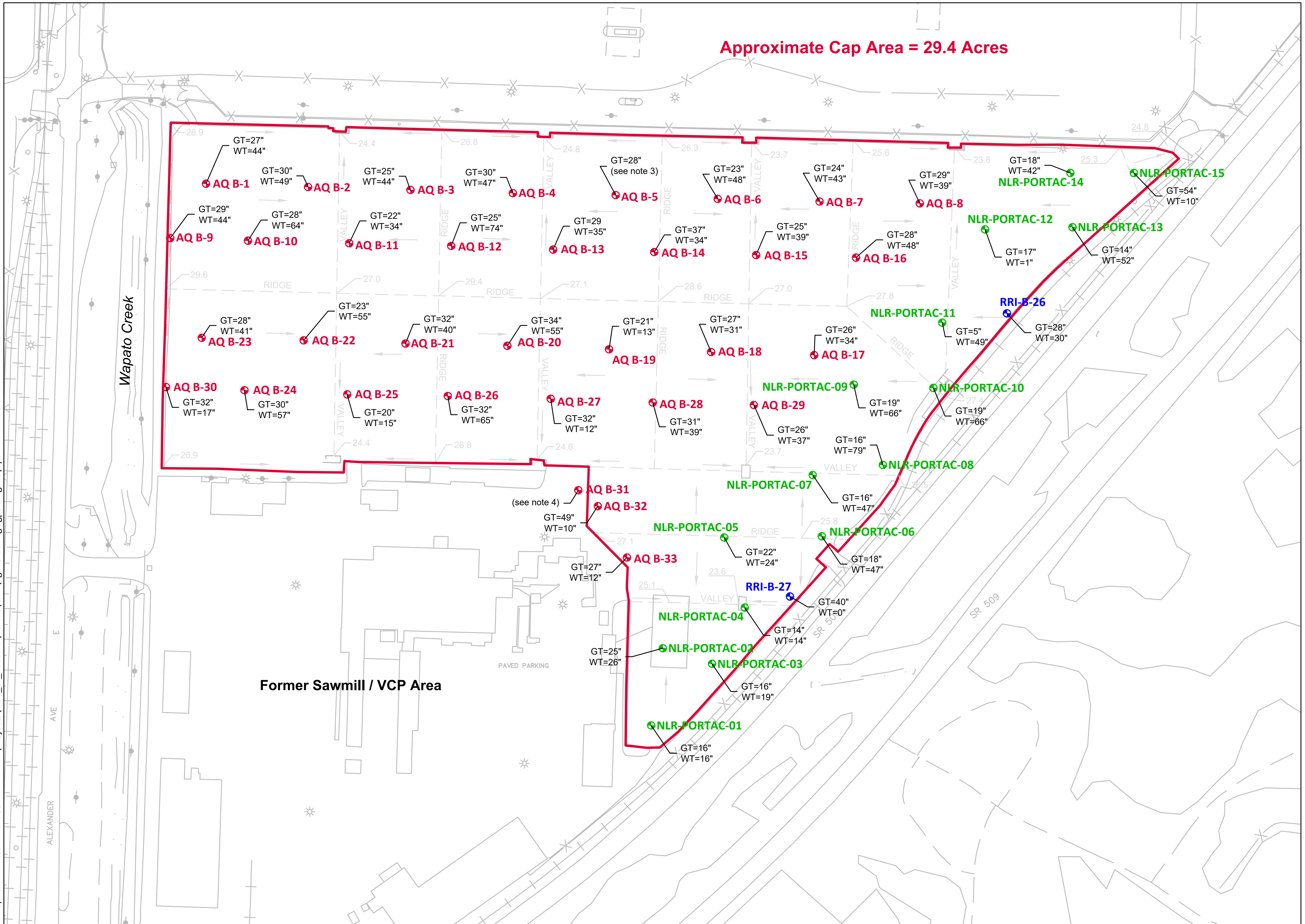
Depth scale: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Date Drilled:

4-22-2009

Water Level Data	Depth	Date/Time
First Encountered:	8'	4/22/09
Stabilized:		

Whitman Environmental Sciences



LEGEND:

B-26 Boring Location (Jacobs Engineering, 2011)

NLR-PORTAC-07 Boring Location (Landau Associates, 2013)

AQ B-29 Boring Location (AQ, 2014)

28.6 Grade break, spot elevation, and flow direction

GT: gravel thickness
WT: waste thickness
(see note 2)

0 200
Scale in Feet

NOTES:

1. All boring locations are approximate.
2. Thickness measurements are based on estimated insitu thickness.
3. Lower geoprobe sample was highly disturbed and waste thickness could not be determined.
4. No RCC cap, slag, or wood waste were encountered.
5. Grade breaks and spot elevations were taken from as-built plans for the Portac Log Sort Yard Paving Project, dated August, 1988.

Jun 25, 2014 11:20am heriksen T:\Projects\Port_of_Tacoma\Portac\CAD\figure borings gps.dwg F2 (2)

ANCHOR QEA

Figure 2
Boring Locations
Log Yard Soil Testing Report
Former Portac Inc. Site – Tacoma, Washington

Table 1
Summary of Measured Material Depths and Thicknesses

ring ID	Roller Compacted Concrete Thickness (inches)	Gravel Base Course Thickness (inches) [1]	Top of Fill Containing Slag (inches bgs)[1]	Top of Wood and Slag Layer (inches bgs)[1]	Bottom of Wood and Slag Layer (inches bgs)[1]	Bottom of Fill Containing Slag (inches bgs)[1]	Thickness of Wood and Slag Layer (inches)[1]	Thickness of Fill Containing Slag (inches)[1]	Comment
Previous Testing (Landau)									
Portac-01	16.8	15.6	32.4	32.4	48.0	48.0	15.6	15.6	No slag noted above or below wood layer
Portac-02	16.8	25.2	42.0	42.0	68.4	68.4	26.4	26.4	No slag noted above or below wood layer
Portac-03	16.8	15.6	32.4	32.4	51.6	51.6	19.2	19.2	No slag noted above or below wood layer
Portac-04	16.8	14.4	16.8	nd	nd	31.2	0.0	14.4	Gravel with trace slag (no wood)
Portac-05	14.4	21.6	14.4	nd	nd	38.4	0.0	24.0	Gravel with trace slag (no wood) 0.2' layer slag @ 3 to 3.2'
Portac-06	18.0	18.0	18.0	36.0	64.8	64.8	28.8	46.8	Trace slag in gravel above wood layer
Portac-07	18.0	15.6	18.0	33.6	51.6	64.8	18.0	46.8	Gravel with slag above and below wood layer
Portac-08	15.6	15.6	15.6	31.2	87.6	94.8	56.4	79.2	Gravel with slag above wood layer, slag and gravel below
Portac-09	16.8	19.2	16.8	36.0	74.4	82.8	38.4	66.0	Gravel with slag above and below wood layer
Portac-10	16.8	19.2	16.8	36.0	78.0	82.8	42.0	66.0	Gravel with slag above and below wood layer
Portac-11	21.6	4.8	21.6	26.4	48.0	70.8	21.6	49.2	Gravel with slag above and below wood layer
Portac-12	18.0	16.8	34.8	nd	nd	36.0	0.0	1.2	Sand with slag (no wood)
Portac-13	15.6	14.4	30.0	30.0	78.0	81.6	48.0	51.6	Gravel with slag below wood layer only
Portac-14	16.8	18.0	34.8	34.8	69.6	76.8	34.8	42.0	Gravel with slag below wood layer only
Portac-15	14.4	54.0	68.4	68.4	78.0	78.0	9.6	9.6	No slag noted above or below wood layer
RRI-B-26(X)	14.4	27.6	42.0	42.0	72.0	72.0	30.0	30.0	No slag noted above or below wood layer
RRI-B-27(X)	14.4	39.6	nd	nd	nd	nd	0.0	0.0	No slag or wood layer noted
Current Study (Anchor QEA)									
AQ-1	13.0	27.0	40.0	40.0	84.0	84.0	44.0	44.0	No slag observed above or below wood layer
AQ-2	13.0	30.0	43.0	43.0	81.0	92.0	38.0	49.0	Slag observed below wood layer
AQ-3	13.0	25.0	38.0	38.0	82.0	82.0	44.0	44.0	No slag observed above or below wood layer
AQ-4	13.0	30.0	43.0	43.0	90.0	90.0	47.0	47.0	No slag observed above or below wood layer
AQ-5	13.0	28.0	41.0	41.0	nv	nv	nv***	nv ***	Liner stuck in sampler, bottom sample was highly disturbed
AQ-6	13.0	23.0	36.0	36.0	84.0	84.0	48.0	48.0	No slag observed above or below wood layer
AQ-7	13.0	24.0	37.0	37.0	80.0	80.0	43.0	43.0	No slag observed above or below wood layer
AQ-8*	17.0	29.0	46.0	46.0	60.0	85.0	14.0	39.0	Slag observed below wood layer
AQ-9	14.0	29.0	43.0	43.0	87.0	87.0	44.0	44.0	No slag observed above or below wood layer
AQ-10	14.0	28.0	42.0	42.0	106.0	106.0	64.0	64.0	No slag observed above or below wood layer
AQ-11	14.0	22.0	36.0	36.0	59.0	70.0	23.0	34.0	Slag observed below wood layer
AQ-12	14.0	25.0	39.0	39.0	113.0	113.0	74.0	74.0	No slag observed above or below wood layer
AQ-13*	16.0	29.0	45.0	45.0	72.0	80.0	27.0	35.0	8" fill layer between slag and sand, slag observed below wood layer
AQ-14*	16.0	37.0	53.0	53.0	87.0	87.0	34.0	34.0	No slag observed above or below wood layer
AQ-15*	16.0	25.0	41.0	41.0	80.0	80.0	39.0	39.0	24" fill layer between slag and sand (fill sampled), no slag observed above or below wood layer
AQ-16	13.0	28.0	41.0	41.0	89.0	89.0	48.0	48.0	No slag observed above or below wood layer
AQ-17	14.0	26.0	40.0	40.0	74.0	74.0	34.0	34.0	No slag observed above or below wood layer
AQ-18	14.0	27.0	41.0	41.0	67.0	72.0	26.0	31.0	Slag observed below wood layer
AQ-19	14.0	21.0	35.0	35.0	48.0	48.0	13.0	13.0	28" fill layer between slag and sand (fill sampled), no slag observed above or below wood layer
AQ-20	13.0	34.0	47.0	47.0	90.0	102.0	43.0	55.0	Wood/slag layer grades to predominantly slag in bottom 1-foot
AQ-21	13.0	32.0	45.0	45.0	74.0	85.0	29.0	40.0	Wood/slag layer grades to predominantly slag in bottom 1-foot

Table 1
Summary of Measured Material Depths and Thicknesses

ring ID	Roller Compacted Concrete Thickness (inches)	Gravel Base Course Thickness (inches) [1]	Top of Fill Containing Slag (inches bgs)[1]	Top of Wood and Slag Layer (inches bgs)[1]	Bottom of Wood and Slag Layer (inches bgs)[1]	Bottom of Fill Containing Slag (inches bgs)[1]	Thickness of Wood and Slag Layer (inches)[1]	Thickness of Fill Containing Slag (inches)[1]	Comment
AQ-22	13.0	23.0	36.0	36.0	79.0	91.0	43.0	55.0	Wood/slag layer grades to predominantly slag in bottom 1-foot
AQ-23	13.0	28.0	41.0	41.0	82.0	82.0	41.0	41.0	No slag observed above or below wood layer
AQ-24	13.0	30.0	43.0	43.0	88.0	100.0	45.0	57.0	Wood/slag layer grades to predominantly slag in bottom 1-foot
AQ-25	13.0	20.0	33.0	33.0	48.0	48.0	15.0	15.0	No slag observed above or below wood layer
AQ-26	13.0	32.0	45.0	45.0	98.0	110.0	53.0	65.0	Wood/slag layer grades to predominantly slag in bottom 1-foot
AQ-27	14.0	32.0	46.0	46.0	58.0	58.0	12.0	12.0	No slag observed above or below wood layer
AQ-28	14.0	31.0	45.0	45.0	84.0	84.0	39.0	39.0	No slag observed above or below wood layer
AQ-29	14.0	26.0	40.0	40.0	77.0	77.0	37.0	37.0	No slag observed above or below wood layer
AQ-30	13.0	32.0	45.0	45.0	62.0	62.0	17.0	17.0	No slag observed above or below wood layer
AQ-31** (ramp area) *	nd	36.0	nd	nd	nd	nd	na ***	na***	No RCC, slag, or wood waste observed, samples collected and archived
AQ-32*	19.0	49.0	68.0	68.0	78.0	78.0	10.0	10.0	14" fill layer between sand and slag (fill sampled), no slag observed above or below wood layer
AQ-33*	18.0	27.0	45.0	45.0	57.0	57.0	12.0	12.0	No slag observed above or below wood layer
Average	**14.9**	**26.0**	**37.8**	**40.9**	**74.7**	**76.2**	**31.0**	**37.6**	Average thickness of layer containing slag (inches). Excludes invalid (disturbed) sample and sample from ramp area.
max	21.6	54.0	68.4	68.4	113.0	113.0	74.0	79.2	
min	13.0	4.8	14.4	26.4	48.0	31.2	0.0	0.0	

Notes:
[1] - Material depths and thicknesses are based on estimated *in situ* depths/thicknesses after correction for compaction/recovery in the core samples
bgs - Below ground surface
na - Not applicable for this material
nd - Material not detected / not present
nv - Not valid; disturbed sample
ramp - Sample located within ramp area adjacent to cap; no slag encountered
RCC - roller-compacted concrete
* - Includes asphalt overlay
** - No RCC present, only asphalt
*** - Value not included in average thickness calculations
- Gravel base course
- Fill containing slag

Direct-Push Soil Boring Log

AQ-B1

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705650.2 Easting: 1175594.2	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/13/14		
Contractor: Cascade Drilling		

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS
0–13	1		RCC	Concrete
13–40	2 (13–60)	Arsenic (24–34)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
40–84	2 / 3 (60–120)		WD	Black/dark brown WOOD WASTE with Slag and gravel, damp, geotextile fabric at 65 inches
84–120	3	Arsenic (84–90); Arsenic (90–96); Arsenic (96–102); Arsenic (102–108)	SP-SM	Gray-brown SAND (fine to medium) with some silt, damp, loose
120				End of soil boring at 120"

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Notes:
1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B2

Sheet 1 of 1

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705643.8 Easting: 1175793.7	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/13/14		
Contractor: Cascade Drilling		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–13	1		RCC	Concrete
13–43	2	Arsenic (30–36)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
43–81	2 (to 60); 3 (60–120)		WD	Black/dark brown WOOD WASTE with Slag and gravel, moist, geotextile fabric at 74 inches
81–92	3		GM	Dark gray GRAVEL and SLAG
92–120	3	Arsenic (92–98); Arsenic (98–104); Arsenic (104–110); Arsenic (110–116)	SP-SM	Gray-brown SAND (fine to medium) with some silt, damp, loose
120				End of soil boring at 120"

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Notes:
1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B3

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705.638.1 Easting: 1175993.7	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/13/14		
Contractor: Cascade Drilling		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–13	1		RCC	Concrete
13–38	2	Arsenic (26–32)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
38–63	2 (to 60); 3 (from 60)	Arsenic, TCLP Metals (50–56)	WD	Black/dark brown WOOD WASTE with Slag, moist
63–68	3		GP	Gray Gravel, course, wet
68–82	3		WD	Black/dark brown WOOD WASTE with Slag, damp
82–120	3	Arsenic (82–88); Arsenic (88–94); Arsenic (94–100); Arsenic (100–106)	SP	Gray-brown SAND (fine to medium) with trace silt and roots, damp, loose
120				End of soil boring at 120"

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Notes:
1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B4

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705631.7** Easting: **1176193.7**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/13/14**		
Contractor: **Cascade Drilling**		

Recovered Depth (in)	Sample Interval	Chemical Analysis	Graphic Log	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS	Sample Recovery	Recovered Depth (in)
0–13	1			RCC	Concrete		
13–43	2	Arsenic		GM	Light gray angular GRAVEL with silt and sand, dry, dense		
43–90	2 / 3			WD	Black/dark brown WOOD WASTE with Slag, damp		
90–120	3	Arsenic Arsenic Arsenic Arsenic		SP	Gray-brown SAND (fine to medium) with trace silt, damp, loose		
120					End of soil boring at 120"		

Depth scale: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B5

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705628** Easting: **1176394.5**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/13/14**		
Contractor: **Cascade Drilling**		

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS
0–13	1		RCC	Concrete
13–41	2	Arsenic (29–35)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
41–52	2		WD	Black/dark brown WOOD WASTE with Slag, damp
52–60	2		GM	Black GRAVEL and tar-like material, dense
60–90	3		GM	Gray rounded to sub-rounded GRAVEL, course
90–120	3	Arsenic (90–96); Arsenic (96–102)	SP-SM	Gray-brown SAND (fine to medium) with some silt, damp, loose
120				End of soil boring at 120"

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Notes:
1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples
3. Bottom sample (5 to 10-foot) was disturbed, liner stuck in sampler.

Direct-Push Soil Boring Log

AQ-B6

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705620.7** Easting: **1176593.8**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/13/14**		
Contractor: **Cascade Drilling**		

Recovered Depth (in)	Sample Interval	Chemical Analysis	Graphic Log	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS	Sample Recovery	Recovered Depth (in)
0–13	1			RCC	Concrete		0–13
13–36	2 (13–60)	Arsenic (24–30)		GM	Light gray angular GRAVEL with silt and sand, dry, dense		13–36
36–84	2 (13–60); 3 (60–120)	Arsenic, TCLP Metals (48–58)		WD	Black/dark brown WOOD WASTE with Slag, moist		36–84
84–120	3 (60–120)	Arsenic (84–90); Arsenic (90–96); Arsenic (96–102)		SP	Gray-brown SAND (fine to medium) with trace silt, moist, loose		84–120
120					End of soil boring at 120"		120

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

Sheet 1 of 1

AQ-B7

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705615.4** Easting: **1176792.8**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/13/14**		
Contractor: **Cascade Drilling**		

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–13	1		RCC	Concrete
13–37	2 (13–60)	Arsenic (25–31)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
37–80	2 / 3 (60–120)		WD	Black/dark brown WOOD WASTE with Slag, moist
80–116	3	Arsenic (80–86); Arsenic (86–92); Arsenic (92–98)	SP-SM	Gray-brown SAND (fine to medium) with some silt, moist, loose
116–120	3		ML	Gray-brown SILT, moist, dense
120				End of soil boring at 120"

Soil Description: Samples and descriptions are in recovered depths. Classification scheme based on USCS

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B8

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705611.8 Easting: 1176988.6	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/13/14		
Contractor: Cascade Drilling		

Recovered Depth (in)	Sample Interval	Chemical Analysis	Graphic Log	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS	Sample Recovery	Recovered Depth (in)
0	1			AS	Asphalt		0
10				RCC	Concrete		10
20	2			GM	Light gray angular GRAVEL with silt and sand, dry, dense		20
30–40		Arsenic					30–40
50				WD	Black/dark brown WOOD WASTE with Slag, moist		50
60–80	3			GM	Black SLAG and Gravel with trace wood waste		60–80
90–110		Arsenic Arsenic		SP	Gray-brown SAND (fine to medium) with trace silt, wet, loose		90–110
120					End of soil boring at 120"		120

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B9

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705543.9** Easting: **1175524.4**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/14/14**		
Contractor: **Cascade Drilling**		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–14	1		RCC	Concrete
14–43	2	Arsenic (31–37)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
43–56	2		WD	Black/dark brown WOOD WASTE with Slag, moist
56–67	2		GP	Gray rounded to sub-rounded GRAVEL with sand, course
67–87	2 (to 74), 3		WD	Black/dark brown WOOD WASTE with Slag some course gravel at 82 inches, slag content increases with depth, damp
87–120	3	Arsenic (87–93); Arsenic (93–99); Arsenic (99–105)	SP-SM	Gray-brown SAND (fine to medium) with some silt, damp, loose
120				End of soil boring at 120"

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B10

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705539 Easting: 1175676.2	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/14/14		
Contractor: Cascade Drilling		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–14	1		RCC	Concrete
14–42	2	Arsenic (30–36)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
42–67	2		WD	Black/dark brown WOOD WASTE with Slag, moist
67–75	2		GM	Gray sub-angular to sub-rounded GRAVEL with silt and sand, course
75–106	3		WD	Black/dark brown WOOD WASTE with Slag, slag content increases with depth, moist
106–120	3	Arsenic (106–112); Arsenic (112–118); Arsenic (118–120)	SP	Gray-brown SAND (fine to medium) with trace silt, damp, loose
120				End of soil boring at 120"

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

Sheet 1 of 1

AQ-B11

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705534 Easting: 1175874.1	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/14/14		
Contractor: Cascade Drilling		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–14	1		RCC	Concrete
14–36	2	Arsenic (24–30)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
36–59	2		WD	Black/dark brown WOOD WASTE with Slag, damp
59–68	2		GM	Gray angular to sub-rounded GRAVEL with silt and sand, course
68–70	2		WD	Black SLAG with trace wood waste
70–120	2 (to 74), 3 (74–120)	Arsenic (70–76), Arsenic (76–82), Arsenic (82–88)	SP-SM	Gray-brown SAND (fine to medium) with some silt, moist, loose
120				End of soil boring at 120"

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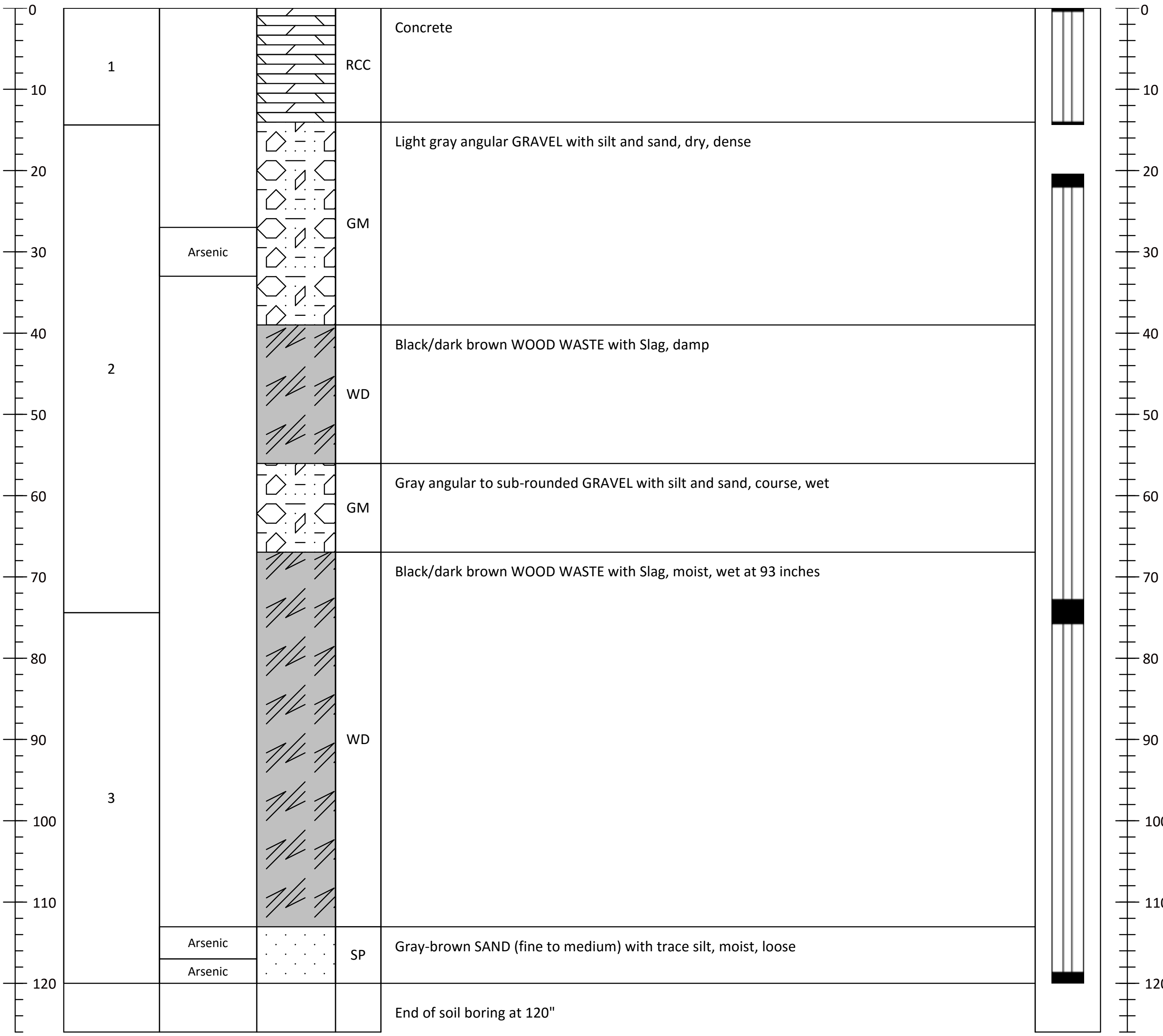
Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B12

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705528.7 Easting: 1175073.3	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/14/14		
Contractor: Cascade Drilling		

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS
0–14	1		RCC	Concrete
14–39	2	Arsenic (27–33)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
39–56	2		WD	Black/dark brown WOOD WASTE with Slag, damp
56–67	2		GM	Gray angular to sub-rounded GRAVEL with silt and sand, course, wet
67–113	2 (to 74) / 3		WD	Black/dark brown WOOD WASTE with Slag, moist, wet at 93 inches
113–120	3	Arsenic; Arsenic	SP	Gray-brown SAND (fine to medium) with trace silt, moist, loose
120				End of soil boring at 120"



Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

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Direct-Push Soil Boring Log

AQ-B13

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705521.5** Easting: **1176272.4**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/14/14**		
Contractor: **Cascade Drilling**		

Recovered Depth (in)	Sample Interval	Chemical Analysis	Graphic Log	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS
0–3	1 (0–15.5)			AS	Asphalt
3–16				RCC	Concrete
16–45.5	2 (15.5–75.5)	Arsenic (33–39)		GM	Light gray angular GRAVEL with silt and sand, dry, dense
45.5–72				WD	Black/dark brown WOOD WASTE with Slag, moist, predominantly slag below 57 inches
72–80				GM	Gray angular to sub-rounded GRAVEL with silt and sand, some slag
80–120	3 (75.5–120)	Arsenic (80–86) Arsenic (86–92) Arsenic (92–98)		SP	Gray-brown SAND (fine to medium) with trace silt, damp, loose
120					End of soil boring at 120"

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B14

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705516.7 Easting: 1176469.8	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/14/14		
Contractor: Cascade Drilling		

Recovered Depth (in)	Sample Interval	Chemical Analysis	Graphic Log	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS	Sample Recovery	Recovered Depth (in)
0–4	1			AS	Asphalt		
4–16	1			RCC	Concrete		
16–53	2	Arsenic		GM	Light gray angular GRAVEL with silt and sand, dry, dense		
53–87	2, 3			WD	Black/dark brown WOOD WASTE with Slag, damp		
87–120	3	Arsenic Arsenic		SP	Gray-brown SAND (fine to medium) with trace silt, damp, loose		
120					End of soil boring at 120"		

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Notes:
1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B15

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705510.9 Easting: 1176669	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/14/14		
Contractor: Cascade Drilling		

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS
0–3	1		AS	Asphalt
3–16	1		RCC	Concrete
16–41	2	Arsenic (29–35)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
41–80	2 (to 76), 3		WD	Black/dark brown WOOD WASTE with Slag, moist
80–104	3	Arsenic (80–86); Arsenic (94–100)	ML	Brown sandy SILT with some course gravel (fill)
104–120	3	Arsenic (104–110)	SP	Gray-brown SAND (fine to medium) with trace silt, damp, loose
120				End of soil boring at 120"

Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

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Direct-Push Soil Boring Log

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AQ-B16

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705505.8** Easting: **1176864**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/14/14**		
Contractor: **Cascade Drilling**		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–13	1		RCC	Concrete
13–41	2	Arsenic (29–35)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
41–89	2 (to 73); 3 (from 73)		WD	Black/dark brown WOOD WASTE with Slag, moist
89–120	3	Arsenic (89–95); Arsenic (95–101); Arsenic (101–107); Arsenic (107–113)	SP-SM	Gray-brown SAND (fine to medium) with some silt, moist, loose
120				End of soil boring at 120"

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B17

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705349.1 Easting: 1175585.9	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/14/14		
Contractor: Cascade Drilling		

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS
0–14	1		RCC	Concrete
14–40	2	Arsenic (28–34)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
40–72.5	2	Arsenic, TCLP Metals (50–60)	WD	Black/dark brown WOOD WASTE with Slag, moist
72.5–120	3 (74.5–120)	Arsenic (72.5–78.5); Arsenic (78.5–84.5); Arsenic (84.5–90.5); Arsenic (90.5–96.5)	SP-SM	Gray-brown SAND (fine to medium) with some silt, moist, loose
120				End of soil boring at 120"

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B18

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705344 Easting: 1175784.9	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/14/14		
Contractor: Cascade Drilling		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–14	1		RCC	Concrete
14–41	2	Arsenic (29–35)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
41–49	2		WD	Black/dark brown WOOD WASTE with Slag, moist
49–59	2		GM	Light gray sub-angular to sub-rounded GRAVEL with some silt and sand, dry
59–67	2		WD	Black/dark brown WOOD WASTE with Slag, moist
67–72	2		GM	Black SLAG and GRAVEL with trace wood waste
72–120	2 (to 74); 3 (74–120)	Arsenic (72–78); Arsenic (78–84); Arsenic (84–90)	SP-SM	Gray-brown SAND (fine to medium) with some silt, moist, loose
120				End of soil boring at 120"

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B19

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705338** Easting: **1175984**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/14/14**		
Contractor: **Cascade Drilling**		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–14	1		RCC	Concrete
14–35	2	Arsenic (23–29)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
35–48	2		WD	Black/dark brown WOOD WASTE with Slag, moist
48–76	2 (to 74.5) / 3	Arsenic (54–60)	GM	Light gray sub-angular to sub-rounded GRAVEL with some silt and sand, dry
76–120	3	Arsenic (76–82)	SP	Gray-brown SAND (fine to medium) with trace silt, damp, loose
120				End of soil boring at 120"

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Notes:
1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B20

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705333.6 Easting: 1176182.9	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/14/14		
Contractor: Cascade Drilling		

Recovered Depth (in)	Sample Interval	Chemical Analysis	Graphic Log	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS	Sample Recovery	Recovered Depth (in)
0	1			RCC	Concrete		0
10							10
20	2			GM	Light gray angular GRAVEL with silt and sand, dry, dense		20
30							30
40		Arsenic					40
50				WD	Black/dark brown WOOD WASTE with Slag, moist, predominantly slag below 90 inches		50
60							60
70							70
80	3						80
90		Arsenic, TCLP Metals					90
100							100
		Arsenic		SP-SM	Gray-brown SAND (fine to medium) with some silt, moist, loose		
110		Arsenic					110
		Arsenic					
120					End of soil boring at 120"		120

Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

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Direct-Push Soil Boring Log

AQ-B21

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705326.7 Easting: 1176381.6	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/14/14		
Contractor: Cascade Drilling		

Soil Description: Samples and descriptions are in recovered depths. Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–13	1		RCC	Concrete
13–45	2	Arsenic (33–39)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
45–54	2		WD	Black/dark brown WOOD WASTE with Slag, moist
54–59	2		GM	Light gray angular to sub-rounded GRAVEL, course, dry
59–85	2 (to 73); 3		WD	Black/dark brown WOOD WASTE with Slag, moist, predominantly slag below 74 inches
85–120	3	Arsenic (85–91); Arsenic (91–97)	SP-SM	Gray-brown SAND (fine to medium) with some silt, moist, loose
120				End of soil boring at 120"

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Notes:
1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B22

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705344.1 Easting: 1176580.9	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/14/14		
Contractor: Cascade Drilling		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	USCS	Soil Description
0–13	RCC	Concrete
13–36	GM	Light gray angular GRAVEL with silt and sand, dry, dense
36–41	WD	Black/dark brown WOOD WASTE with Slag, moist
41–46	GM	Light gray angular to sub-rounded GRAVEL, course, dry
46–91	WD	Black/dark brown WOOD WASTE with Slag, moist, predominantly slag below 79 inches
91–120	SP	Gray-brown SAND (fine to medium) with trace silt, moist, loose
120		End of soil boring at 120"

Sample Interval	Recovered Depth (in)
1	0–13
2	13–73
3	73–120

Chemical Analysis	Recovered Depth (in)
Arsenic	24–30
Arsenic	91–97
Arsenic	97–103
Arsenic	103–109
Arsenic	109–115

Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

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Direct-Push Soil Boring Log

AQ-B23

Sheet 1 of 1

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705315.2** Easting: **1176782.2**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/14/14**		
Contractor: **Cascade Drilling**		

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS
0–13	1		RCC	Concrete
13–41	2	Arsenic (29–35)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
41–82	2 (to 73); 3 (from 73)	Arsenic, TCLP Metals (56–66)	WD	Black/dark brown WOOD WASTE with Slag, moist
82–120	3	Arsenic; Arsenic; Arsenic; Arsenic	SP-SM	Gray-brown SAND (fine to medium) with some silt, moist, loose
120				End of soil boring at 120"

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Notes:
1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B24

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705252.9 Easting: 1175516.2	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/15/14		
Contractor: Cascade Drilling		

Recovered Depth (in)	Sample Interval	Chemical Analysis	Graphic Log	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS	Sample Recovery	Recovered Depth (in)
0–13	1			RCC	Concrete		0–13
13–43	2	Arsenic (31–37)		GM	Light gray angular GRAVEL with silt and sand, dry, dense		13–43
43–100	2 / 3			WD	Black/dark brown WOOD WASTE with Slag, moist, predominantly slag below 88 inches		43–100
100–116	3	Arsenic (100–106); Arsenic (106–112); Arsenic (112–116)		SP-SM	Gray-brown SAND (fine to medium) with some silt, damp, loose		100–116
116–120	3	Arsenic (116–118)		ML	Gray-brown SILT, damp, dense		116–120
					End of soil boring at 120"		

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

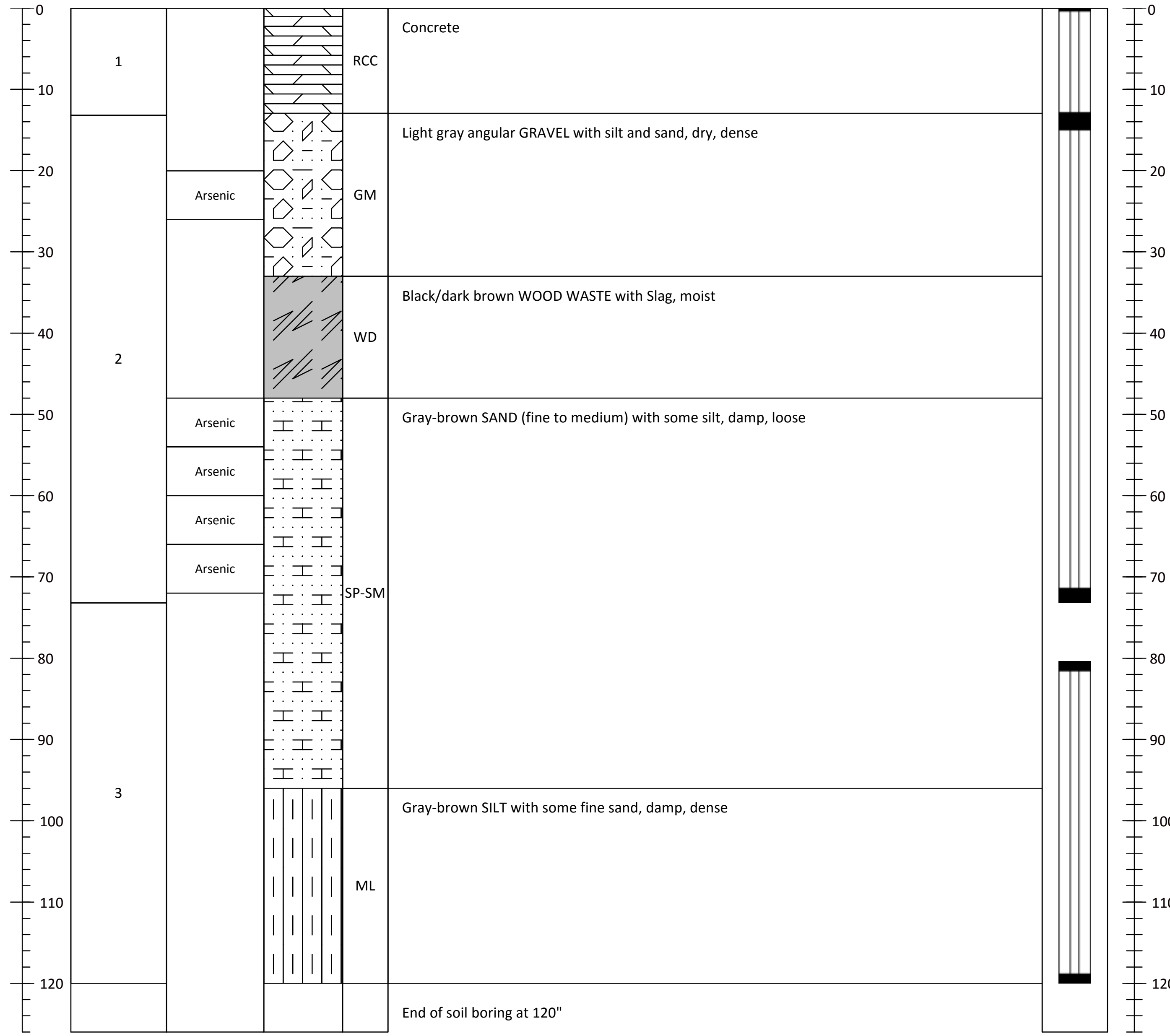
Direct-Push Soil Boring Log

Sheet 1 of 1

AQ-B25

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705246.7** Easting: **1175669.5**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/15/14**		
Contractor: **Cascade Drilling**		

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS
0–13	1		RCC	Concrete
13–33	2	Arsenic (20–26)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
33–48	2		WD	Black/dark brown WOOD WASTE with Slag, moist
48–96	2 (to 73); 3 (from 73)	Arsenic (48–54); Arsenic (54–60); Arsenic (60–66); Arsenic (66–72)	SP-SM	Gray-brown SAND (fine to medium) with some silt, damp, loose
96–120	3		ML	Gray-brown SILT with some fine sand, damp, dense
120				End of soil boring at 120"



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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B26

Sheet 1 of 1

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705238.5** Easting: **1175.870.2**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/15/14**		
Contractor: **Cascade Drilling**		

Recovered Depth (in)	Sample Interval	Chemical Analysis	Graphic Log	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS
0–13	1			RCC	Concrete
13–45	2	Arsenic (33–39)		GM	Light gray angular GRAVEL with silt and sand, dry, dense
45–110	2 / 3			WD	Black/dark brown WOOD WASTE with Slag, moist, predominantly slag below 98 inches
110–120	3	Arsenic; Arsenic		SP	Gray-brown SAND (fine to medium) with trace silt, moist, loose
120					End of soil boring at 120"

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B27

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705235.4 Easting: 1176066.5	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/15/14		
Contractor: Cascade Drilling		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–14	1		RCC	Concrete
14–46	2	Arsenic (34–40)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
46–58	2		WD	Black/dark brown WOOD WASTE with Slag, moist
58–114	2 (to 74); 3 (74–120)	Arsenic (58–64); Arsenic (64–70); Arsenic (70–76); Arsenic (76–82)	SP	Gray-brown SAND (fine to medium) with trace silt, moist, loose
114–120	3		ML	Gray-brown SILT, moist, dense
120				End of soil boring at 120"

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B28

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705229.9 Easting: 1176267.7	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/15/14		
Contractor: Cascade Drilling		

Soil Description: Samples and descriptions are in recovered depths. Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–14	1		RCC	Concrete
14–45	2	Arsenic (33–39)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
45–67	2		WD	Black/dark brown WOOD WASTE with Slag, moist
67–74	2		GP	Light gray angular to sub-rounded GRAVEL, course, damp
74–84	3		WD	Black/dark brown WOOD WASTE with Slag, moist
84–120	3	Arsenic (84–90); Arsenic (90–96); Arsenic (96–102)	SP-SM	Gray-brown SAND (v.fine to fine) with some silt, moist, loose
120				End of soil boring at 120"

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B29

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705222.7 Easting: 1176466.9	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/15/14		
Contractor: Cascade Drilling		

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS
0–14	1		RCC	Concrete
14–40	2	Arsenic (28–34)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
40–53	2		WD	Black/dark brown WOOD WASTE with Slag, moist
53–74	2		GM	Brown sandy GRAVEL (Fill)
74–77	3		WD	Black/dark brown WOOD WASTE with Slag, moist
77–120	3	Arsenic (77–83), Arsenic (83–89), Arsenic (89–95)	SP-SM	Gray-brown SAND (fine to medium) silt content increases with depth, moist to wet, loose
120				End of soil boring at 120"

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Notes:
1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

AQ-B30

Sheet 1 of 1

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705217.8 Easting: 1176664.4	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/15/14		
Contractor: Cascade Drilling		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–13	1		RCC	Concrete
13–45	2	Arsenic (33–39)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
45–62	2		WD	Black/dark brown WOOD WASTE with Slag, moist
62–73	2	Arsenic (62–68)	SP	Gray-brown SAND (fine to medium) with trace silt, moist
73–107	3	Arsenic (81–87); Arsenic (87–93)	SP-SM	Gray-brown SAND (fine to medium) silt content increases with depth, moist, loose
107–120	3		ML	Gray-brown sandy SILT, moist, loose
120				End of soil boring at 120"

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

Sheet 1 of 1

AQ-B31

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **705051.2** Easting: **1176321.5**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/15/14**		
Contractor: **Cascade Drilling**		

Recovered Depth (in)	Sample Interval	Chemical Analysis	Graphic Log	USCS	Soil Description Samples and descriptions are in recovered depths. Classification scheme based on USCS	Sample Recovery	Recovered Depth (in)
0–4				AS	Asphalt		0–4
4–40				GM	Light gray angular GRAVEL with silt and sand, dry, dense		4–40
40–92				GM	Brown sandy GRAVEL with silt, mottled, iron oxide staining, sub-rounded to sub-angular, damp		40–92
92–120				SP-SM	Gray-brown SAND (fine to medium) with silt, moist, loose		92–120
120					End of soil boring at 120"		120

Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

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Direct-Push Soil Boring Log

AQ-B32

Project: Former Portac Log Yard	Location: 4215 SR 509 East Frontage Road, Tacoma, Washington	Method: Direct Push
Project #: 130996-01.01	Northing: 705020.1 Easting: 1176359.8	Total Depth (in): 120
Client: Portac, Inc.	Horizontal Datum: NAD83 WA State Plane South Feet	Logged By: Jason Cornetta
Collection Date: 05/15/14		
Contractor: Cascade Drilling		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–5	1 (0–19)		AS	Asphalt
5–19	1		RCC	Concrete
19–68	2 (19–79)	Arsenic (56–62)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
68–78	2		WD	Black/dark brown WOOD WASTE with Slag, moist
78–92	3 (79–120)	Arsenic (86–92)	GP	Gray sandy GRAVEL , sub-rounded, damp
92–120	3	Arsenic (92–98); Arsenic (98–104)	SP	Gray-brown SAND (fine to medium) with trace silt, moist, loose
120				End of soil boring at 120"

Sample Recovery: 0–19; 42–78; 79–120

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Notes: 1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples

Direct-Push Soil Boring Log

Sheet 1 of 1

AQ-B33

Project: **Former Portac Log Yard**	Location: **4215 SR 509 East Frontage Road, Tacoma, Washington**	Method: **Direct Push**
Project #: **130996-01.01**	Northing: **704919.8** Easting: **1176416.6**	Total Depth (in): **120**
Client: **Portac, Inc.**	Horizontal Datum: **NAD83 WA State Plane South Feet**	Logged By: **Jason Cornetta**
Collection Date: **05/15/14**		
Contractor: **Cascade Drilling**		

Soil Description
Samples and descriptions are in recovered depths.
Classification scheme based on USCS

Recovered Depth (in)	Sample Interval	Chemical Analysis	USCS	Soil Description
0–4	1 (0–18)		AS	Asphalt
4–18	1		RCC	Concrete
18–45	2 (18–78)	Arsenic (33–39)	GM	Light gray angular GRAVEL with silt and sand, dry, dense
45–57	2	Arsenic, TCLP Metals	WD	Black/dark brown WOOD WASTE with Slag, moist
57–98	2 / 3 (78–120)	Arsenic (57–63); Arsenic (63–69); Arsenic (69–75); Arsenic (75–81)	SP-SM	Gray-brown SAND (fine to medium) silt content increases with depth, wet, loose
98–120	3		ML	Gray-brown SILT with fine sand, wet, loose
120				End of soil boring at 120"

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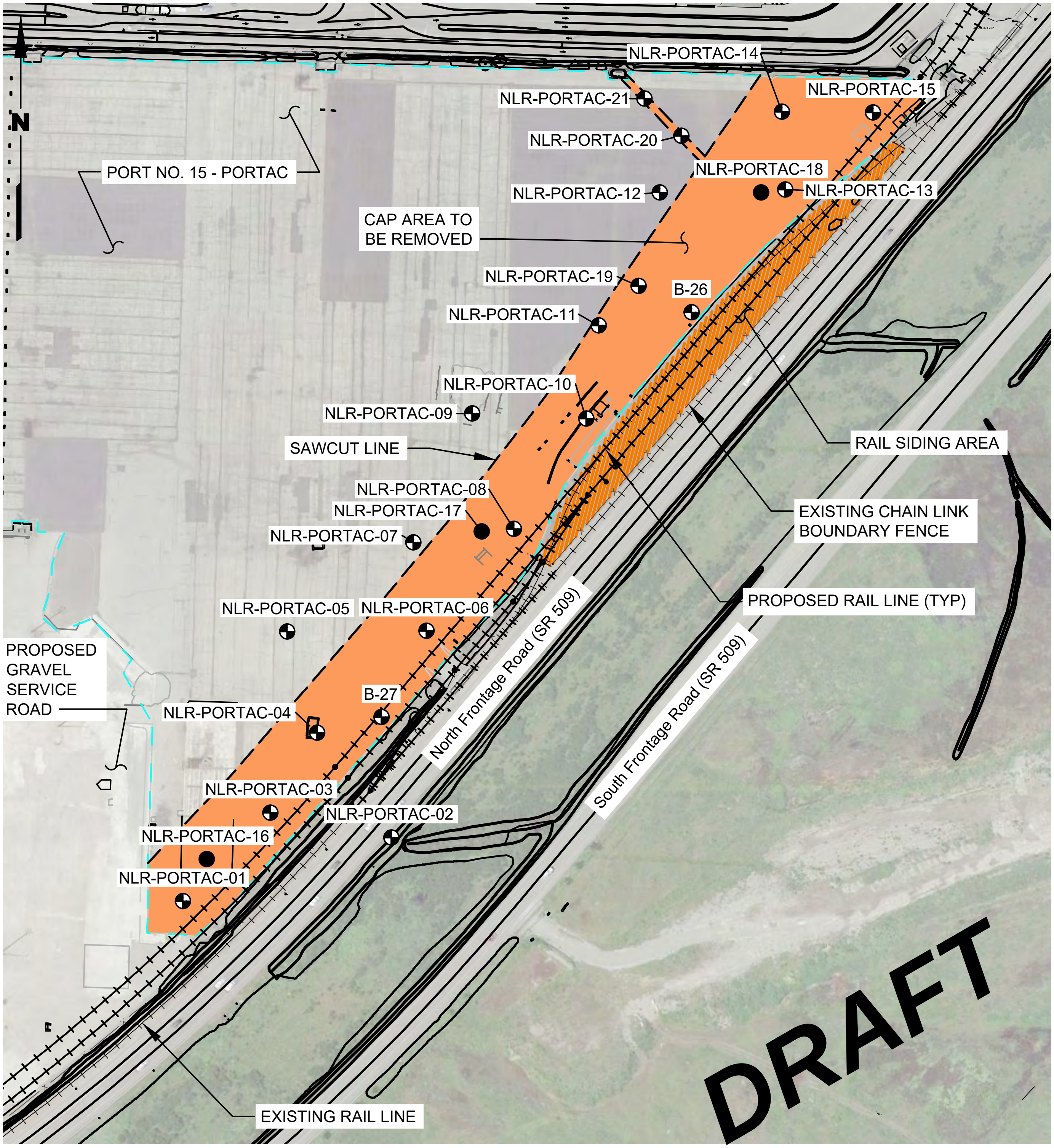
Notes:
1. Soil boring only. No well installed. Boring abandoned with bentonite upon reaching total depth.
2. Material and sample intervals are based on estimated in situ depths/thicknesses after correction for compaction/recovery in the core samples



Legend

NLR-PORTAC-16 ● Well/Piezometer Location and Designation

NLR-PORTAC-01/B-27 ⊕ Boring Location and Designation

0 200 400

Scale in Feet

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Aerial Base: Goggle Earth Professional, 6,2010
Proposed Rail Alignment: Jacobs Engineering, 9/2011
Existing Surface Information: Jacobs Engineering, 9/2011

LANDAU ASSOCIATES, INC. | G:\Projects\168\008\060\067\F03_04_Explorations.dwg (A) "Figure 3" 6/23/2014

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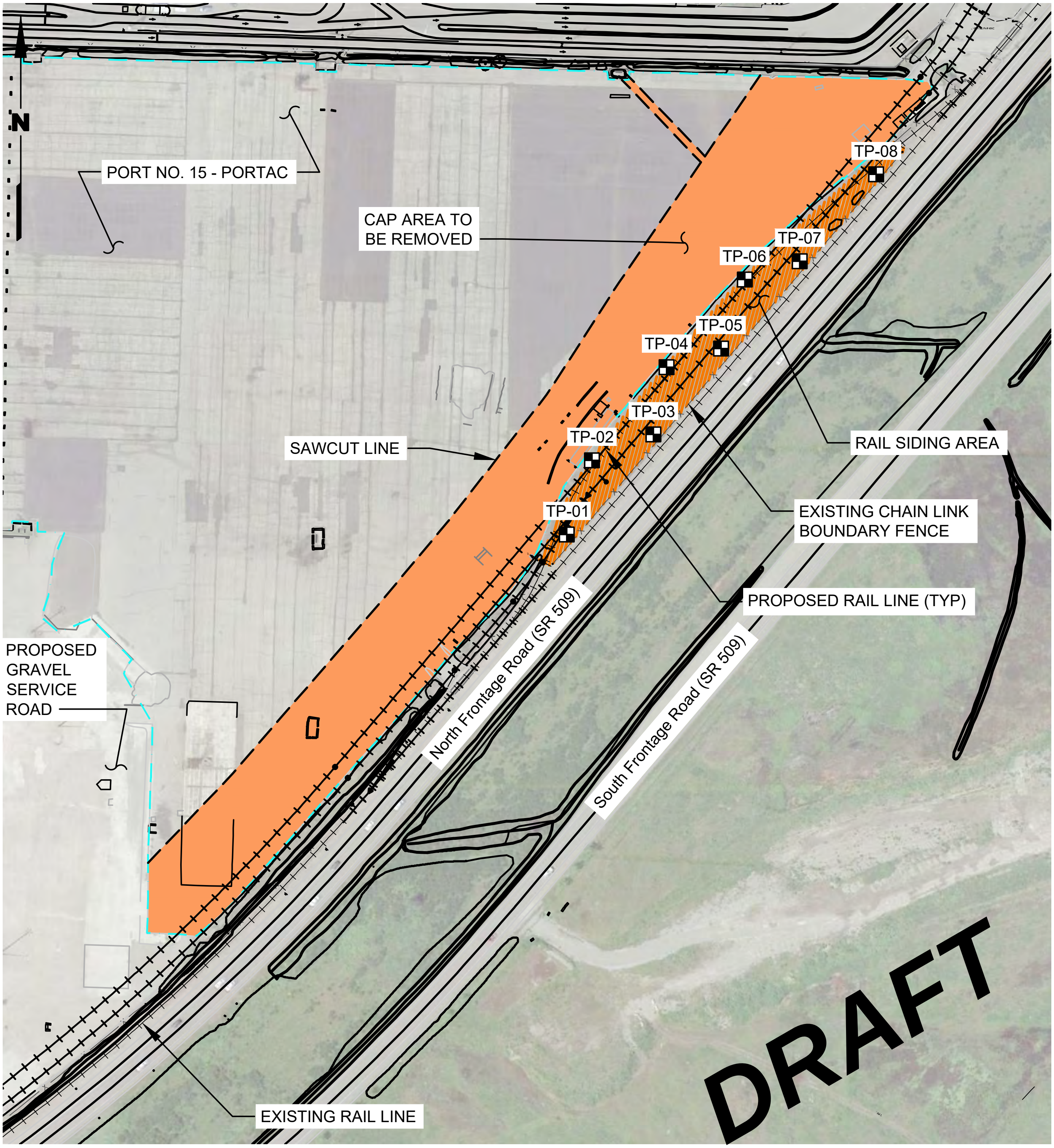
Port of Tacoma North Lead Rail Improvements Tacoma, Washington	**Well/Piezometer and Boring Locations**	Figure 3



Legend

Test Pit Location and Designation

0 200 400

Scale in Feet

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Aerial Base: Goggle Earth Professional, 6,2010
Proposed Rail Alignment: Jacobs Engineering, 9/2011
Existing Surface Information: Jacobs Engineering, 9/2011

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Port of Tacoma North Lead Rail Improvements Tacoma, Washington	**Test Pit Locations**	Figure 4

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Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS [2][3]
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. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*, 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.
3. 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.
	> 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
	≤ 5% - "trace gravel," "trace sand," "trace silt," etc., or not noted.

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North Lead Rail Improvements
Tacoma, Washington

Soil Classification System and Key

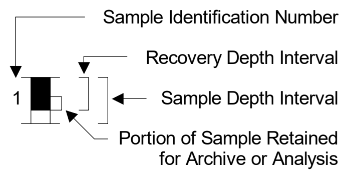
Figure
A-1
(1 of 2)

Drilling and Sampling Key

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	Single-Tube Core Barrel
f	Double-Tube Core Barrel
g	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Rotosonic
5	Air Rotary (Rock)
6	Wash Rotary (Rock)
7	Other - See text if applicable

SAMPLE NUMBER & INTERVAL



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
VST	Vane Shear Test
GT	Other Geotechnical Testing
CA	Chemical Analysis

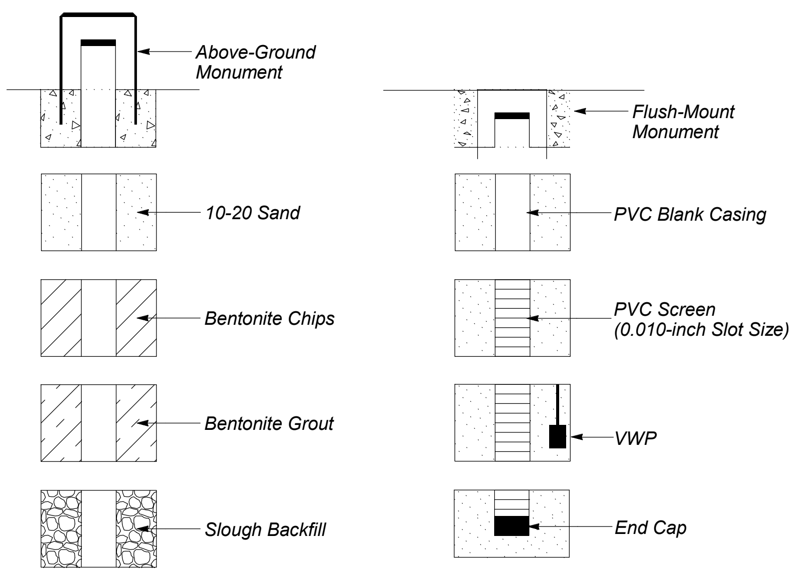
Groundwater

▽ Approximate water elevation at time of drilling (ATD).

▼ Approximate water elevation at other time(s). When multiple water levels are obtained other than ATD, only a representative range is shown. See text for additional information.

Note: Groundwater levels can fluctuate due to precipitation, seasonal conditions, and other factors.

Well Log Graphics



PORTAC-01

SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Geoprobe™
Ground Elevation (ft): Not Measured
Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	USCS Symbol	Description	Water Level
0			PC	Rolled Compacted Concrete	
		i4	GP	Grayish-brown, sandy GRAVEL; no odor or sheen (medium dense, moist) **(FILL)** **Soil sample: SS-PORTAC-01(1.4-1.9)** **Soil sample: SS-PORTAC-01(1.9-2.4)**	
			WD	Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)	
5			GP	Grayish-brown, very sandy GRAVEL; no odor or sheen (very dense, moist)	
		i4	WD	Dark brown, fibrous WOOD WASTE with gravel; no odor or sheen (medium dense, moist)	
			GP	Gray GRAVEL with sand; no odor or sheen (very dense, moist)	
			ML	Brownish-gray SILT with sand; no odor or sheen (hard, moist) **Soil sample: SS-PORTAC-01(7.2-7.7)**	
10		i4	SM	Grayish-brown, silty, fine SAND; no odor or sheen (medium dense, wet) **(ALLUVIUM)** **Soil sample: SS-PORTAC-01(10-10.5)** - grades very silty at 15 ft BGS **Soil sample: SS-PORTAC-01(15-15.5)** **Groundwater sample: GW-PORTAC-01(17.5)**	ATD
15		i4	ML	Grayish-brown, very sandy SILT; no odor or sheen (medium stiff, wet) **Soil sample: SS-PORTAC-01(17.5-18)**	
20	S-1, S-2	d, d	SM	Dark gray, silty, fine SAND; no odor or sheen (medium dense, wet)	
	S-3	d, i4	ML	Brown SILT with organics; no odor or sheen (stiff, wet)	
25					

Boring Completed 03/05/13
Total Depth of Boring = 25.0 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.

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Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Boring PORTAC-01

Figure A-2

PORTAC-02

SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Geoprobe™
Ground Elevation (ft): Not Measured
Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	USCS Symbol	Description	Water Level
0					PC	Rolled Compacted Concrete - 1.4 ft thick	
		i4			GP	Brown, sandy GRAVEL; no odor or sheen (dense, moist) **(FILL)** **Soil sample: SS-PORTAC-02(1.4-1.9)** **Soil sample: SS-PORTAC-02(2.1-2.6)** - grades grayat 3.1 ft BGS	
5					WD	Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)	
		i4			GP	Gray, sandy GRAVEL; no odor or sheen (dense, damp)	
					SM	Brownish-gray, silty, fine SAND; no odor or sheen (dense, moist) **Soil sample: SS-PORTAC-02(6.6-7.1)** **Soil sample: SS-PORTAC-02(7.1-7.6)** **Soil sample: SS-PORTAC-02(8-8.5)**	
					ML	Brownish-gray, sandy SILT; no odor or sheen (stiff, damp) **(ALLUVIUM)** **Soil sample: SS-PORTAC-02(8.5-9)**	
10		i4			SM	Brownish-gray, very silty, fine SAND; no odor or sheen (dense, wet)	ATD
15		i4					
						- grades with organics at 19 ft BGS	
20							

Boring Completed 03/05/13
Total Depth of Boring = 20.0 ft.

25

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.

168008.05 4/1/13 N:\PROJECTS\168008.GPJ SOIL BORING LOG

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Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Boring PORTAC-02

Figure A-3

PORTAC-03

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): Not Measured Drilled By: Cascade Drilling Inc.	Water Level
0						PC	Rolled Compacted Concrete - 1.4 ft thick	
		i4				GP	Brown, sandy GRAVEL; no odor or sheen (medium dense, damp) **(FILL)** **Soil sample: SS-PORTAC-03(1.4-1.9)** **Soil sample: SS-PORTAC-03(1.9-2.4)**	
						WD	Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)	
5						GP	Gray, sandy GRAVEL; no odor or sheen (dense, damp)	
		i4				SM	Brownish-gray, very silty, fine SAND; no odor or sheen (medium dense, damp) **Soil sample: SS-PORTAC-03(5.7-6.3)** **Soil sample: SS-PORTAC-03(6.5-7)** **Soil sample: SS-PORTAC-03(7.5-8)**	
						ML	Brownish-gray, sandy SILT; no odor or sheen (stiff, moist) **(ALLUVIUM)** **Soil sample: SS-PORTAC-03(8-8.5)** - grades with organics at 8.9 ft BGS	
10						SM	Dark brown, very silty, fine SAND with organics; no odor or sheen (dense, wet)	ATD
		i4				ML	Brownish-gray, sandy SILT; no odor or sheen (stiff, wet)	
15						SM	Brownish-gray, silty, fine SAND; no odor or sheen (dense, wet)	
		i4				ML	Brownish-gray, sandy SILT; no odor or sheen (stiff, wet)	
20								
25								

Boring Completed 03/05/13
Total Depth of Boring = 20.0 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.

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Port of Tacoma North Lead Rail Improvements Tacoma, Washington	Log of Boring PORTAC-03	Figure A-4

PORTAC-04

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Geoprobe™
Ground Elevation (ft): Not Measured
Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Description	Water Level
0						PC	Rolled Compacted Concrete - 1.4 ft thick	
		i4				GP	Brown, sandy GRAVEL with trace slag; no odor or sheen (dense, damp) **(FILL)** **Soil sample: SS-PORTAC-04(1.4-1.9)**	
						SM	**Soil sample: SS-PORTAC-04(2.0-2.5)** Dark brown, very silty, fine SAND; no odor or sheen (dense, damp)	
						SP-SM	**Soil sample: SS-PORTAC-04(2.6-3.3)** Dark grayish-brown, fine SAND with silt; no odor or sheen (dense, damp)	
5		i4				SP	**Soil sample: SS-PORTAC-04(3.5-4)** Dark gray, fine to medium SAND with trace silt; no odor or sheen (medium dense, wet) **Soil sample: SS-PORTAC-04(5.5-6)**	
10		i4				ML	Grayish-brown SILT; no odor or sheen (stiff, wet) **(ALLUVIUM)** **Soil sample: SS-PORTAC-04(7.7-8.3)** - grades with organics at 8.3 ft BGS - grades without organics at 10 ft BGS	ATD
15		i4				SM	**Groundwater sample: GW-PORTAC-04(12)** Grayish-brown, silty to very silty, fine SAND; no odor or sheen (medium dense, wet) - grades with trace organics at 15 ft BGS	
						ML	Brownish-gray, mottled SILT with sand and organics; no odor or sheen (stiff, wet)	
20								
25								

Boring Completed 03/05/13
Total Depth of Boring = 20.0 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.

168008.05 4/1/13 N:\PROJECTS\168008.GPJ SOIL BORING LOG

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Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Boring PORTAC-04

Figure
A-5

PORTAC-05

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol		Water Level

Drilling Method: Geoprobe™
Ground Elevation (ft): Not Measured
Drilled By: Cascade Drilling Inc.

USCS Symbol	Description
PC	Rolled Compacted Concrete - 1.2 ft thick
GP	Brownish-gray, sandy GRAVEL with trace slag; no odor or sheen (medium dense, damp) **(FILL)**
DB	
SP-SM	
SM	
SM	
SP-SM	
SM	
ML	
SM	
ML	

Soil sample: SS-PORTAC-05(1.2-1.7)

Soil sample: SS-PORTAC-05(2.5-3)

Black SLAG (1.5 inch diameter)

Brownish-gray, fine SAND with silt; no odor or sheen (medium dense, damp)

Soil sample: SS-PORTAC-05(3.2-3.8)

Grayish-brown, silty, fine SAND; no odor or sheen (medium dense, damp)

Soil sample: SS-PORTAC-05(5-5.5)

Black, silty, fine SAND with organics; no odor or sheen (medium dense, damp)

(ALLUVIUM)

Dark gray, fine to medium SAND with silt (medium dense, damp)

Soil sample: SS-PORTAC-05(6.4-7)

- grades moist at 7.5 ft BGS

Grayish-brown, silty, fine SAND; no odor or sheen (medium dense, moist)

Soil sample: SS-PORTAC-05(8.5-9)

- grades very silty and with trace organics at 10 ft BFS

Grayish-brown SILT; low to moderate plasticity; no odor or sheen (medium stiff, wet)

- grades black and gray mottled and with trace organics at 12.2 ft BGS
- grades grayish-brown at 12.6 ft BGS

Grayish-brown, very silty, fine SAND; no odor or sheen (medium dense, wet)

- grades silty at 15 ft BGS

Grayish-brown, sandy SILT; no odor or sheen (medium stiff, wet)

Sample data (Depth (ft) 0–25):

Sample	Sampler Type
	i4
	i4
S-1	d
S-2	d
	i4
S-3	d
S-4	d
	i4
S-5	d

Water Level: ATD (approx. 9 ft)

Boring Completed 03/05/13
Total Depth of Boring = 20.0 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.

168008.05 4/1/13 N:\PROJECTS\168008.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Boring PORTAC-05

Figure A-6

PORTAC-06

SAMPLE DATA	SOIL PROFILE	GROUNDWATER

Drilling Method: Geoprobe™
Ground Elevation (ft): Not Measured
Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Description	Water Level
0						PC	Rolled Compacted Concrete - 1.5 ft thick	
		i4				GP	Brown, sandy GRAVEL with trace slag; no odor or sheen (medium dense, damp) **(FILL)** **Soil sample: SS-PORTAC-06(1.5-2)**	
						WD	**Soil sample: SS-PORTAC-06(2.5-3)** Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, damp)	
5		i4				GP	Gray, sandy GRAVEL; no odor or sheen (dense, damp) **Soil sample: SS-PORTAC-06(5.4-6)**	
						SP	Dark gray, fine to medium SAND with trace silt; no odor or sheen (dense, damp) **Soil sample: SS-PORTAC-06(6-6.7)**	
10		i4				ML	Dark grayish-brown SILT with sand and trace organics; no odor or sheen (stiff, wet) **(ALLUVIUM)** **Soil sample: SS-PORTAC-06(6.7-7.3)** - grades wet at 10 ft BGS	ATD
15		i4				SM	Grayish-brown, silty, fine SAND; no odor or sheen (medium dense, wet) - grades very silty at 18 ft BGS	
20								
25								

Boring Completed 03/06/13
Total Depth of Boring = 20.0 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.

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Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Boring PORTAC-06

Figure A-7

PORTAC-07

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): Not Measured Drilled By: Cascade Drilling Inc.	Water Level

Depth (ft)	Sampler Type	USCS Symbol	Description	Water Level
0		PC	Rolled Compacted Concrete - 1.5 ft thick	
	i4	GP	Brown, sandy GRAVEL with slag; no odor or sheen (medium dense, damp) **(FILL)** **Soil sample: SS-PORTAC-07(1.5-2)** **Soil sample: SS-PORTAC-07(2.3-2.8)**	
		WD	Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, damp)	
5		GP	Black GRAVEL with slag and sand; no odor or sheen (dense, damp)	
	i4	SM	Brown, silty, fine SAND; no odor or sheen (dense, moist) **Soil sample: SS-PORTAC-07(5.4-6.1)**	
		ML	Brown and black mottled SILT with sand; no odor or sheen (stiff, moist) **Soil sample: SS-PORTAC-07(6.1-6.6)**	
		SP	Brown, fine to medium SAND with trace silt; no odor or sheen (medium dense, moist) **Soil sample: SS-PORTAC-07(8.2-8.7)**	
10	i4	SM	Grayish-brown, very silty, fine SAND; no odor or sheen (medium dense, wet) **(ALLUVIUM)**	ATD
		ML	Grayish-brown SILT with organics and sand; no odor or sheen (stiff, wet) **Soil sample: SS-PORTAC-07(10.9-11.4)** **Groundwater sample: GW-PORTAC-07(12)**	
15	i4	SP-SM	Dark gray, fine SAND with silt; no odor or sheen (medium dense, wet)	
		ML	Grayish-brown, sandy SILT (stiff, wet)	
20				
25				

Boring Completed 03/06/13
Total Depth of Boring = 20.0 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.

168008.05 4/1/13 N:\PROJECTS\168008.GPJ SOIL BORING LOG

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Port of Tacoma North Lead Rail Improvements Tacoma, Washington	Log of Boring PORTAC-07	Figure A-8

PORTAC-08

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): Not Measured Drilled By: Cascade Drilling Inc.	Water Level

Depth (ft)	Sampler Type	USCS Symbol	Description	Water Level
0		PC	Rolled Compacted Concrete - 1.3 ft thick	
	i4	GP	Brown, sandy GRAVEL with slag; no odor or sheen (dense, damp) **(FILL)**	
		WD	**Soil sample: SS-PORTAC-08(1.6-1.8)** **Soil sample: SS-PORTAC-08(2.1-2.6)** Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, damp)	
5	i4	GP	Dark gray SLAG and GRAVEL; no odor or sheen (dense, wet)	
		SM	Brownish-gray, silty, fine SAND; no odor or sheen (medium dense, moist)	
10	i4	ML	**Soil sample: SS-PORTAC-08(7.9-8.4)** **Soil sample: SS-PORTAC-08(8.4-8.9)** **Soil sample: SS-PORTAC-08(8.9-9.3)** Brownish-gray SILT (stiff to very stiff, wet) **(ALLUVIUM)** **Soil sample: SS-PORTAC-08(10-10.5)** - grades stiff at 11.5 ft BGS - grades with organics at 15 ft BGS	ATD
15		SM	Brownish-gray, very silty, fine SAND; no odor or sheen (medium dense, wet)	
	i4	ML	Brownish-gray, sandy SILT; no odor or sheen (stiff, wet)	
20				
25				

Boring Completed 03/06/13
Total Depth of Boring = 20.0 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.

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Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Boring PORTAC-08

Figure
A-9

PORTAC-09

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Geoprobe™
Ground Elevation (ft): Not Measured
Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	USCS Symbol	Description	Water Level
0			PC	Rolled Compacted Concrete - 1.4 ft thick	
		i5	GP	Gray, sandy GRAVEL with slag; no odor or sheen (dense, moist) **(FILL)**	
			WD	**Soil sample: SS-PORTAC-09(1.4-1.9)** **Soil sample: SS-PORTAC-09(2.5-3)** Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)	
5			GP	Dark gray GRAVEL with slag and sand; no odor or sheen (dense, moist)	
		i5	SM	Grayish-brown, silty, fine SAND; no odor or sheen (medium dense, moist) **Soil sample: SS-PORTAC-09(6.9-7.4)** **Soil sample: SS-PORTAC-09(7.7-8.2)**	
10			ML	- grades very silty at 8.2 ft BGS **Soil sample: SS-PORTAC-09(8.5-9)** Grayish-brown SILT; no odor or sheen (very stiff, wet) **(ALLUVIUM)**	ATD
	S-1	d i5	SM	**Soil sample: SS-PORTAC-09(10-10.5)** Grayish-brown, very silty, fine SAND; no odor or sheen (medium dense, wet)	
			ML	Grayish-brown SILT; no odor or sheen (stiff, wet)	
15	S-2	d i5	SM	Grayish-brown, silty, fine SAND; no odor or sheen (medium dense, wet)	
	S-3	d	ML	Grayish-brown, sandy SILT; no odor or sheen (medium stiff, wet)	
20	S-4	d	ML	Brownish-gray SILT with organics; no odor or sheen (stiff, wet)	
		i5			
25					

Boring Completed 03/06/13
Total Depth of Boring = 25.0 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.

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Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Boring PORTAC-09

Figure
A-10

PORTAC-10

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Geoprobe™

Ground Elevation (ft): Not Measured

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sampler Type	USCS Symbol	Description	Water Level
0		PC	Rolled Compacted Concrete - 1.4 ft thick	
	i4	GP	Brown, sandy GRAVEL with slag; no odor or sheen (dense, moist) **(FILL)**	
		WD	**Soil sample: SS-PORTAC-10(1.4-1.9)** **Soil sample: SS-PORTAC-10(2.5-3)** Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)	
5				
	i4	GP	Dark gray, sandy GRAVEL with slag; no odor or sheen (dense, moist)	
		SP-SM	Grayish-brown, fine to medium SAND with silt; no odor or sheen (dense, moist)	
		SM	Grayish-brown, silty, fine SAND; no odor or sheen (medium dense, moist) **(ALLUVIUM)**	
10			**Soil sample: SS-PORTAC-10(7.8-8.8)** - grades wet at 10 ft BGS	ATD
	i4	ML	Grayish-brown SILT; no odor or sheen (stiff, wet)	
		SM	Grayish-brown, silty, fine SAND; no odor or sheen (medium dense, wet) **Soil sample: SS-PORTAC-10(12-13)**	
15			- grades very silty at 15 ft BGS **Soil sample: SS-PORTAC-10(15.9-16.9)**	
	i4	ML	Grayish-brown SILT; no odor or sheen (stiff, wet) **Soil sample: SS-PORTAC-10(17-17.5)**	
20				
25				

Boring Completed 03/06/13
Total Depth of Boring = 20.0 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.

PORTAC-11

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ / Ground Elevation (ft): Not Measured / Drilled By: Cascade Drilling Inc.	Water Level
0						PC	Rolled Compacted Concrete - 1.8 ft thick	
		i4				GP	Gray, sandy GRAVEL with slag; no odor or sheen (dense, moist) **(FILL)** **Soil sample: SS-PORTAC-11(1.8-2.2)**	
						WD	Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)	
5						GP	Black GRAVEL with slag; no odor or sheen (dense, moist)	
		i4				SM	Grayish-brown, silty, fine SAND; no odor or sheen (medium dense, moist) **Soil sample: SS-PORTAC-11(5.9-6.4)**	
						ML	Brownish-gray SILT; no odor or sheen (stiff, moist) **(ALLUVIUM)**	
10		i4				SM	Brownish-gray, silty, fine SAND; no odor or sheen (medium dense, wet) **Soil sample: SS-PORTAC-11(11.8-12.3)**	ATD
						SP	Black, fine to medium SAND with trace silt; no odor or sheen (medium dense, wet)	
15		i4				SM	Brownish-gray, silty, fine SAND; no odor or sheen (medium dense, wet) **Soil sample: SS-PORTAC-11(13.5-14)** **Groundwater sample: GW-PORTAC-11(17)**	
						ML	Brownish-gray SILT with organics; no odor or sheen (very stiff, wet) **Soil sample: SS-PORTAC-11(17.6-18.1)**	
20								
25								

Boring Completed 03/06/13
Total Depth of Boring = 20.0 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.

168008.05 4/1/13 N:\PROJECTS\168008.GPJ SOIL BORING LOG

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Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Boring PORTAC-11

Figure
A-12

PORTAC-12

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ / Ground Elevation (ft): Not Measured / Drilled By: Cascade Drilling Inc.	Water Level

Depth (ft)	Sampler Type	USCS Symbol	Description	Water Level
0		PC	Rolled Compacted Concrete - 1.5 ft thick	
		GP	Brown, sandy GRAVEL; no odor or sheen (dense, moist) **(FILL)**	
	i4	SP	**Soil sample: SS-PORTAC-12(1.5-2)**	
		SP-SM	**Soil sample: SS-PORTAC-12(2.4-2.9)**	
5		SP	Dark brown, fine to coarse SAND with slag; no odor or sheen (dense, moist)	
		SM	Brownish-gray, fine to medium SAND with silt; no odor or sheen (dense, moist) **Soil sample: SS-PORTAC-12(3-3.5)**	
	i4	SP-SM	Dark gray, fine to medium SAND with organics; no odor or sheen (dense, moist) **Soil sample: SS-PORTAC-12(5-5.5)**	ATD
10			Brownish-gray, very silty, fine SAND with organics; no odor or sheen (dense, moist) **Soil sample: SS-PORTAC-12(6.1-6.6)** - grades silty at 6.8 ft BGS	
	i4	SP	Brownish-gray, fine to medium SAND with silt; no odor or sheen (dense, moist) **(ALLUVIUM)** **Soil sample: SS-PORTAC-12(7.4-7.9)** - grades wet at 10 ft BGS	
15			Dark gray, fine to medium SAND with trace silt; no odor or sheen (medium dense, wet) **Groundwater sample: GW-PORTAC-12(13)**	
	i4	SM	Grayish-brown, silty, fine SAND; no odor or sheen (medium dense, wet)	
		ML	Grayish-brown SILT with sand; no odor or sheen (stiff, wet) - grades with organics at 17.9 ft BGS	
20				
25				

Boring Completed 03/07/13
Total Depth of Boring = 20.0 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.

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Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Boring PORTAC-12

Figure
A-13

PORTAC-13

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Geoprobe™

Ground Elevation (ft): Not Measured

Drilled By: Cascade Drilling Inc.

Depth (ft)	Sampler Type	USCS Symbol	Description	Water Level
0		PC	Rolled Compacted Concrete - 1.3 ft thick	
	i4	GP	Brown, sandy GRAVEL; no odor or sheen (medium dense, moist) **(FILL)**	
		WD	**Soil sample: SS-PORTAC-13(1.3-1.8)** **Soil sample: SS-PORTAC-13(2-2.5)** Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)	
5				
		GP	Black GRAVEL with slag; no odor or sheen (dense, moist)	
	i4	SP-SM	Brownish-gray, fine to medium SAND with silt; no odor or sheen (dense, moist) **Soil sample: SS-PORTAC-13(6.8-7.3)**	
		SP	Dark gray, fine to medium SAND with trace silt; no odor or sheen (dense, moist) **(ALLUVIUM)** **Soil sample: SS-PORTAC-13(8.5-9)**	
10				
	i4	ML	Brown SILT; no odor or sheen (medium stiff, wet)	ATD
		SP	Dark gray, fine to medium SAND with trace silt; no odor or sheen (dense, wet) **Soil sample: SS-PORTAC-13(12.6-13.1)**	
		SM	Dark grayish-brown, silty, fine to medium SAND; no odor or sheen (dense, wet)	
15				
	i4	ML	Grayish-brown SILT with organics; no odor or sheen (stiff, wet) **Soil sample: SS-PORTAC-13(16.4-16.9)**	
		SM	Grayish-brown, very silty, fine to medium SAND; no odor or sheen (dense, wet)	
		ML	Grayish-brown SILT with organics (stiff, wet)	
20				
25				

Boring Completed 03/07/13
Total Depth of Boring = 20.0 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.

PORTAC-14

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): Not Measured Drilled By: Cascade Drilling Inc.	Water Level

Depth (ft)	Sampler Type	USCS Symbol	Description	Water Level
0		PC	Rolled Compacted Concrete - 1.4 ft thick	
	i4	GP	Brown, sandy GRAVEL; no odor or sheen (dense, moist) **(FILL)**	
		WD	**Soil sample: SS-PORTAC-14(1.4-1.9)** **Soil sample: SS-PORTAC-14(2.4-2.9)** Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)	
5		GP	Dark brown, sandy GRAVEL with slag; slight odor, no sheen (dense, wet)	
	i4	SP-SM	Dark gray, fine to medium SAND with silt; no odor or sheen (medium dense, wet)	ATD
		SM	**Soil sample: SS-PORTAC-14(6.4-6.9)**	
		SP-SM	Dark gray, silty, fine SAND; no odor or sheen (medium dense, wet) **(ALLUVIUM)**	
10		SP	Dark gray, fine to medium SAND with silt; no odor or sheen (medium dense, wet) Dark gray, fine to medium SAND; no odor or sheen (medium dense, wet)	
	i4	SP-SM	**Soil sample: SS-PORTAC-14(10-10.5)**	
		SM	Dark gray, fine to medium SAND with silt; no odor or sheen (medium dense, wet)	
15		ML	Dark gray, silty, fine to medium SAND; no odor or sheen (medium dense, wet) - grades very silty at 13.9 ft BGS **Soil sample: SS-PORTAC-14(14-14.5)**	
	i4	SM	Grayish-brown SILT with organics; no odor or sheen (very stiff, wet) **Soil sample: SS-PORTAC-14(15-15.5)**	
		ML	Grayish-brown, very silty, fine SAND; no odor or sheen (medium dense, wet) Grayish-brown SILT with organics; no odor or sheen (very stiff, wet)	
20				

Boring Completed 03/07/13
Total Depth of Boring = 20.0 ft.

25

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.

PORTAC-15

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Geoprobe™
Ground Elevation (ft): Not Measured
Drilled By: Cascade Drilling Inc.

Depth (ft)	Sample Number & Interval	Sampler Type	USCS Symbol	Description	Water Level
0			PC	Rolled Compacted Concrete - 1.2 ft thick	
		i4	GP	Brown, sandy GRAVEL; no odor or sheen (dense, moist) **(FILL)** **Soil sample: SS-PORTAC-15(1.5-2.3)** - grades gray at 3.8 ft BGS **Soil sample: SS-PORTAC-15(5-5.5)**	
5		i4	WD	Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)	
			SP	Dark gray, fine to medium SAND; no odor or sheen (medium dense, moist) **Soil sample: SS-PORTAC-15(6.5-7)** **Soil sample: SS-PORTAC-15(10-10.5)**	
10		i4			ATD
15			SM	Brownish-gray, silty, fine SAND; no odor or sheen (medium dense, wet) **(ALLUVIUM)** - grades very silty at 15 ft BGS	
	S-1	d	ML	**Groundwater sample: GW-PORTAC-15(15)** **Soil sample: SS-PORTAC-15(15.4-15.9)**	
	S-2	i4 d	ML	Brownish-gray SILT with organics; no odor or sheen (stiff, wet)	
	S-3	d	ML	**Soil sample: SS-PORTAC-15(15.9-16.4)** Brownish-gray, sandy SILT; no odor or sheen (stiff, wet)	
20				Brownish-gray SILT with organics; no odor or sheen (stiff, wet)	
	S-4	d i4	ML	Brownish-gray, sandy SILT; no odor or sheen (stiff, wet)	
25					

Boring Completed 03/07/13
Total Depth of Boring = 25.0 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.

168008.05 4/1/13 N:\PROJECTS\168008.GPJ SOIL BORING LOG

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Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Boring PORTAC-15

Figure A-16

PORTAC-16

SAMPLE DATA	SOIL PROFILE	GROUNDWATER

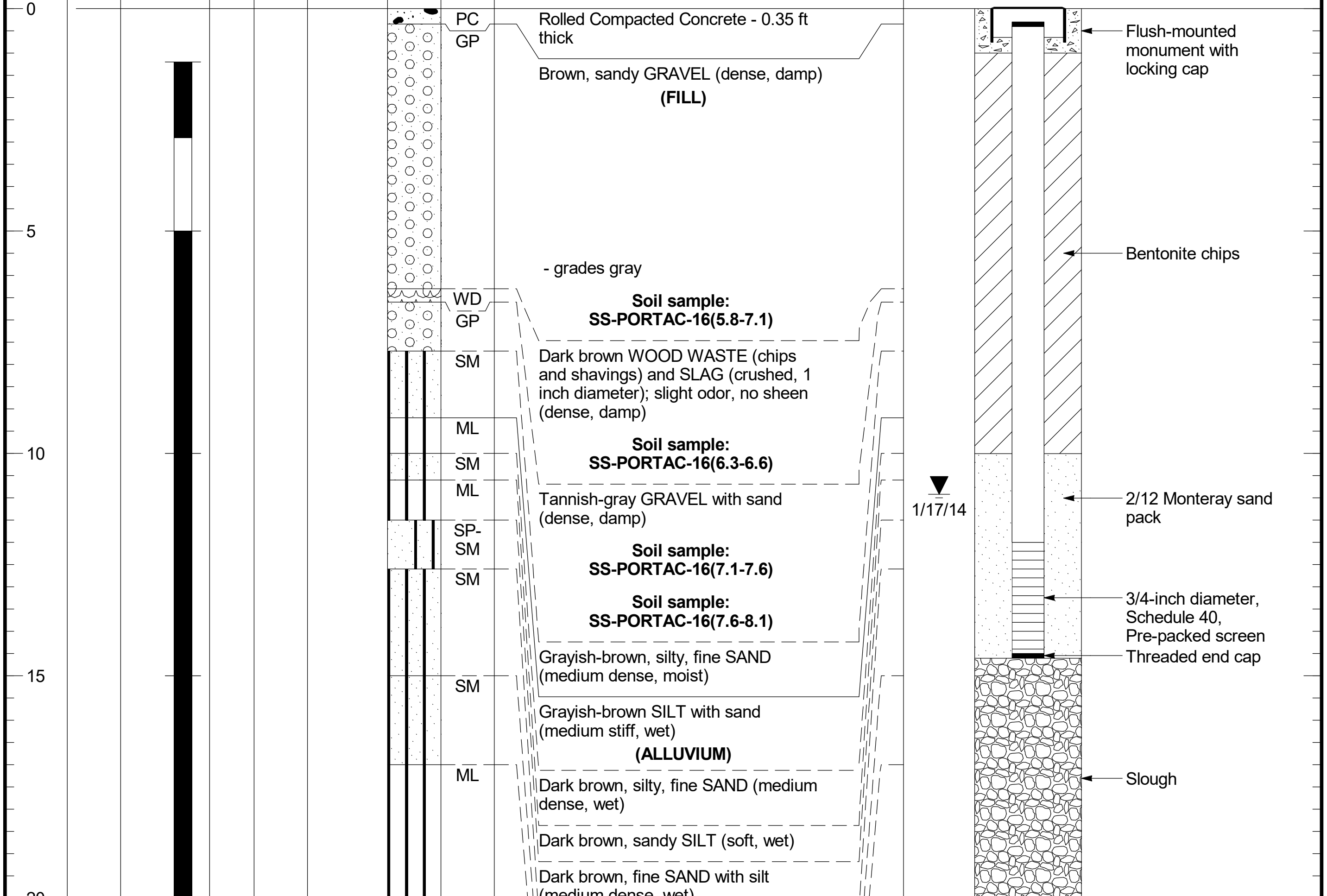
Columns: Depth (ft) | Elevation | Sample Number & Interval | Sampler Type | Blows/Foot | Test Data | Graphic Symbol | USCS Symbol | Water Level

Drilling Method: Geoprobe™

Ground Elevation (ft): Not Measured

Drilled By: Cascade Drilling Inc.

USCS Symbol	Description
PC	Rolled Compacted Concrete - 0.35 ft thick
GP	Brown, sandy GRAVEL (dense, damp) **(FILL)** - grades gray
WD / GP	**Soil sample: SS-PORTAC-16(5.8-7.1)** Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, damp)
SM	**Soil sample: SS-PORTAC-16(6.3-6.6)** Tannish-gray GRAVEL with sand (dense, damp)
ML	**Soil sample: SS-PORTAC-16(7.1-7.6)**
SM	**Soil sample: SS-PORTAC-16(7.6-8.1)**
ML	Grayish-brown, silty, fine SAND (medium dense, moist)
SP-SM	Grayish-brown SILT with sand (medium stiff, wet) **(ALLUVIUM)**
SM	Dark brown, silty, fine SAND (medium dense, wet)
SM	Dark brown, sandy SILT (soft, wet)
ML	Dark brown, fine SAND with silt (medium dense, wet)
	Dark brownish-gray, silty, fine SAND (medium dense, wet)
	Grayish-brown, very silty, fine SAND (medium dense, wet)
	Grayish-brown, sandy SILT (medium stiff, wet)



Boring Completed 01/16/14
Total Depth of Boring = 20.0 ft.

Piezometer Completed 01/16/14
Total Depth of Piezometer = 14.5 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.

168008.05 6/18/14 N:\PROJECTS\168008.GPJ WELL LOG W/ ELEVATION

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North Lead Rail Improvements
Tacoma, Washington

Log of Piezometer PORTAC-16

Figure A-17

PORTAC-17

SAMPLE DATA	SOIL PROFILE	GROUNDWATER

Drilling Method: Geoprobe™

Ground Elevation (ft): Not Measured

Drilled By: Cascade Drilling Inc.

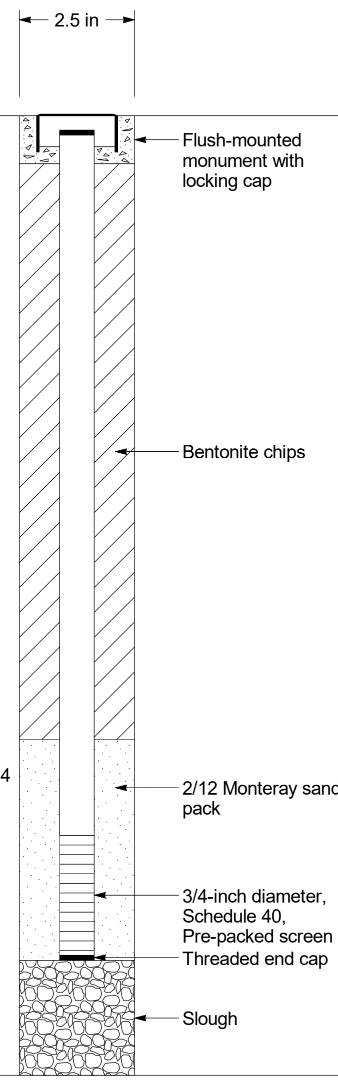
Columns: Depth (ft) | Elevation | Sample Number & Interval | Sampler Type | Blows/Foot | Test Data | Graphic Symbol | USCS Symbol | Description | Water Level

USCS Symbol	Description
PC	Rolled Compacted Concrete - 1.1 ft thick
GP	Gray GRAVEL with sand (medium dense, damp) **(FILL)** **Soil sample: SS-PORTAC-17(2.6-8.8)**
WD	Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (medium dense, damp) **Soil sample: SS-PORTAC-17(3.1-7.3)**
SP-SM	Brownish-gray, fine SAND with silt (medium dense, damp)
SM	Brownish-gray, silty, fine SAND (medium dense, damp) **(ALLUVIUM)**
ML	**Soil sample: SS-PORTAC-17(8.8-9.3)** **Soil sample: SS-PORTAC-17(9.3-9.8)** Brownish-gray SILT (soft, wet)
SM	Brownish-gray, very silty, fine SAND (medium dense, wet)

Depth (ft): 0, 5, 10, 15, 20, 25

Water Level: 1/17/14

Piezometer Detail (DOE#: BID068)



Boring Completed 01/16/14
Total Depth of Boring = 20.0 ft.

Piezometer Completed 01/16/14
Total Depth of Piezometer = 17.8 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.

168008.05 6/18/14 N:\PROJECTS\168008.GPJ WELL LOG W/ ELEVATION

LANDAU ASSOCIATES

Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Piezometer PORTAC-17

Figure A-18

PORTAC-18

SAMPLE DATA	SOIL PROFILE	GROUNDWATER
Depth (ft), Elevation, Sample Number & Interval, Sampler Type, Blows/Foot, Test Data	Graphic Symbol, USCS Symbol	Water Level

Drilling Method: Geoprobe™

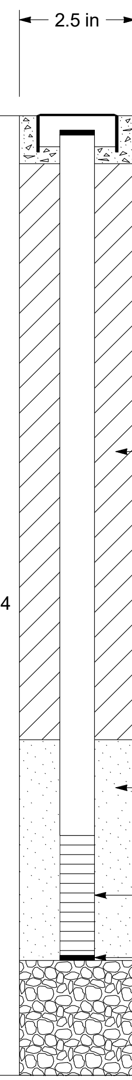
Ground Elevation (ft): Not Measured

Drilled By: Cascade Drilling Inc.

Piezometer Detail (DOE#: BID069)

USCS Symbol	Description
PC	Rolled Compacted Concrete - 1.2 ft thick
GP	Brown GRAVEL with sand (dense, moist) **(FILL)** **Soil sample: SS-PORTAC-18(2.9-7.3)**
WD	Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist) **Soil sample: SS-PORTAC-18(3.4-6.8)**
DB	Dark brown SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)
SP	Brown, fine to medium SAND with slag (dense, moist)
SP-SM	Brownish-gray, fine to medium SAND with silt (medium dense, moist) **Soil sample: SS-PORTAC-18(7.3-7.8)**
SM	Brownish-gray, silty, fine to medium SAND (medium dense, moist) **(ALLUVIUM)** **Soil sample: SS-PORTAC-18(7.8-8.3)**
SP	Dark gray, fine to medium SAND (medium dense, wet)
SP-SM	Dark gray, fine to medium SAND with silt (medium dense, wet)
ML	Grayish-brown SILT (soft, wet) - grades with wood and organics
SM	Grayish-brown, very silty, fine SAND (medium dense, wet)

Water level: 1/17/14



Boring Completed 01/16/14
Total Depth of Boring = 20.0 ft.

Piezometer Completed 01/16/14
Total Depth of Piezometer = 17.5 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.

168008.05 6/18/14 N:\PROJECTS\168008.GPJ WELL LOG W/ ELEVATION

LANDAU ASSOCIATES

Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Piezometer PORTAC-18

Figure A-19

PORTAC-19

SAMPLE DATA	SOIL PROFILE	GROUNDWATER

Drilling Method: Geoprobe™

Ground Elevation (ft): Not Measured

Drilled By: Cascade Drilling Inc.

Depth (ft)	USCS Symbol	Description	Water Level
0	PC	Rolled Compacted Concrete - 1.25 ft thick	
	GP	Gray GRAVEL with sand (dense, moist) **(FILL)** **Soil sample: SS-PORTAC-19(2.4-5.8)**	
	WD	Dark brown WOOD WASTE (chips and shavings) and SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)	
5	GP	**Soil sample: SS-PORTAC-19(2.9-5.3)** Grayish-brown, sandy GRAVEL (medium dense, moist)	
	SP-SM	**Soil sample: SS-PORTAC-19(5.8-6.3)** Gray, fine to medium SAND with silt (medium dense, moist) **(ALLUVIUM)**	
10	SM	**Soil sample: SS-PORTAC-19(6.3-6.8)** Grayish-brown, silty, fine SAND (medium dense, wet)	ATD
	SP-SM	Grayish-brown, fine SAND with silt (medium dense, wet)	
	SM	Grayish-brown, silty, fine SAND (medium dense, wet)	
15	SP	Dark gray, fine to medium SAND (medium dense, wet) - grades with shells	
20	ML	Grayish-brown SILT (medium stiff, wet)	

Boring Completed 01/17/14
Total Depth of Boring = 20.0 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.

PORTAC-20

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Geoprobe™

Ground Elevation (ft): Not Measured

Drilled By: Cascade Drilling Inc.

USCS Symbol	Description
PC	Rolled Compacted Concrete - 1.35 ft thick
GP	Gray GRAVEL with sand (dense, moist) **(FILL)** **Soil sample: SS-PORTAC-20(2.5-6.5)**
DB	Dark brown SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist) **Soil sample: SS-PORTAC-20(3-6)**
GP	Gray GRAVEL with sand (dense, moist)
DB	Dark brown SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist)
SP-SM	Brown, fine SAND with silt (medium dense, moist) **Soil sample: SS-PORTAC-20(6.5-7)** **Soil sample: SS-PORTAC-20(7-7.5)**
SP	Dark gray, fine to medium SAND (medium dense, moist) **(ALLUVIUM)**
SP-SM	Grayish-brown, fine SAND with silt (medium dense, moist)
SP	Dark gray, fine to medium SAND (medium dense, wet) - grades wet
SM	Brownish-gray, silty, fine SAND (medium dense, wet)
ML	Brown SILT (medium stiff, wet) - grades with organics
SM	Grayish-brown, very silty, fine SAND (medium dense, wet)
ML	Grayish-brown SILT with organics (medium stiff, wet)
PT	Dark brown PEAT (soft, wet)

Water Level: ATD (at approx. 9.7 ft)

Depth scale: 0, 5, 10, 15, 20, 25

Boring Completed 01/17/14
Total Depth of Boring = 20.0 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.

LANDAU ASSOCIATES

Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Boring PORTAC-20

Figure A-21

PORTAC-21

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Geoprobe™

Ground Elevation (ft): Not Measured

Drilled By: Cascade Drilling Inc.

Depth (ft)	USCS Symbol	Description	Water Level
0	PC	Rolled Compacted Concrete - 1.6 ft thick	
	GP	Brown GRAVEL with sand (dense, moist) **(FILL)** **Soil sample: SS-PORTAC-21(2.9-5.5)**	
	DB	Dark brown SLAG (crushed, 1 inch diameter); slight odor, no sheen (dense, moist) **Soil sample: SS-PORTAC-21(3.4-4)**	
5	SP-SM	Brownish-black, fine SAND with silt (dense, moist)	
	SP	Dark gray, fine to medium SAND (dense, moist) **(ALLUVIUM)** **Soil sample: SS-PORTAC-21(5.5-6)** **Soil sample: SS-PORTAC-21(6-6.5)**	ATD
10		- grades wet	
15			
20			
25			

Boring Completed 01/17/14
Total Depth of Boring = 20.0 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.

PORTAC-TP-01

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Green Earthworks Construction Logged By: KMH	
0						SP	Brown, fine to medium SAND (loose, moist) **(FILL)** **Soil sample: TP-PORTAC-01(0-0.5)** **Soil sample: TP-PORTAC-01(0.5-1)**	Groundwater not encountered.
1							- grades gravelly and fine to coarse SAND	
2								

Test Pit Completed 01/21/14
Total Depth of Test Pit = 2.0 ft.

3

4

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.

168008.05 6/18/14 N:\PROJECTS\168008.GPJ SINGLE TEST PIT LOG

LANDAU ASSOCIATES

Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Test Pit PORTAC-TP-01

Figure A-23

PORTAC-TP-02

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Green Earthworks Construction Logged By: KMH	
0						DB	Dark brown SLAG (crushed, 0.5 to 6 inch diameter); slight odor, no sheen (loose, damp) **(FILL)**	Groundwater not encountered.
1						SP	Brown, fine to medium SAND (loose, moist) **Soil sample: TP-PORTAC-02(0.9-1.4)** **Soil sample: TP-PORTAC-02(1.4-1.9)**	
2								

Test Pit Completed 01/21/14
Total Depth of Test Pit = 2.0 ft.

3

4

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.

168008.05 6/18/14 N:\PROJECTS\168008.GPJ SINGLE TEST PIT LOG

LANDAU ASSOCIATES

Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Test Pit PORTAC-TP-02

Figure
A-24

PORTAC-TP-03

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Green Earthworks Construction Logged By: KMH	
0						SP	Brown, gravelly, fine to coarse SAND with roots (loose, moist) **(FILL)** **Soil sample: TP-PORTAC-03(0-0.5)** **Soil sample: TP-PORTAC-03(0.5-1)**	Groundwater not encountered.
1							- grades gray and without roots	
2								

Test Pit Completed 01/21/14
Total Depth of Test Pit = 2.0 ft.

3

4

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.

168008.05 6/18/14 N:\PROJECTS\168008.GPJ SINGLE TEST PIT LOG

LANDAU ASSOCIATES

Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Test Pit PORTAC-TP-03

Figure
A-25

PORTAC-TP-04

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Green Earthworks Construction Logged By: KMH	
0						DB	Dark brown SLAG (crushed, 0.5 to 6 inch diameter); slight odor, no sheen (loose, damp) **(FILL)**	Groundwater not encountered.
1						SP	Brown, fine to medium SAND (loose, moist) **Soil sample: TP-PORTAC-04(1.4-1.9)** **Soil sample: TP-PORTAC-04(1.9-2.4)**	
2						SM	Brown and gray, very silty, fine to medium SAND (medium dense, moist)	
3								
4								

Test Pit Completed 01/21/14
Total Depth of Test Pit = 2.5 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.

PORTAC-TP-05

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Green Earthworks Construction Logged By: KMH	
0–2						SP	Brown, fine to medium SAND with trace gravel and roots (loose, moist) **(FILL)** **Soil sample: TP-PORTAC-05(0-0.5)** **Soil sample: TP-PORTAC-05(0.5-1)**	Groundwater not encountered.

Test Pit Completed 01/21/14
Total Depth of Test Pit = 2.0 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.

LANDAU ASSOCIATES

Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Test Pit PORTAC-TP-05

Figure A-27

PORTAC-TP-06

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Green Earthworks Construction Logged By: KMH	
0						DB	Dark brown SLAG (crushed, 0.5 to 6 inch diameter); slight odor, no sheen (loose, damp) **(FILL)**	Groundwater not encountered.
1						SM	Grayish-brown, silty, fine to medium SAND (medium dense, moist) **Soil sample: TP-PORTAC-06(1.3-1.8)** **Soil sample: TP-PORTAC-06(1.8-2.3)**	
2								

Test Pit Completed 01/21/14
Total Depth of Test Pit = 2.4 ft.

3

4

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.

LANDAU ASSOCIATES

Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Test Pit PORTAC-TP-06

Figure
A-28

PORTAC-TP-07

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Green Earthworks Construction Logged By: KMH	
0						DB	Dark brown SLAG (crushed, 0.5 to 6 inch diameter); slight odor, no sheen (loose, damp) **(FILL)**	Groundwater not encountered.
						SM	Brown, silty, fine to coarse SAND (medium dense, moist) **Soil sample: TP-PORTAC-07(0.6-1.1)** **Soil sample: TP-PORTAC-07(1.1-1.6)**	
1								
2								

Test Pit Completed 01/21/14
Total Depth of Test Pit = 2.0 ft.

3

4

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.

168008.05 6/18/14 N:\PROJECTS\168008.GPJ SINGLE TEST PIT LOG

LANDAU ASSOCIATES

Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Test Pit PORTAC-TP-07

Figure
A-29

PORTAC-TP-08

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Green Earthworks Construction Logged By: KMH	
0						DB	Dark brown SLAG (crushed, 0.5 to 6 inch diameter); slight odor, no sheen (loose, damp) **(FILL)**	Groundwater not encountered.
						SM	Brown, silty, fine to medium SAND (medium dense, moist) **Soil sample: TP-PORTAC-08(0.7-1.2)** **Soil sample: TP-PORTAC-08(1.2-1.7)**	
1								
2								

Test Pit Completed 01/21/14
Total Depth of Test Pit = 2.0 ft.

3

4

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.

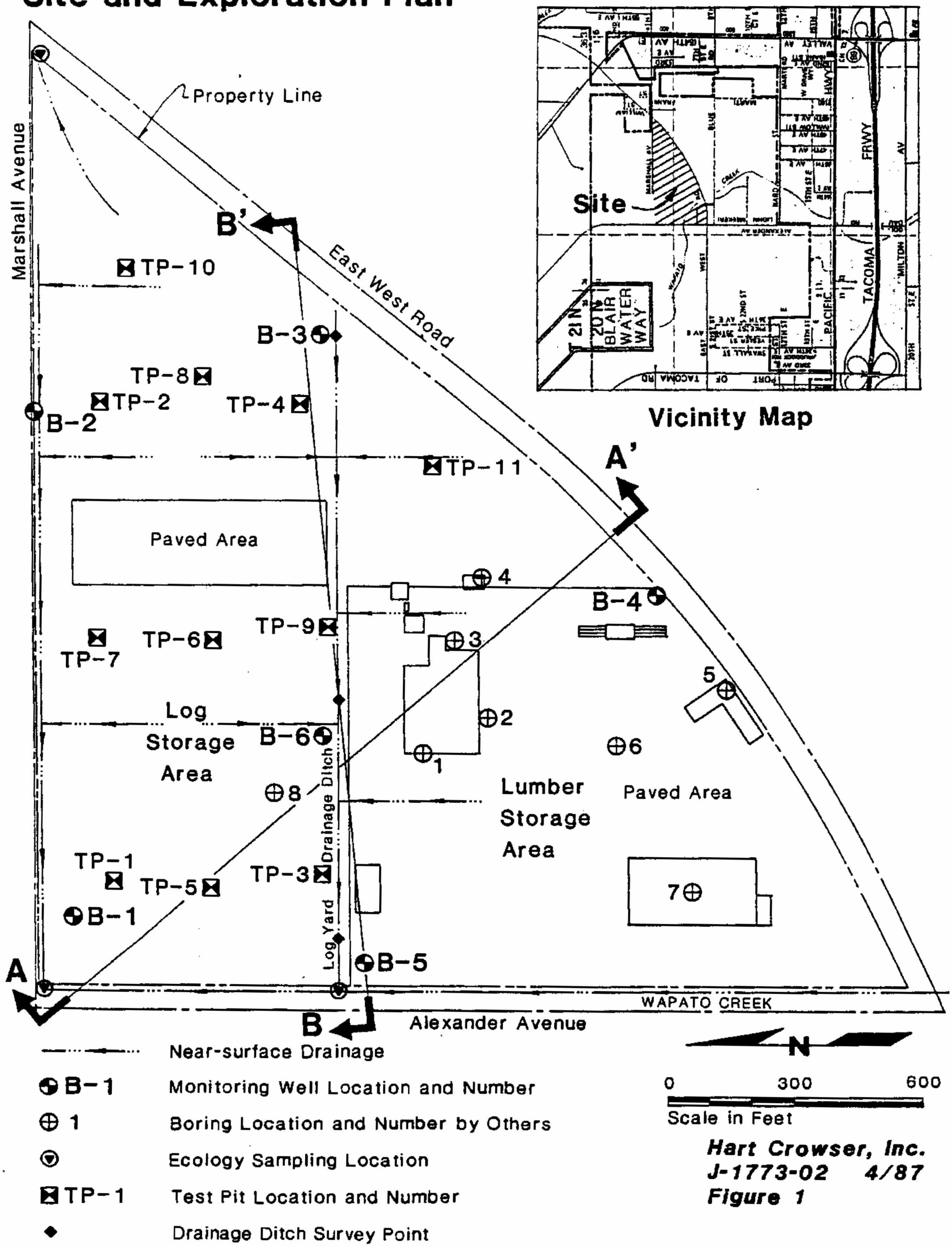
LANDAU ASSOCIATES

Port of Tacoma
North Lead Rail Improvements
Tacoma, Washington

Log of Test Pit PORTAC-TP-08

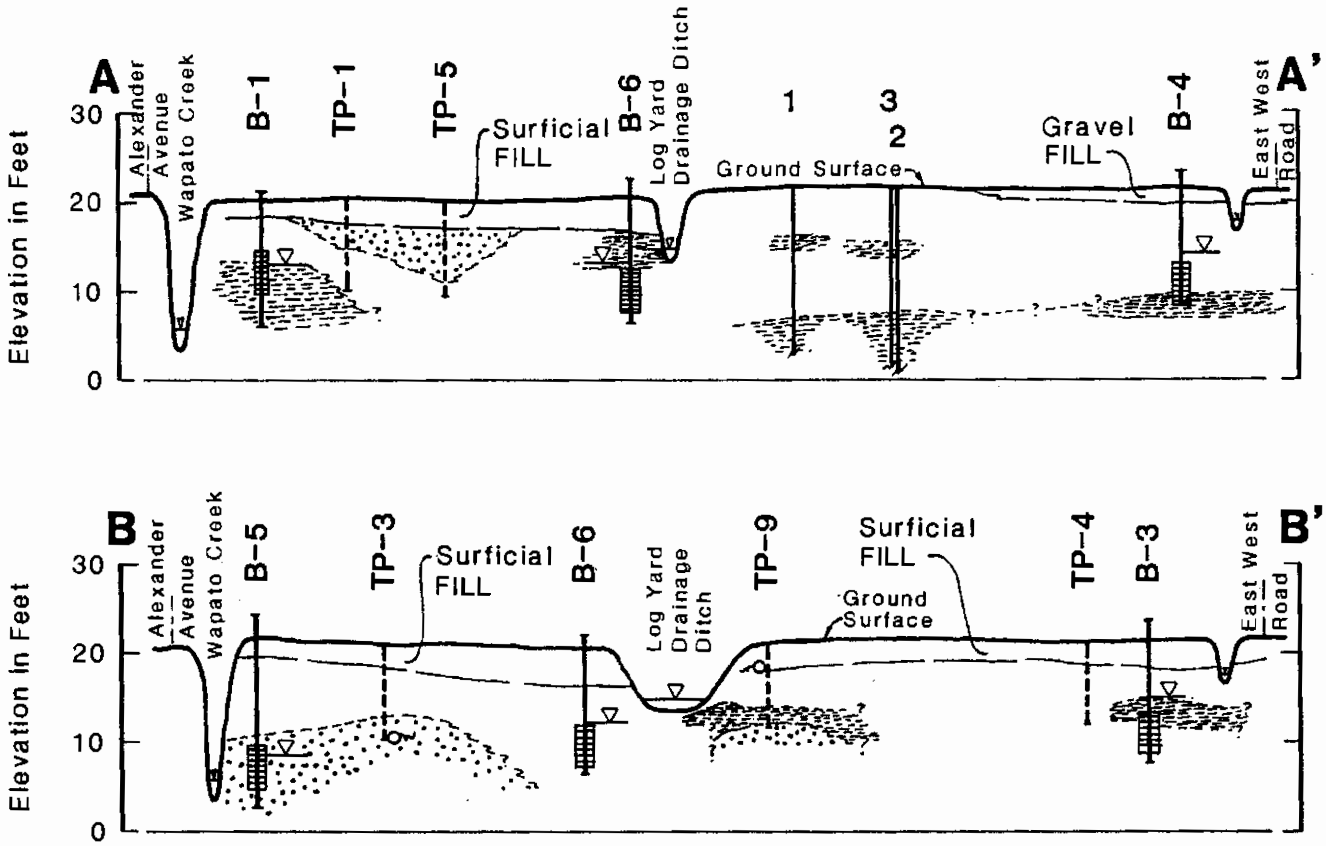
Figure A-30

Site and Exploration Plan



Hart Crowser, Inc.
J-1773-02 4/87
Figure 1

Generalized Subsurface Cross Sections



Surficial FILL — SAND, GRAVEL, SILT, BARK, and SLAG

Silty SAND to sandy SILT

Clayey SILT

Slightly silty to clean, fine to medium SAND

B-1 Well Number

Well Location

Water Level in Well

Screen Section

TP-1 Test Pit Number

Test Pit Location

Seepage in Test Pit

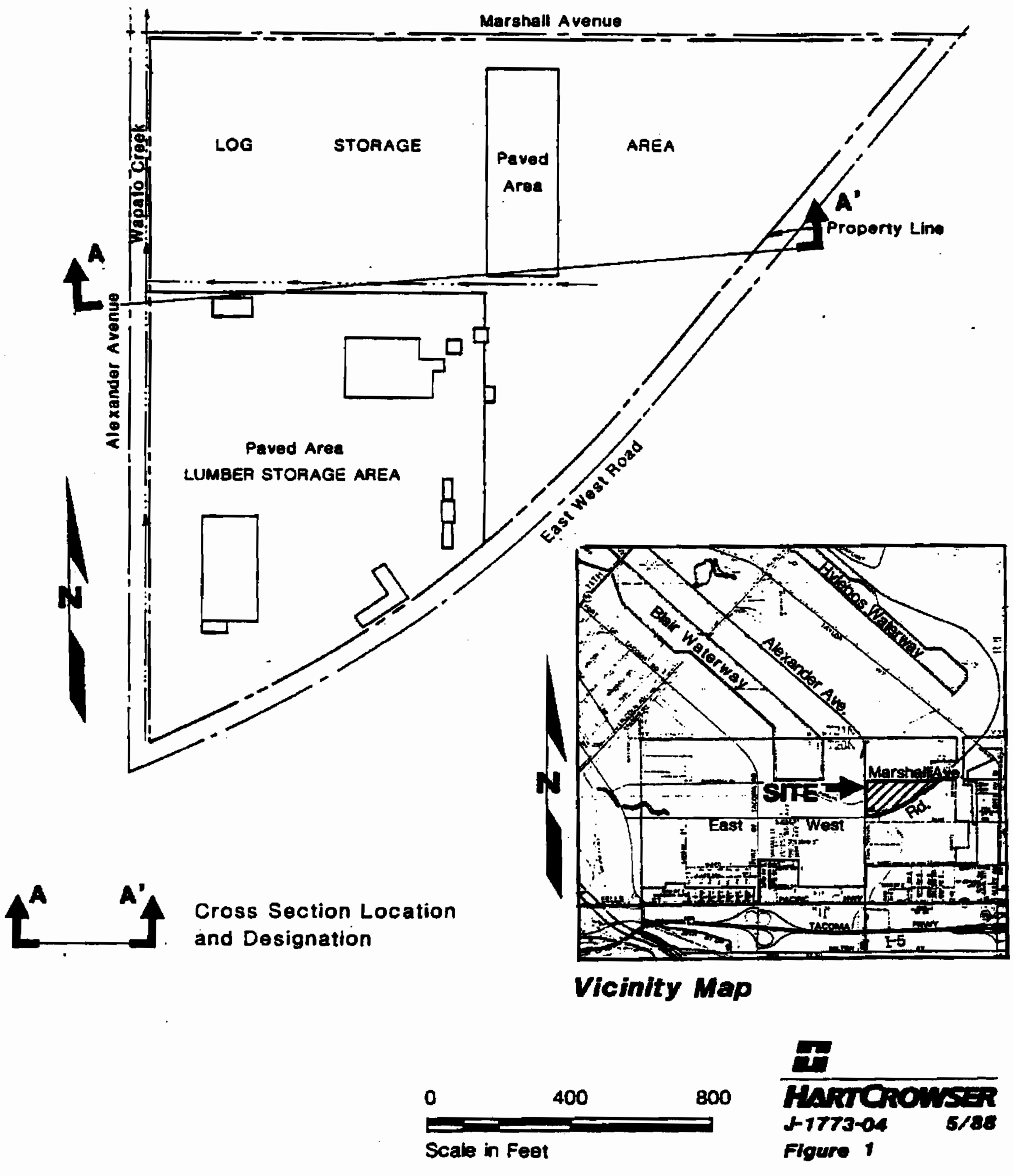
Horizontal Scale in Feet
0 300 600

0 20 40
Vertical Scale in Feet

Vertical Exaggeration x 15

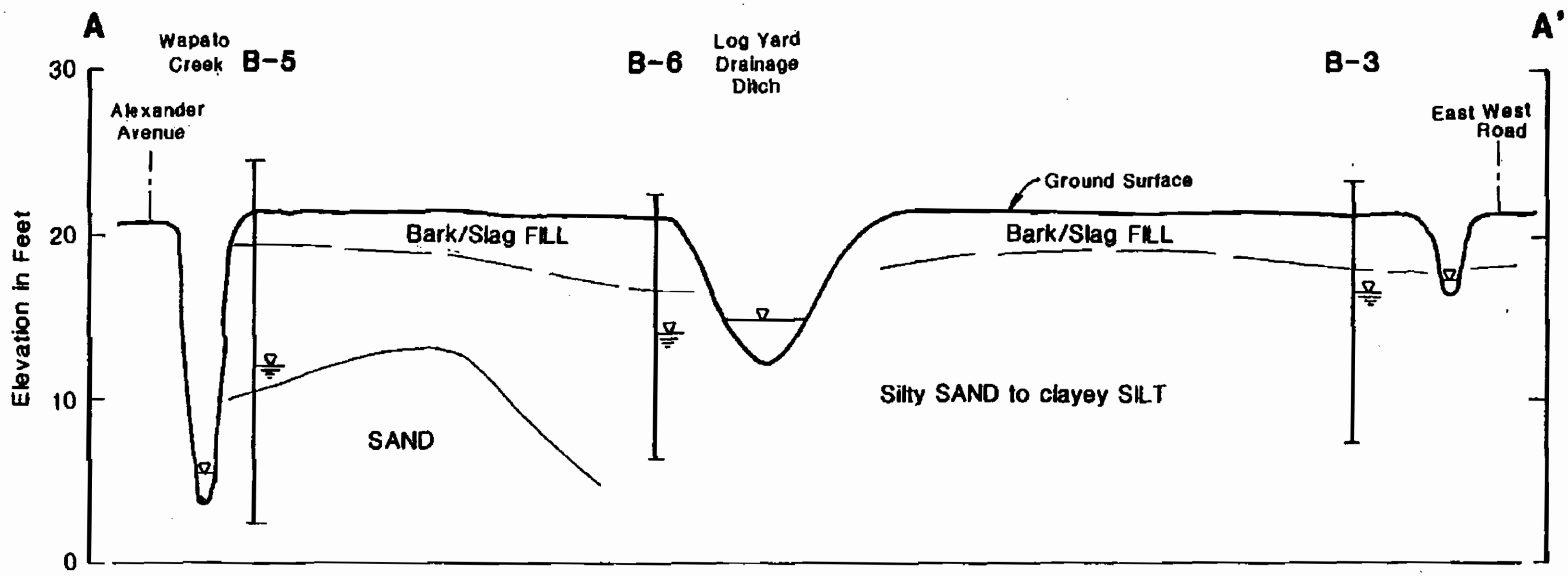
Hart Crowser, Inc.
J-1773-02 4/87
Figure 2

Site Plan



Marshall Avenue
LOG STORAGE AREA
Paved Area
Wapato Creek
Alexander Avenue
A
A'
Property Line
Paved Area
LUMBER STORAGE AREA
East West Road
N
Cross Section Location and Designation
Blair Waterway
Alexander Ave
Hylebos Waterway
SITE
Marshall Ave
East
West
Rd.
I-5
Vicinity Map
0
400
800
Scale in Feet
HARTCROWSER
J-1773-04
5/88
Figure 1

Generalized Subsurface Cross Section



Note: Contact lines between soil types are based on interpolation between borings, and represent our interpretation of subsurface conditions based on currently available data.

B-5 Well Number

Well Location

Maximum Observed Groundwater Level

Surface Water Level

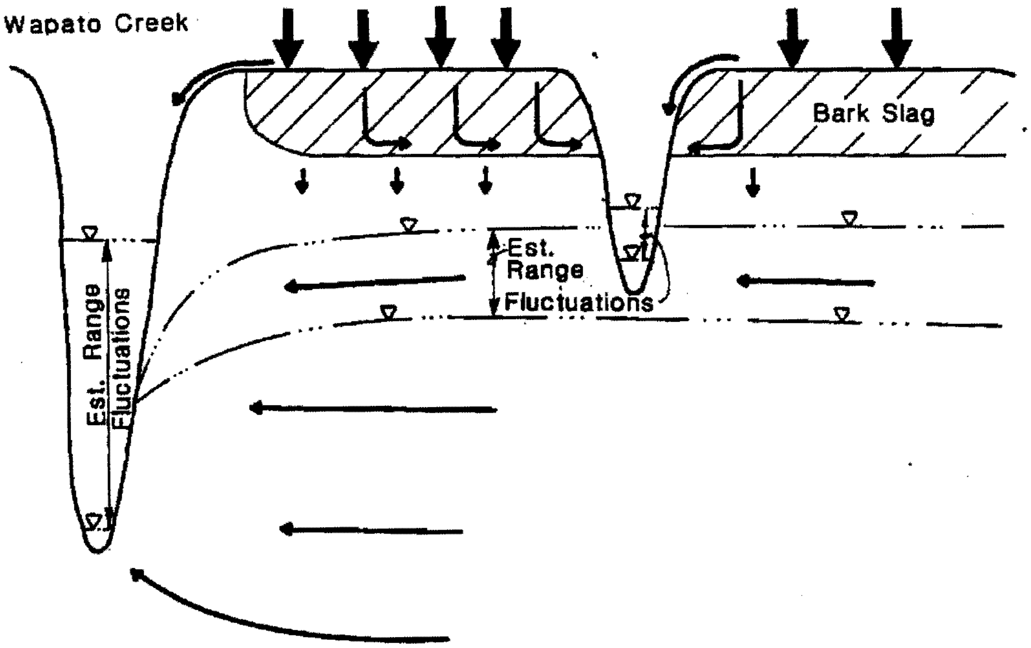
Horizontal Scale in Feet
0 200 400

0 10 20
Vertical Scale in Feet
Vertical Exaggeration x 20

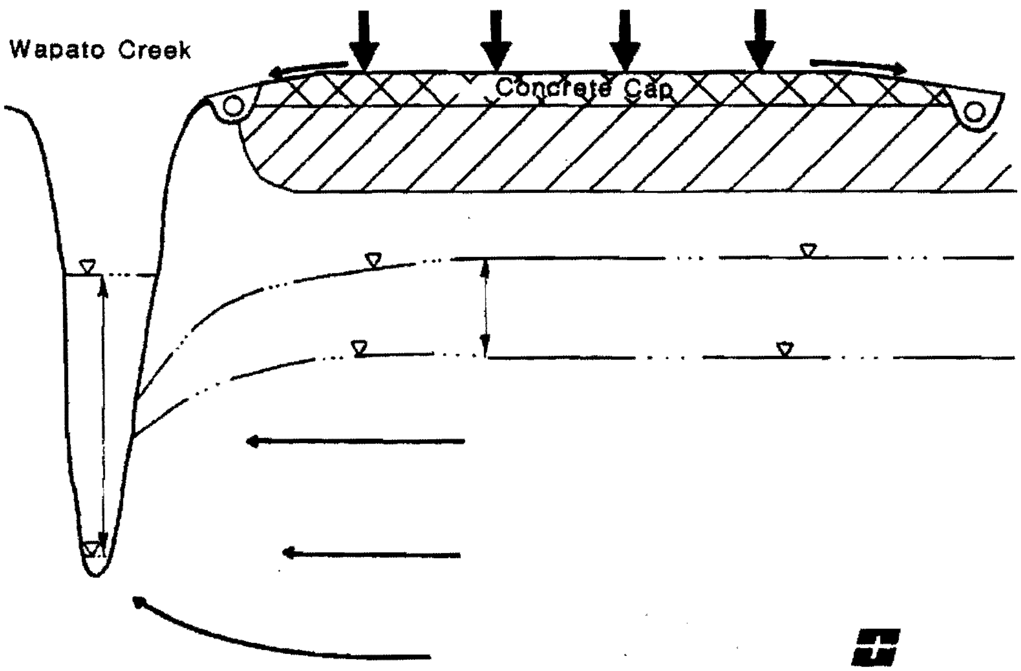
HARTCROWSER
J-1773-04 5/88
Figure 3

Conceptual Diagram of Hydrologic System

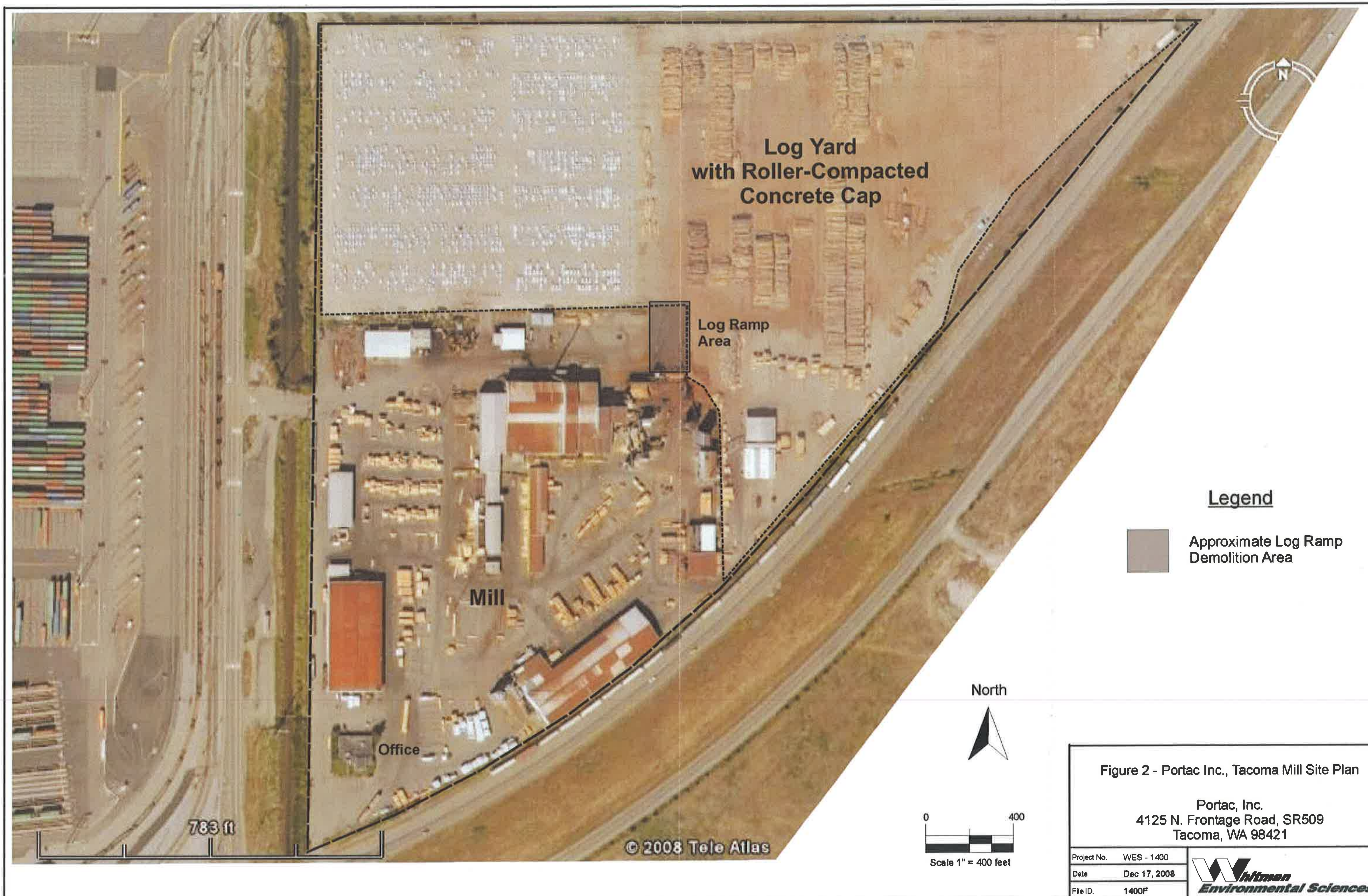
Before Paving



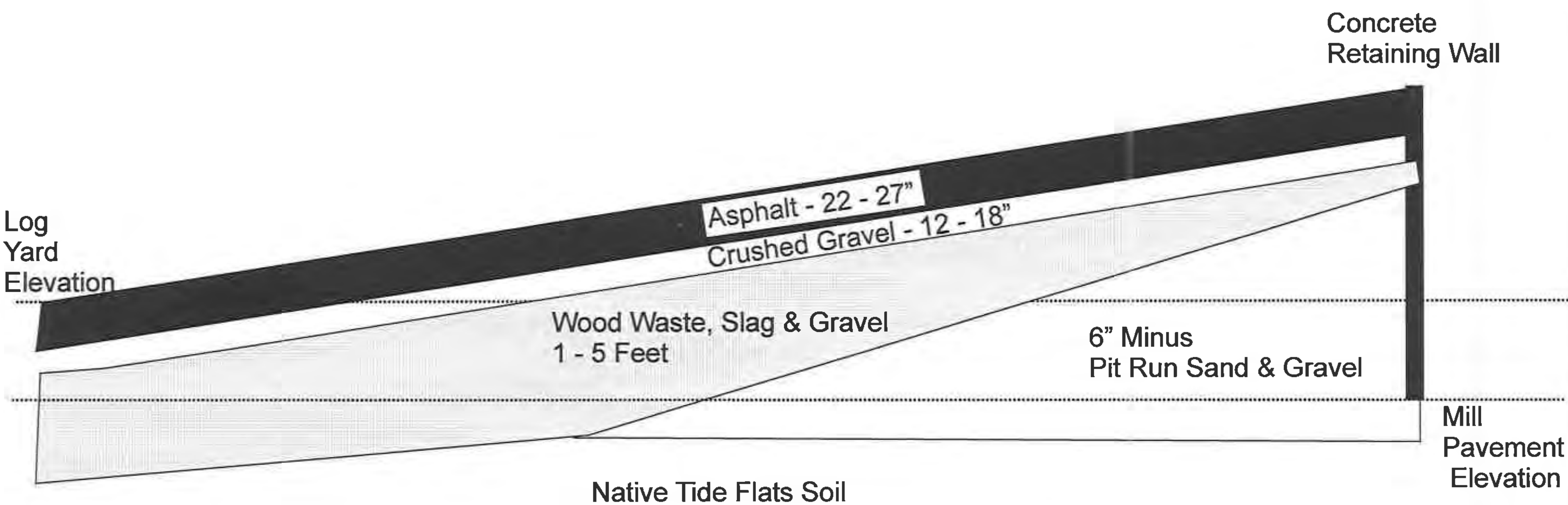
After Paving



HARTCROWSER
J-1773-04 9/88
Figure 1



Log Yard
with Roller-Compacted
Concrete Cap
Log Ramp
Area
Mill
Office
783 ft
© 2008 Tele Atlas
N
Legend
Approximate Log Ramp
Demolition Area
North
0
400
Scale 1" = 400 feet
Figure 2 - Portac Inc., Tacoma Mill Site Plan
Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421
Project No. WES - 1400
Date Dec 17, 2008
File ID. 1400F
Whitman
Environmental Sciences



Not to Scale

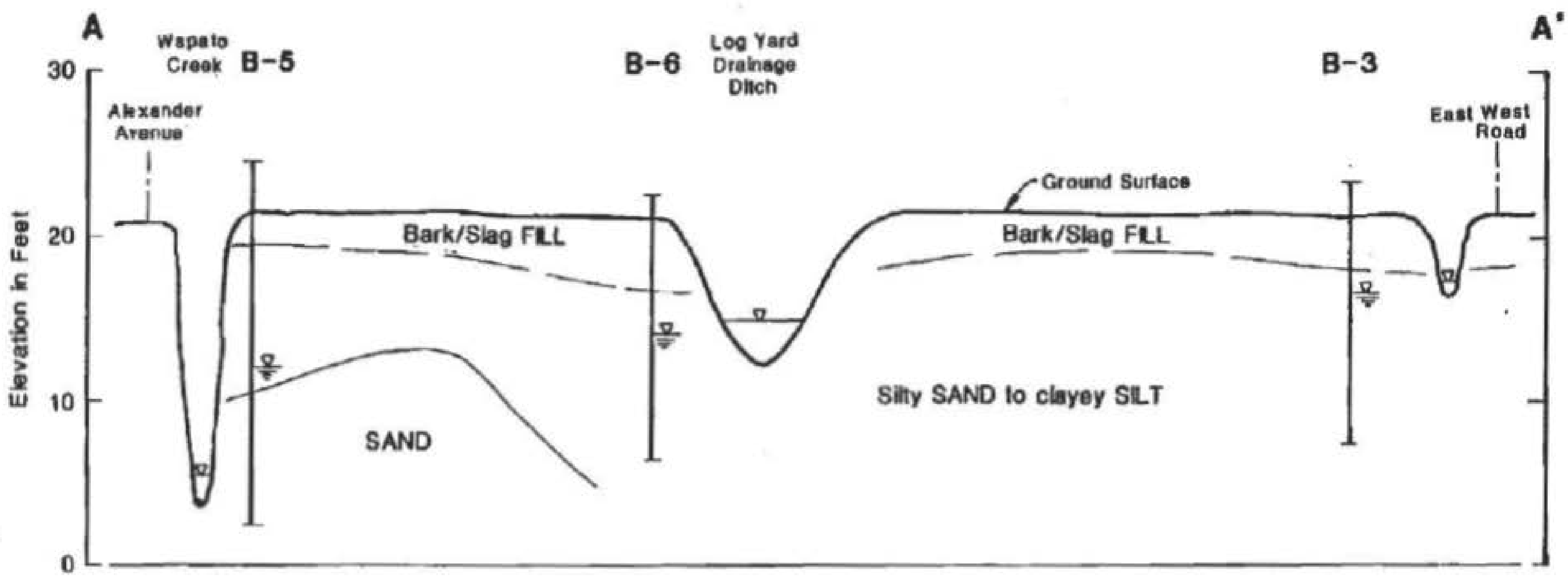
Figure 3 - Generalized Log Ramp Cross-Section

Portac, Inc.
4215 SR 509 N. Frontage Rd.
Tacoma, Washington

Project No.	WES - 1400
Date	Sep 22, 2008
File ID.	1400F3

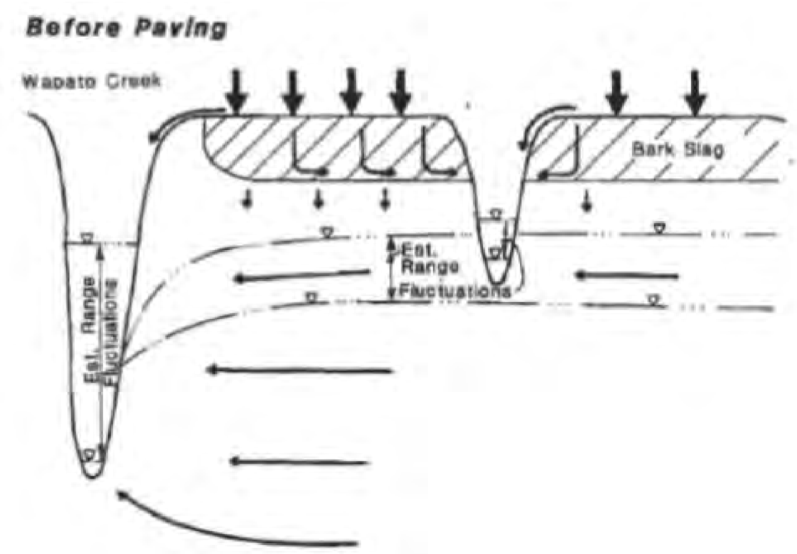
Whitman Environmental Sciences

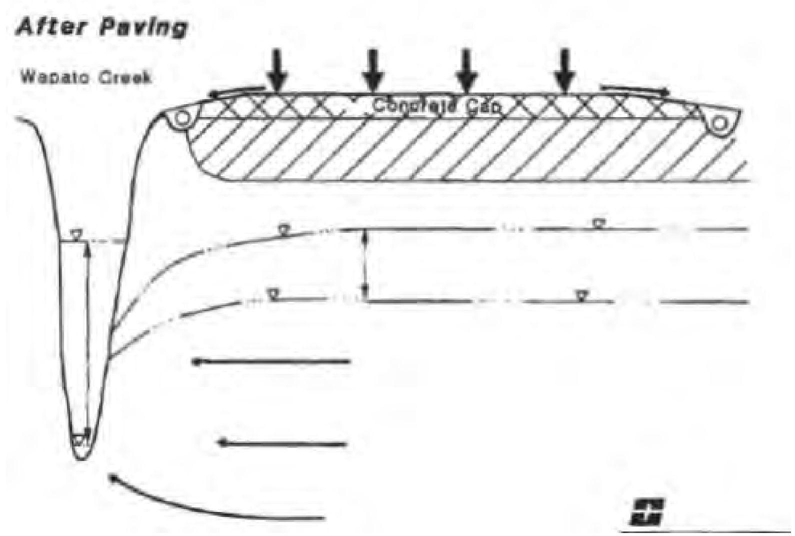
Generalized Site Cross-Section



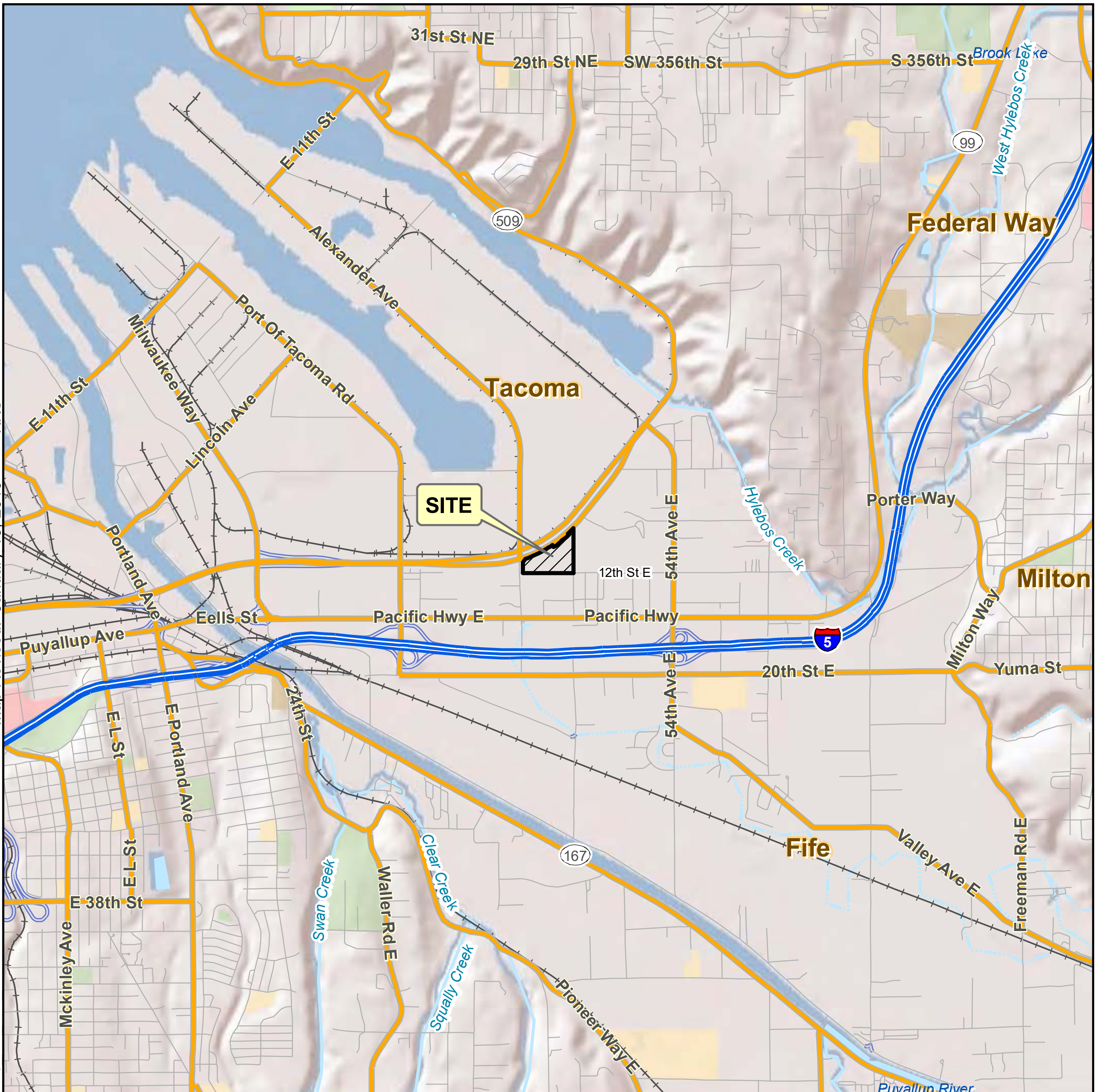
Final Report, Groundwater Quality Monitoring Program, Hart Crowser, 1992

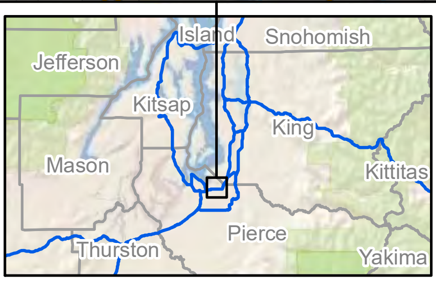
Completion of Log-Yard Cap





Final Report, Groundwater Quality
Monitoring Program, Hart Crowser, 1992





Legend

Interstate Highway

Major Road

Local Road

N
W E
S

4,000 0 4,000

Feet

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.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps, Street Maps 2008

Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

Vicinity Map

Port of Tacoma Parcel 14
Tacoma, Washington

GeoEngineers

Figure 1

Office: TAC Path: \\Tac\projects\0\0454094\GIS\045409415 F1 VM Parcel14.mxd Map Revised: January 13, 2010 KKS

Legend

TP-1	Test Pit Number and Approximate Location
B-1	Boring Number and Approximate Location
MW-1	Monitoring Well Number and Approximate Location
	Current path of Wapato Creek
	Original Path of Wapato Creek
	Site Boundary

N W E S

200 0 200

Feet

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.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

Data Sources: ESRI I3 Aerial Imagery, 2007.
Pierce County parcel and stream data, 2009.

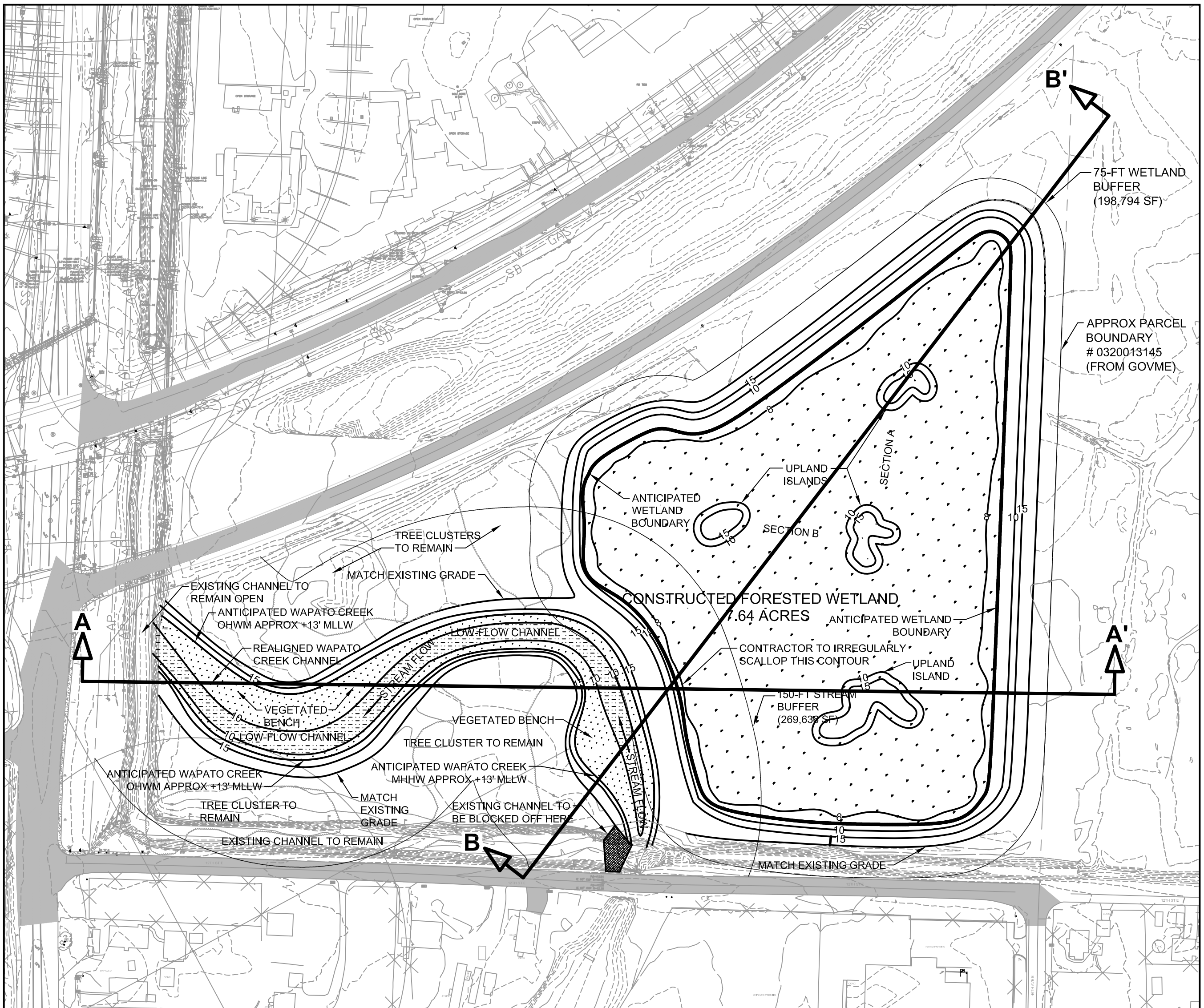
Existing Features and Explorations

Port of Tacoma Parcel 14
Tacoma, Washington

GEOENGINEERS

Figure 3

Office: TAC Path: \\Tac\projects\0\0454094\GIS\045409415 F3 SitePlan Parcel14.mxd Map Revised: 12/3/10, KKS, dbc, ras.tck



VEGETATED WETLAND AND STREAM CHANNEL

PARCEL 14 MITIGATION SITE
EXCAVATION AND GRADING TOTALS

- TOTAL EST AREA OF EXCAVATION/GRADING = 543,000 SF
- TOTAL EST VOLUME OF EXCAVATION/GRADING = 161,000 CY

Legend

A A'

Approximate cross section location

N W E S

240 0 240
Feet

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.

Reference: Drawing provided by Parametrix and Grette Associates.

Site Plan - Proposed Actions

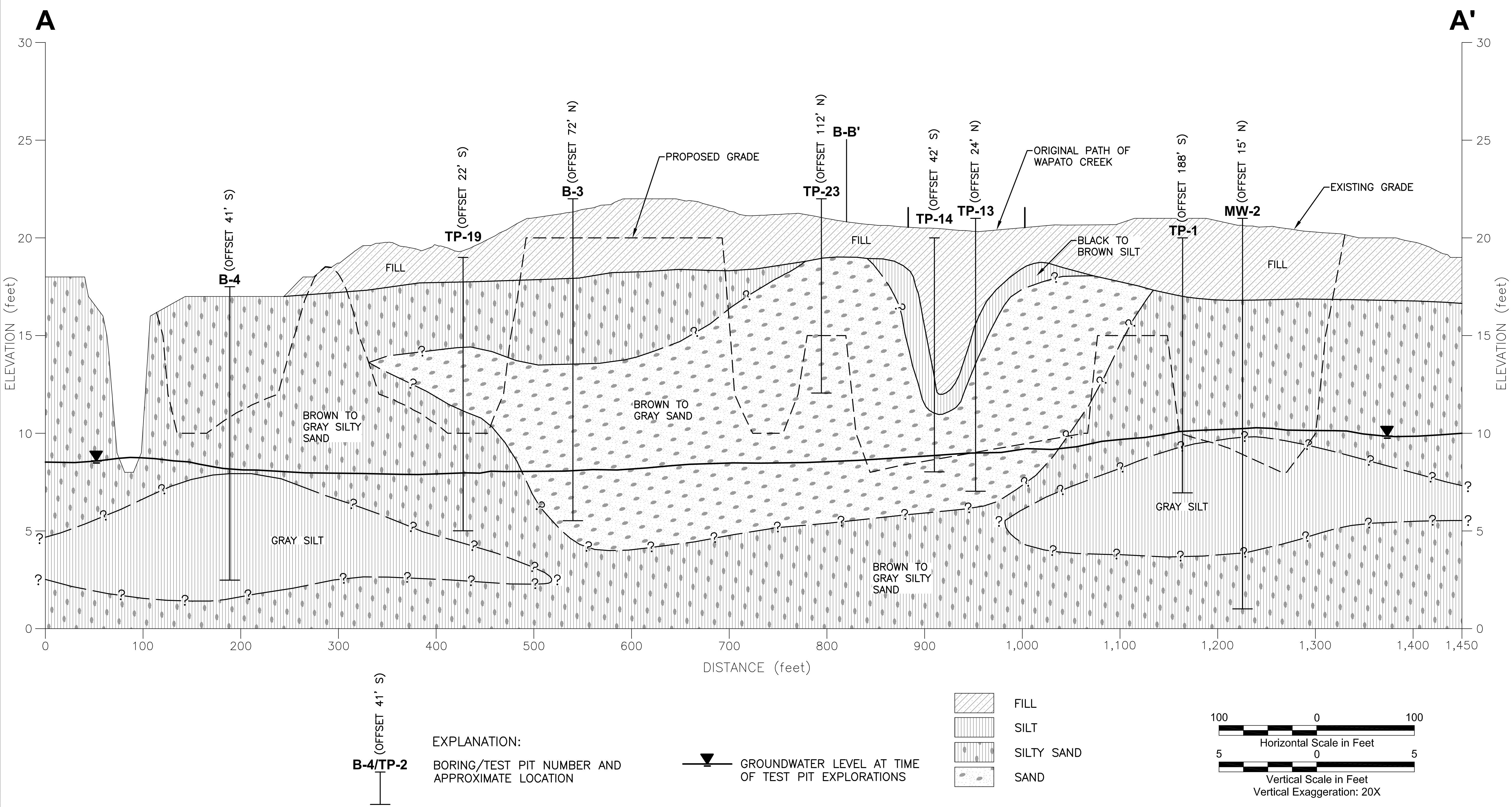
Port of Tacoma Parcel 14
Tacoma, Washington

GEOENGINEERS

Figure 2

TACO:JWP:MM : SCY

P:\0\0454094\15\CAD\045409415_F2.dwg\TAB:F2 modified on Nov 30, 2010 - 12:31pm



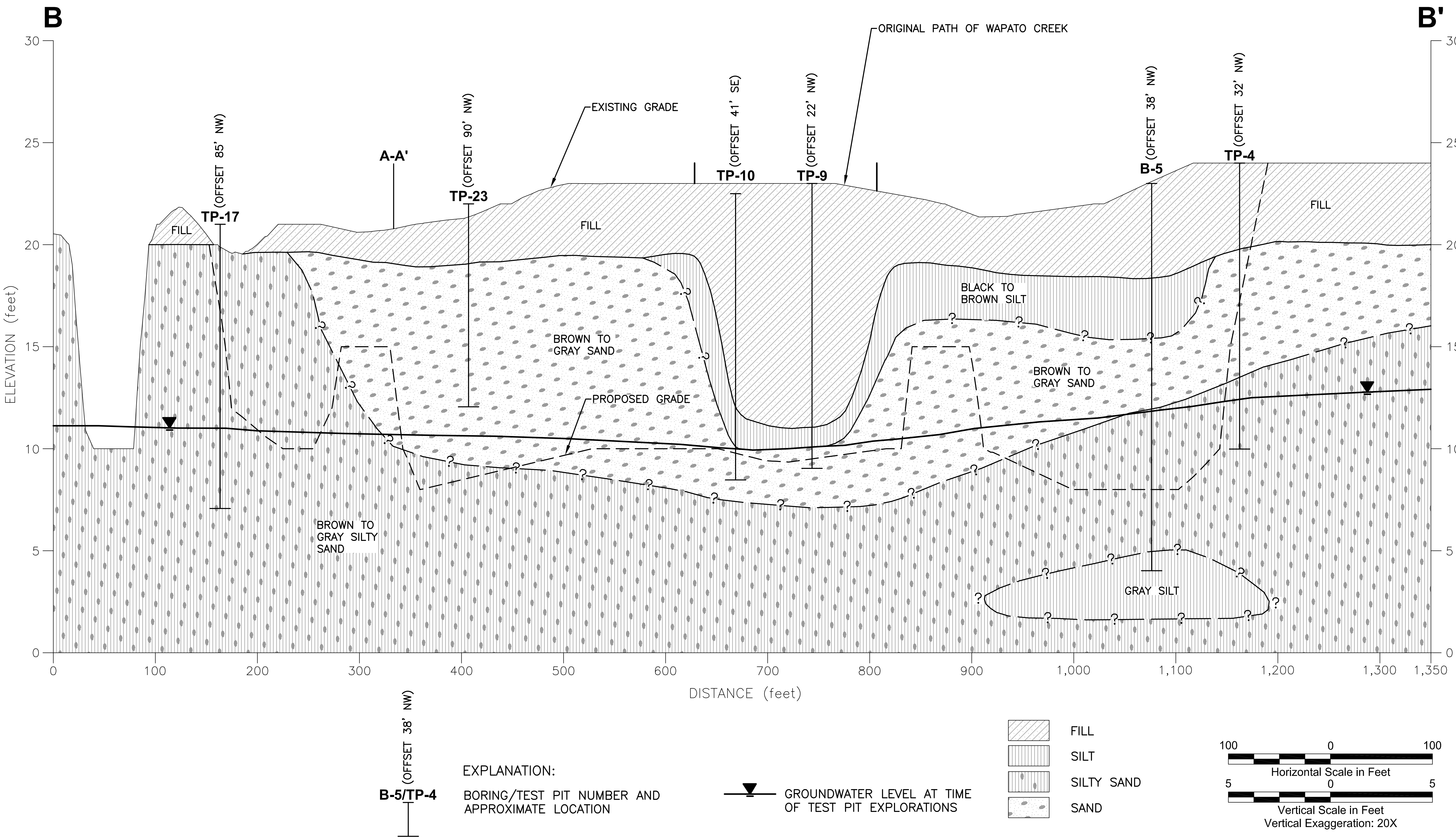
Notes:
1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. Refer to Figure 2 for location of Cross Section.
3. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.

Cross Section A-A'

Port of Tacoma Parcel 14
Tacoma, Washington

GEOENGINEERS

Figure 5



Notes:
1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. Refer to Figure 2 for location of Cross Section.
3. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.

Cross Section B-B'

Port of Tacoma Parcel 14
Tacoma, Washington

GEOENGINEERS

Figure 6

TACO:JWP:MM:SCY

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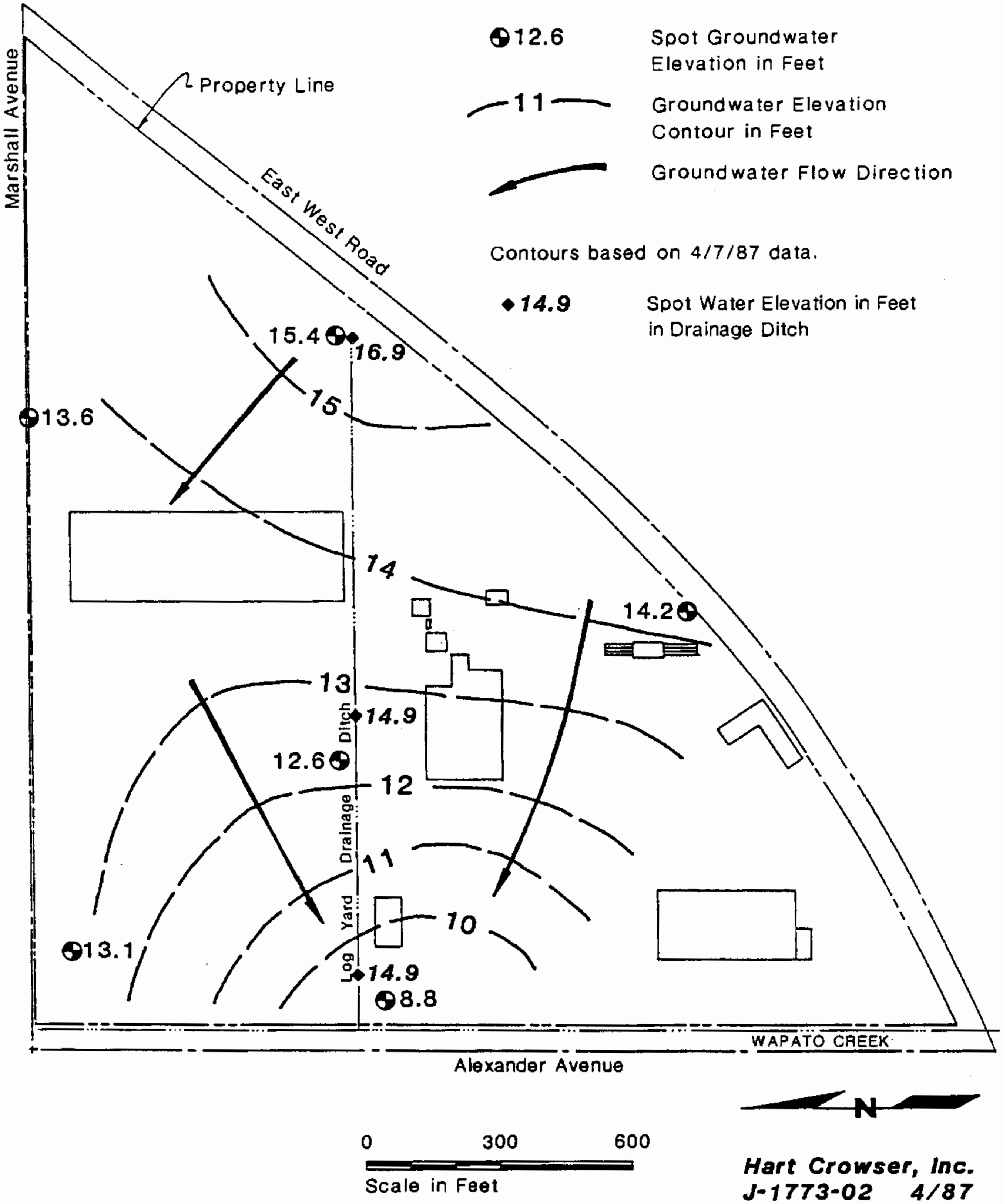
APPENDIX A.3

Groundwater Elevation Information

Attachment A.3 Contains Excerpted Information from the Following Reference

Year	Author Abbreviation	Author	Document Title
1987	HC	Hart Crowser, Inc. (HC)	Portac Log Yard, Groundwater Assessment (See #117 & 125)
1988	HC	Hart Crowser, Inc. (HC)	Portac Log Sort Yard Remediation Plan, Volume I and II Appendices
1992	HC	Hart Crowser, Inc. (HC)	Final Report Groundwater Quality Monitoring Program Portac Log Sort Yard Remediation
2008	CDM	CDM	Facility Closure Assessment Former Portac Lumber Facility
2008	CDM	CDM	Facility Closure Assessment Second Phase Former Portac Lumber Facility
2009	WES	Whitman Environmental Services (WES)	Lumber Mill Demolition - Environmental Cleanup and Testing Report - Former Portac Inc. Site - Tacoma, WA. Prepared by WES for Portac, Inc. July 6, 2009.
2010	WES	Whitman Environmental Services (WES)	Letter from WES to Ecology, dated May 7, 2010, First Quarter 2010 Groundwater Monitoring - Former Portac Inc. Site - Tacoma, WA
2010	WES	Whitman Environmental Services (WES)	Letter from WES to Ecology, dated August 25, 2010, Second Quarter 2010 Groundwater Monitoring - Former Portac Inc. Site - Tacoma, WA
2010	WES	Whitman Environmental Services (WES)	Letter from WES to Ecology, dated January 21, 2010, Fourth Quarter 2009 Groundwater Monitoring - Former Portac Inc. Site - Tacoma, WA
2010	WES	Whitman Environmental Services (WES)	Letter from WES to Ecology, dated November 29, 2010, Third Quarter 2010 Groundwater Monitoring - Former Portac Inc. Site - Tacoma, WA

Groundwater Elevation Contour Map



Hart Crowser, Inc.
J-1773-02 4/87
Figure 3

TABLE 1 - GROUNDWATER AND SURFACE WATER ELEVATIONS

Water Elevation in Feet (Port of Tacoma Datum: Mean Low Low Water)

STATION	B-1 (B-1R)	B-2	B-3 (B-3R)	B-4	B-5	B-6 (B-6R)	DDW	DDC	DDE	WAPATO
MEASURE PT ELEV. (*)	21.43 (21.12)	21.44	23.93 (24.32)	23.51	24.35	22.39 (22.13)	15.55	16.60	18.75	10.94
DATE OF MEASUREMENT:										
3/20/87	13.63	13.74	15.63	14.81	9.15	12.89	--	--	--	--
3/24/87	13.23	13.74	15.43	14.51	9.85	12.79	14.90	14.90	--	--
4/02/87	13.23	13.64	15.73	14.21	8.85	12.69	--	--	--	--
4/07/87	13.13	13.64	15.43	14.21	8.85	12.59	14.70	14.90	--	--
3/01/88	13.09	13.53	15.25	13.87	10.03	12.31	--	--	--	--
4/06/88	13.23	13.98	15.51	15.16	10.83	12.59	--	--	--	--
4/11/88	12.92	13.94	15.47	14.76	9.05	12.53	--	--	--	--
4/15/88	12.83	13.81	15.41	14.46	9.18	12.50	15.01	15.69	15.68	5.84
5/11/88	12.45	13.40	15.29	14.20	8.86	12.31	14.60	15.25	16.89	5.37
6/23/88	12.34	13.68	15.54	13.73	8.50	12.21	14.60	15.25	16.82	5.85
7/06/88	12.34	13.34	15.00	13.51	8.61	12.12	14.60	15.25	16.63	5.22
8/01/88	12.22	13.62	14.85	13.23	9.07	12.12	DRY	13.70	DRY	5.22
9/06/88	11.99	13.26	14.61	13.10	10.47	12.61	DRY	15.04	DRY	--

(*) Elevation reference point is top of PVC casing in monitoring wells and survey markers at surface water stations.

(21.34) Elevations for replacement wells 1R, 3R, and 6R installed near the original wells on 5/4/88.

Original wells were abandoned by pressure grouting due to poor condition.

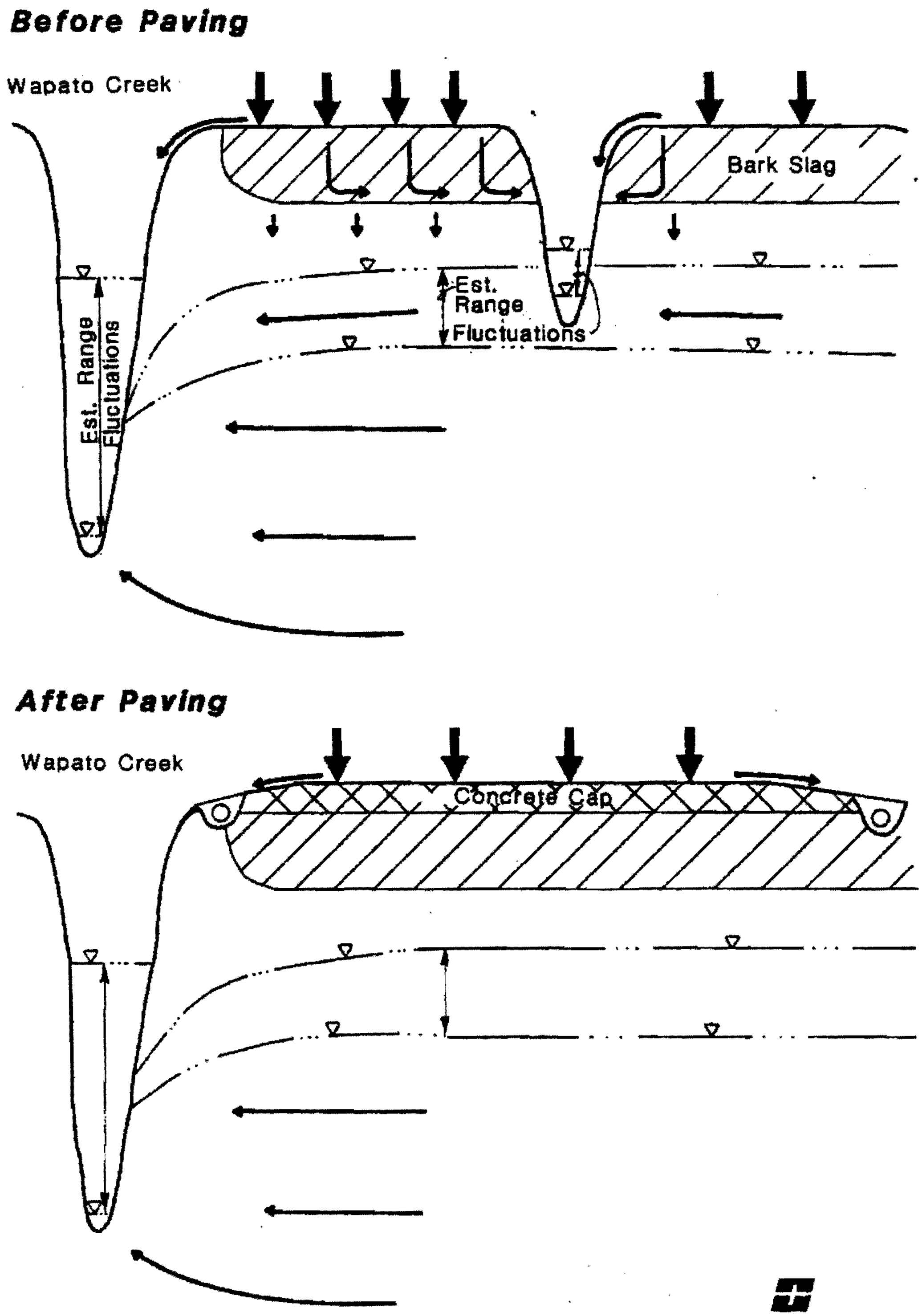
DDW - Drainage Ditch West

DDC - Drainage Ditch Central

DDE - Drainage Ditch East

WAPATO - Wapato Creek, northwest of site

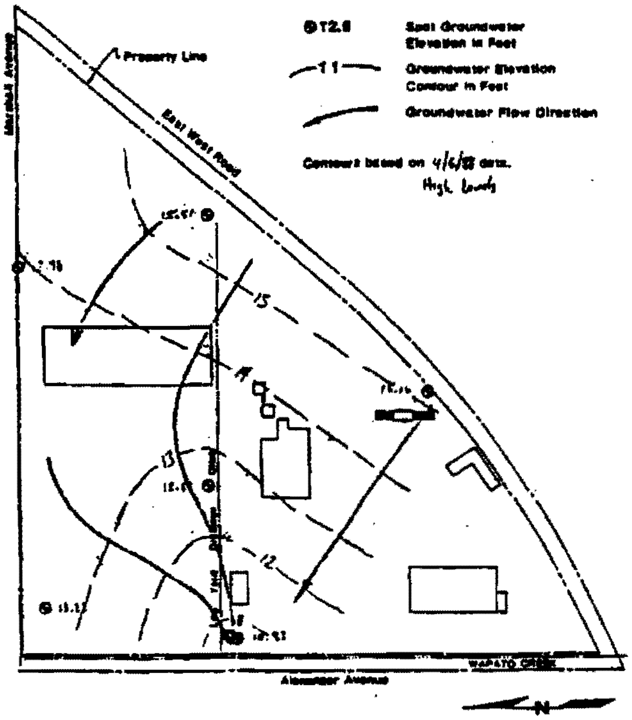
Conceptual Diagram of Hydrologic System



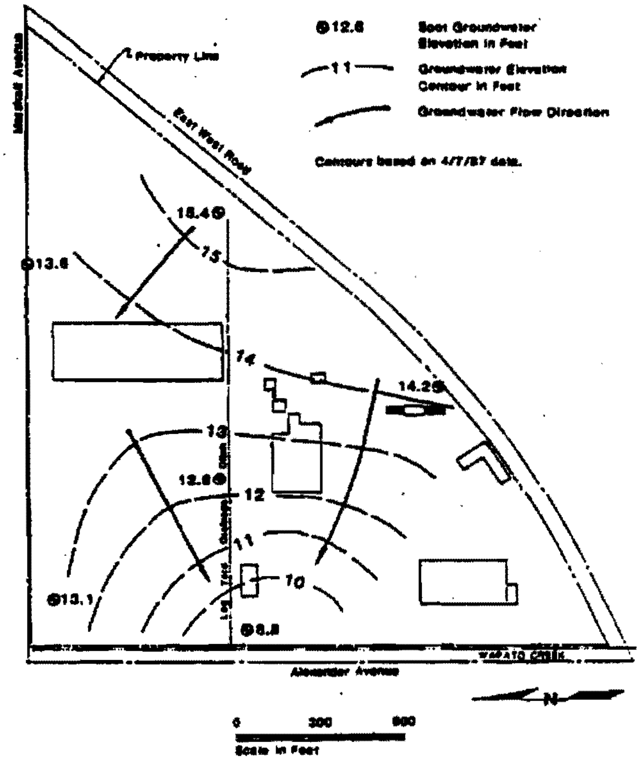
HARTCROWSER
J-1773-04 9/88
Figure 1

Groundwater Elevation Contour Maps

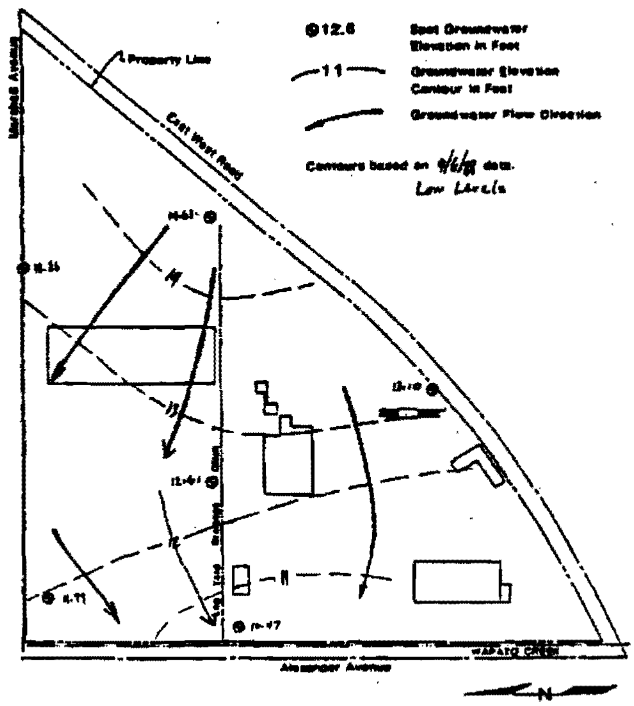
4/6/88 High Levels



4/7/87



9/6/88 Low Levels



HARTCROWSER
J-1773-04 9/88
Figure 2

Table 1 – Groundwater and Surface Water Elevation Data

LOCATION	B-1 (B-1R) [B-1R2]	B-2 [B-2R]	B-3 (B-3R) [B-3R2]	B-4 (**)	B-5 [B-5R]	B-6 (B-6R) [B-6R2]	DDW	DDC	DDE	WAPATO	HC-1	HC-2
MEASURE PT ELEV. (*)	21.43 (21.12) [24.52]	21.44 [23.94]	23.93 (24.32) [24.07]	23.51 {22.05}	24.35 [21.54]	22.39 (22.13) [25.14]	15.55	16.60	18.75	10.94	24.42	24.99
	Water Elevation in Feet (Mean Low Low Water)											
DATE												
3/20/87	13.63	13.74	15.63	14.81	9.15	12.89	—	—	—	—		
3/24/87	13.23	13.74	15.43	14.51	9.85	12.79	14.90	14.90	—	—		
4/2/87	13.23	13.64	15.73	14.21	8.85	12.69	—	—	—	—		
4/7/87	13.13	13.64	15.43	14.21	8.85	12.59	14.70	14.90	—	—		
3/1/88	13.09	13.53	15.25	13.87	10.03	12.31	—	—	—	—		
4/6/88	13.23	13.98	15.51	15.16	10.83	12.59	—	—	—	—		
4/11/88	12.92	13.94	15.47	14.76	9.05	12.53	—	—	—	—		
4/15/88	12.83	13.81	15.41	14.46	9.18	12.50	15.01	15.69	15.68	5.84		
5/11/88	12.45	13.40	15.29	14.20	8.88	12.31	14.60	15.25	16.89	5.37		
6/23/88	12.34	13.68	15.54	13.73	8.50	12.21	14.60	15.25	16.82	5.85		
7/6/88	12.34	13.34	15.00	13.51	8.61	12.12	14.60	15.25	16.63	5.22		
8/1/88	12.22	13.62	14.85	13.23	9.07	12.12	DRY	13.70	DRY	5.22		
9/3/88	11.99	13.26	14.61	13.10	10.47	12.61	DRY	15.04	DRY	—		
9/15/89	12.42	14.19	14.93	—	9.75	12.46	—	—	—	—	DRY	19.53
10/23/89	12.32	—	14.91	13.39	9.38	—	—	—	—	—	DRY	18.44
11/9/89	11.96	—	—	13.70	—	—	—	—	—	—	—	18.27
11/30/89	12.35	13.36	—	14.14	10.12	12.64	—	—	—	—	—	18.16
3/23/90	12.09	14.19	—	—	—	12.56	—	—	—	—	—	17.97
4/6/90	12.31	14.34	—	—	—	12.50	—	—	—	—	—	17.97
4/16/90	12.30	14.40	15.40	14.16	10.28	12.52	—	—	—	—	DRY	17.95
5/11/90	12.07	14.32	—	—	9.26	12.30	—	—	—	—	—	17.84
6/15/90	12.54	13.39	—	—	—	12.76	—	—	—	—	—	17.82
8/21/90	12.11	—	—	—	—	—	—	—	—	—	—	17.66
10/18/90	11.97	13.73	14.85	13.96	10.73	12.13	—	—	—	—	DRY	17.46
2/22/91	12.67	—	—	—	—	—	—	—	—	—	—	17.35
4/5/91	12.54	—	—	—	—	—	—	—	—	—	—	17.29
4/12/91	12.66	14.45	15.38	—	9.31	12.87	—	—	—	—	—	17.34
6/27/91	11.97	—	—	—	—	12.25	—	—	—	—	—	17.36
8/2/91	11.93	—	—	—	—	—	—	—	—	—	—	17.30
10/8/91	11.85	—	—	—	—	—	—	—	—	—	—	17.08
10/23/91	11.89	13.65	14.73	(**)	9.26	11.85	—	—	—	—	DRY	16.60 (***)
11/27/91	12.46	—	—	—	—	—	—	—	—	—	—	16.60 (***)
1/17/92	11.93	—	—	—	—	—	—	—	—	—	—	16.61 (***)
3/30/92	12.05	—	—	—	—	—	—	—	—	—	—	17.03
4/15/92	12.23	13.9	14.66	—	9.17	12.34	—	—	—	—	DRY	16.51 (***)

(*) Elevation reference point is top of PVC casing in monitoring wells and survey markers at surface water locations.

(**) Monitoring well B-4 abandoned 10/23/91.

(***) Water elevation below bottom of screened interval and does not does not represent actual perched water table elevation.

(21.34) Elevations for replacement wells 1R, 3R, and 6R installed near the original wells on 5/4/88.

[24.25] Elevations for replacement wells 1R2, 2R, 3R2, 5R and 6R2 installed in August, 1989.

{22.05} New elevation after replacing damaged monument on 11/9/89.

DDW – Drainage Ditch West

DDC – Drainage Ditch Central

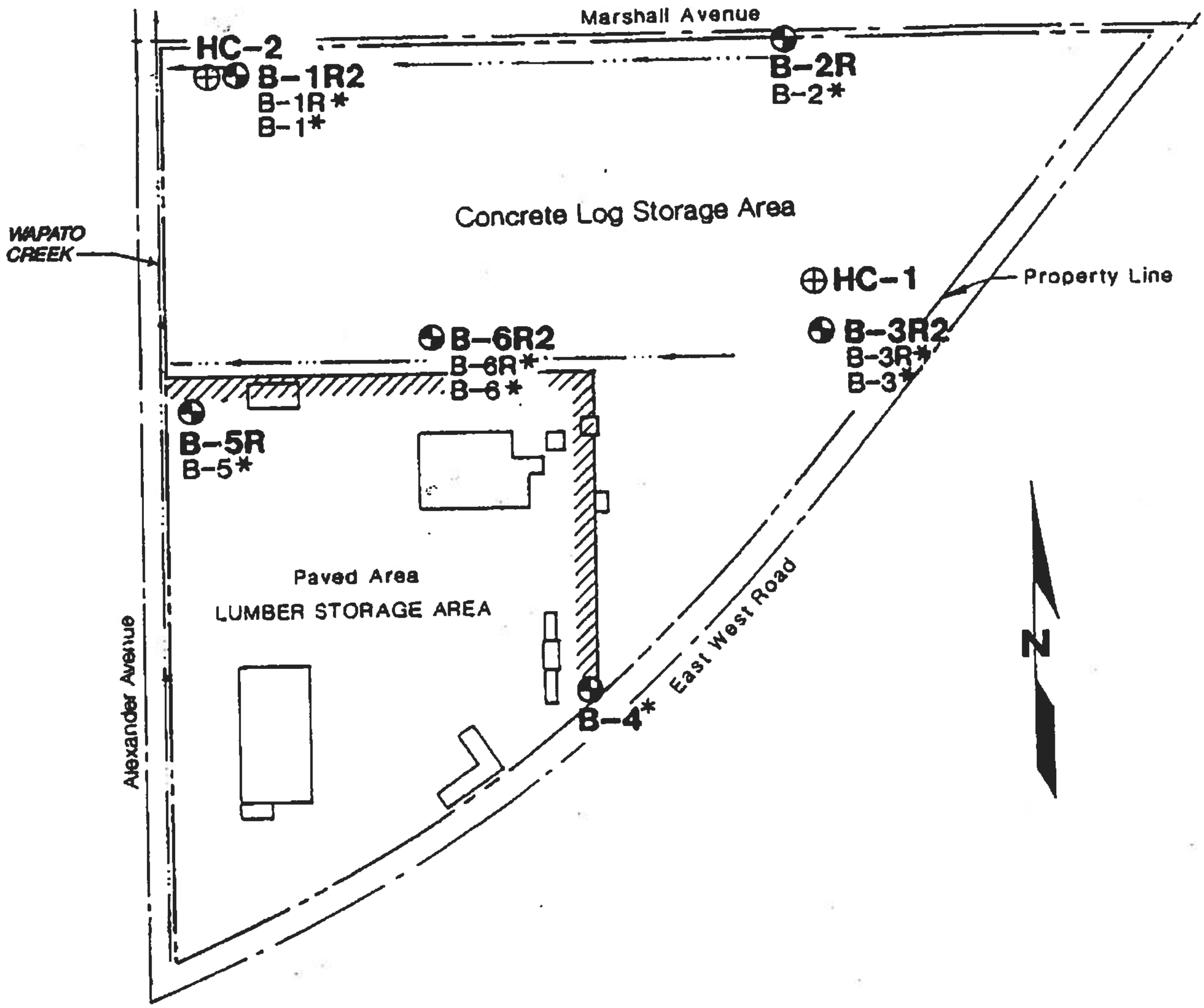
DDE – Drainage Ditch East

WAPATO – Wapato Creek, northwest of site

— Not Measured

1773041l.wk1

Groundwater Sampling Location Plan



B-1R2	Groundwater Monitoring Well Location and Number
HC-1	Slag Monitoring Well Location and Number
*	Abandoned
	Site Drain Line
	Margin of Concrete Log Storage Area

0 400 800

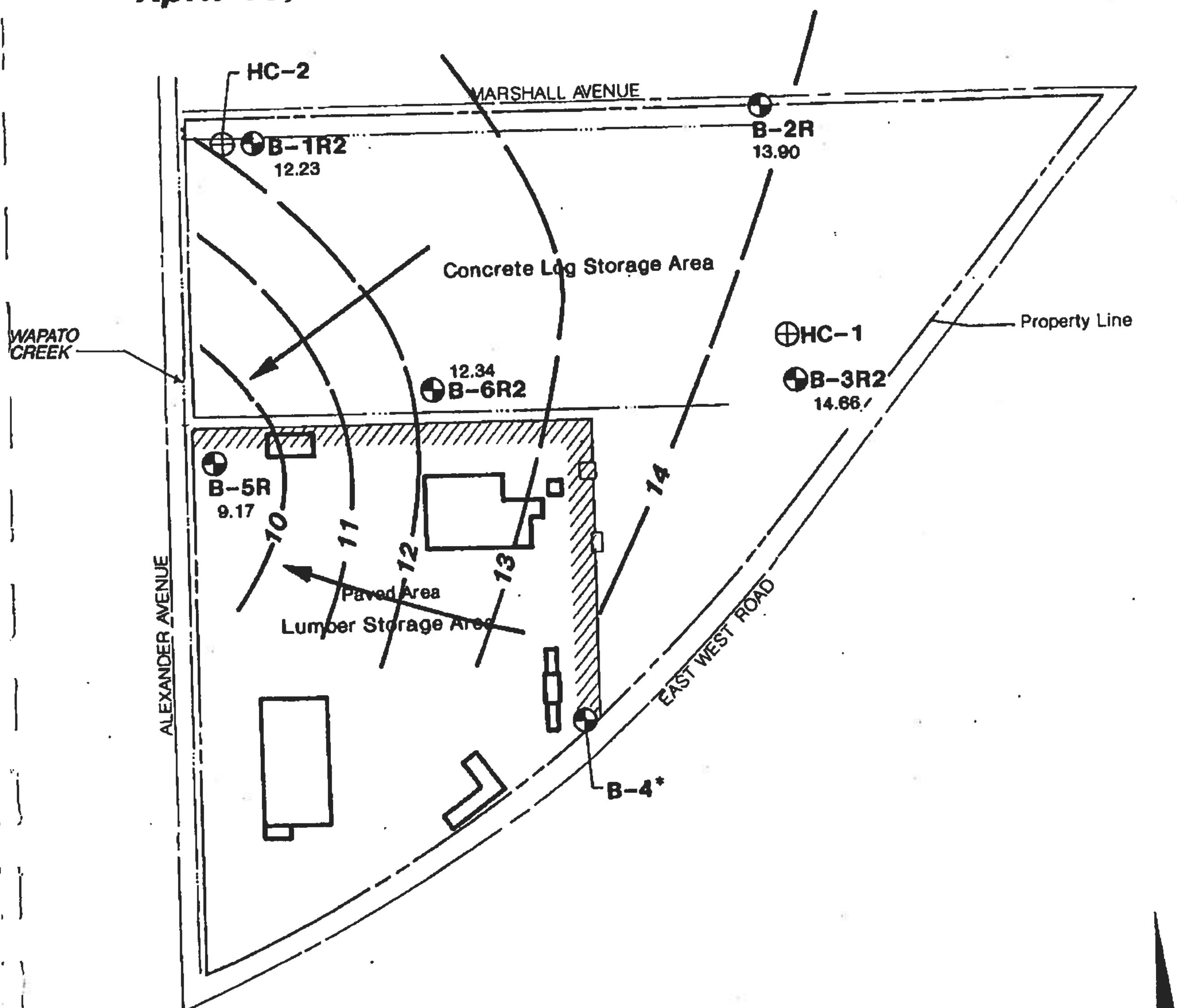
Scale in Feet

HARTCROWSER

J-1773-04 5/92

Figure 1

Groundwater Elevation Contour Map
April 15, 1992



B-1R2 Groundwater Monitoring Well Location and Number

HC-1 Slag Monitoring Well Location and Number

12.23 Groundwater Elevation in Feet

— 10 — Groundwater Elevation Contour in Feet (Dashed where Infered)

Groundwater Flow Direction

* Abandoned October 23,1991

Site Drain Line

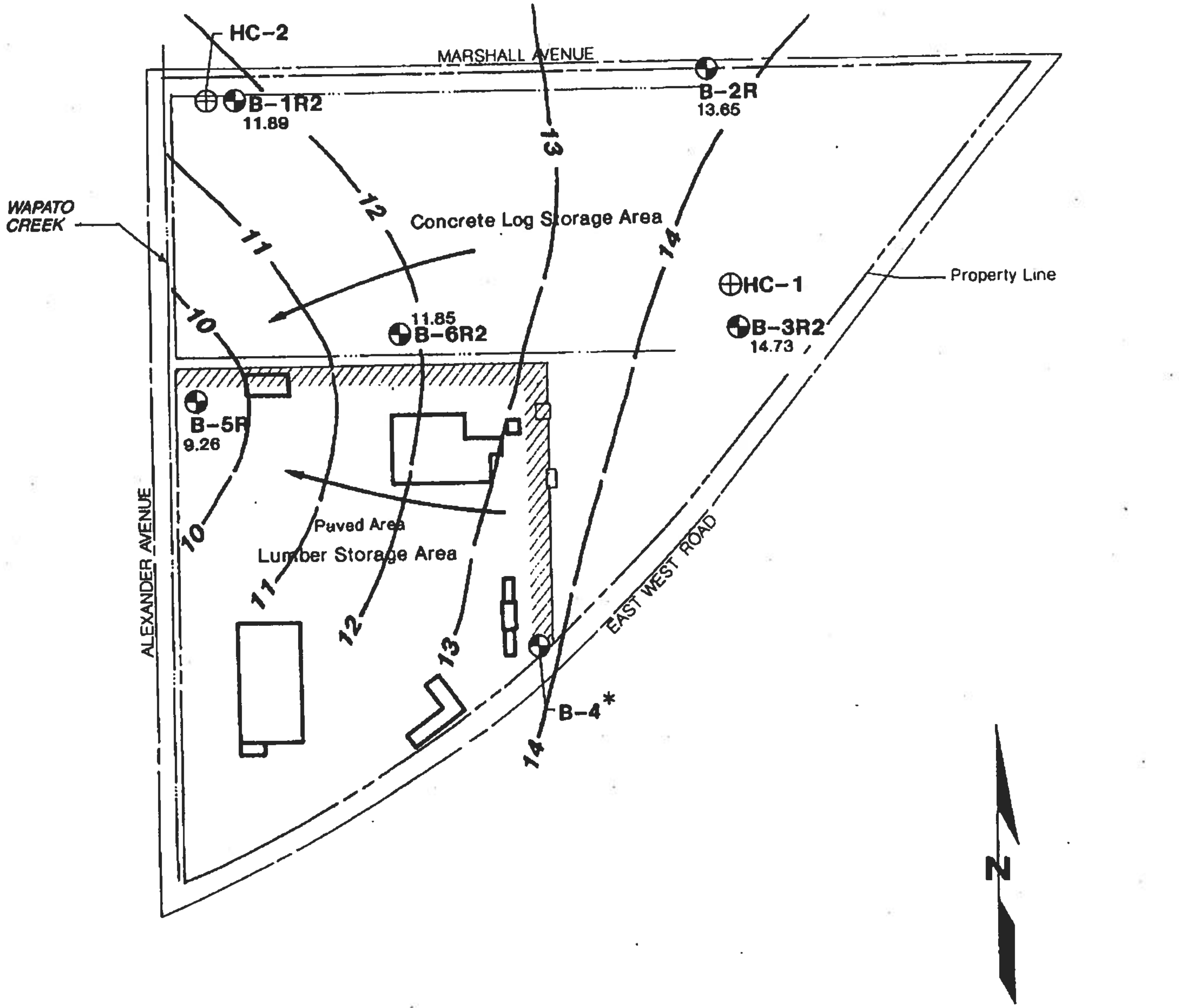
Margin of Concrete Log Storage Area

0 400 800
Scale in Feet

HARTCROWSER
J-1773-04 5/92
Figure 2

Groundwater Elevation Contour Map

October 23, 1991



B-1R2 Groundwater Monitoring Well Location and Number

HC-1 Slag Monitoring Well Location and Number

11.89 Groundwater Elevation in Feet

— 10 — Groundwater Elevation Contour in Feet

Groundwater Flow Direction

* Abandoned October 23, 1991

Site Drain Line

Margin of Concrete Log Storage Area

0 400 800

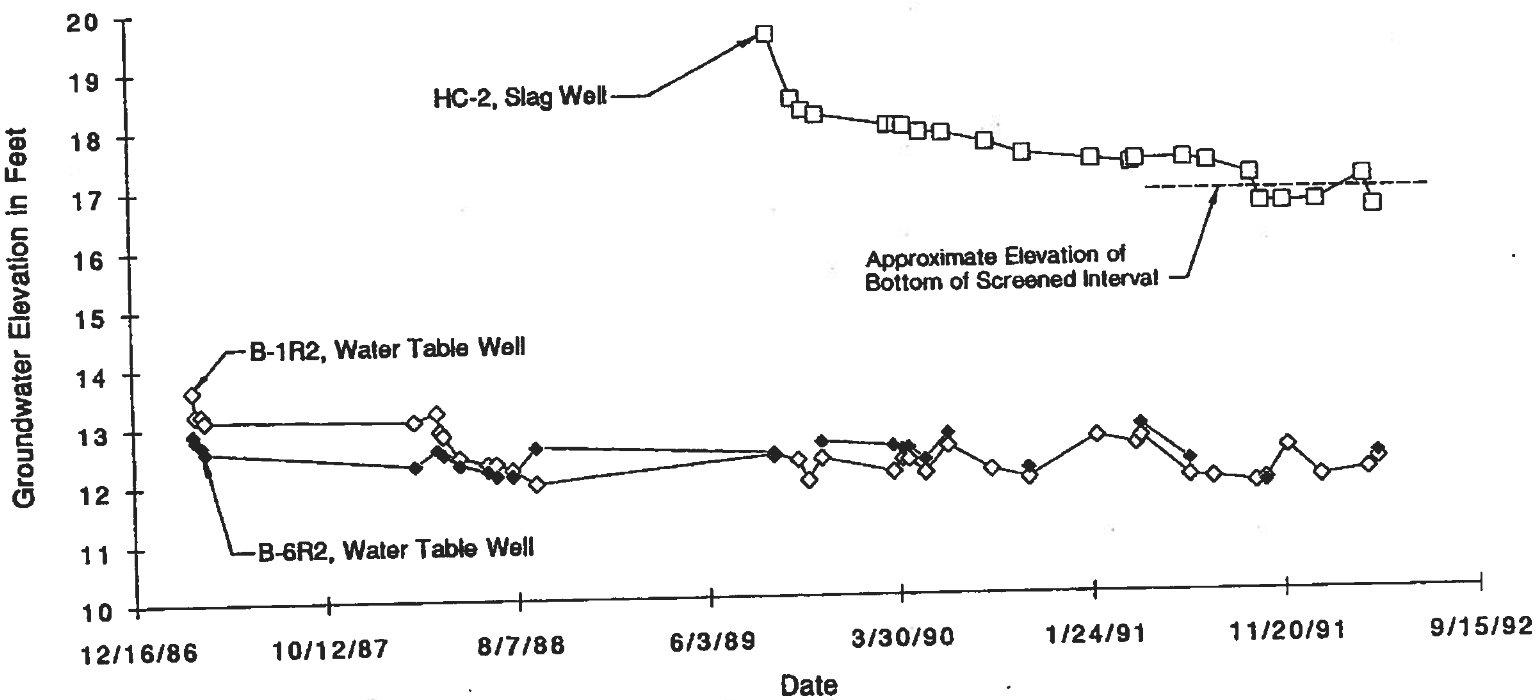
Scale in Feet

HARTCROWSER

J-1773-04 5/92

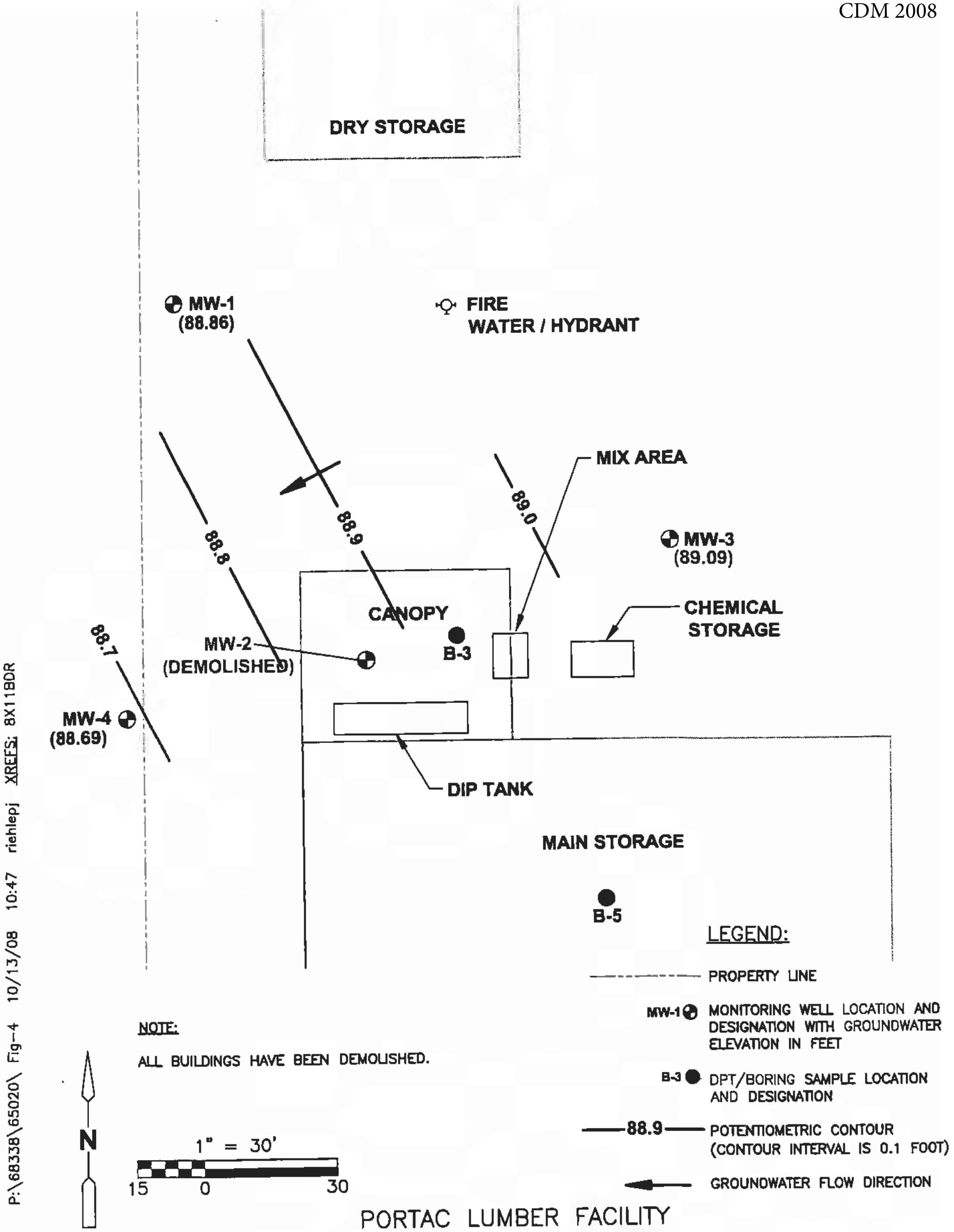
Figure 3

Groundwater Elevation Hydrographs
Wells HC-2, B-1R2, and B-6R2



HARTCROWSER
J-1773-04 5/92
Figure 4

CDM 2008

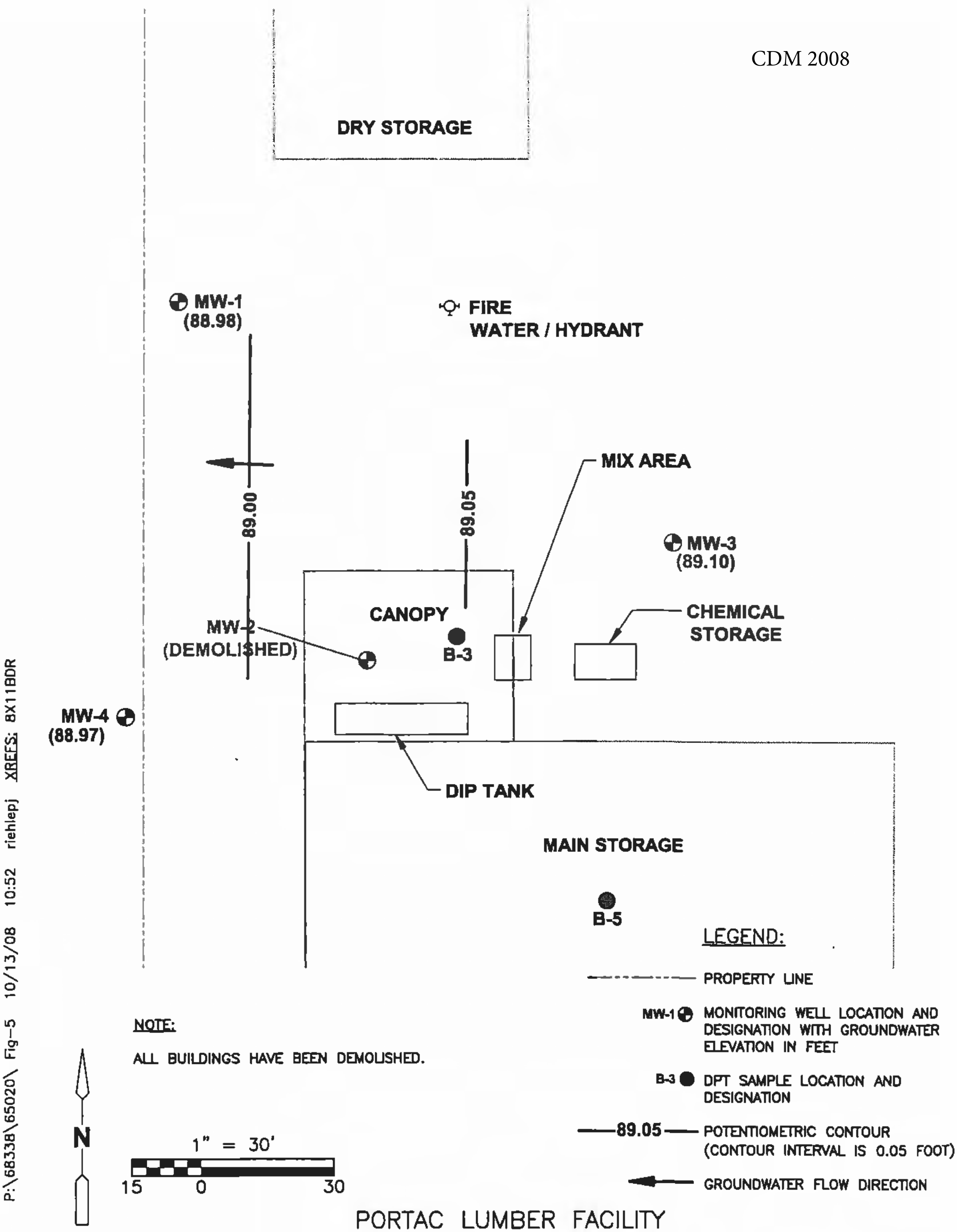


PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

Figure No. 4
Potentiometric Surface Map –
Low Tide Sept 23, 2008

CDM

CDM 2008



PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

Figure No. 5
Potentiometric Surface Map –
High Tide Sept 23, 2008

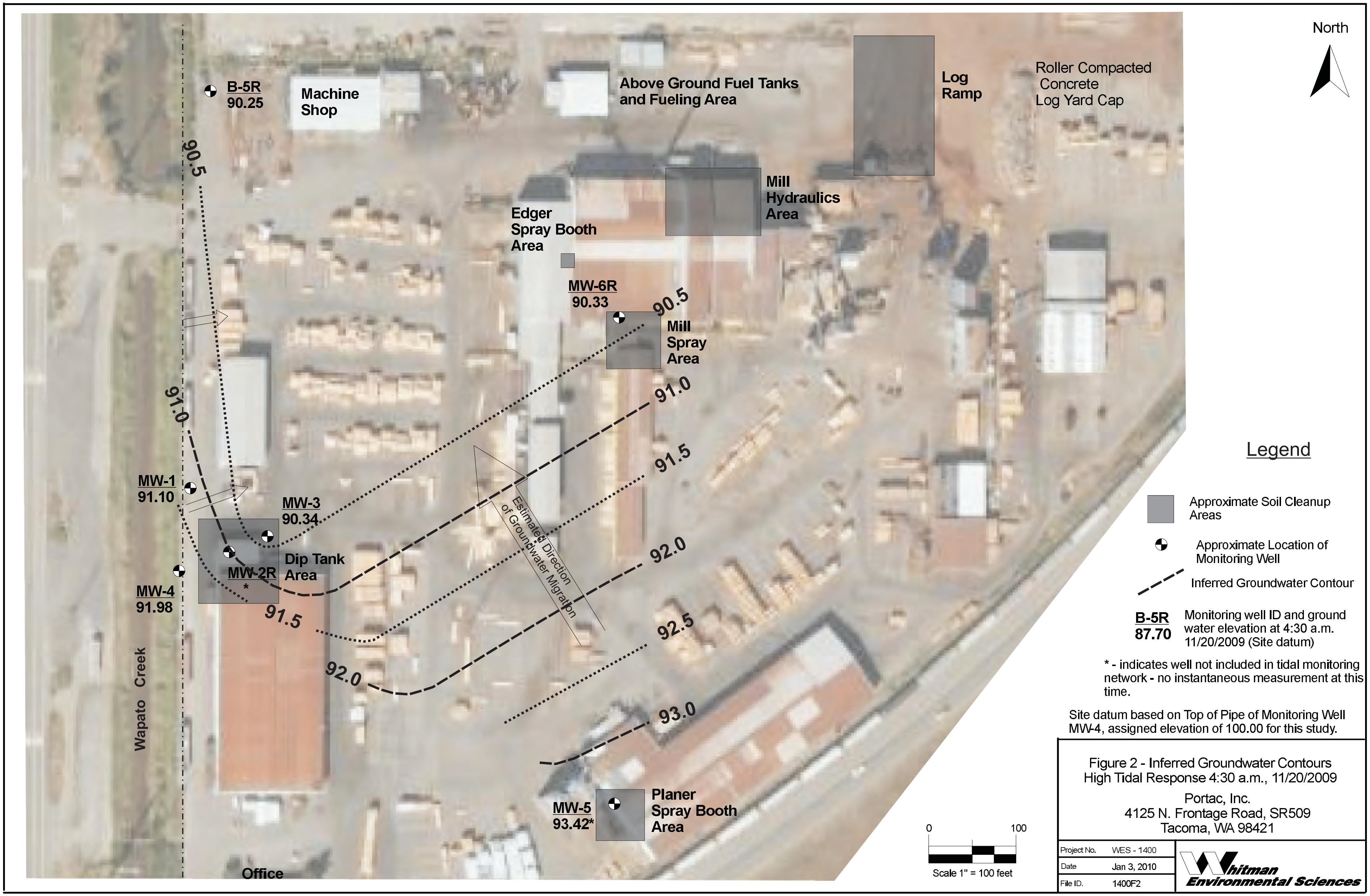


Figure 2 - Inferred Groundwater Contours
High Tidal Response 4:30 a.m., 11/20/2009

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Jan 3, 2010
File ID.	1400F2

Whitman Environmental Sciences

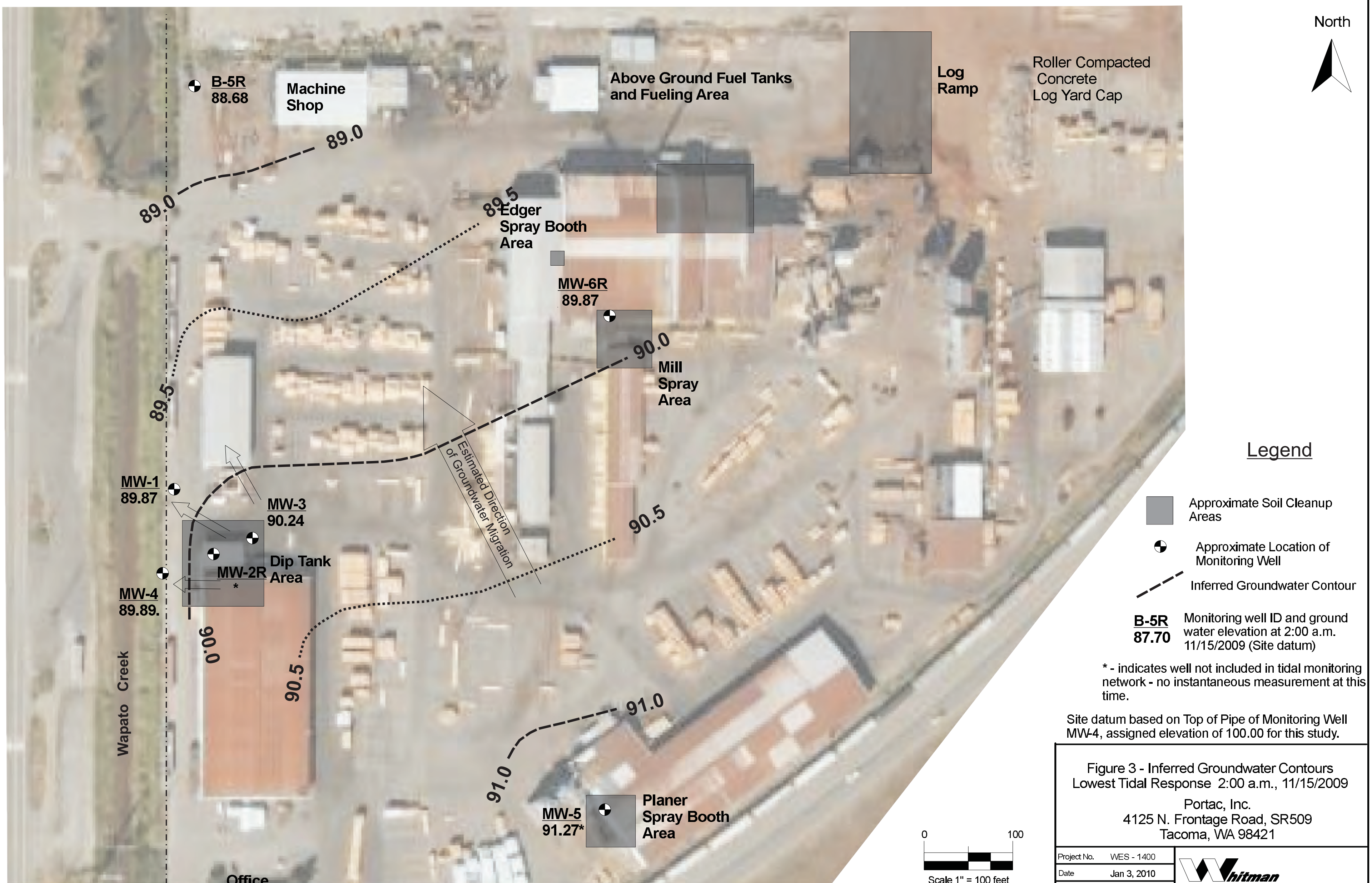
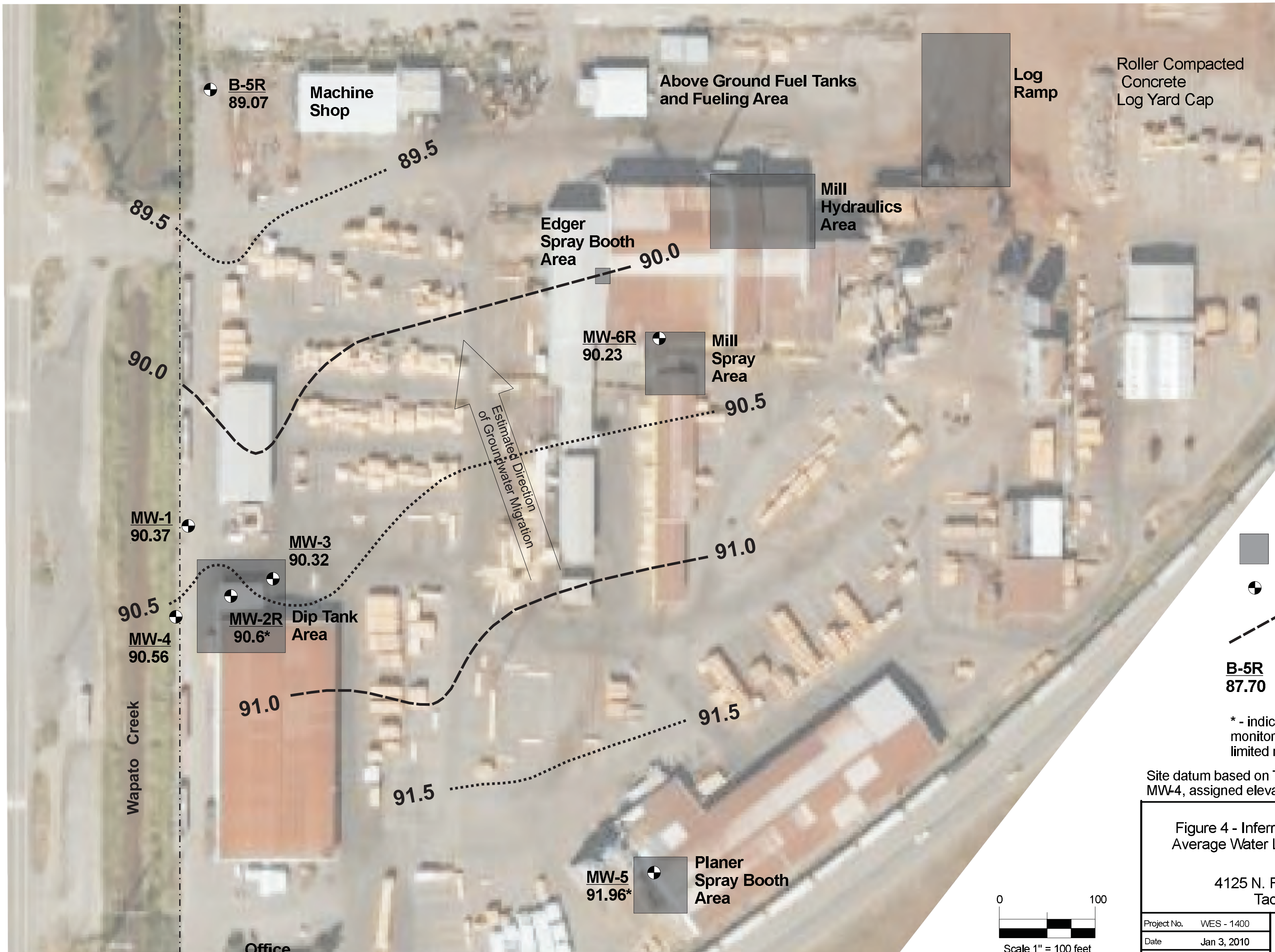


Figure 3 - Inferred Groundwater Contours
Lowest Tidal Response 2:00 a.m., 11/15/2009

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Jan 3, 2010
File ID.	1400F3

Whitman Environmental Sciences



Legend

Approximate Soil Cleanup Areas

Approximate Location of Monitoring Well

Inferred Groundwater Contour

B-5R
87.70 Monitoring well ID and average groundwater elevation 11/12 to 11/29 2009 (Site datum)

* - indicates well not included in tidal monitoring network - average based on limited number of measurements

Site datum based on Top of Pipe of Monitoring Well MW-4, assigned elevation of 100.00 for this study.

Figure 4 - Inferred Groundwater Contours
Average Water Levels 11/12 to 11/29/2009

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Jan 3, 2010
File ID.	1400F4

Whitman Environmental Sciences

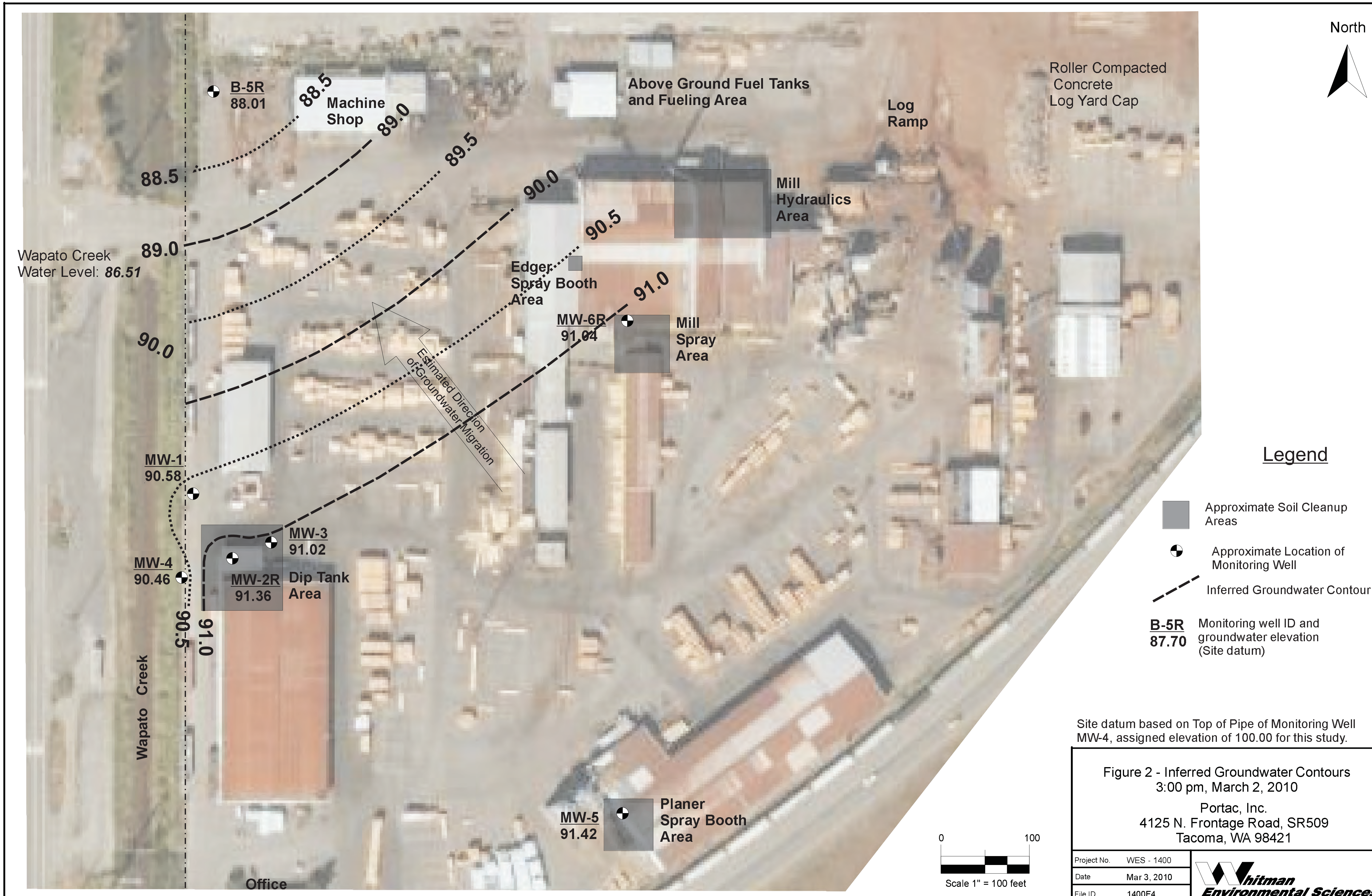
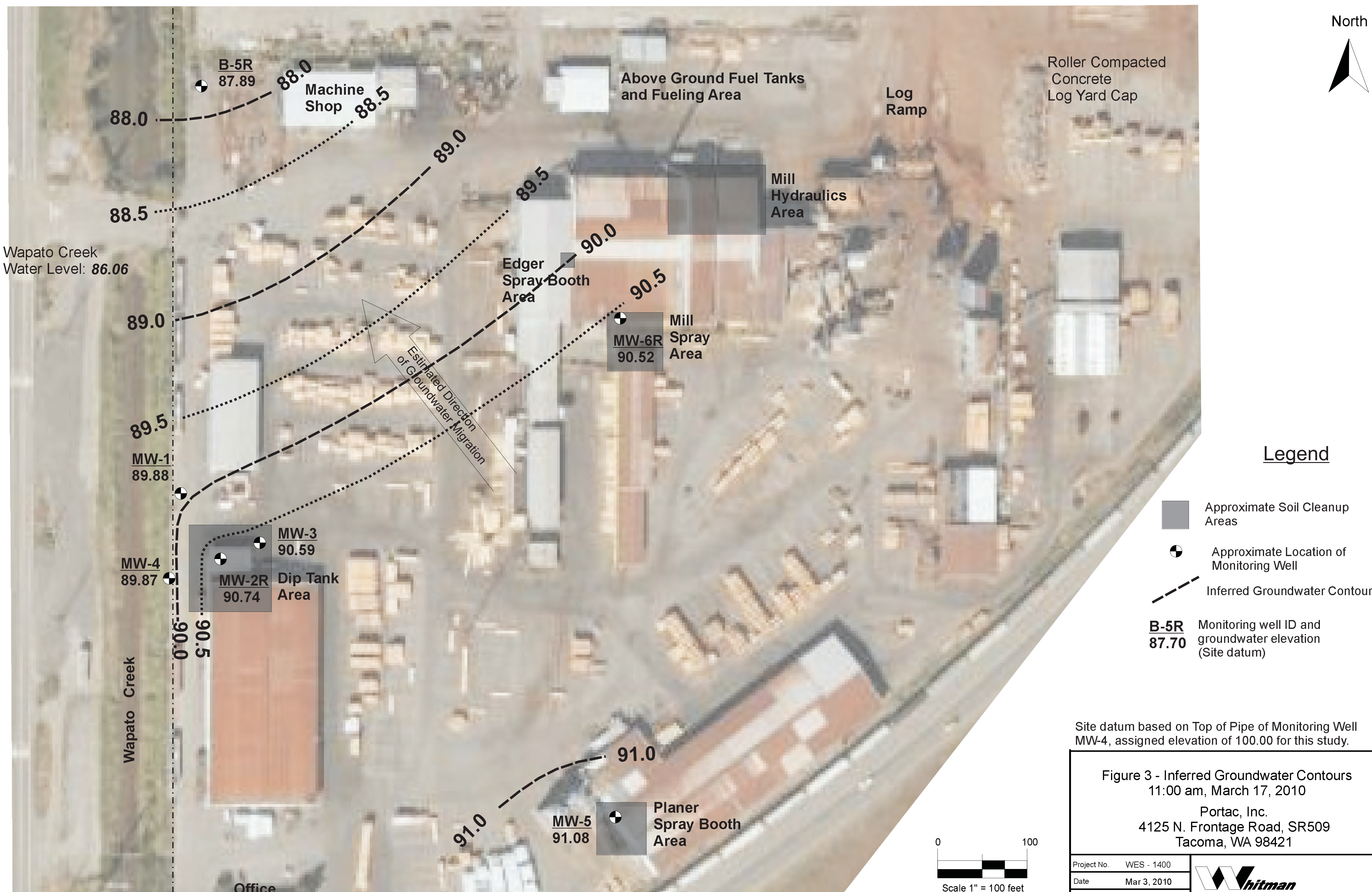


Figure 2 - Inferred Groundwater Contours
3:00 pm, March 2, 2010
Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421



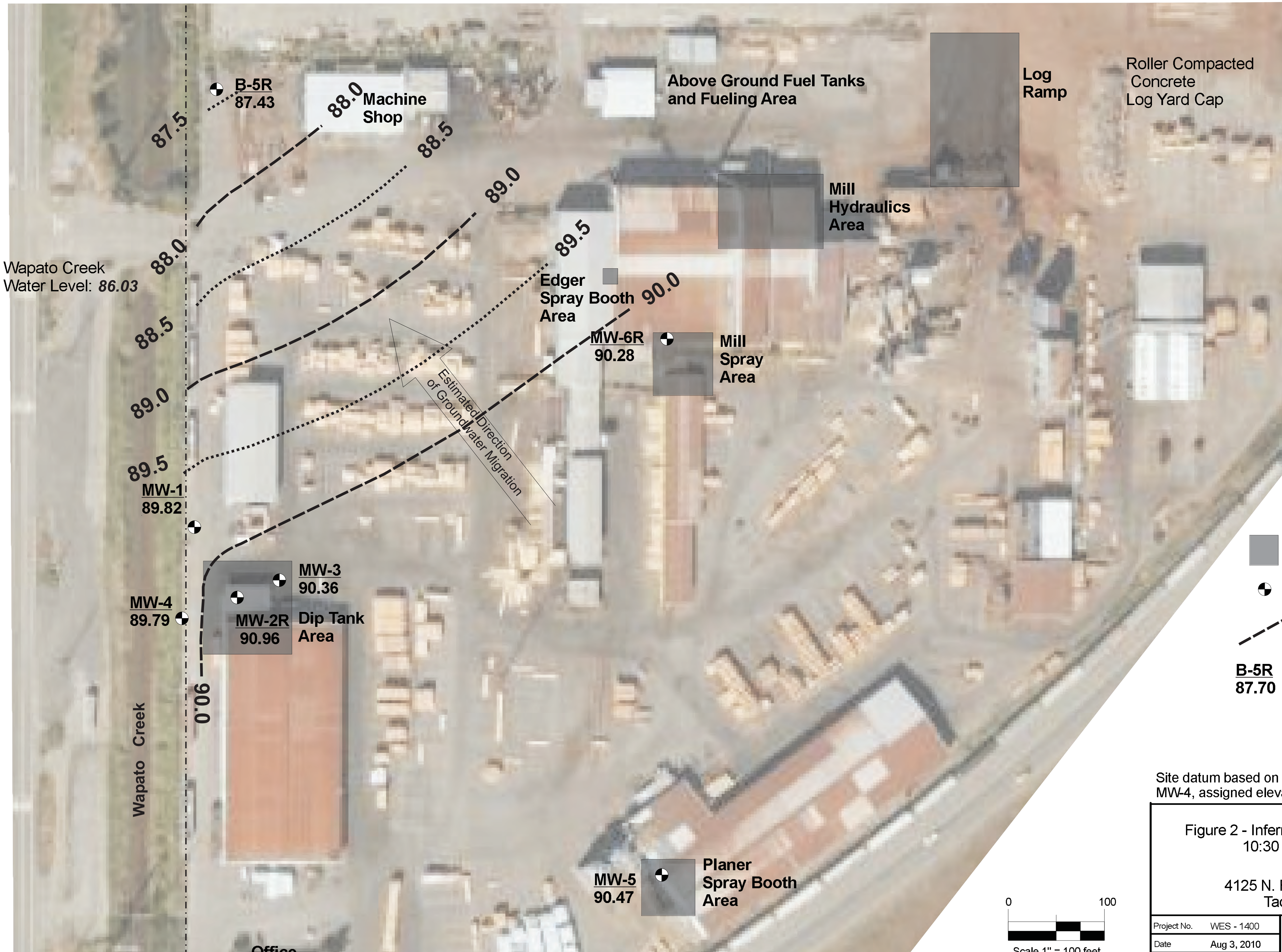
Site datum based on Top of Pipe of Monitoring Well MW-4, assigned elevation of 100.00 for this study.

Figure 3 - Inferred Groundwater Contours
11:00 am, March 17, 2010

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Mar 3, 2010
File ID.	1400F4

Whitman Environmental Sciences



Legend

Approximate Soil Cleanup Areas

Approximate Location of Monitoring Well

Inferred Groundwater Contour

B-5R **87.70** Monitoring well ID and groundwater elevation (Site datum)

Site datum based on Top of Pipe of Monitoring Well MW-4, assigned elevation of 100.00 for this study.

Figure 2 - Inferred Groundwater Contours
10:30 am, June 8, 2010

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Aug 3, 2010
File ID.	1400F4

Whitman Environmental Sciences

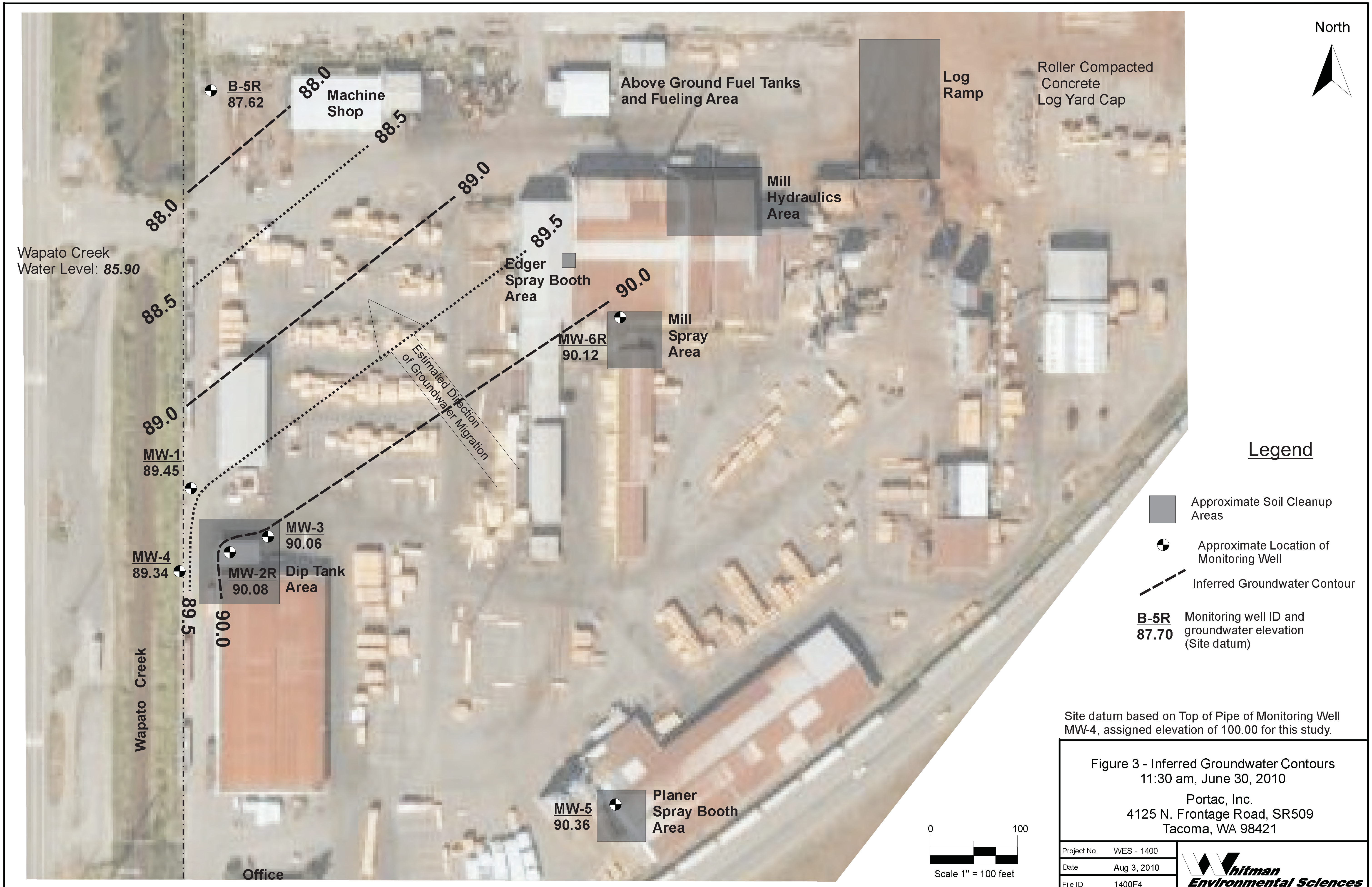
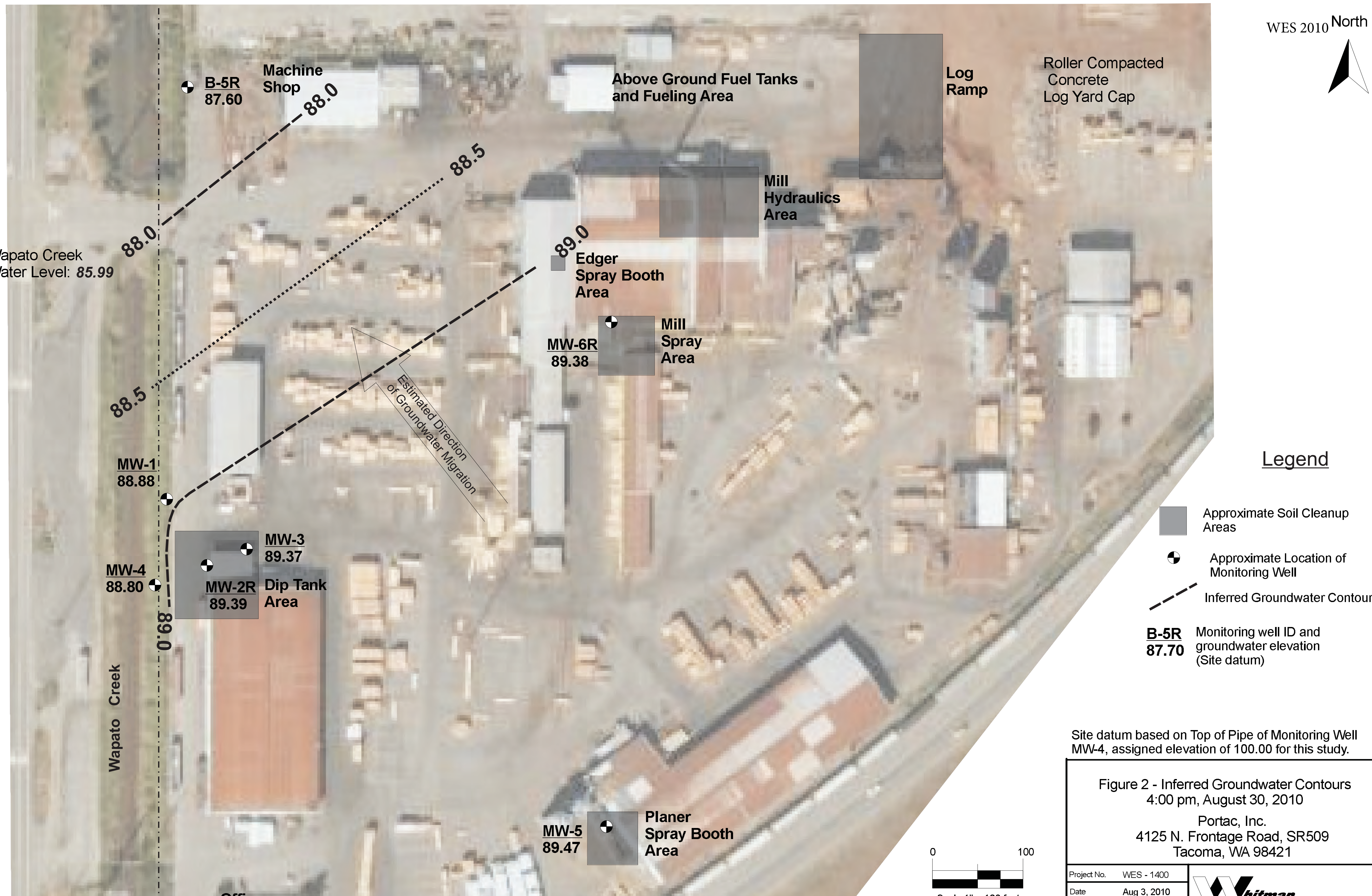


Figure 3 - Inferred Groundwater Contours
11:30 am, June 30, 2010

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421



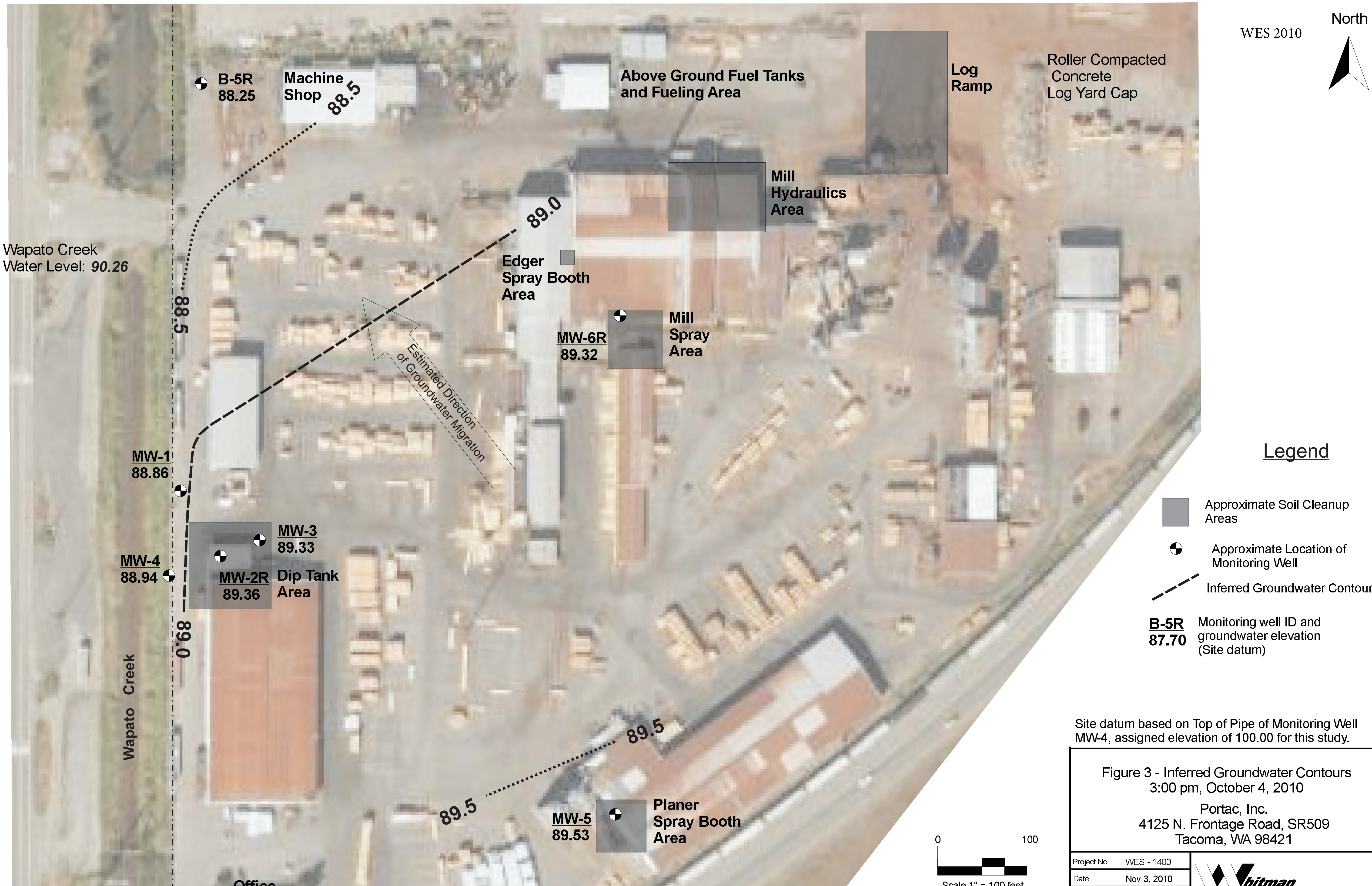
Site datum based on Top of Pipe of Monitoring Well MW-4, assigned elevation of 100.00 for this study.

Figure 2 - Inferred Groundwater Contours
4:00 pm, August 30, 2010

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Aug 3, 2010
File ID.	1400F4

Whitman Environmental Sciences



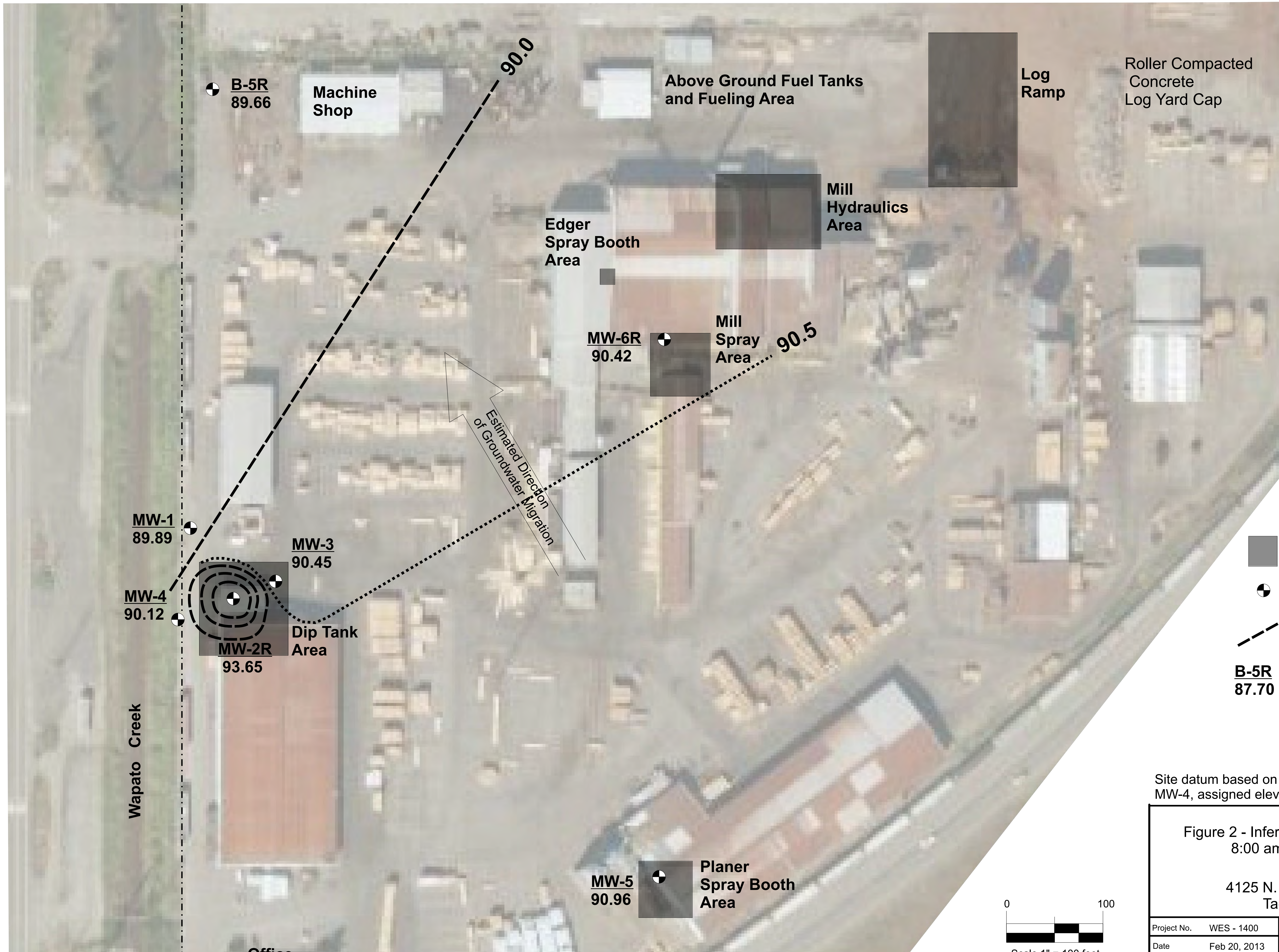
Site datum based on Top of Pipe of Monitoring Well MW-4, assigned elevation of 100.00 for this study.

Figure 3 - Inferred Groundwater Contours
3:00 pm, October 4, 2010

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Nov 3, 2010
File ID.	1400F4

Whitman Environmental Sciences



Legend

Approximate Soil Cleanup Areas

Approximate Location of Monitoring Well

Inferred Groundwater Contour

B-5R
87.70 Monitoring well ID and groundwater elevation based on measurements on 1/3/2013 (Site datum)

Site datum based on Top of Pipe of Monitoring Well MW-4, assigned elevation of 100.00 for this study.

Figure 2 - Inferred Groundwater Contours
8:00 am, January 31, 2013

Portac, Inc.
4125 N. Frontage Road, Sr509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Feb 20, 2013
File ID.	1400F2

Whitman Environmental Sciences

APPENDIX A.4
Groundwater Chemistry

Attachment A.4 Contains Excerpted Information from the Following References:

Year	Author Abbreviation	Author	Document Title
1987	HC	Hart Crowser, Inc. (HC)	Portac Log Yard, Groundwater Assessment (See #117 & 125)
1988	HC	Hart Crowser, Inc. (HC)	Portac Log Sort Yard Remediation Plan, Volume I and II Appendices
1990	HC	Hart Crowser, Inc. (HC)	Portac Log Sort Yard Water Quality Monitoring Program, Second Round of Surface Water Samples
1990	HC	Hart Crowser, Inc. (HC)	Portac Log Sort Yard, Water Quality Monitoring Program, Spring Groundwater Sampling and Analysis Results
1990	HC	Hart Crowser, Inc. (HC)	Portac Log Yard Remediation, Water Quality Monitoring Program, 3rd & Final Round of Surface Water Sampling
1991	HC	Hart Crowser, Inc. (HC)	Portac Log Sort Yard, Spring 1991 Groundwater Sampling/Analysis Water Quality Monitoring Program
1992	HC	Hart Crowser, Inc. (HC)	Final Report Groundwater Quality Monitoring Program Portac Log Sort Yard Remediation
2003	EMS	EMS Consultants, Inc.	Groundwater Monitoring Report for July 2003, Auto Warehousing Company
2008	CDM	CDM	Facility Closure Assessment Former Portac Lumber Facility
2008	CDM	CDM	Facility Closure Assessment Second Phase Former Portac Lumber Facility
2010	WES	Whitman Environmental Services (WES)	Letter from WES to Ecology, dated January 21, 2010, Fourth Quarter 2009 Groundwater Monitoring - Former Portac Inc. Site - Tacoma, WA
2013	WES	Whitman Environmental Services (WES)	Letter from WES to Portac, dated March 25, 2013, First Quarter 2013 Groundwater Monitoring - Former Portac Inc. Site - Tacoma, WA
2014	Landau	Landau Associates Inc.	North Lead Rail Improvements - Portac Cap Subsurface Investigation - Port of Tacoma, Washington

that significant accumulation of metals by leaching of the surficial soils and adsorption in the underlying soil is not occurring.

Groundwater

Groundwater was evaluated to assess whether this media may be contributing metal loads to the waterways. The six wells installed on site were sampled and tested for dissolved arsenic, zinc, copper and lead. The results indicated the metal concentrations in the groundwater were low relative to the surface water concentration levels. The results of the laboratory testing are presented in Appendix B.

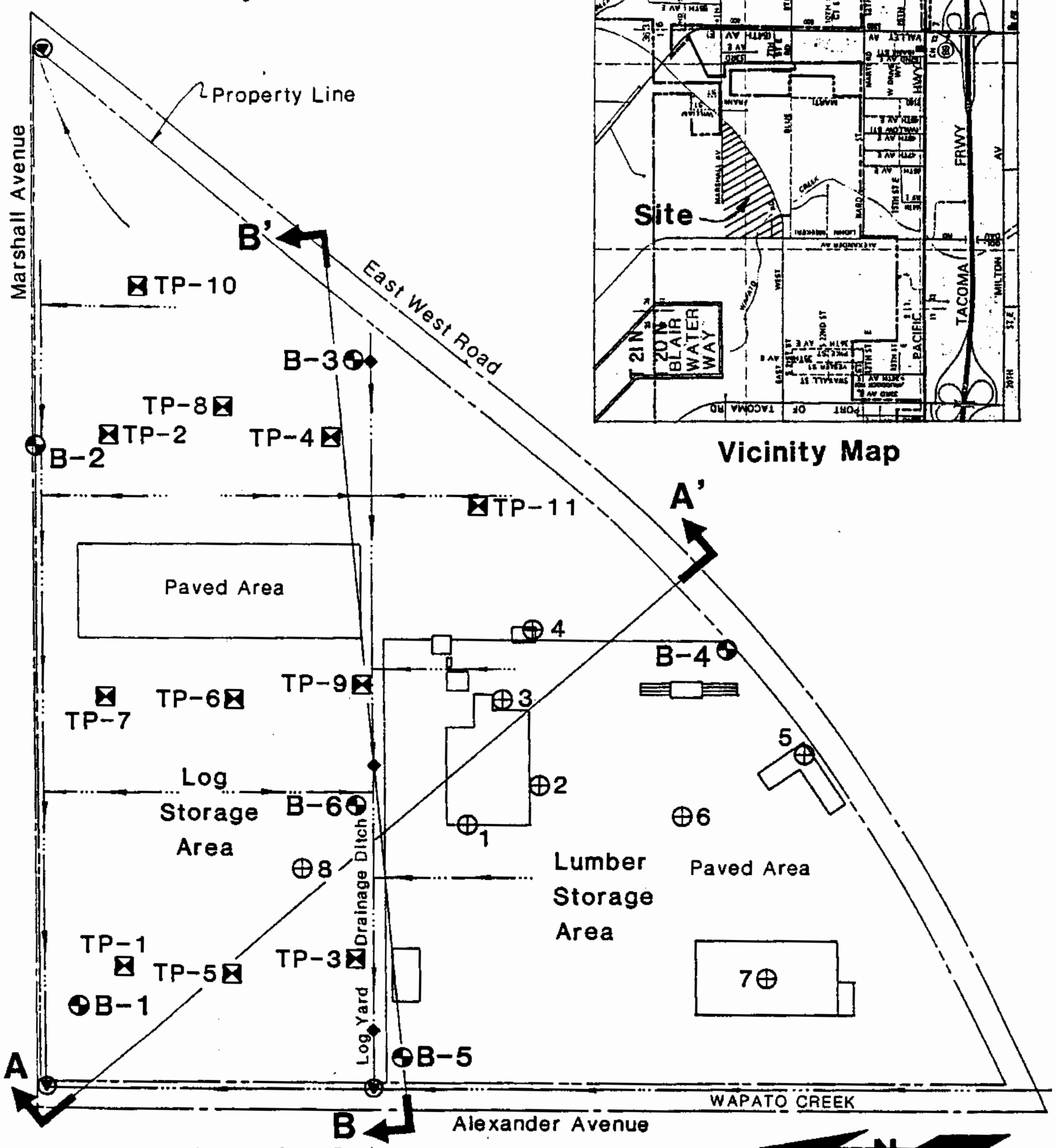
A comparison of the metal concentration levels measured in the groundwater with those measured in the storm water runoff from the site is presented in Table 3. The surface water data obtained from the Ecology investigation represent flow-weighted average concentrations determined from three discharge points (Figure 1) during 5 storm events.

Table 3 - Concentration of Metals in Water

	CONCENTRATION IN mg/L			
	Surface Water			Groundwater
	Total Metals		Dissolved Metals	Dissolved Metals
METAL	AVERAGE	RANGE	RANGE	RANGE
Arsenic	5.3	1.1 - 9.5	2.7 - 18.9	<0.01 - 0.31
Zinc	2.4	0.79 - 5.0	0.9 - 3.5	<0.01 - 0.13
Copper	1.0	0.3 - 1.6	0.07 - 1.7	<0.01 - 0.08
Lead	0.3	0.009 - 0.5	0.13 - 0.21	<0.1 - 0.4

The data indicate the groundwater metal concentrations are one to two orders of magnitude less than the surface water discharge concentrations. Considering the higher flow volumes of the surface water discharging from

Site and Exploration Plan



Near-surface Drainage

B-1 Monitoring Well Location and Number

1 Boring Location and Number by Others

Ecology Sampling Location

TP-1 Test Pit Location and Number

Drainage Ditch Survey Point

Hart Crowser, Inc.
J-1773-02 4/87
Figure 1

Table 7 - Concentration of Metals in Groundwater

	Groundwater Concentration in mg/L		
	Average	Range	Background
Arsenic	0.14	<0.005 to 0.56	<0.005
Zinc	0.07	<0.01 to 0.31	0.01
Copper	0.02	0.005 to 0.08	<0.002
Lead	0.1	0.01 to 0.4	<0.01

The data indicate the groundwater metal concentrations are one to two orders of magnitude less than the surface water discharge concentrations.

Based on the water levels observed in the wells, B-4 is essentially upgradient from the site (with respect to the uppermost aquifer). The metals levels in this well represent the background values listed in Table 7.

4.2.5 Air

Air quality has not been specifically addressed at the Portac site. In general, we do not expect that the site has a significant effect on existing air quality: metals do not volatilize into the air. The major potential problem is contaminated dust raised by the action of heavy equipment on site during construction. Current practice is to water spray heavily traveled areas to reduce dust. Dust is generally only a problem during extended dry periods. Construction is expected to last only two to three months.

Other studies have shown that all Commencement Bay is blanketed with elevated levels of arsenic due to ASARCO emissions.

Table 8 - Comparison of Criteria Levels for Metals against Metal Concentrations in Nearby Surface Waters

CRITERIA	Metal Concentration in mg/L			
	As (III)	Pb	Cu	Zn
Fresh Water Animal Toxicity				
Acute *	0.36	0.082	0.018	0.12
Chronic**	0.19	0.0032	0.012	0.11
Marine Animal Toxicity				
Acute	0.069	0.14	0.0029	0.095
Chronic	0.036	0.0056	0.0029	0.086
Human Health				
Drinking Water	0.05	0.05	--	--
Carcinogen	YES	NO	NO	NO
MEASURED VALUES				
Wapato Creek Upstream	0.002	0.004	0.014	0.008
Wapato Creek Downstream	0.07	0.011	0.034	0.065
Blair Waterway (Mouth Wapato Creek)	0.015	--	0.012	0.025
Groundwater at Portac	0.14	0.1	0.02	0.07

* Acute - Short-Term

** Chronic - Long-Term

Table 1 - Time Table of Site Sampling

Sample Date	Sampling Party	Sample Type	Type of Chemical Tests for Metals
11/83	Ecology	Surface Water Runoff	Total Metals (As, Zn, Cu, Pb, Ni, Sb, Cd)
12/83	Ecology	Surface Water Runoff	Total Metals (As, Zn, Cu, Pb, Ni, Sb, Cd)
3/84	Ecology	Surface Water Runoff	Total Metals (As, Zn, Cu, Pb, Ni, Sb, Cd)
4/84	Ecology	Surface Water Runoff	Total Metals (As, Zn, Cu, Pb, Ni, Sb, Cd)
5/84	Ecology	Surface Water Runoff	Total Metals (As, Zn, Cu, Pb, Ni, Sb, Cd)
5/84	Ecology	Wapato Creek Water	Total Metals (As, Zn, Cu, Pb, Ni, Sb, Cd)
6/84	Ecology	Wapato Creek Water	Total Metals (As, Zn, Cu, Pb, Ni, Sb, Cd)
7/86	Hart Crowser	Portac Site Slag, Bark, and Soil	E.P. Toxicity (As, Zn, Cu, Pb)
3/87	Hart Crowser	Portac Site Slag, Bark, and Soil	E.P. Toxicity (As, Zn, Cu, Pb)
3/87	Hart Crowser	Portac Site Groundwater	Dissolved Metals (As, Zn, Cu, Pb)
9/87	Hart Crowser	Portac Site Slag & Bark	E.P. Toxicity (As, Zn, Cu, Pb)
2/88	Hart Crowser	Portac Site Slag & Bark	Total Metals (As, Zn, Cu, Pb)
5/88	Hart Crowser	Portac Site Groundwater	Dissolved Metals (As, Zn, Cu, Pb)

Table 2 - Dissolved Arsenic in Groundwater

Well Number	Dissolved Arsenic Concentration in mg/L					
	DATE OF SAMPLING					
	Pre-Paving Data		Post-Paving Monitoring Data			
	4/87	5/88	10/23/89	11/30/89	4/16/90	5/11/90
B-1	0.31					
B-1R		0.005 U				
B-1R2			13		330	
B-2	0.01 U	0.15				
B-2R				0.015	0.023	
B-3	0.2					
B-3R		0.19 0.33 (dup)				
B-3R2			0.03		0.025	
B-4	0.01 U	0.005 U	0.018		0.032	
B-5	0.01 U	0.005 U				
B-5R			0.005 U 0.029 (dup)*		0.005 U 0.005 U (dup)	
B-6	0.04					
B-6R		0.56				
B-6R2				0.034 0.040 (dup)	150.0** 0.085**	0.028
HC-2			218		570	

*Sample labeled as S-1, B-7 on chain of custody form and lab report.

**Because of inconsistency with previous analyses, the sample was re-analyzed by the lab. Results of both analyses are presented.

U Indicates compound was analyzed for but not detected at the given detection limit.

Field method blank collected 11/30/89 removed from table (for discussion refer to Hart Crowser, January 30, 1990).

Table 3 - Dissolved Lead in Groundwater

Well Number	Dissolved Lead Concentration in mg/L					
	DATE OF SAMPLING					
	Pre-Paving Data		Post-Paving Monitoring Data			
	4/87	5/88	10/23/89	11/30/89	4/16/90	5/11/90
B-1	0.4					
B-1R		0.01 U				
B-1R2			0.01 U		0.05 U	
B-2	0.1 U	0.01 U				
B-2R				0.005 U	0.005 U	
B-3	0.2					
B-3R		0.01 0.01 (dup)			0.005 U	
B-3R2			0.01			
B-4	0.1 U	0.01 U	0.01 U		0.005 U	
B-5	0.1 U	0.01 U				
B-5R			0.01 U 0.01 U (dup)*		0.05 U 0.05 U (dup)	
B-6	0.1 U					
B-6R		0.01 U				
B-6R2				0.054 0.008 (dup)	0.050 U	0.005 U
HC-2			0.02		0.054	

*Sample labeled as S-1, B-7 on chain of custody form and lab report
U Indicates compound was analyzed for but not detected at the given detection limit.
Field method blank collected 11/30/89 removed from table (for discussion refer to Hart Crowser, January 30, 1990).

177304T6

Table 4 - Dissolved Copper in Groundwater

Well Number	Dissolved Copper Concentration in mg/L					
	DATE OF SAMPLING					
	Pre-Paving Data		Post-Paving Monitoring Data			
	4/87	5/88	10/23/89	11/30/89	4/16/90	5/11/90
B-1	0.08					
B-1R		0.007				
B-1R2			0.002 U		0.0014	
B-2	0.01 U	0.011				
B-2R				0.001 U	0.0014	
B-3	0.04					
B-3R		0.043 0.033 (dup)				
B-3R2			0.002 U		0.001	
B-4	0.01 U	0.002 U	0.002 U		0.005	
B-5	0.01 U	0.002 U				
B-5R			0.002 U 0.002 U (dup)*		0.001 U 0.001 U (dup)	
B-6	0.01 U					
B-6R		0.005				
B-6R2				0.007 0.007 (dup)	0.004 0.006	0.001 U
HC-2			0.005			

*Sample labeled as S-1, B-7 on chain of custody form and lab report
U Indicates compound was analyzed for but not detected at the given detection limit.
Field method blank collected 11/30/89 removed from table (for discussion refer to Hart Crowser, January 30, 1990).

Table 5 - Dissolved Zinc in Groundwater

Well Number	Dissolved Zinc Concentration in mg/L					
	DATE OF SAMPLING					
	Pre-Paving Data		Post-Paving Monitoring Data			
	4/87	5/88	10/23/89	11/30/89	4/16/90	5/11/90
B-1	0.13					
B-1R		0.014				
B-1R2			0.023		0.046	
B-2	0.08	0.02				
B-2R				0.011	0.0067	
B-3	0.04					
B-3R		0.31 0.29 (dup)				
B-3R2			0.017		0.006	
B-4	0.01 U	0.011	0.009		0.014	
B-5	0.01 U	0.011				
B-5R			0.009 0.006 (dup)*		0.034 0.032 (dup)	
B-6	0.01 U					
B-6R		0.018				
B-6R2				0.015 0.013 (dup)	0.014	0.004
HC-2			1.8		3.7	

*Sample labeled as S-1, B-7 on chain of custody form and lab report
U Indicates compound was analyzed for but not detected at the given detection limit.
Field method blank collected 11/30/89 removed from table (for discussion refer to Hart Crowser, July 30, 1990).

177304T8

Table 2 – Dissolved Arsenic in Groundwater

Well Number	Dissolved Arsenic Concentration in mg/L							
	Date of Sampling							
	Pre-Paving Data		Post-Paving Monitoring Data					
	4/87	5/88	10/23/89	11/30/89	4/16/90	5/11/90	10/18/90	4/12/91
B-1	0.31							
B-1R		0.005 U						
B-1R2			13		330		37	40
							37 (rep)	37 (rep) *
B-2	0.010 U	0.15						
B-2R				0.015	0.023		0.014	0.021
B-3	0.20							
B-3R		0.19						
		0.33 (rep)						
B-3R2			0.030		0.025		0.020	0.025
B-4	0.010 U	0.005 U	0.018		0.032		0.005 U	NA
B-5	0.010 U	0.005 U						
B-5R			0.005 U		0.005 U		0.010	0.005
			0.029 (rep)		0.005 U (rep)			
B-6	0.040							
B-6R		0.56						
B-6R2				0.034	150.0**	0.028	0.058	0.057
				0.040 (rep)	0.085**			
HC-2			218		570		370	300

(rep) Field replicate.

* Replicate sample labeled B-7 on chain of custody form and laboratory certificate.

** Because of inconsistency with previous analyses, the sample was re-analyzed by the lab. Results of both analyses are presented.

U Indicates compound was analyzed for but not detected at the given detection limit.

NA Monitoring well not accessible.

177304T5

Table 3 – Dissolved Copper in Groundwater

Well Number	Dissolved Copper Concentration in mg/L — Date of Sampling — Pre-Paving Data: 4/87	5/88	Post-Paving Monitoring Data: 10/23/89	11/30/89	4/16/90	5/11/90	10/18/90	4/12/91
B-1	0.080							
B-1R		0.007						
B-1R2			0.002 U		0.0014		0.10 U	0.010 U
							0.10 U (rep)	0.010 U (rep) *
B-2	0.010 U	0.011						
B-2R				0.001 U	0.0014		0.001 U	0.005 U
B-3	0.040							
B-3R		0.043						
		0.033 (rep)						
B-3R2			0.002 U		0.001		0.001 U	0.010 U
B-4	0.010 U	0.002 U	0.002 U		0.005		0.0022	NA
B-5	0.010 U	0.002 U						
B-5R			0.002 U		0.001 U		0.001 U	0.002 U
			0.002 U (rep)		0.001 U (rep)			
B-6	0.010 U							
B-6R		0.005						
B-6R2				0.007	0.004	0.001 U	0.0012	0.005 U
				0.007 (rep)	0.006			
HC-2			0.005				0.10 U	0.010 U

(rep) Field replicate.

* Replicate sample labeled B-7 on chain of custody form and laboratory certificate.

U Indicates compound was analyzed for but not detected at the given detection limit.

NA Monitoring well not accessible.

177304T7

Hart Crowser
J-1773-04

Table 4 – Dissolved Lead in Groundwater

Well Number	Dissolved Lead Concentration in mg/L							
	Date of Sampling							
	Pre-Paving Data		Post-Paving Monitoring Data					
	4/87	5/88	10/23/89	11/30/89	4/16/90	5/11/90	10/18/90	4/12/91
B-1	0.40							
B-1R		0.010 U						
B-1R2			0.010 U		0.050 U		1.0 U	0.050 U
							1.0 U (rep)	0.050 U (rep)*
B-2	0.10 U	0.010 U						
B-2R				0.005 U	0.005 U		0.010 U	0.025 U
B-3	0.20							
B-3R		0.010						
		0.010 (rep)						
B-3R2			0.010		0.005 U		0.010 U	0.050 U
B-4	0.10 U	0.010 U	0.010 U		0.005 U		0.010 U	NA
B-5	0.10 U	0.010 U						
B-5R			0.010 U		0.050 U		0.010 U	0.010 U
			0.010 U (rep)		0.050 U (rep)			
B-6	0.10 U							
B-6R		0.010 U						
B-6R2				0.054	0.050 U	0.005 U	0.010 U	0.025 U
				0.008 (rep)				
HC-2			0.020		0.054		1.0 U	0.050 U

(rep) Field replicate.

* Replicate; sample labeled B-7 on chain of custody form and laboratory certificates.

U Indicates compound was analyzed for but not detected at the given detection limit.

NA Monitoring well not accessible.

177304T6

Table 5 – Dissolved Zinc in Groundwater

Well Number	Dissolved Zinc Concentration in mg/L							
	Date of Sampling							
	Pre-Paving Data		Post-Paving Monitoring Data					
	4/87	5/88	10/23/89	11/30/89	4/16/90	5/11/90	10/18/90	4/12/91
B-1	0.13							
B-1R		0.014						
B-1R2			0.023		0.046		0.10 U	0.023
							0.10 U (rep)	0.023 (rep)*
B-2	0.080	0.020						
B-2R				0.011	0.0067		0.0095 BU	0.005 U
B-3	0.040							
B-3R		0.31						
		0.29 (rep)						
B-3R2			0.017		0.006		0.0089 BU	0.010 U
B-4	0.010 U	0.011	0.009		0.014		0.074 B	NA
B-5	0.010 U	0.011						
B-5R			0.009		0.034			
			0.006 (rep)		0.032 (rep)		0.0098 BU	0.006
B-6	0.010 U							
B-6R		0.018						
B-6R2				0.015	0.014	0.004	0.0091 BU	0.010
				0.013 (rep)				
HC-2			1.8		3.7		1.6 B	2.5

(rep) Field replicate.

* Replicate sample labeled B-7 on chain of custody and laboratory certificates.

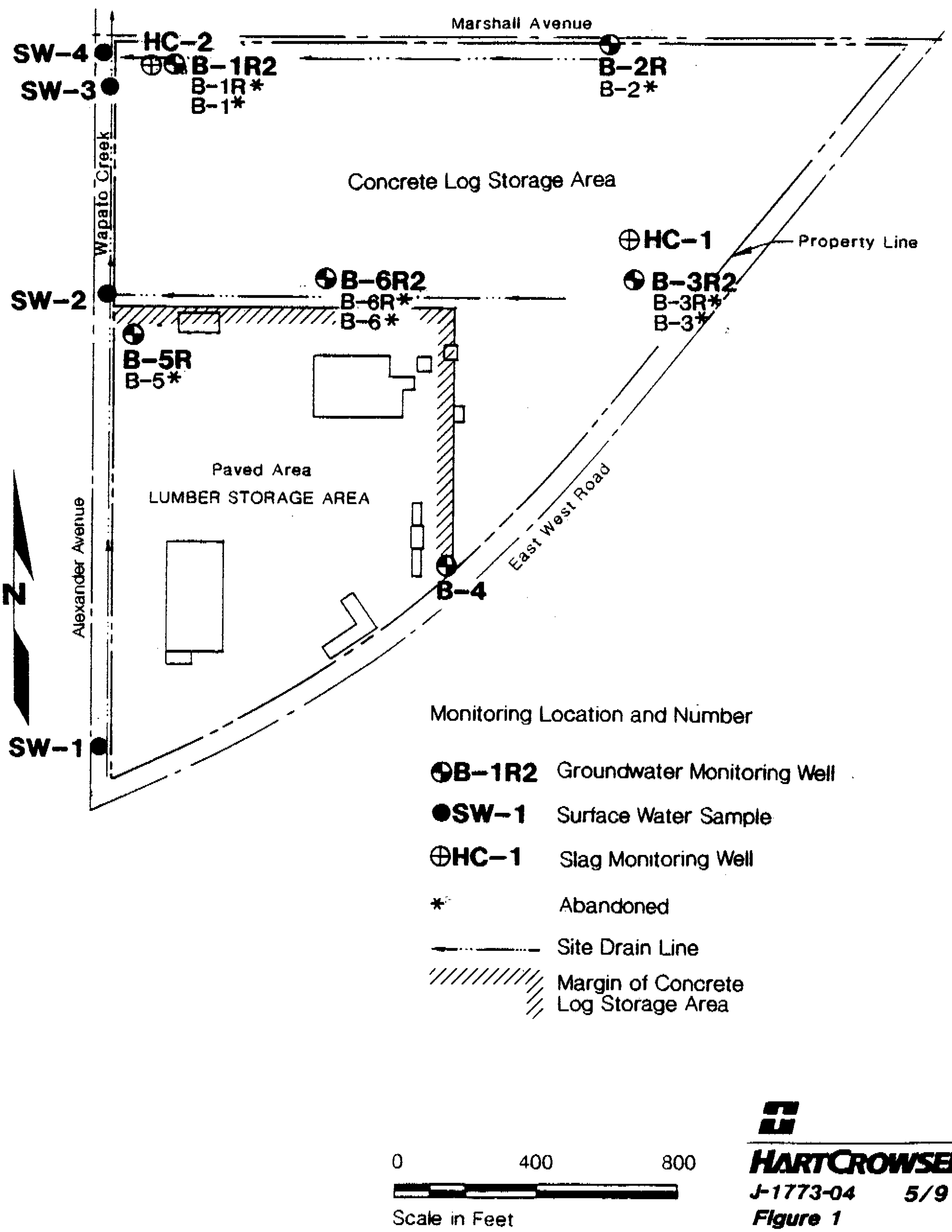
U Indicates compound was analyzed for but not detected at the given detection limit.

B Indicates compound was detected in the associated method blank.

NA Monitoring well not accessible.

177304T8

Groundwater and Surface Water Sampling Location Plan



HARTCROWSER

J-1773-04 5/91

Figure 1

Table 2 – Dissolved Arsenic in Groundwater

Well Number	Dissolved Arsenic Concentration in mg/L									
	Pre-Paving Data		Post-Paving Monitoring Data							
	4/7/87	5/11/88	10/23/89	11/30/89	4/16/90	5/11/90	10/18/90	4/12/91	10/23/91	4/15/92
B-1	0.31									
B-1R		0.005 U								
B-1R2			13		330		37 37 (rep)	40 37 (rep) *	72 69 (rep) *	64 56 (rep) *
B-2	0.010 U	0.150								
B-2R				0.015	0.023		0.014	0.021	0.013	0.005 U
B-3	0.20									
B-3R		0.190 0.33 (rep)								
B-3R2			0.030		0.025		0.020	0.025	0.087	0.13
B-4	0.010 U	0.005 U	0.018		0.032		0.005 U	NA	NA	NA
B-5	0.010 U	0.005 U								
B-5R			0.005 U 0.029 (rep)		0.005 U 0.005 U (rep)		0.010	0.005	0.005 U	0.005 U
B-6	0.040									
B-6R		0.560								
B-6R2				0.034 0.040 (rep)	150.0 *** 0.085 ***	0.028	0.058	0.057	0.046	0.045
HC-2			218.000		570.000		370.000	300.000	NS	NS

(rep) Field replicate.
* Replicate sample labeled B-7 on chain-of-custody form and laboratory certificate.
*** Because of inconsistency with previous analyses, the sample was re-analyzed by the lab. Results of both analyses are presented.
U Indicates compound was analyzed for but not detected at the given detection limit.
NA Monitoring well not accessible (B-4 abandoned 10/23/91).
NS Monitoring well not sampled. Insufficient groundwater volume in well.

177304t2.wk1

Table 3 – Dissolved Copper in Groundwater

Well Number	Dissolved Copper Concentration in mg/L									
	Pre-Paving Data		Post-Paving Monitoring Data							
	4/7/87	5/11/88	10/23/89	11/30/89	4/16/90	5/11/90	10/18/90	4/12/91	10/23/91	4/15/92
B-1	0.080									
B-1R		0.007								
B-1R2			0.002 U		0.0014		0.10 U**	0.010 U	0.010 U	0.010 U
							0.10 U (rep)	0.010 U	0.010 U	0.010 U (rep) *
B-2	0.010 U	0.011								
B-2R				0.001 U	0.0014		0.001 U	0.005 U	0.001 U	0.001 U
B-3	0.040									
B-3R		0.043								
		0.033 (rep)								
B-3R2			0.002 U		0.001		0.001 U	0.010 U	0.001 U	0.001 U
B-4	0.010 U	0.002 U	0.002 U		0.005		0.0022	NA	NA	NA
B-5	0.010 U	0.002 U								
B-5R			0.002 U		0.001 U		0.001 U	0.002 U	0.001 U	0.001 U
			0.002 U (rep)		0.001 U (rep)					
B-6	0.010 U									
B-6R		0.005								
B-6R2				0.007	0.004	0.001 U	0.0012	0.005 U	0.001 U	0.001 U
				0.007 (rep)						
HC-2			0.005		0.006		0.10 U**	0.010 U	NS	NS

(rep) Field replicate.
* Replicate sample labeled B-7 on chain-of-custody form and laboratory certificate.
** Undetected value omitted from time series plot.
U Indicates compound was analyzed for but not detected at the given detection limit.
NA Monitoring well not accessible (B-4 abandoned 10/23/91).
NS Monitoring well not sampled. Insufficient groundwater volume in well.

1773043.wk1

Table 4 – Dissolved Lead in Groundwater

Well Number	Dissolved Lead Concentration in mg/L									
	Pre-Paving Data		Post-Paving Monitoring Data							
	4/7/87	5/11/88	10/23/89	11/30/89	4/16/90	5/11/90	10/18/90	4/12/91	10/23/91	4/15/92
B-1	0.40									
B-1R		0.010 U								
B-1R2			0.010 U		0.050 U		1.0 U** 1.0 U (rep)	0.050 U 0.050 U	0.025 U 0.010 (rep) *	0.050 U 0.050 U (rep)
B-2	0.10 U**	0.010 U								
B-2R				0.005 U	0.005 U		0.010 U	0.025 U	0.005 U	0.005 U
B-3	0.20									
B-3R		0.010 0.010 (rep)								
B-3R2			0.010		0.005 U		0.010 U	0.050 U	0.005 U	0.005 U
B-4	0.10 U**	0.010 U	0.010 U		0.005 U		0.010 U	NA	NA	NA
B-5	0.10 U**	0.010 U								
B-5R			0.010 U 0.010 U (rep)		0.050 U 0.050 U (rep)		0.010 U	0.010 U	0.005 U	0.005 U
B-6	0.10 U**									
B-6R		0.010 U								
B-6R2				0.054 0.008 (rep)	0.050 U	0.005 U	0.010 U	0.025 U	0.005 U	0.005 U
HC-2			0.020		0.054		1.0 U**	0.050 U	NS	NS

(rep) Field replicate.
* Replicate sample labeled B-7 on chain-of-custody form and laboratory certificate.
** Undetected value omitted from time series plot.
U Indicates compound was analyzed for but not detected at the given detection limit.
NA Monitoring well not accessible (B-4 abandoned 10/23/91).
NS Monitoring well not sampled. Insufficient groundwater volume in well.

17730t4.wk1

Table 5 – Dissolved Zinc in Groundwater

Well Number	Dissolved Zinc Concentration in mg/L									
	Pre-Paving Data		Post-Paving Monitoring Data							
	4/7/87	5/11/88	10/23/89	11/30/89	4/16/90	5/11/90	10/18/90	4/12/91	10/23/91	4/15/92
B-1 B-1R B-1R2	0.13	0.014	0.023		0.046		0.10 U** 0.10 U (rep)	0.023 0.023 (rep) *	0.014 0.016 (rep) *	0.010 U 0.010 (rep) *
B-2 B-2R	0.080	0.020		0.011	0.0067		0.0095 BU	0.005 U	0.005	0.001 U
B-3 B-3R B-3R2	0.040	0.31 0.29 (rep)	0.017		0.006		0.0089 BU	0.010 U	0.004	0.001 U
B-4	0.010 U	0.011	0.009		0.014		0.074 B	NA	NA	NA
B-5 B-5R	0.010 U	0.011	0.009 0.006 (rep)		0.034 0.032 (rep)		0.0098 BU	0.006	0.005	0.001 U
B-6 B-6R B-6R2	0.010 U	0.018		0.015 0.013 (rep)	0.014	0.004	0.0091 BU	0.010	0.005	0.001 U
HC-2			1.8		3.7		1.6 B	2.5	NS	NS

(rep) Field replicate.
* Replicate sample labeled B-7 on chain-of-custody form and laboratory certificate.
** Undetected value omitted.
U Indicates compound was analyzed for but not detected at the given detection limit.
B Indicates compound was detected in the associated method blank.
NA Monitoring well not accessible (B-4 abandoned 10/23/91).
NS Monitoring well not sampled. Insufficient groundwater volume in well.

17730tt5.wk1

Table 6 – Summary of Ranked Statistics for Arsenic in Site Monitoring Wells

Notes: All results and values reported in mg/L.
(1) Undetected -- Statistical value is 1/2 detection limit.
(2) Average of sample and replicate sample results.
(3) Includes only reanalyzed sample result.

Pre-Summer 1990 As Results					Post-Summer 1990 As Results					All Results	
Well ID	Date	Rank	Result	Notes:	Well ID	Date	Rank	Result	Notes:	Rank	Value
B-1**	05/10/84	1	0.0025	(1)	B-4	10/17/86	1	0.0025	(1)	4.5	0.0025
B-4	05/10/84	2	0.0025	(1)	B-5*	10/22/87	2	0.0025	(1)	4.5	0.0025
B-5*	05/10/84	3	0.0025	(1)	B-2*	04/14/88	3	0.0025	(1)	4.5	0.0025
B-5*	04/15/86	4	0.0025	(1),(2)	B-5*	04/14/88	4	0.0025	(1)	4.5	0.0025
B-2*	04/06/83	5	0.005	(1)	B-5*	04/11/87	5	0.005		4.5	0.0025
B-4	04/06/83	6	0.005	(1)	B-5*	10/17/86	6	0.01		4.5	0.0025
B-5*	04/06/83	7	0.005	(1)	B-2*	10/22/87	7	0.013		4.5	0.0025
B-2*	11/29/85	8	0.015		B-2*	10/17/86	8	0.014		4.5	0.0025
B-5*	10/22/85	9	0.0158	(2)	B-3**	10/17/86	9	0.02		10.5	0.005
B-4	10/22/85	10	0.018		B-2*	04/11/87	10	0.021		10.5	0.005
B-2*	04/15/86	11	0.023		B-3**	04/11/87	11	0.025		10.5	0.005
B-3**	04/15/86	12	0.025		B-6**	04/14/88	12	0.045		10.5	0.005
B-6**	05/10/86	13	0.028		B-6**	10/22/87	13	0.046		13	0.01
B-3**	10/22/85	14	0.03		B-6**	04/11/87	14	0.057		14	0.013
B-4	04/15/86	15	0.032		B-6**	10/17/86	15	0.058		15	0.014
B-6**	11/29/85	16	0.037	(2)	B-3**	10/22/87	16	0.087		16	0.015
B-6**	04/06/83	17	0.04		B-3**	04/14/88	17	0.13		17	0.0158
B-6**	04/15/86	18	0.085	(3)	B-1**	10/17/86	18	37	(2)	18	0.018
B-2*	05/10/84	19	0.15		B-1**	04/11/87	19	38.5	(2)	19	0.02
B-3**	04/06/83	20	0.2		B-1**	04/14/88	20	60	(2)	20	0.021
B-3**	05/10/84	21	0.26	(2)	B-1**	10/22/87	21	70.5	(2)	21	0.023
B-1**	04/06/83	22	0.31							22.5	0.025
B-6**	05/10/84	23	0.56							22.5	0.025
B-1**	10/22/85	24	13							24	0.028
B-1**	04/15/86	25	330							25	0.03
										26	0.032
										27	0.037
										28	0.04
										29	0.045
										30	0.046
										31	0.057
										32	0.058
										33	0.085
										34	0.087
										35	0.13
										36	0.15
										37	0.2
										38	0.26
										39	0.31
										40	0.56
										41	13
										42	37
										43	38.5
										44	60
										45	70.5
										46	330

Summary Statistics

Pre-Summer 1990		Post-Summer 1990	
Number of Samples:	25	Number of Samples:	21
Number of LTDL Samples:	7	Number of LTDL Samples:	4
Mean Value:	13.79	Mean Value:	9.84
Median Value:	0.028	Median Value:	0.025
Standard Deviation:	65.93	Standard Deviation:	21.67
Minimum:	0.0025	Minimum:	0.0025
Maximum:	330	Maximum:	70.5

Table 7 – Summary of Ranked Statistics for Copper in Site Monitoring Wells

Notes: All results and values reported in mg/L.
(1) Undetected -- Statistical value is 1/2 detection limit.
(2) Average of sample and replicate sample results.

Pre-Summer 1990 Cu Results

Well ID	Date	Rank	Value	Notes
B-2*	11/29/85	1	0.0005	(1)
B-5*	04/15/86	2	0.0005	(1),(2)
B-6**	05/10/86	3	0.0005	(1)
B-4	05/10/84	4	0.001	(1)
B-5*	05/10/84	5	0.001	(1)
B-1**	10/22/85	6	0.001	(1)
B-3**	10/22/85	7	0.001	(1)
B-4	10/22/85	8	0.001	(1)
B-5*	10/22/85	9	0.001	(1),(2)
B-3**	04/15/86	10	0.001	
B-1**	04/15/86	11	0.0014	
B-2*	04/15/86	12	0.0014	
B-6**	04/15/86	13	0.004	
B-2*	04/06/83	14	0.005	(1)
B-4	04/06/83	15	0.005	(1)
B-5*	04/06/83	16	0.005	(1)
B-6**	04/06/83	17	0.005	(1)
B-6**	05/10/84	18	0.005	
B-4	04/15/86	19	0.005	
B-1**	05/10/84	20	0.007	
B-6**	11/29/85	21	0.007	(2)
B-2*	05/10/84	22	0.011	
B-3**	05/10/84	23	0.038	(2)
B-3**	04/06/83	24	0.04	
B-1**	04/06/83	25	0.08	

Post-Summer 1990 Cu Results

Well ID	Date	Rank	Value	Notes
B-2*	10/17/86	1	0.0005	(1)
B-3**	10/17/86	2	0.0005	(1)
B-5*	10/17/86	3	0.0005	(1)
B-2*	10/22/87	4	0.0005	(1)
B-3**	10/22/87	5	0.0005	(1)
B-5*	10/22/87	6	0.0005	(1)
B-6**	10/22/87	7	0.0005	(1)
B-2*	04/14/88	8	0.0005	(1)
B-3**	04/14/88	9	0.0005	(1)
B-5*	04/14/88	10	0.0005	(1)
B-6**	04/14/88	11	0.0005	(1)
B-5*	04/11/87	12	0.001	(1)
B-6**	10/17/86	13	0.0012	
B-4	10/17/86	14	0.0022	
B-2*	04/11/87	15	0.0025	(1)
B-6**	04/11/87	16	0.0025	(1)
B-1**	04/11/87	17	0.005	(1),(2)
B-3**	04/11/87	18	0.005	(1)
B-1**	10/22/87	19	0.005	(1),(2)
B-1**	04/14/88	20	0.005	(1),(2)

All Results

Rank	Value
1	0.0005
2	0.0005
3	0.0005
4	0.0005
5	0.0005
6	0.0005
7	0.0005
8	0.0005
9	0.0005
10	0.0005
11	0.0005
12	0.0005
13	0.0005
14	0.0005
15	0.001
16	0.001
17	0.001
18	0.001
19	0.001
20	0.001
21	0.001
22	0.001
23	0.0012
24	0.0014
25	0.0014
26	0.0022
27	0.0025
28	0.0025
29	0.004
30	0.005
31	0.005
32	0.005
33	0.005
34	0.005
35	0.005
36	0.005
37	0.005
38	0.005
39	0.005
40	0.007
41	0.007
42	0.011
43	0.038
44	0.04
45	0.08

Summary Statistics

	Pre-Summer 1990	Post-Summer 1990
Number of Samples:	25	20
Number of LTDL Samples:	13	18
Mean Value:	0.0091	0.0017
Median Value:	0.004	0.0005
Standard Deviation:	0.018	0.0018
Minimum:	0.0005	0.0005
Maximum:	0.08	.0.005

Table 8 – Summary of Ranked Statistics for Lead in Site Monitoring Wells

Notes: All results and values reported in mg/L.
(1) Undetected -- Statistical value is 1/2 detection limit.
(2) Average of sample and replicate sample results.

Pre-Summer 1990 Pb Results Well ID	Date	Rank	Value	Notes	Post-Summer 1990 Pb Results Well ID	Date	Rank	Value	Notes	All Results Rank	Value
B-2*	04/15/86	1	0.0025	(1)	B-2*	10/22/87	1	0.0025	(1)	1	0.0025
B-3**	04/15/86	2	0.0025	(1)	B-3**	10/22/87	2	0.0025	(1)	2	0.0025
B-4	04/15/86	3	0.0025	(1)	B-5*	10/22/87	3	0.0025	(1)	3	0.0025
B-6**	05/10/86	4	0.0025	(1)	B-6**	10/22/87	4	0.0025	(1)	4	0.0025
B-1**	05/10/84	5	0.005	(1)	B-2*	04/14/88	5	0.0025	(1)	5	0.0025
B-2*	05/10/84	6	0.005	(1)	B-3**	04/14/88	6	0.0025	(1)	6	0.0025
B-3**	05/10/84	7	0.005	(2)	B-5*	04/14/88	7	0.0025	(1)	7	0.0025
B-4	05/10/84	8	0.005	(1)	B-6**	04/14/88	8	0.0025	(1)	8	0.0025
B-5*	05/10/84	9	0.005	(1)	B-2*	10/17/86	9	0.005	(1)	9	0.0025
B-6**	05/10/84	10	0.005	(1)	B-3**	10/17/86	10	0.005	(1)	10	0.0025
B-1**	10/22/85	11	0.005	(1)	B-4	10/17/86	11	0.005	(1)	11	0.0025
B-3**	10/22/85	12	0.005		B-5*	10/17/86	12	0.005	(1)	12	0.0025
B-4	10/22/85	13	0.005	(1)	B-6**	10/17/86	13	0.005	(1)	13	0.005
B-5*	10/22/85	14	0.005	(1),(2)	B-5*	04/11/87	14	0.005	(1)	14	0.005
B-2*	11/29/85	15	0.005	(1)	B-2*	04/11/87	15	0.0125	(1)	15	0.005
B-1**	04/15/86	16	0.025	(1)	B-6**	04/11/87	16	0.0125	(1)	16	0.005
B-5*	04/15/86	17	0.025	(1),(2)	B-1**	10/22/87	17	0.0175	(1),(2)	17	0.005
B-6**	04/15/86	18	0.025	(1)	B-1**	04/11/87	18	0.025	(1),(2)	18	0.005
B-6**	11/29/85	19	0.031	(2)	B-3**	04/11/87	19	0.025	(1)	19	0.005
B-3**	04/06/83	20	0.2		B-1**	04/14/88	20	0.025	(1),(2)	20	0.005
B-1**	04/06/83	21	0.4							21	0.005
										22	0.005
										23	0.005
										24	0.005
										25	0.005
										26	0.005
										27	0.005
										28	0.005
										29	0.005
										30	0.0125
										31	0.0125
										32	0.0175
										33	0.025
										34	0.025
										35	0.025
										36	0.025
										37	0.025
										38	0.025
										39	0.031
										40	0.2
										41	0.4

Summary Statistics

Pre-Summer 1990		Post-Summer 1990	
Number of Samples:	21	Number of Samples:	20
Number of LTDL Samples:	16	Number of LTDL Samples:	20
Mean Value:	0.037	Mean Value:	0.008
Median Value:	0.005	Median Value:	0.005
Standard Deviation:	0.093	Standard Deviation:	0.0082
Minimum:	0.0025	Minimum:	0.0025
Maximum:	0.4	Maximum:	0.025

Table 9 – Summary of Ranked Statistics for Zinc in Site Monitoring Wells

Notes: All results and values reported in mg/L.
(1) Undetected -- Statistical value is 1/2 detection limit.
(2) Average of sample and replicate sample results.
(3) Analyte was detected in associated method blank.

Pre-Summer 1990 Zn Results

Well ID	Date	Rank	Value	Notes
B-6**	05/10/86	1	0.004	
B-4	04/06/83	2	0.005	(1)
B-5*	04/06/83	3	0.005	(1)
B-6**	04/06/83	4	0.005	(1)
B-3**	04/15/86	5	0.006	
B-2*	04/15/86	6	0.0067	
B-5*	10/22/85	7	0.0075	(2)
B-4	10/22/85	8	0.009	
B-4	05/10/84	9	0.011	
B-5*	05/10/84	10	0.011	
B-2*	11/29/85	11	0.011	
B-1**	05/10/84	12	0.014	
B-6**	11/29/85	13	0.014	(2)
B-4	04/15/86	14	0.014	
B-6**	04/15/86	15	0.014	
B-3**	10/22/85	16	0.017	
B-6**	05/10/84	17	0.018	
B-2*	05/10/84	18	0.02	
B-1**	10/22/85	19	0.023	
B-5*	04/15/86	20	0.033	(2)
B-3**	04/06/83	21	0.04	
B-1**	04/15/86	22	0.046	
B-2*	04/06/83	23	0.08	
B-1**	04/06/83	24	0.13	
B-3**	05/10/84	25	0.3	(2)

Post-Summer 1990 Zn Results

Well ID	Date	Rank	Value	Notes
B-2*	04/14/88	1	0.0005	(1)
B-3**	04/14/88	2	0.0005	(1)
B-5*	04/14/88	3	0.0005	(1)
B-6**	04/14/88	4	0.0005	(1)
B-2*	04/11/87	5	0.0025	(1)
B-3**	10/22/87	6	0.004	
B-3**	10/17/86	7	0.0045	(1),(3)
B-6**	10/17/86	8	0.0046	(1),(3)
B-2*	10/17/86	9	0.0048	(1),(3)
B-5*	10/17/86	10	0.0049	(1),(3)
B-3**	04/11/87	11	0.005	(1)
B-2*	10/22/87	12	0.005	
B-5*	10/22/87	13	0.005	
B-6**	10/22/87	14	0.005	
B-1**	04/14/88	15	0.005	(1),(2)
B-5*	04/11/87	16	0.006	
B-6**	04/11/87	17	0.01	
B-1**	10/22/87	18	0.015	(2)
B-1**	04/11/87	19	0.023	(2)
B-4	10/17/86	20	0.074	(3)

All Results

Rank	Value
1	0.0005
2	0.0005
3	0.0005
4	0.0005
5	0.0025
6	0.004
7	0.004
8	0.0045
9	0.0046
10	0.0048
11	0.0049
12	0.005
13	0.005
14	0.005
15	0.005
16	0.005
17	0.005
18	0.005
19	0.005
20	0.006
21	0.006
22	0.0067
23	0.0075
24	0.009
25	0.01
26	0.011
27	0.011
28	0.011
29	0.014
30	0.014
31	0.014
32	0.014
33	0.015
34	0.017
35	0.018
36	0.02
37	0.023
38	0.023
39	0.033
40	0.04
41	0.046
42	0.074
43	0.08
44	0.13
45	0.3

Summary Statistics

	Pre-Summer 1990	Post-Summer 1990
Number of Samples:	25	20
Number of LTDL Samples:	3	11
Mean Value:	0.034	0.009
Median Value:	0.014	0.005
Standard Deviation:	0.062	0.016
Minimum:	0.004	0.0005
Maximum:	0.3	0.074

Table 10 – Summary of Ranked Statistics for Arsenic in Monitoring Well B-1R2

Notes: All results and values reported in mg/L.
(1) Undetected -- Statistical value is 1/2 detection limit.
(2) Average of sample and replicate sample results.
Pre-summer 1990 values left-hand justified.
Post-summer 1990 values right-hand justified.

Pre-Summer 1990 As Results					Post-Summer 1990 As Results					All Results	
Well ID	Date	Rank	Value	Notes	Well ID	Date	Rank	Value	Notes	Rank	Value
B-1*	05/10/84	1	0.0025	(1)	B-1**	10/17/86	1	37	(2)	1	0.0025
B-1	04/06/83	2	0.31		B-1**	04/11/87	2	38.5	(2)	2	0.31
B-1R**	10/22/85	3	13		B-1**	04/14/88	3	60	(2)	3	13
B-1**	04/15/86	4	330		B-1**	10/22/87	4	70.5	(2)	4	37
										5	38.5
										6	60
										7	70.5
										8	330

Summary Statistics

Pre-Summer 1990		Post-Summer 1990	
Number of Samples:	4	Number of Samples:	4
Number of LTDL Samples:	1	Number of LTDL Samples:	0
Mean Value:	85.83	Mean Value:	51.5
Median Value:	6.66	Median Value:	49.25
Standard Deviation:	162.89	Standard Deviation:	16.46
Minimum:	0.0025	Minimum:	37
Maximum:	330	Maximum:	70.5

1773TAB10.WK1

Groundwater Sampling Location Plan

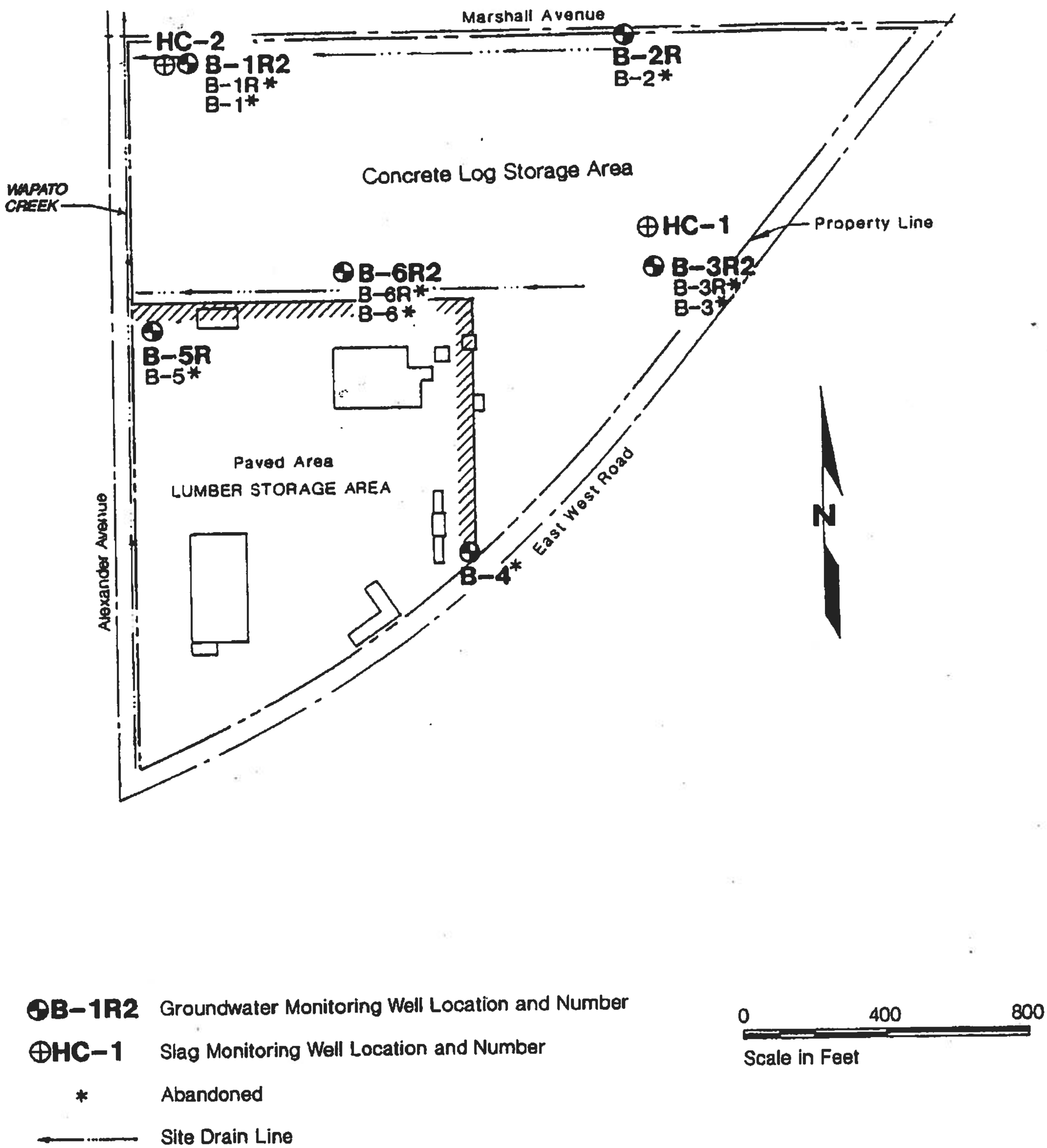


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Figure 1

Table 1
Groundwater Elevations and Field Parameters
Auto Warehousing Company Site, Port of Tacoma
3715 East West Road, Tacoma, WA

Well Number	Date Measured	DTW (feet)	Relative Elevation of Top of Casing	Relative Groundwater elevation	pH	Temperature (Degrees Farenheit)	Specific Conductance (µmhos/cm)	Comments
MW-1	05/23/91	5.66	100.01	94.35	N/A	N/A	N/A	Field parameters not measured.
MW-1	07/14/03	5.31	100.00	94.69	6.35	70.9	470	Removed 10 gallons or purge water. Wellhead damaged. Evidence of surface infiltration around cap.
MW-2	05/23/91	5.93	100.00	94.07	N/A	N/A	N/A	Field parameters not measured.
MW-2	07/14/03	6.70	100.05	93.35	6.70	66.2	800	Slight sewer-like odor.
MW-3	5/23/91	6.69	100.51	93.92	N/A	N/A	N/A	Field parameters not measured.
MW-3	07/14/03	6.78	100.63	93.85	6.75	70.3	1,890	
T-1	05/23/91			No information provided.				
OBS-1		4.98	99.69	94.71	6.75	69.3	200	Well sceened top of casing at surface.

DTW = Depth to Water

Table 2
Summary of Analytical Results
Groundwater Monitoring Well Sampling
Auto Warehousing Company Site, Port of Tacoma
3715 East West Road, Tacoma, WA

Sample Designation	Sample Location	Sample Date	Fuel Hydrocarbons	Gasoline	Diesel	Oil	Benzene	Toluene	Ethyl-benzene	Xylenes	Total Lead
Groundwater Samples			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-1	Well MW-1	5/23/91	ND	N/A	N/A	N/A	ND	ND	ND	ND	N/A
MW-1	Well MW-1	7/14/03	N/A	<10	**9,580**	**23,200**	<0.5	<1	<1	<2	N/A
MW-2	Well MW-2	5/23/91	ND	N/A	N/A	N/A	ND	ND	ND	ND	N/A
MW-2	Well MW-2	7/14/03	N/A	<0.1	**1,690**	<1,010	<0.5	<1	<1	<2	N/A
MW-3	Well MW-3	5/23/91	ND	N/A	N/A	N/A	ND	ND	ND	ND	N/A
MW-3	Well MW-3	7/14/03	N/A	57.6 J	405 J	<1,000	<0.5	<1	<1	<2	N/A
T-1	Southeast corner of UST complex	5/23/91	ND	N/A	N/A	N/A	5	ND	2	ND	N/A
OBS-1	Northwest corner of UST complex	7/14/03	N/A	145	436 J	<1,000	<0.5	<1	<1	<2	<2.5
MTCA Method A - Groundwater			N/A	1,000	500	500	5	1,000	700	1,000	5

Notes:

Fuel hydrocarbons by EPA SW-846, Modified Method 8015. This analytical method is no longer used for fuels analyses.

Diesel and oil by WDOE Method NWTPH-Dx.

BTEX by EPA Method 8021b.

ND means Not Detected at the analytical method reporting limit.

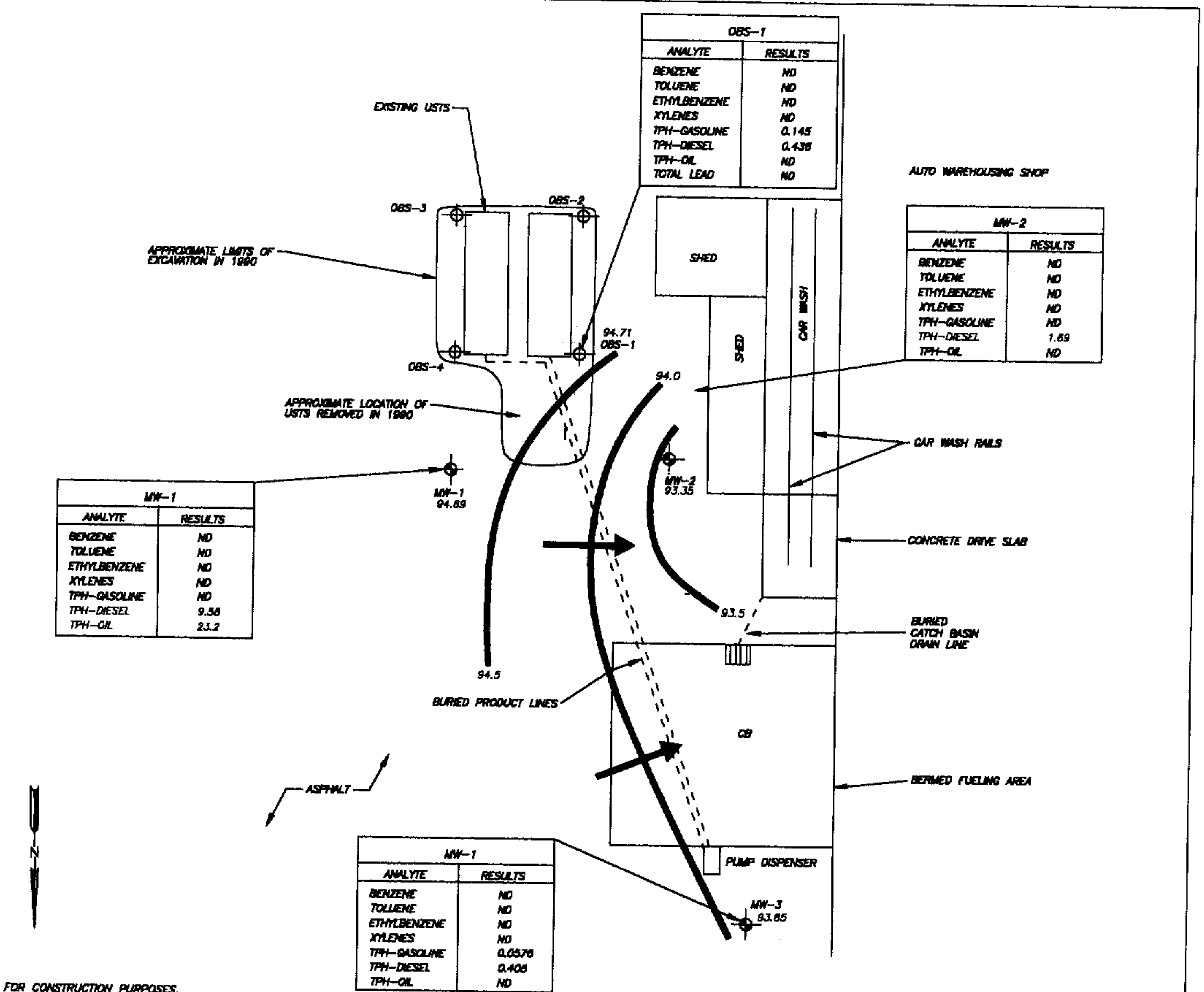
NA means Not Applicable.

210 Bold denotes concentration exceeds respective MTCA Method A cleanup level.

J-flagged results indicate that the result was below the laboratory method Practical Quatitation Limit (PQL) and the value is an estimate.

Data reported in ug/L units which approximate parts per million (ppm) concentrations.

MTCA means Model Toxics Control Act Regulation, WAC 173-340, Method A Cleanup Levels for Unrestricted Land Use, February 2001.



OBS-1	
ANALYTE	RESULTS
BENZENE	ND
TOLUENE	ND
ETHYLBENZENE	ND
XYLENES	ND
TPH-GASOLINE	0.145
TPH-DIESEL	0.436
TPH-OIL	ND
TOTAL LEAD	ND

MW-2	
ANALYTE	RESULTS
BENZENE	ND
TOLUENE	ND
ETHYLBENZENE	ND
XYLENES	ND
TPH-GASOLINE	ND
TPH-DIESEL	1.69
TPH-OIL	ND

MW-1	
ANALYTE	RESULTS
BENZENE	ND
TOLUENE	ND
ETHYLBENZENE	ND
XYLENES	ND
TPH-GASOLINE	ND
TPH-DIESEL	9.56
TPH-OIL	23.2

MW-1	
ANALYTE	RESULTS
BENZENE	ND
TOLUENE	ND
ETHYLBENZENE	ND
XYLENES	ND
TPH-GASOLINE	0.0576
TPH-DIESEL	0.406
TPH-OIL	ND

EXPLANATION

OBS-1 94.68 — OBSERVATION WELL INSTALLED IN UST BACKFILL RELATIVE GROUNDWATER ELEVATION ON JULY 14, 2003

MW-1 — EXISTING MONITORING WELL INSTALLED BY B & C EQUIPMENT IN 1990

CB — EXISTING CATCH BASIN

LABORATORY ANALYTICAL RESULTS

BENZENE by EPA Method 8021B, in ug/L (water)
TOLUENE by EPA Method 8021B, in ug/L (water)
ETHYLBENZENE by EPA Method 8021B, in ug/L (water)
XYLENES by EPA Method 8021B, in ug/L (water)
TPH-GASOLINE by WSDOE Method NWTPH-Gx, in ug/L (water)
TPH-DIESEL by WSDOE Method NWTPH-Dx, in ug/L (water)
TPH-OIL by WSDOE Method NWTPH-Dx, in ug/L (water)
TOTAL LEAD by EPA Method 6020, in ug/L (water)

ug/L approximates parts per billion (ppb) concentrations

RED DENOTES VALUE EXCEEDS RESPECTIVE MTCA METHOD A CLEANUP LEVEL

RELATIVE GROUNDWATER ELEVATION CONTOUR AND GENERAL DIRECTION OF GROUNDWATER FLOW ON JULY 14, 2003

94.5

BASE MAP WAS PREPARED FROM APPROXIMATE HAND MEASUREMENTS AND SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

DESIGN HWS
DRAWN HWS
DATE SEPTEMBERT 2003
JOB No. T-34

0 10 20 40
APPROXIMATE SCALE (FEET)

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

FIGURE 2

SITE PLAN, RELATIVE GROUNDWATER ELEVATIONS AND ANALYTICAL RESULTS

AUTO WAREHOUSING COMPANY
3715 EAST WEST ROAD
TACOMA, WA

SEPTEMBERT 2003

Table 1
Analytical Schedule
Former Portac Lumber Facility/Environmental Investigation
Tacoma, Washington

Soil

Sample ID	Boring	Depth ft bgs	EPA 8041	EPA 8321A	NWTPH-Dx		EPA 350.1M	EPA 351.4	EPA 8021B				EPA 6010B			TCLP - EPA 1311/6010B		
			PCP	IPBC	TPH-D	TPH-O	N-Ammonia	TKN	Benzene	Toluene	Ethylbenzene	Xylenes	Arsenic	Cadmium	Lead	Arsenic	Cadmium	Lead
PT-B1-(2-7')	B1	2-7											X	X	X			
PT-B1-(7-12)	B1	7-12											X	X	X			
PT-B2-3.5(slag)[a]	B2	3.5											X	X	X	X	X	X
PT-B2-6	B2	6											X	X	X			
PT-B2-13	B2	13											X	X	X			
PT-B3-SS[b]	B3	Surface	X		X	X												
PT-B3-2	B3	2	X	X	X	X	X	X										
PT-B3-6	B3	6	X	X	X	X	X	X										
PT-MW-7.5	MW1	7.5	X	X	X	X	X	X										
PT-B4-0.5	B4	0.5	X		X	X												
PT-B4-5	B4	5	X		X	X												
MW2-1'	MW2	1	X		X	X			X	X	X	X						
MW2-6'	MW2	6	X		X	X			X	X	X	X						

Water

Sample ID	Boring	EPA 8041	EPA 8321A	NWTPH-HCID			EPA 350.1M	EPA 351.4	EPA 8021B			
		PCP	IPBC	Gas	Diesel	Oil	N-Ammonia	TKN	Benzene	Toluene	Ethylbenzene	Xylenes
CDM-MW1	MW1	X	X	X	X	X	X					
MW2	MW2	X			X	X	X	X	X	X	X	X

Notes
a) Sample of slag
b) Not a soil sample. Sludge-like debris on the surface of the asphalt next to the dip tank.
PCP - pentachlorophenol
IPBC - 3-iodo-2-propynyl butyl carbamate
TPH-D - total petroleum hydrocarbons quantified in the diesel range
TPH-O - total petroleum hydrocarbons quantified in the oil range
N - nitrogen
TKN - total kjehldal nitrogen
TCLP - toxicity characteristic leaching procedure

Table 3

Analytical Summary - Groundwater

Former Portac Lumber Facility/Environmental Investigation
Tacoma, Washington

Sample ID	Boring	EPA 8041 PCP µg/L	EPA 8321A IPBC µg/L	NWTPH-HCID Gas mg/L	NWTPH-HCID Diesel mg/L	NWTPH-HCID Oil mg/L	EPA 350.1M N-Ammonia mg-N/L	EPA 351.4 TKN-Nitrogen mg-N/L
CDM-MW1	MW1	<0.25	<1.0	<0.25	<0.63	<0.63	3.92	10.9
Regulatory Standards		0.73 [a]						

Sample ID	Boring	EPA 8041 PCP µg/L	NWTPH-Dx Diesel mg/L	NWTPH-Dx Oil mg/L	EPA 8021B Benzene µg/L	EPA 8021B Toluene µg/L	EPA 8021B Ethylbenzene µg/L	EPA 8021B Xylenes µg/L	EPA 350.1M N-Ammonia mg-N/L
MW2	MW2	120	0.73	<0.50	**3.8**	<1.0	<1.0	<1.0	6.14
Regulatory Standards		0.73 [a]	0.5 [b]	0.5 [c]	5 [c]	1,000 [c]	1,000 [c]	700 [c]	

Notes:

Bold value indicates analyte detected at or above detection level.

Shaded value exceeds one or more regulatory standards.

a) Washington Department of Ecology's Cleanup Levels and Risk Calculation Tables (CLARC), downloaded from http://www.ecy.wa.gov July 3, 2008. The lowest value in the CLARC tables (carcinogenic) used.

b) Analyzed with silica gel cleanup to remove naturally occurring organics.

c) Washington Administrative Code (WAC) Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested soil cleanup level for unrestricted land uses; promulgated August 15, 2001.

PCP - pentachlorophenol.

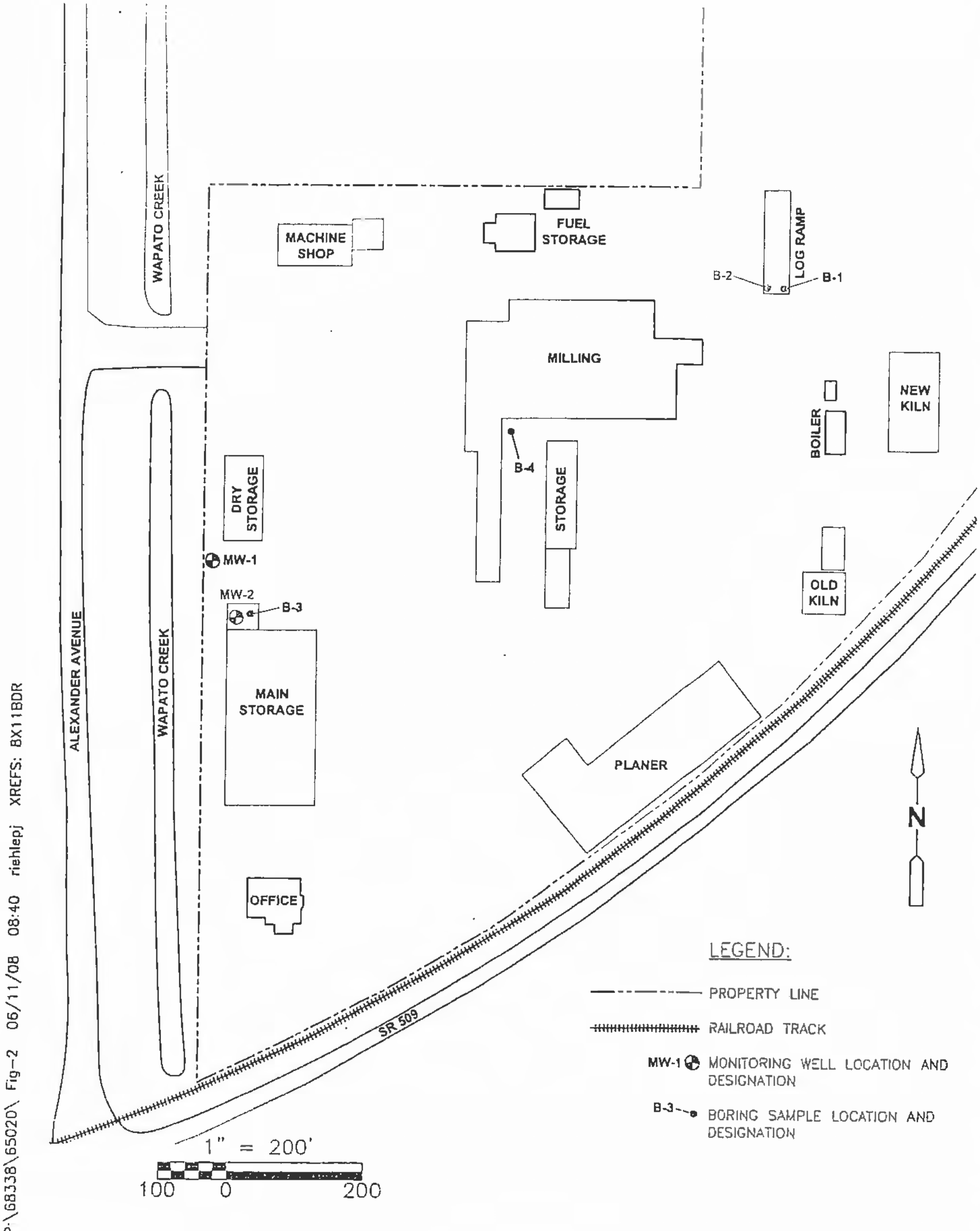
IPBC - 3-iodo-2-propanyl butyl carbamate

mg/L - milligrams per liter.

µg/L - micrograms per liter.

mg-N/L - milligrams nitrogen per liter.

< - analyte not detected at or greater than the listed concentration.



PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

Figure No. 2
Site Plan

Table 3

Summary of Pentachlorophenol and Petroleum Hydrocarbons in Groundwater

Former Portac Lumber Facility/Environmental Investgation

Tacoma, Washingtoin

Well/ Boring ID	EPA Method 8151					Northwest Method NWTPH-Dx									
	PCP					TPH-Diesel					TPH-Oil				
	05/07/08	06/20/08	07/09/08	09/10/08	09/23/08	05/07/08	06/20/08	07/09/08	09/10/08	09/23/08	05/07/08	06/20/08	07/09/08	09/10/08	09/23/08
	µg/L					mg/L					mg/L				
MW1	<0.25	–	0.69	–	<0.5	<0.63 [a]	–	<0.25	–	<0.20	<0.63 [a]	–	<0.5	–	<0.50
MW2	–	120	–	–	–	–	0.73	FP [a]	–	–	–	<0.5	FP [a]	–	–
MW3	–	–	–	–	<0.5	–	–	–	–	<0.20	–	–	–	–	<0.50
MW4	–	–	–	–	<0.5	–	–	–	–	<0.20	–	–	–	–	<0.50
B5	–	–	–	<0.5	–	–	–	–	<0.20	–	–	–	–	<0.50	–
B6	–	–	–	220	–	–	–	–	<0.20	–	–	–	–	<0.50	–
B7	–	–	–	31	–	–	–	–	<0.20	–	–	–	–	<0.50	–
Regulatory Standard	0.73 [b]					0.5 [c]					0.5 [c]				

Notes:

a) Analyzed by hydrocarbon screening method NWTPH-HCID.

b) Washington Department of Ecology's Cleanup Levels and Risk Calculation Tables (CLARC), downloaded from http://www.ecy.wa.gov July 3, 2008. The lowest value in the CLARC tables (carcinogenic) used.

c) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested soil cleanup level for unrestricted land uses; promulgated August 15, 2001.

FP - free phase hydrocarbons present. Chromatographic profile indicates a light oil.

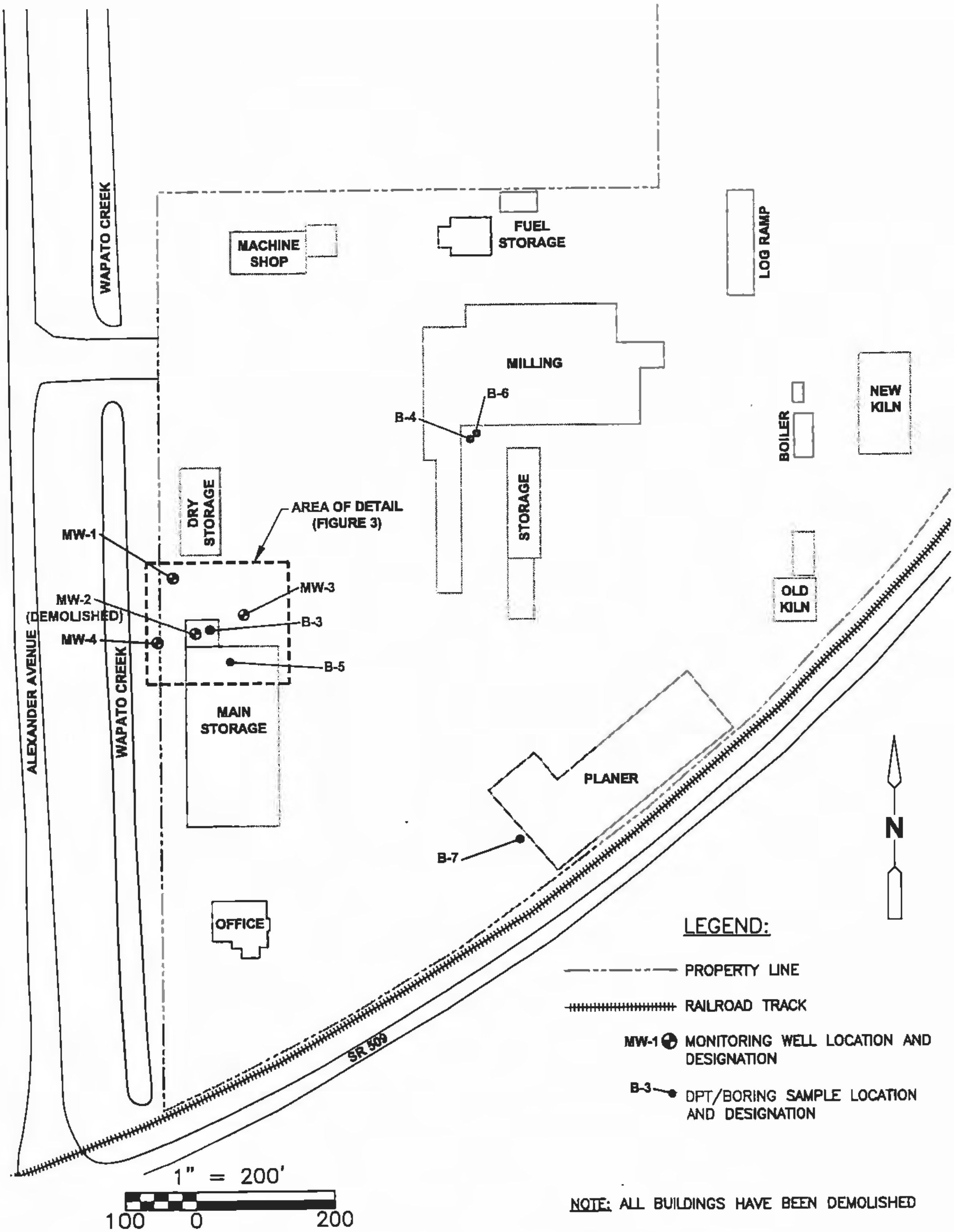
TPH - total petroleum hydrocarbons.

µg/L - micrograms per liter.

mg/L - micrograms per liter.

– not analyzed.

< - analyte not detected at or greater than the listed concentration.



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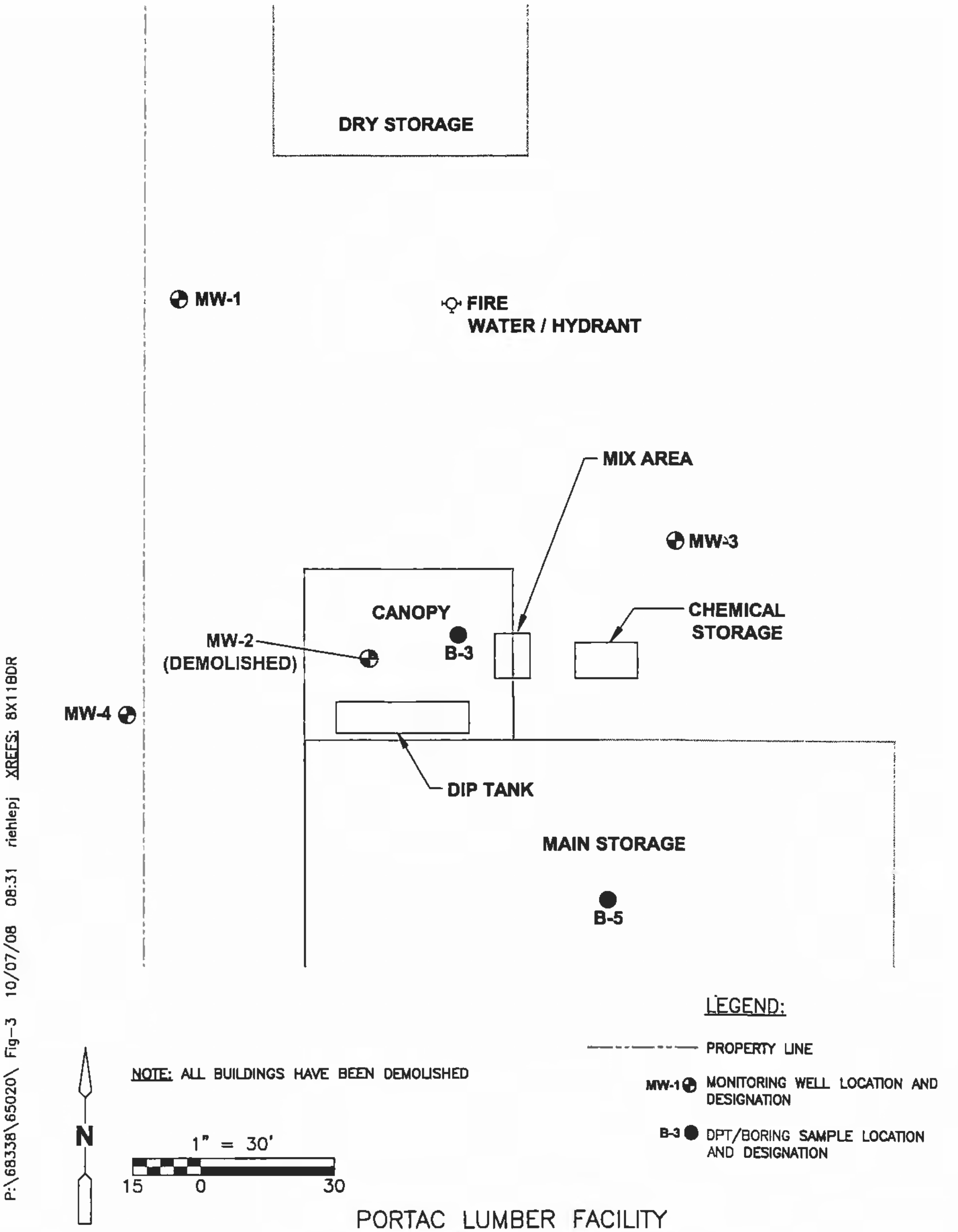
PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

Figure No. 2
Site Plan And
Exploration Map



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PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

Figure No. 3
Exploration Locations
Surrounding Dip Tank

TABLE 5
Portac Mill and Planer Spray Area *WES-1400*
Groundwater Sample Analytical Summary *Page 1*

Sample I.D.		***Pentachlorophenol (ug/l)***
MW-6	(Labeling Error - Sample was incorrectly labeled. Sample is actually from **MW-5** at Portac Planer Building	***180***
MW-7	(Labeling Error - Sample was incorrectly labeled. Sample is actually from **MW-6**, at Portac Mill PCP Spray area)	***1,600***
Model Toxics Control Act Method B Standard Formula Value Groundwater Cleanup Criteria		0.73
MTCA Method B - Standard Formula Value Surface Water Cleanup Criteria		4.9
MTCA Method C - Standard Formula Value Groundwater Cleanup Criteria		7.3
MTCA Method C -Standard Formula Value Surface Water Cleanup Criteria		120
Most restrictive surface water aquatic life ARAR (Marine/Chronic - Clean Water Act §304 & Ch. 173-201A WAC		7.9
Most restrictive surface water human health ARAR Fresh Water - Clean Water Act §304		0.27

Table 5 Notes:
Samples were incorrectly labeled in the field. Correct monitoring well ID is noted, and proper Sample IDs have been noted in laboratory reports in Appendix B.

NA - Not analyzed for the noted parameter.

Various Model Toxics Control Act groundwater cleanup criteria from Dept. of Ecology CLARC database, per Chapter 173-340- 720.

TABLE 13
Portac Post-Cleanup Site Investigation ***WES-1400***
Groundwater Sample Analytical Summary ***Page 1***

Monitoring Well ID	***Sample Date***	***Pentachloro-phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	ND (64 different volatile compounds)	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
MW-2R	5-19-2009	***69***	NA	Acetone - 98 Naphthalene - 2.5 ND (62 other volatile compounds)	Gasoline - NA ***Diesel - 1,000*** ***Motor Oil - 4,900***	***Arsenic - 12.1*** Cadmium - ND (<1) Chromium - 12.6 Lead - 1.13 Mercury - ND (<0.2)
MW-3	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	NA	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
MW-4	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	ND (64 different volatile compounds)	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
MW-5	3-5-2009	***22***	ND (64 additional semi-volatile compounds)	NA	NA	NA
MW-6R	5-19-2009	ND (<0.5)	NA	NA	NA	Arsenic - 3.43 Cadmium - ND (<1) Chromium - 5.79 Lead - 1.26 Mercury - ND (<0.2)

TABLE 13
Portac Post-Cleanup Site Investigation
Groundwater Sample Analytical Summary

Monitoring Well ID	***Sample Date***	***Pentachloro-phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
B-5R	5-19-2009	NA	NA	Isopropylbenzene - 1.1 ND (63 other volatile compounds)	Gasoline - <100 Diesel - 150 Motor Oil - <250	Arsenic - ND (<1) Cadmium - ND (<1) Chromium - 2.68 Lead - 1.53 Mercury - ND (<0.2)
MTCA Groundwater Cleanup Criteria (ug/l)		***Method B - 0.73***	***Undetected Parameters Vary***	***Method A*** ***Naphthalene - 160*** ***Method B*** ***Acetone 800*** ***Isopropylbenzene - -*** ***Other Undetected Parameters Vary***	***Method A*** ***Gasoline - 1,000[2]*** ***Diesel - 500*** ***Motor Oil - 500***	***Method A*** ***Arsenic - 5*** ***Cadmium - 5*** ***Chromium - 50*** ***Lead - 15*** ***Mercury - 2***

Table Notes:
NA - Sample not analyzed for the listed parameter.
ND (<XXX) - Analyzed parameter not detected above the noted concentration.
[1] - Denotes the laboratory's Method Detection Limit (MDL) for pentachlorophenol by EPA Method 8270D. This method was used to analyze for a wide list of semi-volatile aromatic compounds to demonstrate that no other semi-volatile compounds are present in groundwater. However, by this method the detection limit for pentachlorophenol is not low enough to compare to Method B regulatory criteria.
4-7-2009 analyses for Pentachlorophenol were conducted by EPA Method 8270SIM, with reporting limits suitable for comparison to MTCA Method B groundwater cleanup criteria.
[2] - MTCA Method A groundwater cleanup criteria for gasoline range organics where no benzene has been detected in groundwater. Other criteria apply if benzene is present.
Volatile organic compounds by EPA Method 8260C.
Total Petroleum Hydrocarbons in the gasoline range analyzed by method NWTPH-G.
Total Petroleum Hydrocarbons in the Diesel and Oil ranges analyzed by method NWTPH-D(extended).
Regulated metals by EPA Method 200.8, except mercury, by EPA Method 1631E.

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1	5-7-2008 (CDM)	<0.25	NA	NA	Diesel - ND (<630) Motor Oil- ND (<500)	NA
	7-9-2008 (CDM)	0.69	NA	NA	Diesel - ND (<250) Motor Oil- ND (<500)	NA
	9-23-2008 (CDM)	<0.5	NA	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	ND (64 different volatile compounds)	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 25.2*** Barium - 203 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 6,680*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-2R	5-19-2009	***69***	NA	Acetone - 98 Naphthalene - 2.5 ND (62 other volatile compounds)	***Diesel - 1,000*** ***Motor Oil - 4,900***	***Arsenic - 12.1*** Cadmium - ND (<1) Chromium - 12.6 Lead - 1.13 Mercury - ND (<0.2)
	12-4-2009	***61***	Analyzed PAH compounds: Napthalene - 0.48 Acenaphthylene - ND (<0.1) Acenaphthene - 0.72 Fluorene 0.45 Phenanthrene - 0.14 Anthracene - ND (<0.1) Fluoranthene - 0.26 Pyrene - 0.16 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 0.34 2 Methylnaphthalene - 0.24 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 118*** Barium - 33.3 Cadmium - ND (<1) Chromium - ND(<5) Copper - 63.7 Lead - ND (<5) Manganese - 71.7 Mercury - ND (<0.2) Molybdenum - 41.8 Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

TABLE 1
Portac Inc. ***WES-1400***
Groundwater Sample Analytical Summary ***Page 3***

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-3	9-23-2008 (CDM)	<0.5	NA	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	NA	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 10.1*** Barium - 102 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 2,350*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

TABLE 1
Portac Inc.
Groundwater Sample Analytical Summary

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-4	9-23-2008 (CDM)	<0.5	NA	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	ND (64 different volatile compounds)	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 160 Motor Oil- ND (<250)	***Arsenic - 10.2*** Barium - 213 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 6,260*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

TABLE 1
Portac Inc.
Groundwater Sample Analytical Summary

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-5	3-5-2009	***22***	ND (64 additional semi-volatile compounds)	NA	NA	NA
	12-4-2009	***1.5***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<5) Barium - 41.7 Cadmium - ND (<1) Chromium - 27.0 Copper - 29.9 Lead - ND (<5) Manganese - 144 Mercury - 0.22 Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - 5.45

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-6R	5-19-2009	ND (<0.5)	NA	NA	NA	Arsenic - 3.43 Cadmium - ND (<1) Chromium - 5.79 Lead - 1.26 Mercury - ND (<0.2)
	12-4-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - 27 Acenaphthylene - ND (<0.1) Acenaphthene - 14 Fluorene 1.4 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 5.3 2 Methylnaphthalene - 2.5 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 400 Motor Oil- ND (<250)	Arsenic - ND (<5) Barium - 115 Cadmium - ND (<1) Chromium - 6.34 Copper - ND (<5) Lead - ND (<5) ***Manganese - 7,850*** Mercury - ND (<0.2) Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

TABLE 1
Portac Inc.
Groundwater Sample Analytical Summary

Monitoring Well ID	*Sample Date*	*Pentachloro phenol (ug/l)*	*Other Semi-Volatile Organic Compounds (ug/l)*	*Volatile Organic Compounds (ug/l)*	*Total Petroleum Hydrocarbons (ug/l)*	*Regulated Metals (ug/l)*
B-5R	5-19-2009	NA	NA	Isopropylbenzene - 1.1 ND (63 other volatile compounds)	Gasoline - <100 Diesel - 150 Motor Oil - <250	Arsenic - ND (<1) Cadmium - ND (<1) Chromium - 2.68 Lead - 1.53 Mercury - ND (<0.2)
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.81 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,I)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<1) Barium - 67.1 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) Manganese - 1,250 Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

TABLE 1
Portac Inc.
Groundwater Sample Analytical Summary

Monitoring Well ID	Sample Date	Pentachlorophenol (ug/l)	Other Semi-Volatile Organic Compounds (ug/l)	Volatile Organic Compounds (ug/l)	Total Petroleum Hydrocarbons (ug/l)	Regulated Metals (ug/l)
MTCA Groundwater Cleanup Criteria (ug/l)		Method B - 0.73	**Method A** Naphthalene - 160 Benzo(a)pyrene - 0.1 TEC[3] of other cPAHs - 0.1 **Method B** Napthalene - 160 Acenaphthylene - -- Acenaphthene - 960 Fluorene 640 Phenanthrene - -- Anthracene - 4,800 Fluoranthene - 640 Pyrene - 480 Benz(a)anthracene* - –* Chrysene* - –* Benzo(a)pyrene* - 0.012* Benzo(b)fluoranthene* - –* Benzo(k)fluoranthene* - –* Indeno(1,2,3-cd)pyrene* - –* Dibenz(a,h)anthracene* - --* Benzo(g,h,l)perylene - – 1 Methylnaphthalene - -- 2 Methylnaphthalene - 32 * - carcinogenic PAH compounds used to calculate the Toxicity Equivalent Concentration (TEC)	**Method A** Naphthalene - 160 **Method B** Acetone 800 Isopropylbenzene -- Other Undetected Parameters Vary	**Method A** Gasoline - 1,000[2] Diesel - 500 Motor Oil - 500	**Method A** Arsenic - 5 Cadmium - 5 Chromium - 50 Lead - 15 Mercury - 2 **Method B** Arsenic - 4.8 Barium - 3,200 Cadmium - 8 Chromium III - 24,000 Copper - 590 Lead - -- Manganese - 2,200 Mercury - 4.8 Molybdenum - 80 Nickel - 3,200 Selenium - 80 Zinc - 4,800

Table 1 Notes:
NA - Sample not analyzed for the listed parameter.
ND (<XXX) - Analyzed parameter not detected above the noted concentration.
[1] - Denotes the laboratory's Method Detection Limit (MDL) for pentachlorophenol by EPA Method 8270D. This method was used in March 2009 analyses to identify a wide list of semi-volatile aromatic compounds to demonstrate that no other semi-volatile compounds are present in groundwater. However, by this method the detection limit for pentachlorophenol is not low enough to compare to Method B regulatory criteria.

4-7-2009 and 12-3-209 analyses for Pentachlorophenol were conducted by EPA Method 8270SIM, with reporting limits suitable for comparison to MTCA Method B groundwater cleanup criteria.

Volatile organic compounds by EPA Method 8260C.

[2] - MTCA Method A groundwater cleanup criteria for gasoline range organics where no benzene has been detected in groundwater. Other criteria apply if benzene is present.

Total Petroleum Hydrocarbons in the gasoline range analyzed by method NWTPH-G.
Total Petroleum Hydrocarbons in the Diesel and Oil ranges analyzed by method NWTPH-D(extended), with silica gel cleanup to remove organic matter.

Regulated metals by EPA Method 200.8, except mercury, by EPA Method 1631E.

TEC - Toxic Equivalent Concentration - The summed concentration of seven carcinogenic PAH compounds, after applying a toxicity equivalency factor (TEF) to each compound, based on its relative toxicity compared to benzo-(a)-pyrene.

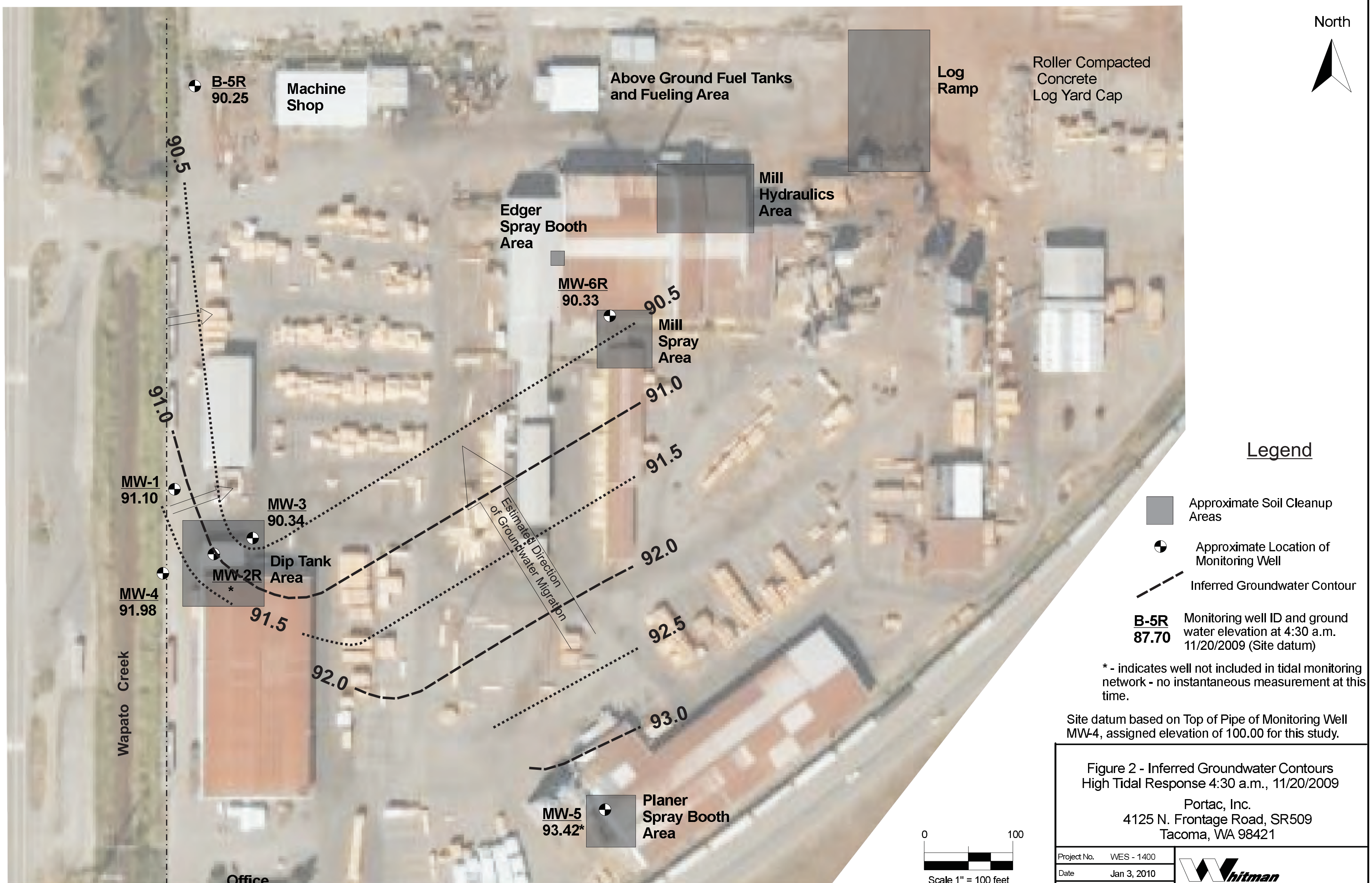
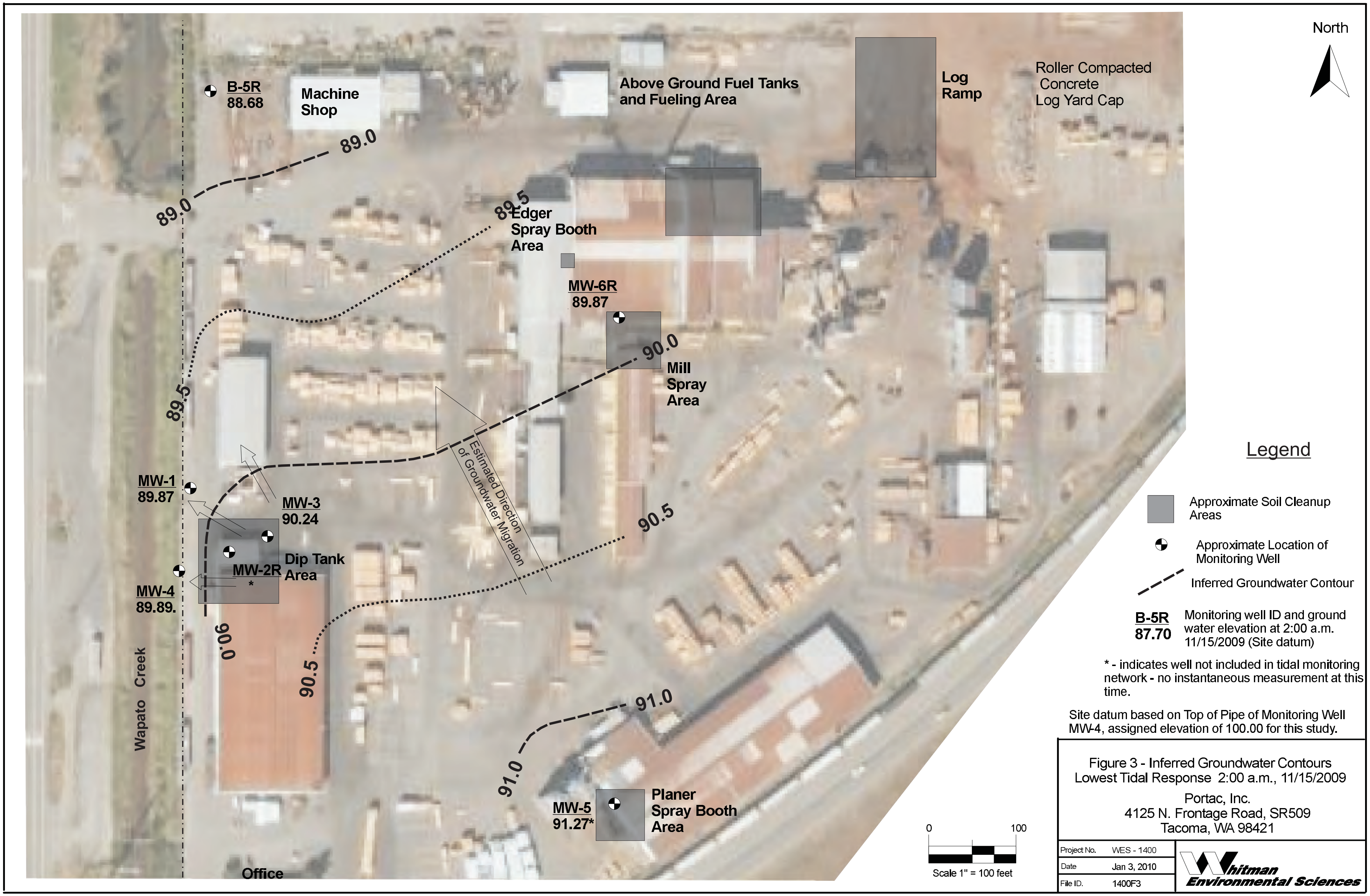


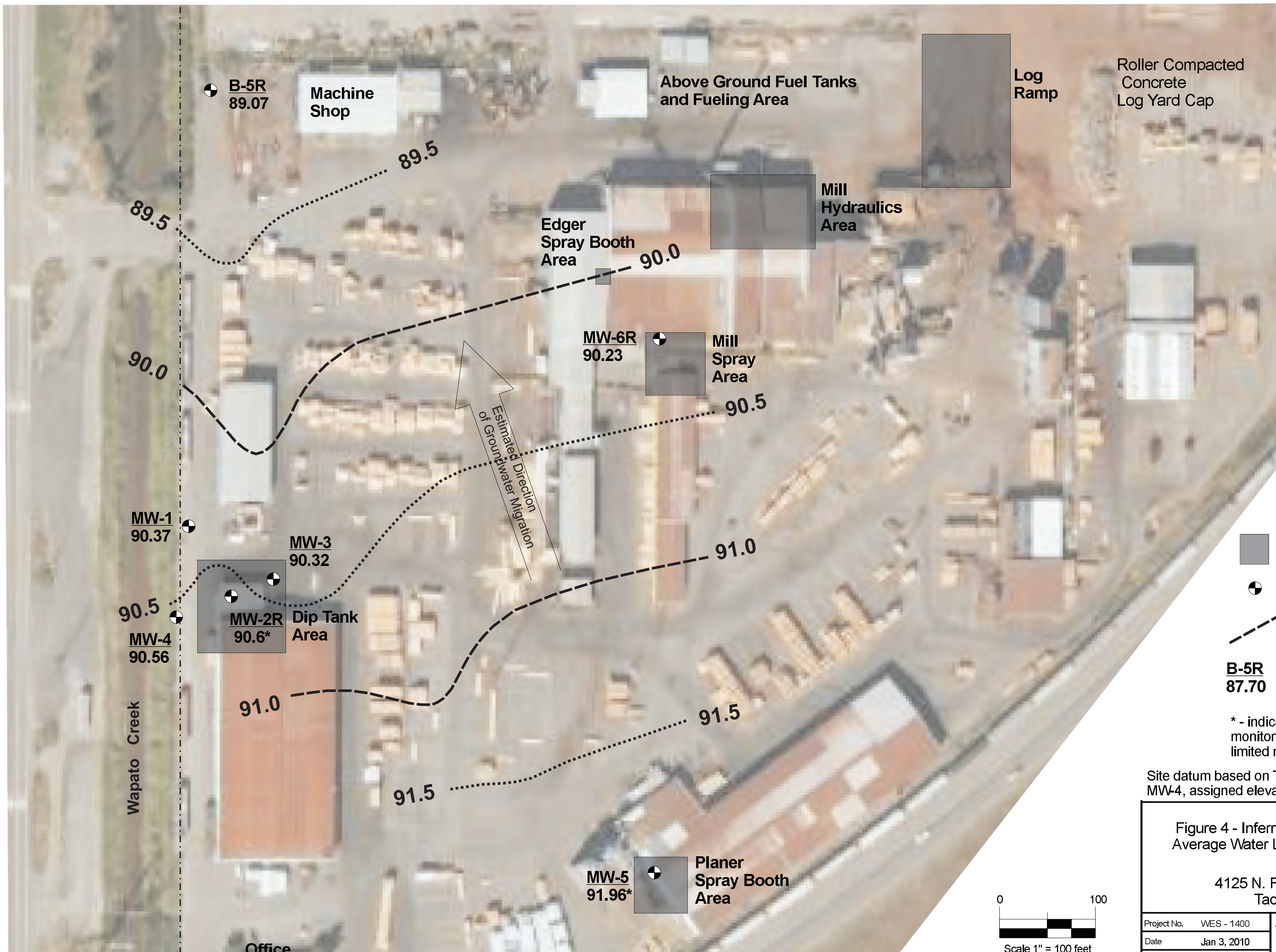
Figure 2 - Inferred Groundwater Contours
High Tidal Response 4:30 a.m., 11/20/2009

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Jan 3, 2010
File ID.	1400F2

Whitman Environmental Sciences


North
B-5R
88.68
Machine Shop
Above Ground Fuel Tanks and Fueling Area
Log Ramp
Roller Compacted Concrete Log Yard Cap
89.0
89.0
89.5
Edger Spray Booth Area
MW-6R
89.87
90.0
Mill Spray Area
89.5
Estimated Direction of Groundwater Migration
MW-1
89.87
MW-3
90.24
Dip Tank Area
MW-2R
*
MW-4
89.89.
90.0
90.5
90.5
Wapato Creek
91.0
91.0
MW-5
91.27*
Planer Spray Booth Area
Office
Legend
Approximate Soil Cleanup Areas
Approximate Location of Monitoring Well
Inferred Groundwater Contour
B-5R
87.70
Monitoring well ID and ground water elevation at 2:00 a.m. 11/15/2009 (Site datum)
* - indicates well not included in tidal monitoring network - no instantaneous measurement at this time.
Site datum based on Top of Pipe of Monitoring Well MW-4, assigned elevation of 100.00 for this study.
0
100
Scale 1" = 100 feet
Figure 3 - Inferred Groundwater Contours
Lowest Tidal Response 2:00 a.m., 11/15/2009
Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421
Project No. WES - 1400
Date Jan 3, 2010
File ID. 1400F3
Whitman Environmental Sciences



North

Legend

Approximate Soil Cleanup Areas

Approximate Location of Monitoring Well

Inferred Groundwater Contour

B-5R
87.70 Monitoring well ID and average groundwater elevation 11/12 to 11/29 2009 (Site datum)

* - indicates well not included in tidal monitoring network - average based on limited number of measurements

Site datum based on Top of Pipe of Monitoring Well MW-4, assigned elevation of 100.00 for this study.

0 100

Scale 1" = 100 feet

Figure 4 - Inferred Groundwater Contours
Average Water Levels 11/12 to 11/29/2009

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Jan 3, 2010
File ID.	1400F4

Whitman Environmental Sciences

TABLE 2
Portac Inc. ***WES-1400***
Groundwater Sample Analytical Summary ***Page 1***

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1	5-7-2008 (CDM)	<0.25	NA	NA	Diesel - ND (<630) Motor Oil- ND (<500)	NA
	7-9-2008 (CDM)	0.69	NA	NA	Diesel - ND (<250) Motor Oil- ND (<500)	NA
	9-23-2008 (CDM)	<0.5	NA	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	ND (64 different volatile compounds)	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 25.2*** Barium - 203 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 6,680*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1 (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,I)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 26.9*** Barium - 181 Cadmium - ND (<5) Chromium - 8.92 Copper - ND (<5) Lead - ND (<5) ***Manganese - 6,440*** Mercury - ND (<0.2) Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

TABLE 2
Portac Inc.
Groundwater Sample Analytical Summary

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-2R	5-19-2009	***69***	NA	Acetone - 98 Naphthalene - 2.5 ND (62 other volatile compounds)	***Diesel - 1,000*** ***Motor Oil - 4,900***	***Arsenic - 12.1*** Cadmium - ND (<1) Chromium - 12.6 Lead - 1.13 Mercury - ND (<0.2)
	12-4-2009	***61***	Analyzed PAH compounds: Napthalene - 0.48 Acenaphthylene - ND (<0.1) Acenaphthene - 0.72 Fluorene 0.45 Phenanthrene - 0.14 Anthracene - ND (<0.1) Fluoranthene - 0.26 Pyrene - 0.16 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 0.34 2 Methylnaphthalene - 0.24 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 118*** Barium - 33.3 Cadmium - ND (<1) Chromium - ND(<5) Copper - 63.7 Lead - ND (<5) Manganese - 71.7 Mercury - ND (<0.2) Molybdenum - 41.8 Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-2R (Continued)	3-17-2010	***66***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 1.9 Fluorene 0.58 Phenanthrene - 1.2 Anthracene - ND (<0.1) Fluoranthene - 0.32 Pyrene - 0.20 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,I)perylene - ND (<0.1) 1 Methylnaphthalene - 0.51 2 Methylnaphthalene - 0.11 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 16.6*** Barium - 67.3 Cadmium - ND (<1) Chromium - 4.5 Copper - 29.6 Lead - ND (<1) Manganese - 36.9 Mercury - ND (<0.2) Molybdenum - 17.5 Nickel - 3.88 Selenium - ND (<1) Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-3	9-23-2008 (CDM)	<0.5	NA	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	NA	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,I)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 10.1*** Barium - 102 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 2,350*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

TABLE 2
Portac Inc.
Groundwater Sample Analytical Summary

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-3 (Continued)	3-17-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,I)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 11.3*** Barium - 78.2 Cadmium - ND (<5) Chromium - 6.27 Copper - ND (<5) Lead - ND (<5) Manganese - 2,000 Mercury - ND (<0.2) Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-4	9-23-2008 (CDM)	<0.5	NA	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	ND (64 different volatile compounds)	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 160 Motor Oil- ND (<250)	***Arsenic - 10.2*** Barium - 213 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 6,260*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-4 (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,I)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 12.5*** Barium - 161 Cadmium - ND (<5) Chromium - ND(<5) Copper - ND (<5) Lead - ND (<5) ***Manganese - 5,410*** Mercury - ND (<0.2) Molybdenum - ND (<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

TABLE 2
Portac Inc.
Groundwater Sample Analytical Summary

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-5	3-5-2009	***22***	ND (64 additional semi-volatile compounds)	NA	NA	NA
	12-4-2009	***1.5***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<5) Barium - 41.7 Cadmium - ND (<1) Chromium - 27.0 Copper - 29.9 Lead - ND (<5) Manganese - 144 Mercury - 0.22 Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - 5.45

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-5 (Continued)	3-16-2010	***4.7***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,I)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - 1.29 Barium - 28.8 Cadmium - ND (<1) Chromium - 9.97 Copper - 7.51 Lead - ND (<1) Manganese - 126 Mercury - ND (<0.2) Molybdenum - 2.44 Nickel - 1.83 Selenium - ND (<1) Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-6R	5-19-2009	ND (<0.5)	NA	NA	NA	Arsenic - 3.43 Cadmium - ND (<1) Chromium - 5.79 Lead - 1.26 Mercury - ND (<0.2)
	12-4-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - 27 Acenaphthylene - ND (<0.1) Acenaphthene - 14 Fluorene 1.4 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 5.3 2 Methylnaphthalene - 2.5 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 400 Motor Oil- ND (<250)	Arsenic - ND (<5) Barium - 115 Cadmium - ND (<1) Chromium - 6.34 Copper - ND (<5) Lead - ND (<5) ***Manganese - 7,850*** Mercury - ND (<0.2) Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-6R (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - 11 Acenaphthylene - ND (<0.1) Acenaphthene - 9.5 Fluorene 0.73 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,I)perylene - ND (<0.1) 1 Methylnaphthalene - 3.6 2 Methylnaphthalene - 0.12 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 52 Motor Oil- ND (<250)	Arsenic - 3.41 Barium - 98.3 Cadmium - ND (<1) Chromium - 4.03 Copper - 1.26 Lead - ND (<1) ***Manganese - 6,400*** Mercury - ND (<0.2) Molybdenum - 2.66 Nickel - 1.38 Selenium - 1.14 Zinc - 1.08

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
B-5R	5-19-2009	NA	NA	Isopropylbenzene - 1.1 ND (63 other volatile compounds)	Gasoline - <100 Diesel - 150 Motor Oil - <250	Arsenic - ND (<1) Cadmium - ND (<1) Chromium - 2.68 Lead - 1.53 Mercury - ND (<0.2)
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.81 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<1) Barium - 67.1 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) Manganese - 1,250 Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
B-5R (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.76 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<1) Barium - 54.4 Cadmium - ND (<1) Chromium - 2.47 Copper - ND (<1) Lead - ND (<1) Manganese - 1,130 Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - ND (<1) Selenium - 1.48 Zinc - ND (<1)

TABLE 2
Portac Inc.
Groundwater Sample Analytical Summary

Monitoring Well ID	Sample Date	Pentachloro phenol (ug/l)	Other Semi-Volatile Organic Compounds (ug/l)	Volatile Organic Compounds (ug/l)	Total Petroleum Hydrocarbons (ug/l)	Regulated Metals (ug/l)
MTCA Groundwater Cleanup Criteria (ug/l)		Method B - 0.73	**Method A** Naphthalene - 160 Benzo(a)pyrene - 0.1 TEC[3] of other cPAHs - 0.1 **Method B** Napthalene - 160 Acenaphthylene - -- Acenaphthene - 960 Fluorene 640 Phenanthrene - -- Anthracene - 4,800 Fluoranthene - 640 Pyrene - 480 Benz(a)anthracene* - –* Chrysene* - –* Benzo(a)pyrene* - 0.012* Benzo(b)fluoranthene* - –* Benzo(k)fluoranthene* - –* Indeno(1,2,3-cd)pyrene* - –* Dibenz(a,h)anthracene* - --* Benzo(g,h,l)perylene - – 1 Methylnaphthalene - -- 2 Methylnaphthalene - 32 * - carcinogenic PAH compounds used to calculate the Toxicity Equivalent Concentration (TEC)	**Method A** Naphthalene - 160 **Method B** Acetone 800 Isopropylbenzene -- **Other Undetected Parameters Vary**	**Method A** Gasoline - 1,000[2] Diesel - 500 Motor Oil - 500	**Method A** Arsenic - 5 Cadmium - 5 Chromium - 50 Lead - 15 Mercury - 2 **Method B** Arsenic - 4.8 Barium - 3,200 Cadmium - 8 Chromium III - 24,000 Copper - 590 Lead - -- Manganese - 2,200 Mercury - 4.8 Molybdenum - 80 Nickel - 3,200 Selenium - 80 Zinc - 4,800

Table 2 Notes:
NA - Sample not analyzed for the listed parameter.
ND (<XXX) - Analyzed parameter not detected above the noted concentration.
[1] - Denotes the laboratory's Method Detection Limit (MDL) for pentachlorophenol by EPA Method 8270D. This method was used in March 2009 analyses to identify a wide list of semi-volatile aromatic compounds to demonstrate that no other semi-volatile compounds are present in groundwater. However, by this method the detection limit for pentachlorophenol is not low enough to compare to Method B regulatory criteria. Analyses for Pentachlorophenol since that time were conducted by EPA Method 8270SIM, with reporting limits suitable for comparison to MTCA Method B groundwater cleanup criteria.

Volatile organic compounds by EPA Method 8260C.

[2] - MTCA Method A groundwater cleanup criteria for gasoline range organics where no benzene has been detected in groundwater. Other criteria apply if benzene is present.

Total Petroleum Hydrocarbons in the gasoline range analyzed by method NWTPH-G.
Total Petroleum Hydrocarbons in the Diesel and Oil ranges analyzed by method NWTPH-D(extended), with silica gel cleanup to remove organic matter.

Regulated metals by EPA Method 200.8, except mercury, by EPA Method 1631E.

[3] - TEC - Toxic Equivalent Concentration - The summed concentration of seven carcinogenic PAH compounds, after applying a toxicity equivalency factor (TEF) to each compound, based on its relative toxicity compared to benzo-(a)-pyrene.

TABLE 2
Portac Inc.
June 30, 2010 Groundwater Sampling — ***WES-1400***
Current Sample Analytical Results — ***Page 1***

Monitoring Well ID	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2] - 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 22.2*** Barium - 192 Cadmium - ND (<1) Chromium - 4.55 Copper - 1.72 Lead - ND (<1) ***Manganese - 6,610*** Mercury - ND (<0.2) Molybdenum - 3.77 Nickel - 3.50 Selenium - 5.83 Zinc - ND (<1)
MW-2R	***37***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.21 Fluorene 0.12 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - 0.55 Pyrene - 0.36 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2] - 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - 2.85 Barium - 194 Cadmium - ND (<1) Chromium - 7.13 Copper - 78.6 Lead - ND (<1) Manganese - 4.91 Mercury - ND (<0.2) Molybdenum - 12.3 Nickel - 14.1 Selenium - ND (<1) Zinc - ND (<1)

TABLE 2
Portac Inc.
June 30, 2010 Groundwater Sampling ***WES-1400***
Current Sample Analytical Results ***Page 2***

Monitoring Well ID	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-3	<0.5	Analyzed PAH compounds: Napthalene - 0.21 Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 13.7*** Barium - 77.4 Cadmium - ND (<1) Chromium - 3.95 Copper - 1.14 Lead - ND (<1) Manganese - 2,030 Mercury - ND (<0.2) Molybdenum - 1.13 Nickel - 2.59 Selenium - 3.52 Zinc - ND (<1)
MW-4	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 13.1*** Barium - 122 Cadmium - ND (<1) Chromium - 2.06 Copper - 2.00 Lead - ND (<1) ***Manganese - 3,960*** Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - 2.14 Selenium - 5.81 Zinc - ND (<1)

Monitoring Well ID	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-5	***2.4***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil - ND (<250)	Arsenic - 1.35 Barium - 25.1 Cadmium - ND (<1) Chromium - 11.0 Copper - 8.23 Lead - ND (<1) Manganese - 92.2 Mercury - ND (<0.2) Molybdenum - 2.84 Nickel - 1.71 Selenium - ND (<1) Zinc - ND (<1)
MW-6R	ND (<0.5)	Analyzed PAH compounds: Napthalene - 8.2 Acenaphthylene - ND (<0.1) Acenaphthene - 8.4 Fluorene 0.59 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 3.0 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	Diesel - 50 Motor Oil - ND (<250)	Arsenic - 3.46 Barium - 109 Cadmium - ND (<1) Chromium - 3.23 Copper - 2.70 Lead - ND (<1) ***Manganese - 7,890*** Mercury - ND (<0.2) Molybdenum - 3.22 Nickel - 1.56 Selenium - 1.66 Zinc - ND (<1)

TABLE 2
Portac Inc.
June 30, 2010 Groundwater Sampling *WES-1400*
Current Sample Analytical Results *Page 4*

Monitoring Well ID	*Pentachloro phenol (ug/l)*	*Other Semi-Volatile Organic Compounds (ug/l)*	*Total Petroleum Hydrocarbons (ug/l)*	*Regulated Metals (ug/l)*
B5-R	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.89 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2] - 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - 1.11 Barium - 59.9 Cadmium - ND (<1) Chromium - 2.63 Copper - 1.43 Lead - ND (<1) Manganese - 1,230 Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - 1.03 Selenium - 2.55 Zinc - ND (<1)

TABLE 2
Portac Inc.
June 30, 2010 Groundwater Sampling — **WES-1400**
Current Sample Analytical Results — **Page 5**

Monitoring Well ID	Pentachloro phenol (ug/l)	Other Semi-Volatile Organic Compounds (ug/l)	Total Petroleum Hydrocarbons (ug/l)	Regulated Metals (ug/l)
MTCA Groundwater Cleanup Criteria (ug/l)				
--	Method B - 0.73	**Method A** Naphthalene - 160 Benzo(a)pyrene - 0.1 TEC[2] of other cPAHs - 0.1 **Method B** Napthalene - 160 Acenaphthylene - -- Acenaphthene - 960 Fluorene 640 Phenanthrene - -- Anthracene - 4,800 Fluoranthene - 640 Pyrene - 480 Benz(a)anthracene* - –* Chrysene* - –* Benzo(a)pyrene* - 0.012* Benzo(b)fluoranthene* - –* Benzo(k)fluoranthene* - –* Indeno(1,2,3-cd)pyrene* - –* Dibenz(a,h)anthracene* - --* Benzo(g,h,l)perylene - – 1 Methylnaphthalene - -- 2 Methylnaphthalene - 32 * - carcinogenic PAH compounds used to calculate the Toxicity Equivalent Concentration (TEC)	**Method A** Gasoline - 1,000[1] Diesel - 500 Motor Oil - 500	**Method A** Arsenic - 5 Cadmium - 5 Chromium - 50 Lead - 15 Mercury - 2 **Method B** Arsenic - 4.8 Barium - 3,200 Cadmium - 8 Chromium III 24,000 Copper - 590 Lead - -- Manganese - 2,200 Mercury - 4.8 Molybdenum - 80 Nickel - 3,200 Selenium - 80 Zinc - 4,800

Table 2 Notes:
NA - Sample not analyzed for the listed parameter.
ND (<XXX) - Analyzed parameter not detected above the noted concentration.

Volatile organic compounds by EPA Method 8260C.

[1] - MTCA Method A groundwater cleanup criteria for gasoline range organics where no benzene has been detected in groundwater. Other criteria apply if benzene is present.

Total Petroleum Hydrocarbons in the gasoline range analyzed by method NWTPH-G.
Total Petroleum Hydrocarbons in the Diesel and Oil ranges analyzed by method NWTPH-D(extended), with silica gel cleanup to remove organic matter.

Regulated metals by EPA Method 200.8, except mercury, by EPA Method 1631E.

[2] - TEC - Toxic Equivalent Concentration - The summed concentration of seven carcinogenic PAH compounds, after applying a toxicity equivalency factor (TEF) to each compound, based on its relative toxicity compared to benzo-(a)-pyrene.

TABLE 3
Portac Inc.
Summary of Historical Groundwater Monitoring Data

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1	5-7-2008 (CDM)	<0.25	NA	NA	Diesel - ND (<630) Motor Oil- ND (<500)	NA
	7-9-2008 (CDM)	0.69	NA	NA	Diesel - ND (<250) Motor Oil- ND (<500)	NA
	9-23-2008 (CDM)	<0.5	NA	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	ND (64 different volatile compounds)	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 25.2*** Barium - 203 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 6,680*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1 (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 26.9*** Barium - 181 Cadmium - ND (<5) Chromium - 8.92 Copper - ND (<5) Lead - ND (<5) ***Manganese - 6,440*** Mercury - ND (<0.2) Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

TABLE 3
Portac Inc.
Summary of Historical Groundwater Monitoring Data

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1 (Continued)	6-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 22.2*** Barium - 192 Cadmium - ND (<1) Chromium - 4.55 Copper - 1.72 Lead - ND (<1) ***Manganese - 6,610*** Mercury - ND (<0.2) Molybdenum - 3.77 Nickel - 3.50 Selenium - 5.83 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-2R	5-19-2009	***69***	NA	Acetone - 98 Naphthalene - 2.5 ND (62 other volatile compounds)	***Diesel - 1,000*** ***Motor Oil - 4,900***	***Arsenic - 12.1*** Cadmium - ND (<1) Chromium - 12.6 Lead - 1.13 Mercury - ND (<0.2)
	12-4-2009	***61***	Analyzed PAH compounds: Napthalene - 0.48 Acenaphthylene - ND (<0.1) Acenaphthene - 0.72 Fluorene 0.45 Phenanthrene - 0.14 Anthracene - ND (<0.1) Fluoranthene - 0.26 Pyrene - 0.16 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 0.34 2 Methylnaphthalene - 0.24 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 118*** Barium - 33.3 Cadmium - ND (<1) Chromium - ND(<5) Copper - 63.7 Lead - ND (<5) Manganese - 71.7 Mercury - ND (<0.2) Molybdenum - 41.8 Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-2R (Continued)	3-17-2010	***66***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 1.9 Fluorene 0.58 Phenanthrene - 1.2 Anthracene - ND (<0.1) Fluoranthene - 0.32 Pyrene - 0.20 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 0.51 2 Methylnaphthalene - 0.11 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 16.6*** Barium - 67.3 Cadmium - ND (<1) Chromium - 4.5 Copper - 29.6 Lead - ND (<1) Manganese - 36.9 Mercury - ND (<0.2) Molybdenum - 17.5 Nickel - 3.88 Selenium - ND (<1) Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-2R (Continued)	6-30-2010	***37***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.21 Fluorene 0.12 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - 0.55 Pyrene - 0.36 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - 2.85 Barium - 194 Cadmium - ND (<1) Chromium - 7.13 Copper - 78.6 Lead - ND (<1) Manganese - 4.91 Mercury - ND (<0.2) Molybdenum - 12.3 Nickel - 14.1 Selenium - ND (<1) Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-3	9-23-2008 (CDM)	<0.5	NA	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	NA	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 10.1*** Barium - 102 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 2,350*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

TABLE 3
Portac Inc.
Summary of Historical Groundwater Monitoring Data

Monitoring Well ID	*Sample Date*	*Pentachloro phenol (ug/l)*	*Other Semi-Volatile Organic Compounds (ug/l)*	*Volatile Organic Compounds (ug/l)*	*Total Petroleum Hydrocarbons (ug/l)*	*Regulated Metals (ug/l)*
MW-3 (Continued)	3-17-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 11.3*** Barium - 78.2 Cadmium - ND (<5) Chromium - 6.27 Copper - ND (<5) Lead - ND (<5) Manganese - 2,000 Mercury - ND (<0.2) Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-3 (Continued)	6-30-2010	<0.5	Analyzed PAH compounds: Napthalene - 0.21 Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 13.7*** Barium - 77.4 Cadmium - ND (<1) Chromium - 3.95 Copper - 1.14 Lead - ND (<1) Manganese - 2,030 Mercury - ND (<0.2) Molybdenum - 1.13 Nickel - 2.59 Selenium - 3.52 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-4	9-23-2008 (CDM)	<0.5	NA	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	ND (64 different volatile compounds)	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 160 Motor Oil- ND (<250)	***Arsenic - 10.2*** Barium - 213 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 6,260*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-4 (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 12.5*** Barium - 161 Cadmium - ND (<5) Chromium - ND(<5) Copper - ND (<5) Lead - ND (<5) ***Manganese - 5,410*** Mercury - ND (<0.2) Molybdenum - ND (<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-4 (Continued)	6-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 13.1*** Barium - 122 Cadmium - ND (<1) Chromium - 2.06 Copper - 2.00 Lead - ND (<1) ***Manganese - 3,960*** Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - 2.14 Selenium - 5.81 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-5	3-5-2009	***22***	ND (64 additional semi-volatile compounds)	NA	NA	NA
	12-4-2009	***1.5***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<5) Barium - 41.7 Cadmium - ND (<1) Chromium - 27.0 Copper - 29.9 Lead - ND (<5) Manganese - 144 Mercury - 0.22 Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - 5.45

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-5 (Continued)	3-16-2010	***4.7***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - 1.29 Barium - 28.8 Cadmium - ND (<1) Chromium - 9.97 Copper - 7.51 Lead - ND (<1) Manganese - 126 Mercury - ND (<0.2) Molybdenum - 2.44 Nickel - 1.83 Selenium - ND (<1) Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-5 (Continued)	6-30-2010	***2.4***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	Arsenic - 1.35 Barium - 25.1 Cadmium - ND (<1) Chromium - 11.0 Copper - 8.23 Lead - ND (<1) Manganese - 92.2 Mercury - ND (<0.2) Molybdenum - 2.84 Nickel - 1.71 Selenium - ND (<1) Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-6R	5-19-2009	ND (<0.5)	NA	NA	NA	Arsenic - 3.43 Cadmium - ND (<1) Chromium - 5.79 Lead - 1.26 Mercury - ND (<0.2)
	12-4-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - 27 Acenaphthylene - ND (<0.1) Acenaphthene - 14 Fluorene 1.4 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 5.3 2 Methylnaphthalene - 2.5 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 400 Motor Oil- ND (<250)	Arsenic - ND (<5) Barium - 115 Cadmium - ND (<1) Chromium - 6.34 Copper - ND (<5) Lead - ND (<5) ***Manganese - 7,850*** Mercury - ND (<0.2) Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-6R (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - 11 Acenaphthylene - ND (<0.1) Acenaphthene - 9.5 Fluorene 0.73 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 3.6 2 Methylnaphthalene - 0.12 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 52 Motor Oil- ND (<250)	Arsenic - 3.41 Barium - 98.3 Cadmium - ND (<1) Chromium - 4.03 Copper - 1.26 Lead - ND (<1) ***Manganese - 6,400*** Mercury - ND (<0.2) Molybdenum - 2.66 Nickel - 1.38 Selenium - 1.14 Zinc - 1.08

TABLE 3
Portac Inc.
Summary of Historical Groundwater Monitoring Data

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-6R (Continued)	6-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - 8.2 Acenaphthylene - ND (<0.1) Acenaphthene - 8.4 Fluorene 0.59 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 3.0 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 50 Motor Oil - ND (<250)	Arsenic - 3.46 Barium - 109 Cadmium - ND (<1) Chromium - 3.23 Copper - 2.70 Lead - ND (<1) ***Manganese - 7,890*** Mercury - ND (<0.2) Molybdenum - 3.22 Nickel - 1.56 Selenium - 1.66 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
B-5R	5-19-2009	NA	NA	Isopropylbenzene - 1.1 ND (63 other volatile compounds)	Gasoline - <100 Diesel - 150 Motor Oil - <250	Arsenic - ND (<1) Cadmium - ND (<1) Chromium - 2.68 Lead - 1.53 Mercury - ND (<0.2)
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.81 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<1) Barium - 67.1 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) Manganese - 1,250 Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
B-5R (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.76 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<1) Barium - 54.4 Cadmium - ND (<1) Chromium - 2.47 Copper - ND (<1) Lead - ND (<1) Manganese - 1,130 Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - ND (<1) Selenium - 1.48 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
B5-R (Continued)	6-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.89 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - 1.11 Barium - 59.9 Cadmium - ND (<1) Chromium - 2.63 Copper - 1.43 Lead - ND (<1) Manganese - 1,230 Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - 1.03 Selenium - 2.55 Zinc - ND (<1)

TABLE 3
Portac Inc.
Summary of Historical Groundwater Monitoring Data

Monitoring Well ID	Sample Date	Pentachloro phenol (ug/l)	Other Semi-Volatile Organic Compounds (ug/l)	Volatile Organic Compounds (ug/l)	Total Petroleum Hydrocarbons (ug/l)	Regulated Metals (ug/l)
MTCA Groundwater Cleanup Criteria (ug/l)		Method B - 0.73	**Method A** Naphthalene - 160 Benzo(a)pyrene - 0.1 TEC[3] of other cPAHs - 0.1 **Method B** Napthalene - 160 Acenaphthylene - -- Acenaphthene - 960 Fluorene 640 Phenanthrene - -- Anthracene - 4,800 Fluoranthene - 640 Pyrene - 480 Benz(a)anthracene* - –* Chrysene* - –* Benzo(a)pyrene* - 0.012* Benzo(b)fluoranthene* - –* Benzo(k)fluoranthene* - –* Indeno(1,2,3-cd)pyrene* - –* Dibenz(a,h)anthracene* - --* Benzo(g,h,l)perylene - – 1 Methylnaphthalene - -- 2 Methylnaphthalene - 32 * - carcinogenic PAH compounds used to calculate the Toxicity Equivalent Concentration (TEC)	**Method A** Naphthalene - 160 **Method B** Acetone 800 Isopropylbenzene -- **Other Undetected Parameters Vary**	**Method A** Gasoline - 1,000[2] Diesel - 500 Motor Oil - 500	**Method A** Arsenic - 5 Cadmium - 5 Chromium - 50 Lead - 15 Mercury - 2 **Method B** Arsenic - 4.8 Barium - 3,200 Cadmium - 8 Chromium III - 24,000 Copper - 590 Lead - -- Manganese - 2,200 Mercury - 4.8 Molybdenum - 80 Nickel - 3,200 Selenium - 80 Zinc - 4,800

Table 3 Notes:
NA - Sample not analyzed for the listed parameter.
ND (<XXX) - Analyzed parameter not detected above the noted concentration.
[1] - Denotes the laboratory's Method Detection Limit (MDL) for pentachlorophenol by EPA Method 8270D. This method was used in March 2009 analyses to identify a wide list of semi-volatile aromatic compounds to demonstrate that no other semi-volatile compounds are present in groundwater. However, by this method the detection limit for pentachlorophenol is not low enough to compare to Method B regulatory criteria. Analyses for Pentachlorophenol since that time were conducted by EPA Method 8270SIM, with reporting limits suitable for comparison to MTCA Method B groundwater cleanup criteria.

Volatile organic compounds by EPA Method 8260C.

[2] - MTCA Method A groundwater cleanup criteria for gasoline range organics where no benzene has been detected in groundwater. Other criteria apply if benzene is present.

Total Petroleum Hydrocarbons in the gasoline range analyzed by method NWTPH-G.
Total Petroleum Hydrocarbons in the Diesel and Oil ranges analyzed by method NWTPH-D(extended), with silica gel cleanup to remove organic matter.

Regulated metals by EPA Method 200.8, except mercury, by EPA Method 1631E.

[3] - TEC - Toxic Equivalent Concentration - The summed concentration of seven carcinogenic PAH compounds, after applying a toxicity equivalency factor (TEF) to each compound, based on its relative toxicity compared to benzo-(a)-pyrene.

TABLE 2
Portac Inc.
August-September, 2010 Groundwater Sampling ***WES-1400***
Current Sample Analytical Results ***Page 1***

Monitoring Well ID	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2] - 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 18.7*** Barium - 187 Cadmium - ND (<1) Chromium - 4.53 Copper - ND (<1) Lead - ND (<1) ***Manganese - 7,260*** Mercury - ND (<0.2) Molybdenum - 1.31 Nickel - 2.87 Selenium - 4.93 Zinc - ND (<1)
MW-2R	***76***	Analyzed PAH compounds: Napthalene - 0.30 Acenaphthylene - ND (<0.1) Acenaphthene - 0.48 Fluorene 0.23 Phenanthrene - 0.20 Anthracene - ND (<0.1) Fluoranthene - 0.49 Pyrene - 0.30 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 0.20 2 Methylnaphthalene - ND (<0.1) Sample TEC[2] - 0.1 based on ½ detection limit of cPAHs	Diesel - 54 Motor Oil- ND (<250)	***Arsenic - 7.11*** Barium - 102 Cadmium - ND (<1) Chromium - 1.39 Copper - 52.9 Lead - 1.21 Manganese - 9.74 Mercury - ND (<0.2) Molybdenum - 33.9 Nickel - 21.3 Selenium - 1.13 Zinc - 2.06

TABLE 2
Portac Inc.
August-September, 2010 Groundwater Sampling ***WES-1400***
Current Sample Analytical Results

Monitoring Well ID	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-3	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,I)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 8.23*** Barium - 88.5 Cadmium - ND (<1) Chromium - 3.00 Copper - ND (<1) Lead - ND (<1) ***Manganese - 2,570*** Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - 1.78 Selenium - 3.74 Zinc - ND (<1)
MW-4	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,I)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 10.3*** Barium - 153 Cadmium - ND (<1) Chromium - 2.35 Copper - 1.98 Lead - 1.06 ***Manganese - 4,810*** Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - 2.03 Selenium - 6.97 Zinc - ND (<1)

TABLE 2
Portac Inc.
August-September, 2010 Groundwater Sampling ***WES-1400***
Current Sample Analytical Results ***Page 3***

Monitoring Well ID	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-5	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil - ND (<250)	Arsenic - 1.01 Barium - 28.1 Cadmium - ND (<1) Chromium - 16.5 Copper - 11.1 Lead - ND (<1) Manganese - 97.9 Mercury - ND (<0.2) Molybdenum - 3.02 Nickel - 1.59 Selenium - ND (<1) Zinc - ND (<1)
MW-6R	ND (<0.5)	Analyzed PAH compounds: Napthalene - 1.2 Acenaphthylene - ND (<0.1) Acenaphthene - 13 Fluorene 0.83 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 2.4 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil - ND (<250)	Arsenic - 2.84 Barium - 125 Cadmium - ND (<1) Chromium - 4.46 Copper - 19.0 Lead - ND (<1) ***Manganese - 8,760*** Mercury - ND (<0.2) Molybdenum - 2.83 Nickel - 1.37 Selenium - 1.45 Zinc - ND (<1)

TABLE 2
Portac Inc.
August-September, 2010 Groundwater Sampling ***WES-1400***
Current Sample Analytical Results

Monitoring Well ID	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
B5-R	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 1.1 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2] - 0.1 based on ½ detection limit of cPAHs	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<1) Barium - 58.8 Cadmium - ND (<1) Chromium - 3.17 Copper - ND (<1) Lead - ND (<1) Manganese - 1,340 Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - ND (<1) Selenium - 2.57 Zinc - ND (<1)

Monitoring Well ID	Pentachlorophenol (ug/l)	Other Semi-Volatile Organic Compounds (ug/l)	Total Petroleum Hydrocarbons (ug/l)	Regulated Metals (ug/l)
MTCA Groundwater Cleanup Criteria (ug/l)				
--	Method B - 0.73	**Method A** Naphthalene - 160 Benzo(a)pyrene - 0.1 TEC[2] of other cPAHs - 0.1 **Method B** Napthalene - 160 Acenaphthylene - -- Acenaphthene - 960 Fluorene 640 Phenanthrene - -- Anthracene - 4,800 Fluoranthene - 640 Pyrene - 480 Benz(a)anthracene* - –* Chrysene* - –* Benzo(a)pyrene* - 0.012* Benzo(b)fluoranthene* - –* Benzo(k)fluoranthene* - –* Indeno(1,2,3-cd)pyrene* - –* Dibenz(a,h)anthracene* - --* Benzo(g,h,l)perylene - – 1 Methylnaphthalene - -- 2 Methylnaphthalene - 32 * - carcinogenic PAH compounds used to calculate the Toxicity Equivalent Concentration (TEC)	**Method A** Gasoline - 1,000[1] Diesel - 500 Motor Oil - 500	**Method A** Arsenic - 5 Cadmium - 5 Chromium - 50 Lead - 15 Mercury - 2 **Method B** Arsenic - 4.8 Barium - 3,200 Cadmium - 8 Chromium III 24,000 Copper - 590 Lead - -- Manganese - 2,200 Mercury - 4.8 Molybdenum - 80 Nickel - 3,200 Selenium - 80 Zinc - 4,800

Table 2 Notes:
NA - Sample not analyzed for the listed parameter.
ND (<XXX) - Analyzed parameter not detected above the noted concentration.

[1] - MTCA Method A groundwater cleanup criteria for gasoline range organics where no benzene has been detected in groundwater. Other criteria apply if benzene is present.

Total Petroleum Hydrocarbons in the Diesel and Oil ranges analyzed by method NWTPH-D(extended), with silica gel cleanup to remove organic matter.

Regulated metals by EPA Method 200.8, except mercury, by EPA Method 1631E.

[2] - TEC - Toxic Equivalent Concentration - The summed concentration of seven carcinogenic PAH compounds, after applying a toxicity equivalency factor (TEF) to each compound, based on its relative toxicity compared to benzo-(a)-pyrene.

TABLE 3
Portac Inc. ***WES-1400***
Summary of Historical Groundwater Monitoring Data ***Page 1***

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1	5-7-2008 (CDM)	<0.25	NA	NA	Diesel - ND (<630) Motor Oil- ND (<500)	NA
	7-9-2008 (CDM)	0.69	NA	NA	Diesel - ND (<250) Motor Oil- ND (<500)	NA
	9-23-2008 (CDM)	<0.5	NA	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	ND (64 different volatile compounds)	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 25.2*** Barium - 203 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 6,680*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

TABLE 3
Portac Inc.
Summary of Historical Groundwater Monitoring Data

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1 (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 26.9*** Barium - 181 Cadmium - ND (<5) Chromium - 8.92 Copper - ND (<5) Lead - ND (<5) ***Manganese - 6,440*** Mercury - ND (<0.2) Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

Monitoring Well ID	*Sample Date*	*Pentachloro phenol (ug/l)*	*Other Semi-Volatile Organic Compounds (ug/l)*	*Volatile Organic Compounds (ug/l)*	*Total Petroleum Hydrocarbons (ug/l)*	*Regulated Metals (ug/l)*
MW-1 (Continued)	6-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 22.2*** Barium - 192 Cadmium - ND (<1) Chromium - 4.55 Copper - 1.72 Lead - ND (<1) ***Manganese - 6,610*** Mercury - ND (<0.2) Molybdenum - 3.77 Nickel - 3.50 Selenium - 5.83 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-1 (Continued)	8-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 18.7*** Barium - 187 Cadmium - ND (<1) Chromium - 4.53 Copper - ND (<1) Lead - ND (<1) ***Manganese - 7,260*** Mercury - ND (<0.2) Molybdenum - 1.31 Nickel - 2.87 Selenium - 4.93 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-2R	5-19-2009	***69***	NA	Acetone - 98 Naphthalene - 2.5 ND (62 other volatile compounds)	***Diesel - 1,000*** ***Motor Oil - 4,900***	***Arsenic - 12.1*** Cadmium - ND (<1) Chromium - 12.6 Lead - 1.13 Mercury - ND (<0.2)
	12-4-2009	***61***	Analyzed PAH compounds: Napthalene - 0.48 Acenaphthylene - ND (<0.1) Acenaphthene - 0.72 Fluorene 0.45 Phenanthrene - 0.14 Anthracene - ND (<0.1) Fluoranthene - 0.26 Pyrene - 0.16 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 0.34 2 Methylnaphthalene - 0.24 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 118*** Barium - 33.3 Cadmium - ND (<1) Chromium - ND(<5) Copper - 63.7 Lead - ND (<5) Manganese - 71.7 Mercury - ND (<0.2) Molybdenum - 41.8 Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

TABLE 3
Portac Inc.
Summary of Historical Groundwater Monitoring Data

Monitoring Well ID	Sample Date	Pentachloro phenol (ug/l)	Other Semi-Volatile Organic Compounds (ug/l)	Volatile Organic Compounds (ug/l)	Total Petroleum Hydrocarbons (ug/l)	Regulated Metals (ug/l)
MW-2R (Continued)	3-17-2010	***66***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 1.9 Fluorene 0.58 Phenanthrene - 1.2 Anthracene - ND (<0.1) Fluoranthene - 0.32 Pyrene - 0.20 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 0.51 2 Methylnaphthalene - 0.11 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 16.6*** Barium - 67.3 Cadmium - ND (<1) Chromium - 4.5 Copper - 29.6 Lead - ND (<1) Manganese - 36.9 Mercury - ND (<0.2) Molybdenum - 17.5 Nickel - 3.88 Selenium - ND (<1) Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-2R (Continued)	6-30-2010	***37***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.21 Fluorene 0.12 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - 0.55 Pyrene - 0.36 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - 2.85 Barium - 194 Cadmium - ND (<1) Chromium - 7.13 Copper - 78.6 Lead - ND (<1) Manganese - 4.91 Mercury - ND (<0.2) Molybdenum - 12.3 Nickel - 14.1 Selenium - ND (<1) Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-2R (Continued)	8-30-2010	***76***	Analyzed PAH compounds: Napthalene - 0.30 Acenaphthylene - ND (<0.1) Acenaphthene - 0.48 Fluorene 0.23 Phenanthrene - 0.20 Anthracene - ND (<0.1) Fluoranthene - 0.49 Pyrene - 0.30 Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 0.20 2 Methylnaphthalene - ND (<0.1) Sample TEC[2] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 54 Motor Oil- ND (<250)	***Arsenic - 7.11*** Barium - 102 Cadmium - ND (<1) Chromium - 1.39 Copper - 52.9 Lead - 1.21 Manganese - 9.74 Mercury - ND (<0.2) Molybdenum - 33.9 Nickel - 21.3 Selenium - 1.13 Zinc - 2.06

TABLE 3
Portac Inc.
Summary of Historical Groundwater Monitoring Data

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-3	9-23-2008 (CDM)	<0.5	NA	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	NA	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 10.1*** Barium - 102 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 2,350*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-3 (Continued)	3-17-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 11.3*** Barium - 78.2 Cadmium - ND (<5) Chromium - 6.27 Copper - ND (<5) Lead - ND (<5) Manganese - 2,000 Mercury - ND (<0.2) Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-3 (Continued)	6-30-2010	<0.5	Analyzed PAH compounds: Napthalene - 0.21 Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 13.7*** Barium - 77.4 Cadmium - ND (<1) Chromium - 3.95 Copper - 1.14 Lead - ND (<1) Manganese - 2,030 Mercury - ND (<0.2) Molybdenum - 1.13 Nickel - 2.59 Selenium - 3.52 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-3 (Continued)	8-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 8.23*** Barium - 88.5 Cadmium - ND (<1) Chromium - 3.00 Copper - ND (<1) Lead - ND (<1) ***Manganese - 2,570*** Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - 1.78 Selenium - 3.74 Zinc - ND (<1)

Monitoring Well ID	Sample Date	Pentachlorophenol (ug/l)	Other Semi-Volatile Organic Compounds (ug/l)	Volatile Organic Compounds (ug/l)	Total Petroleum Hydrocarbons (ug/l)	Regulated Metals (ug/l)
MW-4	9-23-2008 (CDM)	<0.5	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<200) Motor Oil- ND (<500)	NA
	3-5-2009	ND (<3.4)[1]	ND (64 additional semi-volatile compounds)	ND (64 different volatile compounds)	NA	NA
	4-7-2009	ND (<0.5)	NA	NA	NA	NA

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-4 (Continued)	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 160 Motor Oil- ND (<250)	***Arsenic - 10.2*** Barium - 213 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) ***Manganese - 6,260*** Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-4 (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	***Arsenic - 12.5*** Barium - 161 Cadmium - ND (<5) Chromium - ND(<5) Copper - ND (<5) Lead - ND (<5) ***Manganese - 5,410*** Mercury - ND (<0.2) Molybdenum - ND (<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-4 (Continued)	6-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 13.1*** Barium - 122 Cadmium - ND (<1) Chromium - 2.06 Copper - 2.00 Lead - ND (<1) ***Manganese - 3,960*** Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - 2.14 Selenium - 5.81 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachlorophenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-4 (Continued)	8-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	***Arsenic - 10.3*** Barium - 153 Cadmium - ND (<1) Chromium - 2.35 Copper - 1.98 Lead - 1.06 ***Manganese - 4,810*** Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - 2.03 Selenium - 6.97 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-5	3-5-2009	***22***	ND (64 additional semi-volatile compounds)	NA	NA	NA
	12-4-2009	***1.5***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<5) Barium - 41.7 Cadmium - ND (<1) Chromium - 27.0 Copper - 29.9 Lead - ND (<5) Manganese - 144 Mercury - 0.22 Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - 5.45

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-5 (Continued)	3-16-2010	***4.7***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - 1.29 Barium - 28.8 Cadmium - ND (<1) Chromium - 9.97 Copper - 7.51 Lead - ND (<1) Manganese - 126 Mercury - ND (<0.2) Molybdenum - 2.44 Nickel - 1.83 Selenium - ND (<1) Zinc - ND (<1)

Monitoring Well ID	**Sample Date**	**Pentachloro phenol (ug/l)**	**Other Semi-Volatile Organic Compounds (ug/l)**	**Volatile Organic Compounds (ug/l)**	**Total Petroleum Hydrocarbons (ug/l)**	**Regulated Metals (ug/l)**
MW-5 (Continued)	6-30-2010	***2.4***	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	Arsenic - 1.35 Barium - 25.1 Cadmium - ND (<1) Chromium - 11.0 Copper - 8.23 Lead - ND (<1) Manganese - 92.2 Mercury - ND (<0.2) Molybdenum - 2.84 Nickel - 1.71 Selenium - ND (<1) Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-5 (Continued)	8-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - ND (<0.1) Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	Arsenic - 1.01 Barium - 28.1 Cadmium - ND (<1) Chromium - 16.5 Copper - 11.1 Lead - ND (<1) Manganese - 97.9 Mercury - ND (<0.2) Molybdenum - 3.02 Nickel - 1.59 Selenium - ND (<1) Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
MW-6R	5-19-2009	ND (<0.5)	NA	NA	NA	Arsenic - 3.43 Cadmium - ND (<1) Chromium - 5.79 Lead - 1.26 Mercury - ND (<0.2)
	12-4-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - 27 Acenaphthylene - ND (<0.1) Acenaphthene - 14 Fluorene 1.4 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 5.3 2 Methylnaphthalene - 2.5 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 400 Motor Oil- ND (<250)	Arsenic - ND (<5) Barium - 115 Cadmium - ND (<1) Chromium - 6.34 Copper - ND (<5) Lead - ND (<5) ***Manganese - 7,850*** Mercury - ND (<0.2) Molybdenum - ND(<5) Nickel - ND (<5) Selenium - ND (<5) Zinc - ND (<5)

TABLE 3
Portac Inc.
Summary of Historical Groundwater Monitoring Data

Monitoring Well ID	*Sample Date*	*Pentachlorophenol (ug/l)*	*Other Semi-Volatile Organic Compounds (ug/l)*	*Volatile Organic Compounds (ug/l)*	*Total Petroleum Hydrocarbons (ug/l)*	*Regulated Metals (ug/l)*
MW-6R (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - 11 Acenaphthylene - ND (<0.1) Acenaphthene - 9.5 Fluorene 0.73 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 3.6 2 Methylnaphthalene - 0.12 Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 52 Motor Oil- ND (<250)	Arsenic - 3.41 Barium - 98.3 Cadmium - ND (<1) Chromium - 4.03 Copper - 1.26 Lead - ND (<1) ***Manganese - 6,400*** Mercury - ND (<0.2) Molybdenum - 2.66 Nickel - 1.38 Selenium - 1.14 Zinc - 1.08

Monitoring Well ID	Sample Date	Pentachloro phenol (ug/l)	Other Semi-Volatile Organic Compounds (ug/l)	Volatile Organic Compounds (ug/l)	Total Petroleum Hydrocarbons (ug/l)	Regulated Metals (ug/l)
MW-6R (Continued)	6-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - 8.2 Acenaphthylene - ND (<0.1) Acenaphthene - 8.4 Fluorene 0.59 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 3.0 2 Methylnaphthalene - ND (<0.1) Sample TEC[3]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - 50 Motor Oil - ND (<250)	Arsenic - 3.46 Barium - 109 Cadmium - ND (<1) Chromium - 3.23 Copper - 2.70 Lead - ND (<1) ***Manganese - 7,890*** Mercury - ND (<0.2) Molybdenum - 3.22 Nickel - 1.56 Selenium - 1.66 Zinc - ND (<1)

Monitoring Well ID	*Sample Date*	*Pentachloro phenol (ug/l)*	*Other Semi-Volatile Organic Compounds (ug/l)*	*Volatile Organic Compounds (ug/l)*	*Total Petroleum Hydrocarbons (ug/l)*	*Regulated Metals (ug/l)*
MW-6R (Continued)	10-5-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - 1.2 Acenaphthylene - ND (<0.1) Acenaphthene - 13 Fluorene 0.83 Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - 2.4 2 Methylnaphthalene - ND (<0.1) Sample TEC[2]- 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil - ND (<250)	Arsenic - 2.84 Barium - 125 Cadmium - ND (<1) Chromium - 4.46 Copper - 19.0 Lead - ND (<1) ***Manganese - 8,760*** Mercury - ND (<0.2) Molybdenum - 2.83 Nickel - 1.37 Selenium - 1.45 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
B-5R	5-19-2009	NA	NA	Isopropylbenzene - 1.1 ND (63 other volatile compounds)	Gasoline - <100 Diesel - 150 Motor Oil - <250	Arsenic - ND (<1) Cadmium - ND (<1) Chromium - 2.68 Lead - 1.53 Mercury - ND (<0.2)
	12-3-2009	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.81 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<1) Barium - 67.1 Cadmium - ND (<1) Chromium - ND(<10) Copper - ND (<10) Lead - ND (<10) Manganese - 1,250 Mercury - ND (<0.2) Molybdenum - ND(<10) Nickel - ND (<10) Selenium - ND (<10) Zinc - ND (<10)

TABLE 3
Portac Inc.
Summary of Historical Groundwater Monitoring Data

Monitoring Well ID	Sample Date	Pentachloro phenol (ug/l)	Other Semi-Volatile Organic Compounds (ug/l)	Volatile Organic Compounds (ug/l)	Total Petroleum Hydrocarbons (ug/l)	Regulated Metals (ug/l)
B-5R (Continued)	3-16-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.76 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<1) Barium - 54.4 Cadmium - ND (<1) Chromium - 2.47 Copper - ND (<1) Lead - ND (<1) Manganese - 1,130 Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - ND (<1) Selenium - 1.48 Zinc - ND (<1)

Monitoring Well ID	***Sample Date***	***Pentachloro phenol (ug/l)***	***Other Semi-Volatile Organic Compounds (ug/l)***	***Volatile Organic Compounds (ug/l)***	***Total Petroleum Hydrocarbons (ug/l)***	***Regulated Metals (ug/l)***
B5-R (Continued)	6-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 0.89 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[3] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - 1.11 Barium - 59.9 Cadmium - ND (<1) Chromium - 2.63 Copper - 1.43 Lead - ND (<1) Manganese - 1,230 Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - 1.03 Selenium - 2.55 Zinc - ND (<1)

Monitoring Well ID	*Sample Date*	*Pentachlorophenol (ug/l)*	*Other Semi-Volatile Organic Compounds (ug/l)*	*Volatile Organic Compounds (ug/l)*	*Total Petroleum Hydrocarbons (ug/l)*	*Regulated Metals (ug/l)*
B-5R (Continued)	8-30-2010	ND (<0.5)	Analyzed PAH compounds: Napthalene - ND (<0.1) Acenaphthylene - ND (<0.1) Acenaphthene - 1.1 Fluorene ND (<0.1) Phenanthrene - ND (<0.1) Anthracene - ND (<0.1) Fluoranthene - ND (<0.1) Pyrene - ND (<0.1) Benz(a)anthracene - ND (<0.1) Chrysene - ND (<0.1) Benzo(a)pyrene - ND (<0.1) Benzo(b)fluoranthene - ND (<0.1) Benzo(k)fluoranthene - ND (<0.1) Indeno(1,2,3-cd)pyrene - ND (<0.1) Dibenz(a,h)anthracene - ND (<0.1) Benzo(g,h,l)perylene - ND (<0.1) 1 Methylnaphthalene - ND (<0.1) 2 Methylnaphthalene - ND (<0.1) Sample TEC[2] - 0.1 based on ½ detection limit of cPAHs	NA	Diesel - ND (<50) Motor Oil- ND (<250)	Arsenic - ND (<1) Barium - 58.8 Cadmium - ND (<1) Chromium - 3.17 Copper - ND (<1) Lead - ND (<1) Manganese - 1,340 Mercury - ND (<0.2) Molybdenum - ND(<1) Nickel - ND (<1) Selenium - 2.57 Zinc - ND (<1)

Monitoring Well ID	Sample Date	Pentachloro phenol (ug/l)	Other Semi-Volatile Organic Compounds (ug/l)	Volatile Organic Compounds (ug/l)	Total Petroleum Hydrocarbons (ug/l)	Regulated Metals (ug/l)

| MTCA Groundwater Cleanup Criteria (ug/l) | Method B - 0.73 | **Method A**
Naphthalene - 160
Benzo(a)pyrene - 0.1
TEC[3] of other cPAHs - 0.1

Method B
Napthalene - 160
Acenaphthylene - --
Acenaphthene - 960
Fluorene 640
Phenanthrene - --
Anthracene - 4,800
Fluoranthene - 640
Pyrene - 480
Benz(a)anthracene* - –*
Chrysene* - –*
Benzo(a)pyrene* - 0.012*
Benzo(b)fluoranthene* - –*
Benzo(k)fluoranthene* - –*
Indeno(1,2,3-cd)pyrene* - –*
Dibenz(a,h)anthracene* - --*
Benzo(g,h,l)perylene - –
1 Methylnaphthalene - --
2 Methylnaphthalene - 32

* - carcinogenic PAH compounds used to calculate the Toxicity Equivalent Concentration (TEC) | **Method A**
Naphthalene - 160

Method B
Acetone 800
Isopropylbenzene --

Other Undetected Parameters Vary | **Method A**
Gasoline - 1,000[2]
Diesel - 500
Motor Oil - 500 | **Method A**
Arsenic - 5
Cadmium - 5
Chromium - 50
Lead - 15
Mercury - 2

Method B
Arsenic - 4.8
Barium - 3,200
Cadmium - 8
Chromium III - 24,000
Copper - 590
Lead - --
Manganese - 2,200
Mercury - 4.8
Molybdenum - 80
Nickel - 3,200
Selenium - 80
Zinc - 4,800 |

Table 3 Notes:
NA - Sample not analyzed for the listed parameter.
ND (<XXX) - Analyzed parameter not detected above the noted concentration.
[1] - Denotes the laboratory's Method Detection Limit (MDL) for pentachlorophenol by EPA Method 8270D. This method was used in March 2009 analyses to identify a wide list of semi-volatile aromatic compounds to demonstrate that no other semi-volatile compounds are present in groundwater. However, by this method the detection limit for pentachlorophenol is not low enough to compare to Method B regulatory criteria. Analyses for Pentachlorophenol since that time were conducted by EPA Method 8270SIM, with reporting limits suitable for comparison to MTCA Method B groundwater cleanup criteria.

Volatile organic compounds by EPA Method 8260C.

[2] - MTCA Method A groundwater cleanup criteria for gasoline range organics where no benzene has been detected in groundwater. Other criteria apply if benzene is present.

Total Petroleum Hydrocarbons in the gasoline range analyzed by method NWTPH-G.
Total Petroleum Hydrocarbons in the Diesel and Oil ranges analyzed by method NWTPH-D(extended), with silica gel cleanup to remove organic matter.

Regulated metals by EPA Method 200.8, except mercury, by EPA Method 1631E.

[3] - TEC - Toxic Equivalent Concentration - The summed concentration of seven carcinogenic PAH compounds, after applying a toxicity equivalency factor (TEF) to each compound, based on its relative toxicity compared to benzo-(a)-pyrene.

TABLE 2
Portac Inc.
January 31, 2013 Groundwater Sampling ***WES-1400***
Current Sample Analytical Results

Monitoring Well I.D.	***Pentachlorophenol (ug/l)***	***Total Arsenic (ug/l)***
MW-1	ND (<0.5)	***18.0***
MW-2R	***15***	1.60
MW-3	ND (<0.5)	***12.0***
MW-4	ND (<0.5)	***10.0***
MW-5	1.3	ND (<1)
MW-6R	ND (<0.5)	2.52
B5-R	ND (<0.5)	ND (<1)
MTCA Groundwater Cleanup Criteria (ug/l)	***Site Specific Method B - 8.2***	***Method A - 5***

Table 2 Notes:
ND (<XXX) - Analyzed parameter not detected above the noted concentration.
Pentachlorophenol by EPA Method 8270D SIM
Total arsenic by EPA Method 200.8.

Washington State MTCA Method B site specific cleanup criteria for pentachlorophenol based on a surface water ARAR National Toxics Rule, 40 CFR 131, based on marine chronic values for protection of human health.

Monitoring Well - MW-1											
Analyzed Parameter	***Model Toxics Control Act Groundwater Cleanup Criteria[1]***	***Sample Date***					***VCP Compliance Samples***				
		5-7-2008 (CDM)	***7-9-2008 (CDM)***	***9-23-2008 (CDM)***	***3-5-2009***	***4-7-2009***	***12-3-2009***	***3-16-2010***	***6-30-2010***	***8-30-2010***	***1-31-2013***
Pentachlorophenol (ug/l)	Site Method B - 8.2	ND (<0.25)	0.69	ND (<0.5)	ND (<3.4)[1]	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)
Other Semi-Volatile Organic Compounds											
Napthalene (ug/l)	Method A - 160	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Acenaphthylene (ug/l)	--	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Acenaphthene (ug/l)	Method B - 960	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Fluorene (ug/l)	Method B - 640	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Phenanthrene (ug/l)	--	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Anthracene (ug/l)	Method B - 4,800	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Fluoranthene (ug/l)	Method B - 640	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Pyrene (ug/l)	Method B - 480	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benz(a)anthracene (ug/l)	–* TEC	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Chrysene (ug/l)	–* TEC	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(a)pyrene (ug/l)	Method A - 0.1 Method B - 0.012*	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(b)fluoranthene (ug/l)	–* TEC	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(k)fluoranthene (ug/l)	–* TEC	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Indeno(1,2,3-cd)pyrene (ug/l)	–* TEC	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Dibenz(a,h)anthracene (ug/l)	–* TEC	–	–	–	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(g,h,l)perylene (ug/l)	--	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
1 Methylnaphthalene (ug/l)	--	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
2 Methylnaphthalene (ug/l)	Method B - 32	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Calculated TEC[2] (ug/l)	Method A - 0.1[2]	--	--	--	--	--	0.1[2]	0.1[2]	0.1[2]	0.1[2]	--
Total Petroleum Hydrocarbons											
Gasoline Range (ug/l)	Method A - 1,000[3]	--	--	--	--	--	--	--	--	--	--
Diesel Range (ug/l)	Method A - 500	ND (<630)	ND (<250)	ND (<200)	--	--	ND (<50)	ND (<50)	ND (<50)	ND (<50)	--
Motor Oil Range (ug/l)	Method A - 500	ND (<630)	ND (<500)	ND (<500)	--	--	ND (<250)	ND (<250)	ND (<250)	ND (<250)	--
Regulated Metals											
Arsenic (ug/l)	Method A - 5 Method B - 8	--	--	--	--	--	***25.2***	***26.9***	***22.2***	***18.7***	***18.0***
Barium (ug/l)	Method B - 3,200	--	--	--	--	--	203	181	192	187	--
Cadmium (ug/l)	Method A - 5 Method B - 8	--	--	--	--	--	ND (<1)	ND (<1)	ND (<1)	ND (<1)	--
Chromium (ug/l)	Method A - 50	--	--	--	--	--	ND (<10)	8.92	4.55	4.53	--
Copper (ug/l)	Method B - 590	--	--	--	--	--	ND (<10)	ND (<5)	1.72	ND (<1)	--
Lead (ug/l)	Method A - 15	--	--	--	--	--	ND (<10)	ND (<5)	ND (<1)	ND (<1)	--
Manganese (ug/l)	Method B - 2,200	--	--	--	--	--	***6,680***	***6,440***	***6,610***	***7,260***	--
Mercury (ug/l)	Method A - 2 Method B - 4.8	--	--	--	--	--	ND (<0.2)	ND (<0.2)	ND (<0.2)	ND (<0.2)	--
Molybdenum (ug/l)	Method B - 80	--	--	--	--	--	ND (<10)	ND (<5)	3.77	1.31	--
Nickel (ug/l)	Method B - 3,200	--	--	--	--	--	ND (<10)	ND (<5)	3.50	2.87	--
Selenium (ug/l)	Method B - 80	--	--	--	--	--	ND (<10)	ND (<5)	5.83	4.93	--
Zinc (ug/l)	Method B - 4,800	--	--	--	--	--	ND (<10)	ND (<5)	ND (<1)	ND (<1)	--

Table 3 - Summary of Groundwater Monitoring Data (Continued)
Portac, Inc.

Monitoring Well - MW-2R											
	Model Toxics Control Act Groundwater Cleanup Criteria[1]	***Note: MW-2R installed 4/22/2009 as a replacement for MW-2 which was destroyed during cleanup excavations.***					***VCP Compliance Samples***				
Analyzed Parameter		***--***	***--***	***--***	***--***	***5-19-2009***	***12-4-2009***	***3-17-2010***	***6-30-2010***	***8-30-2010***	***1-31-2013***
Pentachlorophenol (ug/l)	Site Method B - 8.2	--	--	--	--	***69***	***61***	***66***	***37***	***76***	***15***
Other Semi-Volatile Organic Compounds											
Napthalene (ug/l)	Method A - 160	--	--	--	--	2.5[3]	0.48	ND (<0.1)	ND (<0.1)	0.30	--
Acenaphthylene (ug/l)	--	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Acenaphthene (ug/l)	Method B - 960	--	--	--	--	--	0.72	1.9	0.21	0.48	--
Fluorene (ug/l)	Method B - 640	--	--	--	--	--	0.45	0.58	0.12	0.23	--
Phenanthrene (ug/l)	--	--	--	--	--	--	0.14	1.2	ND (<0.1)	0.20	--
Anthracene (ug/l)	Method B - 4,800	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Fluoranthene (ug/l)	Method B - 640	--	--	--	--	--	0.26	0.32	0.55	0.49	--
Pyrene (ug/l)	Method B - 480	--	--	--	--	--	0.16	0.20	0.36	0.30	--
Benz(a)anthracene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Chrysene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(a)pyrene (ug/l)	Method A - 0.1 Method B - 0.012*	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(b)fluoranthene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(k)fluoranthene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Indeno(1,2,3-cd)pyrene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Dibenz(a,h)anthracene (ug/l)	–* TEC	–	–	–	–	–	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(g,h,l)perylene (ug/l)	–	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
1 Methylnaphthalene (ug/l)	--	--	--	--	--	--	0.34	0.51	ND (<0.1)	0.20	--
2 Methylnaphthalene (ug/l)	Method B - 32	--	--	--	--	--	0.24	0.11	ND (<0.1)	ND (<0.1)	--
Calculated TEC[2] (ug/l)	Method A - 0.1[2]	--	--	--	--	--	0.1[2]	0.1[2]	0.1[2]	0.1[2]	--
Total Petroleum Hydrocarbons											
Gasoline Range (ug/l)	Method A - 1,000[3]	--	--	--	--	--	--	--	--	--	--
Diesel Range (ug/l)	Method A - 500	--	--	--	--	1,000	ND (<50)	ND (<50)	ND (<50)	54	--
Motor Oil Range (ug/l)	Method A - 500	--	--	--	--	***4,900***	ND (<250)	ND (<250)	ND (<250)	ND (<250)	--
Regulated Metals											
Arsenic (ug/l)	Method A - 5 Method B - 8	--	--	--	--	***12.1***	***118***	***16.6***	2.85	***7.11***	1.6
Barium (ug/l)	Method B - 3,200	--	--	--	--	--	33.3	67.3	194	102	--
Cadmium (ug/l)	Method A - 5 Method B - 8	--	--	--	--	ND (<1)	ND (<1)	ND (<1)	ND (<1)	ND (<1)	--
Chromium (ug/l)	Method A - 50	--	--	--	--	12.6	ND (<5)	4.5	7.13	1.39	--
Copper (ug/l)	Method B - 590	--	--	--	--	--	63.7	29.6	78.6	52.9	--
Lead (ug/l)	Method A - 15	--	--	--	--	1.13	ND (<5)	ND (<1)	ND (<1)	1.21	--
Manganese (ug/l)	Method B - 2,200	--	--	--	--	--	71.7	36.9	4.91	9.74	--
Mercury (ug/l)	Method A - 2 Method B - 4.8	--	--	--	--	ND (<0.2)	ND (<0.2)	ND (<0.2)	ND (<0.2)	ND (<0.2)	--
Molybdenum (ug/l)	Method B - 80	--	--	--	--	--	41.8	17.5	12.3	33.9	--
Nickel (ug/l)	Method B - 3,200	--	--	--	--	--	ND (<5)	3.88	14.1	21.3	--
Selenium (ug/l)	Method B - 80	--	--	--	--	--	ND (<5)	ND (<1)	ND (<1)	1.13	--
Zinc (ug/l)	Method B - 4,800	--	--	--	--	--	ND (<5)	ND (<1)	ND (<1)	2.06	--

Monitoring Well - MW-3											
Analyzed Parameter	*Model Toxics Control Act Groundwater Cleanup Criteria[1]*	*Sample Date*					*VCP Compliance Samples*				
		--	*--*	*9-23-2008 (CDM)*	*3-5-2009*	*4-7-2009*	*12-3-2009*	*3-17-2010*	*6-30-2010*	*8-30-2010*	*1-31-2013*
Pentachlorophenol (ug/l)	Site Method B - 8.2	--	--	ND (<0.5)	ND (<3.4)[1]	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)
Other Semi-Volatile Organic Compounds											
Napthalene (ug/l)	Method A - 160	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	0.21	ND (<0.1)	--
Acenaphthylene (ug/l)	--	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Acenaphthene (ug/l)	Method B - 960	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Fluorene (ug/l)	Method B - 640	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Phenanthrene (ug/l)	--	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Anthracene (ug/l)	Method B - 4,800	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Fluoranthene (ug/l)	Method B - 640	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Pyrene (ug/l)	Method B - 480	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benz(a)anthracene (ug/l)	–* TEC	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Chrysene (ug/l)	–* TEC	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(a)pyrene (ug/l)	Method A - 0.1 Method B - 0.012*	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(b)fluoranthene (ug/l)	–* TEC	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(k)fluoranthene (ug/l)	–* TEC	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Indeno(1,2,3-cd)pyrene (ug/l)	–* TEC	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Dibenz(a,h)anthracene (ug/l)	–* TEC	–	–	–	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(g,h,l)perylene (ug/l)	–* TEC	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
1 Methylnaphthalene (ug/l)	--	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
2 Methylnaphthalene (ug/l)	Method B - 32	--	--	--	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Calculated TEC[2] (ug/l)	Method A - 0.1[2]	--	--	--	--	--	0.1[2]	0.1[2]	0.1[2]	0.1[2]	--
Total Petroleum Hydrocarbons											
Gasoline Range (ug/l)	Method A - 1,000[3]	--	--	--	--	--	--	--	--	--	--
Diesel Range (ug/l)	Method A - 500	--	--	ND (<250)	--	--	ND (<50)	ND (<50)	ND (<50)	ND (<50)	--
Motor Oil Range (ug/l)	Method A - 500	--	--	ND (<500)	--	--	ND (<250)	ND (<250)	ND (<250)	ND (<250)	--
Regulated Metals											
Arsenic (ug/l)	Method A - 5 Method B - 8	--	--	--	--	--	***10.1***	***11.3***	***13.7***	***8.23***	***12.0***
Barium (ug/l)	Method B - 3,200	--	--	--	--	--	102	78.2	77.4	88.5	--
Cadmium (ug/l)	Method A - 5 Method B - 8	--	--	--	--	--	ND (<1)	ND (<5)	ND (<1)	ND (<1)	--
Chromium (ug/l)	Method A - 50	--	--	--	--	--	ND (<10)	6.27	3.95	3.00	--
Copper (ug/l)	Method B - 590	--	--	--	--	--	ND (<10)	ND (<5)	1.14	ND (<1)	--
Lead (ug/l)	Method A - 15	--	--	--	--	--	ND (<10)	ND (<5)	ND (<1)	ND (<1)	--
Manganese (ug/l)	Method B - 2,200	--	--	--	--	--	***2,350***	2,000	2,030	***2,570***	--
Mercury (ug/l)	Method A - 2 Method B - 4.8	--	--	--	--	--	ND (<0.2)	ND (<0.2)	ND (<0.2)	ND (<0.2)	--
Molybdenum (ug/l)	Method B - 80	--	--	--	--	--	ND (<10)	ND (<5)	1.13	ND (<1)	--
Nickel (ug/l)	Method B - 3,200	--	--	--	--	--	ND (<10)	ND (<5)	2.59	1.78	--
Selenium (ug/l)	Method B - 80	--	--	--	--	--	ND (<10)	ND (<5)	3.52	3.74	--
Zinc (ug/l)	Method B - 4,800	--	--	--	--	--	ND (<10)	ND (<5)	ND (<1)	ND (<1)	--

Monitoring Well - MW-4											
Analyzed Parameter	***Model Toxics Control Act Groundwater Cleanup Criteria[1]***	***Sample Date***					***VCP Compliance Samples***				
		--	***--***	***9-23-2008 (CDM)***	***3-5-2009***	***4-7-2009***	***12-3-2009***	***3-17-2010***	***6-30-2010***	***8-30-2010***	***1-31-2013***
Pentachlorophenol (ug/l)	Site Method B - 8.2	--	--	ND (<0.5)	ND (<3.4)[1]	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)
Other Semi-Volatile Organic Compounds											
Napthalene (ug/l)	Method A - 160	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Acenaphthylene (ug/l)	--	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Acenaphthene (ug/l)	Method B - 960	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Fluorene (ug/l)	Method B - 640	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Phenanthrene (ug/l)	--	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Anthracene (ug/l)	Method B - 4,800	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Fluoranthene (ug/l)	Method B - 640	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Pyrene (ug/l)	Method B - 480	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benz(a)anthracene (ug/l)	–* TEC	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Chrysene (ug/l)	–* TEC	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(a)pyrene (ug/l)	Method A - 0.1 Method B - 0.012*	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(b)fluoranthene (ug/l)	–* TEC	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(k)fluoranthene (ug/l)	–* TEC	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Indeno(1,2,3-cd)pyrene (ug/l)	–* TEC	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Dibenz(a,h)anthracene (ug/l)	–* TEC	–	–	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(g,h,l)perylene (ug/l)	–	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
1 Methylnaphthalene (ug/l)	--	--	--	ND (<0.1)	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
2 Methylnaphthalene (ug/l)	Method B - 32	--	--	ND (<0.1)	ND (<2)	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Calculated TEC[2] (ug/l)	Method A - 0.1[2]			0.1[3]	--		0.1[2]	0.1[2]	0.1[2]	0.1[2]	--
Total Petroleum Hydrocarbons											
Gasoline Range (ug/l)	Method A - 1,000[3]	--	--	--	--	--	--	--	--	--	--
Diesel Range (ug/l)	Method A - 500	--	--	ND (<250)	--	--	160	ND (<50)	ND (<50)	ND (<50)	--
Motor Oil Range (ug/l)	Method A - 500	--	--	ND (<500)	--	--	ND (<250)	ND (<250)	ND (<250)	ND (<250)	--
Regulated Metals											
Arsenic (ug/l)	Method A - 5 Method B - 8	--	--	--	--	--	***10.2***	***12.5***	***13.1***	***10.3***	***10.0***
Barium (ug/l)	Method B - 3,200	--	--	--	--	--	213	161	122	153	--
Cadmium (ug/l)	Method A - 5 Method B - 8	--	--	--	--	--	ND (<1)	ND (<5)	ND (<1)	ND (<1)	--
Chromium (ug/l)	Method A - 50	--	--	--	--	--	ND (<10)	ND (<5)	2.06	2.35	--
Copper (ug/l)	Method B - 590	--	--	--	--	--	ND (<10)	ND (<5)	2.00	1.98	--
Lead (ug/l)	Method A - 15	--	--	--	--	--	ND (<10)	ND (<5)	ND (<1)	1.06	--
Manganese (ug/l)	Method B - 2,200	--	--	--	--	--	***6,260***	***5,410***	***3,960***	***4,810***	--
Mercury (ug/l)	Method A - 2 Method B - 4.8	--	--	--	--	--	ND (<0.2)	ND (<0.2)	ND (<0.2)	ND (<0.2)	--
Molybdenum (ug/l)	Method B - 80	--	--	--	--	--	ND (<10)	ND (<5)	ND (<1)	ND (<1)	--
Nickel (ug/l)	Method B - 3,200	--	--	--	--	--	ND (<10)	ND (<5)	2.14	2.03	--
Selenium (ug/l)	Method B - 80	--	--	--	--	--	ND (<10)	ND (<5)	5.81	6.97	--
Zinc (ug/l)	Method B - 4,800	--	--	--	--	--	ND (<10)	ND (<5)	ND (<1)	ND (<1)	--

Table 3 - Summary of Groundwater Monitoring Data (Continued)
Portac, Inc.

Monitoring Well - MW-5											
	Model Toxics Control Act Groundwater Cleanup Criteria[1]	*Sample Date*					*VCP Compliance Samples*				
Analyzed Parameter		*--*	*--*	*--*	*--*	*3-5-2009*	*12-4-2009*	*3-17-2010*	*6-30-2010*	*8-30-2010*	*1-31-2013*
Pentachlorophenol (ug/l)	Site Method B - 8.2	--	--	--	--	***22***	***1.5***	***4.7***	***2.4***	ND (<0.5)	1.3
Other Semi-Volatile Organic Compounds											
Napthalene (ug/l)	Method A - 160	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Acenaphthylene (ug/l)	--	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Acenaphthene (ug/l)	Method B - 960	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Fluorene (ug/l)	Method B - 640	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Phenanthrene (ug/l)	--	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Anthracene (ug/l)	Method B - 4,800	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Fluoranthene (ug/l)	Method B - 640	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Pyrene (ug/l)	Method B - 480	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benz(a)anthracene (ug/l)	–* TEC	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Chrysene (ug/l)	–* TEC	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(a)pyrene (ug/l)	Method A - 0.1 Method B - 0.012*	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(b)fluoranthene (ug/l)	–* TEC	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(k)fluoranthene (ug/l)	–* TEC	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Indeno(1,2,3-cd)pyrene (ug/l)	–* TEC	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Dibenz(a,h)anthracene (ug/l)	–* TEC	–	–	–	–	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(g,h,l)perylene (ug/l)	–	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
1 Methylnaphthalene (ug/l)	--	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
2 Methylnaphthalene (ug/l)	Method B - 32	--	--	--	--	ND (<2)	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Calculated TEC[2] (ug/l)	Method A - 0.1[2]	--	--	--	--	0.1[2]	0.1[2]	0.1[2]	0.1[2]	0.1[2]	--
Total Petroleum Hydrocarbons											
Gasoline Range (ug/l)	Method A - 1,000[3]	--	--	--	--	--	--	--	--	--	--
Diesel Range (ug/l)	Method A - 500	--	--	--	--	--	ND (<50)	ND (<50)	ND (<50)	ND (<50)	--
Motor Oil Range (ug/l)	Method A - 500	--	--	--	--	--	ND (<250)	ND (<250)	ND (<250)	ND (<250)	--
Regulated Metals											
Arsenic (ug/l)	Method A - 5 Method B - 8	--	--	--	--	--	ND (<5)	1.29	1.35	1.01	ND (<1)
Barium (ug/l)	Method B - 3,200	--	--	--	--	--	41.7	28.8	25.1	28.1	--
Cadmium (ug/l)	Method A - 5 Method B - 8	--	--	--	--	--	ND (<1)	ND (<1)	ND (<1)	ND (<1)	--
Chromium (ug/l)	Method A - 50	--	--	--	--	--	27.0	9.97	11.0	16.5	--
Copper (ug/l)	Method B - 590	--	--	--	--	--	29.9	7.51	8.23	11.1	--
Lead (ug/l)	Method A - 15	--	--	--	--	--	ND (<5)	ND (<1)	ND (<1)	ND (<1)	--
Manganese (ug/l)	Method B - 2,200	--	--	--	--	--	144	126	92.2	97.9	--
Mercury (ug/l)	Method A - 2 Method B - 4.8	--	--	--	--	--	0.22	ND (<0.2)	ND (<0.2)	ND (<0.2)	--
Molybdenum (ug/l)	Method B - 80	--	--	--	--	--	ND (<5)	2.44	2.84	3.02	--
Nickel (ug/l)	Method B - 3,200	--	--	--	--	--	ND (<5)	1.83	1.71	1.59	--
Selenium (ug/l)	Method B - 80	--	--	--	--	--	ND (<5)	ND (<1)	ND (<1)	ND (<1)	--
Zinc (ug/l)	Method B - 4,800	--	--	--	--	--	5.45	ND (<1)	ND (<1)	ND (<1)	--

Monitoring Well - MW-6R											
	Model Toxics Control Act Groundwater Cleanup Criteria[1]	***Note: MW-6R installed 4/22/2009 as a replacement for MW-6 which was destroyed during cleanup excavations.***					***VCP Compliance Samples***				
Analyzed Parameter		**--**	**--**	**--**	**--**	***5-19-2009***	***12-4-2009***	***3-16-2010***	***6-30-2010***	***10-5-2010***	***1-31-2013***
Pentachlorophenol (ug/l)	Site Method B - 8.2	--	--	--	--	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)
Other Semi-Volatile Organic Compounds											
Napthalene (ug/l)	Method A - 160	--	--	--	--	--	0.27	11	8.2	1.2	--
Acenaphthylene (ug/l)	--	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Acenaphthene (ug/l)	Method B - 960	--	--	--	--	--	14	9.5	8.4	13	--
Fluorene (ug/l)	Method B - 640	--	--	--	--	--	0.14	0.73	0.59	0.83	--
Phenanthrene (ug/l)	--	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Anthracene (ug/l)	Method B - 4,800	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Fluoranthene (ug/l)	Method B - 640	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Pyrene (ug/l)	Method B - 480	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benz(a)anthracene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Chrysene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(a)pyrene (ug/l)	Method A - 0.1 Method B - 0.012*	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(b)fluoranthene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(k)fluoranthene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Indeno(1,2,3-cd)pyrene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Dibenz(a,h)anthracene (ug/l)	–* TEC	–	–	–	–	–	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(g,h,l)perylene (ug/l)	–	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
1 Methylnaphthalene (ug/l)	--	--	--	--	--	--	5.3	3.6	3.0	2.4	--
2 Methylnaphthalene (ug/l)	Method B - 32	--	--	--	--	--	2.5	0.12	ND (<0.1)	ND (<0.1)	--
Calculated TEC[2] (ug/l)	Method A - 0.1[2]	--	--	--	--	--	0.1[2]	0.1[2]	0.1[2]	0.1[2]	--
Total Petroleum Hydrocarbons											
Gasoline Range (ug/l)	Method A - 1,000[3]	--	--	--	--	--	--	--	--	--	--
Diesel Range (ug/l)	Method A - 500	--	--	--	--	--	400	52	50	ND (<50)	--
Motor Oil Range (ug/l)	Method A - 500	--	--	--	--	--	ND (<250)	ND (<250)	ND (<250)	ND (<250)	--
Regulated Metals											
Arsenic (ug/l)	Method A - 5 Method B - 8	--	--	--	--	3.43	ND (<5)	3.41	3.46	2.84	2.52
Barium (ug/l)	Method B - 3,200	--	--	--	--	--	115	98.3	109	125	--
Cadmium (ug/l)	Method A - 5 Method B - 8	--	--	--	--	ND (<1)	ND (<1)	ND (<1)	ND (<1)	ND (<1)	--
Chromium (ug/l)	Method A - 50	--	--	--	--	5.79	6.34	4.03	3.23	4.46	--
Copper (ug/l)	Method B - 590	--	--	--	--	--	ND (<5)	1.26	2.70	19	--
Lead (ug/l)	Method A - 15	--	--	--	--	1.26	ND (<5)	ND (<1)	ND (<1)	ND (<1)	--
Manganese (ug/l)	Method B - 2,200	--	--	--	--	--	***7,850***	***6,400***	***7,890***	***8,760***	--
Mercury (ug/l)	Method A - 2 Method B - 4.8	--	--	--	--	ND (<0.2)	ND (<0.2)	ND (<0.2)	ND (<0.2)	ND (<0.2)	--
Molybdenum (ug/l)	Method B - 80	--	--	--	--	--	ND (<5)	2.66	3.22	2.83	--
Nickel (ug/l)	Method B - 3,200	--	--	--	--	--	ND (<5)	1.38	1.56	1.37	--
Selenium (ug/l)	Method B - 80	--	--	--	--	--	ND (<5)	1.14	1.66	1.45	--
Zinc (ug/l)	Method B - 4,800	--	--	--	--	--	ND (<5)	1.08	ND (<1)	ND (<1)	--

Table 3 - Summary of Groundwater Monitoring Data (Continued)
Portac, Inc.

Monitoring Well - B-5R - Rehabilitated Log Yard Monitoring Well											
Analyzed Parameter	***Model Toxics Control Act Groundwater Cleanup Criteria[1]***	***Note: B-5R reconstructed 4/22/2009 and redeveloped for use on 5/18/2009.***					***VCP Compliance Samples***				
		--	***--***	***--***	***--***	***5-19-2009***	***12-3-2009***	***3-16-2010***	***6-30-2010***	***8-30-2010***	***1-31-2013***
Pentachlorophenol (ug/l)	Method B - 0.73	--	--	--	--	--	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (<0.5)
Other Semi-Volatile Organic Compounds											
Napthalene (ug/l)	Method A - 160	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Acenaphthylene (ug/l)	--	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Acenaphthene (ug/l)	Method B - 960	--	--	--	--	--	0.81	0.76	0.89	1.1	--
Fluorene (ug/l)	Method B - 640	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Phenanthrene (ug/l)	--	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Anthracene (ug/l)	Method B - 4,800	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Fluoranthene (ug/l)	Method B - 640	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Pyrene (ug/l)	Method B - 480	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benz(a)anthracene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Chrysene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(a)pyrene (ug/l)	Method A - 0.1 Method B - 0.012*	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(b)fluoranthene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(k)fluoranthene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Indeno(1,2,3-cd)pyrene (ug/l)	–* TEC	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Dibenz(a,h)anthracene (ug/l)	–* TEC	–	–	–	–	–	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Benzo(g,h,l)perylene (ug/l)	–	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
1 Methylnaphthalene (ug/l)	--	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
2 Methylnaphthalene (ug/l)	Method B - 32	--	--	--	--	--	ND (<0.1)	ND (<0.1)	ND (<0.1)	ND (<0.1)	--
Calculated TEC[2] (ug/l)	Method A - 0.1[2]	--	--	--	--	--	0.1[2]	0.1[2]	0.1[2]	0.1[2]	--
Total Petroleum Hydrocarbons											
Gasoline Range (ug/l)	Method A - 1,000[3]	--	--	--	--	ND (<100)	--	--	--	--	--
Diesel Range (ug/l)	Method A - 500	--	--	--	--	150	ND (<50)	ND (<50)	ND (<50)	ND (<50)	--
Motor Oil Range (ug/l)	Method A - 500	--	--	--	--	ND (<250)	ND (<250)	ND (<250)	ND (<250)	ND (<250)	--
Regulated Metals											
Arsenic (ug/l)	Method A - 5 Method B - 8	--	--	--	--	ND (<1)	ND (<1)	ND (<1)	1.11	ND (<1)	ND (<1)
Barium (ug/l)	Method B - 3,200	--	--	--	--	--	67.1	54.4	59.9	58.8	--
Cadmium (ug/l)	Method A - 5 Method B - 8	--	--	--	--	ND (<1)	ND (<1)	ND (<1)	ND (<1)	ND (<1)	--
Chromium (ug/l)	Method A - 50	--	--	--	--	2.68	ND (<10)	2.47	2.63	3.17	--
Copper (ug/l)	Method B - 590	--	--	--	--	--	ND (<10)	ND (<1)	1.43	ND (<1)	--
Lead (ug/l)	Method A - 15	--	--	--	--	1.53	ND (<10)	ND (<1)	ND (<1)	ND (<1)	--
Manganese (ug/l)	Method B - 2,200	--	--	--	--	--	1,250	1,130	1,230	1,340	--
Mercury (ug/l)	Method A - 2 Method B - 4.8	--	--	--	--	ND (<0.2)	ND (<0.2)	ND (<0.2)	ND (<0.2)	ND (<0.2)	--
Molybdenum (ug/l)	Method B - 80	--	--	--	--	--	ND (<10)	ND (<1)	ND (<1)	ND (<1)	--
Nickel (ug/l)	Method B - 3,200	--	--	--	--	--	ND (<10)	ND (<1)	1.03	ND (<1)	--
Selenium (ug/l)	Method B - 80	--	--	--	--	--	ND (<10)	1.48	2.55	2.57	--
Zinc (ug/l)	Method B - 4,800	--	--	--	--	--	ND (<10)	ND (<1)	ND (<1)	ND (<1)	--

Table 3 Notes:
[1] - Model Toxics Control Act Groundwater Cleanup Criteria. Method A cleanup levels from WAC 173-340-900, Table 720-1.
Site specific Method B groundwater cleanup level for pentachlorophenol based on a surface water ARAR National Toxics Rule, 40 CFR 131, using marine chronic values for protection of human health.
Method B standard formula values from Ecology CLARC database. Method B standard formula values are based on potable groundwater and may not represent final cleanup levels established for the site.
-- - Sample not analyzed for the listed parameter.
ND (<XX) - Analyzed parameter not detected at or above the noted concentration.
Analyses for Pentachlorophenol and other semi-volatile organic compounds conducted by EPA Method 8270D SIM
Total Petroleum Hydrocarbons in the gasoline range analyzed by method NWTPH-G.
Total Petroleum Hydrocarbons in the Diesel and Oil ranges analyzed by method NWTPH-D(extended), with silica gel cleanup to remove organic matter.
[2] - TEC - Toxic Equivalent Concentration - The summed concentration of seven carcinogenic PAH compounds, after applying a toxicity equivalency factor (TEF) to each compound, based on its relative toxicity compared to benzo-(a)-pyrene.
* - Identifies PAH compunds used to calculate TEC. In all cases, the TEC is a calculation using ½ the laboratory reporting limit of individual component concentrations, since none of the compounds were detected.
[3] - MTCA Method A groundwater cleanup criteria for gasoline range organics where no benzene has been detected in groundwater. Other criteria apply if benzene is present.

Regulated metals by EPA Method 200.8, except mercury, by EPA Method 1631E.

Laboratory analyses for volatile organic compounds in samples prior to December 2009 not included in this summary. These data were previously reported in WES' groundwater monitoring reports. No detected volatle organic compounds approach MTCA groundwater cleanup criteria.

TABLE 1
INVESTIGATION LOCATION COORDINATES
PORTAC CAP INVESTIGATION
NORTH RAIL LEAD IMPROVEMENTS
PORT OF TACOMA, WASHINGTON

Name	Northing (WA83SF)	Easting (WA83SF)	Elevation (Jacob's 2013) (a)
Borings and Piezometers			
PORTAC-01	704592.2775	1176464.066	24.7
PORTAC-02	704743.9761	1176487.264	24.0
PORTAC-03	704713.4813	1176583.573	23.2
PORTAC-04	704822.9858	1176647.543	22.0
PORTAC-05	704961.1686	1176606.525	23.0
PORTAC-06	704962.1974	1176797.025	23.7
PORTAC-07	705083.4343	1176779.162	22.7
PORTAC-08	705101.7558	1176916.703	24.1
PORTAC-09	705259.6418	1176859.29	24.2
PORTAC-10	705252.9078	1177015.275	25.1
PORTAC-11	705380.013	1177032.467	24.7
PORTAC-12	705562.2738	1177116.091	23.7
PORTAC-13	705566.22	1177287.241	23.9
PORTAC-14	705672.6219	1177283.023	23.3
PORTAC-15	705671.5684	1177407.462	23.3
PORTAC-16	704649.6867	1176496.628	24.2
PORTAC-17	705098.2353	1176872.26	23.5
PORTAC-18	705562.1193	1177254.28	23.9
PORTAC-19	705434.276	1177087.063	24.3
PORTAC-20	705639.766	1177145.649	23.1
PORTAC-21	705690.6038	1177094.986	22.5
B-18	705565.0034	1177252.94	23.9
RRI-B-26	705397.9446	1177159.446	24.8
RRI-B-27	704844.3989	1176735.263	23.2
Rail Spur Test Pits			
TP-1	705099.909	1176991.511	18.8
TP-2	705192.0965	1177039.969	19.4
TP-3	705236.3507	1177105.331	18.3
TP-4	705314.293	1177144.399	19.0
TP-5	705351.38	1177196.927	18.9
TP-6	705435.2059	1177246.599	19.3
TP-7	705467.0255	1177301.919	18.9
TP-8	705582.9548	1177403.624	18.8

(a) Elevation determined utilizing a digital surface file provided by Jacobs Engineering in October 2013 (NAVD88).

TABLE 6
GROUNDWATER ANALYTICAL RESULTS
PORTAC CAP INVESTIGATION
NORTH RAIL LEAD IMPROVEMENTS
PORT OF TACOMA, WASHINGTON

Sample ID	Laboratory ID	Sample Date	Arsenic (ug/L) EPA Method 200.8 Screening Level = 5 ug/L
GW-PORTAC-01(17.5)	WG70B	03/05/2013	11.4
GW-PORTAC-04(12)	WG70C	03/05/2013	21.1
GW-PORTAC-07(12)	WG70A	03/06/2013	8560
GW-PORTAC-11(17)	WG70E	03/06/2013	62.6
GW-PORTAC-12(13)	WG70F	03/07/2013	13.3
GW-PORTAC-15(15)	WG70D	03/07/2013	2.4

Box = Exceedance of cleanup level.

APPENDIX A.5
Soil Chemistry

Attachment A.5 Contains Excerpted Information from the Following References:

Year	Author Abbreviation	Author	Document Title
1987a	HC	Hart Crowser, Inc. (HC)	Portac Log Yard, Groundwater Assessment (See #117 & 125)
1988a	HC	Hart Crowser, Inc. (HC)	Portac Log Sort Yard, Phase I Material Characterization
2008a	CDM	CDM	Facility Closure Assessment Former Portac Lumber Facility
2008b	CDM	CDM	Facility Closure Assessment Second Phase Former Portac Lumber Facility
2009b	WES	Whitman Environmental Services (WES)	Log yard Ramp Demolition - Portac, Inc. - 4215 N. Frontage Road, Tacoma, WA. (Draft)
2009e	WES	Whitman Environmental Services (WES)	Lumber Mill Demolition - Environmental Cleanup and Testing Report - Former Portac Inc. Site - Tacoma, WA. Prepared by WES for Portac, Inc. July 6, 2009.
2014	AQEA	Anchor QEA (AQEA)	Log Yard Soil Testing Report. Former Portac Inc. Site. Tacoma, WA. Prepared for Portac and Port of Tacoma.

METALS CONTAMINATION

Soils

The surficial and underlying soil layers were tested for metal leaching characteristics using the EP toxicity test. Each test sample was analyzed for arsenic, zinc, copper, and lead, the principal metals detected in the surface runoff study and typical extractants of ASARCO slag. Data evaluated include 9 samples of surficial soil containing slag and 5 samples of the underlying silt and sand (results of testing completed during our previous work are included). The results of the test analyses are presented in Appendix B.

A comparison of the concentration levels of leachable metals in the surficial soil layer which contains some slag and the underlying silt and sand soil are presented in Table 2. In cases where concentrations were below the detection limit, average values were computed using the detection limit for these samples.

Table 2 - Concentration of Metals in Soil

	CONCENTRATION IN mg/L (EP TOXICITY TEST)		
	Surface Soil with Bark and Slag		Underlying Silt and Sand
METAL	AVERAGE	RANGE	RANGE
Arsenic	1.1	0.12 - 2.7	<0.01
Zinc	0.23	<0.01 - 0.87	<0.01 - 0.03
Copper	1.14	<0.01 - 8.2	<0.01
Lead	0.1	<0.02 - 0.25	<0.1 - 0.2

These data indicate that metals are leachable primarily from the surficial layer. This is probably due to the concentration of metals in the slag. The minor concentrations of leachable metals in the underlying soil implies

TABLE B-1. RESULTS OF LABORATORY TESTING

SURFACE SOIL SAMPLES	DEPTH IN FEET	EP TOXICITY TEST RESULTS IN MG/L ARSENIC	ZINC	COPPER	LEAD
B-1 BAG	0-2	0.16	<0.01	<0.01	<0.1
B-3 BAG	0-2	2.49	0.12	0.01	<0.1
B-6 BAG	0-2	0.12	0.87	0.8	<0.1
B-3,S-1	0-4	0.81	0.1	0.03	<0.1
B-6,S-1	2.5-4	0.27	0.03	0.01	<0.1
TP-8,S-1	0.5-1	2.7	-	0.7	0.03
TP-8,S-2	1.5-2	0.7	-	8.2	0.25
TP-5,S-1	1-1.5	1.9	-	0.3	0.13
TP-6,S-1	2-2.5	0.9	-	<0.2	<0.02

SILT & SAND SAMPLES	DEPTH IN FEET	EP TOXICITY TEST RESULTS IN MG/L ARSENIC	ZINC	COPPER	LEAD
B-1,S-1	2.5-4	<0.01	0.01	<0.01	0.2
B-1,S-2	5-6.5	<0.01	0.03	<0.01	<0.1
B-3,S-2	3.5-5	<0.01	<0.01	<0.01	<0.1
B-6,S-2	5-6.5	<0.01	<0.01	<0.01	<0.1
TP-8,S-3	2.5-3	<0.02	-	<0.2	<0.02

GROUNDWATER SAMPLES	SCREENED ZONE	RESULTS OF DISSOLVED METALS TESTS IN MG/L ARSENIC	ZINC	COPPER	LEAD
B-1	5-10	0.31	0.13	0.08	0.4
B-2	8-13	<0.01	0.08	<0.01	<0.1
B-3	8-13	0.2	0.04	0.04	0.2
B-4	8-13	<0.01	<0.01	<0.01	<0.1
B-5	12-17	<0.01	<0.01	<0.01	<0.1
B-6	8-13	0.04	<0.01	<0.01	<0.1

- Indicates metal not tested.
Laboratory testing on the boring samples (B-)was performed by Bennett Laboratories of Tacoma and reported on 4/7/87. The lab testing on the test pit samples (TP-) was performed by Analytical Technologies, Inc. of California on 7/11/86 as reported in Hart Crowser's August 18, 1986 report.

Table 1 - Material Quantities

Material	Total Organics by Weight in Percent	Estimated Volume in Cubic Yards	Estimated Weight in Tons
Fines	55	47,000	25,000
Rocks	1	12,000	21,000
Bark	70	19,000	9,000

Contamination Levels of Surface Material

Table 2 summarizes our estimate of contamination levels of the surface material components. We based our estimate on the chemical test data from the test pits, bulk sampling, and test separation sampling. Section III of this letter summarizes these data. The E.P. Toxicity method is designed to simulate leaching of contaminants from a waste material within a sanitary landfill.

We focused our efforts on four metals (arsenic, lead, copper, and zinc). These metals are the predominant contaminants of ASARCO slag. We tested for other metals in one set of testing (see Table 3, page 8). Besides arsenic, lead, copper, and zinc; no metals were detected.

Table 2 - Surface Material Component Contamination Levels

	E.P. Toxicity in ppm				Total Metals in ppm			
Material	As	Pb	Cu	Zn	As	Pb	Cu	Zn
Fines	1.2	nd	nd	0.1	490	260	450	650
Bark	1.0	nd	nd	0.1	200	110	190	350
Regulatory Limit	5.0	5.0	100	500				
Detection Limit	0.2	0.1	0.1	0.1				

nd = Not detected.

The E.P. Toxicity test results indicate the material is not considered hazardous waste, for the parameters analyzed, in observed occasional seepage in the test pits and estimate groundwater was at least 8 feet below the surface.

Hart Crowser submitted five samples to a chemical laboratory for testing. The selected samples included two of bark mixed with slag, two of slag, and one of the underlying soil. The laboratory analyzed the samples for metals content using the E.P. Toxicity method. Table 3 presents the test results.

Table 3 - Test Pit Sample Chemical Test Results

	Metal Content (E.P. Toxicity) in parts per million				
Metal	Bark/Slag	Bark/Slag	Slag	Slag	Soil
Arsenic	2.7	0.9	0.7	1.9	nd
Cadmium	nd	nd	nd	nd	nd
Lead	0.03	nd	0.25	0.13	nd
Selenium	nd	nd	nd	nd	nd
Chromium	nd	nd	nd	nd	nd
Copper	0.7	nd	8.2	0.3	nd
Silver	nd	nd	nd	nd	nd
Barium	nd	nd	nd	nd	nd
Mercury	nd	nd	nd	nd	nd

nd = Not Detected

Summary of September 25, 1987 Letter

Hart Crowser obtained five samples of the surface material at the PORTAC site. The hand dug samples each weighed about 200 pounds. We sieved each sample to separate the fines (arbitrarily defined as material passing the 3/8-inch sieve) from the coarse particles. Our understanding is PORTAC intends to salvage the coarse wood chips.

Using the test pit and sieve data, we estimated material quantities. We assumed the material will expand 20 percent upon excavation. Table 4 presents our results.

Table 4 - PORTAC Site, Surface Material Quantities

Material Size in Inches	Estimated Volume in Cubic Yards
Minus 3/8	32,000
3/8 to 2	41,000
Plus 2	5,000

Hart Crowser sent portions of seven of the samples to a chemical laboratory. The laboratory analyzed these samples for metals content using the E.P. Toxicity method. They also analyzed for total arsenic. Table 5 presents the results of these analyses.

Table 5 - Hand-dug Sample Chemical Test Results

	Metal Content in parts per million						
	Minus 3/8 Inch			3/8 to 2 Inch		Plus 2 Inch	
	Samp 1	Samp 2	Samp 7	Samp 3 bark	Samp 4 bark	Samp 5 bark	Samp 6 bark
EP Toxicity							
Arsenic	nd	0.4	1.5	0.5	nd	0.5	0.5
Lead	nd	nd	nd	nd	nd	nd	nd
Copper	nd	nd	nd	nd	0.1	nd	nd
Zinc	0.2	nd	nd	nd	0.1	nd	nd
Total Arsenic	700	280	320	78	360	120	51

nd = Not Detected

Summary of Test Separation Sample Chemical Test Results

Table 6 presents the results of chemical testing of samples we obtained during the test separation of the surface material. Part I of this letter discusses our observations during the separation process. Part IV of this letter discusses the sampling protocol we used to take the samples. Attachment A includes the laboratory chemical testing certificate.

Table 6 - Test Separation Chemical Test Results

	E.P. Toxicity in ppm				Total Metals in ppm			
Material	As	Pb	Cu	Zn	As	Pb	Cu	Zn
Fines	1.6	nd	nd	nd	530 (330-640)*	260 (190-310)	450 (370-520)	650 (460-810)
Bark	1.3	nd	nd	nd	250 (120-400)	110 (42-180)	190 (76-310)	350 (240-440)

* = Values in ( ) indicate range in quadruplicate tests.
nd = Not detected.

The relatively high value of total metals in the Bark may be the result of the high water content of the sample during separation. It is possible that slag particles adhered to the bark during the test separation that may not adhere during summer time, dry weather separation. Our material testing during the actual separation process will shed further light on this matter.

PART IV: SAMPLING PROTOCOL

During the test separation process, Hart Crowser obtained samples for chemical testing. The purpose of the chemical testing was to characterize the material for disposal. Of the four product piles, the quantity of +5-inch material is relatively insignificant and essentially consists of large rocks. PORTAC plans to return the +5-inch and rock material to the site. Therefore, only the Fines and Bark were chemically tested. Also, we obtained samples of each product material for organic content testing.

The raw material sample used for the test run consisted of about 18 cubic yards (cy) of material from the PORTAC site. Of that total, approximately 8 to 10 cy consisted of Fines and 4 to 5 cy consisted of Bark.

How We Obtained Fines and Bark Samples

Hart Crowser sampled the Fines at the rate of about one sample per cubic yard. Each sample was obtained from beneath the fines "screen". We placed each sample in a clean, glass quart jar using a stainless-steel spoon. Between samples, we washed the spoon

Table 1
Analytical Schedule
Former Portac Lumber Facility/Environmental Investigation
Tacoma, Washington

Soil

Sample ID	Boring	Depth ft bgs	EPA 8041	EPA 8321A	NWTPH-Dx		EPA 350.1M	EPA 351.4	EPA 8021B				EPA 6010B			TCLP - EPA 1311/6010B		
			PCP	IPBC	TPH-D	TPH-O	N-Ammonia	TKN	Benzene	Toluene	Ethylbenzene	Xylenes	Arsenic	Cadmium	Lead	Arsenic	Cadmium	Lead
PT-B1-(2-7')	B1	2-7											X	X	X			
PT-B1-(7-12)	B1	7-12											X	X	X			
PT-B2-3.5(slag)[a]	B2	3.5											X	X	X	X	X	X
PT-B2-6	B2	6											X	X	X			
PT-B2-13	B2	13											X	X	X			
PT-B3-SS[b]	B3	Surface	X		X	X												
PT-B3-2	B3	2	X	X	X	X	X	X										
PT-B3-6	B3	6	X	X	X	X	X	X										
PT-MW-7.5	MW1	7.5	X	X	X	X	X	X										
PT-B4-0.5	B4	0.5	X		X	X												
PT-B4-5	B4	5	X		X	X												
MW2-1'	MW2	1	X		X	X			X	X	X	X						
MW2-6'	MW2	6	X		X	X			X	X	X	X						

Water

Sample ID	Boring	EPA 8041	EPA 8321A	NWTPH-HCID			EPA 350.1M	EPA 351.4	EPA 8021B			
		PCP	IPBC	Gas	Diesel	Oil	N-Ammonia	TKN	Benzene	Toluene	Ethylbenzene	Xylenes
CDM-MW1	MW1	X	X	X	X	X	X					
MW2	MW2	X			X	X	X	X	X	X	X	X

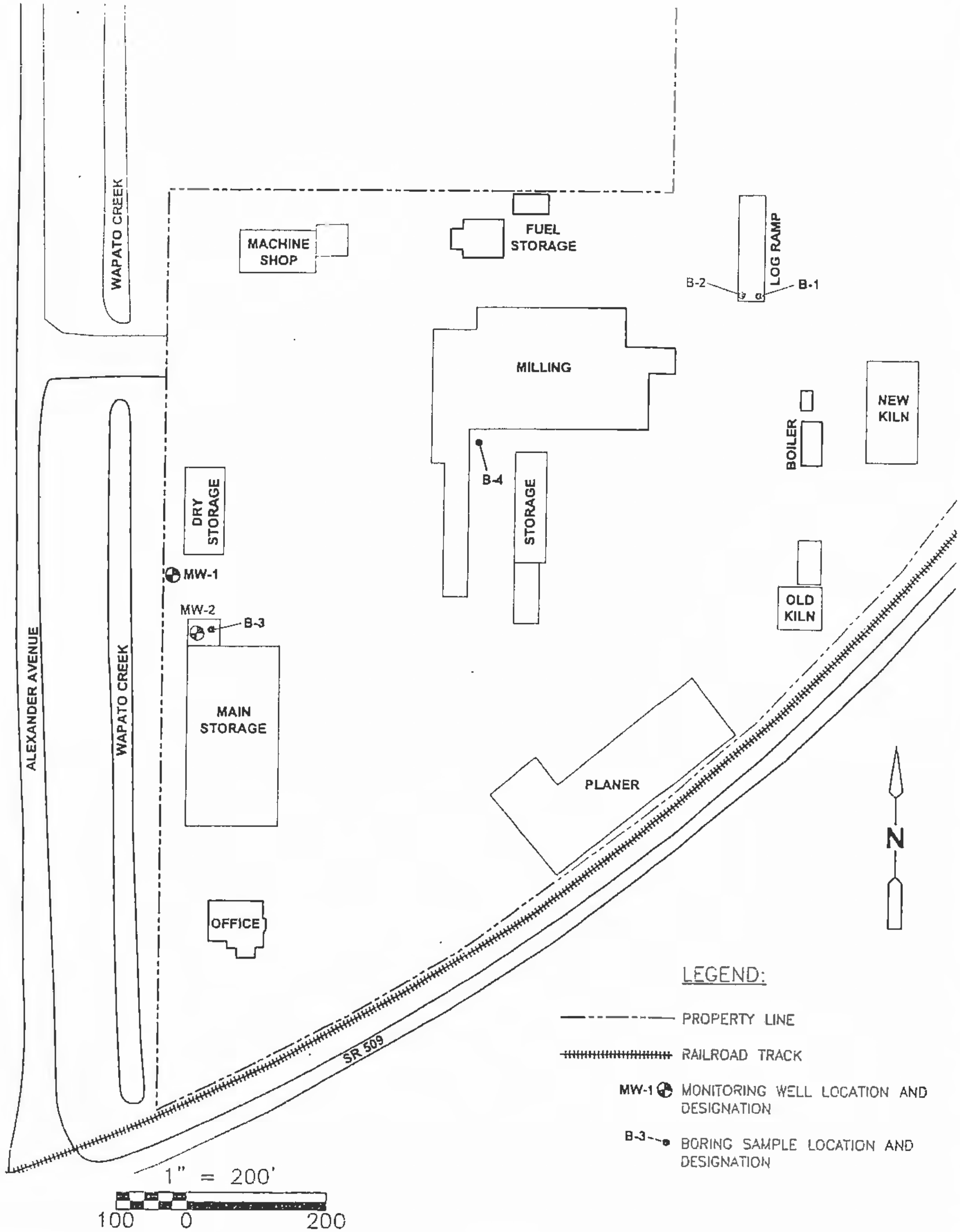
Notes
a) Sample of slag
b) Not a soil sample. Sludge-like debris on the surface of the asphalt next to the dip tank.
PCP - pentachlorophenol
IPBC - 3-iodo-2-propynyl butyl carbamate
TPH-D - total petroleum hydrocarbons quantified in the diesel range
TPH-O - total petroleum hydrocarbons quantified in the oil range
N - nitrogen
TKN - total kjehldal nitrogen
TCLP - toxicity characteristic leaching procedure

Table 2
Analytical Summary - Soil
Former Portac Lumber Facility/Environmental Investigation
Tacoma, Washington

Sample ID	Boring	Depth ft bgs	EPA 8041 PCP mg/kg	EPA 8321A IPBC mg/kg	NWTPH-Dx TPH-D mg/kg	NWTPH-Dx TPH-O mg/kg	EPA 350.1M N-Ammonia mg/kg	EPA 351.4 TKN-Nitrogen mg/kg	EPA 8021B Benzene µg/L	EPA 8021B Toluene µg/L	EPA 8021B Ethylbenzene µg/L	EPA 8021B Xylenes µg/L
PT-B3-SS[a]	B3	Surface	400	–	97,000	120,000	–	–	–	–	–	–
PT-B3-2	B3	2	<.050 Y	<0.02	ND	ND	24	204	–	–	–	–
PT-B3-6	B3	6	**0.18**	<0.04	**35**	**180**	**43.7**	**379**	–	–	–	–
PT-MW-7.5	MW1	7.5	**0.014**	<0.04	ND	ND	**35.3**	**199**	–	–	–	--
PT-B4-0.5	B4	0.5	**0.38**	–	**12**	**57**	–	–	–	–	–	–
PT-B4-5	B4	5	**0.08 J**	–	ND	ND	--	–	–	–	–	–
MW2-1'	MW2	1	<0.0067	–	12	66	–	–	<0.013	<0.013	<0.013	<0.025/<0.013 [d]
MW2-6'	MW2	6	<0.060 Y	–	610	3,200	–	–	<0.014	<0.014	<0.014	<0.028/<0.014 [d]
Regulatory Standards			8.3 [b]	–	2,000 [c]	2,000 [c]			0.03	7	3	9

Sample ID	Boring	Depth ft bgs	EPA 6010B Arsenic mg/kg	EPA 6010B Cadmium mg/kg	EPA 6010B Lead mg/kg	TCLP - EPA 1311/6010B Arsenic mg/L	TCLP - EPA 1311/6010B Cadmium mg/L	TCLP - EPA 1311/6010B Lead mg/L
PT-B1-(2-7')	B1	2-7	**5**	<0.2	**3**	–	–	–
PT-B1-(7-12)	B1	7-12	**10**	<0.2	**5**	–	–	–
PT-B2-3.5(slag)	B2	3.5	1,940	6.5	1,920	**1.0**	**0.02**	**1.3**
PT-B2-6	B2	6	30	<0.5	**33**	–	–	–
PT-B2-13	B2	13	<10	<0.5	<5	–	–	–
Regulatory Standards			20 [c]	2 [c]	250 [c]	5.0 [e]	1.0 [e]	5.0 [e]

Notes:
Bold value indicates analyte detected at or above detection level.
Shaded value exceeds one or more regulatory standards
a) Not a soil sample. Sludge-like debris on the surface of the asphalt next to the dip tank.
b) Washington Department of Ecology's Cleanup Levels and Risk Calculation Tables (CLARC), downloaded from http://www.ecy.wa.gov July 3, 2008. The lowest value in the CLARC tables (carcinogenic) used.
c) Washington Administrative Code (WAC) Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested soil cleanup level for unrestricted land uses; promulgated August 15, 2001.
d) The first value is for total m & p-xylenes and the second for o-xylenes.
e) Dangerous Waste Limit per WAC Chapter 173-303
J - estimated value.
Y - detection limit raised due to chromatographic interference
PCP - pentachlorophenol.
IPBC - 3-iodo-2-propanyl butyl carbamate
mg/kg - milligrams per kilogram.
mg/L - milligrams per liter.
< - analyte not detected at or greater than the listed concentration.



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PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

Figure No. 2
Site Plan

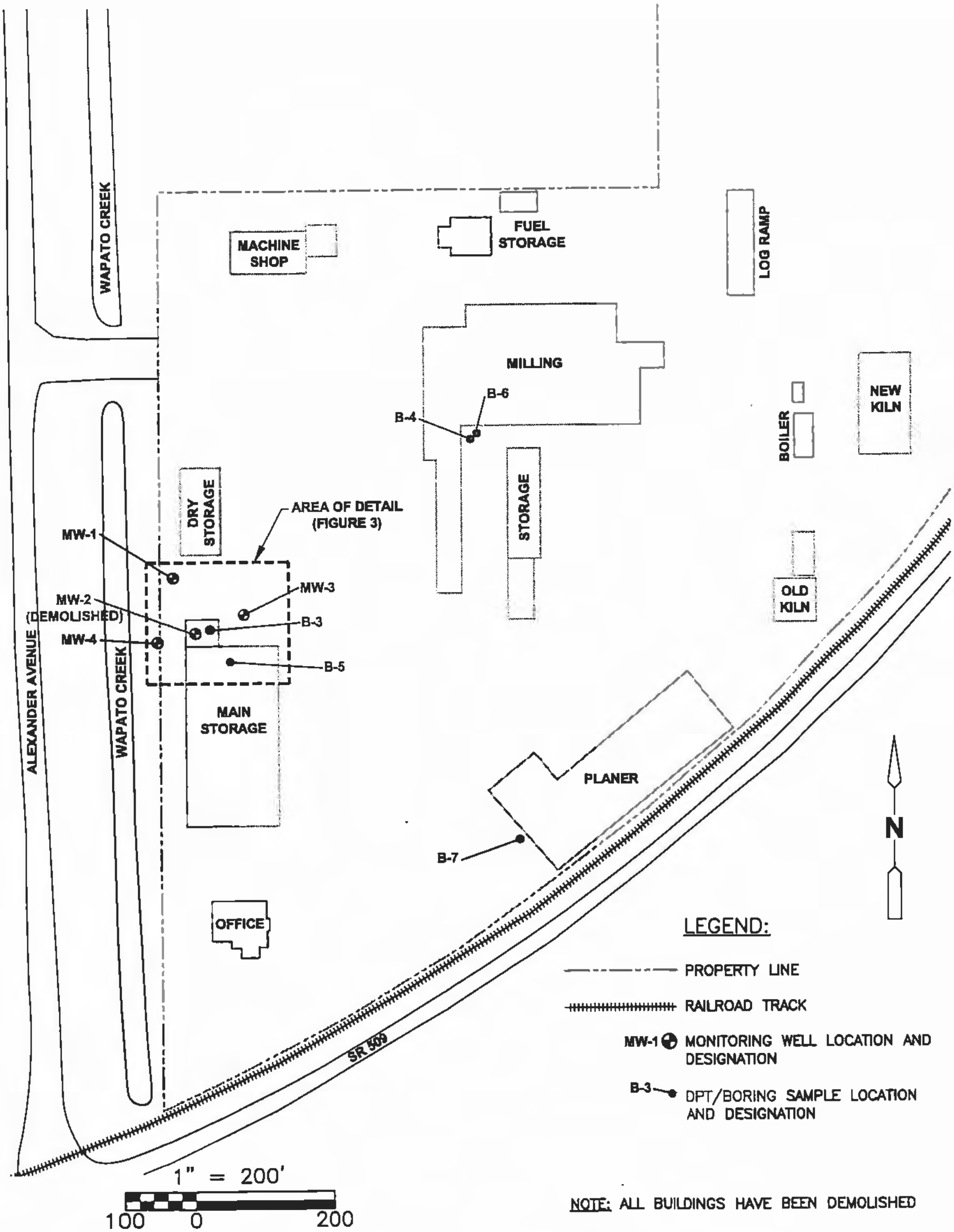
CDM

Table 2
Soil Analytical Summary
Former Portac Lumber Faciliy/Environmental Investigation
Tacoma, Washington

Analyte	Sample I.D., Depth (ft bgs), Date Sampled							
	MW3	MW4	B5	B6	B7	B7 (Lab Dup)	Dip Tank	Dip Tank (Lab Dup)
	10	6.5	9	7.5	7.5	7.5	2	2
	09/10/08	09/10/08	09/10/08	09/10/08	09/10/08	09/10/08	09/10/08	09/10/08
EPA Method 8151 (mg/kg)								
Pentachlorophenol (PCP)	**0.02**	<0.02	**0.03**	<0.02	**0.57**	**0.67**	**0.41**	--
NWTPH-Dx/Dx Ext. (mg/kg)								
Diesel (Fuel Oil)	<20	<20	<20	<20	<20	--	<20	<20
Mineral Oil	<40	<40	<40	<40	<40	--	<40	<40
Heavy Oil	<50	<50	<50	<50	<50	--	**24,000**	**23,000**
TCLP Metals (EPA Method 1311 Extraction) (mg/L)								
Arsenic	--	--	--	--	--	--	<0.5	--
Lead	--	--	--	--	--	--	<1.0	--
Cadmium	--	--	--	--	--	--	<0.1	--
Chromium	--	--	--	--	--	--	<1.0	--
Mercury	--	--	--	--	--	--	<0.2	--

Notes:

Bold indicates value exceeds detection limit.
-- not analyzed.
ft bgs - feet below ground surface.
mg/kg - milligrams per kilogram.
mg/L - milligrams per liter.
< - analyte not detected at or greater than the listed concentration.



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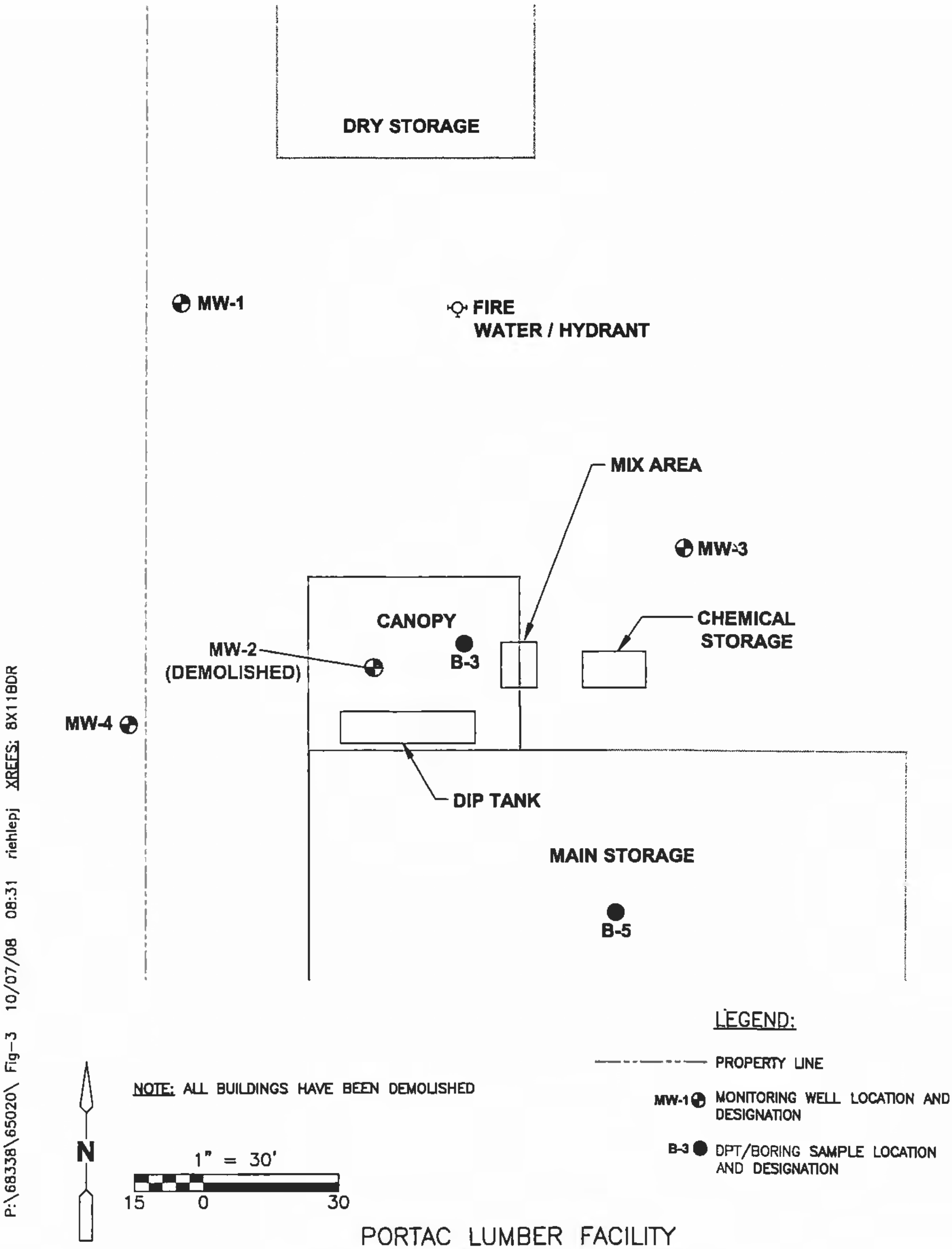
PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

Figure No. 2
Site Plan And
Exploration Map



PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

Figure No. 3
Exploration Locations
Surrounding Dip Tank

TABLE 1
Portac Inc. Log Ramp Demolition — *Project No. WES-1400*
Soil Sample Analytical Summary — *Page 1*

Sample I.D.	*Location*	*Sample Date*	*Arsenic (mg/kg)*	*Lead (mg/kg)*
Ramp Base Compliance Samples				
Base 23S/15W	23 Ft S. of Toe of Ramp, 15 Ft. W. of E. Side	9-12-08	15	2.9
Base 40S/20W*	40 Ft S. of Toe of Ramp, 20 Ft. W. of E. Side	9-12-08	***170****	74
Base 83S/15W	83 Ft S. of Toe of Ramp, 15 Ft. W. of E. Side	9-12-08	***39***	4.5
Base 115S/20W	115 Ft S. of Toe of Ramp, 20 Ft. W. of E. Side	9-12-08	14	4.0
Base 19S/36W	19 Ft S. of Toe of Ramp, 36 Ft. W. of E. Side	9-15-08	***33***	21
Base 40S/40W	40 Ft S. of Toe of Ramp, 40 Ft. W. of E. Side	9-15-08	17	20
Base 40S/20W-REX	Retest after additional excavation 40 Ft S. of Toe of Ramp, 20 Ft. W. of E. Side	9-18-08	***37.0***	25.3
Base 20S/40W-REX	40 Ft S. of Toe of Ramp, 20 Ft. W. of E. Side	9-18-08	***22.7***	12.0

TABLE 1
Portac Inc. Log Ramp Demolition — ***Project No. WES-1400***
Soil Sample Analytical Summary — ***Page 2***

Sample I.D.	***Location***	***Sample Date***	***Arsenic (mg/kg)***	***Lead (mg/kg)***
Stockpile 1 - Crushed Gravel Surface Material (Approx. 150 cu. yds.)				
STK-1-N	N. side of Stockpile 1	9-10-08	***75****	29
STK-1-S	S. side of Stockpile 1	9-10-08	9.2	3.0
STK-1-SE	S.E. corner of Stockpile 1	9-10-08	***23****	8.7
STK-1-W	W. side of Stockpile 1	9-10-08	6.7	3.0
STK-1-E	E. side of Stockpile 1	9-10-08	6.8	3.6
STK-1-S2	South side of Stockpile 1	9-12-08	19	8.3
STK-1-N2	N. side of pile after removing previously sampled area	9-16-08	17.8	7.53
STK-1-N3	N. side of pile after removing previously sampled area	9-16-08	15.3	9.36
STK-1-SE2	S.E. side of pile after removing previously sampled area	9-16-08	19.0	11.1
STK-1-SE3	SE side of pile after adding +/- 10 cu. yards	9-16-08	***40.3***	21.4
Stockpile 2 - Slag and Wood Waste Material - Removed and Disposed (Approx. 2,472 tons)				
STK-2-N	North side of Waste Pile	9-10-08	***270***	150
STK-2-S	South side of Waste Pile	9-10-08	***350***	240
STK-2-E	East side of Waste Pile	9-10-08	***280***	***390***
STK-2-W	West side of Waste Pile	9-10-08	***320***	230

TABLE 1
Portac Inc. Log Ramp Demolition — *Project No. WES-1400*
Soil Sample Analytical Summary — *Page 3*

Sample I.D.	*Location*	*Sample Date*	*Arsenic (mg/kg)*	*Lead (mg/kg)*
Stockpile 3 - 6" Minus Pit Run Sand and Gravel from Ramp Base (Approx. 210 cu. yds.)				
STK-3-NW*	Northwest side of Stockpile 3 after first day of excavation	9-10-08	***73****	3.4
STK-3-SW*	Southwest side of Stockpile 3	9-10-08	18*	7.1
STK-3-E*	East side of Stockpile 3	9-10-08	***30****	10
STK-3-S*	South side of Stockpile 3	9-10-08	***37****	24
STK-3-N2*	15 feet E. along N. side of pile, as additional soil was added at E. end	9-11-08	15*	8.4
STK-3-N3	20 feet E. along N. side of pile	9-11-08	12	5.2
STK-3-N4	25 feet E. along N. side of pile	9-11-08	12	5.5
STK-3-S2*	15 feet E. along S. side of pile, as additional soil was added at E. end	9-11-08	***41****	21
STK-3-S3	20 feet E. along S. side of pile	9-11-08	7.6	3.9
STK-3-S4	25 feet E. along S. side of pile	9-11-08	13	6.0

TABLE 1
Portac Inc. Log Ramp Demolition ***Project No. WES-1400***
Soil Sample Analytical Summary

Sample I.D.	***Location***	***Sample Date***	***Arsenic (mg/kg)***	***Lead (mg/kg)***
Ramp Stockpile - 6" Minus Pit Run Sand and Gravel in Stockpile in Ramp Base (Approx. 495 cu. yds.)				
Ramp - E*	Along East side of Stockpile in Ramp Area	9-11-08	***24****	6.7
Ramp - S	South end of Stockpile	9-11-08	3.9	3.1
Ramp - SW	Southwest side of Stockpile, near retaining wall base	9-11-08	6.8	2.5
Ramp - NW	Northwestern part of Stockpile	9-11-08	5.8	3.0
Ramp - Center	Top of Stockpile	9-11-08	***24***	6.4
Ramp STK - SW	Southwest side of Stockpile, after additional soil added	9-12-08	6.9	3.1
Ramp STK - E	East side of Stockpile, after additional soil removed	9-12-08	8.1	4.0
Model Toxics Control Act Method A Soil Cleanup Criteria for Unrestricted Land Use			***20***	***250***

Table 1 Notes:

* - Indicates Performance Sample. Sampled material was later removed for disposal. Performance samples representing areas excavated further during later cleanup are shaded. Retest of areas excavated further are identified with the suffix REX in sample ID.

Model Toxics Control Act Method A Unrestricted Lands Use soil cleanup criteria per Chapter 173-340-740 WAC.

Detected parameters exceeding Washington Model Toxics Control Act soil cleanup criteria are noted in ***BOLD ITALIC.***

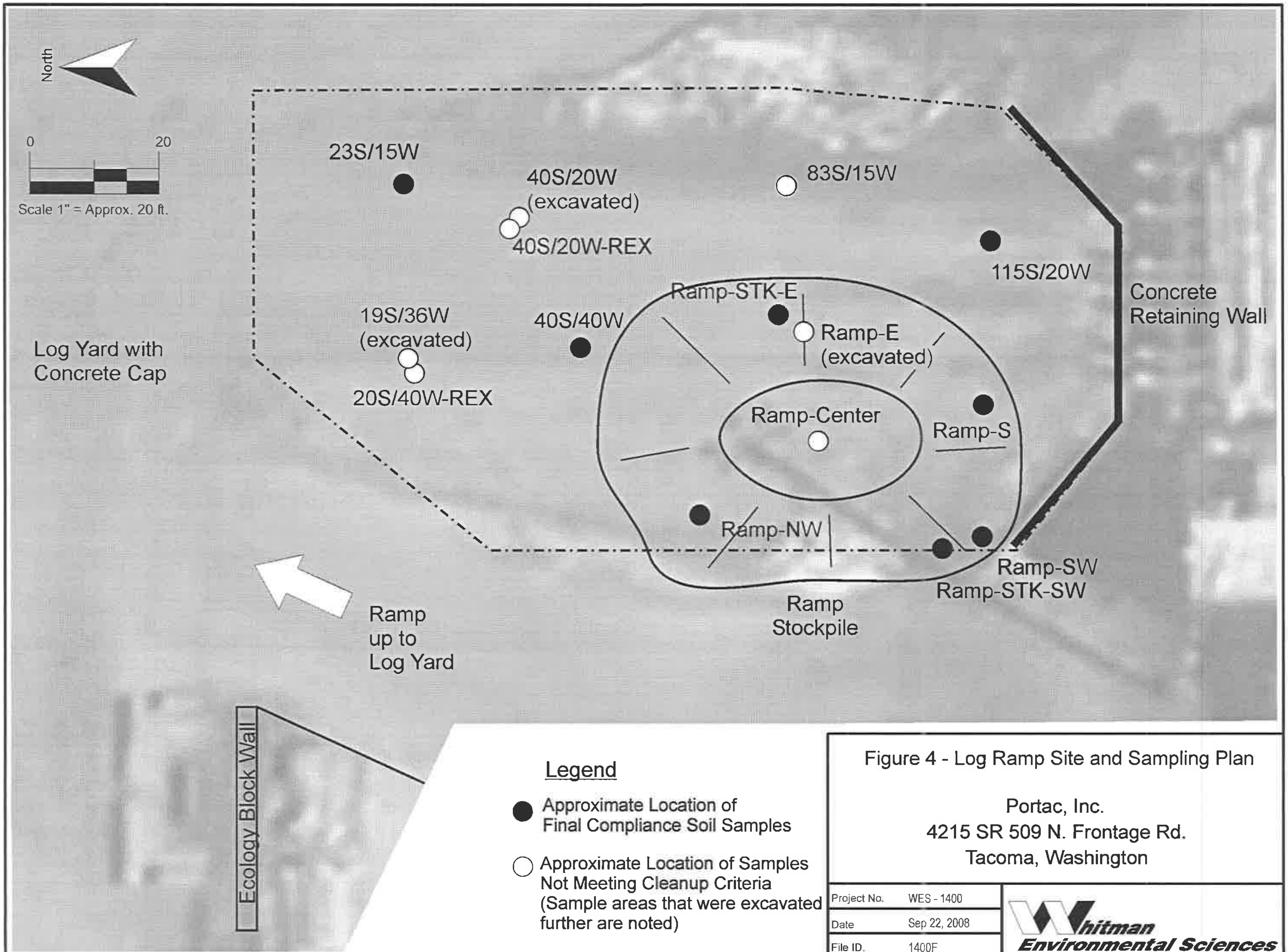


Figure 4 - Log Ramp Site and Sampling Plan

Portac, Inc.
4215 SR 509 N. Frontage Rd.
Tacoma, Washington

Project No.	WES - 1400
Date	Sep 22, 2008
File ID.	1400F

Whitman
Environmental Sciences

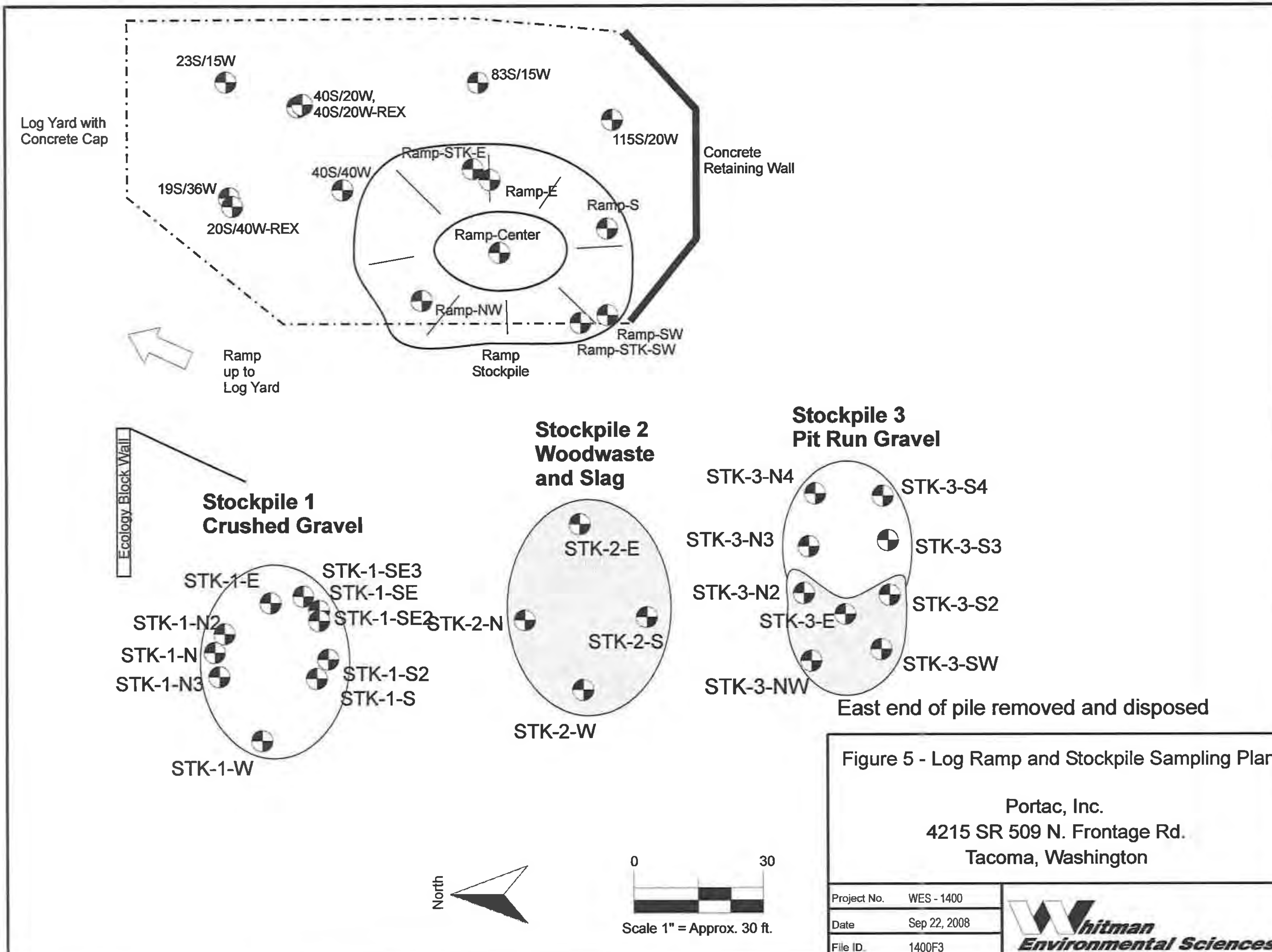


Figure 5 - Log Ramp and Stockpile Sampling Plan

Portac, Inc.
4215 SR 509 N. Frontage Rd.
Tacoma, Washington

Project No.	WES - 1400
Date	Sep 22, 2008
File ID.	1400F3

Whitman Environmental Sciences

TABLE 2

Portac Inc. Dip Tank Removal — ***Project No. WES-1400***

Soil Sample Analytical Summary —

Sample I.D.	***Location/Depth Below Ground Surface***	***Sample Date***	***Pentachlorophenol (mg/kg)***	***Total Petroleum Hydrocarbons (mg/kg)***
Sidewall and Base Compliance Samples				
DT-SESW-11	SE Sidewall / 11'	9-16-08	ND (<0.13)	Diesel- ND (<33) Oil - ND (<66)
DT-SSW-9*	S Sidewall / 9'	9-16-08	7.3	Diesel- ND (<32)* Oil - ND (<64)*
DT-WSW-9	W Sidewall under 10" fire line / 9'	9-16-08	ND (<0.13)	Diesel- ND (<33) Oil - ND (<66)
DT-SE Base-18*	Excavation base in SE corner /18'	9-16-08	6.6	NA*
DT-Center Base-16	Excavation base S of tank location / 16'	9-16-08	ND (<0.14)	NA
DT-E Base-16	Excavation base at E end of tank / 16'	9-16-08	ND (<0.13)	NA
DT-W Base-14*	Excavation base at W end of tank / 14'	9-17-08	ND (<0.14)*	Diesel- 430* Oil - ***3,000****
DT-SSW-REX-11	S Sidewall retest after further excavation / 11'	9-19-08	ND (<0.14)	NA
DT-SE Base-REX-18	Excavation base in SE corner after further excavation / 18'	9-19-08	ND (<0.13)	NA

Sample I.D.	***Location/Depth Below Ground Surface***	***Sample Date***	***Pentachlorophenol (mg/kg)***	***Total Petroleum Hydrocarbons (mg/kg)***
DT-NSW-Center-12	North sidewall near center / 12'	9-19-08	0.15	NA
DT-NSW-10'EFL-12	North sidewall 10' E of fire line / 12'	9-19-08	1.6	Diesel- 160 Oil - 800
DT-WSW-20N-11[(1)]	West sidewall 20' N of centerline of dip tank / 11'	9-18-08	NA	Diesel- ND (<33) Oil - ND (<65)
DT-WSW-Tank-10	West sidewall at centerline of dip tank / 10'	9-18-08	NA	Diesel- ND (<33) Oil - ND (<67)
DT-Base-15N/20E-16	Excavation base 15' N and 20' E of west end of dip tank / 16'	9-19-08	NA	Diesel- ND (<31) Oil - ND (<62)
DT-W Base-10N-16	Excavation base 10' N of west end of dip tank / 16'	9-19-08	NA	Diesel- ND (<31) Oil - ND (<62)
DT-NSW-10'W-11	North sidewall 10' W of NE corner of excavation / 11'	9-24-08	0.31	Diesel- ND (<31) Oil - ND (<61)
DT-NE Corner-7	Northeastern corner of excavation / 7'	9-24-08	ND (<0.12)	Diesel- ND (<29) Oil - ND (<58)
DT-NWSW-11 (20'W)	North sidewall 20' W. of NE corner of excavation / 11'	9-24-08	ND (<0.13)	Diesel- ND (<33) Oil - ND (<66)
Model Toxics Control Act Soil Cleanup Criteria:			***8.3***[2]	***2,000***[3]

Table 2 Notes:

ND (<XX) - Not detected above the noted concentration.
NA - Not analyzed for the noted parameter.
* - Indicates Performance Sample. Sampled material was later removed for disposal. Performance samples representing areas excavated further during later cleanup are shaded. Retests of these areas identified with suffix REX in sample ID.
Model Toxics Control Act soil cleanup criteria per Chapter 173-340-740 WAC.
(1) - Sample incorrectly identified on laboratory report as NSW-12N-11. Chain of custody and field records identify the sample as noted in this table.
[2] - Method B standard formula value for pentachlorophenol per Washington Department of Ecology CLARC database.
[3] - Method A cleanup criteria for total petroleum hydrocarbons in the heavy oil range, per Table 740-1.

Detected parameters exceeding Washington Model Toxics Control Act soil cleanup criteria are noted in ***BOLD ITALIC.***

TABLE 3

Portac Inc. Dip Tank Waste Soil — ***Project No. WES-1400***

Analytical Summary — ***Page 1***

Sample I.D.	***Location in Stockpiles***	***Sample Date***	***Pentachlorophenol (mg/kg)***	***Total Petroleum Hydrocarbons (mg/kg)***
Waste Soil Stockpile - As Excavated				
STK-DT-S	S end of dip tank Stockpile	9-16-08	***14.0***	NA
STK-DT-E1	E side of Stockpile	9-16-08	ND (<0.12)	NA
STK-DT-E2	E side of Stockpile 20' N	9-16-08	***8.6***	NA
STK-DT-W1	W side of Stockpile	9-16-08	ND (<0.12)	NA
STK-DT-W2	W side of Stockpile 15' N	9-16-08	***11.0***	Diesel- 3,200 Oil - 32,000
Composite Waste Samples in Windrows				
Comp 1	S end of Windrow 1	10-1-08	***13***	NA
Comp 2	Mid section Windrow 1	10-1-08	***13***	NA
Comp 3	N end Windrow 1	10-1-08	***23***	NA
Comp 4	S end of Windrow 2	10-1-08	***25***	NA
Comp 5	Mid section Windrow 2	10-1-08	***20***	NA
Comp 6	N end Windrow 2	10-1-08	***21***	NA
Comp 7	S end of Windrow 3	10-1-08	***25***	NA

TABLE 3
Portac Inc. Dip Tank Waste Soil ***Project No. WES-1400***
Analytical Summary

Sample I.D.	***Location in Stockpiles***	***Sample Date***	***Pentachlorophenol (mg/kg)***	***Total Petroleum Hydrocarbons (mg/kg)***
Comp 8	N. end Windrow 3	10-1-08	***29***	NA
Comp 9	S. end of Windrow 4	10-1-08	***20***	NA
Comp 10	N. end of Windrow 4	10-1-08	***17***	NA
RCRA Universal Treatment Standard (UTS) (mg/kg)			***7.4***	***Not Applicable***
Allowable Land Disposal Concentration for Soil from Remediation 10 X UTS (mg/kg)			***74***	***Not Applicable***

Table 3 Notes:
ND (<XX) - Not detected above the noted concentration.
NA - Not analyzed for the noted parameter.
RCRA Universal Treatment Standard for pentachlorophenol per 40CFR 268.48
Allowable Land Disposal Concentration for Remediation Soil per 40CFR268.49
Detected parameters exceeding RCRA Universal Treatment Standard are noted in ***BOLD ITALIC.***

TABLE 4
Additional Dip Tank Area Soil Waste Characterization ***Project No. WES-1400***
Analyses on Sample Comp 8 and Comp 11

Parameters:	***Laboratory Analytical Result***
Semi-volatile Organic Compounds- (mg/kg)	ND (all - 65 other individual compounds) - reporting limits vary; see laboratory report
Chromium - total (mg/kg)	8.78
Arsenic - total (mg/kg)	3.43
Dioxins/Furans (mg/kg)	For full parameter list see laboratory report
Total TCDD	ND (<0.00037)
Total PeCDD	ND (<0.00033)
Total HxCDD	0.0022
1,2,3,4,6,7,8-HpCDD	0.0045
Total HpCDD	0.0068
OCDD	0.034
Total TCDF	ND (<0.000065)
Total PeCDF	ND (<0.0002)
Total HxCDF	ND (<0.00024)
Total HpCDF	0.00094
OCDF	0.0015

Table 4 Notes:
ND (<XX) - Not detected above the noted concentration.
Semi-volatile organic compounds by EPA Method 8270C
Arsenic and chromium by EPA Method 200.8
Dioxins/furans by EPA Method 8280A.

TABLE 6
Portac Inc. Mill and Planer Pentachlorophenol Spray Areas ***Project No. WES-1400***
Soil Sample Analytical Summary ***Page 1***

Sample I.D.	***Location/Depth Below Ground Surface***	***Sample Date***	***Pentachlorophenol (mg/kg)***
Mill Spray Area Excavation			
Mill E Base-9.5	East side if final base of spray area excavation / 9.5'	11-6-08	ND (<3)
Mill W Base-10.5	West side of final excavation base / 10.5'	11-6-08	ND (<3)
Mill NSW-5	North sidewall of excavation / 5'	11-6-08	ND (<3)
Mill ESW-3	East sidewall of excavation / 3'	11-6-08	ND (<3)
Mill SSW-4.5	South sidewall of excavation / 4.5'	11-6-08	ND (<3)
Mill WSW-6	West sidewall of excavation / 6'	11-6-08	ND (<3)
Mill Spray Area Soil Stockpile			
Mill STK-W	West side of Stockpile	11-6-08	ND (<3)
Mill STK-N	North side of Stockpile 20' N	11-6-08	ND (<3)
Mill STK-E	East side of Stockpile	11-6-08	ND (<3)
Mill STK-Comp N	Composite of three areas from North center of pile	11-11-08	ND (<3)
Mill STK-Comp S	Composite of three areas from South center of pile	11-11-08	ND (<3)

Sample I.D.	***Location/Depth Below Ground Surface***	***Sample Date***	***Pentachlorophenol (mg/kg)***
Mill Edger Spray Booth Area Test Pit			
D4SB-3.5	Test Pit at interior Edger Spray Booth location after removing concrete floor slab / 3.5'	11-6-08	ND (<3)
Planer Spray Booth Area Test Pit Samples			
PTP-1-2	Test Pit 10' Southwest of Monitoring Well MW-5, at former spray booth location / 2'	11-6-08	6.1
PTP-1-5	Test Pit 10' Southwest of Monitoring Well MW-5, at former spray booth location / 5'	11-6-08	***16***
PTP-2-2.5	Test Pit 10' Southeast of Monitoring Well MW-5, at former spray booth location / 2.5'	11-6-08	ND (<3)
PTP-3-6	Test Pit 5' Northeast of Monitoring Well MW-5, at former spray booth location / 6'	11-6-08	ND (<3)
PTP-4-3	Test Pit 5' Northwest of Monitoring Well MW-5, at former spray booth location / 3'	11-6-08	ND (<3)

Sample I.D.	***Location/Depth Below Ground Surface***	***Sample Date***	***Pentachlorophenol (mg/kg)***
Planer Spray Booth Area Initial Excavation (REX)			
PTP-1REX-7	Re-excavation in the area of Test Pit PTP-1, SW of Monitoring Well MW-5, Base / 7'	11-12-08	ND (<3)
PTP-1REX-NSW-6	Re-excavation in the area of Test Pit PTP-1, SW of Monitoring Well MW-5, North Sidewall / 6'	11-12-08	ND (<3)
PTP-1REX-SWSW-5	Re-excavation of PTP-1, SW of Monitoring Well MW-5, Southwest Sidewall / 5'	11-12-08	***20***
PTP-1REX-SSW-4	Re-excavation of PTP-1, SW of Monitoring Well MW-5, South Sidewall / 4'	11-12-08	***92***
Planer Spray Booth Area Second Round Excavation (REX2)			
PTP/REX2-Base-6	Expanded excavation in the area of PTP-1, south and southwest of initial digging, Base / 6'	11-17-08	ND (<3)
PTP/REX2-WSW-4	Expanded excavation in the area of PTP-1, south and southwest of initial digging, West Sidewall / 4'	11-17-08	ND (<3)
PTP/REX2-ESW-4	Expanded excavation in the area of PTP-1, south and southwest of initial digging, East Sidewall / 4'	11-17-08	***17***

Sample I.D.	***Location/Depth Below Ground Surface***	***Sample Date***	***Pentachlorophenol (mg/kg)***
PTP/REX2-SSW-4	Expanded excavation in the area of PTP-1, south and southwest of initial digging, South Sidewall / 4'	11-17-08	ND (<3)
PTP/REX2-NSW-4	Expanded excavation in the area of PTP-1, south and southwest of initial digging, North Sidewall / 4'	11-17-08	***30***
Planer Spray Booth Area Third Round Excavation (REX3)			
PTP-REX3-SWSW-4	Expanded excavation east and west of REX2 digging, Southwest Sidewall / 4'	11-21-08	ND (<3)
PTP-REX3-WSW-4	Expanded excavation east and west of REX2 digging, West Sidewall / 4'	11-21-08	ND (<3)
PTP-REX3-NEC-4	Expanded excavation east and west of REX2 digging, Northeast Corner / 4'	11-21-08	ND (<3)
PTP-REX3-SEC-4	Expanded excavation east and west of REX2 digging, Southeast Corner / 4'	11-21-08	ND (<3)
Model Toxics Control Act Soil Cleanup Criteria:			***8.3***[1]

Table 6 Notes:
ND (<XX) - Not detected above the noted concentration.
* - Indicates Performance Sample. Sampled material was later removed for disposal. Performance samples representing areas excavated further during later cleanup are shaded.
Model Toxics Control Act soil cleanup criteria per Chapter 173-340-740 WAC.
[1] - Method B standard formula value for pentachlorophenol per Washington Department of Ecology CLARC database.

Detected parameters exceeding Washington Model Toxics Control Act soil cleanup criteria are noted in ***BOLD ITALIC.***

TABLE 7
Portac Inc. Planer Area Stockpile ***Project No. WES-1400***
Waste Characterization Sample Analytical Summary ***Page 1***

Sample I.D.	***Location***	***Sample Date***	***Semi-Volatile Organic Compounds (mg/kg)***	***Total Metals (mg/kg)***	***Total Petroleum Hydrocarbons (mg/kg)***
W-1-STK	North side of Stockpile	11-21-08	Pentachlorophenol - 4.0 Other SVOCs - ND (all)	Arsenic 2.77 Barium 44.3 Cadmium ND (<1) Chromium 15.4 Mercury 1.5 Lead 6.27 Selenium ND (<1) Silver ND (<1)	Diesel- ND (<50) Oil - ND (<250)
W-2-STK	West side of Stockpile	11-21-08	Pentachlorophenol - 5.2 Other SVOCs - ND (all)	Arsenic 3.05 Barium 32 Cadmium ND (<1) Chromium 14.2 Mercury 1.2 Lead 4.17 Selenium ND (<1) Silver ND (<1)	Diesel- ND (<50) Oil - ND (<250)
W-3-STK	East side of Stockpile	11-21-08	Pentachlorophenol - 3.7 Other SVOCs - ND (all)	Arsenic 2.41 Barium 34.3 Cadmium ND (<1) Chromium 13.9 Mercury 0.73 Lead 3.45 Selenium ND (<1) Silver ND (<1)	Diesel- ND (<50) Oil - ND (<250)

Table 7 Notes:
ND (<XX) - Not detected above the noted concentration.
Semi-volatile aromatic compounds by EPA Method 8270D, for a list of 66 analytical parameters. Pentachlorophenol was identified as the only semi-volatile compound in any of the samples.
Total metals analyzed by EPA Method 200.8 except mercury, tested by EPA Method 1631E.
Total Petroleum Hydrocarbons in the Diesel and Oil ranges analyzed by method NWTPH-D(extended).

TABLE 8
Portac Inc. Mill Hydraulics Area Test Pits — ***Project No. WES-1400***
Soil Sample Analytical Summary — ***Page 1***

Sample I.D.	***Sample Date***	***Total Petroleum Hydrocarbons (mg/kg)***	***Other Testing***
Hydraulic Area Test Pits - Before Excavation			
TP-1/3.5'	10-22-08	Diesel - ND (<50) Oil - ND (<250)	NA
TP-2/3'	10-22-08	Diesel - 1,700 ***Oil - 11,000***	PCBs - ND (<0.1) TCLP Metals Arsenic - ND (<1) Barium - ND (<1) Cadmium - ND (<1) Chromium - ND (<1) Mercury - ND (<0.02) Lead - ND (<1) Selenium - ND (<1) Silver - ND (<1)
TP-3/3'	10-22-08	Diesel - ND (<50) Oil - ND (<250)	NA
TP-4/4'	10-22-08	Diesel - 83 Oil - 530	TCLP Metals Arsenic - ND (<1) Barium - ND (<1) Cadmium - ND (<1) Chromium - ND (<1) Mercury - ND (<0.02) Lead - ND (<1) Selenium - ND (<1) Silver - ND (<1)

TABLE 8
Portac Inc. Mill Hydraulics Area Test Pits ***Project No. WES-1400***
Soil Sample Analytical Summary ***Page 2***

Sample I.D.	***Sample Date***	***Total Petroleum Hydrocarbons (mg/kg)***	***Other Testing***
TP-5/4'	10-22-08	***Diesel - 5,800*** ***Oil - 39,000***	PCBs - ND (<0.1) TCLP Metals Arsenic - ND (<1) Barium - ND (<1) Cadmium - ND (<1) Chromium - ND (<1) Mercury - ND (<0.02) Lead - ND (<1) Selenium - ND (<1) Silver - ND (<1)
TP-6/2'	10-22-08	***Diesel - 11,000*** ***Oil - 48,000***	NA
TP-8/3'	10-22-08	Diesel - ND (<50) Oil - ND (<250)	NA
Model Toxics Control Act Method A Soil Cleanup Criteria:		***Diesel or Oil - 2,000***	***PCBs - 1***
Method B Criteria for the Site Specific Petroleum from Ecology Workbook Tool MTCACALC 11:		***Site Specific Oil - 8,803***	***TCLP Metals - Conducted for Waste Characterization - Not used as MTCA Cleanup Criteria***

Table 8 Notes:
ND (<XX) - Not detected above the noted concentration.
NA - Not analyzed for the noted parameter.
Diesel or Motor Oil analyzed by WA accepted Method NWTPH-D(extended). MTCA Method A criteria requires the combined total of all diesel and oil range organics meet the lowest criteria for the detected petroleum types.
Method B Cleanup Level for the site specific hydraulic oil, based on Ecology's "Workbook Tools for Calculating Soil and Ground Water Cleanup Levels under the Model Toxics Control Act Cleanup Regulation", Publication No. 01-09-073, December, 2007. (MTCATPH 11.1)

TCLP Metals analysis is intended for waste characterization under state and federal dangerous waste regulations. No Washington State soil cleanup criteria are based on TCLP concentrations of any parameter.

TABLE 9
Portac Inc. Mill Hydraulics Area — *Project No. WES-1400*
Soil Sample Analytical Summary — *Page 1*

Sample I.D.	***Sample Location / Depth (ft.) (All sample coordinates measured from the northeastern corner of the excavation)***	***Sample Date***	***Total Petroleum Hydrocarbons (mg/kg)***
Hydraulic Area Excavation Base and Sidewall Samples			
NE Corner	Sample from sidewall at the northeastern corner of the excavation / 4'	11-11-08	Diesel - ND (<50) Oil - ND (<250)
Base 20S/0W	Excavation base 20 feet south, along eastern sidewall of excavation / 4'	11-11-08	Diesel - ND (<50) Oil - ND (<250)
Base 15S/15W	Excavation base 15' south and 15' west of NE Corner / 4'	11-11-08	Diesel - ND (<50) Oil - ND (<250)
Base 10S/48W	Excavation base 10' south and 48' west of NE Corner / 4'	11-11-08	Diesel - ND (<50) Oil - ND (<250)
Base 30S/15W	Excavation base 30' south and 15' west of NE Corner / 4'	11-11-08	Diesel - ND (<50) Oil - ND (<250)
Base 42S/23W*	Excavation base 42' south and 23' west of NE Corner / 4'	11-11-08	***Diesel - 13,000*** ***Oil - 33,000***
NSW 15W - 3	North sidewall, 15' west of NE Corner / 3'	11-11-08	Diesel - ND (<50) Oil - ND (<250)
NSW 45W - 3	North sidewall, 45' west of NE Corner / 3'	11-11-08	Diesel - ND (<50) Oil - ND (<250)
SSW 25W - 2.5	South sidewall, 45' south and 25' west of NE Corner / 2.5'	11-11-08	Diesel - ND (<50) Oil - ND (<250)

TABLE 9

Portac Inc. Mill Hydraulics Area — ***Project No. WES-1400***

Soil Sample Analytical Summary —

Sample I.D.	***Sample Location / Depth (ft.) (All sample coordinates measured from the northeastern corner of the excavation)***	***Sample Date***	***Total Petroleum Hydrocarbons (mg/kg)***
SSW 42W - 3.5*	South sidewall, 45' south and 42' west of NE Corner / 3.5'	11-11-08	***Diesel - 8,100*** ***Oil - 29,000***
Base 25S/55W*	Excavation base, 25' south and 55' west of NE Corner / 4'	11-11-08	***Diesel - 9,400*** ***Oil - 33,000***
Base 42S/42W	Excavation base, 42' south and 42' west of NE Corner / 4'	11-11-08	Diesel - ND (<50) Oil - ND (<250)
ESW 40S - 2.5	East sidewall, 40 ‘ south of NE Corner / 2.5'	11-11-08	Diesel - ND (<50) Oil - ND (<250)
ESW 22S - 3	East sidewall, 22' south of NE Corner / 3'	11-11-08	Diesel - ND (<50) Oil - ND (<250)
SSW 45W/55S - 3*	South sidewall, 45 feet west and 55 feet south of NE Corner / 3'	11-14-08	***Diesel - 16,000*** ***Oil - 27,000***
SSW 55W/55S - 3*	South sidewall, 45 feet west and 55 feet south of NE Corner / 3'	11-14-08	***Diesel - 500*** ***Oil - 2,400***
NSW 60W - 2	North sidewall, 60 feet west of NE Corner / 2'	11-14-08	Diesel - ND (<50) Oil - ND (<250)
Base 45W/50S - 4	Excavation base 45' west and 50' south of NE Corner / 4'	11-14-08	Diesel - ND (<50) Oil - ND (<250)
WSW 57W/25S	West sidewall slope, 57' west and 25' south of NE Corner / 3'	11-14-08	Diesel - ND (<50) Oil - ND (<250)

Sample I.D.	***Sample Location / Depth (ft.) (All sample coordinates measured from the northeastern corner of the excavation)***	***Sample Date***	***Total Petroleum Hydrocarbons (mg/kg)***
Base 65W/15S - 4	Excavation base 65' west and 15' south of NE Corner / 4'	11-14-08	Diesel - ND (<50) Oil - ND (<250)
Base 60W/30S - 5	Excavation base 60' west and 30' south of NE Corner / 5'	11-14-08	Diesel - ND (<50) Oil - ND (<250)
WSW 68W/40S - 3*	West sidewall, 68' west and 40' south of NE Corner / 3'	11-14-08	***Diesel - 1,300*** ***Oil - 7,600***
SWB 55W/70S	Sloping sidewall and base, 55' west and 70'south of NE Corner / 4'	11-19-08	Diesel - ND (<50) Oil - ND (<250)
WSW 70W/45S	West sidewall, 70' west and 45' south of NE Corner / 2'	11-19-08	Diesel - ND (<50) Oil - ND (<250)
ESW 40W/78S	East sidewall, 40' west and 78' south of NE Corner / 3'	11-19-08	Diesel - ND (<50) Oil - ND (<250)
Base 40W/60S	Excavation base 40' west and 60' south of NE Corner / 3'	11-19-08	Diesel - ND (<50) Oil - ND (<250)
SSW 45W/80S	South sidewall 45' west and 80' south of NE Corner / 4'	11-19-08	Diesel - ND (<50) Oil - ND (<250)
Model Toxics Control Act Method A Soil Cleanup Criteria:			***Diesel or Oil - 2,000***
Method B Criteria for the Site Specific Petroleum from Ecology Workbook Tool MTCACALC 11:			***Oil - 8,803***

Table 9 Notes:
ND (<XX) - Not detected above the noted concentration.
* - Indicates Performance Sample. Sampled material was later removed for disposal.
Samples representing areas excavated further during later cleanup are shaded.
Model Toxics Control Act soil cleanup criteria per Chapter 173-340-740 WAC.
[1] - Method B standard formula value for pentachlorophenol per Washington Department of Ecology CLARC database.
[2] - Method A cleanup criteria for total petroleum hydrocarbons in the heavy oil range, per Table 740-1.

Method B Cleanup Level for the site specific hydraulic oil, based on Ecology's "Workbook Tools for Calculating Soil and Ground Water Cleanup Levels under the Model Toxics Control Act Cleanup Regulation", Publication No. 01-09-073, December, 2007. (MTCATPH 11.1) See Workbook printout in Appendix C.

Detected parameters exceeding Washington Model Toxics Control Act soil cleanup criteria are noted in ***BOLD ITALIC.***

TABLE 10
Portac Inc. Crushed Concrete Backfill — ***Project No. WES-1400***
Analytical Summary — ***Page 1***

Parameter:	***Sample ID Crushed Concrete (mg/kg)***	***MTCA Soil Cleanup Criteria (mg/kg)***
Total Petroleum Hydrocarbons	Gasoline - ND (<20) Diesel - 550 Oil - 2,000[1]	***Gasoline - 100*** ***Diesel - 2,000*** ***Oil - 2,000***
Semi-volatile Organic Compounds (66 common semi-volatile parameters)	Detected compounds: Acenaphthene 0.45 Benz(a)anthracene 0.17 Dibenzofuran 0.28 Fluorene 0.37 Fluoranthene 0.67 Naphthalene 0.27 2-Methylnaphthalene 0.34 Phenanthrene 1.5 Pyrene 0.55 Other SVOCs: ND (all) Toxic Equivalent Concentration: 0.017 (Chapter 173-340-708(8)(e) WAC)	***Acenaphthene 4,800**** ***Benz(a)anthracene –**** ***Dibenzofuran 160**** ***Fluorene 3,200**** ***Fluoranthene 3,200**** ***Naphthalene 1,600**** ***2-Methylnaphthalene 320**** ***Phenanthrene –**** ***Pyrene 2,400**** ***Toxic Equivalent Concentration Limit: 0.1***
Regulated Metals		
Arsenic	16.9	***20***
Barium	51.7	***16,000****
Cadmium	ND (<1)	***2***
Chromium III	25.6 (total)	***2,000***
Chromium VI	--	***19***
Lead	11.0	***250***
Mercury	ND (<0.2)	***2***
Selenium	ND (<1)	***400****
Silver	ND (<1)	***400****

Table 10 Notes:
ND (<XX) - Not detected above the noted concentration.
Model Toxics Control Act soil cleanup criteria per Chapter 173-340-740 WAC.
[1] - TPH concentration attributed in part to asphalt content in the crushed material.

*- Method B standard formula value per Washington Department of Ecology CLARC database. Benz(a)anthracene and phenanthrene formula values not reported; evaluated as part of the Toxic Equivalent Concentration calculation for carcinogenic PAHs.

Toxic Equivalent Concentration per Chapter 173-340-708(8)(e) WAC, summarizing the toxic equivalency of seven carcinogenic PAH compounds compared to that of benzo(a)pyrene.

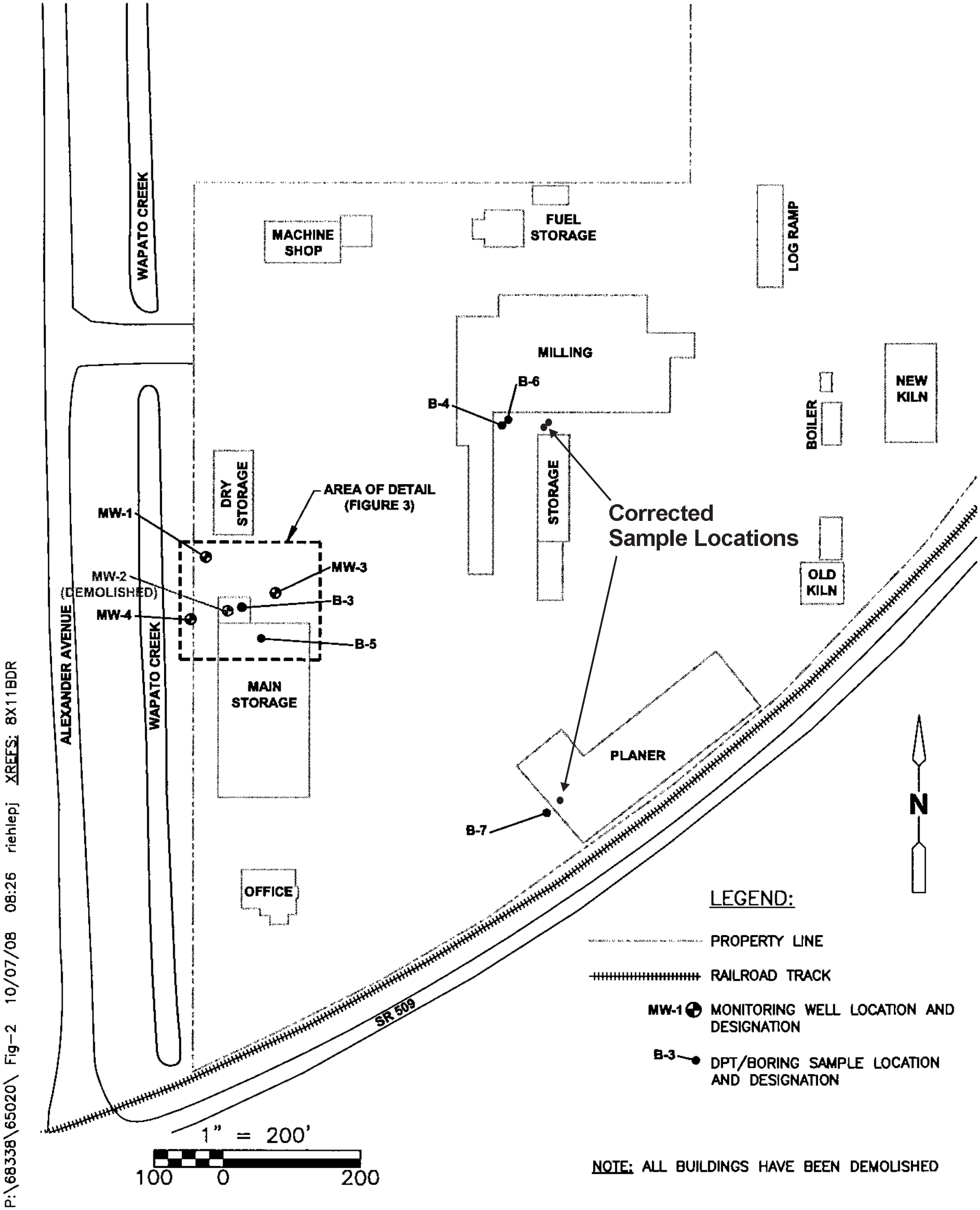
TABLE 12
Portac Post Cleanup Site Investigation
Soil Sample Analytical Summary

Boring Number	*Sample Depth Below Ground Surface (Ft.)*	*Sample Date*	*Pentachloro-phenol (mg/kg)*	*Dioxins/ furans[1] (ng/kg)*	*Volatile Organic Compounds (mg/kg)*	*Total Petroleum Hydrocarbons (mg/kg)*	*Regulated Metals (mg/kg)*
MW-2R	10.0 - 11.5	4-22-2009	ND (<0.019)[2]	TEQ = 0.23	NA	NA	NA
MW-6R	2.5 - 4.0	4-22-2009	NA	NA	NA	NA	Arsenic - 1.58 Lead - 2.65
	10.0 - 11.5	4-22-2009	ND (<0.019)[2]	TEQ = 0.17	NA	NA	NA
SH-1	2.5 - 4.0	4-22-2009	NA	NA	ND (62 different volatile compounds)	Gasoline - ND (<2) Diesel - ND (<50) Motor Oil - ND (<250)	Arsenic - 4.41 Lead - 5.34
SH-2	7.5 - 9.0	4-22-2009	NA	NA	ND (62 different volatile compounds)	Gasoline - ND (<2) Diesel - ND (<50) Motor Oil - ND (<250)	NA
FA-1	2.5 - 4.0	4-22-2009	NA	NA	Benzene - ND (<0.02) Toluene - ND (<0.02) Ethylbenzene -ND (<0.02) Xylenes - 0.09	Gasoline - 14 Diesel - 170 Motor Oil - 720	NA
FA-2	7.5 - 9.0	4-22-2009	NA	NA	Benzene - ND (<0.02) Toluene - ND (<0.02) Ethylbenzene -ND (<0.02) Xylenes - ND (<0.06)	Gasoline - ND (<2) Diesel - ND (<50) Motor Oil - ND (<250)	NA
PLSS-1	0.0 - 0.5	4-22-2009	NA	NA	NA	NA	Arsenic - 1.78 Lead - 6.80
PLSS-2	0.5 - 1,0	5-22-2009	NA	NA	NA	NA	Arsenic - 4.87 Lead - 3.99

TABLE 12
Portac Site Investigation
Soil Sample Analytical Summary

Boring Number	Sample Depth Below Ground Surface (Ft.)	Sample Date	Pentachloro-phenol (mg/kg)	Dioxins/ furans[1] (ng/kg)	Volatile Organic Compounds (mg/kg)	Total Petroleum Hydrocarbons (mg/kg)	Regulated Metals (mg/kg)
Office-1	0.5 - 1.0	5-22-2009	NA	NA	NA	NA	Arsenic - 6.08 Lead - 12.4
E. MILL	1.5 - 2.0	5-22-2009	NA	NA	NA	NA	Arsenic - 3.17 Lead - 4.02
MTCA Soil Cleanup Criteria (mg/kg) except dioxins, as noted.			***8.4[3]***	***TEQ = 11 ng/kg***	***Xylenes - 9 Other undetected compounds vary***	***Gasoline - 100[4] Diesel - 2,000 Motor Oil - 2,000***	***Arsenic - 20 Lead - 250***

Table Notes:
NA - Sample not analyzed for the listed parameter.
ND (<XXX) - Analyzed parameter not detected above the noted concentration.
[1] - Tabulated Toxicity Equivalency Concentration calculated per MTCA WAC Chapter 173-340-708(d). See laboratory report for a complete listing of the analyzed parameters and laboratory results.
[2] - Denotes the laboratory's Method Detection Limit (MDL) for pentachlorophenol. The laboratory did not detect pentachlorophenol at a concentration above this level. Any detection above the MDL but below the laboratory's standard reporting limit of 0.1 mg/kg must be considered an estimate.
[3] - MTCA Method B Standard formula value for unrestricted land use, per Washington Department of Ecology CLARC database.
[4] - MTCA Method A unrestricted land use cleanup criteria where benzene is not detected and the total BTEX concentration is less than 1% of the gasoline mixture.
Arsenic and chromium by EPA Method 200.8
Pentachlorophenol by EPA Method 8270SIM.
Dioxins/furans by EPA Method 8290.
Volatile organic compounds by EPA Method 8260C.
BTEX compounds by EPA Method 8021B.
Total Petroleum Hydrocarbons in the gasoline range analyzed by method NWTPH-G.
Total Petroleum Hydrocarbons in the Diesel and Oil ranges analyzed by method NWTPH-D(extended).



PORTAC LUMBER FACILITY
SITE CLOSURE INVESTIGATION
TACOMA, WASHINGTON

CDM

REVISED

Figure No. 2
Site Plan And
Exploration Map

WES Figure 3

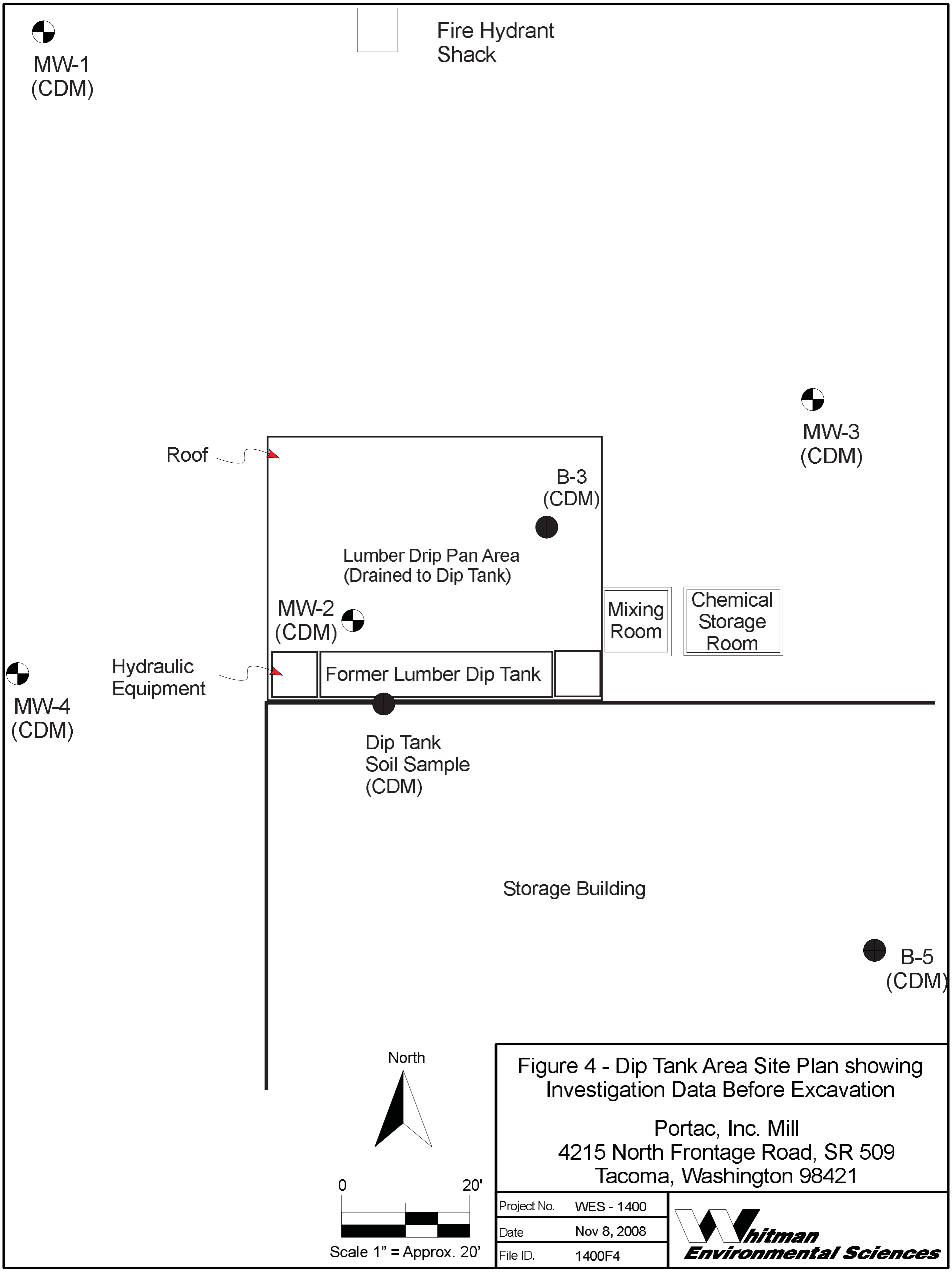


Figure 4 - Dip Tank Area Site Plan showing Investigation Data Before Excavation

Portac, Inc. Mill
4215 North Frontage Road, SR 509
Tacoma, Washington 98421

Project No.	WES - 1400
Date	Nov 8, 2008
File ID.	1400F4

Whitman Environmental Sciences

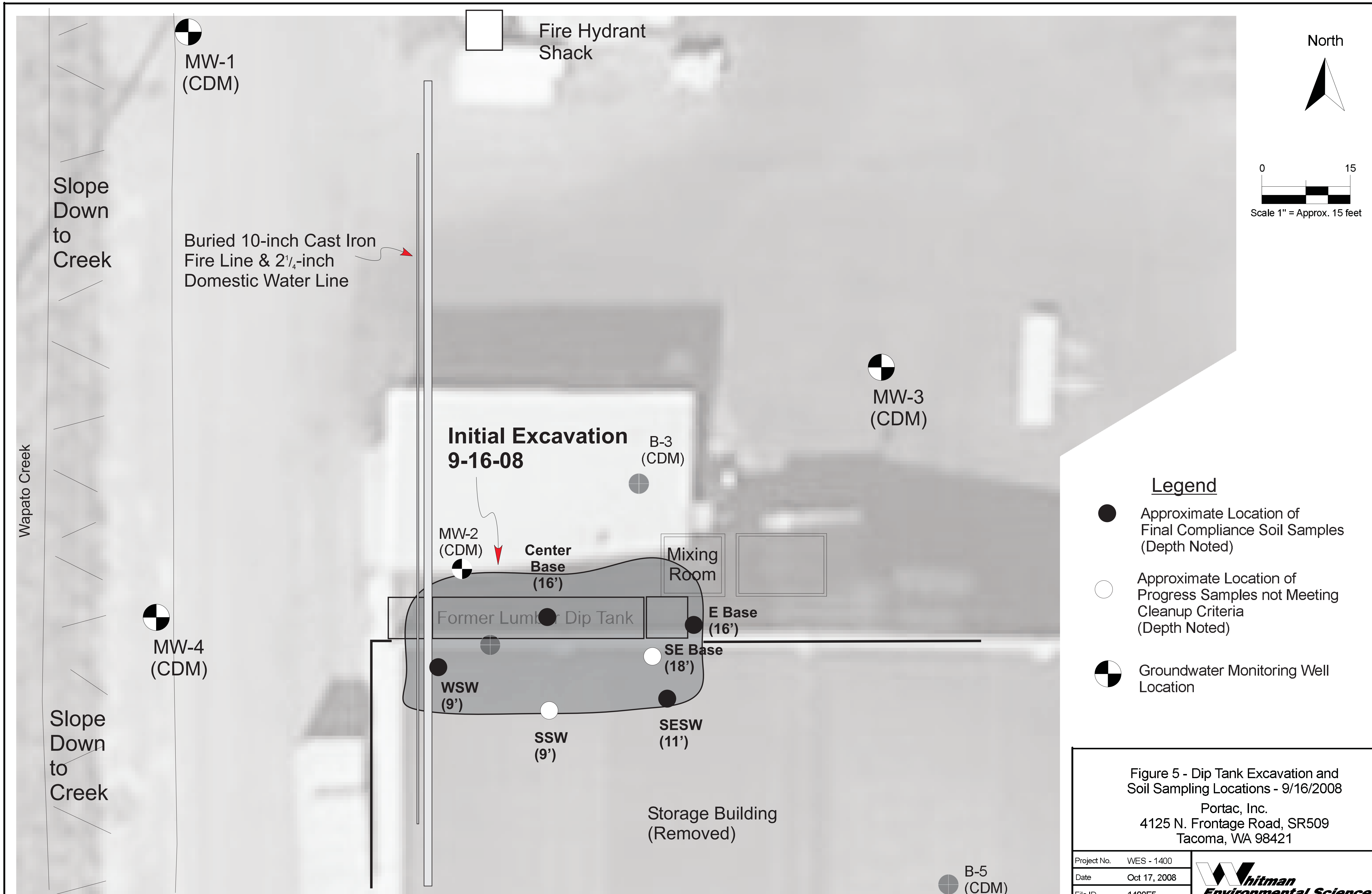


Figure 5 - Dip Tank Excavation and Soil Sampling Locations - 9/16/2008

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Oct 17, 2008
File ID.	1400F5

Whitman Environmental Sciences

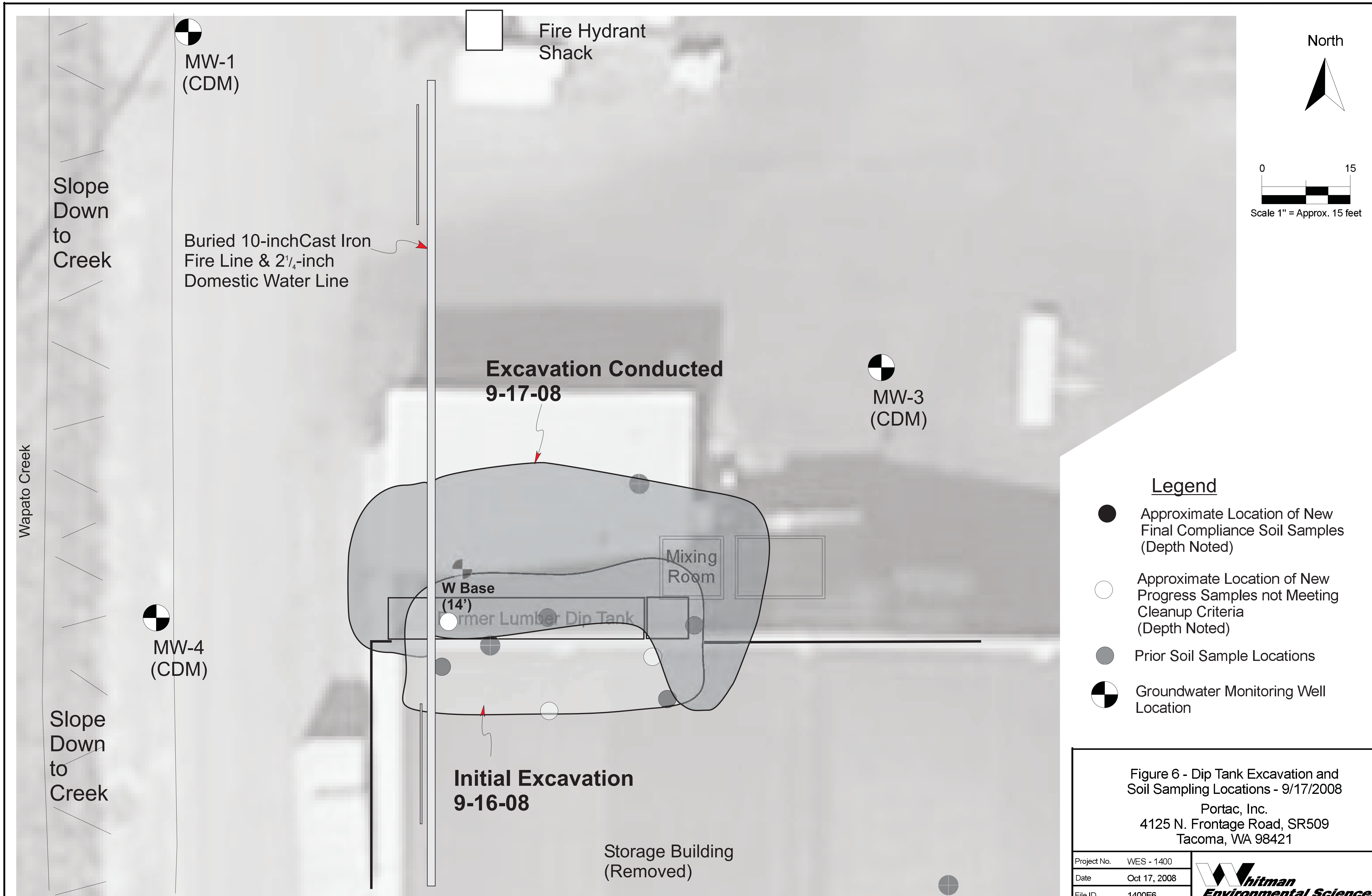


Figure 6 - Dip Tank Excavation and Soil Sampling Locations - 9/17/2008

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Oct 17, 2008
File ID.	1400F6

Whitman Environmental Sciences

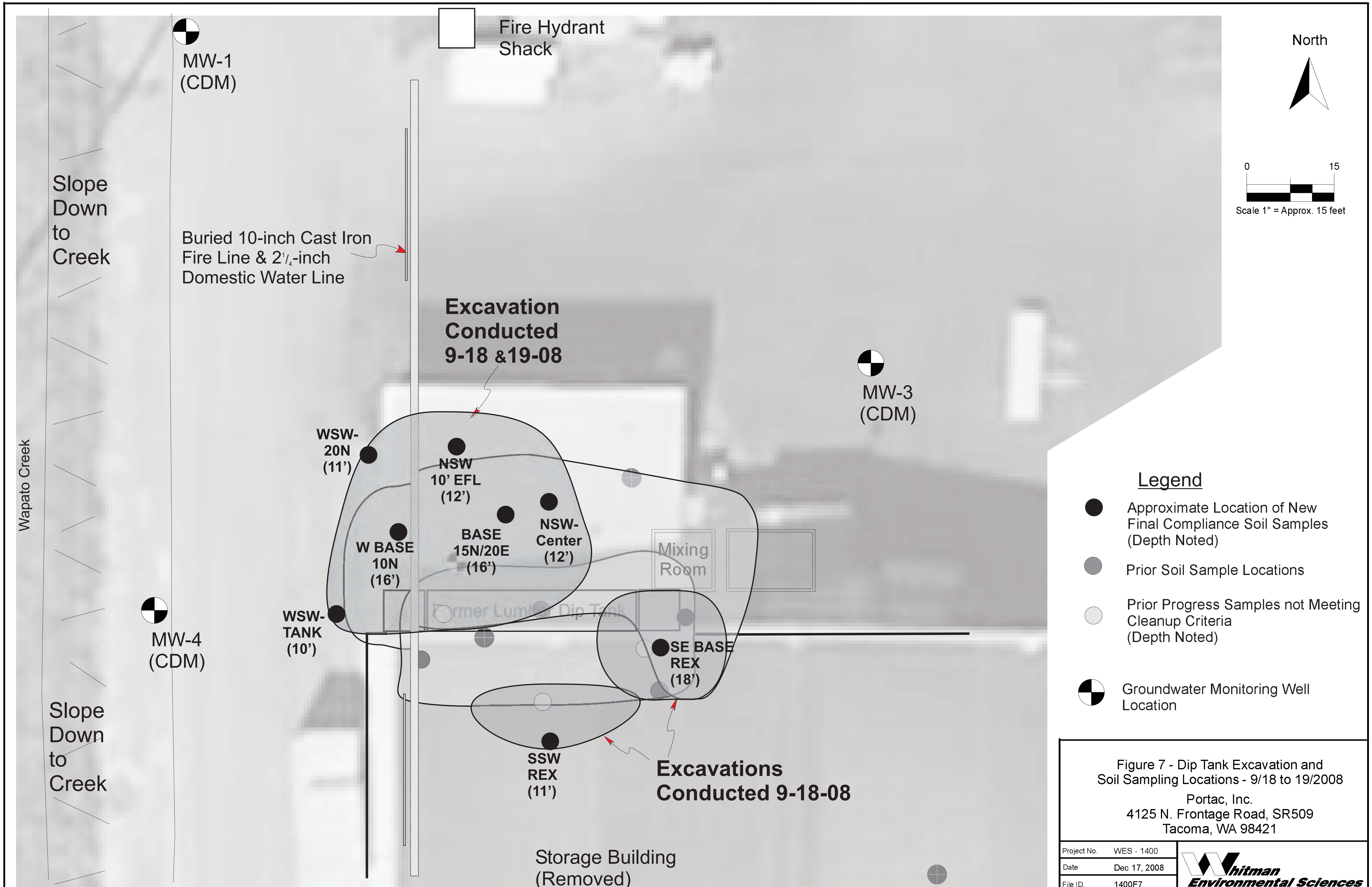


Figure 7 - Dip Tank Excavation and Soil Sampling Locations - 9/18 to 19/2008

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Dec 17, 2008
File ID.	1400F7

Whitman Environmental Sciences

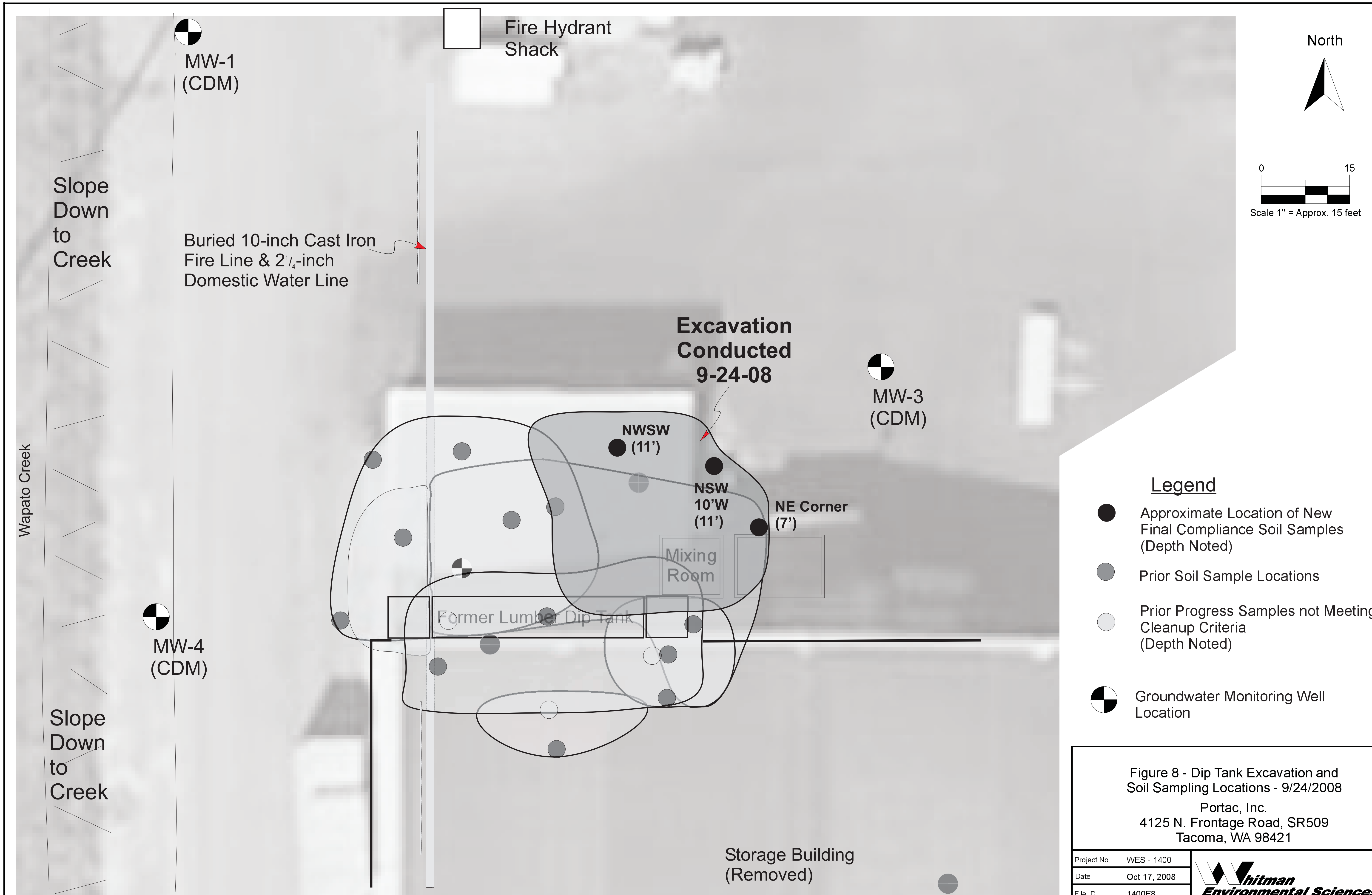


Figure 8 - Dip Tank Excavation and Soil Sampling Locations - 9/24/2008

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

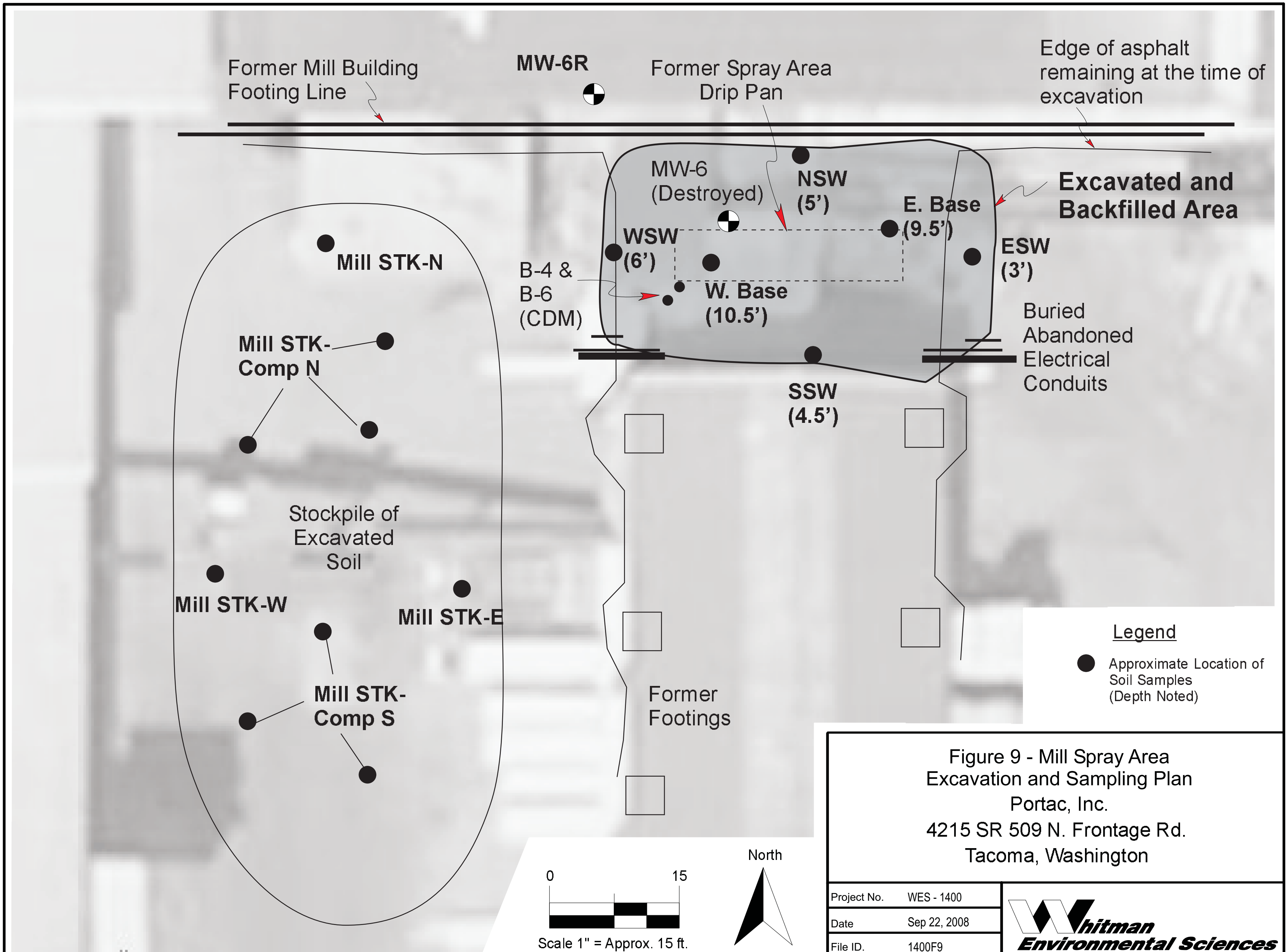


Figure 9 - Mill Spray Area
Excavation and Sampling Plan
Portac, Inc.
4215 SR 509 N. Frontage Rd.
Tacoma, Washington

Project No.	WES - 1400
Date	Sep 22, 2008
File ID.	1400F9

Whitman Environmental Sciences

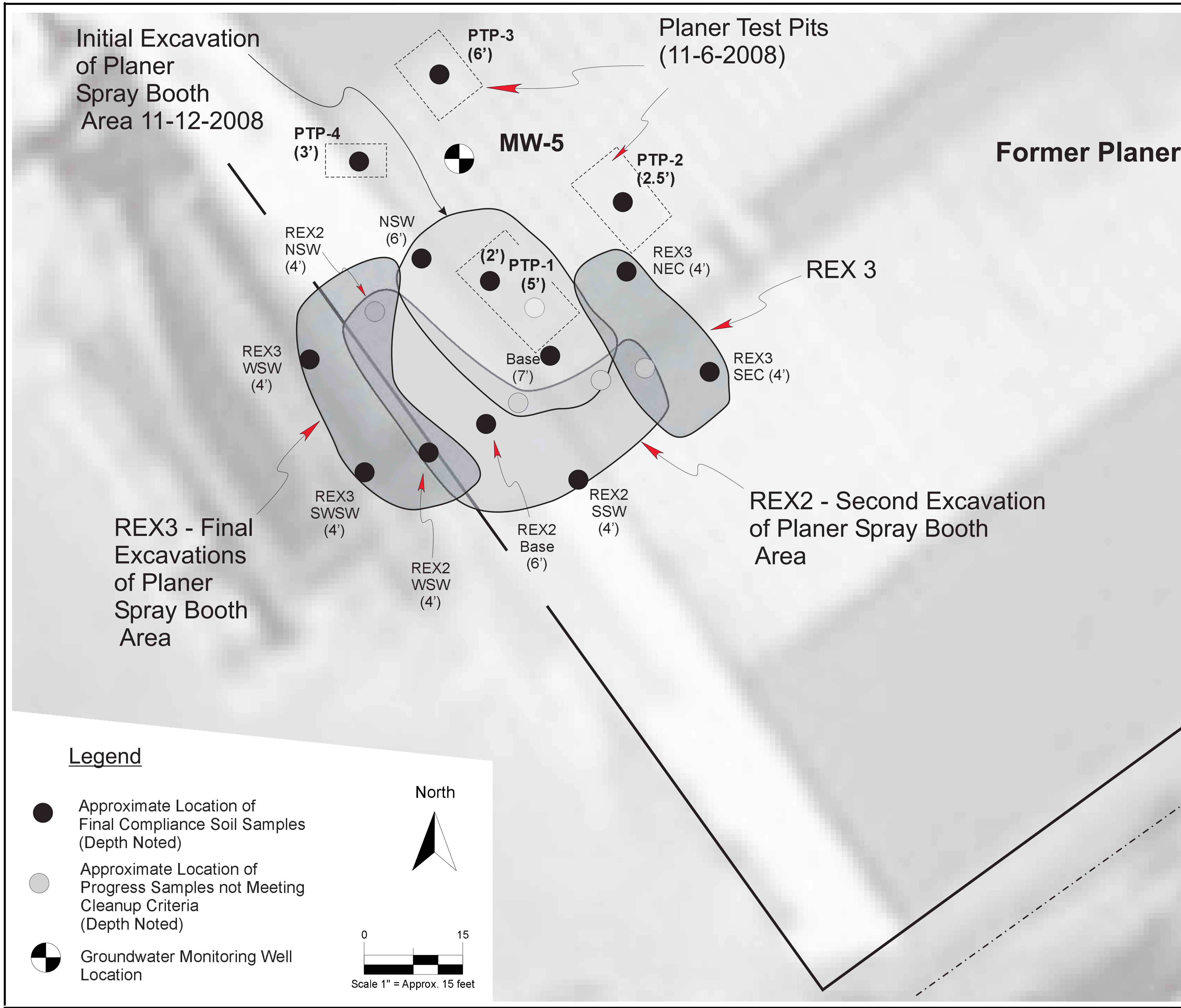


Figure 10 - Planer Spray Booth Excavation and Soil Sampling Locations

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
	Dec 17, 2008
File ID.	1400F10

Whitman Environmental Sciences

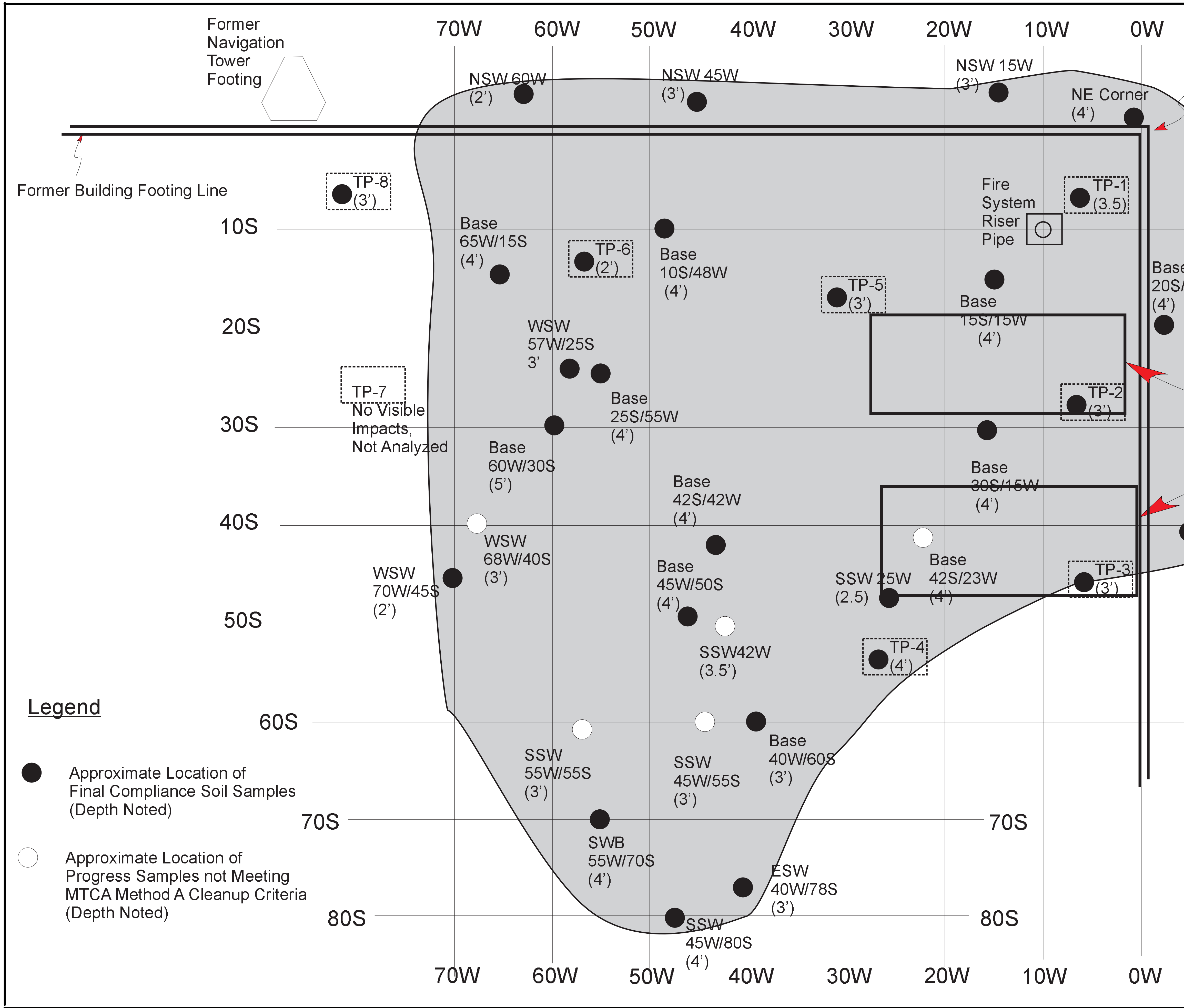


Figure 11 - Mill Hydraulic Equipment Area Excavation and Soil Sampling Locations

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Dec 11, 2008
File ID.	1400F11

Whitman Environmental Sciences

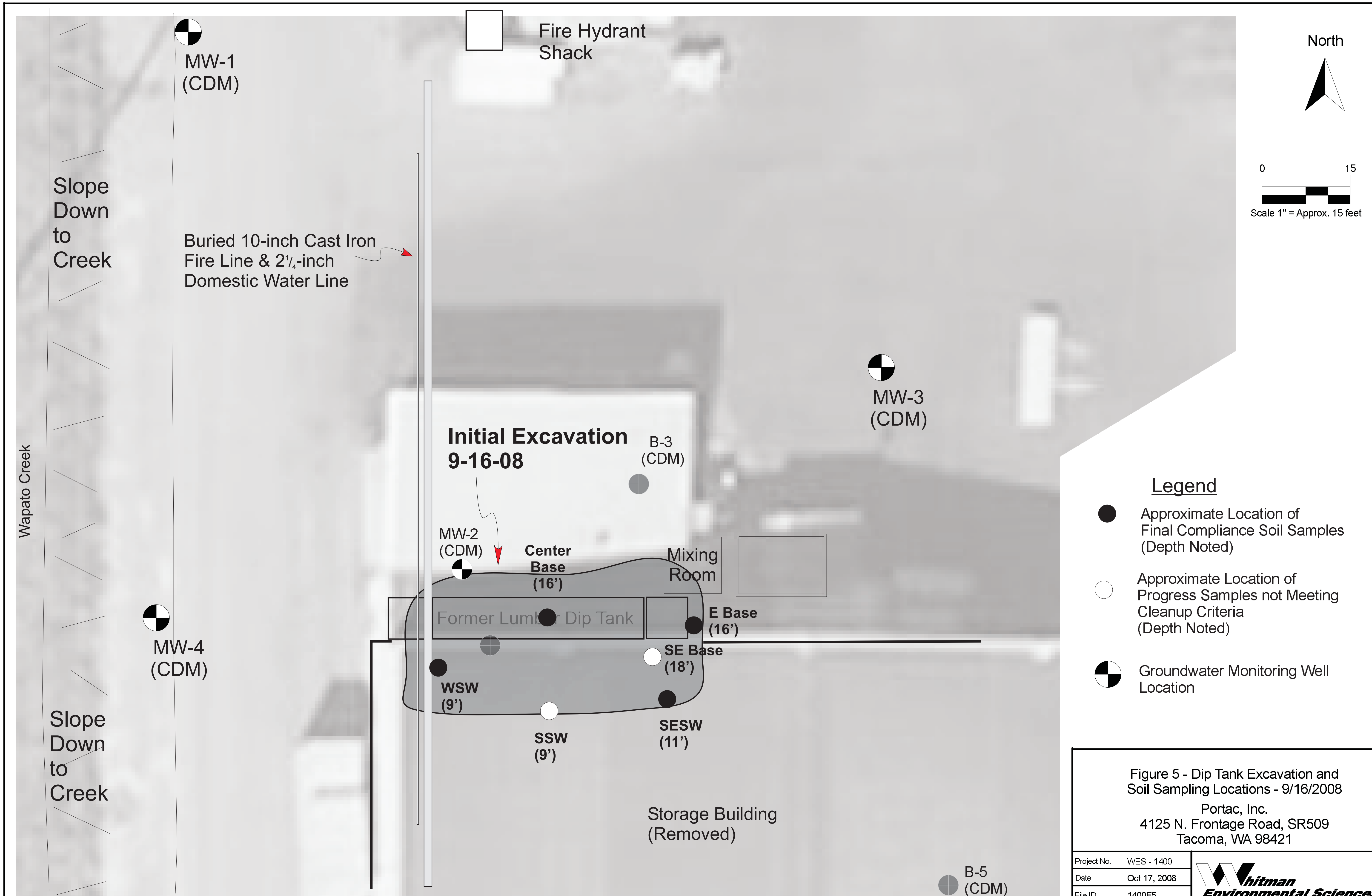


Figure 5 - Dip Tank Excavation and Soil Sampling Locations - 9/16/2008

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Oct 17, 2008
File ID.	1400F5

Whitman Environmental Sciences

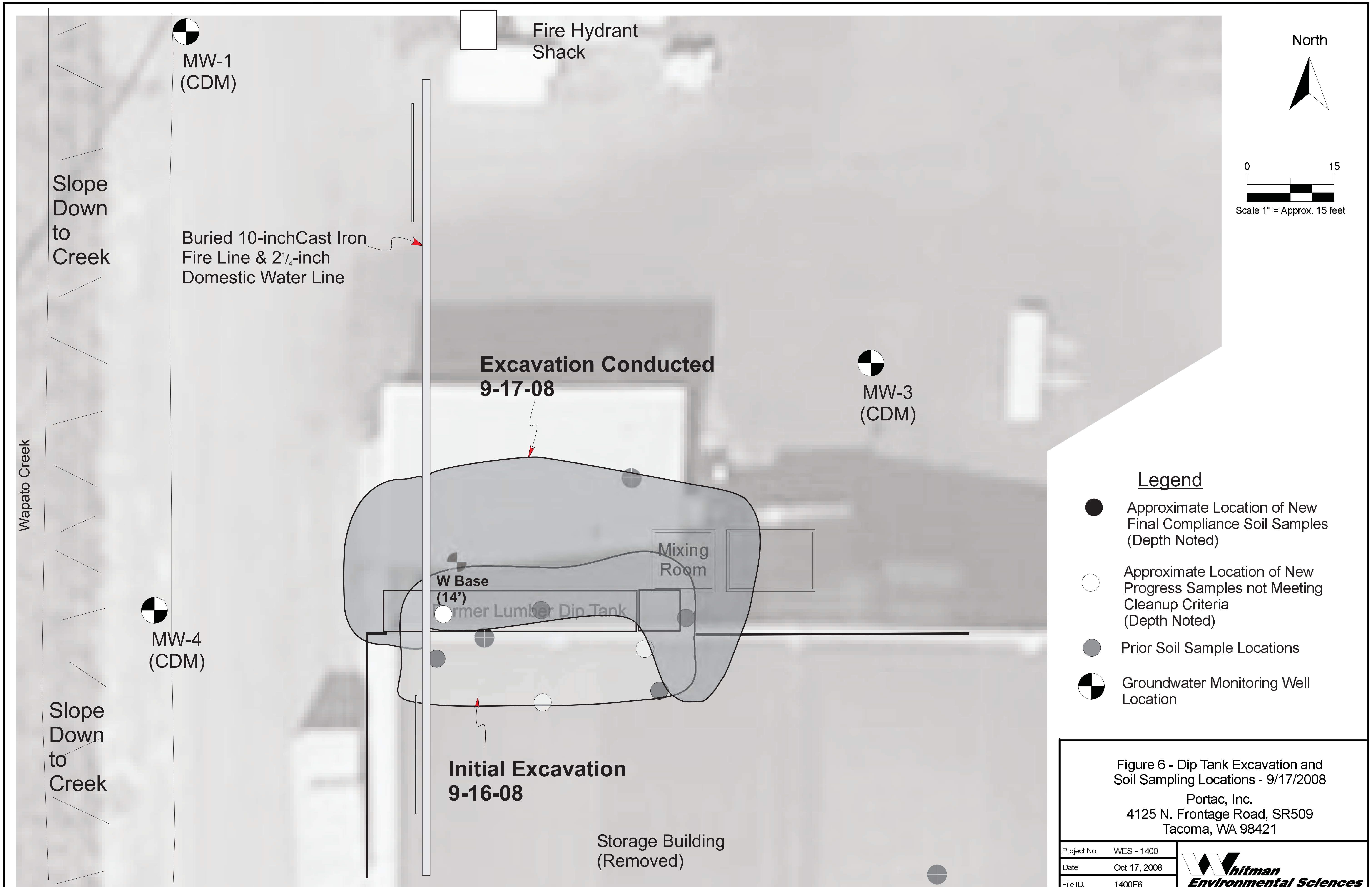


Figure 6 - Dip Tank Excavation and Soil Sampling Locations - 9/17/2008

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Oct 17, 2008
File ID.	1400F6

Whitman Environmental Sciences

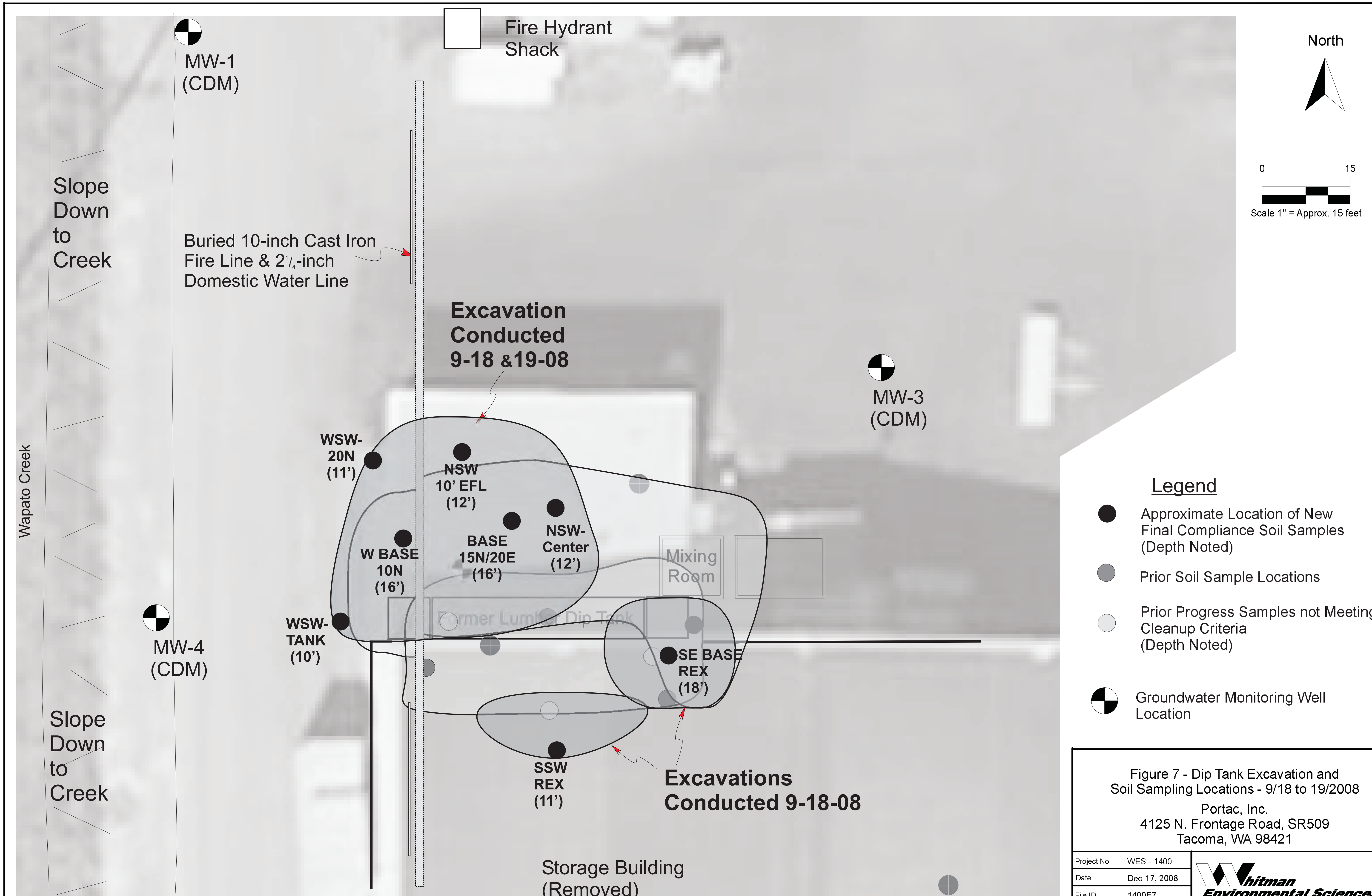


Figure 7 - Dip Tank Excavation and Soil Sampling Locations - 9/18 to 19/2008

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Dec 17, 2008
File ID.	1400F7

Whitman Environmental Sciences

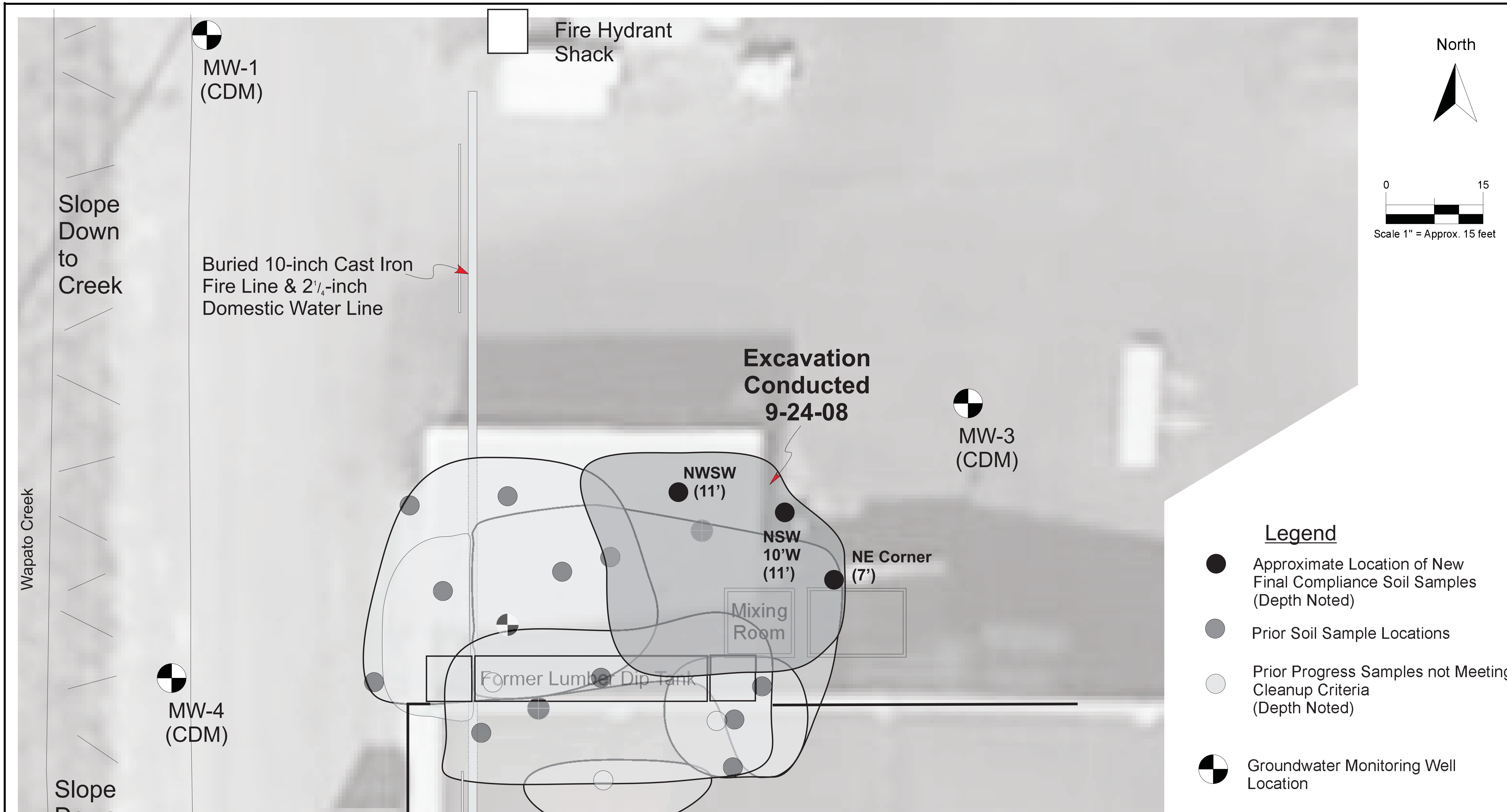


Figure 8 - Dip Tank Excavation and
Soil Sampling Locations - 9/24/2008

Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Oct 17, 2008
File ID.	1400F8

Whitman Environmental Sciences

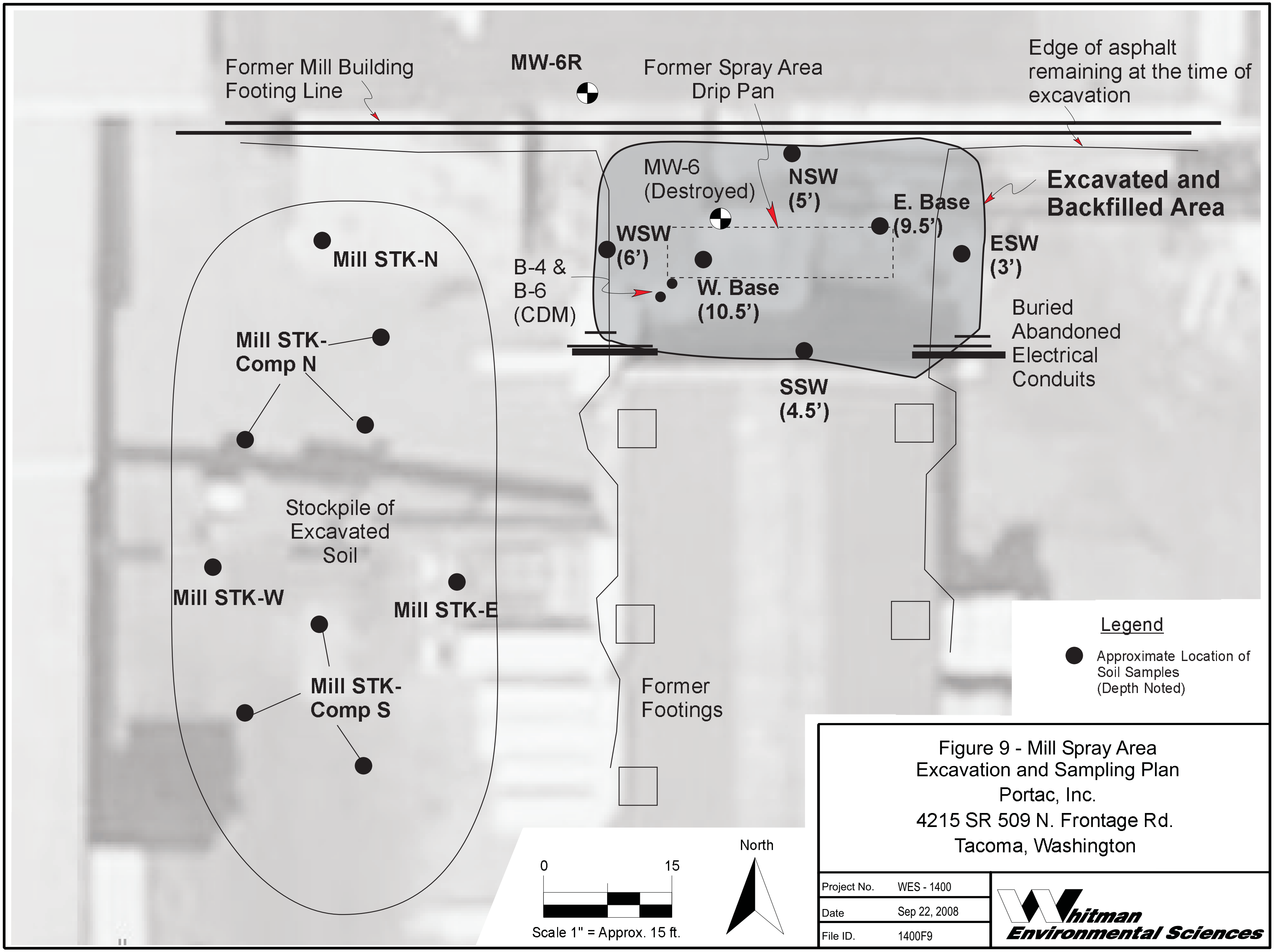


Figure 9 - Mill Spray Area
Excavation and Sampling Plan
Portac, Inc.
4215 SR 509 N. Frontage Rd.
Tacoma, Washington

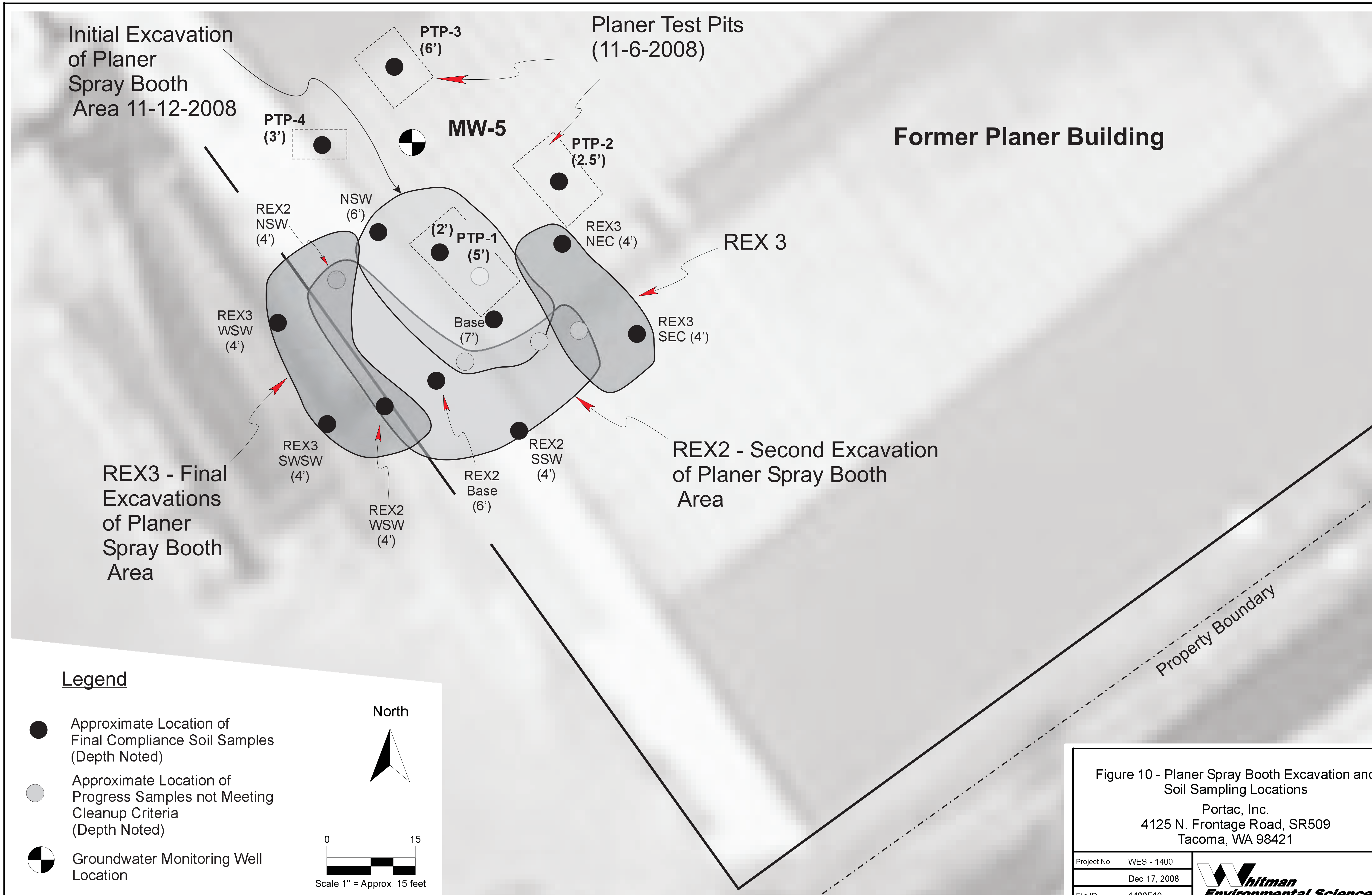
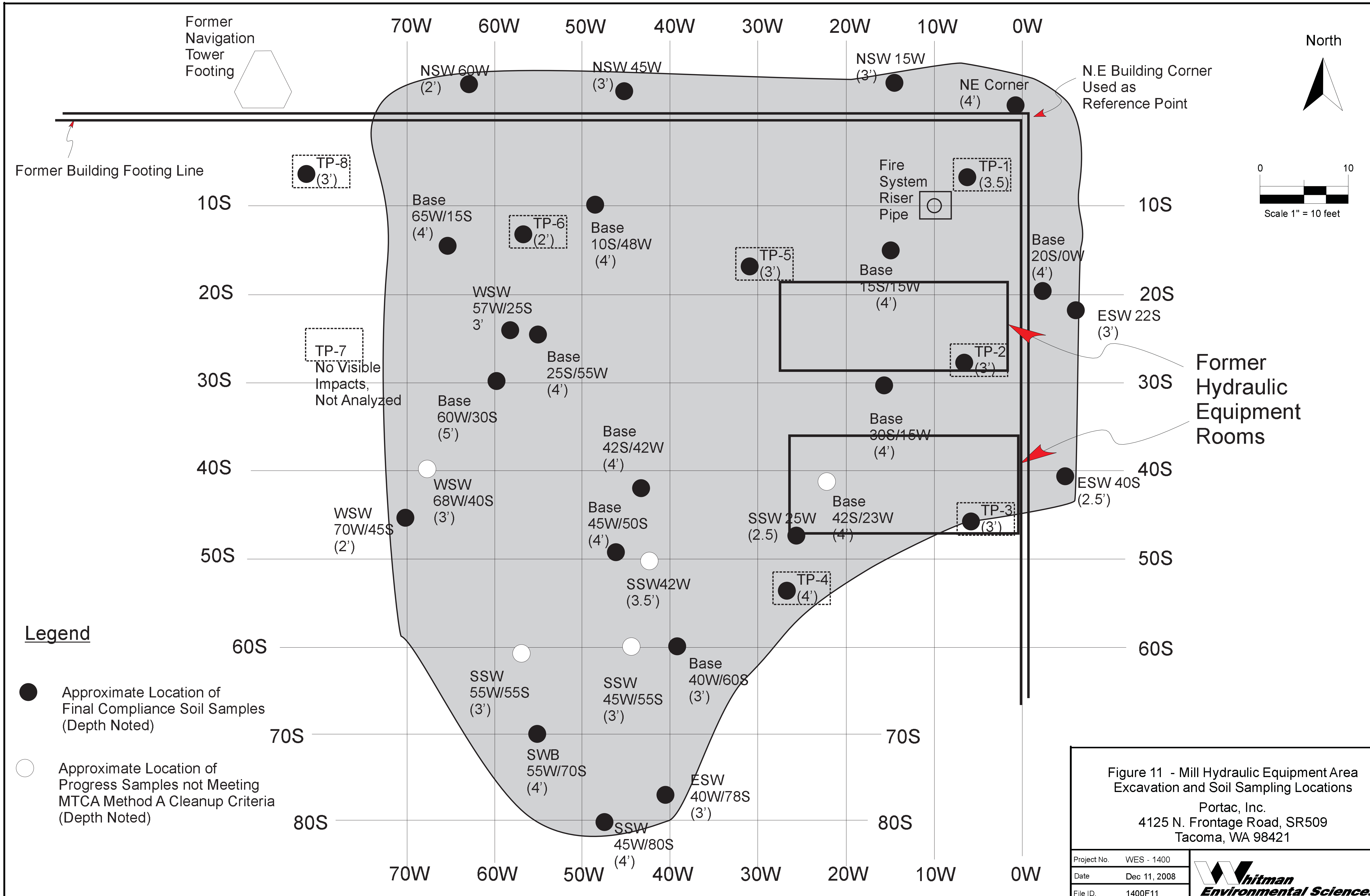


Figure 10 - Planer Spray Booth Excavation and Soil Sampling Locations
Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
	Dec 17, 2008
File ID.	1400F10

Whitman Environmental Sciences


Former Navigation Tower Footing
70W
60W
50W
40W
30W
20W
10W
0W
North
NSW 60W (2')
NSW 45W (3')
NSW 15W (3')
NE Corner (4')
N.E Building Corner Used as Reference Point
Former Building Footing Line
TP-8 (3')
Fire System Riser Pipe
TP-1 (3.5)
0
10
Scale 1" = 10 feet
10S
Base 65W/15S (4')
TP-6 (2')
Base 10S/48W (4')
TP-5 (3')
Base 15S/15W (4')
Base 20S/0W (4')
20S
WSW 57W/25S 3'
ESW 22S (3')
TP-7 No Visible Impacts, Not Analyzed
Base 25S/55W (4')
TP-2 (3')
Former Hydraulic Equipment Rooms
30S
Base 60W/30S (5')
Base 30S/15W (4')
Base 42S/42W (4')
40S
WSW 68W/40S (3')
ESW 40S (2.5')
WSW 70W/45S (2')
Base 45W/50S (4')
SSW 25W (2.5)
Base 42S/23W (4')
TP-3 (3')
50S
SSW42W (3.5')
TP-4 (4')
Legend
60S
SSW 55W/55S (3')
SSW 45W/55S (3')
Base 40W/60S (3')
Approximate Location of Final Compliance Soil Samples (Depth Noted)
70S
SWB 55W/70S (4')
Approximate Location of Progress Samples not Meeting MTCA Method A Cleanup Criteria (Depth Noted)
ESW 40W/78S (3')
80S
SSW 45W/80S (4')
Figure 11 - Mill Hydraulic Equipment Area Excavation and Soil Sampling Locations
Portac, Inc.
4125 N. Frontage Road, SR509
Tacoma, WA 98421
Project No. WES - 1400
Date Dec 11, 2008
File ID. 1400F11
Whitman Environmental Sciences

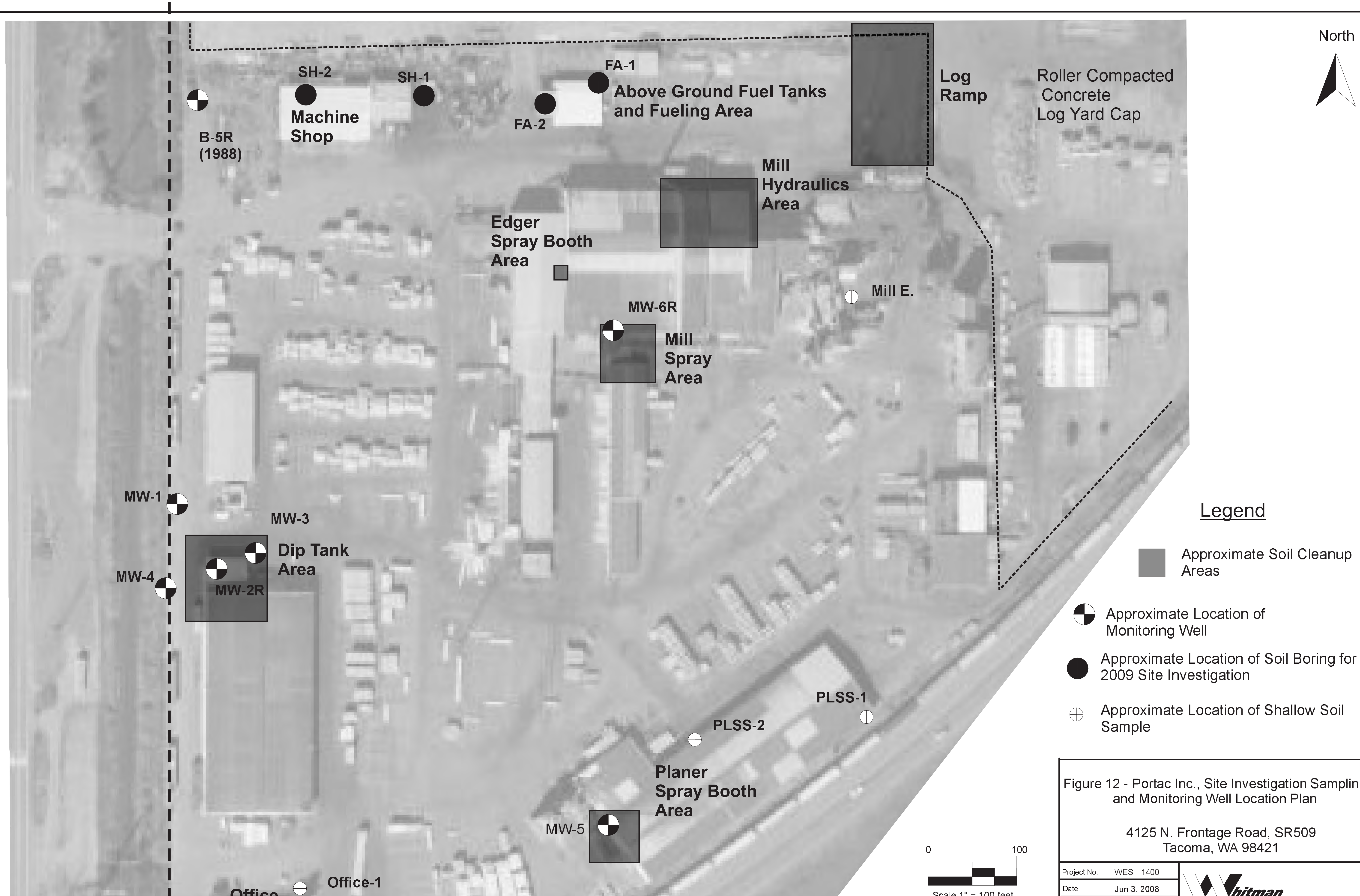


Figure 12 - Portac Inc., Site Investigation Sampling and Monitoring Well Location Plan

4125 N. Frontage Road, SR509
Tacoma, WA 98421

Project No.	WES - 1400
Date	Jun 3, 2008
File ID.	1400F13

Whitman Environmental Sciences

Table 1 – Total Organic Carbon Analyses
Former Portac, Inc. Site

Boring	***Depth Range (feet)***	***Total Organic Carbon (percent)***
OC-2	6-8	0.22
	8-10	0.30
	10-12	0.21
	12-16	0.18
OC-3	6-8	0.57
	8-12	0.34
	12-16	0.19
OC-4	6-8	0.35
	8-12	0.37
OC-5	4-8	0.22
	8-12	0.12
	12-16	0.05
	16-20	0.09
Mean Soil Organic Content:	6-8	0.34
Mean Soil Organic Content:	8-12	0.27
Mean Soil Organic Content:	12-16	0.14
Overall Mean Soil Organic Content:		0.25

The laboratory testing found organic carbon in the samples ranging from 0.09 to 0.57 percent. The samples demonstrated generally decreasing organic content with depth. Samples from depths of six to eight feet had an arithmetic mean soil organic content of 0.34 percent. The samples from eight to 12 feet and 12 to 16 feet had mean organic contents of 0.27 percent and 0.14 percent, respectively. The overall mean organic content was 0.25 percent.

The workbook model is based on determining the potential for contaminants held in soil to be desorbed into groundwater. Since the former contaminant sources at the Portac site were at shallow depths above the groundwater level, contaminant migration would be required to pass through the shallow soil where contaminant would have the tendency to bind to organic matter, before reaching the soil zones with lower carbon content. Because of this, the shallow soil mean organic content of 0.34 percent was used in the Workbook to calculate an appropriate soil cleanup level that would be protective of groundwater.

It should be noted that a prior test for total organic carbon was conducted on a sample of sediment in Wapato Creek, which was discussed in a prior report (WES, 2009). The organic content in that sample was 19%. Although not used for the Workbook calculation, that sample represents conditions at a potential discharge area where groundwater meets surface water and would acts as another zone of highly organic material that contaminants would need to pass through before coming into contact with surface water.

Table 2

Summary of Soil Testingl Results for Total Arsenic

			Boring ID and Total Arsenic Concentration																***MTCA Method C***
Layer/Material Sampled			**AQ-B1**	**AQ-B2**	**AQ-B3**	**AQ-B4**	**AQ-B5**	**AQ-B6**	**AQ-B7**	**AQ-B8**	**AQ-B9**	**AQ-B10**	**AQ-B11**	**AQ-B12**	**AQ-B13**	**AQ-B14**	**AQ-B15**	**AQ-B16**	***Cleanup Level***
	Depth to base of slag (inches):		**84**	**92**	**82**	**90**	**nv**	**84**	**80**	**85**	**87**	**106**	**70**	**113**	**80**	**87**	**80**	**89**	
Gravel base course layer	(6-12" above slag)	*mg/kg*	**3.2**	**3.3**	**4.0**	**3.4**	**4.3**	**3.4**	**3.9**	**2.8**	**4.4**	**3.2**	**3.0**	**3.5**	**3.1**	**4.5**	**3.6**	**3.6**	*88*
Wood/slag layer sample	(within slag layer)	*mg/kg*	--	--	**236**	--	--	**414**	--	--	--	--	--	--	--	--	--	--	*88*
Slag/soil transition layer	(0-6" below slag)	*mg/kg*	**272**	**210**	**437**	**398**	**2.0***	**347**	**328**	**334**	**340**	**390**	**433**	**316**	**386**	**96.4**	**244**	**430**	*88*
Soil beneath slag layer	(6-12" below slag)	*mg/kg*	**192**	**356**	**91**	**124**	**1.0***	**200**	**180**	**61**	**154**	**346**	**177**	**194**	**322**	**23.8**	**4.8**	**250**	*88*
Soil beneath slag layer	(12-18" below slag)	*mg/kg*	**167**	**253**	**333**	**684**		**9.4**	**66.4**		**59.7**	**711**	**4.2**	--	**68.1**		**0.9**	**305**	*88*
Soil beneath slag layer	(18-24" below slag)	*mg/kg*	**94.5**	**59.2**	**101**	**374**						--		--				**157**	*88*
Soil beneath slag layer	(24-30" below slag)	*mg/kg*			--	--						--						--	*88*
Soil beneath slag layer	(30-36" below slag)	*mg/kg*				--													*88*
Estimated depth to soil below MTCA Method C Cleanup Level (inches below slag)			18	18	24	30	0	12	12	6	12	24	12	18	12	6	6	24	
Depth interval meeting MTCA Method C Cleanup Level Confirmed? (yes/no)			yes	yes	no**	no***	yes	yes	yes	yes	yes	no***	yes	no***	yes	yes	yes	no**	
			Boring ID and Total Arsenic Concentration																***MTCA Method C***
Layer/Material Sampled			**AQ-B17**	**AQ-B18**	**AQ-B19**	**AQ-B20**	**AQ-B21**	**AQ-B22**	**AQ-B23**	**AQ-B24**	**AQ-B25**	**AQ-B26**	**AQ-B27**	**AQ-B28**	**AQ-B29**	**AQ-B30**	**AQ-B32**	**AQ-B33**	***Cleanup Level***
	Depth to base of slag (inches):		**74**	**72**	**48**	**102**	**85**	**91**	**82**	**100**	**48**	**110**	**58**	**84**	**77**	**62**	**78**	**57**	
Gravel base course layer	(6-12" above slag)	*mg/kg*	**8.1**	**3.9**	**3.3**	**4.0**	**3.8**	**3.8**	**3.9**	**3.4**	**3.9**	**3.0**	**3.1**	**4.2**	**8.4**	**3.8**	**3.7**	**3.1**	*88*
Wood/slag layer sample	(within slag layer)	*mg/kg*	**1910**	--	--	**1360**	--	--	**334**	--	--	--	--	--	--	--	--	**165**	*88*
Slag/soil transition layer	(0-6" below slag)	*mg/kg*	**185**	**282**	**5.1**	**236**	**544**	**288**	**298**	**271**	**240**	**600**	**337**	**304**	**22.9**	**486**	**97.8**	**7.7**	*88*
Soil beneath slag layer	(6-12" below slag)	*mg/kg*	**148**	**91**	**1.9**	**215**	**14.8**	**240**	**241**	**444**	**149**	**146**	**475**	**104**	**1.6**	**27.1**	**31.3**	**1.7**	*88*
Soil beneath slag layer	(12-18" below slag)	*mg/kg*	**151**	**21.1**		**172**		**357**	**130**	**405**	**109**	--	**224**	**90.1**	**1.1**	**6.3**	**3.3**	**0.7**	*88*
Soil beneath slag layer	(18-24" below slag)	*mg/kg*	**10.4**			--		**278**	**126**	**1480**	**125**		**91.9**						*88*
Soil beneath slag layer	(24-30" below slag)	*mg/kg*						--	--	--	--								*88*
Soil beneath slag layer	(30-36" below slag)	*mg/kg*						--		--									*88*
Estimated depth to soil below MTCA Method C Cleanup Level (inches below slag)			18	12	0	18	6	30	24	30	24	12	18	12	0	6	6	0	
Depth interval meeting MTCA Method C Cleanup Level Confirmed? (yes/no)			yes	yes	yes	no**	yes	no***	no**	no***	no**	no**	yes	yes	yes	yes	yes	yes	
Arsenic Concentration in Soil intervals meeting MTCA Method C Cleanup Level				36.9	average of 21 samples														
Average estimated depth to soil below MTCA Method C Cleanup Level (inches below slag)				14	average of 32 samples														

Notes:

- Gravel base course
- Fill containing slag
- Estimated top of depth interval meeting MTCA Method C Cleanup Level

Black Result complies with the MTCA Method C Cleanup Level

Blue Result exceeds the MTCA Method C Cleanup Level on a point by point basis but soils comply with MTCA compliance tests at at the Method C Cleanup Level considering existing data along with the previous Landau soil testing data

Red Result exceeds the MTCA Method C Cleanup Level based on MTCA compliance tests

mg/kg milligram per kilogram dry weight

MTCA Model Toxics Control Act

* Sample interval was disturbed.

no** Deepest sample analyzed exceeded the cleanup level by less than two times. Contaminated layer assumed to extend to base of sample.

no*** Deepest sample analyzed exceeded the cleanup level by more than two times. Contaminated layer assumed to extend to base of next sample interval (i.e., additional 6 inches assumed to be contaminated).

Table 3
Summary of Previous Soil Testing Data for Total Arsenic (Landau 2013)

		Boring ID and Total Arsenic Concentration (mg/kg)															*MTCA Method C*
Layer/Material Sampled		PORTAC-01	PORTAC-02	PORTAC-03	PORTAC-04	PORTAC-05	PORTAC-06	PORTAC-07	PORTAC-08	PORTAC-09	PORTAC-10	PORTAC-11	PORTAC-12	PORTAC-13	PORTAC-14	PORTAC-15	*Cleanup Level*
Depth to base of slag (inches)		48	68	52	31	38	65	65	95	83	83	71	36	82	77	78	*88*
>12" above slag	*mg/kg*	--	5.4	--	--	--	4.2*			2.6*	3.3*	--	--	--	--	--	*88*
>6" above slag	*mg/kg*	3.9	4.6	3.2	4.4*	3.2*	--	6.5*	3.9*	--	--	--	5.0	5.8	3.5	9.0	*88*
<6" above slag	*mg/kg*	4.5	--	3.7	4.4*	**103***	3.9*	3.7*	3.2*	3.8*	4.1*	3.2	9.2	3.9	4.5	41.9	*88*
Wood/slag layer sample	*mg/kg*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	*88*
0-6" below slag	*mg/kg*	--	--	--	**5.4**	**2.6**	**6.9**	**230**	**615**	**151**	--	**62.8**	**86.4**	**24.3**	**172**	**359**	*88*
6-12" to 8-14" below slag	*mg/kg*	--	--	--	--	--	**1.1**	**46.2**	**137**	--	--	--	--	--	--	--	*88*
10-16" to 12-18" below slag	*mg/kg*	--	**7.0**	--	**1.0**	--	--	--	**68.6**	**25.7**	**71.3**	--	--	--	--	--	*88*
>15" below slag	*mg/kg*	--	**9.1**	**1.6**	--	--	**7.0**	--	--	**3.9**	--	--	--	**11**	--	--	*88*
>24" below slag	*mg/kg*	--	**2.6**	**2.4**	--	**35.8**	--	--	**18.3**	--	--	--	**6.0**	--	--	--	*88*
>30"below slag	*mg/kg*	**2.4**	**4.3**	**2.3**	**0.6**	**1.4**	--	**62.4**		**25.0**	--	--	**4.3**	--	--	--	*88*
>40"below slag	*mg/kg*	--					--				--	--	--	--	**86.4**	**1.4**	*88*
>50"below slag	*mg/kg*	--			--	--	--	--			--	--	**1.1**	--	--	--	*88*
>60"below slag	*mg/kg*	--			**4.9**	**2.3**	--	**3.7**			**1.9**	--		--	--	--	*88*
>70"below slag	*mg/kg*	**1.4**									--	**2.2**		**1.2**	--	--	*88*
>90"below slag	*mg/kg*	--									--	**3.0**		--	**2.9**	**2.8**	*88*
>100"below slag	*mg/kg*	--									**3.8**	--		**4.1**	**24.6**	**6.2**	*88*
>120"below slag	*mg/kg*	--									**4.9**	--					*88*
>140"below slag	*mg/kg*	**1.2**										**41.4**					*88*
>150"below slag	*mg/kg*	**2.1**															*88*
Estimated depth to soil below MTCA Method C Cleanup Level (inches below slag)		< 30 *	< 12	< 15	0	0	0	8	12	10	< 11	0	0	0	< 40*	< 40*	
Depth interval meeting MTCA Method C Cleanup Level Confirmed? (yes/no)		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
Average Arsenic Concentration in Soil intervals meeting MTCA Method C Cleanup Level		33.3	average of 15 samples														
Average estimated depth to soil below MTCA Method C Cleanup Level (inches below slag)		6	average of 12 samples														

Notes:

- C30Estimated top of depth interval meeting MTCA Method C Cleanup Level

- Gravel base course

- Fill containing slag

Black Result complies with the MTCA Method C Cleanup Level

Blue Result exceeds the MTCA Method C Cleanup Level on a point by point basis but soils comply with MTCA compliance tests at at the Method C Cleanup Level

Red Result exceeds the MTCA Method C Cleanup Level based on MTCA compliance tests

mg/kg milligram per kilogram dry weight

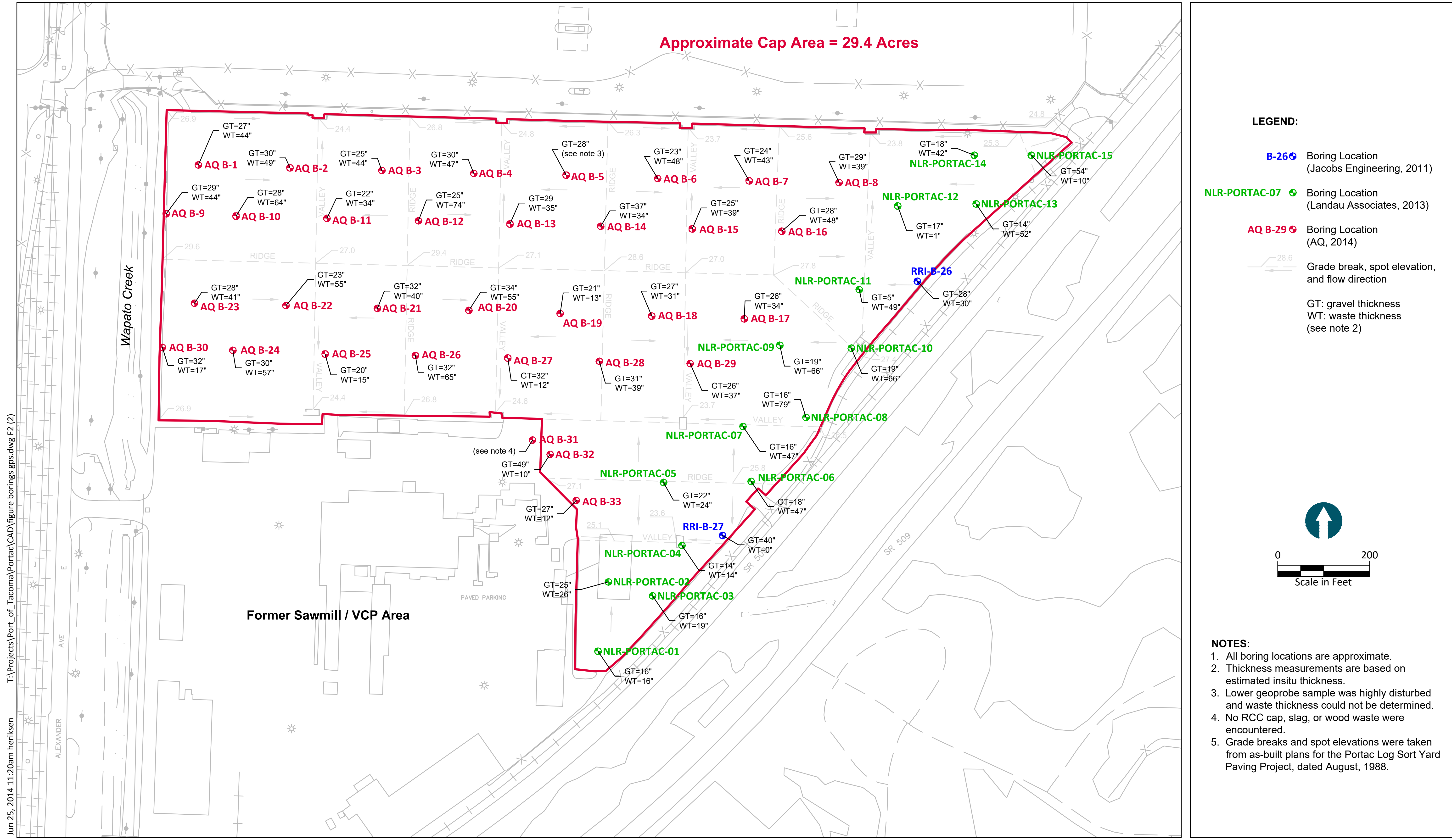
MTCA Model Toxics Control Act

* sample not used in estimate of average thickness due to lack of sampling data in first 1-2 feet below slag layer.

Table 4
TCLP Analytical Results for Wood Waste/Slag Layer Samples

Parameter	Sample ID and Measured TCLP Leachate Concentration (mg/L)						80% Upper Confidence Limit [1]	Regulatory Level[2]
	AQ-B3-48-58	AQ-B6-48-58	AQ-B17-60-70	AQ-B20-85-95	AQ-B23-56-66	AQ-B33-45-57		
Arsenic	1.2	1.2	3.3	5.0	2.3	0.4	3.1	5.0
Barium	0.03	0.07	0.12	0.04	0.09	0.13	nc	100
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	nc	1.0
Chromium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	nc	5.0
Lead	<0.1	<0.1	2.9	0.2	<0.1	<0.1	nc	5.0
Mercury	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	nc	0.2
Selenium	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	nc	1.0
Silver	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	nc	5.0

Notes:
All results are presented as mg/L (milligrams per liter of TCLP leachate)
nc - not calculated
TCLP - toxicity characteristic leaching procedure
1 - Consistent with Washington Dangerous Waste (WAC 173-303) and Federal Hazardous Waste characterization requirements, the point of comparison for the TCLP test is the 80% upper confidence limit around the mean, calculated with the assumption of normally-distributed data (SW-846 Chapter 9).
2 - Toxicity characteristic, Code of Federal Regulations (CFR), Title 40, Part 261.24, Subpart C

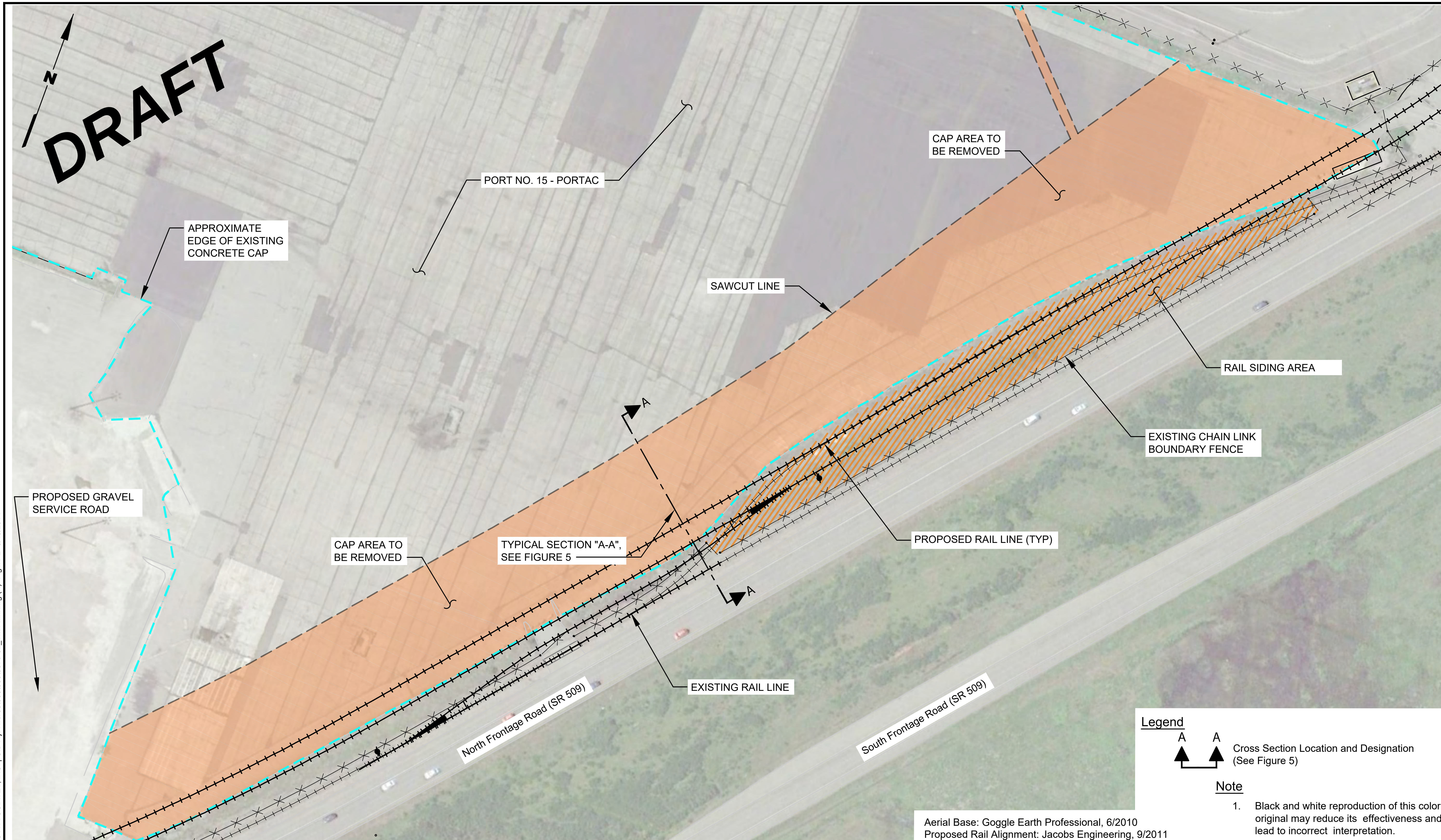


NOTES:

1. All boring locations are approximate.
2. Thickness measurements are based on estimated insitu thickness.
3. Lower geoprobe sample was highly disturbed and waste thickness could not be determined.
4. No RCC cap, slag, or wood waste were encountered.
5. Grade breaks and spot elevations were taken from as-built plans for the Portac Log Sort Yard Paving Project, dated August, 1988.

ANCHOR QEA

Figure 2
Boring Locations
Log Yard Soil Testing Report
Former Portac Inc. Site – Tacoma, Washington



Legend

A A Cross Section Location and Designation (See Figure 5)

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

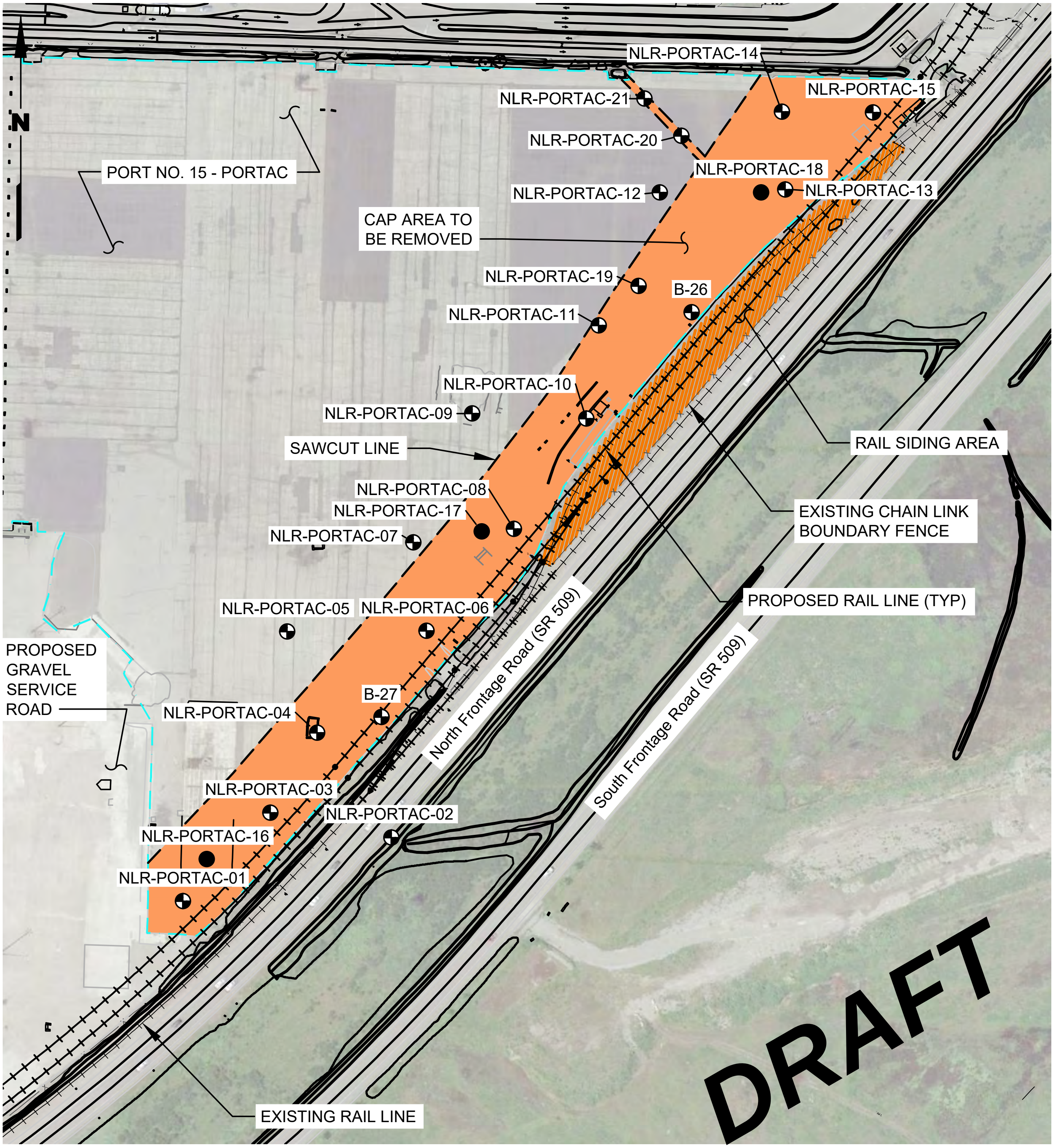
Aerial Base: Goggle Earth Professional, 6/2010
Proposed Rail Alignment: Jacobs Engineering, 9/2011
Existing Surface Information: Jacobs Engineering, 9/2011

0 100 200
Scale in Feet

LANDAU ASSOCIATES, INC. | G:\Projects\1168\008\060\067\F02_SitePlan.dwg (A) "Figure 2" 6/19/2014

LANDAU ASSOCIATES

Port of Tacoma North Lead Rail Improvements Tacoma, Washington	**Site Plan**	Figure 2



LANDAU ASSOCIATES, INC. | G:\Projects\168\008\060\067\F03_04_Explorations.dwg (A) "Figure 3" 6/23/2014

Legend

NLR-PORTAC-16 ● Well/Piezometer Location and Designation

NLR-PORTAC-01/B-27 ⊕ Boring Location and Designation

0 200 400

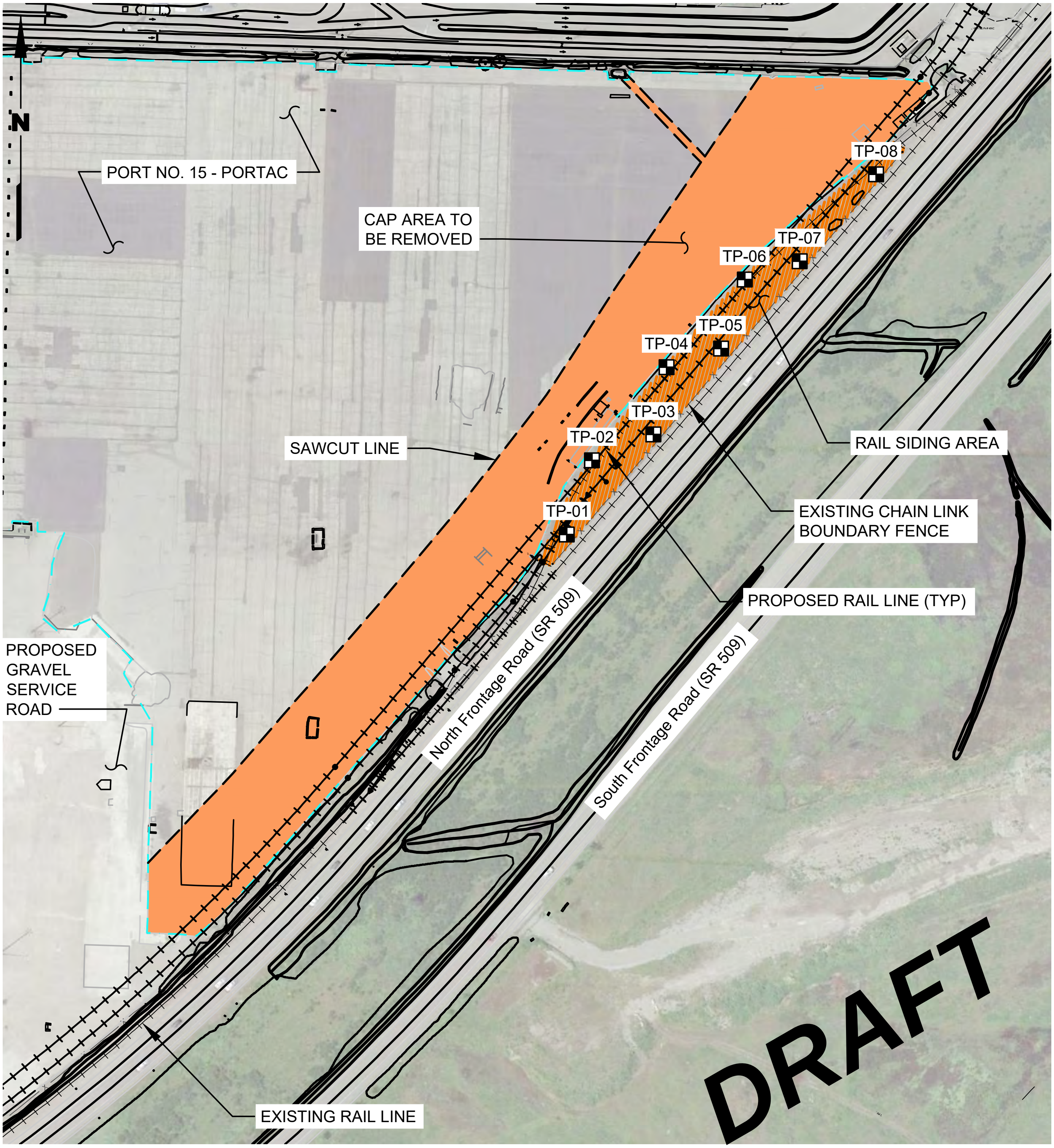
Scale in Feet

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Aerial Base: Goggle Earth Professional, 6,2010
Proposed Rail Alignment: Jacobs Engineering, 9/2011
Existing Surface Information: Jacobs Engineering, 9/2011

LANDAU ASSOCIATES	Port of Tacoma North Lead Rail Improvements Tacoma, Washington	**Well/Piezometer and Boring Locations**	Figure 3



Legend

Test Pit Location and Designation

0 200 400

Scale in Feet

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Aerial Base: Goggle Earth Professional, 6,2010
Proposed Rail Alignment: Jacobs Engineering, 9/2011
Existing Surface Information: Jacobs Engineering, 9/2011

LANDAU ASSOCIATES, INC. | G:\Projects\168\008\060\067\F03_04_Explorations.dwg (A) "Figure 4" 6/23/2014

LANDAU ASSOCIATES

Port of Tacoma North Lead Rail Improvements Tacoma, Washington	**Test Pit Locations**	Figure 4

TABLE 1
INVESTIGATION LOCATION COORDINATES
PORTAC CAP INVESTIGATION
NORTH RAIL LEAD IMPROVEMENTS
PORT OF TACOMA, WASHINGTON

Name	Northing (WA83SF)	Easting (WA83SF)	Elevation (Jacob's 2013) (a)
Borings and Piezometers			
PORTAC-01	704592.2775	1176464.066	24.7
PORTAC-02	704743.9761	1176487.264	24.0
PORTAC-03	704713.4813	1176583.573	23.2
PORTAC-04	704822.9858	1176647.543	22.0
PORTAC-05	704961.1686	1176606.525	23.0
PORTAC-06	704962.1974	1176797.025	23.7
PORTAC-07	705083.4343	1176779.162	22.7
PORTAC-08	705101.7558	1176916.703	24.1
PORTAC-09	705259.6418	1176859.29	24.2
PORTAC-10	705252.9078	1177015.275	25.1
PORTAC-11	705380.013	1177032.467	24.7
PORTAC-12	705562.2738	1177116.091	23.7
PORTAC-13	705566.22	1177287.241	23.9
PORTAC-14	705672.6219	1177283.023	23.3
PORTAC-15	705671.5684	1177407.462	23.3
PORTAC-16	704649.6867	1176496.628	24.2
PORTAC-17	705098.2353	1176872.26	23.5
PORTAC-18	705562.1193	1177254.28	23.9
PORTAC-19	705434.276	1177087.063	24.3
PORTAC-20	705639.766	1177145.649	23.1
PORTAC-21	705690.6038	1177094.986	22.5
B-18	705565.0034	1177252.94	23.9
RRI-B-26	705397.9446	1177159.446	24.8
RRI-B-27	704844.3989	1176735.263	23.2
Rail Spur Test Pits			
TP-1	705099.909	1176991.511	18.8
TP-2	705192.0965	1177039.969	19.4
TP-3	705236.3507	1177105.331	18.3
TP-4	705314.293	1177144.399	19.0
TP-5	705351.38	1177196.927	18.9
TP-6	705435.2059	1177246.599	19.3
TP-7	705467.0255	1177301.919	18.9
TP-8	705582.9548	1177403.624	18.8

(a) Elevation determined utilizing a digital surface file provided by Jacobs Engineering in October 2013 (NAVD88).

TABLE 2
SOIL ANALYTICAL RESULTS -
NORTH RAIL LEAD IMPROVEMENTS
PORT OF TACOMA, WASHINGTON

Sample ID	Laboratory ID	Sample Date	Soil Layer	Arsenic (mg/kg) EPA 200.8	Copper (mg/kg) EPA 200.8	Lead (mg/kg) EPA 200.8	Zinc (mg/kg) EPA 200.8
			Project Screening Level:	88 mg/kg			
SS-PORTAC-01(1.4-1.9)	WG71L	03/05/2013	Gravel Base Course	3.9			
SS-PORTAC-01(1.9-2.4)	WG71K	03/05/2013	Gravel Base Course	4.5			
SS-PORTAC-01(7.2-7.7)	WG71H	03/05/2013	Fill Soil	2.4			
SS-PORTAC-01(10-10.5)	WG71M	03/05/2013	Native Soil	1.4			
SS-PORTAC-01(15-15.5)	WG71I	03/05/2013	Native Soil	1.2			
SS-PORTAC-01(17.5-18)	WG71J	03/05/2013	Native Soil	2.1			
SS-PORTAC-02(1.4-1.9)	WG71N	03/05/2013	Gravel Base Course	5.4			
SS-PORTAC-02(2.1-2.6)	WG71G	03/05/2013	Gravel Base Course	4.6			
SS-PORTAC-02(6.6-7.1)	WG71F	03/05/2013	Fill Soil	7.0			
SS-PORTAC-02(7.1-7.6)	WG71O	03/05/2013	Fill Soil	9.1			
SS-PORTAC-02(8-8.5)	WG71Q	03/05/2013	Fill Soil	2.6			
SS-PORTAC-02(8.5-9)	WG71P	03/05/2013	Native Soil	4.3			
SS-PORTAC-03(1.4-1.9)	WG72G	03/05/2013	Gravel Base Course	3.2			
SS-PORTAC-03(1.9-2.4)	WG72J	03/05/2013	Gravel Base Course	3.7			
SS-PORTAC-03(5.7-6.3)	WG72A	03/05/2013	Fill Soil	1.6			
SS-PORTAC-03(6.5-7)	WG71R	03/05/2013	Fill Soil	2.4			
SS-PORTAC-03(7.5-8)	WG72F	03/05/2013	Fill Soil	2.3			
SS-PORTAC-03(8-8.5)	WG72K	03/05/2013	Native Soil	4.1			
SS-PORTAC-04(1.4-1.9)	WG72H	03/05/2013	Gravel Base Course	4.4			
SS-PORTAC-04(2-2.5)	WG72I	03/05/2013	Gravel Base Course	4.4			
SS-PORTAC-04(2.6-3.1)	WG72B	03/05/2013	Fill Soil	5.4			
SS-PORTAC-04(3.5-4)	WG72C	03/05/2013	Fill Soil	1.0			
SS-PORTAC-04(5.5-6)	WG72E	03/05/2013	Fill Soil	0.6			
SS-PORTAC-04(7.7-8.3)	WG72D	03/05/2013	Native Soil	4.9			
SS-PORTAC-05(1.2-1.7)	WG72M	03/05/2013	Gravel Base Course	3.2			
SS-PORTAC-05(2.5-3)	WG72N	03/05/2013	Gravel Base Course	**103**			
SS-PORTAC-05(3.2-3.8)	WG72O	03/05/2013	Fill Soil	2.6			
SS-PORTAC-05(5-5.5)	WG72L	03/05/2013	Fill Soil	35.8			
SS-PORTAC-05(6.4-7)	WG72P	03/05/2013	Native Soil	1.4			
SS-PORTAC-05(8.5-9)	WG72Q	03/05/2013	Native Soil	2.3			
SS-PORTAC-06(1.5-2)	WG70K	03/06/2013	Gravel Base Course	4.2			
SS-PORTAC-06(2.5-3)	WG70J	03/06/2013	Gravel Base Course	3.9			
SS-PORTAC-06(5.4-6)	WG70G	03/06/2013	Fill Soil	6.9			
SS-PORTAC-06(6-6.7)	WG70H	03/06/2013	Fill Soil	1.1			
SS-PORTAC-06(6.7-7.3)	WG70I	03/06/2013	Native Soil	7.0			
SS-PORTAC-07(1.5-2)	WG71C	03/06/2013	Gravel Base Course	6.5			

TABLE 2
SOIL ANALYTICAL RESULTS -
NORTH RAIL LEAD IMPROVEMENTS
PORT OF TACOMA, WASHINGTON

Sample ID	Laboratory ID	Sample Date	Soil Layer	Arsenic (mg/kg) EPA 200.8	Copper (mg/kg) EPA 200.8	Lead (mg/kg) EPA 200.8	Zinc (mg/kg) EPA 200.8
			Project Screening Level:	88 mg/kg			
SS-PORTAC-07(2.3-2.8)	WG71B	03/06/2013	Gravel Base Course	3.7			
SS-PORTAC-07(5.4-6.1)	WG70P	03/06/2013	Fill Soil	**230**			
SS-PORTAC-07(6.1-6.6)	WG71D	03/06/2013	Fill Soil	46.2			
SS-PORTAC-07(8.2-8.7)	WG71E	03/06/2013	Fill Soil	62.4			
SS-PORTAC-07(10.9-11.4)	WG70Q	03/06/2013	Native Soil	3.7			
SS-PORTAC-08(1.3-1.8)	WG70O	03/06/2013	Gravel Base Course	3.9			
SS-PORTAC-08(2.1-2.6)	WG70N	03/06/2013	Gravel Base Course	3.2			
SS-PORTAC-08(7.9-8.4)	WG70M	03/06/2013	Fill Soil	**615**			
SS-PORTAC-08(8.4-8.9)	WG70L	03/06/2013	Fill Soil	**137**			
SS-PORTAC-08(8.9-9.3)	WG70R	03/06/2013	Fill Soil	68.6			
SS-PORTAC-08(10-10.5)	WG71A	03/06/2013	Native Soil	18.3 J			
SS-PORTAC-09(1.4-1.9)	WG73N	03/06/2013	Gravel Base Course	2.6			
SS-PORTAC-09(2.5-3)	WG73M	03/06/2013	Gravel Base Course	3.8			
SS-PORTAC-09(6.9-7.4)	WG73K	03/06/2013	Fill Soil	**151**			
SS-PORTAC-09(7.7-8.2)	WG73L	03/06/2013	Fill Soil	25.7			
SS-PORTAC-09(8.5-9)	WG73O	03/06/2013	Fill Soil	3.9			
SS-PORTAC-09(10-10.5)	WG73J	03/06/2013	Native Soil	25.0			
SS-PORTAC-10(1.4-1.9)	WG73R	03/06/2013	Gravel Base Course	3.3			
SS-PORTAC-10(2.5-3)	WG73Q	03/06/2013	Gravel Base Course	4.1			
SS-PORTAC-10(7.8-8.8)	WG74A	03/06/2013	Native Soil	71.3 J			
SS-PORTAC-10(12-13)	WG74D	03/06/2013	Native Soil	1.9			
SS-PORTAC-10(17-17.5)	WG74E	03/06/2013	Native Soil	4.9			
SS-PORTAC-10(15.9-16.9)	WG73P	03/06/2013	Native Soil	3.8			
SS-PORTAC-11(1.8-2.2)	WG74P	03/06/2013	Gravel Base Course	3.2			
SS-PORTAC-11(5.9-6.4)	WG74I	03/06/2013	Fill Soil	62.8			
SS-PORTAC-11(11.8-12.3)	WG74H	03/06/2013	Native Soil	2.2			
SS-PORTAC-11(13.5-14)	WG74F	03/06/2013	Native Soil	3.0			
SS-PORTAC-11(17.6-18.1)	WG74G	03/06/2013	Native Soil	41.4			
SS-PORTAC-12(1.5-2)	WG74M	03/07/2013	Gravel Base Course	5.0			
SS-PORTAC-12(2.4-2.9)	WG74O	03/07/2013	Gravel Base Course	9.2			
SS-PORTAC-12(3-3.5)	WG74N	03/07/2013	Fill Soil	86.4			
SS-PORTAC-12(5-5.5)	WG74L	03/07/2013	Fill Soil	6.0			
SS-PORTAC-12(6.1-6.6)	WG74K	03/07/2013	Fill Soil	4.3			
SS-PORTAC-12(7.4-7.9)	WG74J	03/07/2013	Native Soil	1.1			

TABLE 2
SOIL ANALYTICAL RESULTS -
NORTH RAIL LEAD IMPROVEMENTS
PORT OF TACOMA, WASHINGTON

Sample ID	Laboratory ID	Sample Date	Soil Layer	Arsenic (mg/kg) EPA 200.8	Copper (mg/kg) EPA 200.8	Lead (mg/kg) EPA 200.8	Zinc (mg/kg) EPA 200.8
			Project Screening Level:	88 mg/kg			
SS-PORTAC-07(2.3-2.8)	WG71B	03/06/2013	Gravel Base Course	3.7			
SS-PORTAC-07(5.4-6.1)	WG70P	03/06/2013	Fill Soil	**230**			
SS-PORTAC-07(6.1-6.6)	WG71D	03/06/2013	Fill Soil	46.2			
SS-PORTAC-07(8.2-8.7)	WG71E	03/06/2013	Fill Soil	62.4			
SS-PORTAC-07(10.9-11.4)	WG70Q	03/06/2013	Native Soil	3.7			
SS-PORTAC-08(1.3-1.8)	WG70O	03/06/2013	Gravel Base Course	3.9			
SS-PORTAC-08(2.1-2.6)	WG70N	03/06/2013	Gravel Base Course	3.2			
SS-PORTAC-08(7.9-8.4)	WG70M	03/06/2013	Fill Soil	**615**			
SS-PORTAC-08(8.4-8.9)	WG70L	03/06/2013	Fill Soil	**137**			
SS-PORTAC-08(8.9-9.3)	WG70R	03/06/2013	Fill Soil	68.6			
SS-PORTAC-08(10-10.5)	WG71A	03/06/2013	Native Soil	18.3 J			
SS-PORTAC-09(1.4-1.9)	WG73N	03/06/2013	Gravel Base Course	2.6			
SS-PORTAC-09(2.5-3)	WG73M	03/06/2013	Gravel Base Course	3.8			
SS-PORTAC-09(6.9-7.4)	WG73K	03/06/2013	Fill Soil	**151**			
SS-PORTAC-09(7.7-8.2)	WG73L	03/06/2013	Fill Soil	25.7			
SS-PORTAC-09(8.5-9)	WG73O	03/06/2013	Fill Soil	3.9			
SS-PORTAC-09(10-10.5)	WG73J	03/06/2013	Native Soil	25.0			
SS-PORTAC-10(1.4-1.9)	WG73R	03/06/2013	Gravel Base Course	3.3			
SS-PORTAC-10(2.5-3)	WG73Q	03/06/2013	Gravel Base Course	4.1			
SS-PORTAC-10(7.8-8.8)	WG74A	03/06/2013	Native Soil	71.3 J			
SS-PORTAC-10(12-13)	WG74D	03/06/2013	Native Soil	1.9			
SS-PORTAC-10(17-17.5)	WG74E	03/06/2013	Native Soil	4.9			
SS-PORTAC-10(15.9-16.9)	WG73P	03/06/2013	Native Soil	3.8			
SS-PORTAC-11(1.8-2.2)	WG74P	03/06/2013	Gravel Base Course	3.2			
SS-PORTAC-11(5.9-6.4)	WG74I	03/06/2013	Fill Soil	62.8			
SS-PORTAC-11(11.8-12.3)	WG74H	03/06/2013	Native Soil	2.2			
SS-PORTAC-11(13.5-14)	WG74F	03/06/2013	Native Soil	3.0			
SS-PORTAC-11(17.6-18.1)	WG74G	03/06/2013	Native Soil	41.4			
SS-PORTAC-12(1.5-2)	WG74M	03/07/2013	Gravel Base Course	5.0			
SS-PORTAC-12(2.4-2.9)	WG74O	03/07/2013	Gravel Base Course	9.2			
SS-PORTAC-12(3-3.5)	WG74N	03/07/2013	Fill Soil	86.4			
SS-PORTAC-12(5-5.5)	WG74L	03/07/2013	Fill Soil	6.0			
SS-PORTAC-12(6.1-6.6)	WG74K	03/07/2013	Fill Soil	4.3			
SS-PORTAC-12(7.4-7.9)	WG74J	03/07/2013	Native Soil	1.1			

TABLE 2
SOIL ANALYTICAL RESULTS - NORTH RAIL LEAD IMPROVEMENTS
PORT OF TACOMA, WASHINGTON

Sample ID	Laboratory ID	Sample Date	Soil Layer	Arsenic (mg/kg) EPA 200.8	Copper (mg/kg) EPA 200.8	Lead (mg/kg) EPA 200.8	Zinc (mg/kg) EPA 200.8
			Project Screening Level:	88 mg/kg			
SS-PORTAC-13(1.3-1.8)	WG74Q	03/07/2013	Gravel Base Course	5.8			
SS-PORTAC-13(2-2.5)	WG70S	03/07/2013	Gravel Base Course	3.9			
SS-PORTAC-13(6.8-7.3)	WG74R	03/07/2013	Fill Soil	24.3			
SS-PORTAC-13(8.5-9)	WG70T	03/07/2013	Fill Soil	11.0			
SS-PORTAC-13(12.6-13.1)	WG70V	03/07/2013	Native Soil	1.2			
SS-PORTAC-13(16.4-16.9)	WG70U	03/07/2013	Native Soil	4.1			
SS-PORTAC-14(1.4-1.9)	WG73I	03/07/2013	Gravel Base Course	3.5			
SS-PORTAC-14(2.4-2.9)	WG73H	03/07/2013	Gravel Base Course	4.5			
SS-PORTAC-14(6.4-6.9)	WG73E	03/07/2013	Fill Soil	**172**			
SS-PORTAC-14(10-10.5)	WG73D	03/07/2013	Fill Soil	86.4			
SS-PORTAC-14(14-14.5)	WG73B	03/07/2013	Native Soil	2.9			
SS-PORTAC-14(15-15.5)	WG73C	03/07/2013	Native Soil	24.6			
SS-PORTAC-15(1.5-2.3)	WG74B	03/07/2013	Gravel Base Course	9.0			
SS-PORTAC-15(5-5.5)	WG74C	03/07/2013	Gravel Base Course	41.9			
SS-PORTAC-15(6.5-7)	WG73F	03/07/2013	Fill Soil	**359**			
SS-PORTAC-15(10-10.5)	WG73G	03/07/2013	Fill Soil	1.4			
SS-PORTAC-15(15.4-15.9)	WG72R	03/07/2013	Native Soil	2.8			
SS-PORTAC-15(15.9-16.4)	WG73A	03/07/2013	Native Soil	6.2 J			
SS-PORTAC-16(5.8-7.1)	XV20A/YL44A	01/16/2014	Composite	**731**	846	528	1190
SS-PORTAC-16(6.3-6.6)	XV20D	01/16/2014	Wood Waste and Slag	**2280**			
SS-PORTAC-16(7.1-7.6)	XV20B	01/16/2014	Fill Soil	**362**			
SS-PORTAC-16(7.6-8.1)	XV20C	01/16/2014	Fill Soil	**108**			
SS-PORTAC-17(2.6-8.8)	XV20H/YN01A	01/16/2014	Composite	**437**	575	383	860
SS-PORTAC-17(3.1-7.3)	XV20E/YL44B	01/16/2014	Wood Waste and Slag	**570**	1670	897	1810
SS-PORTAC-17(8.8-9.3)	XV20F	01/16/2014	Native Soil	9.4			
SS-PORTAC-17(9.3-9.8)	XV20G	01/16/2014	Native Soil	6.7			
SS-PORTAC-18(2.9-7.3)	XV20I/YL44C	01/16/2014	Composite	**657**	2720	881	1890
SS-PORTAC-18(3.4-6.8)	XV20J	01/16/2014	Wood Waste and Slag	**829**			
SS-PORTAC-18(7.3-7.8)	XV20K	01/16/2014	Fill Soil	37.4			
SS-PORTAC-18(7.8-8.3)	XV20L	01/16/2014	Native Soil	79.6			
SS-PORTAC-19(2.4-5.8)	XV20M/YL44D	01/17/2014	Composite	**389**	1130	607	1310
SS-PORTAC-19(2.9-5.3)	XV20O	01/17/2014	Wood Waste and Slag	**813**			
SS-PORTAC-19(5.8-6.3)	XV20P	01/17/2014	Fill Soil	**128**			
SS-PORTAC-19(6.3-6.8)	XV20N	01/17/2014	Native Soil	29.4			

TABLE 2
SOIL ANALYTICAL RESULTS - NORTH RAIL LEAD IMPROVEMENTS PORT OF TACOMA, WASHINGTON

Sample ID	Laboratory ID	Sample Date	Soil Layer	Arsenic (mg/kg) EPA 200.8	Copper (mg/kg) EPA 200.8	Lead (mg/kg) EPA 200.8	Zinc (mg/kg) EPA 200.8
			Project Screening Level:	88 mg/kg			
SS-PORTAC-20(2.5-6.5)	XV21B/YL44E	01/17/2014	Composite	**531**	2340	705	1600
SS-PORTAC-20(3-6)	XV20R	01/17/2014	Slag	**726**			
SS-PORTAC-20(6.5-7)	XV21A	01/17/2014	Fill Soil	7.4			
SS-PORTAC-20(7-7.5)	XV20Q	01/17/2014	Fill Soil	1.4			
SS-PORTAC-21(2.9-5.5)	XV21C/YL44F	01/17/2014	Composite	**332**	554	425	1070
SS-PORTAC-21(3.4-4)	XV21E	01/17/2014	Slag	**1440**			
SS-PORTAC-21(5.5-6)	XV21D	01/17/2014	Native Soil	4.1			
SS-PORTAC-21(6-6.5)	XV21F	01/17/2014	Native Soil	5.0			

Bold = Exceedance of project specific screening level.

TABLE 3
SOIL ANALYTICAL RESULTS - RAIL SPUR TEST PITS
PORTAC CAP SUPPLEMENTAL INVESTIGATION
NORTH RAIL LEAD IMPROVEMENTS
PORT OF TACOMA, WASHINGTON

Sample ID	Laboratory ID	Sample Date	Soil Layer	Arsenic (mg/kg) EPA 200.8
			Project Screening Level:	88 mg/kg
TP-PORTAC-01(0.5-1)	XV58A	01/21/2014	Fill Soil	2.1
TP-PORTAC-01(0-0.5)	XV58B	01/21/2014	Fill Soil	2.7
TP-PORTAC-02(1.4-1.9)	XV58C	01/21/2014	Fill Soil	6.5
TP-PORTAC-03(0.5-1)	XV58D	01/21/2014	Fill Soil	8.2
TP-PORTAC-04(1.9-2.4)	XV58E	01/21/2014	Fill Soil	1.7
TP-PORTAC-05(0.5-1)	XV58F	01/21/2014	Fill Soil	2.4
TP-PORTAC-06(1.8-2.3)	XV58G	01/21/2014	Fill Soil	8.0
TP-PORTAC-07(1.1-1.6)	XV58H	01/21/2014	Fill Soil	2.1
TP-PORTAC-08(1.2-1.7)	XV58I	01/21/2014	Fill Soil	4.0

Bold = Exceedance of project specific screening level of 88 mg/kg

TABLE 4
OTHER SITE MATERIAL ANALYTICAL RESULTS
PORTAC CAP INVESTIGATION
NORTH RAIL LEAD IMPROVEMENTS
PORT OF TACOMA, WASHINGTON

Sample ID	Laboratory ID	Sample Date	Soil Layer	Arsenic (mg/kg) EPA 200.8	Lead (mg/kg) EPA 200.8
			Project Screening Level:	100 mg/kg	--
Composite sample of selected gravel material from B-13, B-14, and B-15	WH93A	3/18/2013		2.1	2.49

Bold = Exceedance of project specific screening level of 100 mg/kg

TABLE 5
SOLID WASTE DISPOSAL CHARACTERIZATION
PORTAC CAP SUPPLEMENTAL INVESTIGATION
NORTH RAIL LEAD IMPROVEMENTS
PORT OF TACOMA, WASHINGTON

Sample ID	Laboratory ID	Sample Date	Soil Layer	Arsenic (mg/kg) EPA 200.8 (Total)	Lead (mg/kg) EPA 200.8 (Total)	Arsenic (mg/L) SW 6010C (TCLP)	Lead (mg/L) SW 6010C (TCLP)
						5 mg/L[1]	5 mg/L[1]
SS-PORTAC-16(5.8-7.1)	XV20A/YL44A	01/16/2014	Composite	731	528	2.9	0.6
SS-PORTAC-17(2.6-8.8)	XV20H/YN01A	01/16/2014	Composite	437	383	1.6	0.1
SS-PORTAC-18(2.9-7.3)	XV20I/YL44C	01/16/2014	Composite	657	881	2.2	0.5
SS-PORTAC-19(2.4-5.8)	XV20M/YL44D	01/17/2014	Composite	389	607	0.6	0.2
SS-PORTAC-20(2.5-6.5)	XV21B/YL44E	01/17/2014	Composite	531	705	1.2	0.4
SS-PORTAC-21(2.9-5.5)	XV21C/YL44F	01/17/2014	Composite	332	425	0.4	0.2

1 - Characteristic Dangerous Waste Criterion

TABLE 8
MATERIAL REMOVAL ESTIMATES
PORTAC CAP INVESTIGATION
NORTH RAIL LEAD IMPROVEMENTS
PORT OF TACOMA, WASHINGTON

Material Unit (a)	Area (SF) (b)	Volume Estimate (CY) (d)	Conversion Factor (TON/CY)(e)	Estimated Tons
Portac Cap Materials				
RCC (rubble)	184,995	10,802	1.5	16,203
Clean Base Course Fill (excavated)	184,995	9,930	1.5	14,895
Waste Material (wood fiber, slag and soil with metals contamination from above and below the waste)	184,995	22,150	1.5	33,225
Rail Siding				
Asarco Slag Ballast in Rail Siding Area	33,331	1,500	1.7	2,550

<u>30 Percent Design Estimate Notes:</u>

(a) Based on Landau Associates Investigation Work Plan (2013) and field exploration logs. Waste material volume estimate includes the slag and wood material, 0.5 ft of soil above, and 0.5 ft of soil below waste layer. Waste material unit also includes soil below waste with Arsenic concentration > 100 mg/kg.

(b) Portac cap within identified boundary (sawcut line) measured in CAD and rounded to the nearest 100 SF.

(c) RCC depth is average depth from field exploration logs rounded to hundredth of a foot. Clean Base and Waste material depths obtained from volume' surface area' and rounded to nearest hundredth of a foot. Asarco Slag depth taken at 1.0'.

(d) RCC and Asarco Slag volume calculated using Area and Thickness values. Clean Base and Waste Material volume were obtained from CAD surfaces. Volumes rounded to nearest 10 CY.

(e) Soil volume to tonnage conversion factors from WSDOT Design Manual M 22-01.06, December 2009. Waste material composition may be variable, conversion factor estimated at 1.5, based on other wood debris- slag landfill in tideflats area with a 1.2 to 1.6 T/CY range.

SF = Square Feet

CY = Cubic Yards

RCC = Roller Compacted Concrete

APPENDIX A.6

Wapato Creek Sediment and Surface Water Chemistry

Attachment A.6 Contains Excerpted Information from the Following References:

Year	Author Abbreviation	Author	Document Title
1988b	HC	Hart Crowser, Inc. (HC)	Portac Log Sort Yard Remediation Plan, Volume I and II Appendices
1988b	RZA	Rittenhourse, Zeman & Associates (RZA)	Letter from Daniel Whitman, RZA to C. Pittman, Portac, Inc., dated September 8, 1988. Subject: Wapato Creek Sediment Sampling and Analytical Results.
1990a	HC	Hart Crowser, Inc. (HC)	Portac Log Sort Yard Water Quality Monitoring Program, Second Round of Surface Water Samples
1990c	HC	Hart Crowser, Inc. (HC)	Portac Log Yard Remediation, Water Quality Monitoring Program, 3rd & Final Round of Surface Water Sampling
2009a	WES	Whitman Environmental Services (WES)	Letter to Washington Department of Ecology. Subject: Additional Wapato Creek Sediment Sample Analyses. Portac, Inc. 4215 N. Frontage Road. Tacoma, WA.
2009c	HC	Hart Crowser, Inc. (HC)	Wapato Creek Sediment Sampling and Analysis Results
2009c	WES	Whitman Environmental Services (WES)	Letter from WES to Ecology, dated November 17, 2009. RE: Additional Site Information, Portac, Inc. Tacoma, WA. Including documentation of storm drain sampling and cleaning; terrestrial ecological evaluation; Wapato Creek sediment analysis.

Table 4 Coventional Parameters and Metals Concentrations in Water Samples Collected by Ecology from Blair Waterway and Hapato Creek May 3, 1984 (From Table 17 of Appendix A)

Sample Number	Station Number	Time Sampled	pH (S.U.)	Specific Conductivity in umhos/cm	Salinity (0/00)	Total Susp. Solids in mg/L	Flow Weighted Concentration in ug/L Total Metal: Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
Blair Waterway													
14-1940	B-1	0930	7.3	---	15	24	16	23	24	12	1u	1u	0.6
14-1941	B-2	0935	7.7	---	25	18	13	17	12	6	---	---	---
14-1942	B-3	0940	7.8	---	26	23	1u	1u	18	13	---	---	---
14-1943	B-4	0945	7.8	---	25	20	13	10	15	8	1u	1u	0.6
14-1944	B-5	0950	7.7	---	26	20	40	15	21	11	1u	1u	0.3
14-1945	B-6	1000	7.6	---	23	24	88	35	31	9	1u	1u	0.4
14-1946	B-7	1005	7.8	---	25	19	8	14	22	7	---	---	---
14-1947	B-8	1010	7.4	---	20	21	59	87	54	8	---	---	---
14-1948	B-9	1020	7.3	---	16	34	120	72	30	12	1u	5	0.4
14-1949	B-10	1030	7.4	---	22	18	34	33	27	12	---	---	---
14-1950	B-11	1040	7.8	---	25	18	6	12	17	6	---	---	---
14-1951	B-12	1100	7.8	---	15	27	3	8	31	9	---	---	---
Hapato Creek													
14-1965	H-1	1445	7.4	220	---	32	2	8	14	4	1u	1u	0.4
14-1966	H-2	1130	7.1	2720	---	58	70	65	34	11	1u	1u	0.2
EPA Criteria - Saltwater Aquatic Life (1)													
24-hour average (chronic)							---	58	4	25	7.1	---	4.5
Maximum (acute)							508	170	23	668	140	---	5.9

u = Not detected at detection limit shown
--- = Not analysed
(1) = EPA water quality criteria documents; availabilty, "Federal Register, 1980.

Table 5 Coventional Parameters and Metals Concentrations in Sediment Samples Collected by Ecology from Wapato Creek near Portac Log Sort Yard
June 11, 1984 (From Table 18, Appendix A)

Sample Number	Station Number	Position	Depth at MLLW in Feet	Moisture in Percent	Total Organic Carbon in Percent	Nitrogen in Percent	Grain Size in Percent				Metals in mg/Kg Dry Weight						
							Sand	Silt	Clay	Total	Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
Wapato Creek																	
14-2710	W-8	above	---	69	0.68	0.04(*)	81.1	16.3	0.89	98.3	14	70	23	14	7.3	0.1	0.04
14-2711	W-10	below	---	76	0.32	0.02(*)	91.7	7.2	---	98.9	45	78	23	10	6.2	0.1u	0.16

(*) = Estimated Concentration
u = Not detected at detection limit shown

The chemical testing done on the well soil samples indicated the soils do not appreciably leach metals or act as receptors for metals leached from the bark/slag mixture. Analytical data for the March 1987 sampling are presented in Table 6.

Table 6 - Concentration of Metals in Underlying Silt and Sand

Metal	Concentration in mg/L (EP Toxicity Test)
Arsenic	0.01
Zinc	0.01 to 0.03
Copper	0.01
Lead	0.1 to 0.2

These data suggest that in situ leaching into the underlying soils is limited at the site. Additional supporting information can be found in the August 18, 1986 report and the April 24, 1987 report in Appendices B and E, respectively.

4.2.4 Groundwater

The Ecology study did not investigate the potential impacts on groundwater from the use of slag at the log sort yards.

During March 1987, Hart Crowser installed six monitoring wells to depths of approximately 20 feet and initiated a groundwater monitoring program. The hydrogeologic assessment of the data collected during this program is presented in Appendices E, F, and G. Table 7 presents results from chemical tests conducted on samples obtained from the monitoring wells.

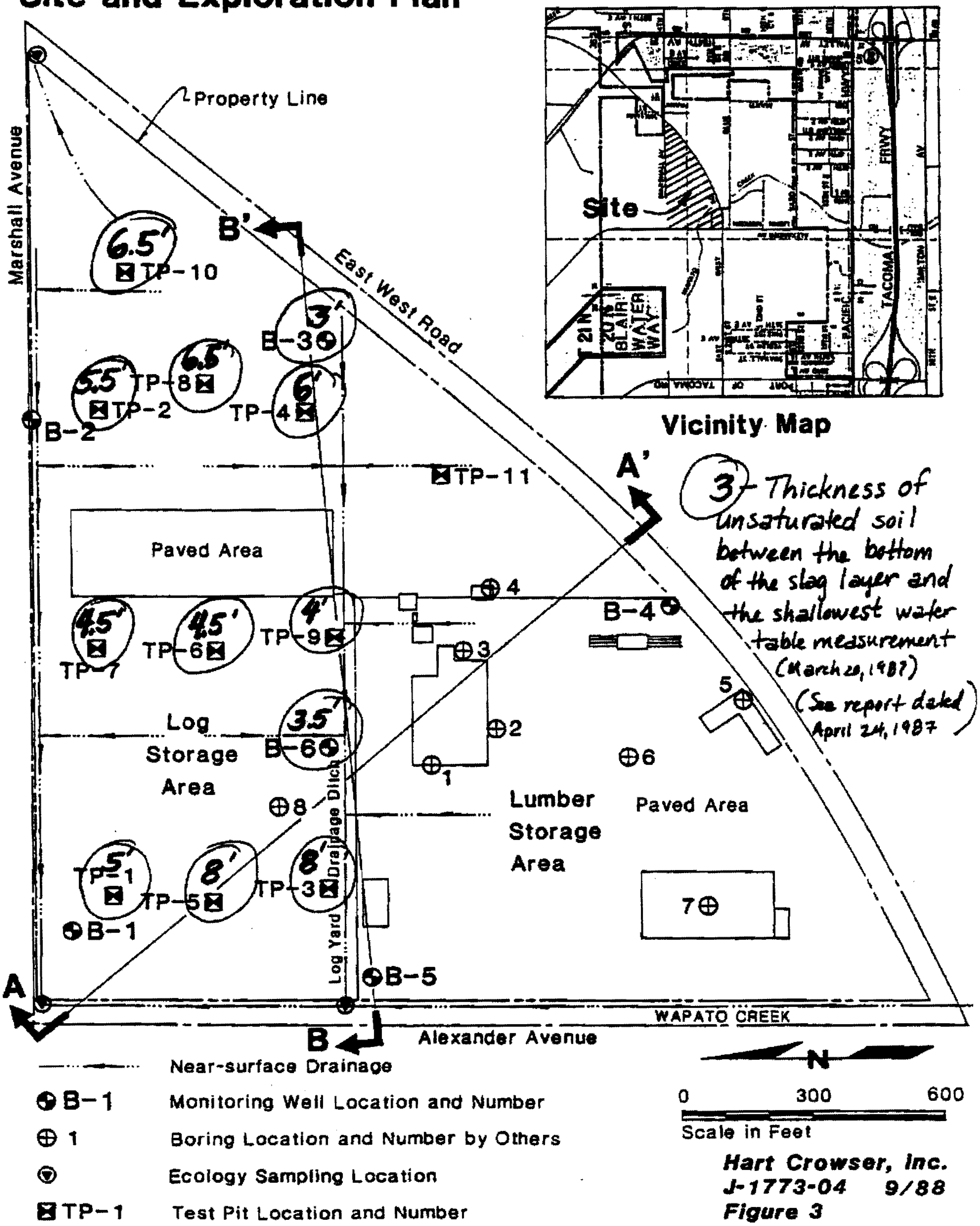
Table 8 - Comparison of Criteria Levels for Metals against Metal Concentrations in Nearby Surface Waters

CRITERIA	Metal Concentration in mg/L			
	As (III)	Pb	Cu	Zn
Fresh Water Animal Toxicity				
Acute *	0.36	0.082	0.018	0.12
Chronic**	0.19	0.0032	0.012	0.11
Marine Animal Toxicity				
Acute	0.069	0.14	0.0029	0.095
Chronic	0.036	0.0056	0.0029	0.086
Human Health				
Drinking Water	0.05	0.05	--	--
Carcinogen	YES	NO	NO	NO
MEASURED VALUES				
Wapato Creek Upstream	0.002	0.004	0.014	0.008
Wapato Creek Downstream	0.07	0.011	0.034	0.065
Blair Waterway (Mouth Wapato Creek)	0.015	--	0.012	0.025
Groundwater at Portac	0.14	0.1	0.02	0.07

* Acute - Short-Term

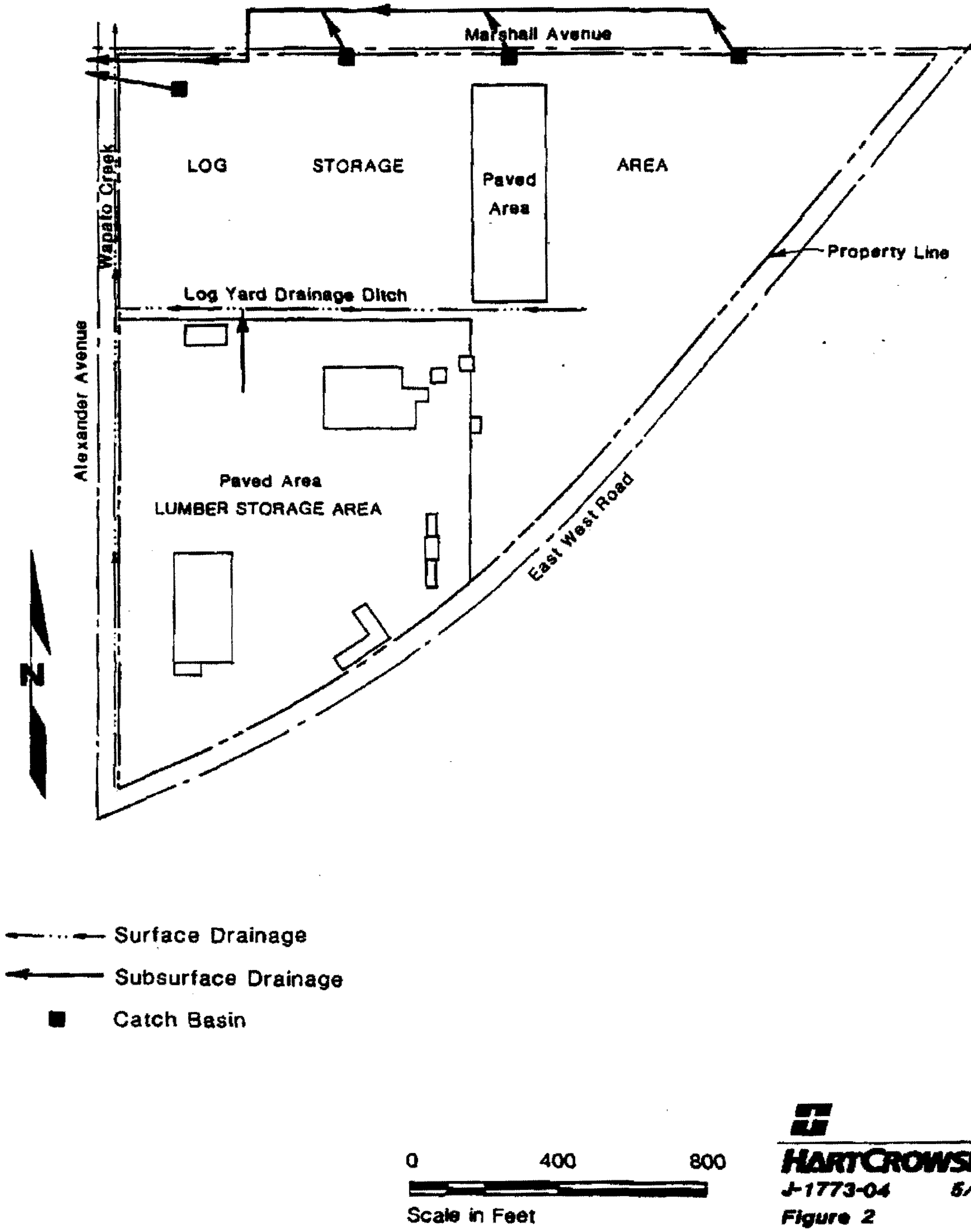
** Chronic - Long-Term

Site and Exploration Plan



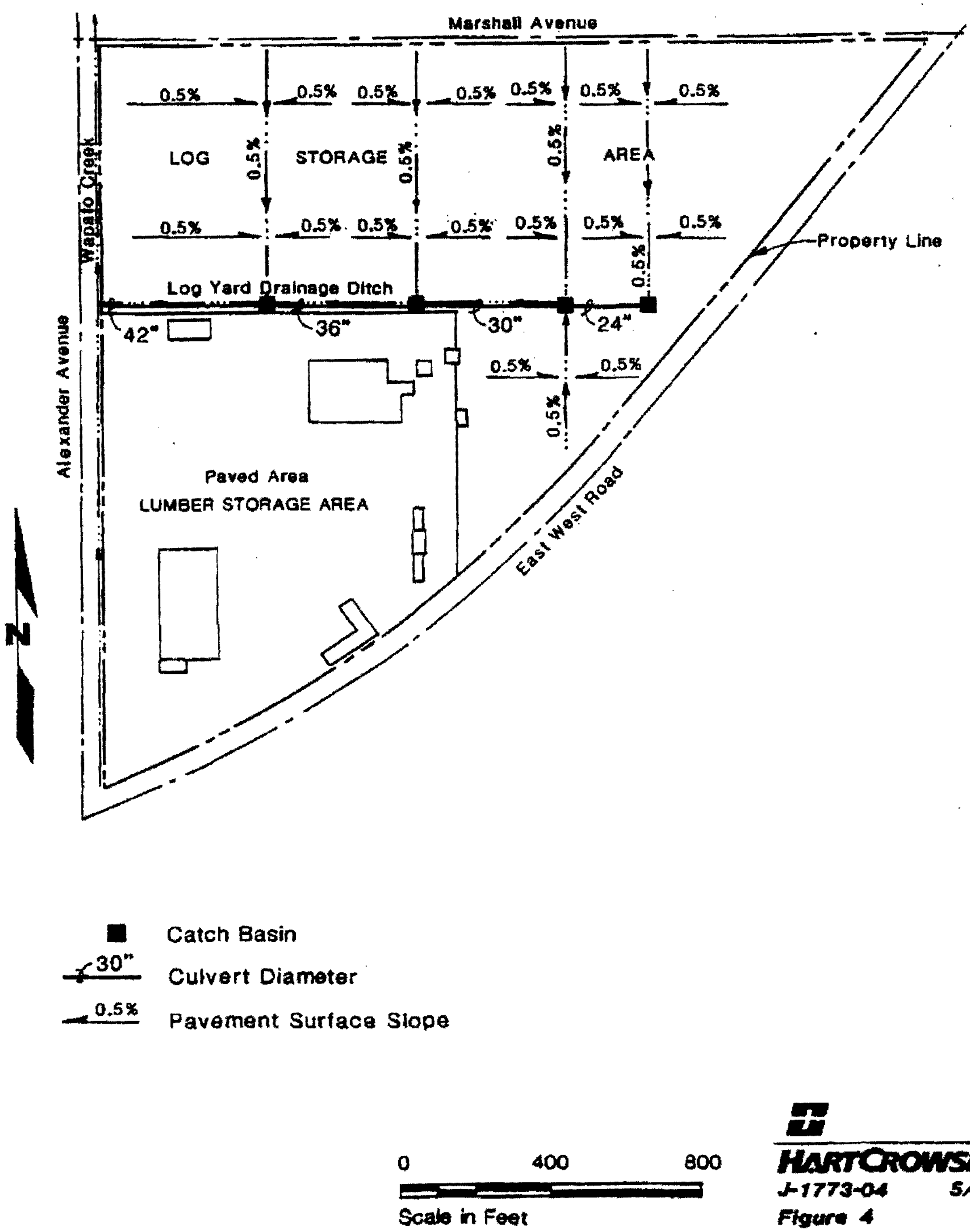
Hart Crowser, Inc.
J-1773-04 9/88
Figure 3

Existing Site Drainage Plan



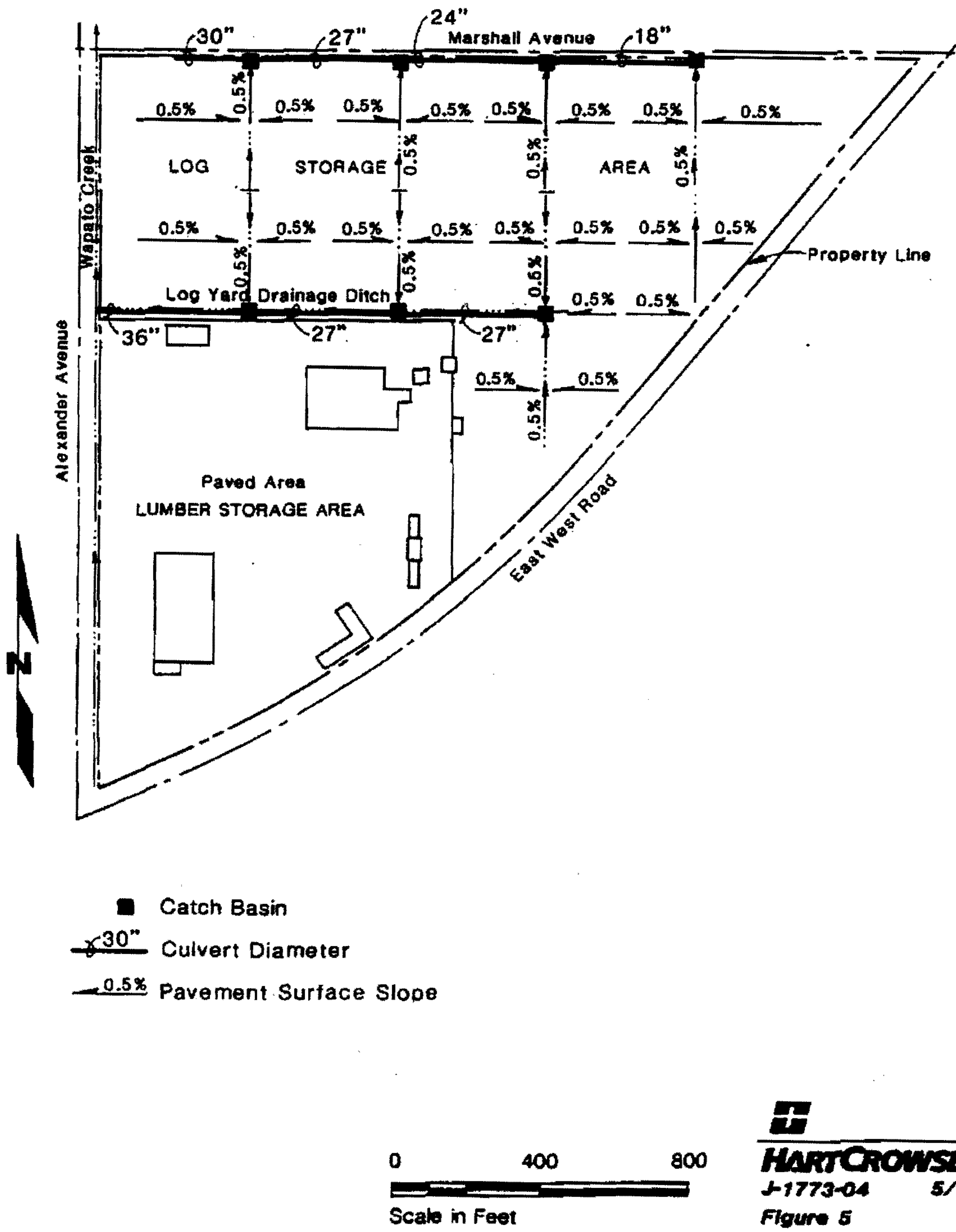
HARTCROWSER
J-1773-04 5/88
Figure 2

Site Drainage Plan
Alternative 1



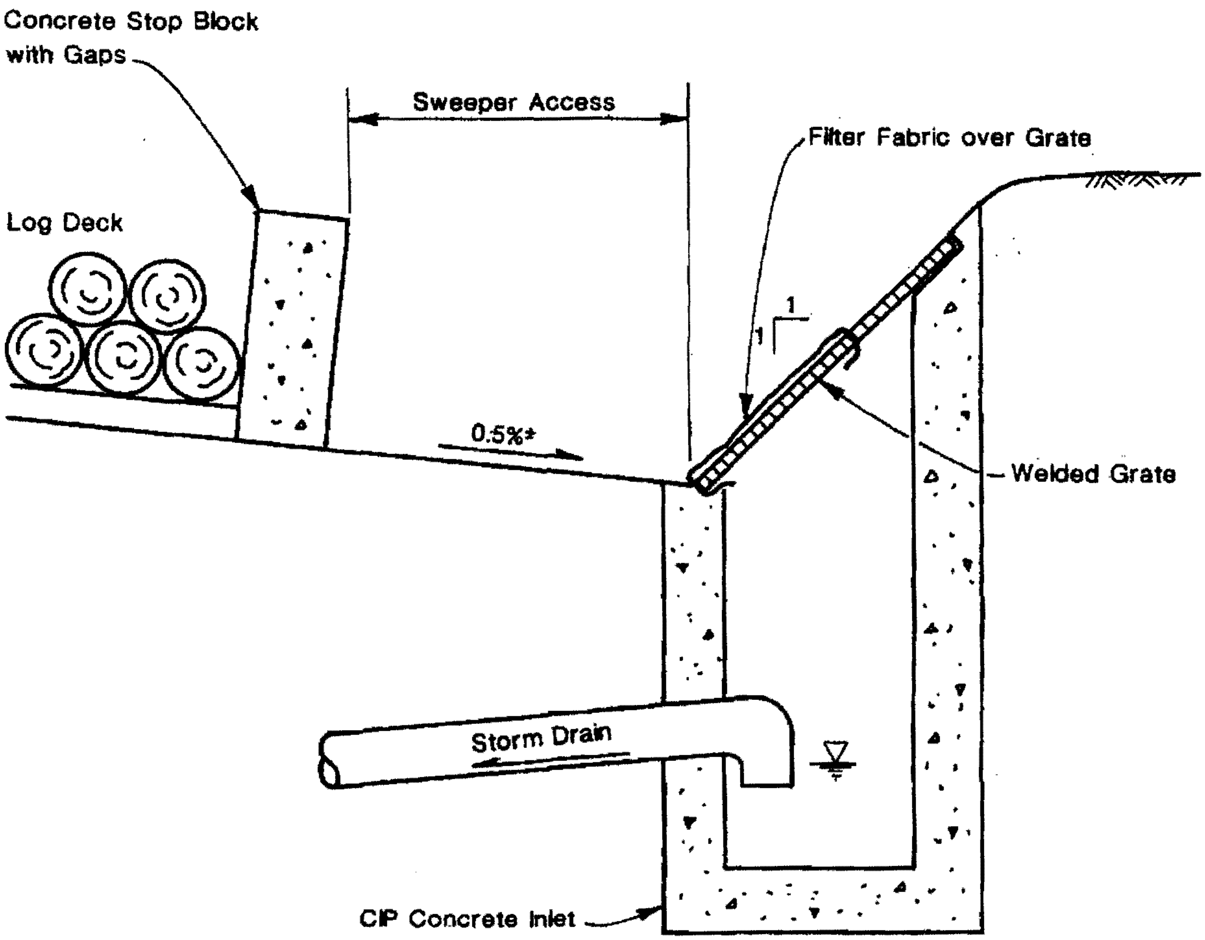
HARTCROWSER
J-1773-04 5/88
Figure 4

Site Drainage Plan
Alternative 2



HARTCROWSER
J-1773-04 5/88
Figure 5

Log Yard Drainage/Filtration Scheme



Not to Scale

HARTCROWSER
J-1773-04 5/88
Figure 6

Table 3. Locations of sediment samples collected by WDOE near log sort yards on Blair and Hylebos Waterways and Wapato Creek, June 14, 1984.

Station Number	Station Description	Depth at MLLW (feet)	Latitude 47°	Longitude 122°
BLAIR WATERWAY - MURRY PACIFIC YARD #2				
B-1	200 feet offshore of B-2	40	15'54.5"	23'24"
B-2	50 feet off 1st dolphin from S. Lincoln Ave. ditch	29	15'52"	23'26.5"
B-3	200 feet offshore of B-4	44	15'50"	23'18"
B-4	50 feet offshore of 11th dolphin from S. Lincoln Ave. ditch	29	15'48"	23'20"
B-5	200 feet offshore of B-6	45	15'43.5"	23'8.5"
B-6	50 feet off 4th dolphin from Murry dock	27	15'42"	23'11"
B-7	50 feet off S. Lincoln Ave. ditch	34	15'53"	23'30"
B-21	200 feet offshore of B-7	41	15'56.5"	23'27"
WAPATO CREEK - PORTAC				
W-8	30 feet downstream of East-West road bridge	--	14'56"	22'17"
W-10	intertidal at head of Blair Waterway near mouth of Wapato Cr.	--	15'15"	22'32"
HYLEBOS WATERWAY - MURRY PACIFIC YARD #1				
H-11	50 feet off blue machine shed, south shore	10	16'23.5"	22'47.5"
H-12	160 feet offshore of H-11	27	16'25"	22'45"
H-13	50 feet off main discharge	16	16'19.5"	22'40.5"
H-14	160 feet offshore of H-13	28	16'21"	22'39"
HYLEBOS WATERWAY - WASSER/WINTERS				
H-16	75 feet off south end of yard near log ramp, upper turning basin	28	15'41.5"	21'32"
H-17	120 feet offshore of H-16, upper turning basin	30	15'42.5"	21'33"
H-18	75 feet off north end of yard, upper turning basin	28	15'43.5"	21'30"
H-19	120 feet offshore of H-18, upper turning basin	28	15'44"	21'31"

A duplicate sediment sample was also prepared in the field from the grab at station B-7. The duplicate analysis results for metals are shown below in Table 6.

Table 6. Results of metals analysis of duplicate sediment samples from station B-7.

Metal		B-7	B-7 (dup.)	Relative Percent Difference
arsenic	(mg/Kg)	48	50	4
zinc	"	131	140	7
copper	"	106	104	2
lead	"	68	72	6
nickel	"	15	15	0
antimony	"	0.6	0.5	20
cadmium	"	0.5	0.43	10

The conventional sediment data (except percent moisture) were reviewed by Robert Barrick, Tetra Tech, Inc., Bellevue, QA officer for the Commencement Bay project. These data were generally within acceptable QA limits; however, the precision estimate for duplicate measurements stated in the Commencement Bay Quality Assurance Plan (Tetra Tech, 1983) was exceeded for total organic carbon. In addition, nitrogen values below 0.10 percent were treated as estimates (due to laboratory blank contamination). The values shown below in Table 7 were achieved for conventional parameters in the field duplicate.

Table 7. Results of conventionals analysis of duplicate sediment samples from station B-7.

Parameter		B-7	B-7 (dup.)	Relative Percent Difference
Moisture	(%)	46	35	24
Total organic carbon	"	2.4	2.6	8
Nitrogen	"	0.33	0.28	5
Grain Size				
sand > 0.062 mm	"	20.6	21.6	5
silt 0.004 - 0.062	"	61.3	59.7	3
clay < 0.004 mm	"	18.2	18.7	3

Groundwater discharge to the waterways was not considered here but, in light of the fact that surface runoff from the log sort yards was estimated to be 40 percent of rainfall and a shallow groundwater table is present in the tideflats area, a strong potential exists that groundwater in the vicinity of the sort yards is being contaminated with metals. Therefore, groundwater flux may be a major mechanism by which metals are being transported to the waterways.

Table 15 presents a relative ranking of the Tacoma tideflats log sort yards based on the loadings presented in Table 14 for arsenic, zinc, copper, and lead. For arsenic, copper, and lead, four yards consistently have the highest loads. They are; Murry Pacific's yard #2, Cascade Timber's yard #2, Portac, and Wasser/ Winters. Three of these yards--Murry Pacific's yard #2, Cascade Timber's yard #2, and Portac--also have the highest zinc load. Weyerhaeuser's yard ranks near the top for zinc and copper; but this is because a runoff coefficient of 1.0 was assumed for this paved yard. Metals concentrations in runoff from the Weyerhaeuser yard were among the lowest measured in the survey.

Table 15. Ranking of Tacoma tideflats log sort yards based on estimated average annual daily metals loads for arsenic, zinc, copper, and lead (lbs/day).

Sort Yard	Arsenic	Sort Yard	Zinc
Murry Pacific Yard #2	2.9	Murry Pacific Yard #2	0.73
Portac	1.4	Cascade Timber Yard #2	0.67
Wasser/Winters	0.69	Portac	0.62
Dunlap Towing	0.49	Weyerhaeuser†	0.23
Murry Pacific Yard #1	0.30	Murry Pacific Yard #1	0.23
Cascade Timber Yard #2	0.32	Wasser/Winters	0.20
" " " #1	0.28	Cascade Timber Yard #1	0.14
Louisiana Pacific	0.24	Dunlap Towing	0.13
Cascade Timber Yard #3	0.18	Louisiana Pacific	0.056
McFarland Cascade	0.086	St. Regis Sort Yard	0.049
Weyerhaeuser†	0.02	McFarland Cascade	0.042
St. Regis Sort Yard	0.013	Cascade Timber Yard #3	0.036
	Copper		**Lead**
Cascade Timber Yard #2	0.50	Cascade Timber Yard #2	0.31
Murry Pacific Yard #2	0.20*	Murry Pacific Yard #2	0.21
Portac	0.26	Portac	0.078*
Wasser/Winters	0.13*	Wasser/Winters	0.075*
Weyerhaeuser†	0.064	Murry Pacific Yard #1	0.042*
Dunlap Towing	0.04	Dunlap Towing	0.033
Louisiana Pacific	0.04	Louisiana Pacific	0.027
Murry Pacific Yard #1	0.035*	Cascade Timber Yard #1	0.022
St. Regis Sort Yard	0.033	Weyerhaeuser†	0.018
Cascade Timber Yard #1	0.025	Cascade Timber Yard #3	0.013
" " " #3	0.025	St. Regis Sort Yard	0.0087
McFarland Cascade	0.021	McFarland Cascade	0.0041

†Paved yard, runoff assumed to be 100 percent.
*Blank-corrected (see text under Quality Assurance).

Table 17. Conventional parameters and metals concentrations in water samples collected by WDOE from Blair and Hylebos Waterways and Wapato and Hylebos Creeks, May 3, 1984.

Sample Number	Station Number	Time Sampled	pH (S.U.)	Specific Conductivity (umhos/cm)	Salinity (o/oo)	Total Suspended Solids (mg/L)	Metals (ug/L total metal) Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
BLAIR WATERWAY													
14-1940	B-1	0930	7.3	--	15	24	16	23	24	12	1u	1u	0.6
14-1941	B-2	0935	7.7	--	25	18	13	17	12	6	--	--	--
14-1942	B-3	0940	7.8	--	26	23	1u	1u	18	13	--	--	--
14-1943	B-4	0945	7.8	--	25	20	13	10	15	8	1u	1u	0.6
14-1944	B-5	0950	7.7	--	26	20	40	15	21	11	1u	1u	0.3
14-1945	B-6	1000	7.6	--	23	24	88	35	31	9	1u	1u	0.4
14-1946	B-7	1005	7.8	--	25	19	8	14	22	7	--	--	--
14-1947	B-8	1010	7.4	--	20	21	59	87	64	8	--	--	--
14-1948	B-9	1020	7.3	--	16	34	120	72	30	12	1u	5	0.4
14-1949	B-10	1030	7.4	--	22	18	34	33	27	12	--	--	--
14-1950	B-11	1040	7.8	--	25	18	6	12	17	6	--	--	--
14-1951	B-12	1100	7.8	--	15	27	3	8	31	9	--	--	--
WAPATO CREEK													
14-1965	W-1	1445	7.4	220	--	32	2	8	14	4	1u	1u	0.4
14-1966	W-2	1130	7.1	2,720	--	58	70	65	34	11	1u	1u	0.2
HYLEBOS WATERWAY													
14-1952	H-1	1255	7.3	--	6.0	74	37	36	24	13	1u	1u	0.1u
14-1954	H-2	1250	7.1	--	5.4	71	56	56	49	20	1u	6	0.1
14-1955	H-3	1245	7.2	--	4.7	110	48	54	44	18	1u	4	0.3
14-1956	H-4	1240	7.4	--	15	24	13	24	19	8	--	--	--
14-1957	H-5	1235	7.5	--	18	26	18	27	28	11	--	--	--
14-1958	H-6	1230	7.5	--	18	24	18	19	23	8	--	--	--
14-1959	H-7	1210	7.4	--	19	26	68	32	20	8	1u	1u	0.1
14-1960	H-8	1215	7.5	--	22	28	38	36	21	10	1u	1u	0.3
14-1961	H-9	1220	7.5	--	12	44	80	155	45	22	1u	16	0.5
14-1962	H-10	1200	7.5	--	21	26	15	7	21	8	--	--	--
14-1963	H-11	1155	7.6	--	23	26	18	10	20	7	--	--	--
14-1964	H-12	1150	7.8	--	22	26	8	1u	31	10	--	--	--
HYLEBOS CREEK													
14-1907	HC-1	1300	7.1	318	--	31	12	7	21	11	1u	1u	0.1
14-1953	HC-2	1345	7.4	494	--	100	45	64	50	21	1u	3	0.1
EPA CRITERIA - SALTWATER AQUATIC LIFE 1/													
24-hour average (chronic)							--	58	4	25	7.1	--	4.5
maximum (acute)							508	170	23	668	140	--	5.9

u = Not detected at detection limit shown
-- = Not analyzed
1/ = "EPA water quality criteria documents; availability," Federal Register, 1980

Table 18. Conventional parameters and metals concentrations in sediment samples collected by WDOE from Blair and Hylebos Waterways near log sort yards, June 14, 1984.

Sample Number	Station Number	Position	Depth at MLLW (ft)	Moisture (%)	Total Organic Carbon (%)	Nitrogen (%)	Grain Size: Sand (%)	Grain Size: Silt (%)	Grain Size: Clay (%)	Grain Size: Total (%)	Metals (mg/Kg dry weight): Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
BLAIR WATERWAY																	
Murry Pacific Yard #2																	
14-2699	B-7	nearshore	34	46	2.4	0.33	20.6	61.3	18.2	100	48	131	106	68	15	0.6	0.50
14-2700	B-7(dup)	"	34	35	2.6	0.28	21.6	59.7	18.7	100	50	140	104	72	15	0.5	0.43
14-2694	B-2	"	29	49	2.5	0.22	26.7	58.3	15.1	100	51	114	85	49	12	0.3	0.23
14-2696	B-4	"	29	55	2.1	0.14	42.1	44.3	13.6	100	57	125	127	86	10	4.0	0.21
14-2698	B-6	"	27	71	0.65	0.04*	73.1	21.0	2.2	96.4	26	59	38	20	9	0.6	0.19
14-2701	B-21	offshore	41	53	1.2	0.22	17.4	64.3	18.2	100	38	86	80	42	15	0.2	0.22
14-2693	B-1	"	40	48	1.5	0.17	12.0	66.5	21.6	100	39	104	93	48	16	0.1u	0.23
14-2695	B-3	"	44	47	1.4	0.13	9.39	67.5	23.1	100	45	98	90	55	14	0.2	0.21
14-2697	B-5	"	45	44	1.8	0.30	7.7	72.8	29.4	100	46	122	109	66	15	0.5	0.27
WAPATO CREEK																	
Portac																	
14-2710	W-8	above	--	69	0.68	0.04*	81.1	16.3	0.89	98.3	14	70	23	14	7.3	0.1	0.04
14-2711	W-10	below	--	76	0.32	0.02*	91.7	7.2	--	98.9	45	78	23	10	6.2	0.1u	0.16
HYLEBOS WATERWAY																	
Murry Pacific Yard #1																	
17-2702	H-11	nearshore	10	33	5.6	0.20	58.1	31.5	10.5	100	116	293	192	134	28	1.8	0.73
14-2704	H-13	"	16	35	4.6	0.15	39.3	46.4	14.3	100	88	251	173	140	27	1.5	0.62
14-2703	H-12	offshore	27	60	2.7	0.09*	29.3	48.9	21.9	100	60	151	138	97	27	0.6	0.44
14-2705	H-14	"	28	54	2.5	0.27	51.5	33.3	15.2	100	30	129	90	63	20	0.5	0.24
Wasser/Winters																	
14-2706	H-16	nearshore	28	35	6.6	0.20	15.4	61.8	22.8	100	111	349	181	105	30	1.2	0.60
14-2708	H-18	"	28	34	6.3	0.19	13.4	58.1	28.4	100	150	282	201	110	32	1.5	0.84
14-2707	H-17	offshore	30	36	6.1	0.23	16.1	57.9	26.0	100	165	274	193	134	32	1.9	0.50
14-2709	H-19	"	28	37	5.9	0.19	12.6	61.1	26.4	100	184	276	206	112	34	1.5	0.51

* = estimated concentration
u = not detected at detection limit shown

Table 19 compares data on arsenic, zinc, copper, and lead in sediments from the present survey to Tetra Tech data on Blair, Hylebos, City, Sitcum, St. Paul, Middle, and Milwaukee Waterways and Carr Inlet, the background station selected for the Commencement Bay Nearshore/Tideflats Investigation. Based on median concentrations, sediments near log sort yards in Blair Waterway are 12 to 14 times higher than background (Carr Inlet) levels for arsenic and copper; zinc and lead are five to six times greater than background. Arsenic concentrations in these sediments are also twice as high as the median concentration for Sitcum Waterway and six times higher than those in City Waterway.

Table 19. Comparison of metals concentrations in sediment adjacent to log sort yards in Blair and Hylebos Waterways to other parts of Commencement Bay and Carr Inlet (mg/Kg dry weight).

Site/Parameter	Sample Size	Arsenic	Zinc	Copper	Lead
Blair Waterway[1]	9	46(26-57)	114(59-140)	93(38-127)	55(20-86)
" " [2]	11	19(7-36)	68(35-85)	54(28-64)	53(27-64)
Hylebos Waterway[1]	8	114(30-184)	278(129-349)	187(90-206)	111(63-140)
" " [2]	24	30(5.8-86)	137(21-273)	111(14-204)	79(8.3-134)
City Waterway[2]	11	8(1.1-33)	234(44-325)	166(40-203)	291(49-725)
Sitcum Waterway[2]	5	28(10-93)	254(109-491)	158(74-292)	310(128-661)
St. Paul Waterway[2]	5	7.0(5.5-12)	60(29-106)	56(29-82)	24(11-52)
Middle Waterway[2]	3	39(15-67)	178(158-208)	311(176-554)	190(188-303)
Milwaukee Waterway[2]	5	10(9.5-13)	105(83-135)	60(46-77)	62(48-78)
Carr Inlet[2]	6	3.8(2.4-3.8)	18(15-24.1)	6.3(4.9-8.0)	11(4.4-13)

median(range)

[1]WDOE present survey (samples collected June 14, 1984).

[2]Tetra Tech main sediment survey (samples collected March 11-18, 1984).

In Hylebos Waterway, nearshore sediments are 10 to 30 times higher than background (Carr Inlet) levels for arsenic, zinc, copper, and lead. Arsenic and zinc concentrations in these sediments are also the highest measured in any Commencement Bay waterway.

A comparison of metals concentrations in ASARCO slag to WDOE data on log sort yard runoff, nearshore surface water, and sediment collected during the present study is shown in Table 20. Two analyses of ASARCO slag were available, the first done in 1971 by ASARCO utilizing atomic absorption spectrometry (except for arsenic which was analyzed by the silverdiethyldithiocarbonate method), and the second performed by E.A. Crecelius of Battelle Pacific Northwest Laboratories in 1984 using X-ray fluoresence spectroscopy. Both analyses showed high concentrations of arsenic, zinc, copper, lead, and antimony in ASARCO slag. Similar metals concentrations were seen in both analyses, with the exception of zinc, which was approximately three times higher in ASARCO's analysis than in Battelle's (18,000 ppm and 6,100 ppm, respectively). However, it is not unusual for the metals content of slag to vary depending on the source and type of ore being smelted (Crecelius, 1985).

Table 20. Comparison of metals concentrations in ASARCO slag to WDOE data collected May 3, 1984, on log sort yard runoff, nearshore surface water, and sediment in Blair and Hylebos Waterways and Wapato Creek (total metal; ppm slag, mg/L water, mg/Kg dry weight sediment).

	ASARCO Slag		Blair Waterway			Wapato Creek			Hylebos Waterway					
			Murry Pacific Yard #2			Portac			Wasser/Winters			Murry Pacific Yard #1		
Metal	Total[1]	Total[2]	Runoff[3]	Nearshore Surface Water[4]	Near-shore Sedi-ment[4]	Runoff[3]	Down-stream Water[4]	Down-stream Sedi-ment	Runoff[3]	Near-shore Surface Water[4]	Near-shore Sedi-ment[4]	Runoff[3]	Near-shore Surface Water[4]	Near-shore Sedi-ment[4]
Arsenic	9,000	7,300	4.4	0.065	52	9.5	0.070	45	12.0	0.047	130	1.3	0.062	100
Zinc	10,000	6,100	0.69	0.033	130	2.1	0.065	78	1.7	0.049	320	1.2	0.074	270
Copper	5,000	4,100	0.45	0.024	110	1.0	0.034	23	1.2	0.039	190	0.15	0.029	180
Lead	5,000	3,600	0.30	0.010	69	0.38	0.011	10	0.83	0.017	110	0.27	0.013	140
Nickel	trace	130	0.043	0.001u	13	0.12	0.001u	6.2	0.12	0.001u	31	0.037	0.001u	28
Antimony	6,000	6,400	0.068	0.0013	1.4	0.12	0.001u	0.1u	0.028	0.003	1.4	0.072	0.005	1.7
Cadmium	--	5	0.00098	0.0004	0.35	0.002	0.0002	0.16	0.0013	0.00013	0.72	0.0009	0.0003	0.68
As:Zn:Cu	1:2:0.6	1:0.8:0.6	1:0.2:0.1	1:0.5:0.4	1:3:2	1:0.2:0.1	1:0.9:0.5	1:2:0.5	1:0.1:0.1	1:1:0.8	1:2:1	1:0.9:0.1	1:1:0.5	1:3:2

[1]Source: State of Washington Discharge Permit Application, 1971; ASARCO.
[2]Source: E.A. Crecelius, 1985. Battelle Pacific Northwest Laboratory, personal communication.
[3]Flow-weighted average concentration.
[4]Average

-- = No data.
u = Not detected at detection limit shown.

Appendix II. Station numbers† entered in the Commencement Bay data base for the WDOE log sort yards survey, November 4, 1983 - June 29, 1984.

Sort Yard	WDOE Station Number (this report)	Station Number in the Commencement Bay Data Base
Murry Pacific Yard #2	1	MP201
" " " "	1a	MP209
" " " "	2	MP202
" " " "	3	MP203
" " " "	4	MP204
" " " "	PW	MP210
" " " "	5	MP205
" " " "	6	MP206
" " " "	7	MP207
" " " "	8	MP208
" " " "	S1	MPS-1
" " " "	S2	MPS-2
Portac	1	PTO 1
"	2	PTO 2
"	3	PTO 3
"	5	PTO 5
Wasser/Winters	1	WW01
" "	2	WW02
" "	2a	WW06
" "	3	WW03
" "	4	WW04
" "	5	WW05
Murry Pacific Yard #1	1	MP101
" " " "	2	MP102
" " " "	3	MP103
Cascade Timber Yard #1	1	CTO 1
Cascade Timber Yard #2	1	CTO 2
Dunlap Towing	1	DTO 1
Louisiana Pacific	1	LPO 1
" "	2	LPO 2
" "	3	LPO 3
" "	4	LPO 4
Weyerhaeuser	1	WYO 1
"	2	WYO 2
McFarland Cascade	1	MCO 1
Cascade Timber Yard #3	1	CTO 3
St. Regis	1	SRO 2

†Station locations shown in Figures 2a - 2e.

Appendix III. Results of metals analysis of field blanks for Tacoma tideflats log sort yard samples collected by WDOE November 1983 - June 1984 (ug/L total metal).

Date of Survey	Sample Number	Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
11/04/83	136132	1u	1.0	24	29	8.0	3.0	0.1u
12/12/83	136740	1u	13	18	12	1u	1u	0.2u
12/29/83	136959	1u	13	17	13	1u	--	0.2u
03/12/84	141014	3.0	5.0	42	8.0	1u	1u	0.2u
"	141013†	15	9.0	24	8.0	1u	2.0	0.2u
04/10/84	141485	24	12	10	24	1u	3	0.1u
"	141486†	12	21	31	17	1u	1	0.1u
05/03/84	141939	1u	1u	1u	1u	1u	1u	0.1u
"	141938†	1u	1u	1u	1u	1u	1u	0.1u
06/29/84	340051	4.0	1u	1.0	1u	1u	1u	0.1u

u = Not detected at detection limit shown.
-- = Not analyzed.
† = Dissolved metals.

Appendix IV: Summary of runoff coefficient (C) values applicable to the Tacoma tideflats log sort yards.

Railroad yard	0.2 - 0.4	Lindeburg, M.R., 1981. "Civil Engineering Review Manual" (3rd ed.). Professional Engineering Registration Program.
Rural Areas: Cultivated loams and similar soils without impeding horizons.	0.40	Dunne, T. and L.B. Leopold. "Water in Environmental Planning." W.H. Freeman and Co., San Francisco, CA.
Permanent pasture, rangeland and idle land with no appreciable canopy and zero percent groundcover.	0.45	USEPA, 1982. "Water Qulaity Assessment, A Screening Procedure." A Screening Procedure for Toxic and Conventional Pollutants: Part 1. EPA-600/6-82-004a.

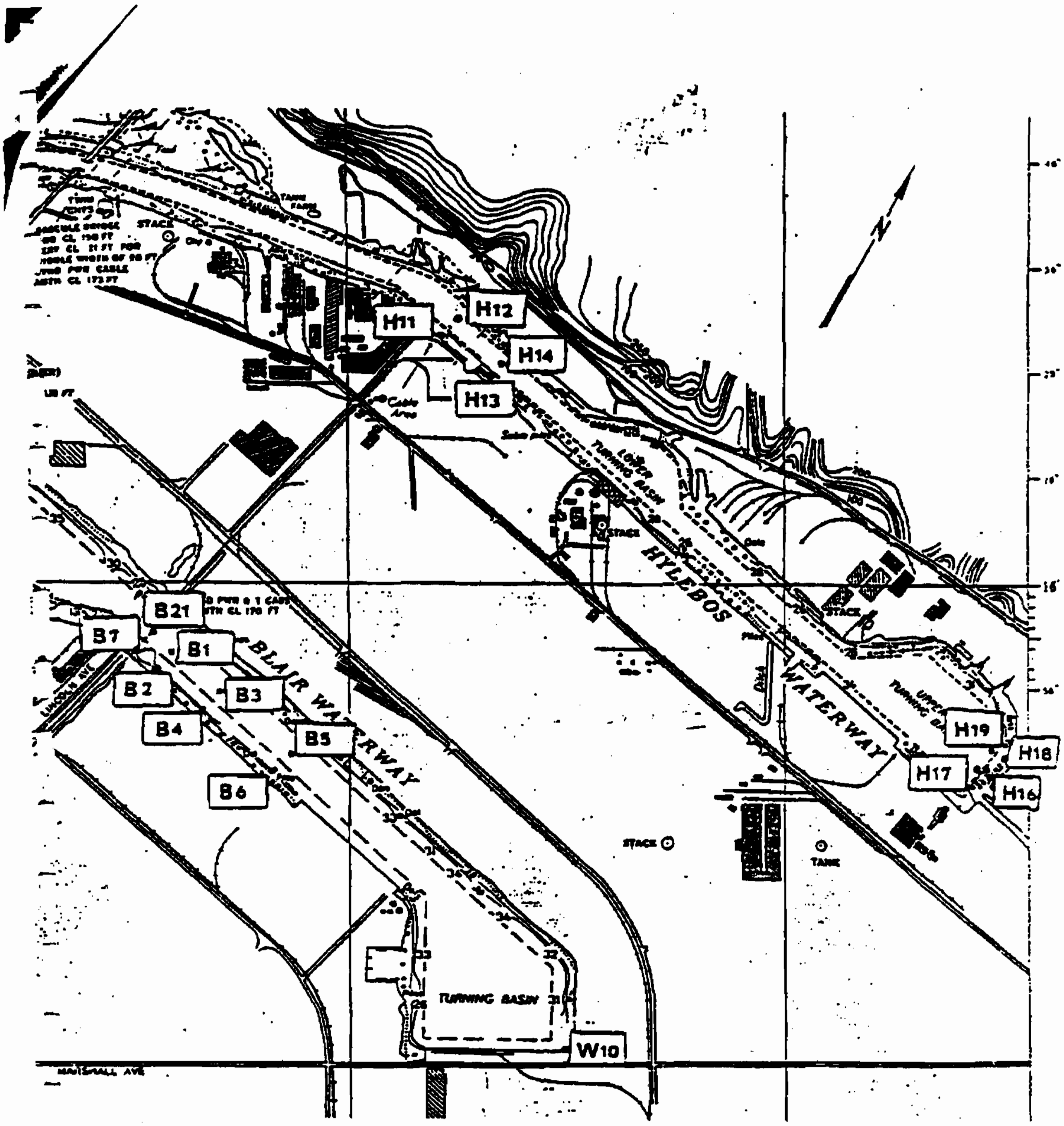


Figure 4. WDOE sediment station locations in Blair and Hylebos Waterways off Tacoma log sort yards, June 14, 1984.

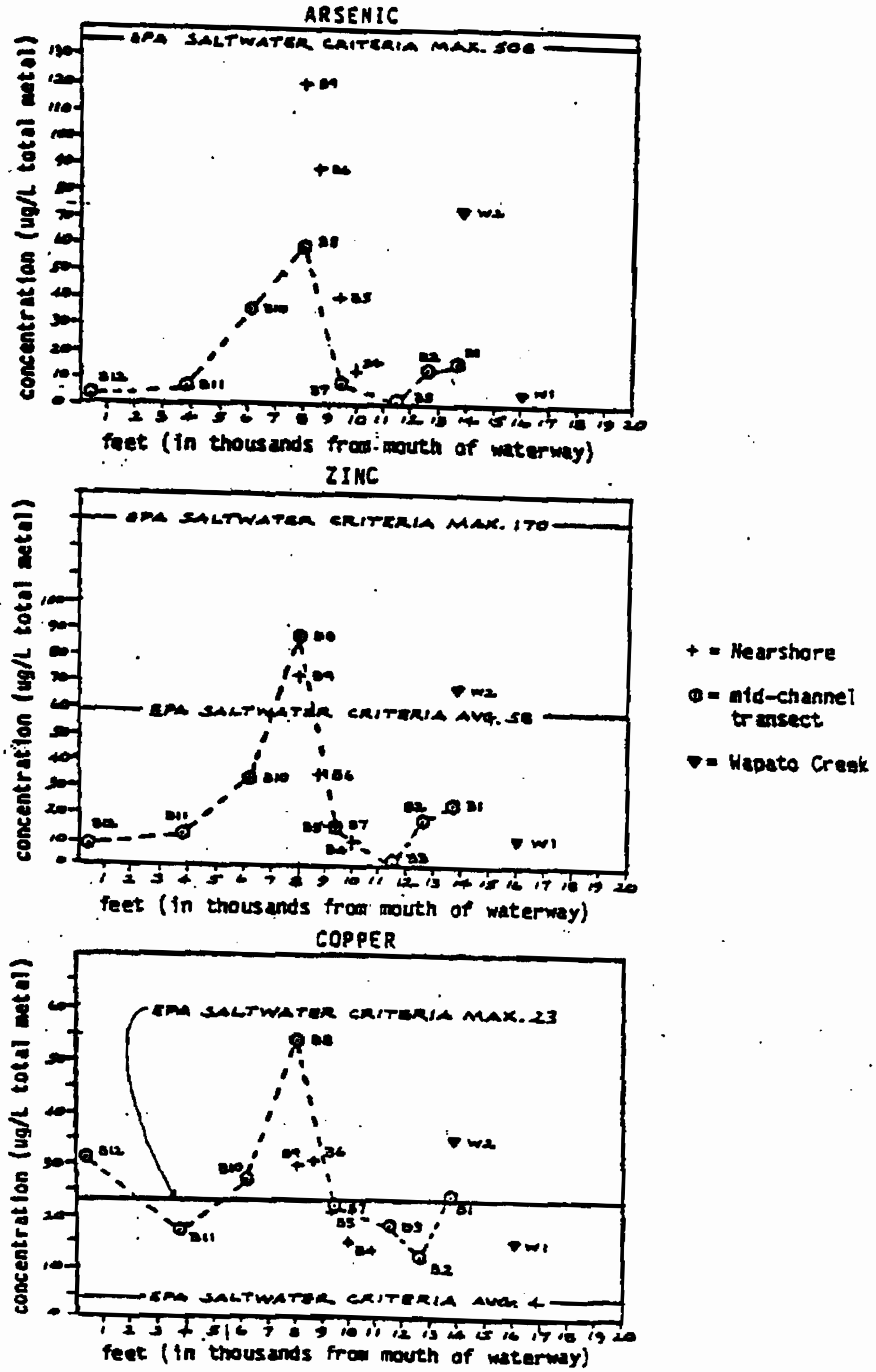


Figure 5. Arsenic, zinc, and copper concentrations in Blair Waterway and Wapato Creek surface water samples collected by WDOE May 3, 1984.

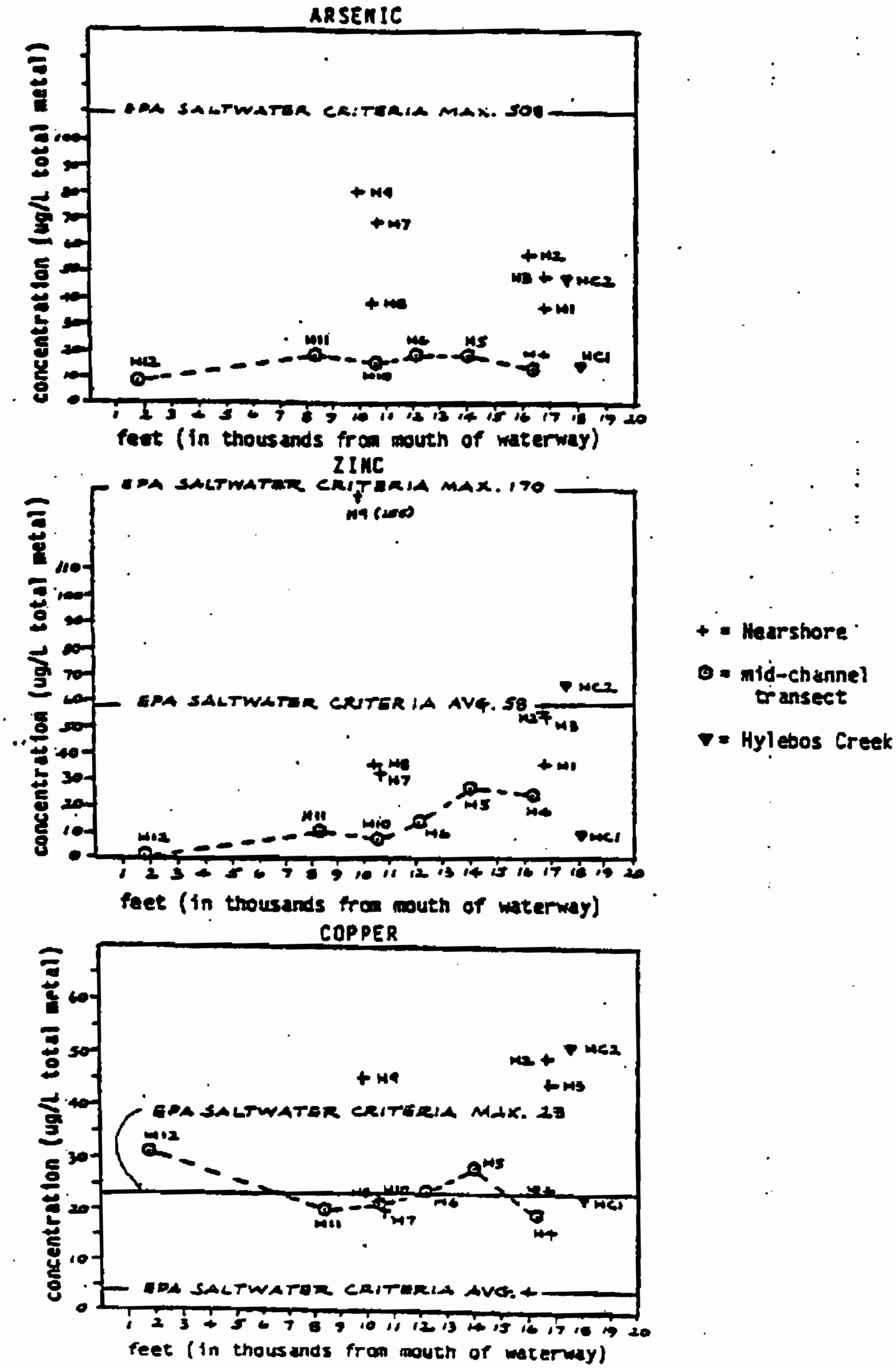
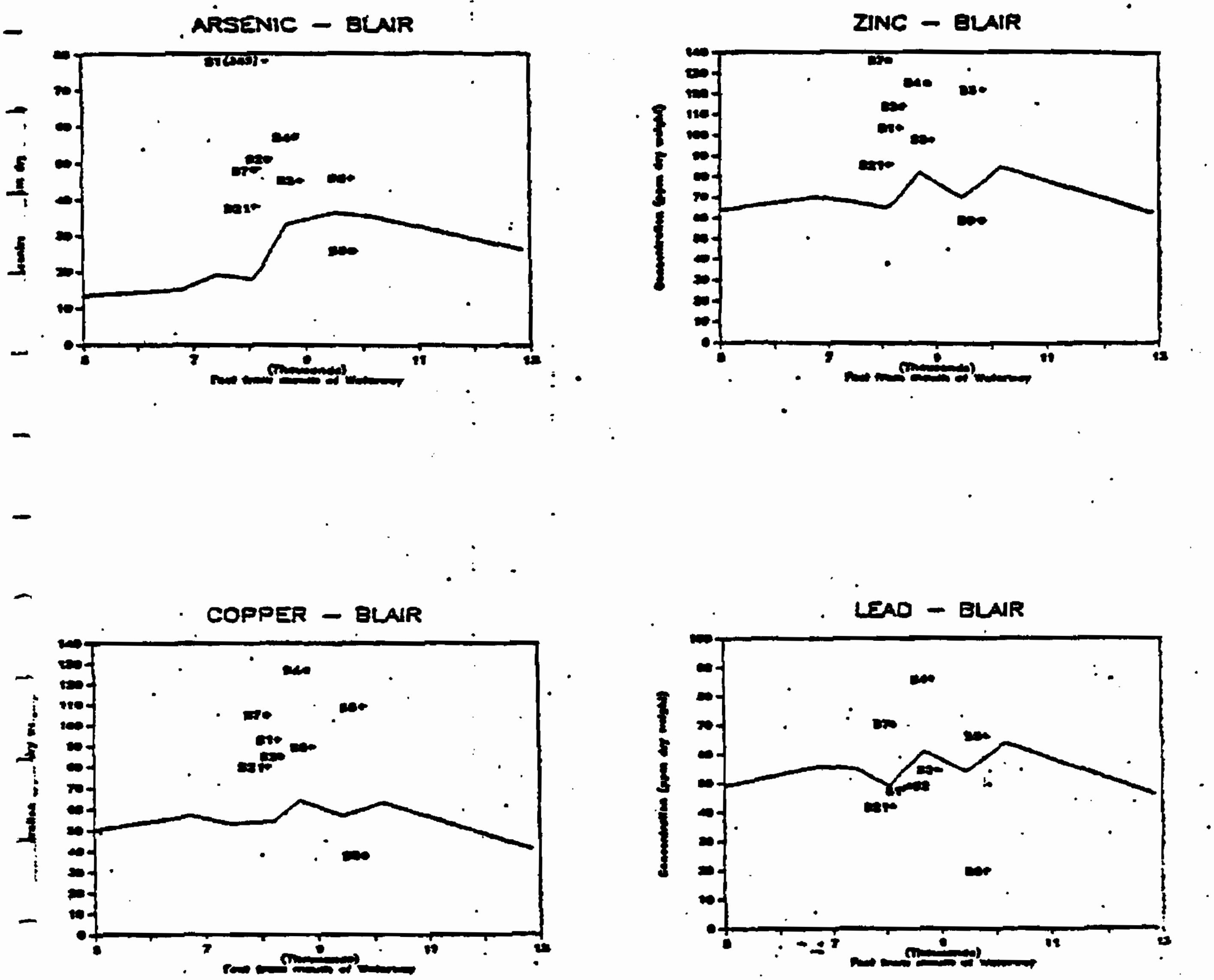


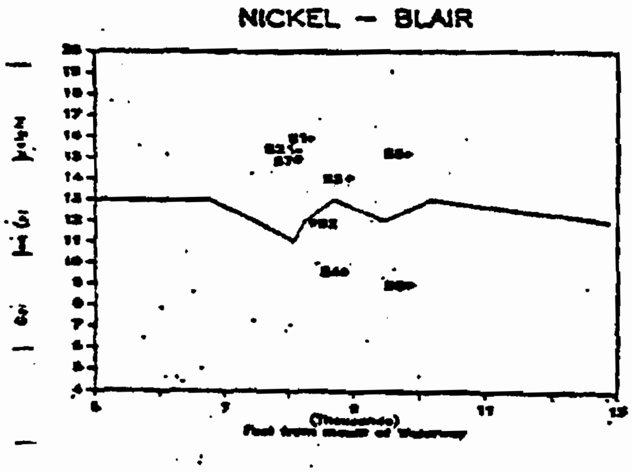
Figure 6. Arsenic, zinc, and copper concentrations in Blair Waterway and Hylebos Creek surface water samples collected by WDOE May 3, 1984.

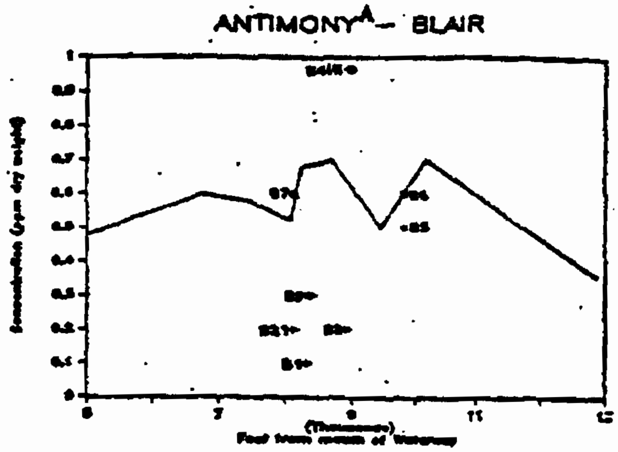


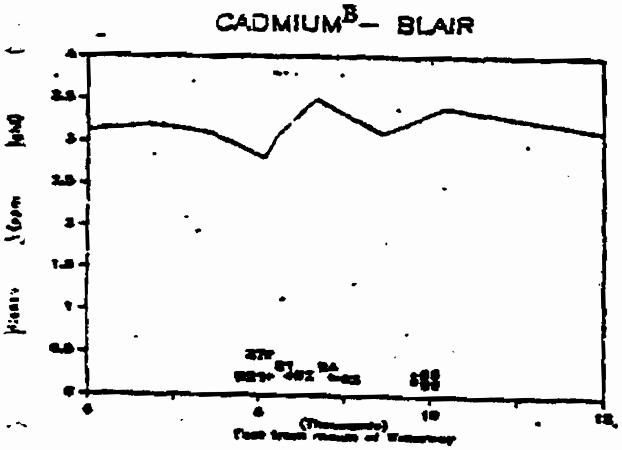
● Nearshore
\+ Offshore = WDOE station

Solid line = Tetra Tech mid-channel transect

Figure 7. Comparison of metals concentrations in Blair Waterway subtidal sediments off Murry Pacific yard #2 collected June 14, 1984, by WDOE to a mid-channel transect sampled March 11-18, 1984, by Tetra Tech, Inc.







● Nearshore
+ Offshore = WDOE station

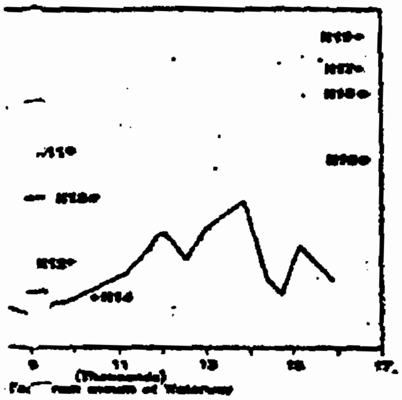
Solid line = Tetra Tech mid-channel transect

A = WDOE data suspect due to analytical technique.

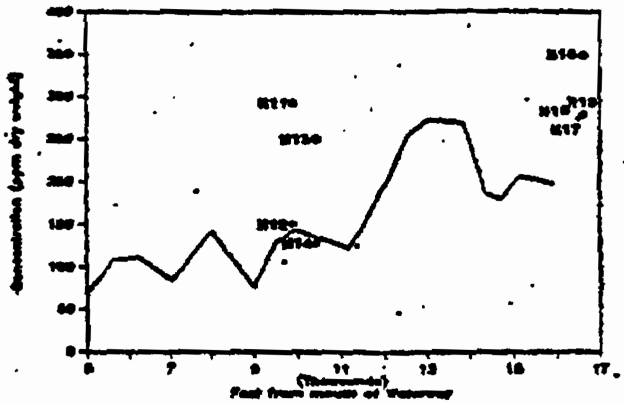
B = Tetra Tech data suspect due to analytical technique.

Figure 7. (continued)

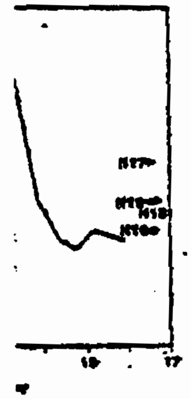
SENIC — HYLEBOS



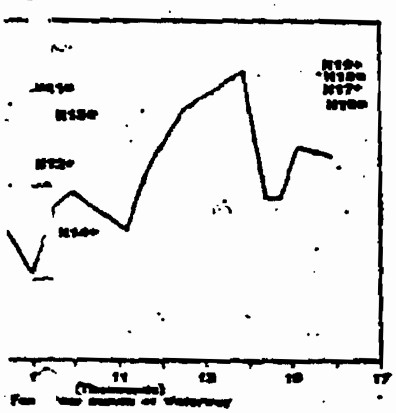
ZINC — HYLEBOS



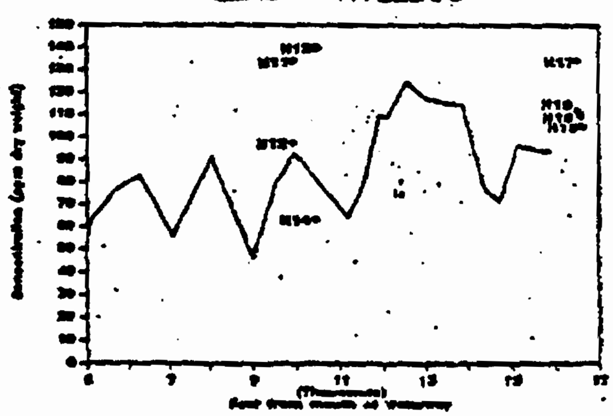
BOS



PPER — HYLEBOS



LEAD — HYLEBOS



d-channel

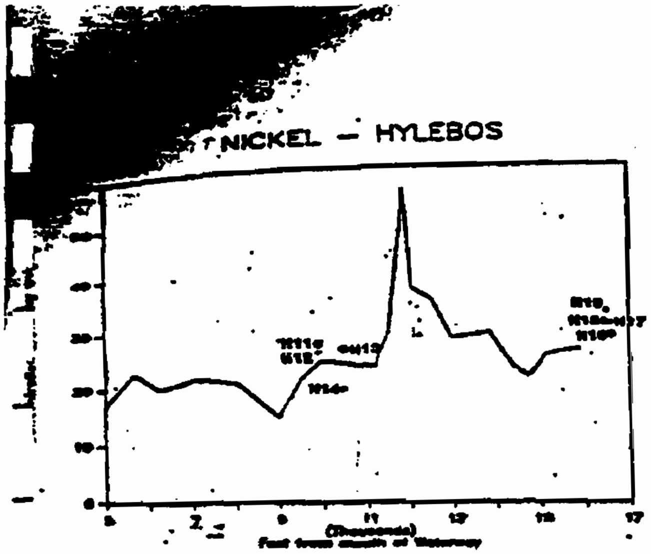
to

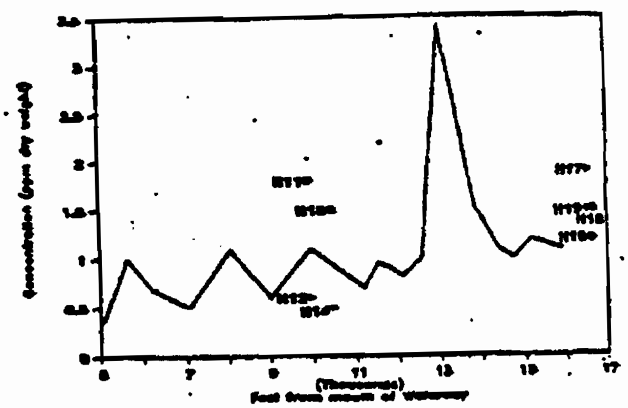
t due to

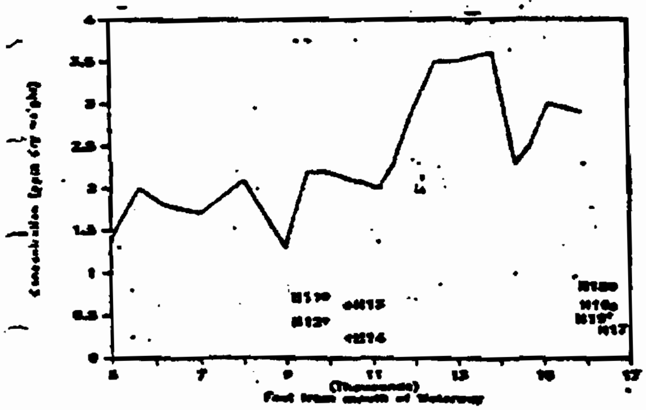
;hore = WDOE station
)O) :

line = Tetra Tech mid-channel transect

8.– Comparison of metals concentrations in Hylebos Waterway subtidal sediments of Murry Pacific yard #1 and Wasser/Winters collected June 14, 1984, by WDOE to a mid-channel transect sampled March 11-18, 1984, by Tetra Tech, Inc.







● Nearshore
\+ Offshore = WDOE station

Solid line = Tetra Tech mid-channel transect

A = WDOE data suspect due to analytical technique.

B = Tetra Tech data suspect due to analytical technique.

Figure 8. (continued)

Table 1 - Wapato Creek Upstream
Ecology Sta. W-1 and Hart Crowser Sta. SW-1

Date	Flow in MGD	pH	Spec. Cond. in umhos/cm	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
5/3/84	---	7.4	220	32	2		8		4		14	
POST-PAVING MONITORING RESULTS												
10/23/89	0.69*	---	---	6	6	5U	6	12	10U	10U	4	6
1/7/90	10.5	6.4	145	71	5U	5U	26	30	10U	10U	6	4

17734T1

Table 2 - Central Drain Discharge
Ecology Sta. 3 and Hart Crowser Sta. SW-2

Date	Flow in MGD	pH	Spec. Cond. in umhos/cm	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
11/4/83	0.17	5.9	318	86	1300		4720		263		1135	
12/29/83	1.4	5.9	49	28	260		554		38		266	
3/12/84	0.045	6.3	138	72	1730		1174		228		630	
4/10/84	0.066	6.3	346	64	4460		1610		235		612	
5/3/84	0.028	6.4	357	80	5400		1880		430		1160	
POST-PAVING MONITORING RESULTS												
10/23/89	0.652*	8.6	90	190	21	19	530	310	10	10U	27	4
1/7/90	0.69	5.9	45	8	33	30	150	160	10U	10U	6	4

17734T2

Table 3 - North Drain Discharge
Ecology Sta. 2 and Hart Crowser Sta. SW-3

Date	Flow in MGD	pH	Spec. Cond. in umhos/cm	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
11/4/83	0.18	5.7	1410	120	4500		5110		312		1660	
12/29/83	0.13	5.9	104	23		3700		2660		43		751
3/12/84	0.015	6.1	931	24	19900	18900	4440	3500	645	213	3190	1750
4/10/84	0.002	6.4	780	18	8600*		3500*		376*		2500*	
5/3/84	0.00064	6.3	1390	120	8760	6640	4370	3550	434	127	3040	1480
POST-PAVING MONITORING RESULTS												
10/23/89	0.339*	7.7	130	430	82	69	180	60	20	104	18	4
1/7/90	0.27	6.4	75	8	37	34	20	48	10U	10U	6	4
Replicate 1/7/90	0.27	6.4	75	2U	36	32	17	47	5U	5U	6	5

17734T3

Table 4 - Wapato Creek Downstream
Ecology Sta. W-2 and Hart Crowser Sta. SW-4

Date	Flow in MGD	pH	Spec. Cond. in umhos/cm	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
5/3/84	---	7.1	2720	58	70		65		11		34	
POST-PAVING MONITORING RESULTS												
10/23/89	1.54	6.6	>1990	28	14	5U	30	38	10	20	4	2
1/7/90	13.15	8.5	795	78	9	5U	47	35	5U	5U	8	3

* Mean of replicate samples or of several measurements
U - undetected to limit of detection shown
All data pre-1985 are Ecology Station data, all post-paving data are Hart Crowser Station data.
Reference: Hart Crowser, "Remediation Plan, PORTAC Log Soil Yard, Port of Tacoma, Washington", Volume II Appendices, J-1773-04, June 12, 1988

17734T4

Table 1 - Summary of Metal Concentrations in Wapato Creek Upstream of Site
Ecology Location W-1 and Hart Crowser Location SW-1

Date	Flow in MGD	pH	Spec. Cond. in umhos	TSS in mg/L	Arsenic in ug/L total	Arsenic in ug/L diss.	Zinc in ug/L total	Zinc in ug/L diss.	Lead in ug/L total	Lead in ug/L diss.	Copper in ug/L total	Copper in ug/L diss.
Pre-Remediation Monitoring Results												
5/3/84	—	7.4	220	32	2		8		4		14	
Post-Remediation Monitoring Results												
10/23/89	0.69*	—	—	6	6	5U	6	12	10 U	10 U	4	6
1/7/90	10.5	6.4	145	71	5U	5U	26	30	10 U	10 U	6	4
8/21/90	0.63	7.6	1,320	9	5U	5U	10 U	6 U	5 U	5 U	2 U	2 U
Average**				29	<5	<5	12	15	<10	<10	4	4

Notes:

* Mean of replicate samples or of several measurements.

** Averages calculated using one-half detection limit for undetected constituents.

U Not detected above limit shown.

B Analyte detected in method blank.

All data pre-1985 are Ecology data; all post-remediation data are Hart Crowser data.

Reference: Hart Crowser Remediation Plan, Portac Log Sort Yard, Port of Tacoma, Washington, Volume II Appendices, J-1773-04, June 12, 1988

17734T1

Table 2 – Summary of Metal Concentrations in Central Drain Discharge
Ecology Location 3 and Hart Crowser Location SW-2

Date	Flow in MGD	pH	Spec. Cond. in umhos	TSS in mg/L	Arsenic in ug/L total	Arsenic diss.	Zinc in ug/L total	Zinc diss.	Lead in ug/L total	Lead diss.	Copper in ug/L total	Copper diss.
Pre-Remediation Monitoring Results												
11/4/83	0.17	5.9	318	86	1,300		4,720		263		1135	
12/29/83	1.4	5.9	49	28	260		554		38		266	
3/12/84	0.045	6.3	138	72	1,730		1,174		228		630	
4/10/84	0.066	6.3	346	64	4,460		1,610		235		612	
5/3/84	0.028	6.4	357	80	5,400		1,880		430		1160	
Average				66	2,630		1,988		239		761	
Post-Remediation Monitoring Results												
10/23/89	0.652*	8.6	90	190	21	19	530	310	10	10 U	27	4
1/7/90	0.69	5.9	45	8	33	30	150	160	10 U	10 U	6	4
8/21/90	0.017	7.2	520	57	24	24	660 B	620 B	6	5 U	18 B	10 U
Average**				85	26	24	447	363	7	<10	17	4
% reduction					99.0	--	77.5	--	97.1	--	97.8	--

Notes:

* Mean of replicate samples or of several measuremetns.
** Averages calculated using one-half detection limit for undetected constituents.
U Not detected above limit shown.
B Analyte detected in method blank.
All data pre-1985 are Ecology data; all post-remediation data are Hart Crowser data.
Reference: Hart Crowser Remediation Plan, Portac Log Sort Yard, Port of Tacoma, Washington, Volume II Appendices, J-1773-04, June 12, 1988

Table 3 – Summary of Metal Concentrations in Northern Drain Discharge
Ecology Location 2 and Hart Crowser Location SW-3

Date	Flow in MGD	pH	Spec. Cond. in umhos	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
Pre-Remediation Monitoring Results												
11/4/83	0.18	5.7	1,410	120	4,500		5,110		312		1,660	
12/29/83	0.13	5.9	104	23		3,700		2,660		43		751
3/12/84	0.015	6.1	931	24	19,900	18,900	4,440	3,500	645	213	3,190	1,750
4/10/84	0.002	6.4	780	18	8600*		3,500 *		376 *		2500 *	
5/3/84	0.00064	6.3	1,390	120	8,760	6,640	4,370	3,550	434	127	3,040	1,480
Average				61	10,440	9,747	4,355	3,237	442	128	2,598	1,327
Post-Remediation Monitoring Results												
10/23/89	0.339*	7.7	130	430	82	69	180	60	20	104	18	4
1/7/90	0.27	6.4	75	8	37	34	20	48	10 U	10 U	6	4
Replicate 1/7/90	0.27	6.4	75	2U	36	32	17	47	5 U	5 U	6	5
8/21/90	0.0063	6.9	340	160	110	120	150 B	190 B	5 U	5 U	18 B	9 B
Average**				150	66	64	92	86	8	29	12	6
% Reduction					99.4	99.3	97.9	97.3	98.2	77.3	99.5	99.6

Notes:

* Mean of replicate samples or of several measurements.
** Averages calculated using one-half detection limit for undetected constituents.
U Not detected above limit shown.
B Analyte detected in method blank.
All data pre-1985 are Ecology data; all post-remediation data are Hart Crowser data.
Reference: Hart Crowser Remediation Plan, Portac Log Sort Yard, Port of Tacoma, Washington, Volume II Appendices, J-1773-04, June 12, 1988
17734T3

Table 4 - Summary of Metal Concentrations in Wapato Creek Downstream of Site
Ecology Location W-2 and Hart Crowser Location SW-4

Date	Flow in MGD	pH	Spec. Cond. in umhos	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
Pre-Remediation Monitoring Results												
5/3/84	---	7.1	2,720	58	70		65		11		34	
Post-Remediation Monitoring Results												
10/23/89	1.54	6.6	>1,990	28	14	5 U	30	38	10	20	4	2
1/7/90	13.15	8.5	795	78	9	5 U	47	35	5 U	5 U	8	3
8/21/90	1.38	6.7	9,650	56	6	5 U	51 B	45 B	5 U	6	4 U	4 U
Replicate 8/21/90				42	5 U	5 U	47 B	67 B	5 U	5 U	4 U	5 U
Average**				51	8	<5	44	46	4	8	4	3
% Reduction					89.6	—	32.3	—	63.6	—	88.2	—

Notes:

* Mean of replicate samples or of several measurements
** Averages calculated using one-half detection limit for undetected constituents.
U Not detected above limit shown.
B Analyte detected in method blank.
All data pre-1985 are Ecology data; all post-remediation data are Hart Crowser Station data.
Reference: Hart Crowser Remediation Plan, Portac Log Sort Yard, Port of Tacoma, Washington, Volume II Appendices, J-1773-04, June 12, 1988

Table 5 -- Summary of Metals Loading to Wapato Creek from Site Surface Water Discharge

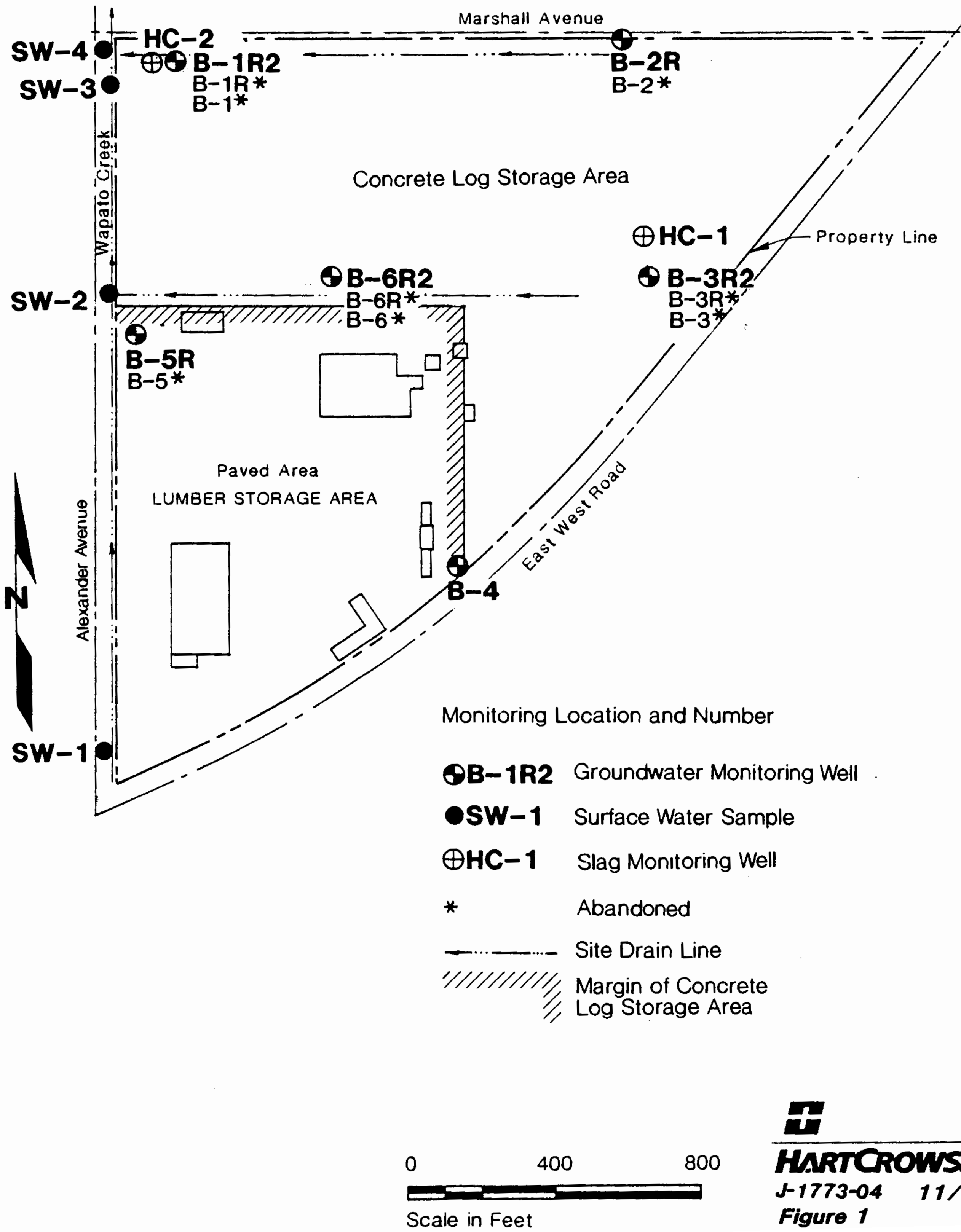
Date	Site Runoff in MGD	Arsenic Loading in ug/L	Arsenic Loading in kg/day	Zinc Loading in ug/L	Zinc Loading in kg/day	Copper Loading in ug/L	Copper Loading in kg/day	Lead Loading in ug/L	Lead Loading in kg/day
Pre-Remediation Loading									
11/4/83	0.36	2,900	3.952	5,000	6.813	1,400	1.908	290	0.395
12/29/83	1.8	1,100	7.494	790	5.382	310	2.112	9	0.061
3/12/84	0.11	7,100	2.956	2,600	1.083	1,600	0.666	570	0.237
4/10/84	0.095	5,800	2.086	1,700	0.611	720	0.259	270	0.097
5/3/84	0.058	9,500	2.086	2,100	0.461	1,000	0.220	380	0.083
Post-Remediation Loading									
10/23/89	0.991	41.9	0.157	410.3	1.539	23.9	0.090	13.4	0.0503
1/7/90	0.96	34.1	0.124	113.4	0.412	6.0	0.022	5.0	0.0182
8/21/90	0.0233	47.3	0.004	522.1	0.046	18.0	0.002	5.1	0.0004

Notes:
1983-84 Data for Ecology Locations 2 and 3 (Table 8, Appendix A, Remediation Plan, Volume II, February 27, 1985)
1989-90 Data for Hart Crowser Locations SW-2 and SW-3

Table 6 -- Metal Concentrations in Wapato Creek and Water Quality Criteria for Protecting Aquatic Life

	Concentration in ug/L			
	Arsenic (III)	Copper	Lead	Zinc
Pre-Remediation Monitoring Results				
SW-1 Upstream of Site	2	14	4	8
SW-4 Downstream of Site	70	34	11	65
Range of Post-Remediation Monitoring Results				
SW-1 Upstream of Site	<5 to 6	<2 to 6	<5 to <10	<10 to 26
SW-4 Downstream of Site	<5 to 14	<4 to 8	<5 to 10	30 to 51
Water Quality Criteria for Protecting Aquatic Life				
Marine Acute	69	2.9	140	95
Proposed MTCA Surface Water Cleanup Standards				
Compliance Levels	5	10	5.6	58

Groundwater and Surface Water Sampling Location Plan

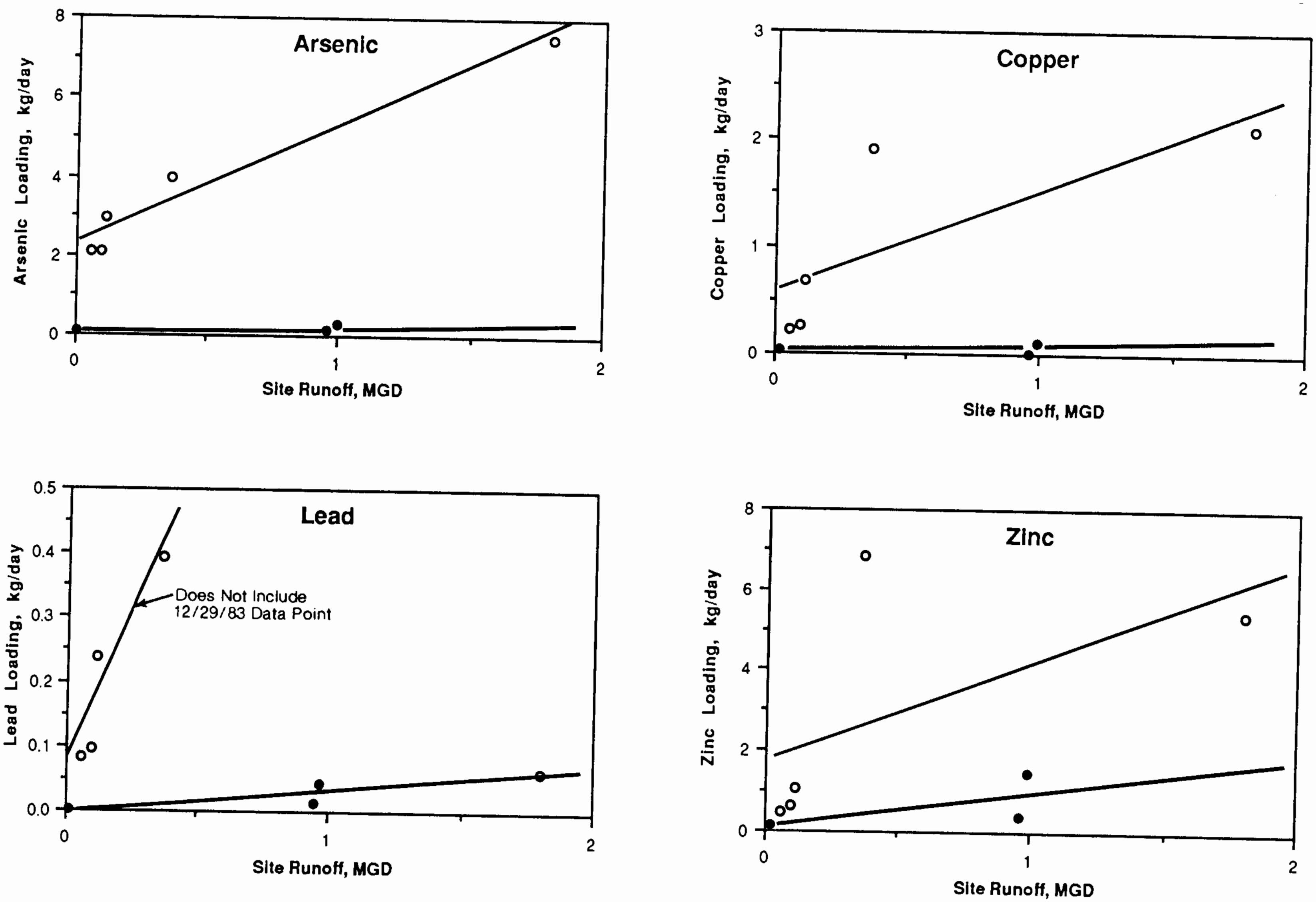


HARTCROWSER

J-1773-04 11/90

Figure 1

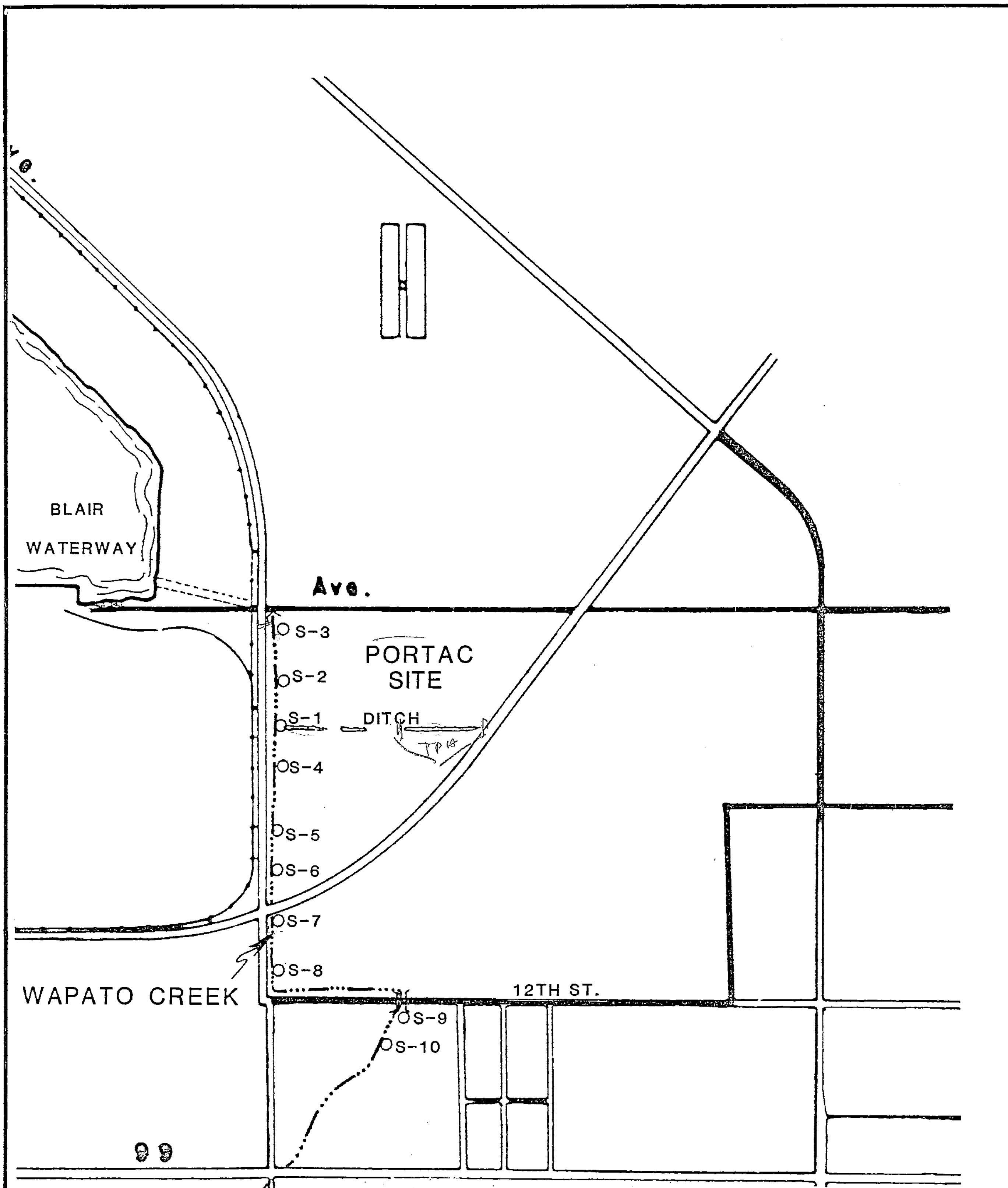
Metals Loading to Wapato Creek



○ Pre – Remediation, Ecology Data, 1983–84

● Post – Remediation, Hart Crowser Data, 1989–90

HARTCROWSER
J-1773-04 11/90
Figure 2



WAPATO CREEK
GENERAL SAMPLE LOCATION DIAGRAM

FIGURE 1

W.O. W-5581
BY DSW
DATE 9-2-88
SCALE NOT TO SCALE

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical & Hydrogeological Consultants
1400 140th Avenue N.E.
Bellevue, WA 98005

RZA

FARR, FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: September 2, 1988
Date Submitted: August 29, 1988
Project: PORTAC, Tacoma

RESULTS OF ANALYSES OF ENVIRONMENTAL SAMPLES FOR PENTACHLOROPHENOL BY GC/ECD

Sample #	PCP (ppb)
S-1	10
S-2	<10
S-3	<10
S-4	<10
S-5	<10
S-6	<10
S-7	13[a]
S-8	17[a]
S-9	<10
S-10	<10
Quality Assurance	
Method Blank	<10
S-9 (Duplicate)	<10

a - These values may be a consequence of carry-over from the previous sample injection.

FARR, FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: September 2, 1988
Date Submitted: August 29, 1988
Project: PORTAC, Tacoma

RESULTS OF ANALYSES OF SOIL SAMPLES FOR TOX

Sample #	TOX (ppm)	
S-1	<0.1	
S-3	<0.1	
S-6	0.4	
S-7	0.5	
S-9	0.6	
S-10	0.5	
Quality Assurance		
Method Blank	1.6	a
S-9 (Duplicate)	0.7	
S-10 (Matrix Spike) Spiked @ 100 ppm Percent Recovery	99%	

a- All values have been blank corrected.

FARR, FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: September 2, 1988
Date Submitted: August 29, 1988
Project: PORTAC, Tacoma

FINGERPRINT CHARACTERIZATION BY CAPILLARY GAS CHROMATOGRAPHY

Sample #	GC Characterization
S-1	The gas chromatographic trace indicates no presence of PCB, or chlorinated hydrocarbon pesticides above the ppm level.
S-3	The gas chromatographic trace indicates no presence of PCB, or chlorinated hydrocarbon pesticides above the ppm level.
S-9	The gas chromatographic trace indicates no presence of PCB, or chlorinated hydrocarbon pesticides above the ppm level.
S-10	The gas chromatographic trace indicates no presence of PCB, or chlorinated hydrocarbon pesticides above the ppm level.
S-10 (Duplicate)	The gas chromatographic trace indicates no presence of PCB, or chlorinated hydrocarbon pesticides above the ppm level.
Blank	The gas chromatographic trace indicates no presence of PCB, or chlorinated hydrocarbon pesticides above the ppm level.

Table 1 - Surface Sediment and Subsurface Core Sample Descriptions

Figure Location	Sample Number	Collection Date	Visual Sediment Description	Comments
Surface Sediment Samples				
WC-1	WC-SS-1	7/23/2009	Saturated, (loose), gray-black, silty fine SAND.	Slight sulfur-like odor, heavy sheen at surface.
WC-2	WC-SS-2	7/23/2009	Saturated, (soft), brown-black, sandy SILT with wood waste (wood chips, sawdust, >50%), with moss growing on the surface.	No notable odor, no sheen.
WC-3	WC-SS-3	7/23/2009	Saturated, (loose), tan-brown at surface changing to black, slightly silty fine SAND, with moss growing on the surface.	No notable odor, no sheen.
WC-4	WC-SS-4	7/23/2009	Saturated, (loose), black-brown, slightly silty sandy GRAVEL (1- to 4-inches), orange-red stain, with a plastic bag at surface.	No notable odor, very slight sheen.
WC-5	WC-SS-5	7/23/2009	Saturated, (loose), gray-black, slightly silty fine to medium SAND, with gravels (0.5- to 1-inch), and a stick at the surface.	No notable odor, no sheen.
WC-6	WC-SS-6	7/23/2009	Saturated, (loose), gray-black, slightly silty fine SAND.	Moderate sulfur-like odor, heavy sheen at surface.
Subsurface Core Samples				
WC-1	WC-SC-1 (S-1)	7/23/2009	Saturated, (loose), black, slightly gravelly silty fine SAND, with gravels (1- to 4-inches).	No notable odor, no sheen.
WC-1	WC-SC-1 (S-2)	7/23/2009	Saturated, (loose), gray-black, slightly gravelly silty fine SAND, with gravels (1- to 2-inches), with wood waste (wood chips, sawdust) from 1.8 to 2.0 feet below surface.	Slight sulfur-like odor, no sheen.
WC-2	WC-SC-2 (S-1)	7/23/2009	Saturated, (soft), brown-black, sandy SILT with wood waste (wood chips, sawdust, >50%).	Moderate petroleum-like odor, no sheen.
WC-2	WC-SC-2 (S-2)	7/23/2009	Saturated, (loose), gray-black, silty fine to medium SAND.	No notable odor, slight sheen.
WC-3	WC-SC-3 (S-1)	7/23/2009	Saturated, (loose), black, slightly silty fine SAND.	No notable odor, no sheen.
WC-3	WC-SC-3 (S-2)	7/23/2009	Saturated, (loose), gray-black, slightly silty fine SAND.	No notable odor, no sheen.
WC-4	WC-SC-4 (S-1)	7/23/2009	Saturated, (loose), black-brown, slightly silty sandy GRAVEL (1- to 6-inches), with glass debris at the surface.	No notable odor, very slight sheen.

Table 1 - Surface Sediment and Subsurface Core Sample Descriptions

Figure Location	Sample Number	Collection Date	Visual Sediment Description	Comments
WC-4	WC-SC-4 (S-2)	7/23/2009	Saturated, (loose), black-brown, slightly silty sandy GRAVEL (1- to 4-inches), with glass debris at surface. Changes to gray, slightly silty sandy GRAVEL at 1.5 feet below surface.	No notable odor, no sheen.
WC-5	WC-SC-5 (S-1)	7/23/2009	Saturated, (loose), gray-black, slightly silty fine to medium SAND, with gravels and twigs at the surface.	No notable odor, no sheen.
WC-5	WC-SC-5 (S-2)	7/23/2009	Saturated, (loose), gray-black, slightly silty fine to medium SAND, with gravels (0.5- to 1-inch), and twigs and glass debris at the surface.	No notable odor, no sheen.
WC-6	WC-SC-6 (S-1)	7/23/2009	Saturated, (loose), gray-black, slightly silty fine SAND, with twigs at the surface.	Moderate sulfur-like odor, heavy sheen at surface.
WC-6	WC-SC-6 (S-2)	7/23/2009	Saturated, (loose), gray-black, slightly silty clayey fine SAND, with wood waste (wood chips, sawdust) from 1.0 to 1.5 feet below surface.	Moderate sulfur-like odor, no sheen.

Table 2 - Analytical Results for Sediment Samples

Sample ID	WA State SMS SQS	CSL	WC-SS-1	WC-SC-1 (S-1)	WC-SS-2	WC-SC-2 (S-1)	WC-SC-2 (S-2)	WC-SS-3	WC-SC-3 (S-1)
Depth in Feet			0 to 0.33	0 to 1	0 to 0.33	0 to 1	1 to 2	0 to 0.33	0 to 1
Sample Date			7/23/2009	7/23/2009	7/23/2009	7/23/2009	7/23/2009	7/23/2009	7/23/2009
Total Solids in %			62.22	71.47	38.59	44.92	72.27	67.15	61.10
NWTPH-Gx in mg/kg									
Gasoline-Range					28 U	24 U	8.5 U		
NWTPH-Dx in mg/kg									
Diesel-Range			36	29	120	110	31	6.9	7.4
Motor-Oil Range			71	57	240	220	61	14	15
Metals in mg/kg									
Arsenic	57	93	39	14	40	40	$\boxed{81}$	11	8 U
Cadmium	5.1	6.7	0.3 U	0.3 U	0.6	0.5	0.3 U	0.3 U	0.3 U
Chromium	260	270	19.4	23.8	34	30	19.8	21.0	19.5
Copper	390	390	21.0	19.9	55.5	45.3	19.0	14.1	19.6
Lead	450	530	10	9	36	28	11	7	7
Mercury	0.41	0.59	0.03 U	0.03	0.12	0.12	0.04	0.03 U	0.04
Nickel			9	13	17	16	10	10	11
Zinc	410	960	67 J	55	301	215	40	54	49
PCP in ug/kg									
Pentachlorophenol	360	690	21 Y	7.4 U	18 Y	14 U	7.6 U	8.4 U	9.5 U

Table 2 - Analytical Results for Sediment Samples

Sample ID	WC-SS-4	WC-SC-4 (S-1)	WC-SS-5	WC-SC-5 (S-1)	WC-SS-6	WC-SC-6 (S-1)
Depth in Feet	0 to 0.33	0 to 1	0 to 0.33	0 to 1	0 to 0.33	0 to 1
Sample Date	7/23/2009	7/23/2009	7/23/2009	7/23/2009	7/23/2009	7/23/2009
Total Solids in %	77.02	76.60	70.43	71.22	70.28	69.12
NWTPH-Gx in mg/kg						
Gasoline-Range						10 U
NWTPH-Dx in mg/kg						
Diesel-Range	28	29	6.1	6.1	6.3	6.6
Motor-Oil Range	55	58	12	12	13	13
Metals in mg/kg						
Arsenic	9	11	7 U	6 U	7 U	7 U
Cadmium	0.2 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Chromium	18.7	21.6	16.0	14.4	15.7	17.0
Copper	18.4	21.4	14.9	10.9	16.3	20.6
Lead	6	5	8	3	3 U	3
Mercury	0.03 U	0.03 U	0.05	0.03 U	0.03 U	0.03 U
Nickel	16	14	11	11	8	11
Zinc	56	58	46	26	24	27
PCP in ug/kg						
Pentachlorophenol	6.9 U	7.6 U	8.0 U	7.8 U	7.8 U	8.3 U

Notes:
U = Not detected at reporting limit indicated.
J = Estimated value.
Y = The analyte is not detected at or above the reported concentration. The reporting limit is raised due tc
chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit
Blank entry indicates no applicable screening criteria established or sample not analyzed for specific analyte
Boxed entry indicates detected concentration exceeds SMS criteria.

Source: Base map prepared from Google Maps, 2009.

WC-1 ⊙ Wapato Creek Sediment Sample Location and Number (Surface Sediment and Subsurface Core Sample)

Stormwater Outfall

Creek Flow Direction

N

0 600 1200

Scale in Feet

Note:

1. Samples were collected on July 23, 2009 within 3 hours before and after low tide at 12:30 pm.
2. Former site structures are shown on figure for reference but are now demolished.
3. Surface sediment and subsurface core sample locations were located immediately adjacent to one another, sample locations are depicted as one sample location (WC-1 through WC-6).

Former Portac Facility
Tacoma, Washington

Sample Location Plan

17565-00 9/09

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Figure
2

EAL 09/14/09 1756500-002.dwg

Table 1
Wapato Creek Repeat Sample WC-SC-2
PAH Analysis and Sediment Quality Criteria

Parameter	***Laboratory Reported Concentration (mg/kg)***	***Normalized Concentration*** ***(mg/kg)/(total organic carbon: 0.159)***	***Sediment Quality Criteria WAC 173-204-320 (mg/kg)***
LPAH[1]	∑ = 0.040	∑ = 0.38	370
Naphthalene	ND (<0.01)	ND (<0.06)	99
Acenaphthylene	ND (<0.01)	ND (<0.06)	66
Acenaphthene	ND (<0.01)	ND (<0.06)	16
Fluorene	ND (<0.01)	ND (<0.06)	23
Phenanthrene	0.037	0.23	100
Anthracene	ND (<0.01)	ND (<0.06)	220
2-methylnaphthalene	ND (<0.01)	ND (<0.06)	38
HPAH[2]	∑ = 1.3	∑ = 8.11	960
Fluoranthene	0.089	0.56	160
Pyrene	0.25	1.57	1000
Benz(a)anthracene	0.065[j]	0.41[j]	110
Chrysene	0.17[j]	1.07[j]	110
Total Benzofluoranthenes	0.34[j]	2.14[j]	230
Benzo(a)pyrene	0.092[j]	0.58[j]	99
Indeno (1,2,3,-c,d) pyrene	0.10[j]	0.63[j]	34
Dibenzo(a,h)anthracene	0.034[j]	0.21[j]	12
Benzo(g,h,i)perylene	0.15[j]	0.94[j]	31

Table 1 Notes:
[1] - LPAH - Low molecular weight polynuclear aromatic hydrocarbons; the sum of the laboratry reported concentrations of naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene and anthracene. Parameters not detected are assumed to be at a concentration ½ of the laboratory reporting limit.

[2] - HPAH - High molecular weigth polynuclear aromatic hydrocarbons; the sum of the laboratry reported concentrations of fluoranthene, pyrene, benz(a)anthracene, chrysene, total benofluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenzo(a,h)anthracene and benzo(g,h,i)perylene. Parameters not detected are assumed to be at a concentration ½ of the laboratory reporting limit.

[j] - Reported concentration is below the laboraty's normal reporting limits and must be considered an estimate. Normalized concentrations based on these estimates are also considered estimates.

To compare to Sediment Management Standards, the reported PAH concentrations are normalized, or expressed on a total organic carbon basis. To normalize to total organic carbon, the dry weight concentration for each parameter is divided by the decimal fraction representing the percent total organic carbon content of the sediment. The testing conducted for this analysis found the sample contained a total organic content of 17.9 percent. Table 1 summarizes the laboratory findings, the normalized concentrations and applicable Marine Sediment Quality Standards.

Table 1
Wapato Creek Split Sample WC-SS-2
PAH Analysis and Sediment Quality Criteria

Parameter	***Laboratory Reported Concentration (mg/kg)***	***Normalized Concentration** (mg/kg)/(total organic carbon: 0.179)*	***Sediment Quality Criteria WAC 173-204-320 (mg/kg)***
LPAH[1]	∑ = 0.082	∑ = 0.48	370
Naphthalene	ND (<0.02)	ND (<0.06)	99
Acenaphthylene	ND (<0.02)	ND (<0.06)	66
Acenaphthene	ND (<0.02)	ND (<0.06)	16
Fluorene	ND (<0.02)	ND (<0.06)	23
Phenanthrene	0.032	0.18	100
Anthracene	ND (<0.02)	ND (<0.06)	220
2-methylnaphthalene	ND (<0.02)	ND (<0.06)	38
HPAH[2]	∑ = 0.84	∑ = 4.69	960
Fluoranthene	0.11	0.61	160
Pyrene	0.17	0.95	1000
Benz(a)anthracene	0.052	0.29	110
Chrysene	0.11	0.61	110
Total Benzofluoranthenes	0.172	0.96	230
Benzo(a)pyrene	0.052	0.29	99
Indeno (1,2,3,-c,d) pyrene	0.064	0.36	34
Dibenzo(a,h)anthracene	ND (<0.02)	ND (<0.06)	12
Benzo(g,h,i)perylene	0.10	0.56	31

Table 1 Notes:
[1] - LPAH - Low molecular weight polynuclear aromatic hydrocarbons; the sum of the laboratry reported concentrations of naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene and anthracene. Parameters not detected are assumed to be at a concentration ½ of the laboratory reporting limit.

[2] - HPAH - High molecular weigth polynuclear aromatic hydrocarbons; the sum of the laboratry reported concentrations of fluoranthene, pyrene, benz(a)anthracene, chrysene, total benofluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenzo(a,h)anthracene and benzo(g,h,i)perylene. Parameters not detected are assumed to be at a concentration ½ of the laboratory reporting limit.

Table 1 – Total Organic Carbon Analyses
Former Portac, Inc. Site

Boring	***Depth Range (feet)***	***Total Organic Carbon (percent)***
OC-2	6-8	0.22
	8-10	0.30
	10-12	0.21
	12-16	0.18
OC-3	6-8	0.57
	8-12	0.34
	12-16	0.19
OC-4	6-8	0.35
	8-12	0.37
OC-5	4-8	0.22
	8-12	0.12
	12-16	0.05
	16-20	0.09
Mean Soil Organic Content:	6-8	0.34
Mean Soil Organic Content:	8-12	0.27
Mean Soil Organic Content:	12-16	0.14
Overall Mean Soil Organic Content:		0.25

The laboratory testing found organic carbon in the samples ranging from 0.09 to 0.57 percent. The samples demonstrated generally decreasing organic content with depth. Samples from depths of six to eight feet had an arithmetic mean soil organic content of 0.34 percent. The samples from eight to 12 feet and 12 to 16 feet had mean organic contents of 0.27 percent and 0.14 percent, respectively. The overall mean organic content was 0.25 percent.

The workbook model is based on determining the potential for contaminants held in soil to be desorbed into groundwater. Since the former contaminant sources at the Portac site were at shallow depths above the groundwater level, contaminant migration would be required to pass through the shallow soil where contaminant would have the tendency to bind to organic matter, before reaching the soil zones with lower carbon content. Because of this, the shallow soil mean organic content of 0.34 percent was used in the Workbook to calculate an appropriate soil cleanup level that would be protective of groundwater.

It should be noted that a prior test for total organic carbon was conducted on a sample of sediment in Wapato Creek, which was discussed in a prior report (WES, 2009). The organic content in that sample was 19%. Although not used for the Workbook calculation, that sample represents conditions at a potential discharge area where groundwater meets surface water and would acts as another zone of highly organic material that contaminants would need to pass through before coming into contact with surface water.

APPENDIX A.7

Stormwater Drainage and Chemistry

Attachment A.7 Contains Excerpted Information from the Following References:

Year	Author Abbreviation	Author	Document Title
1988b	HC	Hart Crowser, Inc. (HC)	Portac Log Sort Yard Remediation Plan, Volume I and II Appendices
2009c	WES	Whitman Environmental Services (WES)	Letter from WES to Ecology, dated November 17, 2009. RE: Additional Site Information, Portac, Inc. Tacoma, WA. Including documentation of storm drain sampling and cleaning; terrestrial ecological evaluation; Wapato Creek sediment analysis.
2009	EMS	Environmental Management Services, LLC. (EMS)	Field Report: Catchbasin Sampling. Prepared for Portac.
2009b	HC	Hart Crowser, Inc. (HC)	Technical Memorandum: Portac Catch Basin Sampling and Analysis Portac Sawmill and Log Yard Site

Table 1 Coventional Water Quality Parameters and Metals Concentrations in Portac Log Sort Yard Runoff to Blair Waterway; Ecology Data Collected November 1983 through May 1984 (From Table 8, Appendix A)

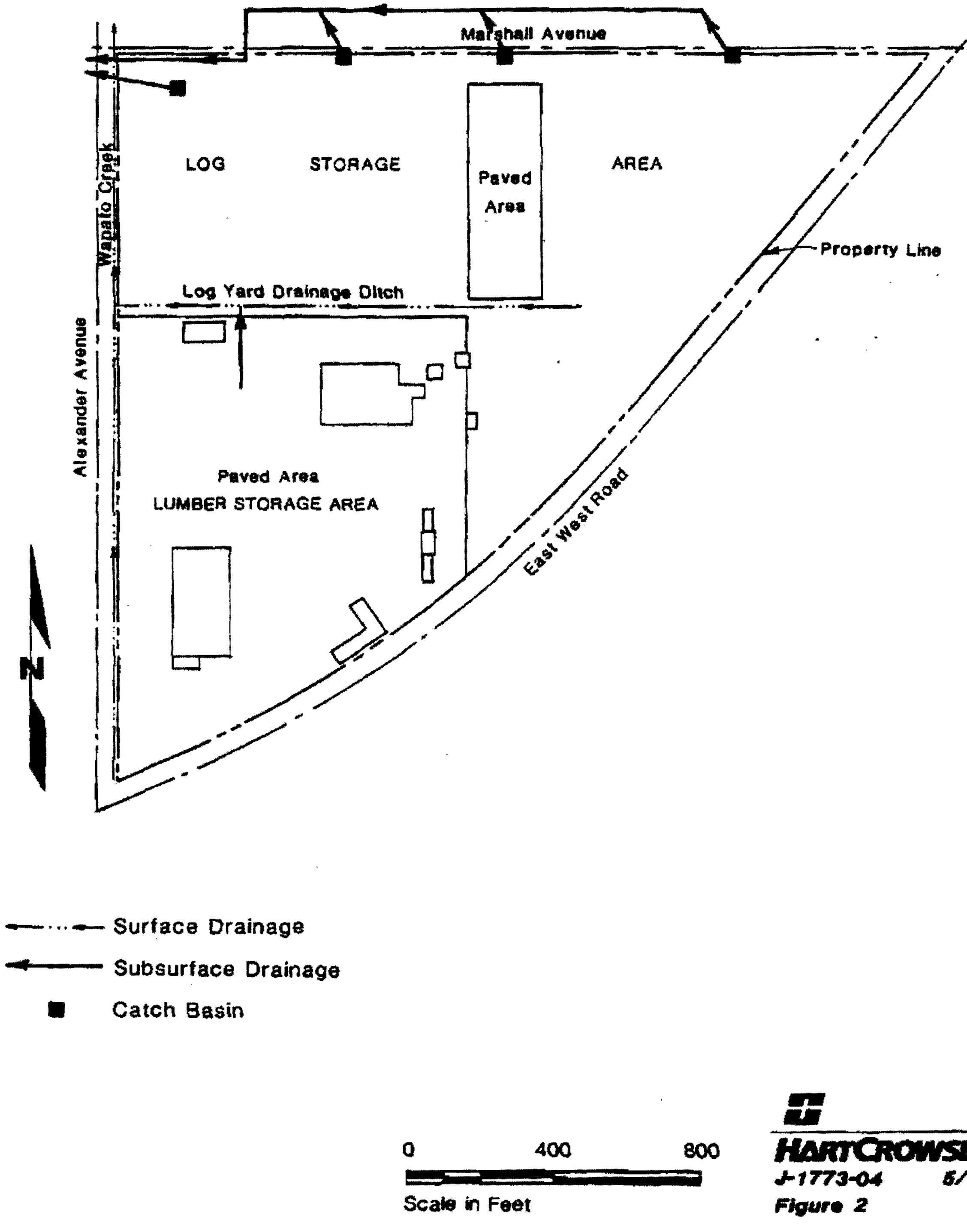
	Date	Time	Total Yard Flow (MGD)	pH (S.U.)	Specific Conductivity in umhos/cm	Total Susp. Solids in mg/L	Flow Weighted Concentration, ug/L Total Metal						
							Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
Wapato Creek/ Blair Waterway	11/04/83	1000-1030	0.36	5.7	910	110	2900	5000	1400	290	270	140	10
	12/29/83	2030-2045	1.8	5.8	230	28	1100	790	310	9	30	---	1.0
	3/12/84	1535-1555	0.11	6.1	600	130	7100	2600	1600	570	130	380	3.5
	4/10/84	1440-1500	0.095	6.3	690	64	5800	1700	720	270	87	150	2.9
	5/03/84	1535-1550	0.058	6.4	930	88	9500	2100	1000	380	120	120	2.0
		Average	0.48	6.1	670	84	5300	2400	1000	300	130	200	3.9

Table 5 Coventional Parameters and Metals Concentrations in Sediment Samples Collected by Ecology from Wapato Creek near Portac Log Sort Yard June 11, 1984 (From Table 10, Appendix A)

Sample Number	Station Number	Position	Depth at MLLW in Feet	Moisture in Percent	Total Organic Carbon in Percent	Nitrogen in Percent	Grain Size in Percent: Sand	Silt	Clay	Total	Metals in mg/Kg Dry Weight: Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
Wapato Creek																	
14-2710	W-8	above	---	69	0.68	0.04(*)	81.1	16.3	0.89	98.3	14	70	23	14	7.3	0.1	0.04
14-2711	W-10	below	---	76	0.32	0.02(*)	91.7	7.2	---	98.9	45	78	23	10	6.2	0.1u	0.16

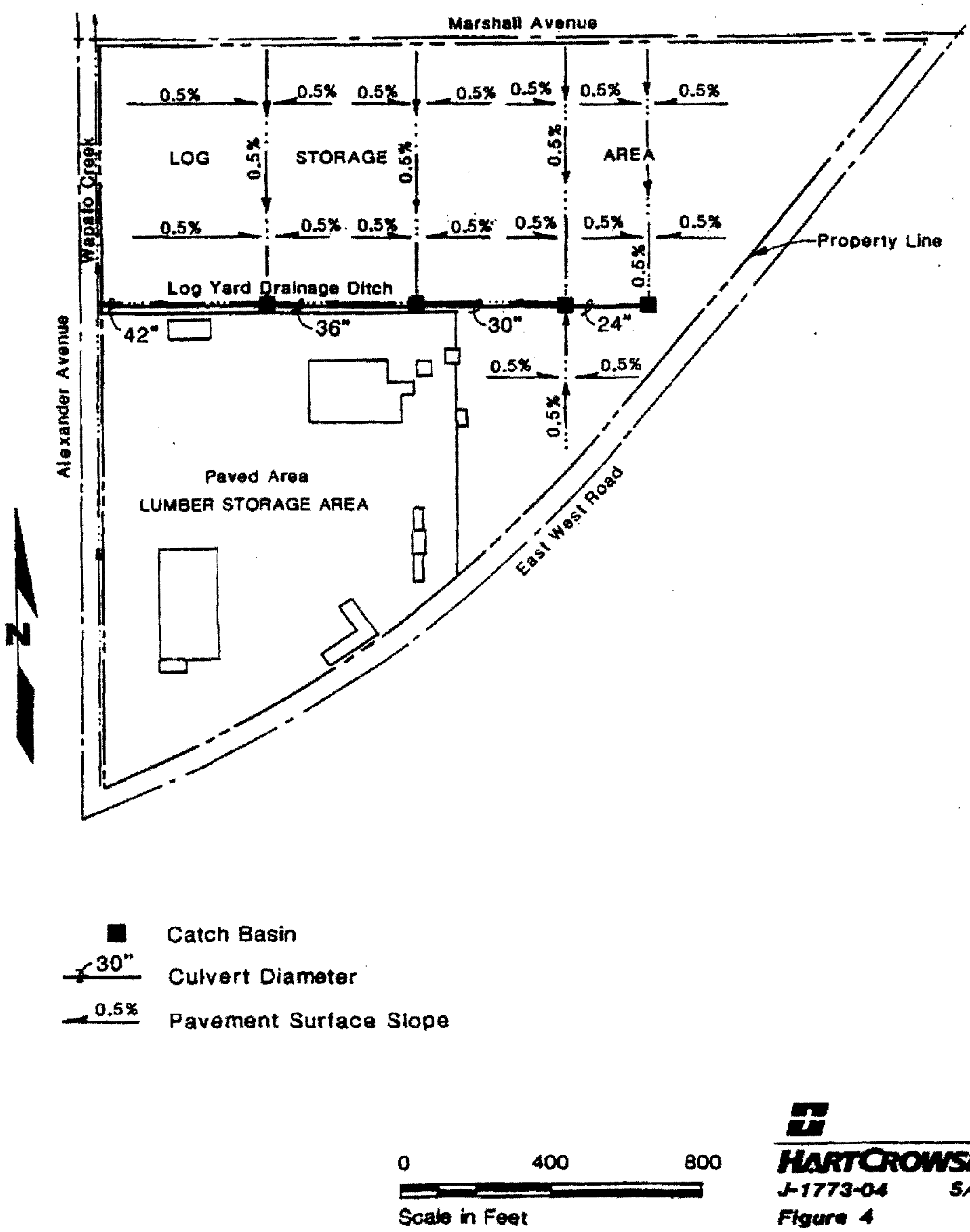
(*) = Estimated Concentration
u = Not detected at detection limit shown

Existing Site Drainage Plan



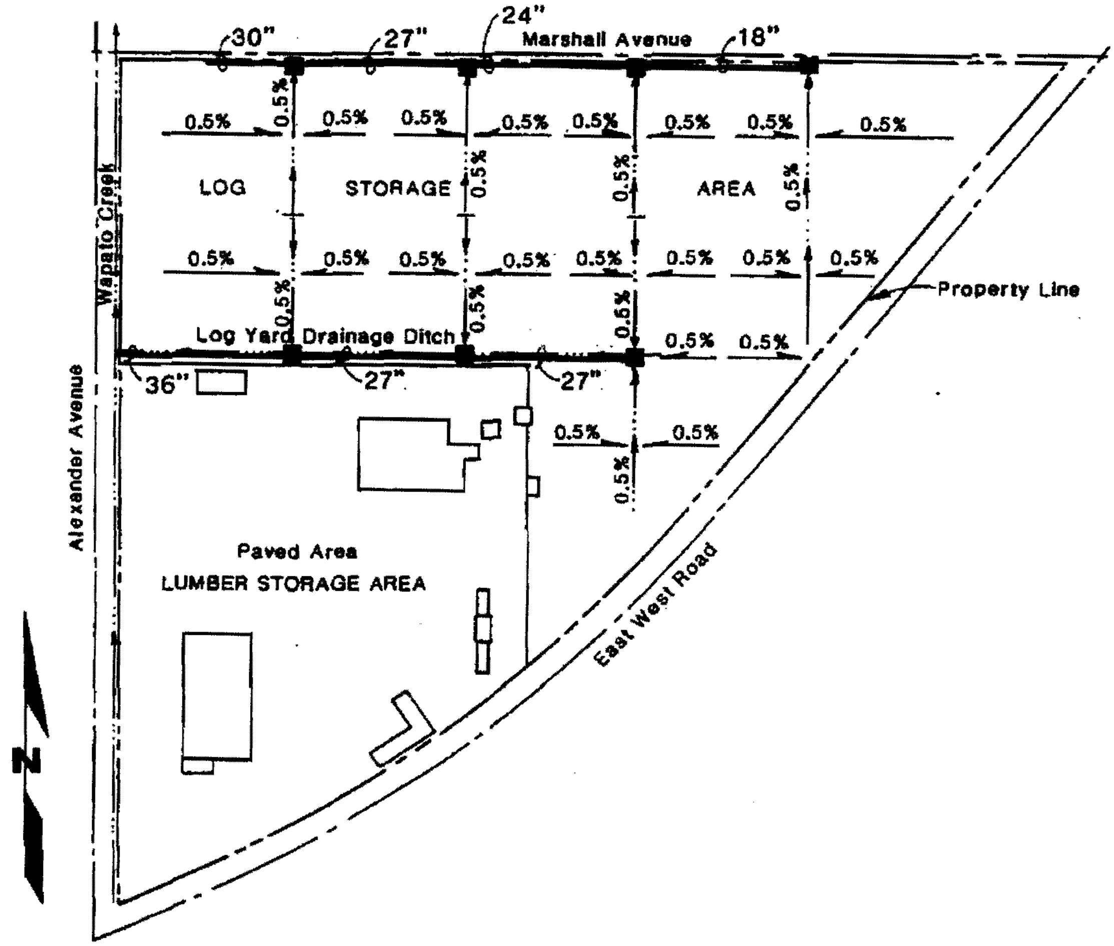
HARTCROWSER
J-1773-04 5/88
Figure 2

Site Drainage Plan
Alternative 1



HARTCROWSER
J-1773-04 5/88
Figure 4

Site Drainage Plan
Alternative 2



■ Catch Basin

30" Culvert Diameter

0.5% Pavement Surface Slope

0 400 800

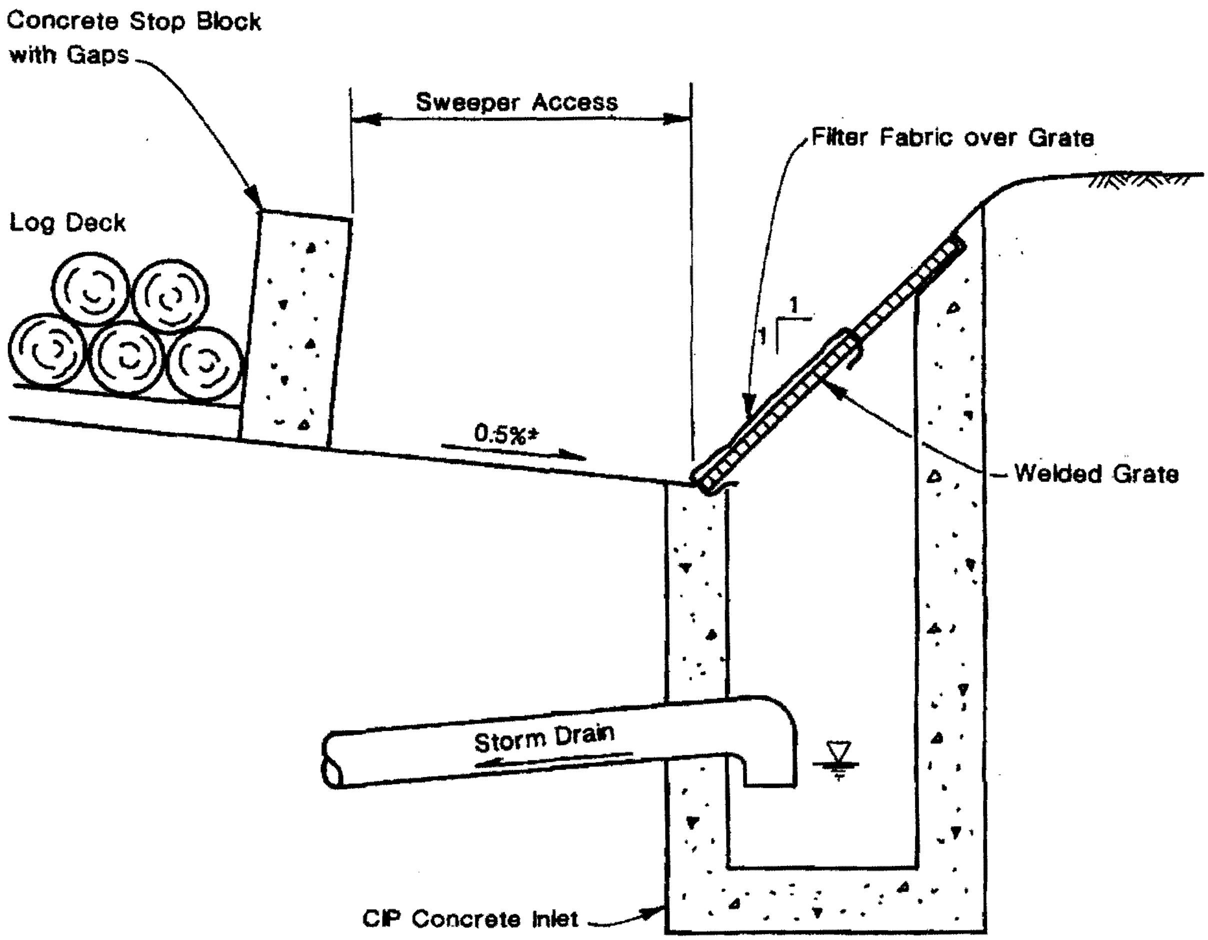
Scale in Feet

HARTCROWSER

J-1773-04 5/88

Figure 5

Log Yard Drainage/Filtration Scheme



Not to Scale

HARTCROWSER
J-1773-04 5/88
Figure 6

Four pairs of duplicate runoff samples were prepared in the laboratory after acidification. The average relative percent difference between duplicates shown below in Table 4 was as follows: arsenic - 3 percent; zinc - 2 percent; copper - 5 percent; lead - 4 percent ; nickel - 30 percent; antimony - 10 percent; and cadmium - 10 percent.

Table 4. Results of metals analysis of duplicate runoff samples (ug/L, total metal).

Date	Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
12/29/83	1580 1600	525 534	254 267	201 207	21 16	-- --	0.5 0.5
Relative percent difference	1	2	5	3	26	--	0
3/12/84	1270 1190	440 442	-- --	101 105	24 14	75 66	0.7 0.6
Relative percent difference	6	0.005	--	4	42	12	14
4/10/84	8700 8500	3620 3410	2480 2530	383 370	214 212	536 459	1.9 3.2
Relative percent difference	2	6	2	3	1	14	7
5/3/84	6940 6820	748 758	444 405	296 312	24 42	137 132	0.6 0.8
Relative percent difference	2	1	9	5	43	4	25
Average relative percent difference	3	2	5	4	30	10	10

-- = no data

A National Bureau of Standards (NBS) standard estuarine sediment sample was nalyzed by the Manchester laboratory to assess the accuracy of sediment metals determinations. As shown in Table 5, the Manchester results coincided with the NBS-determined values for arsenic, copper, and cadmium, but were slightly lower for zinc and lead. Certified values were not available from NBS for antimony.

Table 5. Results of analysis of NBS standard estuarine sediment #1646.

Metal	NBS Certified Value (mg/Kg)	EPA/WDOE Determined Value (mg/Kg)	EPA/WDOE Value as Percent of Stated Value
arsenic	11.6 ± 1.3	11.7	101
zinc	138 ± 6	114	83
copper	18 ± 3	20	110
lead	28.2 ± 1.8	24.1	85
cadmium	0.36 ±0.07	0.38	106

Table 8. Conventional water quality parameters and metals concentrations in log sort yard runoff to Blair and Hylebos Waterways; WDOE data collected November 1983 - May 1984 (ug/L total metal).

Sort Yard	Date	Time	Total Yard Flow (MGD)	pH (S.U.)	Specific Conductivity (umhos/cm)	Total Susp. Solids† (mg/L)	Arsenic†	Zinc†	Copper†	Lead†	Nickel†	Antimony†	Cadmium†
BLAIR WATERWAY													
Murry Pacific Yard #2	11/04/83	0800-0900	0.35	5.2	161	3,000	10,000	3,500	1,200	590	140	48	3.3
(total acreage = 50.8)	12/29/83	2105-2230	2.1	5.2	140	230	2,200	470	220*	160*	32	--	0.42
	03/12/84	1610-1755	0.31	5.8	120	1,700	7,600	1,500	900*	230	80	41	2.1
	04/10/84	1640-1730	0.11	5.9	120	390	7,600	1,900	130*	1,000*	110	52	2.3
	05/03/84	0950-1110	0.11	5.9	150	390	4,400	690	450	300	43	68	0.98
		Average	0.60	5.6	140	1,100	6,400	1,600	581*	460*	81	52	1.8
WAPATO CREEK/BLAIR WATERWAY													
Portac	11/04/83	1000-1030	0.36	5.7	910	110	2,900	5,000	1,400	290	270	140	10
(total acreage = 28.2)	12/29/83	2030-2045	1.8	5.8	230	28	1,100	790	310	9*	30	--	1.0
	03/12/84	1535-1555	0.11	6.1	600	130	7,100	2,600	1,600	570	130	380	3.5
	04/10/84	1440-1500	0.095	6.3	690	64	5,800	1,700	720	270	87	150	2.9
	05/03/84	1535-1550	0.058	6.4	930	88	9,500	2,100	1,000	380	120	120	2.0
		Average	0.48	6.1	670	84	5,300	2,400	1,000	300*	130	200	3.9
HYLEBOS WATERWAY													
Wasser/Winters	11/04/83	1030-1100	0.07	5.6	240	1,200	7,100	2,500	1,000	640	180	130	3.4
(total acreage = 11.7)	12/29/83	1845-1930	0.32	5.5	860	230	1,400	490	160*	130	20	--	0.8
	03/12/84	1810-1845	0.15	6.0	380	1,500	8,300	3,200	2,800*	1,600	140	100	6.2
	04/10/84	1510-1555	0.095	6.3	550	300	3,000	870	610*	390*	45	46*	1.3
	05/03/84	1250-1335	0.015	6.1	640	1,600	12,000	1,700	1,200	830	120	28	1.3
		Average	0.13	5.9	530	1,200	6,400	1,800	1,200*	700*	100	76*	2.4
Murry Pacific Yard #1	11/04/83	1120-1135	0.13	5.9	4,000	11	1,100	2,100	99*	--	44*	65	2.7
(total acreage = 18.0)	12/29/83	2000-2010	0.73	6.1	5,500	33	500	590	84*	67*	6	--	0.5
	03/12/84	1510-1525	0.057	6.4	2,000	72	2,700	1,500	312*	350	33	120	2.0
	04/10/84	1410-1425	0.042	6.7	1,600	39	3,400	1,400	410	330*	140	100	2.1
	05/03/84	1205-1220	0.023	6.8	4,000	43	1,300	1,200	150	270	37	72	0.9
		Average	0.28	6.4	3,400	39	1,800	1,400	210*	250*	52*	89	1.6
Average of all discharges			0.37	6.0	1,200	610	4,800	1,800	750*	430*	91*	100*	2.4

-- = No data.
* = Blank corrected (see text under Quality Assurance).
† = Flow-weighted concentration.

High metals concentrations in runoff, especially arsenic, zinc, and copper, were characteristic of all four yards. The following ranges in concentrations were observed: arsenic, 500 - 12,000 ug/L; zinc, 470 - 5,000 ug/L; copper, 84 - 2,800 ug/L; lead, 9 - 1,600 ug/L; nickel, 6 - 270 ug/L; antimony, 28 - 380 ug/L; and cadmium, 0.42 - 10 ug/L. No single yard consistently had higher metals concentrations in its runoff than other yards. Runoff from Murry Pacific yard #1, however, clearly had the lowest metals concentrations.

Data on individual discharges at these four yards (Appendix I) show metals concentrations were highly variable. The highest metals concentrations were generally seen in discharges draining heavy traffic areas. The highest concentration discharges at each yard were as follows: Murry Pacific yard #2 - discharges #4, #6, #7, and #8; Portac - discharge #2; Wasser/Winters - discharge #1, and Murry Pacific #1 - discharges #2 and #3.

To assess the short-term variability in metals concentrations in sort yard runoff, one discharge was selected during each survey between December 1983 and May 1984 for replicate sampling. The range about the mean of three replicates each collected at four drains (Appendix I) was generally within ± 10 percent for arsenic, zinc, and copper, and ± 20 percent for lead, nickel, and cadmium. Antimony values ranged within ± 75 percent, which could be caused by the variable loss of volatile antimony compounds during sample digestion and reflux in the laboratory (Bailey, 1984).

Dissolved metals determinations for arsenic, zinc, copper, and lead were made on twenty runoff samples (see Table 9). Dissolved arsenic, zinc, and copper constituted a substantial portion of the total metal present in most samples. Lead was primarily in particulate form.

Table 9. Dissolved metals as a percentage of total metals in log sort yard runoff to Blair and Hylebos Waterways: WDOE data collected December 1983 - May 1984.

Sort Yard	Arsenic	Zinc	Copper	Lead
Murry Pacific Yard #2	$74(19\text{-}98)_8$	$36(3\text{-}78)_8$	$34(4\text{-}80)_3$	$18(6\text{-}45)_4$
Portac	$75(32\text{-}95)_4$	$75(56\text{-}85)_4$	$64(49\text{-}87)_3$	$31(29\text{-}33)_2$
Wasser/Winters	$58(50\text{-}75)_4$	$25(9\text{-}51)_3$	$4(4)_1$	$6(1\text{-}14)_3$
Murry Pacific Yard #1	$42(16\text{-}61)_4$	$74(51\text{-}96)_4$	$61(61)_1$	$3(3)_1$
Average	62	53	41	15

$\text{average(range)}_{\text{number of discharges}}$

Table 10. Conventional water quality parameters and metals data on runoff to Commencement Bay waterways; from log sort yards other than Murry Pacific Yard #2, Portac, Wasser/Winters, and Murry Pacific Yard #1, collected by WDOE November 1983 to June 1984.

Sort Yard	Date	Time	Flow (MGD)	pH (S.U.)	Specific Conductivity (umhos/cm)	Total Suspended Solids (mg/L)	(ug/L, total metal) Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
Hylebos Waterway													
Cascade Timber Yard #1	12/12/83	1215	0.003 1/	7.3	247	270	7,280	3,000	695	710	188	71	4.2
" " " "	06/29/84	1400	--	5.7	265	110	1,970	1,685	148	36	56	105	3
(total acreage = 6.6)													
Cascade Timber Yard #2	12/12/83	1015	0.005 1/	7.3	841	27	122	--	--	--	22	1u	16
" " " "	06/29/84	1115	0.065 1/	5.9	437	7,800	4,940	6,340	6,000	2,470	325	155	0.2u
(total acreage = 13.5)													
Dunlap Towing	11/04/83	1200	--	--	--	--	3,800	1,425	183	267	--	91	3.4
" "	06/29/84	1130	--	7.5	1,380	72	2,680	315	342	171	27	259	0.8
(total acreage = 16.6)													
Louisiana Pacific	12/12/83	1120-1150	0.06 2/	(6.8-7.1)	(492-951)	430(52-1,000)†	1,980†	500†	410†	320†	110†	67†	1.2†
" "	06/29/84	1230-1300	0.66 2/	(6.8-7.3)	(307-2,270)	120(40-310)†	850†	170†	73†	17†	13†	5.3†	0.15*†
(total acreage = 18.3)													
Weyerhaeuser	01/05/84	1400-1410	0.024 2/	(4.6-5.8)	(345-480)	740(650-1,200)†	32†	240†	--	--	47†	3.7†	0.4†
"	06/29/84	1140-1200	0.086 2/	(4.9-5.3)	(184-216)	1,500(1,400-1,700)†	44†	650†	121†	35†	69†	0.26*†	1.9†
(total acreage = 23.3)													
Puyallup Waterway													
McFarland Cascade	11/04/83	1310	0.15 1/	5.6	511	150	250	446	--	--	73	--	1.4
" "	06/29/84	1040	0.38 1/	6.3	144	160	1,115	225	171	33	13	14	0.2
(total acreage = 14.1)													
Sitcum Waterway													
Cascade Timber Yard #3	12/12/83	1400	0.11 1/	6.9	841	200	156	102	--	--	18	1u	0.2u
" " " "	06/29/84	1100	--	6.7	248	210	1,750	293	138	69	17	8	0.5
(total acreage = 20.4)													
St. Paul Waterway													
St. Regis Sort Yard (total acreage = 56.4)	06/29/84	1020	0.026 1/	5.6	521	260	25	97	65	17	7	2	0.4

1/ = Flow of individual discharge only; total yard flow not determined
2/ = Total yard flow
† = Flow-weighted concentration(range)
u = Not detected at detection limit shown
-- = No data
* = Blank corrected (see text under Quality Assurance)

Table 11. Metals loads from log sort yard runoff to Blair and Hylebos Waterways; WDOE data collected November 1983 - May 1984 (pounds/day total metal).

Sort Yard	Date	Total Yard Flow (MGD)	Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
BLAIR WATERWAY									
Murry Pacific Yard #2	11/04/83	0.35	32	11	3.9	1.9	0.44	0.15	0.01
	12/29/83	2.1	38	8.2	4.0*	2.7*	0.38	--	0.0074
	03/12/84	0.31	20	3.9	2.3*	1.9	0.21	0.11	0.0055
	04/10/84	0.11	6.9	1.7	1.0	0.92*	0.11	0.047	0.0021
	05/03/84	0.11	4.0	0.63	0.42	0.28	0.04	0.022	0.0009
	Average	0.60	20	5.1	2.3*	1.5*	0.24	0.082	0.0052
WAPATO CREEK/BLAIR WATERWAY									
Portac	11/04/83	0.36	8.8	15	4.2	0.86	0.81	0.43	0.031
	12/29/83	1.8	9.2	12.0	4.7	0.13*	0.45	--	0.014
	03/12/84	0.11	6.5	2.4	1.5	0.53	0.12	0.35	0.0034
	04/10/84	0.095	4.7	1.3	0.57	0.22	0.069	0.12	0.003
	05/03/84	0.058	4.6	1.0	0.49	0.18	0.059	0.057	0.001
	Average	0.48	6.8	6.3	2.3	0.38*	0.30	0.24	0.0054
HYLEBOS WATERWAY									
Wasser/Winters	11/04/83	0.07	4.1	1.5	0.59	0.32	0.10	0.073	0.002
	12/29/83	0.32	3.8	1.3	0.44*	0.36*	0.052	--	0.002
	03/12/84	0.15	10.4	4.0	3.5*	2.0	0.18	0.13	0.0065
	04/10/84	0.095	2.4	0.69	0.48	0.31*	0.026	0.036*	0.0011
	05/03/84	0.015	1.5	0.21	0.15	0.10	0.015	0.0035	0.00016
	Average	0.13	4.4	1.5	1.0*	0.62*	0.075	0.061*	0.0024
Murry Pacific Yard #1	11/04/83	0.13	1.2	2.2	0.11*	--	0.048*	0.07	0.0029
	12/29/83	0.73	3.1	3.7	0.51*	0.41*	0.038	--	0.0032
	03/12/84	0.057	1.3	0.74	0.20*	0.17	0.016	0.059	0.00092
	04/10/84	0.042	1.2	0.47	0.15*	0.12*	0.050	0.037	0.00074
	05/03/84	0.023	0.25	0.23	0.03	0.051	0.0072	0.014	0.00018
	Average	0.20	1.4	1.5	0.20*	0.19*	0.032*	0.045	0.0016

-- = no data
* = Blank corrected (see text under Quality Assurance)

Table 12. Metals loads per acre from log sort yard runoff to Blair and Hylebos Waterways; WDOE data collected November 1983 - May 1984 (pounds/acre total metal).

Sort Yard	Date	Total Yard Flow (MGD/acre)	Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
BLAIR WATERWAY									
Murry Pacific Yard #2	11/04/83	0.0069	0.63	0.22	0.077	0.037	0.0087	0.0030	0.0002
(total acreage = 50.8)	12/29/83	0.041	0.75	0.16	0.079*	0.053*	0.0075	--	0.00015
	03/12/84	0.0061	0.39	0.077	0.045*	0.037	0.0041	0.0022	0.00011
	04/10/84	0.0022	0.14	0.033	0.020	0.018*	0.0022	0.00093	0.00004
	05/03/84	0.0022	0.079	0.012	0.0083	0.0055	0.00079	0.00043	0.000018
	Average	0.012	0.40	0.10	0.046*	0.030*	0.0047	0.0016	0.0001
WAPATO CREEK/BLAIR WATERWAY									
Portac	11/04/83	0.013	0.31	0.53	0.15	0.030	0.029	0.015	0.0011
(total acreage = 28.2)	12/29/83	0.064	0.33	0.43	0.17	0.0046*	0.016	--	0.0005
	03/12/84	0.0039	0.23	0.085	0.053	0.019	0.0043	0.012	0.00012
	04/10/84	0.0034	0.17	0.046	0.020	0.0078	0.0024	0.0043	0.00011
	05/03/84	0.0021	0.16	0.035	0.017	0.0064	0.0021	0.002	0.000035
	Average	0.017	0.24	0.23	0.082	0.014*	0.011	0.0083	0.00037
HYLEBOS WATERWAY									
Wasser/Winters	11/04/83	0.006	0.35	0.13	0.050	0.027	0.0085	0.0062	0.00017
(total acreage = 11.7)	12/29/83	0.027	0.32	0.11	0.038*	0.031*	0.0044	--	0.00017
	03/12/84	0.013	0.89	0.34	0.30*	0.17	0.015	0.011	0.00056
	04/10/84	0.0081	0.21	0.059	0.41	0.026*	0.0022	0.0031*	0.000094
	05/03/84	0.0013	0.13	0.018	0.13	0.0085	0.0013	0.0003	0.000014
	Average	0.011	0.38	0.13	0.19*	0.053*	0.0063	0.0052*	0.0002
Murry Pacific Yard #1	11/04/83	0.0072	0.067	0.12	0.0061*	--	0.0027*	0.0039	0.00016
(total acreage = 18.0)	12/29/83	0.041	0.17	0.21	0.028*	0.023*	0.0021	--	0.00018
	03/12/84	0.0032	0.072	0.041	0.011*	0.0094	0.00089	0.0033	0.000051
	04/10/84	0.0023	0.067	0.026	0.0083*	0.0067*	0.0028	0.0021	0.000041
	05/03/84	0.0013	0.014	0.013	0.0017	0.0028	0.0004	0.00078	0.00001
	Average	0.011	0.078	0.082	0.011*	0.010*	0.0018*	0.0025	0.000088

-- = no data
* = Blank corrected (see text under Quality Assurance)

recognized that C may vary substantially in response to a number of variables including variations in rainfall intensity, antecedent soil moisture conditions, soil type, and the specific operational characteristics of each yard. Although 0.40 represents our best estimate of C, C may well vary from 0.2 to 0.6 at individual yards during individual rainfall events. There is a degree of uncertainty in the choice of any runoff coefficient, and care should be exercised when using the annual average metals loads generated using C.

Daily mass loadings from each yard were then calculated using the concentration data in Tables 8 and 9, yard acreages in Tables 10 and 12, and application of the 0.40 runoff coefficient to an annual rainfall for Tacoma of 37.2 inches from the 30-year period of record (Table 13). Estimated average annual daily metals loads in runoff from the sort yards are shown in Table 14. Because Table 14 is intended to estimate metals loads from runoff on an annual basis, it substantially underestimates short-term loading rates during storm events. The estimated average annual metals loads in surface runoff from all twelve log sort yards combined to Commencement Bay waterways in pounds/year are as follows: arsenic, 2,500; zinc, 1,100; copper, 510; lead, 310; nickel, 66; antimony, 50; and cadmium 2.0.

Table 13. Monthly average rainfall data (inches) for Tacoma, Washington, (months where log sort yards sampled underlined).

Location	Tacoma Central Treatment Plant #1[1]				Tacoma City Hall[2]	
Period of Record	1983-1984[3]	Percent of Annual Rainfall	1982-1984	Percent of Annual Rainfall	1951-1980	Percent of Annual Rainfall
July	2.76	6	1.14	3	0.75	2
August	1.92	4	0.85	2	1.25	3
September	1.84	4	1.59	4	1.95	5
October	1.40	3	2.74*	7	3.27	9
November	8.62	19	6.85*	16	5.47	15
December	5.38	12	6.38*	15	6.02	16
January	4.65	10	5.92	14	5.74	15
February	3.39	7	5.45	13	4.06	11
March	4.29	9	4.25	10	3.38	9
April	2.57	6	2.07	5	2.49	7
May	4.42	10	2.00	5	1.48	4
June	4.15	9	2.41	6	1.31	4
Average Annual	45.4		41.7		37.2	

[1]data provided by Raymond Redding, Tacoma Central Treatment Plant #1.
[2]data provided by Howard Critchfield, Washington State Climatologist, WWU.
[3]study period.

*1984 data not included.

Table 14. Estimated average annual daily metals loads in runoff from Tacoma tideflats log sort yards. Based on average annual rainfall of 37.2 inches and a runoff coefficient of 0.40.

Sort Yard	Total Average Annual Daily Runoff (MGD)	Arsenic (lbs/day total metal)	Zinc	Copper	Lead	Nickel	Antimony	Cadmium	Total Suspended Solids (lbs/day)
HYLEBOS WATERWAY									
Wasser/Winters	0.013	0.69	0.20	0.13*	0.075*	0.011	0.0082*	0.00026	130
Murry Pacific Yard #1	0.020	0.30	0.23	0.035*	0.042*	0.0087*	0.0015	0.00027	6.5
Cascade Timber yard #1	0.0072	0.28	0.14	0.025	0.022	0.0073	0.0053	0.00022	11
Cascade Timber yard #2	0.015	0.32	0.67	0.50	0.31	0.022	0.0098	0.001	490
Dunlap Towing	0.018	0.49	0.13	0.04	0.033	0.0041	0.026	0.00032	11
Louisiana Pacific	0.020	0.24	0.056	0.040	0.027	0.01	0.006	0.00011	46
Weyerhaeuser[1/]	0.063	0.02	0.23	0.064	0.018	0.031	0.0011*	0.0012	590
BLAIR WATERWAY									
Murry Pacific Yard #2	0.055	2.9	0.73	0.27*	0.21*	0.037	0.024	0.00083	500
Portac	0.031	1.4	0.62	0.26	0.078*	0.034	0.052	0.001	22
PUYALLUP WATERWAY									
McFarland Cascade	0.015	0.086	0.042	0.021	0.0041	0.0054	0.0018	0.0001	19
SITCUM WATERWAY									
Cascade Timber Yard #3	0.022	0.18	0.036	0.025	0.013	0.0033	0.00073	0.000046	38
ST. PAUL WATERWAY									
St. Regis Sort yard	0.061	0.013	0.049	0.033	0.0087	0.0036	0.001	0.0002	130
Total Daily Load (lbs/day)		6.9	3.1	1.4	0.84	0.18	0.14	0.0056	2,000
Total Annual Load (lbs/year)		2,500	1,100	510	310	66	50	2.0	730,000

* = Blank corrected (see text under Quality Assurance)

[1/] Paved yard, runoff assumed to be 100 percent

Memo to Jim Krull
Completion Report on WQIS Project 1 for the Commencement Bay Nearshore/Tideflats Remedial Investigation: Assessment of Log Sort Yards as Metals Sources to Commencement Bay Waterways, November 1983 - June 1984

Groundwater discharge to the waterways was not considered here but, in light of the fact that surface runoff from the log sort yards was estimated to be 40 percent of rainfall and a shallow groundwater table is present in the tideflats area, a strong potential exists that groundwater in the vicinity of the sort yards is being contaminated with metals. Therefore, groundwater flux may be a major mechanism by which metals are being transported to the waterways.

Table 15 presents a relative ranking of the Tacoma tideflats log sort yards based on the loadings presented in Table 14 for arsenic, zinc, copper, and lead. For arsenic, copper, and lead, four yards consistently have the highest loads. They are; Murry Pacific's yard #2, Cascade Timber's yard #2, Portac, and Wasser/ Winters. Three of these yards--Murry Pacific's yard #2, Cascade Timber's yard #2, and Portac--also have the highest zinc load. Weyerhaeuser's yard ranks near the top for zinc and copper; but this is because a runoff coefficient of 1.0 was assumed for this paved yard. Metals concentrations in runoff from the Weyerhaeuser yard were among the lowest measured in the survey.

Table 15. Ranking of Tacoma tideflats log sort yards based on estimated average annual daily metals loads for arsenic, zinc, copper, and lead (lbs/day).

Sort Yard	Arsenic	Sort Yard	Zinc
Murry Pacific Yard #2	2.9	Murry Pacific Yard #2	0.73
Portac	1.4	Cascade Timber Yard #2	0.67
Wasser/Winters	0.69	Portac	0.62
Dunlap Towing	0.49	Weyerhaeuser†	0.23
Murry Pacific Yard #1	0.30	Murry Pacific Yard #1	0.23
Cascade Timber Yard #2	0.32	Wasser/Winters	0.20
" " " #1	0.28	Cascade Timber Yard #1	0.14
Louisiana Pacific	0.24	Dunlap Towing	0.13
Cascade Timber Yard #3	0.18	Louisiana Pacific	0.056
McFarland Cascade	0.086	St. Regis Sort Yard	0.049
Weyerhaeuser†	0.02	McFarland Cascade	0.042
St. Regis Sort Yard	0.013	Cascade Timber Yard #3	0.036
	Copper		**Lead**
Cascade Timber Yard #2	0.50	Cascade Timber Yard #2	0.31
Murry Pacific Yard #2	0.20*	Murry Pacific Yard #2	0.21
Portac	0.26	Portac	0.078*
Wasser/Winters	0.13*	Wasser/Winters	0.075*
Weyerhaeuser†	0.064	Murry Pacific Yard #1	0.042*
Dunlap Towing	0.04	Dunlap Towing	0.033
Louisiana Pacific	0.04	Louisiana Pacific	0.027
Murry Pacific Yard #1	0.035*	Cascade Timber Yard #1	0.022
St. Regis Sort Yard	0.033	Weyerhaeuser†	0.018
Cascade Timber Yard #1	0.025	Cascade Timber Yard #3	0.013
" " " #3	0.025	St. Regis Sort Yard	0.0087
McFarland Cascade	0.021	McFarland Cascade	0.0041

†Paved yard, runoff assumed to be 100 percent.
*Blank-corrected (see text under Quality Assurance).

Memo to Jim Krull
Completion Report on WQIS Project 1 for the Commencement Bay Nearshore/Tideflats Remedial Investigation: Assessment of Log Sort Yards as Metals Sources to Commencement Bay Waterways, November 1983 - June 1984

To assess the relative importance of the log sort yards as arsenic sources to Blair and Hylebos Waterways, the average arsenic loads in sort yard runoff measured during storm events are compared in Table 16 to arsenic loads from nine major discharges to Blair and Hyleobs Waterways monitored by WDOE between April 1981 and September 1984. Also included are the estimated annual daily arsenic loads (Table 14) for the sort yards. Murry Pacific yard #2 and Portac had average measured arsenic loads of 20 lbs/day and 6.8 lbs/day, respectively. Their estimated annual daily arsenic loads were approximately one order of magnitude lower (2.9 lbs/day and 1.4 lb/day, respectively). The large difference between these loads indicates that arsenic loadings for the sort yards are the greatest during storm events. Arsenic loads from other non-sort yard discharges to Blair Waterway shown in Table 16 are typically 1 lb/day or less. Therefore, during storm events, these two sort yards are the major arsenic sources to Blair Waterway. In Hylebos Waterway, four discharges have arsenic loads of 1 lb/day or greater. They are in decreasing order, Wasser/Winters - 4.4 lbs/day; Hylebos Creek - 4.0 lbs/day; Pennwalt's final process effluent - 3.9 lbs/day; and Murry Pacific sort yard #1 - 1.4 lbs/day. Estimated annual daily arsenic loads for Wasser/Winters and Murry Pacific yard #1 (0.69 lb/day and 0.30 lb/day, respectively) were also roughly an order of magnitude less than their storm-event loadings. The load from Pennwalt's final process effluent (3.9 lbs/day), while based on a single measurement, is probably real. Data reported by Pennwalt in their consolidated permit show a net effluent load of 2.5 lbs/day. Since most sort yard runoff primarily occurs during winter storm events, during these periods the log sort yards are probably the major source of arsenic to Hylebos Waterway. However, it is likely that Hylebos Creek constitutes the largest arsenic load to the waterway during periods of light precipitation in the winter and for most of the remaining parts of the year. In addition, based on limited data, it appears that Pennwalt's effluent may be the largest arsenic source to Hylebos Waterway during periods of reduced flow (less than 10 MGD) in Hylebos Creek (Johnson and Norton, 1984).

Table 16. Arsenic loads (lbs/day) in major discharges to Hylebos and Blair Waterways calculated from WDOE data collected April 1981 - September 1984.

Discharge	Date(s)	Measured Loads Average	Measured Loads Range	Number of Observations	Estimated Annual Daily Loads1/
BLAIR WATERWAY					
Murry Pacific Yard #2	11/04/83-05/03/84	20	4.4 - 38	5	2.9
Portac	11/04/83-05/03/84	6.8	4.6 - 9.2	5	1.4
Lincoln Drain North Shore	04/21/81-05/30/84	1.2	0.65 - 1.9	3	—
Lincoln Drain South Shore2/	10/12/83-05/03/84	1.0	0.10; 1.9	2	—
South corner Turning basin drain	08/17/81-05/30/84	0.30	0.043 - 0.43	4	—
Wapato Creek3/	10/12/83-05/03/84	0.039	0.0074; 0.071	2	—
HYLEBOS WATERWAY					
Wasser/Winters sort yard	11/04/83-05/03/84	4.4	1.5 - 10.4	5	0.69
Hylebos Creek4/	08/17/81-09/05/84	4.0	ND - 13.0	14	—
Pennwalt Process effluent	06/7-3/81	3.9	—	1	--
Murry Pacific Yard #1	11/04/83-05/03/84	1.4	0.25 - 3.1	5	0.30
Kaiser ditch	08/17/81-04/17/84	0.56	ND - 1.9	8	—
Morningside Drain	08/17/81-11/02/83	0.047	0.008 - 0.13	4	—
Lincoln Avenue Drain	04/28/82-05/30/84	0.0097	0.009 - 0.011	3	--

ND = Not detected
-- = No data
1/ = From Table 14
2/ = Upstream of Murry Pacific yard #2
3/ = Upstream of Portac
4/ = Upstream of Wasser/Winters

Appendix I. Results of conventional parameters and metals analysis on log sort yard runoff collected by WDOE November 1983 - June 1984 (ug/L total metals).

Sort Yard	Discharge Number	Date	Flow (MGD)	pH (S.U.)	Spec. Cond. (umhos/cm)	Total Susp. Solids (mg/L)	Total Nonvol. Susp. Solids (mg/L)	Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
Murry Pacific Yard #2	1	11/04/83	0.043	4.8	161	550	--	4,900	970	318	359	76	66	1.4
" " " "	2	"	0.042	5.0	167	2,900	--	7,700	2,970	945	747	138	22	3.0
" " " "	3	"	0.00093	5.0	140	2,600	--	10,100	4,060	2,630	927	159	325	4.6
" " " "	4	"	0.00076	4.9	167	270	--	12,400	2,135	745	472	110	181	2.3
" " " "	5	"	0.05	5.1	113	750	--	6,400	947	327	471	75	36	1.4
" " " "	6	"	0.08	5.3	136	320	--	10,100	2,190	645	580	81	49	2.3
" " " "	7	"	0.02	5.3	168	1,500	--	12,000	1,810	835	603	68	23	1.9
" " " "	8	"	0.06	5.7	242	13,000	--	23,000	13,680	4,990	1,023	403	90	11.5
" " " "	S1	"	0.053	5.4	159	390	--	10,100	1,250	409	564	140	44	1.7
" " " "	1	12/29/83	0.14	5.0	78	62	24	1,040	256	81*	52*	10	--	0.2
" " " "	2	"	0.02	4.7	102	210	110	1,740	309	106	83	18	--	0.2
" " " "	2†	"	--	--	--	--	--	1,700	151	40*	27*	9	--	0.2u
" " " "	3	"	0.01	5.2	69	83	40	1,580	423	140	78	11	--	0.2
" " " "	4	"	0.14	5.1	66	80	36	2,290	323	110	80	10	--	0.2
" " " "	Port Way	"	0.92	5.5	57	230	160	1,580	525	264	201	21	--	0.5
" " " "	" " (dup)	"	--	--	--	--	--	1,600	534	267	207	16	--	0.5
" " " "	5	"	0.17	5.6	65	410	280	1,650	621	416	237	51	--	0.7
" " " "	6	"	0.30	5.4	65	80	44	2,050	372	183	123	11	--	0.3
" " " "	7	"	0.15	5.3	93	780	720	1,600	541	228	135	30	--	0.5
" " " "	8	"	0.14	5.2	80	150	100	1,600	568	238	181	21	--	0.4
" " " "	8†	"	--	--	--	--	--	3,300	339	60*	38*	9	--	0.3
" " " "	S1	"	0.16	5.2	602	66	53	4,200	225	89	56*	11	--	0.2
" " " "	1	03/12/84	0.0085	5.8	79	160	94	3,500	437	150*	180	19	18	0.6
" " " "	1a	"	0.0046	5.1	155	740	440	4,100	1,126	310	255	92	18	0.8
" " " "	2	"	0.007	5.6	94	1,000	670	6,800	997	470	330	92	15	1.3
" " " "	2†	"	--	--	--	--	--	5,500	266	60*	44	14	59	0.2u
" " " "	4	"	0.028	5.6	100	13,000	810	15,000	2,585	1,570	1,280	128	66	3.2
" " " "	Port Way	"	0.17	6.3	178	580	400	5,000	1,229	772	595	78	30	1.9
" " " "	5 (rep)	"	0.019	5.8	96	300	200	5,000	848	520	394	37	29	1.0
" " " "	5 (rep)	"	--	--	--	--	--	5,500	851	498	330	44	34	1.6
" " " "	5 (rep)	"	--	--	--	--	--	5,800	860	487	380	47	33	1.2
" " " "	6	"	0.037	5.8	114	250	170	10,300	1,207	661	480	50	51	1.4
" " " "	7	"	0.0012	5.7	125	700	490	9,200	2,875	1,205	980	87	53	2.9
" " " "	8	"	0.017	5.9	128	2,300	1,700	15,000	6,050	3,330	3,150	190	101	8.1
" " " "	8†	"	--	--	--	--	--	8,700	583	133	180	36	129	0.4
" " " "	S1	"	0.018	6.0	99	390	310	8,800	669	392	402	35	59	0.8
" " " "	1	04/10/84	0.0076	5.7	96	490	390	6,750	2,840	1,610	1,610	240	62	2.5
" " " "	1a	"	0.0065	5.1	98	120	84	3,940	832	353	322	65	43	0.9
" " " "	2	"	0.00077	6.2	95	84	52	9,300	708	307	227	50	77	0.5
" " " "	4	"	0.0084	6.2	92	260	140	11,600	1,440	674	583	97	89	2.0
" " " "	4†	"	--	--	--	--	--	10,000	419	121*	79*	3	87	0.5
" " " "	Port Way	"	0.056	6.6	207	230	140	5,420	1,240	732	570	52	32	1.4
" " " "	5	"	0.0065	6.0	110	530	370	9,100	2,170	1,450	1,100	195	23	2.9
" " " "	6	"	0.011	5.6	153	980	680	19,200	4,720	3,270	3,160	340	136	6.4
" " " "	8	"	0.0038	5.9	147	2,200	1,400	14,800	7,450	4,680	4,510	373	173	9.1
" " " "	8†	"	--	--	--	--	--	2,960	202	30*	41*	6	48	0.2
" " " "	S1	"	0.0056	6.2	115	28	16	3,440	277	98	58*	14	11	0.6
" " " "	1	05/03/84	0.011	5.1	125	340	220	4,440	610	865	276	46	5	0.1
" " " "	1a	"	0.00088	5.5	133	110	68	3,660	598	1u	252	39	4	0.1u
" " " "	2	"	0.00064	4.1	105	36	76	4,920	557	185	132	21	129	0.1u
" " " "	4	"	0.0028	6.1	98	21	15	7,660	646	193	67	9	29	0.3
" " " "	4†	"	--	--	--	--	--	6,860	506	155	30	20	40	0.3
" " " "	Port Way	"	0.065	6.6	378	560	460	3,160	647	421	314	46	5	1.3
" " " "	5	"	0.0077	5.9	132	110	58	6,940	748	444	296	24	137	0.6
" " " "	5 (dup)	"	--	--	--	--	--	6,820	758	405	312	42	132	0.8
" " " "	6 (rep)	"	0.013	5.8	122	70	36	7,380	574	211	66	41	23	0.7
" " " "	6 (rep)	"	--	--	--	--	--	8,640	843	426	288	30	71	0.5
" " " "	6 (rep)	"	--	--	--	--	--	8,420	850	437	287	27	19	0.6
" " " "	8	"	0.0029	5.9	145	320	190	9,220	2,280	1,200	1,190	99	33	2.3
" " " "	8†	"	--	--	--	--	--	6,140	544	211	89	23	129	0.9
" " " "	S1	"	0.0011	6.1	169	52	22	12,560	463	389	295	37	38	0.5
" " " "	S2	"	0.0016	5.9	129	60	20	4,820	836	378	188	35	172	0.7

-- = Not analyzed
† = Dissolved metals.
* = Data deleted due to field blank contamination.
u = Not detected at detection limit shown.

Appendix I. Results of conventional parameters and metals analysis on log sort yard runoff collected by WDOE, November 1983 - June 1984 (ug/L total metals ..

Sort Yard	Discharge Number	Date	Flow (MGD)	pH (S.U.)	Spec. Cond. (umhos/cm)	Total Susp. Solids (mg/L)	Total Non-vol. Susp. Solids (mg/L)	Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
Portac	1	11/04/83	0.006	5.3	1,720	100	—	2,300	6,880	1,290	224	263	315	10.7
"	2	"	0.18	5.7	1,410	120	—	4,500	5,110	1,660	312	301	166	11
"	3	"	0.17	5.9	318	86	—	1,300	4,720	1,135	263	241	111	9.5
"	5	"	0.008	5.7	204	210		~~400~~	2,545	915	195	153	60	6.2
"	1	12/29/83	0.29	5.6	549	28	13	920	851	276	50*	25	—	0.7
"	2 (rep)	"	0.13	5.9	104	22	15	1,900	1,130	867	138	173	—	2.0
"	2†	"	—	—	—	—	—	1,700	2,660	751	43*	149	—	2.0
"	2 (rep)	"	—	—	—	—	—	1,600	2,900	833	102	169	—	2.0
"	2 (rep)	"	—	—	—	—	—	1,700	1,080	859	117	192	—	2.1
"	3	"	1.4	5.9	49	28	20	260	554	286	38*	17	—	1.0
"	1	03/12/84	0.045	5.9	732	240	68	8,900	3,625	2,170	950	165	490	4.8
"	2	"	0.015	6.1	931	24	2	19,900	4,440	3,190	665	252	1,030	3.9
"	2†	"	—	—	—	—	—	18,900	3,500	1,750	213	171	1,235	2.2
"	3	"	0.046	6.3	138	72	47	1,730	1,174	630	228	48	90	2.3
"	1	04/10/84	0.027	6.2	933	68	30	8,700	1,640	864	361	152	162	3.2
"	1†	"	—	—	—	—	—	2,760	924	74*	90*	50	123	1.8
"	2	"	0.002	6.4	780	18	2	8,700	3,620	2,480	383	214	536	3.9
"	2 (dup)	"	—	—	—	—	—	8,500	1,410	2,130	370	212	459	4.2
"	3	"	0.066	6.3	346	64	44	4,460	1,610	612	235	57	130	2.8
"	1	06/03/84	0.029	6.5	1,030	96	42	13,550	2,320	829	329	165	73	2.1
"	2	"	0.00064	6.3	1,390	120	60	8,760	4,370	3,040	434	237	445	2.9
"	2†	"	—	—	—	—	—	6,640	3,550	1,480	127	179	430	1.7
"	3	"	0.028	6.4	357	80	42	5,400	1,880	1,160	430	79	158	2.0
Hasser/Winters	1	11/04/83	0.03	5.4	281	2,300	—	9,700	4,230	2,040	795	259	223	6.0
" "	2	"	0.04	5.6	211	370	—	5,200	1,143	249	348	116	52	1.5
" "	1	12/29/83	0.10	5.1	190	410	250	2,380	908	336	302	34	—	1.6
" "	1†	"	—	—	—	—	—	1,790	465	66*	33*	6	—	0.7
" "	2	"	0.15	6.0	39	10	3	450	104	25*	24*	1u	—	0.3
" "	3	"	0.009	5.4	434	92	48	1,420	375	169	110	16	—	0.4
" "	4	"	0.03	5.1	407	490	320	2,220	688	294	205	34	—	0.4
" "	5	"	0.031	6.0	3,250	480	330	2,300	823	276	184	55	—	0.9
" "	1	03/12/84	0.029	5.7	228	4,900	3,200	21,600	11,930	10,160	5,900	419	266	16.1
" "	1†	"	—	—	—	—	—	11,400	1,087	109*	61	65	99	0.6
" "	2	"	0.034	6.4	70	120	88	198	294	102*	93	25	6	1.6
" "	3	"	0.0017	5.7	223	8,600	6,400	7,000	5,550	4,470	3,000	512	35	6.7
" "	4	"	0.0032	5.6	399	240	120	8,800	612	234	146	89	39	0.5
" "	5	"	0.084	6.4	1,000	740	450	6,800	1,328	1,350	740	86	92	2.9
" "	1 (rep)	04/10/84	0.08	6.9	52	340	230	1,680	876	662	410	42	31	1.2
" "	1 (rep)	"	—	—	—	—	—	1,680	782	620	412	37	82	1.3
" "	1 (rep)	"	—	—	—	—	—	1,310	1,033	616	381	39	27	1.4
" "	1†	"	—	—	—	—	—	710	51*	25*	53*	1u	6*	0.2
" "	2	"	0.002	6.7	74	30	26	250	222	37*	97*	1u	5*	1.1
" "	2a	"	0.01	6.2	235	420	310	14,200	965	647	479	120	47	1.9
" "	3	"	0.00094	6.6	186	44	32	10,000	403	124	195	1u	30	0.4
" "	4	"	0.00036	5.5	435	420	320	5,560	652	307	237	32	11*	0.9
" "	5	"	0.0012	5.9	2,330	110	42	8,000	460	144	150	11	86	0.7
" "	1	06/03/84	0.0025	5.7	400	6,300	2,400	24,800	6,140	4,090	2,790	338	83	4.6
" "	1†	"	—	—	—	—	—	12,450	971	175	62	52	22	0.5
" "	2	"	0.0091	6.3	292	800	600	11,440	967	674	535	89	18	0.7
" "	2a	"	0.0018	6.2	147	41	32	710	205	20	1u	6	4	0.1
" "	3	"	0.0076	5.3	423	130	80	3,820	412	308	89	28	8	0.1
" "	5	"	0.001	6.1	1,940	120	54	10,280	1,285	489	308	49	24	0.5

— = Not analyzed.
† = Dissolved metals.
* = Data deleted due to field blank contamination.
u = Not detected at detection limit shown.

Appendix I. Results of conventional parameters and metals analysis on log sort yard runoff collected by [illegible] November 1983 - June 1984 (ug/L total metal)

Sort Yard	Discharge Number	Date	Flow (MGD)	pH (S.U.)	Spec. Cond. (umhos/cm)	Total Susp. Solids (mg/L)	Total nonvol. Susp. Solids (mg/L)	Arsenic	Zinc	Copper	Lead	Nickel	Antimony	Cadmium
Murry Pacific Yard #1	1	11/04/83	0.08	6.7	11,400	9	--	945	961	70*	24*	28*	64	0.9
" " " "	3	"	0.045	5.6	257	14	--	1,400	4,360	266	80*	127	73	4.2
" " " "	1	12/29/83	0.39	6.5	16,500	17	6	345	385	86*	38	5	--	0.3
" " " "	1†	"	--	--	--	--	--	210	363	42*	18	5	--	0.4
" " " "	2	"	0.23	6.1	47	34	20	565	760	130	92	5	--	0.7
" " " "	3	"	0.11	5.7	46	90	45	950	959	285	254	13	--	1.0
" " " "	1	03/12/84	0.035	7.2	5,770	28	11	1,270	440	140*	101	24	75	0.7
" " " "	1†	"	--	--	--	--	--	202	226	55*	26*	8	22	0.4
" " " "	1 (dup)	"	--	--	--	--	--	1,190	442	131*	105	14	66	0.6
" " " "	2	"	0.0054	6.1	140	270	130	9,800	4,130	1,120	1,310	81	364	5.5
" " " "	3	"	0.017	6.0	139	100	50	3,300	2,945	710	565	47	145	3.4
" " " "	1	04/10/84	0.021	7.0	4,540	13	6	1,780	368	180	111*	191	74	0.4
" " " "	1†	"	--	--	--	--	--	710	282	75*	84	1u	36	0.7
" " " "	2	"	0.0041	6.6	168	180	83	5,880	3,890	1,430	1,620	170	274	5.6
" " " "	3	"	0.017	6.4	131	38	21	4,800	1,950	459	433	80	107	3.4
" " " "	1	05/03/84	0.012	7.1	7,810	24	10	1,090	190	90	38	15	33	0.1
" " " "	1†	"	--	--	--	--	--	540	136	55	1	5	40	0.1u
" " " "	3	"	0.011	6.5	147	63	38	1,500	2,280	224	518	62	115	1.8
Cascade Timber Yard #1	1	12/12/83	0.003	7.3	247	270	--	7,280	3,000	695	710	188	71	4.2
" " " "	1	06/29/84	--	5.7	286	110	4	1,970	1,686	148	36	58	105	3.0
" " " #2	1	12/12/83	0.005	7.3	841	27	--	122	59*	33*	23*	22	1u	0.2u
" " " "	1	06/29/84	0.065	5.9	437	7,800	5,600	4,790	5,340	4,000	4,940	325	155	15.5
Dunlap Towing	1	11/04/83	--	--	--	--	--	3,800	1,425	183	267	40*	91	3.4
	1	06/29/84	--	7.5	1,380	72	28	2,680	315	342	171	27	259	0.8
Louisiana Pacific	1	12/12/83	0.023	6.9	951	1,000	--	2,160	656	550	385	215	118	1.1
" "	2	"	0.026	7.1	832	52	--	2,200	508	400	335	46	41	1.6
" "	3	"	0.011est	6.8	492	110	--	1,135	172	120	88	42	23	0.3
"	1	06/28/84	0.0077	7.2	783	260	200	401	184	90	69	19	1u	0.6
" "	2	"	0.00038	7.2	1,270	240	170	1,790	592	83	34	16	6	0.6
" "	3	"	0.012	6.8	307	40	7	560	113	75	33	7	4	0.4
" "	4	"	0.046	7.3	2,270	310	260	995	180	70	4	13	6	0.1u
Weyerhaeuser	1	01/05/83	0.004	4.6	480	1,200	--	32	313	58*	27*	64	2	0.4
"	2	"	0.02	5.8	345	480	--	32	212	48*	61*	44	4	0.4
"	1	06/29/84	0.022	4.9	216	1,700	480	25	519	143	43	73	1	1.8
"	2	"	0.064	5.3	184	1,400	430	51	692	114	32	67	1u	1.9
McFarland Cascade	1	11/04/83	0.15	5.6	511	150	--	250	445	86*	54*	73	12*	1.4
"	1	06/29/84	0.038	6.3	144	160	110	1,115	225	171	33	13	14	0.2
Cascade Timber Yard #3	1	12/12/83	0.11	6.9	661	200	--	156	102	78*	52*	18	1u	0.2u
" " " "		06/29/84	--	6.7	248	210	130	1,750	291	138	69	17	8	0.5
St. Regis Sort Yard	1	06/29/84	0.025	5.6	521	260	130	25	97	65	17	7	2	0.4

-- = Not analyzed.
† = Dissolved metals.
* = Data deleted due to field blank contamination.
u = Not detected at detection limit shown.
est = Estimated

Appendix IV: Summary of runoff coefficient (C) values applicable to the Tacoma tideflats log sort yards.

Railroad yard	0.2 - 0.4	Lindeburg, M.R., 1981. "Civil Engineering Review Manual" (3rd ed.). Professional Engineering Registration Program.
Rural Areas: Cultivated loams and similar soils without impeding horizons.	0.40	Dunne, T. and L.B. Leopold. "Water in Environmental Planning." W.H. Freeman and Co., San Francisco, CA.
Permanent pasture, range-land and idle land with no appreciable canopy and zero percent groundcover.	0.45	USEPA, 1982. "Water Qulaity Assessment, A Screening Procedure." A Screening Procedure for Toxic and Conventional Pollutants: Part 1. EPA-600/6-82-004a.

Table 2 - Central Drain Discharge
Ecology Sta. 3 and Hart Crowser Sta. SW-2

Date	Flow in MGD	pH	Spec. Cond. in umhos/cm	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
11/4/83	0.17	5.9	318	86	1300		4720		263		1135	
12/29/83	1.4	5.9	49	28	260		554		38		266	
3/12/84	0.045	6.3	138	72	1730		1174		228		630	
4/10/84	0.066	6.3	346	64	4460		1610		235		612	
5/3/84	0.028	6.4	357	80	5400		1880		430		1160	
POST-PAVING MONITORING RESULTS												
10/23/89	0.652*	8.6	90	190	21	19	530	310	10	10U	27	4
1/7/90	0.69	5.9	45	8	33	30	150	160	10U	10U	6	4

17734T2

Table 3 - North Drain Discharge
Ecology Sta. 2 and Hart Crowser Sta. SW-3

Date	Flow in MGD	pH	Spec. Cond. in umhos/cm	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
11/4/83	0.18	5.7	1410	120	4500		5110		312		1660	
12/29/83	0.13	5.9	104	23		3700		2660		43		751
3/12/84	0.015	6.1	931	24	19900	18900	4440	3500	645	213	3190	1750
4/10/84	0.002	6.4	780	18	8600*		3500*		376*		2500*	
5/3/84	0.00064	6.3	1390	120	8760	6640	4370	3550	434	127	3040	1480
POST-PAVING MONITORING RESULTS												
10/23/89	0.339*	7.7	130	430	82	69	180	60	20	104	18	4
1/7/90	0.27	6.4	75	8	37	34	20	48	10U	10U	6	4
Replicate 1/7/90	0.27	6.4	75	2U	36	32	17	47	5U	5U	6	5

17734T3

Table 2 – Summary of Metal Concentrations in Central Drain Discharge
Ecology Location 3 and Hart Crowser Location SW-2

Date	Flow in MGD	pH	Spec. Cond. in umhos	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
Pre-Remediation Monitoring Results												
11/4/83	0.17	5.9	318	86	1,300		4,720		263		1135	
12/29/83	1.4	5.9	49	28	260		554		38		266	
3/12/84	0.045	6.3	138	72	1,730		1,174		228		630	
4/10/84	0.066	6.3	346	64	4,460		1,610		235		612	
5/3/84	0.028	6.4	357	80	5,400		1,880		430		1160	
Average				66	2,630		1,988		239		761	
Post-Remediation Monitoring Results												
10/23/89	0.652*	8.6	90	190	21	19	530	310	10	10 U	27	4
1/7/90	0.69	5.9	45	8	33	30	150	160	10 U	10 U	6	4
8/21/90	0.017	7.2	520	57	24	24	660 B	620 B	6	5 U	18 B	10 U
Average**				85	26	24	447	363	7	<10	17	4
% reduction					99.0	—	77.5	--	97.1	—	97.8	--

Notes:

* Mean of replicate samples or of several measuremetns.

** Averages calculated using one-half detection limit for undetected constituents.

U Not detected above limit shown.

B Analyte detected in method blank.

All data pre-1985 are Ecology data; all post-remediation data are Hart Crowser data.

Reference: Hart Crowser Remediation Plan, Portac Log Sort Yard, Port of Tacoma, Washington, Volume II Appendices, J-1773-04, June 12, 1988

17734T2

Hart Crowser
J-1773-04

Table 3 – Summary of Metal Concentrations in Northern Drain Discharge
Ecology Location 2 and Hart Crowser Location SW-3

Date	Flow in MGD	pH	Spec. Cond. in umhos	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
Pre-Remediation Monitoring Results												
11/4/83	0.18	5.7	1,410	120	4,500		5,110		312		1,660	
12/29/83	0.13	5.9	104	23		3,700		2,660		43		751
3/12/84	0.015	6.1	931	24	19,900	18,900	4,440	3,500	645	213	3,190	1,750
4/10/84	0.002	6.4	780	18	8600*		3,500 *		376 *		2500 *	
5/3/84	0.00064	6.3	1,390	120	8,760	6,640	4,370	3,550	434	127	3,040	1,480
Average				61	10,440	9,747	4,355	3,237	442	128	2,598	1,327
Post-Remediation Monitoring Results												
10/23/89	0.339*	7.7	130	430	82	69	180	60	20	104	18	4
1/7/90	0.27	6.4	75	8	37	34	20	48	10 U	10 U	6	4
Replicate 1/7/90	0.27	6.4	75	2U	36	32	17	47	5 U	5 U	6	5
8/21/90	0.0063	6.9	340	160	110	120	150 B	190 B	5 U	5 U	18 B	9 B
Average**				150	66	64	92	86	8	29	12	6
% Reduction					99.4	99.3	97.9	97.3	98.2	77.3	99.5	99.6

Notes:

* Mean of replicate samples or of several measurements.
** Averages calculated using one-half detection limit for undetected constituents.
U Not detected above limit shown.
B Analyte detected in method blank.
All data pre-1985 are Ecology data; all post-remediation data are Hart Crowser data.
Reference: Hart Crowser Remediation Plan, Portac Log Sort Yard, Port of Tacoma, Washington, Volume II Appendices, J-1773-04, June 12, 1988
17734T3

Table 2 - Central Drain Discharge
Ecology Sta. 3 and Hart Crowser Sta. SW-2

Date	Flow in MGD	pH	Spec. Cond. in umhos/cm	TSS in mg/L	Arsenic in ug/L total	Arsenic in ug/L diss.	Zinc in ug/L total	Zinc in ug/L diss.	Lead in ug/L total	Lead in ug/L diss.	Copper in ug/L total	Copper in ug/L diss.
11/4/83	0.17	5.9	318	86	1300		4720		263		1135	
12/29/83	1.4	5.9	49	28	260		554		38		266	
3/12/84	0.045	6.3	138	72	1730		1174		228		630	
4/10/84	0.066	6.3	346	64	4460		1610		235		612	
5/3/84	0.028	6.4	357	80	5400		1880		430		1160	
POST-PAVING MONITORING RESULTS												
10/23/89	0.652*	8.6	90	190	21	19	530	310	10	10U	27	4
1/7/90	0.69	5.9	45	8	33	30	150	160	10U	10U	6	4

17734T2

Table 3 - North Drain Discharge
Ecology Sta. 2 and Hart Crowser Sta. SW-3

Date	Flow in MGD	pH	Spec. Cond. in umhos/cm	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
11/4/83	0.18	5.7	1410	120	4500		5110		312		1660	
12/29/83	0.13	5.9	104	23		3700		2660		43		751
3/12/84	0.015	6.1	931	24	19900	18900	4440	3500	645	213	3190	1750
4/10/84	0.002	6.4	780	18	8600*		3500*		376*		2500*	
5/3/84	0.00064	6.3	1390	120	8760	6640	4370	3550	434	127	3040	1480
POST-PAVING MONITORING RESULTS												
10/23/89	0.339*	7.7	130	430	82	69	180	60	20	104	18	4
1/7/90	0.27	6.4	75	8	37	34	20	48	10U	10U	6	4
Replicate 1/7/90	0.27	6.4	75	2U	36	32	17	47	5U	5U	6	5

17734T3

Table 2 – Summary of Metal Concentrations in Central Drain Discharge
Ecology Location 3 and Hart Crowser Location SW-2

Date	Flow in MGD	pH	Spec. Cond. in umhos	TSS in mg/L	Arsenic in ug/L total	Arsenic in ug/L diss.	Zinc in ug/L total	Zinc in ug/L diss.	Lead in ug/L total	Lead in ug/L diss.	Copper in ug/L total	Copper in ug/L diss.
Pre-Remediation Monitoring Results												
11/4/83	0.17	5.9	318	86	1,300		4,720		263		1135	
12/29/83	1.4	5.9	49	28	260		554		38		266	
3/12/84	0.045	6.3	138	72	1,730		1,174		228		630	
4/10/84	0.066	6.3	346	64	4,460		1,610		235		612	
5/3/84	0.028	6.4	357	80	5,400		1,880		430		1160	
Average				66	2,630		1,988		239		761	
Post-Remediation Monitoring Results												
10/23/89	0.652*	8.6	90	190	21	19	530	310	10	10 U	27	4
1/7/90	0.69	5.9	45	8	33	30	150	160	10 U	10 U	6	4
8/21/90	0.017	7.2	520	57	24	24	660 B	620 B	6	5 U	18 B	10 U
Average**				85	26	24	447	363	7	<10	17	4
% reduction					99.0	—	77.5	—	97.1	—	97.8	—

Notes:

* Mean of replicate samples or of several measuremetns.

** Averages calculated using one-half detection limit for undetected constituents.

U Not detected above limit shown.

B Analyte detected in method blank.

All data pre-1985 are Ecology data; all post-remediation data are Hart Crowser data.

Reference: Hart Crowser Remediation Plan, Portac Log Sort Yard, Port of Tacoma, Washington, Volume II Appendices, J-1773-04, June 12, 1988

17734T2

Hart Crowser
J-1773-04

Table 3 – Summary of Metal Concentrations in Northern Drain Discharge
Ecology Location 2 and Hart Crowser Location SW-3

Date	Flow in MGD	pH	Spec. Cond. in umhos	TSS in mg/L	Arsenic in ug/L		Zinc in ug/L		Lead in ug/L		Copper in ug/L	
					total	diss.	total	diss.	total	diss.	total	diss.
Pre-Remediation Monitoring Results												
11/4/83	0.18	5.7	1,410	120	4,500		5,110		312		1,660	
12/29/83	0.13	5.9	104	23		3,700		2,660		43		751
3/12/84	0.015	6.1	931	24	19,900	18,900	4,440	3,500	645	213	3,190	1,750
4/10/84	0.002	6.4	780	18	8600*		3,500 *		376 *		2500 *	
5/3/84	0.00064	6.3	1,390	120	8,760	6,640	4,370	3,550	434	127	3,040	1,480
Average				61	10,440	9,747	4,355	3,237	442	128	2,598	1,327
Post-Remediation Monitoring Results												
10/23/89	0.339*	7.7	130	430	82	69	180	60	20	104	18	4
1/7/90	0.27	6.4	75	8	37	34	20	48	10 U	10 U	6	4
Replicate 1/7/90	0.27	6.4	75	2U	36	32	17	47	5 U	5 U	6	5
8/21/90	0.0063	6.9	340	160	110	120	150 B	190 B	5 U	5 U	18 B	9 B
Average**				150	66	64	92	86	8	29	12	6
% Reduction					99.4	99.3	97.9	97.3	98.2	77.3	99.5	99.6

Notes:

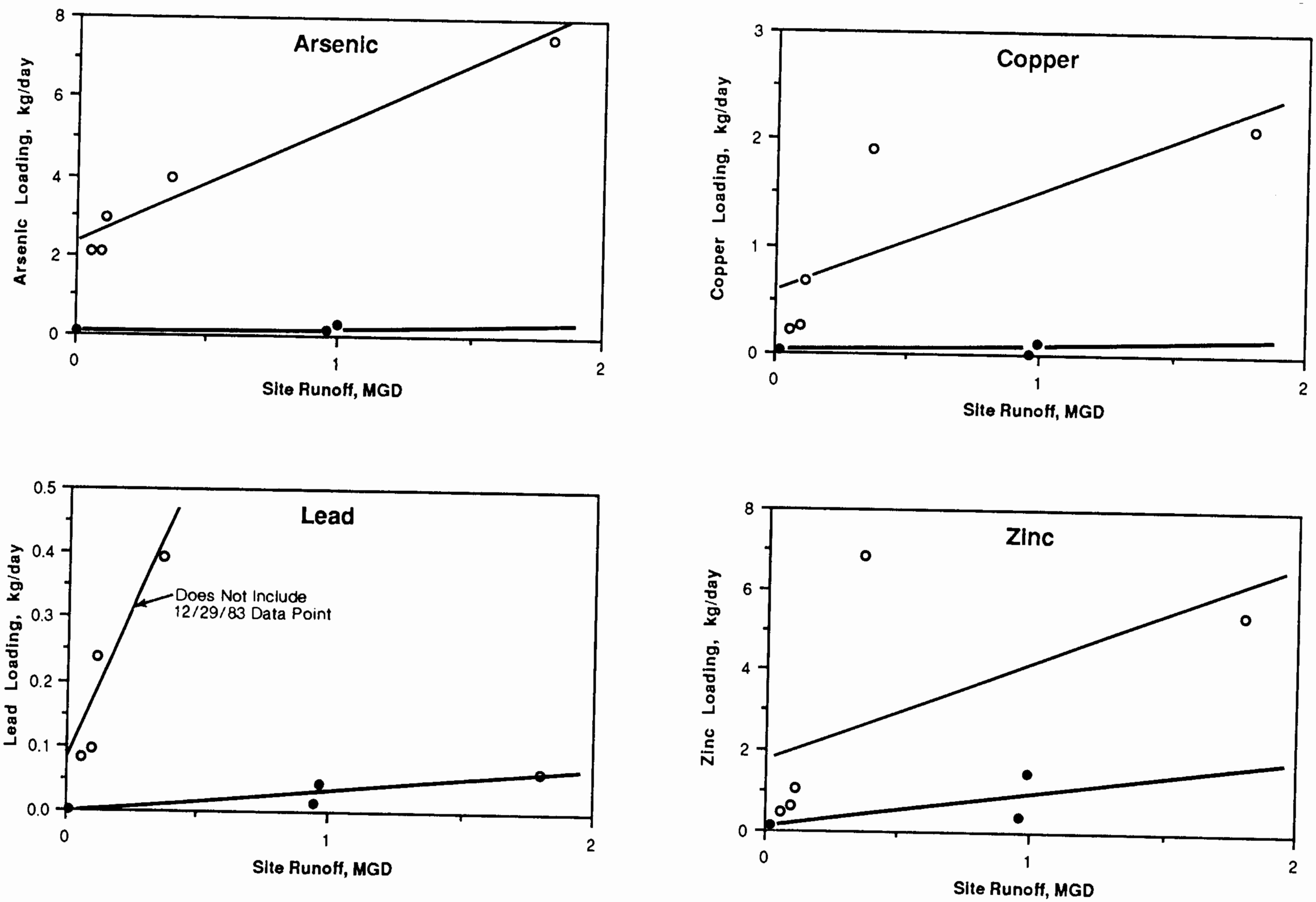
* Mean of replicate samples or of several measurements.
** Averages calculated using one-half detection limit for undetected constituents.
U Not detected above limit shown.
B Analyte detected in method blank.
All data pre-1985 are Ecology data; all post-remediation data are Hart Crowser data.
Reference: Hart Crowser Remediation Plan, Portac Log Sort Yard, Port of Tacoma, Washington, Volume II Appendices, J-1773-04, June 12, 1988
17734T3

Table 5 -- Summary of Metals Loading to Wapato Creek from Site Surface Water Discharge

Date	Site Runoff in MGD	Arsenic Loading in ug/L	Arsenic Loading in kg/day	Zinc Loading in ug/L	Zinc Loading in kg/day	Copper Loading in ug/L	Copper Loading in kg/day	Lead Loading in ug/L	Lead Loading in kg/day
Pre-Remediation Loading									
11/4/83	0.36	2,900	3.952	5,000	6.813	1,400	1.908	290	0.395
12/29/83	1.8	1,100	7.494	790	5.382	310	2.112	9	0.061
3/12/84	0.11	7,100	2.956	2,600	1.083	1,600	0.666	570	0.237
4/10/84	0.095	5,800	2.086	1,700	0.611	720	0.259	270	0.097
5/3/84	0.058	9,500	2.086	2,100	0.461	1,000	0.220	380	0.083
Post-Remediation Loading									
10/23/89	0.991	41.9	0.157	410.3	1.539	23.9	0.090	13.4	0.0503
1/7/90	0.96	34.1	0.124	113.4	0.412	6.0	0.022	5.0	0.0182
8/21/90	0.0233	47.3	0.004	522.1	0.046	18.0	0.002	5.1	0.0004

Notes:
1983-84 Data for Ecology Locations 2 and 3 (Table 8, Appendix A, Remediation Plan, Volume II, February 27, 1985)
1989-90 Data for Hart Crowser Locations SW-2 and SW-3

Metals Loading to Wapato Creek



o Pre – Remediation, Ecology Data, 1983–84

Post – Remediation, Hart Crowser Data, 1989–90

HARTCROWSER
J-1773-04 11/90
Figure 2

Table 1 - Catch Basin Sample Analytical Results - Sediment
PorTac
4215 SR 509 N Frontage Road
Tacoma, Washington 98421

March 4, 2009

Sample Number	Sample Location	Sample Depth	Sample Date	8151 Pentachlorophenol (PCP)
		feet bgs		mg/kg
NCB-4-030209	Catch Basin 4	5-7'	3/2/09	1.8
NCB-6-030209	Catch Basin 6	5-7'	3/2/09	0.64
NCB-7-030209	Catch Basin 7	5-7'	3/2/09	0.44
NCB-8-030209	Catch Basin 8	5-7'	3/2/09	2.0
NCB-9-030209	Catch Basin 9	5-7'	3/2/09	0.08
NCB-11-030209	Catch Basin 11	5-7'	3/2/09	0.24
Laboratory Detection or Practical Quantitation Limit Soil				0.01
Model Toxic Control Act (MTCA) Method A Cleanup Levels For Soil				--

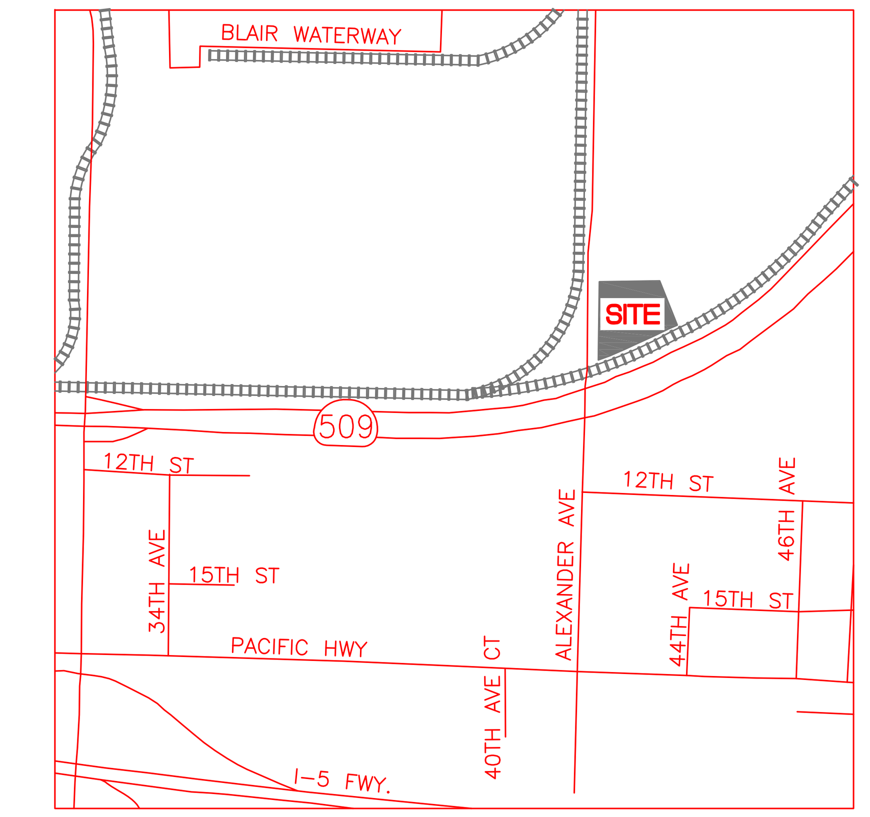
BOLD/RED = Elevated Analyte reading
Values are reported in milligrams per kilograms (mg/kg).
< = analyte not detected above the analytical method detection limit cited.
8151 - Pentachlorophenol by Environmental Protection Agency (EPA) method
bgs=below ground surface
NA=Not Applicable

Table 2 - Catch Basin Sample Analytical Results - Water
PorTac
4215 SR 509 N Frontage Road
Tacoma, Washington 98421

March 4, 2009

Sample Number	Sample Location	Sample Depth	Sample Date	8151
				Pentachlorophenol
		feet bgs		ug/L
NCB-4-H2O-030209	Catch Basin 4	5-7'	3/2/09	4.2
NCB-6-H2O-030209	Catch Basin 6	5-7'	3/2/09	2.5
NCB-7-H2O-030209	Catch Basin 7	5-7'	3/2/09	14
NCB-8-H2O-030209	Catch Basin 8	5-7'	3/2/09	6.1
NCB-9-H2O-030209	Catch Basin 9	5-7'	3/2/09	2.5
NCB-11-H2O-030209	Catch Basin 11	5-7'	3/2/09	16
Laboratory Detection or Practical Quantitation Limit Water				0.20
Model Toxic Control Act (MTCA) Method A Cleanup Levels For Water				--

BOLD/RED = Elevated Analyte reading
Values are reported in micrograms per liter (ug/L).
< = analyte not detected above the analytical method detection limit cited.
8151 - Pentachlorophenol by Environmental Protection Agency (EPA) method
Pentachlorophenol does not have a MTCA-Acleanup level
bgs=below ground surface
NA=Not Applicable



VICINITY MAP
SCALE 1" = 1000'

(253) 921-7059
Environmental Services
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Catch Basin Location Map
Catch Basin Sampling Project - PorTac
4215 Frontage Road
Tacoma, Washington 98421

Date:	March 4, 2009
Completed By:	K. Allegretti
Checked By:	S. Spencer
Version No.:	EMS-001

Comments:

Figure Number: 4

Sheet Number: 01 of 01

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Table 1 - Soil Sample Analytical Results
Storm Drain Sampling - Portac
4215 SR 509 N Frontage Road
Tacoma, Washington 98421

December 11, 2008

Sample Number	Sample Location	Sample Depth	Sample Date	8151	NWTPH-Dx/ Dx Ext			NWTPH-Gx	8021b			
				Pentachloro phenol	Diesel	Mineral Oil	Heavy Oil	Gasoline	Benzene	Toluene	Ethyl benzene	Xylene
		feet bgs		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SD1-120808	Storm Drain 1 North side of Site	4-6'	12/8/08	<0.50	6000	<40	12500	<10	<0.02	0.8	<0.05	<0.15
SD2-120808	Storm Drain 2 South of SD1	4-6'	12/8/08	<0.50	800	<40	900	<10	<0.02	<0.05	<0.05	<0.15
SD3-120808	Storm Drain 3 South of SD2	4-6'	12/8/08	<0.50	<20	<40	900	<10	<0.02	<0.05	<0.05	<0.15
SD4-120808	Storm Drain 4 South of SD3	4-6'	12/8/08	<0.50	370	<40	800	<10	<0.02	<0.05	<0.05	<0.15
SD5-120808	Storm Drain 5 Southwest of SD4	4-6'	12/8/08	<0.50	1700	<40	2300	<10	<0.02	<0.05	<0.05	<0.15
Laboratory Detection or Practical Quantitation Limit Soil				0.50	20	40	50	10	0.02	0.05	0.05	0.15
Model Toxic Control Act (MTCA) Method A Cleanup Levels For Soil				--	2000	4000	2000	100/30*	0.03	7.00	6.00	9.00

BOLD/RED = Elevated Analyte reading
Values are reported in milligrams per kilograms (mg/kg).
< = analyte not detected above the analytical method detection limit cited.
*The cleanup level for gasoline is 30 mg/kg if benzene is present in the sample
8151 - Pentachlorophenol by Environmental Protection Agency (EPA) method
NWTPH-Dx/ Dx Ext - Diesel Range Hydrocarbons by Washington State Department of Ecology (Ecology) Method
NWTPH-Gx - Gasoline Range Hydrocarbons by Ecology Method
8021b - Volatile Aromatic Hydrocarbons by EPA method
bgs=below ground surface
NA=Not Applicable

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Table 2 - Stormwater Sample Analytical Results
Storm Drain Sampling - Portac
4215 SR 509 N Frontage Road
Tacoma, Washington 98421

December 15, 2008

Sample Number	Sample Location	Sample Depth	Sample Date	8151 Pentachlorophenol
		feet bgs		ug/L
SD5-120808	Storm Drain 5 Southwest of SD4	4-6'	12/8/2008	4.9
SD5-120808 Duplicate	Storm Drain 5 Southwest of SD4	4-6'	12/8/08	5.1
Laboratory Detection or Practical Quantitation Limit Water				0.50
Model Toxic Control Act (MTCA) Method A Cleanup Levels For Water				--

BOLD/RED = Elevated Analyte reading
Values are reported in micrograms per liter (ug/L).
< = analyte not detected above the analytical method detection limit cited.
8151 - Pentachlorophenol by Environmental Protection Agency (EPA) method
Pentachlorophenol does not have a MTCA-Acleanup level
bgs=below ground surface
NA=Not Applicable

Table 1 - Catch Basin Sample Analytical Results - Sediment
PorTac
4215 SR 509 N Frontage Road
Tacoma, Washington 98421

March 4, 2009

Sample Number	Sample Location	Sample Depth	Sample Date	8151
				Pentachlorophenol (PCP)
		feet bgs		mg/kg
NCB-4-030209	Catch Basin 4	5-7'	3/2/09	1.8
NCB-6-030209	Catch Basin 6	5-7'	3/2/09	0.64
NCB-7-030209	Catch Basin 7	5-7'	3/2/09	0.44
NCB-8-030209	Catch Basin 8	5-7'	3/2/09	2.0
NCB-9-030209	Catch Basin 9	5-7'	3/2/09	0.08
NCB-11-030209	Catch Basin 11	5-7'	3/2/09	0.24
Laboratory Detection or Practical Quantitation Limit Soil				0.01
Model Toxic Control Act (MTCA) Method A Cleanup Levels For Soil				--

BOLD/RED = Elevated Analyte reading
Values are reported in milligrams per kilograms (mg/kg).
< = analyte not detected above the analytical method detection limit cited.
8151 - Pentachlorophenol by Environmental Protection Agency (EPA) method
bgs=below ground surface
NA=Not Applicable

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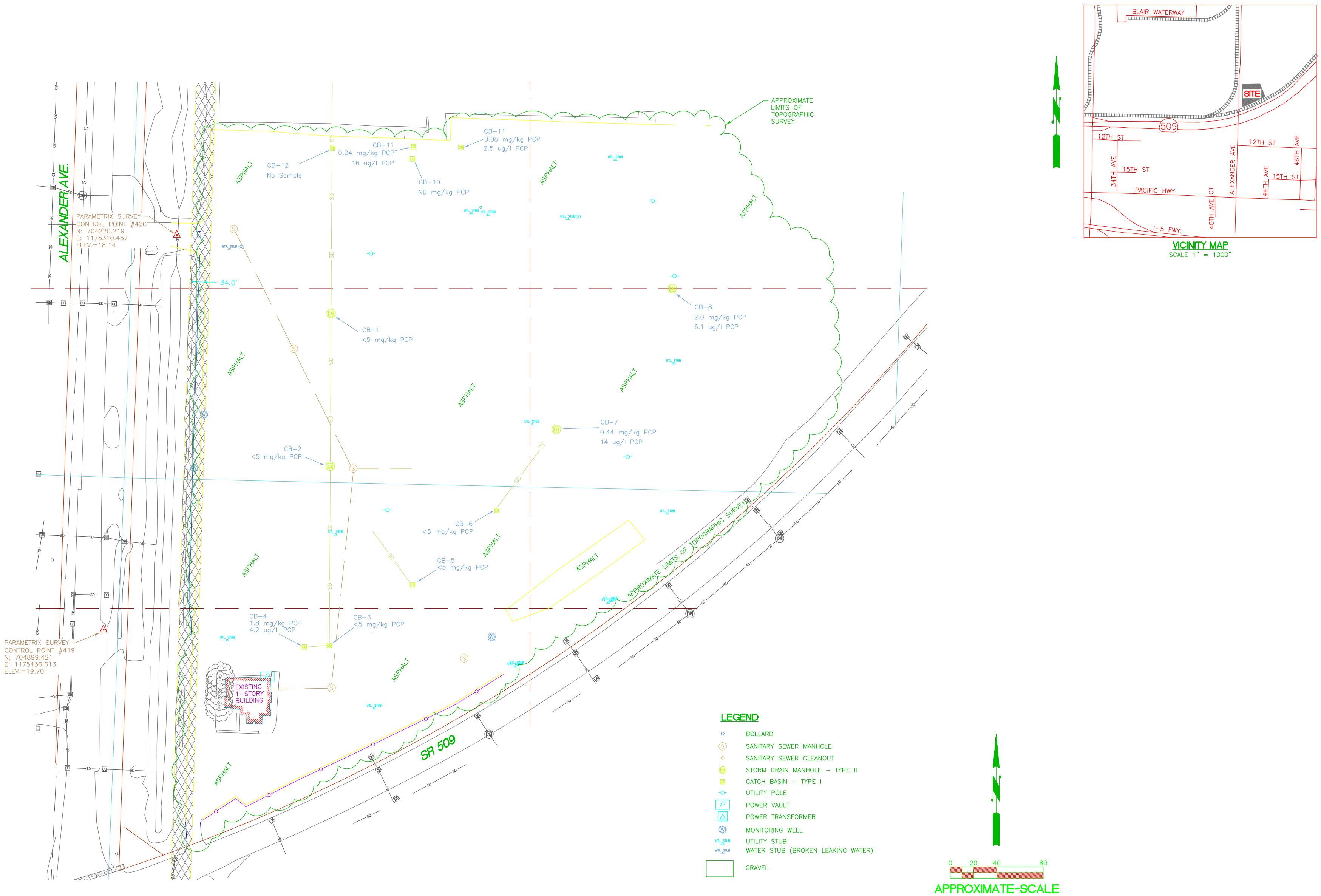
Table 2 - Catch Basin Sample Analytical Results - Water
PorTac
4215 SR 509 N Frontage Road
Tacoma, Washington 98421

March 4, 2009

Sample Number	Sample Location	Sample Depth	Sample Date	8151
				Pentachlorophenol
		feet bgs		ug/L
NCB-4-H2O-030209	Catch Basin 4	5-7'	3/2/09	4.2
NCB-6-H2O-030209	Catch Basin 6	5-7'	3/2/09	2.5
NCB-7-H2O-030209	Catch Basin 7	5-7'	3/2/09	14
NCB-8-H2O-030209	Catch Basin 8	5-7'	3/2/09	6.1
NCB-9-H2O-030209	Catch Basin 9	5-7'	3/2/09	2.5
NCB-11-H2O-030209	Catch Basin 11	5-7'	3/2/09	16
Laboratory Detection or Practical Quantitation Limit Water				0.20
Model Toxic Control Act (MTCA) Method A Cleanup Levels For Water				--

BOLD/RED = Elevated Analyte reading
Values are reported in micrograms per liter (ug/L).
< = analyte not detected above the analytical method detection limit cited.
8151 - Pentachlorophenol by Environmental Protection Agency (EPA) method
Pentachlorophenol does not have a MTCA-Acleanup level
bgs=below ground surface
NA=Not Applicable



(253) 921-7059
Environmental Services
emsgroupllc.com

Catch Basin Location Map
Catch Basin Sampling Project - PorTac
4215 Frontage Road
Tacoma, Washington 98421

Date:	March 4, 2009
Completed By:	K. Allegretti
Checked By:	S. Spencer
Version No.:	EMS-001

Comments:

Figure Number: 4

Sheet Number: 01 of 01

Table 1: Analytical Results for Portac Catch Basin Samples Collected February 24, 2009

Sampling Date	MTCA Method A Industrial Soil Criteria[a] (Soil Cleanup Screening Levels in mg/kg)	MTCA Method B Marine Surface Water Criteria[b]	Ambient Water Quality Criteria - Marine[c] Acute	Ambient Water Quality Criteria - Marine[c] Chronic	SMS SQS	SMS CSL	Metals Background 90th Percentile[d]	PT-CB-1 2/24/2009	PT-CB-2 2/24/2009	PT-CB-3 2/24/2009
Metals in mg/kg										
Arsenic		2.92	40.3	21	57	93	20 [e]	23	16	20
Cadmium		2.76	5.8	1.28	5.1	6.7	0.99	3.3 J	3.8	2.5
Chromium		188	422	19.1	260	270	41.88	27.2 J	15.8	62
Copper		2,700	2.13	1.38	390	390	36.01	39.0	39.3	86.3
Lead					450	530	17.09	28	25	73
Mercury			1.88	0.026	0.41	0.59	0.07	**0.58** J	0.11	0.4
Nickel		1,430	96.5	10.7			38.19	22 J	13	32
Zinc		21,100	112	101	410	960	85.82	**442**	**521**	**603**
Diesel- and Motor Oil-Range Hydrocarbons in mg/kg										
Diesel-Range	2,000							1,700	660	3,400
Motor Oil-Range	2,000							11,000	2,900	19,000
Gasoline-Range Hydrocarbons in mg/kg										
Gasoline-Range	30							6.8 U	7.0	35
Semivolatiles in µg/kg										
Naphthalene		137						290 U	200 U	200
2-Methylnaphthalene								290 U	200 U	110
1-Methylnaphthalene								290 U	200 U	100 U
Acenaphthylene								290 U	200 U	100 U
Acenaphthene		65.3						290 U	200 U	100 U
Fluorene		553						290 U	200 U	110
Phenanthrene								400	640	520
Anthracene		12,100						290 U	200 U	100 U
Fluoranthene		88.6						340	800	550
Pyrene		35,500						400	820	670
Benzo(a)anthracene		0.216						290 U	200	100 U
Chrysene		0.216						320	330	310
Benzo(b)fluoranthene		0.216						290 U	200 U	100 U
Benzo(k)fluoranthene		0.216						290 U	200 U	100 U
Benzo(a)pyrene		0.216						290 U	200 U	110
Indeno(1,2,3-cd)pyrene		0.216						290 U	200 U	100 U
Dibenz(a,h)anthracene		0.216						290 U	200 U	100 U
Benzo(g,h,i)perylene								290 U	200 U	100 U
Dibenzofuran								290 U	200 U	100 U
Pentachlorophenol		0.061	0.161	0.098				5,700 J	230 J	86 J
Semivolatiles in ug/kg OC[f]										
Naphthalene					99,000	170,000		58 U	40 U	40
2-Methylnaphthalene					38,000	64,000		58 U	40 U	22
1-Methylnaphthalene								58 U	40 U	20 U
Acenaphthylene					66,000	66,000		58 U	40 U	20 U
Acenaphthene					16,000	57,000		58 U	40 U	20 U
Fluorene					23,000	79,000		58 U	40 U	22
Phenanthrene					10,000	480,000		80	128	104
Anthracene					220,000	1,200,000		58 U	40 U	20 U
Fluoranthene					160,000	1,200,000		68	160	110
Pyrene					1,000,000	1,400,000		80	164	134
Benzo(a)anthracene					110,000	270,000		58 U	40	20 U
Chrysene					110,000	460,000		64	66	62
Benzo(b)fluoranthene								58 U	40 U	20 U
Benzo(k)fluoranthene								58 U	40 U	20 U
Benzo(a)pyrene					99,000	210,000		58 U	40 U	22
Indeno(1,2,3-cd)pyrene					34,000	88,000		58 U	40 U	20 U
Dibenz(a,h)anthracene					12,000	33,000		58 U	40 U	20 U
Benzo(g,h,i)perylene					31,000	78,000		58 U	40 U	20 U
Dibenzofuran					15,000	58,000		58 U	40 U	20 U
Pentachlorophenol					360	690		**1140** J	46 J	17.2 J

Notes:
U: Not detected at reporting limit indicated.
J: Estimated value.
Blank entry indicates no applicable screening criteria established or sample not analyzed for specific analyte.

23	Boxed entry indicates detected concentration exceeds MTCA and/or Ambient Water Quality screening criteria.
442	Bolded boxed entry indicates detected concentration exceeds MTCA and/or Ambient Water Quality screening criteria, and SMS criteria.
2900	Double boxed entry indicates detected petroleum hydrocarbon concentration exceeds MTCA Method A Industrial criteria for groundwater protection. Method A cleanup level but is not considered to be an exceedance of MTCA criteria per Footnote [b] below.
	Shaded entry indicates metals concentration above Washington State Background Concentration (90th percentile value - Natural Background Soil Metals Concentrations in Washington State, Ecology 1994).

[a] MTCA Method A Industrial cleanup levels for TPH are provided for comparative purposes only. MTCA Method A TPH cleanup levels are based on groundwater protection, which may not be applicable at this site.

[b] Listed soil cleanup screening levels are based on calculated maximum concentrations of chemical constituents in soil, such that constituents in surface water in contact with the soil are at or below the MTCA Method B surface water screening criteria. MTCA Method B cleanup levels for surface water are presented except as noted for TPH and arsenic.

[c] Listed soil cleanup screening levels are based on calculated maximum concentrations of chemical constituents in soil, such that constituents in surface water in contact with the soil are at or below Washington State Water Quality Standards (Chapter 173-201A WAC) for protection of marine organisms.

[d] Ecology 1994. Natural Background Soil Metals Concentrations in Washington State, Ecology Publication 94-115, October, 1994.

[e] MTCA Method A arsenic cleanup level is listed. The MTCA Method A cleanup level for arsenic is based on state background concentrations. MTCA Method B does not apply for arsenic at this site.

[f] Analytical results are OC-normalized for comparison to SQS and CSL sediment critiera in accordance with Washington State Sediment Management Standards (SMS - Chapter 173-204 WAC). OC-normalization is based on assumed nominal Total Organic Carbon concentration of 0.5 percent.

APPENDIX A.8

Log Yard Cap Supporting Information

Attachment A.8 Contains Excerpted Information from the Following References:

Year	Author Abbreviation	Author	Document Title
2017	Winward	Winward Environmental LLC (Winward) and Landau Associates	Environmental Cap Inspection Report Former Portac Facility

Port of Tacoma – Summary of past cap inspections and cap maintenance @ Portac site

- January 29, 1990: Cap inspection (by tenant? Portac? Source not specified) No report on file – informal notes only, including note of cap repair/crack sealing.
- February 13, 1990: Informal note re. status of January cap repairs. No report on file.
- March 9 & 15, 1990: Informal notes re. new crack patching conducted. No report on file.
- April 30, 1990: Informal notes re. cap inspection, sweeping, and crack repairs. No report on file.
- May 7, 1990: Informal notes re. cap inspection. No report on file.
- August 2& 8, 1990: Informal notes re. crack repairs. No report on file.
- January 28, 1992: Informal note re. cap observation. No report on file.
- June 1992: Informal note re. cap observation and repair. No report on file.
- December 1992: Informal note re. cap observation. No report on file.
- June 1993: Informal note re. cap observation and repair. No report on file.
- December 1993: Informal note re. cap observation and repair. No report on file.
- June 1994: Informal note re. cap observation. No report on file.
- December 1994: Informal note re. cap observation. No report on file.
- June 1995: Informal note re. cap observation and repair. No report on file.
- December 1995: Informal note re. cap observation. No report on file.
- June 1996: Informal note re. cap observation. No report on file.
- *NO REPORTS OR CAP OBSERVATIONS ON FILE FOR Q3 1996 TO Q2 2008.*
- February 20, 2009: Cap condition assessment conducted by Port of Tacoma consultant. Summary memo on file.
- June 16, 2009: Cap surface evaluation for potential repairs conducted by Portac contractor. Summary memo on file.
- August 26, 2009: Portac contractor conducted crack sealing and cap surface repairs. Letter to Ecology and Post-Construction Report on file.
- Q1 2010: Port of Tacoma cap inspection (form on file).
- Q2 2010: Port of Tacoma cap inspection (form on file).
- Q3 2010: Port of Tacoma cap inspection (form on file).
- Q4 2010: Port consultant conducted cap inspection. Report on file.
- Q1 2011: Port of Tacoma cap inspection (form on file).
- Summer 2011: Port contractor conducted crack sealing and cap surface repairs

- September 12, 2011: MOU issued from Ecology updating cap inspection frequency to 30 months (formerly 3 months), starting with an event on February 2012.
- Q1 2012: Port consultant conducted cap inspection. Report on file.
- Summer 2012: Port contractor conducted crack sealing and cap surface repairs.
- Q3 2014: Port consultant conducted cap inspection. Report on file.
- Q1 2017: Port consultant conducted cap inspection. Report on file.

Erin Carroll Hughes

From: Weeks, Sarah <sweeks@portoftacoma.com>
Sent: Monday, May 1, 2017 9:09 AM
To: Erin Carroll Hughes
Cc: Healy, Rob
Subject: FW: POT Portac cap inspection - FSID 1215

Hi, Erin –

FYI. I was revisiting the Portac cap inspection report and found a mistake. See correspondence below.

Sarah

From: Smith, Andrew (ECY) [mailto:ansm461@ECY.WA.GOV]
Sent: Wednesday, April 26, 2017 3:32 PM
To: Weeks, Sarah <sweeks@portoftacoma.com>
Subject: RE: POT Portac cap inspection - FSID 1215

Thanks

Andrew Smith, P.E., LHG
UST/Technical Services Unit Supervisor
Ecology's Toxics Cleanup Program
Southwest Regional Office
Phone 360-407-6316
Fax 360-407-6305
ansm461@ecy.wa.gov

From: Weeks, Sarah [mailto:sweeks@portoftacoma.com]
Sent: Wednesday, April 26, 2017 2:24 PM
To: Smith, Andrew (ECY) <ansm461@ECY.WA.GOV>
Subject: RE: POT Portac cap inspection - FSID 1215

Hi Andy –

I came across a mistake in the Portac cap inspection report. The following section should be corrected as noted:

3 Status and Recommendations

3.1 Maintenance and Repair Performed Since Previous Inspection

3.1.1 Environmental cap

Several recommendations for cap maintenance were made in the previous inspection report (Hart Crowser 2014), including the repair of 4,727 ft of cracks. The specific locations of individual cracks were not specified in the report. Cap repairs have not been made since the previous inspection. The most recent cap repairs were made in the summer~~s~~ of 2012 ~~and 2013~~. The Port made repairs to the cap based on the recommendation of the 2012 Cap Inspection Report (Conestoga-Rovers 2012). Repairs included a section of asphalt overlay and crack sealing as necessary. Crack sealing involved removing debris from cracks, filling with crack sealant, and covering with asphalt slurry seal.

How would you like me to address this revision? Will this email suffice as notification or would you prefer that the report be revised?

Thank you,
Sarah

Sarah Weeks | Environmental Project Manager | Port of Tacoma | 253.383.9450 | www.portoftacoma.com

---

From: Weeks, Sarah
Sent: Friday, April 14, 2017 3:15 PM
To: 'Smith, Andrew (ECY)' <ansm461@ECY.WA.GOV>
Subject: POT Portac cap inspection - FSID 1215

Hi, Andy –

The February 2017 environmental cap inspection at the Former Portac Facility (FS ID: 1215) has been completed. I've attached the inspection report as a PDF.

Please confirm the receipt of this email and let me know if you have any questions or concerns.

Have a great weekend,
Sarah

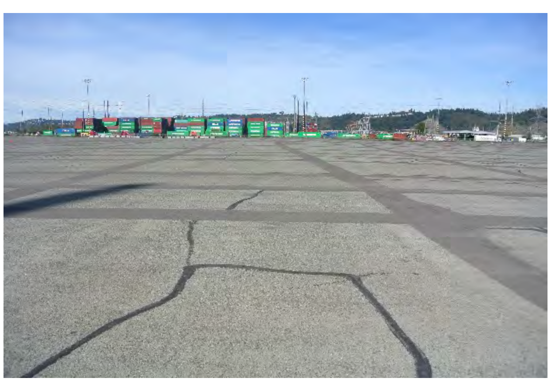
Sarah Weeks | Environmental Project Manager | Port of Tacoma | 253.383.9450 | www.portoftacoma.com

ENVIRONMENTAL CAP INSPECTION REPORT

FORMER PORTAC FACILITY

Order on Consent DE 88-S326 (September 22, 1988)
Washington State Department of Ecology Facility ID # 1215
Inspection Date: February 8, 2017

March 30, 2017



Prepared by:

Windward environmental LLC
200 West Mercer Street, Suite 401
Seattle, Washington • 98119

Landau Associates

Table of Contents

Tables

Figures

Acronyms

Ecology	Washington State Department of Ecology
ID	identification
MOU	Memorandum of Understanding
Port	Port of Tacoma
RI/FS	remedial investigation/feasibility study
VCP	voluntary cleanup program
Windward	Windward Environmental LLC

Certification

I hereby certify that I am familiar with the facilities addressed in this report and that the inspection was conducted in accordance with acceptable engineering practices.

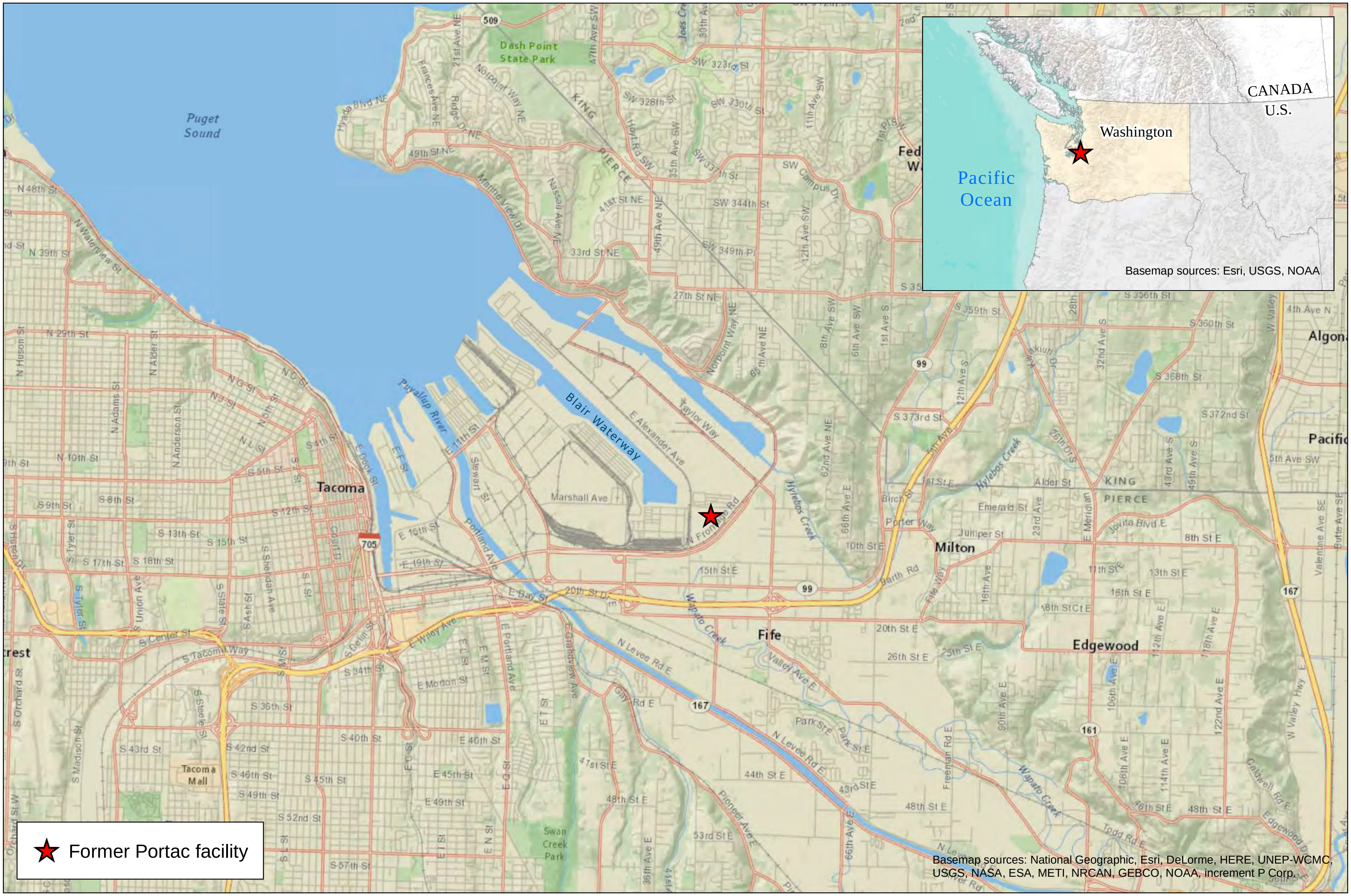
Warren G. Hansen, PE

Expires 4-22-2019

1 Introduction

This report summarizes the field activities and results for the cap inspection conducted on behalf of the Port of Tacoma (Port) for the former Portac facility. The former Portac facility is located at 4215 State Route 509 – North Frontage Road, Tacoma, Washington (Figure 1). The former Portac facility is owned by the Port and is leased to Auto Warehousing Company for automobile storage.

Approximately 30 ac of the facility are covered by an environmental cap; the facility has several stormwater drainage features, further described herein. Cap inspection activities were conducted in accordance with the requirements identified in the Order on Consent (DE 88-S326) and memorandum of understanding (MOU) between the Washington State Department of Ecology (Ecology) and the Port, which was issued on September 12, 2011 (Ecology and Port of Tacoma 2011).



N
0 1 2 Miles
0 1 2 Kilometers

Windward environmental LLC

Figure 1. Former Portac facility vicinity map

Prepared by mikey, 3/29/2017; W:\Projects\Landau-Port of Tacoma on-call\Data\GIS\Maps_and_Analyses\Cap_Inspections_2017\Portac\6593_Vicinity map.mxd

1.1 Purpose and Scope

The purpose of this report is to present the findings of the 2017 environmental cap and stormwater drainage system inspection at the former Portac facility. The inspection was performed by Windward Environmental LLC (Windward) on February 8, 2017, in accordance with the scope of work provided by the Port (Port of Tacoma 2016), which included the following tasks:

- Inspection of the asphalt/concrete pavement for presence of cracks or other failures in the pavement that allow surface water runoff to infiltrate the bark/slag surficial fill (e.g., cracks greater than 1/8 in. wide, sub-base material exposed, pavement edge deterioration, and general appearance)
- Evaluation of the structural and functional condition of the cap and drainage systems (including catch basins, manholes, and oil/water separators)
- Evaluation of debris/sediment accumulation in the stormwater structures

The purpose of the environmental cap is to prevent water infiltration, exposure of humans and the environment to underlying materials, and erosion. The stormwater drainage system is designed to convey stormwater off the cap surface to prevent infiltration and erosion.

1.2 Facility Background

The former Portac facility began operations as a log yard and sawmill in 1974 (Ecology 2017, 1988). The facility was leased from the Port by Portac, Inc. beginning in 1978 (Ecology 1988). Portions of the facility were operated as a log sort yard as recently as 2011. Waste from the former ASARCO smelter was used as ballast material at this property (Ecology 2017).

In the 1980s, the facility was identified as a source of heavy metals contamination to site soil and to surface water in Wapato Creek and Blair Waterway (Ecology 1988). Ecology subsequently issued an Administrative Order on Consent to Portac, Inc. and the Port, requiring both parties to "abate contaminant loading to waters of the state."

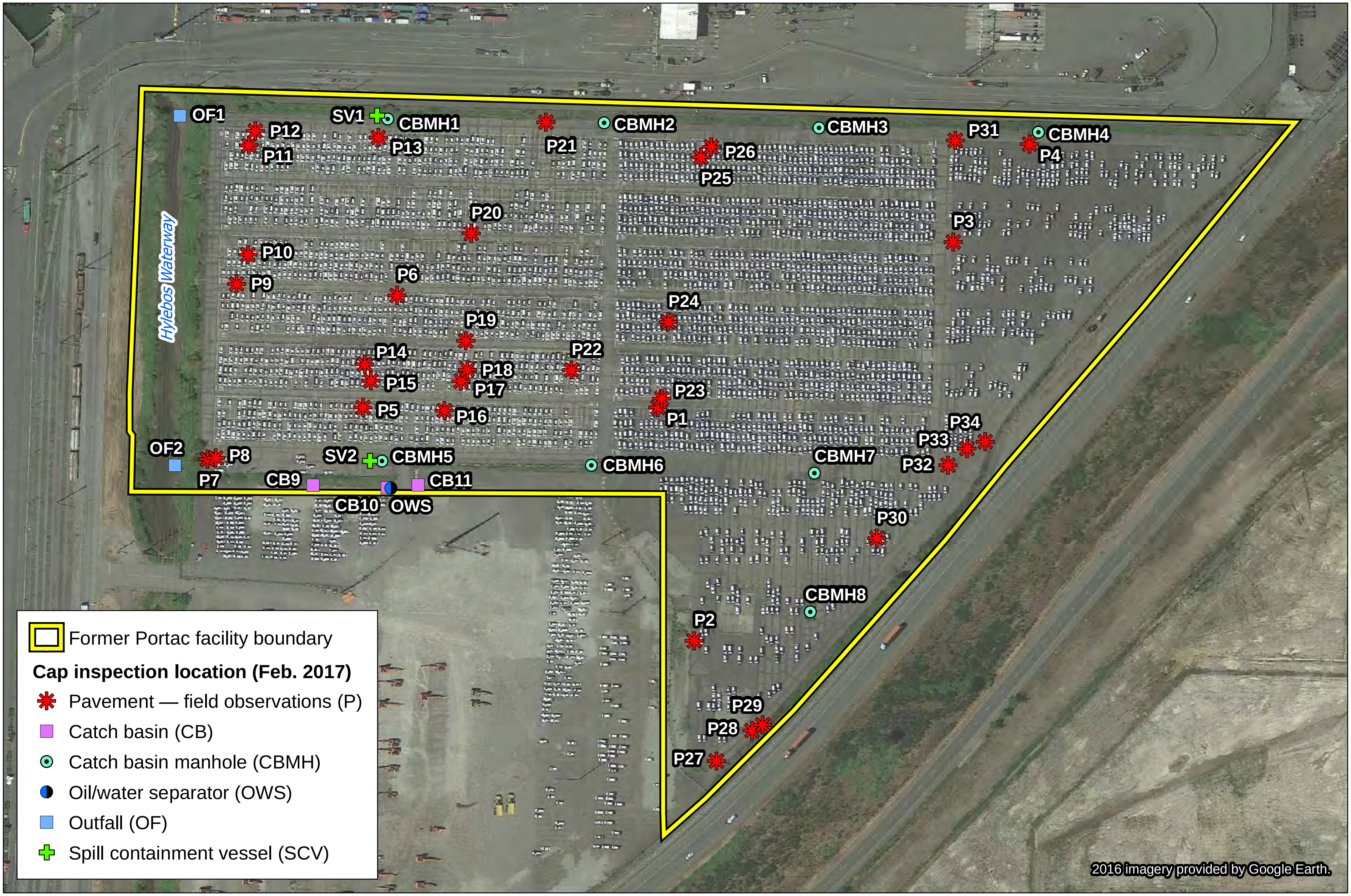
In 2011, Ecology and the Port entered into a MOU related to the property's cap inspection and groundwater monitoring requirements (Ecology and Port of Tacoma 2011). The MOU requires cap inspections every 30 months. The last inspection was performed in August 2014 (Hart Crowser 2014). In 2016, Portac, Inc., the Port, and Ecology entered into an Agreed Order requiring the first two parties to perform a remedial investigation/feasibility study (RI/FS) (Ecology 2016). This work is ongoing.

2 Field Observations

Windward performed the inspection at the former Portac facility on February 8, 2017.

2.1 Environmental Cap

At the time of Windward's inspection, the general appearance of the environmental cap at the former Portac facility was good. Numerous cap repairs, including those made with slurry overlay, caulking, and sealant, were observed. However, re-emerging cracks were observed in many of these repaired areas. In general, cracks that seemed to have been repaired in the past with slurry overlay or caulking appeared to exhibit new cracks during the inspection. Some cracks were also observed in areas that had not been previously repaired. Many cracks were narrower than 1/8 in. and therefore did not require immediate repair. Some of the observed cracks, however, were wider than 1/8 in.; these cracks were documented (Figure 2, Appendix A) and should be repaired. Because of the number of narrow, potentially "emerging" cracks that were observed, the next inspection should include another site-wide evaluation of pavement condition.



Windward environmental LLC

N

0 0.05 0.1 Miles

0 200 400 Feet

Figure 2. Former Portac facility field observations

Prepared by mikey, 3/30/2017; W:\Projects\Landau-Port of Tacoma on-call\Data\GIS\Maps_and_Analyses\Cap_Inspections_2017\Portac\6582_Portac cap inspection locations_Feb 2017.mxd

Moss was observed growing on portions of the caulking used to repair pavement cracks. In some areas, the moss on top of the caulking created the appearance of an open crack where there was none.

The edge of the cap was inspected and found to be in good condition. Curbs, which had been installed at some locations around the edge of the cap, were observed to have been pushed off the edge of the pavement in some places; however, it appeared that the curb had not been installed for the purpose of stormwater runoff containment. The condition of the curbs was not observed to be impacting the integrity of the cap or stormwater drainage system.

The cap was inspected for the presence of exposed sub-base material and none was observed.

Table 1 provides a summary of the cap condition observed during the inspection.

Table 1. Environmental cap condition

Required Inspection Elements	Observed Condition	Recommended Actions
Presence of cracks wider than 1/8 in.	Cracks wider than 1/8 in. were observed throughout the cap.	See Figure 2 and Appendix A for the locations of cracks and recommended repairs.
Sub-base material exposed	No sub-base material was exposed.	none
Pavement edge deterioration	No pavement edge deterioration was observed.	none
Degradation, subsidence, general appearance	No degradation or subsidence was observed.	none

Example photos of cracks observed at the former Portac facility are presented in Figures 3 and 4. Photos were taken of each crack observed during the inspection. These photos are included in Appendix A, which lists the cracks observed on the environmental cap and provides additional details regarding cap condition.

Figure 3. Representative crack A

Note: width of screwdriver blade is 1/8 in.

Figure 4. Representative crack B

2.1 Stormwater Drainage Systems

The stormwater drainage system consists of three catch basins, eight "catch basin manholes," one oil/water separator, two spill containment vessels, and two outfalls. Each drainage structure was inspected for structural and functional condition and debris and sediment accumulation. Observations made at each structure are summarized in Table 2.

Table 2. Stormwater structure observations

Location ID[a]	Type of Structure	Observed Condition	Sediment Accumulation (inches)	Additional Observations	Recommended Actions	Photos
CB9	catch basin	structurally sound, functioning normally	nm (could not observe bottom of chamber)	none	continue to maintain catch basin under stormwater permit	
CB10	catch basin	functioning normally	nm (did not open due to surface debris; see photo)	water level approximately 6 in. from top of structure; grate broken; boom broken	replace broken grate; remove debris from around grate; continue to maintain catch basin under stormwater permit	
CB11	catch basin	functioning normally	approx. 6	catch basin insert present; sediment accumulation around grate	remove sediment from around grate; continue to maintain catch basin under stormwater permit	

Location ID[a]	Type of Structure	Observed Condition	Sediment Accumulation (inches)	Additional Observations	Recommended Actions	Photos
CBMH1	catch basin manhole	functioning normally	nm; some debris noted (see additional observations)	sediment and debris accumulation in basin; standing water of approximately 1 in. depth on south side of basin	remove accumulated sediment and debris; continue to maintain structure under stormwater permit	
CBMH2	catch basin manhole	functioning normally	nm; some debris noted (see additional observations)	broken boom; sediment and debris accumulation in basin	remove accumulated sediment and debris; continue to maintain structure under stormwater permit	
CBMH3	catch basin manhole	functioning normally	nm; some debris noted (see additional observations)	broken boom; organic debris and sediment accumulation in basin; standing water of approximately ½ in. depth on south side of basin	remove accumulated sediment and debris; continue to maintain structure under stormwater permit	
CBMH4	catch basin manhole	functioning normally	nm; some debris noted (see additional observations)	organic debris accumulated on grate; sediment accumulated in sump	remove accumulated sediment and debris; continue to maintain structure under stormwater permit	

Location ID[a]	Type of Structure	Observed Condition	Sediment Accumulation (inches)	Additional Observations	Recommended Actions	Photos
CBMH5	catch basin manhole	functioning normally	nm; some debris noted (see additional observations)	broken boom; sediment and debris accumulated on grate; plant growth around perimeter of basin	remove boom; remove accumulated sediment and debris; remove vegetation around basin perimeter; continue to maintain structure under stormwater permit	
CBMH6	catch basin manhole	functioning normally	nm; some debris noted (see additional observations)	broken boom; vegetation in and around basin; debris in basin	remove boom; remove vegetation; remove debris continue to maintain structure under stormwater permit	
CBMH7	catch basin manhole	functioning normally	none in surface basin	vegetation growing around perimeter of basin; foam on grate; standing water approximately 2 in. deep in a large area on west side of basin	remove vegetation; remove foam; continue to maintain structure under stormwater permit	
CBMH8	catch basin manhole	functioning normally	none in surface basin (other than vegetation)	numerous blackberry bushes in and around basin	remove vegetation; continue to maintain structure under stormwater permit	

Location ID[a]	Type of Structure	Observed Condition	Sediment Accumulation (inches)	Additional Observations	Recommended Actions	Photos
OF1	outfall	functioning normally; unable to observed structure due to tide	na	unable to access outfall due to tide	observe structure during next inspection	
OF2	outfall	functioning normally; unable to observe structure due to tide	na	unable to access outfall due to tide	observe during next inspection	
OWS	oil/water separator	structurally sound, functioning normally	less than 1	less than 1 in. sediment accumulation in center of vault/under lid; no sediment accumulation away from center of vault; minor floatables in first chamber	remove debris from around lid; remove floatables from first chamber; continue to maintain structure under stormwater permit	

Location ID[a]	Type of Structure	Observed Condition	Sediment Accumulation (inches)	Additional Observations	Recommended Actions	Photos
SV1	spill containment vessel	appears to be functioning normally	nm (confined space entry required to probe vault bottom)	1 in. separation between access manhole and pavement on south side; floatables in west chamber; foam and minor floatables in east chamber	repair separated pavement; remove floating material from east and west chambers during next maintenance cycle; continue to maintain structure under stormwater permit	  

Location ID[a]	Type of Structure	Observed Condition	Sediment Accumulation (inches)	Additional Observations	Recommended Actions	Photos
SV2	spill containment vessel	appears to be functioning normally	nm (confined space entry required to probe vault bottom)	floatables in east chamber; mud accumulating on pavement in vicinity	remove floating material during next maintenance cycle from east chamber; remove accumulated mud; continue to maintain structure under stormwater permit	   

[a] See Figure 2.

ID – identification na – not applicable nm – not measured

3 Status and Recommendations

3.1 Maintenance and Repair Performed Since Previous Inspection

3.1.1 Environmental cap

Several recommendations for cap maintenance were made in the previous inspection report (Hart Crowser 2014), including the repair of 4,727 ft of cracks. The specific locations of individual cracks were not specified in the report. Cap repairs have not been made since the previous inspection. The most recent cap repairs were made in the summers of 2012 and 2013. The Port made repairs to the cap based on the recommendation of the 2012 Cap Inspection Report (Conestoga-Rovers 2012). Repairs included a section of asphalt overlay and crack sealing as necessary. Crack sealing involved removing debris from cracks, filling with crack sealant, and covering with asphalt slurry seal.

3.1.2 Stormwater drainage system

Recommendations in the previous inspection report included replacing the grate on the oil/water separator catch basin (presumably CB10); replacing the filter sock in catch basin CB11; and clearing vegetation from around catch basins CB9, CB10, and CB11 (Hart Crowser 2014). Based on observations made during the 2017 inspection, the grate on catch basin CB10 still needs to be replaced. Vegetation had been cleared from catch basins CB9 and CB10 since the previous inspection. The filter sock (insert) in catch basin CB11 appeared to be in good condition, so it is assumed that it had been replaced since the previous inspection.

3.2 Recommendations

3.2.1 Environmental cap

All cracks wider than 1/8 in. and a gouge in the pavement surface have been identified as specified in Appendix A and shown on Figure 2. Since the Site is under an Agreed Order with Ecology to complete a remedial investigation and feasibility study, alternative metrics and methods for cap repair will be evaluated as part of the upcoming Site feasibility study.

3.2.2 Stormwater drainage system

All stormwater structures should continue to be maintained under the Port's municipal stormwater permit. The broken grate on catch basin CB10 should be replaced (Figure 2; Table 2). It is also recommended that the broken booms observed at catch basins CB10, CBMH2, CBMH3, CBMH5, and CBMH6 be removed, and that accumulated sediment and debris be removed from inside and around these structures (Figure 2; Table 2).

3.3 Limitations

Observations contained in this report are limited to environmental cap areas that were visible to the field team. In some instances, portions of the cap surface may have been covered and not readily available for inspection. Inspection of stormwater structures was limited to observations made from the surface and by means of direct observation, probes (extendible poles to check for sediment), and photography. No confined space entry was performed. Observation of some stormwater structures was also be limited by storm flow and / or the presence of damaged or sediment-laden catch basin inserts that could not be safely removed. No guarantee is made that all cap or stormwater deficiencies that could impact cap / drainage system performance were identified.

4 References

Conestoga-Rovers. 2012. Cap inspection report, February 2012, former Portac facility. Conestoga-Rovers & Associates, Tacoma, WA.

Ecology. 1988. Order on Consent. Docket No. DE 88-S326. Washington State Department of Ecology.

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Ecology. 2017. Portac Inc Tacoma [online]. Washington State Department of Ecology. Available from: https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=3642.

Hart Crowser. 2014. Cap inspection report, former Portac facility. Hart Crowser, Seattle, WA.

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Appendix A. Environmental Cap Field Observations

ENVIRONMENTAL CAP FIELD OBSERVATIONS

Contents:

- Table A1. Environmental cap observations

Table A1 lists cracks on the environmental cap wider than 1/8 in. and other conditions requiring attention and observed during the cap inspection.

Table A1. Environmental cap observations

Location ID[a]	Observations	Recommended Actions	Photos
P1	crack approximately ¾ in. wide in previously unrepaired pavement extending south from the recorded coordinates;[b] vegetation in crack	repair crack	
P2	gouge in pavement; approximately 36 x 8 in.	repair by patching or providing a pavement overlay	
P3	crack wider than 1/8 in. in previously unrepaired pavement extending approximately 15 ft west from the recorded coordinates[b]	repair crack	

Location ID[a]	Observations	Recommended Actions	Photos
P4	crack wider than 1/8 in. in previously unrepaired pavement extending approximately 15 ft south from the recorded coordinates;[b] some vegetation in crack	repair crack	
P5	crack in pavement caulking wider than 1/8 in. with vegetation	repair crack	
P6	crack in pavement caulking wider than 1/8 in. extending south approximately 40 ft from the recorded coordinates[b]	remove caulk and repair crack	
P7	crack in slurry overlay wider than 1/8 in.	repair crack	

Location ID[a]	Observations	Recommended Actions	Photos
P8	crack in slurry overlay wider than 1/8 in. with vegetation	repair crack	
P9	crack in slurry overlay wider than 1/8 in.	repair crack	
P10	crack in slurry overlay wider than 1/8 in.; sections of pavement between cracks appear loose and may become unattached from surrounding pavement	repair crack	
P11	crack in slurry overlay wider than 1/8 in. extending north, south, east, and west from the recorded coordinates[b]	repair crack	

Location ID[a]	Observations	Recommended Actions	Photos
P12	crack in slurry overlay wider than 1/8 in. extending north and south from the recorded coordinates[b]	repair crack	
P13	crack in slurry overlay wider than 1/8 in. extending north and south from the recorded coordinates[b]	repair crack	
P14	crack in slurry overlay wider than 1/8 in. extending east and west at least 30 ft from the recorded coordinates;[b] pavement on north side of crack at higher elevation than pavement on south side	repair crack	
P15	crack in slurry overlay wider than 1/8 in. extending east and west from the recorded coordinates[b]	repair crack	

Location ID[a]	Observations	Recommended Actions	Photos
P16	crack in slurry overlay wider than 1/8 in. extending north and south from the recorded coordinates[b]	repair crack	
P17	crack in slurry overlay wider than 1/8 in. extending north and south from the recorded coordinates[b]	repair crack	
P18	crack in slurry overlay wider than 1/8 in. extending east and west from the recorded coordinates;[b] pavement on north side of crack at higher elevation than pavement on south side	repair crack	[no photo]
P19	crack in slurry overlay wider than 1/8 in. extending east and west from the recorded coordinates[b]	repair crack	

Location ID[a]	Observations	Recommended Actions	Photos
P20	crack in slurry overlay wider than 1/8 in. extending north and south from the recorded coordinates[b]	repair crack	
P21	crack in slurry overlay wider than 1/8 in. extending approximately 40 ft east from the recorded coordinates[b]	repair crack	
P22	crack in slurry overlay wider than 1/8 in. extending east and west from the recorded coordinates[b]	repair crack	
P23	crack in slurry overlay wider than 1/8 in.; vegetation in crack	repair crack	

Location ID[a]	Observations	Recommended Actions	Photos
P24	crack in slurry overlay wider than 1/8 in.; vegetation in crack	repair crack	
P25	crack in slurry overlay wider than 1/8 in. extending approximately 30 ft south and 50 ft north from the recorded coordinates[b]	repair crack	
P26	crack approximately ½ in. wide in slurry overlay extending north to edge of cap and approximately 100 ft south from the recorded coordinates[b]	repair crack	
P27	crack in slurry overlay; width ranges from 1/8 in. to approximately 1 in.; located at top of ramp	repair crack	

Location ID[a]	Observations	Recommended Actions	Photos
P28	crack wider than 1/8 in. in slurry overlay extending northeast approximately 30 ft and southwest approximately 10 ft from the recorded coordinates[b]	repair crack	
P29	crack wider than 1/8 in. in slurry overlay extending approximately 15 ft southeast from the recorded coordinates[b]	repair crack	
P30	crack wider than 1/8 in. in slurry overlay extending approximately 40 ft north from the recorded coordinates[b]	repair crack	
P31	crack wider than 1/8 inch in slurry overlay extending (non-continuously) approximately 40 ft west from the recorded coordinates[b]	repair crack	

Location ID[a]	Observations	Recommended Actions	Photos
P32	crack wider than 1/8 in. in slurry overlay extending approximately 30 ft from the recorded coordinates;[b] crack previously repaired using caulk; caulk now coming out of crack	repair crack	
P33	crack wider than 1/8 in. in slurry overlay extending approximately 50 ft northeast from the recorded coordinates[b]	repair crack	
P34	crack wider than 1/8 in. in slurry overlay extending approximately 20 ft east from the recorded coordinates[b]	repair crack	

a See Figure 2.

b The latitude and longitude of each observation were recorded in the field and are available in the project file. These coordinates were used to map the locations shown on Figure 2.

P – pavement observation

APPENDIX A.9

Truck Queuing Project on Former Sawmill

Attachment A.8 Contains Excerpted Information from the Following References:

Year	Author Abbreviation	Author	Document Title
2017	Port	KPFF	Port of Tacoma - PCT Truck Staging Project No. 091606, Contract No. 070287. As-Built Drawings Prepared by KPFF for the Port of Tacoma.

AS BUILT DRAWINGS

PORT OF TACOMA

PCT TRUCK STAGING
PROJECT NO. 091606
CONTRACT NO. 070287

PORT COMMISSIONERS:

CONSTANCE T. BACON
DON MEYER
DONALD C. JOHNSON
RICHARD P. MARZANO
CLARE PETRICH

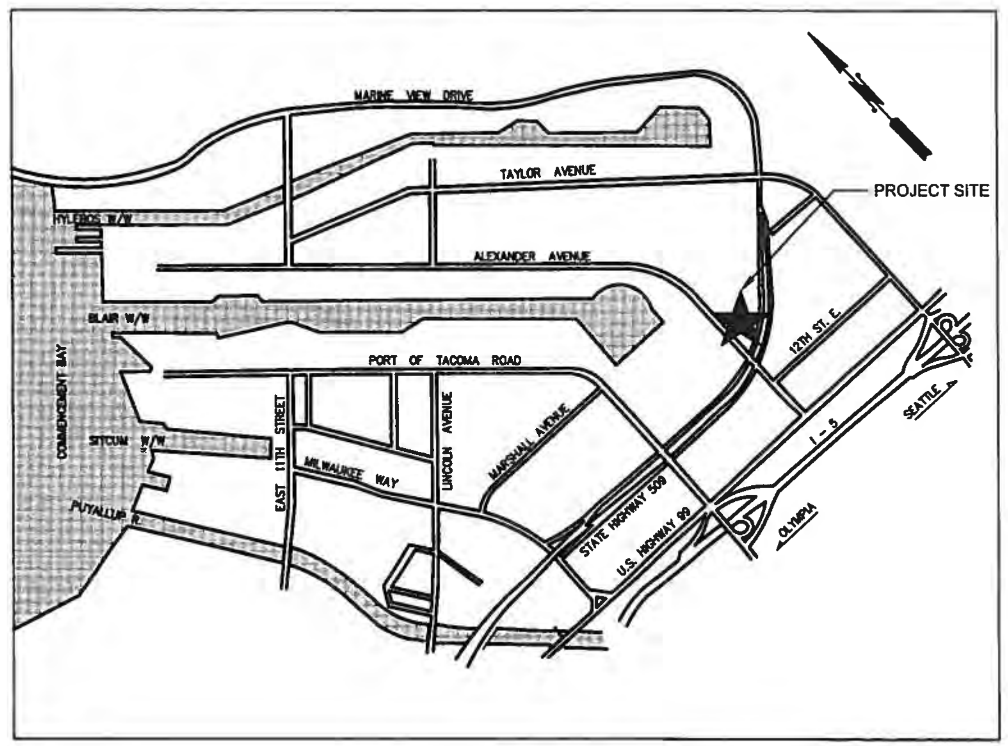
PORT STAFF:

JOHN WOLFE
Chief Executive Officer

DAKOTA CHAMBERLAIN, PE
Chief Facilities Development Officer

THAIS HOWARD, PE
Director of Engineering

PEDRO REYES, PE
Project Manager



Port of Tacoma
kpff 2407 North 31st Street, Suite 100 Tacoma, Washington 98407 (253) 396-0150 Fax (253) 396-0162

MARK:	REVISION:	BY:	APPR:	DATE:

APPROVED: DIRECTOR ENG. DATE 6/2/16
SWK 05/20/2016 CHECKED BY DATE
RGC 05/20/2016 PROJ. ENGR DATE
PRINTED BY: rchandler May 20, 2016
PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837

PCT TRUCK STAGING
COVER SHEET

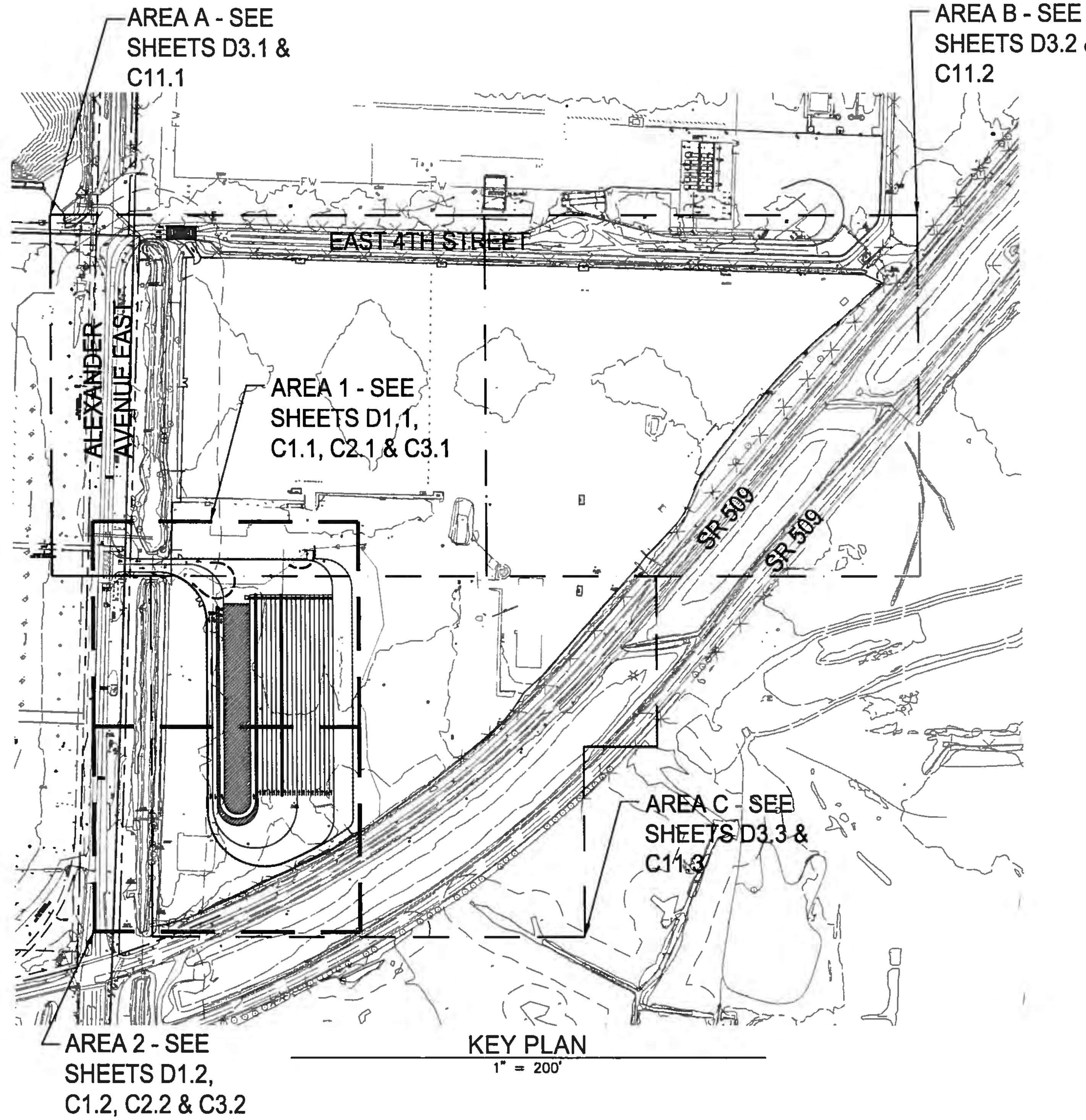
TOWNSHIP: 20N RANGE: 03E SECTION: 01
DAT-HRZ: VERT:
PARCEL: 5000350150 DRAWING SCALE: AS NOTED

6556
G1
SHEET 1 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%

BINDING EDGE
PORT OF TACOMA FILE: C:\Users\rchandler\appdata\local\temp\AcPublish 8800\091606-G001 (Cover Sheet)

DRAWING LIST		
SHEET #	SHEET DESIGNATION	SHEET TITLE
GENERAL		
1	G1	COVER SHEET
2	G2	KEY PLAN AND SHEET INDEX
3	G3	LEGEND, NOTES AND ABBREVIATIONS
4	G4	OVERALL SITE PLAN
PCT DEMOLITION		
5	D1.1	PCT DEMOLITION & TESC PLAN - AREA 1
6	D1.2	PCT DEMOLITION & TESC PLAN - AREA 2
7	D2.0	DEMOLITION & TESC DETAILS AND NOTES
PORTAC DEMOLITION		
8	D3.1	PORTAC DEMO & TESC PLAN - AREA A
9	D3.2	PORTAC DEMO & TESC PLAN - AREA B
10	D3.3	PORTAC DEMO & TESC PLAN - AREA C
PCT CIVIL		
11	C1.1	PCT SITE PLAN - AREA 1
12	C1.2	PCT SITE PLAN - AREA 2
13	C2.1	PCT GRADING & PAVING PLAN - AREA 1
14	C2.2	PCT GRADING & PAVING PLAN - AREA 2
15	C3.1	PCT UTILITY PLAN - AREA 1
16	C3.2	PCT UTILITY PLAN - AREA 2
17	C4.0	PCT SITE SECTIONS
18	C4.1	PCT SITE SECTIONS
19	C4.2	PCT SITE SECTIONS
20	C4 3	PCT SITE SECTIONS
21	C5.0	PAVING DETAILS
22	C5.1	FENCING DETAILS
23	C5.2	FENCING DETAILS
24	C5.3	FENCING DETAILS
25	C5.4	DETAILS
26	C5.5	DETAILS
27	C5.6	STORMWATER DETAILS
28	C5.7	STATION OFFSET AND CONTROL TABLES
29	C5.8	ENLARGED SITE PLAN
PORTAC CIVIL		
30	C10.0	PORTAC OVERALL SITE PLAN
31	C11.1	PORTAC SITE PLAN - AREA A
32	C11.2	PORTAC SITE PLAN - AREA B
33	C11.3	PORTAC SITE PLAN - AREA C
34	C11.4	PORTAC HORIZONTAL CONTROL
35	C12.1	PORTAC DETAILS
36	C12 2	PORTAC SITE SECTIONS
37	C12.3	PORTAC DETAILS
ELECTRICAL		
38	E1.0	PARTIAL ELECTRICAL SITE PLAN - AREA 1
39	E1.1	PARTIAL ELECTRICAL SITE PLAN - AREA A
40	E2.0	PCT GATE ELECTRICAL DETAILS
41	E3.0	PORTAC GATE ELECTRICAL DETAILS

DRAWING LIST CONTINUED		
SHEET #	SHEET DESIGNATION	SHEET TITLE
WORK ORDER		
42	1	COVER SHEET
43	2	SURVEY
44	3	SURVEY
45	4	DEMOLITION AND TESC PLAN
46	5	DEMOLITION AND TESC PLAN
47	6	TESC DETAILS
48	7	PAVING-UTILITY PLAN
49	8	CHANNELIZATION AND SIGNAGE PLAN
50	9	CHANNELIZATION AND SIGNAGE PLAN
51	10	DRIVEWAY SECTIONS
52	11	DETAILS
53	12	WORK ORDER GENERAL NOTES



KEY PLAN
1" = 200'

200' 0 200' 400'
100' 300'
SCALE: 1"=200'

PCT TRUCK STAGING
KEY PLAN AND SHEET INDEX

6556
G2
SHEET 2 OF 53

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
PARCEL: 5000350150
DRAWING SCALE: AS NOTED
PHASE: 100%
CONT/CONS: 070287
PRINTED BY: rchandler May 20, 2016
PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837
SWK 05/20/2016
CHECKED BY DATE
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PROJ. ENGR DATE
DIRECTOR ENG. DATE

kpff 2407 North 31st Street, Suite 100 Tacoma, Washington 98407 (253) 396-0150 Fax (253) 396-0162
Port of Tacoma

PORT OF TACOMA FILE: N:\Civil\114\114080 Port of Tacoma Planning On-Call\114080.16 PCT Gate Queue\Part 3 - KPFF Design\3.13 Drawings\091606-G002 (Key Plan)

BINDING EDGE

SURVEY LEGEND:

	BUILDING OUTLINE WITH DOOR
	CONCRETE SURFACE
	ASPHALT SURFACE
	WALL
	EDGE OF ASPHALT
	EDGE OF GRAVEL
	CYCLONE FENCE LINE
	BOLLARD
	OVERHEAD LIGHT
	CATCH BASIN/AREA DRAIN
	MONITORING WELL

NOTES:

1. VERTICAL DATUM: PORT OF TACOMA
   BENCHMARK: 2-1/2 INCH BRASS DISK AT THE SOUTHEAST CORNER OF THE INTERSECTION OF MILWAUKEE WAY AND FRONTAGE ROAD.
   BENCHMARK NO. 846 ELEVATION = 15.26'
2. BASIS OF BEARINGS FOR THIS SURVEY IS THE PORT OF TACOMA BLAIR-HYLEBOS PENINSULA SURVEY CONTROL MAP.
3. THIS MAP DOES NOT REPRESENT A BOUNDARY SURVEY. EASEMENTS MAY EXIST ON THE PROPERTY BUT ARE NOT SHOWN IN THIS MAP.
4. UTILITY LOCATIONS SHOWN ARE PER FIELD LOCATED UTILITY PAINT MARKS & REFERENCE MAPS MADE AVAILABLE BY THE VARIOUS UTILITY PROVIDERS. UNLESS INDICATED, DEPTHS OF UTILITY LINES ARE NOT AVAILABLE. ALL UTILITY LOCATIONS SHOULD BE FIELD VERIFIED (POTHOLED) PRIOR TO CONSTRUCTION.

UNDERGROUND UTILITY STRUCTURES DESIGN LOADING CRITERIA:

1. ALL UNDERGROUND AND AT GRADE UTILITY STRUCTURES INCLUDING MANHOLES, CATCH BASINS, HAND HOLES, VAULTS AND OTHER STRUCTURES, INCLUDING ALL RINGS, COVERS, HATCHES, GRATES AND OTHER FEATURES WHICH MAY APPLY, SHALL BE DESIGNED TO ACCOMMODATE THE LOAD CRITERIA SHOWN ON THIS SHEET EXCEPT FOR EXISTING CATCH BASIN AND OTHER STRUCTURES THAT WILL BE RAISED TO FINISHED GRADE. FOR ALL UNDERGROUND UTILITY STRUCTURES, SHOP DRAWINGS AND CALCULATIONS STAMPED BY A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF WASHINGTON SHALL BE SUBMITTED AND APPROVED BY THE ENGINEER PRIOR TO FABRICATION.
2. STANDARD PLAN REFERENCES AND MANUFACTURER MODEL NUMBERS FOR UNDERGROUND UTILITY STRUCTURES ARE INTENDED TO PROVIDE INTERIOR GEOMETRY AND INTENT ONLY. THE CONTRACTOR SHALL INCREASE REQUIRED REINFORCING AND WALL THICKNESS, AND CHANGED ACCESS GRATE AND COVER AS REQUIRED TO ACCOMMODATE LOADING CRITERIA.
3. SOIL DESIGN CRITERIA (BASED ON IBC 2012 MINIMUMS, AS NO GEOTECH REPORT IS PROVIDED):
   VERTICAL BEARING PRESSURE = 2500 PSF
   ACTIVE PRESSURE = 85 PSF X H
   SEISMIC PRESSURE = 9H
   ASSUMES K_A = 0.6
   H = STRUCTURE HEIGHT
   COEFFICIENT OF FRICTION, U=0.25
4. DEAD LOAD SHALL BE APPLIED TO ALL STRUCTURES WHICH INCLUDE THE WEIGHT OF THE CONSTRUCTION MATERIALS AND THE SOIL.
5. LIVE LOADS 1 AND 2 SHALL ACT SIMULTANEOUSLY AND IN COMBINATION WITH DEAD LOADS AND HYDROSTATIC PRESSURE WHEN DESIGNING UTILITY STRUCTURES WITHIN THE LIMITS OF THE SITE.

   LOADINGS SHALL ACT SIMULTANEOUSLY, BUT NEED NOT OCCUPY THE SAME SPACE. WHEEL LOAD CRITERIA CONFIGURATION FOR CONTAINER LIFT TRUCK SHALL BE ARRANGED IN PROXIMITY TO THE STACKED CONTAINERS TO RESULT IN THE LARGEST DESIGN REQUIREMENT FOR THE UTILITY STRUCTURE. SEE FIGURE 1 FOR LIFT TRUCK PROXIMITY TO STACKED CONTAINER REQUIREMENTS.

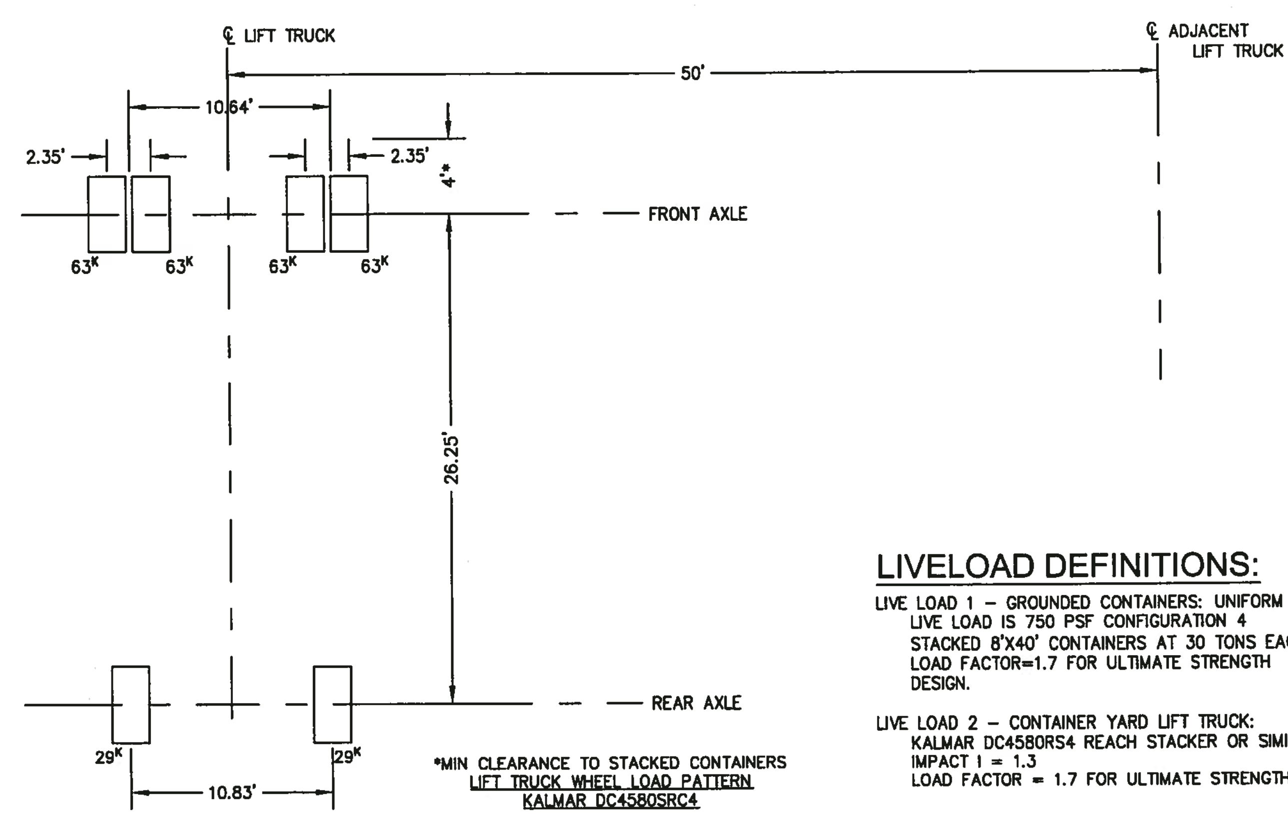

FIGURE 1

LIVELOAD DEFINITIONS:

LIVE LOAD 1 – GROUNDED CONTAINERS: UNIFORM LIVE LOAD IS 750 PSF CONFIGURATION 4 STACKED 8'X40' CONTAINERS AT 30 TONS EACH. LOAD FACTOR=1.7 FOR ULTIMATE STRENGTH DESIGN.

LIVE LOAD 2 – CONTAINER YARD LIFT TRUCK: KALMAR DC4580RS4 REACH STACKER OR SIMILAR IMPACT = 1.3 LOAD FACTOR = 1.7 FOR ULTIMATE STRENGTH

ABBREVIATIONS

#	NUMBER
⌀	DIAMETER
@	AT
AB	AGGREGATE BASE
AC	ASPHALT CONCRETE
ACI	ASPHALT CONCRETE INSTITUTE
ADDL	ADDITIONAL
ADJ	ADJACENT
ADMIN	ADMINISTRATION
AGGR	AGGREGATE
ALT	ALTERNATE
ALUM	ALUMINUM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APP or APPRD	APPROVED
APPROX	APPROXIMATE
APWA	AMERICAN PUBLIC WORKS ASSOCIATION
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AUTO	AUTOMATIC, AUTOMOBILE
AVE	AVENUE
AVG	AVERAGE
AWS	AMERICAN WELDING SOCIETY
AWWA	AMERICAN WATER WORKS ASSOCIATION
BFO	BURIED FIBER OPTIC
BLDG	BUILDING
BM	BENCH MARK or BEAM
BMP or BMP'S	BEST MANAGEMENT PRACTICES
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BRG	BEARING
BRZ	BRONZE
BTW or BTWN	BETWEEN
CY	CUBIC YARD
C/L	CENTERLINE
CAB	CRUSHED AGGREGATE BASE
CB	CATCH BASIN
CC	CENTER TO CENTER
CFS	CUBIC FEET PER SECOND
CIP	CAST IRON PIPE
CL, ℄	CENTER LINE or CLASS
CLF	CHAIN LINK FENCE
CLR	CLEAR or CLEARANCE
CMB	CRUSHED MISCELLANEOUS BASE
CMP	CORRUGATED METAL PIPE
CO	CLEAN OUT
COMPR	COMPRESSOR
CONC	CONCRETE
CONST	CONSTRUCT
CONT	CONTINUE or CONTINUOUS
CONT'D	CONTINUED
CONTR	CONTRACTOR
COORD	COORDINATE
COUP	COUPLING
CSBC	CRUSHED SURFACING BASE COURSE
CSG	CASING
CSP	CORRUGATED STEEL PIPE
CTR	CENTER
Dc	DEGREE OF CURVATURE
DEMO	DEMOLITION
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DTL	DETAIL
DOE	DEPARTMENT OF ECOLOGY
DWG	DRAWING
DWY	DRIVEWAY
E	EAST or EASTING
EA	EACH
EG	EXISTING GRADE
EL or ELEV	ELEVATION
ELEC or ELECT	ELECTRICAL
ENGR	ENGINEER
EP	EDGE OF PAVEMENT
ETC	ET CETERA

ABBREVIATIONS

EX or EXIST	EXISTING
EXP. JT	EXPANSION JOINT
EW	EACH WAY
FF	FINISH FLOOR
FG	FINISH GRADE
FH	FIRE HYDRANT
FIN	FINISH
FM	FORCE MAIN
FS	FINISHED SURFACE
FSM	FIRE SERVICE METER
FT'	FOOT, FEET
FTZ	FOREIGN TRADE ZONE
G	GAS
GALV	GALVANIZED
GIS	GEOGRAPHIC INFORMATION SYSTEM
GPS	GLOBAL POSITIONING SYSTEM
GV	GATE VALVE
H or HORIZ	HORIZONTAL
HAZMAT	HAZARDOUS MATERIALS
HDPE	HIGH DENSITY POLYETHYLENE
HMA	HOT MIX ASPHALT
HORZ	HORIZONTAL
HOWL	HIGHEST OBSERVED WATER LEVEL
HP	HIGH PRESSURE or HIGH POINT
HSSD	HIGH STRENGTH STORM DRAIN
HT	HEIGHT
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN, "	INCH
INFO	INFORMATION
INV	INVERT
JB	JUNCTION BOX
JS	JUNCTION STRUCTURE
JT	JOINT
KIP(S)	KILOPOUND(S)
KSI	KIPS PER SQUARE INCH
L	LENGTH
LAT	LATERAL
LB	POUND
LF	LINEAL FOOT
LH	LEFT HAND
LIN	LINEAL or LINEAR
LOL	LAYOUT LINE
LP	LOW POINT
LT	LEFT
LTP	LIGHT POLE
M&R	MAINTENANCE AND REPAIR
MAX	MAXIMUM
MH	MANHOLE
MIL	MILLIMETER
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MNSB	MINIMUM SET BACK
MWS	MODULAR WETLAND SYSTEM
N	NORTH or NORTHING
NE	NORTH-EAST
NGAS	NATURAL GAS
NIC	NOT IN CONTRACT
No., NO	NUMBER
NS	NEAR SIDE
NTS	NOT TO SCALE
NW	NORTH-WEST
OC	ON CENTER
OD	OUTSIDE DIAMETER
OVH	OVERHEAD
P/L or PL	PROPERTY LINE
PB	PULL BOX
PCC	PORTLAND CEMENT CONCRETE
PCT	PIERCE COUNTY TERMINAL
PERF	PERFORATED
PERP	PERPENDICULAR
PG	PERFORMANCE GRADE
PL	PLATE
POT	PORT OF TACOMA
POV	POWER OPERATED VEHICLE
PP	POWER POLE
PR	PRESSURE RATING
PRESS	PRESSURE
PRESS RED	PRESSURE REDUCER

ABBREVIATIONS

PROP	PROPOSED
PRV	PRESSURE REDUCING VALVE
PRVS	PRESSURE RELIEF VALVE
PSF	POUNDS PER SQUARE FOOT
PS	POINT OF SWITCH
PSI	POUNDS PER SQUARE INCH
PT	POINT or POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
R	RIDGE OR RADIUS
R/W OR ROW	RIGHT OF WAY
RCC	ROLLER COMPACTED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RED	REDUCER
REF	REFERENCE
REINF	REINFORCE OR REINFORCING
REQ'D	REQUIRED
RH	RIGHT HAND
RP	RADIUS POINT
RR	RAILROAD
RT	RIGHT
S	SLOPE
S	SOUTH
SCH or SCHED	SCHEDULE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SE	SOUTH-EAST
SECT	SECTION
SERV	SERVICE
SHT	SHEET
SIM	SIMILAR
SPECS	SPECIFICATIONS
SQ	SQUARE
SQFT	SQUARE FEET
SS	SANITARY SEWER
SSMH	SANITARY SEWER MANHOLE
STA	STATION
STD	STANDARD
STL	STEEL
SW	SOUTH-WEST
SYM	SYMMETRIC or SYMBOL
TB	THRUST BLOCK
TBM	TEMPORARY BENCH MARK
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
T&B	TOP AND BOTTOM
TG	TOP OF GRATE
TOB	TOP OF BANK
TOS	TOE OF SLOPE
TOP	TOP OF PIPE or TOP OF SLOPE
TPU	TACOMA PUBLIC UTILITIES
TR	TRACK
TS	TRANSITION STRUCTURE
TW	TOP OF WALL
TYP	TYPICAL
UB	UPLAND BORING
UNO	UNLESS NOTED OTHERWISE
UV	ULTRA-VIOLET
V	VERTICAL
VAR	VARIABLE or VARIES
VC	VERTICAL CURVE
VERT	VERTICAL
W	WATER, WEST, WIDTH
W/	WITH
W/O	WITHOUT
WELD	WELDING
WHS	WELDED HEADED STUD
WM	WATER METER
WP	WATER CAP/PLUG
WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WT	WATER TEE
WWAY	WALKWAY

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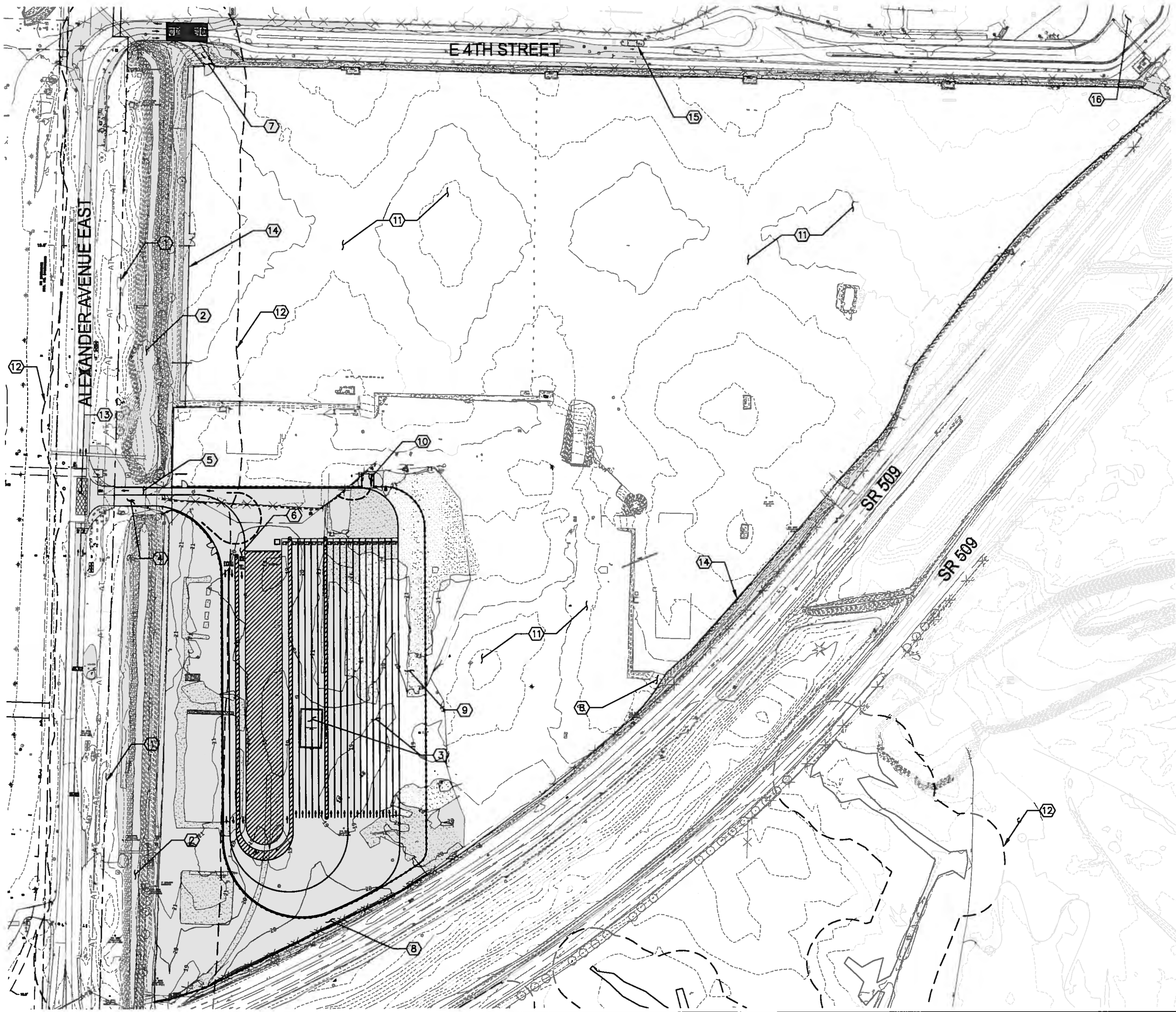
PCT TRUCK STAGING

LEGEND AND ABBREVIATIONS

6556
G3
SHEET 3 OF 53

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
CONT/CONS: 070287 | DAT-HRZ: | VERT:
M. ID: | PARCEL: 5000350150 | DRAWING SCALE: AS NOTED
PHASE: 100%



KEYNOTES:

1. CITY ROW LINE
2. WAPATO CREEK
3. TRUCK QUEUE LANES
4. TRUCK QUEUE ENTRY LANE
5. TRUCK QUEUE AND AUTO STORAGE EXIT LANE
6. BOB TAIL LANE
7. AUTO STORAGE ENTRY
8. ACCESS TO EAST PORTION OF PORTAC SITE
9. ADDITIONAL SPACE FOR 4 FUTURE TRUCK QUEUE LANES
10. AUTO STORAGE EXIT
11. AUTO STORAGE AREA
12. 150' STREAM BUFFER
13. FOR WORK WITHIN CITY ROW, SEE WORK ORDER PERMIT NUMBER 60000041488
14. FOR WORK RELATED TO PORTAC PERIMETER FENCING, SEE SHEETS D3.1 THRU D3.3 AND C10.0 THRU C12.3
15. PIERCE COUNTY TERMINAL SECURITY BOOTH
16. PIERCE COUNTY TERMINAL TRUCK GATE

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6556
G4
SHEET 4 OF 53

PCT TRUCK STAGING
OVERALL SITE PLAN

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PHASE: 100%	PARCEL: 5000350150	DRAWING SCALE: AS NOTED	TACOMA, WA 98401-1837

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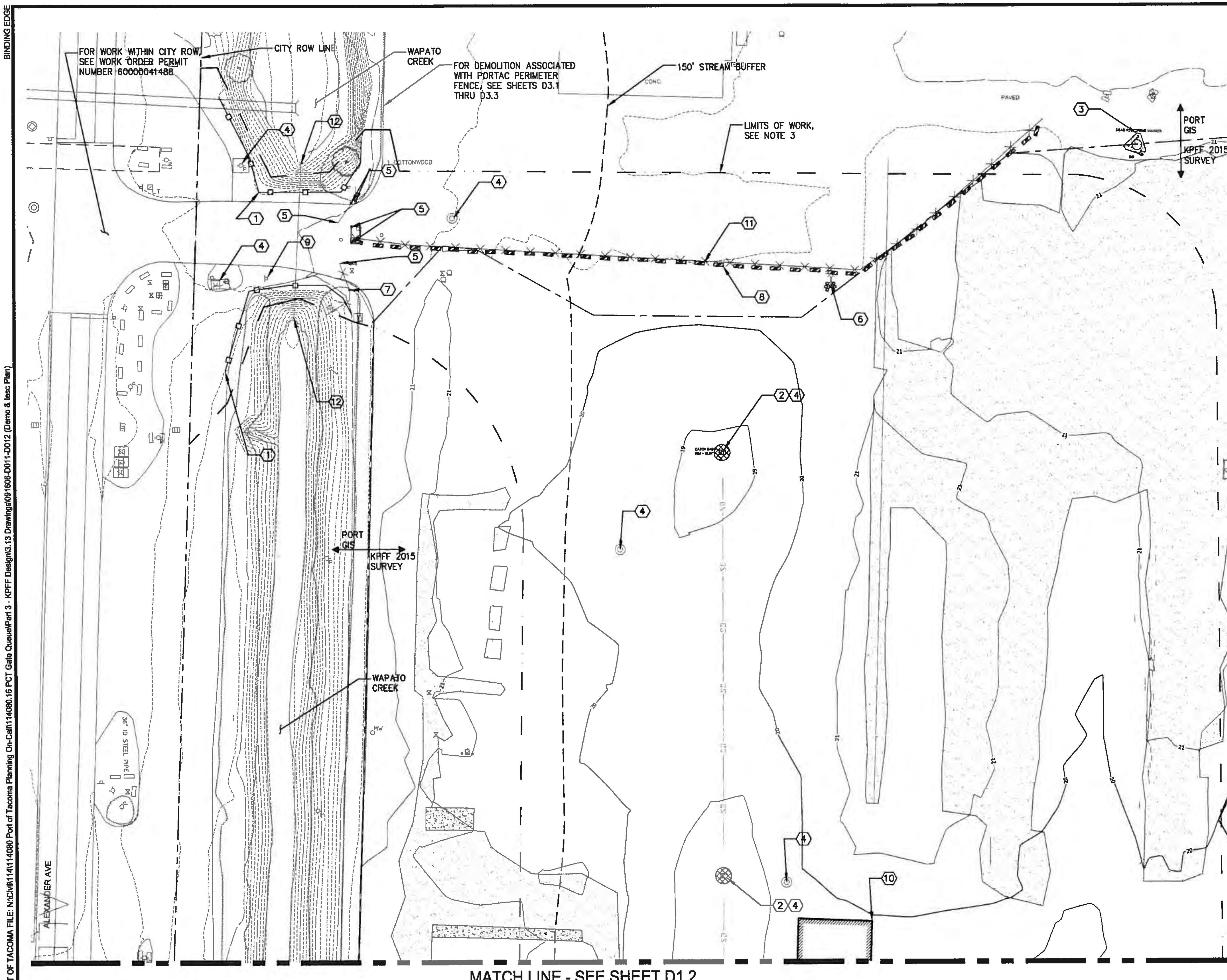
BINDING EDGE



KEY NOTES:

1. STRAW WATTLE
2. INLET PROTECTION
3. PROTECT-IN-PLACE EXISTING NAVIGATION MARKER
4. PROTECT EXISTING UTILITY
5. REMOVE EXISTING GATE POST AND DISPOSE
6. REMOVE LIGHT POLE AND SALVAGE LIGHT FIXTURE. REFER TO SHEET C3.1 AND E1.0 FOR REINSTALLATION
7. PROTECT-IN-PLACE EXISTING GATE POST
8. REMOVE AND SALVAGE EXISTING ECOLOGY BLOCKS, SEE SHEET D1.2 FOR STORAGE LOCATION
9. PROTECT-IN-PLACE EXISTING SIGN
10. EXISTING TEMPORARY BUILDING TO BE REMOVED BY CURRENT TENANT BEFORE CONSTRUCTION BEGINS
11. TEMPORARY FENCE IS RENTED, CONTRACTOR TO COORDINATE WITH SUPPLIER FOR REMOVAL OF FENCE PRIOR TO THE START OF CONSTRUCTION
12. PROTECT EXISTING CULVERT OUTLET

NOTES:

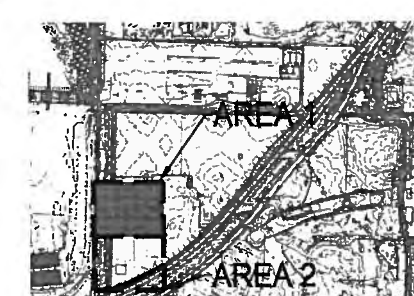
1. EXISTING SITE ENTRANCE SHALL BE USED AS CONSTRUCTION ENTRANCE.
2. LARGE DEBRIS AND CONCRETE RUBBLE SHALL BE REMOVED FROM PAVEMENT SURFACE WITHIN WORK LIMITS.
3. CONTRACTOR SHALL PROVIDE TEMPORARY FENCING ON NORTH AND EAST SIDE OF LIMITS OF WORK TO MAIN A SECURE BARRIER BETWEEN WORK AREA AND AUTO STORAGE AREA THROUGHOUT DURATION OF CONSTRUCTION.

LEGEND:

- DEMO EX FENCE
- STRAW WATTLES (2 / D2.0)
- LIMITS OF WORK
- INLET PROTECTION (1 / D2.0)
- EXISTING GRAVEL SURFACE
- EXISTING ECOLOGY BLOCK

30' 0 15' 30' 45' 60'

SCALE: 1"=30'



KEY PLAN

NTS

Port of Tacoma

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PCT TRUCK STAGING
PCT
DEMOLITION & TESC PLAN - AREA 1

6556

D1.1

SHEET 5 OF 53

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01

CONT/CONS: 070287

DAT-HRZ: | VERT:

M. ID:

PARCEL: 5000350150

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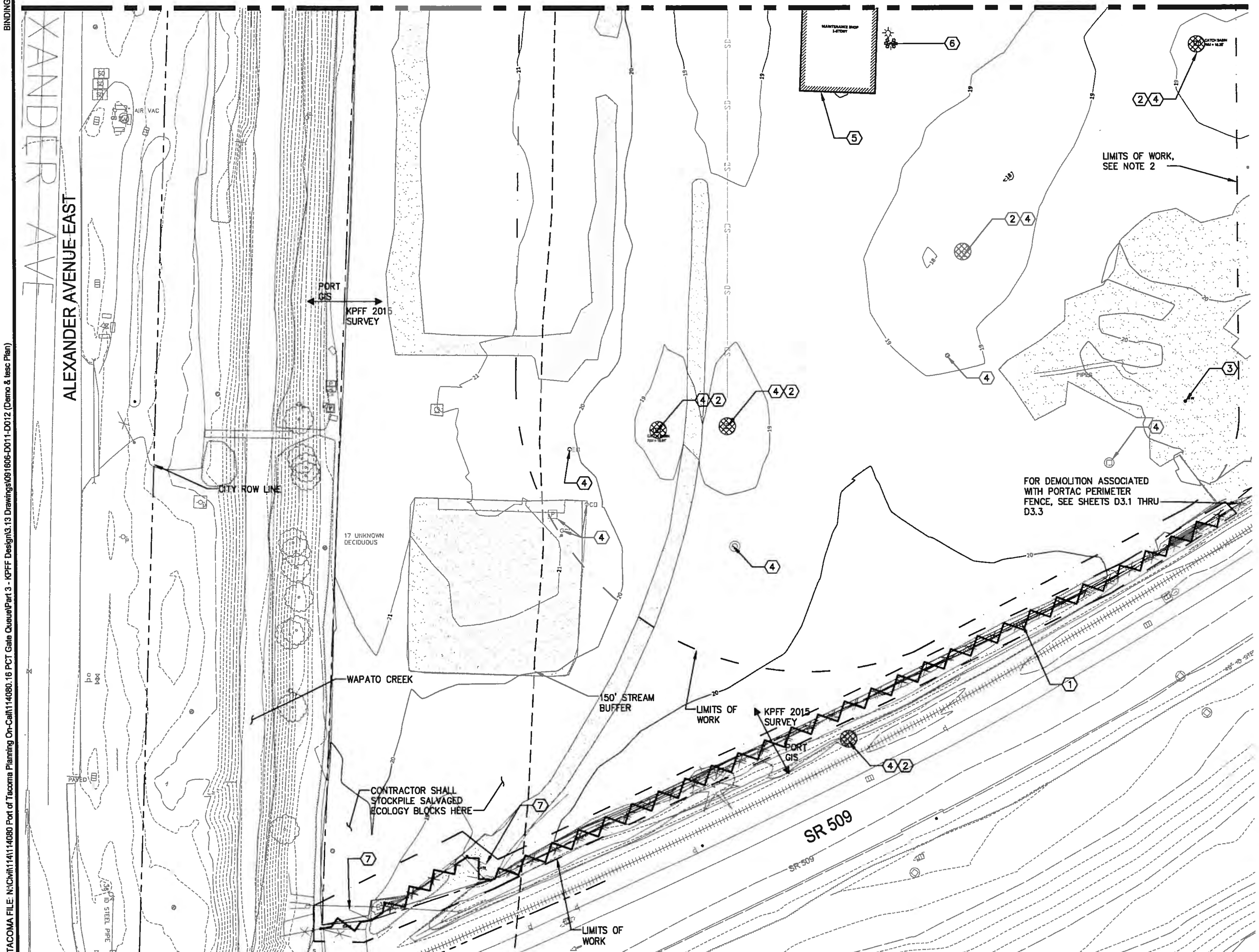
PHASE: 100%

MATCH LINE - SEE SHEET D1.1



KEY NOTES:

1. REMOVE EXISTING FENCE AND DISPOSE
2. INLET PROTECTION
3. PROTECT MONITORING WELL
4. PROTECT EXISTING UTILITY
5. EXISTING TEMPORARY BUILDING TO BE REMOVED BY CURRENT TENANT BEFORE CONSTRUCTION BEGINS
6. PROTECT-IN-PLACE EXISTING LIGHT POLE
7. REMOVE EXISTING GATE AND DISPOSE

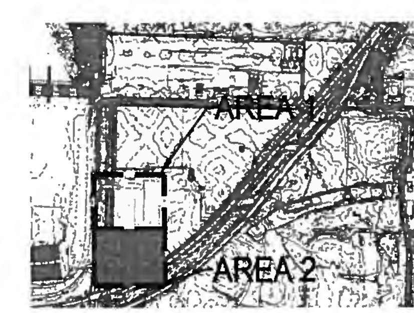
NOTES:

1. LARGE DEBRIS AND CONCRETE RUBBLE SHALL BE REMOVED FROM PAVEMENT SURFACE WITHIN LIMITS OF WORK.
2. CONTRACTOR SHALL PROVIDE TEMPORARY FENCING ON NORTH AND EAST SIDE OF LIMITS OF WORK TO MAIN A SECURE BARRIER BETWEEN WORK AREA AND AUTO STORAGE AREA THROUGHOUT DURATION OF CONSTRUCTION.

LEGEND:

- DEMO EX FENCE
- COMPOST SOCK (2 / D2.0)
- LIMITS OF WORK
- INLET PROTECTION (1 / D2.0)
- EXISTING GRAVEL SURFACE
- EXISTING ECOLOGY BLOCK

30' 0 30' 60'
15' 45'
SCALE: 1"=30'



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STEVE WADE KINGSLEY, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER 32781

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PCT TRUCK STAGING
PCT
DEMOLITION & TESC PLAN - AREA 2

TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
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6556
D1.2
SHEET 6 OF 53

CONT/CONS: 070287
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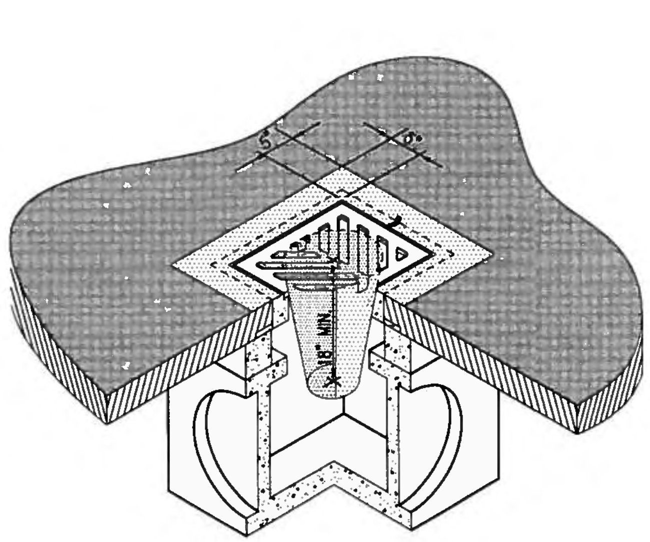
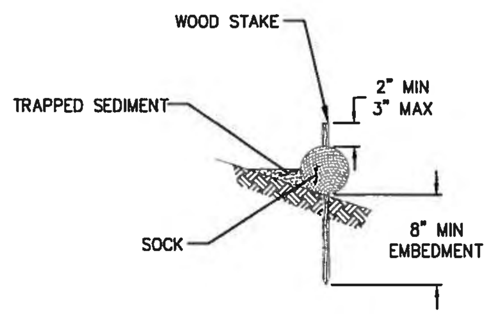
BINDING EDGE

NOTES:

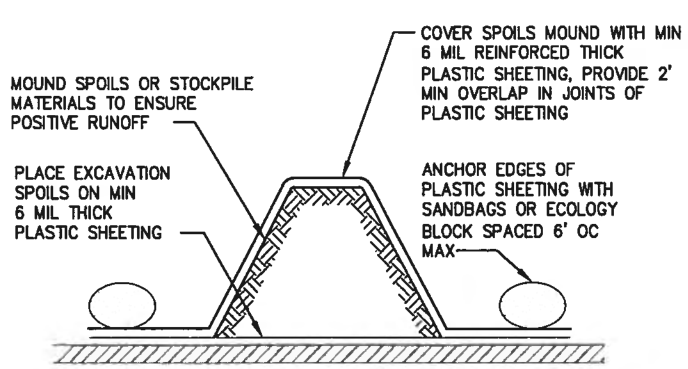
1. INSERT SHALL BE INSTALLED IN ALL OPERATIONAL CATCH BASINS WITHIN 100 FEET OF WORK LIMITS PRIOR TO CLEARING AND GRADING ACTIVITY, OR UPON PLACEMENT OF A NEW CATCH BASIN.
2. FILTERS SHALL BE INSPECTED AFTER EACH STORM EVENT AND CLEANED OR REPLACED WHEN IT IS 1/3 FULL.
3. SEDIMENT REMOVAL SHALL BE ACCOMPLISHED BY REMOVING THE INSERT, EMPTYING INTO APPROPRIATE DISPOSAL LOCATION, AND REINSERTING IT INTO THE CATCH BASIN.



1 INLET PROTECTION DETAIL
D1.1–D1.2, D3.1–D3.3 SCALE: NTS



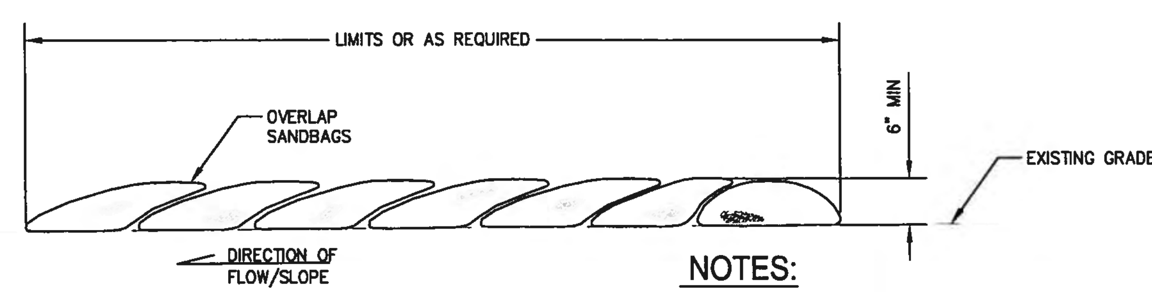
2 COMPOST SOCK DETAIL
D1.1–D1.2 SCALE: NTS



3 STOCK PILE PROTECTION DETAIL
– SCALE: NTS

GENERAL NOTES:

1. ALL WORK SHALL CONFORM TO THESE PLANS AND SPECIFICATIONS. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE PROJECT PERMITS AND ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS PERTAINING TO DEMOLITION AND DISPOSAL.
2. CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A DETAILED WORK PLAN, INCLUDING, DEMOLITION PRIOR TO COMMENCING WORK, SEE SPECIFICATIONS.
3. THE CONTRACT DOCUMENTS AND SPECIFICATIONS REPRESENT THE SCOPE OF WORK. UNLESS OTHERWISE SHOWN THEY DO NOT INDICATE THE METHOD OF WORK. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND HE SHALL BE SOLELY RESPONSIBLE FOR ALL MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES.
4. THE CONTRACTOR SHALL KEEP ALL STREETS, TERMINAL AREAS, AND VEHICULAR TRAFFIC AREAS CLEAN.
5. CONTRACTOR IS RESPONSIBLE FOR ANY TRAFFIC CONTROLS REQUIRED DURING THE DURATION OF THIS PROJECT, SEE SPECIFICATIONS.
6. THE CONTRACTOR SHALL INSTALL AND MAINTAIN PERIMETER FENCING AS REQUIRED TO MAINTAIN SECURITY OF SITES.
7. CONTRACTOR SHALL PROTECT-IN-PLACE ALL STRUCTURES, UTILITIES AND OBJECTS NOT CALLED OUT AS BEING DEMOLISHED ON THE PLANS. ANY DAMAGE TO ITEMS NOT BEING DEMOLISHED SHALL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE.
8. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO STRICTLY CONTAIN THE WORK WITHIN THE LIMITS SHOWN ON THE DRAWINGS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER. ANY DAMAGE TO UTILITIES, OTHER FACILITIES, OR EQUIPMENT DUE TO THE CONTRACTOR'S NEGLIGENCE SHALL BE PROMPTLY REPAIRED AT HIS EXPENSE. THIS INCLUDES ITEMS OUTSIDE THE WORK AREA THAT ARE DAMAGED BY CONSTRUCTION ACTIVITIES DURING EXECUTION OF THIS CONTRACT.
9. ALL LOCATIONS OF EXISTING UNDERGROUND UTILITIES SHOWN HEREIN HAVE BEEN ESTABLISHED BY FIELD OBSERVATIONS OR OBTAINED FROM REVIEW OF AVAILABLE RECORDS AND SHOULD, THEREFORE, BE CONSIDERED APPROXIMATE ONLY AND NOT NECESSARILY COMPLETE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS SHOWN AND TO FURTHER DISCOVER AND AVOID OTHER UTILITIES NOT SHOWN HEREIN WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN. THE CONTRACTOR SHALL BRING ANY CONFLICTS BETWEEN EXISTING UTILITIES AND NEW WORK TO THE ENGINEERS ATTENTION. UTILITY LOCATE PHONE NUMBER 1-800-424-5555.
10. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES PRIOR TO COMMENCING WORK IN ACCORDANCE WITH STATE AND LOCAL REQUIREMENTS.
11. EXTENT OF DEBRIS REMOVAL IS APPROXIMATE AND IS TO BE VERIFIED BY THE ENGINEER PRIOR TO COMPLETION OF WORK. WOOD DEBRIS LARGER THAN 12"ø WITHIN WORK CLEARING LIMITS MUST REMAIN IN PLACE. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.
12. PRIOR TO COMMENCING DEMOLITION ACTIVITIES CONTRACTOR SHALL IMPLEMENT TEMPORARY EROSION AND SEDIMENTATION CONTROLS. NO DEMOLITION MATERIALS OR DEBRIS SHALL BE ALLOWED TO ENTER THE WATERWAY, SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.



4 SANDBAG BERM DETAIL
D3.1–D3.3 SCALE: NTS

NOTES:

1. SANDBAGS OF EITHER BURLAP OR WOVEN GEOTEXTILE FABRIC ARE FILLED WITH GRAVEL AND SAND, LAYERED AND PACKED TIGHTLY.
2. INSPECT BARRIERS AND REMOVE SEDIMENT AFTER EACH STORM EVENT.

TEMPORARY EROSION AND SEDIMENT CONTROL (TESC) GENERAL NOTES:

1. THE IMPLEMENTATION OF THESE PLANS AND THE CONSTRUCTION, REGULAR REVIEW, MAINTENANCE, REPLACEMENT, AND CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP), AND UPGRADING THESE FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND PLANS UNTIL ALL CONSTRUCTION IS APPROVED AND ACCEPTED BY THE ENGINEER.
2. THE TESC FACILITIES SHOWN ON THIS PLAN SHALL BE CONSTRUCTED PRIOR TO ALL CLEARING AND DEMOLITION SO AS TO ENSURE THAT TRANSPORT OF SEDIMENT TO SURFACE WATERS, DRAINAGE SYSTEMS, AND ADJACENT PROPERTIES IS MINIMIZED. THE TYPICAL WET SEASON RUNS FROM OCTOBER 1 THROUGH APRIL 30, AND THE DRY SEASON FROM MAY 1 THROUGH SEPTEMBER 30.
3. THE TESC FACILITIES SHALL BE INSPECTED DAILY BY THE TESC SUPERVISOR AND MAINTAINED TO ENSURE CONTINUED PROPER FUNCTIONING IN ACCORDANCE WITH THE SPECIFICATIONS.
4. CONTRACTOR SHALL MAINTAIN EROSION CONTROL MEASURES AT ALL TIMES TO THE REQUIREMENTS OF THE PERMITS, SPECIFICATIONS AND MINIMUM REQUIREMENTS SHOWN IN PLANS.
5. THE TESC MEASURES SHOWN ON THESE PLANS ARE MINIMUM REQUIREMENTS. SHOULD TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES, AS SHOWN ON THE PLANS BECOME INADEQUATE, THE CONTRACTOR SHALL INSTALL BMPS AND/OR FACILITIES AS NECESSARY TO PROTECT ADJACENT PROPERTIES, WATERBODIES, CITY OF TACOMA DRAINAGE SYSTEM, AND EXISTING PORT DRAINAGE SYSTEMS MEETING THE APPROVAL OF THE ENGINEER.
6. AS A GENERAL RULE, ANY AREAS OF EXPOSED SOILS, INCLUDING EMBANKMENTS, THAT WILL NOT BE DISTURBED FOR TWO DAYS DURING THE WET SEASON OR SEVEN DAYS DURING THE DRY SEASON SHALL BE IMMEDIATELY STABILIZED WITH THE APPROVED TESC BMP METHODS.
7. INLET PROTECTION SHALL BE INSPECTED AFTER EACH STORM EVENT AND CLEANED OR REPLACED WHEN ⅓ FULL.
8. THE CONTRACTOR SHALL PROTECT STOCKPILE AND EXCAVATION AREAS FROM THE RELEASE OF SEDIMENT. STOCKPILES SHALL BE COVERED AT ALL ITEMS WHILE NOT IN USE TO KEEP THE STORED MATERIAL DRY, AS SHOWN IN DETAIL.
9. ALL NON-SALVAGED MATERIAL REMOVED FROM THE SITE SHALL BE PLACED OR DISPOSED OF AT A PERMITTED SITE. CONTRACTOR SHALL OBTAIN CHARACTERIZATION DOCUMENTATION FROM THE ENGINEER FOR ALL MATERIAL PRIOR TO HAUL AND DISPOSAL.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FULL COMPLIANCE WITH THE WASHINGTON STATE DROPPING LOAD OR OTHER MATERIALS COVERING LAWS (RCW 46.51.655.3/4).
11. PAVED AREAS SHALL BE SWEPT AS NECESSARY TO PREVENT SEDIMENT AND DUST TRACKING ONTO THE PAVED AREAS.
12. PREVENTATIVE MEASURES TO MINIMIZE THE WIND TRANSPORT OF SOIL SHALL BE TAKEN WHEN SEDIMENT TRANSPORTED BY THE WIND IS LIKELY TO BE DEPOSITED IN DRAINAGE WAYS, WATER RESOURCES, OR NON-PORT PROPERTY.
13. ALL TESC MEASURES SHALL BE REMOVED AND DISPOSED OF AT AN APPROVED SITE UPON PROJECT COMPLETION.

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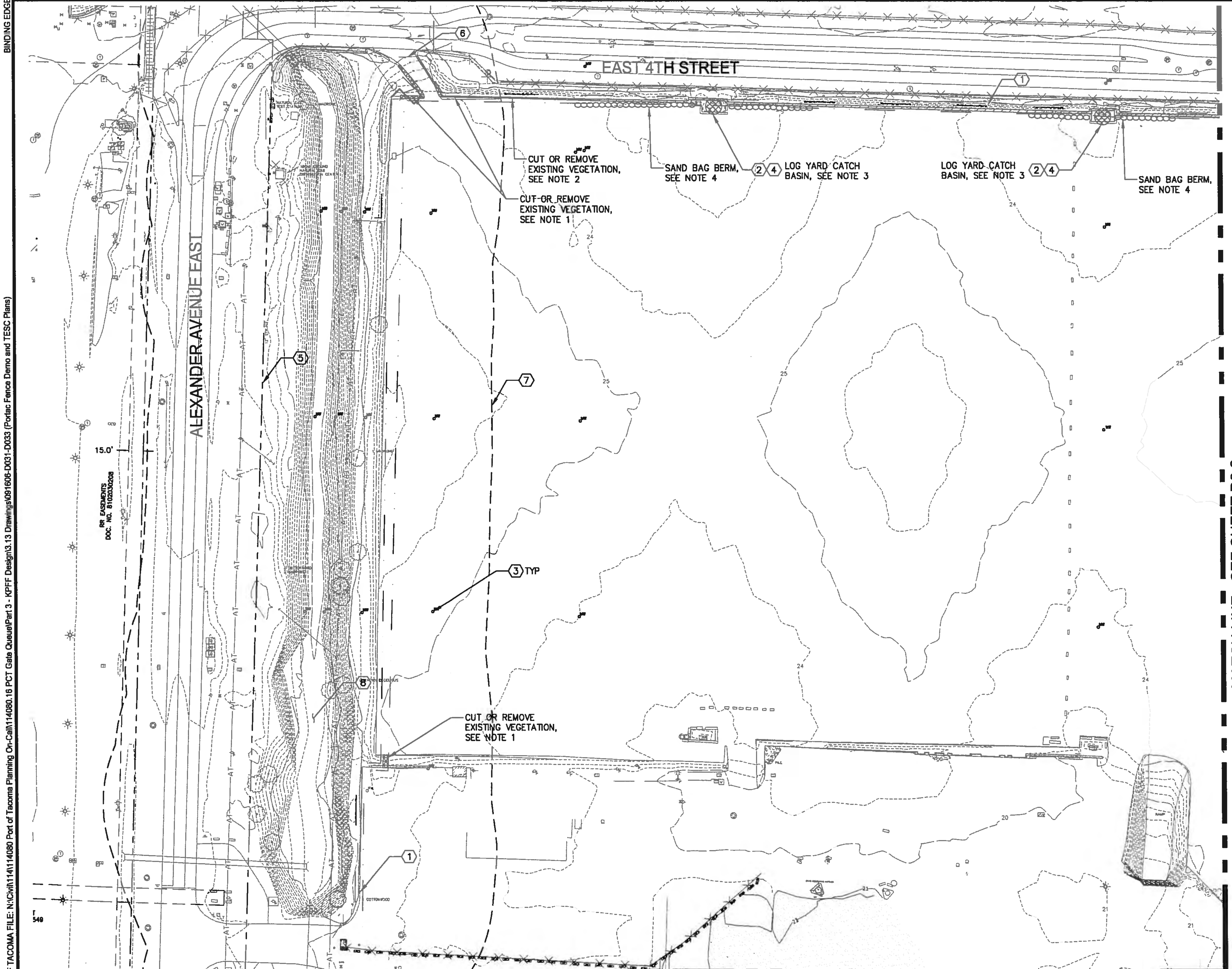
PCT TRUCK STAGING
DEMO & TESC DETAILS AND NOTES
TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
DAT-HRZ: | VERT:
PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

6556
D2.0
SHEET 7 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%



KEY ITEMS:

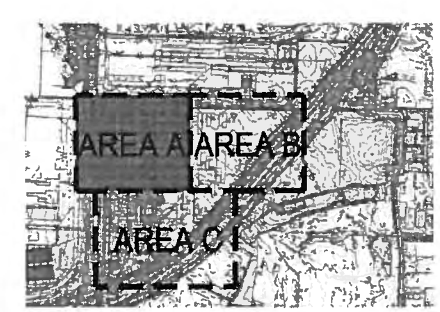
1. SANDBAG BERM
2. INLET PROTECTION
3. PROTECT-IN-PLACE EXISTING MONITORING WELL
4. PROTECT EXISTING UTILITIES
5. CITY ROW LINE
6. REMOVE EXISTING GATE AND DISPOSE
7. 150' STREAM BUFFER
8. WAPATO CREEK

LEGEND:

- DEMO EX FENCE
- SANDBAG BERM (4 / D2.0)
- LIMITS OF WORK
- INLET PROTECTION (1 / D2.0)
- EXISTING GRAVEL SURFACE
- EXISTING ECOLOGY BLOCK
- CUT/REMOVE EXISTING VEGETATION, SEE NOTE 2
- CUT/REMOVE EXISTING VEGETATION, SEE NOTE 1

NOTES:

1. WITHIN THE STREAM BUFFER, ONLY VEGETATION DIRECTLY IN CONFLICT WITH FENCE INSTALLATION SHALL BE CUT OR REMOVED. VEGETATION SHALL REMAIN TO THE MAXIMUM EXTENT FEASIBLE.
2. OUTSIDE OF THE STREAM BUFFER, CUT OR REMOVE VEGETATION WITHIN 2±' FROM THE EDGE OF PAVEMENT.
3. EXISTING LOG YARD CATCH BASIN IS A RECTANGULAR CATCH BASIN APPROX 2'X4' WITH A CUSTOM GRATE SLOPED AT APPROX 30°. CONTRACTOR TO MODIFY TYPICAL INLET PROTECTION TO PROVIDE SAME LEVEL OF PROTECTION FOR LOG YARD CATCH BASINS.
4. CONTRACTOR SHALL INSTALL SANDBAG BERM DURING ANY RAIN EVENT OCCURRING DURING INSTALLATION OF FENCE ADJACENT TO LOW POINTS OF PORTAC STORAGE YARD.



KEY PLAN

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PCT TRUCK STAGING PORTAC

DEMO AND TESC PLAN AREA A

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01

DAT-HRZ: | VERT:

PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

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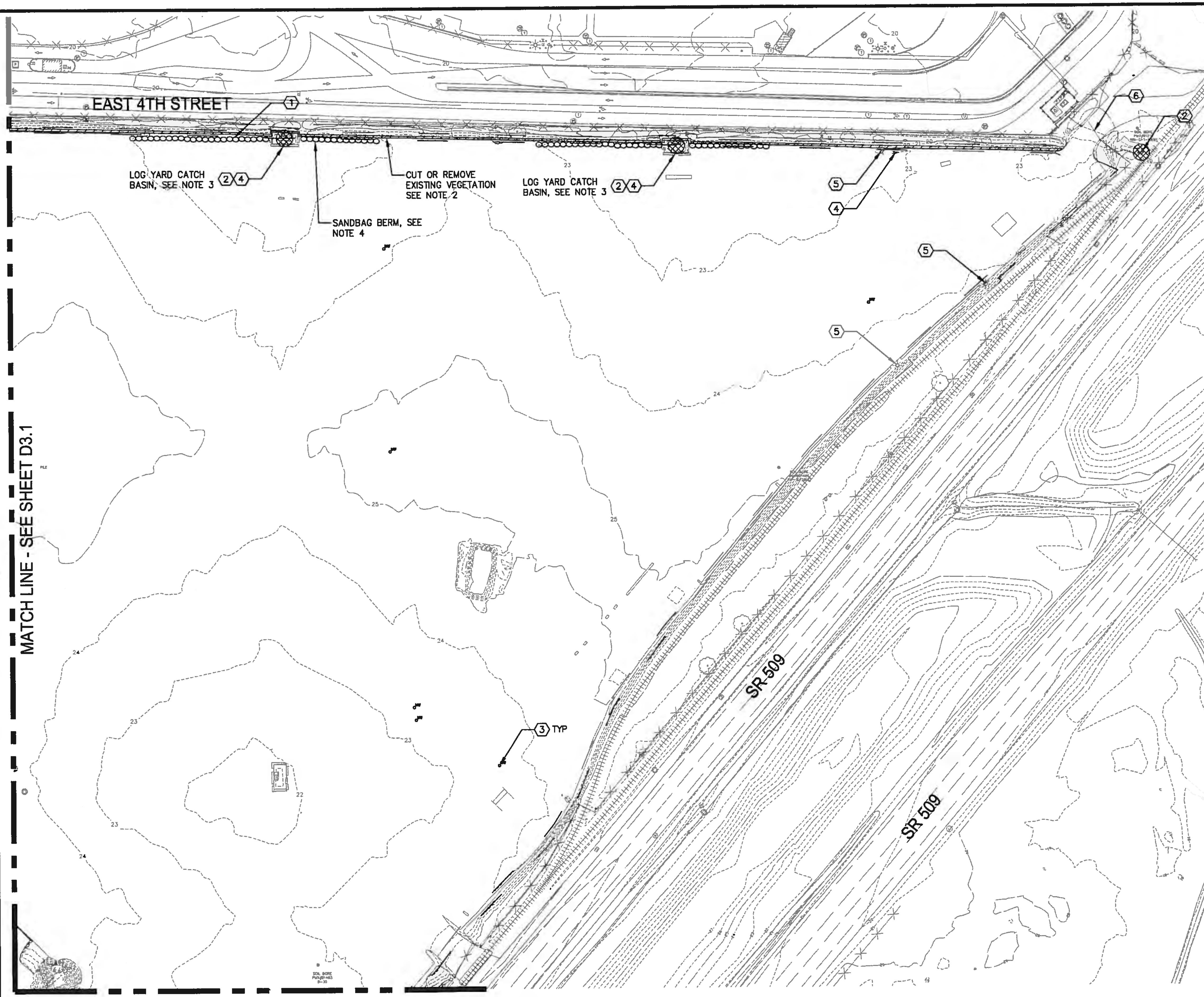
D3.1

SHEET 8 OF 53

CONT/CONS: 070287

M. ID:

PHASE: 100%



KEY ITEMS:

1. SANDBAG BERM
2. INLET PROTECTION
3. PROTECT IN PLACE EXISTING MONITORING WELL
4. PROTECT EXISTING UTILITIES
5. PROTECT-IN-PLACE EXISTING LIGHT POLE
6. EX GATE TO REMAIN

LEGEND:

- DEMO EX FENCE
- SANDBAG BERM (4/D2.0)
- LIMITS OF WORK
- INLET PROTECTION (1/D2.0)
- EXISTING GRAVEL SURFACE
- EXISTING ECOLOGY BLOCK
- REMOVE EXISTING VEGETATION

NOTES:

1. WITHIN THE STREAM BUFFER, ONLY VEGETATION DIRECTLY IN CONFLICT WITH FENCE INSTALLATION SHALL BE CUT OR REMOVED. VEGETATION SHALL REMAIN TO THE MAXIMUM EXTENT FEASIBLE.
2. OUTSIDE OF THE STREAM BUFFER, CUT OR REMOVE VEGETATION WITHIN 2±' FROM THE EDGE OF PAVEMENT.
3. EXISTING LOG YARD CATCH BASIN IS A RECTANGULAR CATCH BASIN APPROX 2'X4' WITH A CUSTOM GRATE SLOPED AT APPROX 30°. CONTRACTOR TO MODIFY TYPICAL INLET PROTECTION TO PROVIDE SAME LEVEL OF PROTECTION FOR LOG YARD CATCH BASINS.
4. CONTRACTOR SHALL INSTALL SANDBAG BERM DURING ANY RAIN EVENT OCCURRING DURING INSTALLATION OF FENCE ADJACENT TO LOW POINTS OF PORTAC STORAGE YARD.

50' 0 50' 100'
25' 75'
SCALE: 1"=50'

KEY PLAN
NTS

Port of Tacoma
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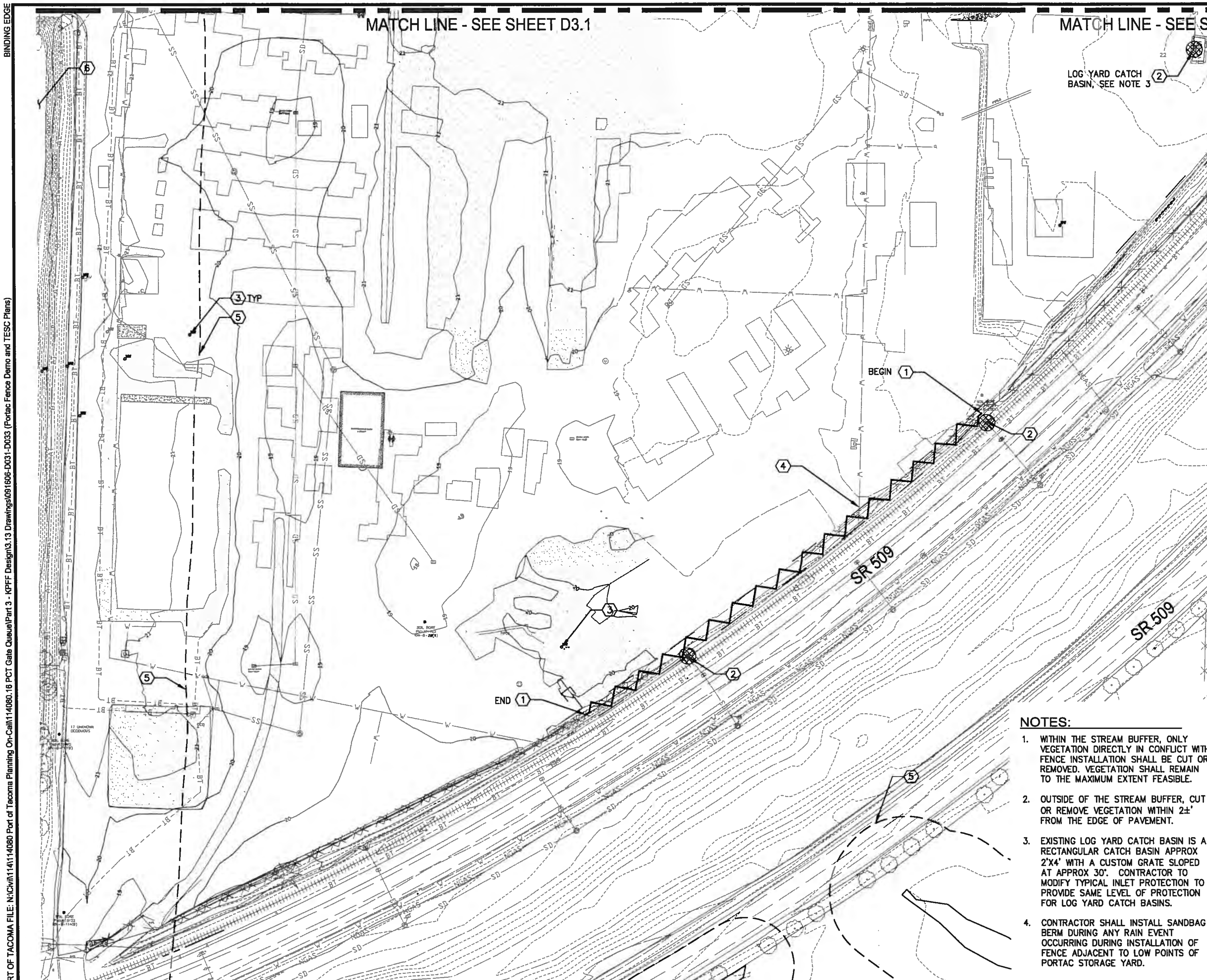
PCT TRUCK STAGING
PORTAC
DEMO AND TESC PLAN AREA B

6556
D3.2
SHEET 9 OF 53

CONT/CONS: 070287	TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
M. ID:	DAT-HRZ:	VERT:	
PHASE: 100%	PARCEL: 5000350150	DRAWING SCALE: AS NOTED	

BINDING EDGE

PORT OF TACOMA FILE: N:\Civil\114\114080\114080.16 PCT Gate Queue\Part 3 - KPFF Design\3.13 Drawings\091606-D031-D033 (Portac Fence Demo and TESC Plans)



KEY ITEMS:

1. DEMOLISH EXISTING FENCE, SEE SHEET C11.4 FOR HORIZONTAL CONTROL
2. INLET PROTECTION
3. PROTECT-IN-PLACE EXISTING MONITORING WELL
4. PROTECT EXISTING UTILITIES
5. 150' STREAM BUFFER
6. WAPATO CREEK

LEGEND:

- DEMO EX FENCE
- SANDBAG BERM 4/D2.0
- LIMITS OF WORK
- INLET PROTECTION 1/D2.0
- EXISTING GRAVEL SURFACE
- EXISTING ECOLOGY BLOCK
- REMOVE EXISTING VEGETATION

50' 0 50' 100'
25' 75'
SCALE: 1"=50'

NOTES:

1. WITHIN THE STREAM BUFFER, ONLY VEGETATION DIRECTLY IN CONFLICT WITH FENCE INSTALLATION SHALL BE CUT OR REMOVED. VEGETATION SHALL REMAIN TO THE MAXIMUM EXTENT FEASIBLE.
2. OUTSIDE OF THE STREAM BUFFER, CUT OR REMOVE VEGETATION WITHIN 2±' FROM THE EDGE OF PAVEMENT.
3. EXISTING LOG YARD CATCH BASIN IS A RECTANGULAR CATCH BASIN APPROX 2'X4' WITH A CUSTOM GRATE SLOPED AT APPROX 30°. CONTRACTOR TO MODIFY TYPICAL INLET PROTECTION TO PROVIDE SAME LEVEL OF PROTECTION FOR LOG YARD CATCH BASINS.
4. CONTRACTOR SHALL INSTALL SANDBAG BERM DURING ANY RAIN EVENT OCCURRING DURING INSTALLATION OF FENCE ADJACENT TO LOW POINTS OF PORTAC STORAGE YARD.

KEY PLAN
NTS

6556
D3.3
SHEET 10 OF 53

PCT TRUCK STAGING
PORTAC
DEMO AND TESC PLAN AREA C

CONT/CONS: 070287	TOWNSHIP:20N	RANGE: 03E
M. ID:	DAT-HRZ:	VERT:
PHASE: 100%	PARCEL: 5000350150	DRAWING SCALE: AS NOTED

SECTION: 01

APPROVED: 6/2/16
DIRECTOR/ENG. DATE

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RGC 05/20/2016
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PORT ADDRESS: ONE SITCUM PLAZA
TACOMA, WA 98401-1837

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Port of Tacoma

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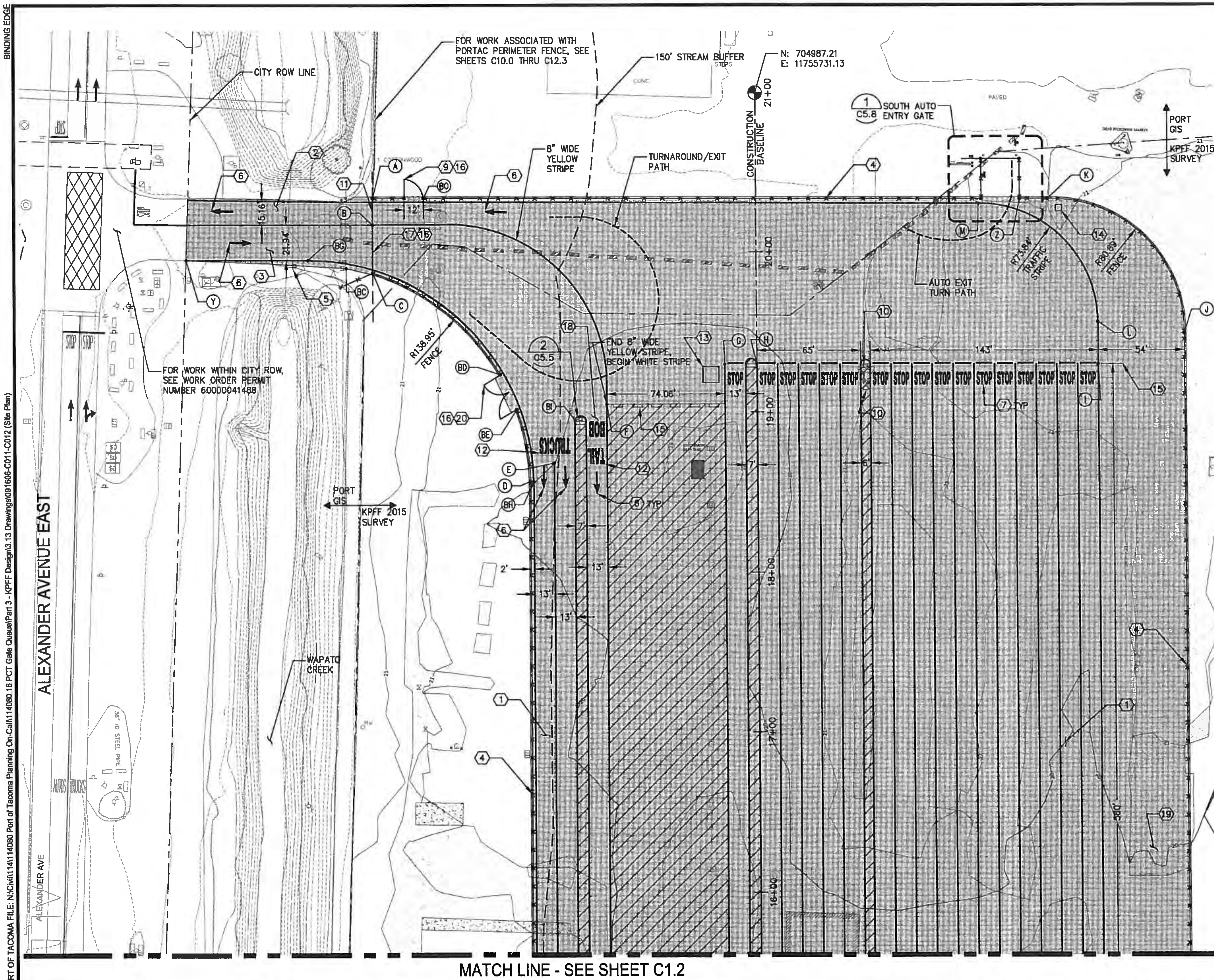


MATCH LINE - SEE SHEET C1.2

KEY NOTES:

1. TRUCK QUEUE LANE, 13-FT TYP
2. TRUCK QUEUE AND AUTO STORAGE EXIT LANE
3. TRUCK QUEUE ENTRY LANE
4. 8-FT CHAIN LINK FENCE, SEE DETAIL 1 ON C5.1
5. BOB TAIL, TRUCK QUEUE LANE, AND TURNAROUND EXIT DELINEATION SIGN, SEE DETAIL 1 ON SHEET C5.5
6. TRAFFIC ARROW SYMBOL, SEE DETAIL 7 ON SHEET C5.0
7. STOP BAR AND SYMBOL, SEE DETAIL 8 ON SHEET C5.0
8. NOT USED
9. 12-FT MANUAL CHAIN LINK SWING GATE, SEE DETAIL 3 ON SHEET C5.2
10. HALF SIZE ECOLOGY BLOCK, 3'X2'X2'
11. 17-FT CHAIN LINK ROLLING GATE, SEE DETAIL 2 ON SHEET C5.3
12. PAINTED TRAFFIC LETTERS, 8' TALL
13. GUARD BOOTH ON WHEELS, PROVIDED BY OTHERS
14. PORTABLE BATHROOM (NIC), FINISH GRADE ELEV 21, BASE FLOOD ELEV 20.45
15. REUSE SALVAGED ECOLOGY BLOCKS
16. PROVIDE CONDUIT UNDER GATE PER DETAIL 6 ON SHEET C5.5 FOR SHAKER WIRE
17. 30-FT CHAIN LINK ROLLING GATE, SEE DETAIL 2 SHEET C5.3
18. BOB TAIL LANE ONLY, 13-FT TYP
19. ADDITIONAL SPACE FOR 4 FUTURE TRUCK QUEUE LANES
20. 24-FT MANUAL CHAIN LINK DOUBLE SWING GATE, SEE DETAIL 1 ON SHEET C5.3

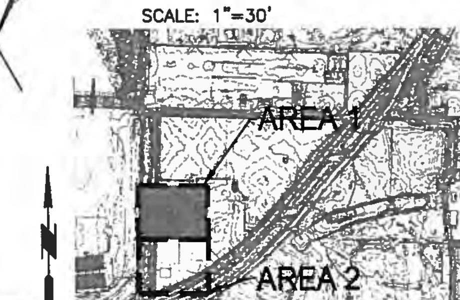
NOTES:

1. FOR STATION AND OFFSET CONTROL DATA TABLE, SEE SHEET C5.7.
2. REFER TO SHEETS C2.1 THRU C2.2 FOR PAVING.

LEGEND:

- WHITE TRAFFIC STRIPE LINE, 4" WIDE UNO
- CHAIN LINK FENCE (1/C5.1)
- NO DRIVING AREA – 4" STRIPES @ 5' OC
- SALVAGED ECOLOGY BLOCK
- CONTROL POINT

30' 0 30' 60'
15' 45'
SCALE: 1"=30'



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STEVEN WADE KINGSLEY, STATE OF WASHINGTON, 32701, REGISTERED PROFESSIONAL ENGINEER, 5/29/16

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PCT TRUCK STAGING
PCT
SITE PLAN - AREA 1

TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
DAT-HRZ:	VERT:	
PARCEL: 5000350150	DRAWING SCALE: AS NOTED	

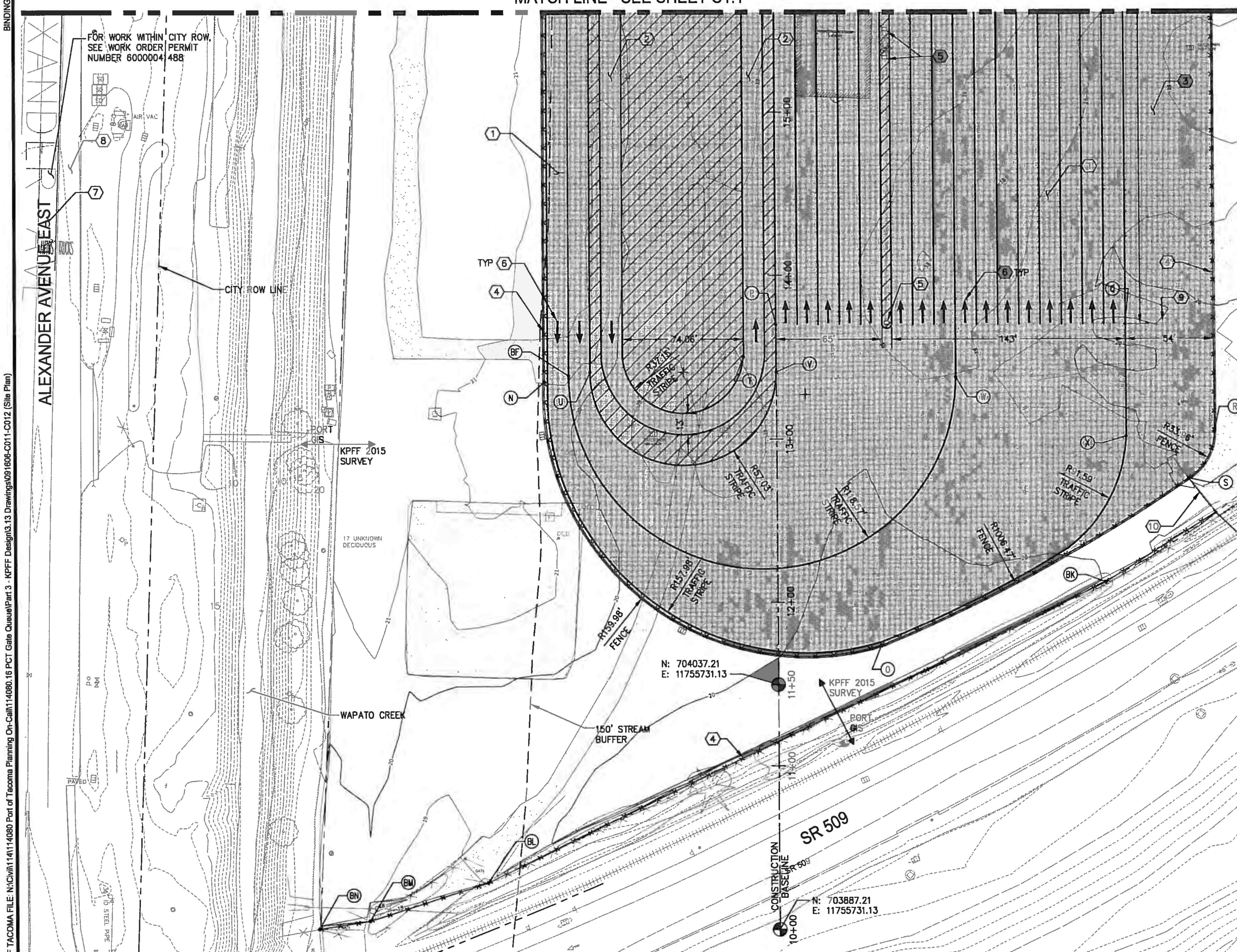
6556
C1.1
SHEET 11 OF 53

CONT/CONS: 070287
M. ID:
PHASE: 100%

BINDING EDGE

PORT OF TACOMA FILE: N:\Civil\114\114080 16 PCT Gate Queue\Part 3 - KPFF Design\3.13 Drawings\091606-C011-C012 (Site Plan)

MATCH LINE - SEE SHEET C1.1



KEY NOTES:

1. TRUCK QUEUE LANE, 13-FT TYP
2. BOB TAIL LANE ONLY, 13-FT TYP
3. ADDITIONAL SPACE FOR 4 FUTURE TRUCK QUEUE LANES
4. 8-FT CHAIN LINK FENCE, SEE DETAIL 1 ON C5.1
5. HALF SIZE ECOLOGY BLOCK, 3'X2'X2'
6. TRAFFIC ARROW SYMBOL, SEE DETAIL 7 ON SHEET C5.0
7. AUTO/POV TRAVEL LANE
8. TRUCK TRAVEL LANE
9. SALVAGED ECOLOGY BLOCK, 6'X2'X2'
10. FOR WORK ASSOCIATED WITH PORTAC PERIMETER FENCE, SEE SHEETS C10.0 THRU C12.3

NOTES:

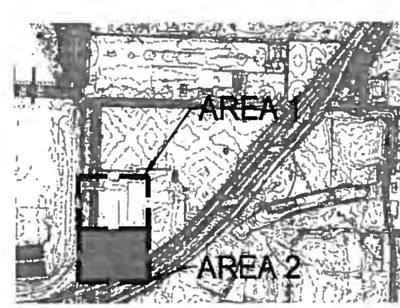
1. FOR STATION AND OFFSET CONTROL DATA TABLE, SEE SHEET C5.7.
2. REFER TO SHEETS C2.1 THRU C2.2 FOR PAVING.

LEGEND:

- WHITE TRAFFIC STRIPE LINE, 4" WIDE UNO
- CHAIN LINK FENCE (1 / C5.1)
- NO DRIVING AREA – 4" STRIPES @ 5' OC
- SALVAGED ECOLOGY BLOCK
- CONTROL POINT

30' 0 15' 30' 45' 60'

SCALE: 1"=30'



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PCT TRUCK STAGING

PCT

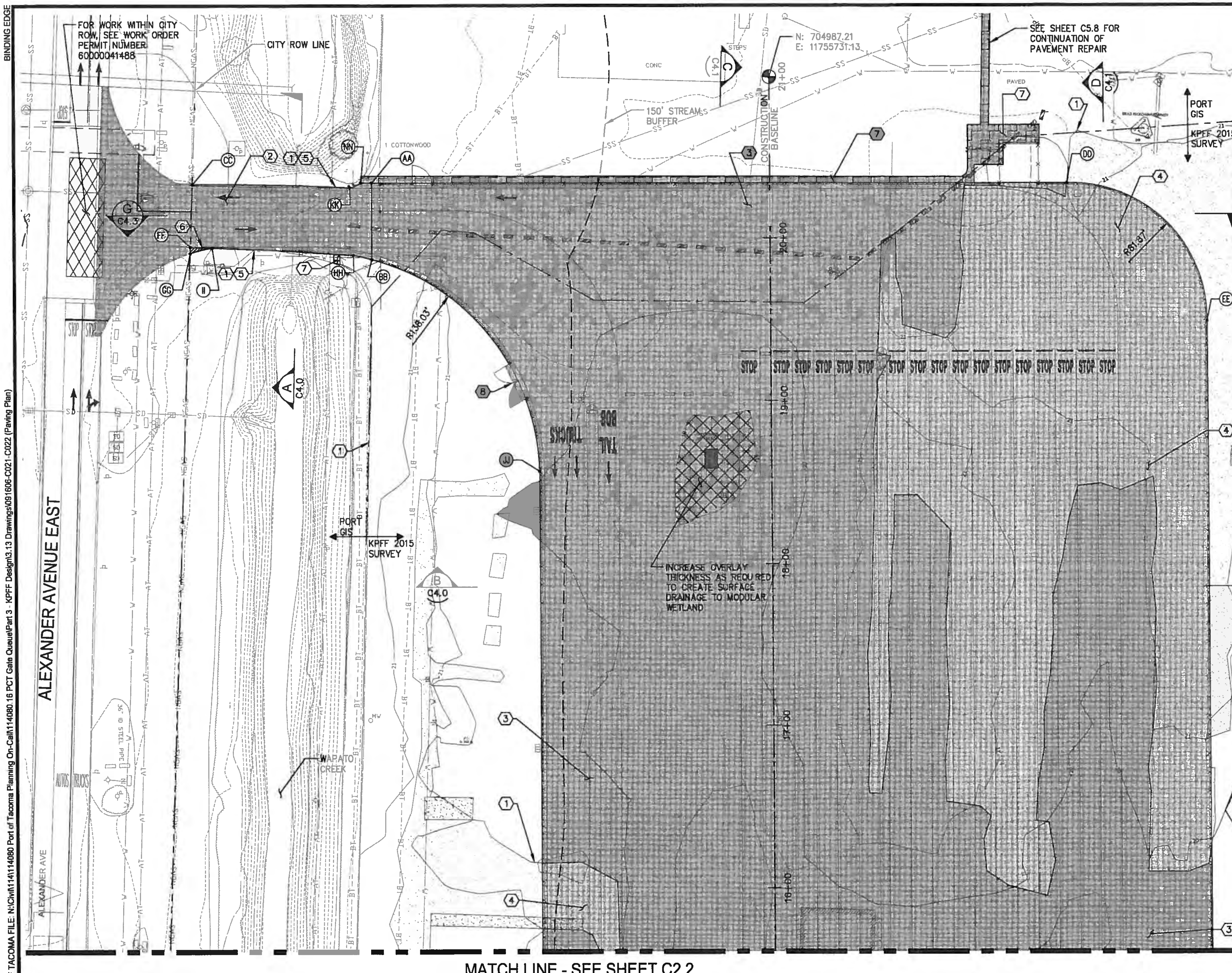
SITE PLAN - AREA 2

6556

C1.2

SHEET 12 OF 53

CONT/CONS: 070287	TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
M. ID:	DAT-HRZ:	VERT:	
PHASE: 100%	PARCEL: 5000350150	DRAWING SCALE: AS NOTED	



KEY NOTES:

1. EXISTING EDGE OF PAVEMENT
2. 4" ASPHALT PAVEMENT OVERLAY AT ENTRANCE, SEE DETAIL 3 ON SHEET C5.0.
3. 4" ASPHALT PAVEMENT OVERLAY, SEE DETAIL 1 ON SHEET C5.0
4. 4" ASPHALT PAVEMENT, EX 7" BASE COURSE, SEE DETAIL 2 ON SHEET C5.0
5. ASPHALT PAVEMENT LIMITS TO MATCH EXISTING ASPHALT PAVEMENT LIMITS
6. 6" ASPHALT PAVEMENT WITH 7" BASE COURSE, SEE DETAIL 6 ON SHEET C5.0
7. ASPHALT PAVEMENT REPAIR PER DETAIL 3 ON SHEET C5.4
8. ASPHALT RAMP FROM EDGE OF OVERLAY AT A 8.33% SLOPE TO MATCH EXISTING PAVEMENT SURFACE

NOTES:

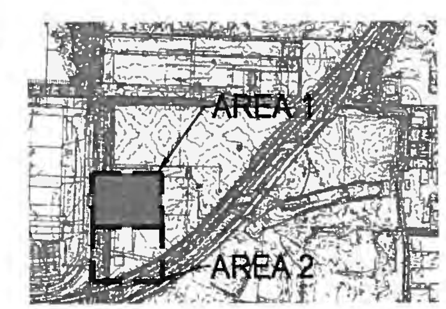
1. FOR STATION AND OFFSET DATA TABLE, SEE SHEET C5.7.
2. FOR UTILITY IMPROVEMENTS SEE SHEETS C3.1 THRU C3.2.
3. PLACE LONGITUDINAL HMA STEP WEDGE JOINTS BETWEEN AREAS OF HMA PLACEMENT. REFER TO 9/C5.0

LEGEND:

- 4" ASPHALT PAVEMENT OVERLAY
- 4" ASPHALT PAVEMENT ON EX BASE
- 6" ASPHALT PAVEMENT WITH 7" BASE
- PAVEMENT REPAIR 3/C5.4
- PAVEMENT EDGE LINE
- CHAIN LINK FENCE
- TRAFFIC STRIPE LINE
- (AA) CONTROL POINT

30' 0 15' 30' 45' 60'

SCALE: 1"=30'



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PCT TRUCK STAGING

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GRADING & PAVING PLAN - AREA 1

TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
DAT-HRZ:	VERT:	DRAWING SCALE: AS NOTED
PARCEL: 5000350150		

CONT/CONS: 070287

M. ID:

PHASE: 100%

6556

C2.1

SHEET 13 OF 53

MATCH LINE - SEE SHEET C2.1

KEY NOTES:

1. EXISTING EDGE OF PAVEMENT
2. 4" ASPHALT PAVEMENT OVERLAY, SEE DETAIL 1 ON SHEET C5.0
3. 4" ASPHALT PAVEMENT, SEE DETAIL 2 ON SHEET C5.0

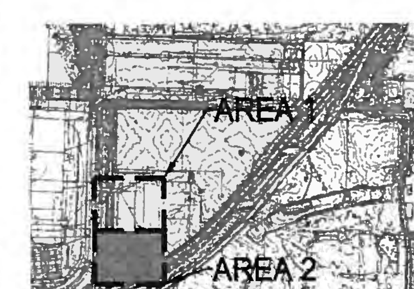
NOTES:

1. FOR STATION AND OFFSET DATA CONTROL TABLE, SEE SHEET C5.7.
2. FOR UTILITY IMPROVEMENTS, SEE SHEETS C3.1 THRU C3.2.
3. PLACE LONGITUDINAL HMA STEP WEDGE JOINTS BETWEEN AREAS OF HMA PLACEMENT. REFER TO 9/C5.0

LEGEND:

- 4" ASPHALT PAVEMENT OVERLAY
- 4" ASPHALT PAVEMENT ON EX BASE
- PAVEMENT EDGE LINE
- CHAIN LINK FENCE
- TRAFFIC STRIPE LINE
- (ZZ) CONTROL POINT

30' 0 30' 60'
15' 45'
SCALE: 1"=30'



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TACOMA, WA 98401-1837

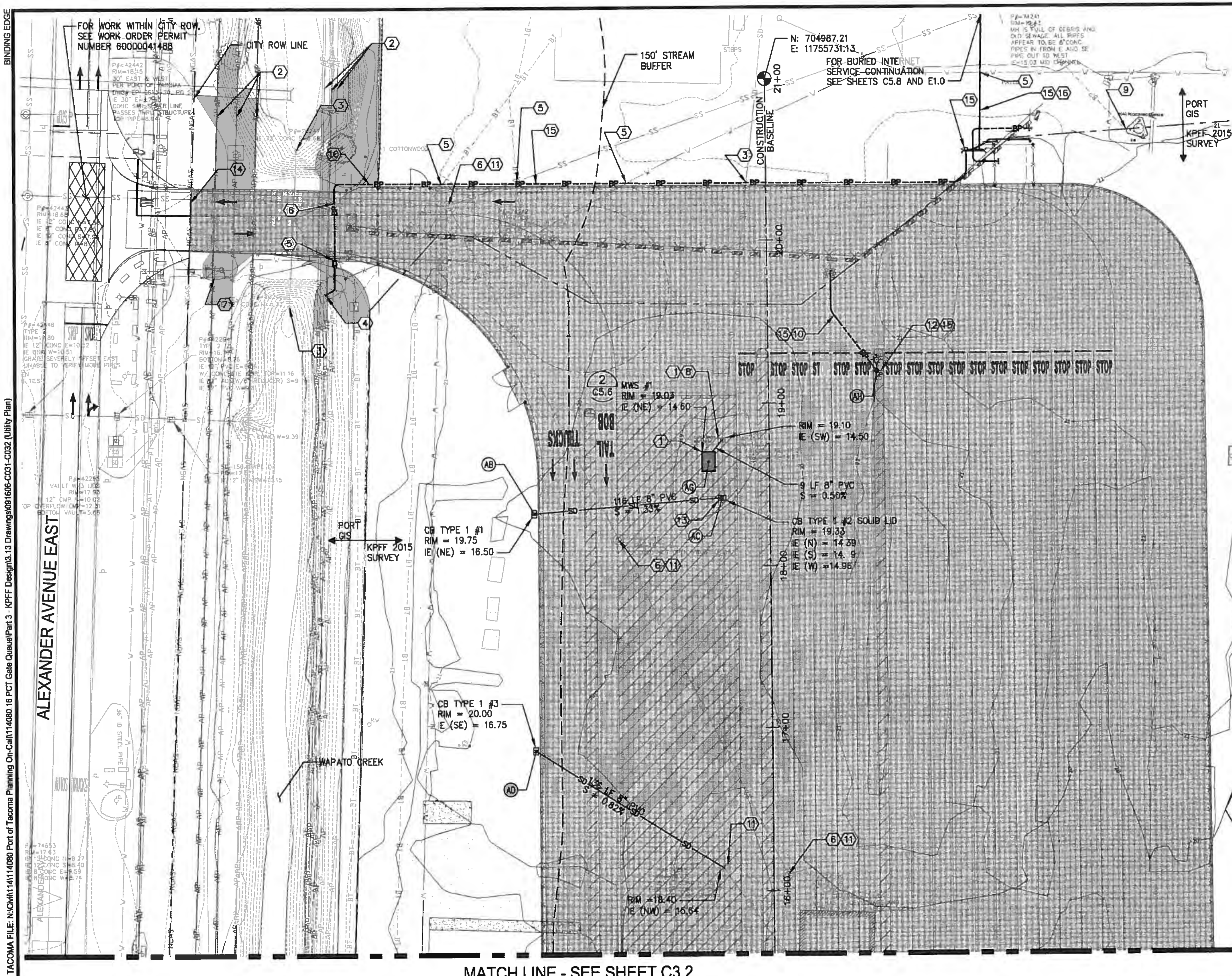
PCT TRUCK STAGING
PCT
GRADING & PAVING PLAN - AREA 2

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
DAT-HRZ: | VERT: | DRAWING SCALE: AS NOTED
PARCEL: 5000350150

6556
C2.2
SHEET 14 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%

PORT OF TACOMA FILE: N:\Civil\114\114080 Port of Tacoma Planning On-Call\114080.16 PCT Gate Queue\Part 3 - KPFF Design\3.13 Drawings\091608-C021-C022 (Paving Plan)

BINDING EDGE



KEY NOTES:

1. MODULAR WETLAND SYSTEM (MWS)
2. EXISTING OVERHEAD POWER LINES. CONTRACTOR TO PROTECT-IN-PLACE.
3. EXISTING STORM SEWER UTILITY CROSSING. LOCATE AND PROTECT-IN-PLACE EXISTING UTILITY.
4. PROTECT-IN-PLACE EXISTING POWER POLE.
5. EXISTING UTILITY CROSSING, INVERT UNKNOWN. LOCATE AND PROTECT-IN-PLACE.
6. EXISTING SANITARY SEWER UTILITY, INVERT UNKNOWN. LOCATE AND PROTECT-IN-PLACE
7. PROTECT-IN-PLACE EXISTING WATER UTILITY
8. REPLACE GRATE LID WITH SOLID HS-25 RATED LID
9. PROTECT-IN-PLACE EX NAVIGATION MARKER
10. BURIED ELECTRICAL SERVICE
11. RAISE EXISTING RIM TO FINISHED GRADE
12. NEW POWER POLE WITH SALVAGED LIGHT FIXTURE
13. INSTALL CATCH BASIN ON EXISTING STORM DRAIN LINE
14. PROTECT-IN-PLACE NATURAL GAS LINE
15. FOR ELECTRICAL, SEE SHEETS E1.0 THRU E3.0
16. BURIED INTERNET SERVICE

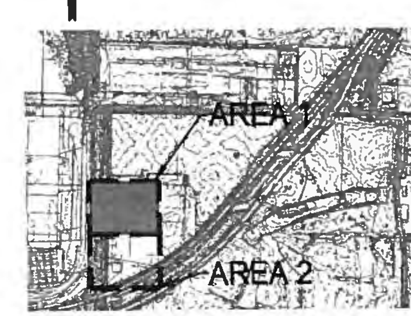
NOTES:

1. FOR STATION AND OFFSET DATA CONTROL TABLE, SEE SHEET C5.7.
2. REFER TO SHEETS C2.1 THRU C2.2 FOR PAVING.
3. CONTRACTOR SHALL RESTORE DISTURBED VEGETATION WITHIN STREAM BUFFER AT A MINIMUM WITH NATIVE GRASSES.
4. ALL NEW UNDERGROUND UTILITY STRUCTURES SHALL BE DESIGNED PER THE LOADING CRITERIA ON SHEET G3.

LEGEND:

- BP — BURIED ELECTRICAL SERVICE
- SD — 8" PVC STORM DRAIN PIPE
- CHAIN LINK FENCE
- TRAFFIC STRIPE LINE
- CATCH BASIN, TYPE 1 (1 / C5.6)
- (AH) CONTROL POINT

SCALE: 1"=30'



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PORT ADDRESS: ONE SITCUM PLAZA, TACOMA, WA 98401-1837

PCT TRUCK STAGING

PCT

UTILITY PLAN - AREA 1

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01

DAT-HRZ: | VERT: | DRAWING SCALE: AS NOTED

PARCEL: 5000350150

6556

C3.1

SHEET 15 OF 53

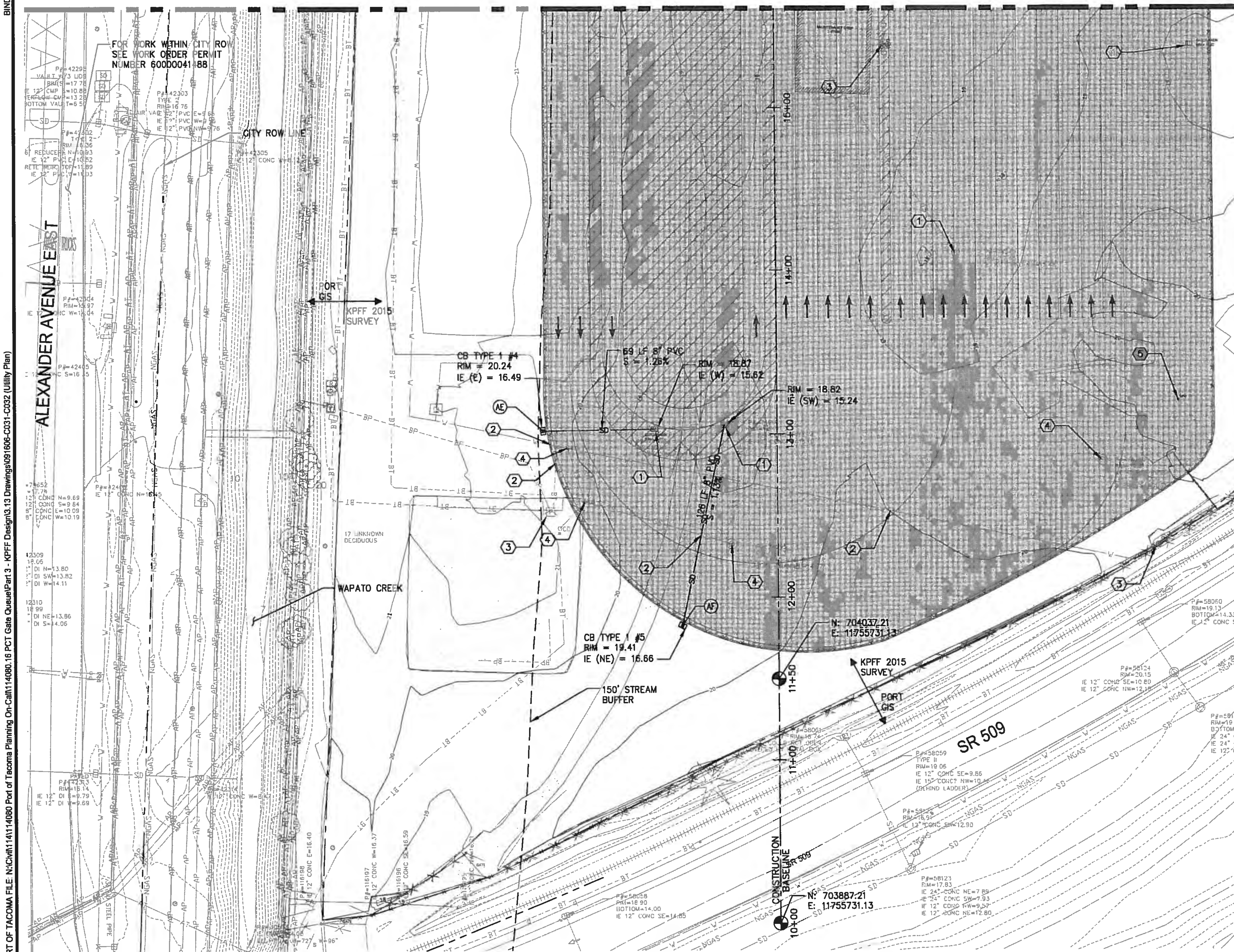
CONT/CONS: 070287

M. ID:

PHASE: 100%

BINDING EDGE

PORT OF TACOMA FILE: N:\Civil\114\114080 Port of Tacoma Planning On-Call\114080.16 PCT Gate Queue\Part 3 - KPFF Design\3.13 Drawings\31606-C031-C032 (Utility Plan)



KEY NOTES:

1. RAISE EXISTING CATCH BASIN RIM TO FINISHED GRADE
2. EXISTING UTILITY CROSSING. EXISTING UTILITY INVERT UNKNOWN. CONTRACTOR TO LOCATE AND PROTECT-IN-PLACE.
3. PROTECT-IN-PLACE
4. RAISE EXISTING SANITARY SEWER LID TO FINISHED GRADE
5. PROTECT IN PLACE MONITORING WELL AND RAISE LID TO FINISHED GRADE, SEE DETAIL 4 ON SHEET C5.4

NOTES:

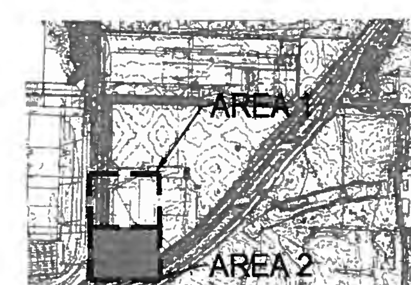
1. FOR STATION AND OFFSET CONTROL DATA TABLE SEE SHEET C5.7.
2. REFER TO SHEETS C2.1 THRU C2.2 FOR PAVING.
3. CONTRACTOR SHALL RESTORE DISTURBED VEGETATION WITHIN STREAM BUFFER AT A MINIMUM WITH NATIVE GRASSES.
4. ALL NEW UNDERGROUND UTILITY STRUCTURES SHALL BE DESIGN PER THE LOADING CRITERIA ON SHEET G3.

LEGEND:

- BP — BURIED ELECTRICAL SERVICE
- SD — 8" PVC STORM DRAIN PIPE
- CHAIN LINK FENCE
- TRAFFIC STRIPE LINE
- CATCH BASIN, TYPE 1 (1 / C5.6)
- (AF) CONTROL POINT

30' 0 15' 30' 45' 60'

SCALE: 1"=30'



KEY PLAN

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TACOMA, WA 98401-1837

PCT TRUCK STAGING
PCT
UTILITY PLAN - AREA 2

6556
C3.2
SHEET 16 OF 53

CONT/CONS: 070287	TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
M. ID:	DAT-HRZ:	VERT:	
PHASE: 100%	PARCEL: 5000350150	DRAWING SCALE: AS NOTED	

PORT OF TACOMA FILE: N:\Civil\114\114080.16 Port of Tacoma Planning On-Call\114080.16 PCT Gate Queue\Part 3 - KPFF Design\3.13 Drawings\091606-C031-C032 (Utility Plan)

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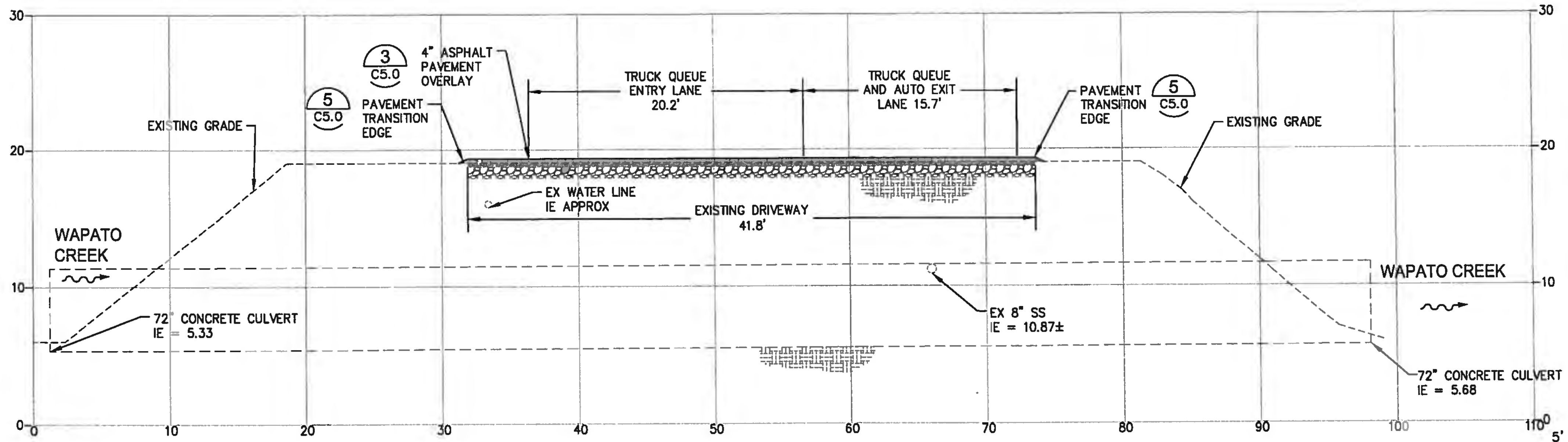
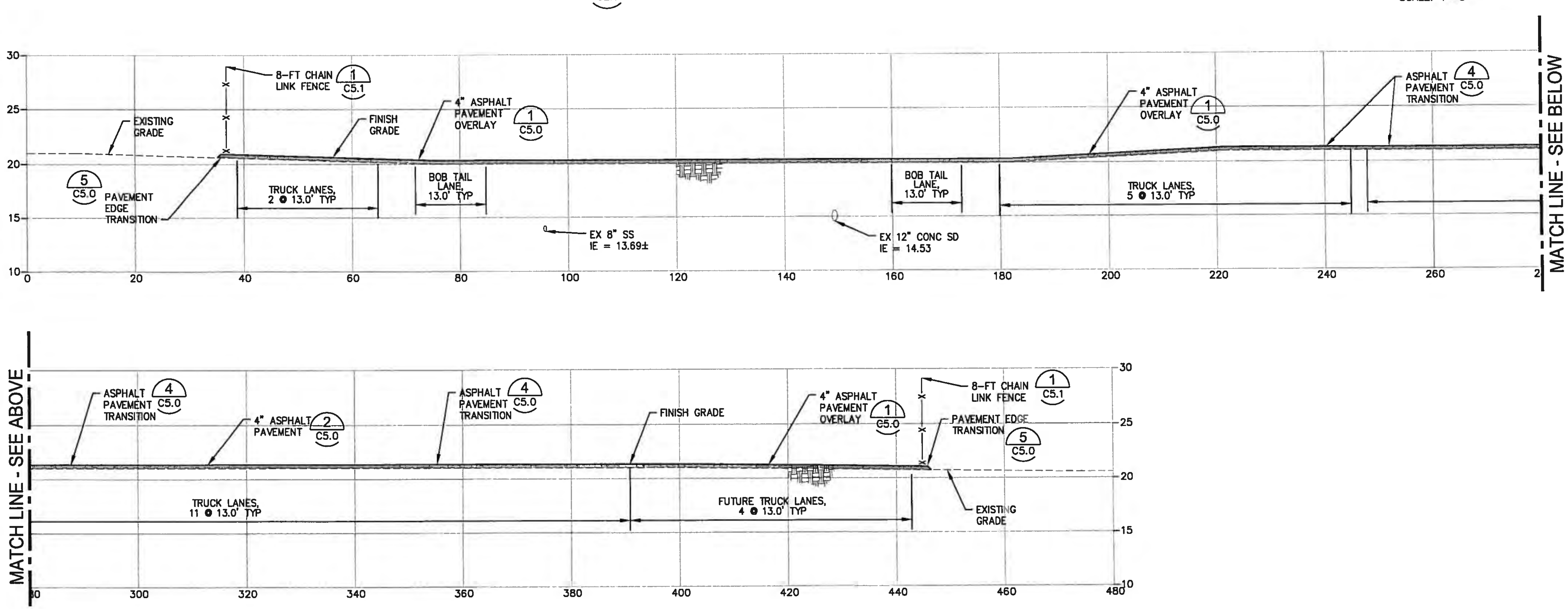


A C2.1 ALEXANDER DRIVEWAY SECTION

SCALE: 1" = 5'

5' 0 5' 10'
2.5' 7.5'
SCALE: 1"=5'



B C2.1 SITE SECTION

SCALE: HORZ: 1" = 10', VERT: 1" = 5'

10' 0 10' 20'
5' 15'
SCALE: 1"=10'

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STEVEN WADE KINGSLEY, STATE OF WASHINGTON, 32701, REGISTERED PROFESSIONAL ENGINEER, 5/20/16

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DIRECTOR/ENG.	DATE	
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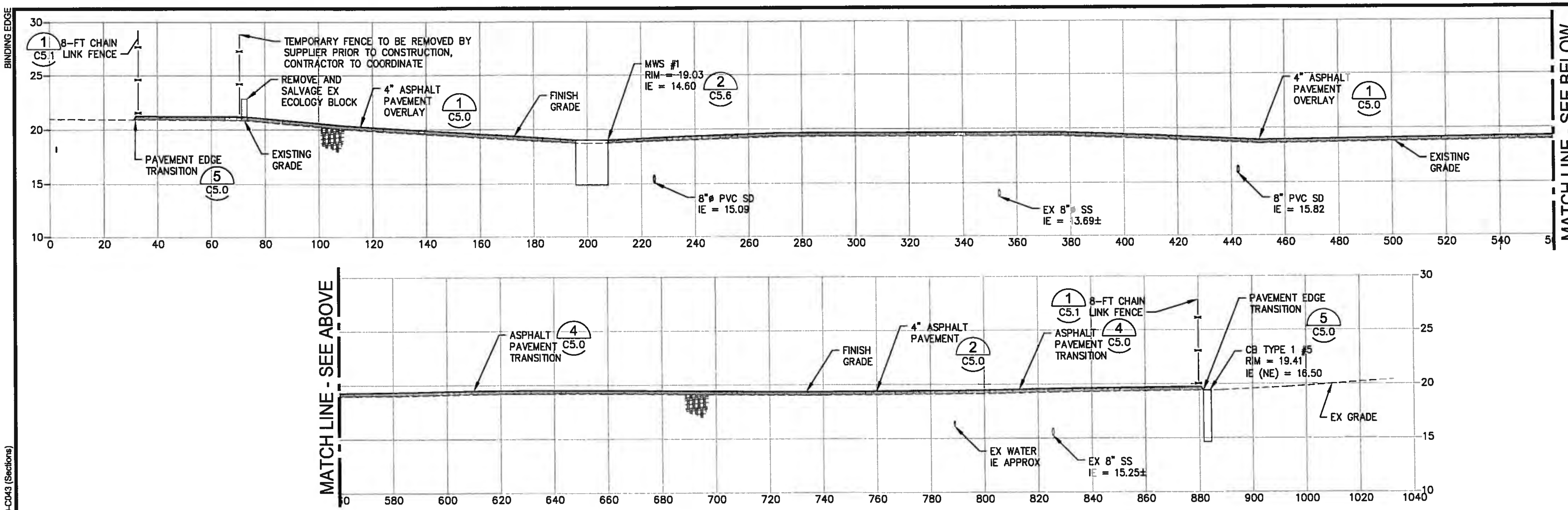
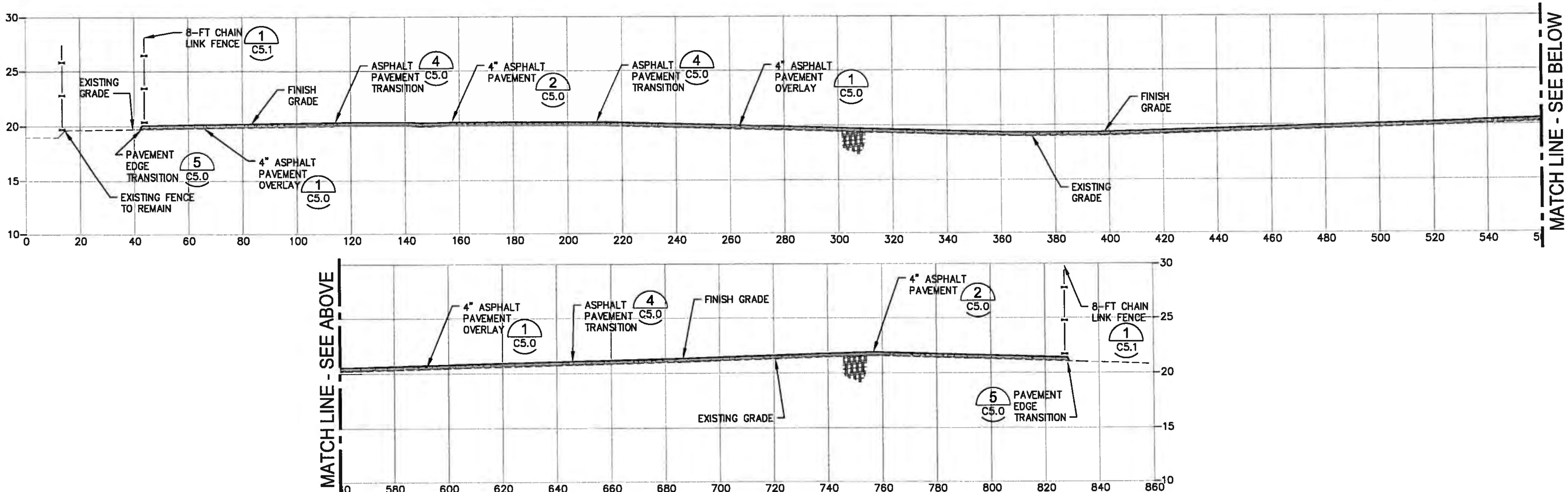
PCT TRUCK STAGING
PCT
SITE SECTIONS

TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
DAT-HRZ:	VERT:	DRAWING SCALE: AS NOTED
PARCEL: 5000350150		

6556
C4.0
SHEET 17 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%



C WEST SITE SECTION
C2.1–2.2
SCALE: HORZ: 1" = 20', VERT: 1" = 5'



D EAST SITE SECTION
C2.1–2.2
SCALE: HORZ: 1" = 20', VERT: 1" = 5'

SCALE: 1"=10'

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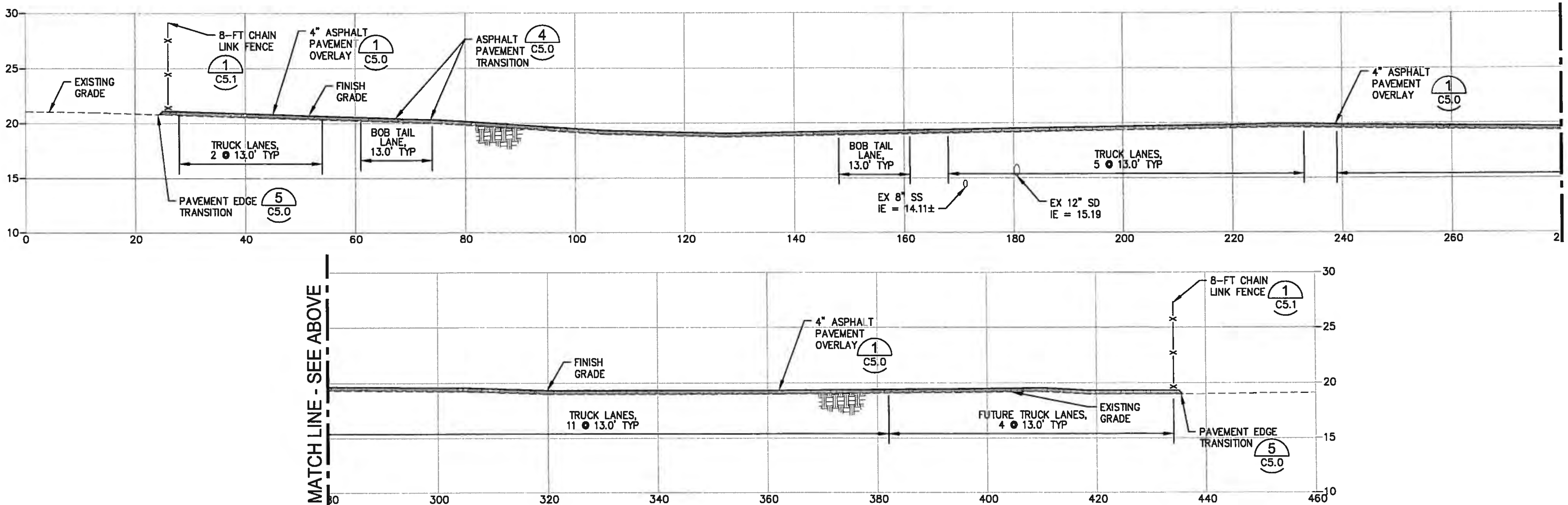
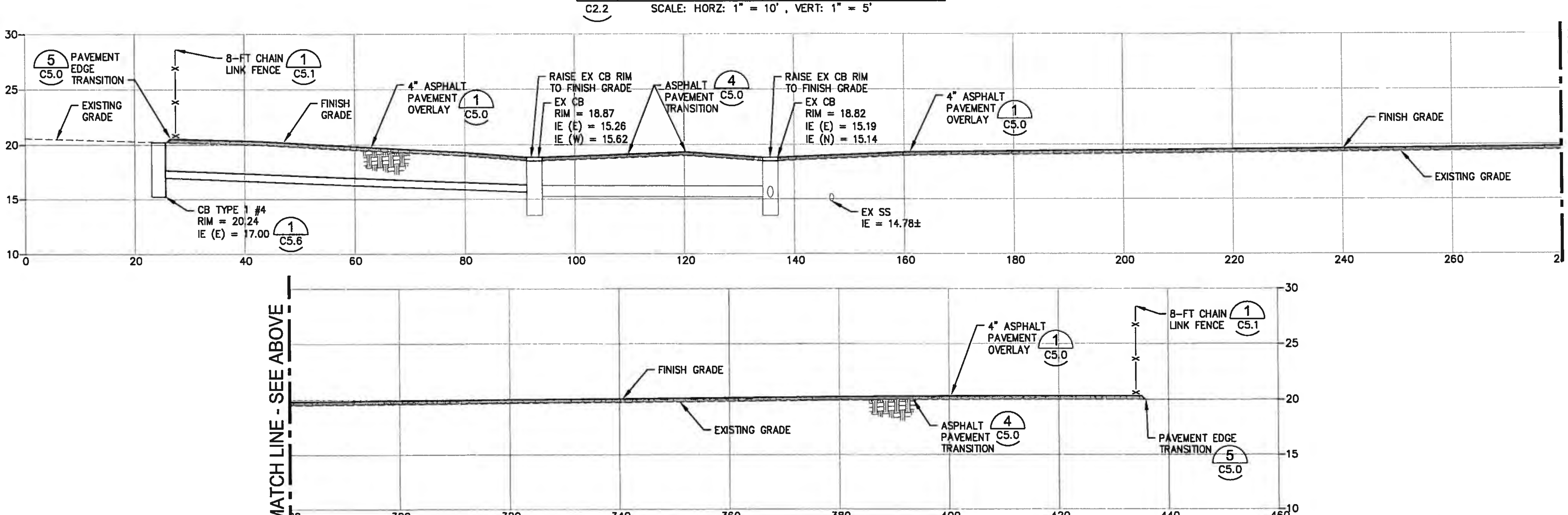
PCT TRUCK STAGING
PCT
SITE SECTIONS

6556
C4.1
SHEET 18 OF 53

CONT/CONS: 070287	TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
M. ID:	DAT-HRZ:	VERT:	
PHASE: 100%	PARCEL: 5000350150	DRAWING SCALE: AS NOTED	



E C2.2 MIDDLE SITE SECTION
SCALE: HORZ: 1" = 10', VERT: 1" = 5'



F C2.2 SOUTH SITE SECTION
SCALE: HORIZ: 1" = 10', VERT: 1" = 5'

SCALE: 1"=10'

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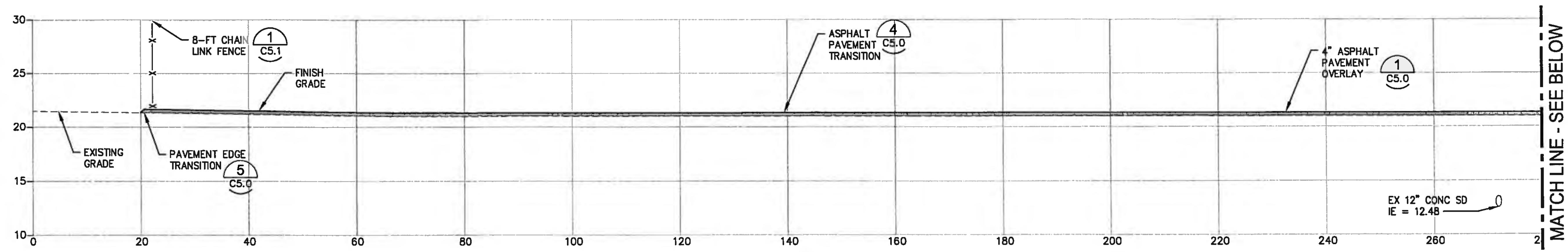
PORT ADDRESS: ONE SITCUM PLAZA
TACOMA, WA 98401-1837

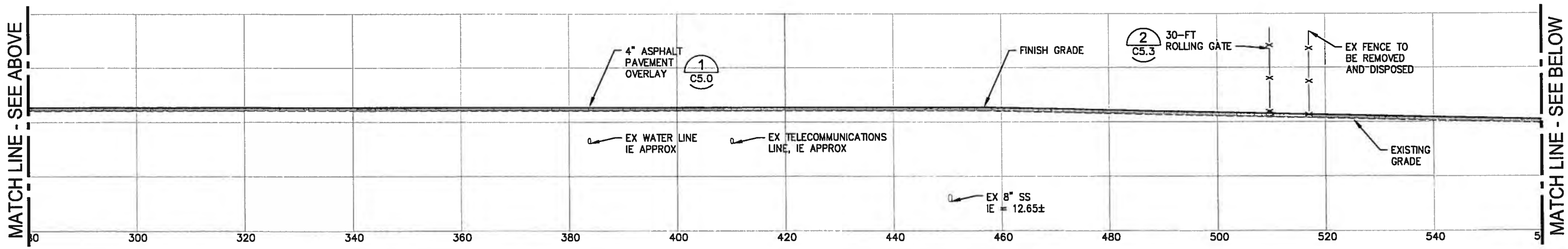
PCT TRUCK STAGING
PCT
SITE SECTIONS

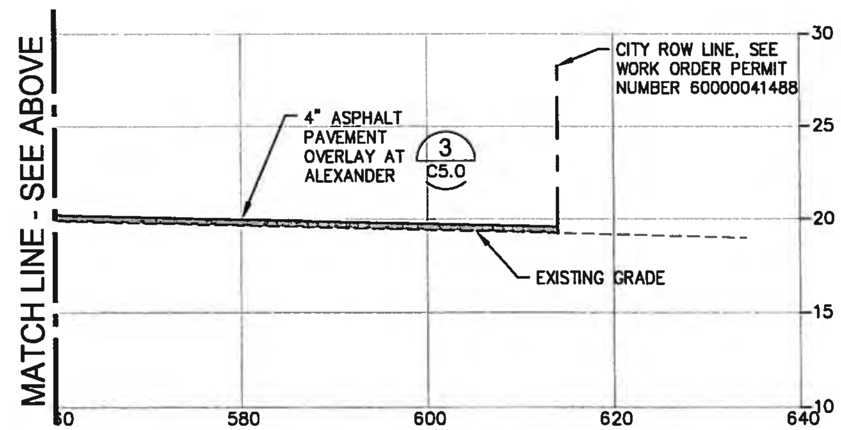
TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
DAT-HRZ: | VERT: | DRAWING SCALE: AS NOTED
PARCEL: 5000350150

6556
C4.2
SHEET 19 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%

BINDING EDGE
PORT OF TACOMA FILE: N:\Civil\114\114080 Port of Tacoma Planning On-Call\114080.16 PCT Gate Queue\Part 3 - KPFF Design\3.13 Drawings\091606-C040-C043 (Sections)







G C2.1 ALEXANDER DRIVEWAY SECTION

SCALE: HORZ: 1" = 20', VERT: 1" = 5'

SCALE: 1"=10'

PORT OF TACOMA FILE: N:\Civil\114\114080 Port of Tacoma Planning On-Call\114080.16 PCT Gate Queue\Part 3 - KPFF Design\3.13 Drawings\091606-C040-C043 (Sections)

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Port of Tacoma

kpff
1601 Fifth Avenue, Suite 1600, Seattle, WA
(253) 396-0150 Fax (253) 396-0162

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SWK 05/20/2016
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6/2/16
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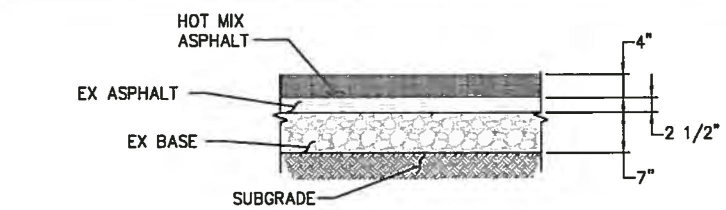
PORT ADDRESS: ONE SITCUM PLAZA
TACOMA, WA 98401-1837

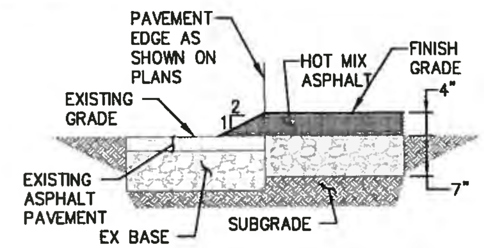
PCT TRUCK STAGING
PCT
SITE SECTIONS

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
DAT-HRZ: | VERT:
PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

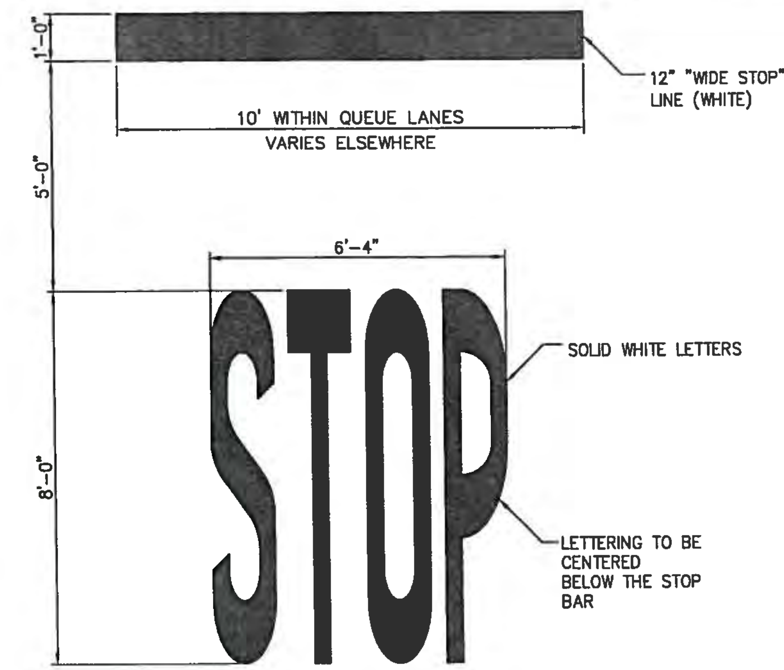
6556
C4.3
SHEET 20 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%



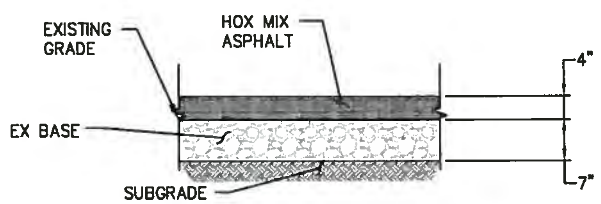
1 ASPHALT PAVEMENT OVERLAY DETAIL
C2.1–C2.2
SCALE: 3/4"=1'–0"



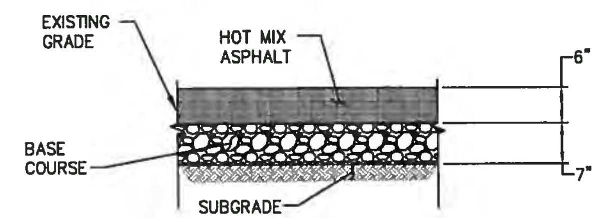
5 PAVEMENT EDGE TRANSITION DETAIL
C4.0–C4.3
SCALE: 3/4"=1'–0"



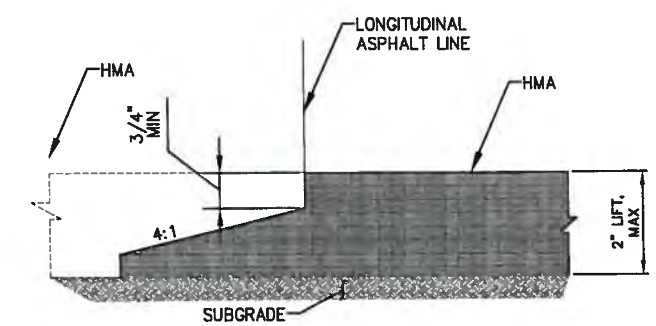
8 STOP BAR AND SYMBOL DETAIL
C1.1
SCALE: 1/2"=1'–0"



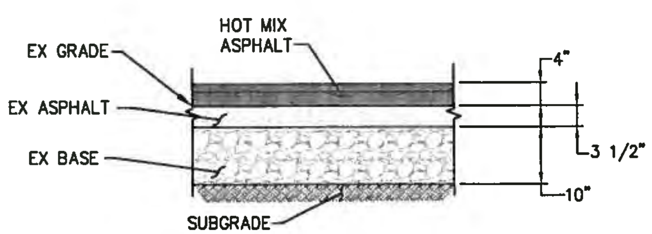
2 ASPHALT PAVEMENT DETAIL
C2.1–C2.2
SCALE: 3/4"=1'–0"



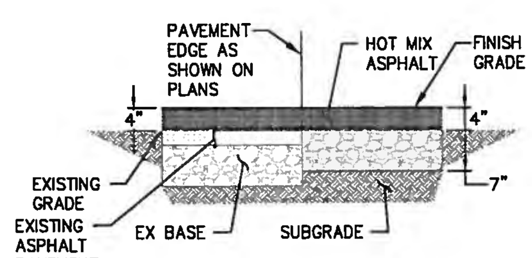
6 ASPHALT PAVEMENT DETAIL
C2.1–C2.2
SCALE: 3/4"=1'–0"



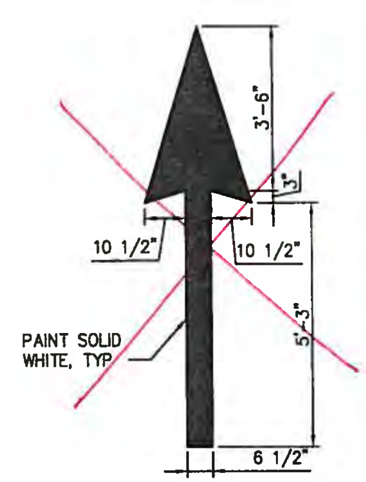
9 LONGITUDNAL HMA STEP WEDGE JOINT DETAIL
–
SCALE: NTS



3 ASPHALT OVERLAY AT ALEXANDER AVE DETAIL
C2.1
SCALE: 3/4"=1'–0"



4 ASPHALT PAVEMENT TRANSITION DETAIL
C4.0–C4.3
SCALE: 3/4"=1'–0"



7 TRAFFIC ARROW DETAIL
C1.1–C1.2, C12.1
SCALE: 1/2"=1'–0"

LANES NUMBERED 1–16

BINDING EDGE

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Port of Tacoma
kpff
2407 North 31st Street, Suite 100, Tacoma, Washington 98407, (253) 396-0150 Fax (253) 396-0162

MARK: | REVISION: | BY: | APPR: | DATE:

STEVEN WADE KINGSLEY, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER, 32781, 5/20/16

SWK 05/20/2016
CHECKED BY DATE: RGC 05/20/2016
PROJ. ENGR DATE
APPROVED:
DIRECTOR ENG. DATE 6/2/16
PRINTED BY: rchandler May 20, 2016
PORT ADDRESS: ONE SITCUM PLAZA, TACOMA, WA 98401-1837

PCT TRUCK STAGING
PAVING DETAILS

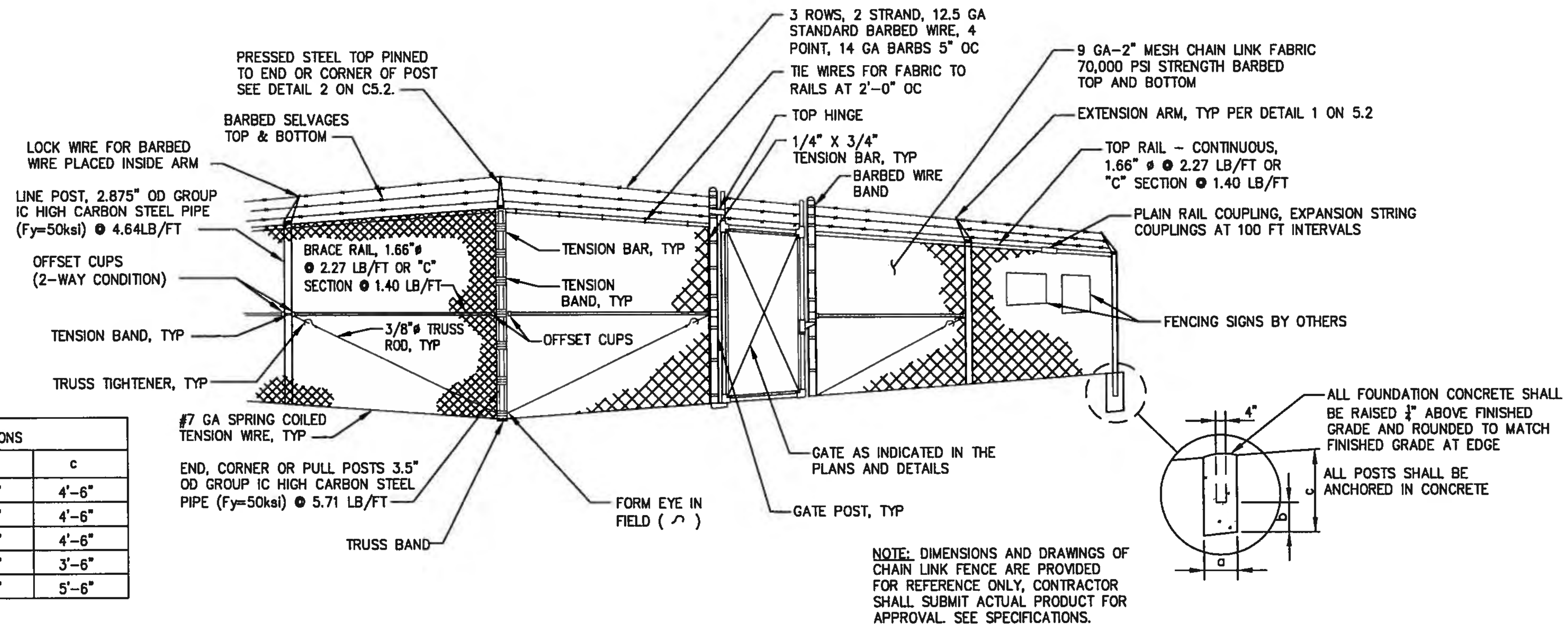
6556
C5.0
SHEET 21 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%
TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
DAT–HRZ: | VERT:
PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

BINDING EDGE

NOTES:

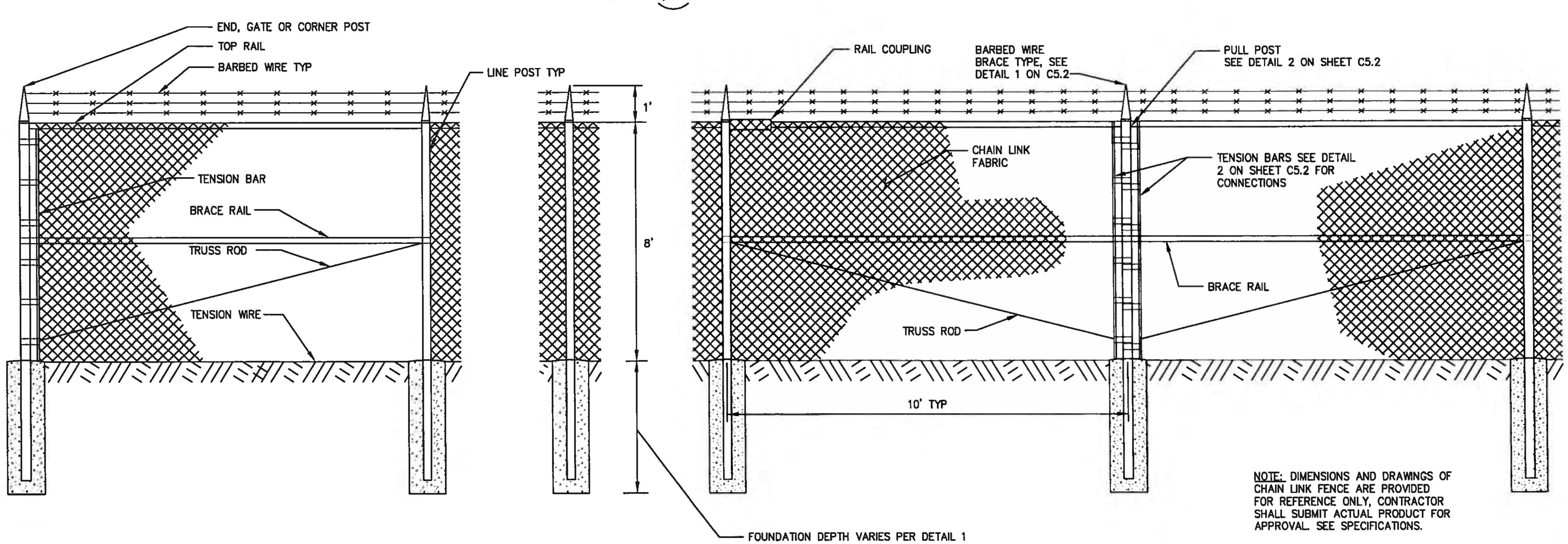
1. ALL FENCING SHALL BE BLACK PVC COATED.

CONCRETE FOUNDATION DIMENSIONS			
LOCATION	a	b	c
CORNER	12"	6"	4'-6"
END	12"	6"	4'-6"
GATE	18" + POST OD	6"	4'-6"
LINE & OTHER	10"	6"	3'-6"
SLOPED CONDITION	12"	6"	5'-6"



NOTE: DIMENSIONS AND DRAWINGS OF CHAIN LINK FENCE ARE PROVIDED FOR REFERENCE ONLY, CONTRACTOR SHALL SUBMIT ACTUAL PRODUCT FOR APPROVAL. SEE SPECIFICATIONS.

1 CHAIN LINK FENCE DETAIL
C1.1-C1.2, C11.1-C11.3
SCALE: NTS



NOTE: DIMENSIONS AND DRAWINGS OF CHAIN LINK FENCE ARE PROVIDED FOR REFERENCE ONLY, CONTRACTOR SHALL SUBMIT ACTUAL PRODUCT FOR APPROVAL. SEE SPECIFICATIONS.

2 PULL POST/LINE POST DETAIL
C5.1
SCALE: NTS

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PCT TRUCK STAGING
FENCING DETAILS

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PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

6556
C5.1
SHEET 22 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%

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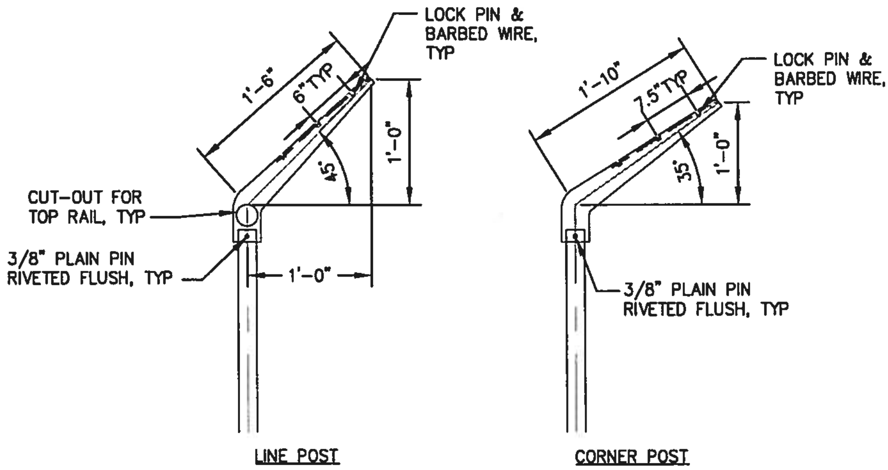
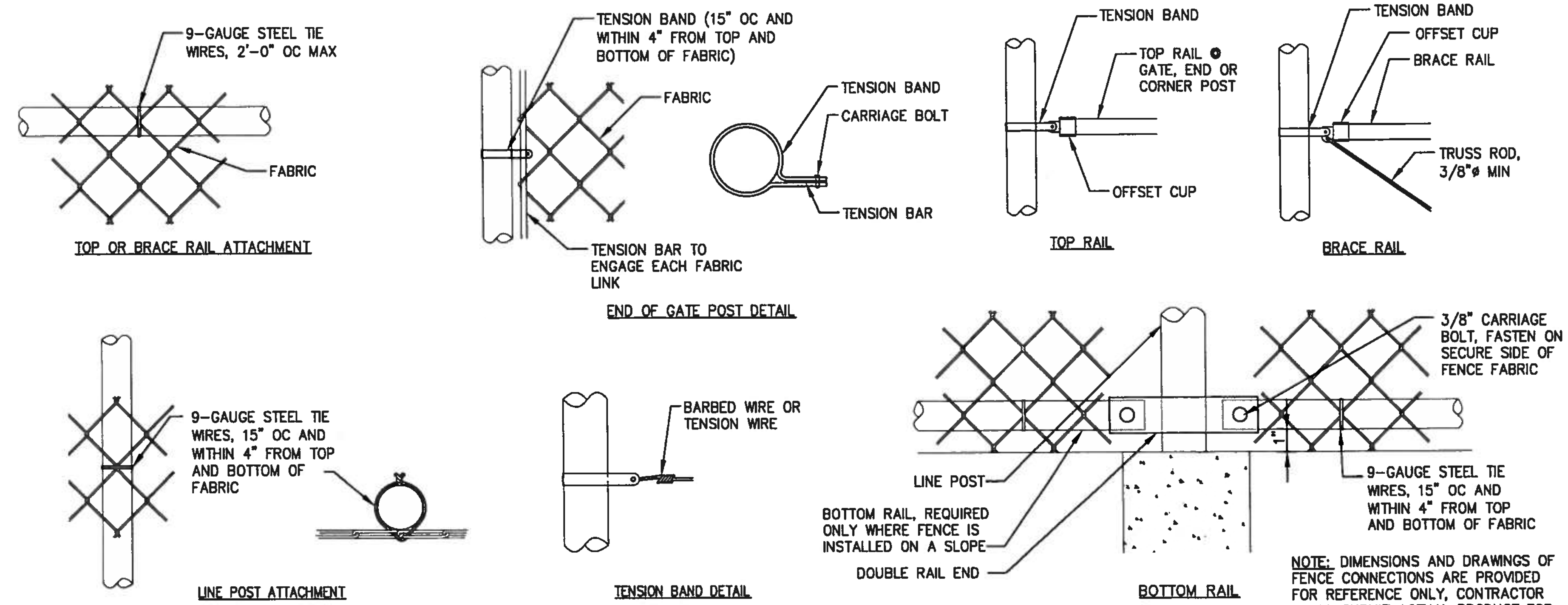
NOTE: DIMENSIONS AND DRAWINGS OF FENCE DETAILS ARE PROVIDED FOR REFERENCE ONLY, CONTRACTOR SHALL SUBMIT ACTUAL PRODUCT FOR APPROVAL. SEE SPECIFICATIONS.



1 EXTENSION ARMS DETAIL

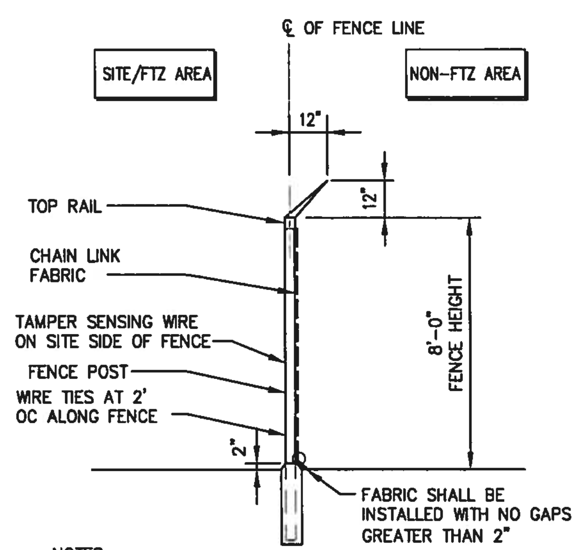
C5.1, C5.3, C12.3 SCALE: NTS



NOTE: DIMENSIONS AND DRAWINGS OF FENCE CONNECTIONS ARE PROVIDED FOR REFERENCE ONLY, CONTRACTOR SHALL SUBMIT ACTUAL PRODUCT FOR APPROVAL. SEE SPECIFICATIONS.

2 FENCE CONNECTION DETAILS

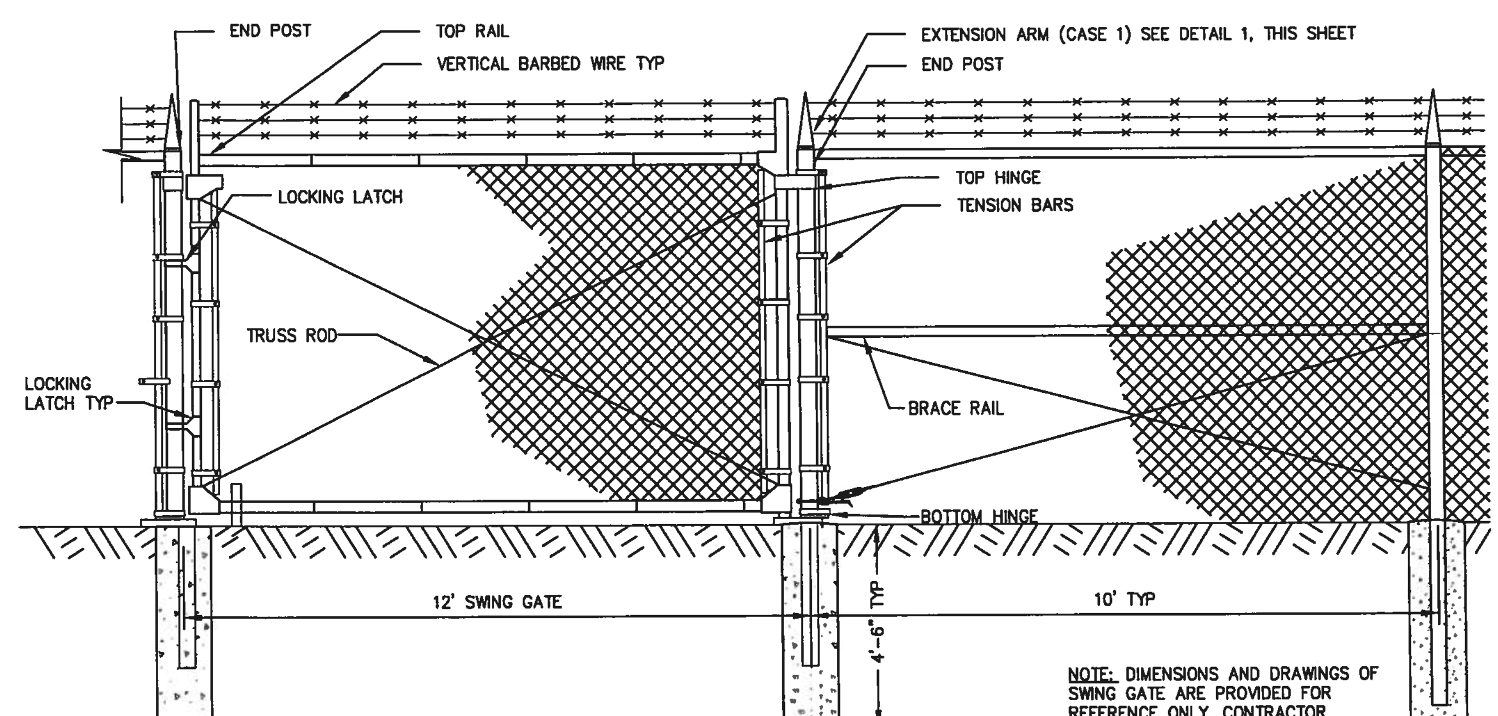
C5.1 SCALE: NTS



NOTES:
1. WHERE FENCING IS LOCATED ON A SLOPE THE CONTRACTOR SHALL INSTALL A BOTTOM RAIL.
2. THE SITE IS CONSIDERED A FOREIGN TRADE ZONE (FTZ AREA).

A TYPICAL FENCE SECTION

C5.2 SCALE: NTS



NOTE: DIMENSIONS AND DRAWINGS OF SWING GATE ARE PROVIDED FOR REFERENCE ONLY, CONTRACTOR SHALL SUBMIT ACTUAL PRODUCT FOR APPROVAL. SEE SPECIFICATIONS.

3 MANUAL CHAIN LINK SWING GATE, 12 FT-PCT DETAIL

C1.1 SCALE: NTS

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RGC 05/20/2016 PROJ. ENGR DATE

PRINTED BY: rchandler May 20, 2016

PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837

PCT TRUCK STAGING

FENCING DETAILS

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01

DAT-HRZ: | VERT:

PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

6556

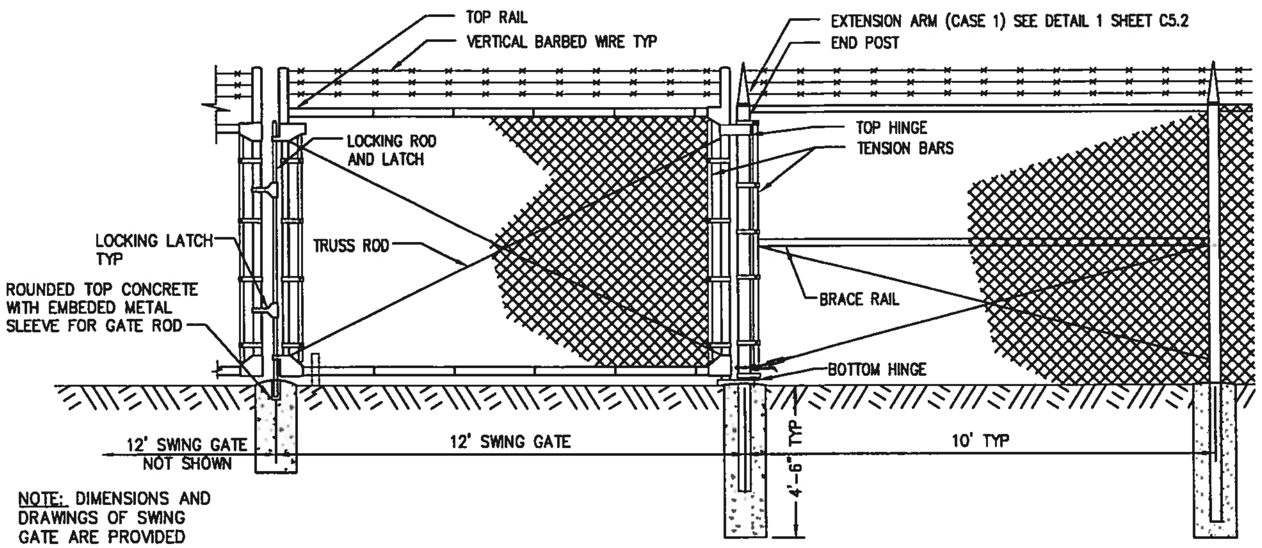
C5.2

SHEET 23 OF 53

CONT/CONS: 070287

M. ID:

PHASE: 100%

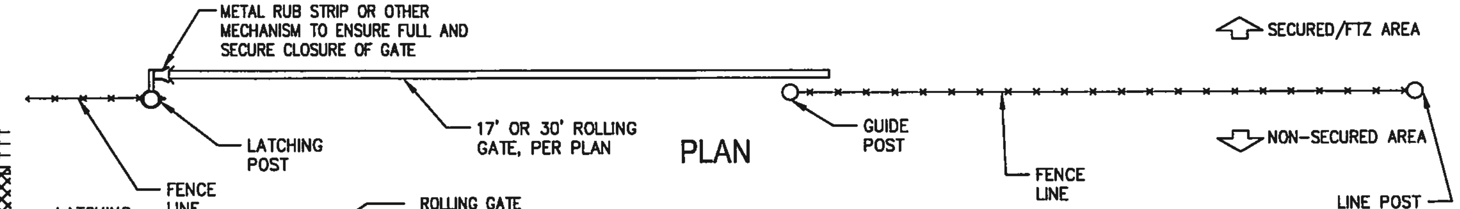


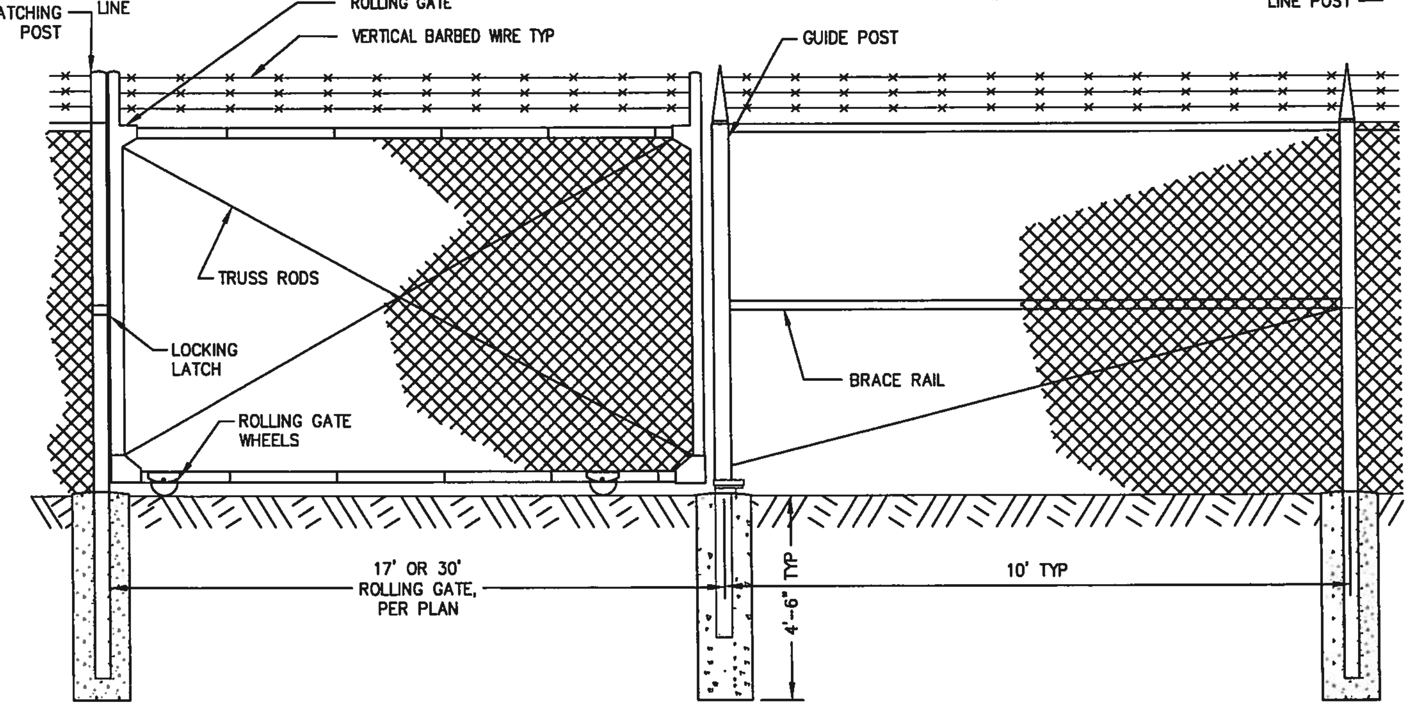
NOTE: DIMENSIONS AND DRAWINGS OF SWING GATE ARE PROVIDED FOR REFERENCE ONLY, CONTRACTOR SHALL SUBMIT ACTUAL PRODUCT FOR APPROVAL. SEE SPECIFICATIONS.

1 MANUAL CHAIN LINK DOUBLE SWING GATE, 24 FT-PCT DETAIL

C1.1, C11.1

SCALE: NTS



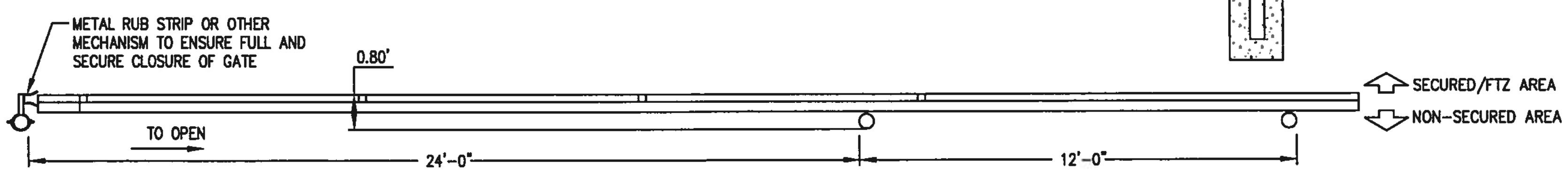


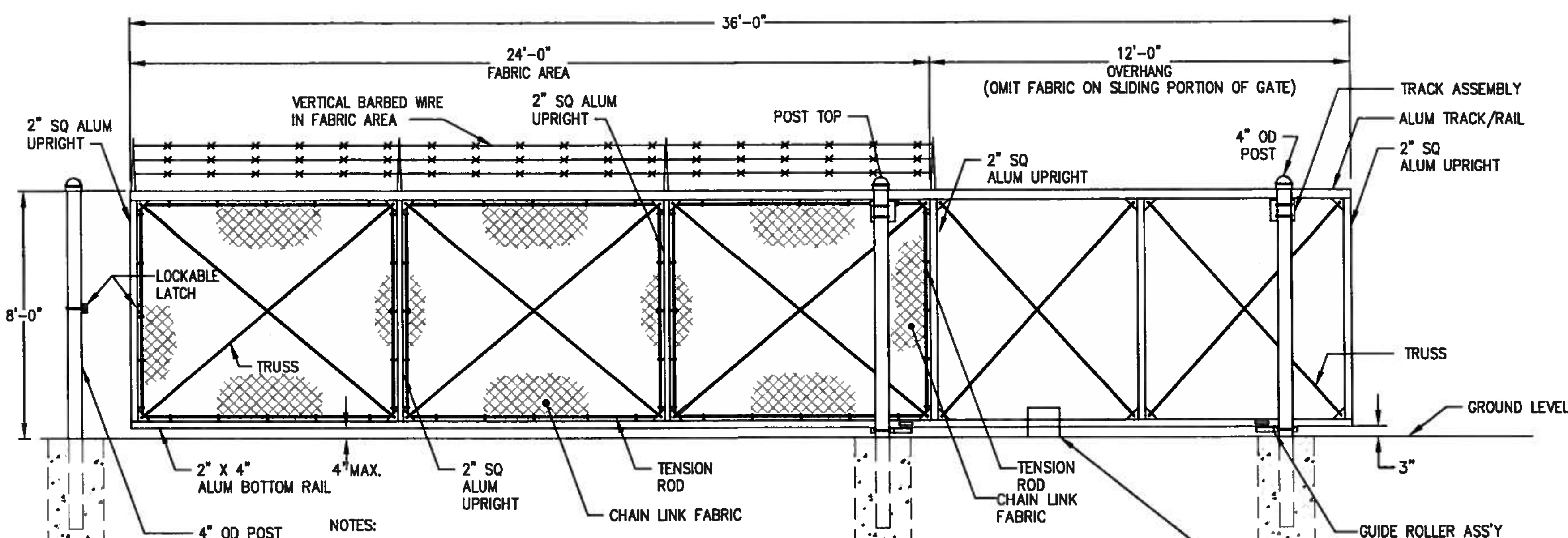
2 MANUAL CHAIN LINK ROLLING GATE, 17 FT OR 30 FT-PCT DETAIL

C1.1

SCALE: NTS

NOTE: DIMENSIONS AND DRAWINGS OF ROLLING GATE ARE PROVIDED FOR REFERENCE ONLY, CONTRACTOR SHALL SUBMIT ACTUAL PRODUCT FOR APPROVAL. SEE SPECIFICATIONS.





NOTE: DIMENSIONS AND DRAWINGS OF SLIDING GATE ARE PROVIDED FOR REFERENCE ONLY, CONTRACTOR SHALL SUBMIT ACTUAL PRODUCT FOR APPROVAL. SEE SPECIFICATIONS.

NOTES:

1. FOOTING WIDTH TO BE (4)X POST WIDTH. MIN DEPTH TO BE 42".
2. GATES SHALL BE ELECTRICALLY OPERATED.
3. CONTRACTOR SHALL COORDINATE LOCATION OF SECURITY MONITORING MOUNTS WITH ENGINEER.

CONTRACTOR SHALL PROVIDE WIRING, POWER CONNECTIONS, MOTOR, CONTROLS AND SYSTEM SHALL WORK WITH CARD READERS. MOTOR SHALL HAVE CONTROLLER THAT IS OPERATED BY CARD READERS ON EACH SIDE OF GATE. PROVIDE A CONCRETE PAD FOR GATE OPERATOR PER MANUFACTURERS RECOMMENDATIONS. 1 / C5.4

3 MOTORIZED CHAIN LINK GATE WITH CARD READERS, 24 FT-PCT DETAIL

C1.1, C5.8

SCALE: NTS

Port of Tacoma

P.O. BOX 1837 TACOMA, WA 98401 (253)383-5841

kpff 2407 North 31st Street, Suite 100 Tacoma, Washington 98407 (253) 396-0150 Fax (253) 396-0162

MARK:	REVISION:	BY:	APPR:	DATE:

STEVEN WADE KINGSLEY, STATE OF WASHINGTON, 32791, REGISTERED PROFESSIONAL ENGINEER, 5/29/16

APPROVED: [signature] 6/2/16 DIRECTOR ENG. DATE

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PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837

PCT TRUCK STAGING

FENCING DETAILS

TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
DAT-HRZ:	VERT:	
PARCEL: 5000350150	DRAWING SCALE: AS NOTED	

6556

C5.3

SHEET 24 OF 53

CONT/CONS: 070287

M. ID:

PHASE: 100%

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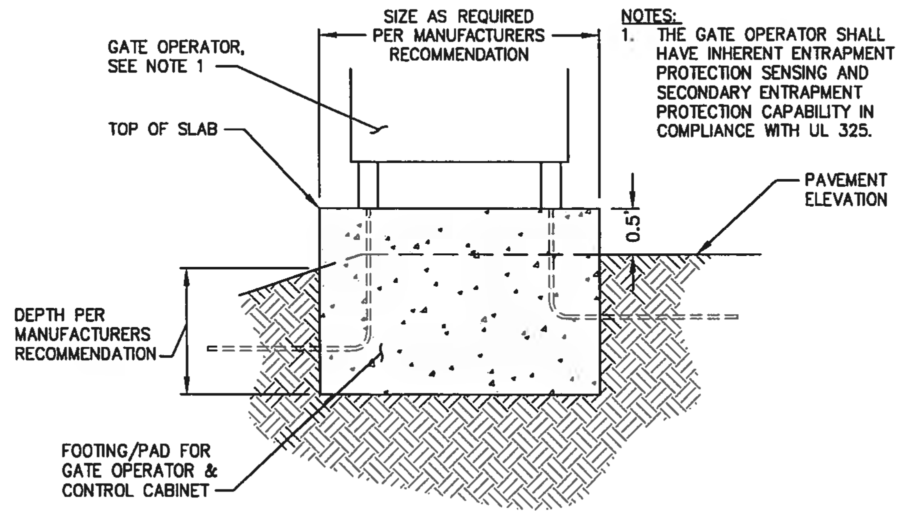
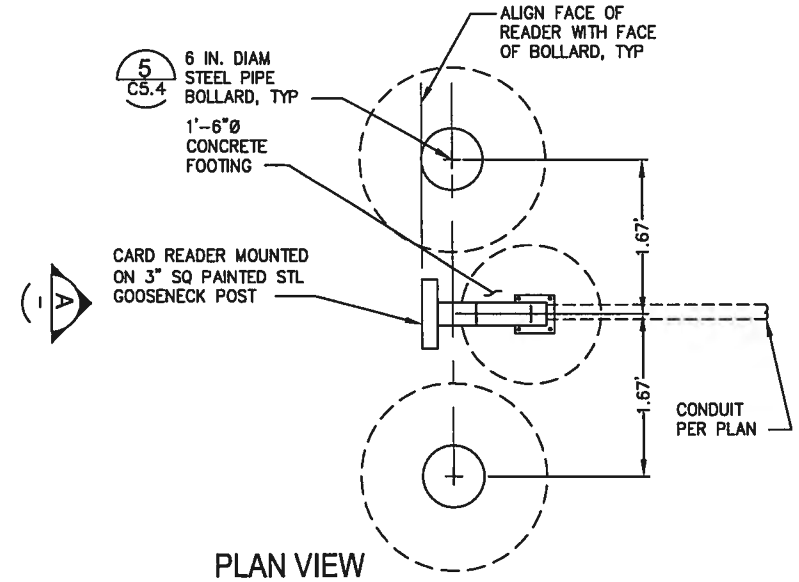
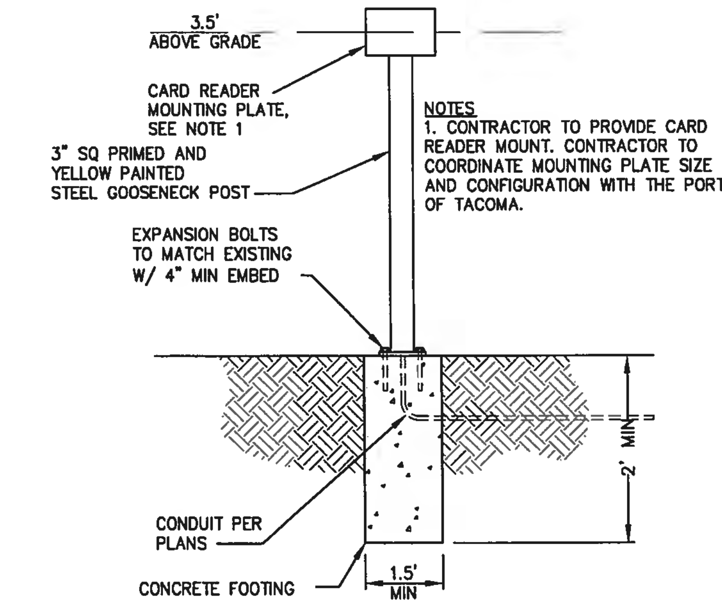


NOTES:
1. THE GATE OPERATOR SHALL HAVE INHERENT ENTRAPMENT PROTECTION SENSING AND SECONDARY ENTRAPMENT PROTECTION CAPABILITY IN COMPLIANCE WITH UL 325.

GATE OPERATOR FOOTING DETAIL

1 — C1.1,C5.3,C5.8 — SCALE: NTS



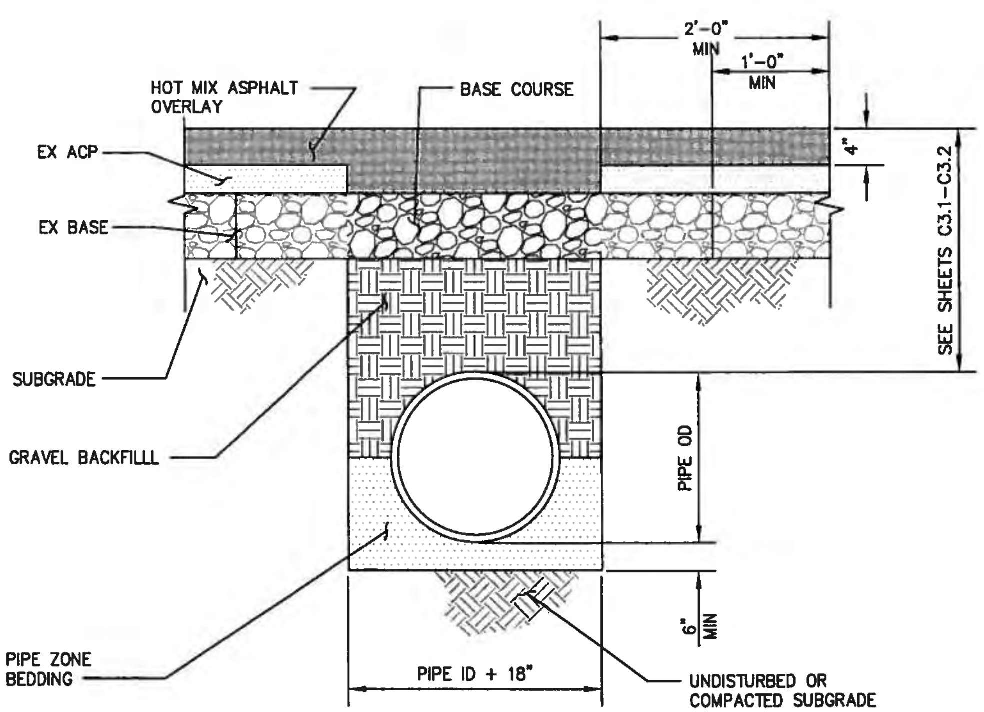


NOTES
1. CONTRACTOR TO PROVIDE CARD READER MOUNT. CONTRACTOR TO COORDINATE MOUNTING PLATE SIZE AND CONFIGURATION WITH THE PORT OF TACOMA.

ELEVATION - A

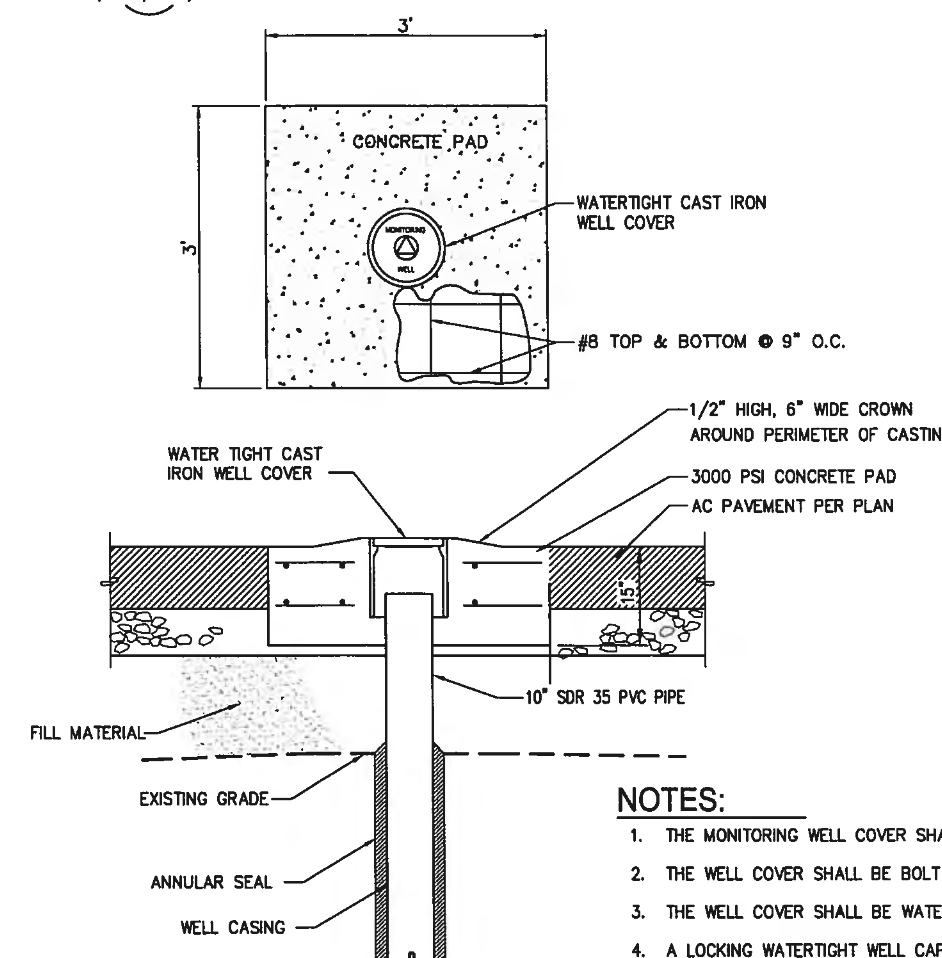
CARD READER WITH BOLLARDS DETAIL

2 — C1.1,C5.3,C5.8,C12.1 — SCALE: NTS



UTILITY TRENCH DETAIL

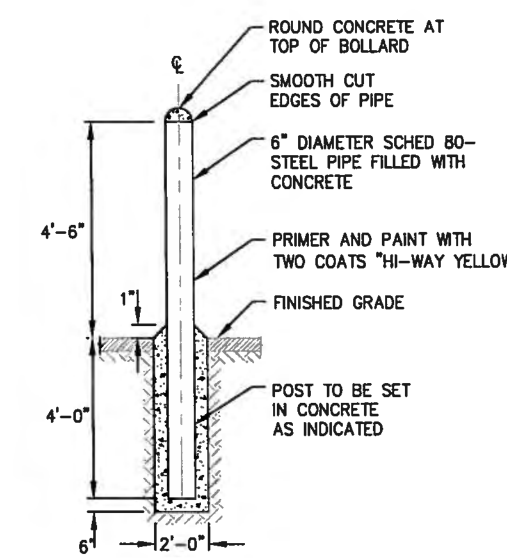
3 — C3.1–3.2 — SCALE: NTS



MONITORING WELL PROTECTION DETAIL

4 — C3.2 — SCALE: NTS

NOTES:
1. THE MONITORING WELL COVER SHALL HAVE CASE LETTERING INDICATING "MONITORING WELL".
2. THE WELL COVER SHALL BE BOLT DOWN.
3. THE WELL COVER SHALL BE WATERTIGHT TO PROTECT AGAINST ENTRY OF SURFACE WATER.
4. A LOCKING WATERTIGHT WELL CAP SHALL BE INSTALLED A THE TOP OF THE WELL CASING IN ACCORDANCE WITH WASHINGTON ADMINISTRATIVE CODE SECTION 173-160-420.
5. CONSTRUCTION, ALTERATION AND RECONSTRUCTION OF MONITORING WELLS SHALL BE PERFORMED BY AN INDIVIDUAL LICENSED UNDER CHAPTER 173-162 OF THE WASHINGTON ADMINISTRATIVE CODE.
6. RECONSTRUCTION PLAN SHALL BE SUBMITTED TO THE PORT AND APPROVED BY THE PORT PRIOR TO PERFORMING THE WORK



BOLLARD DETAIL

5 — C5.4,C5.8,C12.1 — SCALE: NTS

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Port of Tacoma

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PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837

PCT TRUCK STAGING

DETAILS

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01

DAT-HRZ: | VERT:

PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

6556

C5.4

SHEET 25 OF 53

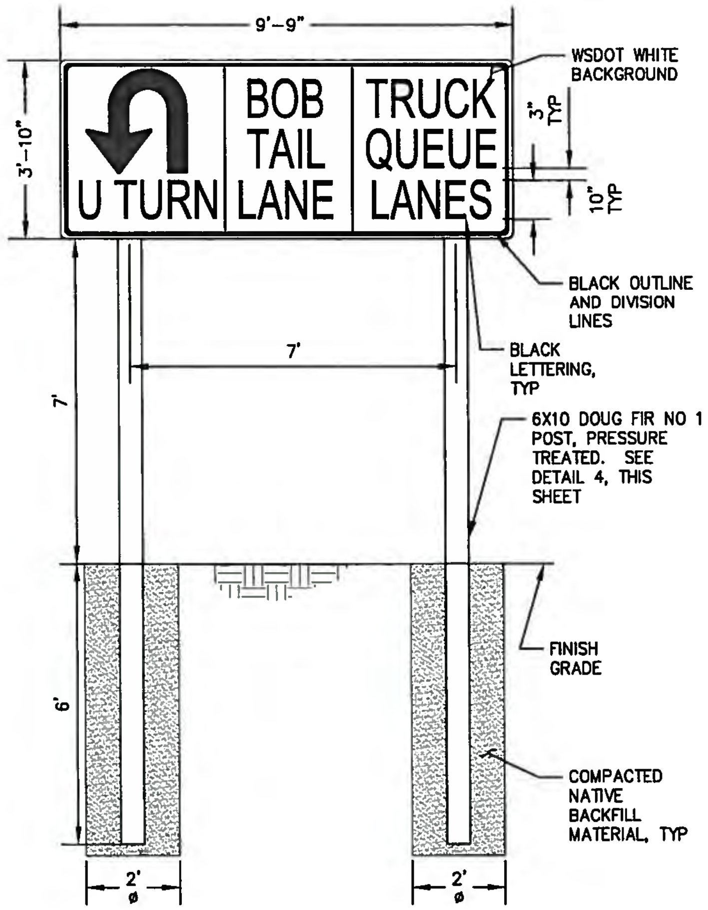
CONT/CONS: 070287

M. ID:

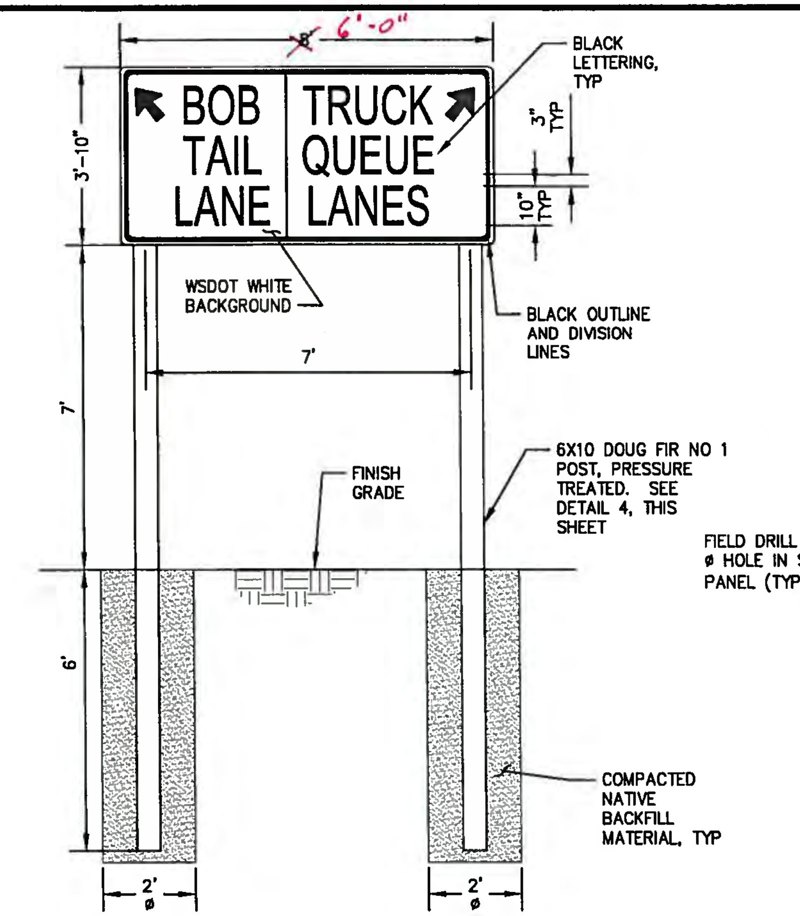
PHASE: 100%

BINDING EDGE

NOTES:
1. PROVIDE SIGN BRACING PER DETAIL 3 THIS SHEET.

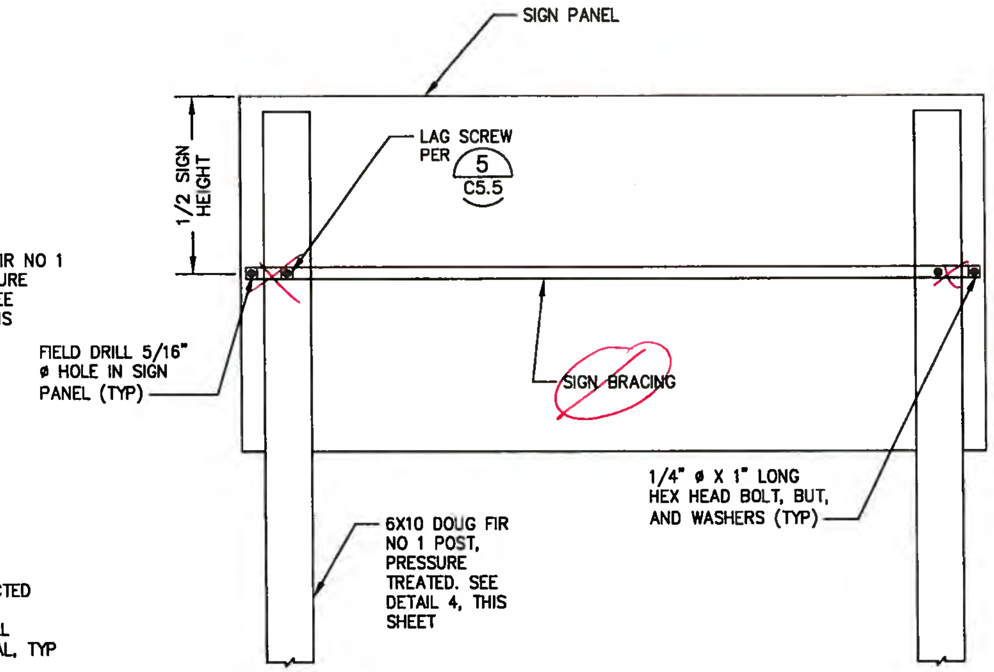


1 / C1.1 TRUCK, BOBTAIL AND TURN AROUND SIGN DETAIL
NTS



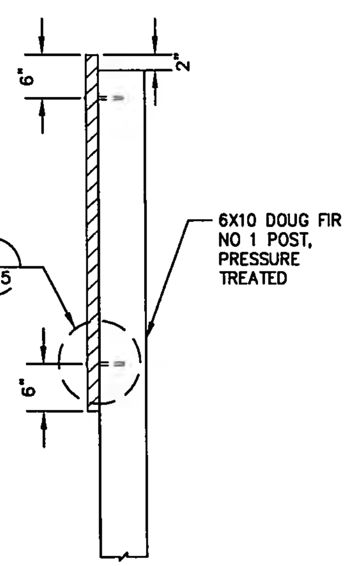
2 / C1.1 TRUCK QUEUE AND BOBTAIL SIGN DETAIL
NTS

NOTES:
1. PROVIDE SIGN BRACING PER DETAIL 3 THIS SHEET.

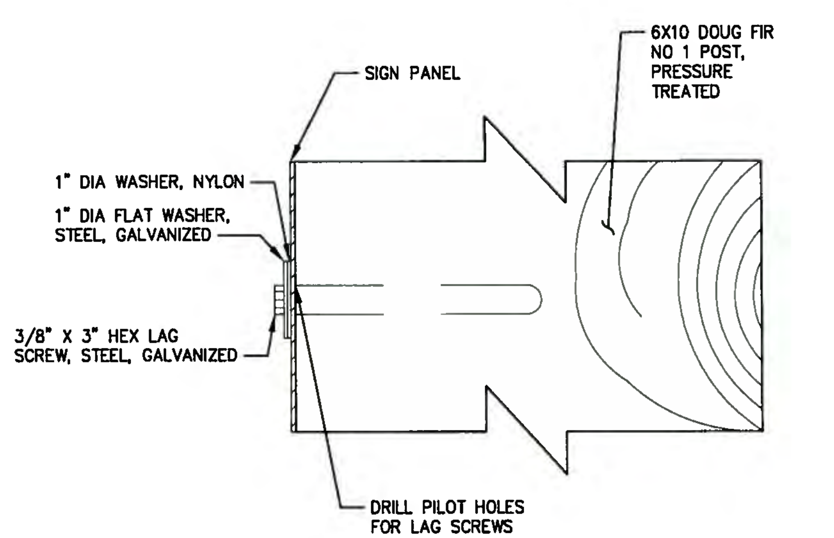


3 / C5.5 SIGN BRACING DETAIL
NTS

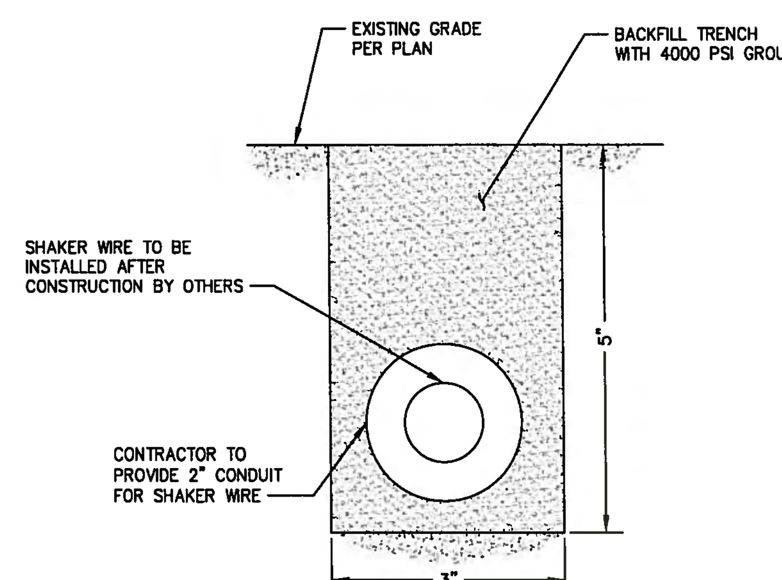
BRACING PER WINDBEAM WSDOT DETAIL



4 / C5.5 SIGN POST DETAIL
NTS



5 / C5.5 SCREW DETAIL
NTS



6 / C5.8,C11.1 SHAKER WIRE CONDUIT INGROUND TRENCH DETAIL
NTS

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Port of Tacoma

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PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837

PCT TRUCK STAGING
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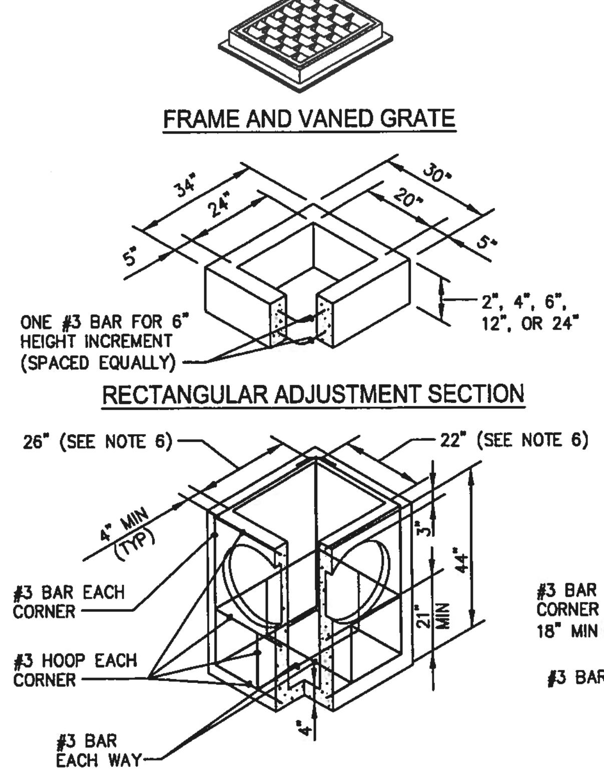
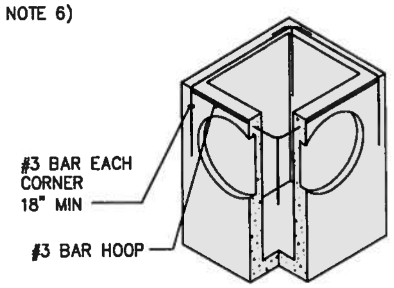
DAT-HRZ: | VERT:
PARCEL: 5000350150
DRAWING SCALE: AS NOTED

6556
C5.5
SHEET 26 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%

BINDING EDGE



PIPE ALLOWANCES	
PIPE MATERIAL	MAXIMUM INSIDE DIAMETER
REINFORCED OR PLAIN CONCRETE	12"
ALL METAL PIPE	15"
CPSSP * (STD.SPEC.9-05.20)	12"
SOLID WALL PVC (STD.SPEC.9-05.12(1))	15"
PROFILE WALL PVC (STD.SPEC.9-05.12(2))	15"

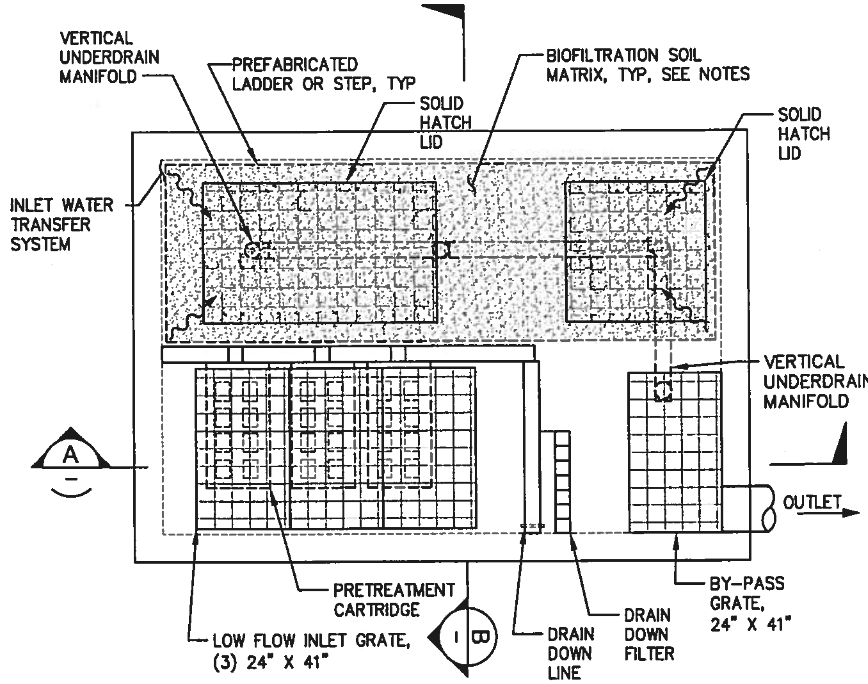


(SEE NOTE 1)

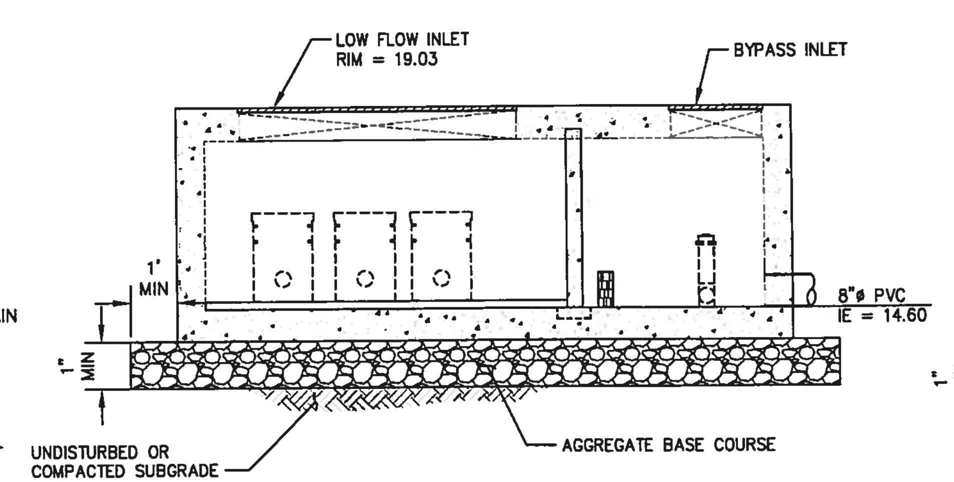
NOTES:

1. AS ACCEPTABLE ALTERNATIVES TO THE REBAR SHOWN IN THE PRECAST BASE SECTION, FIBERS (PLACED ACCORDING TO THE STANDARD SPECIFICATIONS), OR WIRE MESH HAVING A MINIMUM AREA OF 0.12 SQUARE INCHES PER FOOT SHALL BE USED WITH THE MINIMUM REQUIRED REBAR SHOWN IN THE ALTERNATIVE PRECAST BASE SECTION. WIRE MESH SHALL NOT BE PLACED IN THE KNOCKOUTS.
2. THE KNOCKOUT DIAMETER SHALL NOT BE GREATER THAN 20". KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MINIMUM TO 2.5" MAXIMUM. PROVIDE A 1.5" MINIMUM GAP BETWEEN THE KNOCKOUT WALL AND THE OUTSIDE OF THE PIPE. AFTER THE PIPE IS INSTALLED, FILL THE GAP WITH JOINT MORTAR IN ACCORDANCE WITH STANDARD SPECIFICATION 9-04.3.
3. THE MAXIMUM DEPTH FROM THE FINISHED GRADE TO THE LOWEST PIPE INVERT SHALL BE 5'.
4. THE FRAME AND GRATE MAY BE INSTALLED WITH THE FLANGE DOWN, OR INTEGRALLY CAST INTO THE ADJUSTMENT SECTION WITH FLANGE UP.
5. THE PRECAST BASE SECTION MAY HAVE A ROUNDED FLOOR, AND THE WALLS MAY BE SLOPED AT A RATE OF 1:24 OR STEEPER.
6. THE OPENING SHALL BE MEASURED AT THE TOP OF THE PRECAST BASE SECTION.
7. ALL PICKUP HOLES SHALL BE GROUTED FULL AFTER THE BASIN HAS BEEN PLACED.
8. CATCH BASIN SHALL BE DESIGNED PER LOADING CRITERIA ON SHEET G3.
9. STORM DRAIN MANHOLES, VAULTS, AND CATCH BASINS SHALL BE DESIGNED AND CONSTRUCTED WITH FLAT SLAB TOPS AND SHALL BE CONFIGURED TO ACCEPT FUTURE ADDITION OF A MINIMUM 4" RISER SECTION BETWEEN LID OR GRATE OR TOP OF STRUCTURE.

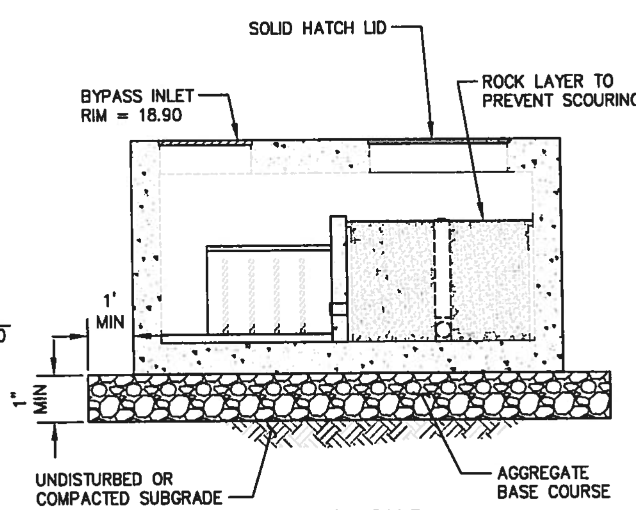
1 CATCH BASIN TYPE 1 DETAIL
C3.1 SCALE: NTS



MODULAR WETLAND #1 MWS 8-12-G-UG DETAIL
2 C3.1 SCALE: NTS



SECTION A



SECTION B

MODULAR WETLANDS TREATMENT REQUIREMENTS
FLOW RATES
PEAK TREATMENT FLOW RATE = 0.33 CFS OR 151 GPM
BIOFILTRATION CHAMBER SURFACE AREA CALCS
WETLAND MEDIA LOADING RATE 151 GPM / 150.96 SF = 1.00 GPM/SF
PRETREATMENT FILTER SURFACE AREA CALCS
PRETREATMENT FILTER LOADING RATE 151 GPM / 75 SF = 2.1 GPM/SF

NOTES:

1. INSTALL UNIT ON LEVEL BED OF AGGREGATE BASE COURSE OF AT LEAST 1' IN DEPTH ON COMPACTED SUBGRADE WITH 1' MINIMUM OVER EXCAVATION AROUND ENTIRE UNIT.
2. MODULAR WETLAND STRUCTURE SHALL BE CONTRACTOR DESIGNED TO THE INTERIOR DIMENSIONS SHOWN.
3. ALL INTERNAL COMPONENTS INCLUDING PRETREATMENT CARTRIDGE, WATER TRANSFER SYSTEM, AND BIOFILTRATION CHAMBER SORPTIVE MEDIA SHALL BE DESIGNED BY THE MANUFACTURER PER THE TREATMENT REQUIREMENTS INDICATED.
4. ALL LIDS, GRATES, HATCHES AND VAULTS SHALL BE DESIGNED PER LOADING CRITERIA ON SHEET G3.
5. STORM DRAIN MANHOLES, VAULTS, AND CATCH BASINS SHALL BE DESIGNED AND CONSTRUCTED WITH FLAT SLAB TOPS AND SHALL BE CONFIGURED TO ACCEPT FUTURE ADDITION OF A MINIMUM 4" RISER SECTION BETWEEN LID OR GRATE OR TOP OF STRUCTURE.

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PCT TRUCK STAGING
PCT
STORMWATER DETAILS

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
DAT-HRZ: | VERT:
PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

6556
C5.6
SHEET 27 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%

SITE PLAN STATION AND OFFSET CONTROL TABLE

POINT	STATION	OFFSET	DESCRIPTION
A	20+33.67	240.18' LT	GATE POST
B	20+16.83	240.18' LT	GATE POST
C	19+86.97	240.18' LT	GATE POST
D	18+56.66	142.06' LT	FENCE LINE
E	18+68.19	127.06' LT	BEGIN 2 LANES
F	19+05.10	94.06' LT	NO TRAVEL AREA
G	19+30.03	20.00' LT	BOB TAIL LANE
H	19+30.03	0'	QUEUE LANES
I	19+30.03	214.00' RT	QUEUE LANES
J	19+49.16	268.00' RT	FENCE LINE
K	20+33.03	183.00' RT	FENCE LINE
L	19+56.46	214.00' RT	TRAFFIC STRIPE
M	20+30.18	139.71' RT	TRAFFIC STRIPE
N	13+35.10	142.06' LT	FENCE LINE
O	11+73.78	63.01' RT	FENCE LINE
P	13+70.03	0'	QUEUE LANES
Q	13+70.12	214.00' RT	QUEUE LANES
R	13+04.25	268.00' RT	FENCE LINE
S	12+75.72	252.09' RT	FENCE LINE
T	13+49.98	20.00' LT	BOB TAIL LANE
U	13+40.92	114.08' LT	TRUCK LANE
V	13+40.92	0'	TRUCK LANE
W	13+37.84	110.00' RT	TRUCK LANE
X	13+01.68	214.00' RT	TRUCK LANE
Y	19+95.03	357.06' LT	STRIPE LINE
Z	20+33.03	165.52' RT	FENCE POST
BC	19+89.96	256.85' LT	PAVEMENT LINE
BD	19+23.54	160.64' LT	GATE POST
BE	19+01.80	150.48' LT	GATE POST
BF	13+38.72	127.13' LT	STRIPE LINE
BG	19+95.03	280.77' LT	STRIPE LINE
BH	18+56.70	140.07' LT	STRIPE LINE
BI	18+95.10	114.07' LT	STRIPE LINE
BJ	12+54.47	268.46' RT	FENCE LINE
BK	12+12.19	200.75' RT	FENCE LINE
BL	10+29.35	178.14' LT	FENCE LINE
BM	10+05.75	250.49' LT	FENCE LINE
BN	10+00.77	281.40' LT	FENCE POST
BO	20+33.68	208.17' LT	GATE POST

PAVING STATION AND OFFSET CONTROL TABLE

POINT	STATION	OFFSET	ELEVATION	DESCRIPTION
AA	20+34.60	245.43' LT	20.47	PAVEMENT EDGE
BB	19+87.42	245.43' LT	20.92	PAVEMENT EDGE
CC	20+33.59	355.72' LT	19.33	PAVEMENT EDGE
DD	20+34.00	183.08' RT	21.36	PAVEMENT EDGE
EE	19+49.12	269.00' RT	21.92	PAVEMENT EDGE
FF	19+94.88	357.07' LT	19.43	PAVEMENT EDGE
GG	19+91.07	357.20' LT	19.43	PAVEMENT EDGE
HH	19+89.96	256.85' LT	20.25	PAVEMENT EDGE
II	19+94.32	343.74' LT	19.43	PAVEMENT EDGE
JJ	18+56.64	143.05' LT	20.30	PAVEMENT EDGE
KK	20+31.51	258.45' LT	20.33	PAVEMENT EDGE
LL	12+74.73	252.39' RT	20.41	PAVEMENT EDGE
MM	13+04.24	269.00' RT	20.55	PAVEMENT EDGE
NN	20+34.60	251.92' LT	20.33	PAVEMENT EDGE
OO	11+72.81	63.35' RT	20.86	PAVEMENT EDGE
PP	13+35.10	143.05' LT	20.68	PAVEMENT EDGE

UTILITY STATION AND OFFSET CONTROL TABLE

POINT	STATION	OFFSET	DESCRIPTION
AB	18+32.30	145.40' LT	CB #1
AC	18+41.62	29.37' LT	CB #2
AD	16+86.38	145.40' LT	CB #3
AE	13+02.36	143.69' LT	CB #4
AF	11+82.98	58.88' LT	CB #5
AG	18+64.03	37.45' LT	MWS #1
AH	19+19.62	67.00' LT	LIGHT POLE

BINDING EDGE

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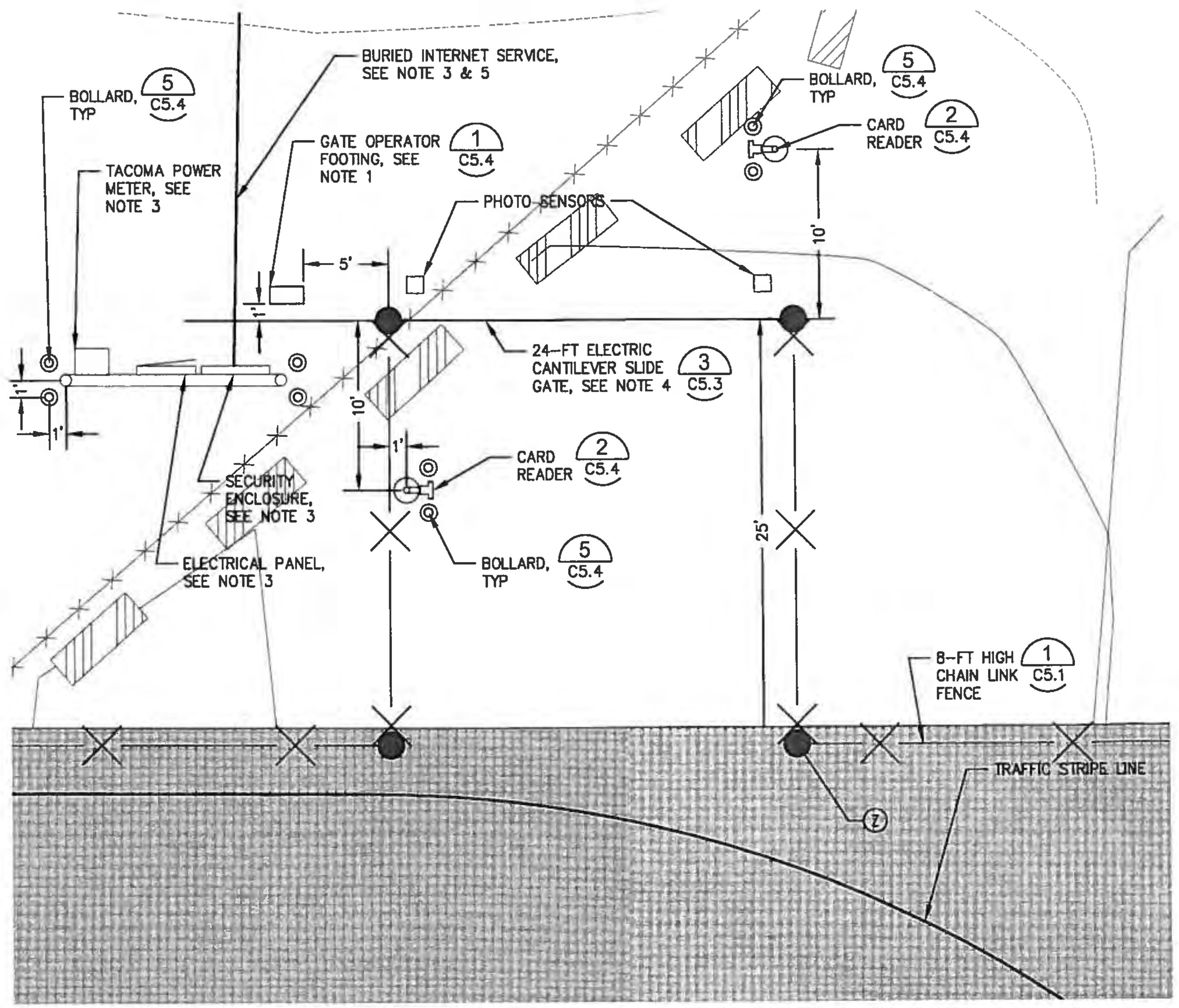
PCT TRUCK STAGING
PCT
STATION AND OFFSET CONTROL

TOWNSHIP:20N RANGE: 03E SECTION: 01
DAT-HRZ: VERT:
PARCEL: 5000350150 DRAWING SCALE: AS NOTED

6556
C5.7
SHEET 28 OF 53

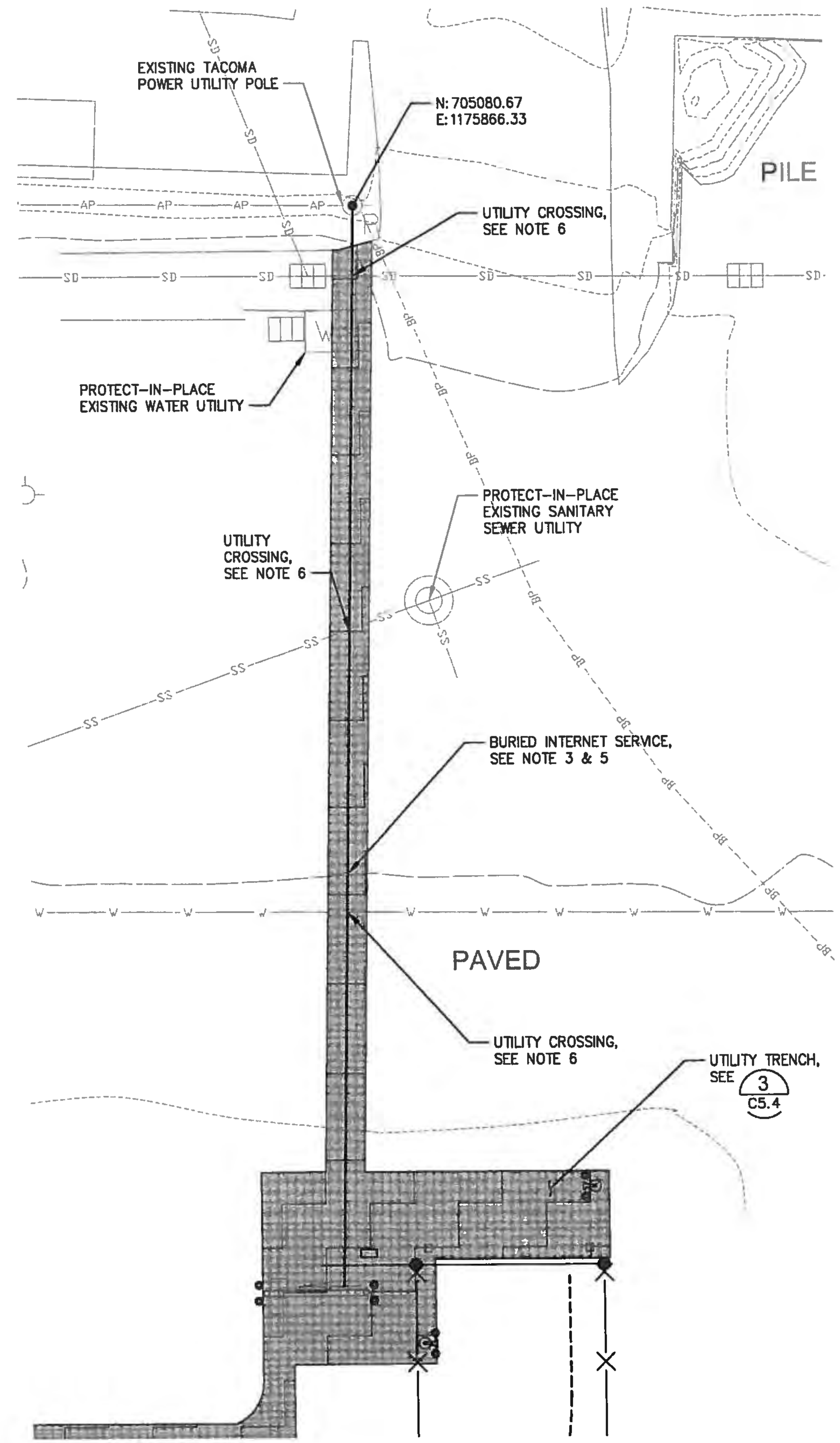
CONT/CONS: 070287
M. ID:
PHASE: 100%



1 C1.1 SOUTH AUTO ENTRY GATE DETAIL
SCALE: 1" = 5'

NOTES:

1. LOCATION OF GATE OPERATOR IS APPROXIMATE. CONTRACTOR TO COORDINATE WITH GATE OPERATOR MANUFACTURER FOR PLACEMENT OF GATE OPERATOR.
2. FOR FENCE POST CONTROL POINTS, SEE SHEETS C1.1 AND C5.7.
3. FOR ELECTRICAL, SEE ELECTRICAL SHEETS E1.0 THRU E3.0.
4. CONTRACTOR TO PROVIDE CONDUIT PER DETAIL 6 ON SHEET C5.5 FOR ENTIRE LENGTH OF GATE FOR INSTALLATION OF SHAKER WIRE BY OTHERS.
5. CONTRACTOR SHALL PROVIDE 2" CONDUIT FOR INSTALLATION OF INTERNET. CONTRACTOR SHALL COORDINATE INSTALLATION OF CONDUIT WITH CLICK! CABLE TV, SEE SPECIFICATIONS FOR CONTACT INFORMATION.
6. EXISTING BURIED UTILITY, CONTRACTOR TO LOCATE AND PROTECT-IN-PLACE.



2 C3.1 BURIED INTERNET SERVICE DETAIL
SCALE: 1" = 10'

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PCT TRUCK STAGING
PCT
ENLARGED SITE PLAN

6556
C5.8
SHEET 29 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%
TOWNSHIP: 20N RANGE: 03E SECTION: 01
DAT-HRZ: VERT:
PARCEL: 5000350150 DRAWING SCALE: AS NOTED

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KEYNOTES:

1. WAPATO CREEK
2. 150' STREAM BUFFER
3. FOR WORK WITHIN CITY ROW, SEE WORK ORDER PERMIT NUMBER 60000041488
4. CITY ROW LINE
5. 8-FT CHAIN LINK FENCE
6. EXISTING MONITORING WELL
7. CONNECT TO PCT TRUCK STAGING FENCE, SEE SHEETS C1.1 THRU C1.2
8. SEE SHEETS C1.1 THRU C1.2 FOR PCT WORK WITHIN THIS AREA
9. AUTO ENTRY
10. 24-FT MANUAL SWING GATE

100' 0 100' 200'
50' 150'
SCALE: 1"=100'

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STEVEN WADE KING — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER — 32781

APPROVED:
DIRECTOR / ENG. DATE 6/2/16

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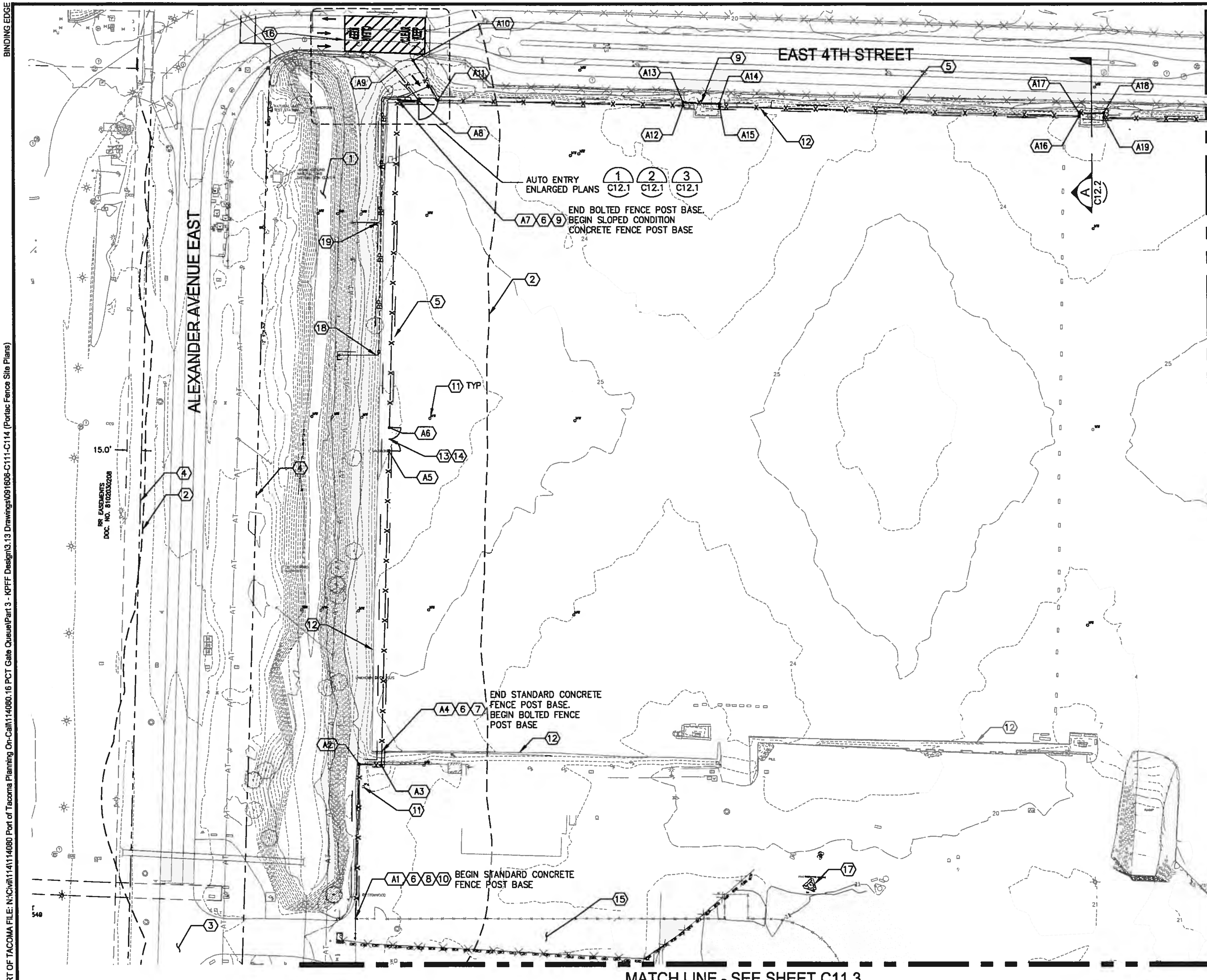
PCT TRUCK STAGING
PORTAC
OVERALL SITE PLAN

TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
DAT-HRZ:	VERT:	
PARCEL: 5000350150	DRAWING SCALE: AS NOTED	

6556
C10.0
SHEET 30 OF 53

CONT/CONS: 070287
M. ID:
PHASE: 100%



KEYNOTES:

1. WAPATO CREEK
2. 150' STREAM BUFFER
3. FOR WORK WITHIN CITY ROW, SEE WORK ORDER PERMIT NUMBER 60000041488
4. CITY ROW LINE
5. LIMITS OF WORK
6. 8 FT CHAIN LINK FENCE 1 C5.1
7. BOLTED FENCE POST BASE 3 C12.3
8. STANDARD CONCRETE FENCE POST BASE 1 C5.1
9. SLOPED CONDITION CONCRETE FENCE POST BASE, LOCATED 1' TYP OUTSIDE THE EDGE OF THE PORTAC CAP 1 C5.1
10. CONNECT TO PCT TRUCK STAGING FENCE, SEE SHEETS C1.1 THRU C1.2
11. PROTECT-IN-PLACE EXISTING MONITORING WELL
12. EDGE OF PORTAC CAP
13. 24' MANUAL DOUBLE SWING GATE 4 C12.3
14. 2" CONDUIT INSTALLED BELOW GRADE FOR FUTURE SHAKER WIRE 6 C5.5
15. PCT TRUCK STAGING, THIS AREA, SEE SHEETS C1.1 THRU C1.2
16. KEEP CLEAR SYMBOL 5 C12.3
17. PROTECT IN PLACE EXISTING NAVIGATION MARKER
18. BURIED ELECTRICAL SERVICE, SEE NOTE 2
19. BURIED INTERNET SERVICE, SEE NOTE 2

LEGEND:

- CHAIN LINK FENCE 1 C5.1
- LIMITS OF WORK
- XX CONTROL POINT

NOTES:

1. FOR HORIZONTAL CONTROL TABLE SEE SHEET C11.4
2. FOR ELECTRICAL WORK, SEE SHEETS E1.0 THRU E3.0.
3. CONTRACTOR SHALL RESTORE DISTURBED VEGETATION WITHIN STREAM BUFFER AT A MINIMUM WITH NATIVE GRASSES.

50' 0 50' 100'
25' 75'
SCALE: 1"=50'

KEY PLAN
NTS

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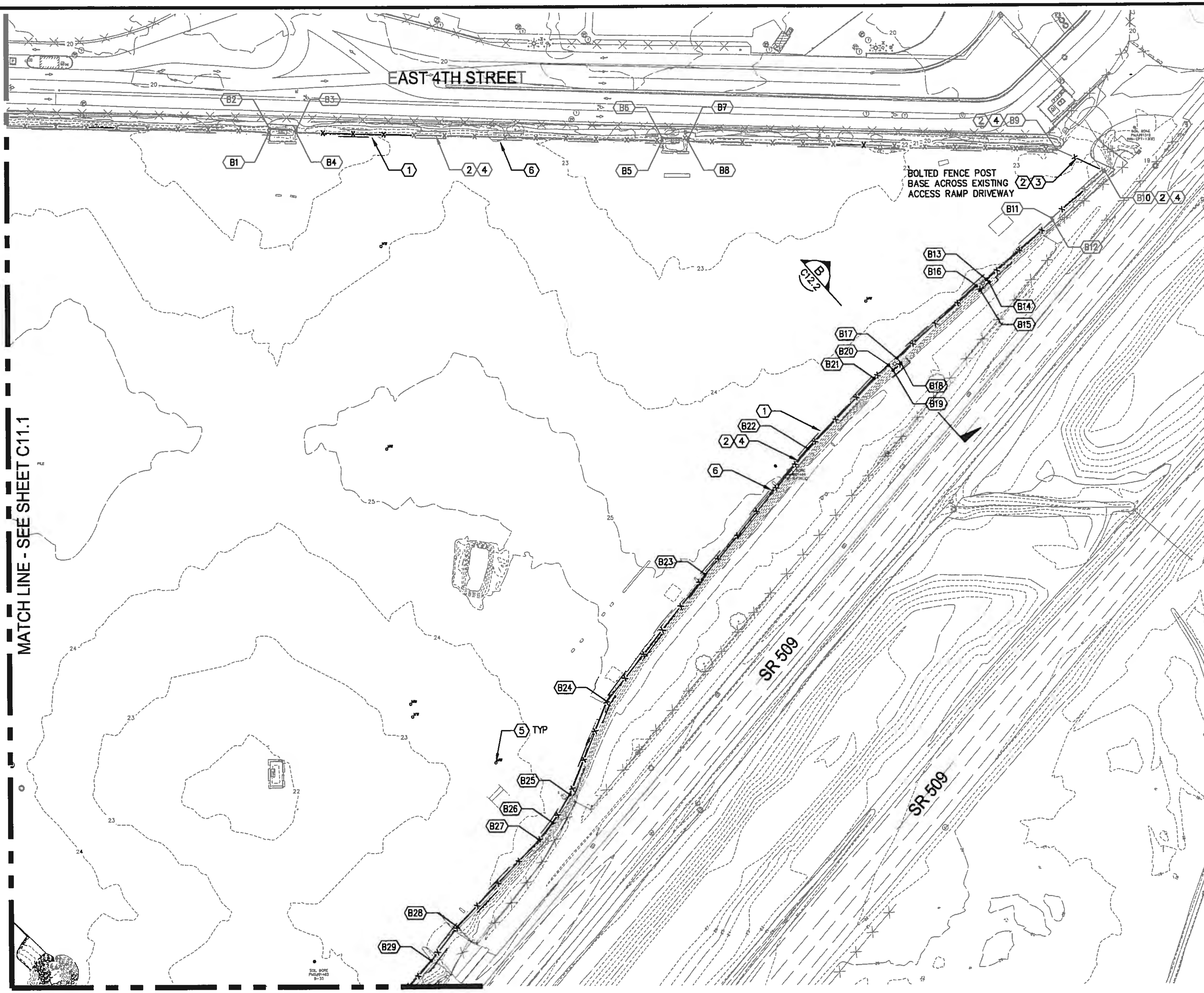
PCT TRUCK STAGING
PORTAC
SITE PLAN - AREA A

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
DAT-HRZ: | VERT:
PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

6556
C11.1
SHEET 31 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%



KEYNOTES:

1. LIMITS OF WORK
2. 8-FT CHAIN LINK FENCE (1/C5.1)
3. BOLTED FENCE POST BASE (3/C12.3)
4. SLOPED CONDITION CONCRETE FENCE POST BASE, 1' TYP OUTSIDE THE EDGE OF THE PORTAC CAP (1/C5.1)
5. PROTECT-IN-PLACE EXISTING MONITORING WELL
6. EDGE OF PORTAC CAP

LEGEND:

CHAIN LINK FENCE (1/C5.1)
LIMITS OF WORK
(XX) CONTROL POINT

NOTES:

1. FOR HORIZONTAL CONTROL TABLE SEE SHEET C11.4

50' 0 50' 100'
25' 75'
SCALE: 1"=50'

KEY PLAN
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STEVEN WADE KINGSLEY
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
5/29/16

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PCT TRUCK STAGING
PORTAC
SITE PLAN - AREA B

6556
C11.2
SHEET 32 OF 53

CONT/CONS: 070287	TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
M. ID:	DAT-HRZ:	VERT:	
PHASE: 100%	PARCEL: 5000350150	DRAWING SCALE: AS NOTED	

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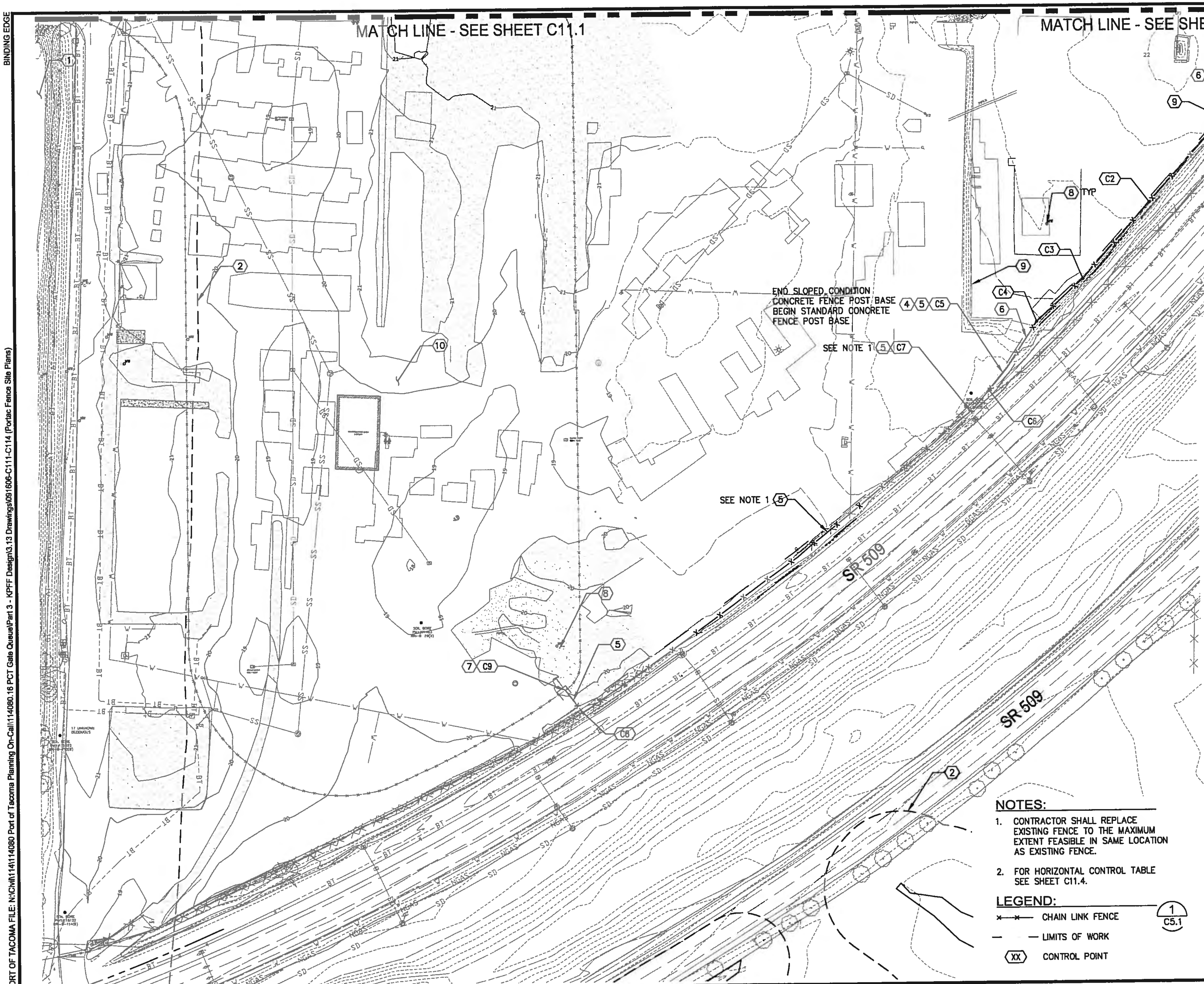


KEYNOTES:

1. WAPATO CREEK
2. 150' STREAM BUFFER
3. LIMITS OF WORK
4. 8-FT CHAIN LINK FENCE (1 / C5.1)
5. STANDARD CONCRETE FENCE POST BASE (1 / C5.1)
6. SLOPED CONDITION CONCRETE FENCE POST BASE, 1' TYP OUTSIDE THE EDGE OF THE PORTAC CAP (1 / C5.1)
7. CONNECT TO PCT TRUCK STAGING FENCE. SEE SHEETS C1.1 THRU C1.2
8. PROTECT-IN-PLACE EXISTING MONITORING WELL
9. EDGE OF PORTAC CAP
10. PCT TRUCK STAGING, THIS AREA, SEE SHEETS C1.1 THRU C1.2

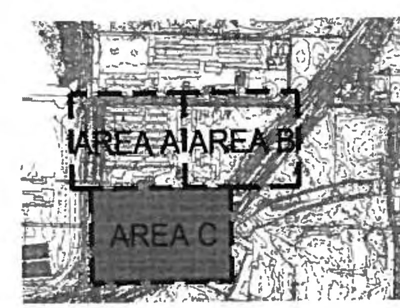
50' 0 50' 100'
25' 75'
SCALE: 1"=50'

NOTES:

1. CONTRACTOR SHALL REPLACE EXISTING FENCE TO THE MAXIMUM EXTENT FEASIBLE IN SAME LOCATION AS EXISTING FENCE.
2. FOR HORIZONTAL CONTROL TABLE SEE SHEET C11.4.

LEGEND:

—x—x— CHAIN LINK FENCE (1 / C5.1)
— — LIMITS OF WORK
(XX) CONTROL POINT



KEY PLAN
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PCT TRUCK STAGING
PORTAC
SITE PLAN - AREA C

6556
C11.3
SHEET 33 OF 53

CONT/CONS: 070287 | TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
M. ID: | DAT-HRZ: | VERT: |
PHASE: 100% | PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

SHEET C11.1 (AREA A) HORIZONTAL CONTROL

POINT	NORTHING	EASTING
A1	704920.96	1175490.96
A2	705079.53	1175495.70
A3	705078.54	1175518.44
A4	705092.91	1175518.86
A5	705404.13	1175527.85
A6	705428.12	1175528.56
A7	705767.15	1175538.38
A8	705766.44	1175560.16
A9	705798.67	1175535.80
A10	705808.13	1175554.51
A11	705766.48	1175580.16
A12	705761.37	1175834.13
A13	705764.74	1175834.22
A14	705763.22	1175872.03
A15	705760.18	1175871.96
A16	705750.40	1176245.47
A17	705753.32	1176245.46
A18	705753.63	1176271.21
A19	705748.84	1176271.12

SHEET C11.2 (AREA B) HORIZONTAL CONTROL

POINT	NORTHING	EASTING
B1	705739.42	1176646.02
B2	705743.75	1176646.20
B3	705742.04	1176673.52
B4	705739.34	1176673.39
B5	705729.79	1177046.87
B6	705732.31	1177046.99
B7	705731.91	1177073.75
B8	705728.85	1177073.62
B9	705719.07	1177449.80
B10	705696.38	1177498.96
B11	705648.89	1177444.15
B12	705646.57	1177445.14
B13	705587.00	1177376.58
B14	705584.41	1177379.07
B15	705576.26	1177370.37
B16	705580.98	1177366.28
B17	705507.67	1177283.82
B18	705502.31	1177288.26
B19	705495.39	1177280.00
B20	705500.59	177275.34
B21	705487.14	1177260.83
B22	705415.76	1177192.69
B23	705288.38	1177086.67
B24	705159.18	1176985.73
B25	705065.81	1176947.38
B26	705037.28	1176929.59
B27	705019.73	1176915.67
B28	704931.28	1176832.22
B29	704897.26	1176805.35

SHEET C11.3 (AREA C) HORIZONTAL CONTROL

POINT	NORTHING	EASTING
C1	704804.49	117624.23
C2	704668.93	1176604.28
C3	704588.93	1176533.15
C4	704544.67	1176483.87
C5	704491.21	1176447.41
C6	704473.32	1176432.51
C7	704451.69	1176413.08
C8	704139.39	1176001.56
C9	74162.93	1175983.22

BINDING EDGE

PORT OF TACOMA FILE: N:\Civil\1141\14080 Port of Tacoma Planning On-Call\14080.16 PCT Gate Queue\Part 3 - KPFF Design\3.13 Drawings\091606-C111-C114 (Portac Fence Site Plans)

Port of Tacoma

kpff

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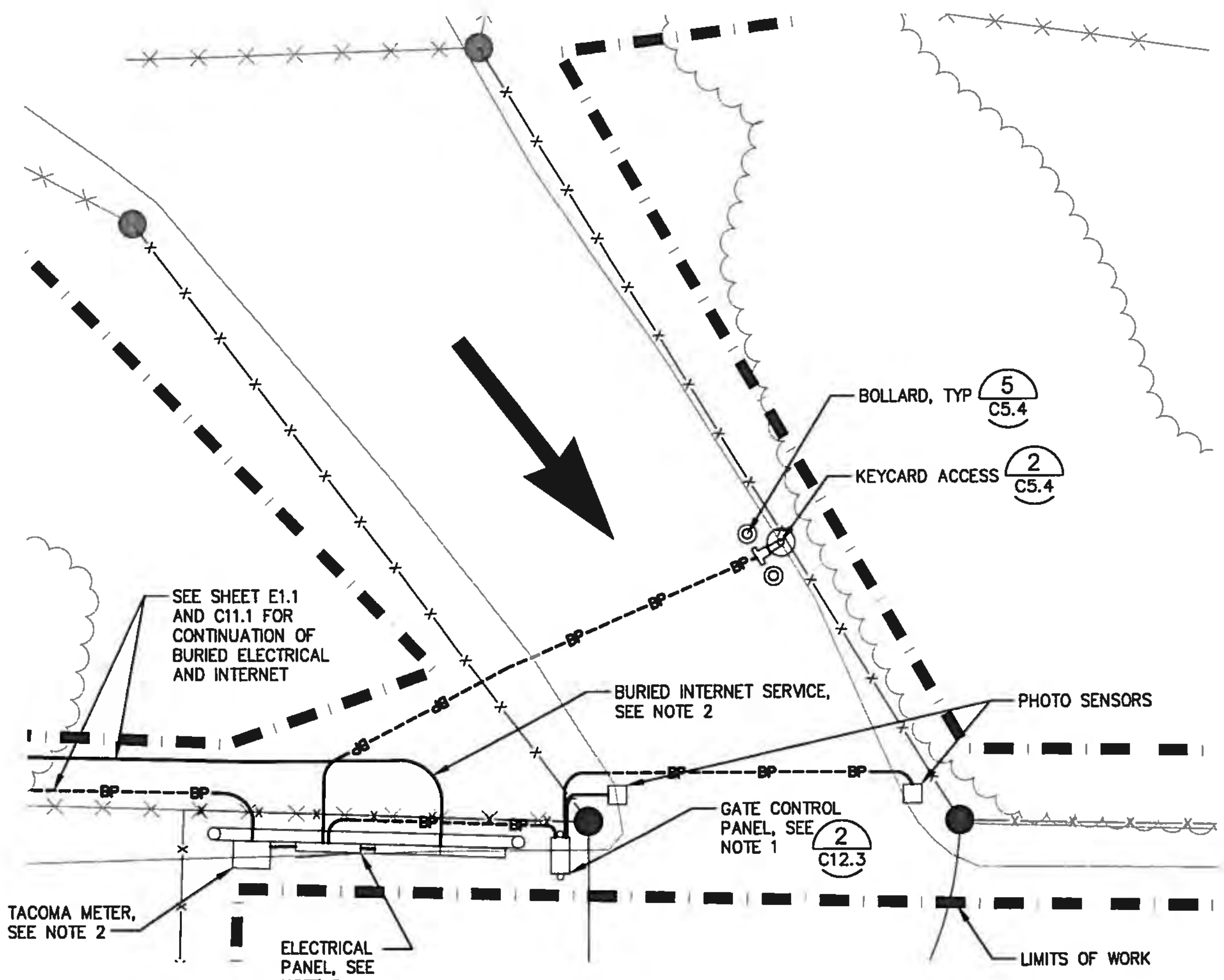
PORT ADDRESS: ONE SITCUM PLAZA
TACOMA, WA 98401-1837

PCT TRUCK STAGING
PORTAC
HORIZONTAL CONTROL

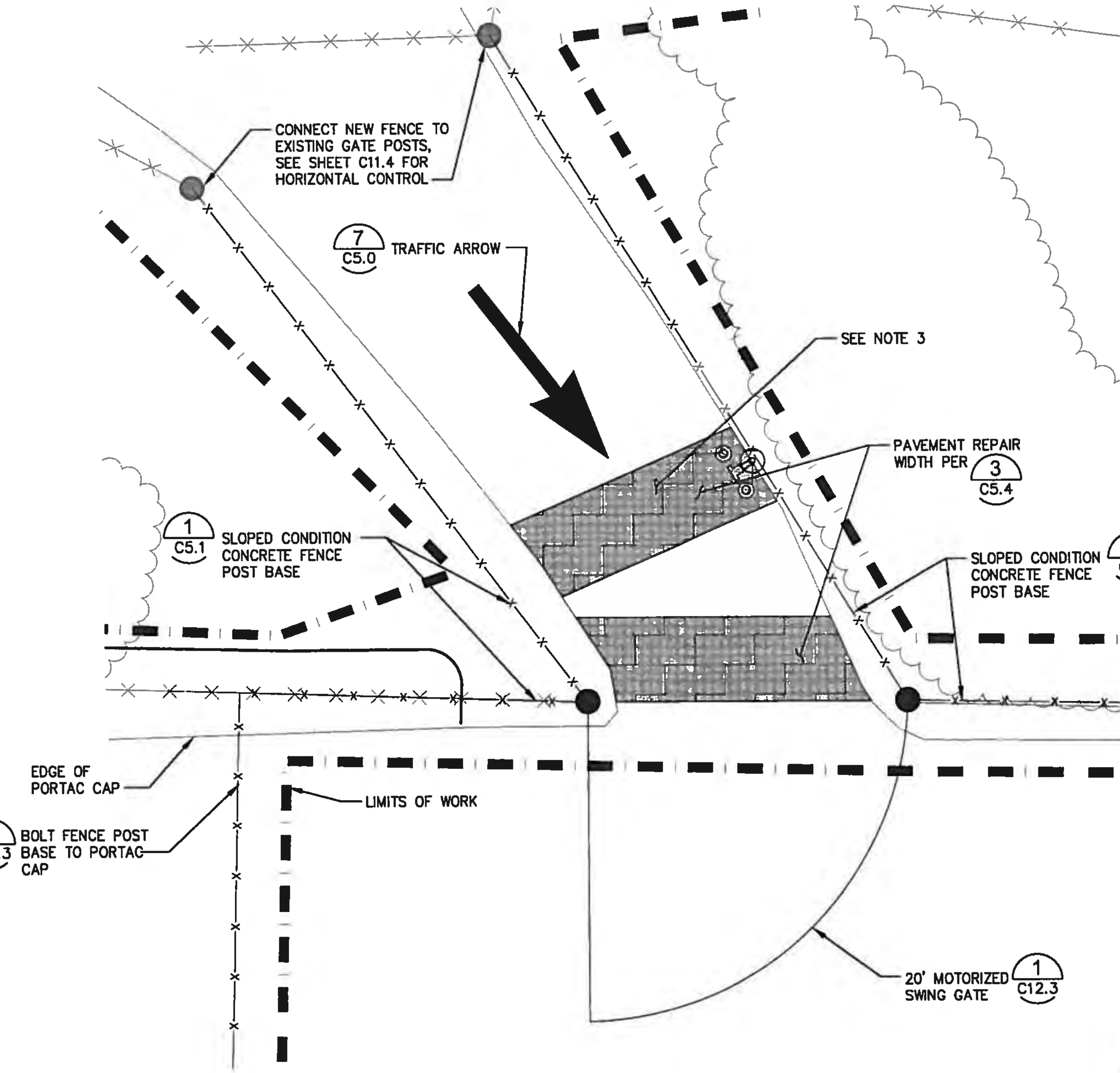
TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
DAT-HRZ: | VERT:
PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

6556
C11.4
SHEET 34 OF 53

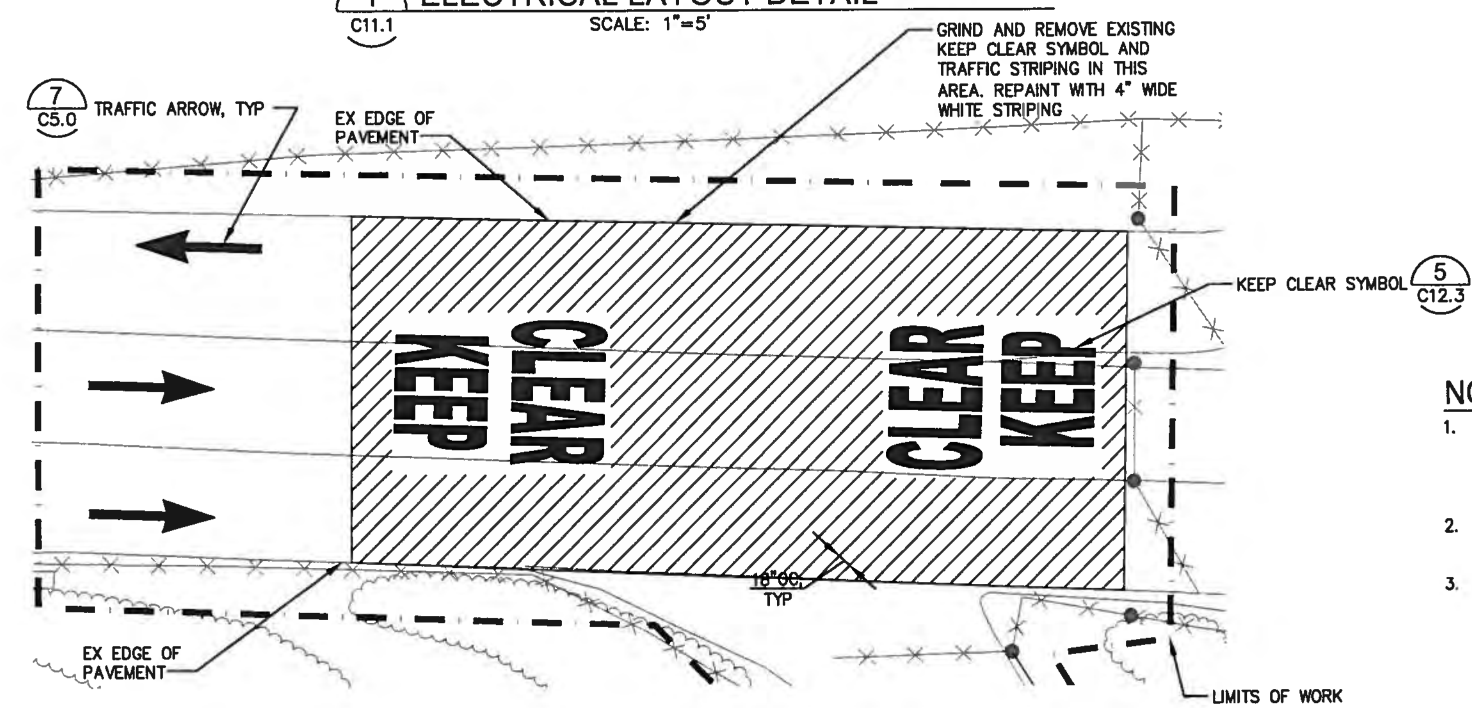
CONT/CONS: 070287
M. ID:
PHASE: 100%



ACCESS GATE
1 ELECTRICAL LAYOUT DETAIL
C11.1 SCALE: 1"=5'



ACCESS GATE AND
2 PAVEMENT REPAIR DETAIL
C11.1 SCALE: 1"=5'



ACCESS GATE
3 PAVEMENT STRIPING DETAIL
C11.1 SCALE: 1"=10'

NOTES:

1. LOCATION OF GATE OPERATOR IS APPROXIMATE. CONTRACTOR TO COORDINATE WITH GATE OPERATOR MANUFACTURER FOR PLACEMENT OF GATE OPERATOR.
2. FOR ELECTRICAL, SEE ELECTRICAL SHEETS E1.0 THRU E3.0.
3. RECORD DRAWINGS DEPICT EXISTING DRIVEWAY PAVEMENT TO BE 13" OF ROLLER COMPACTED CONCRETE OVER 9" OF BALLAST. CONTRACTOR SHALL VERIFY PAVEMENT DEPTHS AND REPLACE IN KIND.

Port of Tacoma

kpff 2407 North 31st Street, Suite 100 Tacoma, Washington 98407 (253) 396-0150 Fax (253) 396-0162

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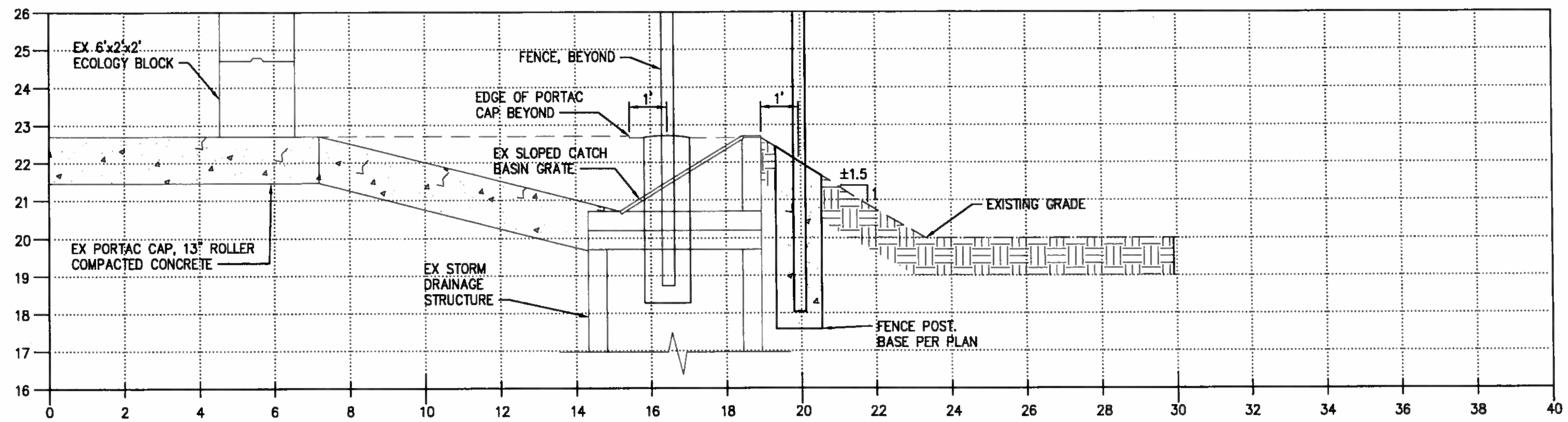
6/2/16	RGC 05/20/2016
DIRECTOR ENG. DATE	PROJ. ENGR DATE
PRINTED BY: rchandler May 20, 2016	
PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837	

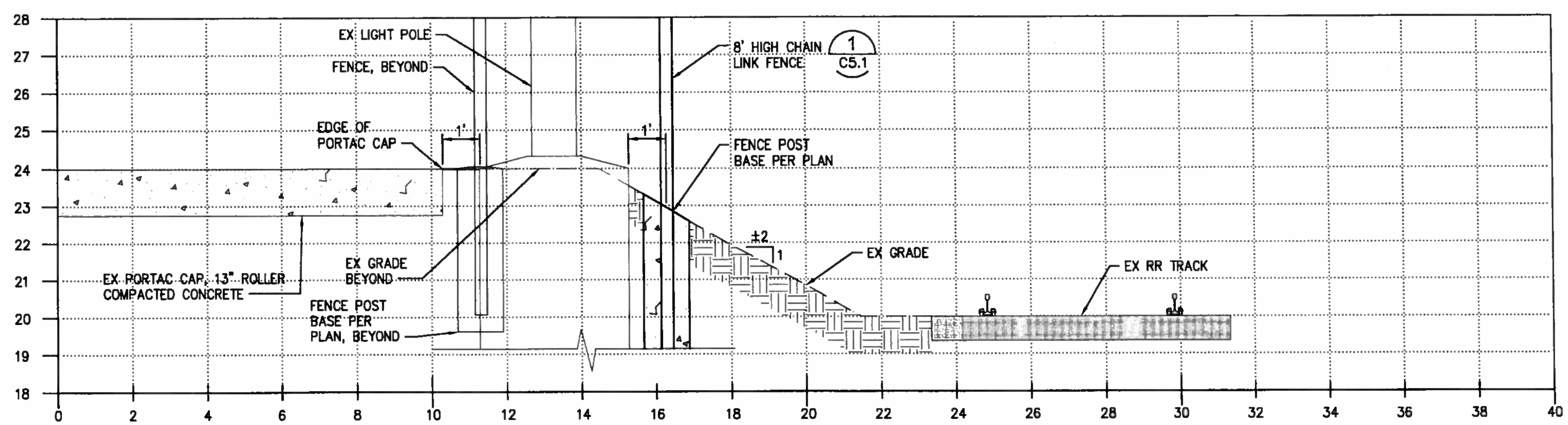
PCT TRUCK STAGING
PORTAC
DETAILS

TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
DAT-HRZ:	VERT:	
PARCEL: 5000350150		DRAWING SCALE: AS NOTED

6556
C12.1
SHEET 35 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%



A FENCE SECTION
C11.1
SCALE: 1" = 2'



B FENCE SECTION
C11.2
SCALE: 1" = 2'

BINDING EDGE

PORT OF TACOMA FILE: N:\Civil\114\114080 Port of Tacoma Planning On-Call\114080.16 PCT Gate Queue\Part 3 - KPFF Design\3.13 Drawings\091606-C121-C123 (Portac Fence Details)

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PRINTED BY: rchandler May 20, 2016
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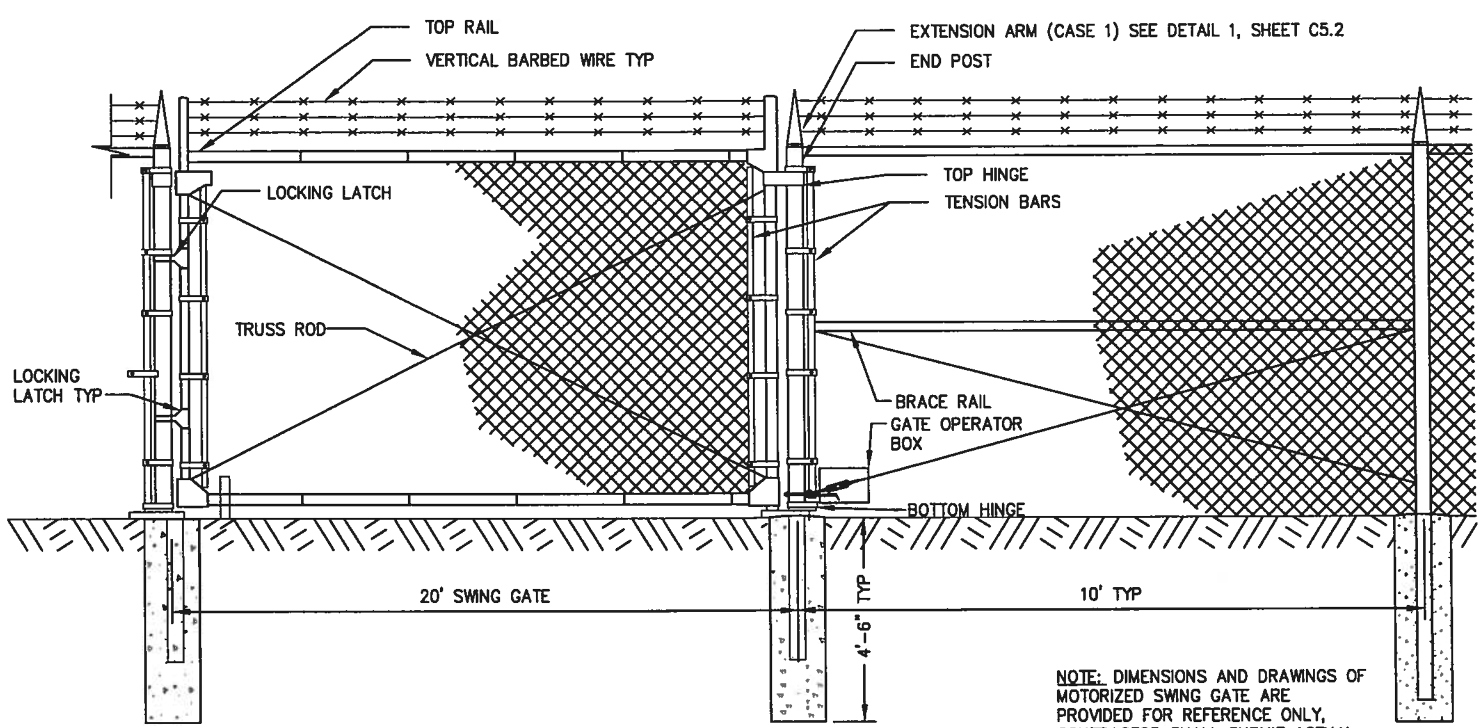
TACOMA, WA 98401-1837

PCT TRUCK STAGING
PORTAC
SITE SECTIONS

TOWNSHIP: 20N RANGE: 03E SECTION: 01
DAT-HRZ: VERT:
PARCEL: 5000350150 DRAWING SCALE: AS NOTED

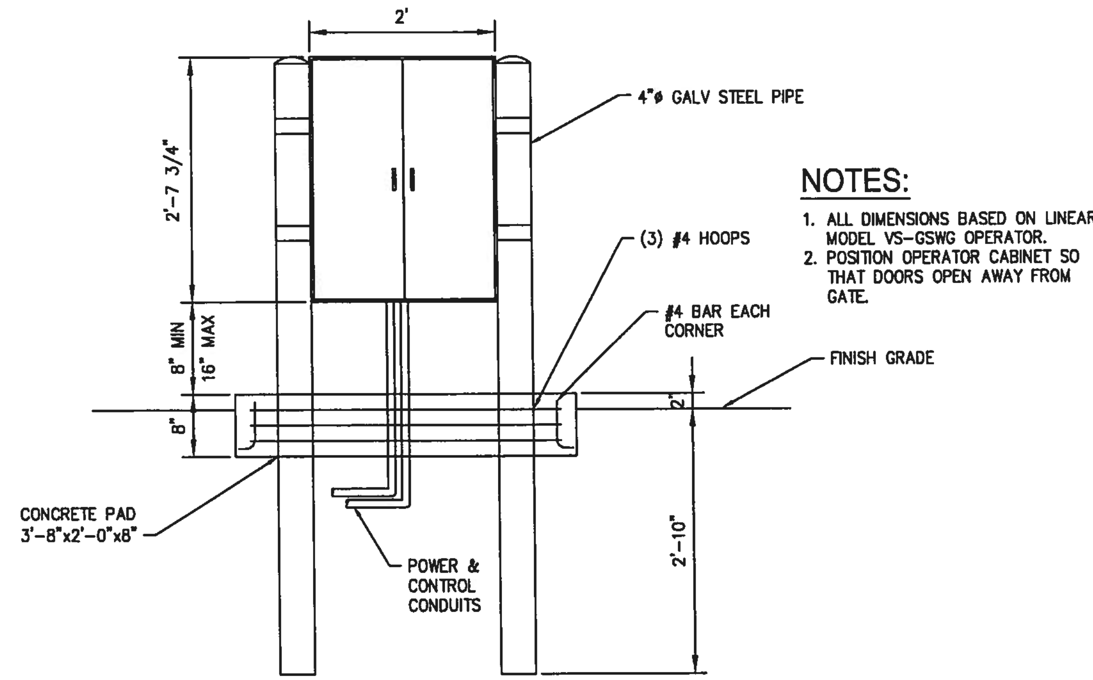
6556
C12.2
SHEET 36 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%

BINDING EDGE



NOTE: DIMENSIONS AND DRAWINGS OF MOTORIZED SWING GATE ARE PROVIDED FOR REFERENCE ONLY, CONTRACTOR SHALL SUBMIT ACTUAL PRODUCT FOR APPROVAL. SEE SPECIFICATIONS.

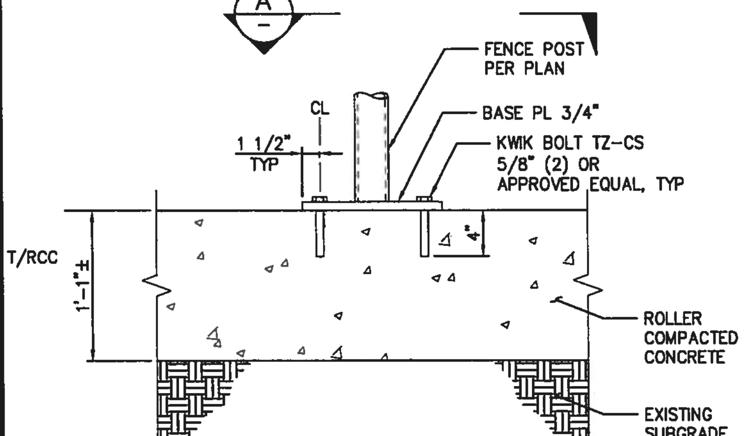
1 MOTORIZED CHAIN LINK GATE WITH CARD READERS, 20 FT-PORTAC DETAIL
C12.1
SCALE: NTS



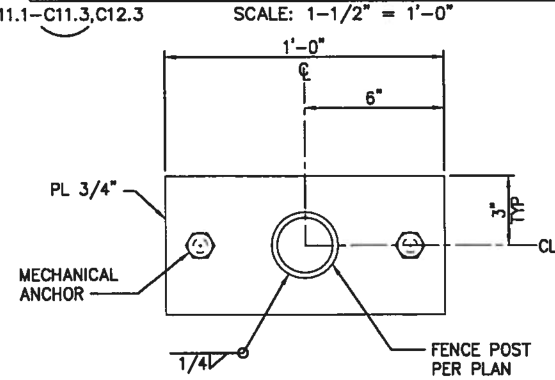
NOTES:
1. ALL DIMENSIONS BASED ON LINEAR MODEL VS-GSWG OPERATOR.
2. POSITION OPERATOR CABINET SO THAT DOORS OPEN AWAY FROM GATE.

2 SWING GATE CONTROL PANEL
C12.1
SCALE: NTS

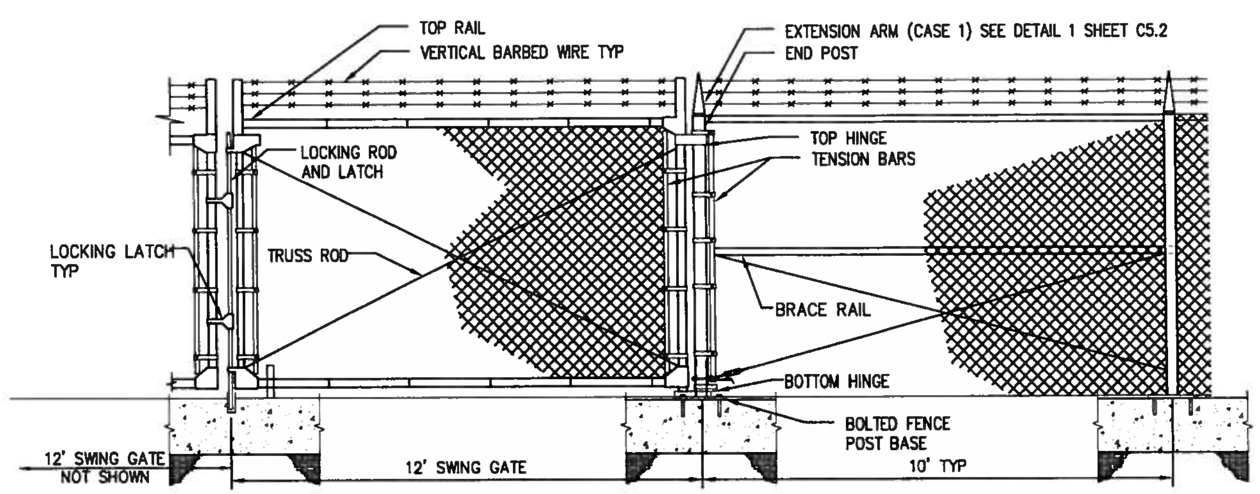
A



3 BOLTED FENCE POST BASE DETAIL
C11.1-C11.3,C12.3
SCALE: 1-1/2" = 1'-0"

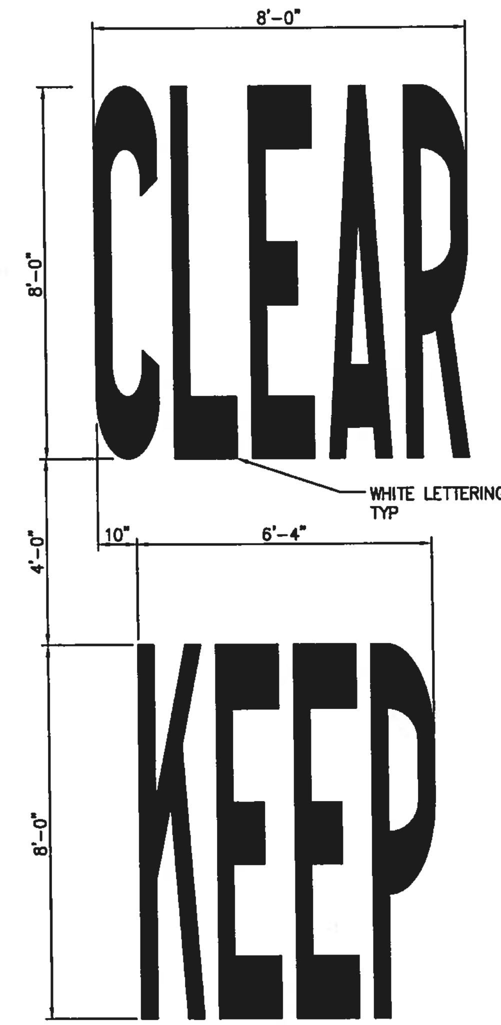


A BOLTED FENCE POST BASE SECTION
SCALE: 3" = 1'-0"



NOTE: DIMENSIONS AND DRAWINGS OF MANUAL SWING GATE ARE PROVIDED FOR REFERENCE ONLY, CONTRACTOR SHALL SUBMIT ACTUAL PRODUCT FOR APPROVAL. SEE SPECIFICATIONS.

4 MANUAL CHAIN LINK SWING GATE, 24 FT-PORTAC DETAIL
C11.1
SCALE: NTS



5 KEEP CLEAR DETAIL
C12.1
SCALE: NTS

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PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837

PCT TRUCK STAGING
PORTAC
DETAILS

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
DAT-HRZ: | VERT:
PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

6556
C12.3
SHEET 37 OF 53
CONT/CONS: 070287
M. ID:
PHASE: 100%

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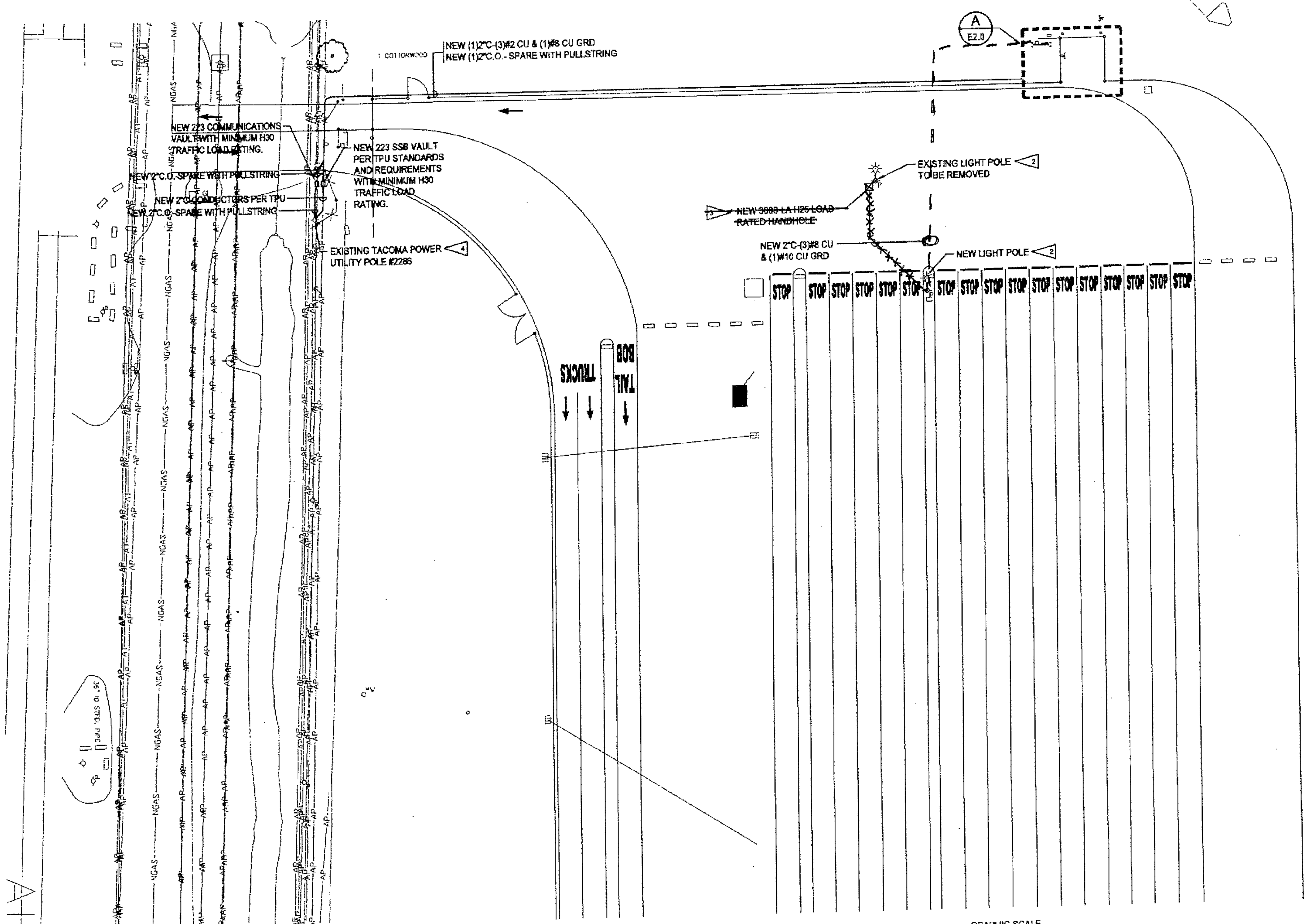
PORT OF TACOMA FILE: N:\Jobs\2016\16-002\Dwgs\16-002-E10

BINDING EDGE



PARTIAL ELECTRICAL SITE PLAN

SCALE: 1" = 30'-0"

N

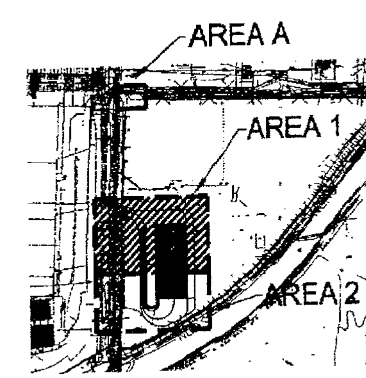
1"=30'-0" GRAPHIC SCALE 30 0 30 60 scale feet

GENERAL NOTES:

1. ALL UNDERGROUND CONDUIT SHALL BE SCHEDULE 80 PVC. ALL EXPOSED ABOVE GRADE CONDUIT SHALL BE PVC COATED RIGID STEEL.
2. METALLIC CONDUITS, COUPLINGS AND JOINTS OF METALLIC CONDUITS EMBEDDED IN CONCRETE, CDF, EARTH OR ASPHALT SHALL BE 1/2 LAP TAPED OR OTHERWISE MADE WATERTIGHT TO PREVENT INTRUSION OF MORTAR, WATER OR OTHER MATERIALS.
3. ALL CONDUIT SHOWN IS BELOW GRADE UNLESS NOTED OTHERWISE. SEE DETAIL B, E2.0 FOR TRENCHING REQUIREMENTS.
4. STORM DRAIN MANHOLES, ELECTRICAL/COMMUNCIATION VAULTS, AND CATCH BASINS SHALL BE DESIGNED AND CONSTRUCTED WITH FLAT SLAB TOPS AND SHALL BE CONFIGURED TO ACCEPT FUTURE ADDITION OF A MINIMUM 4" RISER SECTION BETWEEN LID OR GRATE OR TOP OF STRUCTURE.

ELECTRICAL NOTES:

1. CONTRACTOR SHALL DISCONNECT EXISTING POWER CIRCUIT FROM LIGHT POLE. REMOVE EXISTING DISCONNECT, LIGHTING CONTACTOR AND LIGHT FIXTURES.
2. NEW 95'-0", 80'-0" ABOVE GRADE, WOOD LIGHT POLE. CONTRACTOR SHALL PROVIDE NEW 30A, 480V, 3PH, FUSED DISCONNECT AND CONNECT TO NEW CONDUIT AND CONDUCTORS. REINSTALL EXISTING LIGHTING CONTACTOR AND PHOTOCELL ON NEW WOOD POLE. CONNECT TO EIGHT(8) NEW LIGHT FIXTURES MOUNTED ON POLE.
3. CONTRACTOR SHALL INTERCEPT EXISTING CONDUIT AT EXISTING LIGHT POLE LOCATION AND EXTEND INTO NEW HANDHOLE. PROVIDE WATERTIGHT SPLICE OF EXISTING AND NEW CONDUCTORS IN HANDHOLE.
4. EXISTING TACOMA POWER UTILITY POLE WITH NEW POLE MOUNTED TRANSFORMER TO SERVE NEW GATE ELECTRICAL SERVICE. PROVIDE CONDUIT POLE RISER AT EXISTING UTILITY POLE PER TACOMA POWER STANDARDS AND REQUIREMENTS. CONTRACTOR SHALL CLEAR BRUSH OUT AROUND UTILITY POLE FOR INSTALLATION OF CONDUIT AND 223 SSB VAULT.



KEY PLAN

NOT TO SCALE

N

IF SHEET IS LESS THAN 22" x 34" IT IS A REDUCED SET

Port of Tacoma

CROSS ENGINEERS, INC

MARK:	REVISION:	BY:	APPR:	DATE:

STEVEN L. HUBBS — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER — 5/23/16

APPROVED:	SLH 05/23/2016
	CHECKED BY DATE
6/2/16	GLW 05/23/2016
DIRECTOR ENG. DATE	PROJ. ENGR DATE
PRINTED BY: ScottK May 22, 2016	
PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837	

PCT TRUCK STAGING

PCT PARTIAL ELECTRICAL SITE PLAN - AREA 1

TOWNSHIP: 20N	RANGE: 03E	SECTION: 01
DAT-HRZ:	VERT:	
PARCEL: 5000350150	DRAWING SCALE: AS NOTED	

6556

E1.0

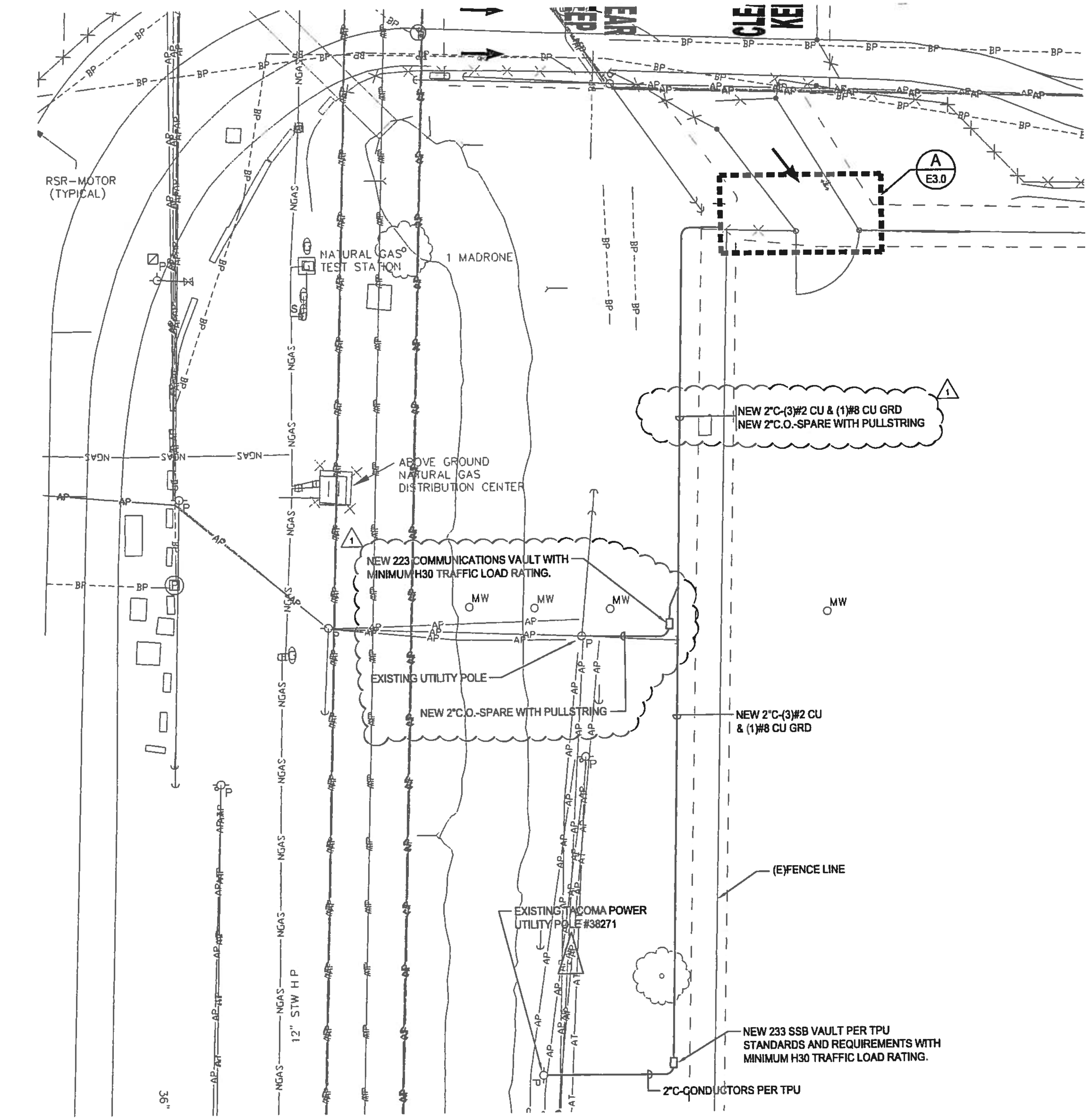
SHEET 38 OF 53

CONT/CONS: 070287

M. ID:

PHASE: BID

BINDING EDGE



PARTIAL ELECTRICAL SITE PLAN

SCALE: 1" = 20'-0"

N

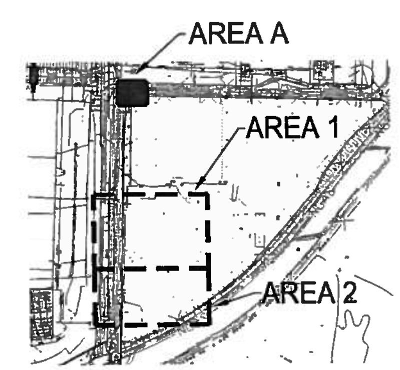
GRAPHIC SCALE 1"=20'-0" 20 0 20 40 scale feet

GENERAL NOTES:

1. ALL UNDERGROUND CONDUIT SHALL BE SCHEDULE 80 PVC. ALL EXPOSED ABOVE GRADE CONDUIT SHALL BE PVC COATED RIGID STEEL.
2. METALLIC CONDUITS, COUPLINGS AND JOINTS OF METALLIC CONDUITS EMBEDDED IN CONCRETE, CDF, EARTH OR ASPHALT SHALL BE 1/2 LAP TAPED OR OTHERWISE MADE WATERTIGHT TO PREVENT INTRUSION OF MORTAR, WATER OR OTHER MATERIALS.
3. ALL CONDUIT SHOWN IS BELOW GRADE UNLESS NOTED OTHERWISE. SEE DETAIL B, E2.0 FOR TRENCHING REQUIREMENTS.
4. STORM DRAIN MANHOLES, ELECTRICAL/COMMUNCIATION VAULTS, AND CATCH BASINS SHALL BE DESIGNED AND CONSTRUCTED WITH FLAT SLAB TOPS AND SHALL BE CONFIGURED TO ACCEPT FUTURE ADDITION OF A MINIMUM 4" RISER SECTION BETWEEN LID OR GRATE OR TOP OF STRUCTURE.

ELECTRICAL NOTES:

1. EXISTING TACOMA POWER UTILITY POLE WITH NEW POLE MOUNTED TRANSFORMER TO SERVE NEW GATE ELECTRICAL SERVICE. PROVIDE CONDUIT POLE RISER AT EXISTING UTILITY POLE PER TACOMA POWER STANDARDS AND REQUIREMENTS. CONTRACTOR SHALL CLEAR BRUSH OUT AROUND UTILITY POLE FOR INSTALLATION OF CONDUIT AND 223 SSB VAULT.



KEY PLAN

NOT TO SCALE

N

IF SHEET IS LESS THAN 22" x 34" IT IS A REDUCED SET

Port of Tacoma

CROSS ENGINEERS, INC

MARK:	REVISION:	BY:	APPR:	DATE:
1	ADDENDUM #1	SJK	GLW	6/14/16

STEVEN L. HUBBS PROFESSIONAL ENGINEER 6/14/16

APPROVED: SLH 05/23/2016

CHECKED BY DATE GLW 05/23/2016

DIRECTOR ENG DATE 6/15/16 PROJ ENGR DATE

PRINTED BY ScottK Jun 14, 2016

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PCT TRUCK STAGING

PORTAC PARTIAL ELECTRICAL SITE PLAN - AREA A

TOWNSHIP-20N RANGE: 03E SECTION: 01

DAT-HRZ VERT DRAWING SCALE AS NOTED

PARCEL 5000350150

6556

E1.1

SHEET 39 OF 53

CONT/CONS 070287

M ID

PHASE BID

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NEMA 3R, 316 STAINLESS STEEL

SURFACE MOUNTING 10,000 AIC	PANEL SCHEDULE							
NO. GP1	LOCATION: GATE SERVING: GATE				120/240 VOLTS 1PH 3WIRE 100 AMPS WITH 100 MAIN BREAKER			
CKT NO.	LOAD DESCRIPTION	KVA	TRIP AMPS		TRIP AMPS	KVA	LOAD DESCRIPTION	CKT NO.
1	GATE OPERATOR	~~[illegible]~~	~~[illegible]~~		20	.18	RECEPTACLE	2
3	CARD READER	.10				.36	SECURITY RECEPTACLES	4
5	SPARE					.36	SECURITY RECEPTACLES	6
7							SPARE	8
9							SPARE	10
11	SPARE		20		20		SPARE	12
REMARKS: .					CONNECTED LOAD:	2.5 KVA	11 AMPS	
					DEMAND LOAD:	2.9 KVA	12 AMPS	

2P 20A
240V

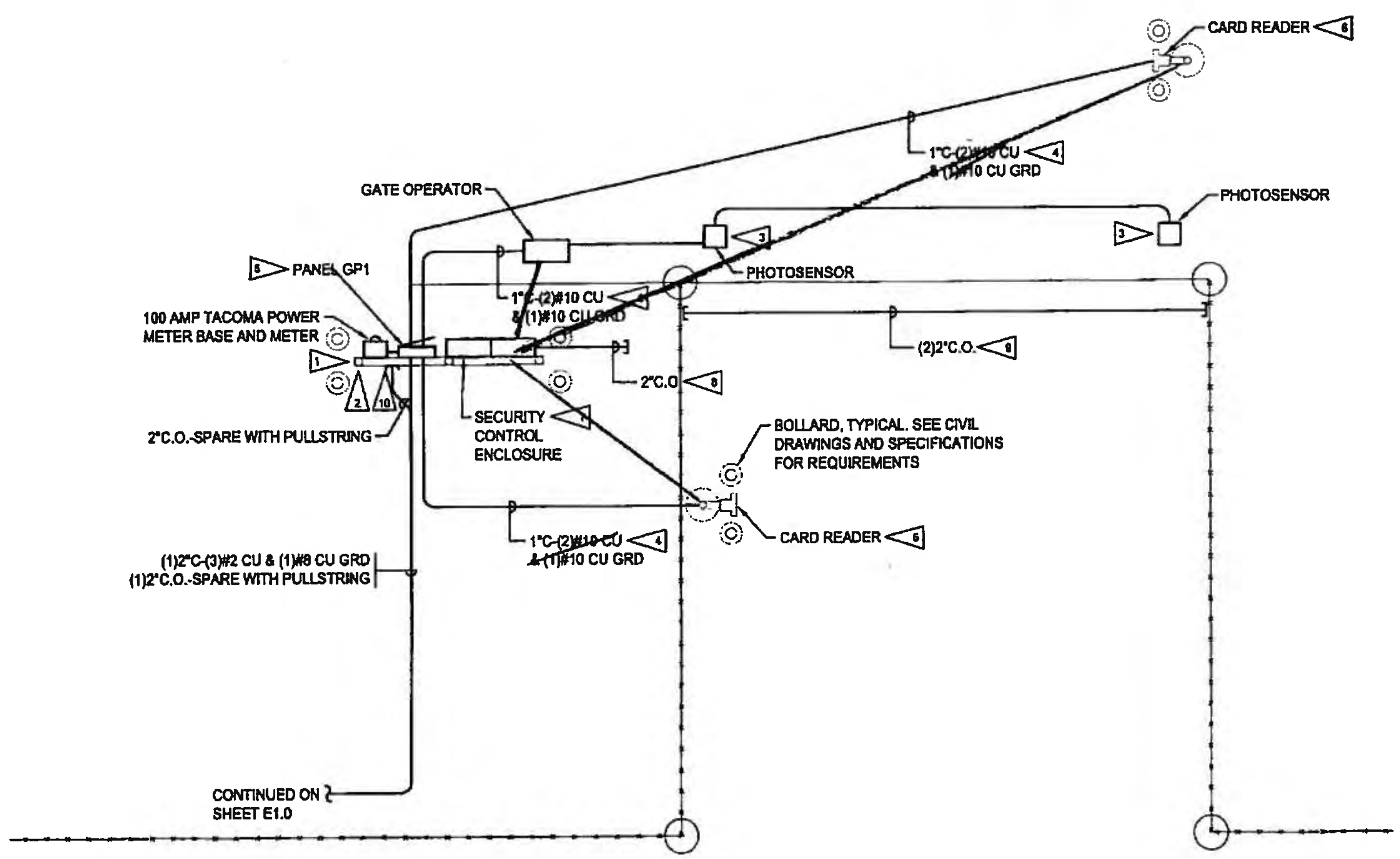
PROVIDE HANDLE TIES FOR ALL MULTI-CIRCUIT HOMERUNS SHARING A NEUTRAL PER THE NATIONAL ELECTRIC CODE ARTICLE 210.4 MULTIWIRE BRANCH CIRCUITS, PART (B) DISCONNECTING MEANS. DRAWINGS ARE DIAGRAMMATIC. WHERE THE CONTRACTOR MODIFIES THE CIRCUITING, THE CONTRACTOR SHALL PROVIDE AN INDIVIDUAL NEUTRAL PER CIRCUIT, MULTI-POLE CIRCUIT BREAKERS, OR CIRCUIT BREAKER HANDLE TIE TO MEET THE NEC ARTICLE. ALL COSTS ASSOCIATED WITH MODIFICATIONS SHALL BE INCLUDED IN THE CONTRACTOR'S BID.

GENERAL NOTES:

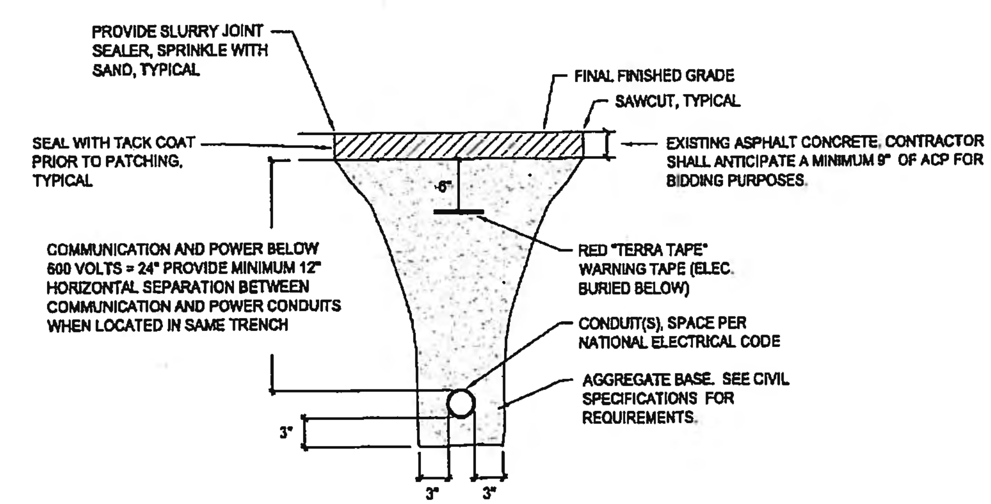
1. ALL UNDERGROUND CONDUIT SHALL BE SCHEDULE 80 PVC. ALL EXPOSED ABOVE GRADE CONDUIT SHALL BE PVC COATED RIGID STEEL.
2. METALLIC CONDUITS, COUPLINGS AND JOINTS OF METALLIC CONDUITS EMBEDDED IN CONCRETE, CDF, EARTH OR ASPHALT SHALL BE 1/2 LAP TAPED OR OTHERWISE MADE WATERTIGHT TO PREVENT INTRUSION OF MORTAR, WATER OR OTHER MATERIALS.
3. ALL CONDUIT SHOWN IS BELOW GRADE UNLESS NOTED OTHERWISE. SEE DETAIL B, E2.0 FOR TRENCHING REQUIREMENTS.
4. STORM DRAIN MANHOLES, ELECTRICAL/COMMUNCIATION VAULTS, AND CATCH BASINS SHALL BE DESIGNED AND CONSTRUCTED WITH FLAT SLAB TOPS AND SHALL BE CONFIGURED TO ACCEPT FUTURE ADDITION OF A MINIMUM 4" RISER SECTION BETWEEN LID OR GRATE OR TOP OF STRUCTURE.

ELECTRICAL NOTES:

1. PROVIDE 8'-0" SECTION OF 3" PVC COATED RIGID GALVANIZED STEEL CONDUIT WITH THREADED END CAP. PROVIDE 8" ROUND x 3'-0" DEEP CONCRETE BASE AND EMBED 3'-0" BELOW FINISHED GRADE.
2. PROVIDE (3)1-5/8" PVC COATED STRUT EACH SIDE BETWEEN PVC COATED RIGID STEEL POSTS (CONDUIT) FOR MOUNTING EQUIPMENT. PROVIDE STAINLESS STEEL MOUNTING HARDWARE FOR STRUT AND EQUIPMENT MOUNTING.
3. POWER FOR PHOTOSENSOR IS FROM GATE OPERATOR. CONTRACTOR SHALL PROVIDE 3/4" CONDUIT WITH CONDUCTORS PER GATE MANUFACTURER FROM GATE OPERATOR TO PHOTOSENSOR.
4. CONTRACTOR SHALL PROVIDE ADDITIONAL 600V INSULATED CONTROL WIRING PER GATE MANUFACTURER REQUIREMENTS.
5. CONTRACTOR SHALL PROVIDE 120V, 20A, GFI, DUPLEX RECEPTACLE WITH NEMA 3R "IN USE" COVER MOUNTED ADJACENT TO PANEL. PROVIDE 3/4"C-(2)#12 CU & (1)#12 CU GRD AND CONNECT TO CIRCUIT #2 IN POWER PANEL.
6. CONTRACTOR SHALL PROVIDE 1"C.O. WITH PULLSTRING FROM CARD READER TO GATE OPERATOR FOR SECURITY WIRING. SECURITY WIRING BY OTHERS.
7. CONTRACTOR SHALL PROVIDE 48"x48"x10", NEMA 4X, HINGED AND LOCKING SECURITY CONTROL ENCLOSURE. PROVIDE FOUR(4), 125V, 20A, GFI, DUPLEX RECEPTACLES IN ENCLOSURE FOR CONNECTION AT SECURITY EQUIPMENT. PROVIDE (2)3/4"C-(2)#12 CU & (1)#12 CU GRD EACH FROM PANEL GP1 TO DUPLEX RECEPTACLES. CONNECT TWO(2) DUPLEX RECEPTACLES TO EACH POWER CIRCUIT.
8. CONTRACTOR SHALL PROVIDE 2"C.O. WITH PULLSTRING FROM SECURITY CONTROL ENCLOSURE TO FENCE. STUB AND CAP CONDUITS 6" ABOVE FINISHED GRADE.
9. CONTRACTOR SHALL PROVIDE (2)2"C.O. WITH PULLSTRINGS ACROSS GATE OPENING. STUB AND CAP CONDUITS 6" ABOVE FINISHED GRADE.
10. CONTRACTOR SHALL STUB AND CAP CONDUIT 6" ABOVE FINISHED GRADE.



A E2.0 **PARTIAL ELECTRICAL PLAN - SOUTH SECURITY GATE**
SCALE: 1/4" = 1'-0"



B E2.0 **TYPICAL CONDUIT TRENCHING**
NOT TO SCALE

IF SHEET IS LESS THAN 22" x 34" IT IS A REDUCED SET

PCT TRUCK STAGING
PCT SOUTH GATE ELECTRICAL PLAN/ ELECTRICAL DETAILS
6556
E2.0
SHEET 40 OF 53
CONT/CONS: 070287 | TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
M. ID: | DAT-HRZ: | VERT:
PHASE: BID | PARCEL: 5000350150 | DRAWING SCALE: AS NOTED
APPROVED: 6/2/16 DIRECTOR ENG. DATE
SLH 05/23/2016 CHECKED BY DATE
GLW 05/23/2016 PROJ. ENGR DATE
PRINTED BY: ScottK May 22, 2016
PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837
STEVEN L. HUBBS PROFESSIONAL ENGINEER 5/23/16
CROSS ENGINEERS, INC
Port of Tacoma
MARK: | REVISION: | BY: | APPR: | DATE:

BINDING EDGE
PORT OF TACOMA FILE: N:\Jobs\2016\16-002\Dwgs\16-002-E20

GENERAL NOTES:

1. ALL UNDERGROUND CONDUIT SHALL BE SCHEDULE 80 PVC. ALL EXPOSED ABOVE GRADE CONDUIT SHALL BE PVC COATED RIGID STEEL.
2. METALLIC CONDUITS, COUPLINGS AND JOINTS OF METALLIC CONDUITS EMBEDDED IN CONCRETE, CDF, EARTH OR ASPHALT SHALL BE 1/2 LAP TAPED OR OTHERWISE MADE WATERTIGHT TO PREVENT INTRUSION OF MORTAR, WATER OR OTHER MATERIALS.
3. ALL CONDUIT SHOWN IS BELOW GRADE UNLESS NOTED OTHERWISE. SEE DETAIL B, E2.0 FOR TRENCHING REQUIREMENTS.
4. STORM DRAIN MANHOLES, ELECTRICAL/COMMUNCIATION VAULTS, AND CATCH BASINS SHALL BE DESIGNED AND CONSTRUCTED WITH FLAT SLAB TOPS AND SHALL BE CONFIGURED TO ACCEPT FUTURE ADDITION OF A MINIMUM 4" RISER SECTION BETWEEN LID OR GRATE OR TOP OF STRUCTURE.

ELECTRICAL NOTES:

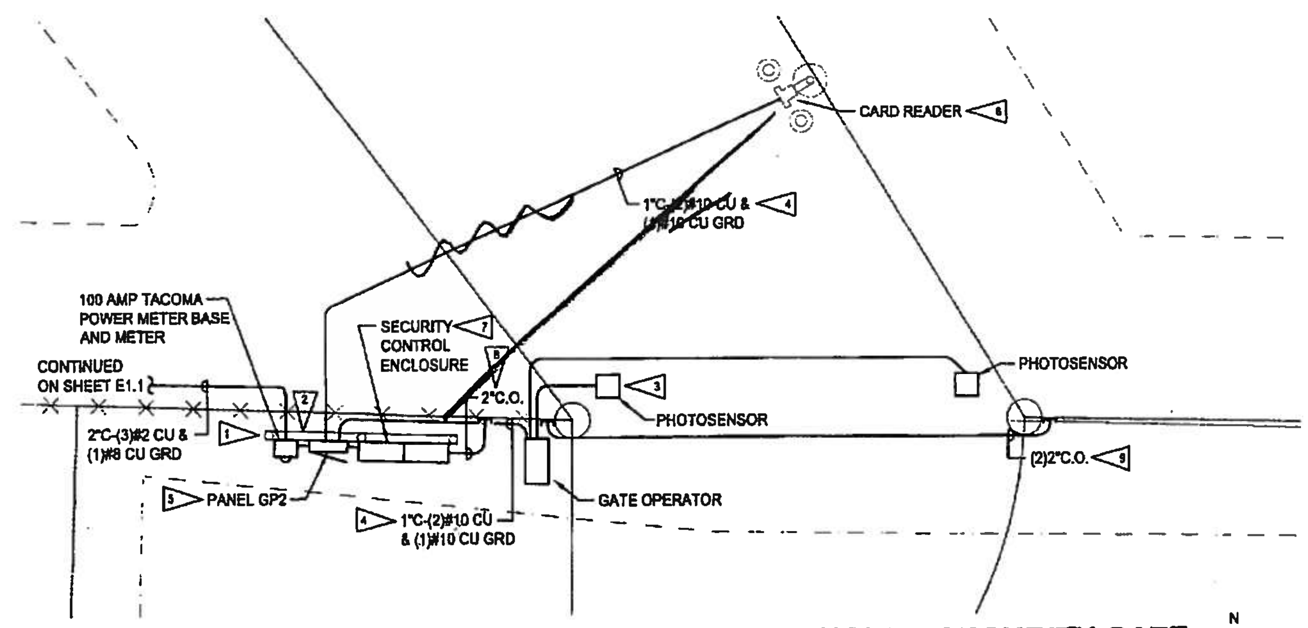
1. PROVIDE 8'-0" SECTION OF 3" PVC COATED RIGID GALVANIZED STEEL CONDUIT WITH THREADED END CAP. PROVIDE 8" ROUND x 3'-0" DEEP CONCRETE BASE AND EMBED 3'-0" BELOW FINISHED GRADE.
2. PROVIDE (3)1-5/8" PVC COATED STRUT EACH SIDE BETWEEN PVC COATED RIGID STEEL POSTS (CONDUIT) FOR MOUNTING EQUIPMENT. PROVIDE STAINLESS STEEL MOUNTING HARDWARE FOR STRUT AND EQUIPMENT MOUNTING.
3. POWER FOR PHOTOSENSOR IS FROM GATE OPERATOR. CONTRACTOR SHALL PROVIDE 3/4" CONDUIT WITH CONDUCTORS PER GATE MANUFACTURER FROM GATE OPERATOR TO PHOTOSENSOR.
4. CONTRACTOR SHALL PROVIDE ADDITIONAL 600V INSULATED CONTROL WIRING PER GATE MANUFACTURER REQUIREMENTS.
5. CONTRACTOR SHALL PROVIDE 120V, 20A, GFI, DUPLEX RECEPTACLE WITH NEMA 3R "IN USE" COVER MOUNTED ADJACENT TO PANEL. PROVIDE 3/4"C-(2)#12 CU & (1)#12 CU GRD AND CONNECT TO CIRCUIT #2 IN POWER PANEL.
6. CONTRACTOR SHALL PROVIDE 1"C.O. WITH PULLSTRING FROM CARD READER TO GATE OPERATOR FOR SECURITY WIRING. SECURITY WIRING BY OTHERS.
7. CONTRACTOR SHALL PROVIDE 48"x48"x10", NEMA 4X, HINGED AND LOCKING SECURITY CONTROL ENCLOSURE. PROVIDE FOUR(4), 125V, 20A, GFI, DUPLEX RECEPTACLES IN ENCLOSURE FOR CONNECTION AT SECURITY EQUIPMENT. PROVIDE (2)3/4"C-(2)#12 CU & (1)#12 CU GRD EACH FROM PANEL GP2 TO DUPLEX RECEPTACLES. CONNECT TWO(2) DUPLEX RECEPTACLES TO EACH POWER CIRCUIT.
8. CONTRACTOR SHALL PROVIDE 2"C.O. WITH PULLSTRING FROM SECURITY CONTROL ENCLOSURE TO FENCE. STUB AND CAP CONDUITS 6" ABOVE FINISHED GRADE.
9. CONTRACTOR SHALL PROVIDE (2)2"C.O. WITH PULLSTRINGS ACROSS GATE OPENING. STUB AND CAP CONDUITS 6" ABOVE FINISHED GRADE.

NEMA 3R, 316 STAINLESS STEEL

SURFACE MOUNTING 10,000 AIC	PANEL SCHEDULE							
NO. GP2	LOCATION: GATE SERVING: GATE				120/240 VOLTS 1PH 3WIRE 100 AMPS WITH 100 MAIN BREAKER			
CKT NO.	LOAD DESCRIPTION	KVA	TRIP AMPS		TRIP AMPS	KVA	LOAD DESCRIPTION	CKT NO.
1	GATE OPERATOR	~~1.50~~	~~20~~		20	.18	RECEPTACLE	2
3	CARD READER	.10				.36	SECURITY RECEPTACLES	4
5	SPARE					.36	SECURITY RECEPTACLES	6
7							SPARE	8
9							SPARE	10
11	SPARE		20		20		SPARE	12
REMARKS:					CONNECTED LOAD:	2.5 KVA	11 AMPS	
					DEMAND LOAD:	2.9 KVA	12 AMPS	

2P 20A
240V

PROVIDE HANDLE TIES FOR ALL MULTI-CIRCUIT HOMERUNS SHARING A NEUTRAL PER THE NATIONAL ELECTRIC CODE ARTICLE 210.4 MULTIWIRE BRANCH CIRCUITS, PART (B) DISCONNECTING MEANS. DRAWINGS ARE DIAGRAMMATIC. WHERE THE CONTRACTOR MODIFIES THE CIRCUITING, THE CONTRACTOR SHALL PROVIDE AN INDIVIDUAL NEUTRAL PER CIRCUIT, MULTI-POLE CIRCUIT BREAKERS, OR CIRCUIT BREAKER HANDLE TIE TO MEET THE NEC ARTICLE. ALL COSTS ASSOCIATED WITH MODIFICATIONS SHALL BE INCLUDED IN THE CONTRACTOR'S BID.



A
E3.0
PARTIAL ELECTRICAL PLAN - NORTH SECURITY GATE
SCALE: 1/4" = 1'-0"

IF SHEET IS LESS THAN 22" x 34" IT IS A REDUCED SET

Port of Tacoma
CROSS ENGINEERS, INC

MARK: | REVISION: | BY: | APPR: | DATE:

STEVEN L. HUBBS, PROFESSIONAL ENGINEER 5/23/16

APPROVED: | SLH 05/23/2016 | CHECKED BY DATE | GLW 05/23/2016 | DIRECTOR ENG. DATE 6/2/16 | PROJ. ENGR DATE
PRINTED BY: ScottK May 22, 2016
PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837

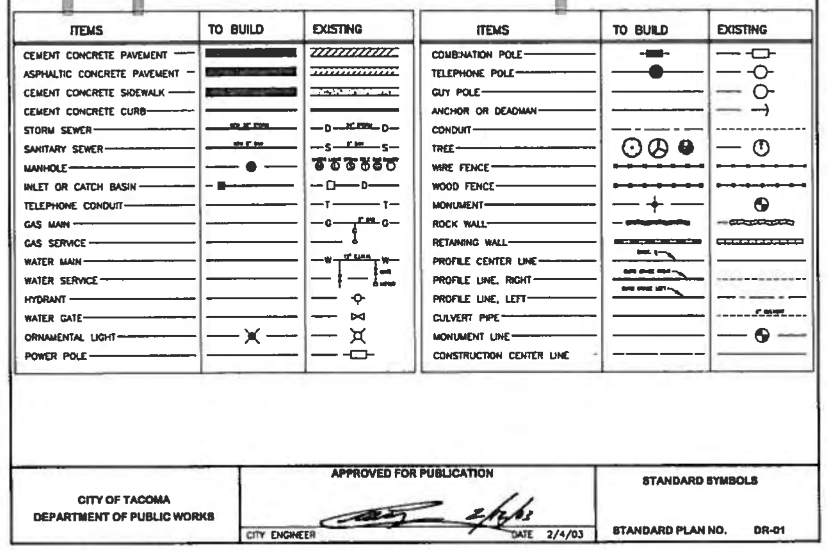
PCT TRUCK STAGING
PORTAC NORTH GATE ELECTRICAL PLAN

TOWNSHIP: 20N | RANGE: 03E | SECTION: 01
DAT-HRZ: | VERT:
PARCEL: 5000350150 | DRAWING SCALE: AS NOTED

6556
E3.0
SHEET 41 OF 53
CONT/CONS: 070287
M. ID:
PHASE: BID

PORT OF TACOMA DRIVEWAY AND CHANNELIZATION IMPROVEMENTS

ALEXANDER AVENUE
TACOMA, WASHINGTON



CITY OF TACOMA STD PLANS NO. DR-01
STANDARD SYMBOLS
NTS

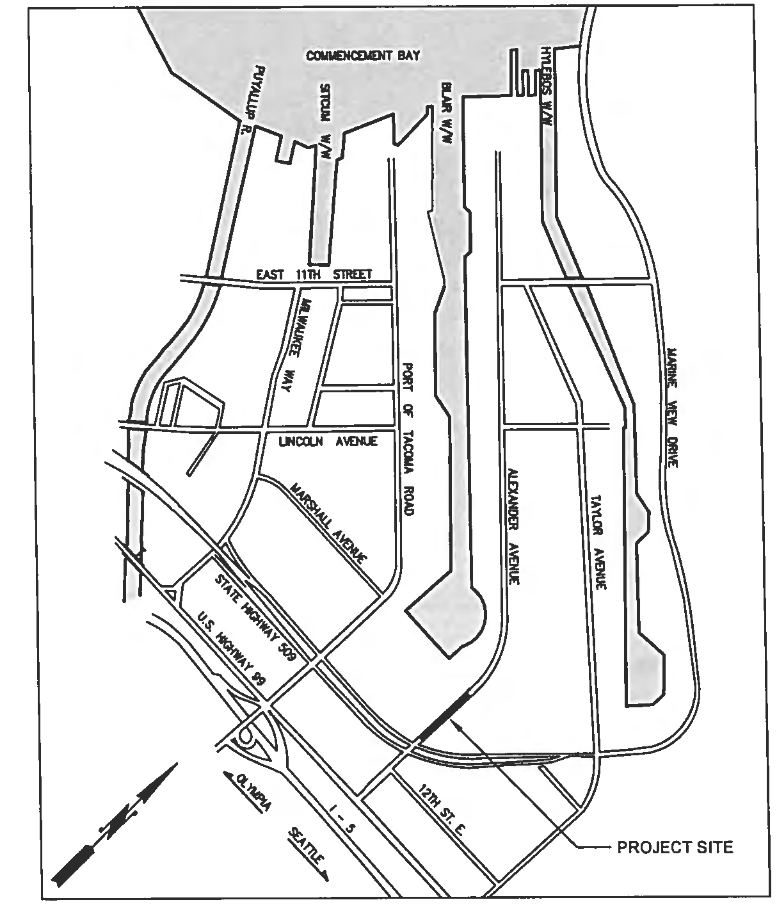
ABBREVIATIONS

BC	BOTTOM OF CURB
BW	BACK OF WALK
C&G	CURB & GUTTER
CB	CATCH BASIN
CL	CENTERLINE
CO	CLEANOUT
CONC	CONCRETE
CONST	CONSTRUCTION
DIA, ∅	DIAMETER
DIP	DUCTILE IRON PIPE
D/W	DRIVEWAY
E	EAST, EASTING
EX/EXIST	EXISTING
FF	FINISH FLOOR
FL	FLOW LINE
HP	HIGH POINT
IE	INVERT ELEVATION
LF	LINEAR FOOT
LT	LEFT
LP	LOW POINT
MECH	MECHANICAL
MH	MANHOLE
N	NORTH, NORTHING
NTS	NOT TO SCALE
P	POWER
PC	POINT OF CURVATURE
PCC	POINT OF COMBINED CURVATURE
R, P/L	PROPERTY LINE
PRC	POINT OF REVERSED CURVATURE
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE/POINT OF VERTICAL CURB
R	RADIUS
RT	RIGHT
RTO	RETURN TO OWNER
R/W	RIGHT-OF-WAY
S	SOUTH
SD	STORM DRAIN
SS	SANITARY SEWER
STA	STATION
S/W	SIDEWALK
T	TELEPHONE
TC	TOP OF CURB
TYP	TYPICAL
U	UNDERGROUND
W	WATER/WEST
W/	WITH
@	AT

GENERAL PLAN NOTES

1. COORDINATE ALL WORK WITH ON-SITE DOCUMENTS FOR BUILDING PERMITS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE SAFEGUARDS, SAFETY DEVICES, PROTECTIVE EQUIPMENT, FLAGGERS AND ANY OTHER NEEDED ACTIONS TO PROTECT THE LIFE, HEALTH AND SAFETY OF THE PUBLIC. ANY WORK WITHIN THE TRAVELED RIGHT-OF-WAY THAT MAY INTERRUPT NORMAL TRAFFIC FLOW SHALL REQUIRE NOTIFICATION AND COORDINATION WITH THE CITY OF TACOMA.
3. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE 2010 WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AS MODIFIED FOR USE BY THE CITY OF TACOMA AND THE CITY OF TACOMA STANDARD PLANS.
4. A COPY OF THE APPROVED PLANS AND SPECIFICATIONS SHALL BE ON-SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
5. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN ALL PERMITS REQUIRED FOR WORK WITHIN THE PUBLIC RIGHT-OF-WAY.
6. ALL LOCATIONS OF EXISTING UTILITIES SHOWN HEREON HAVE BEEN ESTABLISHED BY FIELD SURVEY OR OBTAINED FROM AVAILABLE RECORDS AND SHOULD THEREFORE BE CONSIDERED APPROXIMATE ONLY AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OR THE CONTRACTOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS SHOWN AND TO FURTHER DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN HEREON WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN.
7. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF UTILITIES BY CONTACTING A UTILITY LOCATE SERVICE AND SHALL PROVIDE SUFFICIENT NOTIFICATION TO THE AFFECTED UTILITY COMPANIES PRIOR TO STARTING WORK. COORDINATE WORK FOR EXISTING UTILITIES WITH CONTACTS SHOWN IN THE UTILITY CONTACTS TABLE. CONTACT UNDERGROUND UTILITIES LOCATION AT 1-800-424-5555 AT LEAST 48 HOURS BEFORE COMMENCEMENT OF CONSTRUCTION.
8. THE CONTRACTOR SHALL NOTIFY THE TACOMA FIRE DEPARTMENT (253) 591-5737 24 HOURS IN ADVANCE OF ALL WATER SERVICE INTERRUPTIONS, HYDRANT SHUTOFFS, AND STREET CLOSURES OR OTHER ACCESS BLOCKAGE. THE CONTRACTOR SHALL ALSO NOTIFY THE FIRE DEPARTMENT OF ALL NEW, RELOCATED, OR ELIMINATED HYDRANTS RESULTING FROM THIS WORK.
9. THE CONTRACTOR SHALL MAINTAIN EMERGENCY VEHICLE ACCESS ON ALL AFFECTED STREETS AT ALL TIMES.
10. MAINTAIN AND PROTECT ALL MANHOLES, CATCH BASINS, FIRE HYDRANTS, MONITORING WELLS, WATER VALVES, PIPING, SURVEY MONUMENTS, TRAFFIC CONTROL BOXES, WATER METERS AND ENGINEER OTHER IMPROVEMENTS UNLESS OTHERWISE NOTED ON THE PLANS. CONTRACTOR SHALL REPAIR OR REPLACE ALL ITEMS DAMAGED BY THE CONSTRUCTION OPERATIONS AT NO ADDITIONAL COST TO THE OWNER.
11. THESE PLANS ARE APPROVED FOR CONSTRUCTION FOR A PERIOD OF 24 MONTHS FROM THE DATE OF CITY APPROVAL. THE CITY RESERVES THE RIGHT TO REQUIRE REVISIONS, ADDITIONS, DELETIONS, OR MODIFICATIONS SHOULD CONSTRUCTION BE DELAYED BEYOND THIS TIME LIMITATION OR IF FIELD CONDITIONS ARE DIFFERENT FROM WHAT IS DEPICTED ON THESE PLANS.
12. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A TRAFFIC CONTROL PLAN TO THE CITY THAT MEETS THE CRITERIA OF THE CITY OF TACOMA TRAFFIC CONTROL HANDBOOK AND RIGHT-OF-WAY DESIGN MANUAL. CONTACT PUBLIC WORKS TRAFFIC ENGINEER, PHONE # (253) 591-5554 FOR SPECIFIC TRAFFIC CONTROL REQUIREMENTS FOR THIS PROJECT. A TRAFFIC CONTROL PLAN SHALL BE SUBMITTED AND APPROVED PRIOR TO COMMENCING WORK.
13. CONTRACTOR SHALL VERIFY ALL UTILITY POINTS OF CONNECTIONS TO EXISTING UTILITIES PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCY.
14. EXCAVATED MATERIAL MEETING PROJECT SPECIFICATIONS MAY BE USED FOR BACKFILL. NO STOCKPILING OF EXCAVATED MATERIAL IS ALLOWED WITHIN THE PROJECT LIMITS.
15. THE CONSTRUCTION BASELINE ON THE PLANS IS LOCATED ON THE EXISTING CENTERLINE OF RIGHT-OF-WAY FOR S. 12TH ST., MARTIN LUTHER KING JR. WAY AND THE ALLEY; ALL DIMENSIONS, STATIONS AND OFFSETS ARE BASED ON THE CONSTRUCTION BASELINE UNLESS NOTED OTHERWISE.
16. LIMITS OF PAVEMENT CURB, AND SIDEWALK REMOVAL SHOWN ON THE PLAN FOR BID PURPOSES. EXACT SAWCUT AND PAVEMENT REMOVAL LIMITS WILL BE DETERMINED BY THE CITY OF TACOMA CONSTRUCTION INSPECTOR IN THE FIELD.
17. ALL SIDEWALKS AND CURB RAMP CONSTRUCTION SHALL BE CONSTRUCTED TO THE MAXIMUM EXTENT FEASIBLE IN ACCORDANCE TO THE ADA STANDARDS FOR ACCESSIBLE DESIGN, 28 CFR, PART 35.
18. REMOVE AND REPLACE ALL BROKEN, DAMAGED, OR HAZARDOUS SIDEWALK, CURB AND GUTTER, AND DRIVEWAYS.
19. RESTORATION SHALL BE IN ACCORDANCE WITH THE CITY OF TACOMA ROW RESTORATION POLICY AS ADOPTED JUNE 2, 2009.
20. THE ENGINEER OF RECORD SHALL PROVIDE AN ENGINEER'S CERTIFICATION TO THE CITY OF TACOMA AFTER FACILITY INSTALLATION AND PRIOR TO PERMIT FINAL INSPECTION AND/OR CLOSEOUT. THE ENGINEER'S CERTIFICATION SHALL INCLUDE:
    a. THE PERMIT NUMBER
    b. STATEMENTS TO ATTEST:
    i. THAT ALL STORMWATER FACILITIES HAVE BEEN INSTALLED ACCORDING TO THE APPROVED PERMIT DOCUMENTS. CHANGES TO THE APPROVED PERMIT SET THAT ARE REQUIRED DURING CONSTRUCTION SHALL BE SUBMITTED TO BLUS FOR ESSE TO REVIEW AND APPROVAL DURING THE CONSTRUCTION PHASE AND PRIOR TO THE CHANGE BEING CONSTRUCTED.
    ii. AS-BUILT DRAWINGS HAVE BEEN PROVIDED TO THE CITY ELECTRONICALLY. THESE SHALL BE PROFESSIONALLY DRAFTED ENGINEERING DRAWINGS THAT ARE STAMPED, SIGNED, AND DATED BY A WASHINGTON STATE LICENSED ENGINEER. THE DRAWINGS MUST ACCURATELY REPRESENT THE PROJECT AS CONSTRUCTED.
    iii. THE OPERATIONS AND MAINTENANCE MANUAL IS LOCATED ONSITE.

THE ENGINEER'S CERTIFICATION SHALL BE SUBMITTED TO ENVIRONMENTAL SERVICES / PLAN REVIEW LEAD/ 326 EAST D STREET / TACOMA, WA 98421. FOR SITE AND BUILDING PERMITS SEND A COPY OF THE CERTIFICATION TO BUILDING AND LAND USE SERVICES 747 MARKET STREET, ROOM 345, TACOMA, WA 98402.



VICINITY MAP
NTS

GENERAL CONSTRUCTION SEQUENCE:

1. ARRANGE NECESSARY PRE-CONSTRUCTION MEETINGS WITH THE CITY OF TACOMA CONSTRUCTION DIVISION AND BUILDING AND LAND USE SERVICE, TACOMA POWER, TACOMA WATER, ARCHITECT, AND ENGINEER.
2. STAKE PROJECT LIMITS PRIOR TO BEGINNING CONSTRUCTION.
3. NOTIFY CITY INSPECTOR IN WRITING ABOUT SCHEDULED UTILITY AND ROAD CLOSURES AT LEAST 14 DAYS PRIOR TO CONSTRUCTION.
4. DAMAGE TO ANY OF THE PUBLIC UTILITIES AS A RESULT OF THE CONSTRUCTION OF THIS PROJECT SHALL BE REPAIRED BY THE CONTRACTOR.
5. INSTALL ALL APPLICABLE TESC FACILITIES PER BUILDING PERMIT PLANS. MAINTAIN ALL TESC FACILITIES DURING THE LENGTH OF THE CONSTRUCTION PROCESS. ADDITIONAL FACILITIES MAY BE REQUIRED AS FIELD CONDITIONS WARRANT.
6. DEMOLISH UTILITIES PER APPROVED PLANS. COORDINATE UTILITY DISRUPTIONS WITH UTILITY PROVIDERS AND ADJACENT PROPERTY OWNERS AT LEAST 10 DAYS PRIOR TO CONSTRUCTION.
7. COORDINATE INSTALLATION OF UTILITIES WITH UTILITY PROVIDERS, KEEPING COMMUNITY HEALTH CARE, ARCHITECT AND ENGINEER INFORMED OF ALL TASKS.
8. INSTALL ALL NEW PAVEMENT, CHANNELIZATION AND SIGNAGE.
9. REMOVE TESC FACILITIES ONLY AFTER OBTAINING FINAL APPROVAL FROM CITY INSPECTOR.
10. TRAFFIC TO REMAIN OPEN ON ALEXANDER AVENUE DURING CONSTRUCTION.

ELEVATION DATUM

VERTICAL DATUM: CITY OF TACOMA (NGVD 29)
BENCHMARK: 3 INCH BRASS DISK ON MILWAUKEE WAY, SOUTH OF E. 11TH AVENUE.
BENCHMARK NO. 2863
ELEVATION = 12.117'

BASIS OF BEARING

BASIS OF BEARINGS FOR THIS SURVEY IS THE CITY OF TACOMA DATUM, NAD 83(91) WASHINGTON SOUTH ZONE (3602).

SHEET INDEX:

1. COVER SHEET
2. SURVEY
3. SURVEY
4. DEMOLITION & TESC PLAN
5. DEMOLITION & TESC PLAN
6. TESC DETAILS
7. PAVING AND UTILITY PLAN
8. CHANNELIZATION & SIGNAGE PLAN
9. CHANNELIZATION & SIGNAGE PLAN
10. STREET SECTIONS & DRIVEWAY DETAILS
11. DETAILS
12. WORK ORDER GENERAL NOTES

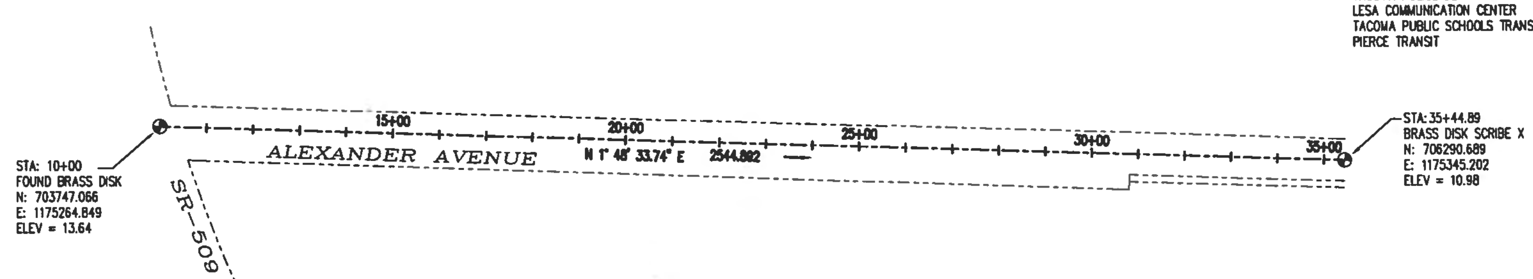
TRAFFIC CONTROL NOTES

LOCATION: ALEXANDER AVENUE
THE FOLLOWING SPECIAL TRAFFIC CONTROLS SHALL SUPPLEMENT SECTION 1-07.23 OF THE STANDARD SPECIFICATIONS.

1. BIDIRECTIONAL TRAFFIC TO MAINTAINED ON ALEXANDER AVENUE THROUGHOUT THE DURATION OF PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A TRAFFIC CONTROL PLAN TO THE CITY THAT MEETS THE CITY OF TACOMA TRAFFIC CONTROL HANDBOOK AND RIGHT-OF-WAY DESIGN MANUAL. CONTACT TRAFFIC DEPARTMENT, PHONE NUMBER (253) 591-5554, FOR SPECIFIC TRAFFIC CONTROL REQUIREMENTS FOR THIS PROJECT. A TRAFFIC CONTROL PLAN SHALL BE SUBMITTED AND APPROVED PRIOR TO COMMENCING WORK.
2. WHEN NECESSARY, AND JUSTIFIED, SINGLE LANES OF TRAFFIC MAY BE CLOSED DURING SPECIFIED HOURS OF THE DAY. THE DETERMINATION OF THESE HOURS SHALL BE IN CONSULTATION WITH AND SUBJECT TO THE APPROVAL OF THE CITY TRAFFIC ENGINEER AND PORT OF TACOMA. PROVIDED THAT LOCAL ACCESS IS MAINTAINED AT ALL TIMES WITH A MINIMUM OF A 12-FOOT WIDE ACCESS LANE FOR EACH DIRECTION OF TRAFFIC. THE CONTRACTOR SHALL COORDINATE ANY LANE CLOSURES AND COOPERATE WITH THE VARIOUS BUSINESSES AND/OR RESIDENCES ADJACENT TO THE PROJECT SITE. A MINIMUM OF ONE ACCESS SHALL BE MAINTAINED TO ALL PROPERTIES AND DIRVEWAYS ON ALEXANDER AVENUE AT ALL TIMES.

THREE (3) WORKING DAYS PRIOR TO ANY LANE CLOSURE, THE CONTRACTOR SHALL NOTIFY:

TACOMA PUBLIC WORKS ENGINEERING DIVISION	(253-591-5500)
TACOMA PUBLIC WORKS STREETS AND GROUNDS	(253-591-5495)
TACOMA PUBLIC WORKS SOLID WASTE	(253-591-5544)
TACOMA FIRE DEPARMENT	(253-591-5733)
TACOMA POLICE DEPARTMENT	(253-591-5951)
LESA COMMUNICATION CENTER	(253-798-4721-Opt.#3)
TACOMA PUBLIC SCHOOLS TRANSPORTATION OFFICE	(253-571-1853)
PIERCE TRANSIT	(253-581-8109)



GRAPHIC SCALE
0 100 200 400 800
1 inch = 200 ft. HORIZ

NOTE:
PRIOR TO SCHEDULING OF THE PRE-CONSTRUCTION MEETING AND ISSUANCE OF THE WORK ORDER PERMIT, A BOND SHALL BE SUBMITTED BY THE PERMIT APPLICANT FOR THE VALUE OF THE SCOPE OF WORK TO BE PERFORMED AS ILLUSTRATED BY THE APPROVED WORK ORDER PLANS IN ACCORDANCE WITH T.M.C. 10.22.070, SECTION F.

PROJECT CONTACT INFORMATION

OWNER – PORT OF TACOMA

PEDRO REYES, PROJECT MANAGER
EMAIL: preyes@portoftacoma.com

ENGINEER – KPFF CONSULTING ENGINEERS
STEVEN KINGSLEY, PROJECT MANAGER
PHONE: (253) 396-0150
EMAIL: steve.kingsley@kpff.com

UTILITY CONTACTS

UTILITY	REGULATORY AGENCY	CONTACT	PHONE NUMBER
STORM WATER	CITY OF TACOMA	ENVIRONMENTAL SERVICES	(253) 591-5588
SANITARY SEWER	CITY OF TACOMA	ENVIRONMENTAL SERVICES	(253) 591-5588
POWER	TACOMA POWER	JOHN MARTINSEN	(253) 502-8659
WATER	TACOMA WATER	KAREN GERKEN	(253) 502-8736
		GRANT WHITLEY	(253) 502-8746
GAS	PSE/PILCHUCK	TERRY BRENTIN	(253) 502-6242
TELEPHONE	QWEST	JOY BATEMAN	(253) 597-5100
CABLE	AT&T BROADBAND	MARTIN MCELROY	(253) 845-4867
FIRE PROTECTION	CITY OF TACOMA	CARL ANDERSON	(253) 591-5503
CONST.	CITY OF TACOMA	LARRY CRISWELL	(253) 591-5787

kpff 2407 North 31st Street, Suite 100 Tacoma, Washington 98407 (253) 396-0150 Fax (253) 396-0162

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

Tacoma

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED BY DATE FIELD BOOKS

DATE 5/16/2016	SCALE AS NOTED
DESIGNED SWK	CHECKED SWK
DRAWN SWK	PROJECT NAME
DRAWING NAME	

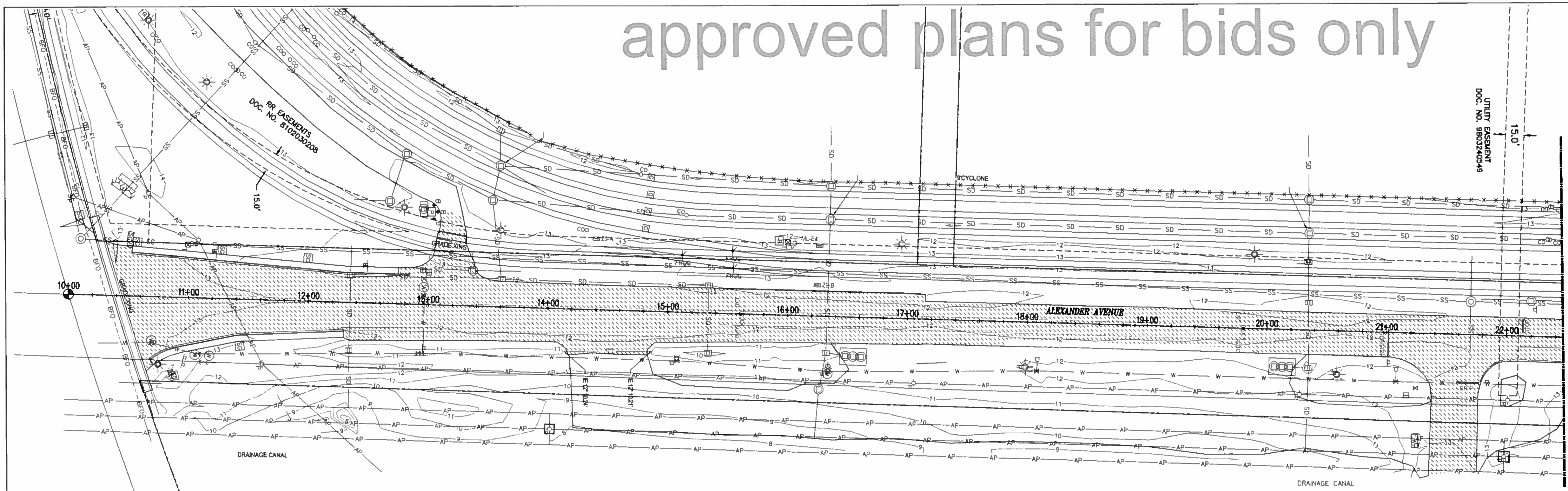
STEVEN WADE KINGSLEY, STATE OF WASHINGTON, 32791, REGISTERED PROFESSIONAL ENGINEER, 5/16/16

CONSTRUCTION DIVISION

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
COVER SHEET

60000041488
SHEET NO
SHEET 1 OF 12



LEGEND:

- CURB LINE
- EDGE OF ASPHALT
- BFO — FIBER OPTIC LINE
- BP — ELECTRICAL LINE
- BT — TELECOMMUNICATIONS LINE
- SD — STORM LINE
- SS — SANITARY SEWER LINE
- W — WATER LINE
- GAS LINE
- CYCLONE FENCE LINE
- AP — OVERHEAD UTILITY LINES
- SIGN
- BOLLARD
- MAILBOX
- ELECTRICAL MANHOLE
- ELECTRICAL METER
- ELECTRICAL RISER
- ELECTRICAL CABINET
- ELECTRICAL VAULT
- TRANSFORMER
- GUY ANCHOR
- GUY POLE
- GROUND FLOOD LIGHT
- LIGHT J-BOX
- OVERHEAD LIGHT
- POWER POLE/OVERHEAD LIGHT
- POWER POLE W/DROP
- POWER POLE
- GAS MARKER POST
- GAS VAULT
- GAS VALVE
- SANITARY MANHOLE WITH STRUCTURE
- STORM MANHOLE WITH STRUCTURE
- CATCH BASIN/AREA DRAIN
- STORM CLEAN OUT
- TELECOMMUNICATIONS MANHOLE
- TELECOMMUNICATIONS VAULT
- TELECOMMUNICATIONS RISER
- TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL CABINET
- TRAFFIC CONTROL SIGNAL ARM
- WATER METER
- FIRE HYDRANT
- WATER VAULT
- WATER VALVE
- WATER MANHOLE
- HOSE BIB
- FIRE DEPARTMENT CONNECT
- POST INDICATOR VALVE
- TRAIN ID SCANNER
- AEI READER
- UNKNOWN UTILITY VAULT
- DECIDUOUS TREE –PERIMETER REPRESENTS DRIPLINE
- CONIFEROUS TREE –PERIMETER REPRESENTS DRIPLINE
- WIND STOCK FLAG
- RAILROAD GREASEBOX
- RAILROAD AUTO SWITCH/NUMBER
- RAILROAD MANUAL SWITCH/NUMBER
- FROG RAILROAD FROG
- RAILROAD SIGN
- RAILROAD CROSSING SIGNAL

NOTES:

1.) VERTICAL DATUM: CITY OF TACOMA (NGVD 29)
BENCHMARK: 3 INCH BRASS DISK ON MILWAUKEE WAY, SOUTH OF E. 11TH AVENUE.
BENCHMARK NO. 2863
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2.) BASIS OF BEARINGS FOR THIS SURVEY IS THE CITY OF TACOMA DATUM, NAD 83(91) WASHINGTON SOUTH ZONE (3602).

3.) UTILITY LOCATIONS SHOWN ARE PER FIELD LOCATED UTILITY PAINT MARKS & REFERENCE MAPS MADE AVAILABLE BY THE VARIOUS UTILITY PROVIDERS. UNLESS INDICATED, DEPTHS OF UTILITY LINES ARE NOT AVAILABLE. ALL UTILITY LOCATIONS SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.

4.) BOUNDARY AND EASEMENTS SHOWN HEREON ARE BASED ON TITLE REPORT NUMBER 0048493-TC BY CHICAGO TITLE INSURANCE COMPANY, EFFECTIVE DATE OF 15 SEPTEMBER 2015.

GRAPHIC SCALE
0 20 40 80 160
1 inch = 40 ft. HORIZ

kpff
2407 North 31st Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

Tacoma

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED	DATE 5/16/2016	SCALE AS NOTED	
BY	DESIGNED SWK	CHECKED SWK	
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FIELD BOOKS	DRAWING NAME		

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

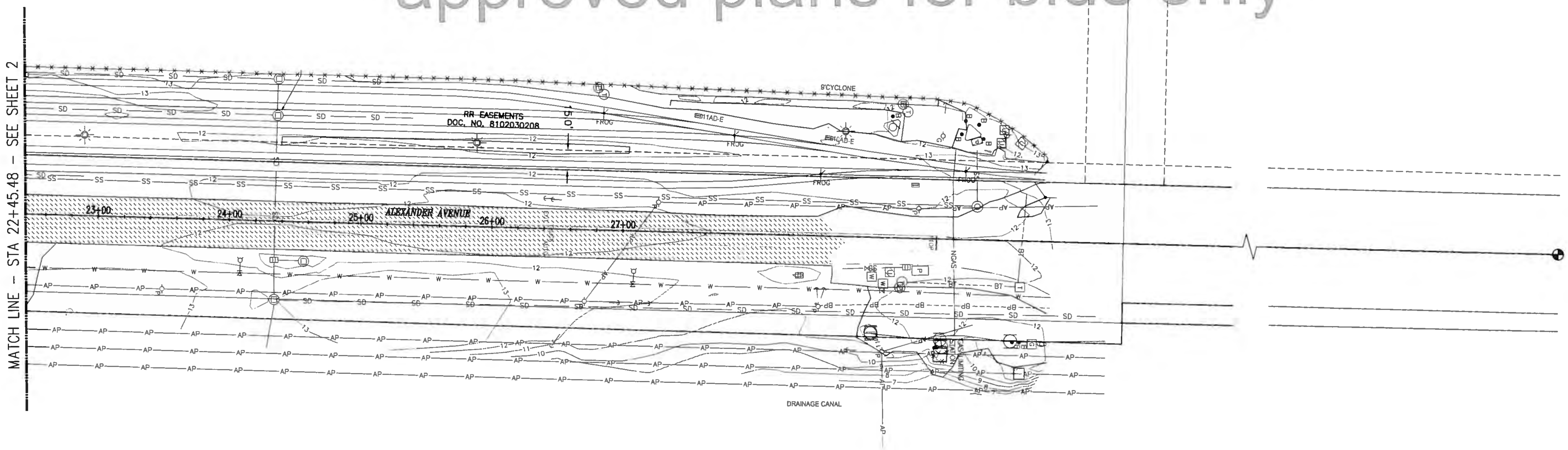
CONSTRUCTION DIVISION

ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
SURVEY

60000041488

SHEET NO

SHEET 2 OF 12



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GRAPHIC SCALE

0 20 40 80 160

1 inch = 40 ft. HORIZ

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(253) 396-0150 Fax (253) 396-0162

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Tacoma

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FINAL CONSTRUCTION CHECKED	DATE	SCALE
BY	5/16/2016	AS NOTED
DATE	DESIGNED SWK	CHECKED SWK
FIELD BOOKS	DRAWN SWK	PROJECT NAME
	DRAWING NAME	

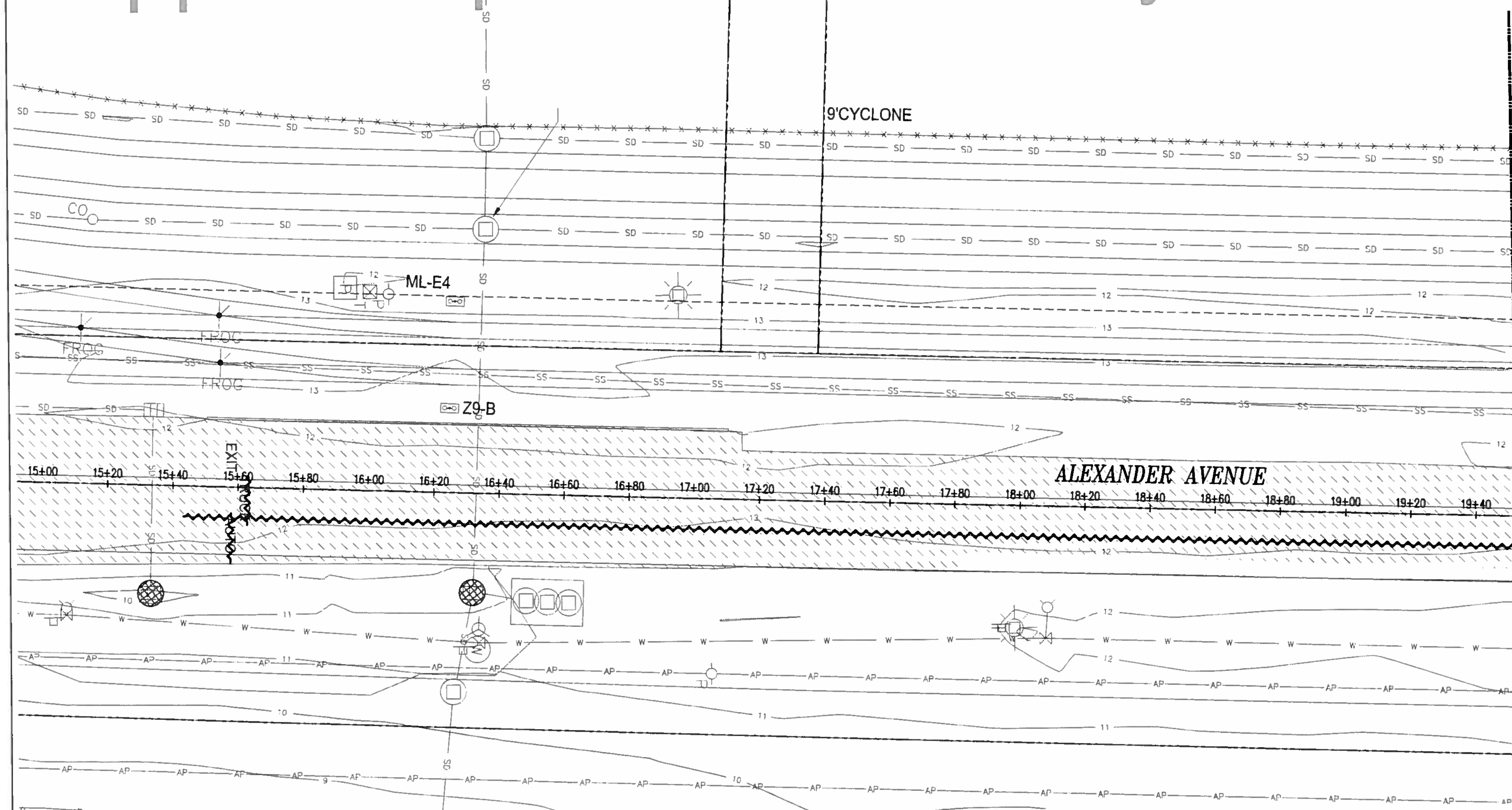
CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

Stephen E Bnd 6/2/16
CONSTRUCTION DIVISION

ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
SURVEY

60000041488

SHEET NO
SHEET 3 OF 12



PLAN
SCALE: 1" = 20'

GRAPHIC SCALE
0 10 20 40 80
1 inch = 20 ft. HORIZ

LEGEND

- EXISTING CONCRETE SIDEWALK
- EXISTING ASPHALT ROADWAY
- REMOVE SIDEWALK/DRIVEWAY APPROACH
- REMOVE ASPHALT
- 0" TO 2" ASPHALT GRIND
- REMOVE PAVEMENT MARKING
- REMOVE UTILITY OR STORM LINE
- SAWCUT
- CATCH BASIN INLET PROTECTION. CONTRACTOR TO INSURE ANY CATCH BASIN DOWNSTREAM OF THE PROJECT LIMITS (WITHIN 500') HAS INLET PROTECTION FOR THE DURATION OF CONSTRUCTION. 1/6
- STRAW WATTLES 2/6

DEMOLITION NOTES:

1. EXTENTS OF ASPHALT REMOVAL ARE APPROXIMATE, ACTUAL REMOVAL LIMITS WILL BE DELINEATED BY A CONSTRUCTION DIVISION INSPECTOR
2. REMOVE SIDEWALKS TO NEAREST EXPANSION JOINT BEYOND STATION LISTED, NOT TO EXCEED 10 FEET.
3. CONTRACTOR SHALL COORDINATE ANY RELOCATION OF HYDRANTS AND ASSOCIATED WATER SERVICES WITH TACOMA WATER, INCLUDING PAYMENT OF ASSOCIATED FEES AND WORK COSTS, AND SCHEDULING OF WORK.
4. ALL DIMENSIONS ARE TO FACE OF CURB OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
5. SAWCUT OF CURB AND GUTTER, SIDEWALKS AND DRIVEWAYS IS NOT ALLOWED. ALL REMOVAL MUST BE LOCATED AT NEAREST JOINTS. COORDINATE WITH CITY OF TACOMA INSPECTOR.
6. DISTURBED AREAS WHICH ARE RESTORED AS LAWN OR AS VEGETATED AREAS, SHALL BE COVERED WITH TOPSOIL AND MULCH IN ACCORDANCE WITH BEST MANAGEMENT PRACTICE L613 OF THE CITY OF TACOMA 2012 STORMWATER MANAGEMENT MANUAL.
7. SITE FURNISHINGS ENCOUNTERED IN THE PUBLIC ROW (CONCRETE PLANTERS, BIKE RACKS, TRASH CANS, ETC.) & IDENTIFIED ON THIS PLAN SHALL BE OFFERED TO THE OWNER (CITY OF TACOMA) FOR SALVAGE PRIOR TO DISPOSAL. IF DECLINED BY THE OWNER (CITY OF TACOMA), ALL DEMOLISHED ITEMS SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR

EROSION & SEDIMENT CONTROL NOTES:

1. APPROVAL OF THIS EROSION/SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
2. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.
3. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
4. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM OR ROADWAYS, OR VIOLATE APPLICABLE WATER STANDARDS.
5. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.
6. THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
7. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 48 HOURS FOLLOWING A STORM EVENT.
8. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER INTO THE DOWNSTREAM SYSTEM.
9. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
10. IF DEWATERING IS ANTICIPATED OR ENCOUNTERED DURING CONSTRUCTION, THE CONTRACTOR SHALL CONTACT A SOURCE CONTROL REPRESENTATIVE WITH THE CITY OF TACOMA AT 253-591-5588.

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Tacoma

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED	DATE 5/16/2016	SCALE AS NOTED
BY	DESIGNED SWK	CHECKED SWK
DATE	DRAWN SWK	PROJECT NAME
FIELD BOOKS	DRAWING NAME	

STEVEN WADE KINGSLEY, STATE OF WASHINGTON, 32791, REGISTERED PROFESSIONAL ENGINEER, 5/16/16

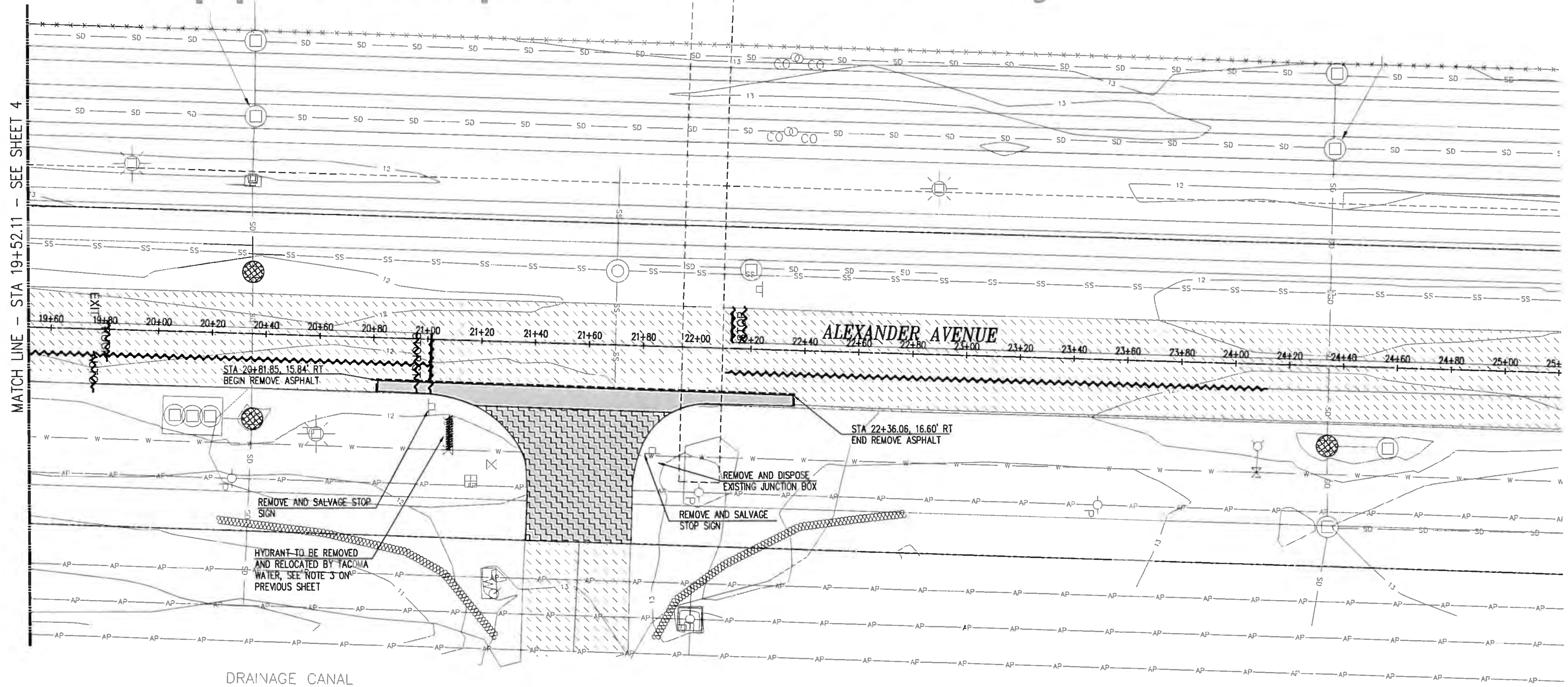
CONSTRUCTION DIVISION

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
DEMOLITION AND TESC PLAN

60000041488

SHEET NO
SHEET 4 OF 12



PLAN

SCALE: 1" = 20'

GRAPHIC SCALE

0 10 20 40 80

1 inch = 20 ft. HORIZ

LEGEND

EXISTING CONCRETE SIDEWALK	REMOVE PAVEMENT MARKING
EXISTING ASPHALT ROADWAY	REMOVE UTILITY OR STORM LINE
REMOVE SIDEWALK/DRIVEWAY APPROACH	SAWCUT
REMOVE ASPHALT	CATCH BASIN INLET PROTECTION. CONTRACTOR TO INSURE ANY CATCH BASIN DOWNSTREAM OF THE PROJECT LIMITS (WITHIN 500') HAS INLET PROTECTION FOR THE DURATION OF CONSTRUCTION. (1/6)
0" TO 2" ASPHALT GRIND	STRAW WATTLES (2/6)

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STEVEN WADE KINGSLEY, STATE OF WASHINGTON, 32791, REGISTERED PROFESSIONAL ENGINEER, 5/16/16

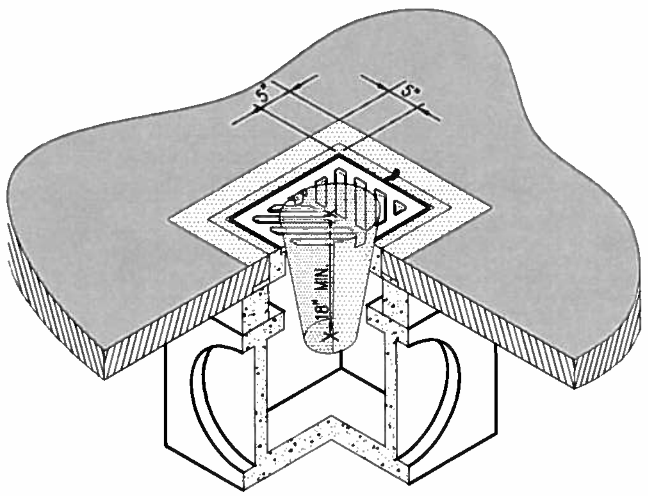
CONSTRUCTION DIVISION

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
DEMOLITION AND TESC PLAN

60000041488

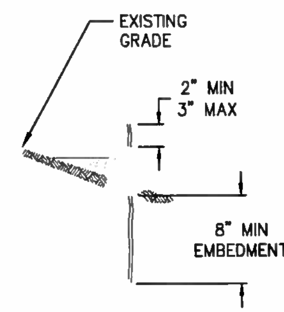
SHEET 5 OF 12



NOTES:

1. INSERT SHALL BE INSTALLED IN ALL OPERATIONAL CATCH BASINS WITHIN 500 FEET OF WORK LIMITS PRIOR TO CLEARING AND GRADING ACTIVITY, OR UPON PLACEMENT OF A NEW CATCH BASIN.
2. FILTERS SHALL BE INSPECTED AFTER EACH STORM EVENT AND CLEANED OR REPLACED WHEN IT IS 1/3 FULL.
3. SEDIMENT REMOVAL SHALL BE ACCOMPLISHED BY REMOVING THE INSERT, EMPTYING INTO APPROPRIATE DISPOSAL LOCATION, AND REINSERTING IT INTO THE CATCH BASIN.

INLET PROTECTION DETAIL (1/4)
SCALE: NTS



STRAW WATTLE DETAIL (2/5)
SCALE: NTS

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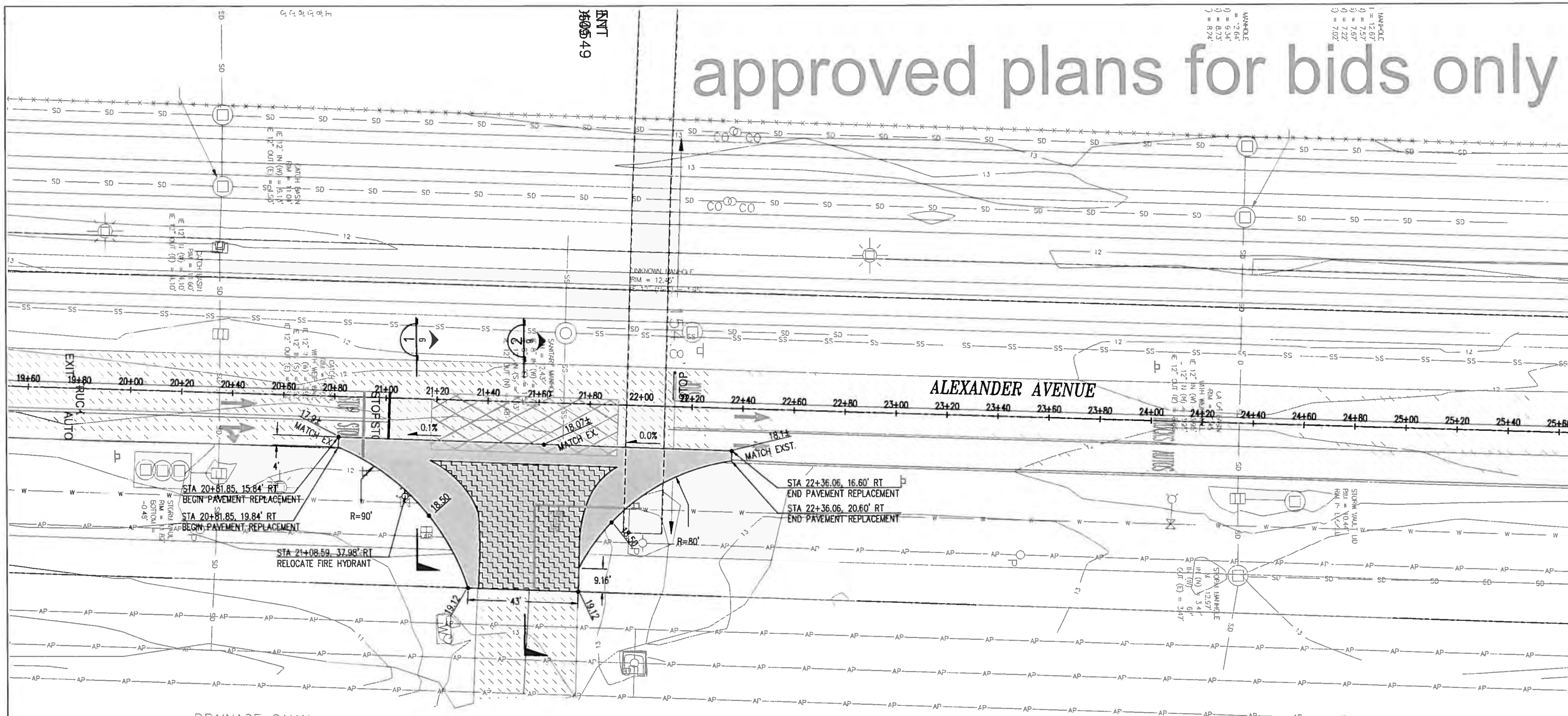
DATE	DRAWN SWK	PROJECT NAME
FIELD BOOKS	DRAWING NAME	

STEVEN WADE KINGSLEY, STATE OF WASHINGTON, 32791, REGISTERED PROFESSIONAL ENGINEER, 5/16/16

CONSTRUCTION DIVISION

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS
ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
TESC DETAILS

60000041488
SHEET 6 OF 12



PLAN

SCALE: 1" = 20'

GENERAL NOTES:

1. FOR DRIVEWAY PAVEMENT SECTIONS SEE 1/10 AND 2/10
2. SEE SHEET 4 AND 5 FOR STREET DEMOLITION PLANS.
3. DISTURBED AREAS WHICH ARE RESTORED AS LAWN OR AS VEGETATED AREAS, SHALL BE COVERED WITH TOPSOIL AND MULCH IN ACCORDANCE WITH BEST MANAGEMENT PRACTICE L613 OF THE CITY OF TACOMA 2008 SURFACE WATER MANAGEMENT MANUAL.
4. EXTENTS OF ROADWAY PAVING ARE APPROXIMATE. ACTUAL PAVING LIMITS WILL BE DELINEATED BY A CONSTRUCTION DIVISION INSPECTOR.
5. PIPE SIZE AND COVER DEPTH OF WATER UTILITY MAIN AND SERVICE LINES ARE ASSUMED. ACTUAL DIMENSIONS SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR.
6. CONTRACTOR TO MATCH EXISTING GRADE AT SAWCUT LINE.
7. SEE SHEETS 8 AND 9 FOR CHANNELIZATION.
8. RESTORATION SHALL BE IN ACCORDANCE WITH THE CITY OF TACOMA POLICY AS ADOPTED JUNE 2, 2009. THE CITY INSPECTOR SHALL HAVE FINAL SAY FOR LIMITS OF RESTORATION.

LEGEND

- EXISTING SIDEWALK
- EXISTING ASPHALT ROADWAY
- PROPOSED ASPHALT ROADWAY
- ~~0" TO 2" ASPHALT GRIND & 4" OVERLAY~~
- CENTERLINE

GRAPHIC SCALE

0 10 20 40 80

1 inch = 20 ft. HORIZ

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FIELD BOOKS	DRAWING NAME	

STEVEN WADE KINGSLEY, STATE OF WASHINGTON, 32791, REGISTERED PROFESSIONAL ENGINEER, 5/16/16

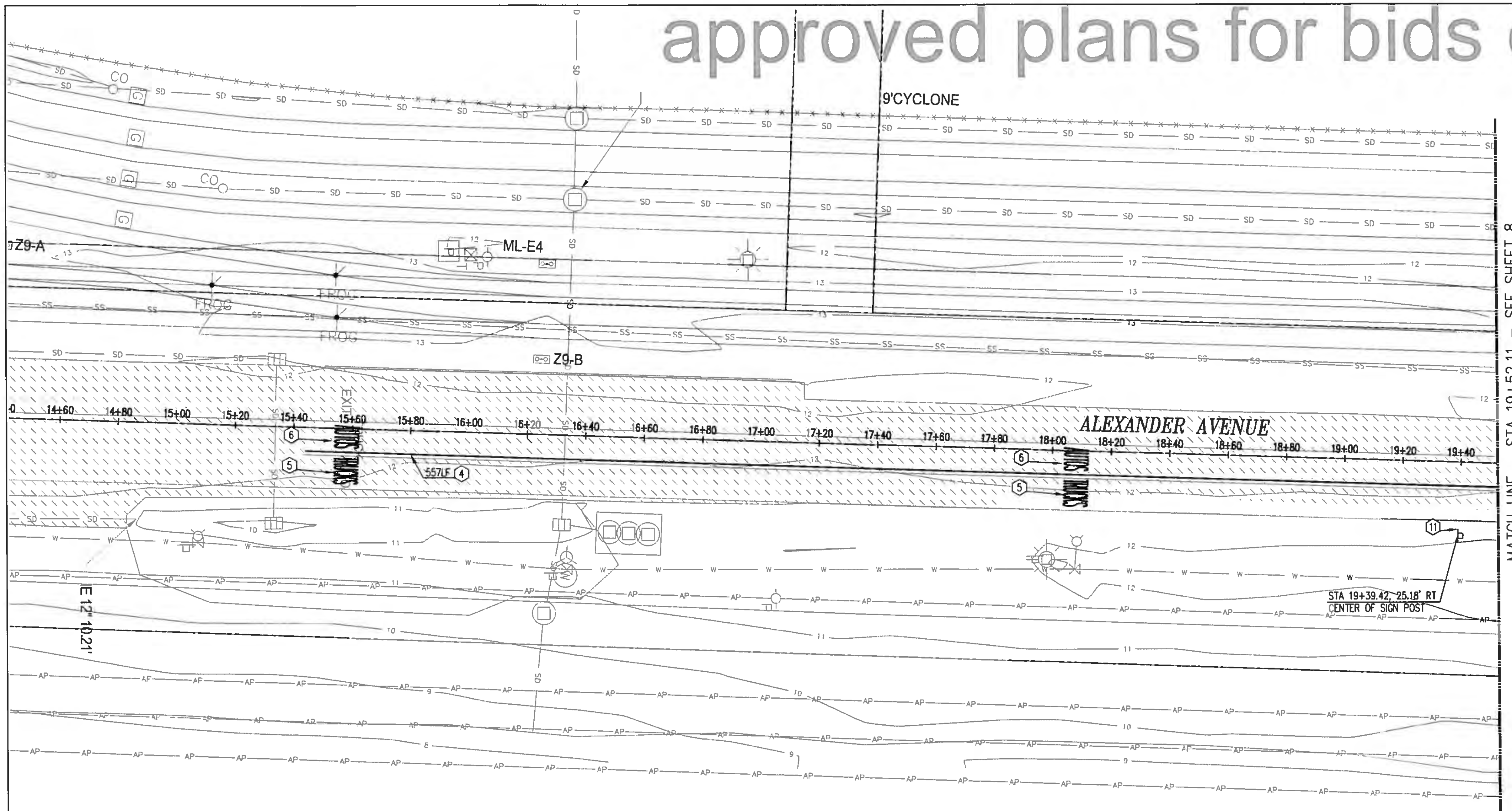
CONSTRUCTION DIVISION

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
PAVING AND UTILTY PLAN

60000041488

SHEET 7 OF 12



PLAN
SCALE: 1" = 20'

GRAPHIC SCALE
0 10 20 40 80
1 inch = 20 ft. HORIZ

KEY NOTES:

1. KEEP CLEAR MARKING – 6-INCH SOLID WHITE BOX WITH 6-INCH SOLID WHITE CROSSHATCH THERMOPLASTIC LINES AT 3 FEET ON CENTER
2. 12" THERMOPLASTIC STOP BAR
3. 8' THERMOPLASTIC HIGH LETTER MARKING "STOP"
4. 4" WIDE THERMOPLASTIC SOLID WHITE STRIPING
5. 8' THERMOPLASTIC HIGH LETTER MARKING "TRUCKS"
6. 8' THERMOPLASTIC HIGH LETTER MARKING "AUTOS"
7. THERMOPLASTIC STRAIGHT ARROW 1/11
8. THERMOPLASTIC STRAIGHT AND RIGHT TURN ARROW COMBINATION 2/11
9. INSTALL RELOCATED STOP SIGN
10. TRUCK/AUTO LANE DELINEATION SIGN 3/11
11. STOP AHEAD WARNING SIGN PER MUTCD
12. LANE CONTROL SIGN 6/11
13. 4" WIDE THERMOPLASTIC DOUBLE YELLOW STRIPING
14. 4" WIDE THERMOPLASTIC WHITE SKIP STRIPING

NOTES:

1. RESTORATION SHALL BE IN ACCORDANCE WITH THE CITY OF TACOMA POLICY AS ADOPTED JUNE 2, 2009. THE CITY INSPECTOR SHALL HAVE FINAL SAY FOR LIMITS OF RESTORATION.

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CONSTRUCTION DIVISION

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
CHANNELIZATION AND SIGNAGE PLAN

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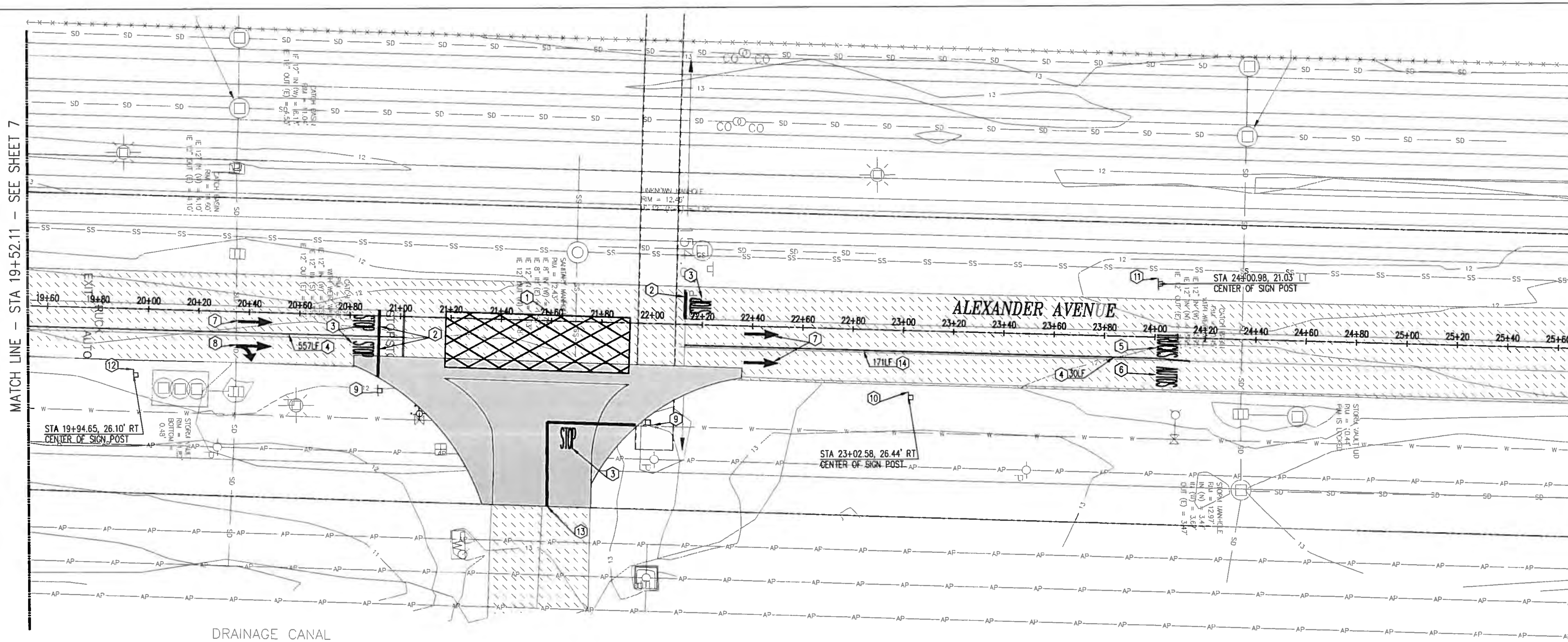
SHEET 8 OF 12



PLAN

SCALE: 1" = 20'

NOTES:

1. RESTORATION SHALL BE IN ACCORDANCE WITH THE CITY OF TACOMA POLICY AS ADOPTED JUNE 2, 2009. THE CITY INSPECTOR SHALL HAVE FINAL SAY FOR LIMITS OF RESTORATION.

KEY NOTES:

1. KEEP CLEAR MARKING - 6-INCH SOLID WHITE BOX WITH 6-INCH SOLID WHITE CROSSHATCH THERMOPLASTIC LINES AT 3 FEET ON CENTER
2. 12" THERMOPLASTIC STOP BAR
3. 8' THERMOPLASTIC HIGH LETTER MARKING "STOP"
4. 4" WIDE THERMOPLASTIC SOLID WHITE STRIPING
5. 8' THERMOPLASTIC HIGH LETTER MARKING "TRUCKS"
6. 8' THERMOPLASTIC HIGH LETTER MARKING "AUTOS"
7. THERMOPLASTIC STRAIGHT ARROW (1/11)
8. THERMOPLASTIC STRAIGHT AND RIGHT TURN ARROW COMBINATION (2/11)
9. INSTALL RELOCATED STOP SIGN

KEY NOTES:

10. TRUCK/AUTO LANE DELINEATION SIGN (3/11)
11. STOP AHEAD WARNING SIGN PER MUTCD
12. LANE CONTROL SIGN (6/11)
13. 4" WIDE THERMOPLASTIC DOUBLE YELLOW STRIPING
14. 4" WIDE THERMOPLASTIC WHITE SKIP STRIPING

GRAPHIC SCALE

0 10 20 40 80

1 inch = 20 ft. HORIZ

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CHECKED	SWK
DRAWN	SWK

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
CHANNELIZATION AND SIGNAGE PLAN

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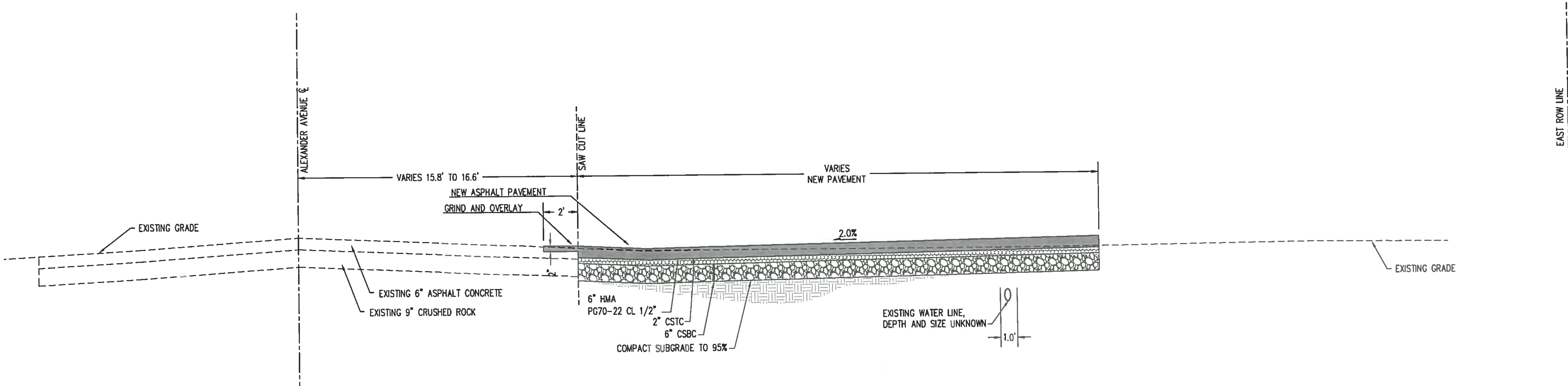
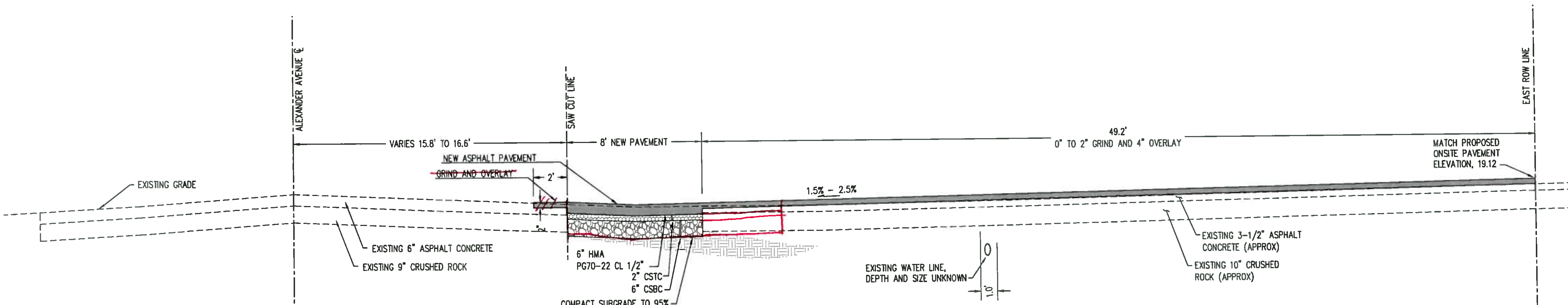
SHEET 9 OF 12



PAVEMENT SECTION CUT
NEW DRIVEWAY AREA
SCALE: NTS

1
7



GRIND DELETED - FULL REBUILD CONSTRUCTED

PAVEMENT SECTION CUT
DRIVEWAY GRIND AND OVERLAY
SCALE: NTS

2
7

NOTES:

1. RESTORATION SHALL BE IN ACCORDANCE WITH THE CITY OF TACOMA POLICY AS ADOPTED JUNE 2, 2009. THE CITY INSPECTOR SHALL HAVE FINAL SAY FOR LIMITS OF RESTORATION.

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BY
DATE
FIELD BOOKS

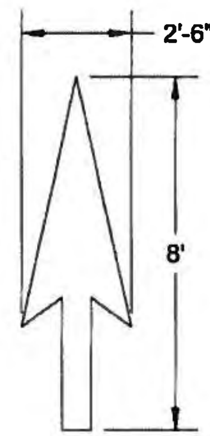
DATE	5/16/2016	SCALE: AS NOTED
DESIGNED	SWK	CHECKED: SWK
DRAWN	SWK	PROJECT NAME
DRAWING NAME		

STEVEN WADE KINGSLEY
STATE OF WASHINGTON
32781
REGISTERED PROFESSIONAL ENGINEER
5/16/16

CONSTRUCTION DIVISION

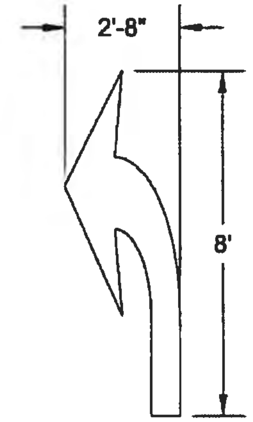
CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS
ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
DRIVEWAY SECTIONS

60000041488
SHEET NO
SHEET 10 OF 12



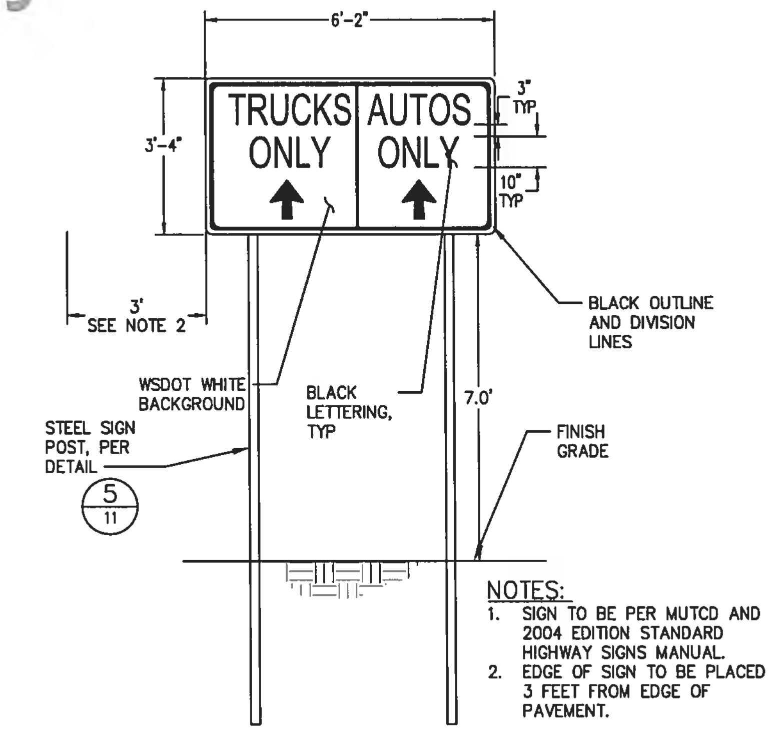
NOTE:
1. TRAFFIC ARROW PER CITY OF TACOMA STANDARD DETAIL CH-10 PAVEMENT WORDS AND ARROWS.

TRAFFIC ARROW DETAIL 1/9
SCALE: NTS



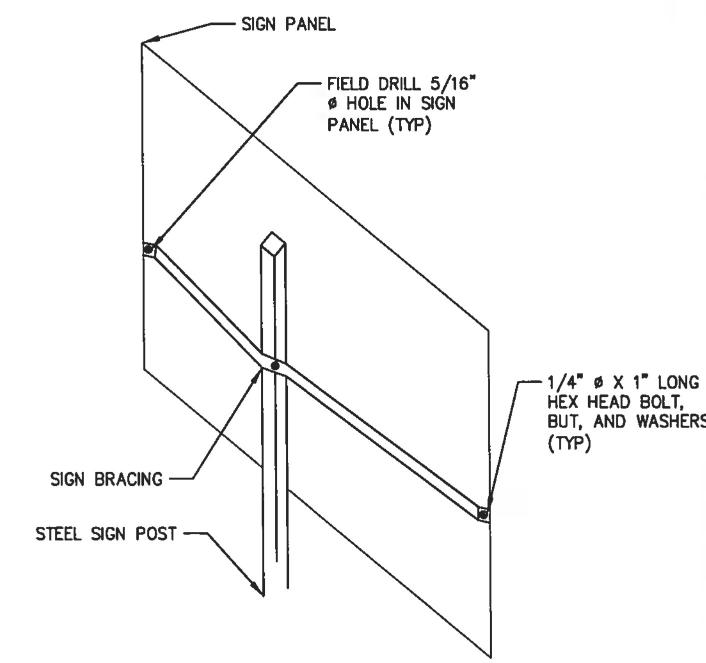
NOTE:
1. TRAFFIC ARROW PER CITY OF TACOMA STANDARD DETAIL CH-10 PAVEMENT WORDS AND ARROWS.
2. ARROWS MAY BE MIRRORED ABOUT THEIR CENTERLINE AS APPLICABLE TO DESIGN.

TRAFFIC TURN ARROW DETAIL 2/9
SCALE: NTS



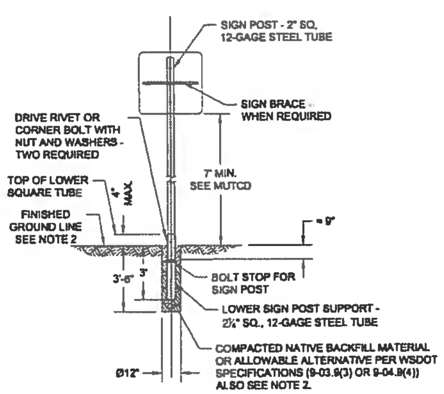
NOTES:
1. SIGN TO BE PER MUTCD AND 2004 EDITION STANDARD HIGHWAY SIGNS MANUAL.
2. EDGE OF SIGN TO BE PLACED 3 FEET FROM EDGE OF PAVEMENT.

AUTO/TRUCK DELINATION SIGN DETAIL 3/9
SCALE: NTS



SIGN BRACING DETAIL 4/9
SCALE: NTS

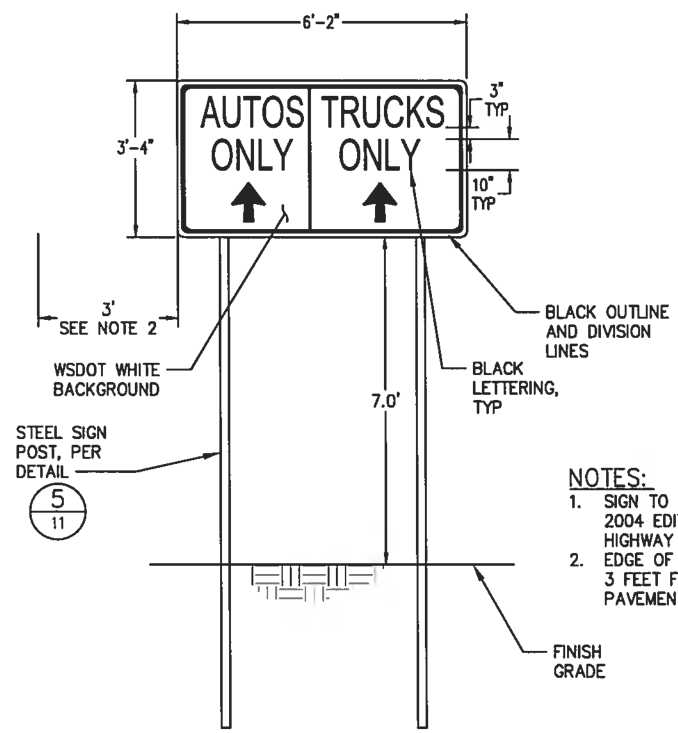
NOTES:
1. Surface mounting of sign posts, especially within traffic islands or medians, is only allowable with special authorization from the city's traffic engineering group, (Exception: Surface mounting of flexible post object markers within islands or medians is permitted).
2. If finished ground line is a hard surface, then compacted native backfill material shall be concrete with the top of foundation being smooth, dense, and uniform to finished ground line.



SIGN SUPPORT DETAIL FOR STEEL SIGN POST

NOTE:
1. SIGN POST PER CITY OF TACOMA STANDARD DETAIL SU-34 SIGN POST INSTALLATION.

SIGN POST DETAIL 5/9
SCALE: NTS



NOTES:
1. SIGN TO BE PER MUTCD AND 2004 EDITION STANDARD HIGHWAY SIGNS MANUAL.
2. EDGE OF SIGN TO BE PLACED 3 FEET FROM EDGE OF PAVEMENT.

LANE CONTROL SIGN DETAIL 6/11
SCALE: NTS

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Tacoma

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	DRAWN SWK	PROJECT NAME
FIELD BOOKS	DRAWING NAME	

STEVEN WADE KINGSLEY, STATE OF WASHINGTON, 32791, REGISTERED PROFESSIONAL ENGINEER, 5/16/16

CONSTRUCTION DIVISION

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS
ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
DETAILS

60000041488

SHEET 11 OF 12

RIGHT-OF-WAY PERMITTING GENERAL NOTES

GENERAL

A. The following special provisions are to be used in conjunction with the City of Tacoma Special Provisions, City of Tacoma Standard Plans and City of Tacoma Right-of-Way Design Manual, "2014 Standard Specifications for Road, Bridge and Municipal Construction" and "Standard Plans for Road, Bridge and Municipal Construction" as prepared by the Washington State Department of Transportation (WSDOT).

B. Any inconsistency between these work order drawings and the 2014 Standard Specifications or the WSDOT Standard Plans shall be resolved by the following order of precedence (e.g., 1 presiding over 2, 3, and so forth):
   1. Approved Work Order Drawings
   2. City of Tacoma Special Provisions, including APWA General Special Provisions, as applicable
   3. City of Tacoma Right-of-Way Design Manual
   4. 2014 Standard Specifications
   5. City of Tacoma Standard Plans
   6. WSDOT Standard Plans

C. Any revisions to these plans must be reviewed and approved by the City of Tacoma prior to any implementation in the field.

D. Contractors shall familiarize themselves with the site and shall bring any discrepancies to the attention of the Engineer prior to undertaking the affected work.

E. Any discrepancy in these drawings, specifications, these notes, and the site conditions shall be reported to the Engineer, who shall correct such discrepancy in writing after reviewing any changes. Any work done by the Contractor after the discovery of such discrepancy shall be done at the Contractor's risk. The Contractor shall verify and coordinate the dimensions among all drawings prior to proceeding with any work.

F. A pre-construction meeting shall be held at the City of Tacoma with the applicant, contractor, and City inspectors prior to issuance of a permit.

ADDITIONAL PERMITS

A. Separate permits are required for on-site work including all retaining walls, grading, and erosion control. Adherance to all conditions of these permits is required as a part of this plan.

B. Separate permits are required for sidewalk installation as well as curb and gutter removal and driveway construction when constructed at building permit stage.

C. Separate storm and sanitary sewer connection permits are required for connections to the wastewater or stormwater systems.

UTILITIES

A. The existing underground utilities shown hereon are based upon existing record drawings and are not guaranteed to be accurate, nor all-inclusive.

B. All utilities must be verified prior to construction. If the project requires any excavation, the developer/contractor is required to call the Utility Underground Location Center at (800) 424-5555 at least two days before starting such excavation in accordance with RCW 19.122.

C. It shall be the Contractor's responsibility to protect, in place, all utilities and/or structures whether shown or not shown on this plan. Damage due to the Contractor's operations shall be repaired at the Contractor's expense.

EXCAVATION

A. If workers enter any trench or other excavation four feet or more in depth that does not meet the open pit requirements of Section 2-09.3(3)B, it shall be shored and cribbed. All trench safety systems shall meet the requirements of the Washington Industrial Safety and Health Act, Chapter 49.17 RCW. The Contractor alone shall be responsible for all worker safety, and neither the City of Tacoma nor the Engineer of record assumes any responsibility.

PAVEMENT PREPARATION / RESTORATION

A. Additional removal and replacement of pavement may be required to provide proper transition/crown as directed by the City of Tacoma Inspector in the field.

B. The street sections shown on this plan are designed to be placed upon a firm and unyielding base.

C. Subgrade compaction shall be tested by a professional geotechnical consultant prior to placing base material.

D. Pavement restoration shall be constructed in accordance with the City of Tacoma Restoration policy and applicable Standard Plans.

E. All permanent traffic channelization, such as but not limited to legends, raised pavement markings, paint, and signage, shall be restored to current Tacoma Standards

F. Final restoration limits shall be determined in the field by the City of Tacoma Inspector.

G. Pavement Preparation and Restoration shall meet all applicable requirements of City of Tacoma Right-of-Way Design Manual Chapter 4 Sections 5.4 and 5.5.

PERMEABLE PAVEMENTS

A. Permeable Pavements including pavers, porous asphalt and pervious concrete may be approved for use within the right of way.

B. Installation shall be in accordance with the approved permit documents and all applicable requirements as outlined in the documents referenced in the GENERAL section above.

C. Permeable pavers shall be designed and installed in accordance with manufacturer's recommendations, per approved permit drawings and the requirements of the City of Tacoma Right-of-Way Design Manual

HOT MIX ASPHALT

A. Standard hot mix asphalt shall be HMA CL 1/2 inch PG 64-22.

B. Porous asphalt shall be Class ½" PG 70-22ER polymer modified or higher grade.

C. Mix design shall be based on Standard Plan PD-01-Pavement Design Standards and PD-02 Pavement Design Worksheet.

D. Section 5-04.3(8)A 'Acceptance Sampling and Testing' of the Standard Specifications is deleted.

E. All standard hot mix asphalt shall be compacted to a minimum of 92 percent of the maximum density as determined by AASHTO T209. All standard hot mix asphalt utilized shall be considered compactable. The level of compaction attained will be determined as the average of not less than 5 nuclear density gauge tests taken on the day the mix is placed (after completion of the finish rolling) at randomly selected locations within each lot. The quantity represented by each lot will be no greater than a single day's production or approximately 400 tons, whichever is less.

F. All testing results shall be provided to the City within 48 hours of the test.

G. Control lots not meeting the minimum density standard shall be removed and replaced with satisfactory material.

H. In addition to the randomly selected locations for test of the control lot, the City Inspector reserves the right to test any area which appears defective and to require further compaction of areas that fall below acceptable density readings. These additional tests shall not impact the compaction evaluation of the entire control lot.

I. Hot mix asphalt pavement shall not be placed on any traveled way between October 1 and April 1 without written approval from a Science & Engineering Assistant Division Manager.

J. No traffic shall be allowed on any newly placed pavement without the approval of the City Inspector.

CONCRETE

A. Concrete pavement mix design shall be based on Standard Plan PD-01-Pavement Design Standards.

B. Cold Weather Concrete Work. The following requirements for placing concrete shall be in effect from November 1 to April 1:
   1. The Engineer shall be notified at least 24 hours prior to any concrete placement.
   2. Weather permitting, all concrete placement shall be completed no later than 2:00 p.m. each day.
   3. Where forms have been placed and the subgrade has been subjected to severe frost, no concrete shall be placed until the ground is completely thawed. At that time, the forms shall be adjusted and subgrade repaired as determined by the Engineer.

C. Curing of concrete shall be in accordance with Section 5-05.3(13) of the Standard Specifications.

D. The slump for standard concrete used for sidewalks shall not exceed four inches +/- one inch.

E. Sidewalks and curb ramps shall be constructed in accordance with ADA Standards for Accessible Design, 28 CFR, Part 35 and as supplemented by the Public Works Right of Way Accessibility Guidelines (PROWAG).

SANITARY AND STORM SEWERS

A. 7-08.3(2)G Jointing of Dissimilar Pipe:

Dissimilar pipe shall be joined by use of rigid couplings manufactured by Romac Industries, Inc., or City of Tacoma approved equal.

B. 7-08.3(2)F Plugs and Connections:

Rigid Couplings, manufactured by Romac Industries, Inc., or City of Tacoma approved equal, shall be used at any pipe joint in which bell and spigot or fused joints are not used. Flexible couplings are not permitted.

C. Section 7-04 of the Standard Specification is deleted. Storm sewers shall meet all the requirements of sanitary sewers.

D. Sewers and appurtenances shall be cleaned and tested after backfilling by either exfiltration or low-pressure air method at the option of the Contractor, except where the ground water table is such that the Engineer may require the infiltration test.

E. All wastewater and stormwater pipes shall be video inspected by City Forces prior to paving where paving occurs over sewers. All other sewers will be video inspected prior to final acceptance.

F. All abandoned pipes encountered during construction and new stormwater and wastewater stub outs shall be sealed with a watertight pipe plug.

G. All frames and grates for standard catch basin inlets on this project shall be "vaned" type and shall conform to that shown on WSDOT Standard Plan No. B-30.30-01 and B-30.40-01.

H. Where existing catch basins are modified, grates may be required to be replaced with vaned grates. Environmental Services will make the final determination based on the condition of the existing grate and structure.

I. Recycled concrete shall not be used for pipe zone backfill.

J. New connections to brick manholes may be allowed on a case by case basis. Manhole replacement may be required by the Environmental Services Department based upon the condition of the existing manhole.

MISCELLANEOUS

A. Any fence or structure replaced and/or relocated shall be maintained to remain functional.

B. Independent quality assurance sampling and testing will be provided by a certified independent laboratory for all improvements within the right-of-way. All special inspection reports shall be forwarded to the Site Development Group on a monthly basis, and / or as requested by the City of Tacoma inspector.

C. The Contractor shall only use those hydrants designated by the agency in charge of water distribution and in strict accordance with its requirements for hydrant use, Water applied by the Contractor shall not be from residential sources.

GRADING, EXCAVATION, AND EROSION CONTROL NOTES

A. All work is to be done in accordance with the approved grading plan, soils report, the most current WSDOT Standard Specifications For Road, Bridge And Municipal Construction and the current City of Tacoma Stormwater Management Manual.

B. When construction operations are such that debris from the work is deposited on the streets, the Contractor shall immediately remove any deposits or debris which may accumulate on the roadway surface. If the Contractor fails to keep the streets free from deposits and debris resulting from the work, the Contractor shall, upon order of the City of Tacoma Inspector, provide facilities for, and remove all clay, dirt, or other deposits from the tires or between wheels before trucks or other equipment will be allowed to travel over paved streets. Should the Contractor fail or refuse to clean the streets in question, or the trucks or equipment in question, the City of Tacoma Inspector may order the work suspended at the Contractor's risk until compliance with the Contractor's obligations is assured, or the City of Tacoma Inspector may order the streets in question cleaned by others and such costs incurred by the City in achieving compliance with these requirements, including cleaning of the streets, shall be deducted from the work order account.

C. The Contractor shall protect existing drainage structures using acceptable methods and materials as shown on this plan. If the methods and materials as shown on this plan are not adequate, the City of Tacoma Inspector may require additional/alternative methods for erosion control and/or protection of existing drainage structures. Additional or alternative methods shall be submitted by the design engineer and accepted by the City of Tacoma Inspector. Any damage caused to the City of Tacoma stormwater system as a result of the work outlined on this plan shall be the sole responsibility of the Contractor. Resolving said damage may include, but not be limited to, the cleaning of the drainage system in question by the Contractor.

D. Watering provisions when applicable must be in place to prevent dust from becoming air borne. Violation of this condition will result in a stop work order until corrected.

E. Fill that will support a street section or other structures shall be placed under the inspection of a Washington State licensed Geotechnical Engineer. Soil to be placed shall be tested and compacted to 95 percent of its maximum density. Engineer shall document existing site conditions, soil and its placement and allowable bearing capacity submitted. Standard requirements for cuts and fill are contained in the WSDOT Standard Specifications For Road, Bridges, and Municipal Construction.

F. A stormwater pollution prevention plan (SWPPP) is required for all work order projects. The plan must be in accordance with the current City Tacoma Stormwater Management Manual.

HYDROSEEDING

A. All areas that are cleared and grubbed, graded, excavated or filled are subject to stabilization. Any of these areas that are left unpaved or unlandscaped shall be hydroseeded or otherwise fully stabilized under the direction and approval of the Construction Inspector.

B. Hydroseeding may occur only during the periods of April 1 though May 31 or September 1 though October 15. Hydroseeding may be allowed during the months of June through August if irrigation is provided.

C. Monitor and maintain hydroseeded areas throughout the winter wet season to ensure that no erosion occurs.

EROSION CONTROL MEASURES

A. Minimum Erosion Control measures shall include:
   1. Construction entrance.
   2. Perimeter erosion/sedimentation control.
   3. Protection of catch basins.
   4. Stabilization of exposed soils.

B. All erosion control shall be in place prior to clearing.The contractor shall call the City of Tacoma Inspector for initial erosion control inspection prior to start of work, per item F. below.

C. Erosion control measures shall be maintained at all times to the approval of the City of Tacoma Inspector.

D. Should temporary erosion and sedimentation control measures, as shown on plans become inadequate, the contractor shall install facilities as necessary to protect adjacent properties and the City of Tacoma drainage system, meeting approval of the City of Tacoma Inspector.

E. No permits to perform grading, excavation, or filling during the period from October 1st through March 31 shall be issued. EXCEPTION: The City may approve a grading, excavation, or filling plan prepared by a licensed Civil or Geotechnical Engineer which specifically addresses the winter rain season and the associated erosion problems, and issue a permit based on such plan.

F. Call for inspection of the City of Tacoma Inspector upon completion of:
   1. Staking of clearing limits.
   2. Installation of erosion control and prior to site grading.
   3. Prior to removal of erosion control devices.

G. All material removed from site shall be placed only at a permitted site. Verify location of destination of material prior to exportation.

H. Traffic control provisions as approved by the City Traffic Engineer shall be adhered to at all times.

I. Trees to be removed shall be clearly marked for removal. Trees to be saved shall be fenced with barricade fence at the drip line (outer edge of tree branches) to keep construction vehicles from compacting root zone and killing trees. This fencing shall be maintained until construction ends.

J. Tree protection measures to be installed with initial TESC measures and shall be maintained throughout the duration of site work. Refer to City of Tacoma Std. Plans LS-06 through LS-11.

RECORD DRAWINGS CRITERIA FOR ACCEPTANCE OF ALL PRIVATE WORK ORDERS

A. All revisions to the approved plans must be approved by the City of Tacoma prior to implementation of the changes.

B. A determination at the time of proposal shall be made whether the revision can be addressed with red line drawings submitted as a part of the record drawings or will require formal submission for approval.

C. Record drawings shall show the station, offset, centerline and gutter flowline elevations, to nearest 0.01 foot; for all horizontal and vertical roadway alignment changes, at the intersection end of radius points and at the beginning and end of new paving.

D. Record drawings shall show the station, offset, invert, and rim elevations to the nearest 0.01 foot for all stormwater and wastewater structures. (I.e.: manholes, catch basins, etc.)

E. After any new stormwater and/or wastewater pipes have been cleaned and the manholes channeled, the main(s) shall be televised for video inspection to provide a record of the constructed conditions and for the wastewater system to verify side sewer connection locations. The City of Tacoma will coordinate this inspection.

F. The property side ends of the side sewers shall be marked in the field by means of a 2-inch by 4-inch board and locate wire that extends from the flow line of the side sewer to at least 1 foot above the finished lot grade. Record drawings shall show all side sewers and shall locate them by measurements from permanent objects. (I.e.: curb, property corner, etc.) In addition, the depth of all side sewers shall be noted on the record drawings and locate board.

G. Record drawings shall be received and accepted prior to issuing utility connection permits or release of performance bonds.

H. Record drawings shall show vertical and horizontal datum for survey monuments (existing or new construction) within the limits of the project.

I. Record drawings shall consist of a clean set of approved work order drawings with all changes noted above shown in red ink.

J. Record drawings, including the Engineer's Certification, as applicable, must be submitted within 30 days of substantial completion or City survey crews will collect the necessary data and bill against the work order.

MONUMENT REMOVAL PERMIT PROCESS

"No survey monument shall be removed or destroyed (the physical disturbance or covering of a monument such that the survey point is no longer visible or readily accessible) before a permit is obtained from the Department of Natural Resources (DNR)." WAC 332-120-030(2) states "It shall be the responsibility of those performing construction work or other activity (including road and street resurfacing projects) to adequately search the records and the physical area of the proposed construction work or other activity for the purpose of locating and referencing any known or existing survey monuments." Construction shall not commence until WAC outlined in Chapter 332-120 is complied with.

STAKING REQUIREMENTS

WASTEWATER AND STORMWATER

A. Clearing stakes if needed.

B. Stakes every 50 feet plus grade breaks. Try to maintain 12 foot offsets in streets and 8 foot offsets in alleys.

C. Double offsets at manholes and catch basins (ahead and back stakes at angle points).

D. Catch basin station shall be to the centerline of the basin. Catch basin offsets shall be to the face of the curb.

RESIDENTIAL STREETS

A. Clearing stakes as needed

B. Slope stakes every 50 feet and grade breaks if cuts or fills exceed 2 feet.

C. Curb stakes every 50 feet and grade breaks, on 4 foot offset to the face of curb. Curb stakes are set to the top of curb grade (Blue Tops).

D. Also stake the beginning and end of all approaches.

E. No centerline of street grades unless the street grade is warped. If street grades are needed, set blue tops for each course.

ARTERIAL STREETS

A. Clearing stakes as needed.

B. Slope stakes every 50 feet and grade breaks if cuts or fills exceed 2 feet.

C. Curb stakes every 50 feet and grade breaks, on 4 foot offset to the face of curb.

D. Curb stakes are set to the top of curb grade (Blue Tops). Also stake the beginning and end of all approaches.

E. Stake centerline and quarterline grade every 50 feet and grade breaks at grade for each course.

ALLEYS

A. Stake both sides every 50 feet and grade breaks, on a 2 foot offset to the edge of paving, with a cut of fill to edge of paving on high side and flow line on low side.

SIDEWALKS

A. Offsets for walks are set on 50' intervals and grade breaks normally at 2 foot to edge of walk and at edge of walk grade (Blue Tops).

B. Sidewalk alignment is normally at 5 feet from the face of curb. No walk grades are needed if curbs are built.

HORIZONTAL AND VERTICAL CURVES

A. Grade stakes must be set every 25 feet and grade breaks with a minimum of 3 stakes for each curve. Radius points on street Returns.

REVISED: 01-07-2016

kpff
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CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

Tacoma

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED
BY
DATE
FIELD BOOKS

DATE 5/16/2016	SCALE AS NOTED	
DESIGNED SWK	CHECKED SWK	
DRAWN SWK	PROJECT NAME	
DRAWING NAME		

STEVEN WADE KINGSLEY
STATE OF WASHINGTON
32791
REGISTERED PROFESSIONAL ENGINEER
5/16/16

CONSTRUCTION DIVISION

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

ALEXANDER AVE DRIVEWAY IMPROVEMENTS
4215 SR 509
WORK ORDER GENERAL NOTES

60000041488
SHEET NO
SHEET 12 OF 12