MATCH LINE – SEE SHEET V01.02

HORIZONTAL DATUM

WASHINGTON STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD 83/2007
(PER PORT OF TACOMA SURVEY CONTROL MAP – 2007)

MEASURED SOUTH 31°00'47" EAST 3340.24 FEET BETWEEN PORT OF TACOMA MONUMENTS 923 AND 903 LOCATED ALONG MILWAUKEE WAY

VERTICAL DATUM

MLLW (PER PORT OF TAOCMA 2007 SECTION CONTROL MAP)

TIDE 22 1933 BENCHMARK: LOCATED AT NE CORNER OF 11TH ST. BRIDGE AT THE INTERSECTION OF E. 11TH ST. AND MILWAUKEE WAY
ELEVATION = 19.39
(BASED ON 1960–1978 TIDAL EPOCH)

NOTES

1. EQUIPMENT USED: TOPCON QS ROBOTIC TOTAL STATION OR CARLSON GEOMAX CR2 ROBOTIC TOTAL STATION OR TOPCON GR3 GPS UNIT

2. THIS SURVEY WAS PERFORMED BY FIELD TRAVERSE WITH THE FINAL RESULTS MEETING OR EXCEEDING THE CURRENT TRAVERSE STANDARDS CONTAINED IN W.A.C. 332–130–090. ALL MEASUREMENTS WERE MADE WITH A TOPCON QS ROBOTIC TOTAL STATION IN ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S SPECIFICATIONS.

3. IN ACCORDANCE WITH THE REVISED CODE OF WASHINGTON (R.C.W.) 58.09 AND THE WASHINGTON ADMINISTRATIVE CODE (W.A.C.) 332–130, THIS SURVEY MAY DEPICT OCCUPATIONAL INDICATORS THAT DIFFER FROM THE DEEDED LOT LINES. THESE INDICATORS, IF AT ALL PRESENT, MAY REPRESENT A POTENTIAL FOR CLAIMS OF UNWRITTEN TITLE. THIS SURVEY DOES NOT PURPORT TO RESOLVE SUCH ITEMS.

4. PORTIONS OF THE FIELD WORK SHOWN HEREON WERE PERFORMED IN MARCH THROUGH JUNE THROUGH AUGUST 2017, UNDER SITTS & HILL PROJECT NUMBER 17310 AND JULY 2019 UNDER SITTS & HILL PROJECT NUMBER 18388.

5. UTILITIES AS SHOWN HEREON ARE BASED ON FIELD SURVEY OBSERVATION OF UTILITY LOCATE SERVICES PERFORMED BY MOUNTAIN VIEW LOCATING SERVICES LLC. IN MARCH THROUGH JUNE 2017 AND JULY 2019 FOR THIS SURVEY. THIS HAS BEEN SUPPLEMENTED BY RECORD INFORMATION PROVIDED BY PORT OF TACOMA. RECORD UTILITY LINES SHOWN HEREON ARE DEPICTED WITH THE STANDARD LINETYPE WITH A "– R" AS SHOWN IN THE LEGEND. UTILITIES OTHER THAN SHOWN MAY EXIST ON THE SITE. THE SURVEYOR DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. THE SURVEYOR DOES CERTIFY THAT THEY ARE SHOWN AS ACCURATELY AS POSSIBLE FROM FIELD SURVEY AND PAINTED UTILITY LOCATE LINES. COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA IS CONSISTENT WITH QUALITY LEVEL (B) OF THE ASCE STANDARD GUIDELINES 38–02.

7. THIS SURVEY COMPLIES WITH W.A.C. 332–130–145. THE CONTOURS DEPICTED HEREON ARE BASED ON DATA FROM DIRECT FIELD MEASUREMENTS. SPOT ELEVATIONS ARE BASED ON DIRECT FIELD MEASUREMENTS AND ARE DEPICTED FOR REFERENCE. THE PURPOSE OF THIS TOPOGRAPHIC MAP IS TO SERVE AS A BASE MAP FOR CONTEMPLATED SITE IMPROVEMENTS AND DESIGN.

REFERENCES

1. CORRECTED PLAT OF PORT OF TACOMA INDUSTRIAL DEVELOPMENT DISTRICT FIRST ADDITION, VOL 18, PAGE 8, PIERCE COUNTY AUDITOR
2. PORT OF TACOMA SURVEY CONTROL MAP; DATED 2007
3. CITY OF TACOMA HISTORIC QUARTER SECTION MAP
4. PIERCE COUNTY QUARTER SECTION MAP

HORIZONTAL SCALE: 1"=20'
20 0 20 40

LEGEND

- FOUND MONUMENT AS NOTED
- SET REBAR W/ CONTROL CAP
- SURVEY CONTROL POINT
- SANITARY SEWER MANHOLE
- UTILITY CLEAN OUT
- STORM MANHOLE
- STORM CATCH BASIN
- STORM CULVERT
- ROOF DRAIN
- WATER MANHOLE
- WATER VALVE
- WATER METER
- FIRE HYDRANT
- WATER VAULT
- FIRE DEPARTMENT CONNECTION
- WATER BLOW OFF
- POST INDICATOR VALVE
- IRRIGATION CONTROL VALVE
- GAS VALVE
- GAS METER
- POWER METER
- POWER CABINET
- UTILITY POLE
- GUY ANCHOR
- JUNCTION BOX
- POWER VAULT
- POWER TRANSFORMER
- POWER MANHOLE
- LIGHT POLE
- TRAFFIC LOOP
- UTILITY VAULT
- UTILITY MANHOLE
- COLUMN
- BOLLARD
- UTILITY POLE
- SIGN
- TRAFFIC SIGNAL
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- NGAS — BURIED GAS LINE
- NGAS–R — RECORD GAS LINE
- BP — BURIED POWER LINE
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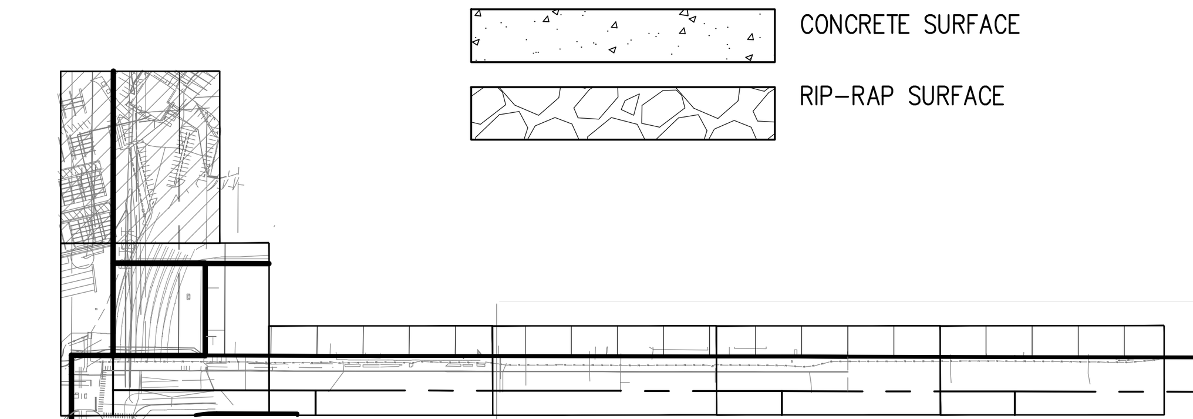
- FO — FIBER OPTIC LINE
- BT — BURIED TELECOM LINE
- BT–R — RECORD TELECOM LINE
- AP — OVERHEAD POWER LINE
- CHAIN LINK FENCE
- WOOD OR SPLIT RAIL FENCE
- RAILROAD TRACKS
- ASPHALT SURFACE
- CONCRETE SURFACE
- RIP–RAP SURFACE



KEY MAP

SITTS & HILL ENGINEERS, INC.
CIVIL • STRUCTURAL • SURVEYING

MARK:	REVISION:	BY:	APPR:	DATE:

APPROVED:
TREVOR THORNSLEY — DIRECTOR ENG. DATE
SG 12–09–19 — CHECKED BY DATE
JT 12–09–19 — PROJ. ENGR DATE
PRINTED BY: schillingd Dec 11, 2019
PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401–1837

PORT OF TACOMA
FIBER TO LOT F
TOPOGRAPHIC SURVEY

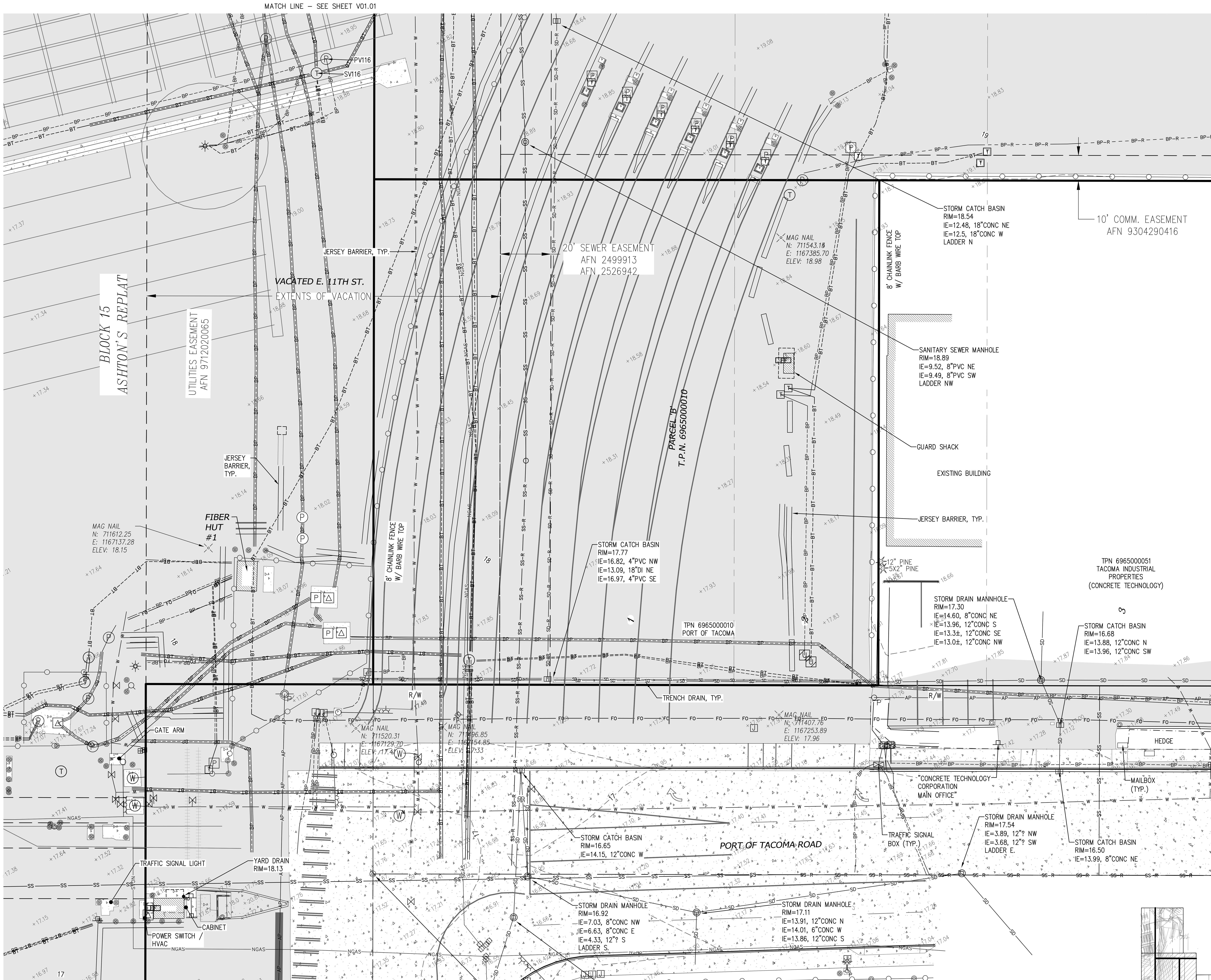
TOWNSHIP: 21N | RANGE: 3E | SECTION: 34
DAT–HRZ: WA83–SF | VERT: MLLW 19.39' @ TIDE 22 1933
PARCEL: | DRAWING SCALE: AS NOTED

6636
V01.01
1 OF 4

CONT/CONS: 071169
M. ID: 101286.01
PHASE: BID SET PLANS

BINDING EDGE

PORT OF TACOMA FILE: O:\18300\18388\Drawings\18388 - V01.01


MATCH LINE – SEE SHEET V01.01
PV116
SV116
JERSEY BARRIER, TYP.
20' SEWER EASEMENT
AFN 2499913
AFN 2526942
VACATED E. 11TH ST.
EXTENTS OF VACATION
BLOCK 15
ASHTON'S REPLAT
UTILITIES EASEMENT
AFN 9712020065
MAG NAIL
N: 711543.18
E: 1167385.70
ELEV. 18.98
8' CHAINLINK FENCE W/ BARB WIRE TOP
STORM CATCH BASIN
RIM=18.54
IE=12.48, 18"CONC NE
IE=12.5, 18"CONC W
LADDER N
10' COMM. EASEMENT
AFN 9304290416
SANITARY SEWER MANHOLE
RIM=18.89
IE=9.52, 8"PVC NE
IE=9.49, 8"PVC SW
LADDER NW
PARCEL "B"
T.P.N. 6965000010
GUARD SHACK
EXISTING BUILDING
JERSEY BARRIER, TYP.
JERSEY BARRIER, TYP.
MAG NAIL
N: 711612.25
E: 1167137.28
ELEV: 18.15
FIBER HUT #1
8' CHAINLINK FENCE W/ BARB WIRE TOP
STORM CATCH BASIN
RIM=17.77
IE=16.82, 4"PVC NW
IE=13.09, 18"DI NE
IE=16.97, 4"PVC SE
TPN 6965000051
TACOMA INDUSTRIAL PROPERTIES
(CONCRETE TECHNOLOGY)
12" PINE
5X2" PINE
STORM DRAIN MANHOLE
RIM=17.30
IE=14.60, 8"CONC NE
IE=13.96, 12"CONC S
IE=13.3±, 12"CONC SE
IE=13.0±, 12"CONC NW
STORM CATCH BASIN
RIM=16.68
IE=13.88, 12"CONC N
IE=13.96, 12"CONC SW
TPN 6965000010
PORT OF TACOMA
TRENCH DRAIN, TYP.
GATE ARM
MAG NAIL
N: 711520.31
E: 1167129.70
ELEV: 17.47
MAG NAIL
N: 711496.85
E: 1167154.85
ELEV: 17.33
MAG NAIL
N: 711407.76
E: 1167253.89
ELEV: 17.96
HEDGE
MATCH LINE – SEE SHEET V01.03
"CONCRETE TECHNOLOGY CORPORATION MAIN OFFICE"
MAILBOX (TYP.)
STORM CATCH BASIN
RIM=16.65
IE=14.15, 12"CONC W
PORT OF TACOMA ROAD
TRAFFIC SIGNAL BOX (TYP.)
STORM DRAIN MANHOLE
RIM=17.54
IE=3.89, 12"? NW
IE=3.68, 12"? SW
LADDER E.
STORM CATCH BASIN
RIM=16.50
IE=13.99, 8"CONC NE
TRAFFIC SIGNAL LIGHT
YARD DRAIN
RIM=18.13
STORM DRAIN MANHOLE
RIM=16.92
IE=7.03, 8"CONC NW
IE=6.63, 8"CONC E
IE=4.33, 12"? S
LADDER S.
STORM DRAIN MANHOLE
RIM=17.11
IE=13.91, 12"CONC N
IE=14.01, 6"CONC W
IE=13.86, 12"CONC S
POWER SWITCH / HVAC
CABINET
R/W
HORIZONTAL SCALE: 1"=20'
20 0 20 40

LEGEND

- FOUND MONUMENT AS NOTED
- SET REBAR W/ CONTROL CAP
- SURVEY CONTROL POINT
- SANITARY SEWER MANHOLE
- UTILITY CLEAN OUT
- STORM MANHOLE
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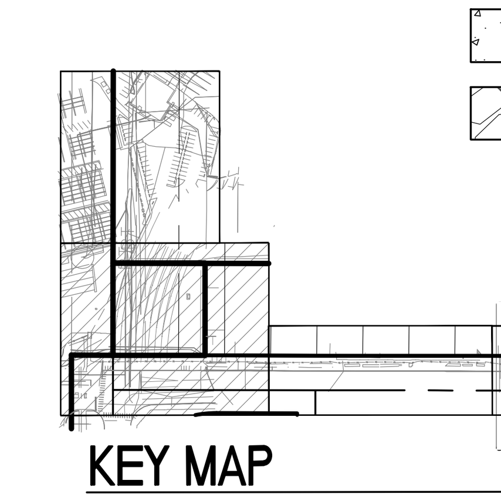


KEY MAP

Port of Tacoma
P.O. BOX 1837 TACOMA, WA 98401-1837 (253)383-5841

SITTS & HILL ENGINEERS, INC.
CIVIL • STRUCTURAL • SURVEYING

MARK:	REVISION:	BY:	APPR:	DATE:

APPROVED:

TREVOR THORNSLEY	JT	12-09-19
DIRECTOR ENG. DATE	PROJ. ENGR	DATE
	SG	12-09-19
	CHECKED BY	DATE

PRINTED BY: schillingd Dec 11, 2019
PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837

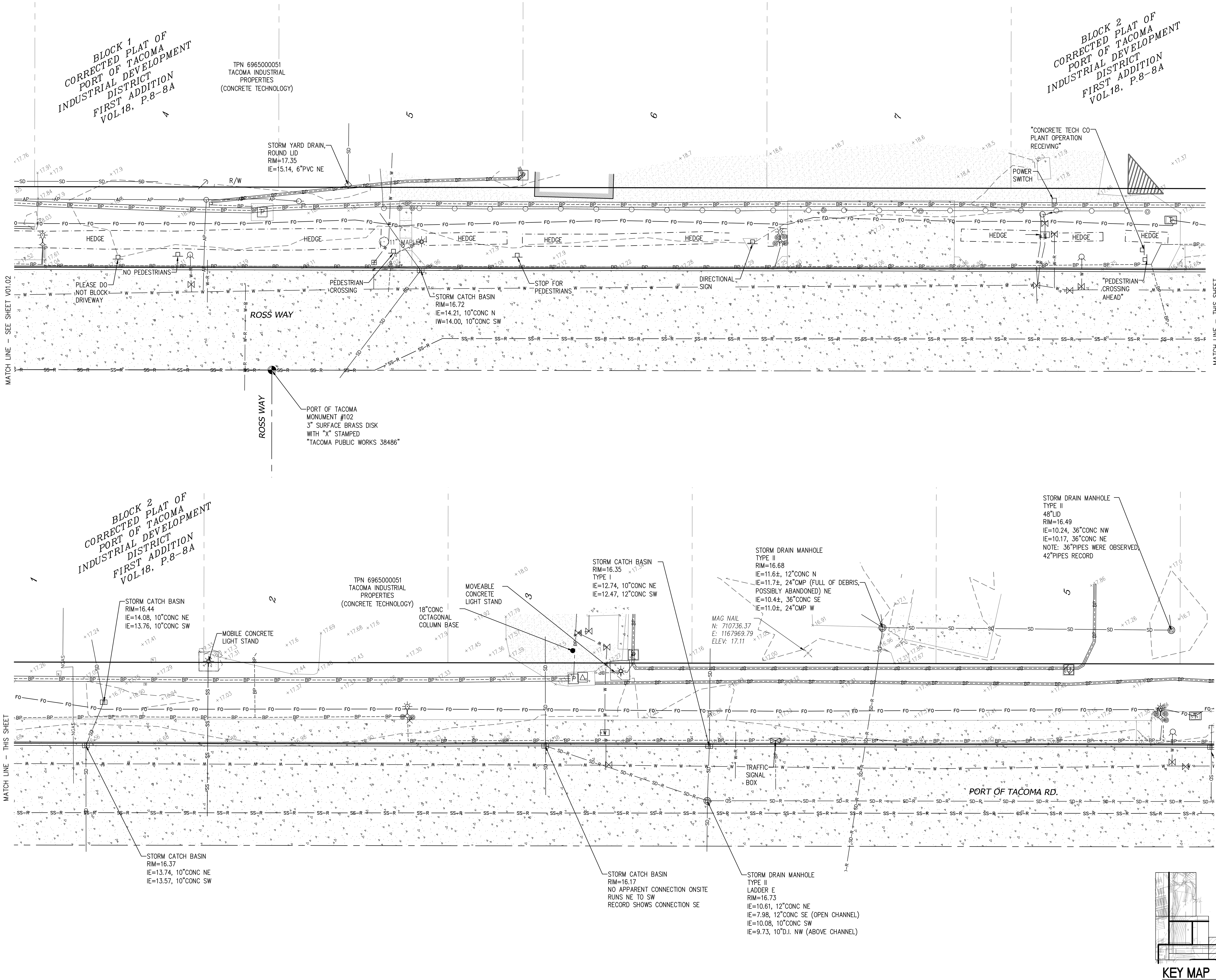
PORT OF TACOMA
FIBER TO LOT F
TOPOGRAPHIC SURVEY

TOWNSHIP: 21N	RANGE: 3E	SECTION: 34
DAT–HRZ: WA83–SF	VERT: MLLW 19.39' @ TIDE 22 1933	
PARCEL:	DRAWING SCALE: AS NOTED	

6636
V01.02
2 OF 4

CONT/CONS: 071169
M. ID: 101286.01
PHASE: BID SET PLANS

PORT OF TACOMA FILE: O:\18300\18388\Drawings\18388 - V01.02



HORIZONTAL SCALE: 1"=20'
20 0 20 40

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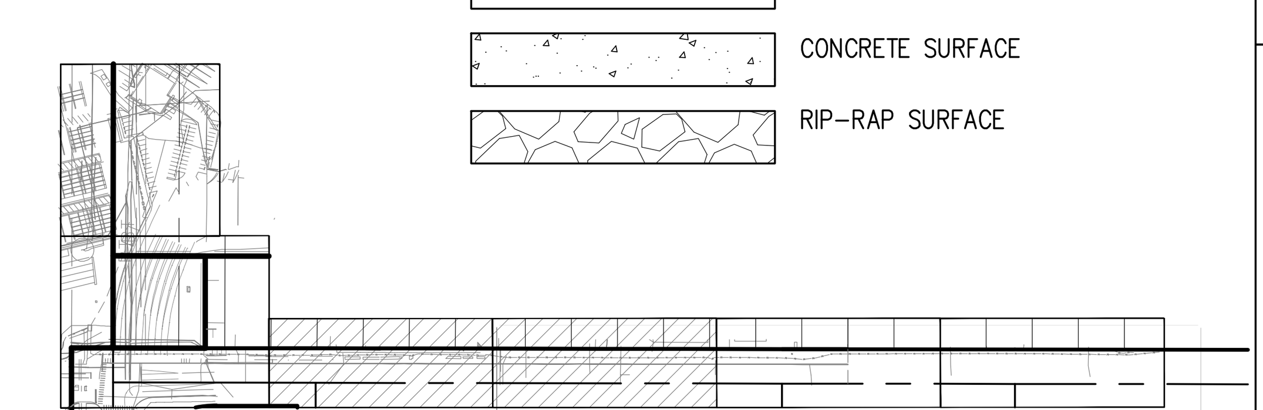
KEY MAP

Port of Tacoma
P.O. BOX 1837 TACOMA, WA 98401 (253)383-5841

SITTS & HILL ENGINEERS, INC.
CIVIL • STRUCTURAL • SURVEYING

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APPROVED:

TREVOR THORNSLEY	SG 12-09-19
DIRECTOR ENG. DATE	CHECKED BY DATE
	JT 12-09-19
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PRINTED BY: schillingd Dec 11, 2019
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TACOMA, WA 98401-1837

PORT OF TACOMA
FIBER TO LOT F
TOPOGRAPHIC SURVEY

TOWNSHIP: 21N	RANGE: 3E	SECTION: 34
DAT-HRZ: WA83-SF	VERT: MLLW 19.39' @ TIDE 22 1933	
PARCEL:	DRAWING SCALE: AS NOTED	

6636
V01.03
3 OF 4

CONT/CONS: 071169
M. ID: 101286.01
PHASE: BID SET PLANS

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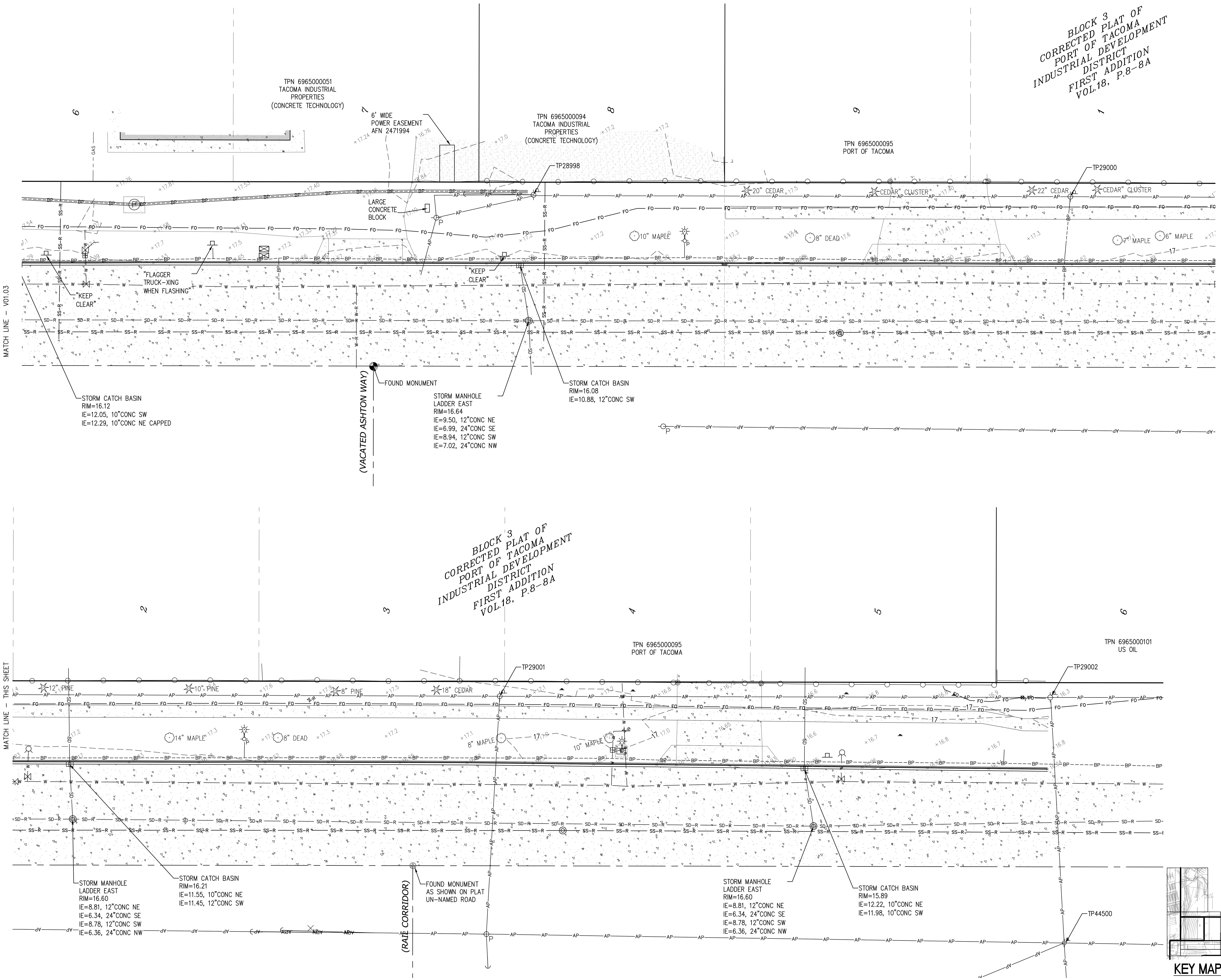

HORIZONTAL SCALE: 1"=20'

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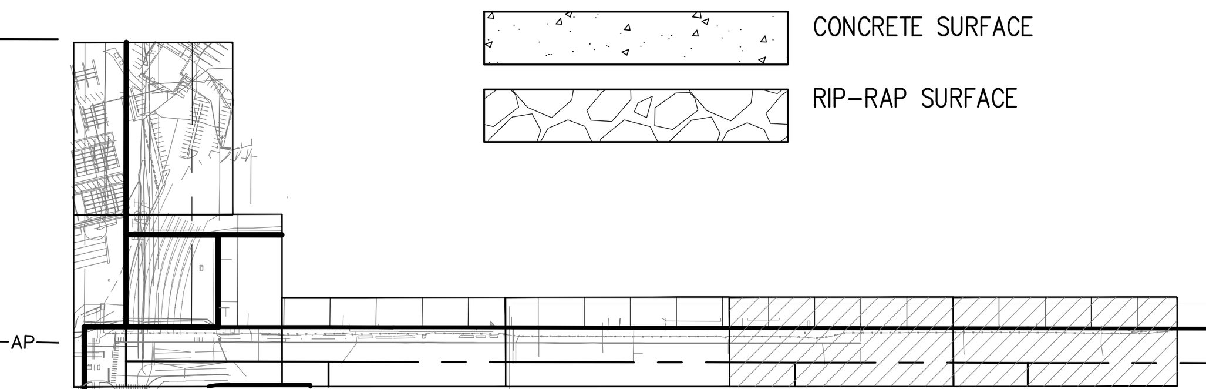

KEY MAP

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SITTS & HILL ENGINEERS, INC.
CIVIL • STRUCTURAL • SURVEYING
4815 CENTER STREET | TACOMA, WA 98409
PHONE: (253) 474-9449 | FAX: (253) 474-0153
http://www.sittshill.com/

MARK:	REVISION:	BY:	APPR:	DATE:

DESIRAE SCHILLING — STATE OF WASHINGTON — REGISTERED PROFESSIONAL LAND SURVEYOR 49289 — 12-10-19

APPROVED:

SG 12-09-19	CHECKED BY DATE
TREVOR THORNSLEY DIRECTOR ENG. DATE	JT 12-09-19 PROJ. ENGR DATE

PRINTED BY: schillingd Dec 11, 2019
PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837

PORT OF TACOMA
FIBER TO LOT F
TOPOGRAPHIC SURVEY

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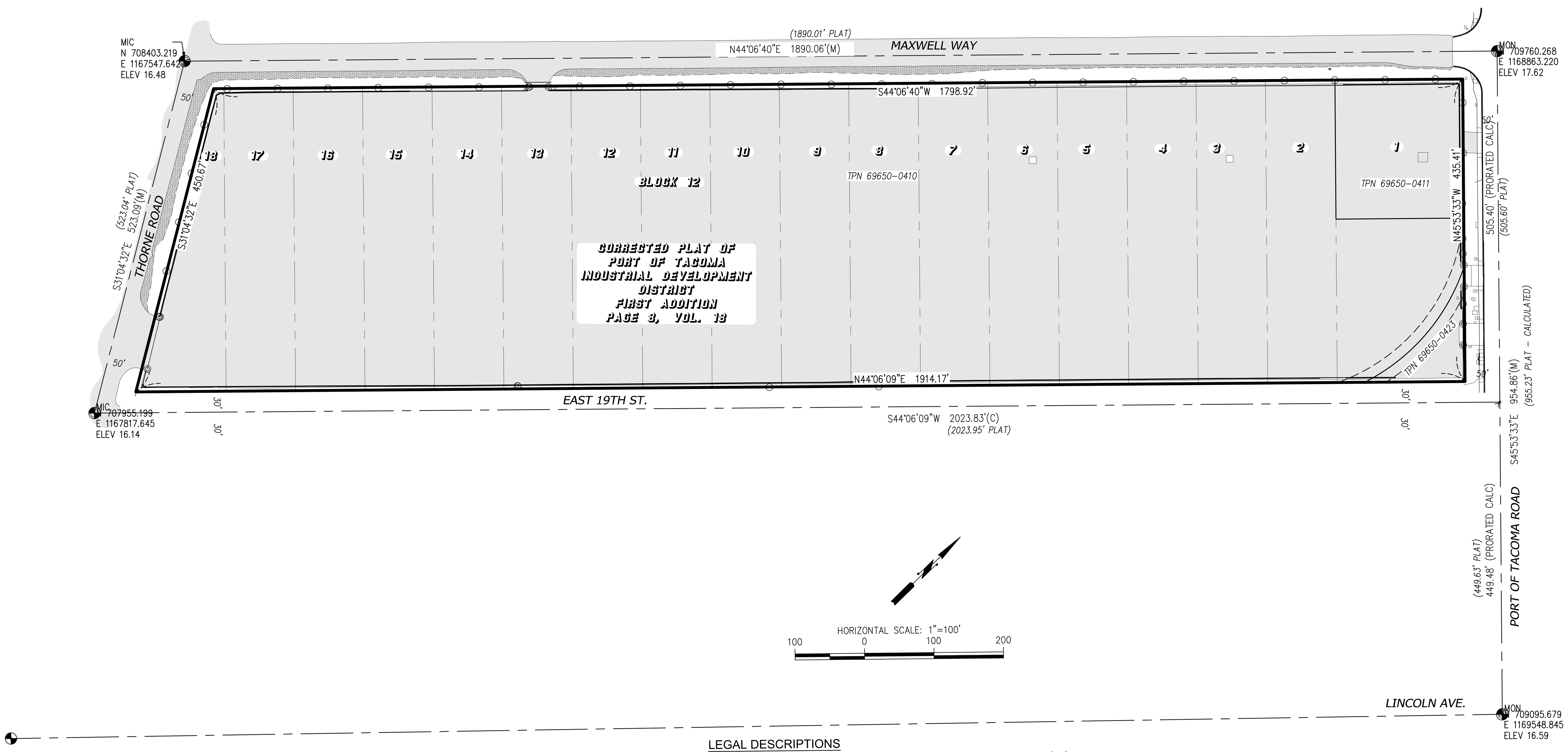
DAT-HRZ: WA83-SF	VERT: MLLW 19.39' @ TIDE 22 1933	
PARCEL:	DRAWING SCALE: AS NOTED	

6636
V01.04
4 OF 4

CONT/CONS: 071169
M. ID: 101286.01
PHASE: BID SET PLANS

PORT OF TACOMA FILE: O:\18300\18388\Drawings\18388 - V01.04



HORIZONTAL DATUM

WASHINGTON STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD 83/2011
(PER PORT OF TACOMA SURVEY CONTROL MAP – 2016)

MEASURED NORTH 44°06'40" EAST BETWEEN MONUMENTS #104 AND "L" LOCATED ON MAXWELL WAY AT THE INTERSECTIONS OF PORT OF TACOMA ROAD AND THORNE ROAD

VERTICAL DATUM

MLLW (PER PORT OF TACOMA 2016 SURVEY CONTROL MAP)

TIDE 22 1933 BENCHMARK: LOCATED AT NE CORNER OF 11TH ST. BRIDGE AT THE INTERSECTION OF E. 11TH ST. AND MILWAUKEE WAY
ELEVATION = 19.18
(BASED ON 1983–2001 TIDAL EPOCH)

SITE DATA

TAX PARCEL NOS. 6965000410, 6965000411, 6965000423
AREA: 18.6± ACRES

NOTES

1. EQUIPMENT USED: TOPCON QS ROBOTIC TOTAL STATION

2. THIS SURVEY WAS PERFORMED BY FIELD TRAVERSE WITH THE FINAL RESULTS MEETING OR EXCEEDING THE CURRENT TRAVERSE STANDARDS CONTAINED IN W.A.C. 332–130–090. ALL MEASUREMENTS WERE MADE WITH A TOPCON QS ROBOTIC TOTAL STATION IN ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S SPECIFICATIONS.

3. IN ACCORDANCE WITH THE REVISED CODE OF WASHINGTON (R.C.W.) 58.09 AND THE WASHINGTON ADMINISTRATIVE CODE (W.A.C.) 332–130, THIS SURVEY MAY DEPICT OCCUPATIONAL INDICATORS THAT DIFFER FROM THE DEEDED LOT LINES. THESE INDICATORS, IF AT ALL PRESENT, MAY REPRESENT A POTENTIAL FOR CLAIMS OF UNWRITTEN TITLE. THIS SURVEY DOES NOT PURPORT TO RESOLVE SUCH ITEMS.

4. FIELD WORK PERFORMED IN MARCH THROUGH MARCH AND SEPTEMBER 2017, UNDER SITTS & HILL PROJECT NUMBER 17537.

5. UTILITIES AS SHOWN HEREON ARE BASED ON FIELD SURVEY OBSERVATION OF UTILITY LOCATE SERVICES PERFORMED BY MOUNTAIN VIEW LOCATING SERVICES LLC. IN SEPTEMBER 2017 FOR THIS SURVEY. THIS HAS BEEN SUPPLEMENTED BY PUBLIC RECORDS. RECORD UTILITY LINES SHOWN HEREON ARE DEPICTED WITH THE STANDARD LINETYPE WITH A "– R" AS SHOWN IN THE LEGEND. UTILITIES OTHER THAN SHOWN MAY EXIST ON THE SITE. THE SURVEYOR DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. THE SURVEYOR DOES CERTIFY THAT THEY ARE SHOWN AS ACCURATELY AS POSSIBLE FROM FIELD SURVEY AND PAINTED UTILITY LOCATE LINES. COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA IS CONSISTENT WITH QUALITY LEVEL (B) OF THE ASCE STANDARD GUIDELINES 38–02.

6. SITTS & HILL ENGINEERS, INC. HAS RELIED UPON TITLE INFORMATION NOTED IN COMMITMENT FOR TITLE INSURANCE PREPARED BY FIRST AMERICAN TITLE INSURANCE COMPANY OF WASHINGTON, COMMITMENT NUMBER 2940659, DATED SEPTEMBER 12TH 2017. IN PREPARATION OF THIS SURVEY, SITTS AND HILL ENGINEERS, INC. HAS CONDUCTED NO INDEPENDENT TITLE SEARCH NOR IS SITTS AND HILL ENGINEERS, INC. AWARE OF ANY TITLE ISSUES AFFECTING THE SURVEYED PROPERTY OTHER THAN THOSE SHOWN ON THE MAP AND/OR DISCLOSED BY SAID TITLE COMPANY'S ORDER. SITTS & HILL ENGINEERS, INC. HAS RELIED WHOLLY ON SAID TITLE COMPANY'S REPORT AND THEREFORE QUALIFIES THE MAP'S ACCURACY AND COMPLETENESS TO THAT EXTENT.

7. THIS SURVEY COMPLIES WITH W.A.C. 332–130–145. THE CONTOURS DEPICTED HEREON ARE BASED ON DATA FROM DIRECT FIELD MEASUREMENTS. SPOT ELEVATIONS ARE BASED ON DIRECT FIELD MEASUREMENTS AND ARE DEPICTED FOR REFERENCE. THE PURPOSE OF THIS TOPOGRAPHIC MAP IS TO SERVE AS A BASE MAP FOR CONTEMPLATED SITE IMPROVEMENTS AND DESIGN.

SCHEDULE B EXCEPTIONS

PER FIRST AMERICAN TITLE INSURANCE COMPANY OF WASHINGTON, COMMITMENT NUMBER 2940659, DATED SEPTEMBER 12TH 2017

EXCEPTION NUMBER	AFN	DESCRIPTION
1.	**8012010130	FACILITY CHARGES, IF ANY, INCLUDING BUT NOT LIMITED TO HOOK–UP, OR CONNECTION CHARGES AND LATECOMER CHARGES FOR SEWER, WATER AND PUBLIC FACILITIES OF THE CITY OF TACOMA AS DISCLOSED BY INSTRUMENT RECORDED UNDER RECORDING NO. 2864651 AND AS AMENDED BY INSTRUMENTS RECORDED UNDER RECORDING NUMBERS 2881434 AND 8012010130.
2.	**––	PROVISIONS AND CONDITIONS OF TITLE 53 RCW RELATING TO THE USE OF LANDS WITHIN PORT DISTRICTS, CHAPTER 73, SESSION LAWS 1955, AS AMENDED, OR IF APPLICABLE, CHAPTER 45, SESSION LAWS 1939, AS AMENDED.
3.	2526942	COVENANT FOR CONSTRUCTION OF SANITARY SEWERS IN THE PORT INDUSTRIAL AREA, CITY OF TACOMA; MULTIPLE LOCATIONS INCLUDED IN DOCUMENT; LIES WITHIN THE RIGHTS OF WAY OF THORNE ROAD AND PORT OF TACOMA ROAD.
4.	2781220	DEED FOR PIPELINE GRANTED TO US OIL; 60' WIDE STRIP OF LAND OVER BLOCK 13 OF PORT OF TACOMA INDUSTRIAL DEVELOPMENT DISTRICT FIRST ADDITION; LOCATED WITHIN THE SOUTH RIGHT OF WAY OF THE UNNAMED ROAD ON SAID PLAT BETWEEN BLOCKS 12 AND 14; EXTENTS OF DEEDED AREA LIES SOUTHEAST OF THE SUBJECT SITE.
5.	*9408020435	DECLARATION OF RESTRICTIVE COVENANT FOR REMEDIAL ACTION OF INDUSTRIAL SOIL CLEAN UP; AFFECTS THE ENTIRE SITE AND NOTES A CAP SYSTEM WITH MONITORING

* BLANKET IN NATURE OF AFFECTS ENTIRE PROPERTY
** INDICATES TITLE EXCEPTION WHICH CANNOT BE SHOWN HEREON DUE TO INSUFFICIENT LEGAL DESCRIPTION OR LACK OF OBSERVABLE PHYSICAL EVIDENCE.

REFERENCES

1. PORT OF TACOMA SURVEY CONTROL MAP; DATED 2016
2. CITY OF TACOMA HISTORIC QUARTER SECTION MAP
3. PIERCE COUNTY QUARTER SECTION MAP
4. CORRECTED PLAT OF PORT OF TACOMA INDUSTRIAL DEVELOPMENT DISTRICT FIRST ADDITION; VOL. 18, PG. 8 BOOK OF RECORDS

LEGAL DESCRIPTIONS

PER FIRST AMERICAN TITLE INSURANCE COMPANY COMMITMENT 2940659; DATED 09/12/2017

PARCEL A (696500–0410):

LOT 1, BLOCK 12, CORRECTED PLAT OF PORT OF TACOMA INDUSTRIAL DEVELOPMENT DISTRICT FIRST ADDITION, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 18 OF PLATS, PAGES 8 AND 8A, RECORDS OF THE PIERCE COUNTY AUDITOR;

TOGETHER WITH THAT PORTION OF THE VACATED RIGHT OF WAY ABUTTING THEREON AND ATTACHED THERETO BY OPERATION OF LAW, AS VACATED BY CITY OF TACOMA ORDINANCE NO. 21116 AND RECORDED UNDER RECORDING NUMBER 2772670;

EXCEPT THAT PORTION LYING WITHIN THE NORTHWESTERLY 200 FEET OF SAID LOT 1;

TOGETHER WITH ALL OF LOTS 2 THROUGH 18, INCLUSIVE, OF SAID BLOCK 12;

SITUATE IN THE CITY OF TACOMA, COUNTY OF PIERCE, STATE OF WASHINGTON.

PARCEL B (696500–0411):

THE NORTHWESTERLY 200 FEET OF LOT 1, BLOCK 12, CORRECTED PLAT OF PORT OF TACOMA INDUSTRIAL DEVELOPMENT DISTRICT FIRST ADDITION, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 18 OF PLATS, PAGES 8 AND 8A, RECORDS OF THE PIERCE COUNTY AUDITOR, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE NORTHERLY CORNER OF SAID LOT 1 AND THE SOUTHWESTERLY RIGHT OF WAY LINE OF PORT OF TACOMA ROAD, BEING THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;
THENCE SOUTHWESTERLY ALONG THE NORTHWESTERLY LINE OF SAID LOT TO THE WESTERLY CORNER THEREOF;
THENCE SOUTHEASTERLY ALONG THE SOUTHWESTERLY LINE OF SAID LOT A DISTANCE OF 200 FEET;
THENCE ON AN ANGLE TO THE LEFT OF 90° AND PARALLEL TO THE NORTHWESTERLY LINE OF SAID LOT TO INTERSECT THE NORTHEASTERLY SIDE OF SAID LOT;
THENCE ALONG THE NORTHEASTERLY LINE OF SAID LOT TO THE TRUE POINT OF BEGINNING;

SITUATE IN THE CITY OF TACOMA, COUNTY OF PIERCE, STATE OF WASHINGTON.

PARCEL C: (696500–0423)

THAT PORTION OF BLOCK 13, CORRECTED PLAT OF PORT OF TACOMA INDUSTRIAL DEVELOPMENT DISTRICT FIRST ADDITION, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 18 OF PLATS, PAGES 8 AND 8A, RECORDS OF THE PIERCE COUNTY AUDITOR, LYING NORTHERLY OF THE PROLONGATION OF THE NORTHWESTERLY BOUNDARY LINE OF LOTS 2 THROUGH 19, BLOCK 14 OF SAID PLAT;

TOGETHER WITH THAT PORTION OF THE VACATED RIGHT OF WAY ABUTTING THEREON AND ATTACHED THERETO BY OPERATION OF LAW, AS VACATED BY CITY OF TACOMA ORDINANCE NO. 21116 AND RECORDED UNDER RECORDING NUMBER 2772670;

EXCEPT THAT PORTION THEREOF CONVEYED TO THE CITY OF TACOMA BY WARRANTY DEED RECORDED NOVEMBER 28, 1977 UNDER RECORDING NUMBER 2781220;

SITUATE IN THE CITY OF TACOMA, COUNTY OF PIERCE, STATE OF WASHINGTON.

Port of Tacoma

SITTS & HILL ENGINEERS, INC.

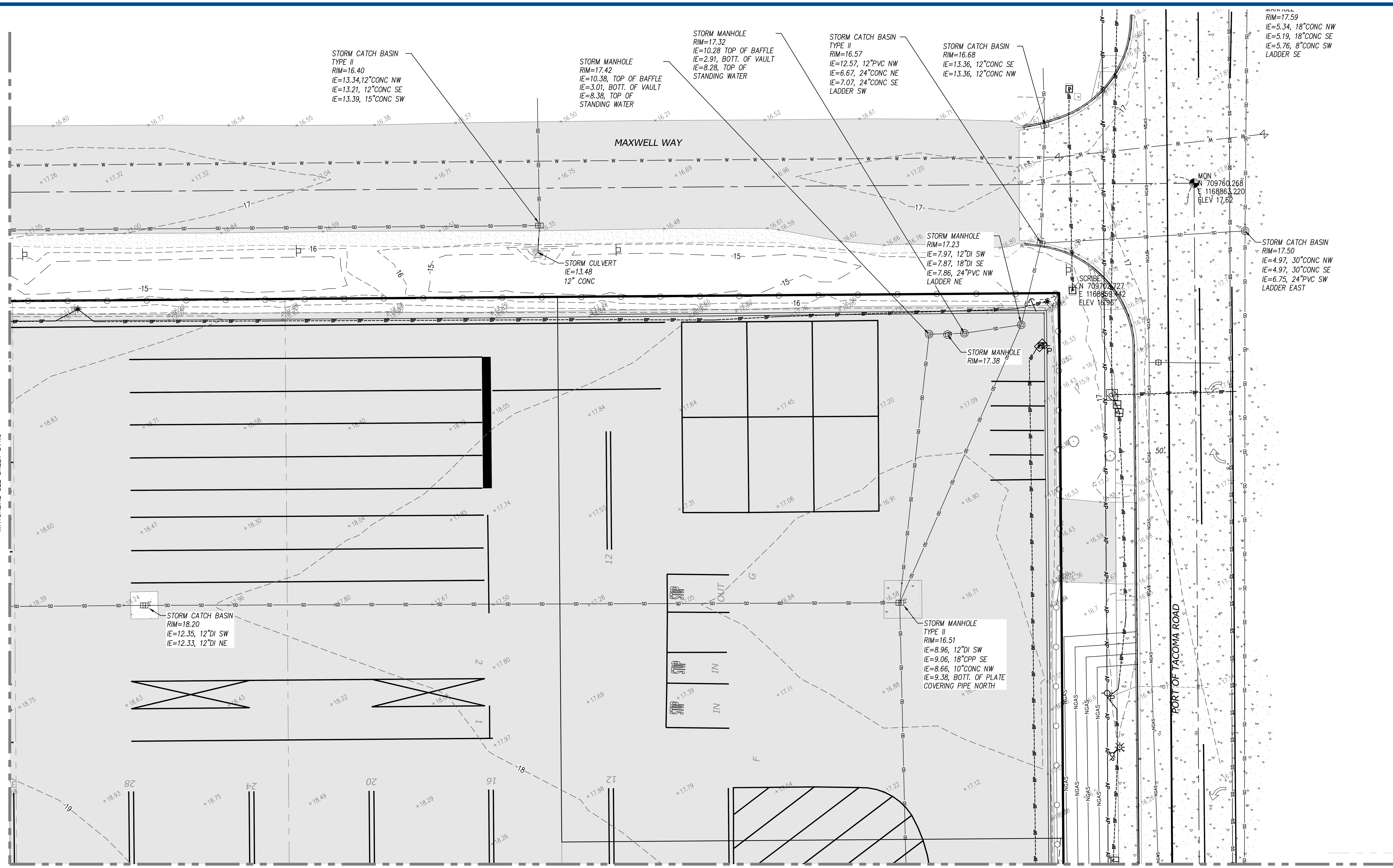
MARK: | REVISION: | BY: | APPR: | DATE:

APPROVED:
M.A.M. 00/00/00
CHECKED BY DATE
DIRECTOR ENG. DATE
PROJ. ENGR DATE
PRINTED BY: schillingd Nov 19, 2019
PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837

PARCEL F
TOPOGRAPHIC SURVEY

TOWNSHIP: 21 NORTH | RANGE: 3 EAST | SECTION: 34
DAT-HRZ: WA83/2011-SF | VERT: MLLW 19.18' @ Tide 22 1933
PARCEL: N/A | DRAWING SCALE: AS NOTED
CONT/CONS:
M. ID:
PHASE:

SV1.0
SH 1 OF 9



HORIZONTAL SCALE: 1"=20'

20 0 20 40

LEGEND

FOUND MONUMENT, 2" BRASS DISK W/"X" STAMPED "TPW 38486" UNLESS OTHERWISE NOTED	IRRIGATION CONTROL VALVE
SET REBAR W/ CONTROL CAP	GAS VALVE
SURVEY CONTROL POINT	GAS METER
SANITARY SEWER MANHOLE	POWER METER
UTILITY CLEAN OUT	POWER CABINET
STORM MANHOLE	UTILITY POLE
STORM CATCH BASIN	GUY ANCHOR
STORM CULVERT	JUNCTION BOX
ROOF DRAIN	POWER VAULT
WATER MANHOLE	POWER TRANSFORMER
WATER VALVE	POWER MANHOLE
WATER METER	LIGHT POLE
FIRE HYDRANT	TRAFFIC LOOP
WATER VAULT	UTILITY VAULT
FIRE DEPARTMENT CONNECTION	UTILITY MANHOLE
WATER BLOW OFF	COLUMN
POST INDICATOR VALVE	BOLLARD

UTILITY POLE	STORM DRAIN LINE
SIGN	RECORD STORM LINE
MAILBOX	SANITARY SEWER LINE
MONITORING WELL	RECORD SANITARY LINE
TAX PARCEL NUMBER	BURIED WATER LINE
TELECOM VAULT	RECORD WATER LINE
TELECOM MANHOLE	BURIED GAS LINE
TELECOM CABINET	RECORD GAS LINE
SCHED. B EXCEPTION NUMBER	BURIED POWER LINE
	RECORD BURIED POWER
	BURIED TELECOM LINE
ASPHALT SURFACE	RECORD TELECOM LINE
	OVERHEAD POWER LINE
CONCRETE SURFACE	CHAIN LINK FENCE
	WOOD OR SPLIT RAIL FENCE
RIP-RAP SURFACE	RAILROAD TRACKS

KEY MAP
SCALE 1"=300'

SEE SHEET SV1.0 FOR SURVEY CONTROL, NOTES AND BOUNDARY INFORMATION

PORT OF TACOMA FILE: P:\17500\17537\Drawings\17537 - Topo SV1.4

Port of Tacoma
P.O. BOX 1837 TACOMA, WA 98401 (253)383-5841

SITTS & HILL ENGINEERS, INC.
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APPROVED:

M.A.M. 00/00/00
CHECKED BY DATE

DIRECTOR ENG. DATE | PROJ. ENGR DATE

PRINTED BY: schillingd Nov 25, 2019

PORT ADDRESS: ONE SITCUM PLAZA TACOMA, WA 98401-1837

PARCEL F
TOPOGRAPHIC SURVEY

TOWNSHIP: 21 NORTH | RANGE: 3 EAST | SECTION: 34

DAT-HRZ: WA83/2011-SF | VERT: MLLW 19.18' @ Tide 22 1933

PARCEL: N/A | DRAWING SCALE: AS NOTED

CONT/CONS:

M. ID:

PHASE:

SV1.4

SH 5 OF 9

APPENDIX A

FIELD EXPLORATIONS, GEOTECHNICAL LABORATORY TESTING AND ENVIRONMENTAL SOIL SAMPLING

APPENDIX A

FIELD EXPLORATIONS, GEOTECHNICAL LABORATORY TESTING AND ENVIRONMENTAL SOIL SAMPLING

Subsurface soil and groundwater conditions were evaluated between October 11, 2002 and October 16, 2002 by drilling two borings and excavating eight test pits at the approximate locations shown on Figure 2. The explorations were located in the field by our representative by measuring from existing site features.

The borings were drilled by Holt Drilling of Puyallup, Washington using truck-mounted hollow-stem auger drilling equipment. Representative samples were obtained of each soil type encountered using a 2.4-inch-inside-diameter split-spoon sampler. The sampler was driven into the soil using a 300-pound hammer free-falling 30 inches. The number of blows required to drive the sampler the last 12 inches, or other indicated distance, is recorded on the boring logs.

Test pits were excavated to depths between 12 and 15 feet bgs using a rubber-tired backhoe. The backhoe and operator were provided by Homestead Excavation under subcontract to GeoEngineers, Inc. The densities noted on the logs are based on the difficulty of excavation and our experience and judgement.

The borings and test pits were continuously monitored by a representative of our firm who visually examined and classified the soils encountered, obtained representative soil samples, observed surface and groundwater conditions and prepared a detailed log of each boring and test pit. Soils were visually classified in general accordance with the system described in Figure A-1. A key to the boring logs and test pits is provided in Figure A-2. Logs of the borings and test pits are presented in Figures A-3 through A-12. The logs are based on our interpretation of the field and laboratory data and indicate the depths at which the subsurface conditions change, although the change may be gradual. If the change occurred between samples it was interpreted.

GEOTECHNICAL LABORATORY TESTING

LABORATORY TEST RESULTS

Soil samples obtained from the borings were transported to GeoEngineers laboratory. Representative soil samples were selected for laboratory tests to evaluate the pertinent geotechnical engineering characteristics of the site soils and to confirm our field classification. The following paragraphs provide a description of the tests performed.

Moisture Content and Density

The moisture content and/or density of selected samples were determined in general accordance with ASTM Test Methods D 2216 and D 2937, respectively. The test results are used to aid in soil classification and correlation with other pertinent engineering soil properties. The test results are presented on the attached logs.

Atterberg Limit Testing

Atterberg Limit Tests were performed on selected samples in general accordance with ASTM Test Method D 4318. This test method determines the liquid limit, plastic limit and plasticity index of soil particles passing the No. 40 sieve. The results of the tests are used to assist in soil classification. Figure A-13 presents the results of this test.

ENVIRONMENTAL SOIL SAMPLING

Upon retrieval, a GeoEngineers representative logged the soils in general accordance with Figure 4. A representative portion of the sample was quickly placed into a clean glass jar, lightly packed, and capped with a plastic lid. All samples were labeled at the time of collection using a unique identifying label and recorded on a Chain of Custody form. The samples were then promptly stored in a cooler with ice.

FIELD SCREENING METHODS

Our representative conducted field screening on each of the soil samples obtained from the test pit explorations. Field screening consisted of visual screening and water sheen testing.

Visual screening consists of observing the soil for stains or odors indicative of petroleum-related contamination. Visual screening is generally more effective when contamination is related to heavy petroleum hydrocarbons such as motor oil, or when hydrocarbon concentrations are high. Water sheen testing is a more sensitive screening method that generally can be effective in detecting petroleum-based products in concentrations lower than regulatory cleanup guidelines.

Water sheen testing involves placing soil in water and observing the water surface for signs of sheen. The results of all observed soil sample water sheen and odors are presented on the test pit logs. Sheens are classified as follows:

No Sheen (NS)	No visible sheen on water surface.
Slight Sheen (SS)	Light colorless film, spotty to globular; spread is irregular, not rapid; areas of no sheen remain; film dissipates rapidly.
Moderate Sheen (MS)	Light to heavy film, may have some color or iridescence, globular to stringy, spread is irregular to flowing; few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy colorful film with iridescence; stringy, spread is rapid; sheen flows off the sample; most of water surface may be covered with sheen.

Odors are classified the same way but given a "O" designation.

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS More Than 50% Retained on No. 200 Sieve	GRAVEL More Than 50% of Coarse Fraction Retained on No. 4 Sieve	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND More Than 50% of Coarse Fraction Passes No. 4 Sieve	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS More Than 50% Passes No. 200 Sieve	SILT AND CLAY Liquid Limit Less Than 50	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY Liquid Limit 50 or More	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1. Field classification is based on visual examination of soil in general accordance with ASTM D2488-93.
2. Soil classification using laboratory tests is in general accordance with ASTM D2487-98.
3. Descriptions of soil density or consistency are based on interpretation of blow count data, visual appearance of soils, and/or test data.

SOIL MOISTURE MODIFIERS:

Dry - Absence of moisture, dusty, dry to the touch

Moist - Damp, but no visible water

Wet - Visible free water or saturated, usually soil is obtained from below water table

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SOIL CLASSIFICATION SYSTEM

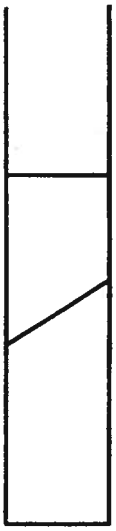
FIGURE A-1

File No. 0454-080-00 TAD:SLF:GWH:tw 11/08/02

LABORATORY TESTS

AL	Atterberg Limits
CP	Compaction
CS	Consolidation
DS	Direct shear
GS	Grain size
%F	Percent fines
HA	Hydrometer Analysis
SK	Permeability
SM	Moisture Content
MD	Moisture and density
SP	Swelling pressure
TX	Triaxial compression
UC	Unconfined compression
CA	Chemical analysis

SOIL GRAPH:



SM Soil Group Symbol (See Note 2)

Distinct Contact Between Soil Strata

Gradual or Approximate Location of Change Between Soil Strata

Water Level

Bottom of Boring

BLOW COUNT/SAMPLE DATA:

Blows required to drive a 2.4-inch I.D. split-barrel sampler 12 inches or other indicated distances using a 300-pound hammer falling 30 inches.

22 Location of relatively undisturbed sample

12 Location of disturbed sample

17 Location of sampling attempt with no recovery

Blows required to drive a 1.5-inch I.D. (SPT) split-barrel sampler 12 inches or other indicated distances using a 140-pound hammer falling 30 inches.

10 Location of sample obtained in general accordance with Standard Penetration Test (ASTM D-1586) procedures

26 Location of SPT sampling attempt with no recovery

Location of grab sample

"P" indicates sampler pushed with weight of hammer or against weight of drill rig.

NOTES:

1. The reader must refer to the discussion in the report text, the Key to Boring and Test Pit Symbols and the exploration logs for a proper understanding of subsurface conditions.
2. Soil classification system is summarized in Figure A-1.

File No. 0454-080-00 TAD:SLF:GWH:tw 11/08/02

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KEY TO BORING LOG AND TEST PIT SYMBOLS

FIGURE A-2

Date(s) Drilled	10/16/02	Logged By	SLM	Checked By	TAD
Drilling Contractor	Holt Drilling	Drilling Method	Hollow-Stem Auger	Sampling Methods	2.4-inch ID Split Barrel
Auger Data	4-inch ID	Hammer Data	300 (lb) hammer/ 30 (in) drop	Drilling Equipment	Mobil B-59
Total Depth (ft)	24	Surface Elevation (ft)	17.5	Groundwater Level (ft. bgs)	12.0
Datum/ System	NAD 83-91				

Elevation feet	Depth feet	SAMPLES Interval	Number	Recovered (in)	Blows/6in	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight,	OTHER TESTS AND NOTES
	0							GP	Gray fine to coarse gravel with sand, trace of silt (medium dense, dry) (fill)			
15								SP	Black fine to medium sand, trace of silt (dense, moist) (fill)			
	5		1	12	44					5	104	
10								SM	Gray silty fine to medium sand, (loose, wet) (fill)			
			2	14	4							
	10							ML	Gray silt with sand (very soft, wet)			
5			3		1	▼				49		AL
	15							SP-SM	Black fine to coarse sand with silt (very loose, wet)			
0			4	16	2							
	20							SM	Brownish gray silty fine to medium sand with silt (medium dense, wet)			
-5			5	14	22							

Note: See Figure A-2 for explanation of symbols

LOG OF BORING B-1

Geo Engineers

Project: Port of Tacoma - Maxwell Avenue Sites
Project Location: Tacoma, Washington
Project Number: 0454-080-00

Figure: A-3
Sheet 1 of 1

Date(s) Drilled	10/16/02	Logged By	SLM	Checked By	TAD
Drilling Contractor	Holt Drilling	Drilling Method	Hollow-Stem Auger	Sampling Methods	2.4-inch ID Split Barrel
Auger Data	4-inch ID	Hammer Data	300 (lb) hammer/ 30 (in) drop	Drilling Equipment	Mobil B-59
Total Depth (ft)	24	Surface Elevation (ft)	18.5	Groundwater Level (ft. bgs)	9.0
Datum/ System	NAD 83-91				

Elevation feet	Depth feet	SAMPLES Interval	Number	Recovered (in)	Blows/6in	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight,	OTHER TESTS AND NOTES
	0							SM	Brown silty fine to coarse sand with gravel and silt (dense, moist) (fill)			
15			1		51			SP	Black fine to coarse sand, trace of silt (dense, moist) (fill)			
5								SP-SM	Brownish gray fine to medium sand with silt (medium dense, moist to wet) (fill)			
10			2		10	▼				28	90	
	10							ML	Gray silt with occasional sand (very soft, wet)			
5			3		2							
	15							SM	Gray silty fine to medium sand (very loose, wet)			
0			4		2			SP	Black fine to coarse sand, trace of silt (medium dense, wet)			
	20											
-5			5	16	24							

Note: See Figure A-2 for explanation of symbols

LOG OF BORING B-2

Geo Engineers

Project: Port of Tacoma - Maxwell Avenue Sites
Project Location: Tacoma, Washington
Project Number: 0454-080-00

Figure: A-4

Date Excavated: 10/11/02 Logged by: KWG

Equipment: Case 480 K Backhoe Surface Elevation (ft): 16.5

Elevation feet	Depth feet	Sample	Sample Number	Water	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					SM	Brown silty fine to medium sand, occasional gravel (medium dense, moist) (fill)			
15		X	1			SP-SM	Black fine sand with silt (loose to medium dense, moist) (fill)			NO/NS
		X	2					7		NO/NS
	5									
10										
		X	3			ML/OL	Gray silt with organic material (very soft, moist)			NO/NS
	10									
5										
							Test pit completed at a depth of 12 feet on 10/11/02 No groundwater seepage observed Severe caving observed at depths between 6 and 9 feet Disturbed soil samples obtained at depths of 2, 4, and 9 feet			
	15									
0										
	20									

Note: See Figure A-2 for explanation of symbols
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-1

GeoEngineers

Project: Port of Tacoma - Maxwell Avenue Sites
Project Location: Tacoma, Washington
Project Number: 0454-080-00

Figure: A-5
Sheet 1 of 1

Date Excavated: 10/11/02 Logged by: KWG

Equipment: Case 480 K Backhoe Surface Elevation (ft): 18.5

Elevation feet	Depth feet	Sample	Sample Number	Water	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					SM	Black to brown silty fine to medium sand, occasional gravel and asphalt (medium dense, moist) (fill)			
		X	1							NO/NS
						SP-SM	Black fine to medium sand with silt, trace of wood debris (loose to medium dense, moist) (fill)			
15		X	2							NO/NS
	5									
		X	3							NO/NS
10						ML	Gray silt with sand (very soft, moist)			
	10	X	4							NO/NS
							Test pit completed at a depth of 12 feet on 10/11/02 No groundwater seepage observed Severe caving observed at depths between 6 and 9 feet Disturbed soil samples obtained at depths of 2, 4, 8, and 10 feet			
5										
	15									
0										
	20									

Note: See Figure A-2 for explanation of symbols
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-2

Geo Engineers

Project: Port of Tacoma - Maxwell Avenue Sites
Project Location: Tacoma, Washington
Project Number: 0454-080-00

Figure: A-6

Date Excavated: 10/11/02 Logged by: KWG

Equipment: Case 480 K Backhoe Surface Elevation (ft): 15.5

Elevation feet	Depth feet	Sample	Sample Number	Water	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
15	0					GP	Gray fine to coarse gravel with sand (medium dense, dry) (fill)			
						SM	Brown silty fine to medium sand with gravel (dense, moist) (fill)			
		X	1			SP-SM	Black fine to coarse sand with silt (loose to medium dense, moist) (fill)			NO/NS
	5	X	2							NO/NS
10										
		X	3			ML/OL	Gray to black silt with organic material (soft, moist)			NO/NS
	10									
5										
							Test pit completed at a depth of 13 feet on 10/11/02 No groundwater seepage observed Severe caving observed at depths between 4 and 7 feet Disturbed soil samples obtained at depths of 1, 4, and 7 feet			
	15									
0										
	20									

Note: See Figure A-2 for explanation of symbols

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-3

GeoEngineers

Project: Port of Tacoma - Maxwell Avenue Sites

Project Location: Tacoma, Washington

Project Number: 0454-080-00

Figure: A-7

Sheet 1 of 1

Date Excavated: 10/11/02 Logged by: KWG

Equipment: Case 480 K Backhoe Surface Elevation (ft): 17.5

Elevation feet	Depth feet	Sample	Sample Number	Water	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					GP	Gray fine to coarse gravel with sand (medium dense, moist) (fill)			
						SM	Brown silty fine to medium sand with gravel (dense, dry (fill)			
15						SM	Gray silty fine to medium sand with gravel (dense, moist) (fill)			
						SM	Dark brown silty fine to medium sand with wood, occasional gravel (medium dense, moist) (fill)			
			1			SP-SM	Black fine to coarse sand with silt and trace of roots (loose, moist) (fill)			NO/NS
	5		2							NO/NS
10						OL	Brown organic silt (very soft, moist)			
	10		3							NO/NS
5							Test pit completed at a depth of 12 feet on 10/11/02 No groundwater seepage observed Severe caving observed at depths between 5 and 8 feet Disturbed soil samples obtained at depths of 3.5, 4, and 10 feet			
	15									
0										
	20									

Note: See Figure A-2 for explanation of symbols

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-4

Geo Engineers

Project: Port of Tacoma - Maxwell Avenue Sites

Project Location: Tacoma, Washington

Project Number: 0454-080-00

Figure: A-8

Date Excavated: 10/11/02 Logged by: KWG

Equipment: Case 480 K Backhoe Surface Elevation (ft): 17.0

Elevation feet	Depth feet	Sample	Sample Number	Water	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					WD	Bark chips and wood debris (loose, moist) (fill)			
						SM	Brown silty fine to medium sand with gravel (dense, moist) (fill)			
15		☒	1							NO/NS
						SP-SM	Gray fine to medium sand with silt (loose, moist) (fill)			
		☒	2					10		NO/NS
	5									
10										
	10					ML	Gray silt with sand and trace of organic material (very soft, moist)			
		☒	3							NO/NS
5										
	15						Test pit completed at a depth of 14 feet on 10/11/02 No groundwater seepage observed No caving observed Disturbed soil samples obtained at depths of 2, 4, and 11 feet			
0										
	20									

Note: See Figure A-2 for explanation of symbols

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-5

Geo Engineers

Project: Port of Tacoma - Maxwell Avenue Sites

Project Location: Tacoma, Washington

Project Number: 0454-080-00

Figure: A-9

Sheet 1 of 1

Date Excavated: 10/11/02 Logged by: KWG

Equipment: Case 480 K Backhoe Surface Elevation (ft): 17.5

Elevation feet	Depth feet	Sample	Sample Number	Water	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					SM	Brown silty fine to coarse sand with gravel, trace of bark (medium dense, dry) (fill)			
15		☒	1							NO/NS
						SP-SM	Gray fine to medium sand with silt (medium dense, moist) (fill)			
		☒	2							NO/NS
	5									
10						ML	Gray silt, trace of organic material (very soft, moist)			
		☒	3							NO/NS
	10									
5										
	15						Test pit completed at a depth of 15 feet on 10/11/02 No groundwater seepage observed Severe caving observed at depths between 5 and 8 feet Disturbed soil samples obtained at depths of 2, 4, and 9 feet			
0										
	20									

Note: See Figure A-2 for explanation of symbols

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-6

Geo Engineers

Project: Port of Tacoma - Maxwell Avenue Sites

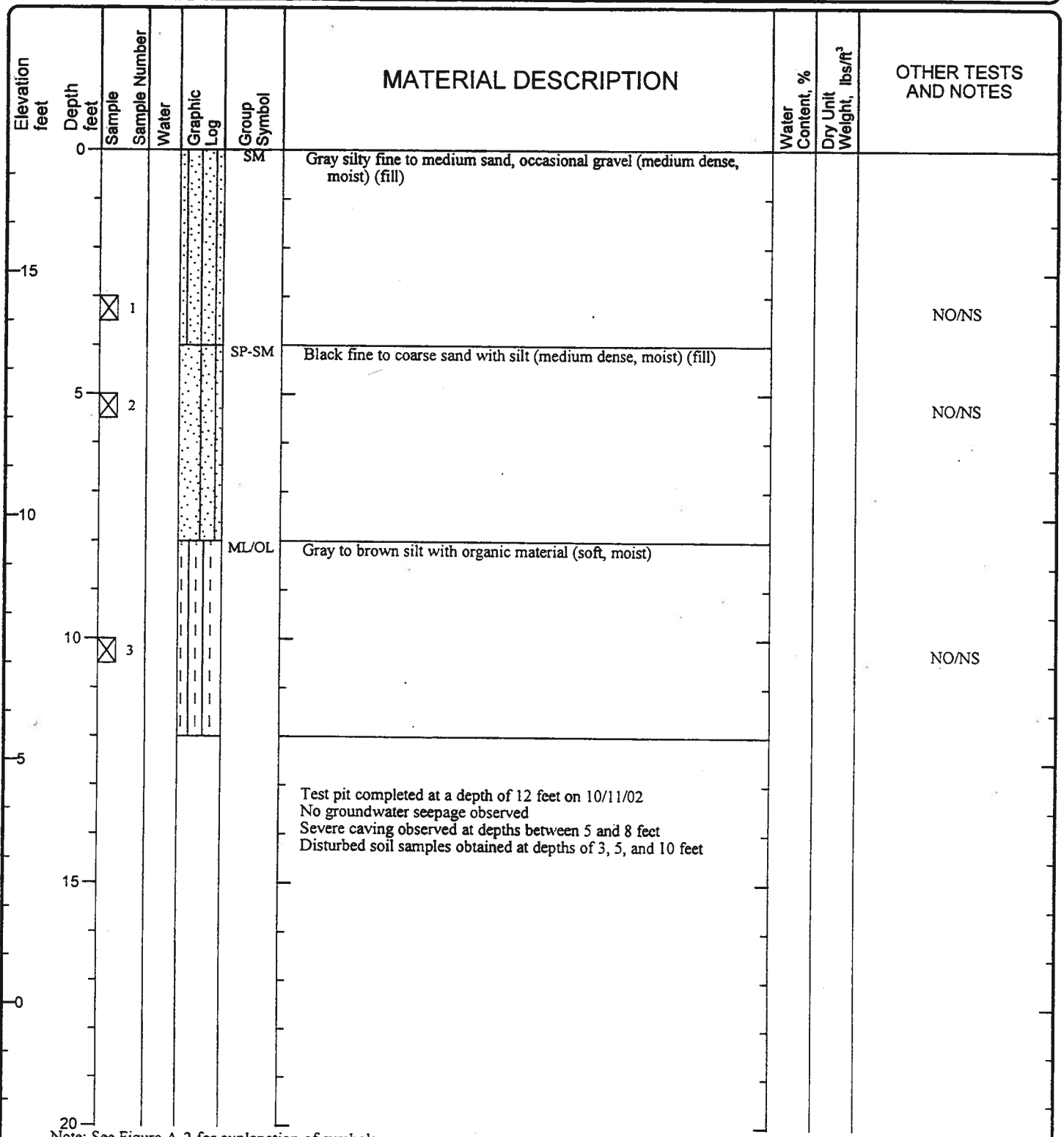
Project Location: Tacoma, Washington

Project Number: 0454-080-00

Figure: A-10

Date Excavated: 10/11/02 Logged by: KWG

Equipment: Case 480 K Backhoe Surface Elevation (ft): 17.5



Note: See Figure A-2 for explanation of symbols

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-7

Geo Engineers

Project: Port of Tacoma - Maxwell Avenue Sites

Project Location: Tacoma, Washington

Project Number: 0454-080-00

Figure: A-11

Sheet 1 of 1

Date Excavated: 10/11/02 Logged by: KWG

Equipment: Case 480 K Backhoe Surface Elevation (ft): 17.5

Elevation feet	Depth feet	Sample	Sample Number	Water	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					SM	Brown silty fine to medium sand with gravel (dense, dry) (fill)			
		X	1							NO/NS
						SP-SM	Black fine to medium sand with silt (medium dense, moist) (fill)			
-15		X	2							NO/NS
	5									
-10										
						ML/OL	Gray silt with organic material (soft, moist)			
	10	X	3							NO/NS
-5							Test pit completed at a depth of 12 feet on 10/11/02 No groundwater seepage observed Severe caving observed at depths between 6 and 9 feet Disturbed soil samples obtained at depths of 1.5, 3, and 10 feet			
	15									
0										
	20									

Note: See Figure A-2 for explanation of symbols

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-8

GeoEngineers

Project: Port of Tacoma - Maxwell Avenue Sites

Project Location: Tacoma, Washington

Project Number: 0454-080-00

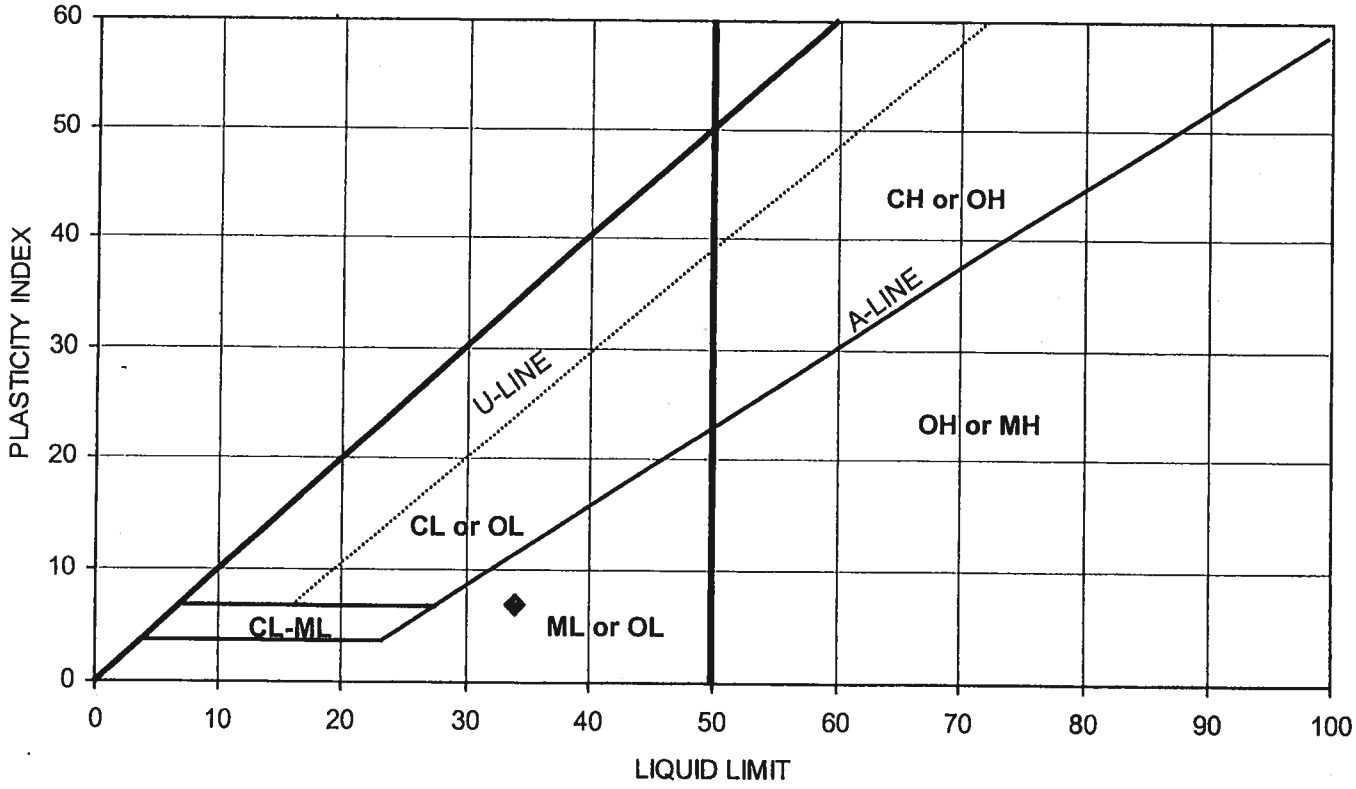
Figure: A-12

Geo Engineers

ATTERBERG LIMITS TEST RESULTS

FIGURE A-13

PLASTICITY CHART



SYMBOL	EXPLORATION NUMBER	SAMPLE DEPTH (ft)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SOIL DESCRIPTION
◆	B-1	13.0	48.6	34	7	Gray silt (ML/OL)

APPENDIX B

SPECTRA LABORATORY REPORT

COPY

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850

GeoEngineers

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File

10/23/2002

GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma, WA 98402
Attn: Sally Fischer

Project: 0454-080-00 (Moffatt & Nichol
Client ID: TPC-1 (TP-1 2'/TP-1 4')
Sample Matrix: Soil
Date Sampled: 10/11/2002
Date Received: 10/11/2002
Spectra Project: 2002100164
Spectra Number: 3

Analyte	Result	Units	Method
Arsenic	< 5	mg/Kg	SW846 6010B
Barium	29	mg/Kg	SW846 6010B
Cadmium	< 0.3	mg/Kg	SW846 6010B
Chromium	13	mg/Kg	SW846 6010B
Lead	< 4	mg/Kg	SW846 6010B
Mercury	<0.05	mg/Kg	SW846 7471A
Selenium	< 8	mg/Kg	SW846 6010B
Silver	< 0.7	mg/Kg	SW846 6010B
Diesel	<5.0	mg/Kg	NWTPH-D
Gasoline	<5	mg/Kg	NWTPH-G
Oil	<100	mg/Kg	NWTPH-D
Benzene	<0.025	mg/Kg	SW846 8260B
Ethylbenzene	<0.025	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
Toluene	<0.025	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B

Surrogate	Recovery	Method
Toluene-d8	111	NWTPH-G
4-Bromofluorobenzene	105	NWTPH-G
p-Terphenyl	46	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850

10/23/2002

GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma, WA 98402
Attn: Sally Fischer

Project: 0454-080-00 (Moffatt & Nichol
Client ID: TPC-2 (TP-2 2'/TP-2 4')
Sample Matrix: Soil
Date Sampled: 10/11/2002
Date Received: 10/11/2002
Spectra Project: 2002100164
Spectra Number: 7

Analyte	Result	Units	Method
Arsenic	< 5	mg/Kg	SW846 6010B
Barium	45	mg/Kg	SW846 6010B
Cadmium	< 0.3	mg/Kg	SW846 6010B
Chromium	17	mg/Kg	SW846 6010B
Lead	150	mg/Kg	SW846 6010B
Mercury	<0.05	mg/Kg	SW846 7471A
Selenium	< 8	mg/Kg	SW846 6010B
Silver	< 0.7	mg/Kg	SW846 6010B
Diesel	<5.0	mg/Kg	NWTPH-D
Gasoline	<5	mg/Kg	NWTPH-G
Oil	<100	mg/Kg	NWTPH-D
Benzene	<0.025	mg/Kg	SW846 8260B
Ethylbenzene	<0.025	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
Toluene	<0.025	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B

Surrogate	Recovery	Method
Toluene-d8	110	NWTPH-G
4-Bromofluorobenzene	110	NWTPH-G
p-Terphenyl	41	NWTPH-D

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GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma, WA 98402
Attn: Sally Fischer

Project: 0454-080-00 (Moffatt & Nichol
Client ID: TP-3 (TP-3 4')
Sample Matrix: Soil
Date Sampled: 10/11/2002
Date Received: 10/11/2002
Spectra Project: 2002100164
Spectra Number: 10

Analyte	Result	Units	Method
Arsenic	< 5	mg/Kg	SW846 6010B
Barium	15	mg/Kg	SW846 6010B
Cadmium	< 0.3	mg/Kg	SW846 6010B
Chromium	10	mg/Kg	SW846 6010B
Lead	5	mg/Kg	SW846 6010B
Mercury	<0.05	mg/Kg	SW846 7471A
Selenium	< 8	mg/Kg	SW846 6010B
Silver	< 0.7	mg/Kg	SW846 6010B
Diesel	<5.0	mg/Kg	NWTPH-D
Gasoline	<5	mg/Kg	NWTPH-G
Oil	<100	mg/Kg	NWTPH-D
Benzene	<0.025	mg/Kg	SW846 8260B
Ethylbenzene	<0.025	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
Toluene	<0.025	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B

Surrogate	Recovery	Method
Toluene-d8	109	NWTPH-G
4-Bromofluorobenzene	112	NWTPH-G
p-Terphenyl	46	NWTPH-D

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GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma, WA 98402
Attn: Sally Fischer

Project: 0454-080-00 (Moffatt & Nichol
Client ID: TPC-4 (TP-4 3.5'/TP-4 4')
Sample Matrix: Soil
Date Sampled: 10/11/2002
Date Received: 10/11/2002
Spectra Project: 2002100164
Spectra Number: 14

Analyte	Result	Units	Method
Arsenic	< 5	mg/Kg	SW846 6010B
Barium	12	mg/Kg	SW846 6010B
Cadmium	< 0.3	mg/Kg	SW846 6010B
Chromium	13	mg/Kg	SW846 6010B
Lead	4	mg/Kg	SW846 6010B
Mercury	<0.05	mg/Kg	SW846 7471A
Selenium	< 8	mg/Kg	SW846 6010B
Silver	< 0.7	mg/Kg	SW846 6010B
Diesel	<5.0	mg/Kg	NWTPH-D
Gasoline	<5	mg/Kg	NWTPH-G
Oil	<100	mg/Kg	NWTPH-D
Benzene	<0.025	mg/Kg	SW846 8260B
Ethylbenzene	<0.025	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
Toluene	<0.025	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B

Surrogate	Recovery	Method
Toluene-d8	108	NWTPH-G
4-Bromofluorobenzene	112	NWTPH-G
p-Terphenyl	56	NWTPH-D

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GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma, WA 98402
Attn: Sally Fischer

Project: 0454-080-00 (Moffatt & Nichol
Client ID: TPC-5 (TP-5 2'/TP-5 4')
Sample Matrix: Soil
Date Sampled: 10/11/2002
Date Received: 10/11/2002
Spectra Project: 2002100164
Spectra Number: 19

Analyte	Result	Units	Method
Arsenic	< 5	mg/Kg	SW846 6010B
Barium	18	mg/Kg	SW846 6010B
Cadmium	< 0.3	mg/Kg	SW846 6010B
Chromium	14	mg/Kg	SW846 6010B
Lead	< 4	mg/Kg	SW846 6010B
Mercury	<0.05	mg/Kg	SW846 7471A
Selenium	< 8	mg/Kg	SW846 6010B
Silver	< 0.7	mg/Kg	SW846 6010B
Diesel	<5.0	mg/Kg	NWTPH-D
Gasoline	<5	mg/Kg	NWTPH-G
Oil	<100	mg/Kg	NWTPH-D
Benzene	<0.025	mg/Kg	SW846 8260B
Ethylbenzene	<0.025	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
Toluene	<0.025	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B

Surrogate	Recovery	Method
Toluene-d8	110	NWTPH-G
4-Bromofluorobenzene	112	NWTPH-G
p-Terphenyl	58	NWTPH-D

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GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma, WA 98402
Attn: Sally Fischer

Project: 0454-080-00 (Moffatt & Nichol
Client ID: TPC-6 (TP-6 2'/TP-6 4')
Sample Matrix: Soil
Date Sampled: 10/11/2002
Date Received: 10/11/2002
Spectra Project: 2002100164
Spectra Number: 23

Analyte	Result	Units	Method
Arsenic	< 5	mg/Kg	SW846 6010B
Barium	30	mg/Kg	SW846 6010B
Cadmium	< 0.3	mg/Kg	SW846 6010B
Chromium	16	mg/Kg	SW846 6010B
Lead	5	mg/Kg	SW846 6010B
Mercury	<0.05	mg/Kg	SW846 7471A
Selenium	< 8	mg/Kg	SW846 6010B
Silver	< 0.7	mg/Kg	SW846 6010B
Diesel	<5.0	mg/Kg	NWTPH-D
Gasoline	<5	mg/Kg	NWTPH-G
Oil	<100	mg/Kg	NWTPH-D
Benzene	<0.025	mg/Kg	SW846 8260B
Ethylbenzene	<0.025	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
Toluene	<0.025	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B

Surrogate	Recovery	Method
Toluene-d8	108	NWTPH-G
4-Bromofluorobenzene	106	NWTPH-G
p-Terphenyl	51	NWTPH-D

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GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma, WA 98402
Attn: Sally Fischer

Project: 0454-080-00 (Moffatt & Nichol
Client ID: TPC-7 (TP-7 2'/TP-7 4')
Sample Matrix: Soil
Date Sampled: 10/11/2002
Date Received: 10/11/2002
Spectra Project: 2002100164
Spectra Number: 27

Analyte	Result	Units	Method
Arsenic	< 5	mg/Kg	SW846 6010B
Barium	20	mg/Kg	SW846 6010B
Cadmium	< 0.3	mg/Kg	SW846 6010B
Chromium	12	mg/Kg	SW846 6010B
Lead	< 4	mg/Kg	SW846 6010B
Mercury	<0.05	mg/Kg	SW846 7471A
Selenium	< 8	mg/Kg	SW846 6010B
Silver	< 0.7	mg/Kg	SW846 6010B
Diesel	<5.0	mg/Kg	NWTPH-D
Gasoline	<5	mg/Kg	NWTPH-G
Oil	<100	mg/Kg	NWTPH-D
Benzene	<0.025	mg/Kg	SW846 8260B
Ethylbenzene	<0.025	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
Toluene	<0.025	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B

Surrogate	Recovery	Method
Toluene-d8	110	NWTPH-G
4-Bromofluorobenzene	112	NWTPH-G
p-Terphenyl	42	NWTPH-D

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GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma, WA 98402
Attn: Sally Fischer

Project: 0454-080-00 (Moffatt & Nichol
Client ID: TPC-8 (TP-8 1.5'/TP-8 3')
Sample Matrix: Soil
Date Sampled: 10/11/2002
Date Received: 10/11/2002
Spectra Project: 2002100164
Spectra Number: 31

Analyte	Result	Units	Method
Arsenic	< 5	mg/Kg	SW846 6010B
Barium	28	mg/Kg	SW846 6010B
Cadmium	< 0.3	mg/Kg	SW846 6010B
Chromium	14	mg/Kg	SW846 6010B
Lead	< 4	mg/Kg	SW846 6010B
Mercury	<0.05	mg/Kg	SW846 7471A
Selenium	< 8	mg/Kg	SW846 6010B
Silver	< 0.7	mg/Kg	SW846 6010B
Diesel	<5.0	mg/Kg	NWTPH-D
Gasoline	<5	mg/Kg	NWTPH-G
Oil	<100	mg/Kg	NWTPH-D
Benzene	<0.025	mg/Kg	SW846 8260B
Ethylbenzene	<0.025	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
Toluene	<0.025	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B

Surrogate	Recovery	Method
Toluene-d8	109	NWTPH-G
4-Bromofluorobenzene	113	NWTPH-G
p-Terphenyl	39	NWTPH-D

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Steve Hibbs, Laboratory Manager

GeoEngineers

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2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850

10/25/2002

GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma, WA 98402
Attn: Teresa Dugger

Project: 0454-080-00
Client ID: B-1
Sample Matrix: Soil
Date Sampled: 10/16/2002
Date Received: 10/16/2002
Spectra Project: 2002100212
Spectra Number: 1

Analyte	Result	Units	Method
Arsenic	< 5	mg/Kg	SW846 6010B
Barium	93	mg/Kg	SW846 6010B
Cadmium	< 0.3	mg/Kg	SW846 6010B
Chromium	27	mg/Kg	SW846 6010B
Lead	< 4	mg/Kg	SW846 6010B
Mercury	<0.05	mg/Kg	SW846 7471A
Selenium	< 8	mg/Kg	SW846 6010B
Silver	< 0.7	mg/Kg	SW846 6010B
Diesel	<5.0	mg/Kg	NWTPH-D
Gasoline	<5	mg/Kg	NWTPH-G
Oil	<100	mg/Kg	NWTPH-D
Benzene	<0.03	mg/Kg	SW846 8260B
Ethylbenzene	<0.03	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.03	mg/Kg	SW846 8260B
Toluene	<0.03	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B
Hexavalent Chromium	<0.4	mg/Kg	SW846 7196A

Surrogate	Recovery	Method
Toluene-d8	110	NWTPH-G
4-Bromofluorobenzene	112	NWTPH-G
p-Terphenyl	60	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

a5/sgh

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2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850

10/25/2002

GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma, WA 98402
Attn: Teresa Dugger

Project: 0454-080-00
Client ID: B-2
Sample Matrix: Soil
Date Sampled: 10/16/2002
Date Received: 10/16/2002
Spectra Project: 2002100212
Spectra Number: 2

Analyte	Result	Units	Method
Arsenic	< 5	mg/Kg	SW846 6010B
Barium	28	mg/Kg	SW846 6010B
Cadmium	< 0.3	mg/Kg	SW846 6010B
Chromium	15	mg/Kg	SW846 6010B
Lead	< 4	mg/Kg	SW846 6010B
Mercury	<0.05	mg/Kg	SW846 7471A
Selenium	< 8	mg/Kg	SW846 6010B
Silver	< 0.7	mg/Kg	SW846 6010B
Diesel	<5.0	mg/Kg	NWTPH-D
Gasoline	<5	mg/Kg	NWTPH-G
Oil	<100	mg/Kg	NWTPH-D
Benzene	<0.03	mg/Kg	SW846 8260B
Ethylbenzene	<0.03	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.03	mg/Kg	SW846 8260B
Toluene	<0.03	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B

Surrogate	Recovery	Method
Toluene-d8	109	NWTPH-G
4-Bromofluorobenzene	110	NWTPH-G
p-Terphenyl	78	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

a5/sgh

APPENDIX C

REPORT LIMITATIONS AND GUIDELINES FOR USE

APPENDIX C

REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES, PERSONS AND PROJECTS

This report has been prepared for the exclusive use of the Port of Tacoma, Moffatt & Nichol Engineers and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

This report has been prepared for proposed automobile storage area located at Port of Tacoma Road and Maxwell Way. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org .

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure;
- elevation, configuration, location, orientation or weight of the proposed structure;
- composition of the design team; or
- project ownership.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

SUBSURFACE CONDITIONS CAN CHANGE

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying a report to determine if it remains applicable.

MOST GEOTECHNICAL AND GEOLOGIC FINDINGS ARE PROFESSIONAL OPINIONS

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

GEOTECHNICAL ENGINEERING REPORT RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the preliminary construction recommendations included in this report. These recommendations are not final, because they were developed principally from GeoEngineers' professional judgment and opinion. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for this report's recommendations if we do not perform construction observation.

Sufficient monitoring, testing and consultation by GeoEngineers should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for

construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT COULD BE SUBJECT TO MISINTERPRETATION

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having GeoEngineers confer with appropriate members of the design team after submitting the report. Also retain GeoEngineers to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having GeoEngineers participate in pre-bid and preconstruction conferences, and by providing construction observation.

DO NOT REDRAW THE EXPLORATION LOGS

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

GIVE CONTRACTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

CONTRACTORS ARE RESPONSIBLE FOR SITE SAFETY ON THEIR OWN CONSTRUCTION PROJECTS

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

READ THESE PROVISIONS CLOSELY

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

GEOTECHNICAL, GEOLOGIC AND ENVIRONMENTAL REPORTS SHOULD NOT BE INTERCHANGED

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

BIOLOGICAL POLLUTANTS

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

GeoEngineers

December 30, 2002

Moffatt & Nichol Engineers
710 Second Avenue, Suite 720
Seattle, Washington 98104

Attention: Jim Reed

Addendum
Geotechnical Engineering Services
Maxwell Way and Port of Tacoma Road
Tacoma, Washington
File No. 0454-080-00

INTRODUCTION

We are pleased to present our recommendations for use of the imported, on-site fill associated with the development of an eight-acre parcel located south of the intersection of Maxwell Way and Port of Tacoma Road in Tacoma, Washington. We previously issued a report describing our site investigation, conclusions and recommendations for the site and presented the results in a report dated November 8, 2002.

Following the delivery of our report, we understand the approximately northeastern half of the site was covered with imported fill. Upon your request and authorization by the Port of Tacoma, two gradation analyses were performed on representative soil sample to determine the suitability of the fill for use as structural fill. The results of the gradation analyses and our conclusions are presented herein.

SITE CONDITIONS

Site conditions as they existed as of November 8, 2002 are described in detail in our prior geotechnical report. Subsurface soil conditions generally consisted of 7 to 9 feet of medium dense to dense fill overlying natural soils. Natural soil was observed in a soft/very loose to medium dense condition.

Following delivery of our final report, we were notified that the Port of Tacoma had placed fill on the project site. On December 23, 2002, we returned to the site to visually observe fill piles and obtain representative samples for gradational analysis. Fill piles were visually classified to be similar in material and were described as a brown fine to coarse sand with gravel, trace silt and occasional debris which included tires, concrete, asphalt pavement, metal and plastic pipe, rebar and organic roots. Two representative soil samples were obtained from stockpiles around the site and returned to our laboratory for gradational analyses. The results of the analyses are shown as Figure 1.

GeoEngineers, Inc.
1101 Fawcett Ave., Suite 200
Tacoma, WA 98402
Telephone (253) 383-4940
Fax (253) 383-4923
www.geoengineers.com

CONCLUSIONS AND RECOMMENDATIONS

In our opinion, imported fill piles located at the site appear to be suited for use as structural fill provided that most of the debris described above can be removed. In our opinion, debris larger than 6 inches in any dimension should be removed from the fill, either by hand-sorting, a brush rake, or by use of a grizzley. The imported fill contains about 8 percent fines. Accordingly, this soil will be slightly moisture sensitive when used during wet-weather construction. We recommend the soil be moisture conditioned and placed as recommended in the "Earthwork" section of our November 8, 2002 report.

LIMITATIONS

The recommendations in this addendum are supplemental to those provided in our prior report. The limitations presented in our November 8, 2002 report apply to this addendum.

We appreciate the opportunity to be of service on this project. If you have any questions or require clarification on any of the above, please call.

Yours very truly,

GeoEngineers, Inc.

Teresa A. Dugger, P.E.
Geotechnical Engineer

Gary W. Henderson, P.E.
Principal

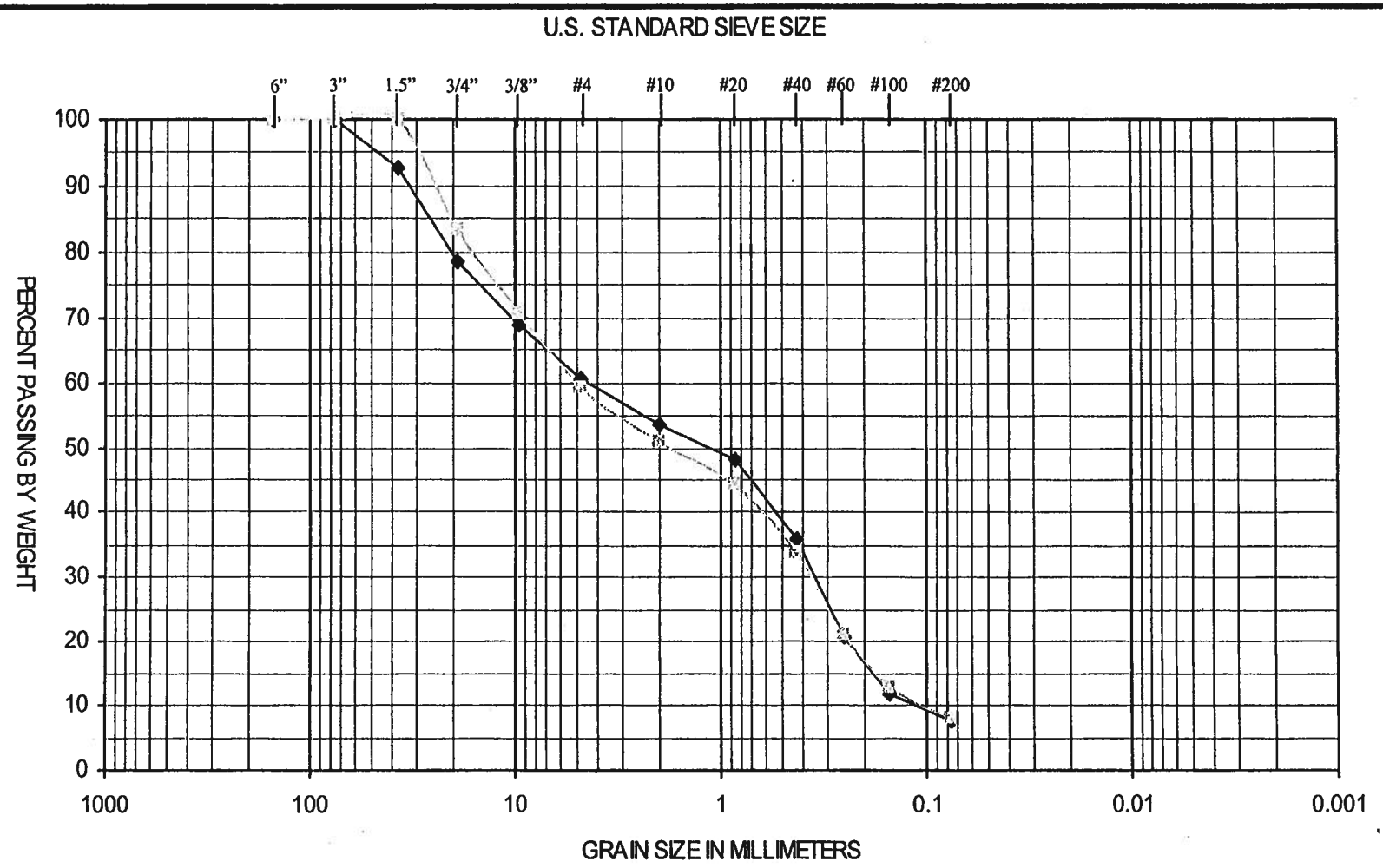
TAD:GWH:tw
TACO\0\0454080\00\Finals\045408000ReportAdden.Doc

Attachment:
Figure 1 – Sieve Analysis Results

Geo Engineers

SIEVE ANALYSIS RESULTS

FIGURE 1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	BORING NUMBER	SAMPLE DEPTH (FEET)	SOIL CLASSIFICATION
◆	Bulk-1		Sand with silt and gravel (SP-SM)
□	Bulk-2		Sand with silt and gravel (SP-SM)

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

December 9, 2002

Mr. Richard Gilmur, Director
Environmental Affairs
Port of Tacoma
1 Sitcum Plaza, PO Box 1837
Tacoma, WA 98401-1837

Dear Mr. Gilmur:

RE: Coverage under the Stormwater General Permit for Construction Activity

Permit Number:	**SO3-005118**
Site Name:	Marshall Avenue & Maxwell Site
Location:	W of Port of Tacoma Rd, S of Marshall Ave & N of Marshall Ave (2810 Marshall Ave); N of Marshall Ave & E of Milwaukee Way (1918 Lincoln Ave). Remote site: S of Maxwell Way & W of Port of Tacoma Rd Tacoma, WA 98421
Receiving Water:	Blair Waterway

The Washington Department of Ecology has reviewed your application for coverage under the Stormwater General Permit for construction activity for the 137-acre subject site. We are granting coverage under the permit as of the date of this letter. **Retain this letter with your permit. It is the official record of permit coverage for your site.**

Note the permit number assigned for the above project. Refer to the permit number on any future correspondence with Ecology. Examples of the type of correspondence could be as follows: 1) If you wish to notify Ecology that there is a new 24-hour contact person for the project. 2) When a new application and public notice is submitted requesting extended permit coverage for adjoining acreage. 3) When the site has been stabilized, submission of a termination request form to cancel the permit and associated fees.

Please read the enclosed permit carefully. As a permittee, you are legally obligated to comply with its terms and conditions. An accompanying document called a Fact Sheet is available upon request by calling (360) 407-7156. The Fact Sheet helps explain the development process for the general stormwater permit.

Stormwater Pollution Prevention Plan (SWPPP)

The most significant requirement of the general permit is the development, implementation, and maintenance (revision) of a Stormwater Pollution Prevention Plan for the entire duration of the project. Implement the SWPPP as the first step when starting construction. Plan requirements are given in Special Condition S9 of the permit. The purpose of the SWPPP is to reduce, eliminate, and

prevent the pollution of stormwater through the application of Best Management Practices. Failure to prepare and implement an adequate SWPPP could result in violations of state and federal laws and regulations. Retain the SWPPP on or near your project. The SWPPP shall be made available upon request form Ecology or local government inspectors.

Permit Fees

State law (RCW 90.48.465) requires that all permittees pay an annual permit fee. If your permit goes into effect during the State's fiscal year (June 30 – July 1), the initial fee will be prorated to the quarter. Future yearly billing notices will be mailed to you in August.

Permits that terminate during the State's fiscal year will have their fees prorated. Ecology will not process refunds if the ending balance of the fee account is less than one-hundred dollars ($100).

If you would like more information on the fee process, contact Bev Poston, Fee Administrator, Department of Ecology at (360) 407-6425.

Appeal

You, or a third party, may appeal Ecology's decision to issue a general stormwater permit for your site. The appeal is limited to the general permit's applicability or non-applicability to your project, not the permit itself. An appeal may be filed with the Pollution Control Hearings Board, P.O. Box 40903, Olympia, WA 98504-0903 within thirty days from the effective date of your permit. In addition, a copy of the appeal must be served on the Department of Ecology, P.O. Box 47696, Olympia, WA 98504-7696. Enclosed is a copy of RCW 43.21B.310 that lists the procedures and requirements for the appeal process.

Notice of Termination

After your site has undergone final stabilization, submit a Notice of Termination request form (located in the back of the permit). Final stabilization is defined as follows: There are no bare soils remaining, the landscaping is well established, paving is complete, all temporary sediment and erosion and control devices have been removed, and all stormwater discharges associated with construction activities have been eliminated. Permit fees continue until Ecology receives the completed termination form.

Ecology Regional Assistance

If you have questions regarding stormwater discharges for your construction site, contact Margaret Hill, of Ecology's Southwest Regional Office in Lacey, at (360) 407-0246.

If you have any questions regarding this letter, please call Linda Matlock at (360) 407-6437.

Sincerely,

Melodie Selby

Melodie A. Selby, P.E., Manager
Program Development Services
Water Quality Program

Enclosures: Permit and RCW

Chapter 43.21B RCW

ENVIRONMENTAL HEARINGS OFFICE
POLLUTION CONTROL HEARINGS BOARD OF THE STATE

RCW 43.21B.310 Appeal of orders, permits and licenses. (1) Any order issued by the department or authority pursuant to RCW 70.94.211, 70.94.332, 70.105.095, 43.27A.190, 86.16.020, or 90.48.120(2) or any provision enacted after July 26, 1987, or any permit, certificate, or license issued by the department may be appealed to the pollution control hearings board if the appeal is filed with the board and served on the department or authority within thirty days after receipt of the order. Except as provided under chapter 70.105D RCW, this is the exclusive means of appeal of such an order.

(2) The department or the authority in its discretion may stay the effectiveness of an order during the pendency of such an appeal.

(3) At any time during the pendency of an appeal of such an order to the board, the appellant may apply pursuant to RCW 43.21B.320 to the hearings board for a stay of the order or for the removal thereof.

(4) Any appeal must contain the following in accordance with the rules of the hearings board:

(a) The appellant's name and address;

(b) The date and docket number of the order, permit, or license appealed;

(c) A description of the substance of the order, permit, or license that is the subject of the appeal;

(d) A clear, separate, and concise statement of every error alleged to have been committed;

(e) A clear and concise statement of facts upon which the requester relies to sustain his or her statements of error; and

(f) A statement setting forth the relief sought.

(5) Upon failure to comply with any final order of the department, the attorney general, on request of the department, may bring an action in the superior court of the county where the violation occurred or the potential violation is about to occur to obtain such relief as necessary, including injunctive relief, to insure compliance with the order. The air authorities may bring similar actions to enforce their orders.

(6) An appealable decision or order shall be identified as such and shall contain a conspicuous notice to the recipient that it may be appealed only by filing an appeal with the hearings board and serving it on the department within thirty days of receipt. [1989 c 2 § 14 (Initiative Measure No. 97, approved November 8, 1988); (1987 3rd ex.s. c 2 § 49. Repealed by 1989 c 2 § 24, effective March 1, 1989); 1987 c 109 § 6.]

Short title—Construction—Existing agreements—Effective date—Severability—1989 c 2: See RCW 70.105D.900 and 70.105D.910 through 70.105D.921, respectively.

Purpose—Short title—Construction—Rules—Severability—Captions—1987 c 109: See notes following RCW 43.21B.001.

If you need additional guidance on the appeal process, please contact the Appeals Board in Olympia at 360.459.6327.

Ecology Regional Office
Water Quality Permit Managers

Refer to the Ecology staff names and counties outlined below for assistance in answering questions to the following type of questions:

- ☑ What technique to use for stormwater runoff from your site;
- ☑ For assistance determining whether your stormwater pollution prevention plan (SWPPP) is adequate;
- ☑ What type of source control to use for stormwater; or
- ☑ Whether or not your permit may be terminated.

Inspector	Phone	Counties
Northwest Regional Office – Bellevue		
Sean Callahan	425.649.7223	Kitsap, Snohomish
Ron Devitt	425.649.7028	King
Bob Wright	425.649.7060	Island, San Juan, Skagit
Bellingham Field Office		
Mak Kaufman	360.738.6248	Whatcom
Southwest Regional Office – Lacey		
Janet Boyd	360.407.0245	Grays Harbor, Lewis, Pacific
Kerry Carroll, Coordinator	360.407.6294	Clallam, Jefferson, Mason, Thurston
Margaret Hill	360.407.0246	Pierce
Marilou Pivirotto	360.407.6273	Industrial permits only - all counties
Vancouver Field Office		
Rusty Post	360.690.4787	Clark, Cowlitz, Skamania, Wahkiakum
Eastern Regional Office – Spokane		
Mike Hepp	509.456.6309	Adams, Asotin, Columbia, Ferry, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman
Paul Turner	509.625.5181	
Central Regional Office – Yakima		
Ray Latham - Construction	509.575.2807	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima
Pam Perun - Industrial	509.454.7869	

☑ Currently, stormwater sampling is not required for Ecology's general stormwater permits. In order to have a more effective stormwater prevention plan (SWPPP), you may choose to identify pollutants discharging from your site that need treatment and control.

☑ Ecology has a free SWPPP guidance manual (Publication No. WQ-R-93-015) for **industrial** facilities. Call 360.407.7156, 360.407.6437, or 360.407.7330 to request a copy.

☑ Call U.S. Environmental Protection Agency (EPA), Region X, in Seattle at 800.424.4372 to request a copy of their NPDES Stormwater Sampling Guidance Document USEPA 833-B-92-001.

Linda Matlock Environmental Specialist	360.407.6437	For assistance with Notice of Intent (NOI) applications, record keeping, change of information, transfer of ownership, terminating permit, general best management practices for stormwater.
Shirley Rollins Environmental Specialist	360.407.7330	
Bev Poston Permit Fee Administrator	360.407.6425	Contact person for fee billing statements, current status of fee account, balance owed, delinquent accounts.

Issuance Date:	October 4, 2000
Effective Date:	November 18, 2000
Expiration Date:	November 18, 2005

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM AND STATE WASTE DISCHARGE GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH

CONSTRUCTION ACTIVITIES

State of Washington
DEPARTMENT OF ECOLOGY
Olympia, Washington 98504-7696

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

Until this permit expires, is modified or revoked, permittees that have properly obtained coverage under this permit are authorized to discharge to waters of the state in accordance with the special and general conditions which follow.

Megan White, P.E., Manager
Water Quality Program
Department of Ecology

Table of Contents

Also Included in the Back of This Booklet:

- Instructions - Notice of Intent for Construction Activity
- Notice of Intent for Construction Activity
- Notice of Termination for Construction Activity

Application Instructions for a General Permit to Discharge Stormwater Associated with CONSTRUCTION ACTIVITY

Introduction

This is an instruction document for the preparation of an application, referred to as a Notice of Intent (NOI), for coverage under a National Pollutant Discharge Elimination System (NPDES) General Permit for stormwater discharges associated with construction activity in the state of Washington. This NPDES General Permit (hereinafter called the General Permit) applies to stormwater discharges to surface waters and to storm drains.

Municipalities of less than 100,000 population need to apply for construction sites which they own or operate.

Owners of construction sites of less than five acres, or which will retain on-site and discharge to the ground all storm-water associated with construction activity are not required to apply for coverage under the construction stormwater general permit.

Who Must Apply

The owner of a construction site, where five acres or more of total land area will be disturbed, must apply for coverage under the general permit if they have a discharge of stormwater associated with construction activity to a surface water or to a storm drain.

At sites for which a lease, easement, or other use agreement has been obtained from the site owner, the entity obtaining the use agreement shall be the permittee. In cases where the owner(s) of a site is (are) represented by a developer, the developer should be the permittee.

At sites where less than five acres of total land area will be disturbed, the owner is not required to apply unless the construction is "part of a larger common plan of development or sale." "Part of a larger common plan of development or sale" is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.

Industrial facilities already covered by the Industrial Baseline General Permit for their industrial activity, and which are planning construction which will disturb five or more acres of total land area, must complete this NOI.

When to Apply

The permit application called a Notice of Intent (NOI) shall be submitted to Ecology on or before the date of the first public notice and at least 38 days prior to the start of construction activities Application A(see Section IX). Ecology must have the permit application during the public comment period in order to provide the public access to the applications as required by WAC 173-226-130(5).

Note: Ecology cannot grant permit coverage until 31 days after the date of the second Public Notice.

Ecology intends to notify applicants by mail of their status concerning coverage under the permit within 10 working days of Ecology's receipt of a complete NOI. An NOI is only deemed complete after a final SEPA determination has been made, the applicant has certified that a SWPPP will be developed prior to the start of construction, the 30 day public comment period has been satisfied, and all other NOI information has been supplied.

Upon receipt of a complete NOI Ecology will notify the applicant of their status either through written authorization of permit coverage or by sending a letter to the applicant giving a date when permit coverage will automatically commence. Coverage will begin from the date of Ecology's written authorization or will automatically commence on the date specified in Ecology's letter.

Where to Apply

Mail the signed NOI to the following Ecology office: Washington Department of Ecology, Stormwater Unit, P.O. Box 47696, Olympia, WA 98504-7696

Applicants who discharge stormwater associated with construction activity to a storm drain operated by any of the following municipalities shall also submit a copy of the NOI to the municipality: Seattle, King County, Snohomish County, Tacoma, Pierce County, Clark County, Spokane County, Washington Department of Transportation.

Fees

There is no application fee. You will be billed for permit fees after the permit is issued. Call (360) 407-6425 for questions relating to fees.

Erosion and Sediment Control BMPs. BMPs that are intended to prevent erosion and sedimentation, such as preserving natural vegetation, seeding, mulching and matting, plastic covering, filter fences, and sediment traps and ponds. Erosion and sediment control BMPs are synonymous with stabilization and structural BMPs.

Erosion and Sediment Control Plan. A document which describes the potential for erosion and sedimentation problems, and explains and illustrates the measures which are to be taken to control those problems.

Final Stabilization. The completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as riprap, gabions or geotextiles) which will prevent erosion.

"40 CFR". Title 40 of the Code of Federal Regulations, which is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government.

General Permit. A permit which covers multiple dischargers of a point source category within a designated geographical area, in lieu of individual permits being issued to each discharger.

Ground Water. Water in a saturated zone or stratum beneath the land surface or a surface water body.

Illicit discharge. Any discharge that is not composed entirely of stormwater except discharges authorized under a separate NPDES permit and discharges resulting from fire fighting activities.

Leachate. Water or other liquid that has percolated through raw material, product or waste and contains substances in solution or suspension as a result of the contact with these materials.

Local Government. Any county, city, or town having its own government for local affairs.

Municipality. A political unit such as a city, town or county; incorporated for local self-government.

Municipal Entity. Incorporated cities and counties (municipalities) as well as service districts such as school districts, sanitary sewer districts, flood control districts, fire districts, port districts and unincorporated towns and townships.

National Pollutant Discharge Elimination System (NPDES). The national program for issuing, modifying, revoking, and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Federal Clean Water Act, for the discharge of pollutants to surface waters of the state from point sources. These permits are referred to as NPDES permits and, in Washington State, are administered by the Washington Department of Ecology.

Notice of Intent (NOI). The application for, or a request for coverage under this General Permit pursuant to WAC 173-226-200.

Notice of Termination (NOT). A request for termination of coverage under this general permit as specified by Special Condition S10 of this permit.

Point Source. Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure and container from which pollutants are or may be discharged to surface waters of the state. This term does not include return flows from irrigated agriculture. (See Fact Sheet for further explanation.)

Section VI. Construction Activity Information

Give the total land area in acres and total area which will be disturbed during all phases of the construction project. This includes all clearing, grading, and excavating, and any other activity which disturbs the surface of the land. Include how many phases. Once the site is prepared for development (utilities and roads installed for example) will the project be sold? (Once you are no longer responsible for the site, request the permit be canceled by submitting a termination form.)

Give the projected month/year when the construction activity will begin, and the anticipated month/year of completion of all soil disturbing and soil stabilization activity.

Notify Ecology if dewatering is planned.

Mark all soil disturbing activity anticipated. Add to the list activities that are pertinent to your project.

Section VII.A. Best Management Practices

Indicate how the stormwater will be cleaned and controlled before it discharges to storm drains and receiving waters. (This includes ditches and wetlands.)

Section VII.B. Stormwater Pollution Prevention Plan (SWPPP)

Applicants must develop and implement the SWPPP prior to the commencement of construction activities(s). Applicants may indicate completion of the SWPPP on the NOI form or certify that development of a SWPPP will occur prior to the commencement of construction activity. If not Ecology must be notified that a SWPPP will be developed prior to the start of construction before permit coverage can be granted.

A stormwater pollution prevention plan (SWPPP) for construction sites is a documented plan primarily intended to control erosion and sedimentation caused by construction activity. These plans are not submitted to Ecology, but kept on-site or within reasonable access to the site, to be made available to Ecology and local governmental agencies upon request.

Section VIII. State Environmental Policy Act (SEPA) Compliance

Ecology cannot cover the applicant under the General Permit until the following SEPA information has been provided and the SEPA process has been satisfied.

Provide the following information:

- Whether SEPA review has been completed or exempt.
- The type of SEPA document prepared, i.e., a Determination of Nonsignificance (DNS) or a Final Environmental Impact Statement (EIS). The name of the agency which issued the DNS, the Final EIS, or which decided that the project was exempt from SEPA. Usually this agency is a representative of local government such as a city or county.
- Provide the date the agency issued the DNS or Final EIS.
- Whether you are aware of an administrative or judicial appeal of the adequacy of the SEPA document. If you check the yes box, provide a letter explaining the issues and status of the appeal.

If necessary the SEPA follow-up information may be supplied in writing after submission of the NOI.

Section IX. Public Notice

The applicant must complete the 30 day public notice requirement prior to receiving permit coverage. The notice must be published at least once each week for 2 consecutive weeks, in a single newspaper which has general circulation in the county in which the construction is to take place with the following information:

- A statement that the applicant is seeking coverage under the Washington Department of Ecology's NPDES General Permit for Stormwater Discharges Associated with Construction Activities;
- The name, address and location of the construction site;
- The name and address of the applicant;
- A description of the applicant's construction activities and areas from which a stormwater discharge will occur, name(s) of receiving water(s); and
- The statement:

  "Any person desiring to present their views to the Department of Ecology concerning this application, or interested in the department's action on this application may notify the Department of Ecology in writing within 30 days of the last date of publication of this notice. Comments can be submitted to: Department of Ecology, P.O. Box 47696, Olympia, WA 98504-7696."

Puget Sound Basin. The Puget Sound south of Admiralty Inlet (including Hood Canal and Saratoga Passage); the waters north to the Canadian border, including portions of the Strait of Georgia; the Strait of Juan de Fuca south of the Canadian border; and all the lands draining into these waters as mapped in Water Resources Inventory Areas numbers 1 through 19, set forth in WAC 173-500-040.

Sanitary Sewer. A sewer which is designed to convey domestic wastewater.

Sediment. The fragmented material that originates from the weathering and erosion of rocks or unconsolidated deposits, and is transported by, suspended in, or deposited by water.

Sedimentation. The depositing or formation of sediment.

SEPA (State Environmental Policy Act). The Washington State Law, RCW 43.21C.020, intended to prevent or eliminate damage to the environment.

Severe Property Damage. Substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

Significant Amount. An amount of a pollutant in a discharge that is amenable to available and reasonable methods of prevention or treatment; or an amount of a pollutant that has a reasonable potential to cause a violation of surface or ground water quality or sediment management standards.

Significant Contributor of Pollutant(s). A facility determined by Ecology to be a contributor of a significant amount(s) of a pollutant(s) to waters of the state of Washington.

Significant Materials. Includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical the facility is required to report pursuant to section 313 of title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with stormwater discharges.

Site. The land or water area where any "facility or activity" is physically located or conducted.

Source Control BMPs. Physical, structural or mechanical devices or facilities that are intended to prevent pollutants from entering stormwater. A few examples of source control BMPs are erosion control practices, maintenance of stormwater facilities, constructing roofs over storage and working areas, and directing wash water and similar discharges to the sanitary sewer or a dead end sump.

Stabilization. The application of appropriate BMPs to prevent the erosion of soils, such as, temporary and permanent seeding, vegetative covers, mulching and matting, plastic covering and sodding. See also the definition of Erosion and Sediment Control BMPs.

Storm Sewer. A sewer that is designed to carry stormwater. Also called a storm drain.

Stormwater. Rainfall and snow melt runoff.

Stormwater Drainage System. Constructed and natural features which function together as a system to collect, convey, channel, hold, inhibit, retain, detain, infiltrate or divert stormwater.

Stormwater Management Manual for the Puget Sound Basin (SWMM) or Manual. The technical manual prepared by Ecology for use by local governments and published in 1992, or statewide revisions when they become available, that contain descriptions of and design criteria for BMPs to prevent, control, or treat pollutants in stormwater.

Stormwater Pollution Prevention Plan (SWPPP). A documented plan to implement measures to identify, prevent, and control the contamination of point source discharges of stormwater.

Surface Waters of the State. Includes lakes, rivers, ponds, streams, inland waters, salt waters, and all other surface waters and water courses within the jurisdiction of the state of Washington.

Treatment BMPs. BMPs that are intended to remove pollutants from stormwater. A few examples of treatment BMPs are detention ponds, oil/water separators, biofiltration, and constructed wetlands.

USEPA. The United States Environmental Protection Agency.

Water Quality. The chemical, physical, and biological characteristics of water, usually with respect to its suitability for a particular purpose.

Waters of the State. Includes those waters as defined as "waters of the United States" in 40 CFR Subpart 122.2 within the geographic boundaries of Washington State and "waters of the state" as defined in Chapter 90.48 RCW which include lakes, rivers, ponds, streams, inland waters, underground waters, salt waters and all other surface waters and water courses within the jurisdiction of the state of Washington.

Acronyms

BMP	Best Management Practice
CERCLA	Comprehensive Environmental Response Compensation & Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
EPA	Environmental Protection Agency
ESC	Erosion and Sediment Control
FWPCA	Federal Water Pollution Control Act
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
SWMM	Stormwater Management Manual for the Puget Sound Basin
SWPPP	Stormwater Pollution Prevention Plan
USC	United States Code
USEPA	United States Environmental Protection Agency
WAC	Washington Administrative Code
WQ	Water Quality

Introduction

The Ecology stormwater pollution control program is based, in part, on the federal regulations of 40 CFR Parts 122, 123, and 124 Subchapter D (Water Programs) issued on November 16, 1990, and the implementation of section 402(p) of the Federal Clean Water Act. The goals of these federal regulations are to reduce or eliminate stormwater pollution from construction activity by requiring the implementation of technology based Stormwater Pollution Prevention Plans (SWPPP), and to eliminate surface water quality standards violations caused by stormwater.

Under the authority of Chapter 90.48 RCW, Ecology has expanded the scope of its stormwater program beyond the federal government's requirements. Ecology's program requires compliance with ground water quality and sediment management standards for those operations that are required to obtain an NPDES permit for a stormwater discharge to surface waters or storm drains.

To comply with 40 CFR Parts 122, 123, and 124, and pursuant to the provisions of Chapters 90.48 and 90.52 RCW and Chapter 173-226 WAC, all those who file a Notice of Intent and are covered under this baseline general permit (see Special Condition S2) shall comply with the following:

Special Conditions

S1. Application for Coverage

A. Notice of Intent (NOI) Submission Deadline

The permit application called a Notice of Intent (NOI) shall be submitted to Ecology on or before the date of the first public notice and at least 38 days prior to the start of construction activities. (see NOI instructions in Appendix 1)

B. Public Notice Requirement

At the time of application the permittee must publish a notice that they are seeking coverage under Ecology's general stormwater permit for construction activities. This notice must be published at least once each week for two consecutive weeks, in a single newspaper which has general circulation in the county in which the construction is to take place. Refer to the NOI instructions for public notice language requirements. State law requires a 30 day public comment period prior to permit coverage, therefore permit coverage will not be granted sooner than 31 days after the date of the last public notice.

C. Stormwater Pollution Prevention Plan (SWPPP) Deadlines

Permit coverage will not be granted until the permittee has indicated completion of the SWPPP or certified that development of a SWPPP in accordance with S9 of this permit will occur prior to the commencement of the construction activity. SWPPPs are not submitted to Ecology but retained on-site or within reasonable access to the site to be made available to Ecology and local governmental agencies upon request.

D. State Environmental Policy Act (SEPA) Notification

The permittee must comply with the SEPA process and provide the following information prior to receiving permit coverage: the type of SEPA document required, the date and agency which issued the final determination and whether or not the permittee is aware of any appeals of the adequacy of the SEPA document. If the above information is not supplied on the NOI it must be supplied in writing to Ecology prior to permit coverage.

S2. Permit Coverage

A. How to Obtain Coverage

Coverage under this general stormwater permit for construction activities may be obtained by submitting a NOI to Ecology to discharge "Stormwater Associated With Construction Activity" (Appendix 1). Ecology intends to notify applicants by mail of their status concerning coverage under this permit within 10 working days of Ecology's receipt of a complete NOI. An NOI is only deemed complete after it is fully filled out and signed, and a final SEPA determination has been made, the applicant has certified that a SWPPP will be developed prior to the start of construction, the 30 day public comment period has been satisfied, and all other NOI information has been supplied.

Upon receipt of a complete NOI Ecology will notify the applicant of their permit status either through written authorization of permit coverage or by sending a letter to the applicant giving a date when permit coverage will automatically commence. Coverage will begin from the date of Ecology's written authorization or will automatically commence on the date specified by Ecology.

Applicants which discharge stormwater associated with construction activity to a storm drain operated by any of the following municipalities shall submit a copy of the NOI to the municipality.

Seattle, King County, Snohomish County, Tacoma, Pierce County, Clark County, Spokane County, and Washington Department of Transportation (WSDOT), if discharge occurs within these permit areas.

B. Construction Activities Required to Seek Coverage

Construction Activity which results in the disturbance of five acres or more of land (or other minimum land area to be determined by federal regulation), including clearing, grading and excavation activities; and those sites or common plans of development or sale that will result in the total disturbance of five acres or more land area and also have a discharge of stormwater to a surface water or storm drain.

C. Construction Activities not Required to Apply

The following construction activities are not required to apply for coverage under this permit to discharge stormwater associated with construction activity:

1. Construction activities which discharge stormwater only to the ground through infiltration basins, dry wells, drain fields, and any other discharge to the ground and have no point source discharge to surface water or a municipal storm sewer;

2. Any part of a facility with a stormwater discharge resulting from remedial action conducted by the USEPA or Ecology or a potentially liable/responsible person under an order or consent decree issued under the Comprehensive Environmental Response, Compensation, and Liability Act. These facilities must still comply with the requirements in this general permit determined by Ecology to be applicable, relevant, and appropriate requirements under these laws;

3. Any emergency construction activity required to protect public health and safety;

4. Any construction activity for routine maintenance of existing facilities to maintain original line and grade, or hydraulic capacity.

D. Facilities EXCLUDED from Coverage Under This Permit

Ecology will not consider coverage for the following facilities:

1. Nonpoint source silvicultural activities; such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance from which there is natural runoff as excluded in 40 CFR Subpart 122.27;

2. Construction projects that are federally owned or operated or are on Tribal land, or discharge stormwater directly to tribal waters with EPA approved water quality standards, including portions of the Puyallup River and other waters on trust or restricted lands within the 1873 Survey Area of the Puyallup Tribe of Indians Reservation;

3. Stormwater discharges that originate from the site after construction activities have been completed and the site has undergone final stabilization;

4. Any facility covered under an existing NPDES individual or general permit in which stormwater management or treatment requirements or both are included for all stormwater discharges associated with construction activity.

E. Coverage for Significant Contributors of Pollutants

This permit may also cover any construction activity discharging stormwater which Ecology determines to be a significant contributor of pollutants to waters of the state of Washington or may reasonably be expected to cause a violation of a water quality standard.

F. Coverage for Discharges to Ground Water

This permit also covers discharges of stormwater associated with construction activity to ground water from any facility which has a discharge of stormwater to a surface water or a storm sewer requiring permit coverage.

S3. Authorized Discharges

This permit authorizes the discharge of stormwater and construction dewatering waters associated with construction activity to waters of the state of Washington and/or to municipal storm drains from construction sites owned or operated by permittees identified in Special Condition S2 (Permit Coverage).

S4. Discharge Prohibitions

A. Discharges to a storm drain or surface water of process wastewater, domestic wastewater or noncontact cooling water not covered by an NPDES permit are prohibited.

B. Discharges of stormwater to sanitary or combined sewers shall be limited pursuant to Chapter 173-245 WAC and WAC 173-226-100. Discharges of stormwater to sanitary or combined sewers shall not occur without the approval of the municipality which owns or operates the sanitary or combined sewer system.

C. This permit does not authorize illicit discharges, including spills of oil or hazardous substances, nor does it relieve entities from obligations under state and federal laws and regulations pertaining to those discharges.

S5. Compliance with Standards

The permittee is responsible for achieving compliance with state of Washington surface water quality standards (Chapter 173-201A WAC), sediment management standards (Chapter 173-204 WAC), ground water quality standards (Chapter 173-200 WAC), and human health based criteria in the National Toxics Rule (Federal Register, Vol. 57, No. 246, Dec. 22, 1992, pages 60848-60923).

Where construction sites are not in compliance with these standards, the permittee shall take immediate action(s) to achieve compliance by implementing additional BMPs and/or improved maintenance of existing BMPs.

For permit compliance purposes compliance with standards means:

i) An adequate SWPPP has been prepared and fully implemented;

ii) The SWPPP and its implementation are adequate to prevent the discharge of toxic pollutants, floating materials, and erosion; and

iii) All available and reasonable means have been taken to prevent the discharge of settleable solids and to reduce turbidity in discharges directly or indirectly to surface waters.

In determining compliance Ecology will consider:

i) Weather conditions as related to design storms for BMPs;

ii) Available dilution and background conditions in the receiving water if the SWPPP and its implementation are determined adequate; and

iii) Other requirements of Chapters 173-200 WAC, 173-201A WAC, and 173-204 WAC.

S6. Sampling and Analysis

Sampling and analysis of stormwater for pollutants and ground water, surface water, or sediments for impacts of stormwater discharges are not required by this permit. However, sampling and analysis are encouraged and may be appropriate during the development and implementation of the SWPPP. Analysis conducted in accordance with 40 CFR Part 136 and Puget Sound Estuary Program Protocols is recommended but not required. Sampling procedures may be conducted in accordance with USEPA's NPDES Stormwater Sampling Guidance Document (EPA 833-B-92-001), July 1992, or Ecology guidance when it becomes available.

Sampling and analysis may be needed on a case-by-case basis for the discharge of construction dewatering waters to ensure compliance with standards. Dewatering in areas where the potential for ground water contamination exists should not be discharged without characterization of the ground water to be discharged. For guidance on the discharge of dewatering waters contact your Ecology Regional Office.

S7. Permit Fees

Annual payment of fees in accordance with RCW 90.48.465 is a condition of this permit. Fees for stormwater discharges covered under this permit shall be established by Chapter 173-224 WAC.

S8. Solid and Liquid Waste Disposal

The following requirements apply in the handling of solid and liquid wastes generated in compliance with the requirements of this general permit:

A. Disposal of waste materials from maintenance activities, including liquids and solids from cleaning catch basins and other stormwater facilities, shall be conducted in accordance with the Minimum Functional Standards for Solid Waste Handling, Chapter 173-304 WAC, and where appropriate, the Dangerous Waste Regulations, Chapter 173-303 WAC.

B. Leachate from the solid waste material handling and disposal sites shall not be discharged to state ground or surface waters without providing all known, available, and reasonable methods of treatment, nor shall such leachate cause violations of the state water quality standards for ground water or surface water or violations of sediment management standards.

S9. Stormwater Pollution Prevention Plan (SWPPP) for Construction Activities

A SWPPP for construction activity, including construction dewatering, shall be prepared and implemented in accordance with the schedule of Special Condition S1 and the requirements of this Special Condition.

A. Objectives

1. To implement Best Management Practices (BMPs) to minimize erosion and sediments from rainfall runoff at construction sites, and to identify, reduce, eliminate, or prevent the pollution of stormwater.

2. To prevent violations of surface water quality, ground water quality, or sediment management standards.

3. To prevent, during the construction phase, adverse water quality impacts including impacts on beneficial uses of the receiving water by controlling peak rates and volumes of stormwater runoff at the permittee's outfalls and downstream of the outfalls.

4. To eliminate the discharges of unpermitted process wastewater, domestic wastewater, illicit discharges, and non-contact cooling water to stormwater drainage systems and surface waters of the state.

B. General Requirements

1. The site owner shall be the permittee and responsible for the implementation of a SWPPP. At construction sites for which a lease, easement, or other use agreement has been obtained from the site owner, the entity obtaining the use agreement shall be the permittee. The SWPPP shall be prepared sufficiently in advance of construction to allow the contractor sufficient time to plan the implementation of the SWPPP.

2. The permittee shall designate on the NOI, a contact person who will be available 24 hours a day to respond to emergencies, and to inquiries or directives from Ecology. The contact person shall have authority over the SWPPP implementation. While the site owner is ultimately responsible for proper activities under the general permit and for proper implementation of the SWPPP, both the owner and/or operator of the site may be held liable for any permit violations.

3. The permittee shall retain the SWPPP on-site or within reasonable access to the site and make it available upon request to Ecology and local governmental agencies with jurisdiction. If stormwater is discharged to a municipal storm drain system, the SWPPP shall be available to the municipality upon request. The public may obtain a copy of a permittee's SWPPP by request from Ecology.

4. The permittee shall retain the SWPPP and copies of the Notice of Intent, inspection reports and all other reports required by this permit for, at least three years after the date of final stabilization of the construction site. The permittee shall make these documents available upon request to Ecology and to the local government agencies with jurisdiction.

5. Reports on incidents, such as discharge of spills and other noncompliance notification (see G3), shall be included in the records.

6. Modifications:

   a. Ecology may notify the permittee when the SWPPP does not meet one or more of the requirements of this Special Condition S9. Upon notification by Ecology, the permittee shall take appropriate action(s) to come into compliance with this Special Condition S9.

   b. Ecology may require SWPPP and BMP modifications if compliance with standards is not being achieved as required in accordance with Special Condition S5.

   c. The permittee shall modify the SWPPP whenever there is a change in design, construction, operation, or maintenance of any BMP which cause(s) the SWPPP to be less effective in controlling the pollutants.

   d. Whenever a self-inspection reveals that the description of pollutant sources or the BMPs identified in the SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, the SWPPP shall be modified, as appropriate. The permittee shall provide for implementation of any modifications to the SWPPP in a timely manner.

7. Applicability of Current and Future Editions of the Stormwater Management Manual for the Puget Sound Basin (SWMM):

   BMPs shall be selected from the most recent published edition of the SWMM, that has been available for at least 120 days prior to BMP selection, or other equivalent manuals available at the time of BMP selection or when the selection of additional BMPs is necessary. If new BMPs are required they shall be implemented in accordance with Special Condition S9.B.6.

C. SWPPP Contents and Requirements:

The SWPPP shall consist of and make provision for the following:

1. An Erosion and Sediment Control Plan:

The Erosion and Sediment Control Plan shall describe stabilization and structural practices, both of which shall be implemented to minimize erosion and the transport of sediments.

a. Stabilization Practices:

The Erosion and Sediment Control Plan shall include a description of stabilization Best Management Practices (BMPs), including site-specific scheduling of the implementation of the practices. Stabilization practices may include: temporary seeding, permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated shall be included in the plan. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased. The plan shall ensure that the following requirements are satisfied:

i) All exposed and unworked soils shall be stabilized by suitable and timely application of BMPs.

ii) Existing vegetation should be preserved where attainable. In the field, mark areas which are not to be disturbed, including setbacks, sensitive/critical areas and their buffers, trees and drainage courses shall be marked or flagged on site before construction activities are initiated. These areas should not be harmed when measures under the SWPPP and/or construction activities are undertaken.

iii) Cut and fill slopes shall be designed and constructed in a manner that will minimize erosion. Slopes shall be stabilized in accordance with requirement a. above.

iv) Stabilization adequate to prevent erosion of outlets and adjacent stream banks shall be provided at the outlets of all conveyance systems.

v) All storm drain inlets made operable during construction shall be properly maintained.

vi) Wherever construction vehicle access routes intersect paved roads, provisions must be made to minimize the transport of sediment (mud) onto the paved road. If sediment is transported onto a road surface, the roads adjacent to the construction site shall be cleaned on a regular basis. Street washing shall be allowed only after other methods to prevent the transport or to remove the sediments are unsuccessful.

b. Structural Practices:

In addition to stabilization practices, the Erosion and Sediment Control Plan shall include a description of structural BMPs to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. Such practices may include silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and sediment basins. Structural practices should be placed on upland soils to the degree attainable. The installation of these devices may be subject to Section 404 of the Federal Clean Water Act. The plan shall ensure that the following requirements are satisfied:

i) Prior to leaving the site, stormwater runoff shall pass through a sediment pond or sediment trap, or other appropriate BMPs.

ii) Properties adjacent to the project site shall be protected from sediment deposition.

iii) Sediment ponds and traps, perimeter dikes, sediment barriers, and other BMPs intended to trap sediment on-site shall be constructed as a first step in grading. These BMPs shall be functional before land disturbing activities take place. Earthen structures used for sediment control such as dams, dikes, and diversions shall be stabilized as soon as possible.

iv) Properties and waterways downstream from the construction site shall be protected from erosion due to increases in volume, velocity, and peak flow of stormwater runoff from the project site.

v) All temporary erosion and sediment control BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on-site. Disturbed soil areas resulting from removal shall be permanently stabilized.

c. Selection of Stabilization and Structural BMPs:

Permittees within the Puget Sound Basin shall select from BMPs described in Volume II of the most recent edition of Ecology's Stormwater Management Manual (SWMM) that has been available at least 120 days prior to the BMP selection, or other equivalent and appropriate BMPs to comply with the requirements listed in sections a. and b. above.

Permittees outside the Puget Sound Basin shall select from BMPs described in the Erosion and Sediment Control Handbook, by Goldman et al; Volume II of the most recent edition of Ecology's SWMM, that has been available at least 120 days prior to the BMP selection, as adapted for local conditions using best professional judgment; or other equivalent and appropriate BMPs to comply with the requirements listed in subsections a. and b. above.

d. Inspection and Maintenance:

All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. All on-site erosion and sediment control measures shall be inspected at least once every seven days and within 24 hours after any storm event of greater than 0.5 inches of rain per 24 hour period.

e. Recordkeeping:

Reports summarizing the scope of inspections, the personnel conducting the inspection, the date(s) of the inspection, major observations relating to the implementation of the SWPPP, and actions taken as a result of these inspections shall be prepared and retained as part of the SWPPP.

f. Compliance Reporting Requirement:

Compliance with the maintenance and schedule requirements of the SWPPP and other schedule requirements of this permit constitutes compliance with the reporting requirements of WAC 173-226-180.

g. Format:

The Erosion and Sediment Control Plan shall consist of two parts: a narrative and a set of site plans (drawings). Permittees may refer to Volume II, *Construction Stormwater Pollution Prevention*, of Ecology's SWMM for guidance on the content and format.

2. Control of Pollutants Other Than Sediment on Construction Sites:

All pollutants other than sediment that occur on-site during construction shall be handled and disposed of in a manner that does not cause contamination of stormwater. Chapter II-3 of the SWMM can be referenced for guidance in controlling other potential pollutants.

3. Coordination with Local Requirements:

This permit does not relieve the permittee of compliance with any more stringent requirements of local government.

Also, as required by the Puget Sound Water Quality Management Plan, local governments within the Puget Sound Basin are to adopt requirements for construction which are at least equivalent to the requirements listed in Volume I, *Minimum Technical Requirements*, of Ecology's SWMM. Where Ecology has determined such requirements to be equivalent, compliance with these requirements meets the SWMM requirements of this permit.

S10. Notice of Termination (NOT)

After the site has undergone final stabilization, and all stormwater discharges from soil disturbing activities have ceased, and all exposed soils have a permanent vegetative cover, or equivalent permanent stabilization measure which prevent erosion, the permittee shall submit a Notice of Termination form (Appendix 2 of this permit). A Notice of Termination, that is signed in

accordance with General Condition G20 of this permit, will end permit coverage and the responsibility of the permittee(s) to be subject to the conditions of this permit. The permittee is responsible for submitting the termination notice in order to end permit coverage. Unless the permit is terminated, Ecology will continue to assess a fee for the permit.

Where the site owner changes, the site owner listed as the permittee shall submit a NOT that is signed in accordance with General Condition G20 of this permit. The new site owner shall submit a new Notice of Intent.

General Conditions

G1. Discharge Violations:

All discharges and activities authorized by this permit shall be consistent with the terms and conditions of this permit.

G2. Proper Operation and Maintenance:

The Permittee shall at all times properly operate and maintain all facilities and systems of collection, treatment, and control (and related appurtenances) which are installed or used by the Permittee for pollution control.

G3. Non-compliance Notification:

If for any reason, the Permittee does not comply with, or will be unable to comply with conditions specified in the permit, the Permittee shall, at a minimum, provide the Department of Ecology (Ecology) with the following information:

A. A description of the nature and cause of noncompliance, including the quantity and quality of any unauthorized waste discharges;

B. The period of noncompliance, including exact dates and times and/or the anticipated time when the Permittee will return to compliance; and

C. The steps taken, or to be taken, to reduce, eliminate, and prevent recurrence of the noncompliance.

In addition, the Permittee shall take immediate action as expeditiously as practicable, to stop, contain, and clean up any discharge of spills and take all reasonable steps to minimize any adverse impacts to waters of the state and correct the problem. The Permittee shall notify Ecology by telephone so that an investigation can be made to evaluate any resulting impacts and the corrective actions taken to determine if additional action should be taken.

In the case of any discharge which could constitute a threat to human health, welfare, or the environment, 40 CFR Part 122 requires that the information specified in Sections G3.A., G3.B., and G3.C., above, shall be provided not later than 24 hours from the time the Permittee becomes aware of the circumstances. If this information is provided orally, a written submission covering these points shall be provided within five days of the time the Permittee becomes aware of the circumstances, unless Ecology waives or extends this requirement on a case-by-case basis.

Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the conditions of this permit or the resulting liability for failure to comply.

G4. Bypass Prohibited:

The intentional bypass of stormwater from all or any portion of a stormwater treatment system whenever the design capacity of the treatment system is not exceeded, is prohibited unless the following conditions are met:

A. Bypass is: 1) unavoidable to prevent loss of life, personal injury, or severe property damage; or 2) necessary to perform construction or maintenance-related activities essential to meet the requirements of the Clean Water Act and authorized by administrative order; and

B. There are no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated stormwater, maintenance during normal periods of equipment down time, or temporary reduction or termination of production;

G5. Right of Entry:

The Permittee shall allow an authorized representative of Ecology, upon the presentation of credentials and such other documents, as may be required by law:

A. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit;

B. To have access to and copy at reasonable times any records that must be kept under the terms of the permit;

C. To inspect at reasonable times any monitoring equipment or method of monitoring required in the permit;

D. To inspect at reasonable times any collection, treatment, pollution management, or discharge facilities; and

E. To sample at reasonable times any discharge of pollutants.

G6. Revocation of Coverage:

Pursuant with Chapter 43.21B RCW and Chapter 173-226 WAC, the director may terminate coverage under this General Permit. Cases where coverage may be terminated include, but are not limited to the following:

A. Violation of any term or condition of the general permit;

B. Obtaining coverage under a general permit by misrepresentation or failure to disclose fully all relevant facts;

C. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

D. A determination that the permitted activity endangers human health or the environment, or contributes significantly to water quality standards violations;

E. Failure or refusal of the permittee to allow entry as required in RCW 90.48.090;

F. Nonpayment of permit fees assessed pursuant to RCW 90.48.610;

G. Failure of the permittee to satisfy the public notice requirements of WAC 173-226-130(6); or

Revocation of coverage under a general permit may be initiated by Ecology or requested by any interested person.

G7. Transfer of Coverage:

Pursuant with Chapter 43.21 RCW and Chapter 173-226 WAC, the director may require any discharger authorized by this general permit to apply for and obtain an individual permit or to apply for coverage under an industry-specific general permit.

G8. General Permit Modification and Revocation:

General permits may be modified, revoked and reissued, or terminated in accordance with the provisions of Chapter 173-226 WAC. Grounds for modification, revocation and reissuance, or termination include, but are not limited to, the following:

A. A change occurs in the technology or practices for control or abatement of pollutants applicable to the category of dischargers covered under the general permit;
B. Effluent limitation guidelines or standards are promulgated pursuant to the FWPCA or chapter 90.48 RCW, for the category of dischargers covered under the general permit;

C. A water quality management plan containing requirements applicable to the category of dischargers covered under the general permit is approved; or

D. Information is obtained which indicates that cumulative effects on the environment from dischargers covered under the general permit are unacceptable.

G9. Permit Coverage Modification:

A Permittee who knows, or has reason to believe, that any activity has occurred or will occur which would constitute cause for revocation or transfer of coverage under General Conditions G6 and G7 respectively, or 40 CFR Subpart 122.62, must report such plans, or such information to Ecology. Activities which shall be reported include facility expansions, production increases, or process modifications which will: 1) result in new or substantially increased discharges of pollutants into stormwater or a change in the nature of the discharge of pollutants into stormwater; or 2) violate the terms and conditions of this permit. Ecology may then require submission of a new Notice of Intent or an application for an individual permit.

Submission of a new Notice of Intent for coverage under this or another general permit, or an application for an individual permit does not relieve the Permittee of the duty to comply with the terms and conditions of the existing permit until the new notice of intent has been approved or an individual permit has been issued.

G10. Toxic Pollutants:

If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Clean Water Act for a toxic pollutant and that standard or prohibition is more stringent than any limitation upon such pollutant in this general permit, Ecology shall institute proceedings to modify or revoke and reissue this general permit to conform to the new toxic effluent standard or prohibition.

G11. Other Requirements of Title 40 Code of Federal Regulations:

All other requirements of 40 CFR Subpart 122.41 and 122.42 are incorporated in this permit by reference.

G12. Compliance With Other Laws and Statutes:

Nothing in this permit shall be construed as excusing the Permittee from compliance with any applicable federal, state, or local laws, ordinances, or regulations.

G13. Additional Monitoring:

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G14. Removed Substances:

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of stormwater shall not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G15. Duty to Reapply:

The Permittee must reapply for coverage under this general permit, at least 180 days prior to the specified expiration date of this permit. An expired general permit continues in force and effect until a new general permit is issued or until the department cancels it. Only those facilities which have reapplied for coverage under the general permit are covered under the continued permit.

G16. Transfer of Permit Coverage:

Coverage under this permit is not transferable to any other person or entity except in compliance with WAC 173-226-210. The new operator shall submit a new Notice of Intent for coverage under this or another general permit, or apply for and obtain an individual discharge permit. The previous operator shall submit a Notice of Termination.

G17. Requests to be Excluded from Coverage Under a General Permit:

Any discharger authorized by a general permit may request to be excluded from coverage under the general permit by applying for an individual permit. The discharger shall submit to the director an application as described in WAC 173-220-040 (NPDES permit program), with reasons supporting the request. The director will either issue an individual permit or deny the request with a statement explaining the reason for denial.

G18. Appeals:

A. The terms and conditions of this general permit, as they apply to the appropriate class of dischargers, are subject to appeal by any person within 30 days of issuance of this general permit, in accordance with Chapter 43.21B RCW, and Chapter 173-226 WAC.

B. The terms and conditions of this general permit, as they apply to an individual discharger, are appealable in accordance with Chapter 43.21B RCW within 30 days of the effective date of coverage of that discharger. Consideration of an appeal of general permit coverage of an

individual discharger is limited to the general permit's applicability or nonapplicability to that individual discharger.

C. The appeal of general permit coverage of an individual discharger does not affect any other dischargers covered under this general permit. If the terms and conditions of this general permit are found to be inapplicable to any individual discharger(s), the matter shall be remanded to the department for consideration of issuance of an individual permit or permits.

G19. Record Keeping Requirements:

The permittee shall maintain records required as a condition of the application for, as a condition of coverage under, and as conditions of this permit.

The permittee shall retain for a minimum of five (5) years reports required by this permit. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the permittee or when requested by the department or regional administrator.

Upon termination of coverage under this permit, the owner shall retain all records and reports required under this General Condition for at least three (3) years from the date of termination of coverage under this permit.

G20. Signatory Requirements:

All Notices of Intent and Termination, plans (including the SWPPP), reports, certifications or information either submitted to the Department of Ecology or to the operator of a municipal storm sewer system, (or that this permit requires be maintained by the permittee), shall be signed as follows:

A. In the case of corporations, by a responsible corporate officer or a duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates.

B. In the case of a partnership, by a general partner.

C. In the case of a sole proprietorship, by the proprietor.

D. In the case of a municipal, state or other public agency, by either a principal executive officer, ranking elected official, or other duly authorized employee.

G21. Use of Registered or Accredited Laboratories:

Except for flow, temperature and internal process control parameters, sampling and analysis data required as a condition of coverage under this general permit shall be prepared by a laboratory accredited under the provisions of Chapter 173-50 WAC (Accreditation of Environmental Laboratories).

G22. Commencement of Coverage Under a General Permit:

Unless the department responds in writing to an application for coverage, coverage of a discharger under a general permit will automatically commence on the later of the following:

A. On the effective date of the general permit;

B. On the 31st day following the end of the 30 day comment period required by WAC 173-226-130(5)(iv) for new operations;

C. On the 31st day following receipt by the department of a completed application for coverage under a general permit; or

D. On the coverage date specified in this permit.

G23. Termination of coverage upon issuance of an individual permit or an industry-specific general permit:

When an individual permit is issued to a discharger otherwise subject to this general permit, the applicability of the general permit to that permittee is automatically terminated on the effective date of the individual permit.

When coverage under an industry-specific general permit is granted to a discharger otherwise subject to this general permit, the applicability of this general permit to that permittee is automatically terminated 90 days after the effective date of the industry-specific general permit.

G24. Severability:

The provisions of this permit are severable, and if any provision of this permit, or application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

Application for General Permit to Discharge Stormwater Associated with Construction Activity (Notice of Intent)

☐ Change of Information

Permit # SO3-00_____

(Please print legibly in ink or type)

Please Read NOI Instructions Before Filling Out This Form

I. Contact Person

Contact Name	Phone No.
Title	
Company	
Mailing Address	
City	State Zip + 4

II. Owner/Representative of Site

(All correspondence will be mailed here)

Owner's Name	Phone No.
Title	
Company Name	
Mailing Address	
City	State Zip +.4

III. Site Location/Address

Site Name	
Street Address (or Location Description)	
City (or nearest city)	Zip + 4
County	
Provide legal description if no address for site (attach separate sheet if necessary)	

V. Billing Address

Contact Name	Phone No.
Company Name	
Mailing Address	
City	State Zip + 4

V. Receiving Water Information (check all that apply)

A. **Does your construction site discharge stormwater to:**

1. ☐ Storm drain system - Owner of storm drain system (name) : _____
2. ☐ Indirectly or directly to surface waters: ☐ River ☐ Lake ☐ Creek ☐ Estuary ☐ Ocean ☐ Wetland
3. ☐ Directly to ground waters of Washington state: ☐ Dry Well ☐ Drainfield ☐ Other

B. **Name(s) of receiving water(s):** _____

Initial discharge is to an unnamed receiving water? ☐ Yes ☐ No (☐ Ditch ☐ Wetland ☐ Unnamed Stream)

C. **Location of discharges.** (Use all of the following to identify location of discharge. Attach a supplemental sheet if more than one discharge point and/or numerous receiving waters.):

1. Map enclosed (Mark discharge point on map and provide distance from receiving water.)
2. Specify degrees, minutes, and seconds.

   Section: _____ Township: _____ Range: _____
   Section: _____ Township: _____ Range: _____
   Section: _____ Township: _____ Range: _____

3. Latitude: _____ _____ _____ Longitude: _____ _____ _____
   Latitude: _____ _____ _____ Longitude: _____ _____ _____
   Latitude: _____ _____ _____ Longitude: _____ _____ _____

List receiving waters.

_____
_____
_____
_____
_____
_____

VI. Construction Activity Information

1. Total size of site: _____ acres Total area to be disturbed: _____ acres How many phases? _____
2. Will any portion of the project be sold to private developers? ☐ Yes ☐ No
3. Projected startup date: _____ Proposed completion date: _____
4. Will there be dewatering activity? ☐ Yes ☐ No If yes, give brief description of location of such activity and how water will be disposed of: _____
5. Check all construction (soil disturbing activities) that applies. Attach a supplemental sheet if necessary

☐ Clearing	☐ Homes (how many) ➢ Condominiums _____	☐ Landscaping	☐ Stormwater Facilities
☐ Demolition	➢ Multi-family _____ ➢ Single-family _____	☐ Parks	☐ Trails
☐ Exporting Soil	➢ Town homes _____	☐ Piping Systems	☐ Utilities
☐ Filling Wetland	☐ Importing Soil	☐ Retaining Walls	☐ Other
☐ Grading	☐ Industrial Buildings ➢ Type: _____	☐ Roads/Streets	☐ Other
	➢ Site: _____	☐ Stockpiling	☐ Other

VII. Stormwater Pollution Prevention Plan (SWPPP)

A. **Best Management Practices (BMPs)** (Check all that apply.) Attach supplemental list if needed to include other BMPs.

☐ Berms	☐ Diverted Flows	☐ Plastic Covering	☐ Swale
☐ Check Dams	☐ Hydroseed	☐ Polyacrylamides	☐ Terracing
☐ Chemical Treatment	☐ Interceptor Trenches/Ditches	☐ Riprap Channel Lining	☐ Vegetated Strips
☐ Culverts	☐ Kiln Dust	☐ Sediment Pond	☐ Wheel Wash Area
☐ Detention Pond	☐ Mulching	☐ Silt Fencing	☐ Other
☐ Dikes	☐ Nets and Blankets	☐ Slope Reduction	☐ Other
☐ Dust Control	☐ Pipes	☐ Straw Bales	☐ Other

B. **Stormwater Pollution Prevention Plan (SWPPP)**

Has a SWPPP been developed that includes a narrative and drawings? ☐ Yes ☐ No

If NO, will a plan be developed prior to the start of construction? ☐ Yes ☐ No

If you answered "NO" to the above question, notify Ecology in writing when a final plan has been developed. A permit will not be issued until a confirmation letter has been received by Ecology. The SWPPP is to be implemented when construction activity commences on your project.

VIII. State Environmental Policy Act (SEPA)

If the SEPA process has not been completed at the time of NOI submittal, a follow-up letter must be sent to Ecology with the following information prior to Ecology granting permit coverage.

Has a SEPA review been completed? ☐ Yes ☐ No ☐ Exempt

Type of SEPA document: ☐ DNS ☐ Final EIS ☐ MDNS

Agency issuing DNS, Final EIS, or Exemption: _____ Date: _____

Are you aware of an appeal of the adequacy of the SEPA document? ☐ Yes ☐ No

If yes, please attach explanatory letter.

SEPA requirements must be complied with prior to permit issuance.

IX. Public Notice

The public notice must be published at least once each week for 2 consecutive weeks, in a single newspaper which has general circulation in the county in which the construction is to take place. See the NOI instructions for the public notice language requirements. Permit coverage will not be granted sooner than 31 days after the date of the second public notice.

Note: The NOI and public notice must be reviewed and approved by Ecology before the date of the first public notice. The NOI and public notice can be faxed to 360.407.6426 or email to lmat461@ecy.wa.gov.

PUBLIC NOTICE

_____ *(Name of owner; or name of owner % engineering firm, architect, etc).*

_____ *(Address of owner or % Representative* is seeking coverage under the Washington Department of Ecology's NPDES General Permit for Stormwater Discharges Associated with Construction Activities.

The proposed _____ *(Total acres)* project, known as _____ *(Project name)* is located at _____

(Street address, intersection, crossroads, or other descriptive site location) in _____ *(Name of nearest city).* Approximately _____ (*Number of disturbed acres*) will be disturbed for construction of _____

_____

_____

_____

(List all construction activity, e.g., clearing, grading, stockpiling (approx c.y. and location), importing/exporting materials (c.y.), demolition, grading, stormwater facilities, roads, utilities, number buildings/homes and type, sidewalks, landscaping.) Stormwater will be

_____

_____

_____ *(Brief description of how the stormwater will be cleaned and controlled),* prior to discharging _____

_____

_____

(Clarify the direction of the stormwater flows; include distance to receiving waters. List wetlands, unnamed and named receiving waters and storm drains; clarify if buffers will be used to protect sensitive waterbodies.)

Any person desiring to present their views to the Department of Ecology concerning this application may notify Ecology in writing within 30 days from the last date of publication of this notice.

Comments may be submitted to:

Department of Ecology
Stormwater Unit
PO Box 47696
Olympia, WA 98504-7696

Provide the exact dates (mm/dd/yy) that the first and second public notices will appear in the newspaper:

Date of the first notice ____/____/____

Date of second notice ____/____/____

Name of the newspaper which will run the public notices: _____

Ecology is no longer requiring the submittal of the affidavit of publication.

Complete the above public notice information or provide a copy of the notice to be published.

X. Regulatory Status

☐ NPDES Permit (e.g., industrial stormwater) Permit No: _____

☐ State Waste Discharge Permit No: _____

☐ Air Notice of Construction, Permit, or Order Agency: _____

☐ State/USEPA Hazardous Waste ID No: _____

XI. Certification of Permittee(s)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Owner/Representative's Printed Name	Title
Owner/Representative's Signature	Date

Sign and return this document to the following address:

Washington Department of Ecology
Water Quality Program
Stormwater Unit
PO Box 47696
Olympia, WA 98504-7696

For questions, please call (360) 407-6437.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

NOTICE OF TERMINATION

For General Permit to Discharge Stormwater Associated with

Construction Activity

Permit No. SO3-00

(Please print or type in ink.)

Use this form to end permit coverage once all construction and soil stabilization measures have been completed

I. CONTACT PERSON

Contact Name	Phone No.
Company	
Mailing Address	
City	State / Zip + 4

II. OWNER / REPRESENTATIVE OF SITE

Owner's Name	Phone No.
Company Name	
Mailing Address	
City	State / Zip + 4

III. SITE LOCATION / ADDRESS

Site Name	
Street Address (or Location Description)	
City (or nearest city)	Zip + 4
County	
Provide legal description if no address for site (attach separate sheet if necessary)	

IV. BILLING ADDRESS

Contact Name	Phone No.
Company Name	
Mailing Address	
City	State / Zip + 4

Total area disturbed: _____ acre(s). Name of receiving waters: _____

V. CONSTRUCTION ACTIVITY

☐ The site has undergone final stabilization of all exposed soils through vegetation or other measures and all stormwater discharges from construction activities that are authorized by this permit are eliminated.

IV. CERTIFICATION OF PERMITTEE(S) (Please read the certification statement carefully before signing.)

"I certify under penalty of law that all stormwater discharges associated with construction activity from the identified site that are authorized by the National Pollution Discharge Elimination System (NPDES) and State Waste Discharge general permit have been eliminated, or that I am no longer the owner of the site. I understand that by submitting this Notice of Termination, that I am no longer authorized to discharge stormwater associated with construction activity by the general permit, and that discharging pollutants in stormwater to waters of the State of Washington is unlawful under the Clean Water Act where the discharge is not authorized by a NPDES permit. I also understand that the submittal of this Notice of Termination does not release the owner (or other permittee) from liability for any violations of this permit or the Clean Water Act."

_____ _____

Owner/Representative's Printed Name and Title — Date

_____ _____

Owner/Representative's Signature — Date

Instructions for Completing the Notice of Termination Form For the Baseline General Permit to Discharge Storm Water Associated with Construction Activity

This is an instruction document for preparing a Notice of Termination (NOT) for coverage under the Baseline General Permit for the discharge of stormwater associated with construction activity. Where all stormwater discharges from a construction site have been eliminated and the site has undergone final stabilization, the permittee of the site shall submit a Notice of Termination to the Department of Ecology. The permit fees will continue until this notice is received by Ecology.

Instructions for Completing the Notice of Termination Form

Please complete the document by printing or typing the information in ink.

1. Permit Number	Enter the permit number for the facility.
2. Contact Person (Section I)	Give the name, address, and telephone number of the person who is available 24 hours a day for contact by Ecology or other local authorities. The contact person should be someone who is completely familiar with the site, and charged with overseeing compliance with the permit requirements.
3. Owner/Representative of Site (Section II)	Give the name, and the address of the person, company, firm, public corporation, municipality or any other entity which owns or legally represents the site. If the owner is the same as the contact person, enter "same as contact" on the first line.
4. Site Address (Section III)	Enter the street address or location description, including the city or nearest city and county for the construction site. Construction sites which do not have a street address must also provide a legal description in the space provided or as an attachment.
5. Billing Address (Section IV)	Indicate where the final fee invoice should be sent.
6. Acreage	Provide number of disturbed acres in the project.
7. Construction Activity (Section V)	Indicate that all stormwater discharges associated with construction activity have been eliminated, and final stabilization of all exposed soils through vegetation or other measures has been completed.
8. Receiving Waters	Provide named and unnamed receiving waters (including wetlands and storm drains).
9. Certification of Permittee(s)	This statement should be read carefully by the permittee(s). The responsible official or authorized representative of the owner shall print their names for clarity, then sign and date the document on the lines provided. Refer to General Condition G20 in the permit for signatory requirements.

Address to Submit the Notice of Termination

Notices of Termination are to be sent, using the Construction Activity NOT form included in the permit as Appendix 2, to the following address:

Linda Matlock
Department of Ecology
Industrial Storm Water Unit
PO Box 47696
Olympia, WA 98504-7696

Note: Confirmation of termination requests will be sent in 30 days from date of receipt.

Questions

Questions concerning proper completion of this form can be directed to the Department of Ecology by calling (360) 407-6437.

A Report Prepared for

Port of Tacoma
P.O. Box 1837
Tacoma, Washington 98401

DRAFT REPORT
GEOTECHNICAL INVESTIGATION AND
PAVEMENT DESIGN, PORT OF TACOMA
CASCADE TIMBER No. 3 LOG SORT YARD
TACOMA, WASHINGTON

HLA Job N0. 12183.2

by:

Rodney C. Soule, P.E.
Associate Engineer

Stuart E. Dykins, P.E.
Consulting Principal Engineer

Harding Lawson Associates
961 Matley Lane Suite 110
Reno, Nevada 89502
(702) 329-6123

March 1, 1994

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TABLES

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FIGURES

I. INTRODUCTION

This report presents the results of our geotechnical investigation for design of an impermeable cap cover and future pavement structures for the Port of Tacoma - Cascade Timber No. 3 Log Sort Yard. The log yard is located along Maxwell Way between Port of Tacoma Road and Thorne Road in Tacoma, Washington. The design of the impermeable cap has included considerations for the anticipated future use of the site, as an overflow containerized cargo terminal facility for the Port of Tacoma.

Our services were provided in accordance with our letter proposal dated October 22, 1993. The scope of services, as they relate to this report, consist of:

- Review Existing Data
- Conduct Pre-Design Investigation
    - Excavate, log and sample 10 test pits within the existing log yard.
    - Perform laboratory testing consisting of grain size distribution, organic content (bark content), Atterberg Limits, soil classification, and resistance value (R-value) testing.
    - Perform engineering analysis to determine the structural section required for the impermeable cap, a containerized terminal facility. Surface materials to be considered include asphalt concrete, Portland cement concrete, roller compacted concrete, and concrete block pavers. Initial construction and life cycle costs will be generated for each alternative considered.
    - Prepare a written report (this report) outlining our field investigation, laboratory testing and engineering analysis and provide recommended pavement section.

This draft report presents various pavement section thickness alternatives for a range of design parameters. The analysis evaluates the sensitivity of the various design

parameters and provides alternative pavement options. This report is intended to assist the Port of Tacoma in selecting the final pavement section.

II. FIELD EXPLORATION AND LABORATORY TESTING

We explored subsurface soil conditions by excavating 10 test pits to depths up to six feet at the locations illustrated on Plate 1 in the Appendix.

The test pits were excavated using a Case 580D backhoe. Our field engineer logged the test pits and obtained representative loose bulk soil samples at selected depths for visual classification and laboratory testing.

A summary of the test pits (TP1 through TP10) is presented on Table 1. The soils were classified in accordance with the ASTM D2487-85 method of classification shown on Plate 2 in the Appendix.

The soil samples were reexamined in our laboratory to confirm field classifications and to select representative samples for testing. The laboratory testing program included: percent passing the No. 200 sieve, moisture content, grain size distribution, organic content (bark content), Atterberg limits, and R-value (pavement design) tests. The test results are presented on Table 2, Summary of Soil Test Data, and on Plates 3 through 13 in the Appendix.

III. SITE CONDITIONS

A. Surface Conditions

The Cascade Timber No. 3 Log Sort Yard is located on Maxwell Way between port of Tacoma Road and Thorne Road in Tacoma, Washington. The log yard has an aerial extent of approximately 10.9 acres. Logs were previously sorted and stored in bays and unpaved roads provide access around the bays. The yard is currently vacant. In general, the ground surface across the site consists of a brown poorly to well-graded gravel with silt, silty clay, sand and gravel and various contents of organic (bark) material. Slag from the Asarco smelter was used as fill material across the site in the mid- to late-1970's.

B. Subsurface Conditions

As shown in Table 1, Test Pit Soil Summary, the subsurface soils consist of gravel with silt, sand, and cobbles; silt; and silty sand to depths up to 3.0 feet and poorly graded sand and silty clay to depths up to 5.0 feet. Free ground water was not encountered in any of the test pits during exploration.

IV. PAVEMENT DESIGN CONSIDERATIONS

A. General

The design of the structural sections was based on a rational design method using the computer program titled ELSYM5 which presents solutions for multilayered elastic systems. The program computes stresses, strains, and deflections at pre-selected locations in the pavement structure. The program requires the material properties of the individual layers in terms of the elasticity (resilient modulus), Poisson's ratio, and thickness. The vertical load and contact pressure are also required. With the computed stresses and strains, fatigue and rutting failure modes can be analyzed.

B. Design Parameters

1. Design vehicle

Two vehicles were considered in the design of the ultimate structural section. The Valmet container carrier and a Standard Highway Truck. The Valmet container carrier was also considered for the long term use of the facility with a wheel load of 26,675 pounds and a tire pressure of 105 psi. The Standard Highway Truck was evaluated based upon the 18,000 pound Equivalent Single Axle Load (ESAL).

2. Material Properties

A pavement section can generally be divided into the following layers:

- Surface Course - Asphalt concrete (AC) or Portland Cement Concrete (PCC), or some other type of wearing surface
- Base Course - Aggregate or stabilized material
- Subbase Course - Aggregate or processed material
- Subgrade - In-place soil or engineered fill soil

While a base and/or subbase is not required they are usually used to decrease the cost of construction by decreasing the thickness of the more expensive surface course. A

base layer will also serve as a working platform upon which the wearing surface is constructed. The following sections of this report discuss the material properties used in developing the alternative sections presented in Section "V. DISCUSSION OF RESULTS".

a. Subgrade

For the purpose of design, the subgrade soils were taken as the brown silty sand encountered at approximately 2 feet to 5 feet below the surface (Table 1). Laboratory tests indicate an R value of 66 (Table 2). An R-value of 50 was used in design and can be converted to a resilient modulus (Mr) value of 28,900 psi using relationships derived by the Asphalt Institute in Manual Series 1 (1).

b. Subbase

Based on the results of our tests, the upper 0 to 2 feet of material across the site contains average organic (bark) contents of 75 to 80 percent by volume of dry soil (Table 2). This material should be thoroughly mixed/blended to produce a homogeneous mixture, and placed to form 18 inches of processed material. The presence of the bark appears to cause little reduction in strength. The bark will have long-term effects on the consolidation of the bark layer. To control differential settlement caused by the decomposition of the bark, the material should be thoroughly mixed with the existing soils to insure even distribution of the bark. Laboratory testing indicates R-values ranging from 41 to 57 at various organic contents (see Figure 1). Because of the variability of the results and the potential of organic decomposition an R-value of 35 was used in design. An R-value of 35 can be converted to an Mr of 20,580 psi using the relationship previously discussed. The analysis also considered the possibility of complete removal of the soil/bark mixture thereby eliminating the "subbase" course.

c. Base

The base material considered in the analysis consisted of an aggregate base (AB). The aggregate base will be used as a working platform to enable the level

placement of the asphalt concrete cap. A typical R value for an aggregate base would be 70 and this can be converted to an Mr of 40,000 psi using the relationship previously discussed.

d. Surface Course

Four materials were considered for use as a surface course and include: asphalt concrete (AC), Portland cement concrete (PCC), roller compacted concrete (RCC), and concrete block pavers (CBP).

C. Asphalt Concrete Surface

The design of the AC section was based on a rational design method using the computer program ELSYM5. The parameters used in the analysis are summarized in Table 3. With the computed strains, several failure modes can be analyzed. These failure modes include:

1. Fatigue Cracking: Caused by repeated loads inducing tensile strains at the bottom of the AC layer.
2. Rutting: Caused by repeated loads inducing vertical compressive strain and permanent deformation on the top of the subgrade.

The fatigue criteria used was developed by Finn (2) and uses 10 percent cracking of the surface course as the limiting factor. The rutting criteria was developed by Chevron (3) and uses 3/4 inch rutting of the subgrade as the limiting factor.

Based on the design parameters discussed above, the cycles to failure for various AC thicknesses can be calculated and are shown in Tables 4 and 5. Table 4 considers the structural section with the soil/bark subbase mixture and Table 5 considers the structural section without the subbase. The results indicate that rutting is the controlling failure criteria. Figures 2 and 3 present plots of AC thickness verses cycles to failure using the rutting criteria for the container carrier and the highway truck.

D. Portland Cement Concrete Surface

The design of the PCC section was also based on a rational design method using ELSYM5 and the American Association of State Highway Officials (AASHTO) design procedures for the container carrier and the highway vehicle, respectively. The parameters used in the analysis are summarized in Table 3. The effects of fatigue are the controlling criteria for PCC thickness design. For the container carrier, a ratio of the flexural stress at the bottom of the PCC layer and the modulus of rupture (flexural strength) can be calculated and is known as the endurance limit (3). When the endurance limit is approximately 0.50 to 0.55 the concrete will withstand virtually unlimited stress repetitions without loss of load carrying capacity (4). An endurance limit of 0.50 was used in this analysis. Based on the design parameters discussed above, the PCC thickness required for various flexural strength values are shown in Tables 6 and 7. Table 6 considers the structural section with the subbase course and Table 7 considers the structural section without the subbase course.

Figure 4 presents plots of PCC thickness versus flexural strength for the container carrier with the soil/bark subbase and without the soil/bark subbase. Figures 5 and 6 present plots of Portland Cement Concrete thickness versus the cycles to failure for the Highway Truck with the soil/bark subbase and without the soil/bark subbase respectively.

E. Roller Compacted Concrete Surface

The design of RCC is essentially the same as the design for a PCC section. The only exception would be the flexural strength of the RCC used in the analysis. Typically, the flexural strength used for RCC would be between 200 and 400 psi. Figures 4, 5 and 6 which present PCC thickness verses flexural strength can be used for RCC design by limiting the flexural strength to between 200 and 400 psi. The AASHTO design

procedure does not consider PCC flexural strengths below 500 psi. Design thickness flexural strengths below 500 psi were extrapolated based upon the results for flexural strength between 500 to 700 psi.

F. Concrete Block Paver Surface

The design of the CBP system was based on work performed by the U.S. Army Engineer Waterways Experiment Station (5) in which the paver block is treated as equivalent to 6 1/2 inches of AC. A paver block thickness of 4 inches is recommended for heavy industrial floors and hardstands on which the vehicle speed does not exceed 35 miles per hour (6). A well graded, non plastic bedding sand is recommended beneath the paver block to provide a level surface for placing the block. The sand material used to fill the joint spacing between paver blocks and provide the required vertical block interlock should be slightly finer than the bedding sand.

V. DISCUSSION OF RESULTS

A. General

This section of the report discusses various pavement section alternatives and provides initial construction and life cycle maintenance costs. Figures 2 through 6 present pavement thicknesses for various surface treatments over a range of design parameters. Figures 7 through 11 present pavement section details for the impermeable cap and various pavement structures. The details presented in Figures 8 through 11 are based on an assumed maximum loading of 100,000 repetitions of the Container Carrier as the design vehicle. The 100,000 repetitions used in the analysis was provided by the Port of Tacoma.

Estimated initial construction costs and life cycle maintenance costs are presented in Tables 9 through 16. For comparison, the cost analysis is based on the structural section thicknesses required for 100,000 repetitions of the Container Carrier. Unit prices used in the analysis are summarized in Table 9.

B. Impermeable Cap

Slag from the Asarco smelter was used as a fill material across the site. The Department of Ecology has determined that heavy metals have been leached out of the slag from the site to the adjacent Blair Waterway. To prevent further leaching of the heavy metals, the preferred remedial alternative is an impermeable cap. The design of the impermeable cap has included considerations for the anticipated future uses of the site, both short term and long term. The site will be used as a container overflow terminal facility for the Port of Tacoma.

The structural section for the impermeable cap shall be constructed above the 18 inches of bark/soil processed material and shall consist of 4 inches of aggregate base (AB), and 4 inches of dense grade asphalt concrete (DGAC) (Figure 7). The service related

structural sections described later in this report shall be constructed directly above the impermeable cap.

C. Asphalt Concrete Surface

For comparison purposes, the AC sections were evaluated at 100,000 repetitions for each of the design vehicles considered. From Figure 2, The AC thickness required with the soil/bark subbase layer, is 10 inches for the container carrier and a minimum of 4 inches for the standard highway truck. Since the impermeable cap consists of 4 inches of AC the supplemental AC required for the container carrier would be 6 inches. Table 11 presents the life cycle cost analysis for the AC with the soil/bark subbase alternative using the container carrier design vehicle. From Figure 3 without the soil/bark subbase layer, an AC thickness of 8 inches can be obtained for the container carrier. Since the impermeable cap consists of 4" of AC the supplemental AC required for the container carrier would be 4 inches. Table 12 presents the life cycle cost analysis for the AC without the soil/bark subbase alternative, using the container carrier as the design vehicle.

The advantage in using an AC surface would be the inherent flexibility of asphaltic concrete material which would allow the surface to adjust due to the possible differential settlement caused by the decomposition of the organics (bark) in the "subbase" material.

The disadvantage to using AC would be the cost associated with the removal of additional contaminated material to accommodate the AC section. The advantages and disadvantages for each surface type are summarized in Table 8.

D. Portland Cement Concrete Surface

The design of the PCC section was based on varying concrete flexural strengths and unlimited repetitions. For comparison purposes, a flexural strength of 600 psi was used in the cost analysis. From Figure 4, with the soil/bark subbase layer, a PCC thickness

of 7 inches would the required for the container carrier. Table 13 presents the life cycle cost analysis for the PCC with the soil/bark subbase alternative, using the container carrier as the design vehicle. From Figure 4, without the soil/bark subbase layer, a PCC thickness of 6 inches can be obtained for the container carrier. This would be the minimum PCC section recommended. Table 14 presents the life cycle cost analysis for the PCC without the soil/bark subbase alternative using the log stacker as the design vehicle. A minimum thickness of 8 inches should be used for constructability reasons.

The advantage to using a PCC surface would be that the PCC structural section would allow for unlimited traffic repetitions.

The disadvantage to using a PCC surface would be the lack of flexibility and the high initial cost of the PCC.

E. Roller Compacted Concrete Surface

As previously mentioned, the design of the RCC is essentially the same as the PCC section, the only exception being the flexural strength of the concrete used in the analysis. For comparison purposes a flexural strength of 200 psi was used in the cost analysis. From Figure 4, with soil/bark subbase layer, a RCC thickness of 10 inches can be obtained for the container carrier. From Figure 4, without the soil/bark subbase layer a RCC thickness of 9.5 inches would be obtained for the container carrier. Table 15 presents the life cycle cost analysis for the RCC alternative with the soil/bark subbase and using the container carrier as the design vehicle.

The advantage of using a RCC surface would be a reduced cost compared to the PCC and jointing would not be required. Annual maintenance of the RCC surface would also be limited to sealing cracks.

The disadvantage of using RCC would be the maintenance associated with faulting and possibly a rough riding surface.

F. Concrete Block Paver Surface

The structural section recommended for the CBP system consists of a 4 inch block, a sand leveling course, a fabric interlayer and 4 inches of AC for the container carrier. The fabric layer is used to prevent the loss of bedding sand due to cracks which may develop in the AC layer. Table 16 presents the life cycle cost analysis for the RCC alternative with the soil/bark subbase and using the log stacker as the design vehicle.

The advantage of using a block paver surface would be if settlement does occur on the site, the effected blocks can be removed, the underlying material fixed, and the blocks replaced.

The disadvantage of the block paver surface would be the cost associated with the initial installation and the lack of experience using this type of construction.

G. Economic Analysis

A life cycle cost analysis was performed to evaluate the economic impacts of the various pavement alternatives. The life cycle analysis compares the initial costs and the future maintenance and rehabilitation costs. The future maintenance and rehabilitation costs were determined from local bid prices and information provided by the Port of Tacoma. The life cycle cost analysis and maintenance strategies provided, are based on experience on similar type pavement systems. A summary of the unit prices for the various items used in the cost estimates are presented in Table 9. The maintenance and rehabilitation strategies are presented in Table 10. The maintenance strategy for each pavement type is a basic plan to maintain the pavement throughout the design life. A discount rate of 4 percent per year was used for this evaluation. A life cycle cost analysis for each surface type is summarized in Tables 11 through 16. The economic analysis is based on 100,000 repetitions of the container carrier spread over a 20 year design life.

The present worth (PW) cost column in Tables 11 through 16 represents the cost incurred during the 20 year design period at today's dollar. The analysis includes the impermeable cap and all related maintenance activities for the surface material. The analysis also includes a salvage value which is the prorated value of the last major maintenance or rehabilitation activity performed on the pavement. The salvage value is used to normalize the analysis period so that it will be the same period for each pavement alternative

The economic analysis does not include any earthwork associated with getting the site to subgrade elevation or processing of the on site material to produce the soil/bark material (subbase). The economic analysis is based upon using the Soil/bark Layer throughout the site. Depending on the final pavement section selected and the amount of bark material left on site, the maintenance strategies and costs may change.

H. Construction Considerations

If the Soil/ Bark Subbase is to be used, the preparation of the Subbase will be critical to controlling the differential movement of the layer. The bark material will make normal density requirements and testing difficult to use. Of primary importance will the thorough mixing of the soil and bark throughout the site so that a homogeneous mixture is obtained. This mixture will not eliminate the consolidation of that layer but any consolidation that does occur will occur uniformly over the site. Determining if the mixture is consistent can be done visually during construction. Testing with a nuclear density gage may also be helpful. If testing is done with a nuclear density gage, the gage readings (unit weight, moisture content) will be useful to determine if the layer is homogeneous. This test method will only be able to give comparative results.

If import material is brought in to provide stability in certain areas this material should be mixed with uncontaminated bark to match the existing onsite material. This will help to control differential settlement.

Prior to the construction of the final structural section we recommend that the Port conduct falling weight deflectometer testing to determine the load carrying characteristics of the cap as it exists at that time and thereby refine the design on the final structural section.

I. Recommendations

The recommendation presented in this section is based upon the design assumptions and traffic levels presented in this report. If the design parameters are modified the recommendations will have to be reevaluated.

If the container carrier is used as the design vehicle, we recommend the use of asphalt concrete pavement section for the following reasons.

1. AC will perform better if differential settlement does occur due to the bark.
2. Lower life cycle cost.
3. Lower initial Cost

VI. REFERENCES

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4. Portland Cement Association, 1973. Design of Concrete Airport Pavement., Engineering Bulletin.

5. Rollings, R.S. 1979. Precast Concrete Paving Block Pavement, U. S. Army Engineer Waterways Experiment Station, ETL 1110-3-310.

6. National Concrete Masonry Association, 1980. Concrete Block Pavements - Structural Design, TEK 115.

Table 1. Test Pit Soil Summary

* = Lab Classification

Test Pit No.	Depth Below Existing Grade (ft.)	Soil Description
TP-1	0-1.5	Dark Brown-Gray Poorly Graded Sand (SP) trace gravels -1" diameter and abundant wood waste
	1.5	*Brown Poorly Graded Gravel with Silt and Sand (GP-GM) Note: Visual classification only; est. 75-85% bark
	1.5-4.6	Brown Silty Sand (SM) Trace Gravels to 2" diameter - test pit wet at bottom
TP-2	0-2.2	*Brown Poorly Graded Gravel with Silt and Sand (GP-GM)
	2.2-3.3	Dark Grey Poorly Graded Sand (SP) with trace silts, medium grain sand at 3.0-3.3' saturated
	3.3-6.4	Green Grey Lean Clay (CL) with trace silts, moderately plastic
TP-3	0-2.0	*Brown Silty Gravel with Sand (GM)
	2.0-2.4	Brown Grey Clayey Gravel (GC) hard, dry, gravels are -1/4" diameter and well rounded
	2.4-4.0	Dark Grey Poorly Graded Sand (SP), sand is medium grained
TP-4	0-2.0	Brown Poorly Graded Gravel (GP) with abundant red-brown wood debris - gravels are well rounded, up to 5" diameter
	2.0-3.0	*Brown Poorly Graded Sand with Silt (SP-SM)
	3.0-4.0	Brown Grey Poorly Graded Sand (SP), sand medium grained, some oxidation, groundwater seepage at 4'
TP-5	0-0.5	Dark Brown Silty Sand (SM) with abundant roots and wood debris
	0.5-1.0	Red Grey Clayey Sand with Gravels (SC)
	1.0-3.5	Grey Brown Poorly Graded Sand (SP) with trace silts and minor oxidized zones
TP-6	0-0.6	*Brown Silty Gravel (GM) estimated organics at 80-90% (visual)
	0.6-1.6	Dark Brown Silty Sand with Gravel (SM)
	1.6-4.0	Grey Brown Silty Sand (SM) wet water seepage at bottom of test pit
TP-7	0-2.0	*Brown Poorly Graded Gravel (GP)
	2.0-4.0	Grey Poorly Graded Sand (SP)

Table 1. Test Pit Soil Summary
(Continued)

Test Pit No.	Depth Below Existing Grade (ft.)	Soil Description
TP-8	0-2.0 2.0-3.0	*Dark Brown Well-Graded Bark with Bark (BW-BB)? Grey Green Clayey Sand (SC) with boulders - rock is weathered, groundwater in bottom of test pit
TP-9	0-1.0 1.0-2.0 2.0-3.0 3.0-5.0	Dark Brown Wood Debris with Trace Silts Brown Grey Poorly Graded Sand with Gravel (SP) moist-wet *Brown Poorly Graded Sand with Silt and Gravel (SP-SM) Grey Poorly Graded Sand (SP), moist
TP-10	0-1.0 1.0-2.0 2.0-3.0	Dark Brown Silty Gravel with Sand (GM) with wood debris *Grey Brown Poorly Graded Gravel (GP) Dark Grey Poorly Graded Sand (SP)

Table 2.
Summary of Laboratory Test Data

Test Pit No.	Depth	Atterberg Limits		% Passing by Dry Weight						R-value	% Organics by Wt.	USCS
		LL	PI	6"	3"	No.4	No.30	No.50	No.200			
TP-1	1.5'									49		
TP-2	0.0-0.5			100	100	32.9	21	15	10			
TP-3	0.0-2.0			100	100	37.9	23	16	12.4	57		
TP-4	2.0'-3.0'	NP		100	100	100	86	56	8.2	66		
TP-5												
TP-6												
TP-7	0.0'-2.0'			100	100	13.4	8	6	3.6			
TP-8	0.0'-2.0'			100	100	46	9	5	0.9	41	100%	
TP-9	2.0'-3.0'			100	100	84	65	31	5.5			
TP-10	1.0'-2.0'			100	100	17.1	10	8	4.4			

Table 3.
Summary of Material Design Parameters

	R-Value	Flexural Strength	Resilient Modulus	Poisson's Ratio
Asphalt Concrete (Varies)			400,000 psi	0.35
Portland Cement Concrete (8" Minimum)		600 psi	3,420,000	0.20
Roller Compacted Concrete		200 psi	1,140,000 to 2,280,000	0.20
Aggregate Base (4" Minimum)			40,000	0.35
Subbase-Bark/Soil Material (18" Minimum)	35		20,580	0.40
Subgrade	50		28,900	0.40

Table 4

Cycles to Failure for Various Asphalt Concrete Thicknesses
(w/ soil/bark Subbase)

AC Thickness (inches)	Cycles to Failure			
	Fatigue Criteria		Rutting Criteria	
	Container Carrier	Highway Truck	Container Carrier	Highway Truck
4	96,299	26,805,471	1,904	5,565,938
5		332,672,324		9,804,556
6	159,240	22,416,054,034	10,710	18,026,124
7				33,056,543
8	335,559		47,328	
10	689,247		170,864	
12	1,419,551		523,573	
14	2,840,056		1,418,415	

Table 5
Cycles to Failure for Various Asphalt Concrete Thicknesses
(w/o soil/bark Subbase)

AC Thickness (inches)	Cycles to Failure			
	Fatigue Criteria		Rutting Criteria	
	Container Carrier	Highway Truck	Container Carrier	Highway Truck
4	99,079	18,794,366	5,755	8,395,776
5		164,972,860		8,395,776
6	209,320	3,442,856,663	29,604	14,643,815
8	407,650		123,270	
10	816,504		430,003	
12	1,607,078		1,277,866	
14	3,064,426		3,400,037	

Table 6.
Portland Cement Concrete Thickness Summary
(w/ soil/bark subbase)

Flexural Strength (psi)	Require PCC Thickness (inches)	
	Container Carrier	Highway Truck
200	9.5	9
300	8.5	8.5
400	8*	8*
500	8*	8*
600	8*	8*
700	8*	8*

* Minimum Recommended Thickness

Table 7.
Portland Cement Concrete Thickness Summary
(w/o soil/bark subbase)

Flexural Strength (psi)	Require PCC Thickness (inches)	
	Container Carrier	Highway Truck
200	9.5	9
300	8.5	8.5
400	8*	8*
500	8*	8*
600	8*	8*
700	8*	8*

* Minimum Recommended Thickness

Table 8:
Summary of Advantages and Disadvantages

Proposed Surface	Remarks
Asphalt Concrete	**Advantages**
	Flexible
	Low initial Cost
	Constructability- easy, fast
	Disadvantages
	Increased Structural Section
	Annual Maintenance
Portland Cement Concrete	**Advantages**
	Reduced Structural Section
	Unlimited Traffic Repetitions
	Disadvantages
	Rigid
	High Initial Cost
Roller Compacted Concrete	**Advantages**
	Reduced Structural Section
	Unlimited Traffic Repetitions
	Low Annual Maintenance
	Disadvantages
	Rigid
	Rough Finish
Concrete Block Paver	**Advantages**
	Flexible
	Easy to Maintain
	Disadvantages
	High Initial Cost
	Limited Construction Experience
	Labor Intensive

Table 9.

Construction Material Unit Prices

Item	Unit Price
Crack Seal (Asphalt Concrete)	$1/LF
Crack Seal (Portland Cement Concrete)	$2.5/LF
Joint Seal (Portland Cement Concrete)	$2/LF
Shallow Patch (Asphalt Concrete)	$3.5/SF
Deep Patch (Asphalt Concrete)	$7/SF
Aggregate Base	$25/CY
Asphalt Concrete	$32/TON
Portland Cement Concrete	$100/CY
Roller Compacted Concrete	$60/CY
4" Block Paver (includes sand layer)	$1.85/SF
Fabric	$1/SY

Maintenance Strategies For Alternative Pavement Surfacing

YEAR	ITEM	DESCRIPTION	QUANTITY	UNIT
		ASPHALT CONCRETE ALTERNATIVE		
7,14	CRACK SEALING	200' CRACK / 2500SF PAVEMENT	37,932	FT
7,14	PATCH-SHALLOW	25SF PATCH/2500 SF PAVEMENT	4,742	SF
7,14	PATCH-DEEP	25SF PATCH/2500SF PAVEMENT	4,742	SF
10	LEVELING COURSE	20% TOTAL AREA	94,830	SF
		PORTLAND CEMENT CONCRETE		
5,10,15	CRACK SEALING	2 SLAB LENGTHS/ 10 SLABS	6,322	FT
10	JOINT RESEALING	ALL	63,220	FT
10	SPALL REPAIR	2 SPALLS/10 SLABS	2,107	SF
10	CORNER BREAK	1 BREAK/ 20 SLABS	1,054	SF
10	SLAB REPLACEMENT	1% SLABS	139	CY
10	MUDJACKING	20% TOTAL AREA	421	SLBS
		ROLLER COMPACTED CONCRETE		
1,10	CRACK SEALING	ALL CRACKS (EVERY 50")	88,000	LF
10	SPALL REPAIRS	5 SF SPALL / 2500 SF PAVEMENT	948	SF
10	GRINDING	20% TOTAL AREA	94,830	SF
		CONCRETE BLOCK PAVERS		
5,10,15	REPLACE BLOCKS &	1% OF THE AREA	4,742	
5,10,15	ADD SAND			
10	LEVELING COURSE	20% TOTAL AREA	94,830	SF

LIFE CYCLE COST ANALYSIS FOR ASPHALT CONCRETE ALTERNATIVE WITH SOIL/BARK MIXTURE

YEAR	ITEM	QUANTITY	UNIT	COST	UNIT	TOTAL COST	PW COST
0	4" AB	474,150	SF	$0.32	SF	$151,728	$151,728
0	4" AC CAP	474,150	SF	$0.75	SF	$355,613	$355,613
0	5.0" AC	474,150	SF	$0.97	SF	$459,926	$459,926
						$967,266	$967,266
7	CRACK SEALING	37,932	FT	$1.00	FT	$37,932	$28,825
7	PATCH-SHALLOW	4,742	SF	$3.50	SF	$16,595	$12,611
7	PATCH-DEEP	4,742	SF	$7.00	SF	$33,191	$25,222
7	LEVELING COURSE (2"AC)	94,830	SF	$0.37	SF	$35,372	$26,880
						$123,089	$93,538
14	CRACK SEALING	37,932	FT	$1.00	FT	$37,932	$21,905
14	PATCH-SHALLOW	4,742	SF	$3.50	SF	$16,595	$9,583
14	PATCH-DEEP	4,742	SF	$7.00	SF	$33,191	$19,167
14	LEVELING COURSE (2"AC)	94,830	SF	$0.37	SF	$35,087	$20,262
						$122,805	$70,917
20	SALVAGE VALUE					($17,544)	($8,007)
				TOTAL		$1,195,617	$1,123,714
	TOTAL (cost per square foot)					$2.52	$2.37

Table 12.

LIFE CYCLE COST ANALYSIS FOR ASPHALT CONCRETE ALTERNATIVE WITHOUT SOIL/BARK MIXTURE

YEAR	ITEM	QUANTITY	UNIT	COST	UNIT	TOTAL COST	PW COST
0	4" AB	474,150	SF	$0.32	SF	$151,728	$151,728
0	4" AC CAP	474,150	SF	$0.75	SF	$355,613	$355,613
0	4.0"AC	474,150	SF	$0.75	SF	$355,613	$355,613
						$862,953	$862,953
7	CRACK SEALING	37,932	FT	$1.00	FT	$37,932	$28,825
7	PATCH-SHALLOW	4,742	SF	$3.50	SF	$16,595	$12,611
7	PATCH-DEEP	4,742	SF	$7.00	SF	$33,191	$25,222
						$87,718	$66,658
14	CRACK SEALING	37,932	FT	$1.00	FT	$37,932	$21,905
14	PATCH-SHALLOW	4,742	SF	$3.50	SF	$16,595	$9,583
14	PATCH-DEEP	4,742	SF	$7.00	SF	$33,191	$19,167
14	LEVELING COURSE (2"AC)	94,830	SF	$0.37	SF	$35,087	$20,262
						$122,805	$70,917
20	SALVAGE VALUE					($17,544)	($8,007)
				TOTAL		$1,055,932	$992,521
		TOTAL (cost per square foot)				$2.23	$2.09

LIFE CYCLE COST ANALYSIS FOR JOINTED PORTLAND CEMENT CONCRETE ALTERNATIVE WITH SOIL/BARK MIXTURE

YEAR	ITEM	QUANTITY	UNIT	COST	UNIT	TOTAL COST	PW COST
0	4" AB	474,150	SF	$0.32	SF	$151,728	$151,728
0	4" AC	474,150	SF	$0.75	SF	$355,613	$355,613
0	8." JCP	474,150	SF	$2.46	SF	$1,166,409	$1,166,409
						$1,673,750	$1,673,750
5	CRACK SEALING	6,322	FT	$2.50	FT	$15,805	$12,991
						$15,805	$12,991
10	JOINT RESEALING	63,220	FT	$2.00	FT	$126,440	$85,418
10	CRACK SEALING	6,322	FT	$2.50	FT	$15,805	$10,677
10	SPALL REPAIRS	2,107	SF	$70.00	SF	$147,513	$99,655
10	CORNER BREAK	1,054	SF	$120.00	SF	$126,440	$85,418
10	SLAB REPLACEMENT	139	SF	$2.62	SF	$364	$246
						$416,563	$281,415
15	CRACK SEALING	6,322	FT	$2.50	FT	$15,805	$8,776
						$15,805	$8,776
				TOTAL		$2,121,922	$1,976,931
		TOTAL (cost per square foot)				$4.48	$4.17

Table 14.

LIFE CYCLE COST ANALYSIS FOR JOINTED PORTLAND CEMENT CONCRETE ALTERNATIVE WITHOUT SOIL/BARK MIXTURE

YEAR	ITEM	QUANTITY	UNIT	COST	UNIT	TOTAL COST	PW COST
0	4" AB	474,150	SF	$0.32	SF	$151,728	$151,728
0	4" AC	474,150	SF	$0.75	SF	$355,613	$355,613
0	8" JCP	474,150	SF	$2.46	SF	$1,166,409	$1,166,409
						$1,673,750	$1,673,750
5	CRACK SEALING	6,322	FT	$2.50	FT	$15,805	$12,991
						$15,805	$12,991
10	JOINT RESEALING	63,220	FT	$2.00	FT	$126,440	$85,418
10	CRACK SEALING	6,322	FT	$2.50	FT	$15,805	$10,677
10	SPALL REPAIRS	2,107	SF	$70.00	SF	$147,513	$99,655
10	CORNER BREAK	1,054	SF	$120.00	SF	$126,440	$85,418
10	SLAB REPLACEMENT	139	SF	$2.62	SF	$364	$246
						$416,563	$281,415
15	CRACK SEALING	6,322	FT	$2.50	FT	$15,805	$8,776
						$15,805	$8,776
				TOTAL		$2,121,922	$1,976,931
		TOTAL (cost per square foot)				$4.48	$4.17

Table 15.

LIFE CYCLE COST ANALYSIS FOR ROLLER COMPACTED CONCRETE ALTERNATIVE WITH SOIL/BARK MIXTURE

YEAR	ITEM	QUANTITY	UNIT	COST	UNIT	TOTAL COST	PW COST
0	4" AB	474,150	SF	$0.32	SF	$151,728	$151,728
0	4" AC	474,150	SF	$0.75	SF	$355,613	$355,613
0	10" RCC	474,150	SF	$1.85	SF	$877,178	$877,178
						$1,384,518	$1,384,518
1	CRACK SEALING	88,000	FT	$2.50	FT	$220,000	$211,538
						$220,000	$211,538
10	CRACK SEALING	88,000	FT	$2.50	FT	$220,000	$148,624
10	SPALL REPAIRS	948	SF	$70.00	SF	$66,381	$44,845
10	GRINDING	94,830	SF	$3.33	SF	$315,784	$213,332
						$602,165	$406,801
				TOTAL		$2,206,683	$2,002,857
		TOTAL (cost per square foot)				$4.65	$4.22

Table 16.

LIFE CYCLE COST ANALYSIS FOR CONCRETE BLOCK PAVER ALTERNATIVE WITH SOIL/BARK MIXTURE

YEAR	ITEM	QUANTITY	UNIT	COST	UNIT	TOTAL COST	PW COST
0	4" AB	474,150	SF	$0.32	SF	$151,728	$151,728
0	12.5" AC	474,150	SF	$2.33	SF	$1,104,770	$1,104,770
0	FABRIC	52,683	SY	$1.00	SY	$52,683	$52,683
0	4"BLOCK/1"SAND	474,150	SF	$1.85	SF	$877,178	$877,178
						$2,186,358	$2,186,358
5	REPLACE BLOCKS	4,742	SF	$3.00	SF	$14,225	$11,692
						$14,225	$11,692
10	LEVELING COURSE (2"AC)	94,830	SF	$0.37	SF	$35,087	$23,704
10	REPLACE BLOCKS	4,742	SF	$2.00	SF	$9,483	$6,406
						$44,570	$30,110
15	REPLACE BLOCKS	4,742	SF	$3.00	SF	$14,225	$7,898
						$14,225	$7,898
				TOTAL		$2,259,377	$2,236,058
		TOTAL (cost per square foot)				$4.77	$4.72

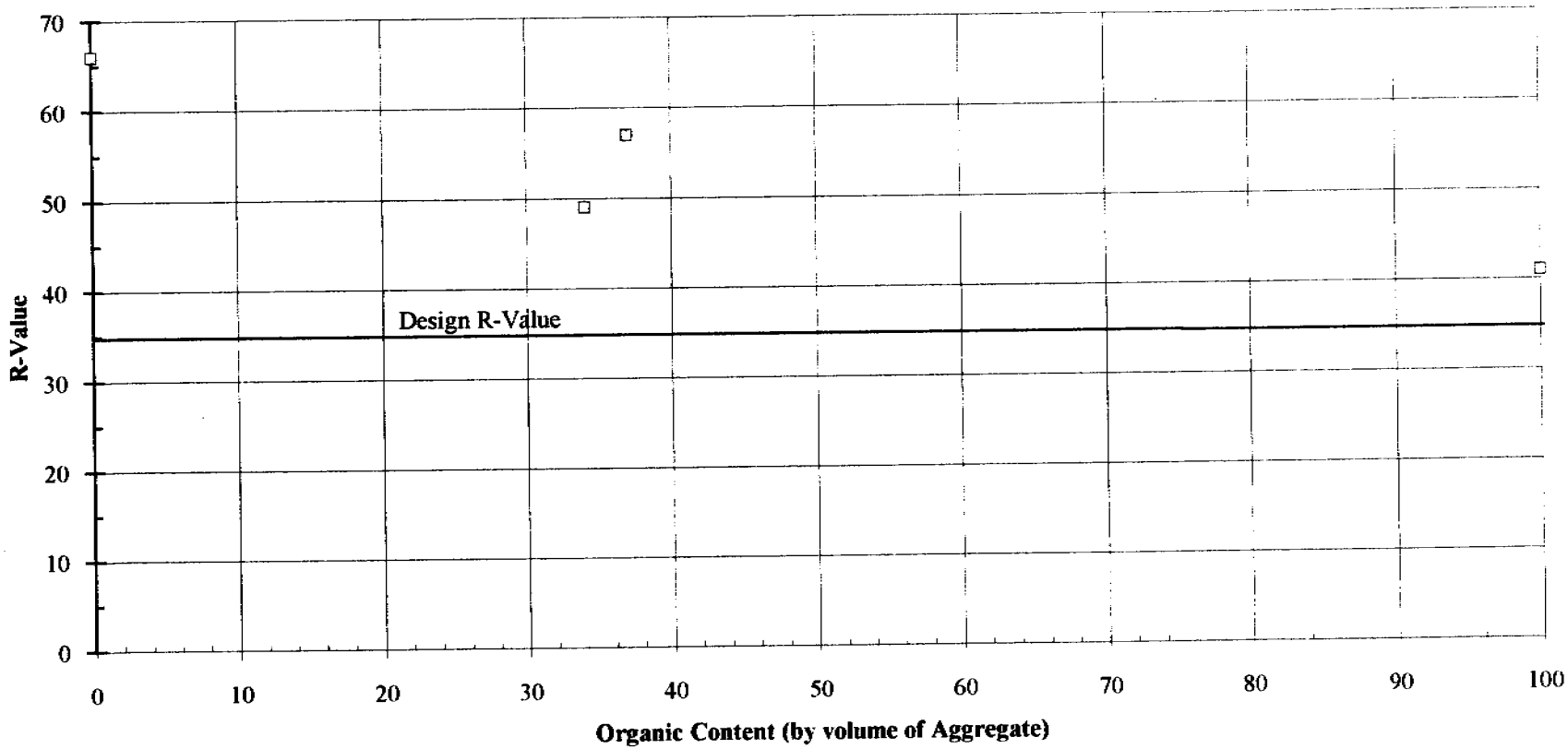


Figure 1. R-Value Verus Organic Content

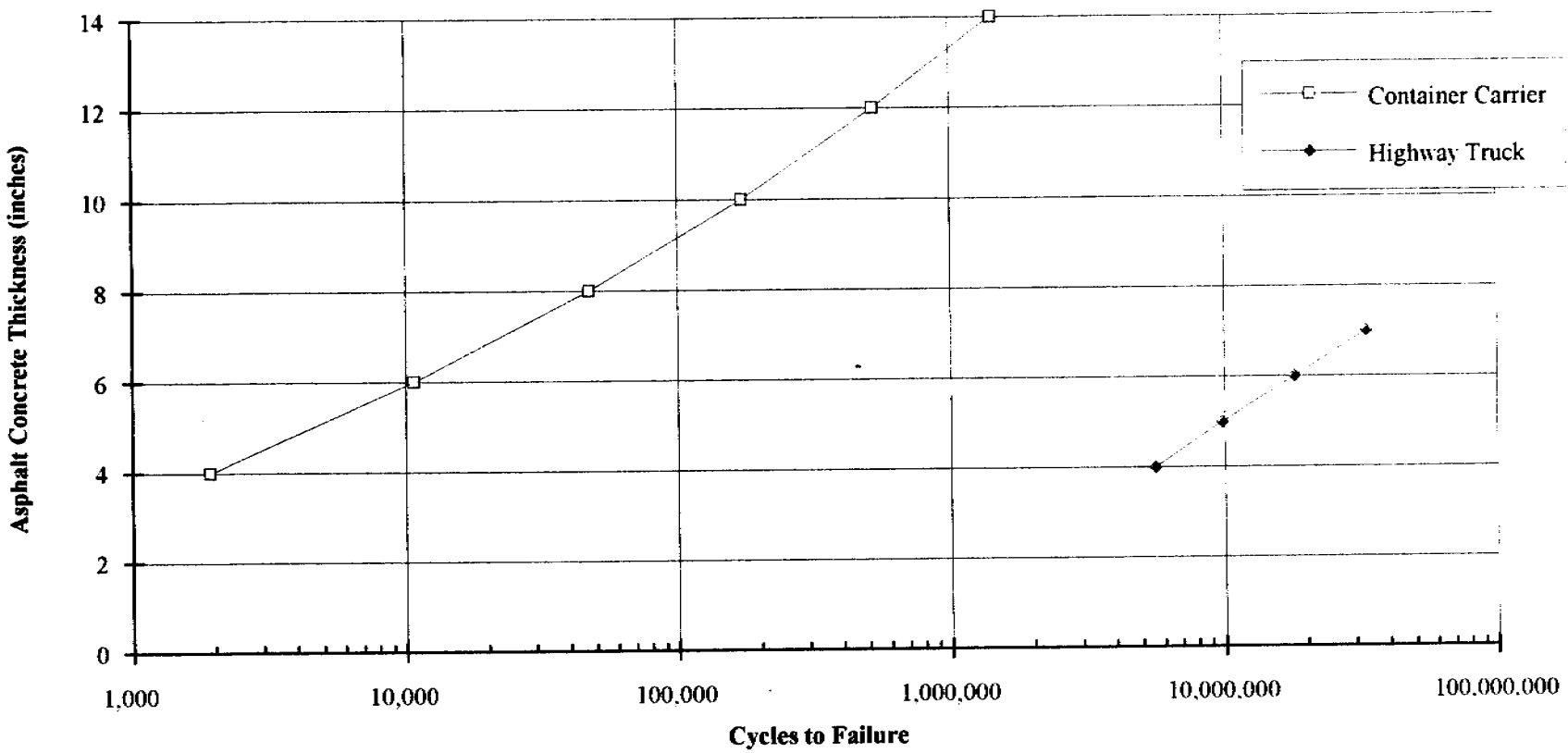


Figure 2. Asphalt Concrete Thickness Versus Cycles to Failure (w/ Soil/Bark Subbase)

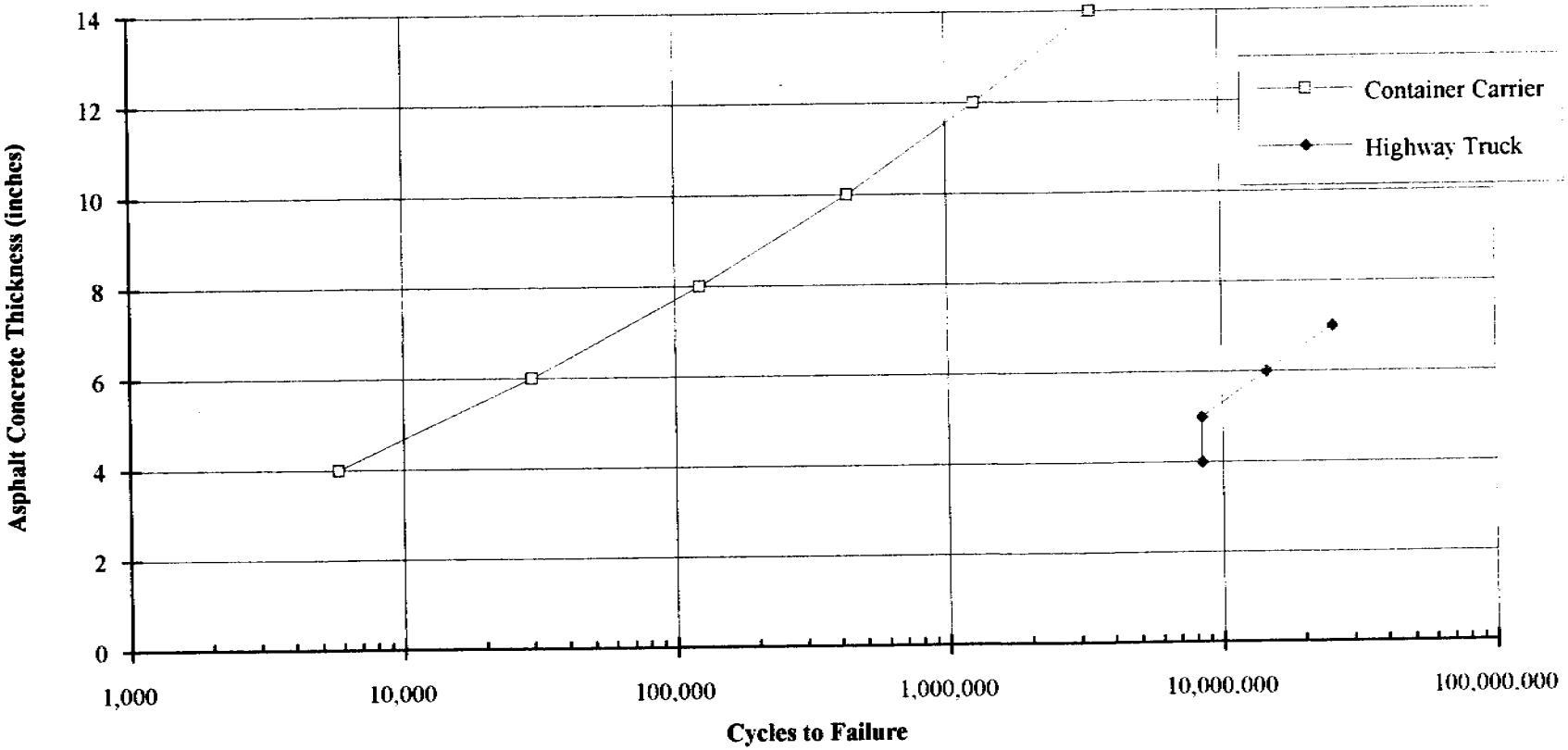


Figure 3. Asphalt Concrete Thickness Versus Cycles to Failure (w/o Soil/Bark Subbase)

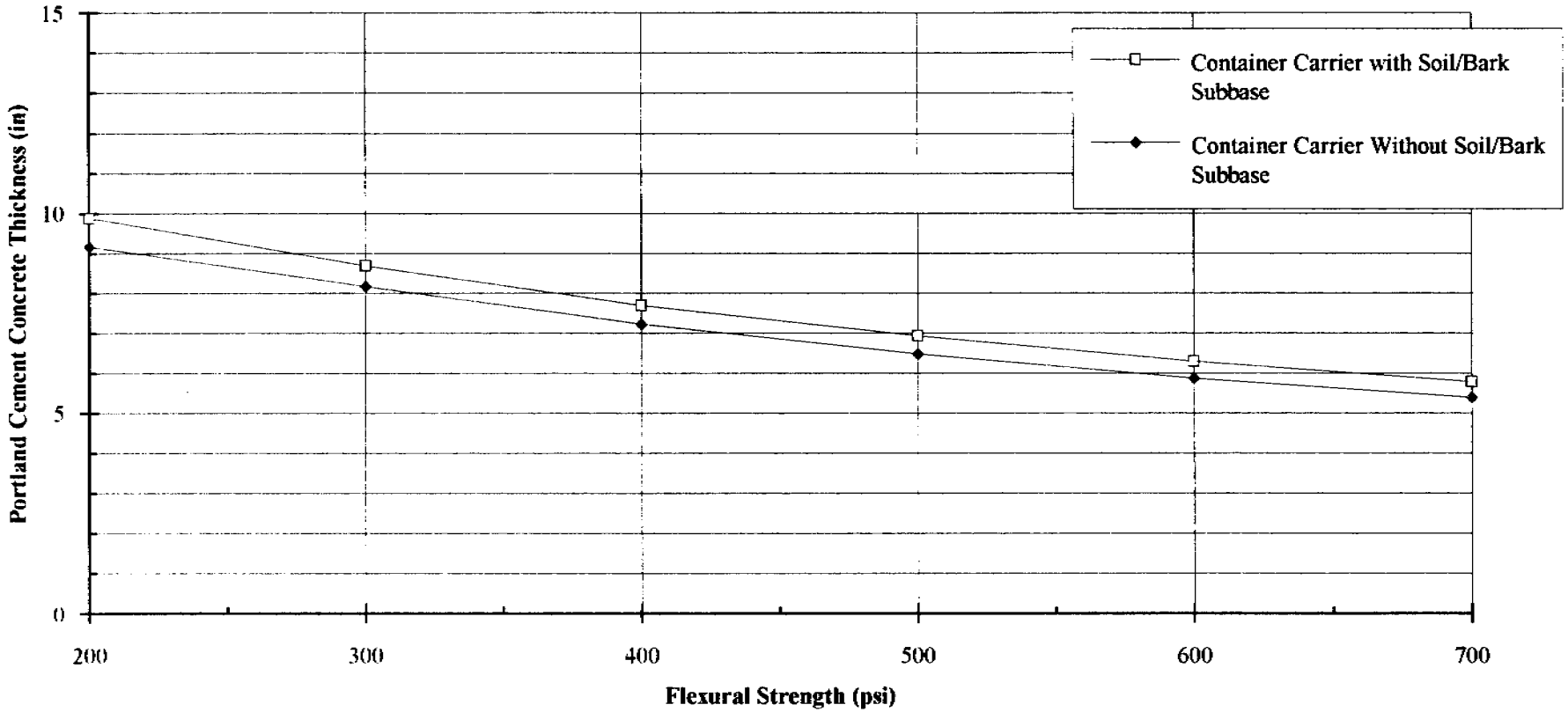


Figure 4. Portland Cement Concrete Thickness Versus Flexural Strength for The Container Carrier

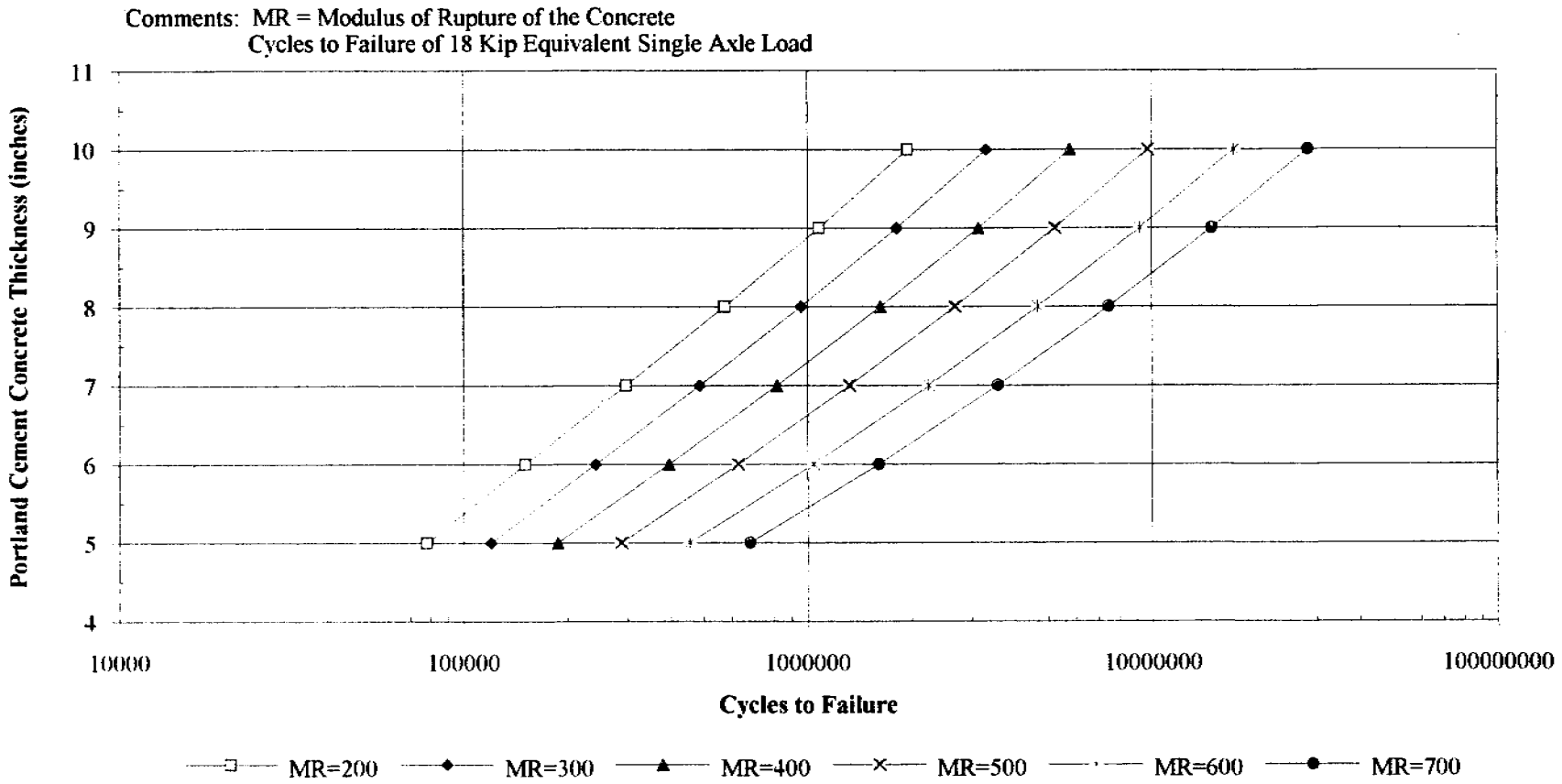


Figure 5. Portland Cement Concrete Thickness Versus Cycles to Failure (w/ Soil/Bark Subbase)

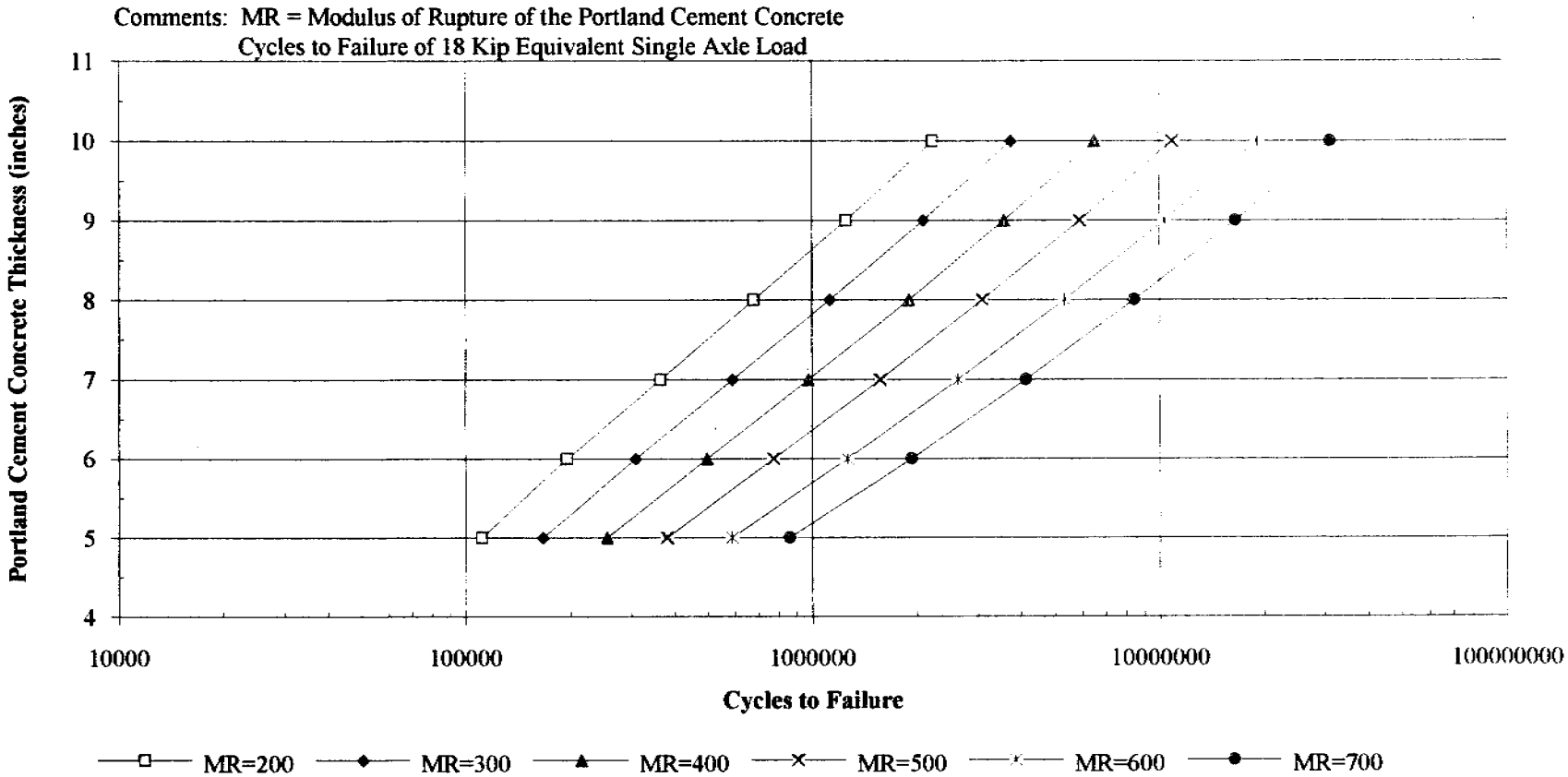
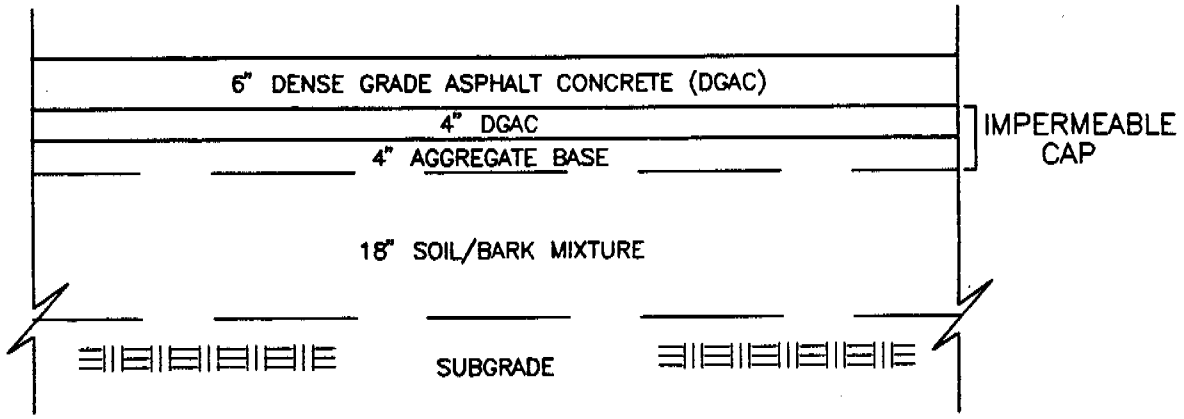
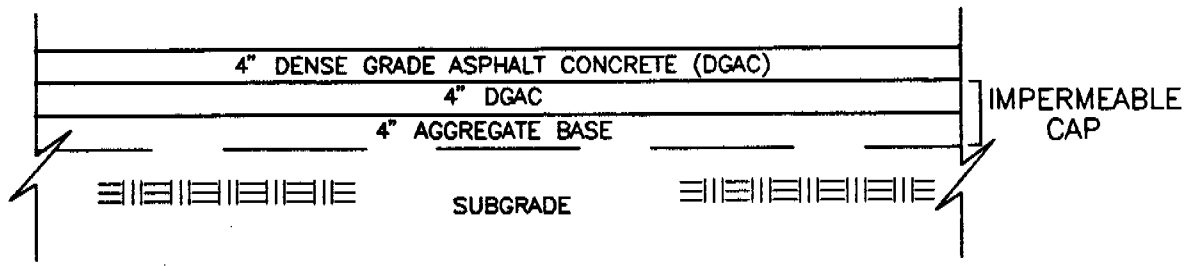


Figure 6. Portland Cement Concrete Thickness versus Cycles to Failure (w/o Soil/Bark Subbase)



ASPHALT SECTION FOR THE CONTAINER CARRIER WITH SOIL/BARK MIXTURE

N.T.S.



ASPHALT SECTION FOR THE CONTAINER CARRIER WITHOUT SOIL/BARK MIXTURE

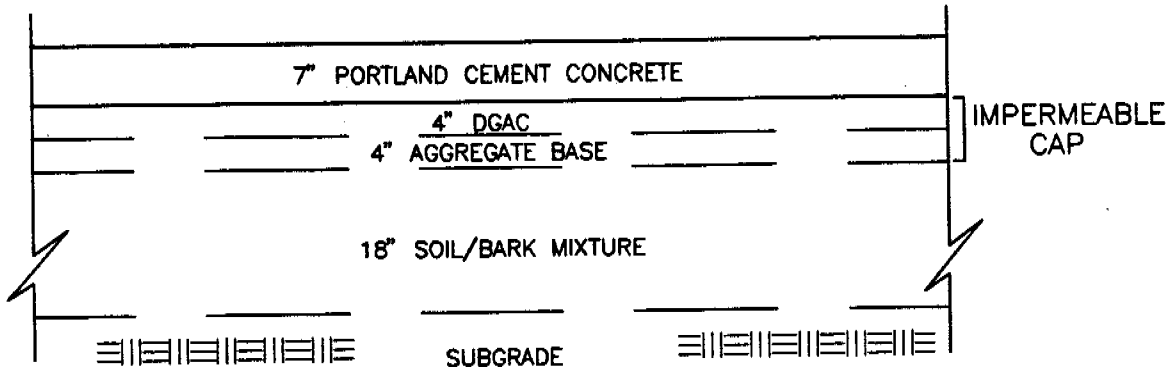
N.T.S.

HARDING LAWSON ASSOCIATES
Engineering and Environmental Services

ASPHALT CONCRETE PAVEMENT SECTIONS
PORT OF TACOMA
CASCADE TIMBER NO. 3 LOG SORT YARD
TACOMA, WASHINGTON

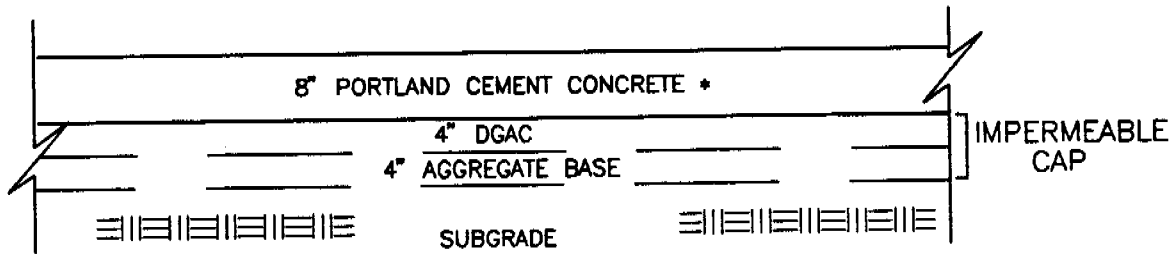
FIGURE 7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		



PORTLAND CEMENT CONCRETE SECTION FOR THE CONTAINER CARRIER WITH SOIL/BARK MIXTURE

N.T.S.



*MINIMUM RECOMMENDED SECTION

PORTLAND CEMENT CONCRETE SECTION FOR THE CONTAINER CARRIER WITHOUT SOIL/BARK MIXTURE

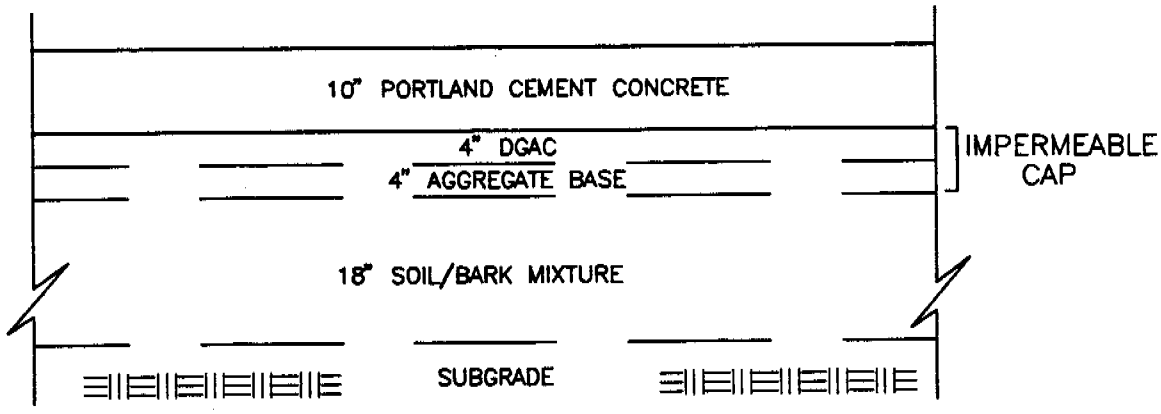
N.T.S.

HARDING LAWSON ASSOCIATES
Engineering and Environmental Services

PORTLAND CEMENT CONCRETE PAVEMENT SECTIONS
PORT OF TACOMA
CASCADE TIMBER NO. 3 LOG SORT YARD
TACOMA, WASHINGTON

FIGURE 8

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		



ROLLER COMPACTED CONCRETE SECTION FOR CONTAINER CARRIER WITH SOIL/BARK MIXTURE

N.T.S.

HARDING LAWSON ASSOCIATES
Engineering and Environmental Services

ROLLER COMPACTED CONCRETE PAVEMENT SECTION
PORT OF TACOMA
CASCADE TIMBER NO. 3 LOG SORT YARD
TACOMA, WASHINGTON

FIGURE 9

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
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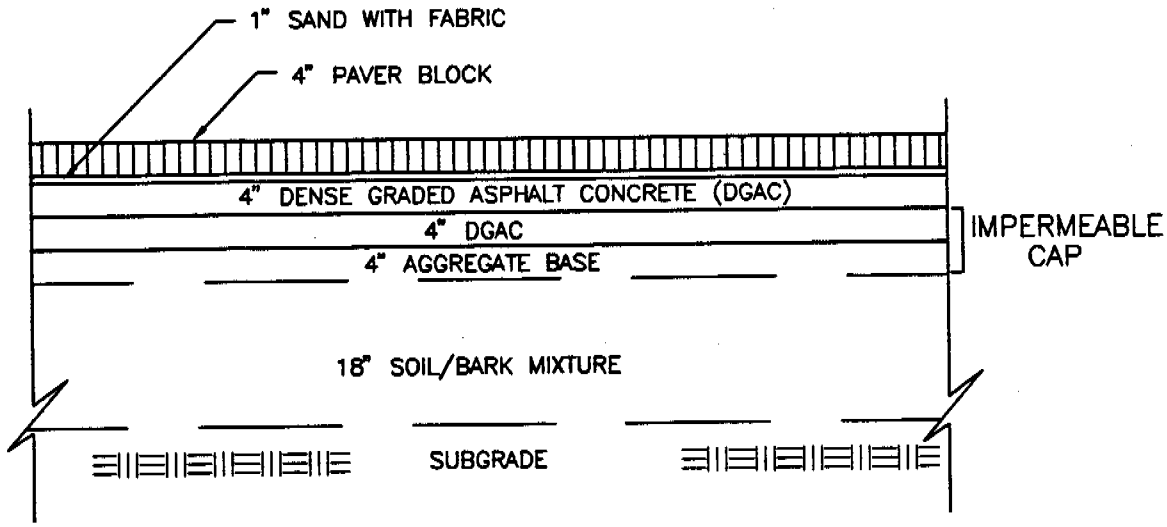

CONCRETE BLOCK PAVER SECTION FOR CONTAINER CARRIER WITH SOIL/BARK MIXTURE

N.T.S.

HARDING LAWSON ASSOCIATES
Engineering and Environmental Services

CONCRETE BLOCK PAVER PAVEMENT SECTION
PORT OF TACOMA
CASCADE TIMBER NO. 3 LOG SORT YARD
TACOMA, WASHINGTON

FIGURE 10

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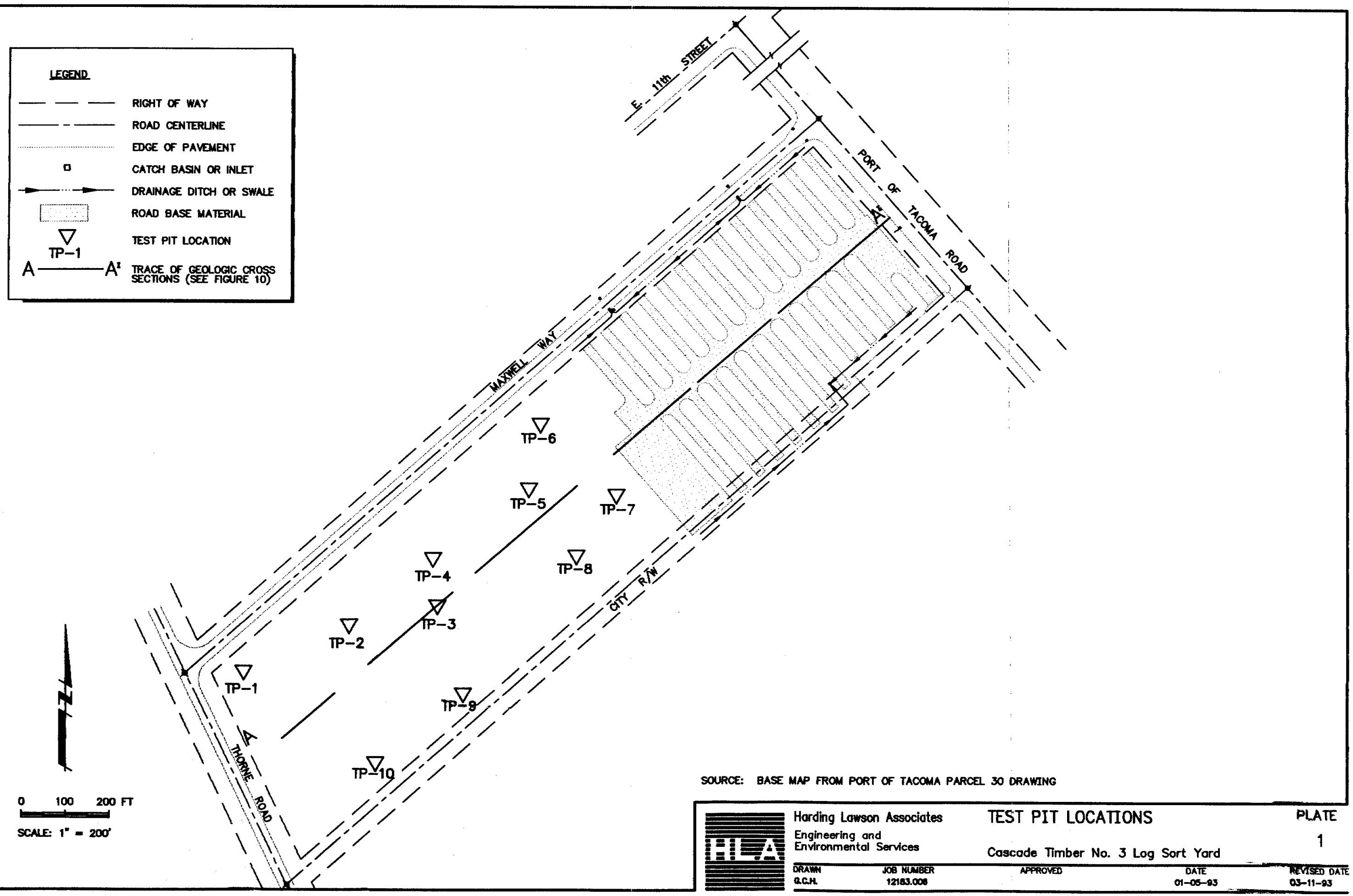
Bruce Krater, P.E.
Consulting Principal Engineer



SOURCE: BASE MAP FROM PORT OF TACOMA PARCEL 30 DRAWING

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TEST PIT LOCATIONS

Cascade Timber No. 3 Log Sort Yard

PLATE 1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
G.C.H.	12183.008		01-05-93	03-11-93

CPLATE1 2000
1994032411412

UNIFIED SOIL CLASSIFICATION - ASTM D2487-85

MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER 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 WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP		POORLY GRADED GRAVEL WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC		CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN No. 4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP		POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM		SILTY SANDS WITH OR WITHOUT GRAVEL
			SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN No. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL		ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC SILTS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS

KEY TO TEST DATA

M(80)	-	Moisture Content (%)
DD(105)	-	Dry Density(pcf)
Perm	-	Permeability
Consol	-	Consolidation
LL	-	Liquid Limit (%)
PI	-	Plasticity Index (%)
G_s	-	Specific Gravity
MA	-	Particle Size Analysis
OC	-	Organic Content
■	-	"Undisturbed" Sample
⊠	-	Bulk or Classification Sample

Shear Strength (psf)
Confining Pressure

TxUU 3200 (2600)	-	Unconsolidated Undrained Triaxial Shear
(FM) or (S)	-	(field moisture or saturated)
TxCU 3200 (2600)	-	Consolidated Undrained Triaxial Shear
(P)	-	(with or without pore pressure measurement)
TxCD 3200 (2600)	-	Consolidated Drained Triaxial Shear
SSCU 3200 (2600)	-	Simple Shear Consolidated Undrained
(P)	-	(with or without pore pressure measurement)
SSCD 3200 (2600)	-	Simple Shear Consolidated Drained
DSCD 2700 (2000)	-	Consolidated Drained Direct Shear
UC 470	-	Unconfined Compression
LVS 700	-	Laboratory Vane Shear

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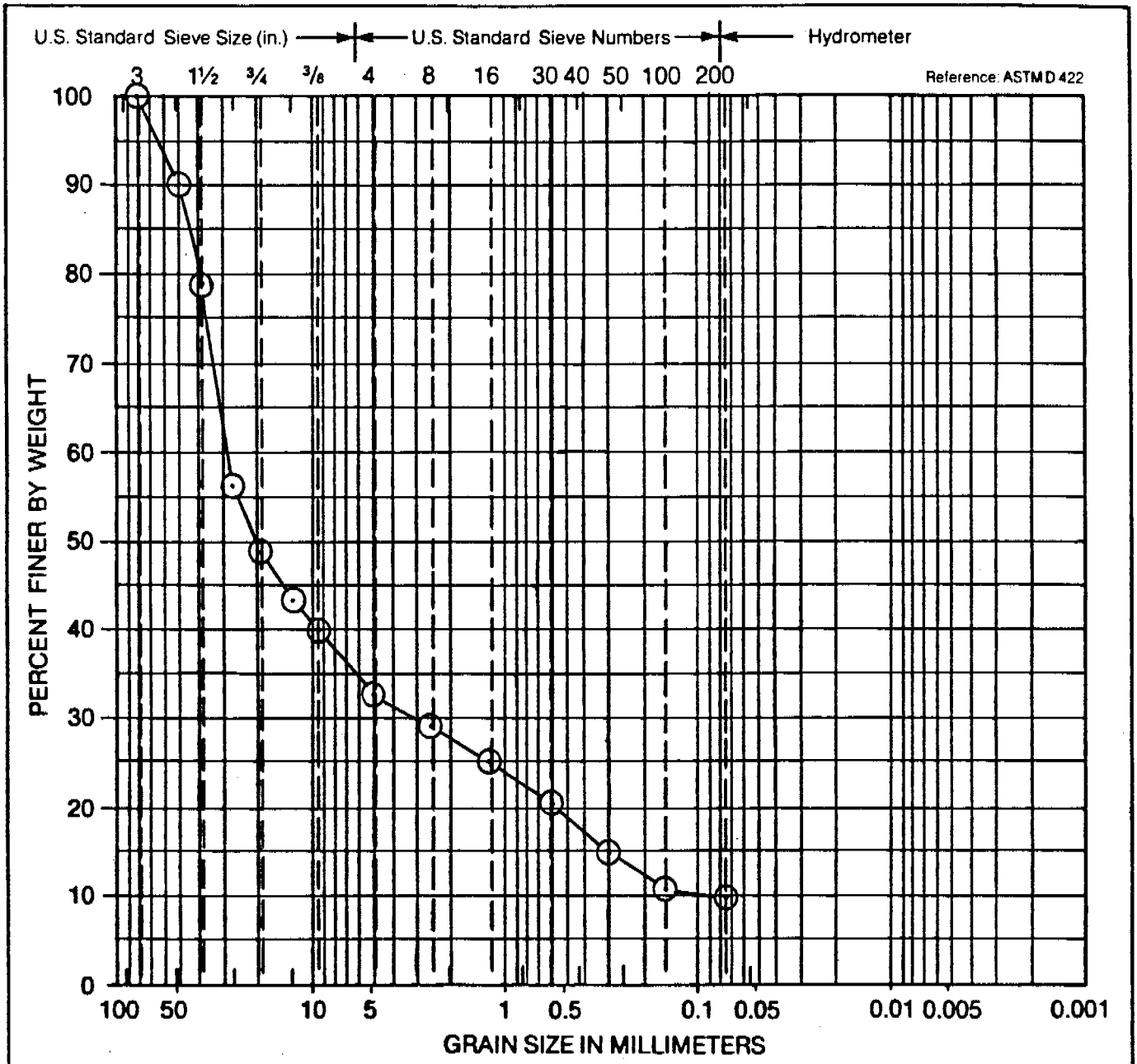
SOIL CLASSIFICATION CHART/KEY TO TEST DATA
PORT OF TACOMA
CASCADE TIMBER NO. 3 LOG SORT YARD
TACOMA, WASHINGTON

PLATE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
RLH	12183.2		3-1-94	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Sample Source	Classification
⊙	TP-2 @ 0.0' to 2.2'	BROWN POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM)

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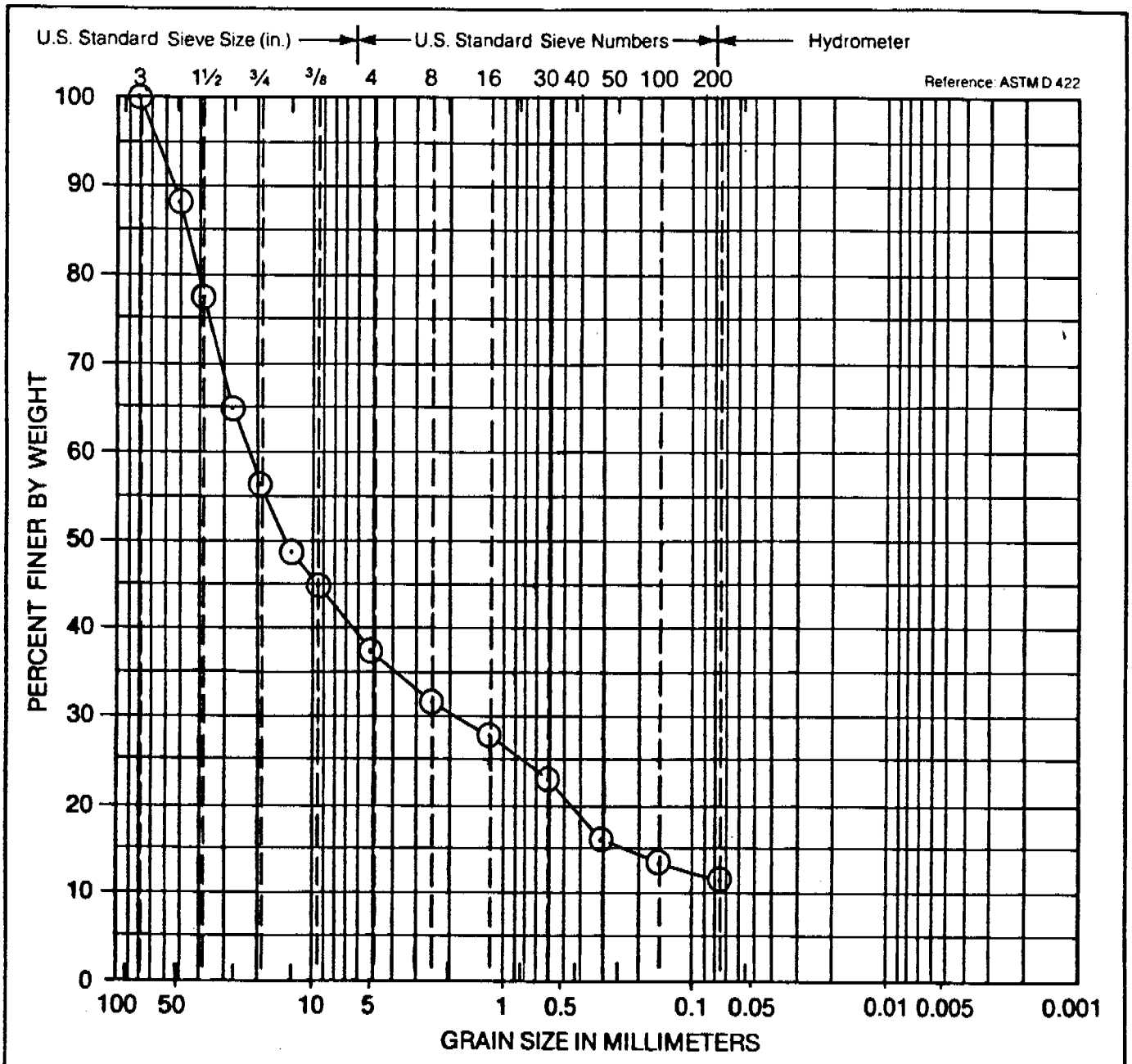
Particle Size Analysis
PORT OF TACOMA
CASCADE TIMBER NO. 3 LOG SORT YARD
TACOMA, WASHINGTON

PLATE
3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Sample Source	Classification
⊙	TP-3 @ 0.0' to 2.0'	BROWN SILTY GRAVEL WITH SAND (GM)

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Particle Size Analysis
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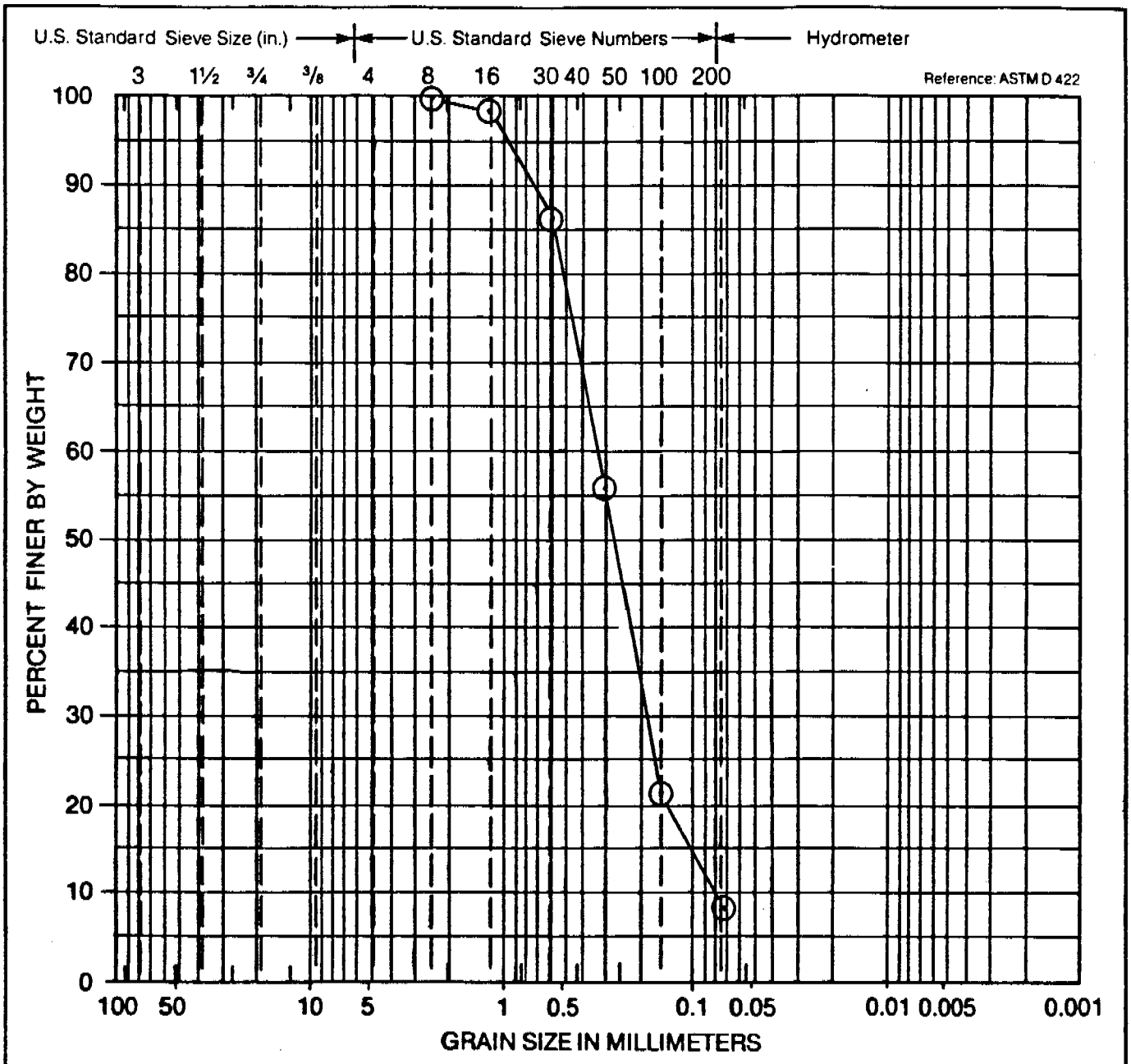
PLATE
4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		



Symbol	Sample Source	Classification
⊙	TP-4 @ 2.0' to 3.0'	BROWN POORLY GRADED SAND WITH SILT (SP-SM)

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Particle Size Analysis
PORT OF TACOMA
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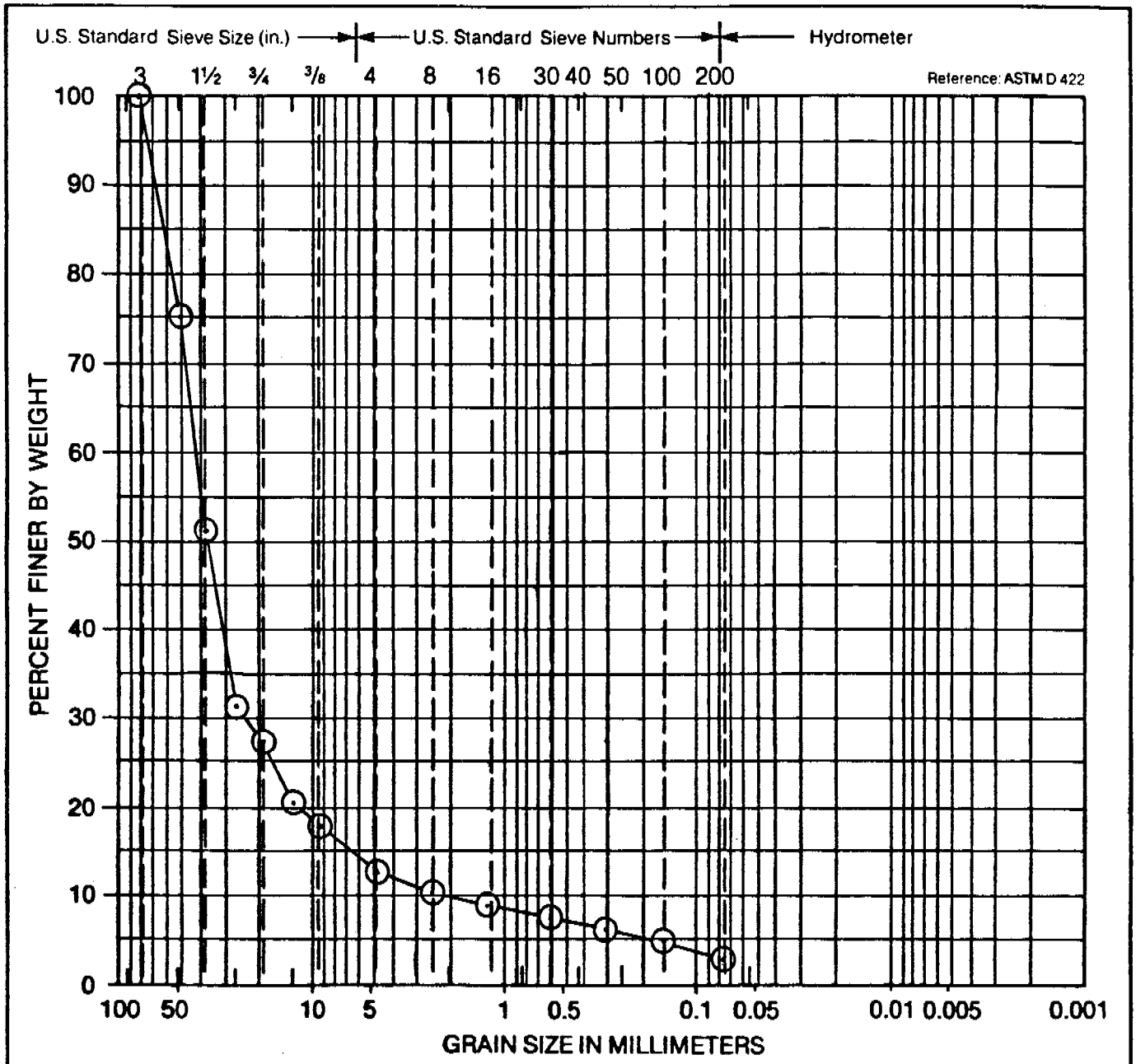
PLATE
5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		



Symbol	Sample Source	Classification
⊙	TP-7 @ 0.0' to 2.0'	BROWN POORLY GRADED GRAVEL (GP)

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Particle Size Analysis
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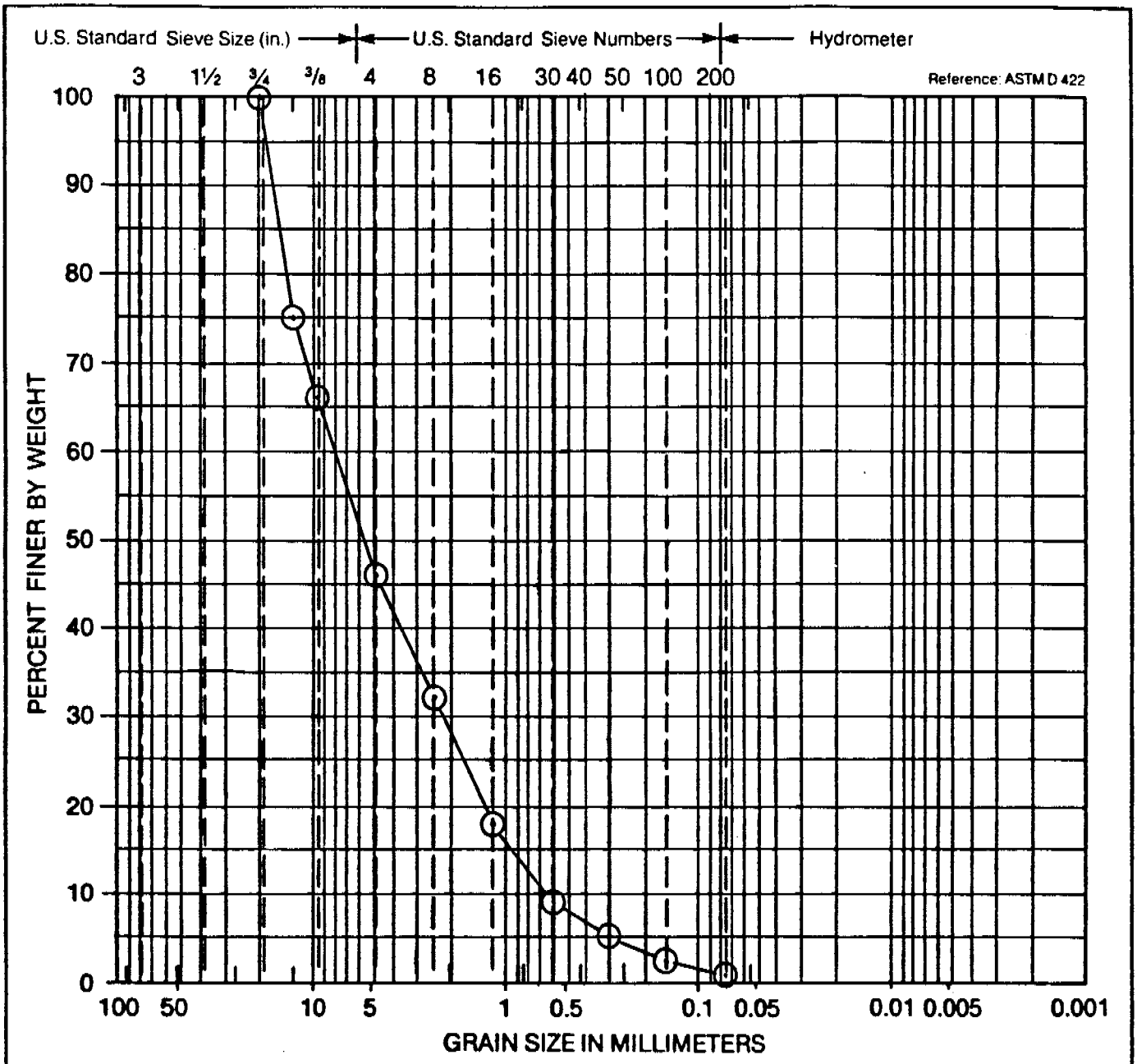
PLATE
6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		



Symbol	Sample Source	Classification
⊙	TP-8 @ 0.0' to 2.0'	DARK BROWN WELL GRADED BARK

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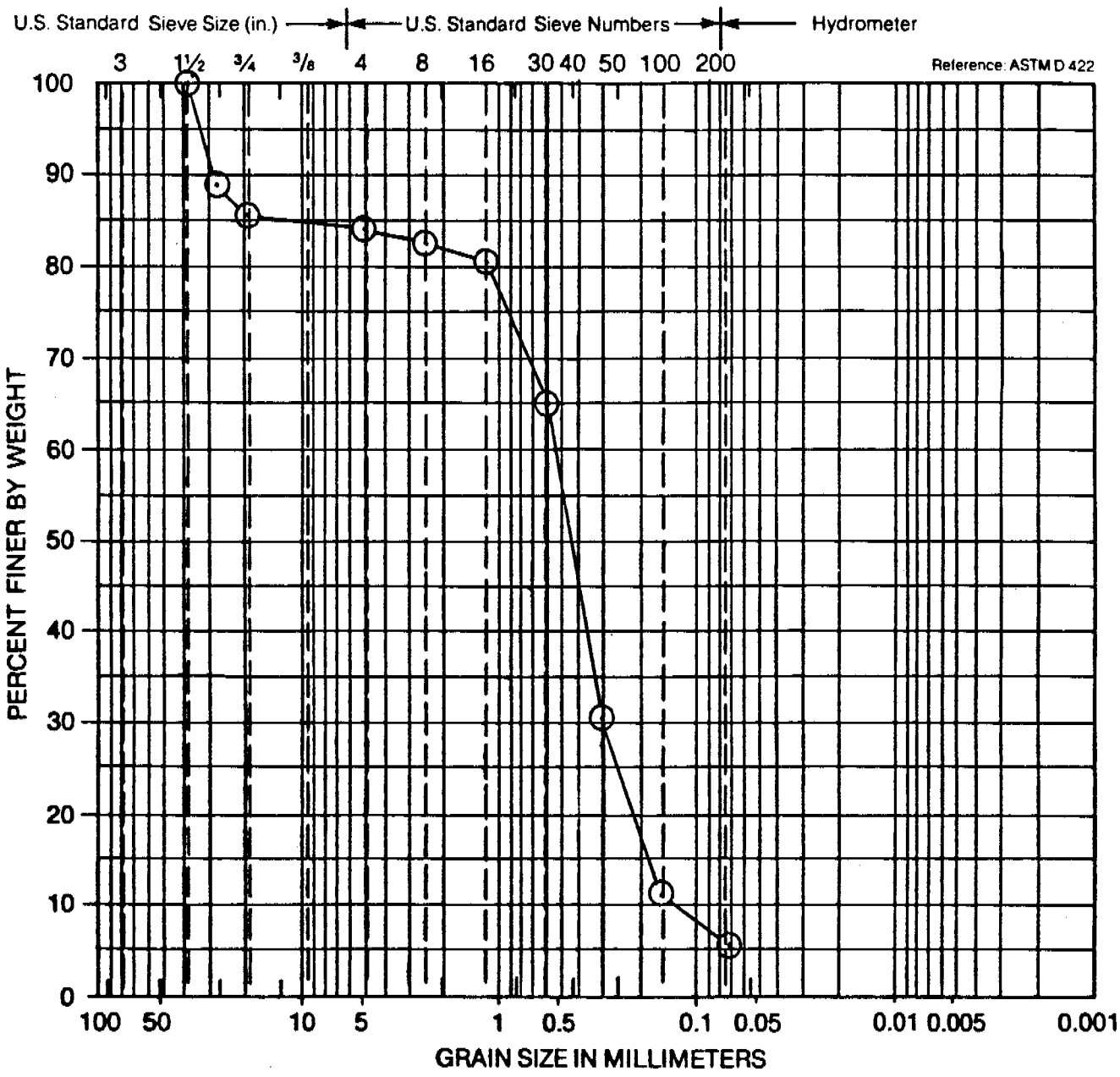
PLATE
7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		



Symbol	Sample Source	Classification
⊙	TP-9 @ 2.0' to 3.0'	BROWN POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)

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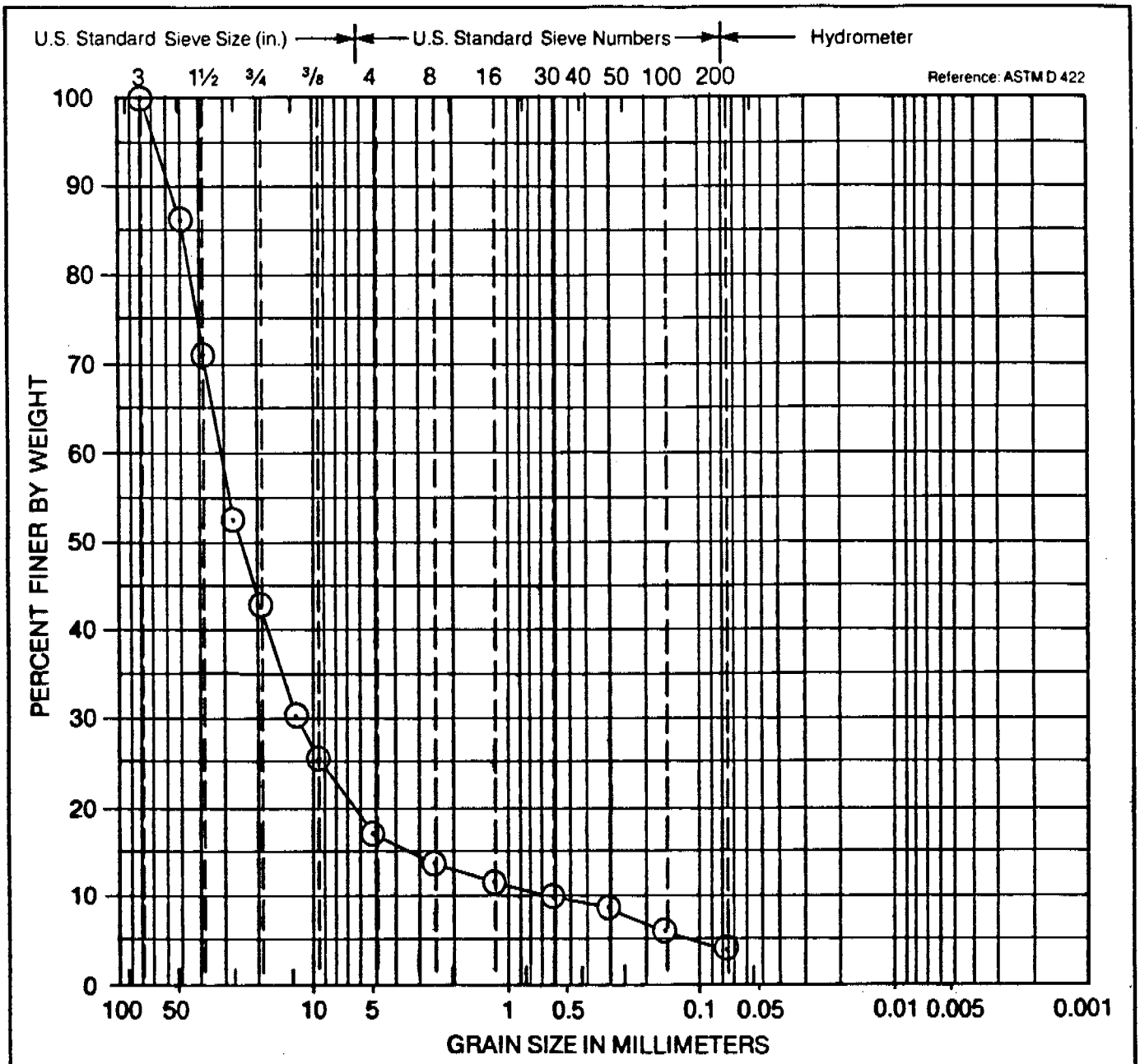
PLATE
8

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Sample Source	Classification
⊙	TP-10 @ 1.0' to 2.0'	GRAY-BROWN POORLY GRADED GRAVEL (GP)

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Particle Size Analysis
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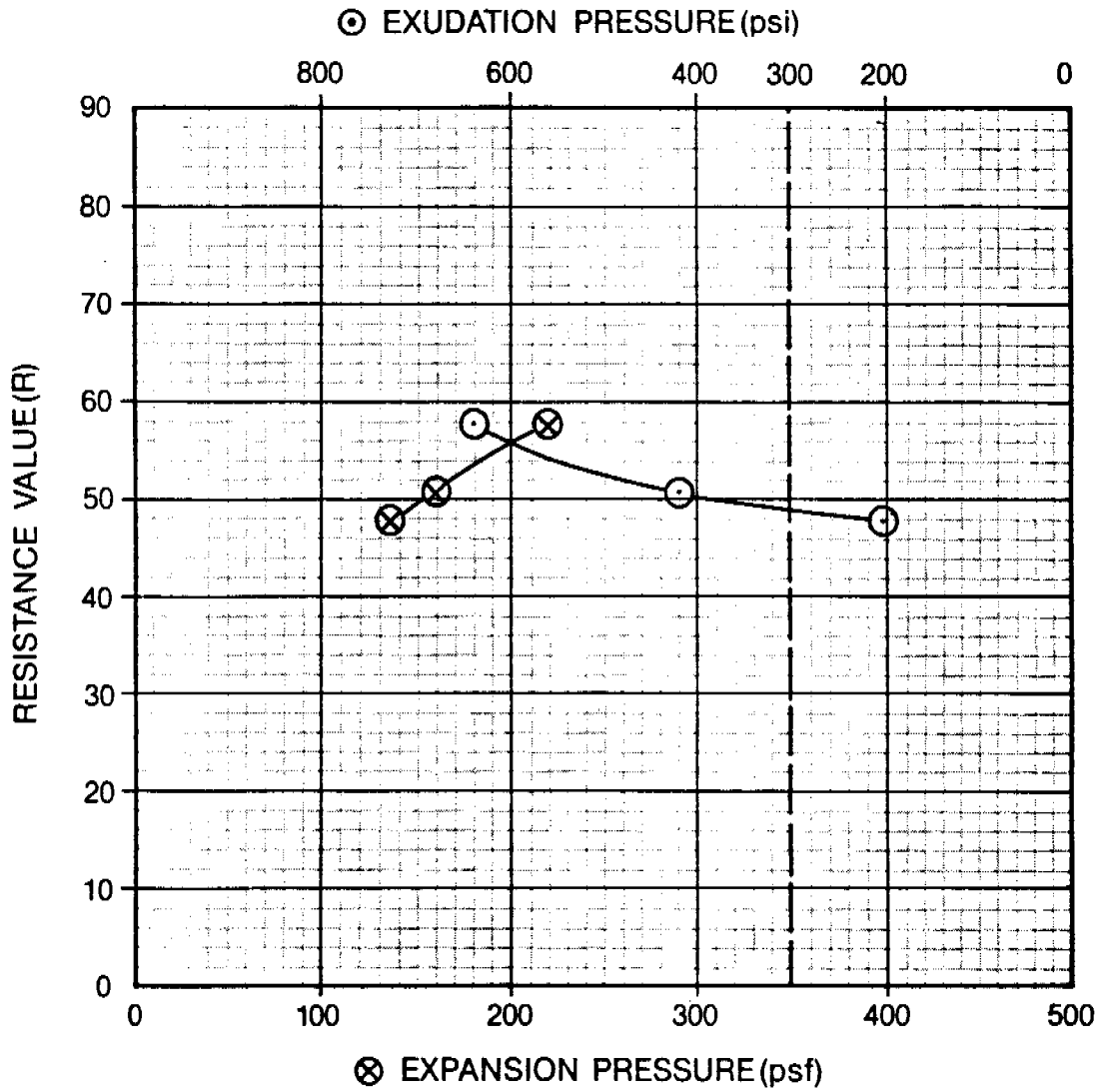
PLATE
9

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		

Reference State of California 301, ASTM D 2844



Specimen No.	1	2	3	
Water Content (%)	31.2	32.5	34.7	
Dry Density (pcf)	68.4	68.1	67.5	
Exudation Pressure (psi)	640	420	205	
Expansion Pressure (psf)	220	160	135	
Resistance Value (R)	58	51	48	

Sample Source	Classification	Sand Equivalent	Expansion Pressure	R value
TP-1 @ 1.5'	BROWN POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM)	--	145	49

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Resistance Value Test Data
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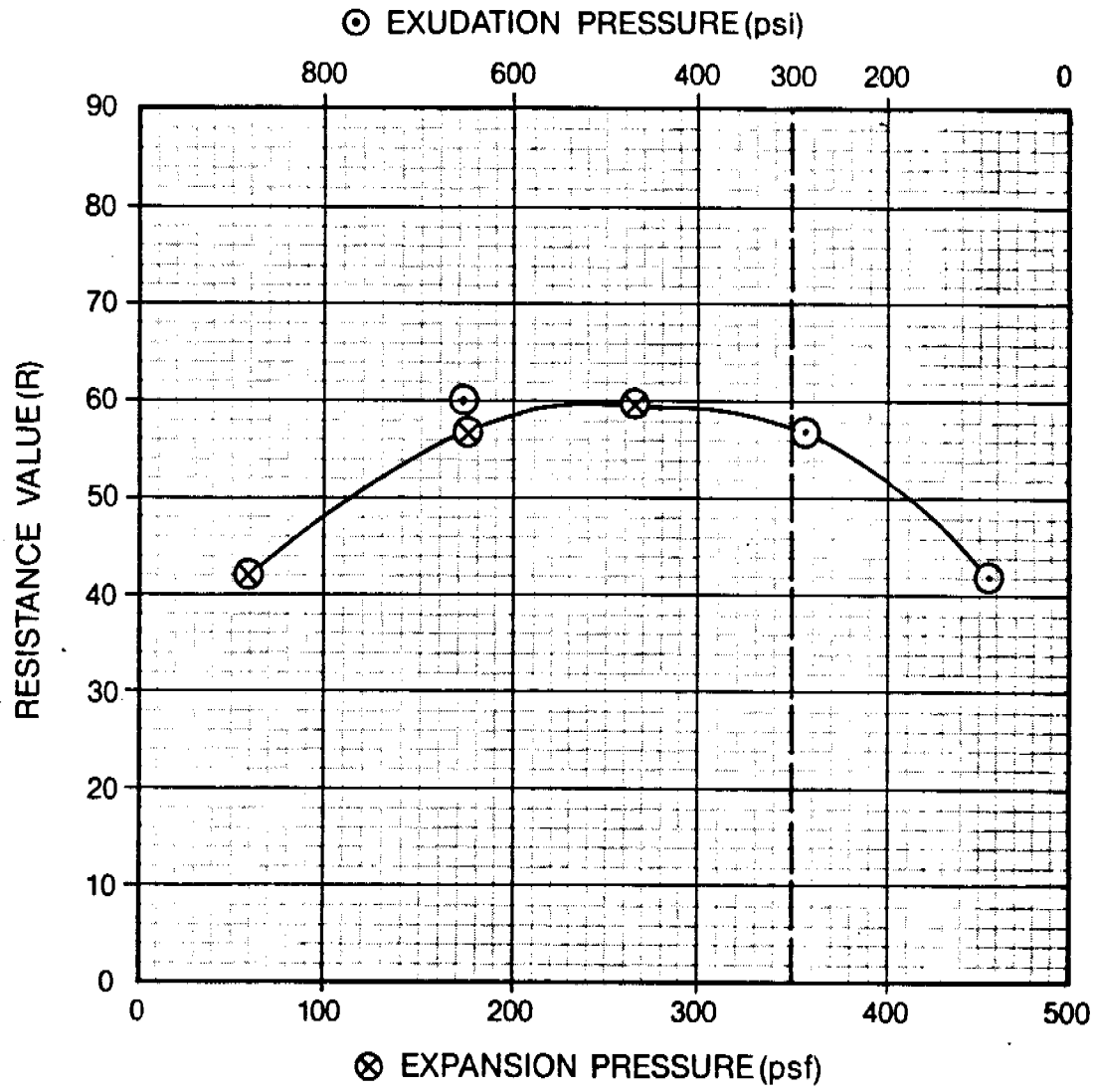
PLATE **10**

DRAWN	JCE NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		

Reference: State of California 301, ASTM D 2844



Specimen No.	1	2	3	
Water Content (%)	27.0	38.1	44.4	
Dry Density (pcf)	77.8	73.7	66.8	
Exudation Pressure (psi)	655	290	90	
Expansion Pressure (psf)	265	175	60	
Resistance Value (R)	60	57	42	

Sample Source	Classification	Sand Equivalent	Expansion Pressure	R value
TP-3 @ 0.0' to 2.0'	BROWN SILTY GRAVEL WITH SAND (GM)	--	175	57

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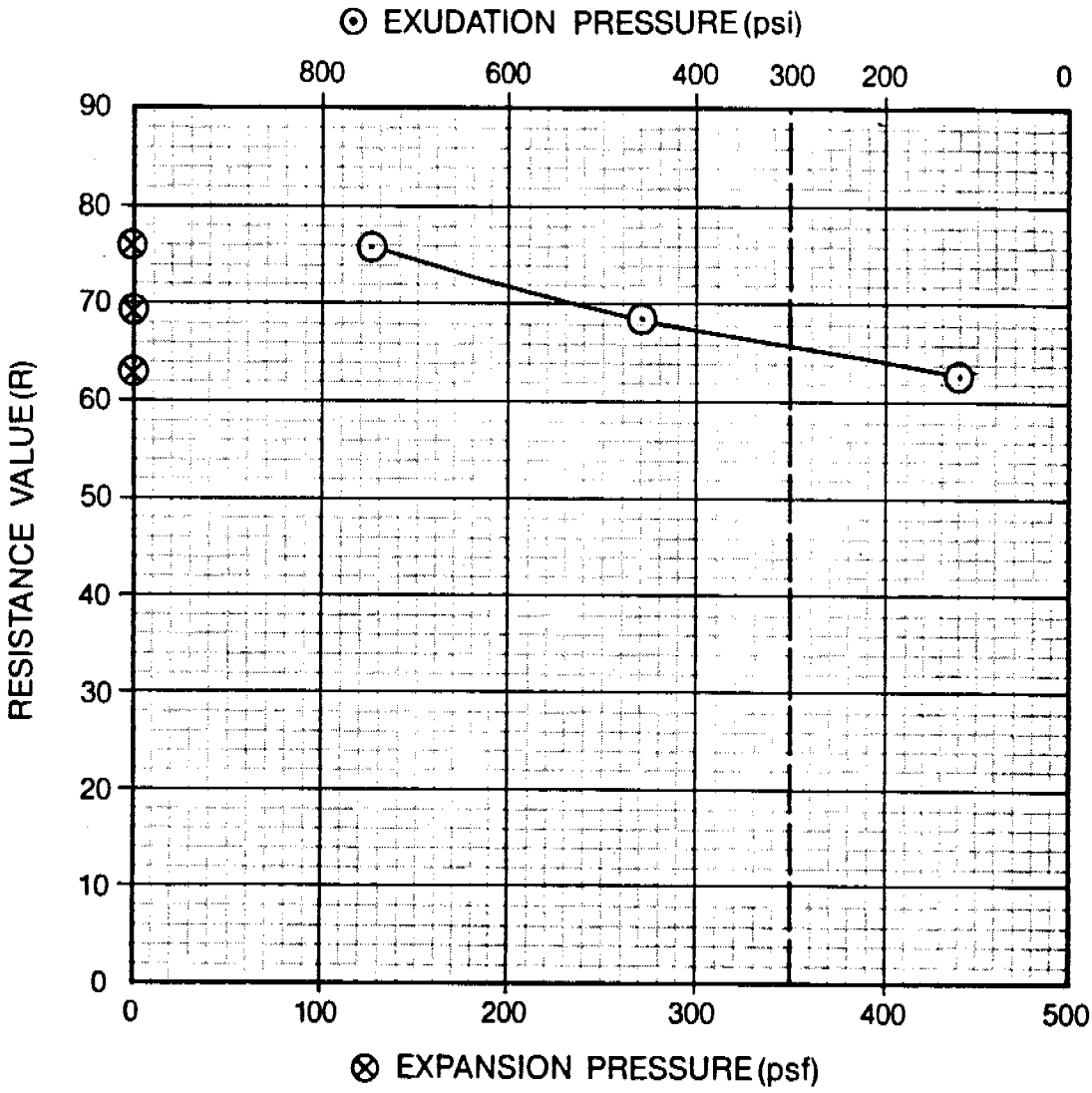
PLATE **11**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		

Reference: State of California 301, ASTM D 2844



Specimen No.	1	2	3	
Water Content (%)	11.1	12.0	12.9	
Dry Density (pcf)	103.7	103.0	102.4	
Exudation Pressure (psi)	750	460	120	
Expansion Pressure (psf)	0	0	0	
Resistance Value (R)	76	69	63	

Sample Source	Classification	Sand Equivalent	Expansion Pressure	R value
TP-4 @ 2.0' to 3.0'	BROWN POORLY GRADED SAND WITH SILT (SP-SM)	--	0	66

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Resistance Value Test Data
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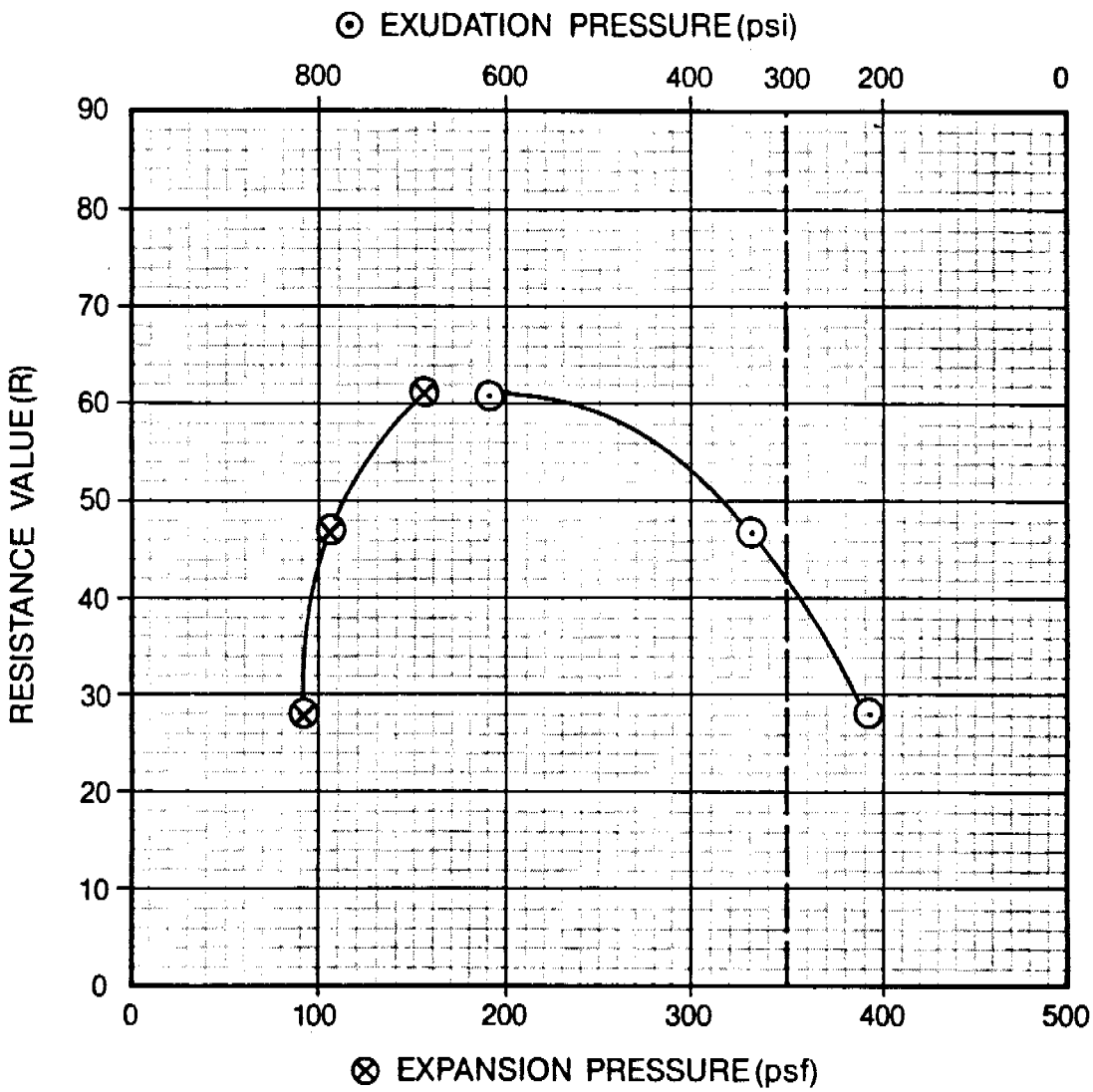
PLATE **12**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		

Reference: State of California 301, ASTM D 2844



Specimen No.	1	2	3	
Water Content (%)	79.6	90.6	106.2	
Dry Density (pcf)	28.8	26.8	25.2	
Exudation Pressure (psi)	620	340	215	
Expansion Pressure (psf)	155	105	90	
Resistance Value (R)	61	47	28	

Sample Source	Classification	Sand Equivalent	Expansion Pressure	R value
TP-8 @ 0.0' to 2.0'	DARK BROWN WELL GRADED BARK	--	95	41

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Resistance Value Test Data
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PLATE **13**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RLH	12183.2		3-1-94		