Foundation

Washington State Department of Transportation
Sid Morrison
Secretary of Transportation

Materials Laboratory
P.O. Box 167
Olympia, WA 98507-0167

October 17, 1995

Mr. M. Myint Lwin, P.E.
Bridge and Structures Engineer
Bridge and Structures Office
4500 3rd Avenue SE
Lacey, WA 98503-7340
MS: 47340

Re: SR-5, CS 1727, OL 1863
Pierce County Line to Tukwila Stage 3-HOV
Bridges 5/506W, 5/507W, 5/508W, 5/509W,
and 5/510W
Foundation Recommendations Report

Dear Mr. Lwin:

This letter presents the geotechnical recommendations for design and construction of five proposed bridge widenings from Military Road to S. 320th Street along SR-5, in the vicinity of Federal Way, WA. The west side will be widened for a 3.0 m wide shoulder and the eastern side will be widened for a 3.6 m wide HOV lane and a 3.0 m wide shoulder. The bridges are three span structures, with span lengths ranging from 14.9 to 24.8 m for the exterior spans and 15.0 to 24.3 m for the middle span.

The analyses, conclusions, and recommendations contained in this report are based on the project description and site conditions that existed at the time of the field explorations. We assume the exploratory borings represent the subsurface conditions throughout the project area. If subsurface conditions encountered during construction are different from those found by the explorations, either beneath or beyond the excavations, please advise us so that we can assist you and reevaluate our recommendations.

Regional Geology and Seismicity

This site is located in the geologic region of the Puget Sound Lowlands, a broad low-lying region of low relief between the Olympic Mountains on the west and the Cascade foothills on the east. The surface of the Puget Sound lowland has low elevation and is gently rolling with a relief of 30 to 60 m. The elevation in the region increases slightly from the northwest to southeast, and the topography exhibits distinctive parallel ridges,

depressions, and low, rounded hills that are elongated in the southeast direction, reflecting the direction of the last ice advance. Prior to the advance of the last glaciation, this area had been receiving large quantities of continental sediments of clay, silt, sand, and gravel. After this deposition a period of erosion followed removing some or all of the material. The erosional period was due to lowering of sea level during the advance of the Vashon glaciation. The continental glaciation subsequently buried the sediments under several kilometers of ice resulting in overconsolidation of the remaining material. Upon the recession of the glacial ice, some of the glacial debris as well as more of the preglacial sediments were removed.

The regional seismicity is characterized by both shallow and deep focus earthquakes. The shallow earthquakes (less than 35 km in depth) occur within the North American plate and are believed to be due to north-south compression. The deep focus earthquakes (greater than 40 km in depth) are associated with crustal movement of the subducting Juan de Fuca plate beneath western Washington. In general, the deeper subcrustal seismic events have greater magnitude and less frequency than the shallower events.

Field Investigation and Laboratory Testing

Field investigations for this project were carried out from October 27, 1994 to January 18, 1995. Supplemental investigations were performed from October 6 to 8, 1995. Figures 1, 3, 5, 7 and 9 show the location of the twenty-one test holes for the five bridges. Standard Penetration Tests were performed, in general, at 1.5 m intervals in each test hole. Disturbed soil samples from the standard penetrometer were visually identified in the field and then sent to the Materials Laboratory for more detailed classification testing. Piezometers were installed at interior pier test holes and they were monitored from February to July, 1995.

Selected samples from the test borings were classified in the Materials Laboratory using the Unified Soil Classification System. Visual Classification included density, consistency, color, water content, major soil types, and modifying fractions of the soil samples. Grain size analyses and moisture content tests were performed in accordance with AASHTO T-88 and ASTM-D2216 procedures, respectively. Determination of Atterberg limits for fine grained samples were performed according to AASHTO T-88 and T-90.

The testhole logs of the field investigations are provided in Appendix B. The results of the laboratory tests are provided in Appendix C.

Subsurface Conditions

Figures 2, 4, 6, 8, and 10 show the interpreted subsurface profile for the Bridges 5/506W, 5/507W, 5/508W, 5/509W, and 5/510W, respectively. Characteristic soil strata are listed below in their order of occurrence:

Bridge 5/506W (Military Road Overcrossing-1)

- Unit 1: Loose to medium dense silty SAND. The thickness of this layer ranged from 2.9 m to 7 m. (Fill)

- Unit 2: Dense silty SAND with gravel, dense silty GRAVEL with sand, and hard sandy SILT with gravel.

Ground water encountered at Testhole H-22 fluctuated between elevations 121.9 (on 2/23/95) and 121.0 m (on 7/31/95) which are about 3.4 to 4.3 m, respectively below grade at Military Road.

Bridge 5/507W (S. 288th Street Overcrossing)

- Unit 1: Loose to medium dense silty SAND with gravel. (Fill)

- Unit 2: Very dense GRAVEL with silt and sand and dense to very dense poorly graded SAND with silt and gravel.

Ground water encountered at Testhole H-25 fluctuated between elevations 104.0 (on 5/24/95) and 101.5 m (on 2/3/95) which are about 12.9 and 15.4 m, respectively below grade at S. 288th Street.

Bridge 5/508W (Military Road Overcrossing-2)

- Unit 1: Loose to medium dense silty SAND with gravel, cobbles and clay. (Fill) Cobbles and boulders were encountered at ground surface.

- Unit 2: Loose to very dense silty SAND with gravel.

- Unit 3: Very dense well graded SAND with silt and gravel, and dense to very dense well graded GRAVEL with silt and cobbles.

Ground water encountered at Testhole H-28 fluctuated between elevations 104.6 (on 2/3/95) and 100.7 m (on 7/31/95) which are 5.6 and 9.4 m, respectively below grade at Military Road.

Bridge 5/509W (S. 272nd Street Overcrossing)

- Unit 1: Loose to dense silty SAND and loose to dense well graded GRAVEL with sand. (Fill)

- Unit 2: Very dense silty SAND, or very dense silty GRAVEL.

Ground water encountered at Testhole H-31 fluctuated between elevations 112.6 (on 2/13/95) and 112.3 m (on 7/31/95) which are 3.6 and 3.7 m, respectively below grade at S. 272nd Street. Perched water encountered at Testhole H-30 during drilling was at Elevation 117.1 m.

Bridge 5/510W (S. 260th Street Overcrossing)

- Unit 1: Loose to medium dense silty SAND with gravel. (Fill)
- Unit 2: Medium dense to very dense silty SAND with gravel, medium dense to dense sandy SILT with gravel, and very dense silty GRAVEL with sand and cobbles.

Ground water encountered at Testhole H34 fluctuated between elevations 97.1 (on 2/23/95) and 96.2 m (on 7/31/95) which are 2.0 and 2.9 m, respectively below grade at S. 260th Street.

Foundation Recommendations

The subsurface material for most of the bridge sites could support medium capacity to high capacity spread footings. The Project Engineer's Office expressed concern over the possibility of underground utilities interfering with spread footing excavation and wished to have minimal lane closure. Therefore, they have requested our office to provide a drilled shaft option for piers where this foundation is feasible.

Recent cost over-runs and difficulties encountered during drilled shaft construction have resulted in a directive from the OSC Construction Office and Bridge and Structures Office to avoid usage of drilled shafts unless no other foundation option is available. We have, however, included shaft options for piers where they are considered geotechnically feasible and constructable.

Allowable bearing capacities for spread footings have been determined using a minimum safety factor of 3. Allowable compressive capacities for piles and shafts have been determined using a minimum safety factor of 2.5. Ultimate uplift capacities are considered "safe" values for resisting seismic loads (e.g. AASHTO Group VII).

Bridge 5/506W(Military Road Overcrossing-1)

Low to medium capacity spread footings are only feasible for Pier 4 of this bridge. For other piers, deep excavation would be required to found spread footings below the loose Unit 1 coarse grained materials. Drilled shafts are feasible for Piers 1, 2 and 3. Pile supported footings are also feasible for Piers 1, 2, and 3. Table 1 provides a summary of our recommendation for spread footings. The allowable bearing capacity provided in the table is based on an estimated total settlement of less than 25 mm. The differential settlement between the piers is estimated to be less than 15 mm. Post construction settlement will be negligible.

Table 1 Spread Footing Recommendations Summary

BRIDGE AND PIER NO.	ALLOWABLE BEARING CAPACITY kPa	REQUIRED FOOTING ELEVATION m	SHEAR MODULUS G (AT 0.2% STRAIN) MPa	SHEAR MODULUS G (AT 0.02% STRAIN) MPa	POISSON'S RATIO μ
506W-Pier 4	250	below 130.0	30	95	0.3

Pile Foundations

Pile supported footings are feasible for supporting Piers 1, 2, and 3. We recommend that Standard 70 ton or 100 ton piles be used to support this bridge. The minimum diameter of the Standard 70 ton or 100 ton cast-in-place piles are 406 mm and 457 mm, respectively. Table 2 provides a summary of pile tip elevations for the piers. The soil parameters needed to perform the lateral analyses are provided in Appendix D.

Table 2 Pile Foundation Recommendations

	Standard 70 ton				100 ton			
BRIDGE AND PIER NO.	ESTIMATED TIP ELEVATION m	MINIMUM TIP ELEVATION m	LOAD (kN) ALLOW COMP.	LOAD (kN) ULT. UPLIFT	ESTIMATED TIP ELEVATION m	MINIMUM TIP ELEVATION m	LOAD (kN) ALLOW COMP.	LOAD (kN) ULT. UPLIFT
506W-Pier 1	122.3	125.0	620	300	122.3	125.0	880	400
506W-Pier 2	117.5	Not applicable	620	300	117.5	Not applicable	880	400
506W-Pier 3	117.5	Not applicable	620	300	117.5	Not applicable	880	400

Drilled Shafts

We are providing charts depicting Shaft Capacities versus Tip Elevations for shaft diameters ranging from 1.2 m to 1.8 m. These charts are provided in Figures A1 and A2. The soil parameters needed to perform the lateral analyses are provided in Appendix D.

Bridge 5/507W(S. 288th Street Overcrossing)

Medium capacity spread footings are feasible foundations for this bridge. Table 3 provides a summary of our recommendations for the bridge piers. The allowable bearing capacity provided in the table are based on an estimated total settlement of less than 25 mm. The differential settlement between the piers is estimated to be less than 15 mm. This settlement is expected to occur during construction with negligible post-construction settlement. Drilled shafts are feasible for Piers 2 and 3.

Table 3 Spread Footing Recommendations Summary

BRIDGE AND PIER NO.	ALLOWABLE BEARING CAPACITY kPa	REQUIRED FOOTING ELEVATION m	SHEAR MODULUS G (AT 0.2% STRAIN) Map	SHEAR MODULUS G (AT 0.02% STRAIN) MPa	POISSON'S RATIO μ
507W-Pier 1	500	below 122.8	35	100	0.3
507W-Pier 2	400	below 118.4	35	100	0.3
507W-Pier 3	400	below 118.4	35	100	0.3
507W-Pier 4	500	below 121.1	35	100	0.3

Drilled Shafts

We are providing charts depicting Shaft Capacities versus Tip Elevations for shaft diameters ranging from 1.2 m to 1.8 m for Piers 2 and 3. These charts are provided in Figure A3. The soil parameters needed to perform the lateral analyses are provided in Appendix D.

Bridge 5/508W (Military Road Overcrossing-2)

Low capacity spread footings are feasible only for Piers 1 and 4 of this bridge. Drilled shafts or piles are therefore recommended for all the interior piers. Pile supported footings are feasible for the end piers as well. Table 4 provides a summary of our recommendations for Piers 1 and 4. The allowable bearing capacities provided in the table could result in an estimated total settlement of less than 35 mm. In order to reduce settlement to within 25 mm, 1.0 m of the subsurface material below the spread footing should be overexcavated and recompacted to Method C compaction described

in the Standard Specifications. This settlement is expected to occur during construction with negligible post-construction settlement. Drilled shafts are feasible for Piers 2 and 3.

Table 4 Spread Footing Recommendations Summary

BRIDGE AND PIER NO.	ALLOWABLE BEARING CAPACITY kPa	REQUIRED FOOTING ELEVATION m	SHEAR MODULUS G (AT 0.2% STRAIN) MPa	SHEAR MODULUS G (AT 0.02% STRAIN) MPa	POISSON'S RATIO μ
508W-Pier 1	200	below 114.5*	35	100	0.3
508W-Pier 4	200	below 114.0*	35	100	0.3

*with 1.0 m of overexcavation and recompaction to Method C requirements.

Pile Foundations

Pile supported footings are feasible for all piers. We recommend that Standard 70 ton or 100 ton piles be used to support this bridge. The minimum diameter of the Standard 70 ton or 100 ton cast-in-place piles are 406 mm and 457 mm, respectively. Table 5 provides a summary of pile tip elevations for the piers. The soil parameters needed to perform the lateral analyses are provided in Appendix D.

Table 5 Pile Foundation Recommendations

	Standard 70 ton				100 ton			
	ESTIMATED	MINIMUM	LOAD (kN)		ESTIMATED	MINIMUM	LOAD (kN)	
BRIDGE AND PIER NO.	TIP ELEVATION m	TIP ELEVATION m	ALLOW COMP.	ULT. UPLIFT	TIP ELEVATION m	TIP ELEVATION m	ALLOW COMP.	ULT. UPLIFT
508W-Pier 1	97.0	105.0	620	300	97.0	105.0	880	400
508W-Pier 2	97.0	105.0	620	300	97.0	105.0	880	400
508W-Pier 3	97.0	105.0	620	300	97.0	105.0	880	400
508W-Pier 4	97.0	105.0	620	300	97.0	105.0	880	400

Drilled Shafts

We are providing charts depicting Shaft Capacities versus Tip Elevations for shaft diameters ranging from 1.2 m to 1.8 m for Piers 2 and 3. These charts are provided in Figure A4. The soil parameters needed to perform the lateral analyses are provided in Appendix D.

Bridge 5/509W(S. 272nd Street Overcrossing)

Medium capacity spread footings are feasible foundations for this bridge. Table 6 provides a summary of our recommendations for the bridge piers. The allowable bearing capacity provided in the table are based on an estimated total settlement of less than 25 mm. The differential settlement between the piers is estimated to be less than 15 mm. This settlement is expected to occur during construction with negligible post-construction settlement. Drilled shafts are feasible for Piers 2 and 3.

Table 6 Spread Footing Recommendations Summary

BRIDGE AND PIER NO.	ALLOWABLE BEARING CAPACITY kPa	REQUIRED FOOTING ELEVATION m	SHEAR MODULUS G (AT 0.2% STRAIN) MPa	SHEAR MODULUS G (AT 0.02% STRAIN) MPa	POISSON'S RATIO μ
509W-Pier 1	300	below 117.1	35	100	0.3
509W-Pier 2	500	below 115.0	35	100	0.3
509W-Pier 3	500	below 115.0	35	100	0.3
509W-Pier 4	300	below 117.1	35	100	0.3

Drilled Shafts

We are providing charts depicting Shaft Capacities versus Tip Elevations for shaft diameters ranging from 1.2 m to 1.8 m for Piers 2 and 3. These charts are provided in Figure A5. The soil parameters needed to perform the lateral analyses are provided in Appendix D.

Bridge 5/510W (S. 260th Street Overcrossing)

Medium capacity spread footings are feasible foundations for Piers 2, 3, and 4 of this bridge. The allowable bearing capacity provided in the table are based on an estimated total settlement of less than 25 mm. The differential settlement between the piers is

estimated to be less than 15 mm. This settlement is expected to occur during construction with negligible post-construction settlement.

Deep excavation will be required to found the footing of Pier 1 below the loose granular subsurface materials. However, a low capacity spread footing is feasible for Pier 1 with estimated settlement less than 35 mm. In order to reduce settlement to within 25 mm, 1.0 m of the subsurface material below the spread footing should be overexcavated and recompacted to Method C compaction described in the Standard Specifications. This settlement is expected to occur during construction with negligible post-construction settlement. Table 7 provides a summary of our spread footing recommendations for the bridge piers. Drilled shafts are feasible for Piers 2 and 3.

Table 7 Spread Footing Recommendations Summary

BRIDGE AND PIER NO.	ALLOWABLE BEARING CAPACITY kPa	REQUIRED FOOTING ELEVATION m	SHEAR MODULUS G (AT 0.2% STRAIN) MPa	SHEAR MODULUS G (AT 0.02% STRAIN) MPa	POISSON'S RATIO μ
510W-Pier 1	240	below 100.0*	32	94	0.3
510W-Pier 2	400	below 98.1	32	94	0.3
510W-Pier 3	400	below 98.1	32	94	0.3
510W-Pier 4	500	below 102.1	35	100	0.3

*with 1.0 m of overexcavation and recompaction to Method C requirements.

Drilled Shafts

We are providing charts depicting Shaft Capacities versus Tip Elevations for shaft diameters ranging from 1.2 m to 1.8 m for Piers 2 and 3. These charts are provided in Figure A6. The soil parameters needed to perform the lateral analyses are provided in Appendix D.

Approach Embankments

The approach embankments for all bridges except for Bridge 5/510W will have additional fills ranging from 0.5 to 2.5 m in height. The approach to Bridge 5/510W will be in cut section. The existing slopes of the approach embankments are 2H:1V. The proposed slopes of the approach embankments are made to match the existing

slopes. The maximum permissible slope is 1 3/4 H: 1V. The settlement due to the additional fill is estimated to be less than 25 mm. Post construction settlement will be negligible.

Approach Slab

The Design Manual Section 1120.03(6) requires all bridges to have approach slabs unless approval for their deletion has been given. Final approval for deletion is to be made by the Olympia Service Center Project Development Office. Approval for the deletion of the approach slab requires the recommendation of the Olympia Service Center Materials Laboratory. We typically recommend deleting the approach slab if any of the following geotechnical considerations are met:

1. If settlements are excessive (greater than 150 mm)
2. If creep settlement will not occur
3. If fill heights are low (not exceeding 3 m)
4. If more than 50 mm of differential settlement could occur between the centerline and shoulder

Other issues such as design speed and average daily traffic (ADT) may supersede our recommendation for deletion. Based on the criteria above, we recommend the deletion of approach slabs for all the bridges. However, approach slabs for the bridges should probably be included for existing structures constructed with approach slabs.

General Seismic Considerations

The recommended acceleration according to the Bridge Design Manual is 0.27 times the gravitational acceleration. The recommended acceleration is based on expected ground acceleration that has a 90 percent probability of nonexceedence in a 50 year period. In determining elastic reponse spectrum for this site, the soil profile can be classified as Type II.

The subsurface materials for all the bridges except for Bridge 5/508W is not susceptible to liquefaction due to their dense nature. The soils at Bridge 5/508W are potentially liquefiable if they are saturated at the time of a seismic event. However, our monitoring of the groundwater level at this site indicate that these soils would be saturated for only a small percentage of the time, if at all. Therefore, we conclude that the risks of liquefaction at this site will be low.

The soil properties required for the determination of the footing stiffness are provided in their respective spread footing summary tables. The soil properties for performing the lateral loading analysis are provided in Appendix D.

General Construction Considerations

Some construction considerations that will require attention during design and construction of this project are as follows:

1. Side slope of temporary excavation for the end piers may be assumed to be 1H:1V for estimating purposes. It should be noted the Contractor is responsible for safety of all excavations during construction. The existing bridges are supported by spread footings.

2. If drilled shafts are selected for support of the piers, excavation below the groundwater table will be required at some locations. There is potential for caving in the coarse grained UNIT 1 soils at Bridges 506, 508 and 509. Positive sidewall support such as temporary casing or drilling slurries will be required. If slurries are used, a positive head above the groundwater elevation must be maintained at all times during shaft excavation.

   The coarse grained nature of the existing fills and the recessional outwash deposits at Bridge 508 may not allow the use of slurries in lieu of casing for sidewall support. Our shaft design capacities assume a concrete to soil adhesion. Therefore, shaft casing, if used during shaft construction, must be removed during tremie placement of concrete.

3. Cobbles and boulders were encountered during subsurface exploration for Bridge 5/508W. This may result in difficult excavation for drilled shafts or hard driving conditions for piling.

4. The Unit 2 materials at Bridge 506 are very dense. Piling, if used, is expected to encounter difficulty penetrating into this stratum. The contractor should take precautions to prevent the piles from being damaged due to overdriving.

5. We recommend a "*Summary of Geotechnical Conditions*" be prepared for inclusion in the Special Provisions for this Project. Please contact the Geotechnical Branch for preparation of this Summary after the foundation types have been finalized.

Closure

Please note that section 1-02.4 of the Standard Specifications allows potential bidders to inspect all factual data which includes the boring logs and the laboratory test results.

If you have any questions regarding the recommendations contained in this report, please contact Kok-Wah Tung at (360) 664-8470 or Bob Kimmerling at (360) 586-7659.

Sincerely,

Tony M. Allen

TONY M. ALLEN, P.E.
State Geotechnical Engineer

TMA:kwt
KWT
Enclosure

cc: B.B. Brecto, FHWA-MS 0943
A.E. Stiles, Northwest Region Materials Engineer, NB82-MS 29 (2 copies)
S. Everett, Northwest Region Project Engineer, NB82-MS 117
R. Matilla, Northwest Region Operations Engineer NB 82- MS 114
R. Shaefer, Bridge and Structures-MS-47340 (2 copies)
F. Higgins, Bridge and Structures-MS-47340 (2 copies)
Chris Cornell, ICF-Kaiser Engineers, 1191-2nd Avenue #1200, Seattle, WA.
J. Weigel, OSC - Construction MS-47354
C. Mansfield, OSC-Design MS-47329
R. Chassie, FHWA.

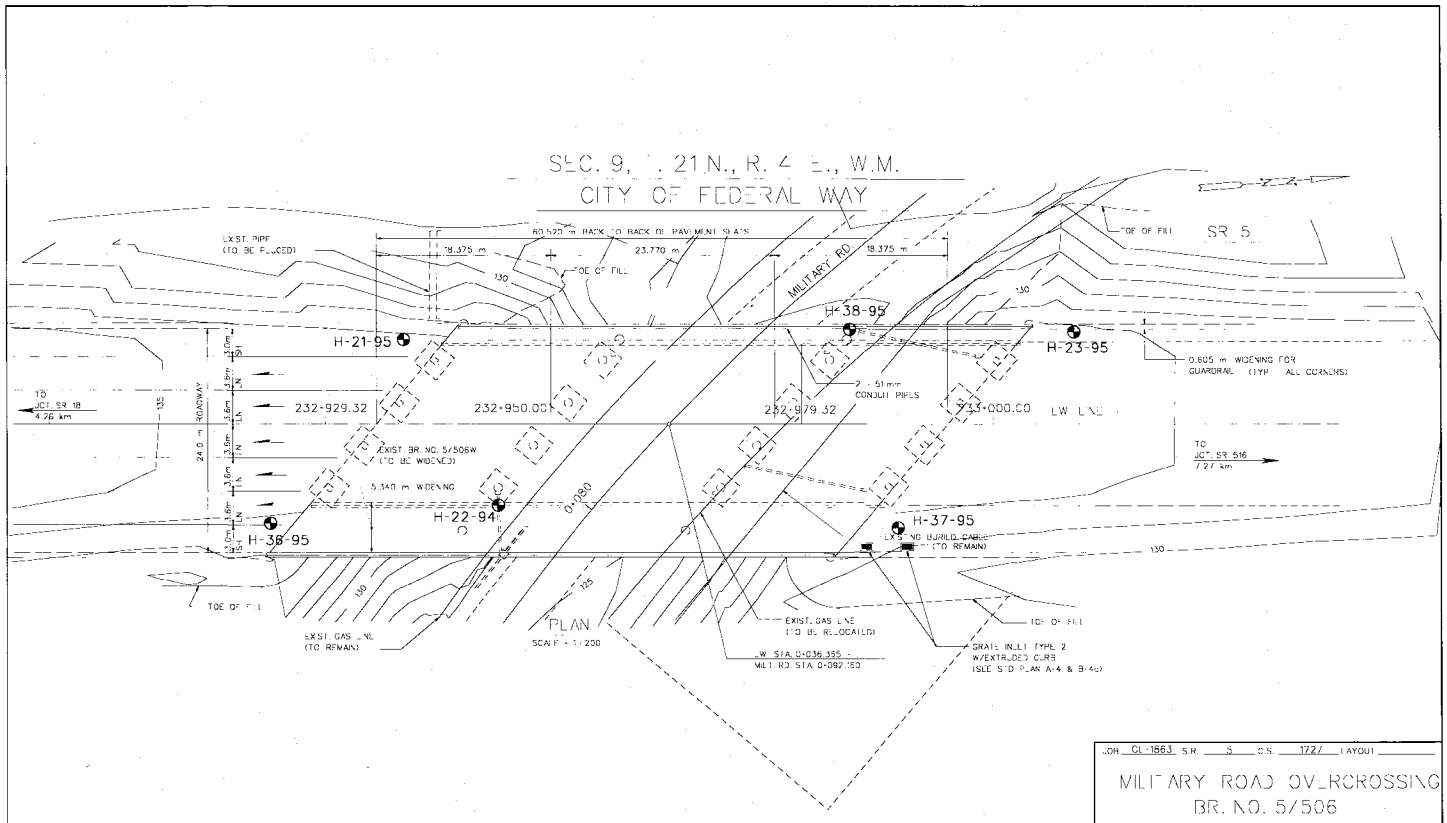

FIGURE 1: TEST HOLE PLAN

JOB CL-1863 S.R. 5 C.S. 1727 LAYOUT

MILITARY ROAD OVERCROSSING
BR. NO. 5/506

WASHINGTON STATE TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
O. C. JACKSON, MATERIALS ENGINEER

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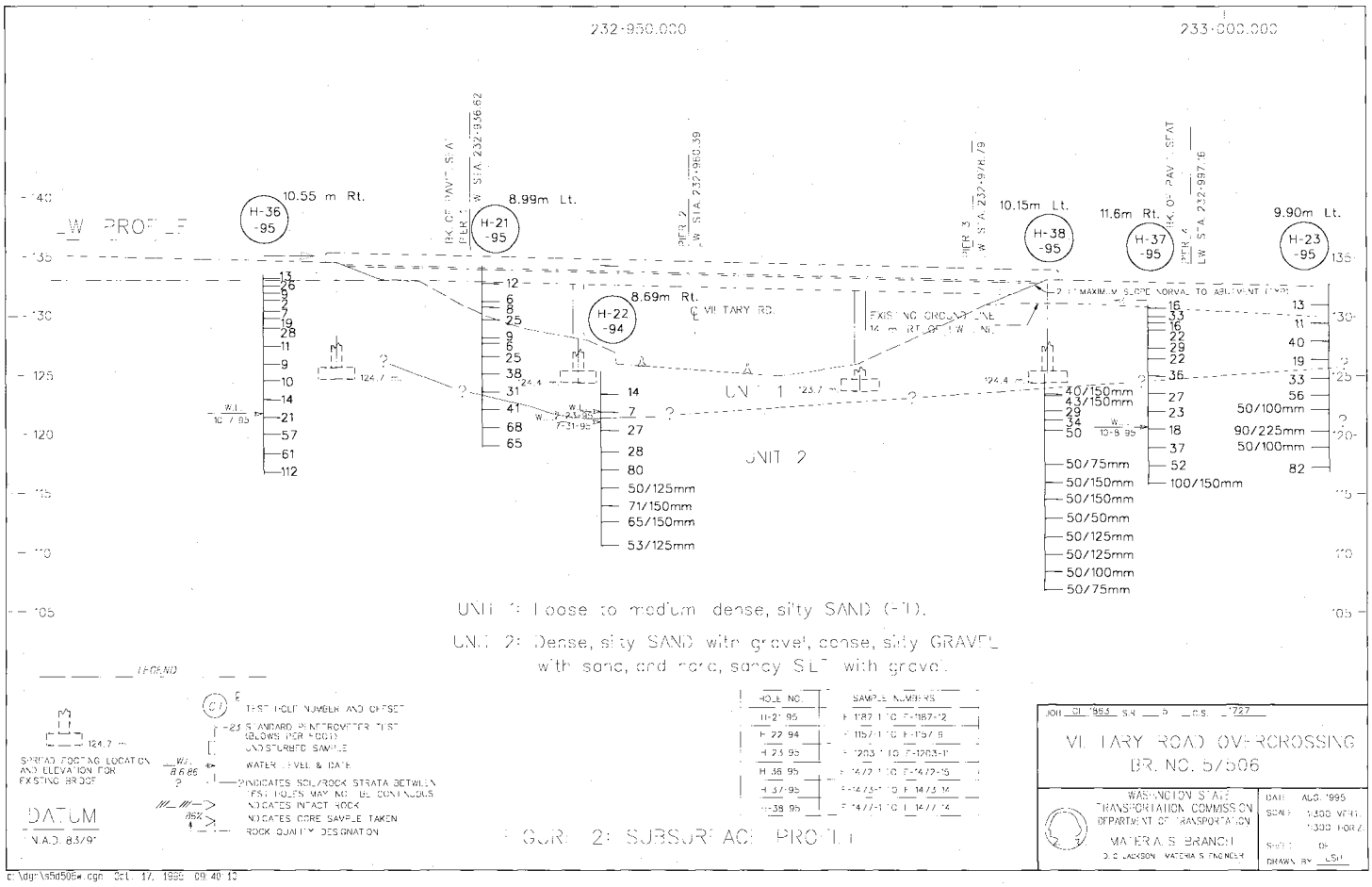

FIGURE 2: SUBSURFACE PROFILE

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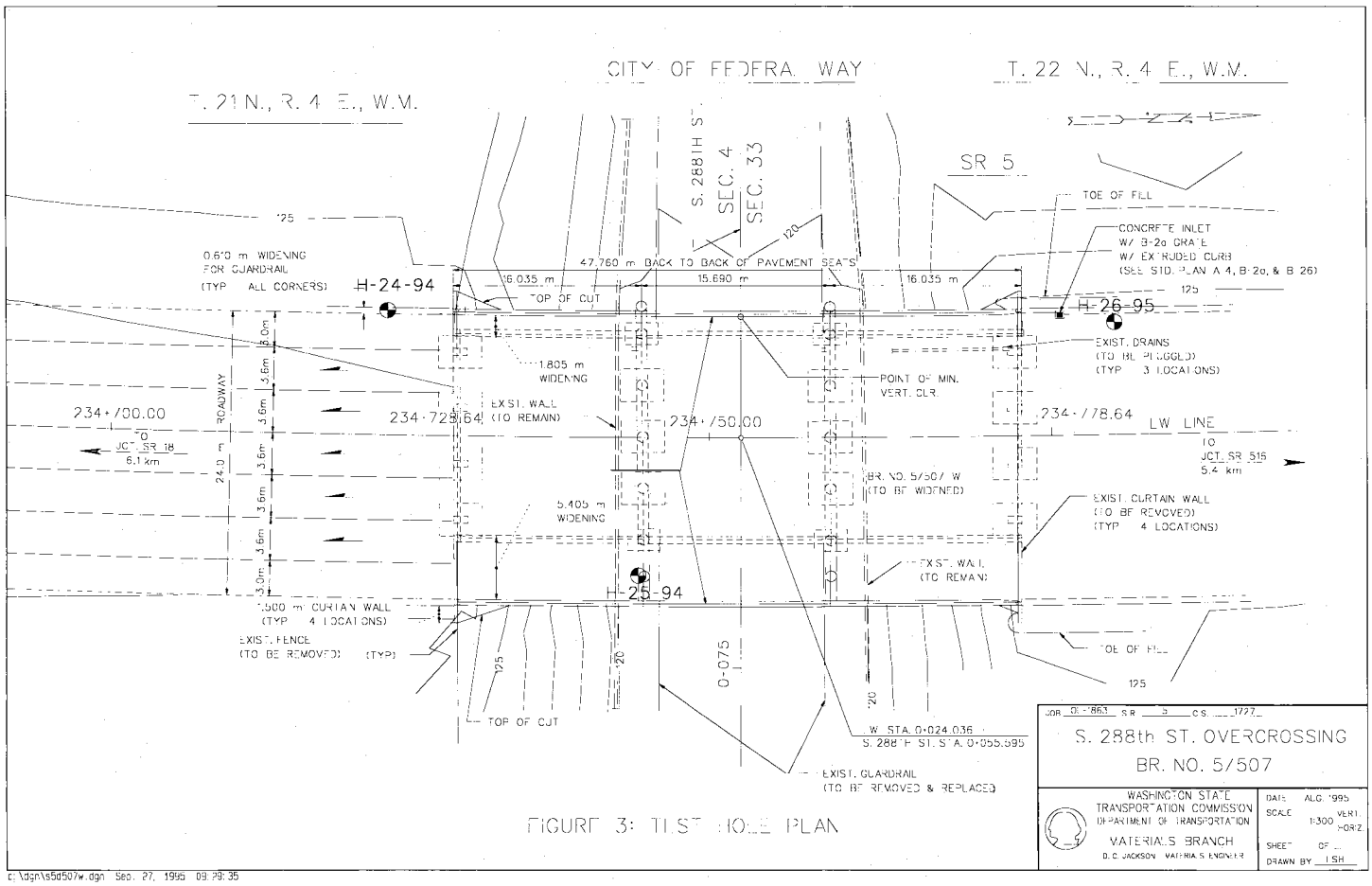

FIGURE 3: TEST HOLE PLAN

JOB 01-7863 S.R. 5 C.S. 1727

S. 288th ST. OVERCROSSING
BR. NO. 5/507

WASHINGTON STATE TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
D.C. JACKSON MATERIALS ENGINEER

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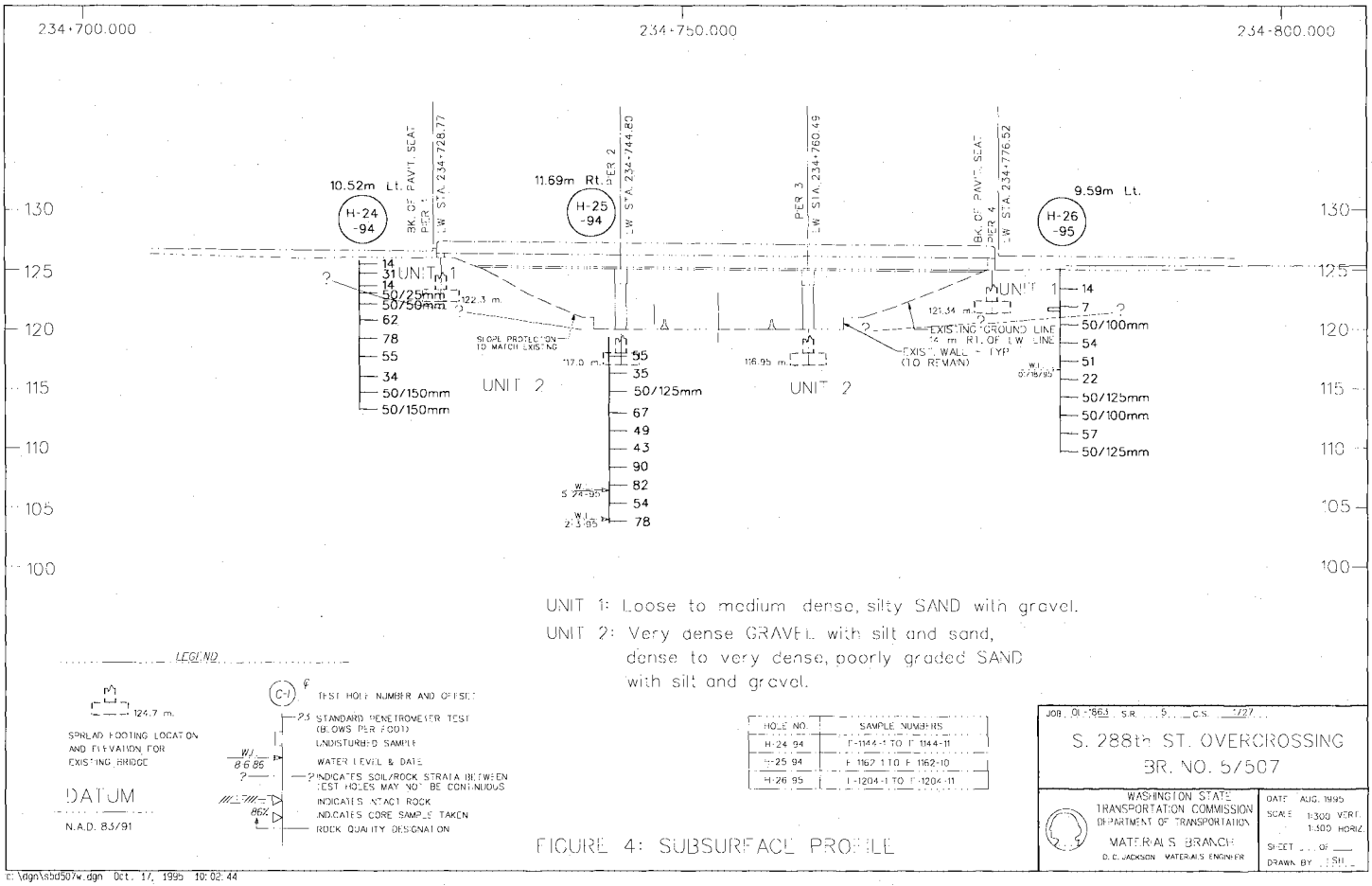

UNIT 1: Loose to medium dense, silty SAND with gravel.

UNIT 2: Very dense GRAVEL with silt and sand, dense to very dense, poorly graded SAND with silt and gravel.

LEGEND

124.7 m.
SPREAD FOOTING LOCATION AND ELEVATION FOR EXISTING BRIDGE

DATUM
N.A.D. 83/91

C-1 ℄ TEST HOLE NUMBER AND OFFSET

23 STANDARD PENETROMETER TEST (BLOWS PER FOOT)

UNDISTURBED SAMPLE

W.I. 8-6-85 WATER LEVEL & DATE

? INDICATES SOIL/ROCK STRATA (BETWEEN TEST HOLES MAY NOT BE CONTINUOUS

INDICATES CONTACT ROCK

462 INDICATES CORE SAMPLE TAKEN

ROCK QUALITY DESIGNATION

HOLE NO.	SAMPLE NUMBERS
H-24 94	F-1144-1 TO F-1144-11
H-25 94	F-1162-1 TO F-1162-10
H-26 95	F-1204-1 TO F-1204-11

FIGURE 4: SUBSURFACE PROFILE

JOB. 01-1863 S.R. 5 C.S. 727

S. 288th ST. OVERCROSSING
BR. NO. 5/507

WASHINGTON STATE TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
D. C. JACKSON MATERIALS ENGINEER

DATE AUG. 1995
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SEC. 33, T. 22 N., R. 4 E., W.M.

CITY OF FEDERAL WAY

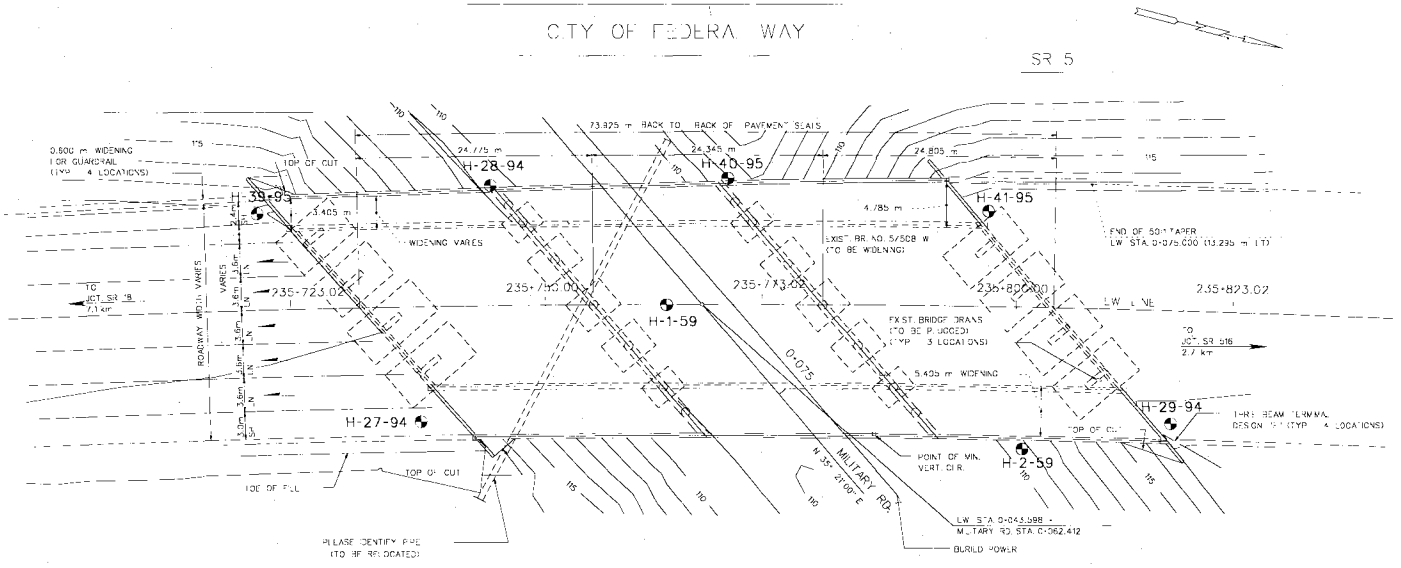

FIGURE 5: TEST HOLE PLAN

JOB OL-186.3 S.R. 5 C.S. 1727 LAYOUT

MILITARY ROAD OVERCROSSING
BR. NO. 5/508

WASHINGTON STATE
TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
D. C. JACKSON MATERIALS ENGINEER

DATE AUG. 1995
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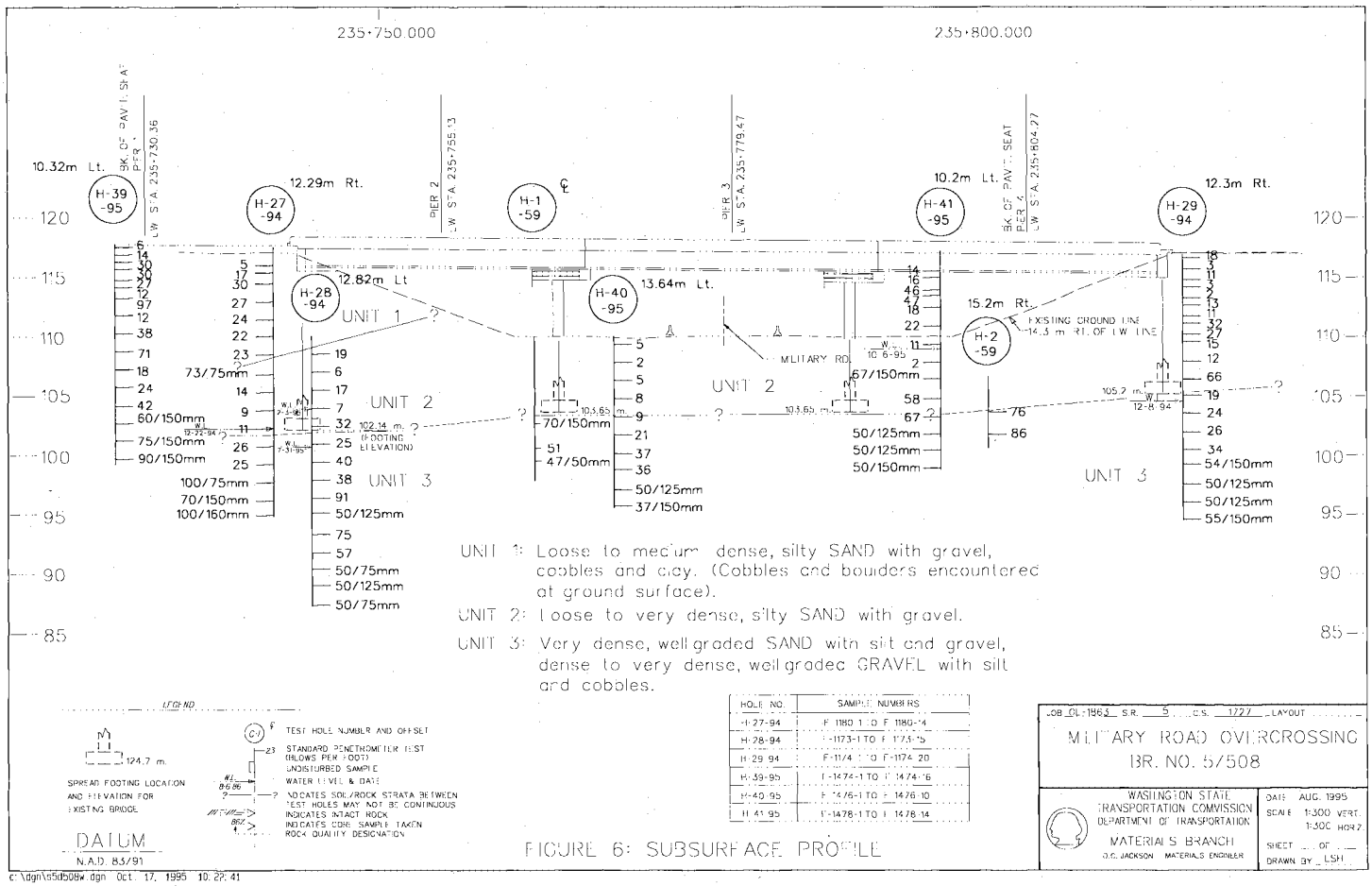

UNIT 1: Loose to medium dense, silty SAND with gravel, cobbles and clay. (Cobbles and boulders encountered at ground surface).

UNIT 2: Loose to very dense, silty SAND with gravel.

UNIT 3: Very dense, well graded SAND with silt and gravel, dense to very dense, well graded GRAVEL with silt and cobbles.

LEGEND

- 124.7 m. — SPREAD FOOTING LOCATION AND ELEVATION FOR EXISTING BRIDGE
- DATUM — N.A.D. 83/91
- TEST HOLE NUMBER AND OFFSET
- STANDARD PENETROMETER TEST (BLOWS PER FOOT)
- UNDISTURBED SAMPLE
- WATER LEVEL & DATE
- INDICATES SOIL/ROCK STRATA BETWEEN TEST HOLES MAY NOT BE CONTINUOUS
- INDICATES INTACT ROCK
- INDICATES CORE SAMPLE TAKEN
- ROCK QUALITY DESIGNATION

HOLE NO.	SAMPLE NUMBERS
H-27-94	F-1180-1 TO F-1180-14
H-28-94	F-1173-1 TO F-1173-15
H-29-94	F-1174-1 TO F-1174-20
H-39-95	F-1474-1 TO F-1474-16
H-40-95	F-1476-1 TO F-1476-10
H-41-95	F-1478-1 TO F-1478-14

FIGURE 6: SUBSURFACE PROFILE

JOB 01-1963 S.R. 5 C.S. 1727 LAYOUT

MILITARY ROAD OVERCROSSING
BR. NO. 5/508

WASHINGTON STATE TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
O.C. JACKSON MATERIALS ENGINEER

DATE AUG. 1995
SCALE 1:300 VERT. 1:300 HORZ.
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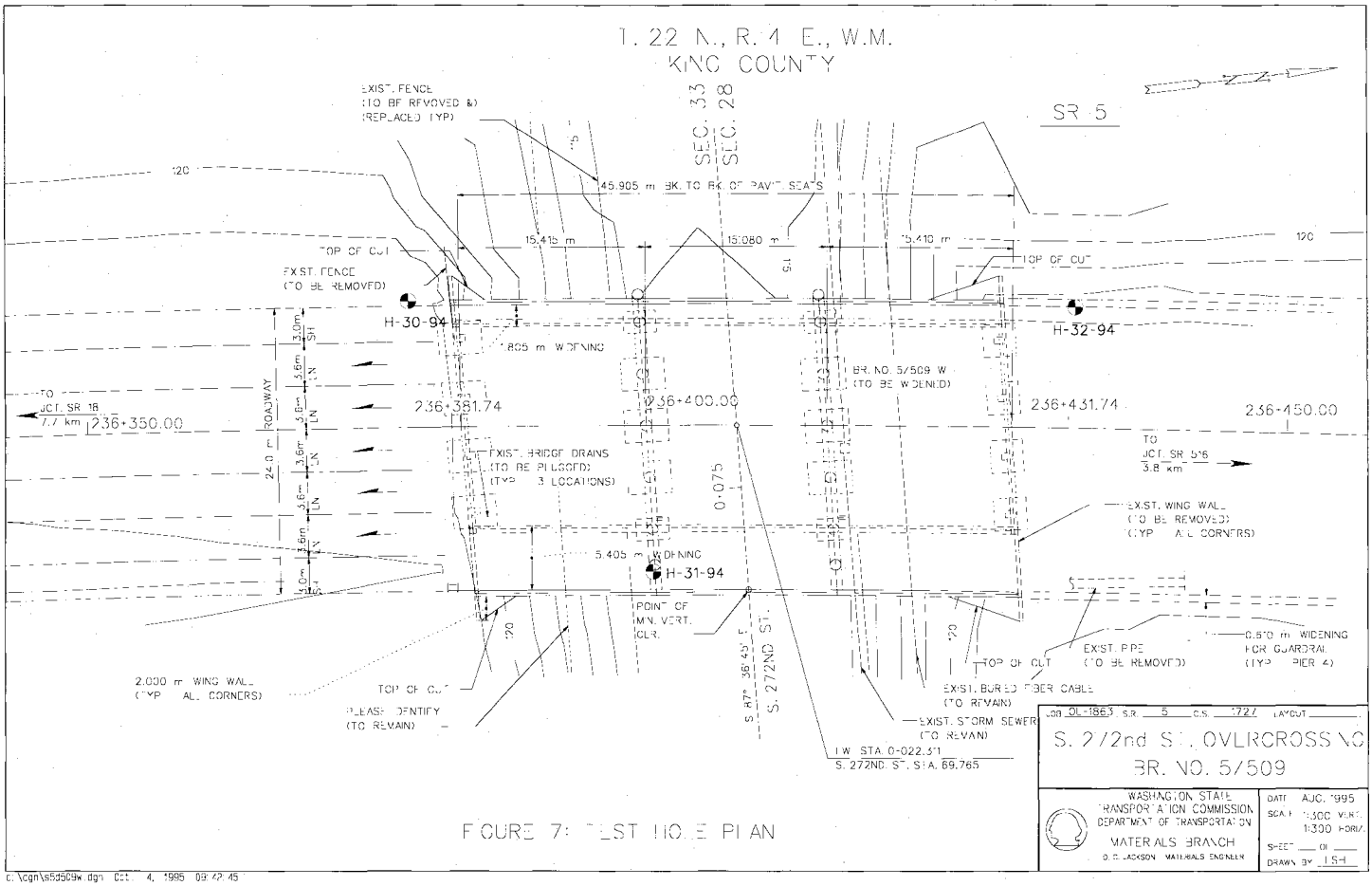

FIGURE 7: TEST HOLE PLAN

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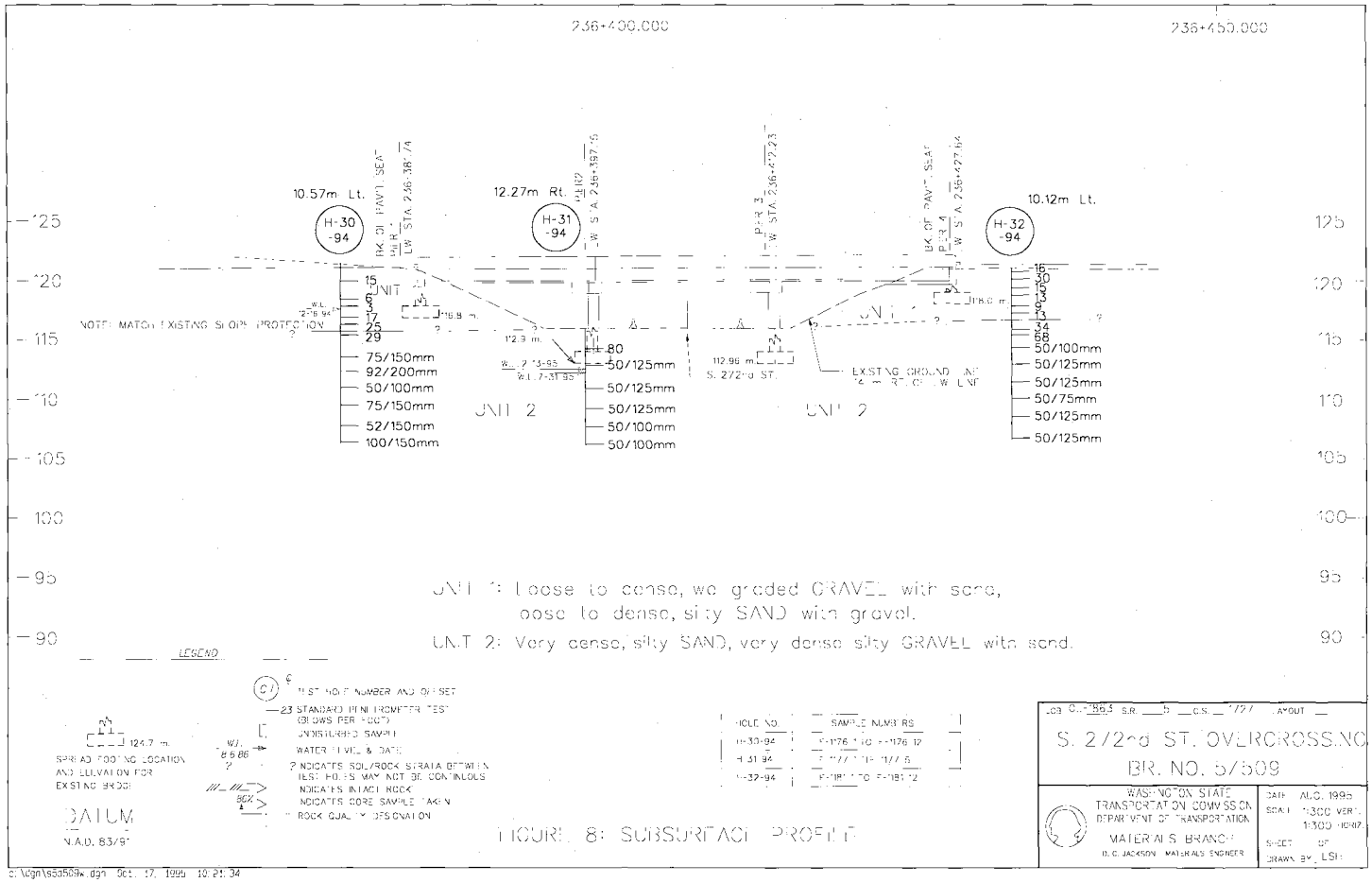


UNIT 1: Loose to dense, wet graded GRAVEL with sand, loose to dense, silty SAND with gravel.

UNIT 2: Very dense, silty SAND, very dense silty GRAVEL with sand.

LEGEND

- (C1) — TEST HOLE NUMBER AND OFFSET
- 23 — STANDARD PENETROMETER TEST (BLOWS PER FOOT)
- UNDISTURBED SAMPLE
- WATER LEVEL & DATE
- ? INDICATES SOIL/ROCK STRATA BETWEEN TEST HOLES MAY NOT BE CONTINUOUS
- INDICATES INTACT ROCK
- BCX — INDICATES CORE SAMPLE TAKEN
- * ROCK QUALITY DESIGNATION

124.7 m. SPREAD FOOTING LOCATION AND ELEVATION FOR EXISTING BRIDGE

W.L. 85.86 ?

DATUM
N.A.D. 83/91

HOLE NO.	SAMPLE NUMBERS
H-30-94	S-1176 TO S-1176.12
H-31-94	S-1177 TO S-1177.5
H-32-94	S-1181 TO S-1181.12

FIGURE 8: SUBSURFACE PROFILE

JOB C...-356.5 S.R. 5 C.S. ...7727 LAYOUT

S. 272nd ST. OVERCROSSING
BR. NO. 5/509

WASHINGTON STATE TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
D.C. JACKSON MATERIALS ENGINEER

DATE AUG. 1995
SCALE 1:300 VERT. 1:300 HORIZ.
SHEET OF
DRAWN BY LSH

c:\dgn\s5d509x.dgn Oct. 17, 1995 10:21:34

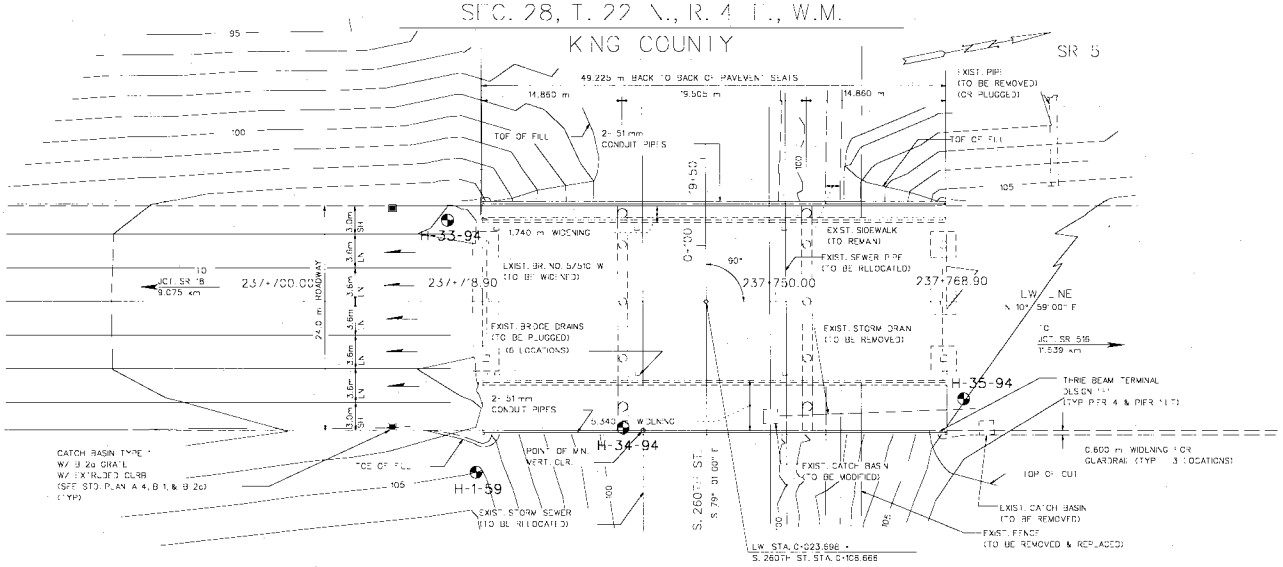


FIGURE 9: TEST HOLE PLAN

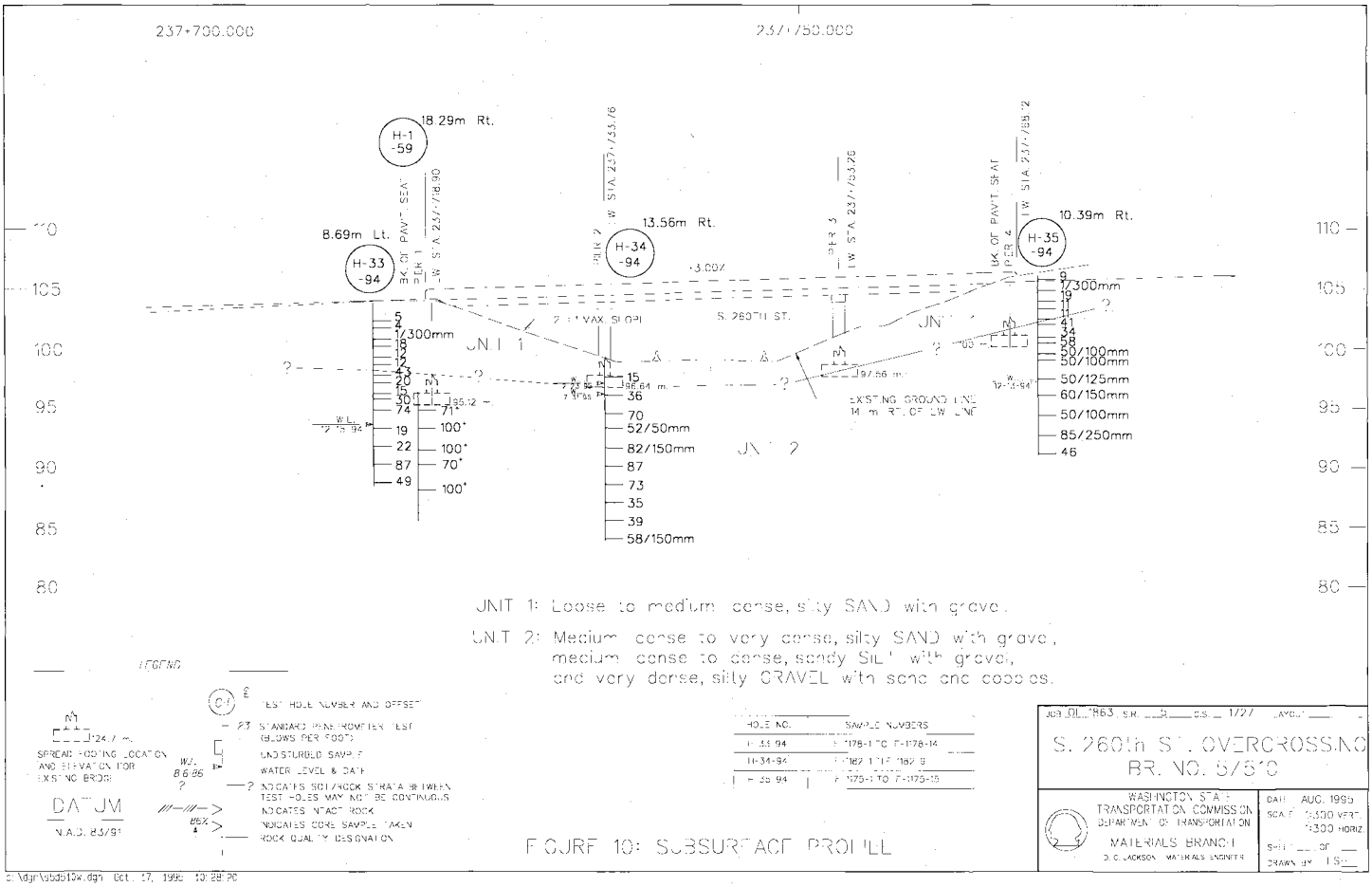
JOB CI-186.3 S.R. 5 C.S. 1/27 LAYOUT

S. 260th ST. OVERCROSSING
BR. NO. 5/510

WASHINGTON STATE TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
D. C. JACKSON MATERIALS ENGINEER

DATE AUG. 1995
SCALE 1:400 VERT. 1:400 HORZ.
SHEET ___ OF ___
DRAWN BY LSH

c:\dgn\s5d510w.dgn Oct. 4, 1995 10:08:30



UNIT 1: Loose to medium dense, silty SAND with gravel.

UNIT 2: Medium dense to very dense, silty SAND with gravel, medium dense to dense, sandy SILT with gravel, and very dense, silty GRAVEL with sand and cobbles.

LEGEND

- C-1 — TEST HOLE NUMBER AND OFFSET
- 23 — STANDARD PENETROMETER TEST (BLOWS PER FOOT)
- UNDISTURBED SAMPLE
- WATER LEVEL & DATE
- ? — INDICATES SOIL/ROCK STRATA BETWEEN TEST HOLES MAY NOT BE CONTINUOUS
- INDICATES INTACT ROCK
- INDICATES CORE SAMPLE TAKEN
- ROCK QUALITY DESIGNATION
- N1 — 124.7 m. — SPREAD FOOTING LOCATION AND ELEVATION FOR EXISTING BRIDGE
- W.L. 86-86 — ?
- DATUM — N.A.D. 83/91

HOLE NO.	SAMPLE NUMBERS
H-33-94	F-1178-1 TO F-1178-14
H-34-94	F-1182-1 TO F-1182-8
H-35-94	F-1175-1 TO F-1175-15

FIGURE 10: SUBSURFACE PROFILE

JOB NO. 1863 S.R. 9 S.S. 1727 LAYOUT

S. 260th ST. OVERCROSSING
BR. NO. 5/510

WASHINGTON STATE TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
D.C. JACKSON MATERIALS ENGINEER

DATE AUG. 1995
SCALE 1:300 VERT. 1:300 HORIZ.
SHEET OF
DRAWN BY TSC

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APPENDIX A- DRILLED SHAFT CAPACITY CHARTS

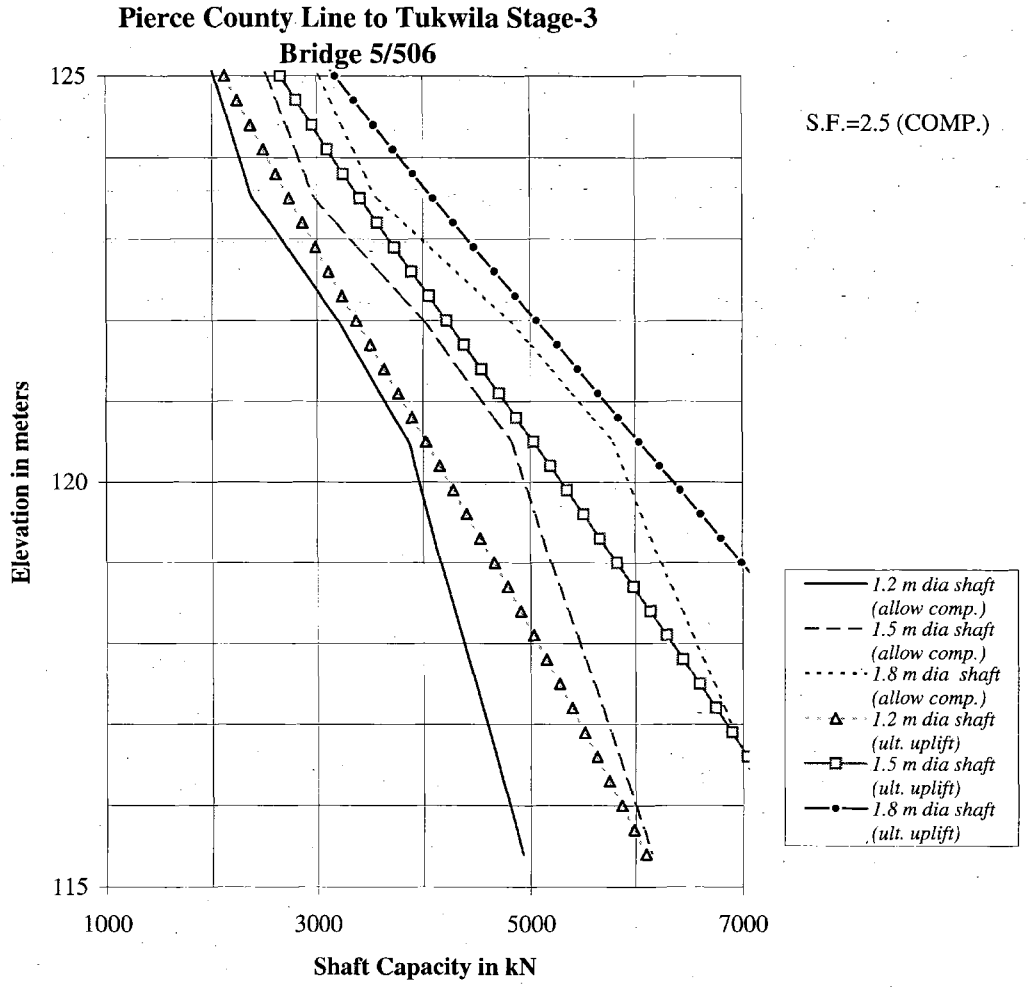


Figure A1-Shaft Capacity-Pier 1

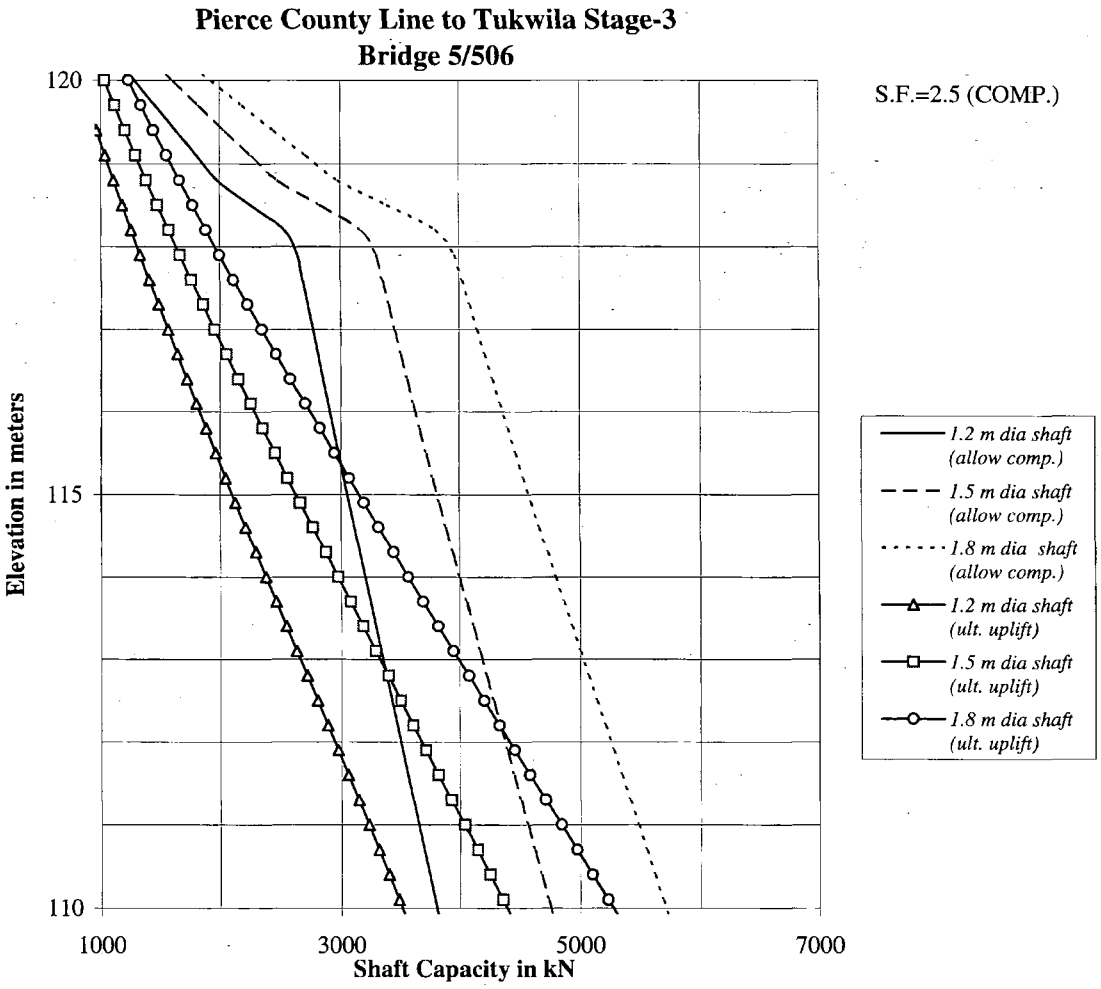


Figure A2-Shaft Capacity-Piers 2 and 3

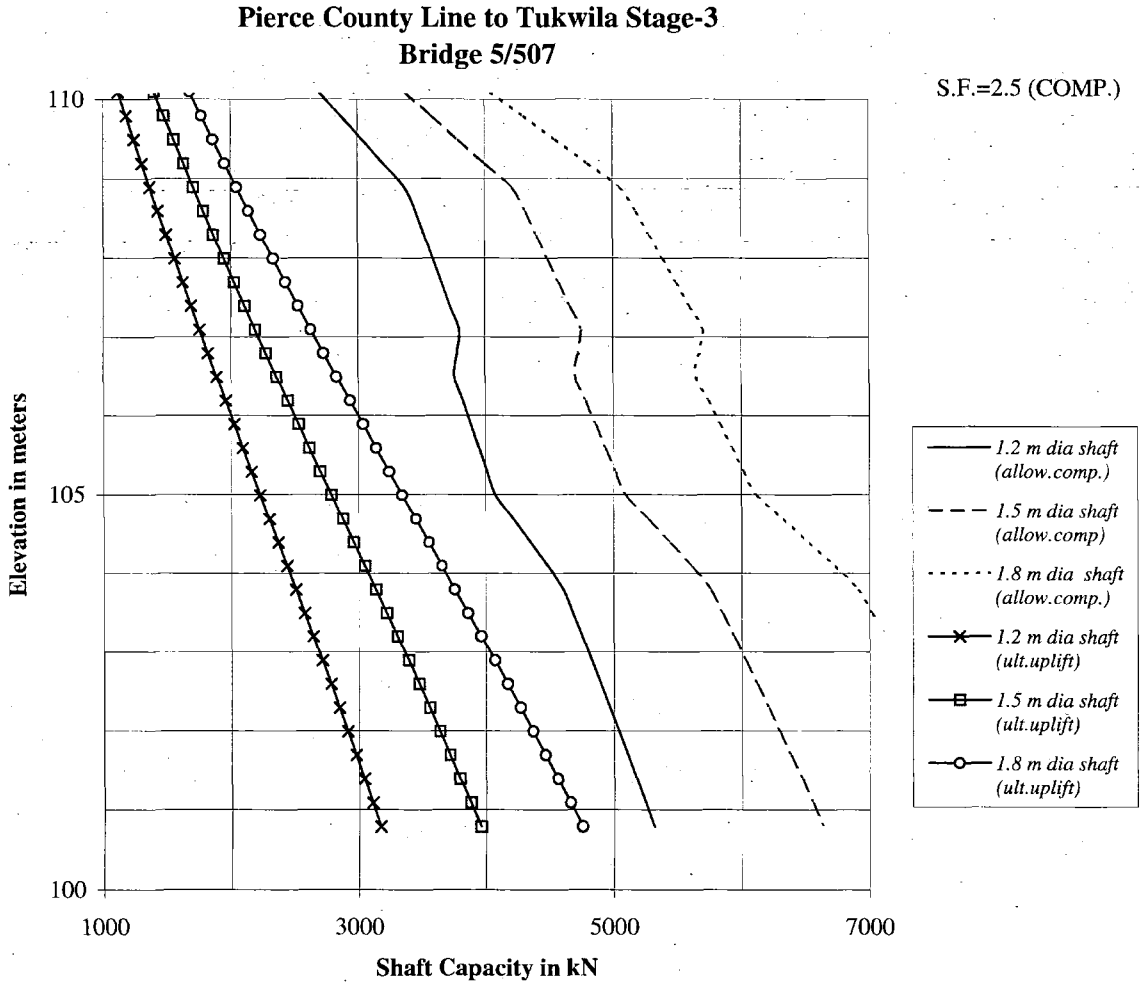


Figure A3- Shaft Capacity-Piers 2 and 3

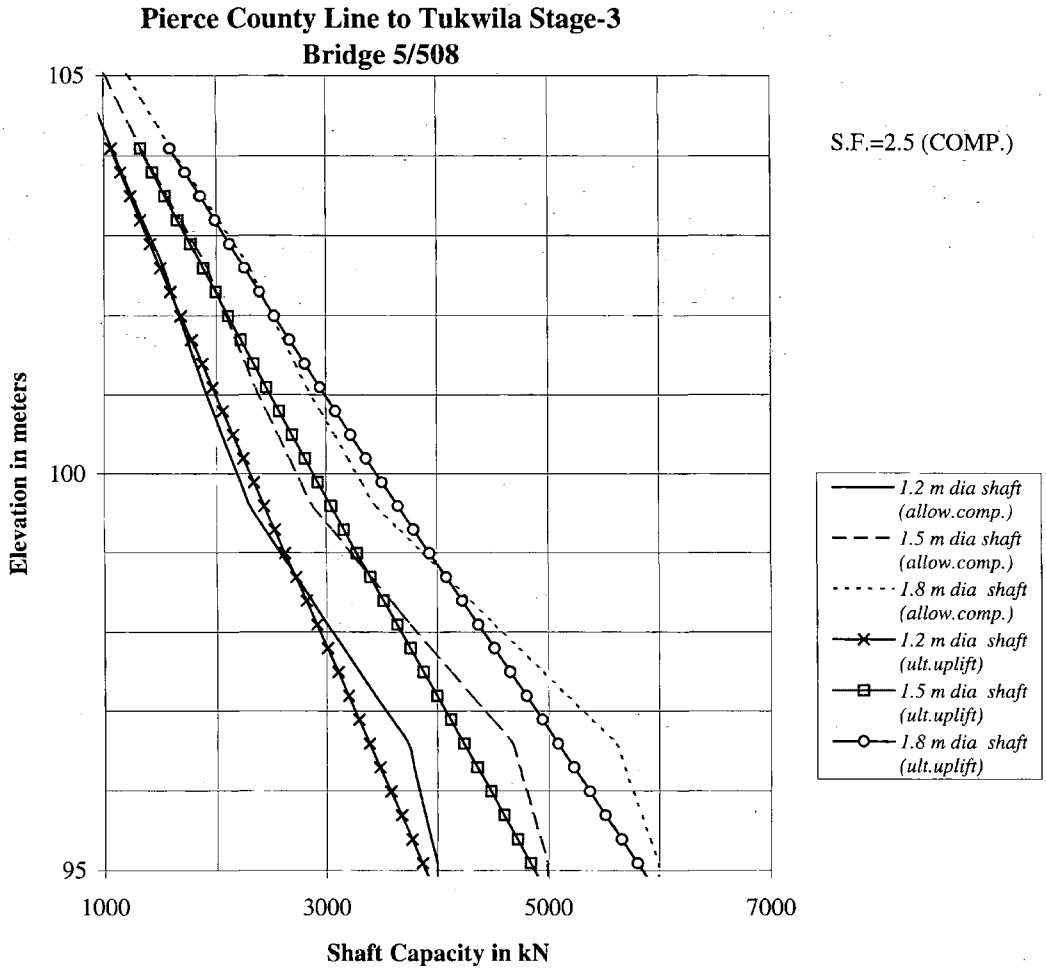


Figure A4- Shaft Capacity-Piers 2 and 3

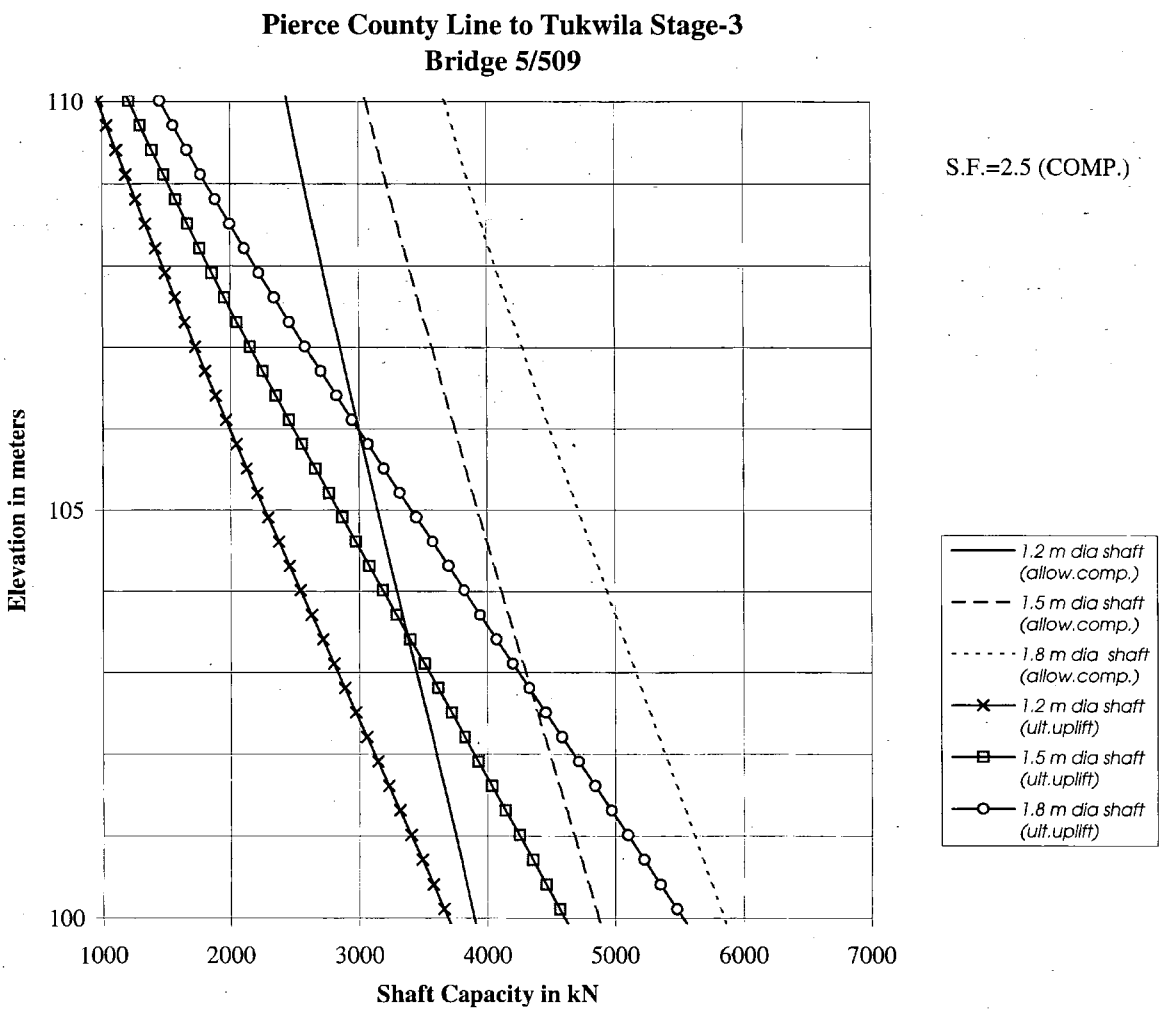


Figure A5- Shaft Capacity-Piers 2 and 3

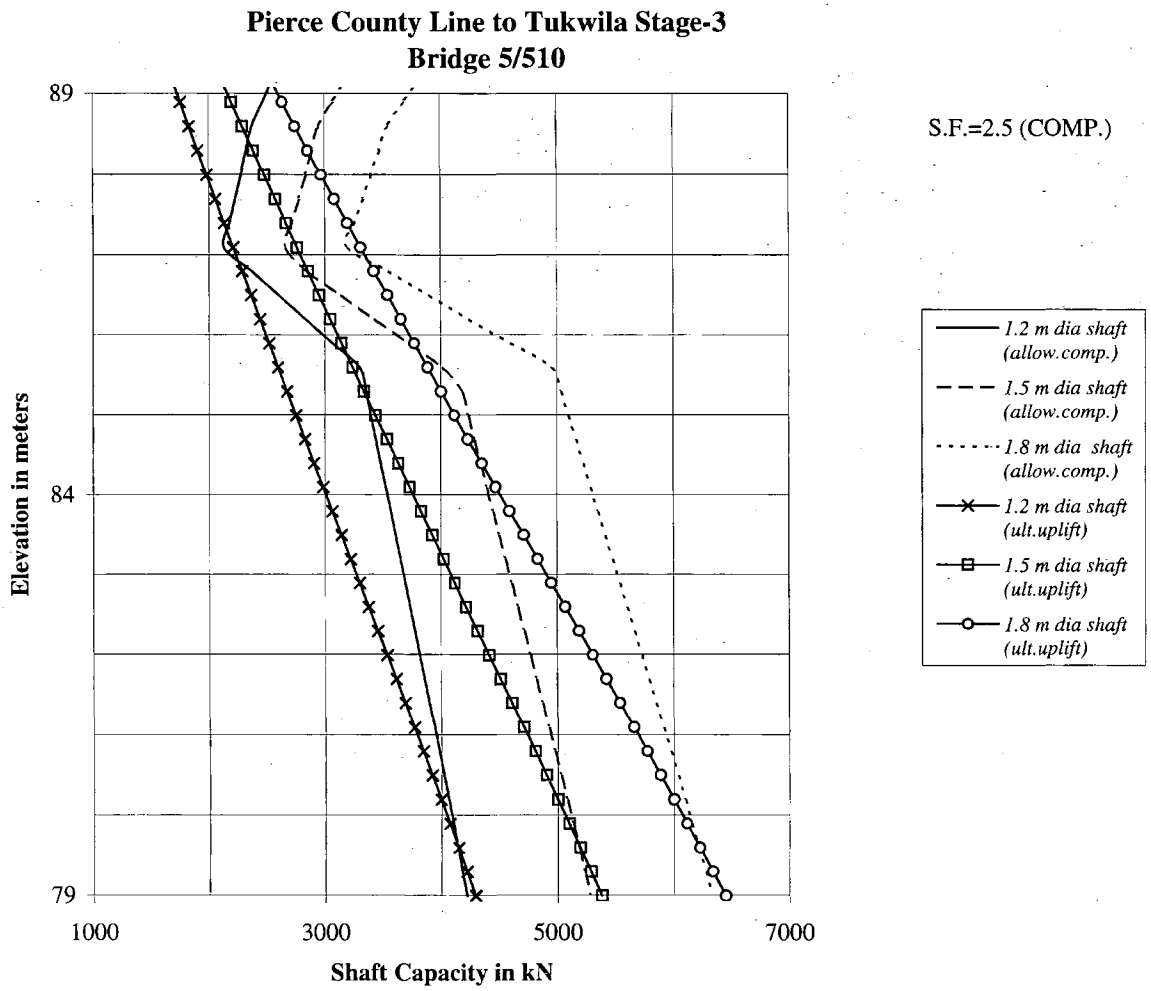


Figure A6- Shaft Capacity-Piers 2 and 3

APPENDIX B- LOGS OF TEST BORINGS

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-21-95**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

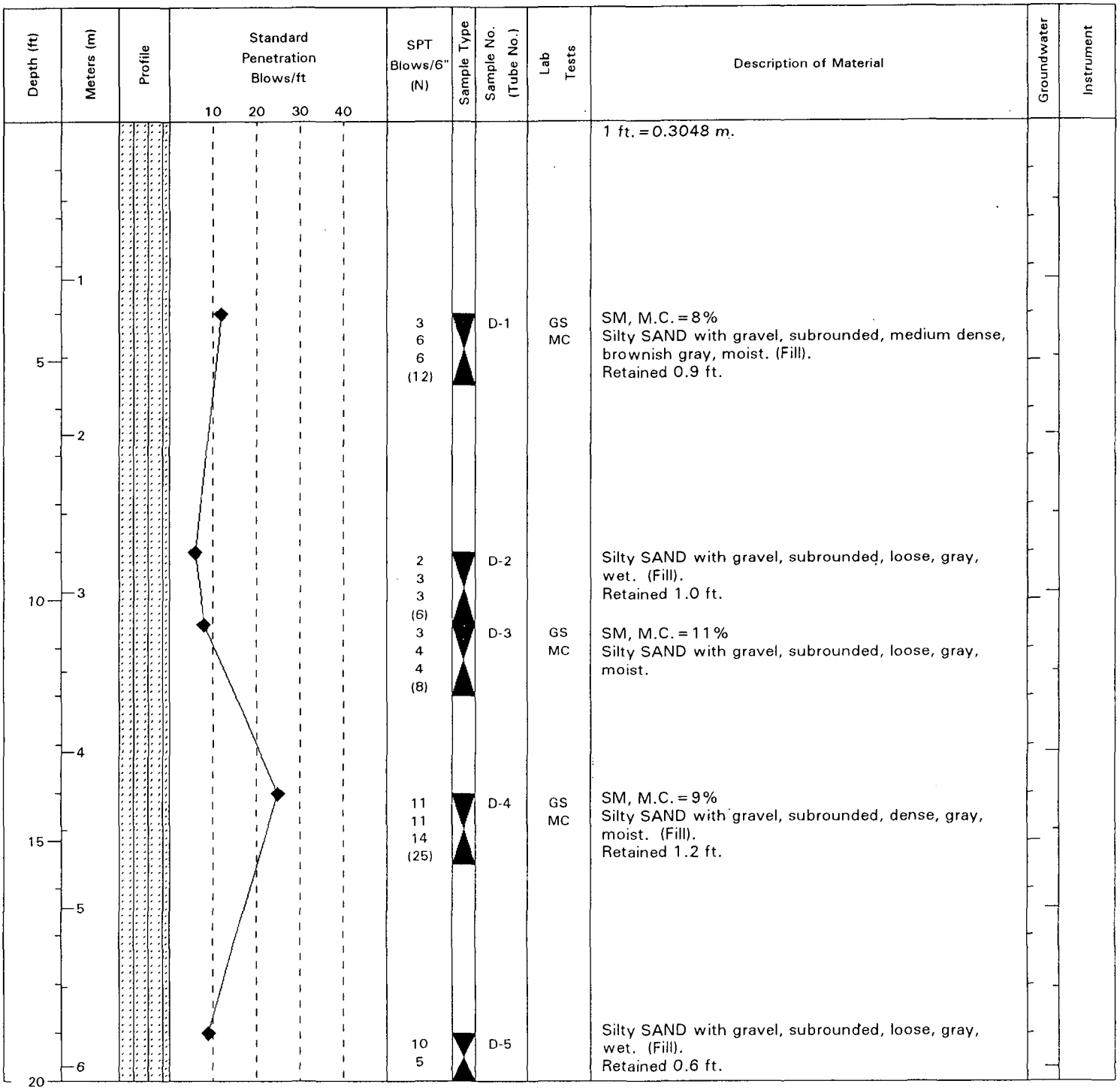
Bridge 5/506 S.R. **5**

Station **232+937.61** Offset **8.99m Lt.** C.S. **1727**

Equipment _____ Casing _____ Ground El **440.6 (134.29 m)**

Method of Boring **Augers**

Start Date **January 4, 1995** Completion Date **January 4, 1995** Sheet **1** of **3**



LOG OF TEST BORING

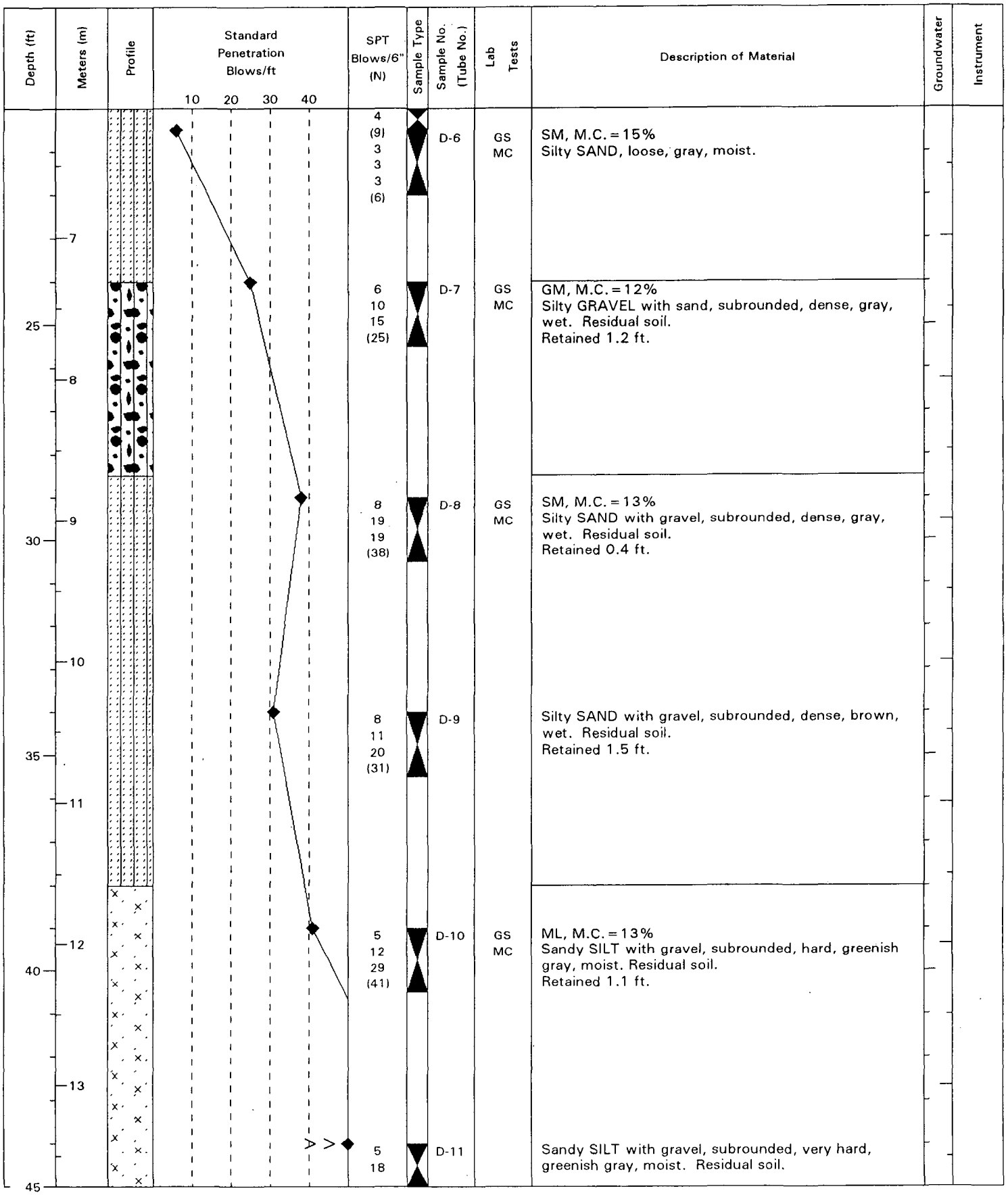
Washington State Department of Transportation

HOLE No. H-21-95

Sheet 2 of 3

PROJECT Pierce County Line to Tukwila Stage 3

Job No. OL-1863



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-21-95**

Sheet **3** of **3**

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				50 (68)				Retained 1.5 ft.		
	14									
	15			16 27 38 (65)		D-12		Sandy SILT with gravel, subrounded, very hard, greenish gray. Residual soil. Retained 1.2 ft.		
50										
								End of test hole boring at 50.5 ft. below ground elevation.		
	16							Water table elevation not determined.		
								This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
55										
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-22-94**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

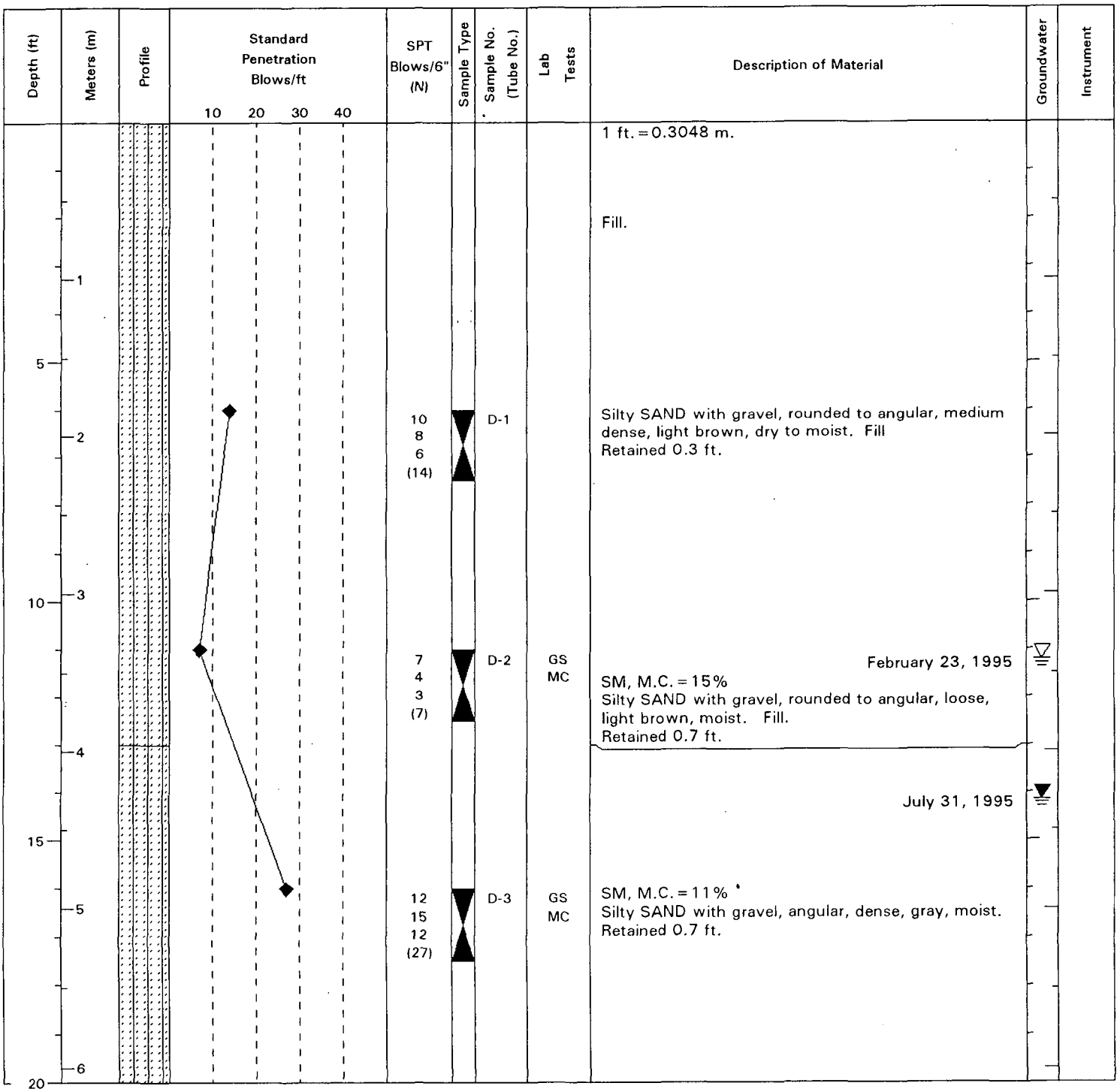
Bridge 5/506 S.R. **5**

Station **232+947.52** Offset **8.69m Rt.** C.S. **1727**

Equipment Casing **HW 22', HQ 47'** Ground El **411.4 (125.39 m)**

Method of Boring **Wet Rotary**

Start Date **November 15, 1994** Completion Date **November 16, 1994** Sheet **1** of **3**



LOG OF TEST BORING

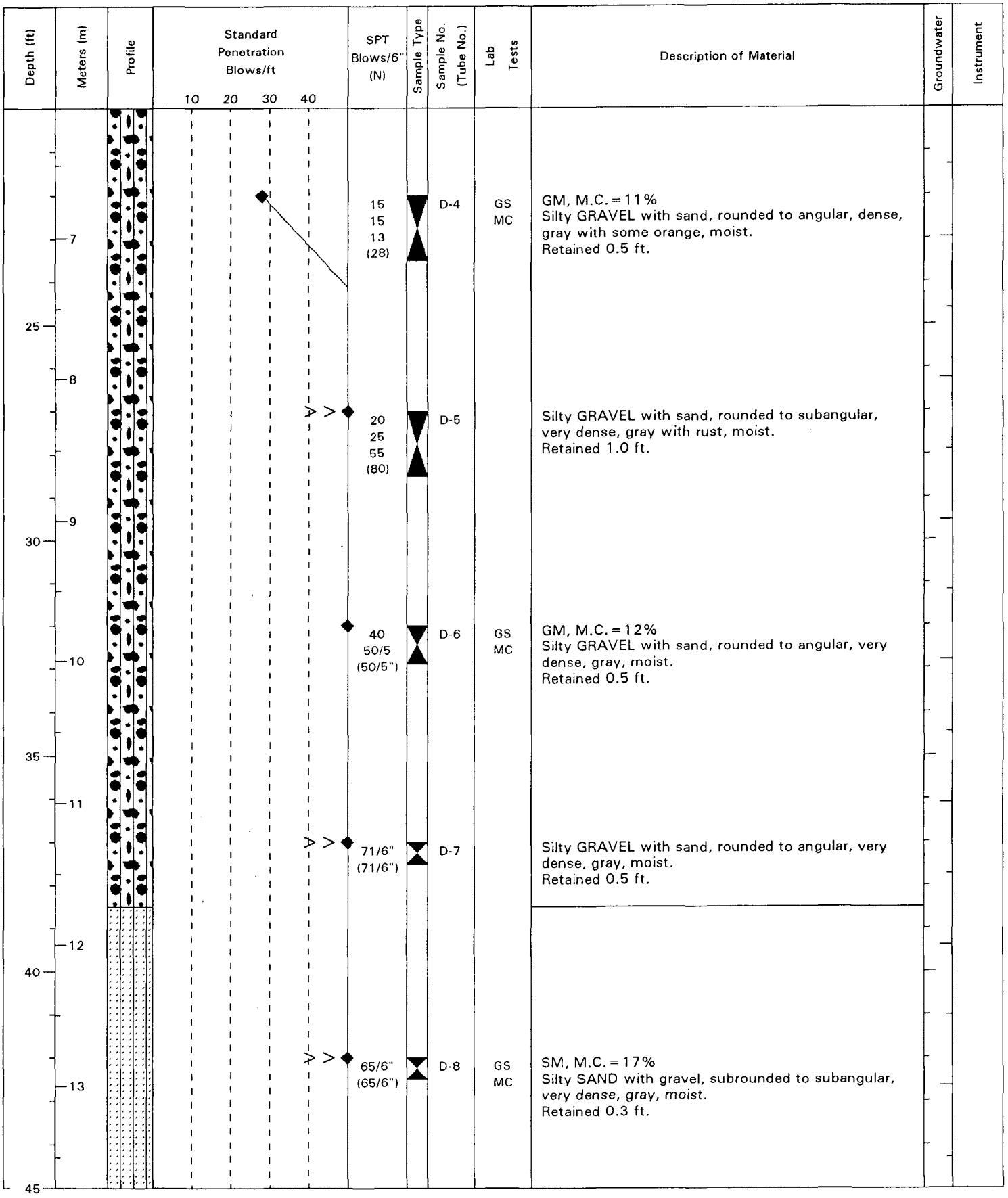
Washington State Department of Transportation

HOLE No. H-22-94

Sheet 2 of 3

PROJECT Pierce County Line to Tukwila Stage 3

Job No. OL-1863



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-22-94**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14		> >	32 53/5 (53/5")		D-9	GS MC	SM, M.C. = 13% Silty SAND with gravel, subrounded to angular, very hard, moist, gray. Retained 0.8 ft.		
50	15							End of test hole boring at 47.9 ft. below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	16									
55	17									
	18									
60	19									
65	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-23-95**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

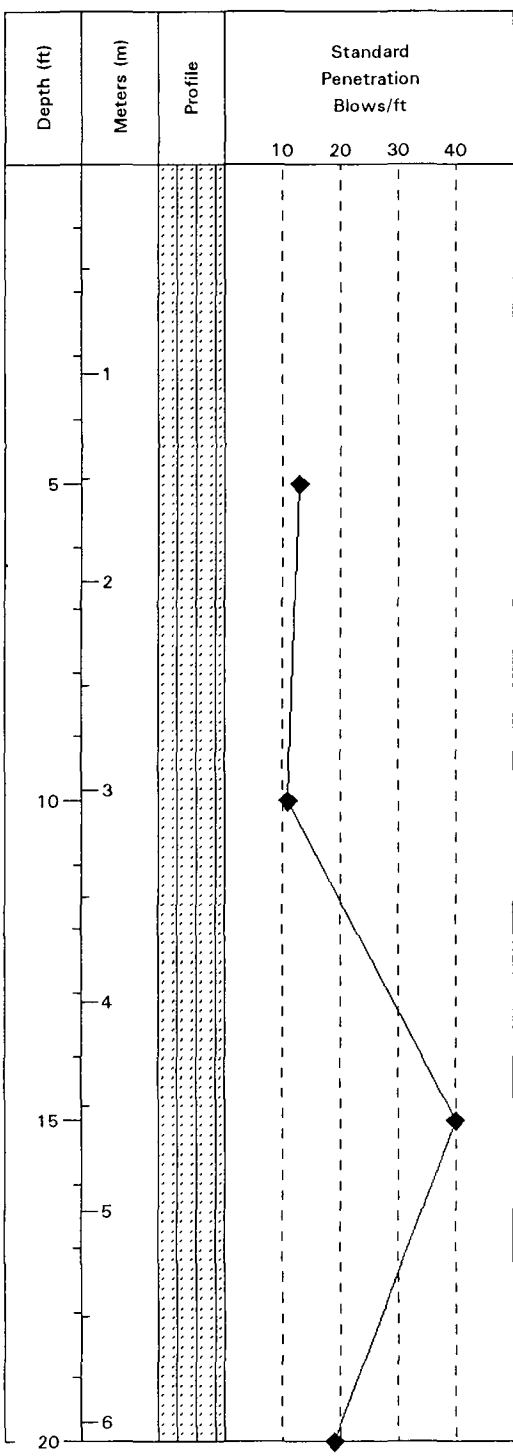
Bridge 5/506 S.R. **5**

Station **233+008.63** Offset **9.90m Lt.** C.S. **1727**

Equipment _____ Casing **HQ to 50'** Ground El **435.7 (132.80 m)**

Method of Boring _____

Start Date **January 17, 1995** Completion Date **January 17, 1995** Sheet **1** of **3**



SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				1 ft. = 0.3048 m.		
10 8 5 (13)		D-1	GS MC	SM, M.C. = 11% Silty SAND with gravel, subrounded, medium dense, light olive brown, moist, homogeneous, no HCl reaction. Retained 0.9 ft.		
6 5 6 (11)		D-2		Silty SAND with gravel, subrounded, medium dense, gray, with some mottling, moist, homogeneous, no HCl reaction. Retained 1.0 ft.		
21 22 18 (40)		D-3	GS MC	SM, M.C. = 10% Silty SAND with gravel, subrounded, dense, gray with some mottling, moist, homogeneous, no HCl reaction. Retained 1.2 ft.		

LOG OF TEST BORING

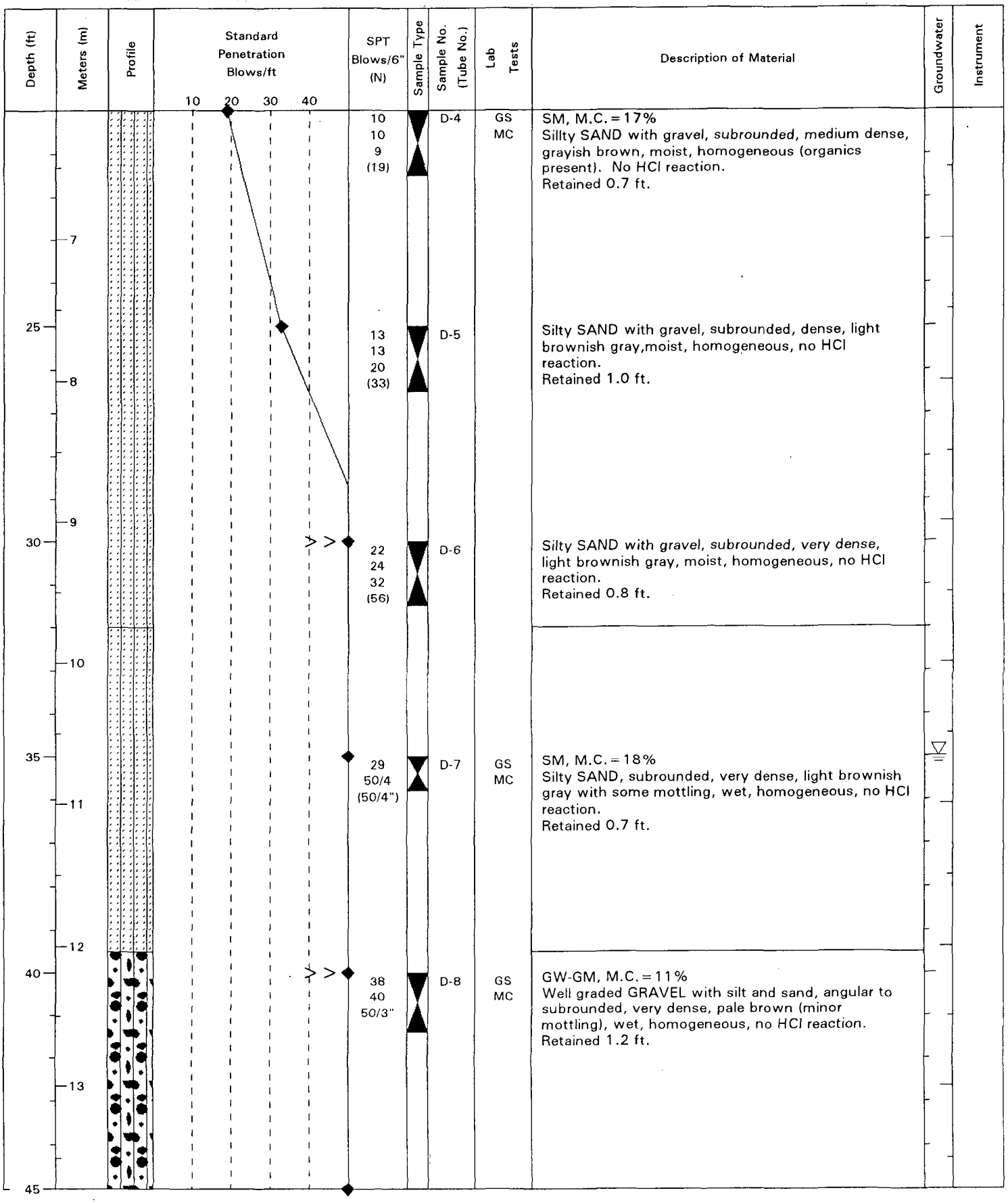
Washington State Department of Transportation

HOLE No. **H-23-95**

Sheet 2 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-23-95**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			24 50/4 (50/4")		D-9	GS MC	SM, M.C. = 19% Silty SAND, subangular to subrounded, very dense, pale brown with some mottling, moist, homogeneous, (0.1 ft. thick silty sand layer at 45.4 to 45.5 ft.), no HCl reaction. Retained 0.8 ft.		
	15									
50			> >	20 34 48 (82)		D-10	GS MC	SP-SM, M.C. = 26% Poorly graded SAND with silt, very dense, brownish gray, (rusty from 50.1 ft. to 50.6 ft.), wet, homogeneous, (one silt layer at 51.3 ft. -- shows liquefaction structure 0.03 ft. thick, bagged as D10-B), no HCl reaction. Retained 1.5 ft.		
	16							End of test hole boring at 51.5 ft. below ground elevation.		
55								This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-24-94**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

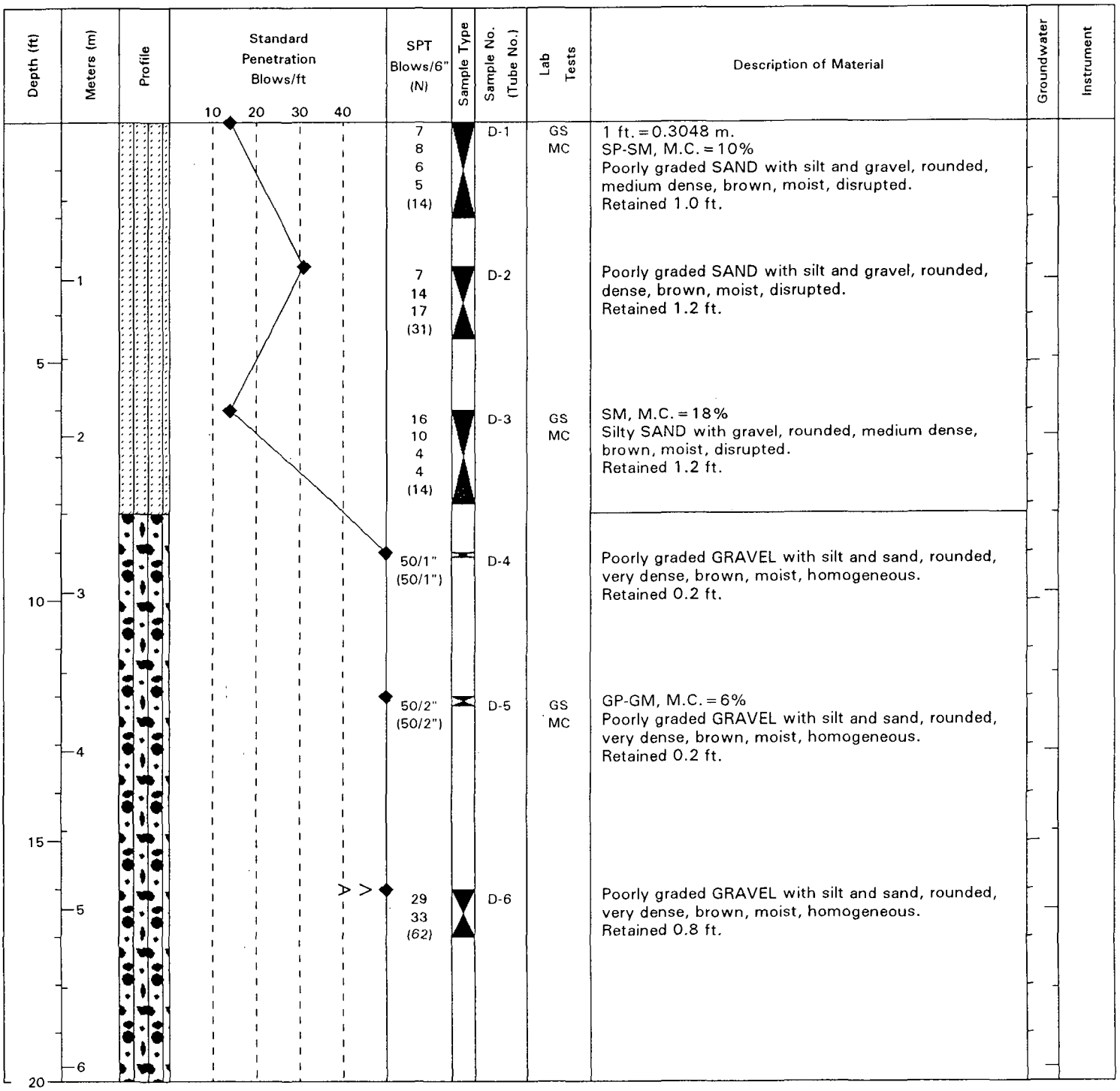
Bridge 5/507 S.R. **5**

Station **234+723.01** Offset **10.52m Lt.** C.S. **1727**

Equipment _____ Casing _____ Ground El **412.7 (125.79 m)**

Method of Boring **Hollow Core Augers**

Start Date **October 27, 1994** Completion Date **October 27, 1994** Sheet **1** of **2**



LOG OF TEST BORING

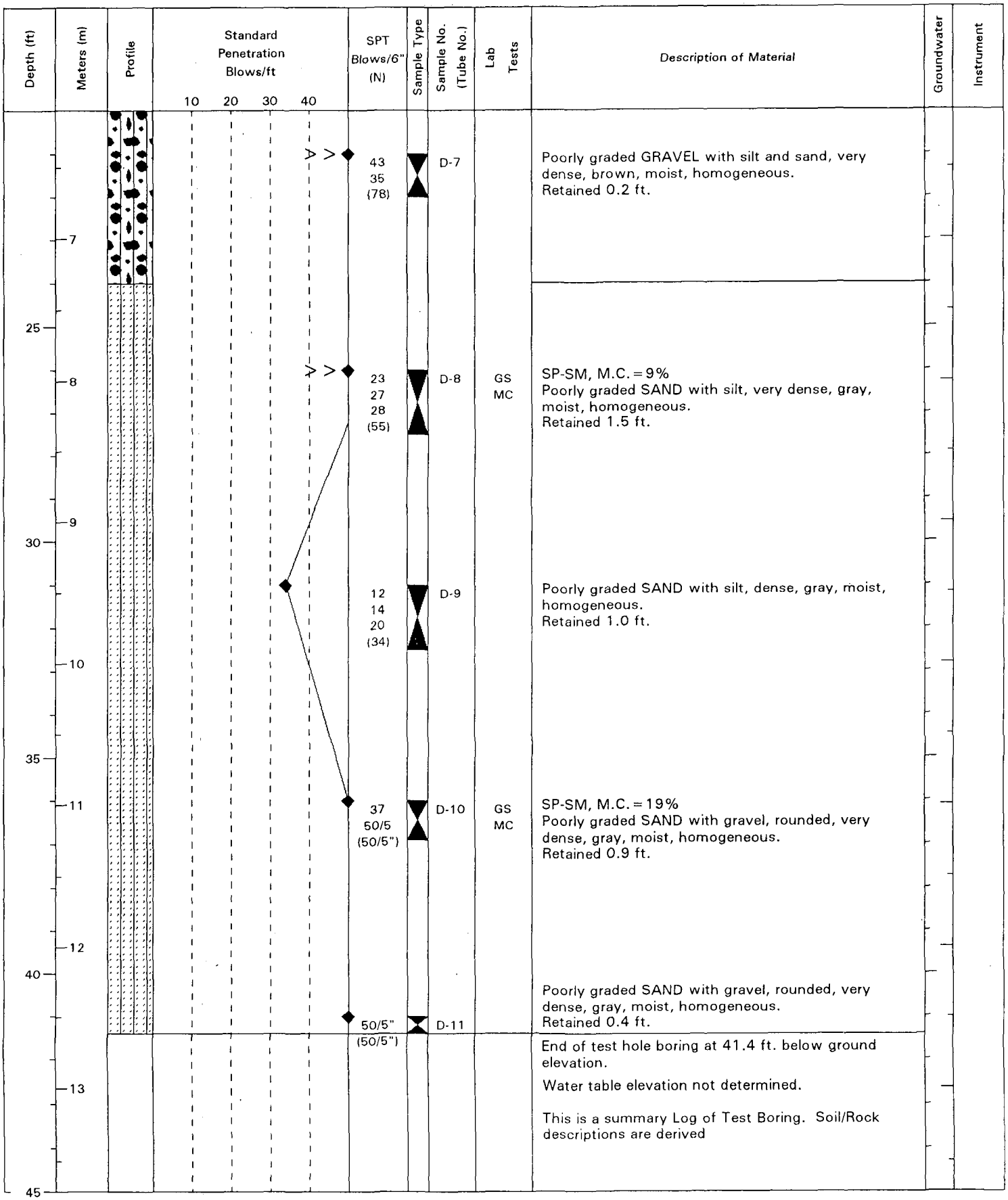
Washington State Department of Transportation

HOLE No. **H-24-94**

Sheet 2 of 2

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-25-94**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

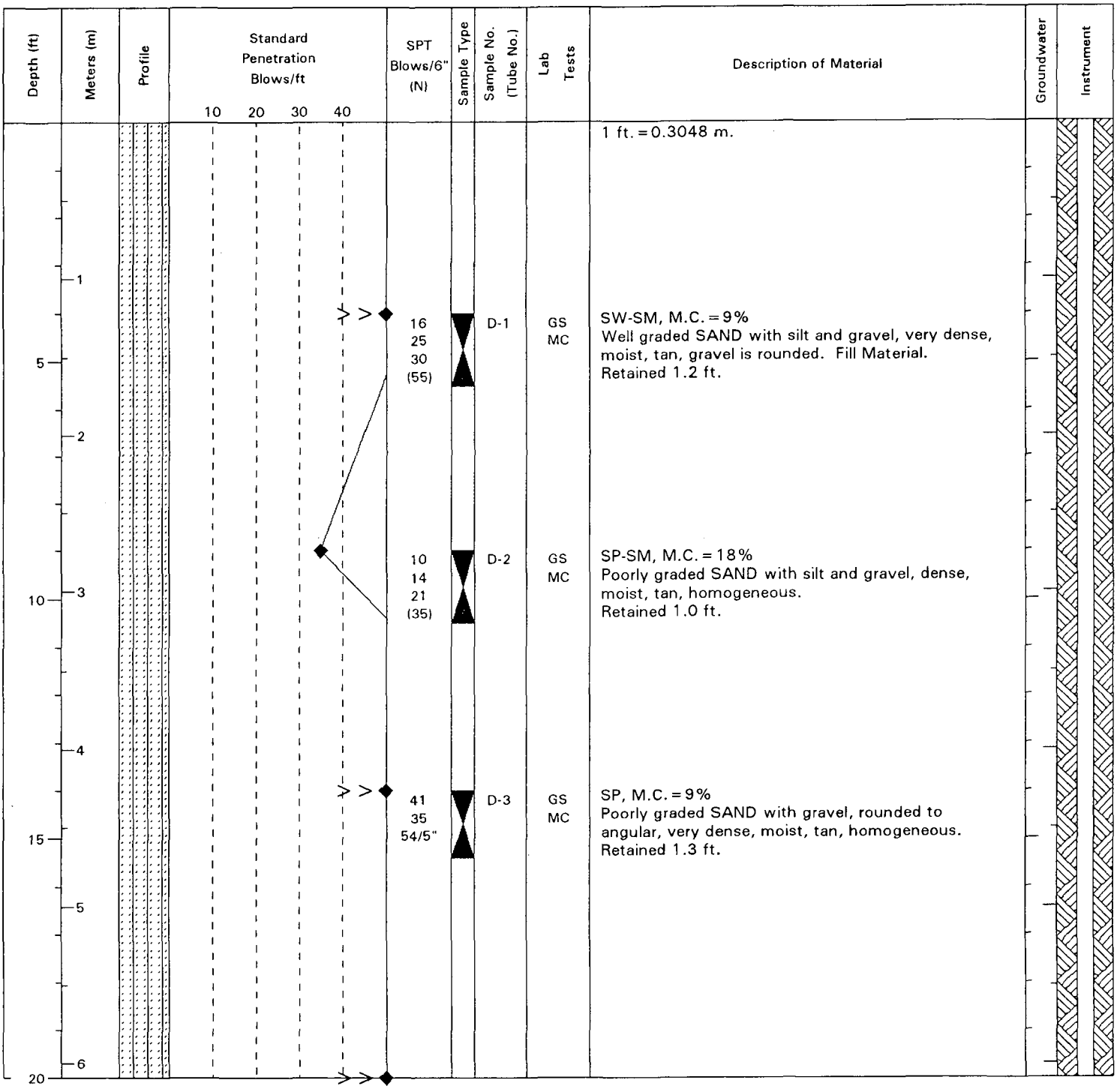
Bridge 5/507 S.R. **5**

Station **234+744.2** Offset **11.69m Rt.** C.S. **1727**

Equipment _____ Casing **HW to 17', HQ to 50'** Ground El **391.7 (119.39 m)**

Method of Boring **Wet Rotary**

Start Date **November 25, 1994** Completion Date **December 1, 1994** Sheet **1** of **3**



LOG OF TEST BORING

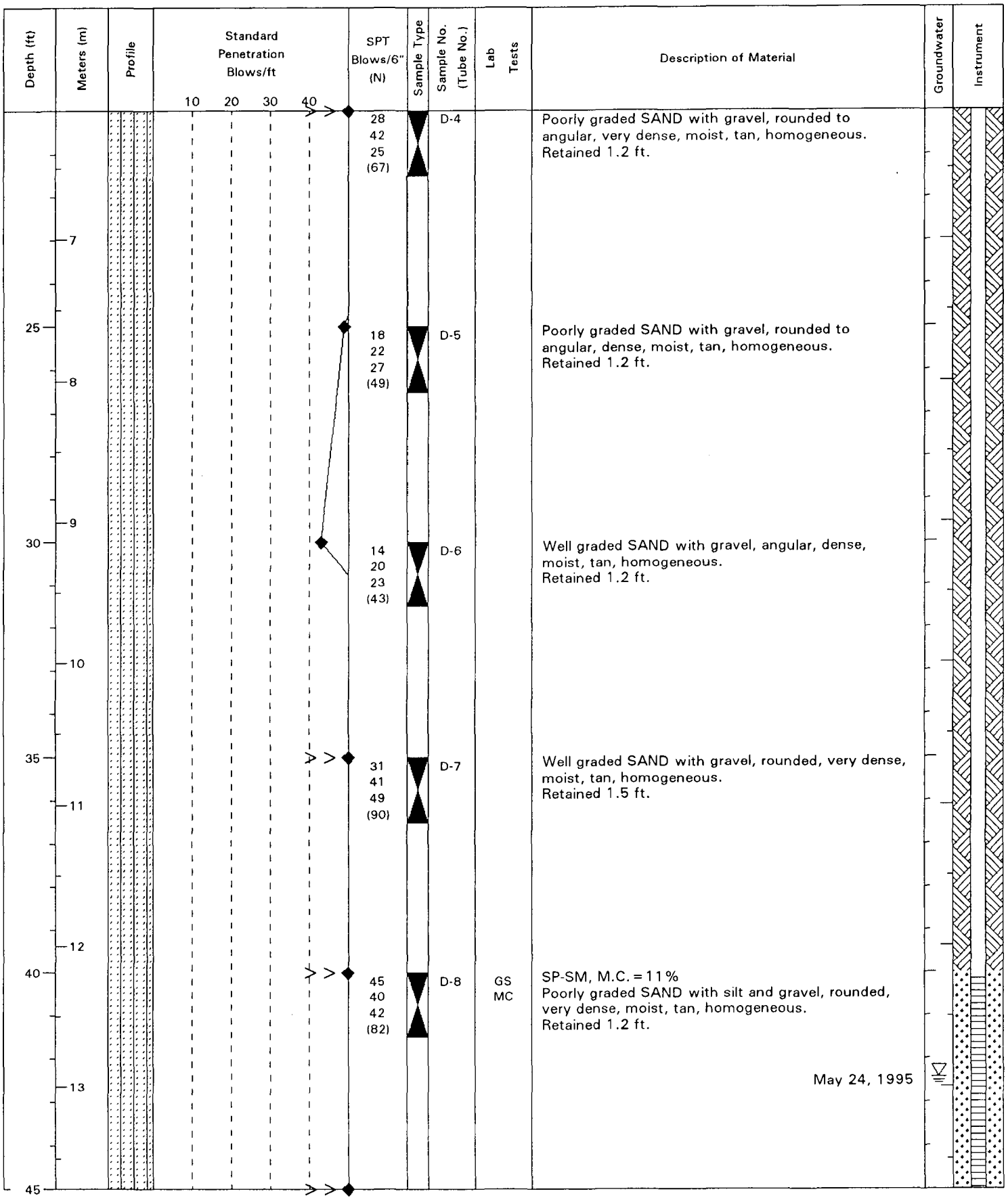
Washington State Department of Transportation

HOLE No. H-25-94

Sheet 2 of 3

PROJECT Pierce County Line to Tukwila Stage 3

Job No. OL-1863



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-25-94**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			19 24 30 (54)		D-9	GS MC	SM, M.C. = 29% Silty SAND, very dense, moist, tan, homogeneous. Retained 0.3 ft.		
	15									
50				27 33 45 (78)		D-10	GS MC	SP-SM, M.C. = 18% Poorly graded SAND with silt and rounded gravel, very dense, moist, tan, homogeneous. Retained 1.2 ft.	▼	
								February 3, 1995		
	16							End of test hole boring at 51.5 ft. below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
55	17									
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. H-26-95

PROJECT Pierce County Line to Tukwila Stage 3 — Job No. OL-1863

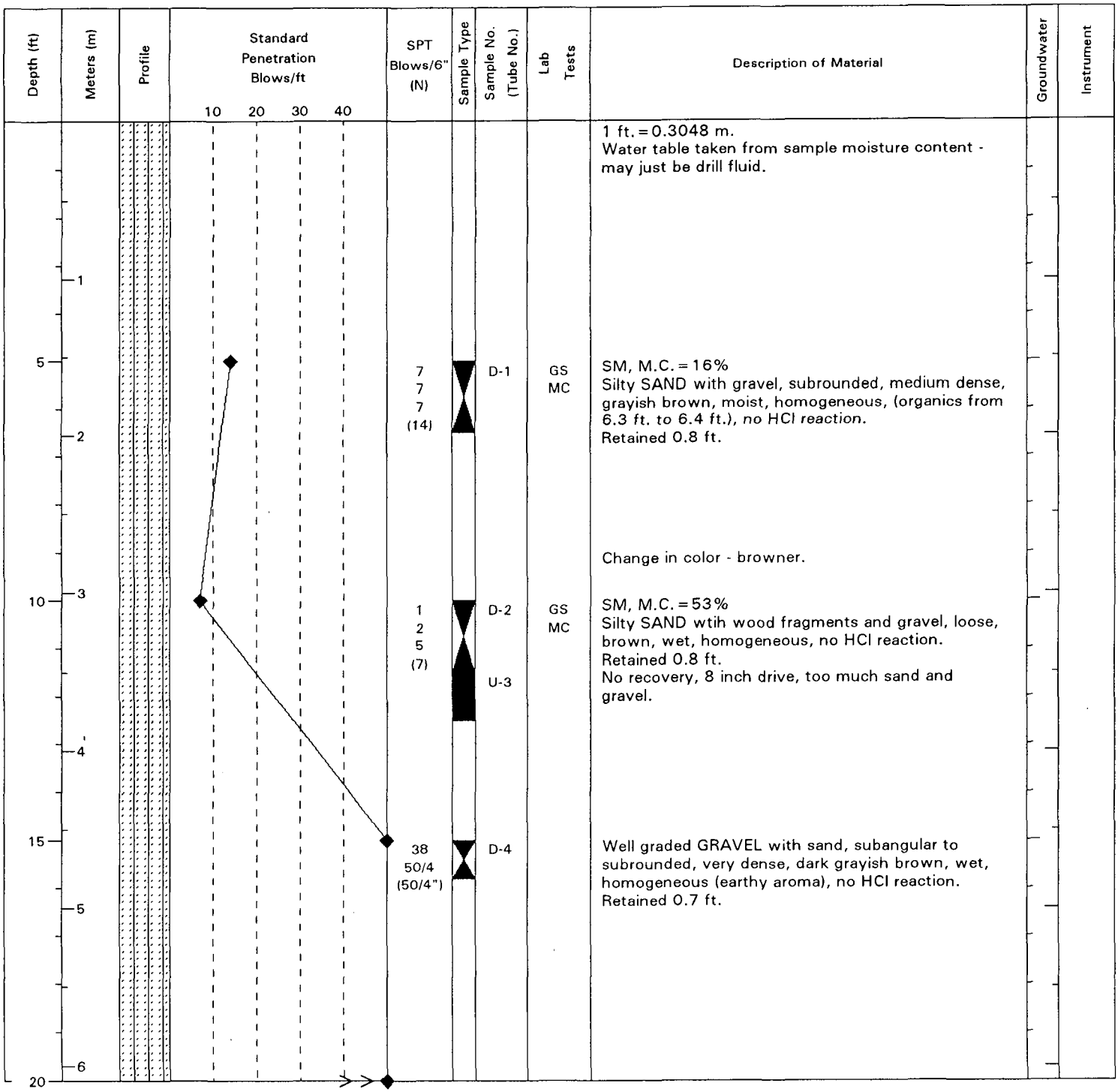
Bridge 5/507 — S.R. 5

Station 234+783.82 — Offset 9.59m Lt. — C.S. 1727

Equipment — Casing HQ X 50' — Ground El 411.3 (125.36 m)

Method of Boring Wet Rotary

Start Date January 18, 1995 — Completion Date January 18, 1995 — Sheet 1 of 3



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-26-95**

Sheet **2** of **3**

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				20 26 28 (54)		D-5	GS MC	SP-SM, M.C. = 15% Poorly graded SAND with silt, subrounded, very dense, brownish orange, moist (wet in coarser layers), alternating sand, silty sand layers 0.05 ft. - 0.09 ft. thick from 20.3 ft. to 20.7 ft. and 21.1 ft. to 21.3 ft., no HCl reaction. Retained 1.5 ft.		
	7									
25				16 24 27 (51)		D-6		Poorly graded SAND with silt, subrounded, very dense, brownish orange, moist (wet in coarser layers) sand/silty sand layers less prominent than in D-5, no HCl reaction. Retained 1.5 ft.		
	8								▽	
	9									
30				17 11 11 (22)		D-7	GS MC	SP-SM, M.C. = 25% Poorly graded SAND with silt, subrounded, medium dense, brownish orange, wet, homogeneous, no HCl reaction. Change in n-values due to water table? Material at this depth and above is orange *suggesting an oxidizing environment.* Retained 1.5 ft.		
	10									
35				25 50/5 (50/5")		D-8	GS MC	SW-SM, M.C. = 15% Well graded SAND with silt and gravel, angular to subrounded, very dense, grayish brown, wet, homogeneous (one silt layer from 35.5 ft. to 35.6 ft.), no HCl reaction. Retained 0.8 ft.		
	11									
	12									
40				38 50/4 (50/4")		D-9		Well graded SAND with silt and gravel, subangular to subrounded, very dense, grayish brown, wet, homogeneous, no HCl reaction. Retained 0.6 ft.		
	13									
45										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-26-95**

Sheet **3** of **3**

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			7 30 27 (57)		D-10	GS MC	SP-SM, M.C. = 15% Poorly graded SAND with silt, subrounded, very dense, brownish gray, wet, homogeneous, no HCl reaction. Retained 1.5 ft.		
	15									
50				48 50/5 (50/5")		D-11		Poorly graded SAND with silt, subangular to subrounded, very dense, brownish gray, wet, homogeneous, no HCl reaction. Retained 0.8 ft.		
	16							End of test hole boring at 50.9 ft. below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
55	17									
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-27-94**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

Bridge 5/508 S.R. **5**

Station **235+736.67** Offset **12.29m Rt.** C.S. **1767**

Equipment _____ Casing **4" OD X 75' Hollow Core** Ground El **385.5 (117.50 m)**

Method of Boring **Dry Rotary**

Start Date **December 22, 1994** Completion Date **December 22, 1994** Sheet **1** of **4**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								1 ft. = 0.3048 m. Cobbles and boulders on ground surface. 0.0 ft. to 4.0 ft. Gravelly, silty SAND with a trace of clay.		
5	1			3 2 3 6 (5)		D-1	GS MC	SM, M.C. = 11% Silty SAND with gravel, cobbles and clay, subangular, loose, brown, moist (fill). Retained 0.7 ft.		
	2			8 8 9 9 (17)		D-2		Silty SAND with gravel, cobbles and clay, subangular, medium dense, brown, moist (fill). Retained 1.5 ft.		
								Material changed at 9.0 ft.		
10	3			13 14 16 50 (30)		D-3	GS MC	SM, M.C. = 10% Silty SAND with gravel, cobbles, and clay, subangular, dense, brown, moist (fill). Cobbles indicated by drilling. Retained 0.9 ft.		
	4									
15				8 11 16 20 (27)		D-4		Silty SAND with gravel, cobbles and clay, subangular, dense, grayish brown, moist (fill). Retained 0.5 ft.		
	5									
20	6			7 6		D-5		Silty SAND with gravel and clay, subangular, medium dense, brownish gray, moist (fill). No		

LOG OF TEST BORING

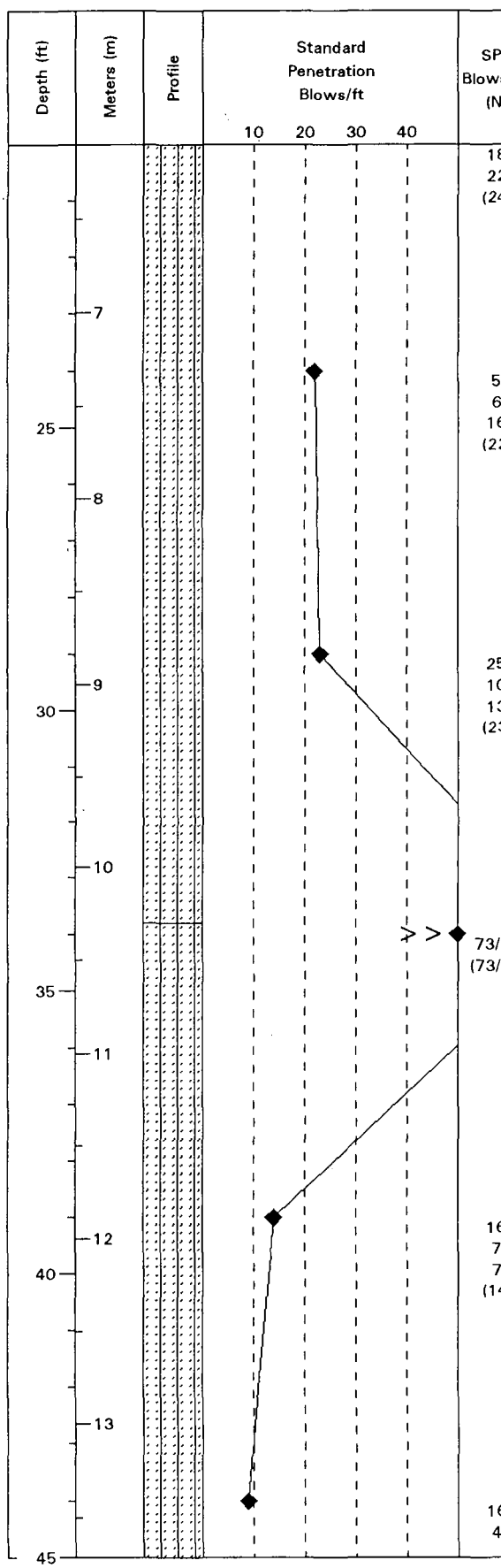
Washington State Department of Transportation

HOLE No. **H-27-94**

Sheet 2 of 4

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**



Depth (ft)	Meters (m)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material
		18 22 (24)				cobbles indicated from 14.0 ft. to 19.0 ft. Retained 0.7 ft.
	7					
						Material changed at depth 24.0 ft.
		5 6 16 (22)		D-6		Silty SAND with gravel and clay, rounded to subangular, medium dense, brown, moist (fill). Retained 0.7 ft.
25						
	8					
						Material changed at 29.0 ft.
		25 10 13 (23)		D-7	GS MC	SM, M.C. = 14% Silty SAND with gravel, clay and decayed wood particles, rounded to subrounded, medium dense, brown, moist (fill). Retained 1.0 ft.
	9					
30						
	10					
		73/3" (73/3")		D-8		Sampler bouncing on cobble, very dense. No recovery.
35						
	11					
						Material changed at 39.0 ft.
		16 7 7 (14)		D-9	GS MC	SM, M.C. = 16% Silty SAND trace of wood particles, medium dense, brownish gray, moist. Retained 1.0 ft.
	12					
40						
	13					
						Material changed at 44.0 ft.
		16 4		D-10	GS MC	SM, M.C. = 15% Silty SAND with gravel, clay and wood particles,
45						

LOG OF TEST BORING

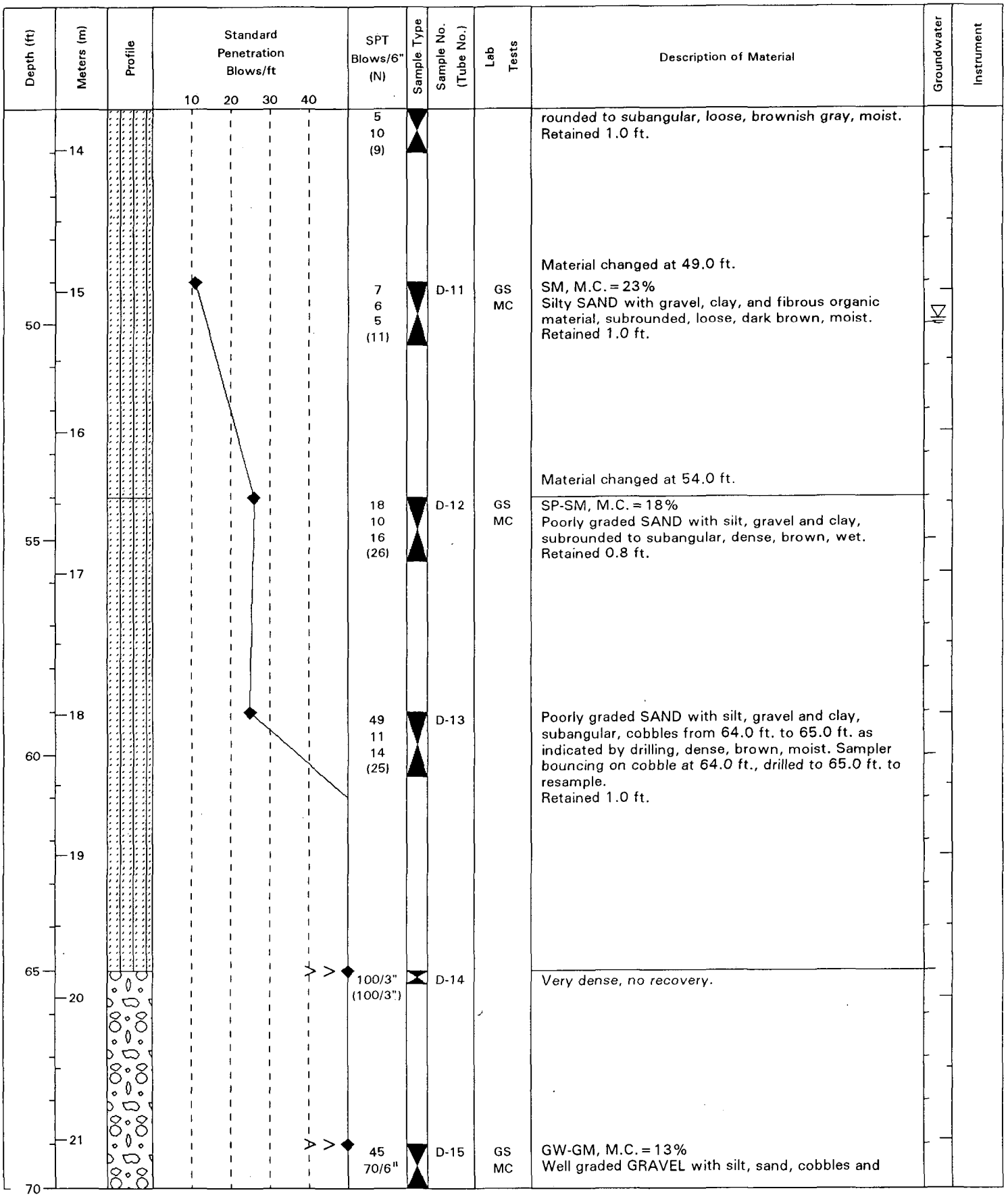
Washington State Department of Transportation

HOLE No. **H-27-94**

Sheet 3 of 4

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. OL-1863



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. H-27-94

Sheet 4 of 4

PROJECT Pierce County Line to Tukwila Stage 3

Job No. OL-1863

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				(70/6")				clay and brown to orange stains, subangular, very dense, brown, moist. Retained 0.8 ft.		
	22									
			> >	100/6" (100/6")		D-16		Well graded gravel with silt, sand, cobbles and clay, angular, very dense, brown, moist. Retained 0.8 ft.		
75	23							End of test hole boring at 74.5.0 ft. below ground elevation.		
								This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	24									
80										
	25									
85	26									
	27									
90										
	28									
95										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. H-28-94

PROJECT Pierce County Line to Tukwila Stage 3 — Job No. OL-1863

Bridge 5/508 — S.R. 5

Station 235+744.32 — Offset 12.82m Lt. — C.S. 1767

Equipment — Casing — Ground El 361.2 (110.09 m)

Method of Boring Augers

Start Date December 7, 1994 — Completion Date December 7, 1994 — Sheet 1 of 4

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								1 ft. = 0.3048 m.		
	1			4 7 12 (19)		D-1		Silty SAND with gravel, subrounded, medium dense, brown, moist, residual soil. Retained 1.0 ft.		
5	2									
				4 3 3 (6)		D-2	GS MC	SM, M.C. = 14% Silty SAND with gravel, subrounded, loose, brown, wet, residual soil. Retained 1.0 ft.		
10	3									
	4			8 12 5 (17)		D-3		Silty SAND with gravel, subrounded, medium dense, brown, moist, residual soil. Retained 0.8 ft.		
15	5									
								February 3, 1995	▽	
	6			2 3		D-4		Silty SAND with gravel, subrounded, loose, brown, wet, residual soil.		
20										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-28-94**

Sheet 2 of 4

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				4 (7)				Retained 1.2 ft.		
	7									
25				14 17 15 (32)		D-5	GS MC	SM, M.C. = 11% Silty SAND with gravel, subrounded, dense, gray, wet, residual soil. Retained 1.5 ft.		
	8									
	9			8 9 16 (25)		D-6		Silty SAND with gravel, subrounded, dense, gray, wet, residual soil. Retained 1.5 ft.		
30								July 31, 1995	▼	
	10									
				12 20 20 (40)		D-7		Well graded SAND with silt and gravel, subrounded, dense, reddish brown, moist, residual soil. Retained 1.0 ft.		
35										
	11									
	12			14 19 19 (38)		D-8	GS MC	Well graded SAND with silt and gravel, subrounded, dense, reddish brown, moist, residual soil. Retained 1.5 ft.		
40										
	13									
			>	44 41		D-9		Well graded SAND with silt and gravel, subrounded, very dense, reddish brown, moist, residual soil.		
45										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-28-94**

Sheet 3 of 4

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				50 (91)				Retained 1.5 ft.		
	14									
	15			21 50/5 (50/5")		D-10		Well graded SAND with silt and gravel, subrounded, very dense, reddish brown, moist, residual soil. Retained 1.0 ft.		
50										
	16									
				14 28 47 (75)		D-11		Well graded SAND with silt and gravel, subangular, very dense, reddish brown, moist, residual soil. Retained 1.2 ft.		
55	17									
	18			43 22 35 (57)		D-12		Well graded SAND with silt and gravel, very dense, brown, moist, residual soil. Retained 1.0 ft.		
60										
	19									
				45 50/3 (50/3")		D-13		Well graded SAND with silt and gravel, subangular, very dense, reddish brown, moist, residual soil. Retained 0.7 ft.		
65	20									
	21			50/5" (50/5")		D-14		Well graded SAND with silt and gravel, subangular, very dense, reddish brown,moist, residual soil.		
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. H-28-94

Sheet 4 of 4

PROJECT Pierce County Line to Tukwila Stage 3

Job No. OL-1863

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								Retained 0.4 ft.		
	22									
				50/3" (50/3")		D-15		Well graded SAND with silt and gravel, subangular, very dense, reddish brown, moist, residual soil. Retained 0.7 ft.		
75	23							End of test hole boring at 74.8 ft. below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	24									
80										
	25									
85	26									
	27									
90										
	28									
95										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-29-94**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

Bridge 5/508 S.R. **5**

Station **235+817.21** Offset **12.3m Rt.** C.S. **1767**

Equipment Casing **4" Augers to 73'** Ground El **383.9 (117.01 m)**

Method of Boring **Hollow Core Augers**

Start Date **December 8, 1994** Completion Date **December 8, 1994** Sheet **1** of **4**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				3 7 11 6 (18)		D-1	GS MC	1 ft. = 0.3048 m. GM, M.C. = 9% Silty GRAVEL with sand, medium dense, brown, moist, homogeneous. Retained 0.8 ft.		
	1			1 1 2 1 (3)		D-2	GS MC	GM, M.C. = 16% Silty GRAVEL with sand, very loose, brown, wet, homogeneous. Retained 1.0 ft.		
5										
	2			7 6 5 4 (11)		D-3		Silty GRAVEL with sand, medium dense, brown, wet, homogeneous. Retained 0.8 ft.		
				1 1 2 2 (3)		D-4		Silty SAND with gravel, medium dense, brown, wet, homogeneous. Retained 0.8 ft.		
10	3									
				1 1 1 1 (2)		D-5	GS MC	SM, M.C. = 14% Silty SAND with gravel, very loose, gray, wet, homogeneous. Retained 0.5 ft.		
	4			2 5 8 9 (13)		D-6	GS MC	SM, M.C. = 13% Silty SAND with gravel, medium dense, brown, moist, homogeneous. Retained 1.8 ft.		
15										
	5			4 5 6 4 (11)		D-7	GS MC PI	SM, M.C. = 15% Silty SAND with gravel, medium dense, gray, moist, homogeneous. Retained 1.5 ft.		
				6 15 17 12 (32)		D-8	GS MC	SM, M.C. = 8% Silty SAND with gravel, dense, gray, moist, homogeneous. Retained 1.3 ft.		
20	6									

LOG OF TEST BORING

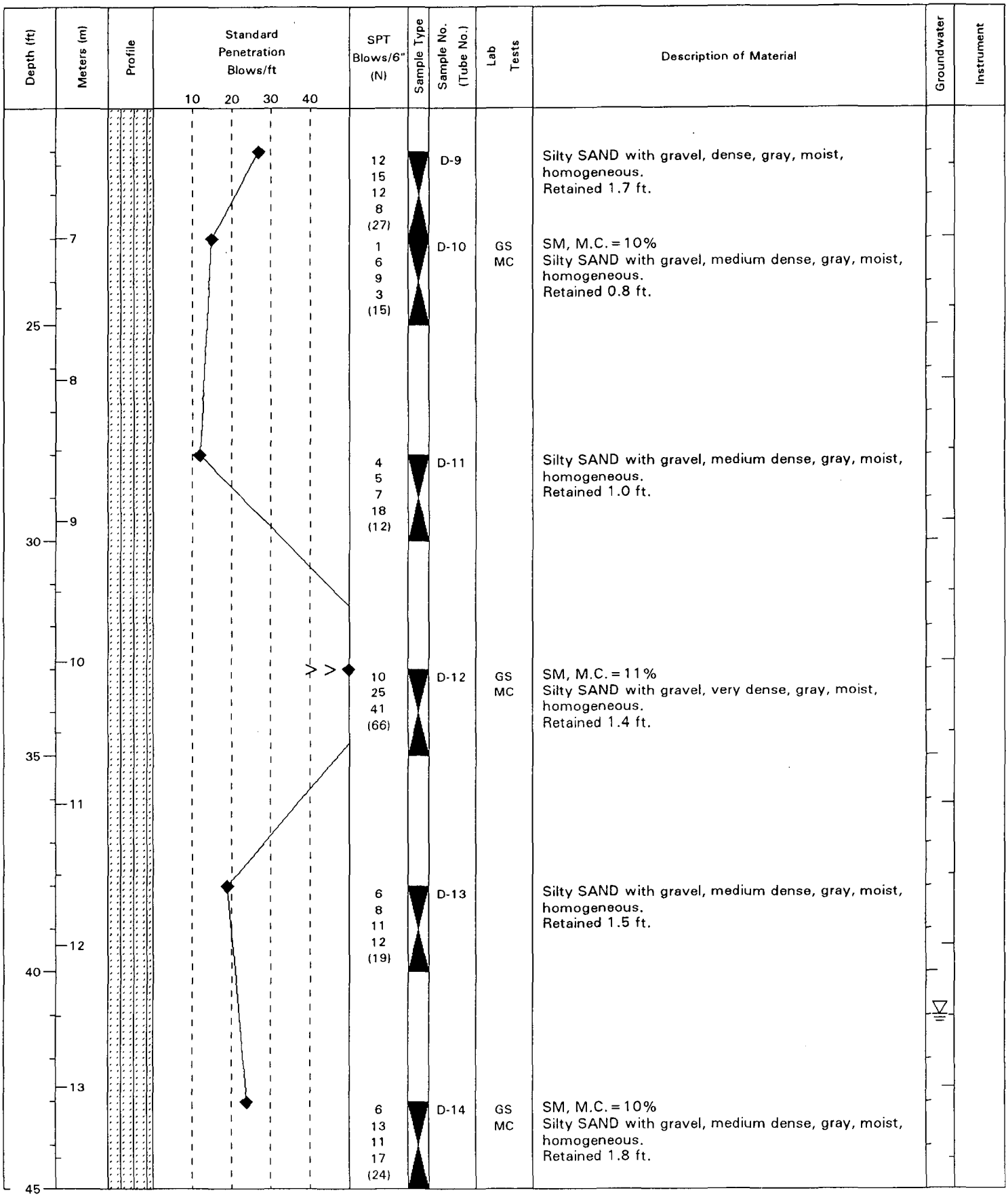
Washington State Department of Transportation

HOLE No. H-29-94

Sheet 2 of 4

PROJECT Pierce County Line to Tukwila Stage 3

Job No. OL-1863



Depth (ft)	Meters (m)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
		12 15 12 8 (27)		D-9		Silty SAND with gravel, dense, gray, moist, homogeneous. Retained 1.7 ft.		
	7	1 6 9 3 (15)		D-10	GS MC	SM, M.C. = 10% Silty SAND with gravel, medium dense, gray, moist, homogeneous. Retained 0.8 ft.		
25								
	8							
		4 5 7 18 (12)		D-11		Silty SAND with gravel, medium dense, gray, moist, homogeneous. Retained 1.0 ft.		
30	9							
	10	10 25 41 (66)		D-12	GS MC	SM, M.C. = 11% Silty SAND with gravel, very dense, gray, moist, homogeneous. Retained 1.4 ft.		
35								
	11							
		6 8 11 12 (19)		D-13		Silty SAND with gravel, medium dense, gray, moist, homogeneous. Retained 1.5 ft.		
40	12						▽	
	13							
		6 13 11 17 (24)		D-14	GS MC	SM, M.C. = 10% Silty SAND with gravel, medium dense, gray, moist, homogeneous. Retained 1.8 ft.		
45								

Standard Penetration Blows/ft: 10 20 30 40

LOG OF TEST BORING

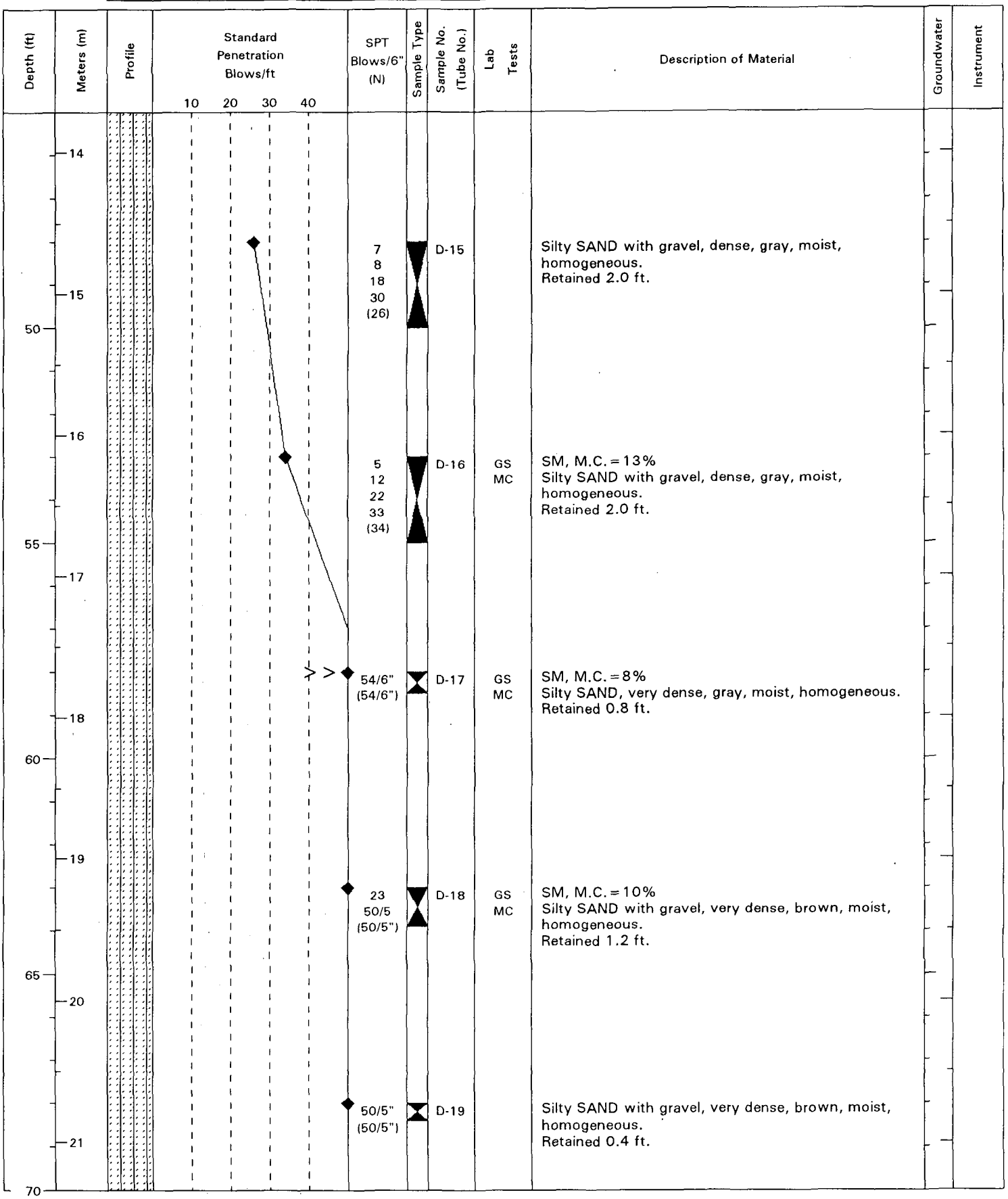
Washington State Department of Transportation

HOLE No. **H-29-94**

Sheet 3 of 4

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. H-29-94

Sheet 4 of 4

PROJECT Pierce County Line to Tukwila Stage 3

Job No. OL-1863

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	22		> >	55/6" (55/6")		D-20		Silty SAND with gravel, very dense, brown, moist, homogeneous. Retained 0.5 ft.		
75	23							End of test hole boring at 73.5 ft. below ground elevation.		
								This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	24									
80										
	25									
85	26									
	27									
90										
	28									
95										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-30-94**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

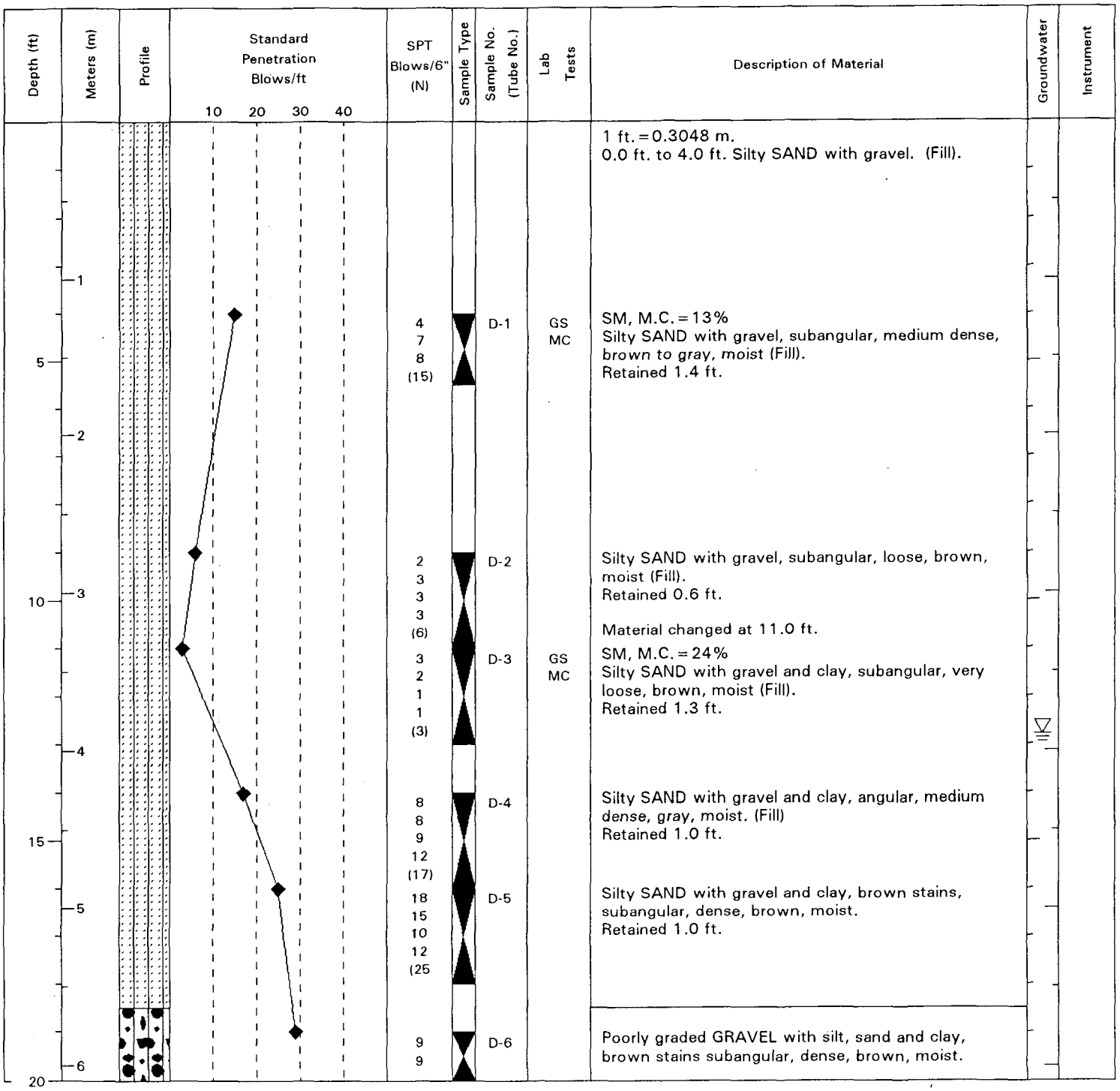
Bridge 5/509 S.R. **5**

Station **236+376.82** Offset **10.57m Lt.** C.S. **1727**

Equipment _____ Casing **4" OD X 50' Hollow Core** Ground El **397.3 (121.10 m)**

Method of Boring **Dry to Wet Rotary**

Start Date **December 15, 1994** Completion Date **December 16, 1994** Sheet **1** of **3**



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-30-94**

Sheet 2 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				20 (29)				Retained 0.5 ft.		
	7							Material changed at depth 24.0 ft.		
				75/6" (75/6")		D-7	GS MC	GP-GM, M.C. = 9% Poorly graded GRAVEL with silt, sand and clay, subangular, very dense, dark brown, wet. Blow count with standard penetrometer, sample taken with California sampler to get more material. Retained 0.9 ft.		
25	8									
				11 22 70/2" (92/8")		D-8		Silty GRAVEL with sand and clay, subangular, very dense, dark brown, moist. Retained 0.8 ft. *Note: Auger refusal at depth 30.5 ft., changed to HQ core barrel wet rotary.*		
30	9									
	10							Changed at depth 34.0 ft.		
				70 50/4 (50/4")		D-9	GS MC	SM, M.C. = 9% Silty SAND with gravel and cobbles bonded together with a clay matrix, subangular, very dense, gray, moist. Retained 0.8 ft.		
35	11									
				75/6" (75/6")		D-10		Silty SAND with gravel and cobbles bonded together with a clay matrix, subangular, very dense, gray, moist. Retained 0.8 ft.		
40	12									
	13									
				24 52/6		D-11		Silty SAND with gravel and cobbles bonded together with a clay matrix, subangular, very dense, gray,		
45										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. H-30-94

Sheet 3 of 3

PROJECT Pierce County Line to Tukwila Stage 3

Job No. OL-1863

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				(52/6")				moist. Retained 0.9 ft.		
	14									
	15			25 100/6 (100/6		D-12		Silty SAND with gravel and cobbles bonded together with a clay matrix, subangular, very dense, gray, moist. Retained 0.8 ft.		
50								End of test hole boring at 50.0 ft. below ground elevation.		
	16							This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
55										
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-31-94**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

Bridge 5/509 S.R. **5**

Station **236+397.16** Offset **12.27m Rt.** C.S. **1727**

Equipment _____ Casing _____ Ground El **380.6 (116.01 m)**

Method of Boring **Wet Rotary**

Start Date **December 15, 1994** Completion Date **December 15, 1994** Sheet **1** of **2**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								1 ft. = 0.3048 m.		
5	1			17 25 55 (80)		D-1	GS MC	GP-GM, M.C. ≈ 13% Poorly graded GRAVEL with silt and sand. Top 7 inches, poorly graded GRAVEL with sand, rounded to angular. Bottom 3 inches is SILT with gravel, rounded to angular, very hard, moist, gray green. Retained 0.8 ft.		
10	2 3			50/5" (50/5")		D-2		SILT with gravel, rounded to angular, very hard, moist, gray green. Retained 0.3 ft. February 13, 1995 July 31, 1995		
15	4 5			50/5" (50/5")		D-3		No recovery, approximately 1 inch rock fragments.		
20	6									

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-31-94**

Sheet 2 of 2

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				28 50/5 (50/5")		D-4		Poorly graded GRAVEL with silt and sand, very dense, moist, gray, homogeneous. Retained 0.5 ft.		
25	7							Approximately 1 ft. layer of SAND.		
	8			15 27 50/4"		D-5	GS MC	SM, M.C. = 25% Silty SAND with gravel, rounded to angular, very dense, moist, green homogeneous. Till. Retained 1.0 ft.		
30	9									
				41 50/4" (50/4"		D-6		Silty SAND with gravel, rounded to angular, very dense, moist, green, homogeneous. Retained 0.7 ft.		
	10							End of test hole boring at 32.2 ft. below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
35	11									
40	12									
	13									
45										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-32-94**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

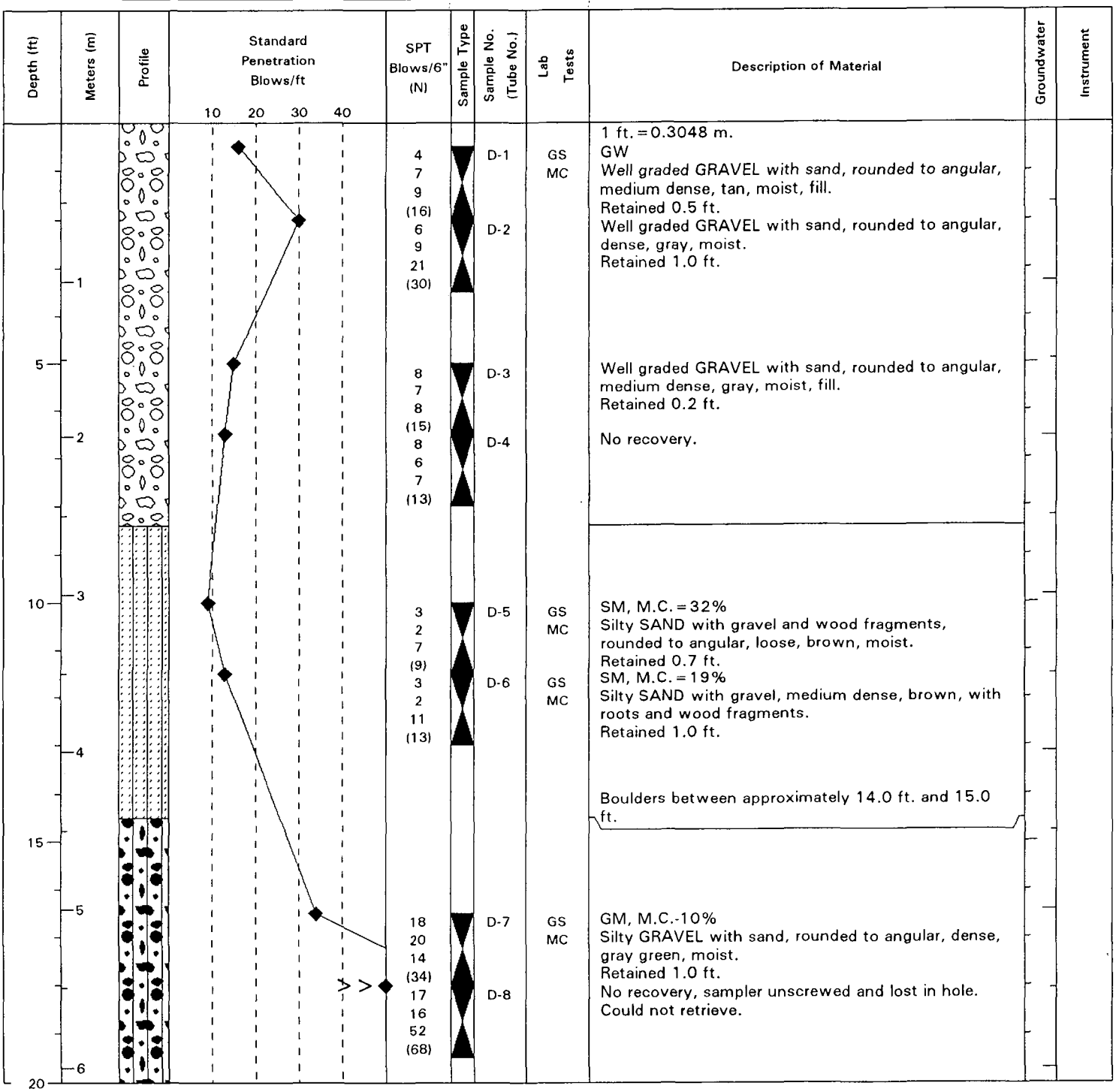
Bridge 5/509 S.R. **5**

Station **236+432.32** Offset **10.12m Lt.** C.S. **1727**

Equipment Casing **18' HW, 46.5' HQ** Ground El **397.3 (121.10 m)**

Method of Boring **Wet Rotary**

Start Date **December 21, 1994** Completion Date **December 21, 1994** Sheet **1** of **3**



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. H-32-94

Sheet 2 of 3

PROJECT Pierce County Line to Tukwila Stage 3

Job No. OL-1863

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				44 50/4 (50/4")		D-9		Silty GRAVEL with sand, rounded to angular, very dense, gray green, moist. Retained 0.7 ft.		
	7									
25										
	8			50/5" (50/5")		D-10		Silty GRAVEL with sand, rounded to angular, very dense, gray, moist. Retained 0.3 ft.		
	9									
30										
				50/5" (50/5")		D-11	GS MC	GP-GM, M.C. = 9% Poorly graded GRAVEL with silt and sand, rounded to angular, very dense, gray, moist. Retained 0.4 ft.		
	10									
35										
	11			50/3" (50/3")		D-12		Poorly graded GRAVEL with silt and sand, rounded to angular, very dense, gray, moist, homogeneous. Retained 0.3 ft.		
	12									
40										
				50/5" (50/5")		D-13		Poorly graded GRAVEL with silt and sand, very dense, gray, moist. Retained 0.4 ft.		
	13									
45										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. H-32-94

Sheet 3 of 3

PROJECT Pierce County Line to Tukwila Stage 3

Job No. OL-1863

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			33 50/5 (50/5")		D-14		Poorly graded GRAVEL with silt and sand, rounded to angular, very dense, green, moist, homogeneous. Retained 0.7 ft.		
								End of test hole boring at 47.4 ft. below ground elevation.		
	15							Water table elevation not determined.		
50								This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	16									
55										
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-33-94**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

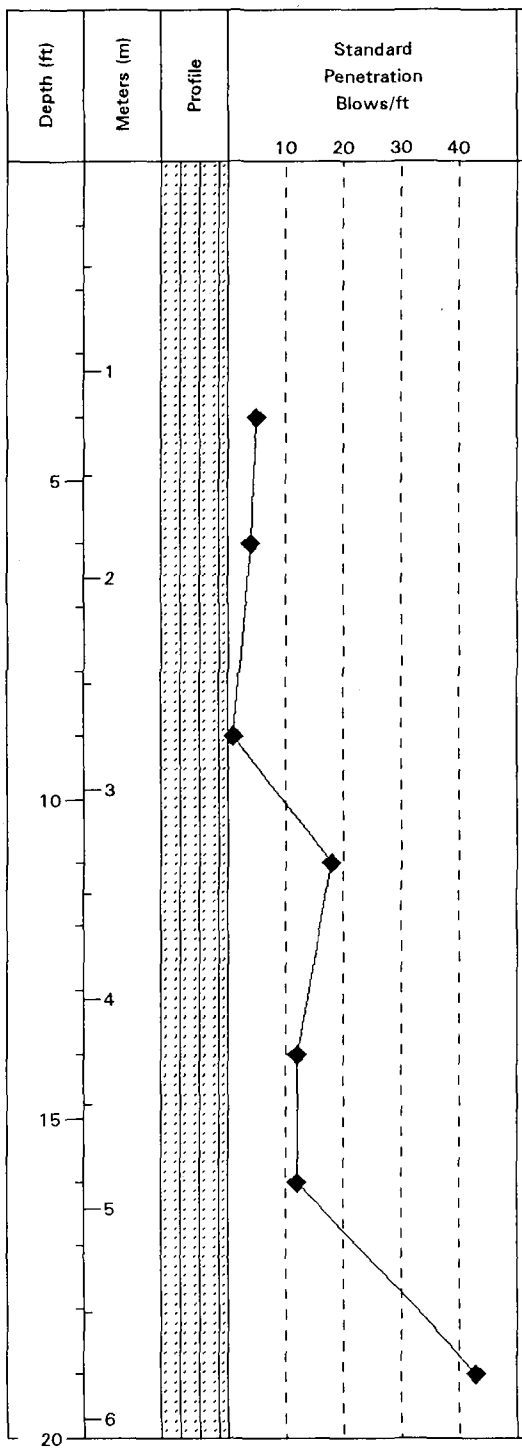
Bridge 5/510 S.R. **5**

Station **237+715.25** Offset **8.69m Lt.** C.S. **1727**

Equipment Casing **4" OD X 50' Hollow Core** Ground El **340.6 (103.81 m)**

Method of Boring **Dry Rotary**

Start Date **December 15, 1994** Completion Date **December 15, 1994** Sheet **1** of **3**



SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				1 ft. = 0.3048 m. 0.0 ft. to 4.0 ft. Silty SAND with gravel (Fill).		
2 2 3 3 (5)		D-1	GS MC	SM, M.C. = 9% Silty SAND with gravel, subrounded, loose, brown, moist. (Fill). Retained 0.5 ft. Material changed at 6.0 ft.		
2 2 2 4 (4)		D-2		Silty SAND with gravel and clay, subangular, loose, brown, moist. (Fill). Retained 0.8 ft.		
2 1/12 2 (1/12")		D-3	GS MC	SM, M.C. = 11% Silty SAND with gravel and clay, very loose, brown, moist. (Fill). Retained 0.8 ft.		
8 9 9 7 (18)		D-4		Silty SAND with gravel and, subangular, medium dense, brown, moist. (Fill). Retained 0.8 ft.		
				Material changed at 14.0 ft.		
2 8 4 6 (12)		D-5	GS MC	SM, M.C. = 7% Silty SAND with gravel, organics and clay, angular to subangular, medium dense, gray, moist. (Fill). Retained 1.5 ft. Material changed at depth 16.0 ft.		
7 7 5 6 (12)		D-6		Silty SAND with gravel and clay, subangular, medium dense, gray, moist. (Fill). Retained 1.6 ft.		
5 6		D-7		Silty SAND with gravel and clay, subangular, dense, gray, moist.		

LOG OF TEST BORING

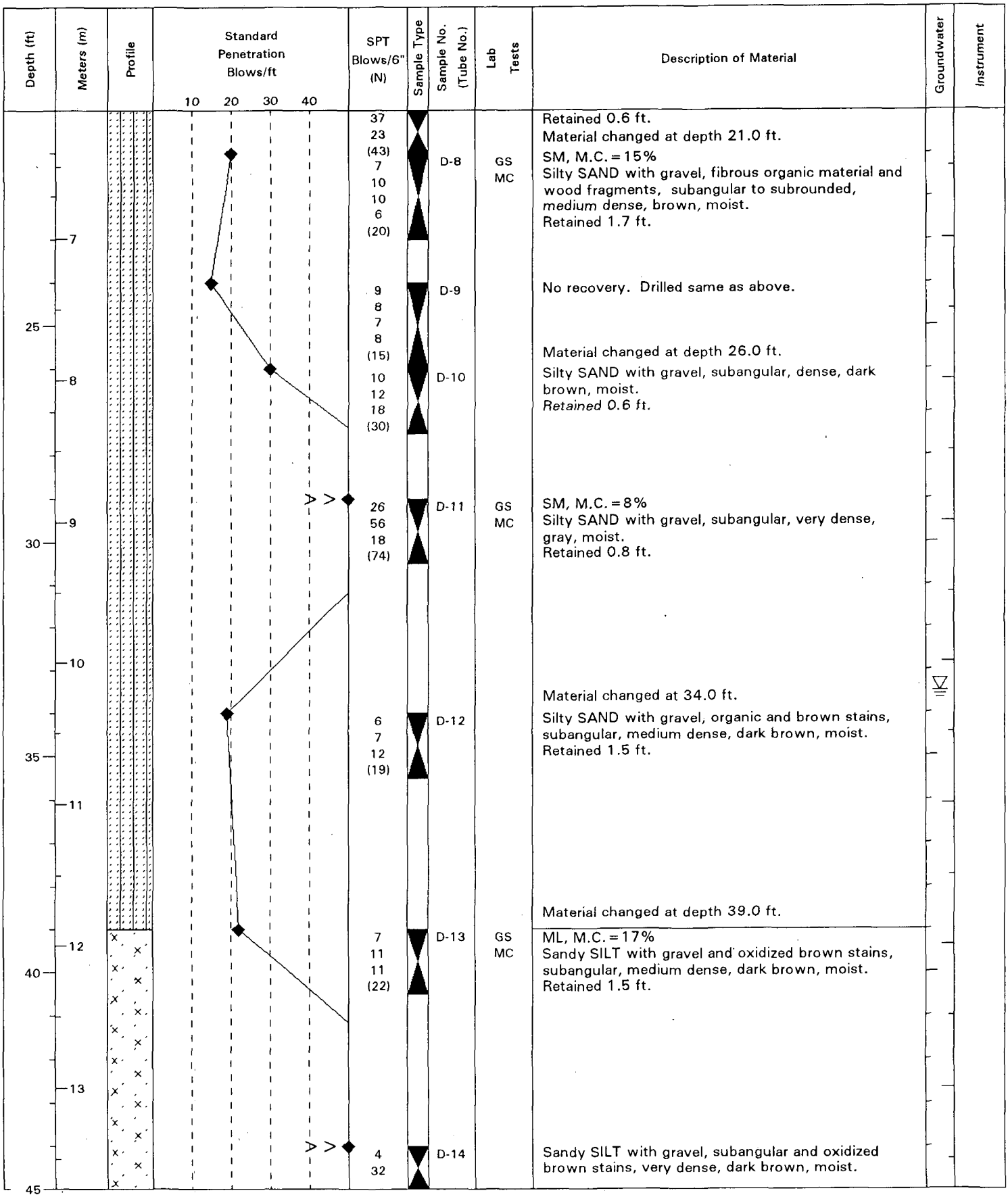
Washington State Department of Transportation

HOLE No. **H-33-94**

Sheet 2 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**



Depth (ft)	Meters (m)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
		37				Retained 0.6 ft.		
		23				Material changed at depth 21.0 ft.		
		(43)				SM, M.C. = 15%		
		7		D-8	GS MC	Silty SAND with gravel, fibrous organic material and wood fragments, subangular to subrounded, medium dense, brown, moist.		
		10						
		10						
		6						
	7	(20)				Retained 1.7 ft.		
		9		D-9		No recovery. Drilled same as above.		
		8						
25		7						
		8						
		(15)				Material changed at depth 26.0 ft.		
	8	10		D-10		Silty SAND with gravel, subangular, dense, dark brown, moist.		
		12						
		18						
		(30)				*Retained* 0.6 ft.		
		26		D-11	GS MC	SM, M.C. = 8%		
	9	56				Silty SAND with gravel, subangular, very dense, gray, moist.		
30		18						
		(74)				Retained 0.8 ft.		
	10						▽	
						Material changed at 34.0 ft.		
		6		D-12		Silty SAND with gravel, organic and brown stains, subangular, medium dense, dark brown, moist.		
		7						
35		12						
		(19)				Retained 1.5 ft.		
	11							
						Material changed at depth 39.0 ft.		
		7		D-13	GS MC	ML, M.C. = 17%		
	12	11				Sandy SILT with gravel and oxidized brown stains, subangular, medium dense, dark brown, moist.		
40		11						
		(22)				Retained 1.5 ft.		
	13							
		4		D-14		Sandy SILT with gravel, subangular and oxidized brown stains, very dense, dark brown, moist.		
45		32						

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-33-94**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				55 (87)				Retained 1.5 ft.		
	14									
	15			16 25 24 (49)		D-15		Sandy SILT with gravel, subangular, dense, dark brown, moist. Retained 0.8 ft.		
50										
								End of test hole boring at 50.5 ft. below ground elevation.		
	16							This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
55										
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-34-94**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

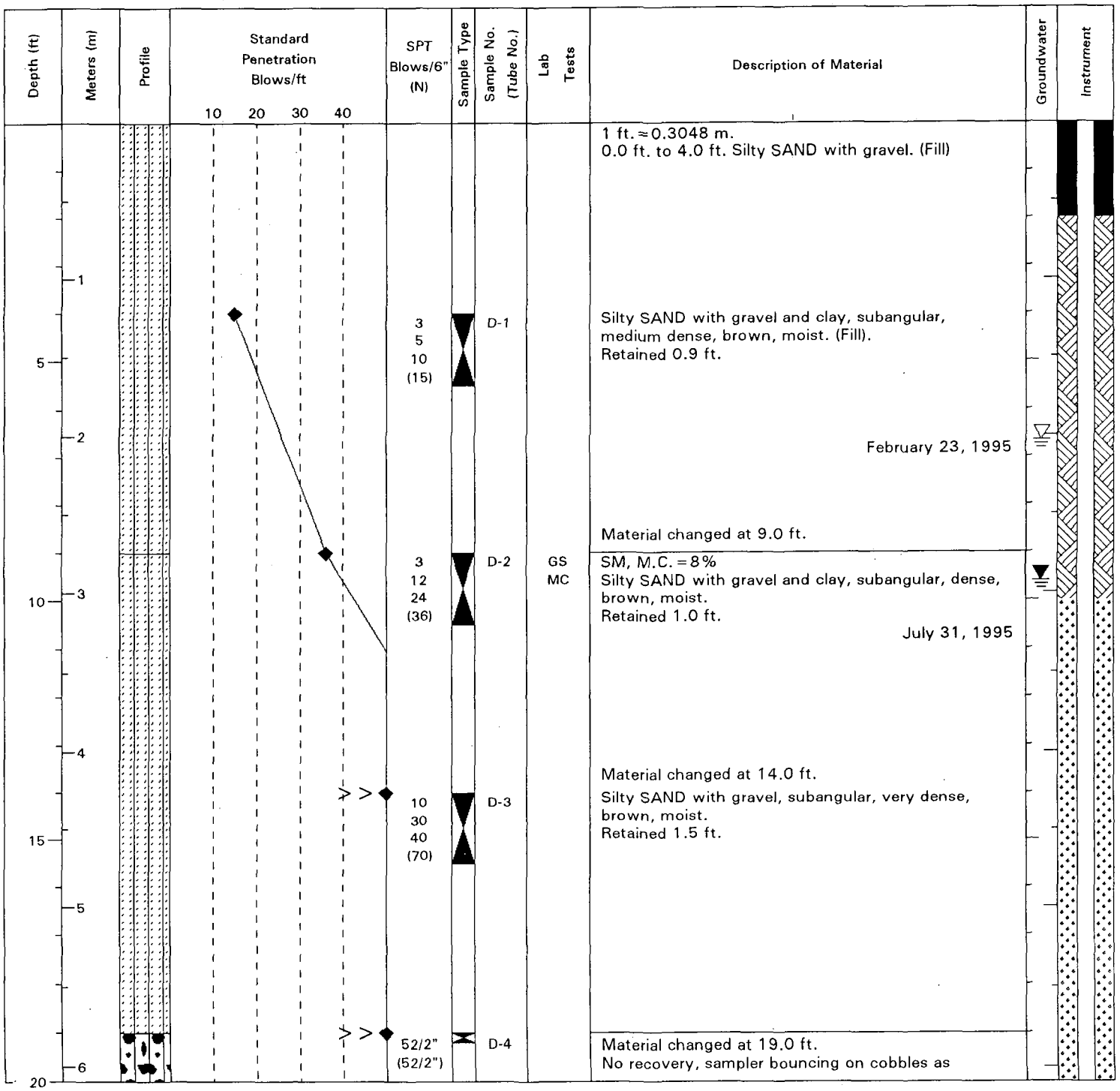
Bridge 5/510 S.R. **5**

Station **237+733.76** Offset **13.56m Rt.** C.S. **1727**

Equipment _____ Casing **4" OD X 50' Hollow Core** Ground El **325.1 (99.09 m)**

Method of Boring **Dry Rotary**

Start Date **December 20, 1994** Completion Date **December 20, 1994** Sheet **1** of **3**



LOG OF TEST BORING

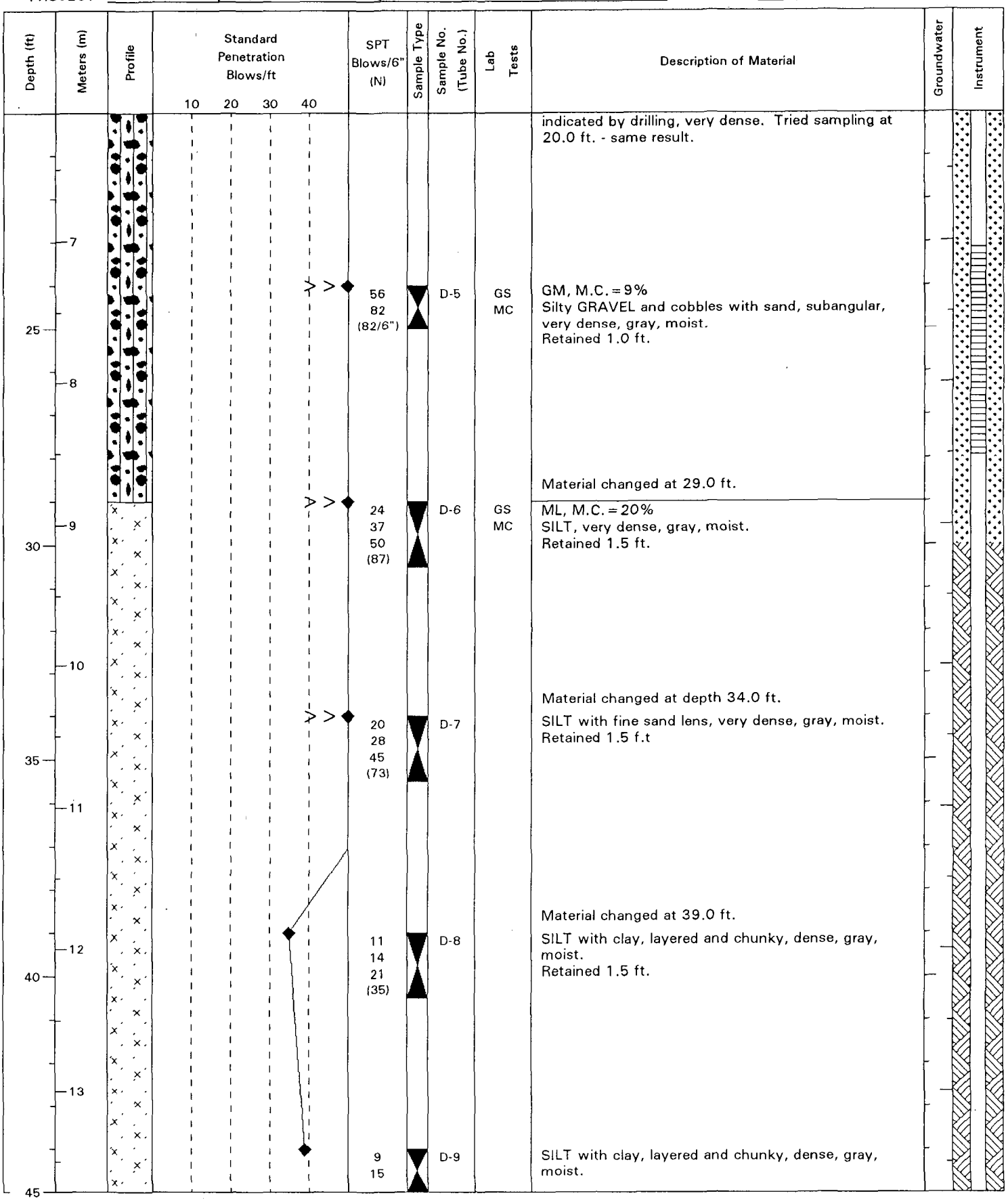
Washington State Department of Transportation

HOLE No. H-34-94

Sheet 2 of 3

PROJECT Pierce County Line to Tukwila Stage 3

Job No. OL-1863



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-34-94**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			24 (39)				Retained 1.5 ft.		
	15		> > ◆	45 58 (58/6")		D-10	GS MC	GM, M.C. = 7% Silty GRAVEL with sand and clay, subangular, very dense, brownish gray, moist. Retained 0.8 ft.		
50								End of test hole boring at 50.0 ft. below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	16									
55										
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-35-94**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

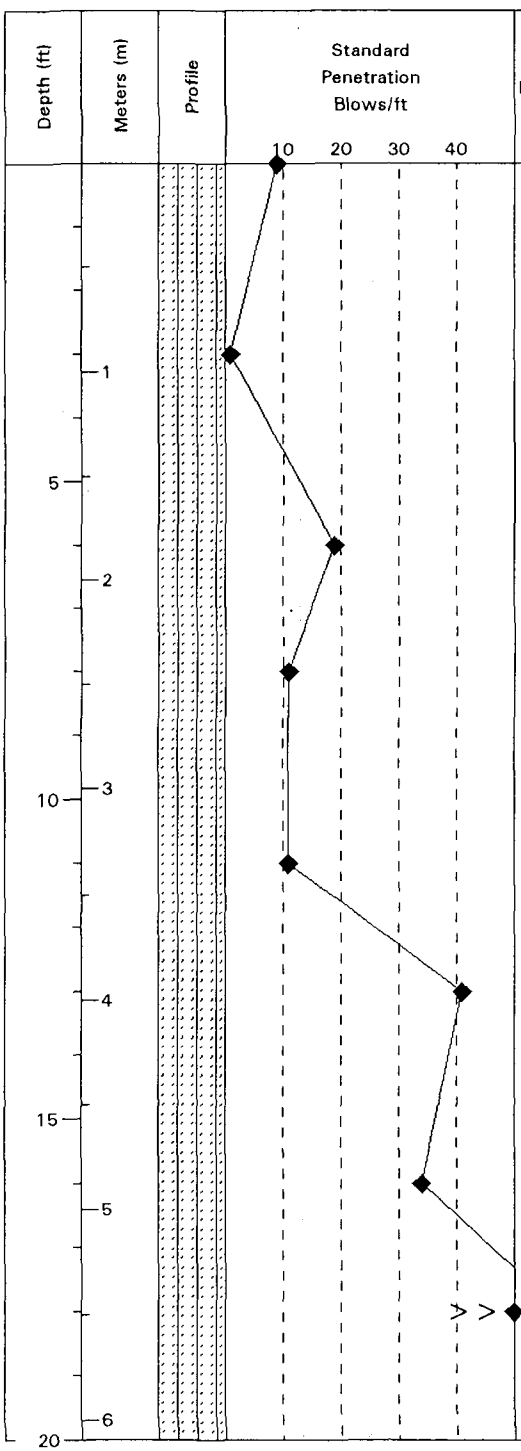
Bridge 5/510 S.R. **5**

Station **237+769.92** Offset **10.39m Rt.** C.S. **1727**

Equipment _____ Casing **4" Augers to 48'** Ground El **348.1 (106.10 m)**

Method of Boring **Hollow Core Augers**

Start Date **December 13, 1994** Completion Date **December 13, 1994** Sheet **1** of **3**



SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material
3 4 5 4 (9)		D-1		1 ft. = 0.3048 m. Poorly graded, silty SAND with gravel, loose, brown, moist, disrupted (Fill). Retained 0.4 ft.
1/12" 1/12"		D-2		Silty SAND with gravel, very loose, brown, wet to moist, disrupted (Fill). Retained 0.5 ft.
1 9 10 9 (19)		D-3	GS MC	SM, M.C. = 13% Silty SAND with gravel, medium dense, brown, moist, disrupted. (Fill) Retained 1.3 ft.
5 5 6 3 (11)		D-4		Silty SAND with gravel, medium dense, brown, moist, disrupted. Retained 0.3 ft.
13 5 6 6 (11)		D-5		Poorly graded, silty SAND with gravel, medium dense, brown, moist, disrupted (Fill). Retained 0.8 ft.
45 19 22 (41)		D-6	GS MC	SM, M.C. = 5% Poorly graded, silty SAND with gravel, dense, gray, moist, homogeneous. Retained 0.9 ft.
10 19 15 22 (34)		D-7		Poorly graded, silty SAND with gravel, dense, gray, moist, homogeneous. Retained 0.9 ft.
15 24 34 (58)		D-8		Silty SAND with gravel, very dense, gray, moist, homogeneous. Retained 1.3 ft.

Groundwater

Instrument

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-35-94**

Sheet 2 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				40 50/4 (50/4")		D-9		Silty SAND with gravel, very dense, gray, moist, homogeneous. Retained 1.5 ft.		
	7			50/4" (50/4")		D-10		Silty SAND with gravel, very dense, gray, moist, homogeneous. Retained 0.3 ft.		
25										
	8									
				50/5" (50/5")		D-11		Silty SAND with gravel, very dense, gray, moist, homogeneous. Retained 0.3 ft.	▽	
	9									
30										
	10		> >	60/6" (60/6")		D-12	GS MC	SM, M.C. = 7% Silty SAND with gravel, very dense, gray, moist, homogeneous. Retained 0.5 ft.		
35										
	11									
				17 50/4 (50/4")		D-13		Silty SAND with gravel, very dense, gray, moist, homogeneous. Retained 0.8 ft.		
	12									
40										
	13		> >	17 35 50/4"		D-14		Silty SAND with gravel, very dense, gray, moist, homogeneous. Retained 1.3 ft.		
45										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-35-94**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14		◆	11 19 27 (46)		D-15		Silty SAND with gravel, dense, gray, moist, homogeneous. Retained 1.5 ft.		
	15									
50								End of test hole boring at 49.5 ft. below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	16									
55										
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. H-36-95

PROJECT Pierce County Line to Tukwila Stage 3 — Job No. OL-1863

Bridge 5/506 — S.R. 5

Station 232+923.51 — Offset 10.55 m Rt. — C.S. 1727

Equipment — Casing 4" OD X 55' Augers — Ground El 438.0 (133.50 m)

Method of Boring Dry Rotary

Start Date October 7, 1995 — Completion Date October 7, 1995 — Sheet 1 of 3

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				3 5 8 18 (13)		D-1		1 ft. = 0.3048 m. Well graded GRAVEL with sand and silt, rounded to subrounded, medium dense, brown, moist. Fill. Retained 0.9 ft.		
				14 14 12 10 (26		D-2		Well graded GRAVEL with silt and sand, rounded to subrounded, dense, brown, moist. Fill. Retained 1.0 ft.		
	1			5 5 4 2 (9)		D-3		Well graded GRAVEL with silt and sand, rounded to subrounded, loose, brown, moist. Fill. Retained 0.5 ft.		
5				2 1 1 1 (2)		D-4		Well graded GRAVEL with silt and sand, very loose, brown, moist. Fill or replacement material. Retained 0.5 ft.		
	2			2 3 4 4 (7)		D-5		Well graded GRAVEL with silt and sand, loose, brown to dark gray, moist. Fill. Retained 0.8 ft.		
10	3			3 11 8 7 (19)		D-6		Well graded GRAVEL with silt, sand and clay, rounded, medium dense, brown, moist. Fill. Retained 0.9 ft.		
	4			15 12 16 (28)		D-7		Well graded GRAVEL with silt and sand, rounded to subrounded, dense, grayish brown, moist. Fill. Retained 1.0 ft.		
15	5			11 5		D-8		Well graded GRAVEL with silt and sand, rounded, medium dense, grayish brown, moist, organics.		
20	6									

LOG OF TEST BORING

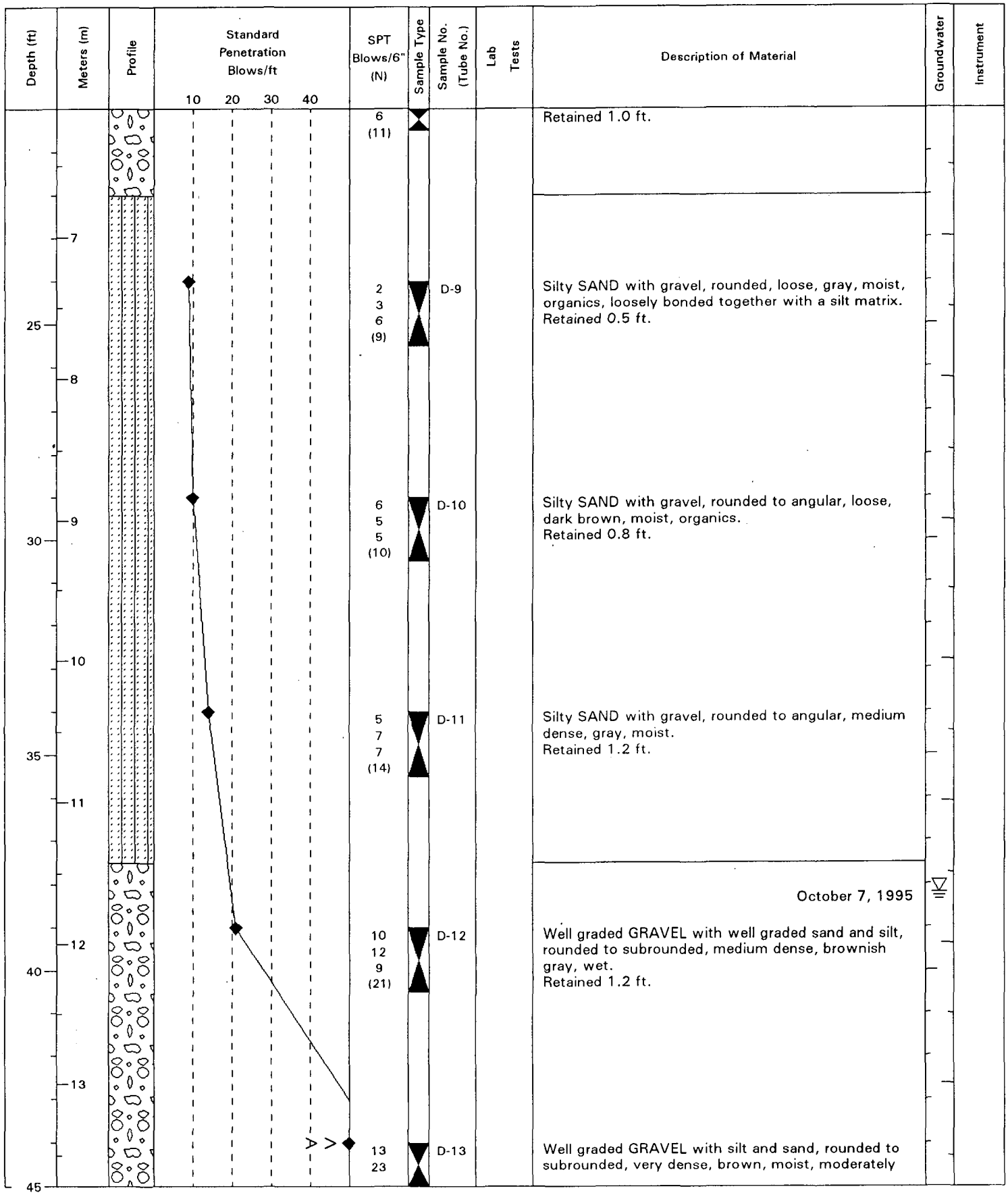
Washington State Department of Transportation

HOLE No. **H-36-95**

Sheet 2 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-36-95**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				34 (57)				bonded with a silt matrix. Retained 1.5 ft.		
	14									
	15			15 16 45 (61)		D-14		Well graded GRAVEL with silt and sand, very dense, dark gray, moist, loosely bonded with silt. Retained 1.0 ft.		
50										
	16									
				15 52 60 (112)		D-15		Poorly graded SAND with well graded gravel and silt, rounded to subrounded, very dense, dark gray, wet. Retained 1.5 ft.		
55										
	17							End of test hole boring at 55.5 ft. below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications.		
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-37-95**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

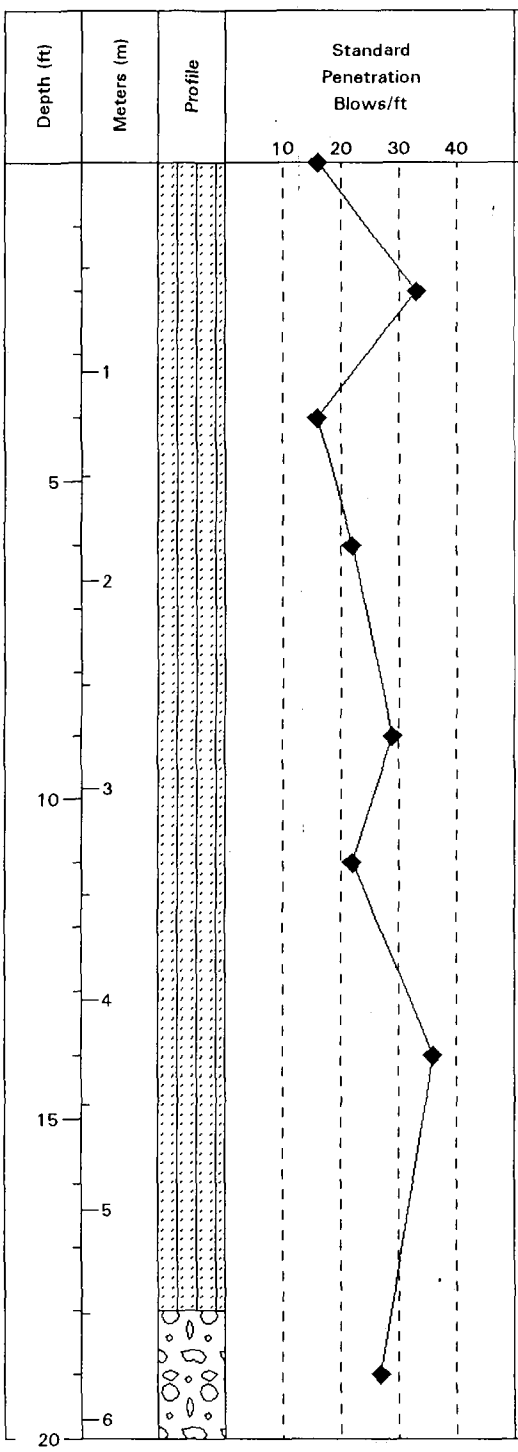
Bridge 5/506 S.R. **5**

Station **232+990.41** Offset **11.16 m Rt.** C.S. **1727**

Equipment Casing **4" OD X 50' Augers** Ground El **429.8 (131.00 m)**

Method of Boring **Dry Rotary**

Start Date **October 7, 1995** Completion Date **October 8, 1995** Sheet **1** of **3**



1 ft. = 0.3048 m.

Well graded GRAVEL with silt and sand, rounded, medium dense, brown, moist. Fill. Retained 1.5 ft.

Well graded GRAVEL with well graded sand, silt and wood debris, rounded to angular, dense, brown, moist. Fill. Retained 1.0 ft.

Well graded GRAVEL with silt and sand, rounded to subangular, medium dense, brown, moist. Fill. Retained 1.3 ft.

Well graded GRAVEL with silt and sand, rounded to subangular, medium dense, brown, moist. Fill. Retained 1.3 ft.

Well graded GRAVEL with silt and sand, rounded to subangular, medium dense, brown, moist. Fill. Retained 1.2 ft.

Well graded GRAVEL with silt and sand, rounded to subrounded, medium dense, brown, moist. Fill. Retained 1.2 ft.

Well graded GRAVEL with silt and sand, rounded, dense, brown,moist, loosely bonded together with silt. Fill. Retained 1.1 ft.

Well graded GRAVEL with silt and sand, rounded, dense, brownish gray, moist.

LOG OF TEST BORING

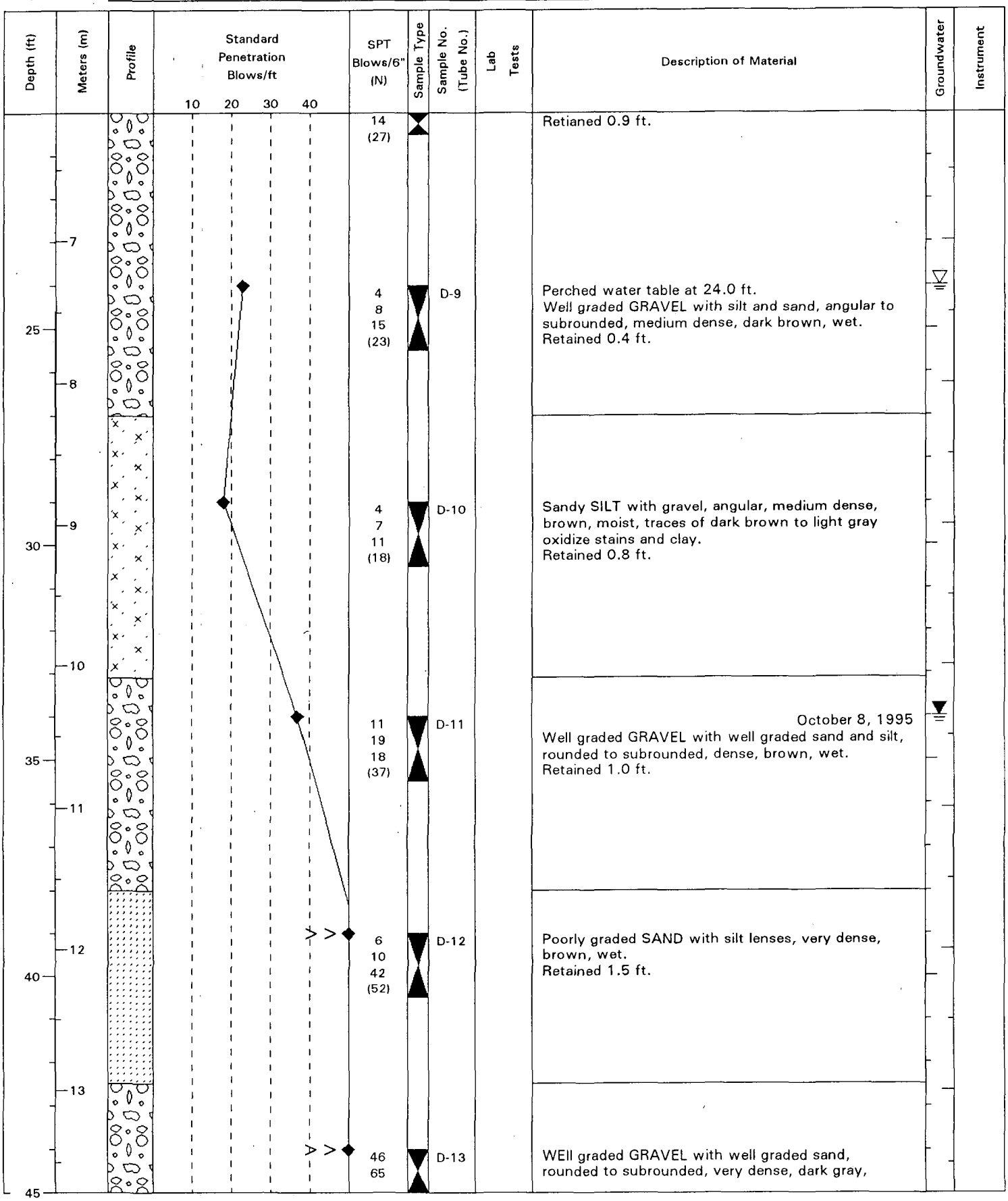
Washington State Department of Transportation

HOLE No. **H-37-95**

Sheet **2** of **3**

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-37-95**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				(65/6")				moist, loosely bonded together with silt. Less than 5% silt. Retained 1.0 ft.		
	14									
	15		> >	44 100 (100/6")		D-14		Well graded GRAVEL with well graded sand, rounded to subrounded, very dense, dark gray, moist, loosely bonded together with silt, less than 5% silt. Retained 1.0 ft.		
50								End of test hole boring at 50.0 ft. below ground elevation.		
	16							This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications.		
55										
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-38-95**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

Bridge 5/506 S.R. **5**

Station **232+984.80** Offset **10.15 m Lt.** C.S. **1727**

Equipment **CME 45** Casing Ground El **410.7 (125.18 m)**

Method of Boring

Start Date **October 7, 1995** Completion Date **October 7, 1995** Sheet **1** of **3**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								1 ft. = 0.3048 m.		
5	1			15 40 (40/6") 43/6" (43/6")	D-1 D-2			Well graded GRAVEL with silt and sand, very dense, brown, moist. Recovered 0.7 ft. Well graded GRAVEL with silt and sand, very dense, brown.		
10	2 3			13 14 15 (29) 18 17 17 (34)	D-3 D-4			Well graded GRAVEL with silt and sand, dense, brown, moist. Recovered 0.7 ft. Well graded GRAVEL with silt and sand, dense, brown, moist. Recovered 0.7 ft.		
15	4 5			31 26 24 (50)	D-5			Well graded GRAVEL with silt and sand, very dense, brown-gray, moist. Recovered 0.9 ft.		
20	6									

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-38-95**

Sheet 2 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				50/3" (50/3")		D-6A		Well graded GRAVEL with silt and sand, very dense, gray, moist. Recovered 0.3 ft.		
25	7			24 50 (50/6")		D-7B		Gravelly SILT with sand, gravel and sand layers are scattered, very hard, gray, moist. Recovered 1.0 ft.		
30	8 9			50/6" (50/6")		D-7		Well graded SAND with silt and gravel, very dense, gray, moist. Recovered 0.5 ft.		
35	10 11			50/2" (50/2")		D-8		Well graded GRAVEL with silt and sand, very dense, gray, moist. Recovered 0.2 ft.		
40	12 13			26 50/5 (50/5")		D-9		Well graded SAND with silt and gravel, very dense, gray, moist. Recovered 0.9 ft.		
45										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-38-95**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			36 50/5 (50/5")		D-10		Well graded SAND with silt and gravel, very dense, gray, moist. Recovered 0.4 ft.		
	15									
50				50/5" (50/5")		D-11		Well graded SAND with silt and gravel, very dense, gray, moist. Recovered 0.4 ft.		
	16									
55				50/4" (50/4")		D-12		Well graded SAND with silt and gravel, very dense, gray, moist. Recovered 0.4 ft.		
	17									
	18									
60				50/3" (50/3")		D-13		Well graded SAND with silt and gravel, very dense, gray, moist. Recovered 0.3 ft.		
								End of test hole boring at 60.3 ft. below ground elevation.		
	19							Water table elevation not determined.		
								This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field *identifications.*		
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-39-95**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

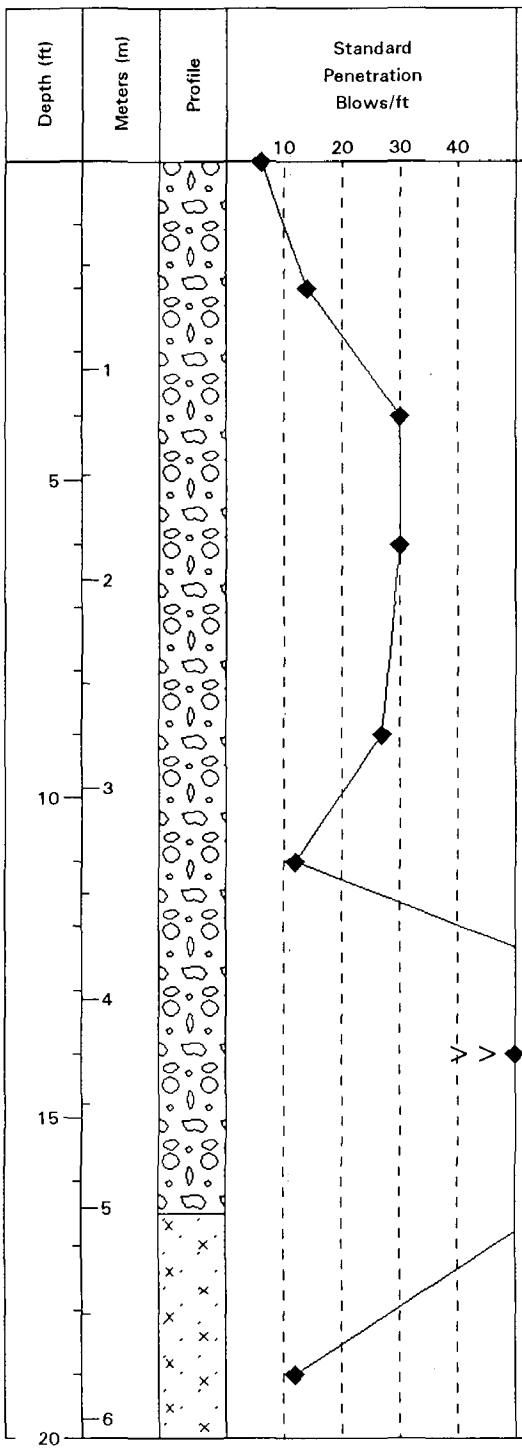
Bridge 5/508 S.R. **5**

Station **LW 235+719.60** Offset **10.32 m Lt.** C.S. **1767**

Equipment Casing **4" OD X 60' Augers** Ground El **385.5 (117.50 m)**

Method of Boring **Dry Rotary**

Start Date **October 6, 1995** Completion Date **October 6, 1995** Sheet **1** of **3**



SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
2 3 3 2 (6)		D-1		1 ft. = 0.3048 m. Well graded GRAVEL with silt and sand, rounded to subrounded, loose, brown, moist. Fill. Retained 0.8 ft.		
4 6 8 9 (14)		D-2		Well graded GRAVEL with silt and sand, rounded to subrounded, medium dense, brown, moist. Fill. Retained 1.2 ft.		
5 11 15 13 (30)		D-3		Well graded GRAVEL with silt and sand, rounded to subrounded, medium dense, brown, moist. Fill. Retained 1.0 ft.		
7 13 17 20 (30)		D-4		Well graded GRAVEL with silt and sand, rounded to subrounded, dense, brown, moist. Fill. Retained 1.0 ft.		
20 16 11 10 (27		D-5		Well graded GRAVEL with silt and sand, rounded to subrounded, dense, brown, moist. Fill. Retained 0.5 ft.		
9 8 4 3 (12)		D-6		Well graded GRAVEL with silt and sand, rounded to subrounded, dense, brown, moist. Fill. Retained 0.4 ft.		
18 18 79 87 (97		D-7		Well graded GRAVEL with silt and sand, very dense, brown, moist. Fill. Retained 0.8 ft.		
				Material changed at depth 16.5 ft. to sandy SILT with gravel, dark gray. Replaced material or outwash, as indicated by drilling and retained.		
5 9		D-8		Sandy SILT with gravel, rounded, medium dense, dark gray, moist with organics.		

LOG OF TEST BORING

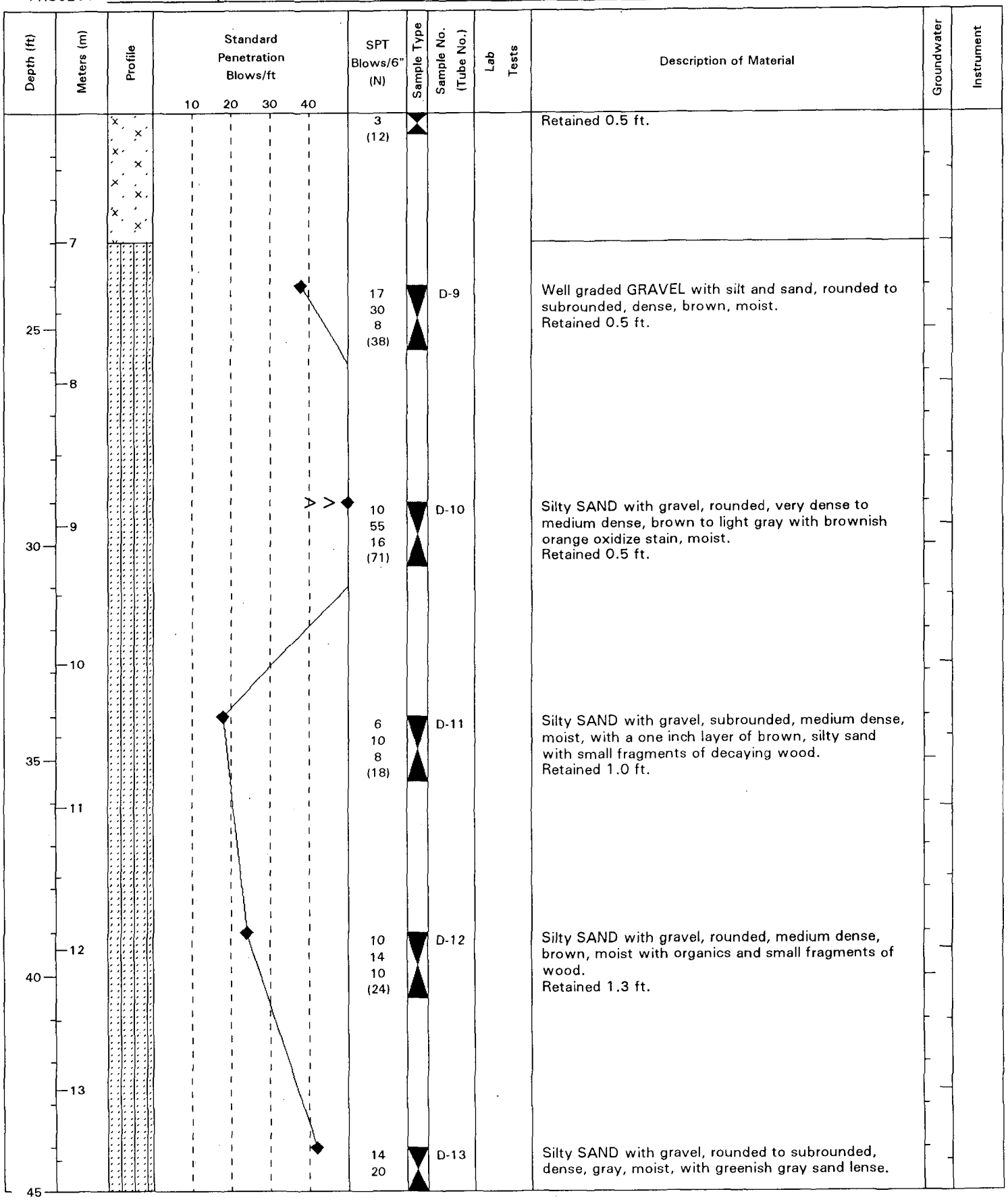
Washington State Department of Transportation

HOLE No. **H-39-95**

Sheet 2 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-39-95**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				22 (42)				Retained 1.0 ft.		
	14									
	15		> >	12 60 (60/6")		D-14		Well graded GRAVEL with silt and sand, rounded to angular, dense, brown, moist. Retained 0.4 ft.		
50										
	16									
			> >	75/6" (75/6")		D-15		Well graded GRAVEL with silt and sand, angular to subrounded, very dense, brown, moist, bonded together with a silt matrix. Retained 0.5 ft.		
55	17									
	18		> >	17 90 (90/6")		D-16		Well graded GRAVEL with silt and sand, angular to rounded, very dense, brown to dark brown, moist, bonded together with a silt matrix. Retained 1.0 ft.		
60								End of test hole boring at 60.0 ft. below ground elevation.		
	19							Water table elevation not determined.		
								This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications.		
65	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-40-95**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

Bridge 5/508 S.R. **5**

Station **235+769.49** Offset **13.64 m Lt.** C.S. **1767**

Equipment _____ Casing _____ Ground El **361.1 (110.06 m)**

Method of Boring **Hollow Stem Augers**

Start Date **October 5, 1995** Completion Date **October 5, 1995** Sheet **1** of **3**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								1 ft. = 0.3048 m.		
				3 2 3 (5)		D-1		Silty SAND with gravel, subround, loose, very dark brown, moist to wet, homogeneous. Recovered 0.8 ft.		
5	1									
	2			2 1 1 (2)		D-2		Silty SAND with gravel, subround, very loose, very dark brown, moist, homogeneous. Recovered 0.4 ft.		
10	3									
				2 3 2 (5)		D-3		Sandy SILT with gravel, subround, medium stiff, dark brown, moist, stratified in one-half inch layers of gray silt and iron staining. No HCl reaction. Recovered 0.5 ft.		
	4									
15										
	5			5 4 4 (8)		D-4		SILT with sand and gravel, subround, medium stiff, dark brownish gray, moist,mottled dark brown, light brown, gray and orange. Recovered 1.5 ft.		
20	6									

LOG OF TEST BORING

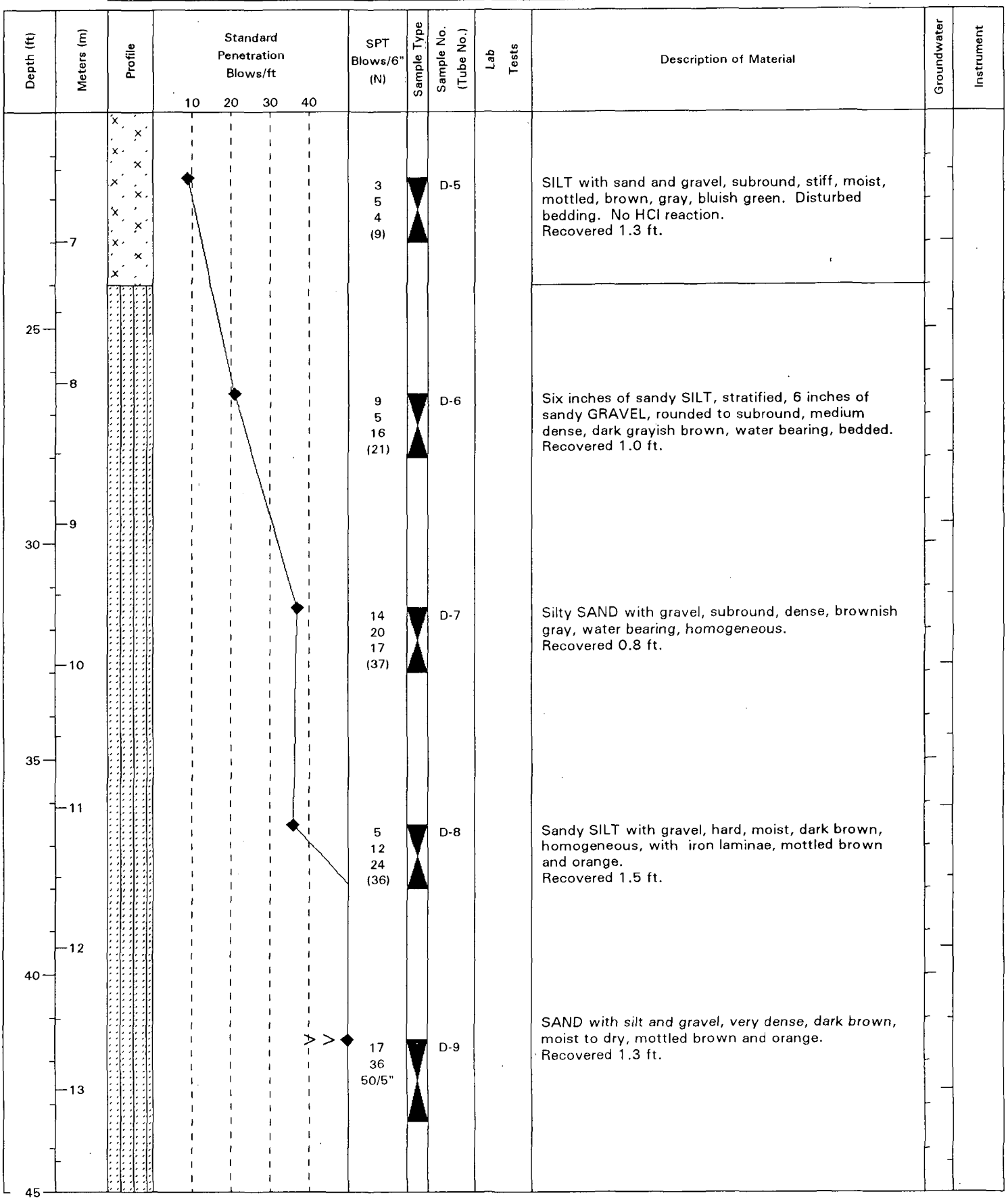
Washington State Department of Transportation

HOLE No. **H-40-95**

Sheet 2 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-40-95**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. OL-1863

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14		◆	25 37 (37/6")		D-10		SAND with silt and gravel, very dense, dark brown, wet, mottled brown and orange. Recovered 0.8 ft.		
								End of test hole boring at 47.5 ft. below ground elevation.		
	15							This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications.		
50										
	16									
55										
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-41-95**

PROJECT **Pierce County Line to Tukwila Stage 3** Job No. **OL-1863**

Bridge 5/508 S.R. **5**

Station **235+796.84** Offset **10.20 m Lt.** C.S. **1767**

Equipment **CME 45** Casing **HQ X 60'** Ground El **384.5 (117.20 m)**

Method of Boring

Start Date **October 6, 1995** Completion Date **October 6, 1995** Sheet **1** of **3**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								1 ft. = 0.3048 m.		
5	1			8 8 6 (14)		D-1		Poorly graded SAND with silt and gravel, medium dense, brown, moist. Recovered 0.1 ft.		
	2			8 7 9 (16)		D-2		Well graded SAND with silt, gravel and cobbles, dense, brown, moist. Recovered 0.2 ft.		
10	3			7 24 22 (46)		D-3		Well graded SAND with silt and gravel, dense, brown, moist. Recovered 0.4 ft.		
				14 27 22 (47)		D-4		Well graded GRAVEL with silt, sand and cobbles, subrounded to angular, dense, mottled, moist.		
15	4									
	5			9 7 11 (18)		D-5		Poorly graded SAND with silt and gravel, medium dense, gray, moist. Recovered 0.2 ft.		
20	6									

LOG OF TEST BORING

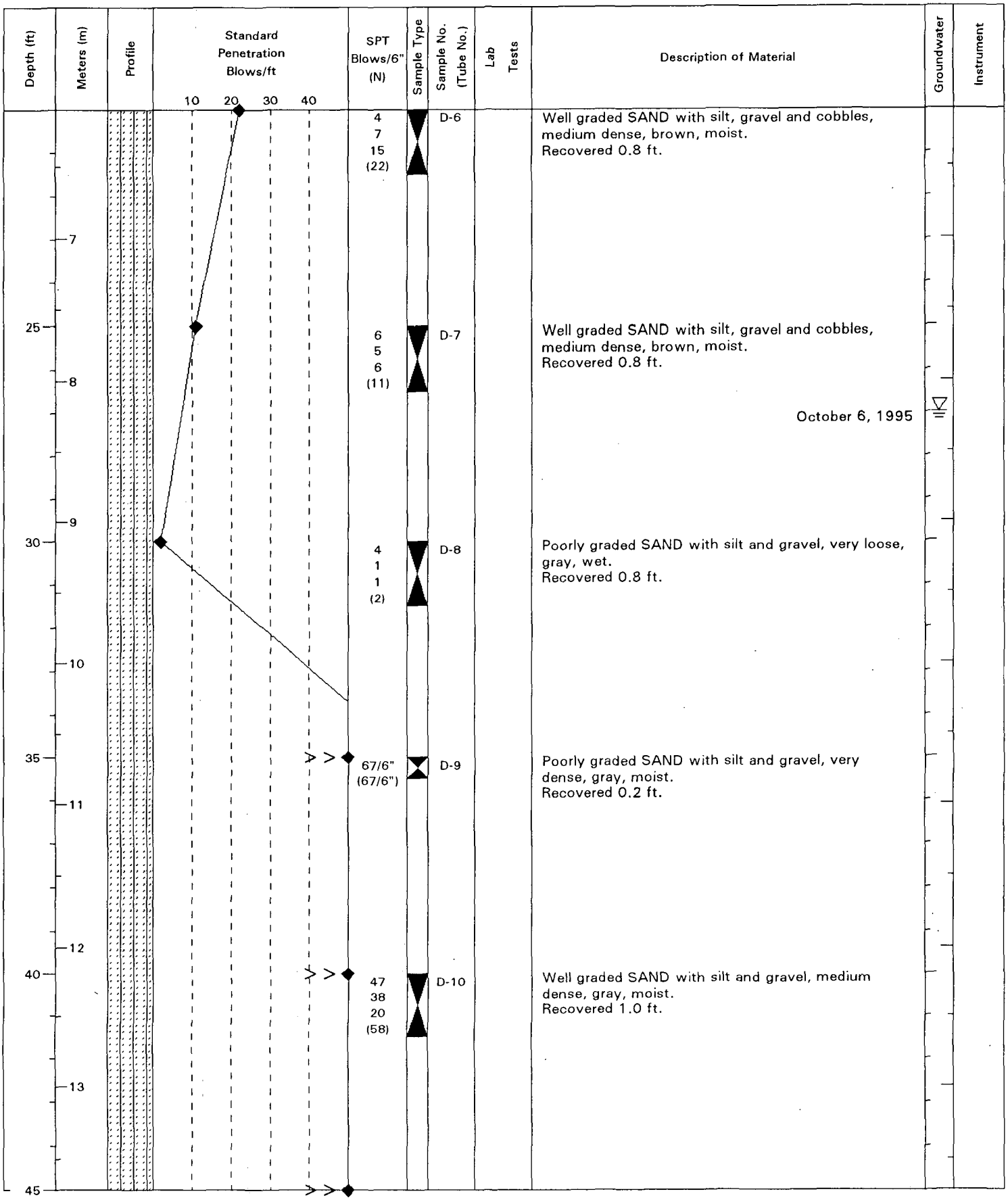
Washington State Department of Transportation

HOLE No. **H-41-95**

Sheet 2 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**



LOG OF TEST BORING

Washington State Department of Transportation

HOLE No. **H-41-95**

Sheet 3 of 3

PROJECT **Pierce County Line to Tukwila Stage 3**

Job No. **OL-1863**

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			15 28 39 (67)		D-11		Well graded SAND with silt, gravel and cobbles, very dense, gray, moist. Recovered 0.8 ft.		
	15									
50				16 50/5 (50/5")		D-12		Well graded SAND with silt and gravel and some silt balls, very dense, gray, moist. Recovered 0.8 ft.		
	16									
55				50/5" (50/5")		D-13		Poorly graded SAND with silt and gravel, very dense, gray, moist. Recovered 0.4 ft. Note: From 56.0 ft. to 57.0 ft. cored through boulder.		
	17									
	18									
60				50/6" (50/6")		D-14		Well graded SAND with silt, gravel and cobbles, very dense, gray, moist. Recovered 0.5 ft.		
								End of test hole boring at 60.5 ft. below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications.		
	19									
65										
	20									
	21									
70										

APPENDIX C- LABORATORY TEST RESULTS

Job No. **OL-1863** Date **January 26, 1995**

Hole No. **H-21-95** Sheet **1** of **2**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

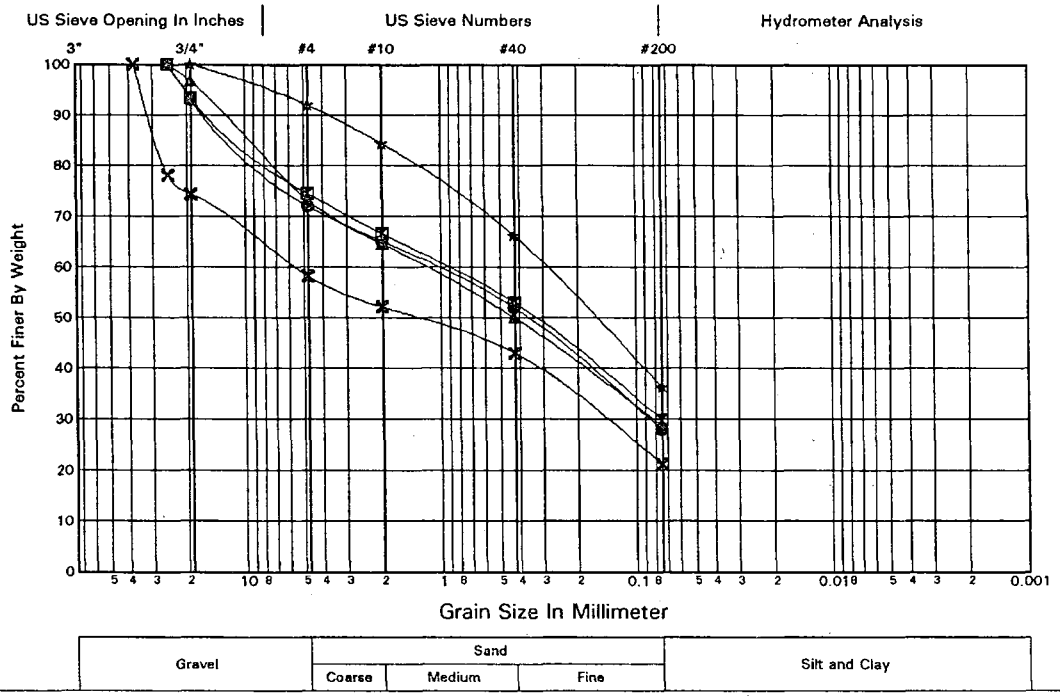
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	4.0	1.22	D-1	SM	OLIVE GRAY	SILTY SAND with GRAVEL	8	NP	NP	NP
⊠	10.5	3.20	D-3	SM	GRAY	SILTY SAND with GRAVEL	11	NP	NP	NP
▲	14.0	4.27	D-4	SM	OLIVE GRAY	SILTY SAND with GRAVEL	9	NP	NP	NP
★	20.5	6.25	D-6	SM	GRAY	SILTY SAND	15	NP	NP	NP
✕	24.0	7.32	D-7	GM	LIGHT GRAY	SILTY GRAVEL with SAND	12	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	28.0	44.0	28.0		
⊠	25.5	44.6	29.9		
▲	26.8	44.4	28.8		
★	8.0	55.7	36.3		
✕	41.8	37.0	21.2		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.09	0.37	0.09		
⊠	0.94	0.34	0.08		
▲	1.23	0.43	0.08		
★	0.30	0.17			
✕	5.55	1.40	0.15		



Job No. OL-1863 Date January 26, 1995

Hole No. H-21-95 Sheet 2 of 2

Project Pierce Co. Line to Tukwila Stage 3

Laboratory Summary

Washington State Department of Transportation

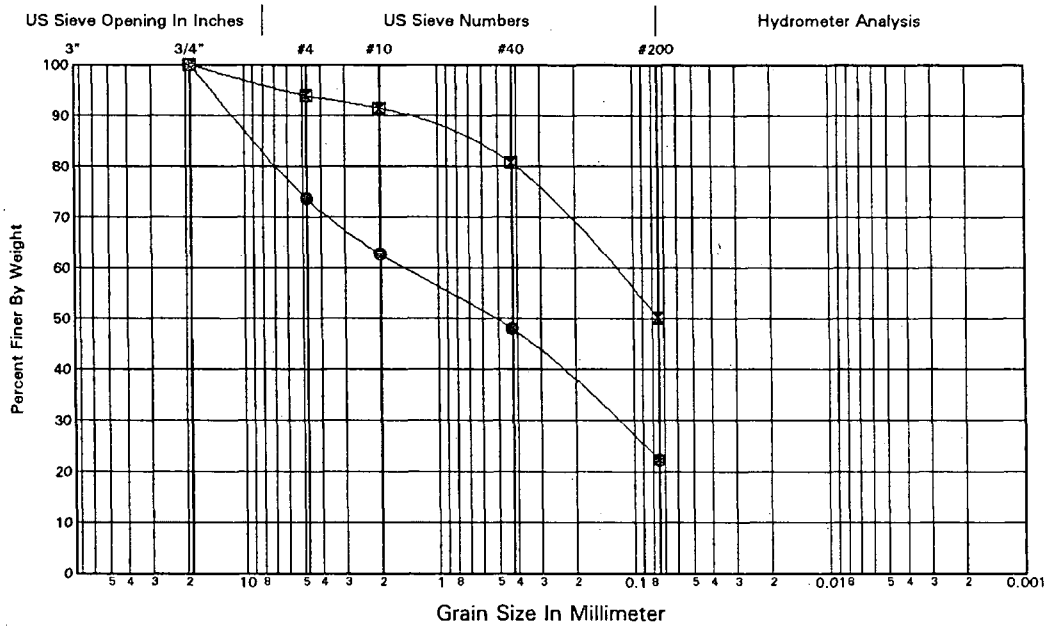
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	29.0	8.84	D-8	SM	OLIVE GRAY	SILTY SAND with GRAVEL	13	NP	NP	NP
☒	39.0	11.89	D-10	ML	DARK GREENISH GRAY	SANDY SILT	13	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	26.4	51.2	22.4		
☒	6.1	43.7	50.2		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.51	0.52	0.13		
☒	0.13				



Job No. **OL–1863** Date **December 23, 1994**

Hole No. **H-22-94** Sheet **1** of **2**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

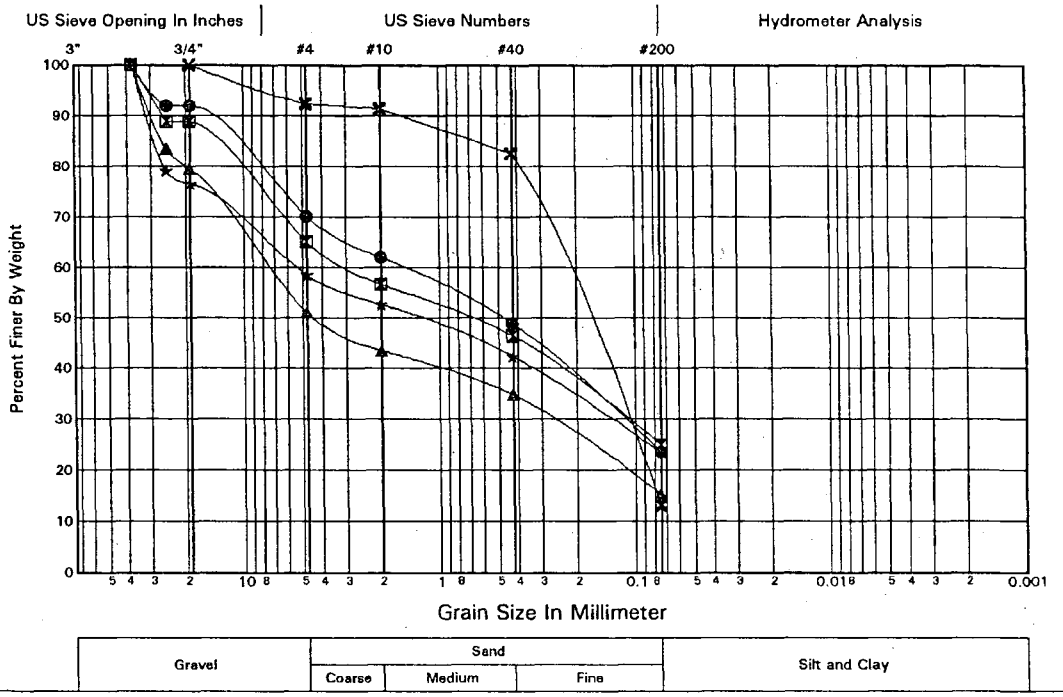
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	11.0	3.35	D-2	SM	OLIVE GRAY	SILTY SAND with GRAVEL	15	NP	NP	NP
⊠	16.0	4.88	D-3	SM	OLIVE GRAY	SILTY SAND with GRAVEL	11	NP	NP	NP
▲	22.0	6.71	D-4	GM	LIGHT OLIVE GRAY	SILTY GRAVEL with SAND	11	NP	NP	NP
★	32.0	9.75	D-6	GM	GRAY	SILTY GRAVEL with SAND	12	NP	NP	NP
✕	42.0	12.80	D-8	SM	GRAY	SILTY SAND w/one large gravel piece 49.5 g.	17	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	29.9	46.5	23.6		
⊠	34.9	40.1	25.0		
▲	49.0	35.7	15.3		
★	41.5	35.1	23.4		
✕	7.6	79.2	13.2		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.58	0.48	0.12		
⊠	2.81	0.73	0.11		
▲	7.36	4.24	0.28	0.11	
★	5.33	1.34	0.14		
✕	0.24	0.19	0.11	0.09	



Job No. **OL-1863** Date **December 23, 1994**

Hole No. **H-22-94** Sheet **2** of **2**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

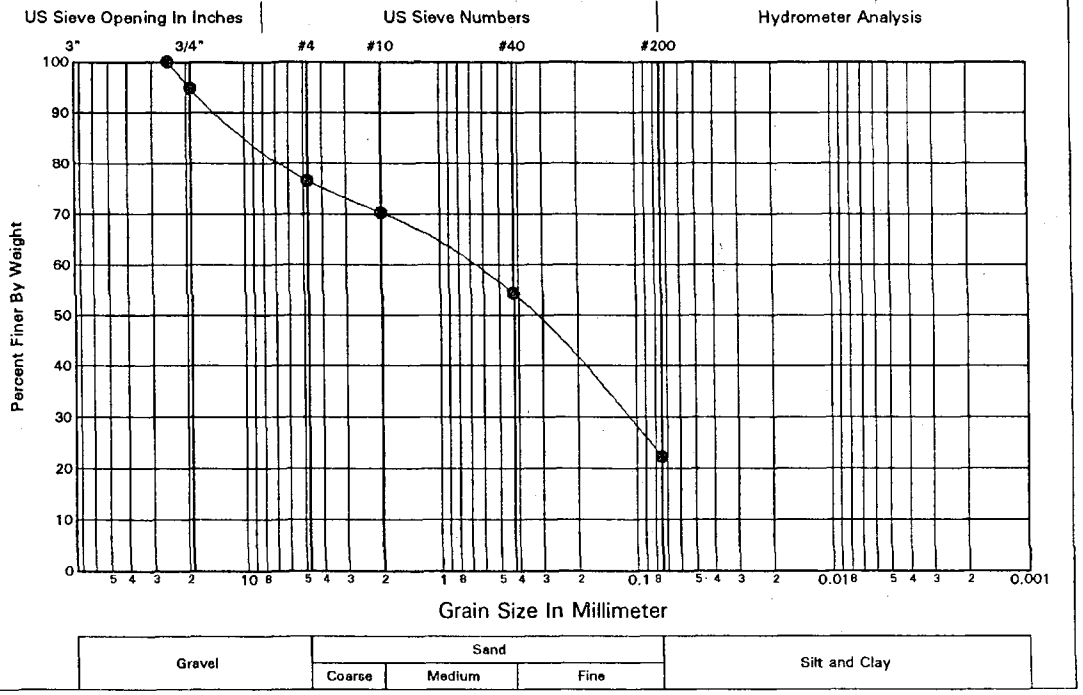
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	47.0	14.33	D-9	SM	DARK GRAY	SILTY SAND with GRAVEL	13	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	23.4	54.3	22.3		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.73	0.34	0.11		



Job No. **OL-1863** Date **February 3, 1995**

Hole No. **H-23-95** Sheet **1** of **2**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

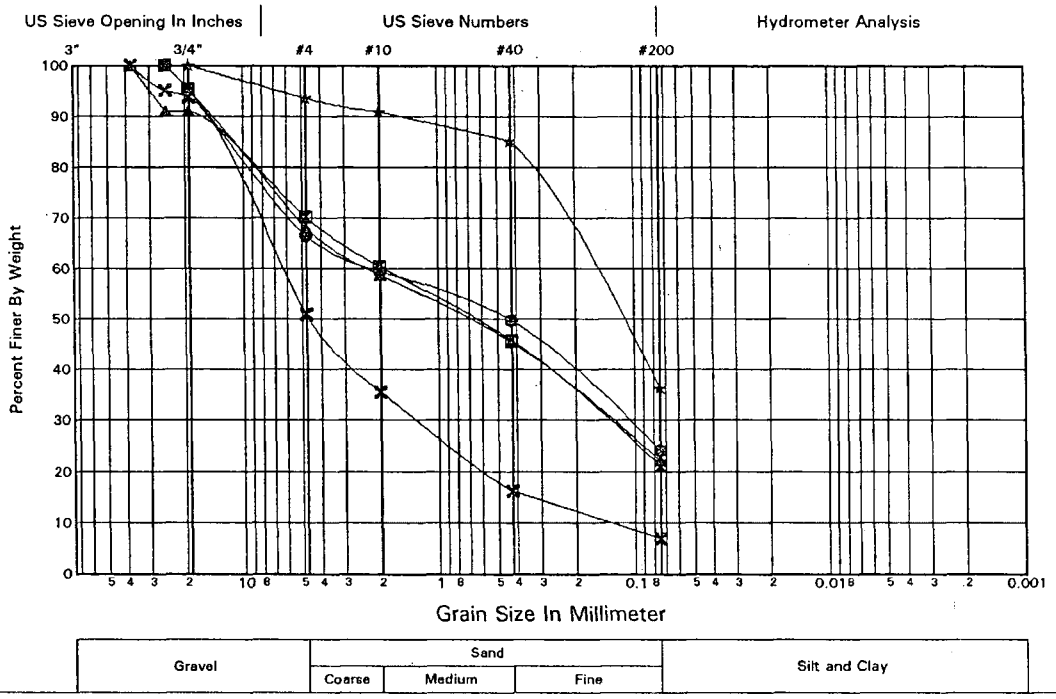
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	5.0	1.52	D-1	SM	OLIVE GRAY	SILTY SAND with GRAVEL	11	NP	NP	NP
⊠	15.0	4.57	D-3	SM	LIGHT GRAY	SILTY SAND with GRAVEL	10	NP	NP	NP
▲	20.0	6.10	D-4	SM	OLIVE GRAY	SILTY SAND with GRAVEL	17	NP	NP	NP
★	35.0	10.67	D-7	SM	OLIVE GRAY	SILTY SAND	18	NP	NP	NP
✕	40.0	12.19	D-8	GW-GM	OLIVE	WELL GRADED GRAVEL with SILT and SAND	11	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	33.5	42.3	24.2		
⊠	29.8	49.0	21.2		
▲	31.9	45.9	22.2		
★	6.4	57.3	36.3		
✕	49.1	44.0	6.9	1.9	48.0

GRADATION VALUES

	D60	D50	D30	D20	D10
●	2.15	0.45	0.11		
⊠	1.92	0.66	0.14		
▲	2.25	0.73	0.13		
★	0.17	0.12			
✕	6.38	4.52	1.28	0.57	0.13



Job No.

Hole No. **H-23-95**

Project **Pierce Co. Line to Tukwila Stage 3**

Date **February 3, 1995**

Sheet **2** of **2**

Laboratory Summary

Washington State Department of Transportation

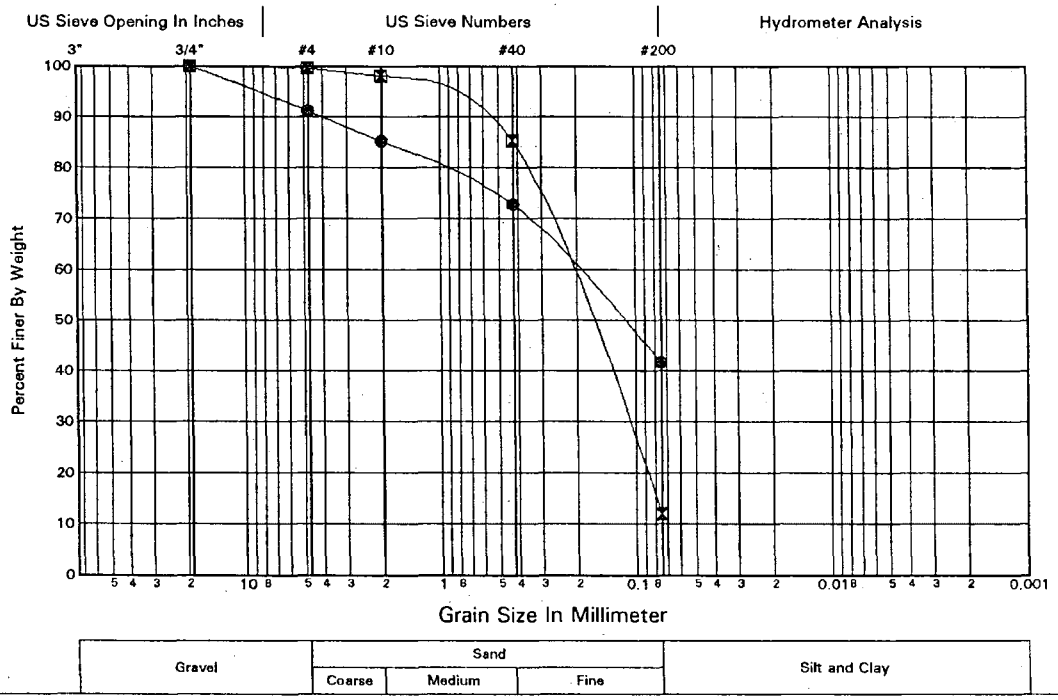
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	45.0	13.72	D-9	SM	OLIVE GRAY	SILTY SAND	19	NP	NP	NP
⊠	50.0	15.24	D-10A	SP-SM	OLIVE GRAY	POORLY GRADED SAND with SILT	26	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	8.9	49.4	41.7		
⊠	0.5	87.5	12.0	0.8	3.3

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.21	0.12			
⊠	0.23	0.18	0.11	0.09	



Job No. **OL-1863** Date **December 23, 1994**

Hole No. **H-24-94** Sheet **1** of **1**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

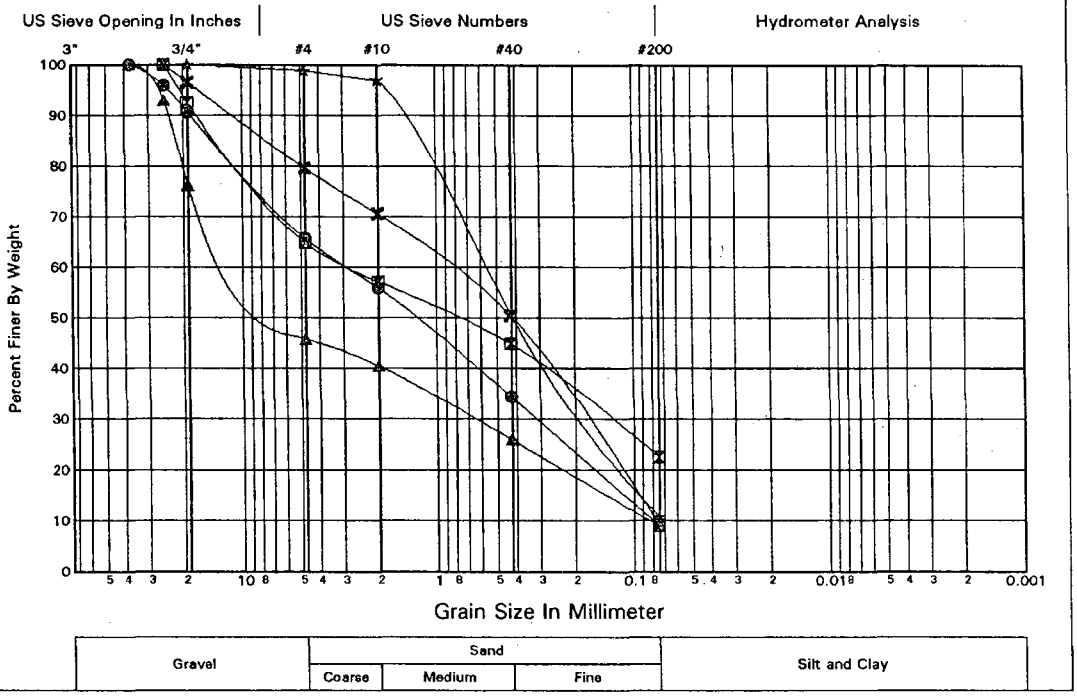
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	0.0	0.00	D-1	SP-SM	LIGHT OLIVE GRAY	POORLY GRADED SAND with SILT and GRAVEL	10	NP	NP	NP
▣	6.0	1.83	D-3	SM	OLIVE GRAY	SILTY SAND with GRAVEL	18	NP	NP	NP
▲	11.0	3.35	D-5	GP-GM	OLIVE	POORLY GRADED GRAVEL with SILT and SAND	6	NP	NP	NP
★	26.0	7.92	D-8	SP-SM	OLIVE GRAY	POORLY GRADED SAND with SILT	9	NP	NP	NP
✕	36.0	10.97	D-10	SP-SM	OLIVE GRAY	POORLY GRADED SAND with SILT and GRAVEL	19	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	34.3	56.7	9.0	0.4	35.8
▣	35.1	42.3	22.6		
▲	54.2	36.9	8.9	0.6	108.2
★	1.2	88.0	10.8	0.7	8.3
✕	20.4	70.4	9.2	0.5	11.4

GRADATION VALUES

	D60	D50	D30	D20	D10
●	2.87	1.31	0.31	0.16	0.08
▣	2.76	0.81	0.13		
▲	9.08	5.75	0.65	0.23	0.08
★	0.58	0.41	0.17	0.11	
✕	0.89	0.42	0.18	0.12	0.08



Job No. **OL-1863** Date **January 26, 1995**

Hole No. **H-25-94** Sheet **1** of **2**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

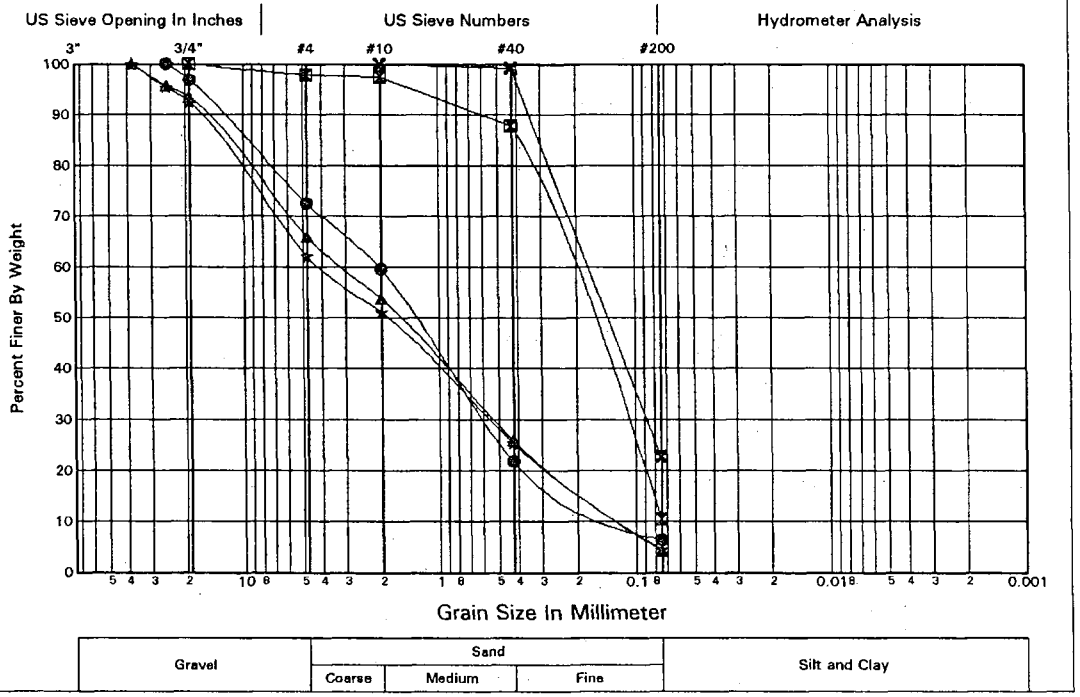
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	4.0	1.22	D-1	SW-SM	LIGHT OLIVE BROWN	WELL GRADED SAND with SILT and GRAVEL	9	NP	NP	NP
⊠	9.0	2.74	D-2	SP-SM	OLIVE	POORLY GRADED SAND with SILT	18	NP	NP	NP
▲	14.0	4.27	D-3	SP	OLIVE GRAY	POORLY GRADED SAND with GRAVEL	9	NP	NP	NP
★	40.0	12.19	D-8	SP-SM	OLIVE GRAY	POORLY GRADED SAND with SILT and GRAVEL	11	NP	NP	NP
✕	45.0	13.72	D-9	SM	OLIVE GRAY	SILTY SAND	29	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	27.5	66.1	6.4	1.5	18.3
⊠	2.2	87.3	10.5	0.8	3.2
▲	34.1	61.7	4.2	0.8	26.2
★	37.9	57.6	4.5	0.7	34.1
✕	0.0	77.3	22.7		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	2.05	1.35	0.59	0.34	0.11
⊠	0.23	0.18	0.12	0.09	
▲	3.12	1.62	0.53	0.26	0.12
★	4.03	1.87	0.56	0.27	0.12
✕	0.17	0.14	0.09		



Job No. **OL-1863** Date **January 26, 1995**

Hole No. **H-25-94** Sheet **2** of **2**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

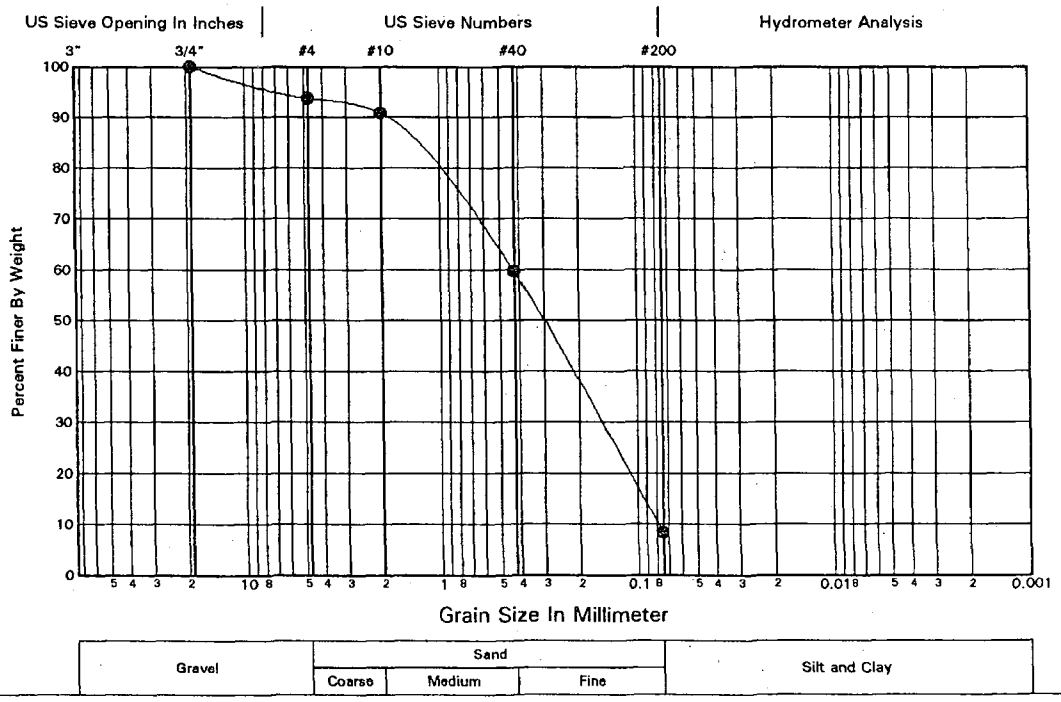
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	50.0	15.24	D-10	SP-SM	OLIVE GRAY	POORLY GRADED SAND with SILT	18	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	6.3	85.3	8.4	0.7	5.4

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.43	0.31	0.16	0.11	0.08



Job No. OL-1863 Date February 3, 1995

Hole No. H-26-95 Sheet 1 of 2

Project Pierce Co. Line to Tukwila Stage 3

Laboratory Summary

Washington State Department of Transportation

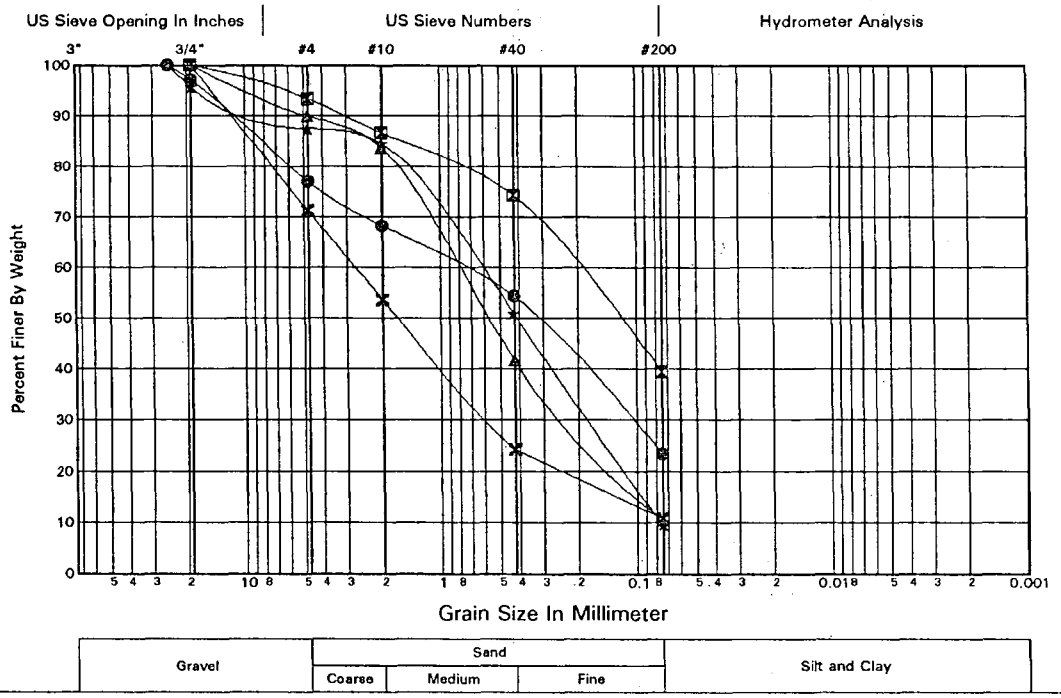
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	5.0	1.52	D-1	SM	OLIVE GRAY	SILTY SAND with GRAVEL	16	NP	NP	NP
⊠	10.7	3.26	D-2A	SM	VERY DARK BROWN	SILTY SAND w/wood fragments	53	NP	NP	NP
▲	20.0	6.10	D-5	SP-SM	PALE YELLOW	POORLY GRADED SAND with SILT	15	NP	NP	NP
★	30.0	9.14	D-7	SP-SM	LT YELLOWISH BROWN	POORLY GRADED SAND with SILT	25	NP	NP	NP
✕	35.0	10.67	D-8	SW-SM	LT YELLOWISH BROWN	WELL GRADED SAND with SILT and GRAVEL	15	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	23.0	53.5	23.5		
⊠	6.6	53.9	39.5		
▲	10.1	79.5	10.4	0.8	11.9
★	12.6	77.8	9.6	0.6	8.5
✕	28.8	60.3	10.9	1.7	39.1

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.80	0.33	0.11		
⊠	0.21	0.13			
▲	0.84	0.58	0.22	0.13	
★	0.65	0.41	0.18	0.12	0.08
✕	2.74	1.65	0.57	0.24	



Job No. **OL–1863** Date **February 3, 1995**

Hole No. **H-26-95** Sheet **2** of **2**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

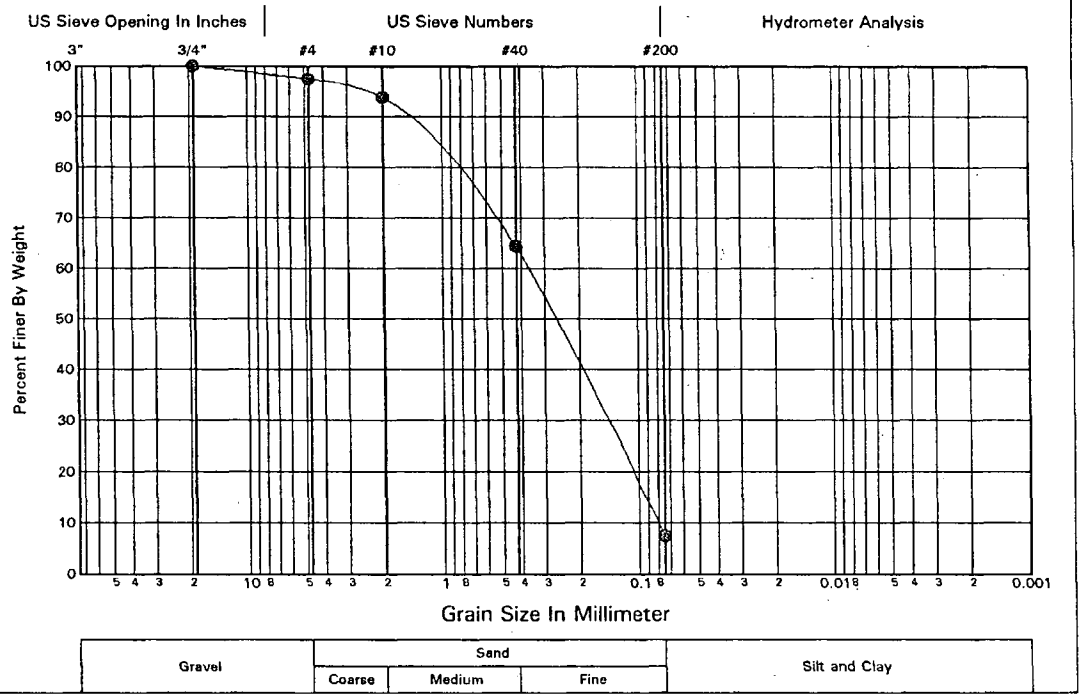
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	45.0	13.72	D-10	SP-SM	OLIVE GRAY	POORLY GRADED SAND with SILT	15	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	2.6	89.9	7.5	0.7	4.6

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.37	0.27	0.15	0.11	0.08



Job No. **OL-1863** Date **January 26, 1995**

Hole No. **H-27-94** Sheet **1** of **2**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

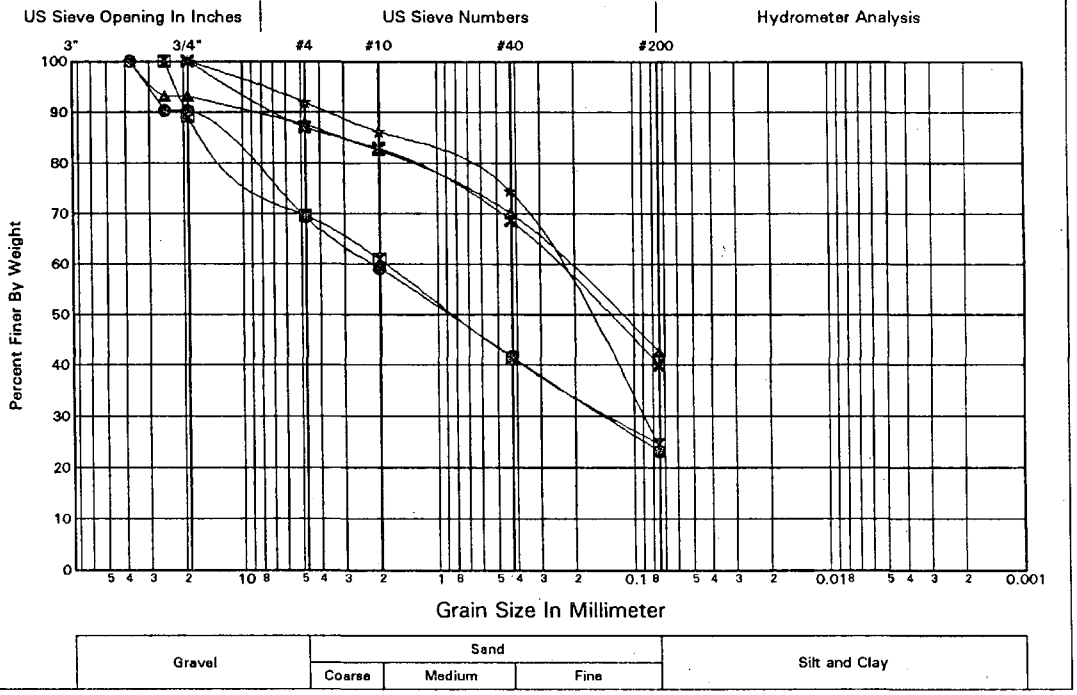
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	4.0	1.22	D-1	SM	GRAY	SILTY SAND with GRAVEL	11	NP	NP	NP
⊠	9.0	2.74	D-3	SM	GRAY	SILTY SAND with GRAVEL	10	NP	NP	NP
▲	29.0	8.84	D-7	SM	OLIVE GRAY	SILTY SAND	14	NP	NP	NP
★	39.0	11.89	D-9	SM	OLIVE GRAY	SILTY SAND	16	NP	NP	NP
✕	44.0	13.41	D-10	SM	GRAY	SILTY SAND	15	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	30.7	46.1	23.2		
⊠	30.4	45.0	24.6		
▲	12.3	45.1	42.6		
★	8.1	68.2	23.7		
✕	12.9	47.1	40.0		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	2.16	0.89	0.14		
⊠	1.86	0.84	0.13		
▲	0.22	0.12			
★	0.26	0.18	0.09		
✕	0.25	0.14			



Job No. OL-1863 Date January 26, 1995

Hole No. H-27-94 Sheet 2 of 2

Project Pierce Co. Line to Tukwila Stage 3

Laboratory Summary

Washington State Department of Transportation

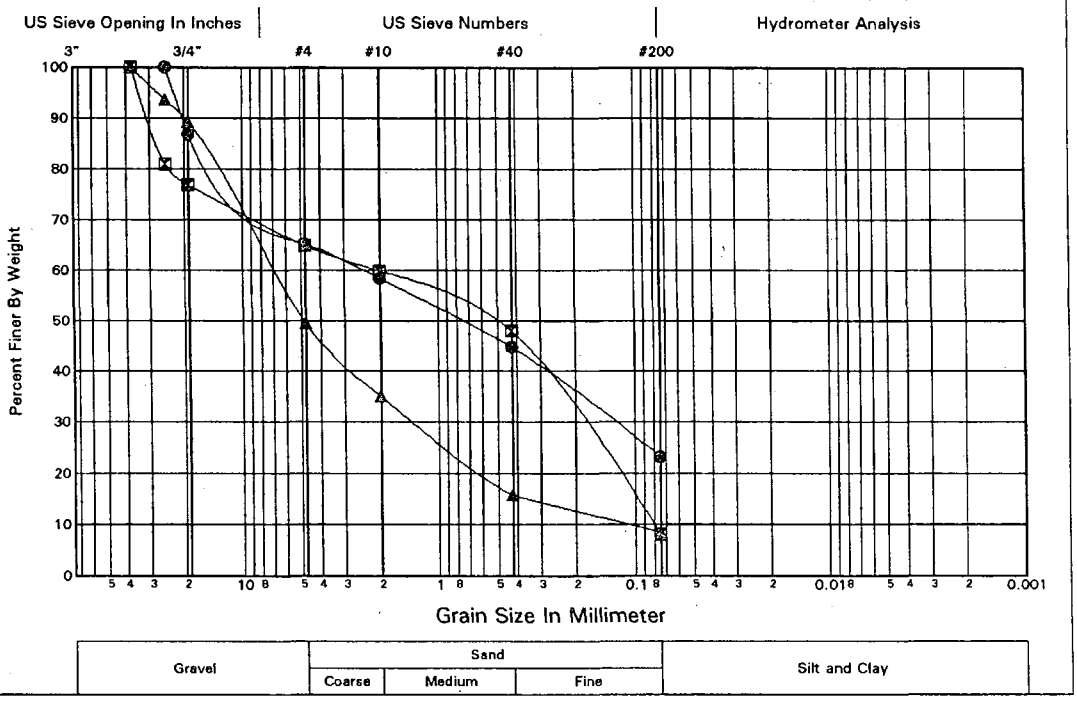
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	49.0	14.94	D-11	SM	V DK GRAYISH BROWN	SILTY SAND with GRAVEL w/fibrous organic material	23	NP	NP	NP
⊠	54.0	16.46	D-12	SP-SM	OLIVE GRAY	POORLY GRADED SAND with SILT and GRAVEL	18	NP	NP	NP
▲	69.0	21.03	D-15	GW-GM	LT YELLOWISH BROWN	WELL GRADED GRAVEL with SILT and SAND	13	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	34.8	41.9	23.3		
⊠	35.1	56.8	8.1	0.2	25.0
▲	50.5	41.0	8.5	2.4	63.9

GRADATION VALUES

	D60	D50	D30	D20	D10
●	2.45	0.77	0.13		
⊠	2.04	0.55	0.19	0.13	0.08
▲	6.85	4.83	1.34	0.60	0.11



Job No. **OL-1863** Date **January 26, 1995**

Hole No. **H-28-94** Sheet **1** of **1**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

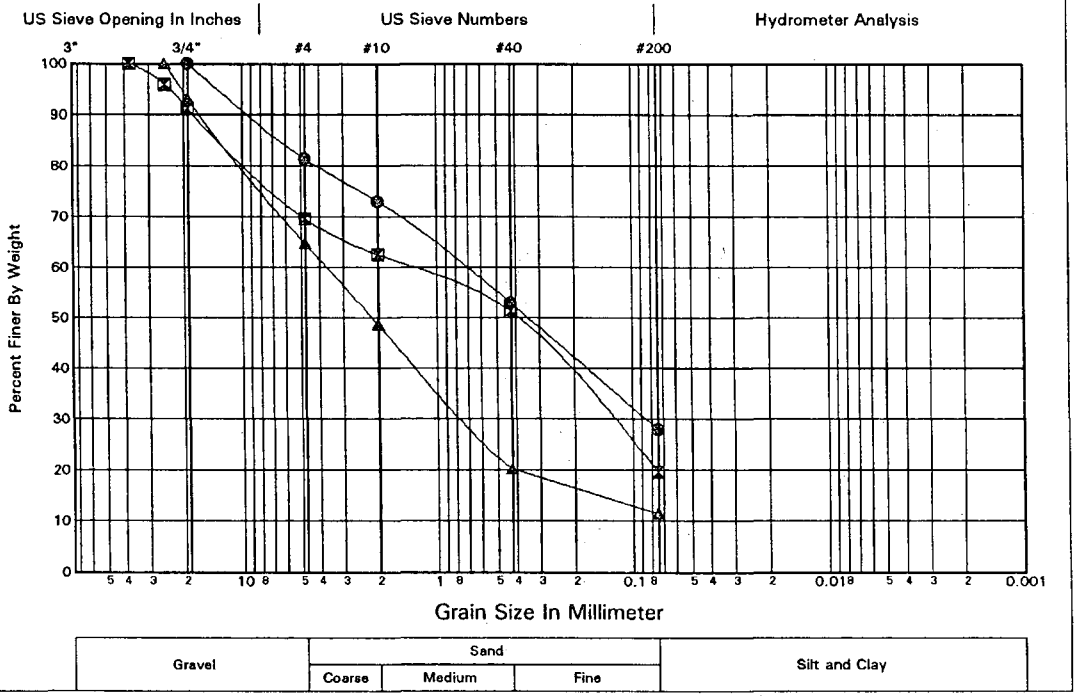
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	9.0	2.74	D-2	SM	LIGHT OLIVE BROWN	SILTY SAND with GRAVEL	14	NP	NP	NP
⊠	24.0	7.32	D-5	SM	GRAY	SILTY SAND with GRAVEL	11	NP	NP	NP
▲	39.0	11.89	D-8	SW-SM	OLIVE	WELL GRADED SAND with SILT and GRAVEL	12	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	18.6	53.4	28.0		
⊠	30.4	50.0	19.6		
▲	35.3	53.2	11.5	2.0	52.7

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.73	0.35	0.09		
⊠	1.42	0.40	0.13	0.08	
▲	3.69	2.16	0.73	0.41	



Job No. **OL-1863** Date **January 31, 1995**

Hole No. **H-29-94** Sheet **1** of **3**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

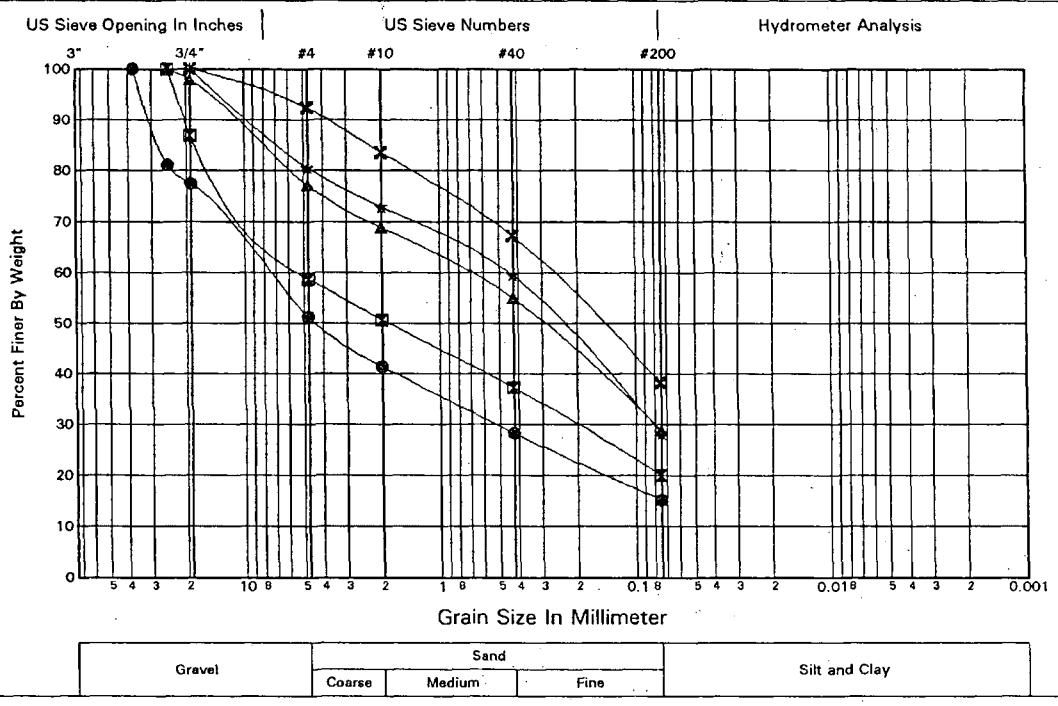
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	0.0	0.00	D-1	GM	OLIVE	SILTY GRAVEL with SAND	9	NP	NP	NP
⊠	3.0	0.91	D-2	GM	OLIVE GRAY	SILTY GRAVEL with SAND	16	NP	NP	NP
▲	11.0	3.35	D-5	SM	GRAY	SILTY SAND with GRAVEL	14	NP	NP	NP
★	13.0	3.96	D-6	SM	OLIVE	SILTY SAND with GRAVEL	13	NP	NP	NP
✕	16.0	4.88	D-7	SM	GRAY	SILTY SAND	15	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	48.8	36.0	15.2		
⊠	41.3	38.6	20.1		
▲	23.0	48.1	28.9		
★	19.5	52.3	28.2		
✕	7.7	54.1	38.2		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	7.57	4.27	0.52	0.14	
⊠	5.06	1.85	0.20		
▲	0.74	0.30	0.08		
★	0.45	0.25	0.08		
✕	0.28	0.15			



Job No. **OL-1863** Date **January 31, 1995**

Hole No. **H-29-94** Sheet **2** of **3**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

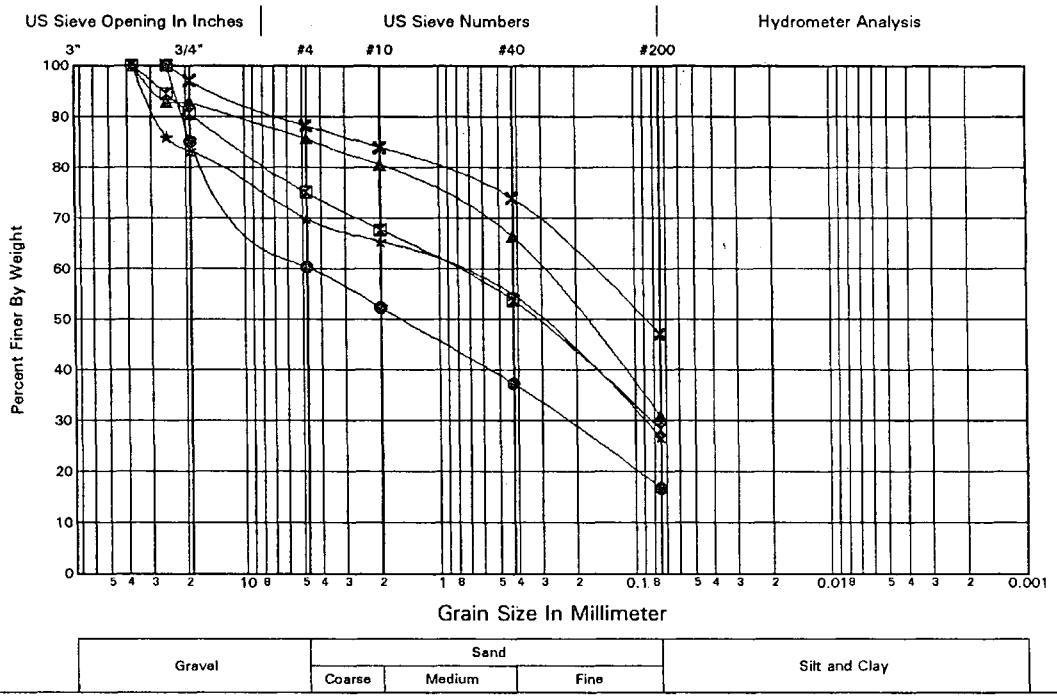
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	18.0	5.49	D-8	SM	GRAY	SILTY SAND with GRAVEL	8	NP	NP	NP
⊠	23.0	7.01	D-10	SM	OLIVE GRAY	SILTY SAND with GRAVEL	10	NP	NP	NP
▲	33.0	10.06	D-12	SM	OLIVE GRAY	SILTY SAND	11	NP	NP	NP
★	43.0	13.11	D-14	SM	OLIVE	SILTY SAND with GRAVEL	10	NP	NP	NP
✕	53.0	16.15	D-16	SM	OLIVE GRAY	SILTY SAND	13	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	39.7	43.5	16.8		
⊠	25.0	46.7	28.3		
▲	14.3	54.8	30.9		
★	30.2	43.0	26.8		
✕	11.8	41.1	47.1		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	4.60	1.58	0.23	0.10	
⊠	0.85	0.33	0.08		
▲	0.31	0.19			
★	0.90	0.31	0.09		
✕	0.17	0.09			



Job No. **OL-1863** Date **January 31, 1995**

Hole No. **H-29-94** Sheet **3** of **3**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

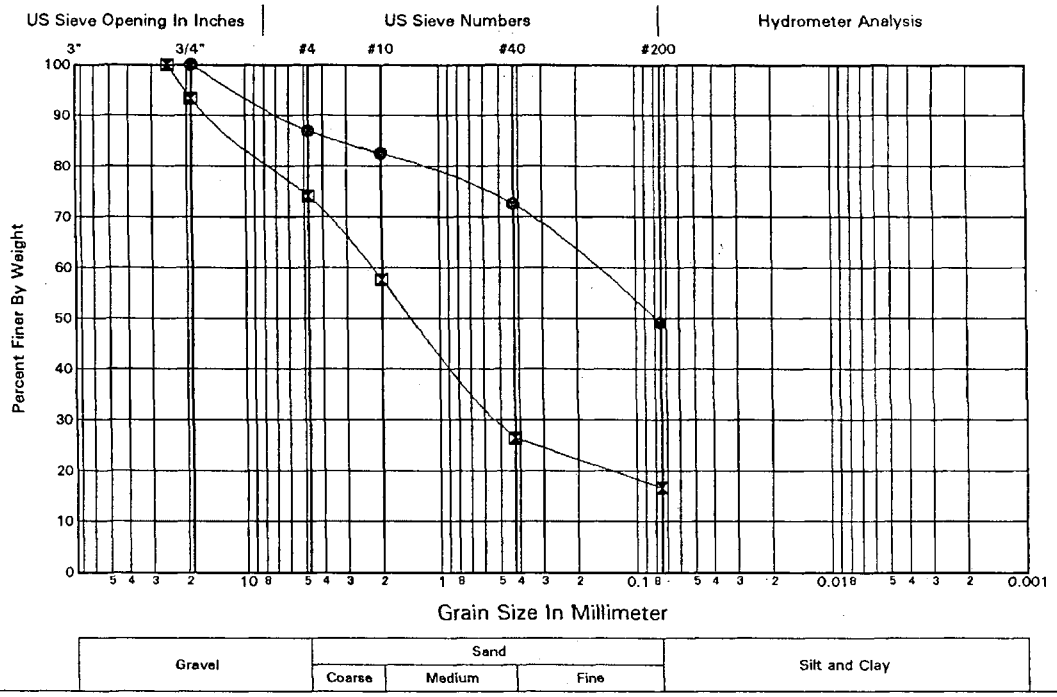
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	58.0	17.68	D-17	SM	DARK GRAY	SILTY SAND	8	NP	NP	NP
⊠	63.0	19.20	D-18	SM	OLIVE	SILTY SAND with GRAVEL	10	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	13.1	37.7	49.2		
⊠	25.9	57.4	16.7		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.17	0.08			
⊠	2.26	1.37	0.51	0.13	



Job No. **OL-1863** Date **January 31, 1995**

Hole No. **H-30-94** Sheet **1** of **1**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

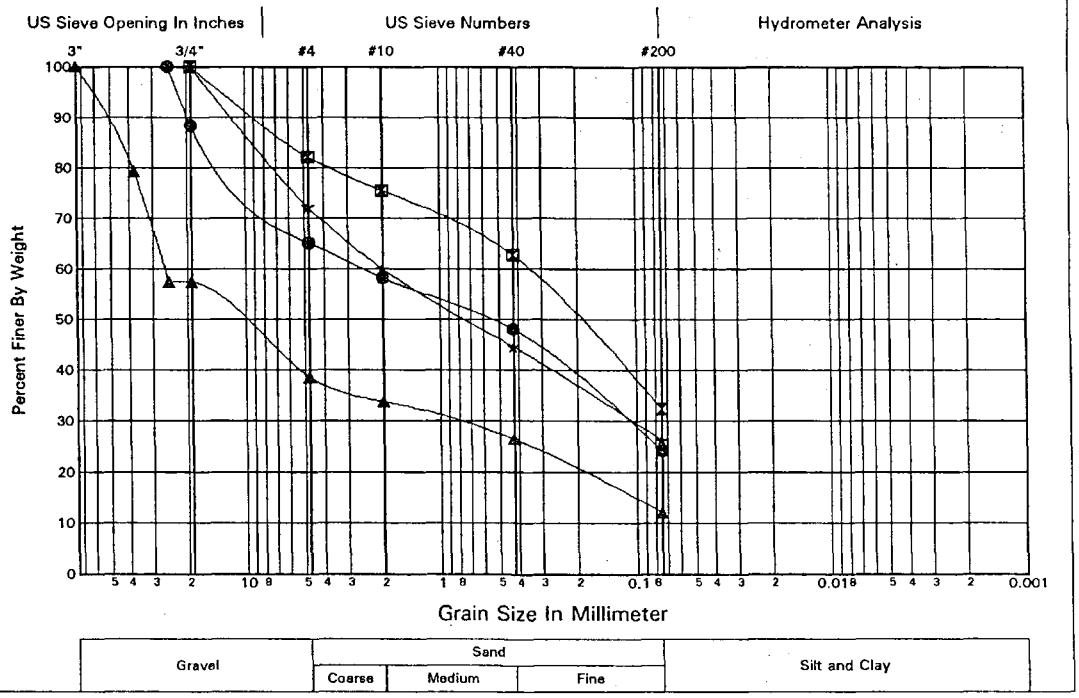
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	4.0	1.22	D-1	SM	OLIVE GRAY	SILTY SAND with GRAVEL	13	NP	NP	NP
⊠	11.0	3.35	D-3	SM	DARK GRAYISH BROWN	SILTY SAND with GRAVEL	24	NP	NP	NP
▲	24.0	7.32	D-7	GP-GM	OLIVE GRAY	POORLY GRADED GRAVEL with SILT and SAND	9	NP	NP	NP
★	34.0	10.36	D-9	SM	GRAY	SILTY SAND with GRAVEL	9	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	34.9	40.9	24.2		
⊠	17.8	49.9	32.3		
▲	61.4	26.5	12.1	0.4	374.8
★	27.8	45.9	26.3		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	2.51	0.57	0.11		
⊠	0.36	0.21			
▲	26.23	11.01	0.89	0.19	
★	2.00	0.73	0.11		



Job No. **OL-1863** Date **January 31, 1995**

Hole No. **H-31-94** Sheet **1** of **1**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

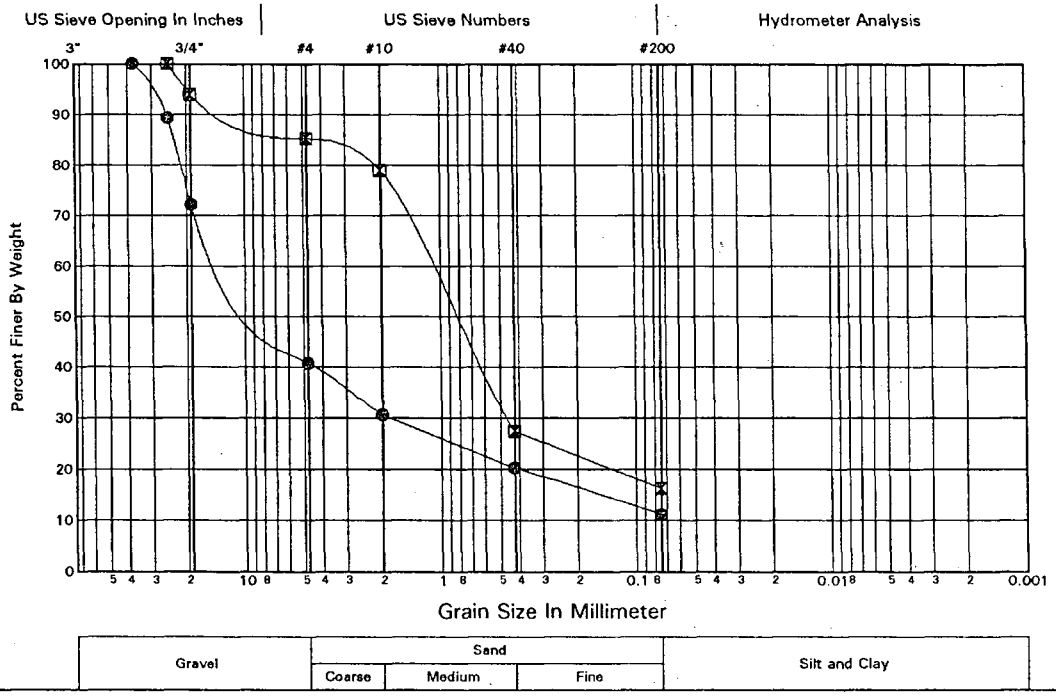
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	5.0	1.52	D-1	GP-GM	GRAY	POORLY GRADED GRAVEL with SILT and SAND	13	NP	NP	NP
⊠	26.5	8.08	D-5	SM	GREENISH GRAY	SILTY SAND with GRAVEL	25	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	59.2	29.6	11.2	4.2	158.4
⊠	14.8	68.8	16.4		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	11.09	7.13	1.80	0.40	
⊠	1.13	0.84	0.46	0.13	



Job No. **OL-1863** Date **January 31, 1995**

Hole No. **H-32-94** Sheet **1** of **1**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

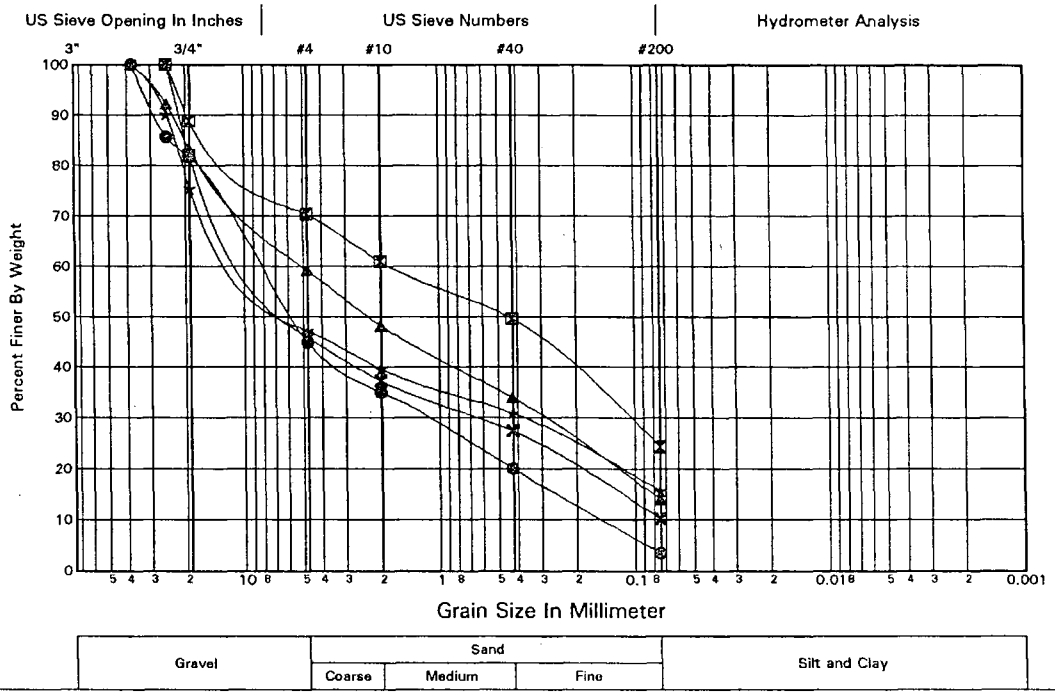
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	0.5	0.15	D-1	GW	OLIVE GRAY	WELL GRADED GRAVEL with SAND		NP	NP	NP
⊠	10.0	3.05	D-5	SM	BLACK	SILTY SAND with GRAVEL w/wood fragments	32	NP	NP	NP
▲	11.5	3.51	D-6	SM	OLIVE BROWN	SILTY SAND with GRAVEL	19	NP	NP	NP
★	16.5	5.03	D-7	GM	LIGHT OLIVE BROWN	SILTY GRAVEL with SAND	10	NP	NP	NP
✕	31.5	9.60	D-11	GP-GM	OLIVE GRAY	POORLY GRADED GRAVEL with SILT and SAND	9	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	55.1	41.4	3.5	1.1	56.7
⊠	29.7	45.9	24.4		
▲	40.8	45.1	14.1		
★	52.8	31.5	15.7		
✕	54.2	35.6	10.2	0.7	117.1

GRADATION VALUES

	D60	D50	D30	D20	D10
●	8.39	5.76	1.19	0.42	0.15
⊠	1.77	0.44	0.11		
▲	4.97	2.30	0.30	0.13	
★	8.91	5.45	0.38	0.12	
✕	8.19	5.58	0.64	0.20	



Job No. **OL-1863** Date **February 3, 1995**

Hole No. **H-33-94** Sheet **1** of **2**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

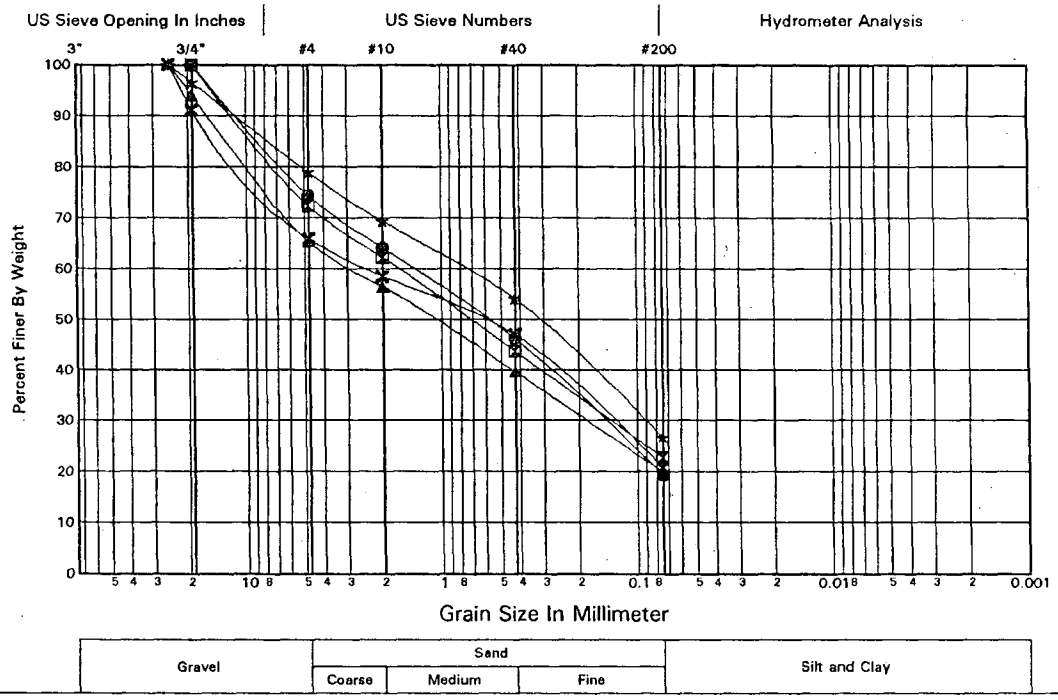
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	4.0	1.22	D-1	SM	OLIVE GRAY	SILTY SAND with GRAVEL	9	NP	NP	NP
⊠	9.0	2.74	D-3	SM	LT BROWNISH GRAY	SILTY SAND with GRAVEL	11	NP	NP	NP
▲	14.0	4.27	D-5	SM	GREENISH GRAY	SILTY SAND with GRAVEL	7	NP	NP	NP
★	21.0	6.40	D-8	SM	V DK GRAYISH BROWN	SILTY SAND with GRAVEL w/fibrous organic material & wood fragments	15	NP	NP	NP
✕	29.0	8.84	D-11	SM	GRAY	SILTY SAND with GRAVEL	8	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	25.6	55.0	19.4		
⊠	27.7	49.5	22.8		
▲	34.7	45.3	20.0		
★	21.1	52.2	26.7		
✕	34.1	45.1	20.8		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.40	0.59	0.15	0.08	
⊠	1.66	0.72	0.14		
▲	2.84	1.11	0.18	0.08	
★	0.77	0.33	0.09		
✕	2.38	0.64	0.14		



Job No. **OL-1863** Date **February 3, 1995**

Hole No. **H-33-94** Sheet **2** of **2**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

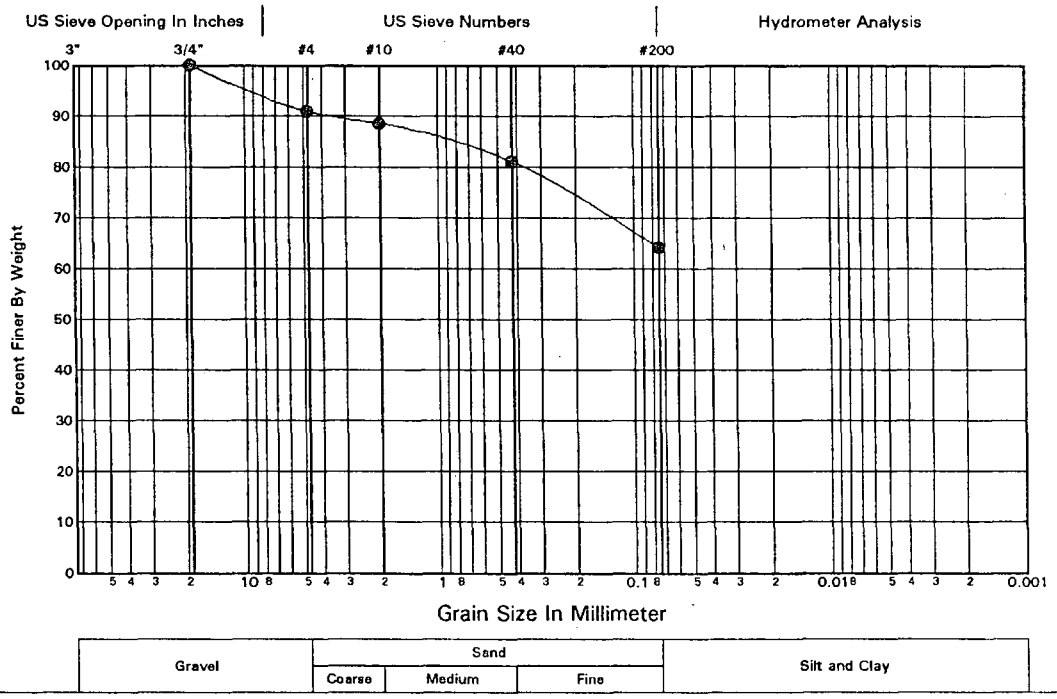
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	39.0	11.89	D-13	ML	OLIVE GRAY	SANDY SILT	17	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	9.1	26.7	64.2		

GRADATION VALUES

	D60	D50	D30	D20	D10
●					



Job No. **OL-1863** Date **February 3, 1995**

Hole No. **H-34-94** Sheet **1** of **1**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

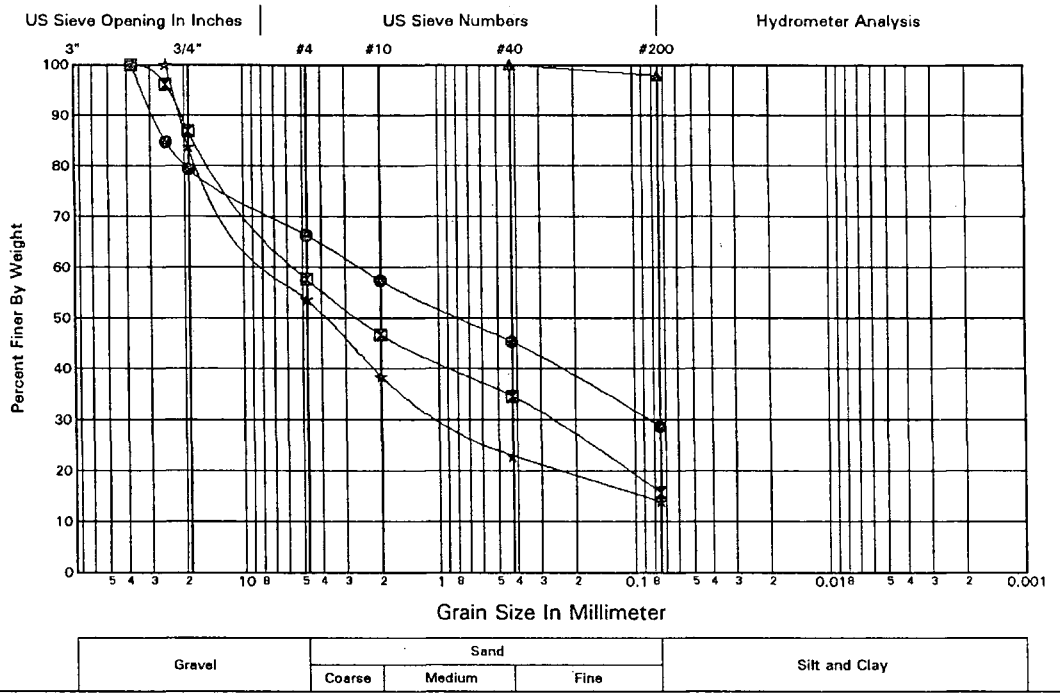
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	9.0	2.74	D-2	SM	GRAY	SILTY SAND with GRAVEL	8	NP	NP	NP
⊠	24.0	7.32	D-5	GM	GRAY	SILTY GRAVEL with SAND	9	NP	NP	NP
▲	29.0	8.84	D-6	ML	DARK GRAY	SILT	20	NP	NP	NP
★	49.0	14.94	D-10	GM	GRAY	SILTY GRAVEL with SAND	7	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	33.7	37.6	28.7		
⊠	42.4	41.9	15.7		
▲	0.0	2.2	97.8		
★	46.4	39.6	14.0		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	2.58	0.78	0.09		
⊠	5.32	2.60	0.28	0.11	
▲					
★	6.38	3.87	0.86	0.24	



Job No. **OL-1863** Date **February 3, 1995**

Hole No. **H-35-94** Sheet **1** of **1**

Project **Pierce Co. Line to Tukwila Stage 3**

Laboratory Summary

Washington State Department of Transportation

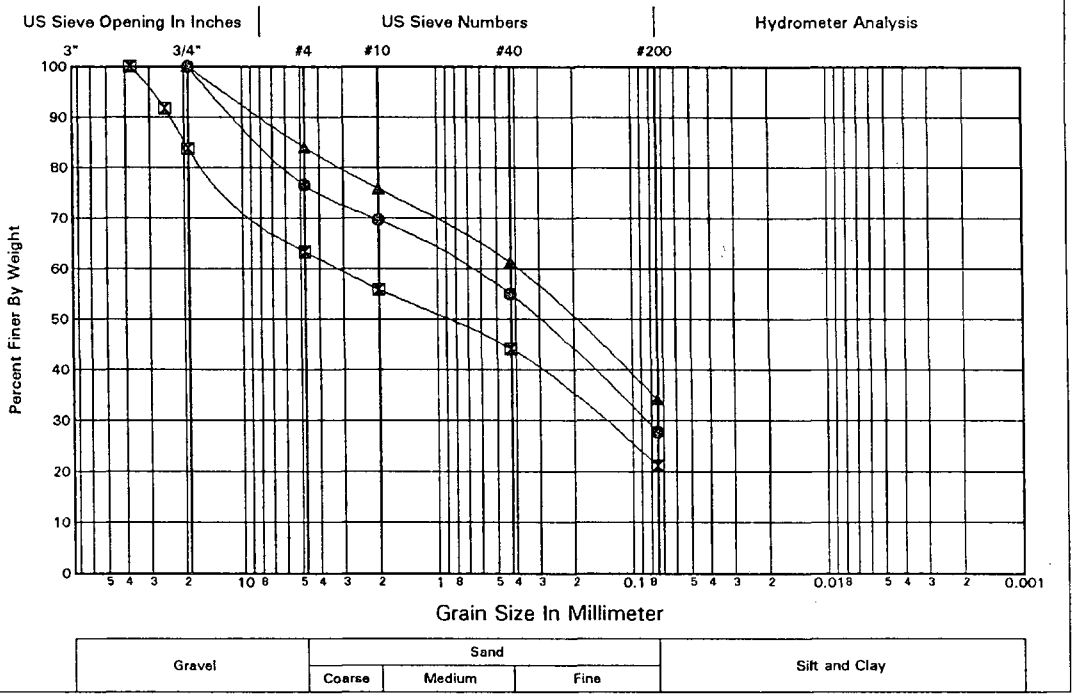
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	6.0	1.83	D-3	SM	GRAYISH BROWN	SILTY SAND with GRAVEL	13	NP	NP	NP
⊠	13.0	3.96	D-6	SM	OLIVE GRAY	SILTY SAND with GRAVEL	5	NP	NP	NP
▲	33.0	10.06	D-12	SM	DARK GRAY	SILTY SAND with GRAVEL	7	NP	NP	NP

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cu	Cc
●	23.5	48.7	27.8		
⊠	36.6	42.2	21.2		
▲	16.0	49.9	34.1		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.72	0.31	0.09		
⊠	3.21	0.92	0.15		
▲	0.39	0.21			



APPENDIX D - SOIL PROPERTIES FOR COM624

Washington State Department of Transportation

COM 624

PIER LOCATIONS FOR WHICH SOIL DATA APPLIES	NUMBER OF SOIL LAYERS (Circle)
506W – Pier 1	1 (2) 3 4 5 6 7 8 9

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu. m.	0 kPa	35°	7500 kN/cu. m.

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
0 m	7.5 m.

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu. m.	0 kPa	38°	12000 kN/cu. m.

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
7.5 m	Shaft/Pile tip

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES: 506 W – Pier 2

NUMBER OF SOIL LAYERS (Circle): 1 (2) 3 4 5 6 7 8 9

Layer 1

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu. m.	0 kPa	32°	6000 kN/cu. m.

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
0 m.	5 m

Layer 2

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu. m.	0 kPa	38°	12,000 kN/cu. m.

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
5 m	Shaft/Pile tip

Layer 3

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

Layer 4

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

Layer 5

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

Layer 6

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

Layer 7

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

Layer 8

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

Layer 9

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES	NUMBER OF SOIL LAYERS (Circle)
506W - Pier 3	1 (2) 3 4 5 6 7 8 9

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [X] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu.m.	0 kPa.	32°	6000 kN/cu.m.

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
	0 m	5.0 m

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [X] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu. m.	0 kPa.	38°	12,000 kN/cu.m

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
	5.0 m	Shaft/ Pile tip

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES	NUMBER OF SOIL LAYERS (Circle)
507W – Pier 2	(1) 2 3 4 5 6 7 8 9

TYPE OF SOIL

☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu.m.	0 kPa	40°	30,000 kN/cu.m.

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
	0 m	Shaft tip.

TYPE OF SOIL

☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES	NUMBER OF SOIL LAYERS (Circle)
507W – Pier 3	(1) 2 3 4 5 6 7 8 9

TYPE OF SOIL
[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [X] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu.m.	0 kPa	40°	30,000 kN/cu.m.

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: 0m. | DEPTH TO LOWER BOUNDARY: Shaft tip

TYPE OF SOIL
[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES	NUMBER OF SOIL LAYERS (Circle)
508W-Pier 1	1 2 3 (4) 5 6 7 8 9

Layer 1

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu.m.	0 kPa	35°	7500 kN/cu.m.

A _____ F _____ ε_{50} _____

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
0 m	9 m

Layer 2

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu.m.	0 kPa	33°	5000 kN/cu.m

A _____ F _____ ε_{50} _____

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
9m	13.5 m.

Layer 3

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu.m.	0 kPa	33°	3000 kN/cu.m.

A _____ F _____ ε_{50} _____

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
13.5 m	19 m

Layer 4

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu.m.	0 kPa	40°	20,000 kN/cu.m.

A _____ F _____ ε_{50} _____

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
19 m	Pile tip

Layer 5

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A _____ F _____ ε_{50} _____

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

Layer 6

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A _____ F _____ ε_{50} _____

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

Layer 7

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A _____ F _____ ε_{50} _____

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

Layer 8

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A _____ F _____ ε_{50} _____

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

Layer 9

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A _____ F _____ ε_{50} _____

DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES	NUMBER OF SOIL LAYERS (Circle)
508 W – Pier 2	1 (2) 3 4 5 6 7 8 9

TYPE OF SOIL: [ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [X] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu. m.	0 kPa	33°	5000 kN/cu. m.

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
	0 m	7.5m.

TYPE OF SOIL: [ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [X] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu. m.	0 kPa	40°	20,000 kN/cu. m.

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
	7.5 m	Shaft/Pile tip

TYPE OF SOIL: [ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL: [ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL: [ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL: [ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL: [ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL: [ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL: [ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES: 508 W – Pier 3

NUMBER OF SOIL LAYERS (Circle): 1 (2) 3 4 5 6 7 8 9

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu.m.	0 kPa	33°	5000 kN/cu.m.

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: 0 m | DEPTH TO LOWER BOUNDARY: 7.5 m.

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu.m.	0 kPa	40°	20,000 kN/cu.m

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: 7.5 m | DEPTH TO LOWER BOUNDARY: Shaft/Pile tip

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TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

TYPE OF SOIL: ☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES: 508W – Pier 4

NUMBER OF SOIL LAYERS (Circle): 1 2 (3) 4 5 6 7 8 9

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu. m.	0 kPa	33°	5000 kN/cu. m.

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: 0 m. | DEPTH TO LOWER BOUNDARY: 12.3 m

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu. m.	0 kPa	35°	5000 kN/cu. m.

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: 12.3m | DEPTH TO LOWER BOUNDARY: 17.2 m

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu. m.	0 kPa	40°	20,000 kN/cu. m.

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: 17.2m | DEPTH TO LOWER BOUNDARY: Pile tip

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ | DEPTH TO UPPER BOUNDARY: | DEPTH TO LOWER BOUNDARY:

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES	NUMBER OF SOIL LAYERS (Circle)
509 W - Pier 3	1 (2) 3 4 5 6 7 8 9

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu.m.	0 kPa	40°	0,000 kN/cu.m.

A ________ F ________ ε_{50} ________ | DEPTH TO UPPER BOUNDARY: 0 m | DEPTH TO LOWER BOUNDARY: 3.3 m.

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu.m.	0 kPa	40°	20,000 kN/cu.m.

A ________ F ________ ε_{50} ________ | DEPTH TO UPPER BOUNDARY: 3.3m | DEPTH TO LOWER BOUNDARY: Shaft tip

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ________ F ________ ε_{50} ________ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ________ F ________ ε_{50} ________ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ________ F ________ ε_{50} ________ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ________ F ________ ε_{50} ________ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ________ F ________ ε_{50} ________ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ________ F ________ ε_{50} ________ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ________ F ________ ε_{50} ________ | DEPTH TO UPPER BOUNDARY | DEPTH TO LOWER BOUNDARY

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES	NUMBER OF SOIL LAYERS (Circle)
509W - Pier 2	1 (2) 3 4 5 6 7 8 9

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu.m.	0 kPa	40°	30,000 kN/cu.m.

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
	0 m	3.3 m

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu.m	0 kPa	40°	20,000 kN/cu.m.

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
	3.3 m	Shaft tip.

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ____ F ____ ε_{50} ____	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES	NUMBER OF SOIL LAYERS (Circle)
510W - Pier 2	1 (2) 3 4 5 6 7 8 9

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [X] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu.m.	0 kPa	33°	5000 kN/cu.m.

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
	0	2.0 m.

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [X] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu.m.	0 kPa	38°	20,000 kN/cu.m.

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY
	2.0 m	Shaft tip

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

TYPE OF SOIL

[ ] SOFT CLAY [ ] STIFF CLAY BELOW WATER LEVEL [ ] STIFF CLAY ABOVE WATER LEVEL [ ] UNIFORM CRITERIA FOR CLAY [ ] SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______	DEPTH TO UPPER BOUNDARY	DEPTH TO LOWER BOUNDARY

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PIER LOCATIONS FOR WHICH SOIL DATA APPLIES: 510W – Pier 3

NUMBER OF SOIL LAYERS (Circle): 1 (2) 3 4 5 6 7 8 9

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
19.8 kN/cu.m.	0 kPa	33°	5000 kN/cu.m.

A ______ F ______ ε_{50} ______ DEPTH TO UPPER BOUNDARY: 0 m DEPTH TO LOWER BOUNDARY: 2.0 m.

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☒ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)
10.0 kN/cu.m.	0 kPa	38°	20,000 kN/cu.m.

A ______ F ______ ε_{50} ______ DEPTH TO UPPER BOUNDARY: 2.0 m DEPTH TO LOWER BOUNDARY: Shaft tip

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ DEPTH TO UPPER BOUNDARY DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ DEPTH TO UPPER BOUNDARY DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ DEPTH TO UPPER BOUNDARY DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ DEPTH TO UPPER BOUNDARY DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ DEPTH TO UPPER BOUNDARY DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ DEPTH TO UPPER BOUNDARY DEPTH TO LOWER BOUNDARY

TYPE OF SOIL
☐ SOFT CLAY ☐ STIFF CLAY BELOW WATER LEVEL ☐ STIFF CLAY ABOVE WATER LEVEL ☐ UNIFORM CRITERIA FOR CLAY ☐ SAND

EFFECTIVE UNIT WEIGHT OF SOIL	COHESION	INTERNAL ANGLE OF FRICTION	MODULUS OF SUBGRADE REACTION (k)

A ______ F ______ ε_{50} ______ DEPTH TO UPPER BOUNDARY DEPTH TO LOWER BOUNDARY

FOUNDATIONS

Washington State Department of Transportation

Memorandum

January 11, 1995

From: T. M. Allen/J. G. Cuthbertson
Headquarters Materials Laboratory, 47365
Geotechnical Branch
PHONE 753-7163 SCAN 234-7163
FAX 586-4611 SCAN FAX 321-4611

To: H. Clayton/D. Cornell
NW Region, NB82-29

RE: SR-5, C.S. 1727, OL-1863
Pierce County Line to Tukwila Stage 3

The field exploration program for the subject project included the installation of open stand-pipe piezometers at each bridge. The piezometers were installed in the following test borings. A total of 5 piezometers were installed.

Br 506W	Br 507W	Br 508W	Br 509W	Br 510W
H-22-94	H-25-94	H-28-94	H-31-94	H-34-94

Please add these piezometers to your current instrumentation schedule. We will require readings from the piezometers once a week for the next three weeks. After three weeks monthly readings will be sufficient. We anticipate that regular readings will no longer be required after July of this year. Attached are copies of the Bridge Layouts showing the locations of the borings. We do not have elevation or location data for the piezometers. The region will be surveying the locations. Once we have location and elevation data, we will forward that information to you. Please note that this project is a metric project. Please use meters for your readings.

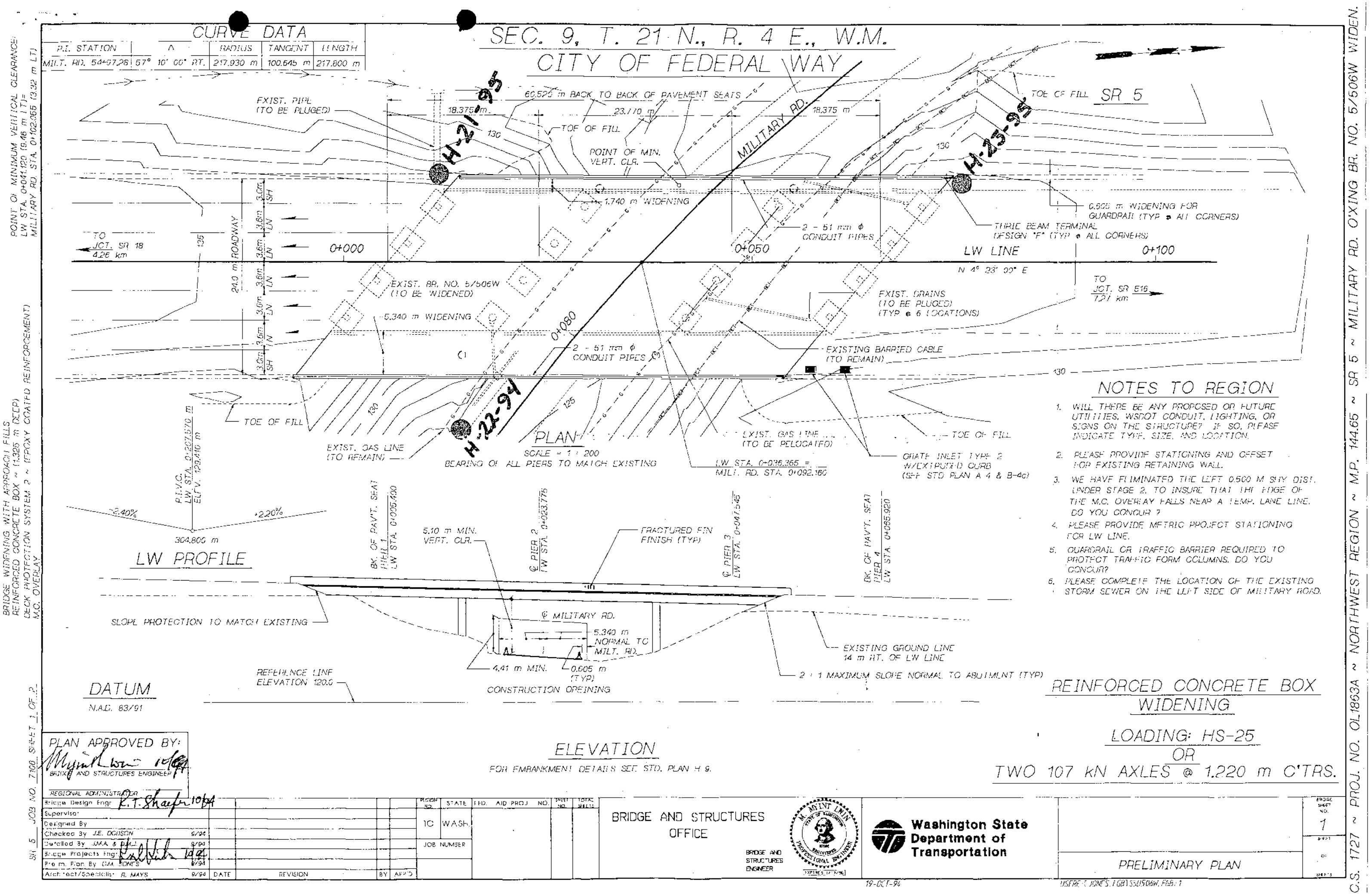
If you have questions or require further information, please contact Jim Cuthbertson at 753-7163 (SCAN 234-7163).

TMA:jgc

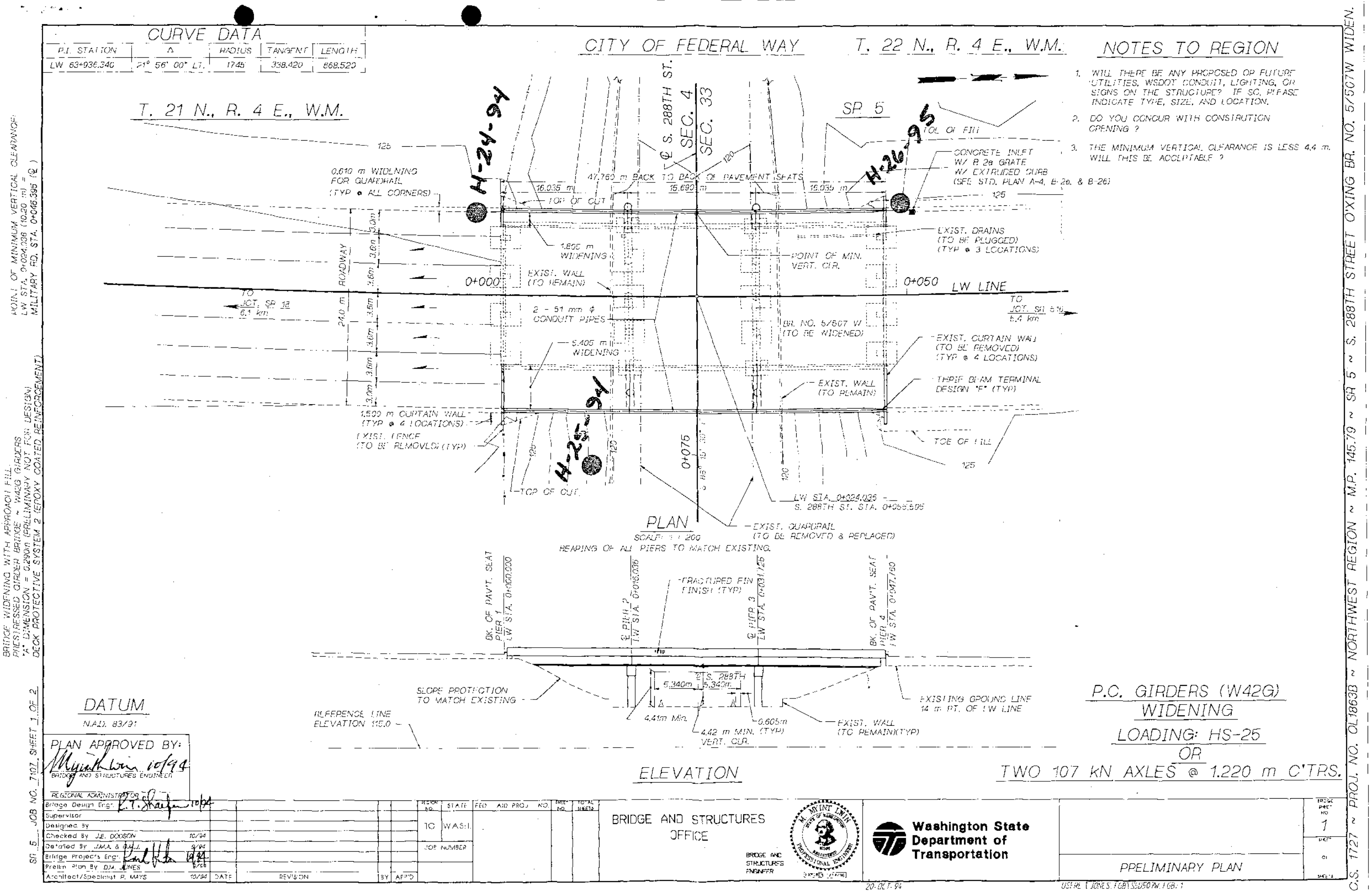
JGC

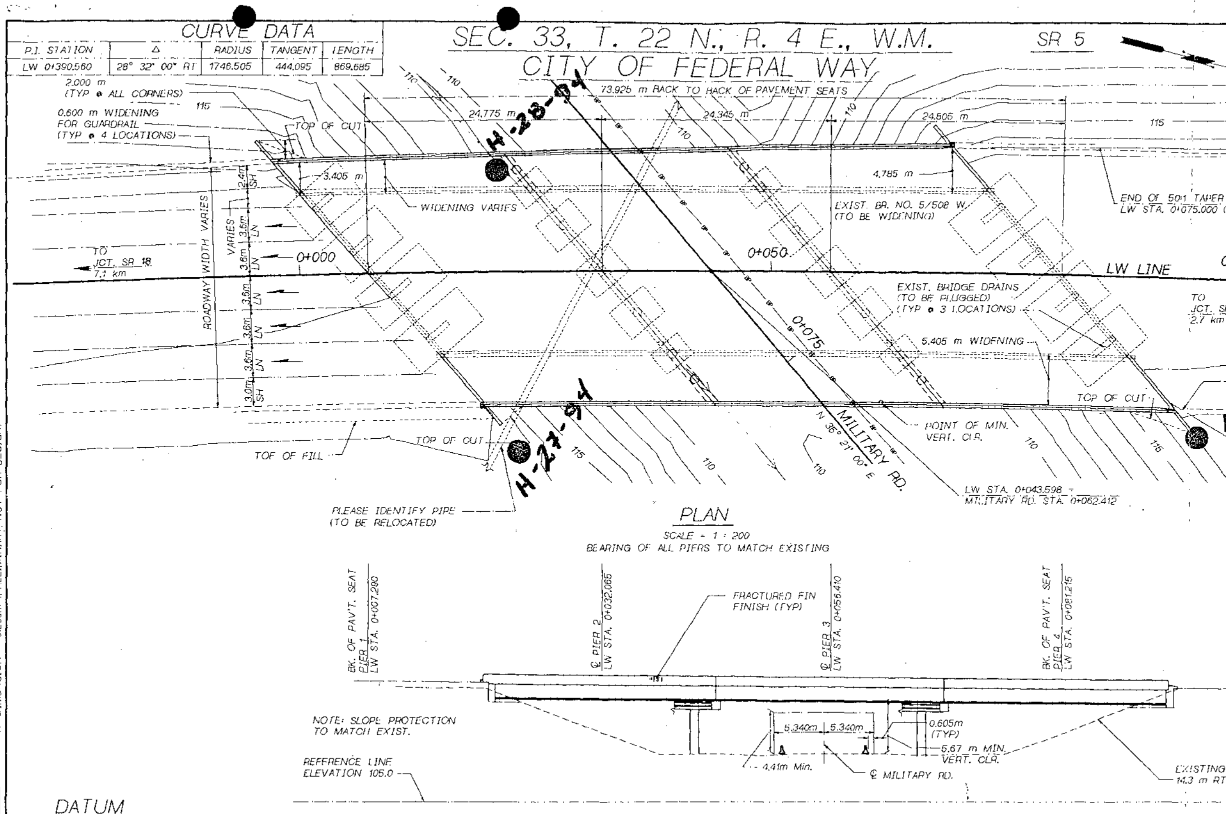
Attachment

cc: T. Badger, Mats. Lab., 47365



CURVE DATA
P.I. STATION | Δ | RADIUS | TANGENT | LENGTH
MILT. RD. 54+67.26 | 57° 10' 00" RT. | 217.930 m | 100.645 m | 217.600 m
SEC. 9, T. 21 N., R. 4 E., W.M.
CITY OF FEDERAL WAY
POINT OF MINIMUM VERTICAL CLEARANCE
LW STA. 0+041.120 (9.46 m LT) = MILITARY RD. STA. 0+102.065 (3.32 m LT)
69.525 m BACK TO BACK OF PAVEMENT SEATS
18.376 m
23.770 m
18.375 m
EXIST. PIPE (TO BE PLUGED)
TOE OF FILL
POINT OF MIN. VERT. CLR.
MILITARY RD.
TOE OF FILL
SR 5
H-21-95
H-23-95
H-22-94
1.740 m WIDENING
2 - 51 mm ϕ CONDUIT PIPES
0.505 m WIDENING FOR GUARDRAIL (TYP @ ALL CORNERS)
THRIE BEAM TERMINAL DESIGN "F" (TYP @ ALL CORNERS)
TO JCT. SR 18 4.26 km
24.0 m ROADWAY
0+000
0+050
LW LINE
0+100
N 4° 23' 00" E
TO JCT. SR 516 7.27 km
EXIST. BR. NO. 5/506W (TO BE WIDENED)
5.340 m WIDENING
0+080
EXIST. DRAINS (TO BE PLUGED) (TYP @ 6 LOCATIONS)
2 - 51 mm ϕ CONDUIT PIPES
EXISTING BARRIED CABLE (TO REMAIN)
TOE OF FILL
EXIST. GAS LINE (TO REMAIN)
PLAN
SCALE = 1 : 200
BEARING OF ALL PIERS TO MATCH EXISTING
EXIST. GAS LINE (TO BE RELOCATED)
LW STA. 0+036.365 = MILT. RD. STA. 0+092.160
GRATE INLET TYPE 2 W/EXTRUDED CURB (SEE STD PLAN A 4 & B-4c)
TOE OF FILL
NOTES TO REGION
1. WILL THERE BE ANY PROPOSED OR FUTURE UTILITIES, WSDOT CONDUIT, LIGHTING, OR SIGNS ON THE STRUCTURE? IF SO, PLEASE INDICATE TYPE, SIZE, AND LOCATION.
2. PLEASE PROVIDE STATIONING AND OFFSET FOR EXISTING RETAINING WALL.
3. WE HAVE ELIMINATED THE LEFT 0.500 M SHY DIST. UNDER STAGE 2, TO INSURE THAT THE EDGE OF THE M.C. OVERLAY FALLS NEAR A TEMP. LANE LINE. DO YOU CONCUR ?
4. PLEASE PROVIDE METRIC PROJECT STATIONING FOR LW LINE.
5. GUARDRAIL OR TRAFFIC BARRIER REQUIRED TO PROTECT TRAFFIC FORM COLUMNS. DO YOU CONCUR?
6. PLEASE COMPLETE THE LOCATION OF THE EXISTING STORM SEWER ON THE LEFT SIDE OF MILITARY ROAD.
BRIDGE WIDENING WITH APPROACH FILLS
REINFORCED CONCRETE BOX ~ 1.326 m DEEP
DECK PROTECTION SYSTEM 2 ~ (EPOXY COATED REINFORCEMENT)
M.C. OVERLAY
P.I.V.C. LW STA. 0+027.570 m ELEV. 129.416 m
-2.40%
+2.20%
304.800 m
LW PROFILE
BK. OF PAVT. SEAT PIER 1 LW STA. 0+005.100
℄ PIER 2 LW STA. 0+023.775
℄ PIER 3 LW STA. 0+047.545
BK. OF PAVT. SEAT PIER 4 LW STA. 0+065.920
5.10 m MIN. VERT. CLR.
FRACTURED FIN FINISH (TYP)
SLOPE PROTECTION TO MATCH EXISTING
℄ MILITARY RD.
5.340 m NORMAL TO MILT. RD.
4.41 m MIN.
0.605 m (TYP)
CONSTRUCTION OPENING
EXISTING GROUND LINE 14 m RT. OF LW LINE
2 : 1 MAXIMUM SLOPE NORMAL TO ABUTMENT (TYP)
REFERENCE LINE ELEVATION 120.0
DATUM
N.A.D. 83/91
REINFORCED CONCRETE BOX WIDENING
LOADING: HS-25
OR
TWO 107 kN AXLES @ 1.220 m C'TRS.
PLAN APPROVED BY:
BRIDGE AND STRUCTURES ENGINEER
ELEVATION
FOR EMBANKMENT DETAILS SEE STD. PLAN H 9.
REGIONAL ADMINISTRATOR
Bridge Design Engr
Supervisor
Designed By
Checked By J.E. DOBSON 9/94
Detailed By
Bridge Projects Engr
Prelim. Plan By
Architect/Specialist R. MAYS 9/94
DATE
REVISION
BY
APP'D
STATE
WASH.
FED. AID PROJ. NO.
JOB NUMBER
BRIDGE AND STRUCTURES OFFICE
BRIDGE AND STRUCTURES ENGINEER
Washington State Department of Transportation
PRELIMINARY PLAN
19-OCT-94
SR 5 JOB NO. 7100 SHEET 1 OF 2
C.S. 1727 ~ PROJ. NO. OL1853A ~ NORTHWEST REGION ~ M.P. 144.65 ~ SR 5 ~ MILITARY RD. O'XING BR. NO. 5/506W WIDEN.


CURVE DATA
P.I. STATION | Δ | RADIUS | TANGENT | LENGTH
LW 63+936.340 | 21° 56' 00" LT. | 1745 | 338.420 | 668.520
CITY OF FEDERAL WAY
T. 22 N., R. 4 E., W.M.
T. 21 N., R. 4 E., W.M.
NOTES TO REGION
1. WILL THERE BE ANY PROPOSED OR FUTURE UTILITIES, WSDOT CONDUIT, LIGHTING, OR SIGNS ON THE STRUCTURE? IF SO, PLEASE INDICATE TYPE, SIZE, AND LOCATION.
2. DO YOU CONCUR WITH CONSTRUCTION OPENING ?
3. THE MINIMUM VERTICAL CLEARANCE IS LESS 4.4 m. WILL THIS BE ACCEPTABLE ?
H-24-94
H-25-94
H-26-95
SP 5
SEC. 4
SEC. 33
℄ S. 288TH ST.
0.610 m WIDENING FOR GUARDRAIL (TYP @ ALL CORNERS)
47.760 m BACK TO BACK OF PAVEMENT SEATS
16.035 m
15.690 m
TOP OF CUT
TOE OF FILL
CONCRETE INLET W/ B 2a GRATE W/ EXTRUDED CURB (SEE STD. PLAN A-4, B-2a, & B-26)
1.800 m WIDENING
EXIST. DRAINS (TO BE PLUGGED) (TYP @ 3 LOCATIONS)
POINT OF MIN. VERT. CLR.
0+000
EXIST. WALL (TO REMAIN)
0+050
LW LINE
TO JCT. SR 18 6.1 km
TO JCT. SR 516 6.4 km
ROADWAY
24.0 m
2 - 51 mm ϕ CONDUIT PIPES
BR. NO. 5/567 W (TO BE WIDENED)
5.405 m WIDENING
EXIST. CURTAIN WALL (TO BE REMOVED) (TYP @ 4 LOCATIONS)
THRIE BEAM TERMINAL DESIGN "F" (TYP)
1.500 m CURTAIN WALL (TYP @ 4 LOCATIONS)
EXIST. FENCE (TO BE REMOVED) (TYP)
0+075
LW STA. 0+034.035 = S. 288TH ST. STA. 0+056.506
EXIST. GUARDRAIL (TO BE REMOVED & REPLACED)
PLAN
SCALE 1 : 200
BEARING OF ALL PIERS TO MATCH EXISTING.
BK. OF PAVT. SEAT PIER 1 LW STA. 0+000.000
℄ PIER 2 LW STA. 0+016.035
FRACTURED FIN FINISH (TYP)
℄ PIER 3 LW STA. 0+031.725
BK. OF PAVT. SEAT PIER 4 LW STA. 0+047.760
SLOPE PROTECTION TO MATCH EXISTING
℄ S. 288TH
5.340m
4.41m Min.
4.42 m MIN. (TYP) VERT. CLR.
0.605m
EXIST. WALL (TO REMAIN)(TYP)
EXISTING GROUND LINE 14 m RT. OF LW LINE
REFERENCE LINE ELEVATION 110.0
ELEVATION
DATUM
N.A.D. 83/91
P.C. GIRDERS (W42G) WIDENING
LOADING: HS-25 OR TWO 107 kN AXLES @ 1.220 m C'TRS.
POINT OF MINIMUM VERTICAL CLEARANCE LW STA. 0+024.036 (10.30 m) = MILITARY RD. STA. 0+046.395 (℄)
BRIDGE WIDENING WITH APPROACH FILL PRESTRESSED GIRDER BRIDGE - W42G GIRDERS "A" DIMENSION = 0.290m (PRELIMINARY NOT FOR DESIGN) DECK PROTECTIVE SYSTEM 2 (EPOXY COATED REINFORCEMENT)
PLAN APPROVED BY:
BRIDGE AND STRUCTURES ENGINEER
REGIONAL ADMINISTRATOR
Bridge Design Engr.
Supervisor
Designed By
Checked By J.E. DOBSON 10/94
Detailed By J.M.A. & B.L.L. 9/94
Bridge Projects Engr.
Prelim. Plan By D.M. JONES 9/94
Architect/Specialist R. MAYS 10/94
DATE
REVISION
BY
APP'D
10
WASH.
JOB NUMBER
BRIDGE AND STRUCTURES OFFICE
BRIDGE AND STRUCTURES ENGINEER
Washington State Department of Transportation
PRELIMINARY PLAN
1
20-OCT-94
SR 5 JOB NO. 7102 SHEET 1 OF 2
C.S. 1727 ~ PROJ. NO. OL1863D ~ NORTHWEST REGION ~ M.P. 145.79 ~ SR 5 ~ S. 288TH STREET O'XING BR. NO. 5/567W WIDEN.



CURVE DATA

P.I. STATION	Δ	RADIUS	TANGENT	LENGTH
LW 01390.560	28° 32' 00" RT	1746.505	444.095	869.685

NOTES TO REGION

1. WILL THERE BE ANY PROPOSED OR FUTURE UTILITIES, WSDOT CONDUIT, LIGHTING, OR SIGNS ON THE STRUCTURE? IF SO, PLEASE INDICATE TYPE, SIZE, AND LOCATION.
2. DO YOU CONCUR WITH CONSTRUCTION OPENING ?
3. PLEASE SHOW LOCATION, SIZE AND LIGHTING REQUIREMENTS FOR PROPOSED SIGN STRUCTURE.
4. WE HAVE ELIMINATED THE LEFT 0.600 M SHY DISTANCE UNDER STAGE 2 IN ORDER TO INSURE THAT THE TEMP. M.C. OVERLAY FALLS NEAR A TEMP. LANE EDGE. DO YOU CONCUR ?

DATUM
N.A.D. 83/91

P.C. GRIDER (W50G)
WIDENING
LOADING: HS-25
OR
TWO 107 kN AXLES @ 1.220 m C'TRS.

PLAN APPROVED BY: Myint Lwin 10/94
BRIDGE AND STRUCTURES ENGINEER
REGIONAL ADMINISTRATOR
Bridge Design Engr. R.T. Shafer 10/94
Supervisor
Designed By
Checked By J.F. DODSON 10/94
Detailed By J.M.A. & D.M.P. 9/94
Bridge Projects Engr. 10/94
Prelim. Plan By D.M. JONES 9/94
Architect/Specialist R. MAYS 10/94

DATE | REVISION | BY | APP'D

REGION NO. 10 | STATE WASH. | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS
JOB NUMBER

BRIDGE AND STRUCTURES OFFICE
BRIDGE AND STRUCTURES ENGINEER

Washington State Department of Transportation

BRIDGE SHEET NO. 1

PRELIMINARY PLAN

SR 5 JOB NO. 7108 SHEET 1 OF 2

C.S. 1727 ~ PROJ. NO. OL1863C ~ NORTHWEST REGION ~ M.P. 146.43 ~ SR 5 ~ MILITARY RD. O'XING BR. NO. 5/508W WIDEN

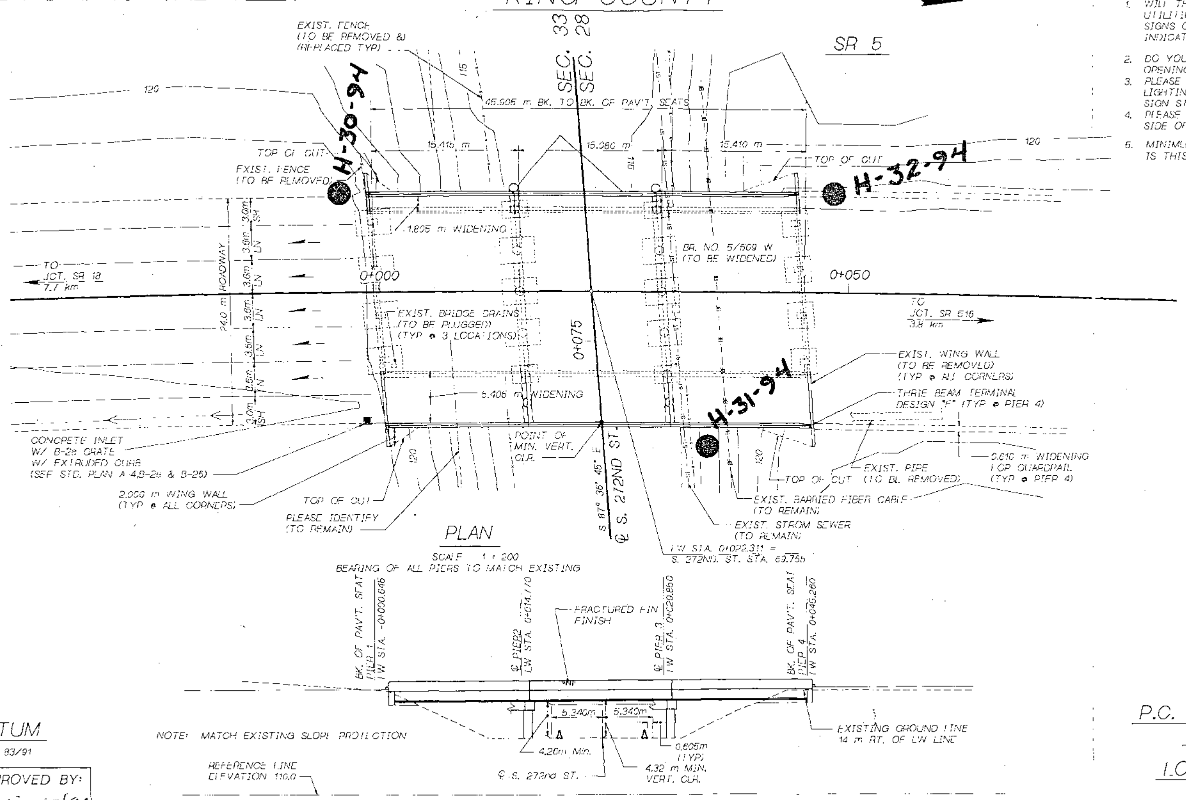
BRIDGE WIDENING WITH PRESTRESSED CONCRETE GIRDER (W50G)
DECK PROTECTIVE SYSTEM 1 (EPOXY COATED REINFORCEMENT)
"A" DIMENSION = 0.230m (PRELIMINARY, NOT FOR DESIGN)

MILITARY ROAD STA. 0+084.757 (4.97 m)

T. 22 N., R. 4 E., W.M.
KING COUNTY

CURVE DATA

P.I. STATION	Δ	RADIUS	TANGENT	LENGTH
LW 2133+66.05	28° 32' 00" RT	1748.505m	444.090m	869.085m



DATUM

N.A.D. 83/91

NOTE: MATCH EXISTING SLOPE PROTECTION

REFERENCE LINE ELEVATION 110.0

ELEVATION

NOTE: SLOPE PROTECTION TO MATCH EXISTING

NOTES TO REGION

1. WILL THERE BE ANY PROPOSED OR FUTURE UTILITIES, WSDOT CONDUIT, LIGHTING, OR SIGNS ON THE STRUCTURE? IF SO, PLEASE INDICATE TYPE, SIZE, AND LOCATION.
2. DO YOU CONCUR WITH CONSTRUCTION OPENING ?
3. PLEASE SHOW LOCATION LIGHTING REQUIREMENTS FOR PROPOSED SIGN STRUCTURE.
4. PLEASE IDENTIFY CONDUIT ON RIGHT SIDE OF S. 272ND STREET.
5. MINIMUM VERTICAL CLEARANCE IS 4.32 m. IS THIS ACCEPTABLE ?

P.C. GIRDER (W42G) WIDENING

LOADING: HS-25 OR TWO 107 kN AXLES @ 1.220 m C'TRS.

BRIDGE WIDENING WITH APPROACH FILLS
PRESTRESSED CONCRETE GIRDERS ~ (W42G)
"A" DIMENSION = 0.200m (PRELIMINARY NOT FOR DESIGN)
DECK PROTECTIVE SYSTEM 1 (EPOXY COATED REINFORCEMENT)

LW STA. 0+023.312 (13.80 m RT)
S. 272nd ST. STA. 0+063.607 (℄)

PLAN APPROVED BY: [signature] 10/94
BRIDGE AND STRUCTURES ENGINEER

Regional Administrator				
Bridge Design Engr.	R.T. Shaefer	10/94		
Supervisor				
Designed By				
Checked By	J.E. DODSON	10/94		
Detailed By	J.M.A. & D.M.J.	10/94		
Bridge Projects Engr.	[signature]	10/94		
Prelim. Plan By	D.M. JONES	10/94		
Architect/Specialist	R. MAYS	10/94	DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER

BRIDGE AND STRUCTURES OFFICE

BRIDGE AND STRUCTURES ENGINEER

Washington State Department of Transportation

PRELIMINARY PLAN

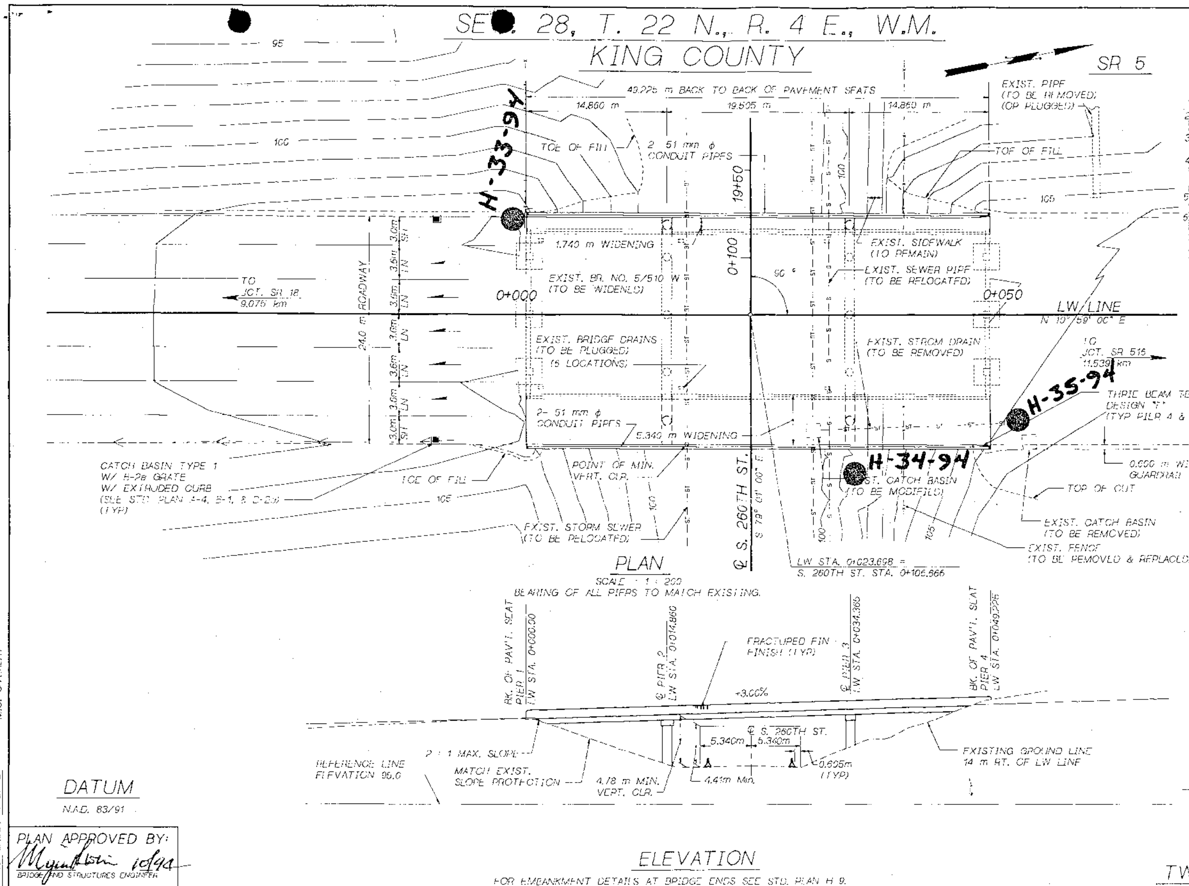
BRIDGE SHEET NO. 1

29 OCT 94

USERF: L:JONES.FGB\5\509W.FGB; 1

SR 5 JOB NO. 7109 SHEET 1 OF 2

C.S. 1727 ~ PROJ. NO. OL1863D ~ NORTHWEST REGION ~ M.P. 146.81 ~ SR 5 ~ S. 272ND ST. O'XING BR. NO. 5/509W WIDEN.



NOTES TO REGION

1. WILL THERE BE ANY PROPOSED OR FUTURE UTILITIES, WSDOT CONDUIT, LIGHTING, OR SIGNS ON THE STRUCTURE? IF SO, PLEASE INDICATE TYPE, SIZE, AND LOCATION.
2. PLEASE VERIFY REVISED INTERSECTION STATION 0+023.698.
3. DO YOU CONCUR WITH FALSE WORK OPENING ?
4. GUARDRAIL OR CONCRETE BARRIER REQUIRED TO PROTECT TRAFFIC FROM COLUMNS. DO YOU CONCUR ?
5. CAN SIDEWALK BE CLOSED DURING CONSTRUCTION ?
6. WE HAVE ELIMINATED THE LEFT 0.500 m SHY DIST. UNDER STAGE 2, TO INSURE THAT THE EDGE OF M.C. OVERLAY FALLS NEAR A TEMP. LANE LINE. DO YOU CONCUR ?

REINFORCED CONCRETE FLAT SLAB WIDENING
LOADING: HS-25
OR
TWO 24K AXLES @ 4' C'TRS.

PLAN APPROVED BY: [signature] 10/94
BRIDGE AND STRUCTURES ENGINEER

REINFORCED CONCRETE FLAT SLAB ~ 0.660 m DEEP
DECK PROTECTIVE SYSTEM 2 (EPOXY COATED REINFORCEMENT)
M.C. OVERLAY
S. 260TH ST STA. 0+120.466 (6.73 m RT)

SR 5 JOB NO. 7110 SHEET 1 OF 2

REGIONAL ADMINISTRATOR	
Bridge Design Engr	R. T. Shaefer 10/94
Supervisor	
Designed By	
Checked By	J.E. DODSON 9/94
Detailed By	J.M.A. & D.S.J. 9/94
Bridge Projects Engr	[signature] 9/94
Prelim. Plan By	D.M. JONES 9/94
Architect/Specialist	R. MAYS 9/94

DATE | REVISION | BY | APP'D

REGION NO. 10 | STATE WASH. | FED. AID PROJ. NO. | JOB NUMBER

BRIDGE AND STRUCTURES OFFICE

BRIDGE AND STRUCTURES ENGINEER

Washington State Department of Transportation

PRELIMINARY PLAN

BRIDGE SHEET NO. 1

C.S. 1727 ~ PROJ. NO. 01.1863E ~ NORTHWEST REGION ~ M.P. 147.64 ~ SR 5 ~ S. 260TH ST. O'XING BR. NO. 5/510W WIDEN.

12-OCT-94

Piezometer Readings

Pierce County Line to Tukwilla Stage 3 - Bridge 506 W

CONTRACT No.	OL-1863	Total Length of Pipe	
		Elevation Top of Pipe	
Hole No.	H-22-94	Ground Elevation	
Station	Offset	Length of Pipe above Ground	0.500 m

DATE	Water Reading	Water Elevation	Remarks
2-3-95	- 3.962 m		Readings taken at
2-13-95	- 3.974 m		top of pipe
2-23-96	- 3.919 m		
3-23-95	- 3.956m		
4-24-95	-4.102m		
5-24-95	-4.309m		
6-27-95	-4.602m		
7-31-95	-4.812 m		

Piezometer Readings

Pierce County Line to Tukwilla Stage 3 - Bridge 507 W

CONTRACT No. OL-1863		Total Length of Pipe	
		Elevation Top of Pipe	
Hole No. H-25-94		Ground Elevation	
Station	Offset	Length of Pipe above Ground	0.000 m

DATE	Water Reading	Water Elevation	Remarks
2-3-95	-15.386 m		Readings taken at
2-13-95	-15.374 m		top of Pipe
2-23-95	-15.371 m		
3-23-95	-15.032 m		
4-24-95	-13.152 m		
5-24-95	-12.932 m		
6-27-95	-13.709 m		
7-31-95	-14.682 m		

Piezometer Readings

Pierce County Line to Tukwilla Stage 3 - Bridge 5084

CONTRACT No. OL-1863		Total Length of Pipe	
		Elevation Top of Pipe	
Hole No. H-28-94		Ground Elevation	
Station	Offset	Length of Pipe above Ground	0.640 m

DATE	Water Reading	Water Elevation	Remarks
2-3-95	-6.153 m		Readings taken at top
2-13-95	-6.998 m		of pipe
2-23-95	-6.589 m		
3-23-95	-7.010 m		
4-24-95	-6.736 m		
5-24-95	-7.403 m		
6-27-95	-8.442 m		
7-31-95	-10.030 m		

Piezometer Readings

Pierce County Line to Tukwila Stage 3 - Bridge 509 W

CONTRACT No. OL-1863		Total Length of Pipe	
		Elevation Top of Pipe	
Hole No. H-31-94		Ground Elevation	
Station	Offset	Length of Pipe above Ground	0.000 m

DATE	Water Reading	Water Elevation	Remarks
2-3-95	-3.444 m		Readings taken at
2-13-95	-3.407m		top of pipe
2-23-95	-3.444 m		
3-23-95	-3.462m		
4-24-95	-3.532 m		
5-24-95	-3.572m		
6-27-95	-3.657m		
7-31-95	-3.697m		

Piezometer Readings

Pierce County Line to Tukwilla Stage 3 - Bridge S10W

CONTRACT No. OL-1863		Total Length of Pipe	
		Elevation Top of Pipe	
Hole No. H-34-94		Ground Elevation	
Station	Offset	Length of Pipe above Ground	0.500 m

DATE	Water Reading	Water Elevation	Remarks
2-3-95	-2.697 m		Readings taken at
2-13-95	-2.709 m		top of pipe
2-23-95	-2.529 m		
3-23-95	-2.557 m		
4-24-95	-2.886m		
5-24-95	-3.108 m		
6-27-95	-3.304 m		
7-31-95	-3.416 m		