GT_003284

BDS Site Development
Map No. 2126

The Community Campus

At

8960 N Woolsey Ave

New Columbia

INIE08BD
21100

Geotechnical Engineering Reports

2125
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05-152867-FND-01-CO

05-152867CO

Enclosed

Carlson Geotechnical, August 2005, "Report of Site-Specific Seismic Hazard Study, New Columbia Elementary School, N Woolsey Avenue & N Houghton Court, Portland, Oregon"

Carlson Geotechnical, November 2005, "Response to Site Development Checksheet"

URS, May 2005, "Geotechnical engineering Report Addendum, Hope VI Redevelopment of Columbia Villa, Portland, Oregon, City of Portland, Office of Transportation (PDOT)"

URS January, 2003, "Geotechnical engineering Report, Hope VI Redevelopment of Columbia Villa, Portland, Oregon, City of Portland, Office of Transportation (PDOT)"

Carlson Geotechnical

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Report of
Site-Specific Seismic Hazard Study
New Columbia Elementary School
N Woolsey Avenue & N Houghton Court
Portland, Oregon

CGT Project Number G0302187.A

Prepared for

Mr. Patrick Rhea
Housing Authority of Portland
135 SW Ash Street
Portland, Oregon 97204

August 22, 2005

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August 22, 2005

Mr. Patrick Rhea
Housing Authority of Portland
135 SW Ash Street
Portland, Oregon 97204

Report of
Site-Specific Seismic Hazard Study
New Columbia Elementary School
N Woolsey Avenue & N Houghton Court
Portland, Oregon

CGT Project Number G0302187.A

Dear Mr. Rhea:

Carlson Geotechnical (CGT) is pleased to submit the results of our Report of Site-Specific Seismic Hazard Study for the New Columbia Elementary School site located at the northeast corner of the intersection of N Woolsey Avenue & N Houghton Court in Portland, Oregon. We performed our work in general accordance with CGT Proposal PO3562, dated July 28, 2005. Written authorization for our services, via Housing Authority of Portland (HAP) Contract No. ES0005, was provided on August 5, 2005.

We appreciate the opportunity to work with you on this project. Please call if you have any questions regarding this report.

Sincerely,
Carlson Geotechnical

David P. Holt, PE
Senior Geotechnical Engineer

Attachments

TABLE OF CONTENTS

INTRODUCTION

This report presents the results of our Site-Specific Seismic Hazard Study for the New Columbia Elementary School site located at the northeast corner of the intersection of N Woolsey Avenue & N Houghton Court in Portland, Oregon. The location of the site is shown on the attached Site Location, Figure 1. The purpose of our work was to provide a Site-Specific Seismic Hazard Study for the new elementary school. Our specific scope of work included the following:

- Review the Geotechnical Engineering Report, and the Geotechnical Engineering Report Addendum prepared for the site by URS, dated January 2003, and May 20, 2003, respectively, in order to identify subsurface conditions with depth. It is our understanding that the recommendations contained within these reports were used in the design of related geotechnical engineering aspects of the project, such as foundation design.
- Provide a Site-Specific Seismic Hazard Study in general accordance with the requirements of Section 1802 of the 2003 International Building Code, and Chapter 18, Section 1804 of the Oregon Structural Specialty Code.
- Provide a written report summarizing the results of our Site-Specific Seismic Hazard Study.

PROJECT INFORMATION AND SITE DESCRIPTION

Project Information

Development will consist of construction of a partial two-story, slab-on-grade, wood-framed with brick veneer, elementary school building, and a future concrete-masonry-unit, slab-on-grade, gymnasium building. Detailed structural information is currently unavailable; however, we have assumed that maximum continuous wall and column loads will not exceed 4 kips per lineal foot and 75 kips, respectively, and that uniform floor loads will be less than 150 pounds per square foot (psf). Site grade changes are anticipated to be less than 2 feet from current site grades.

Regional Geology

The site is located in the Portland basin within the Willamette Valley geological province in Portland, Oregon. The Willamette Valley was formed when volcanic rocks of the Oregon Coast Range, originally formed as submarine islands, were added to the North American Continent. The addition of the volcanic rocks to the North American continent caused inland downwarping, forming a depression in which various types of marine sedimentary and volcanic rocks accumulated. Approximately 15 million years ago, these rocks were covered by Columbia River

Basalts that flowed down the Columbia River Gorge into the Portland area. Later uplift and tilting of these Columbia River Basalts, the Oregon Coast Range, and the western Cascade Range formed the trough-like character of the Willamette Valley that we observe today. Extensive faulting occurred in the area due to the uplift of the Columbia River Basalts. This faulting episode produced normal faults on the southwest and northeast borders of the Portland basin, and dropped the area down, relative to the adjacent topography, to form the Portland basin. During this same time period, local volcanic activity produced the Boring Lavas through several localized vents, including nearby Mt. Scott, and Mt. Tabor. Catastrophic floods flowed into the Willamette Valley approximately 12,000 to 15,000 years ago, and deposited fine to coarse-grained sedimentary assemblages mapped throughout the area.

Site Geology

Available geological mapping of the area (Madin, 1990[1]) indicates that the site is underlain by Pleistocene-Age, coarse-grained, catastrophic, flood deposits (originating from glacial outburst floods of Lake Missoula), consisting of sand, gravel and cobbles, extending to depths of several tens of feet below ground surface (bgs). These flood deposits are underlain by Troutdale Formation gravels, extending to depths of approximately of 800 feet bgs, that are interbedded with sandstone, siltstone, and claystone. The Troutdale Formation gravels are underlain by Columbia River Basalt.

Earthquake Sources and Seismicity

The site is located in a tectonically active area that may be affected by crustal earthquakes, intra-slab earthquakes, or large subduction zone earthquakes. Damaging crustal earthquakes in this region may be derived from local sources such as the Portland Hills Fault Zone, the Lackamas Creek Fault, the Sandy River Fault, the Damascus-Tickle Creek Fault Zone, the Helvetia Fault, and several unnamed faults located within a few miles of the site. Crustal earthquakes typically occur at depths ranging from 15 to 40 km bgs (Geomatrix Consultants, 1995). Intra-slab earthquakes occur within the subducting Juan De Fuca Plate at depths ranging from approximately 40 km to 70 km bgs. Large subduction zone earthquakes in this region are derived from the Cascadia Subduction Zone (CSZ). Due to the lack of historical data on large subduction zone earthquakes, a typical depth for the occurrence of a subduction zone earthquake was inferred from models presented by Geomatrix Consultants in 1995, and is roughly 10 to 25 km bgs.

[1] Madin, 1990. Earthquake Hazard Geology Maps of the Portland Metropolitan Area, Oregon – Linnton Quadrangle. Oregon Department of Geology and Mineral Industries. Open File Report 0-90-2.

Crustal Sources

The Portland Hills Fault Zone, the Lackamas Creek Fault, the Sandy River Fault, the Damascus-Tickle Creek Fault Zone, the Helvetia Fault, and several unnamed faults located within a few miles of the site are the sources for crustal earthquakes in this region.

Portland Hills Fault Zone

The Portland Hills Fault Zone is a series of northwest-trending faults located approximately 2 miles (4 km) southwest of the site. The faults associated with this structural zone vertically displace the Columbia River Basalt Group by 1,130 feet, and appear to control thickness changes in late Pleistocene (approximately 780,000 years) sediment (Madin, 1994). The fault zone extends along the eastern margin of the Portland Hills for a distance of 25 miles (40 km), and has been mapped in the Portland area as a series of inferred faults with no surface expression. Geomorphic lineaments suggestive of Pleistocene deformation have been identified within the fault zone, but none of the fault segments has been shown to cut Holocene (last 10,000 years) deposits (Balsillie and Benson, 1971; Cornforth and Geomatrix Consultants, 1992). The fact that the faults do not cut Holocene sediments is most likely a result of the faulting being related to a time of intense uplift of the Oregon Coast Range during Miocene time, and little to no movement along the faults during the Holocene.

Recent studies of this fault (Wong and Others, 2000) concluded that the Portland Hills Fault Zone is potentially active, based on contemporary seismicity in the vicinity of the fault, and seismic reflection data suggesting that the fault cuts late Pleistocene layered strata. Additionally, In May of 2000, while taking magnetic readings to map the fault, an Oregon Department of Geology and Mineral Industries (DOGAMI) geologist observed folded sediment in a retaining wall cut in North Clackamas Park south of Portland. The folded sediments consisted of sand and silt deposited by Pleistocene floods derived from glacial Lake Missoula approximately 12,800 to 15,000 years ago. An investigation of the folded strata by DOGAMI geologists, and engineering consultants showed that the entire sequence of sediment layers is folded and they concluded that this folding is evidence for an active fault beneath the site, and the fault is either the Portland Hills Fault, or a closely related structure (Madin and Hemphill-Haley, 2001).

Lacamas Creek Fault

The Lacamas Creek Fault is a northwest trending structure located about 13 miles (22 km) northeast of the site, in the vicinity of Lacamas Lake, near Camas, Washington. This fault was originally identified by well-expressed lineaments defined by the relatively steep linear valley margins along both sides of Lacamas Lake, and by a relatively short linear stretch of Lacamas Creek near Camas, Washington (Geomatrix, 1995). Although recent activity on the Lacamas Creek Fault is uncertain, the fault is considered potentially active based on possible

displacement of Troutdale sediments, prominent topographic lineaments associated with the fault, and possible associated seismicity.

Sandy River Fault

The Sandy River Fault is located approximately 19 miles (31 km) southeast of the site. Since faulting has not been observed within Troutdale or Quaternary sediments, the fault is likely inactive (Geomatrix, 1995).

Grant Butte and Damascus-Tickle Creek Fault Zones

The Grant Butte and Damascus-Tickle Creek Fault Zones are located approximately 13 miles (21 km) southeast of the site. This zone consists of several relatively short north-northwest, northwest, and northeast trending faults along a 10½-mile-long (17 km) fault zone. The Grant Butte and Damascus Tickle Creek Fault Zones are considered potentially active based on stratagraphic relationships showing middle, and possibly late Pleistocene activity (Geomatrix, 1995).

In 1990, Ian Madin (Madin, 1990) mapped an east-northeast trending fault along the north side of Mount Scott and Powell Butte. In 1991, further work in the area identified a series of randomly oriented faults in an excavation within the Pliocene to Pleistocene aged Troutdale Formation gravels on Grant Butte. These structures are located approximately 13 miles (21 km) south of the site, and are collectively called the Grant Butte Fault Zone.

Helvetia Fault

The Helvetia Fault is a north-northwest trending fault, with a length of about 6 miles (10 km) in the subsurface, located approximately 11 miles (18 km) west of the site. There is no evidence for displacement of late Quaternary deposits along the fault; however, the recency of displacement is poorly illustrated (Geomatrix, 1995). Therefore, the fault is considered potentially active, but with a low probability of activity.

Other Mapped and Unmapped Crustal Sources

Several other crustal sources, including numerous unnamed inferred faults mapped within a few miles of the site may be capable of producing damaging earthquakes in the region. However, due to their distance from the site, non-active classification, their short fault segments, or low probability of activity, we did not elaborate on these sources for this study.

Several crustally derived seismic events have been recorded in areas where no faults are mapped. Recent seismic activity near Kelly Point near the confluence of the Willamette and Columbia Rivers in Portland, Oregon is an example of seismicity that cannot be correlated to a known fault. This fact is most likely a function of the heavy forestation of western Oregon

preventing the direct observation of faults that may occur in those areas. Additionally, most faulting within the Portland area does not cut the Holocene sediments and is thus difficult to define. Furthermore, the displacement of the Holocene sediments due to ongoing fault movement in recent geologic time is minor and difficult to observe. Additional geophysical studies may define these unmapped sources in the future.

Intra-Slab Source

Earthquakes derived from intra-slab sources occur within the subducting Juan De Fuca Plate at depths ranging from 20 miles (32 km) to 40 miles (64 km) bgs (Geomatrix Consultants, 1995). Approximately 20 miles (32 km) west of the current coast line is the CSZ where the subducting Juan De Fuca Plate moves eastward (relative to the North American Continent) beneath the North American Plate dipping at an angle of 10 to 20 degrees. As the plate moves farther away from the CSZ, the curvature of the plate increases and causes normal faulting within the oceanic slab in response to the extensional forces of the down dipping plate. The region of maximum curvature of the slab is where large intra-slab earthquakes are expected to occur, and is located roughly 30 miles (48 km) below the Oregon Coast Range, approximately 42 miles (68 km) west of the site. Historically, the seismicity rate within the Juan De Fuca Plate beneath Oregon is very low in northern Oregon and southwest Washington, and extremely low in southern and central Oregon (Geomatrix Consultants, 1993, 1995).

Cascadia Subduction Zone

The CSZ is a 680-mile-long (1,088 km) zone of active tectonic convergence where oceanic crust of the Juan De Fuca Plate is subducting beneath the North American continent at a rate of four cm/year (DeMats et al., 1990). Very little seismicity has occurred on the plate interface in historic time, and as a result, the seismic potential of the Cascadia Subduction Zone is a subject of scientific controversy. The lack of seismicity may be interpreted as a period of quiescent stress buildup between large magnitude earthquakes, or characteristic of the long-term behavior of the subduction zone. A growing body of geologic evidence; however, strongly suggests that prehistoric subduction zone earthquakes have occurred (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). This evidence includes: (1) buried tidal marshes recording episodic, sudden subsidence along the coast of northern California, Oregon, and Washington; (2) burial of subsided tidal marshes by tsunami wave deposits; (3) paleoliquefaction features; and (4) geodetic uplift patterns on the Oregon coast. Radiocarbon dates on buried tidal marshes indicate a recurrence interval for major subduction zone earthquakes of 250 to 650 years with the last event occurring 300 years ago (Atwater, 1992; Carver, 1992; Peterson et al., 1993; GC, 1995). The inferred seismogenic portion of the plate interface is roughly coincident with the Oregon/Washington coastline and lies approximately 89 miles (143 km) west of the site.

Earthquake Magnitude

Both deterministic and probabilistic methods are generally used to evaluate the seismic hazard at a specific site. The deterministic method considers the worst-case scenario based on the maximum credible earthquake (the largest earthquake that could be expected to occur), and is used for critical facilities like power plants, hospitals, and hazardous substance storage facilities. The probabilistic method considers the probability of earthquake occurrence during the lifetime of a particular facility, and is more appropriate for residential and commercial development. Both methods involve the choice of a design earthquake that is used to calculate the intensity of ground motion expected at the site.

Maximum Credible Earthquake (Deterministic)

The primary means for estimating the maximum credible earthquake that a particular fault could generate are empirical relationships between earthquake magnitude and fault rupture length (Bonilla et al., 1984). Based on these relationships, the size of historical earthquakes, and the thickness of seismogenic crust in the Willamette Valley, the maximum earthquake magnitude expected from crustal source is M6.0 to M6.6 (Geomatrix Consultants, 1995). Based on the likely thin nature of the Juan De Fuca Plate, and comparing the historic seismicity along the CSZ with other margins, Geomatrix Consultants (1995) estimated the maximum magnitude earthquake for intra-slab sources is M7 to M7.5. Similarly, based on magnitude versus rupture area relationships for subduction zone earthquakes worldwide, the maximum magnitude of a CSZ earthquake is estimated to be M8.0 to M9.0 (Geomatrix Consultants, 1995).

Maximum Probable Earthquake (Probalistic)

Magnitude estimates for the maximum probable earthquake are based largely on the record of historical earthquakes in the region of interest. Table 1 lists earthquakes with magnitudes larger than M4.9 that have occurred in Oregon and Vancouver, Washington since 1873 (Wong and Bott, 1995).

Table 1. Historical Earthquakes in Oregon with Magnitudes Greater than M4.9

Date	Magnitude	Maximum Modified Mercalli Intensity	Location
1877	M5.25*	VII	Portland, OR
1892	M5.0*	VI	Portland, OR
1936	M6.1	VII+	Milton-Freewater, OR
1962	M5.5	VII	Vancouver, WA - Portland, OR
1968	M5.0	V	Adel, OR
1993	M5.6	VII	Scotts Mills, OR
1993	M6.0	VII-VIII	Klamath Falls, OR
2001	M6.8	VII-VIII	Near Olympia, WA
*Magnitude estimated from Modified Mercalli intensity.			

Based on the historical record and crustal faulting models of the Willamette Valley region, the maximum probable earthquake for crustal sources in the vicinity of the subject site is estimated to be M5.75 (Geomatrix Consultants, 1995). Similarly, the maximum probable earthquake for an intra-slab source on the CSZ is estimated to be M7.5 to M7.7.

Seismic Shaking

A standard quantitative method of describing ground motion associated with propagating seismic waves is to specify peak ground accelerations (PGA) in bedrock. PGAs are average values based on empirical attenuation relationships of seismic wave energy with distance from the causative fault. PGAs are expressed as a fraction of the acceleration of gravity (i.e., a vertical PGA of >1.0 g would throw objects into the air). Table 2 shows the estimated PGA at the subject site for the maximum credible events (deterministic) on the listed faults based on attenuation relationships developed by and Geomatrix Consultants (1995), on numerical models by Cohee et al. (1991) and Youngs et al. (1993), and on recent ground shaking maps for the Portland Hills Fault (Wong et al, 2000).

Table 2. Estimated Peak Ground Accelerations at "Rock Sites" Resulting from Maximum Credible Events on Known Faults

Earthquake Source	Moment Magnitude (M_w)	Epicentral Distance (km)	Estimated Peak Ground Acceleration
Portland Hills Fault Zone	6.6	4	0.50 g
Lacamas Creek Fault	6.6	22	0.16 g
Grant Butte and Damascus-Tickle Creek Fault Zones	6.6	21	0.16 g
Cascadia Subduction Zone	8.5	143	0.09 g
Intra-Slab	7.5	68	0.21 g

A recent study commissioned by the Oregon Department of Transportation evaluated all known earthquakes sources in Oregon, and formulated probabilistic assessments of expected seismic shaking; based on maximum probable earthquake magnitudes (Geomatrix Consultants, 1995; Oregon Department of Geology and Mineral Industries, 1996). Table 3 presents the peak bedrock accelerations expected at the subject site (5% dampening), estimated recurrence intervals, and the corresponding probability of occurrence in the next 50 years.

Table 3. Expected Ground Shaking at "Rock Sites" from Crustal, Plate-Interface, and Intra-slab Earthquake Sources

Modified Mercalli Intensity	Peak Ground Acceleration (% gravity)	Recurrence Interval	Chance of Occurrence in the Next 50 Years
VII+	0.20 g	500 years	10%
VIII	0.28 g	1,000 years	5%
VIII+	0.38	2,500 years	2%

Another method of describing the intensity of ground shaking associated with an earthquake is the Modified Mercalli intensity scale. This scale is a subjective measure of the affects experienced by people, man-made structures, and the earth surface. The two largest historical earthquakes in northwestern Oregon, the 1962 M5.5 earthquake near Portland, and the 1993 M5.6 earthquake in Scott Mills, generated maximum Modified Mercalli intensities of VII (Wong and Bott, 1995). The Modified Mercalli intensities predicted for the subject site due to occurrence of maximum probable events is shown in Table 3. An abridged portion of the Modified Mercalli intensity scale, after Bott (1993), is presented in Table 4.

Table 4. Abridged Portion of the Modified Mercalli Intensity Scale

VII (0.10 to 0.15 g)	General alarm and everyone runs outdoors. Damage is negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Plaster and some stucco fall. Loosened brickwork and roof tiles shake down. Heavy furniture overturns. Stream and cut banks cave.
VIII (0.25 to 0.30 g)	General fright and alarm approaching panic. Damage is slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, columns, and walls. Heavy furniture is overturned. Branches and tree trunks break off. Liquefied sand and mud erupts on ground surface.
IX (0.50 to 0.55 g)	General panic. Damage is considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Conspicuous ground cracking. Underground pipes broken.

Site Surface Conditions

The site is bordered by N Houghton Court on the south, N Woolsey Avenue on the west, N Trenton Street on the north, and N Dana Avenue on the east. At the time of our field observation on August 16, 2005, the site was relatively level, and contained scattered piles of on-site soils obtained from nearby excavations.

Site Subsurface Conditions

Field Exploration By Others

In order to identify subsurface conditions with depth at the site, we reviewed the Geotechnical Engineering Report prepared for the site by URS, dated January 2003. Boring B-04-02, and test pits TP-1-02, TP-2-02, TP-9-02, & TP-10-02, within the report were identified as the subsurface explorations in closest proximity the elementary school site. The locations of the referenced borings and test pits are shown on the attached Site Plan prepared by URS within Appendix A. Logs of the boring and test pits prepared by URS are also provided within Appendix A.

Subsurface Materials

The subsurface explorations encountered approximately 1-foot of topsoil at the surface. The topsoil was underlain by brown, moist, stiff silt (ML) that extended to depths of about 4 to 8 feet below ground surface (bgs). The silt was underlain by brown, dry to moist, medium dense to very dense, poorly graded gravel (GP) to silty gravel (GM) that extended to the approximate 4½ to 51½-foot depths of exploration within the boring and test pits.

The subsurface materials are described in more detail on the attached soil boring and test pit logs within Appendix A.

Ground Water

Ground water was not encountered within the soil boring or test pits completed at the site between December 10 & 13, 2002. We anticipate that ground water levels will fluctuate due to seasonal and annual variations in precipitation, changes in site utilization, and other factors. Additionally the on-site silts (ML) and conducive the formation of perched water tables.

Liquefaction

A wide variety of slope and ground failures can occur in response to intense seismic shaking during large magnitude earthquakes. These failures are usually related to the phenomenon of liquefaction, the process by which water-saturated sediment changes from a solid to a liquid state. Since liquefied sediment may not support the overlying ground, or any structure built thereon, a variety of failures may occur including lateral spreading, landslides, ground settlement and cracking, sand boils, oscillation lurching, etc. The conditions necessary for liquefaction to occur are: (1) the presence of poorly consolidated, cohesionless sediment; (2) saturation of the sediment by ground water; and (3) an earthquake that produces intense seismic shaking, generally a Richter Magnitude greater than M5.0. In general, older, more consolidated sediment, clayey or gravelly sediment, and sediment above the water table will not liquefy (Youd and Hoose, 1978). Field performance data and laboratory tests indicate that liquefaction occurs predominantly in well-sorted, loose to medium dense (SPT N-values of 0 to 20) sand to silty sand with a mean grain size between 0.8 mm to 0.08 mm (Lee and Fitton, 1968; Seed and Idriss, 1971).

CONCLUSIONS

Seismic Hazards

Based on the available literature, the Portland Hills Fault Zone, the Lackamas Creek Fault, and the Grant Butte, Damascus-Tickle Creek Fault Zone are judged potentially active (Geomatrix Consultants, 1995). Any of these faults could produce a damaging earthquake at the site. Several unnamed faults are mapped in the area, but none of these faults are considered active.

Liquefaction Induced Settlement

Based on the lack of ground water at the site, and the medium dense to very dense consistencies of the on-site, poorly graded gravel (GP) to silty gravel (GM), there is a negligible risk of liquefaction of the on-site soils.

Lateral Spreading

No free faces, such as riverbanks, are present at or near the site toward which lateral spreading could occur. Given the lack of free faces at the site, and the negligible risk of liquefaction of the on-site soils, the potential for lateral spreading at the site is negligible.

Landsliding

Since there are no slopes on the site, the potential for seismically induced landsliding, or slope instability at the site is negligible.

Tsunami or Seiche Inundation

The site is located several miles away from and is several tens of feet higher in elevation than the nearby Columbia & Willamette Rivers; therefore, the potential for tsunami or seiche inundation of the site is negligible.

Fault Displacement and Subsidence

As described above, several faults in the area are considered to be potentially active; however, since no faults are known to exist on the site, there is a negligible risk of fault displacement occurring.

Seismic Shaking

Based on available hazard mapping, and the proximity of the site to the Portland Hills Fault Zone, there is a moderate hazard for amplification of seismic shaking at the site.

RECOMMENDATIONS

General

Based on our review of the Geotechnical Engineering Report, and the Geotechnical Engineering Report Addendum prepared for the site by URS, dated January 2003, and May 20, 2003, respectively, we are in general agreement with the recommendations contained within these reports, with the exception of the following:

- An ultimate coefficient of friction equal to 0.35 may be used when calculating resistance to sliding for footings founded on the native, stiff silt (ML), the medium dense to very dense, poorly graded gravel (GP), or on structural fill that is properly placed and compacted on these materials during construction.

Seismic Design

Based on our review of the subsurface explorations contained within the referenced reports prepared by URS, the following IBC design criteria were computed using the 2003 IBC:

Table 5. IBC Design Criteria

IBC Coefficient	Value	IBC Source
Site Class	C	Table 1615.1.1
S_s	1.04	Figure 1615(1)
F_a	1.00	Table 1615.1.2(1)
S_1	0.35	Figure 1615(2)
F_v	1.45	Table 1615.1.2(2)
S_{MS}	1.04	Equation 16-38
S_{M1}	0.50	Equation 16-39
S_{DS}	0.69	Equation 16-40
S_{D1}	0.33	Equation 16-41
Category*	III	Table 1604.5
Seismic Use Group	II	Paragraphs 1616.2.1, 1616.2.2, or 1616.2.3
Seismic Design Category	D	Tables 1616.3(1), and 1616.3(2)

*If this is not correct, please inform us in writing so that changes to our recommendations can be made, if warranted.

LIMITATIONS

We have prepared this report for use by the owner/developer and other members of the design and construction team for the proposed development. The opinions and recommendations contained within this report are not intended to be, nor should they be construed as a warranty of subsurface conditions, but are forwarded to assist in the planning and design process.

We have made observations based on explorations performed by URS that indicate the soil conditions at only those specific locations and only to the depths penetrated. These observations do not necessarily reflect soil types, strata thickness, or water level variations that may exist between explorations. If subsurface conditions vary from those encountered with the URS site explorations, CGT should be alerted to the change in conditions so that we may

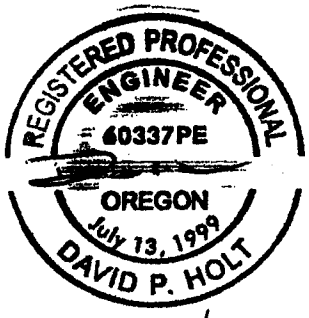
provide additional geotechnical recommendations, if necessary. Observation by experienced geotechnical personnel should be considered an integral part of the construction process.

The owner/developer is responsible for insuring that the project designers and contractors implement our recommendations. When the design has been finalized, we recommend that the design and specifications be reviewed by our firm to see that our recommendations have been interpreted and implemented as intended. If design changes are made, we request that we be retained to review our conclusions and recommendations and to provide a written modification or verification.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with the generally accepted practices in this area at the time this report was prepared. No warranty or other conditions express or implied, should be understood.

We appreciate the opportunity to serve as your geotechnical consultant on this project. Please contact us if you have any questions.

Sincerely,
CARLSON GEOTECHNICAL



EXPIRES: 6/30/2007

David P. Holt, PE
Senior Geotechnical Engineer

Jeff A. Jones, GIT
Project Geologist

Attachments: Site Location, Figure 1
Site Plan, and Boring & Test Pit Logs, Appendix A

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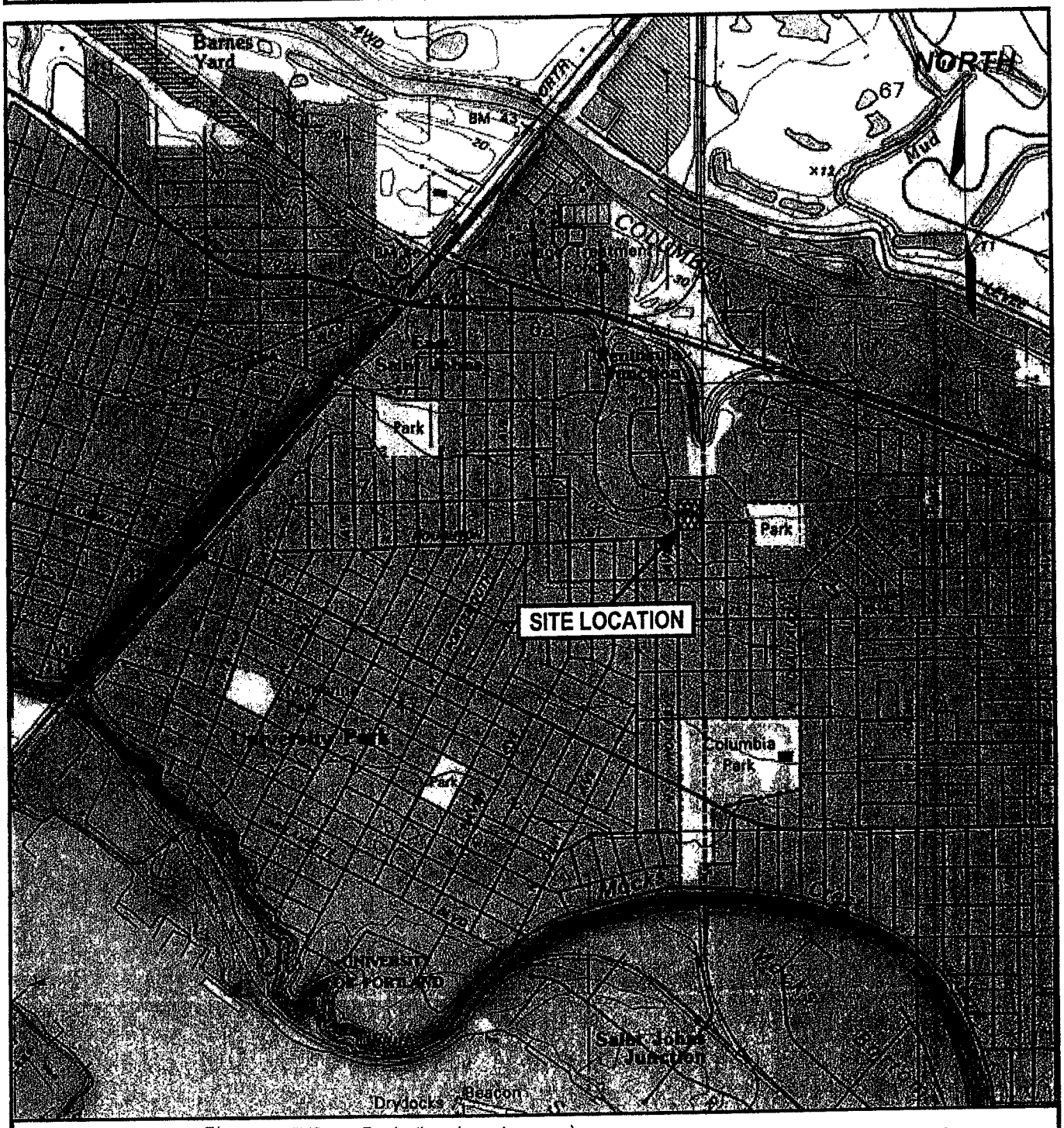
SITE LOCATION
NEW COLUMBIA ELEMENTARY SCHOOL - PORTLAND, OREGON



Map created with TOPO!™ @2000 Wildflower Productions (www.topo.com).
USGS 7.5 Minute Topographic Map Series, PORTLAND, OR Quadrangle.

Scale 1 Inch = 2,000 feet

0 2000 4000

Township 1 North, Range 1 East, Section 8 Willamette Meridian

CARLSON CGT GEOTECHNICAL 503-684-3460

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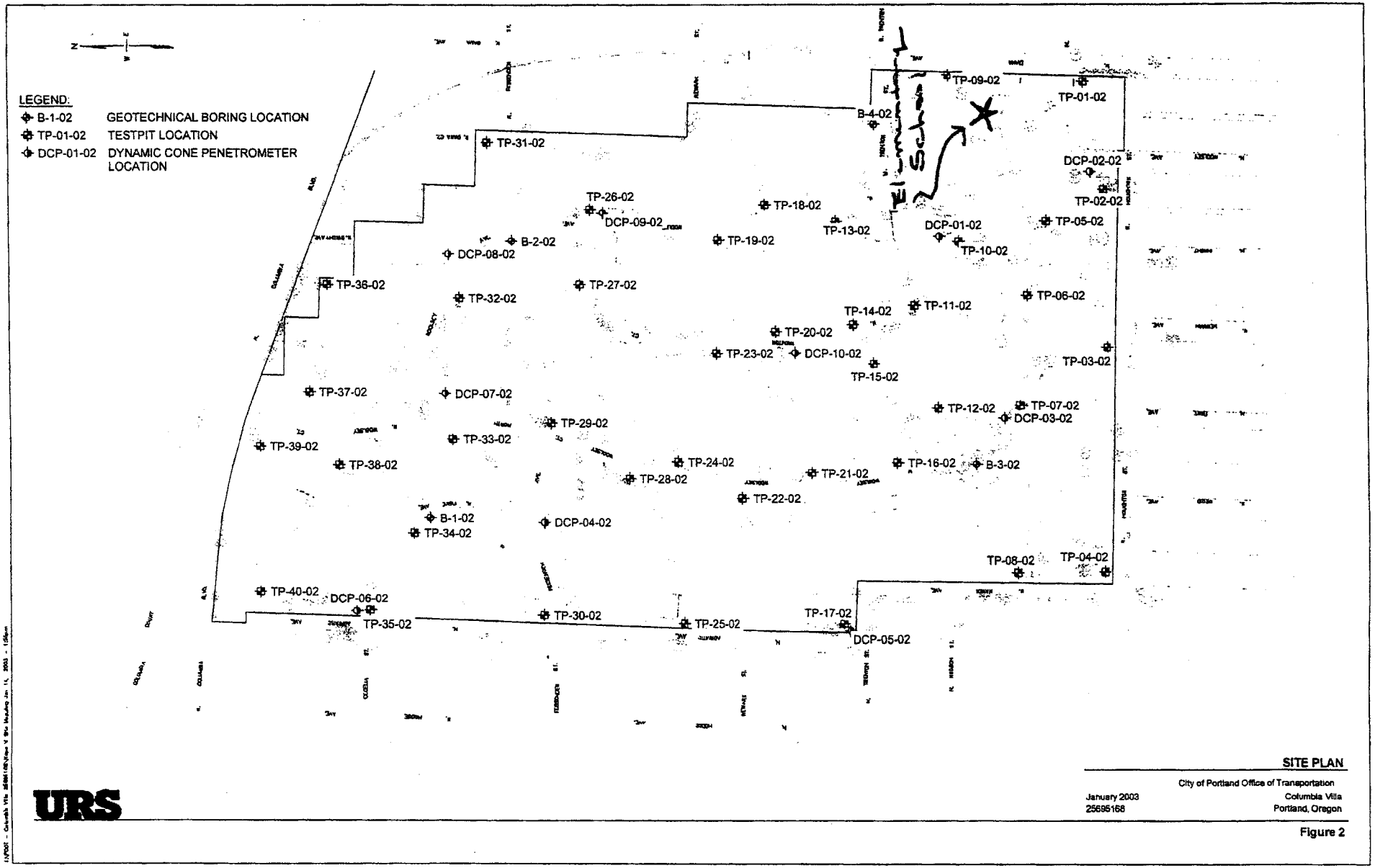
P.O. Box 23814
Tigard, Oregon 97281

CGT Job No. G0302187.A

FIGURE 1



URS

SITE PLAN

City of Portland Office of Transportation
Columbia Villa
Portland, Oregon

January 2003
25695168

Figure 2

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Boring B-04-02 Sheet 1 of 2

Date(s) Drilled	12/10/02	Logged By	JOD	Checked By	BMW
Drilling Method	4 1/4" I.D. Hollow Stem Auger	Drill Bit Size/Type	4 1/4" Tri Cone	Total Depth of Borehole	51.5 feet
Drill Rig Type	B-53 Mobile Drill	Drilling Contractor	Subsurface Technologies	Approximate Surface Elevation	90 feet (MSL)
Groundwater Level and Date Measured	Not Encountered	Sampling Method(s)	SPT	Hammer Data	140lb Manual Hammer
Borehole Backfill	Bentonite Chips	Location	Columbia Villa (see Figure 2)		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, Blows/12 in.	Recovery, (in.)	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS AND OTHER TESTS
90	0							TOPSOIL.		
							ML	SILT [ML], organics, low plasticity, stiff, brown, dry.		
85	5		1	23	18			*Grades to very stiff.*		
							GP	POORLY GRADED GRAVEL WITH SAND [GP], <5% silt, coarse grained sand, subrounded 1" dia. basaltic gravels, medium dense, brown, dry.		
80	10		2	22 32 50/4"	16			*Grades to very dense.*		
75	15		3	72	18			*Grades to subangular to subrounded, 60% Gravels, 40% Coarse Grained Sand.*	7.8	
70	20		4	64	0			*Grades to 10% coarse grained gray sand, with 1-2" dia., subrounded to subangular basaltic gravels.*		
							SP	POORLY GRADED SAND [SP], fine grained sand, very dense, brown, dry.		
65	25		5	56	18		GP	POORLY GRADED GRAVEL WITH SAND [GP], fine grained sand, subrounded 1" dia. basaltic gravels, very dense, brown, moist.		
60	30									

Report: PORT_GEO_NO_DD; File: PDOT.GPJ; 1/14/2003 B-04-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Boring B-04-02

Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, Blows/12 in.	Recovery, (in.)	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS AND OTHER TESTS
-60	30		6	43	18		SP	POORLY GRADED SAND [SP], coarse grained sand, occasional subrounded to subangular, 1-2" dia. basaltic gravels, dense, brown, moist.		
-55	35		7	45	18			*Grades to no gravels.*	9.3	
-50	40		8	51	18			*Grades to very dense with occasional 1/2" dia, subrounded to subangular gravels.*		
-45	45		9	54	18			*Gravel diameter grades to 1".*		
-40	50		10	13 8 50/5"	17			Boring terminated at 51.5 feet bgs on 12/10/02. Boring backfilled with bentonite chips upon completion.		
-35	55									
-30	60									
-25	65									

Report: PORT_GEO_NO_DD; File: PDOT.GPJ; 1/14/2003 B-04-02

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Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-01-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	5.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	96 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
96	0			TOPSOIL	
	1			SILT [ML], occasional gravels, low plasticity, brown, moist.	
94	2				
	3				
92	4				
	5			POORLY GRADED GRAVEL [GP], 5% silt & sand, brown, moist.	
90	6			Testpit terminated at 4.5 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
	7				
88	8				
	9				
86	10				
	11				
84	12				
	13				
82	14				
	15				

Report: PORT_TP_NO_MC; File: PDOT.GPJ; 1/14/2003 TP-01-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-02-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	4.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	103 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				TOPSOIL	
102	1				**SILT [ML]**, occasional gravels, low plasticity, brown, moist.	
	2					
100	3					
	4				**POORLY GRADED GRAVEL [GP]**, 5% silt & sand, brown, moist.	
98	5				Testpit terminated at 4.5 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	Percolation Test = 30 in/hr
	6					
96	7					
	8					
94	9					
	10					
92	11					
	12					
90	13					
	14					
88	15					

Report: PORT_TP_NO_MC; File: PDOT.GPJ; 1/14/2003 TP-02-02

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Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-09-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	8.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	92 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
92	0				TOPSOIL.	
	1				SILT [ML], low plasticity, brown, moist.	
90	2					
	3					
88	4					
	5					
86	6					
	7					
84	8				SILTY GRAVEL WITH SAND [GM], 15% silt & sand, 2-3" dia. gravels, brown, moist.	
	9				Testpit terminated at 8.5 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	
82	10					
	11					
80	12					
	13					
78	14					
	15					

Report: PORT_TP_NO_MC; File: PDOT.GPJ; 1/14/2003 TP-09-02

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Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-10-02

Date(s) Excavated	12/11/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	7.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	97 feet (MSL)
Water Observations	Not Encountered			Weather	Rain, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				TOPSOIL	
96	1				SILT [ML], occasional gravels, low plasticity, brown, moist.	
	2					
94	3					
	4					
92	5					
	6					
90	7				SILTY GRAVEL WITH SAND [GM], 15% silt & sand, 2-3" dia. gravels, brown, moist.	
	8				Testpit terminated at 7.5 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	Percolation Test = 0.14 in/hr
88	9					
	10					
86	11					
	12					
84	13					
	14					
82	15					

Report: PORT_TP_NO_MC; File: PDOT.GPJ; 1/14/2003 TP-10-02

URS

Carlson Geotechnical

A Division of Carlson Testing, Inc.
Geotechnical Consulting
Construction Inspection and Related Tests

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Salem, OR 97301
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FAX (503) 589-1309

Bend Office
P.O. Box 7918
Bend, OR 97708
Phone (541) 330-9155
FAX (541) 330-9163

Carlson Geotechnical Job Number G0302187.A

RESPONSE TO SITE DEVELOPMENT CHECKSHEET

DATE:	November 15, 2005
PROJECT:	New Columbia School
ADDRESS:	8960 N Woolsey Avenue, Portland, Oregon
REFERENCED REPORT:	Report of Site-Specific Hazard Study, New Columbia Elementary School
REPORT DATE:	August 22, 2005
BY:	David P. Holt, P.E.
PURPOSE OF MEMO:	Response to Site Development Checksheet

CITY OF PORTLAND APPLICATION NUMBER: 05-152687-FND-01-CO

In response to Item 5 on the Site Development Checksheet, dated November 8, 2005, prepared by Jason Butler-Brown, P.E. of the City of Portland, Oregon – Bureau of Development Services, we provide the following response:

The IBC Design Criteria provided within Table 5, page 15 of referenced report are specific to this site. The computed values are obtained / based on the latitude and longitude of the site, and are adjusted / amplified based on soil type, in this case Site Class C. These values are not generalized, and are representative.

If you should have any questions, please feel free to call me at 503-684-3460.

David P. Holt, P.E.
Senior Geotechnical Engineer

DISTRIBUTION:
Mr. John Manson, Housing Authority of Portland – Fax: 503-802-8579
Mr. Patrick Rhea, Housing Authority of Portland – Fax: 503-802-8579
Mr. Pete Burns, Walsh Construction Company – Fax: 503-542-8169
Ms. Karina Ruiz, Dull Olson Week Architects – Fax: 503-273-9182
Mr. George Helm, City of Portland – Fax: 503-823-5433
Mr. George Helm, City of Portland – Mail

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Permit# - 05-152867

RECEIVED

NOV 0 7 2005

DULL OLSON WEEKES

May 20, 2003

City of Portland
Office of Transportation Engineering and Development
1120 SW 5th Avenue, Suite 800
Portland, Oregon 97204

Attn: Ms. Kathryn Levine

Re: Geotechnical Engineering Report Addendum
Hope VI Redevelopment of Columbia Villa
Portland, Oregon
City of Portland, Office of Transportation (PDOT)
URS Job No. 25695168

Dear Mr. Levine:

We are pleased to submit herewith an addendum to our previous geotechnical engineering report for the City of Portland, Hope VI Redevelopment of Columbia Villa. Our additional work was authorized by your Flexible Service Work Order #34579, dated December 9, 2002, based on our May 14, 2003 proposal.

URS was asked to provide soil parameters for design of retaining walls on site. For structures that bear on the native silty sand, URS recommends the following:

SOIL PARAMETERS

Condition	Value
Active Pressure	40 pcf
Allowable Passive Pressure	280 pcf
At-Rest Pressure (Restrained)	55 pcf
Allowable Bearing Pressure	2,000 psf
Ultimate Friction Factor	0.2
Friction Angle	28°
Total Density	105 pcf

Retaining Wall

In standard practice, retaining walls should be designed to resist the pressure exerted by retained soil plus any additional lateral forces due to loads placed adjacent to or near the wall. URS understands that up to 4' high retaining walls will be constructed on site. The location of these retaining walls was not known at the time of this report.

URS Corporation
111 SW Columbia, Suite 900
Portland, OR 97201-5814
Tel: 503.222.7200
Fax: 503.222.4292

Active Earth Pressure

Retaining walls with maximum heights of 4' may be designed as cantilever walls with an equivalent fluid weight of 40 pcf for the active earth pressure. This pressure is based on a 3:1 sloping backfill surface conditions, the use of onsite select soil for backfilling the walls, and adequate drainage to prevent buildup of hydrostatic pressure in the backfill.

Maximum allowable bearing pressure of 2000 psf should be used for design of the retaining wall foundations. Resistance to lateral loads on the retaining walls may be provided by passive resistance with an equivalent fluid weight of 280 pcf along the outside face of wall footings. This value assumes a level backfill surface for the soil mass extending 18 inches above the bottom of the footing.

At-Rest Pressure

Restrained walls are rigid structures where essentially no relative movement occurs between the structure and the soil. Most rigid walls that are restrained by buildings fall into the category of restrained walls. For restrained walls in contact with the native silty sands, we recommend that a lateral equivalent fluid pressure of 55 pcf be used for design. The equivalent fluid pressure does not include a factor of safety and assumes the triangular equivalent pressure stress distribution on the vertical face of the walls. If cohesive soils are used as backfill, hydrostatic pressures or surcharge effects for surface loads exist, the equivalent fluid density could be significantly higher and we should be contacted for additional design information.

Retaining Wall Backfill

Backfill behind retaining walls should consist of free draining, washed rock or crushed concrete. We recommend that this fill be compacted to 92% of the maximum dry density as determined by the Modified Proctor Test (ASTM D1557). Additionally, we recommend that any backfill placed between within a 10 feet of the wall face be compacted with lightweight, hand-operated compaction equipment. This is intended to reduce potential "locked-in" lateral pressures caused by compaction with heavy grading equipment.

If drain rock is used, we recommend a minimum 18-inch thick moderate plasticity (PI 20-35) lean clay cap be placed above the drain rock to serve as a barrier from water entering the drain rock from the surface. This material should be placed above optimum moisture content and compacted to a minimum 92% of standard proctor (ASTM D698). Figure 3 in our previous geotechnical engineering report, dated January 7, 2003, depicts a proposed drainage system to mitigate potential problems due to a high groundwater table below the footing.

Pavement Design

We anticipate that vehicle traffic will consist of automobiles, light trucks, with occasional service vehicles and delivery trucks. In addition, URS understands that the Tri-Met No. 4 Fessenden bus route will travel through the proposed development. Tri-Met provided us with an average daily bus count of about 80 busses per day. It is important to note that the anticipated traffic does not include construction traffic. If anticipated traffic is significantly different from the above assumptions, please notify this office for a revised pavement section.

Pavement design was accomplished using the procedures outlined in the 1993 AASHTO Guide for Design of Pavement Structures and Supplements. An *in-situ* subgrade resilient modulus (M_R) of 6,000 psi was estimated from the results of the subsurface investigation performed for this site. The total design life for the pavement is 20 years. Based on the results of this analysis, the pavement sections as shown in the following table are recommended. URS has updated their previous recommendations based on changes in the ODOT asphalt design standards.

RECOMMENDED MINIMUM PAVEMENT SECTIONS*

Parking – Flexible Pavement Asphaltic Concrete	2.0" of ½" Dense Graded, Level 3 HMAC; over 8.0" Compacted Aggregate Base; over 8.0" Compacted Subgrade
Street – General Asphaltic Concrete	1.5" of ½" Dense Graded, Level 3 HMAC; over 1.5" of ¾" Dense Graded, Level 3 HMAC; over 8.0" Compacted Aggregate Base; over 8.0" Compacted Subgrade
Street –Bus Route Asphaltic Concrete	2" of ½" Dense Graded, Level 3 HMAC; over 4" of ¾" Dense Graded, Level 3 HMAC; over 8.0" Compacted Aggregate Base; over 8.0" Compacted Subgrade

* **All materials should meet 2002 ODOT Standard Specifications for Construction.**

URS recommends that no more than 30% of the existing asphaltic concrete on site be blended with the pavement design recommended above, in general accordance with Section 00745 of the 2002 ODOT Standard Specifications for Construction. Aggregate base materials can be crushed, recycled concrete, with no dimension being greater than 1-½", or imported material conforming to the gradation requirements of the 1-½-inch maximum particle size specified in Section 02630.10. If crushed recycled concrete is used, it shall be free of any steel, organics or other deleterious material and compacted to the requirements set forth in the specifications.

Using a design thickness of 3" of Hot Mix Asphaltic Concrete (HMAC), the new pavement not supporting bus traffic will be have an approximate allowable capacity of less than 500,000 flexible pavement 18 kip equivalent single-axle loads (ESAL) over the pavement design life of 20 years. Using a design thickness of 8" of HMAC), the new pavement supporting bus traffic will be have an approximate allowable capacity of about 2,350,000 flexible pavement 18 kip equivalent single-axle loads (ESAL) over the pavement design life of 20 years. This is based on an initial serviceability index of 4.2, a standard deviation of 0.45, a reliability of 85%, and a terminal serviceability index of 2.5. URS recommends that a PG 70-22 binder be use with this mix design. All pavements should be in general conformance with 2002 ODOT Standard Specification for Construction, Section 00744.

This pavement recommendation should replace the pavement design recommendation in the previous geotechnical engineering report. Construction recommendations for pavement designed as above can be found within the previous geotechnical engineering report.

URS

Specifications

We have attached the following specifications that have been modified, as requested, in light of the geotechnical considerations on site. These specifications should be reviewed with the Contract Documents in its entirety prior to incorporation into the Contract Documents. We have highlighted sections that we have identified as requiring verification against the complete and final Contract Documents.

This report summarizes our investigation and formally documents our conclusions and recommendations regarding this site. It has been our pleasure to assist you on this portion of this important project. Should you have any questions regarding the contents of this report, please call us at your convenience.

Yours very truly,
URS

James O. Dabkowski, PE
Project Engineer

Brian M. Willman, PhD, PE
Senior Project Manager

URS

January 7, 2003

City of Portland
Office of Transportation Engineering and Development
1120 SW 5th Avenue, Suite 800
Portland, Oregon 97204

Attn: Ms. Kathryn Levine

Re: Geotechnical Engineering Report
Hope VI Redevelopment of Columbia Villa
Portland, Oregon
City of Portland, Office of Transportation and Development (PDOT)
URS Job No. 25695168

Dear Mr. Levine:

We are pleased to submit herewith our geotechnical engineering report for the City of Portland, Hope VI Redevelopment of Columbia Villa. Our work was authorized by your Flexible Service Work Order #34579, dated December 9, 2002.

This report summarizes our investigation and formally documents our conclusions and recommendations regarding this site.

It has been our pleasure to assist you on this portion of this important project. Should you have any questions regarding the contents of this report, please call us at your convenience.

Yours very truly,
URS

James O. Dabkowski, PE
Project Engineer

EXPIRES: 6/30/04

Brian M. Willman, PhD, PE
Senior Project Manager

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111 SW Columbia, Suite 900
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Appendices

1.1 GENERAL

This report presents the results of URS Corporation's geotechnical investigation, performed for the Hope VI Redevelopment Project in Columbia Villa. Columbia Villa is generally located south of N. Columbia Boulevard and approximately 2.5 miles east of Interstate 5 in Portland, Oregon. The location of the redevelopment project in relation to the surrounding features is shown on Figure 1, Vicinity Map. The purpose of the current investigation is to evaluate subsurface conditions at the proposed site and provide our findings, conclusions and recommendations for foundation support, subsurface flow rates, pavement design, and site grading.

1.2 PROPOSED CONSTRUCTION

We understand that the project will include the redevelopment of the 80-acre site through construction of multiple two-story, residential housing units, associated roads, utilities and improvements. Footing loads are not expected to exceed 15 kips and strip loads will not exceed 1 kips per lineal foot.

1.3 SCOPE OF WORK

The scope of this investigation included the following:

1. A review of our existing files for geotechnical and geological information that pertains to this site.
2. Investigation of the subsurface soils by drilling and sampling 4 boreholes within the subject property. The borehole was backfilled with bentonite upon completion. Additionally, 40 test pits were excavated throughout the site for material characterization.
3. 8 percolation tests within selected test pits across the site according to City of Portland standards.
4. 10 dynamic cone tests to determine near surface capacity and modulus of the onsite soils.
5. 5 resistivity tests using the 4 point "Wenner" method to assess the electrical resistivity of the near surface soils.
6. A laboratory testing of selected soil samples to evaluate the soil type, moisture content, and gradation.
7. Recommendations regarding foundation support of the proposed structures, including foundation type, allowable bearing capacity, anticipated settlement, lateral and uplift capacities, and recommended values of base friction and passive pressure to resist lateral loads from wind and seismic events.
8. Recommendations regarding foundation support of slabs on grade, including recommendations for overexcavation, base course, vapor barrier, geotextile, drainage, and design subgrade modulus.

9. Recommendations pertaining to earthwork and foundation construction at the site, including grading and slope requirements, site preparation, compaction requirements and drainage control as applicable.
10. Recommendations regarding seismic design according to the 1998 Oregon Structural Specialty Code.
11. Recommendations regarding pavement section design, including subgrade preparation, geotextile, base course, and pavement thickness.
12. Recommendations regarding the long-term slope stability of the northeastern section of the site.
13. Three signed and sealed copies of this report containing our findings and conclusions.

2.1 FIELD EXPLORATION

A subsurface exploration was performed from December 9, 2002 through December 13, 2002, and consisted of 4 borings drilled by Subsurface Technologies and 40 test pits excavated by Brownfield Environmental, Inc. The borings, B-1-2002 through B-4-2002, were each advanced to a depth of 51.5 feet below ground surface (bgs). The test pits, TP-1-2002 through TP-40-2002, were excavated to depths ranging from 3.5 to 11.5 feet bgs. The approximate boring and test pit locations relative to the existing site configuration are shown on the Site Plan, Figure 2.

The borings and test pits were advanced under the observation of a URS representative, who developed boring logs of the subsurface conditions encountered. Soil samples within the borings were obtained through the Standard Penetration Test (SPT). For the SPT test (ASTM D1586), the number of blows required to drive the last 12 inches of an 18 inch drive with a 140 pound hammer dropping 30 inches was recorded as the blows per foot (Blow Count).

Final boring and test pit logs were developed from the draft logs, laboratory observations, and laboratory results. The stratigraphic contacts indicated within each boring log represent the approximate boundaries between soil types; actual transitions may be more gradual and indistinct. The soil and groundwater conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other times and locations. Appendix A contains the final boring and test pit logs for B-1-2002 through B-4-2002 and TP-1-2002 through TP-40-2002.

2.2 LABORATORY TESTING

Representative soil samples were returned to the URS laboratory in Portland, Oregon. They were further examined and tested to refine the field classifications and evaluate physical properties of the soils that may affect the geotechnical aspects of project design and construction.

The laboratory-testing program consisted of the following:

- Visual soil classification in general accordance with ASTM D2487.
- Moisture content measurements in general accordance with ASTM D2216.
- Sieve analysis for soils in general accordance with ASTM D422.

The results of the physical laboratory tests conducted are summarized on the boring logs in Appendix A. Sieve analysis results are shown in Appendix B.

3.1 SITE GEOLOGY

The subject property is located at the northern portion of the Willamette Valley physiographic province, an elongate, roughly north/south trending alluvial plain that separates the Coast and Cascade mountain ranges (Orr, *et. al.*, 1992). Specifically, the subject property is located within the Portland fold belt seismotectonic province, a structurally controlled province within the Willamette Valley (Unruh *et al.*, 1994).

Catastrophic flood deposits associated with the Missoula Floods from the late Quaternary underlie the soils at the site (Madin, 1990, URS files). The northern half of the site is underlain by fine-grained flood deposits consisting of sands and silts that are less than 20 feet thick. Coarse-grained flood deposits underlie the fine-grained flood deposits in the northern portion of the site and are present at ground surface on the southern portion of the site. These deposits consist of gravels and sands, which extend several hundred feet below the site.

Various members of the Plio-Pleistocene-aged Troutdale Formation are present beneath the flood deposits. Basaltic bedrock lies beneath these sediments at depths greater than 1000 feet bgs.

Based on groundwater data from borings onsite, depth to groundwater is greater than 50 feet bgs across the site. Groundwater depths are anticipated to vary by up to 5 feet seasonally, with shallower groundwater depths occurring during the wetter winter season.

3.2 SURFACE CONDITIONS

The proposed redevelopment of the subject site is located immediately south of the N. Columbia Boulevard, approximately 2.5 miles east of Interstate 5 in Portland, Oregon. The site generally slopes downward from south to north, from about Elevation 112 to 38 MSL. Asphalt concrete and housing units cover about half of the site, with grass and trees covering the remaining area. Access is provided via existing public roads from all sides of the site.

3.3 SUBSURFACE CONDITIONS

Boring B-1-2002 was drilled to 51.5 feet bgs on December 9, 2002. At the surface, 12 inches of topsoil, underlain by 6 feet of stiff, dry, silt with sand was encountered. Below this the boring encountered medium dense, dry, brown silty sand to a depth of 19.5 feet bgs. A 2.5-foot thick layer of brown, very stiff and moist, silt with sand was encountered below the silty sand. Very dense, moist, brown silty gravel extended to 44 feet bgs. Below this, very dense, gray and moist silty gravel with sand extends to boring terminal depth.

Boring B-2-2002 was drilled to 51.5 feet bgs on December 9, 2002. At the surface, 12 inches of topsoil, underlain by 7 feet of stiff, dry, silt was encountered. Below this the boring encountered medium dense, dry, brown silty sand to a depth of 18 feet bgs. An 8.5-foot thick layer of brown, dense and moist, poorly graded sand was encountered below the silty sand. Dense, moist, brown silty gravel with sand extended to 44 feet bgs. Below this, very dense, brown and moist poorly graded gravel extends to boring terminal depth.

Boring B-3-2002 was drilled to 51.5 feet bgs on December 10, 2002. At the surface, 12 inches of topsoil, underlain by 6 feet of stiff, reddish-brown and dry, silt was encountered. Below this the boring encountered dense, dry, brown silty gravel with sand to a depth of 15 feet bgs. A 10-foot thick layer of brown, medium dense and moist, poorly graded gravel was encountered below the silty gravel with sand. Dense, moist, gray poorly graded sand with gravel extended to 30 feet bgs. Below this, dense, gray and moist poorly graded sand extends to boring terminal depth.

Boring B-4-2002 was drilled to 51.5 feet bgs on December 10, 2002. At the surface, 12 inches of topsoil, underlain by 5 feet of stiff, brown and dry, silt was encountered. Below this the boring encountered medium dense to very dense, dry, brown poorly graded gravel with sand to a depth of 24 feet bgs. A 2-foot thick layer of brown, very dense and dry, poorly graded sand was encountered below the gravel. Very dense, moist, brown poorly graded gravel with sand extended to 30 feet bgs. Below this, dense to very dense, brown and moist poorly graded sand extends to boring terminal depth.

Test pits TP-1-02 through TP-17-02, TP-20-02 through TP-22-02, TP-24-02, TP-25-02, and TP-28-02 generally encountered 12 to 18 inches of topsoil underlain by a low plasticity, brown silt to between 3 and 9 feet bgs. Below this, poorly graded gravels with some intermixed silt and sand was encountered to test pit termination depth. Test pits TP-18, TP-19-02, TP-23-02, TP-29-02, TP-30-02, TP-31-02, TP-32-02, and TP-35-02 encountered the same topsoil and silt materials, but were underlain by silty sand to test pit termination depth of approximately 11 feet bgs. Test pits TP-32-02, TP-34-02, TP-36-02 and TP-37-02 encountered 12 inches of topsoil underlain by low plasticity silt to between 6 and 10 feet bgs. Below this, poorly graded sand with silt was encountered to test pit termination depth. Test pits TP-26-02, TP-27-02, TP-38-02 through TP-40-02 encountered 12 inches of topsoil underlain by low plasticity silt to test pit termination depth of about 11 feet bgs.

At the time of our exploration, groundwater was not encountered in either the borings or the test pits. Groundwater depths may however be subjected to seasonal fluctuation in precipitation and should be considered during the construction phase of this project.

4.1 SHALLOW FOUNDATIONS

4.1.1 Foundation Support

Given the loads expected on the proposed structure and the low compressibility characteristics of the subsurface soils, we recommended that conventional continuous or isolated shallow foundations be used to support the proposed structures. For footings that bear in tested and approved onsite or new soils, we recommend a net allowable bearing pressure of 2,000 psf.

Allowable bearing pressures may be increased by one-third when considering support of transient loads such as wind and seismic forces. We recommend that a unit weight of 100 pcf be used to calculate the overburden pressure due to excavation equipment. Backfill soils will be slightly heavier than excavated soils but not enough to significantly influence the bearing pressure. Continuous wall footings should have a minimum width of 18 inches and isolated column footings should have a minimum plan dimension of 24 inches. Subsurface drains should be installed adjacent to the exterior footings as shown in the attached Figure 3. Subsurface drains allow water to be conveyed away from below grade structures such as basements and crawl spaces and is required by the US Department of Housing and Urban Development.

4.1.2 Foundation Installation

We recommend that excavations for foundations be accomplished with a straight-edged grading bucket to minimize disturbance of the bearing surfaces. Following excavation, the bearing surfaces should be thoroughly cleaned of loosened or disturbed soil, using hand methods if necessary. If footings are prepared during wet weather, we recommend placing a thin lift of compacted crushed rock or lean concrete at the bottom of footing excavation immediately upon its completion to mitigate disturbance during the placing of the rebar. A URS representative should be onsite to verify the bearing capacity of the soils prior to placing concrete or rebar.

4.1.3 Settlements

Given the loads we anticipate for the proposed structures, immediate consolidation settlements were calculated. For the exterior structures, a maximum column load of 15 kips and continuous wall load of 1 klf was evaluated. If the actual loads vary more than 30% from those given above, URS should be contacted to provide additional recommendations.

Based on the loads stated above, the total immediate settlement for these foundations is estimated to be less than ½ inch. Differential settlements are anticipated to be about ¼ inch.

4.1.4 Passive Earth Pressure, Friction Factor and Uplift Resistance

Passive earth pressures acting against the toe of the shallow foundations and friction on the base of the foundations may be considered to provide resistance to lateral forces tending to cause translational sliding. These structural members should be considered for counteracting lateral forces only if the member is placed in direct contact with tested and approved existing soils or approved new soils. If the foundation is constructed by using forms, lean concrete may be placed between the footing and the undisturbed wall of the adjacent excavation in order to provide the direct contact required to consider passive pressure for counteracting lateral movement. The lean concrete should have a minimum 28-day compressive strength of 1,500 psi. An allowable passive pressure having an equivalent fluid density of 280 pcf may be used for design.

An ultimate friction factor of 0.2 for mass concrete on tested and approved existing soils or compacted granular fill can be used for design for those portions of the foundations with full positive pressure on the base of the foundation. Only long-term dead loads should be considered in calculating the available friction on the foundation base.

4.2 SLABS ON GRADE

At the time of this report, the final grades had not been determined. As soon as design slab elevations are known, we should be advised so that we can review and possibly revise the following recommendations.

The subgrade under all floor slab areas should be prepared in accordance with Section 4.4 Site Preparation. We recommend that floor slabs be underlain by a minimum 6-inch thick granular base course to provide uniformity of support and to act a capillary break against moisture migration through the slab. The granular base course should consist of well-graded gravel or crushed rock with a maximum nominal size of ¾-inch and having less than 5 percent by weight passing the No. 200 sieve. The base course should be compacted to at least 95 percent of its maximum dry density as determined by ASTM Test Method D1557. We recommend a modulus of subgrade reaction of 100 pounds per cubic inch (pci) for the base course.

Even with a capillary break as outlined above, there is the possibility of some floor moisture or dampness. If floor moisture is a critical consideration due to storage of materials directly on the floor slab, or because of the use of glued down impervious floor coverings such as tile or linoleum, we recommend the use of an under-slab impermeable membrane. Normally a thin sand layer is placed above and below the membrane to protect it from punctures during construction, and to assist in the curing of the concrete floor slab. To maximize water tightness, the membrane must be installed in accordance with the manufacturer's recommendations.

4.3 FOUNDATION DRAINS

Footing and slab drains are required for any structures with basements or potentially habitable living space below finish exterior grade or in other situations where water and/or soil conditions warrant their use. Water should be transported away from footings to an approved disposal area. Outlets must not permit backflow into subsurface drains. A typical sketch of a footing drain design can be found in Figure 3.

4.4 SITE PREPARATION

4.4.1 General

Prior to construction, all areas that will receive fill, base rock, or structures should be stripped of asphaltic concrete, surface vegetation and any deleterious materials that might be encountered. After stripping the site, we recommend the subgrade in all building areas be proof-rolled with a fully loaded tandem-axled dump truck having a minimum gross weight of 10 tons or other rubber tired equipment that will provide a similar subgrade loading. This should be done under the observation of URS personnel to observe if any areas are soft or unsuitable. Unsatisfactory soils should be overexcavated and compacted back into place at or above optimum moisture content to at least 95 percent of its maximum dry density as determined by the Standard Proctor Method, ASTM D698.

4.4.2 Dry Weather Earthwork

After stripping or excavating to elevation, we recommend that all areas that will receive fill, pavement, or structures be scarified to a depth of 8 inches. The scarified soils should be brought to near optimum moisture content, and compacted to at least 95 percent of its maximum dry density as determined by ASTM D698, the Standard Proctor method.

4.4.3 Wet Weather Earthwork

During or after wet weather, it may be necessary to import granular materials for structural fill or to protect open subgrade materials. It may also be necessary to install a granular working pad to support construction equipment. Delays in site earthwork activities should be anticipated during periods of heavy rainfall. Additionally, site clearing and stripping activities may expose subgrade material that may be damaged if subjected to disturbance from construction traffic. During wet weather, we recommend that site stripping and excavation be performed using an excavator with a straight-edged bucket that does not traverse the final subgrade.

Subgrades exposed during wet weather could potentially have difficulty reaching required compaction levels. Moisture control during this time should be monitored closely to achieve required compaction. Soils that are too wet should be aerated or blended with dry, structural fill and recompacted, prior to placing rebar or concrete.

When a granular working base is used to protect open subgrade material from disturbance by construction equipment, the base should consist of a suitable thickness of crushed rock or ballast placed by end-dumping off an advancing pad of rock fill. Areas that contain native soils are moisture sensitive, and it may be necessary to place a geotextile fabric beneath the working blanket to prevent the intrusion of fines into the rock. Because construction practices can greatly affect the amount of rock required, we recommended that the installation of a granular working blanket, the design, installation and maintenance be made the responsibility of the contractor. After installation, the working blanket should be compacted with a minimum of four overlapping passes with a smooth-faced steel drum or grid roller.

The analyses, conclusions, and recommendations presented in this report are based on site conditions as they existed at the time of our field exploration, and further assume that the conditions encountered in our exploratory boreholes are representative of subsurface conditions within the study areas. If conditions different from those described in this report are encountered or appear to be present beneath the excavations, URS should be advised at once so that our recommendations may be modified as necessary.

This report was prepared for the exclusive use of City of Portland and its agents and consultants. It should be made available to prospective contractors for information on factual data only and not as a warranty of subsurface conditions similar to those interpreted from the borehole logs or discussions presented in this report.

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Orr, E.L., Orr, W.N., and Baldwin, E.M., 1992, Geology of Oregon, 4th Edition, Kendall/Hunt Publishing Company.

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Unruh, J.R., Wong, I.G., Bott, J.D.J., Silva, W.J., and Lettis, W.R., 1994, *Seismotectonic Evaluation: Scoggins Dam, Tualatin Project, Northwestern Oregon*; William Lettis & Associates and Woodward-Clyde Federal Services, unpublished final report prepared for the U.S. Bureau of Reclamation, Denver, CO.

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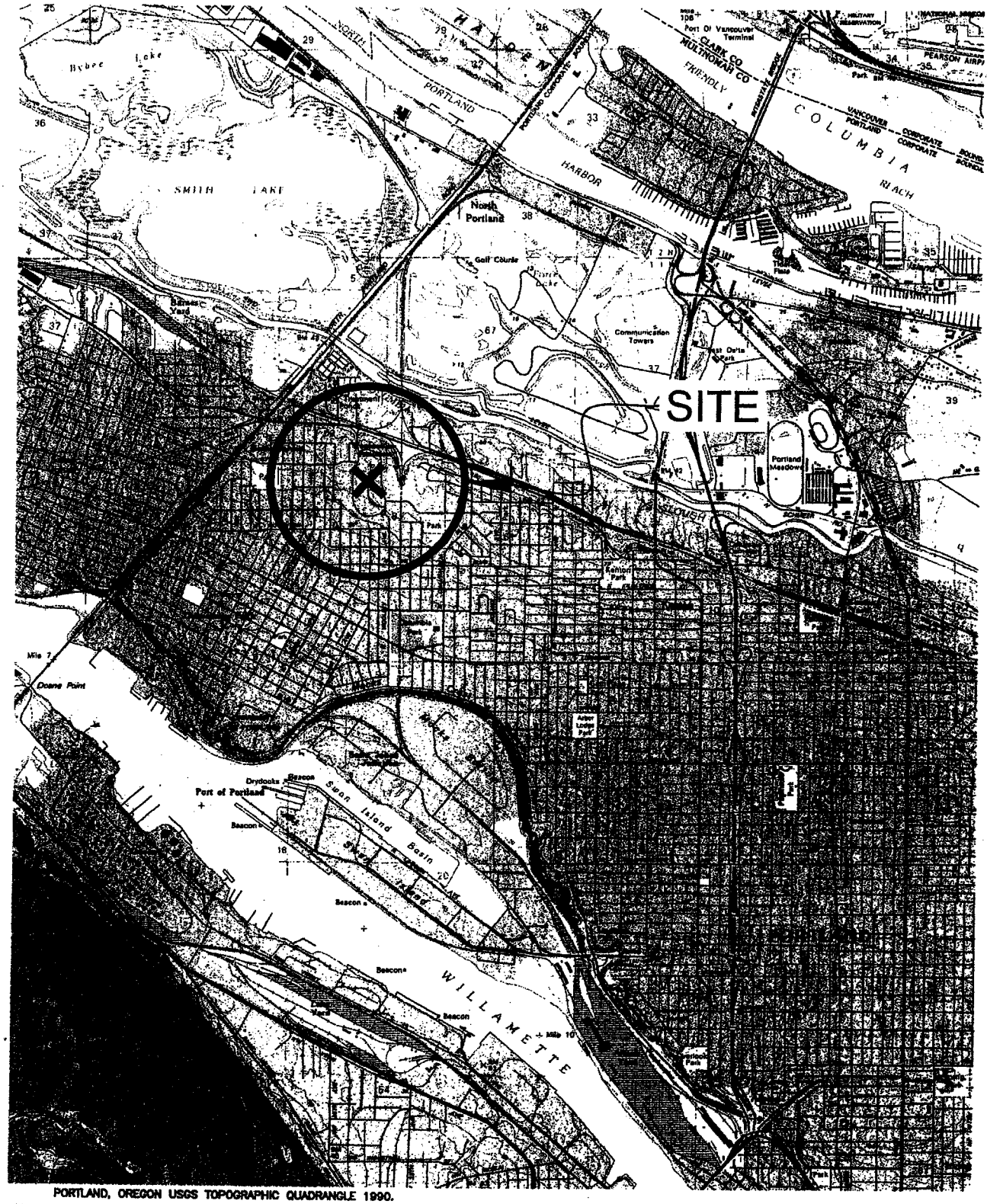


PORTLAND, OREGON USGS TOPOGRAPHIC QUADRANGLE 1990.

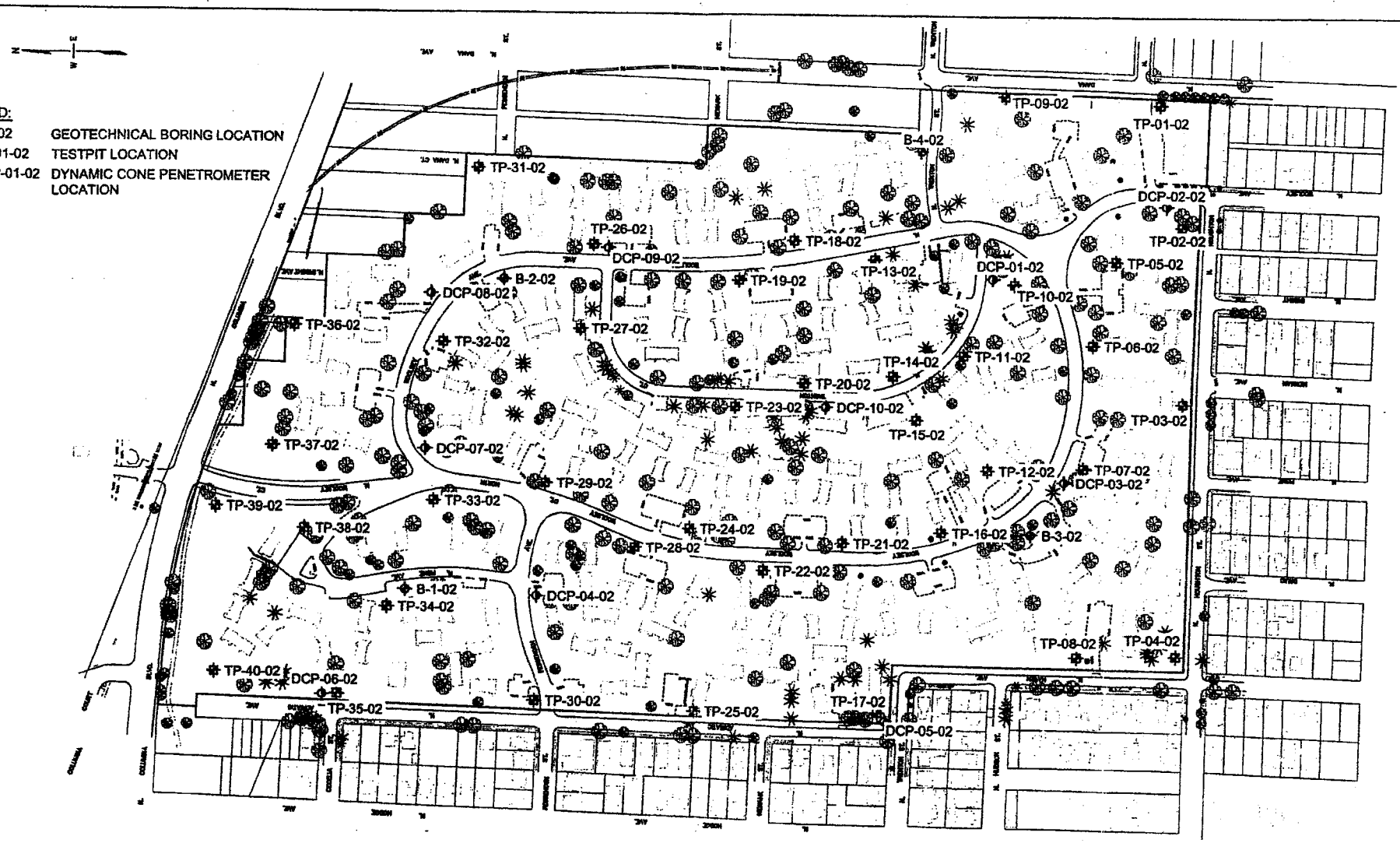
VICINITY MAP

URS

January 2003
25695168

City of Portland Office of Transportation
Columbia Villa
Portland, Oregon

FIGURE 1

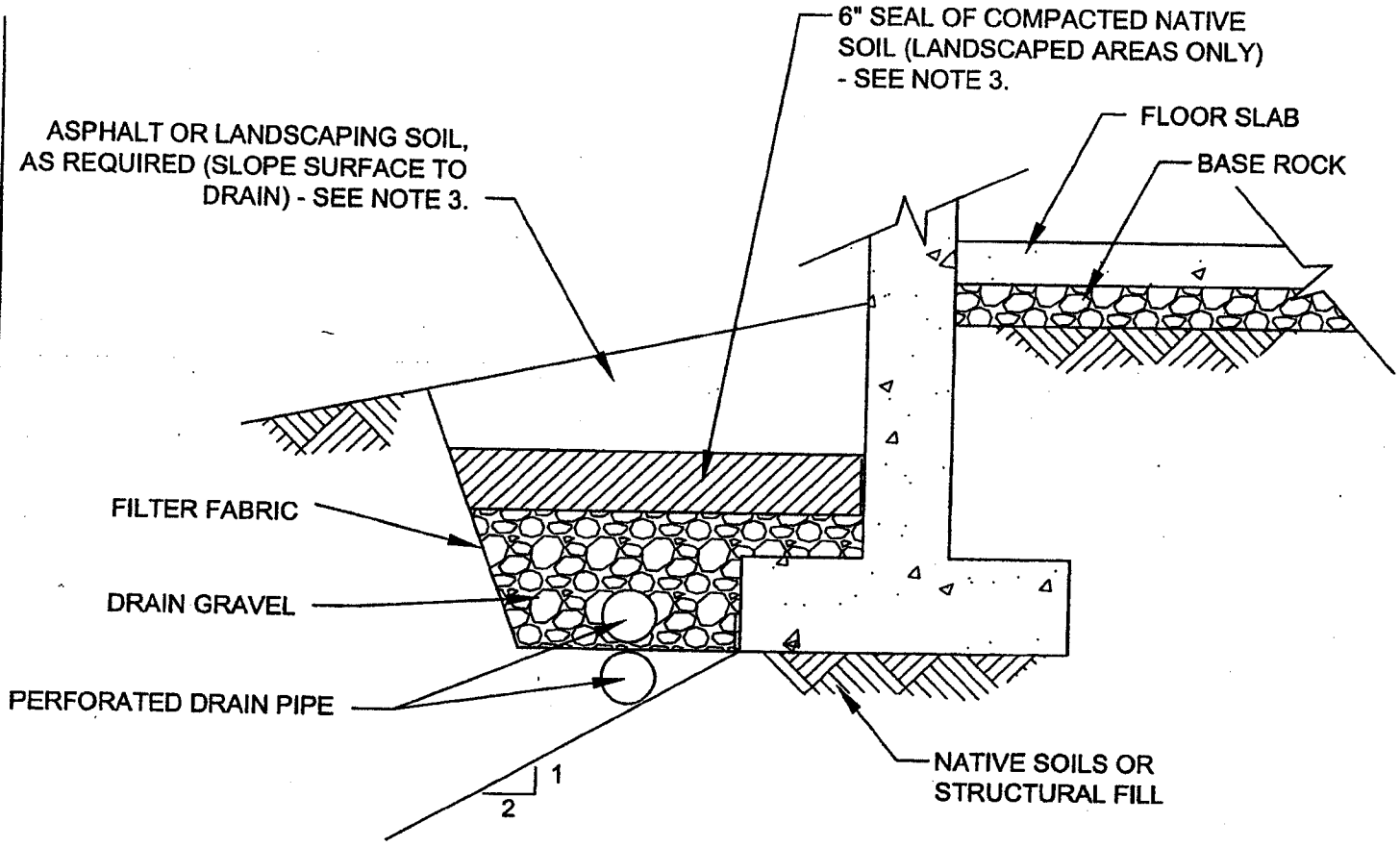


SITE PLAN

City of Portland Office of Transportation
Columbia Villa
Portland, Oregon

January 2003
25695168

Figure 2



FOUNDATION DRAIN
NOT TO SCALE

1. FILTER FABRIC IS NON-WOVEN GEOTEXTILE (AMOCO 4545, MIRAFI 140N, OR EQUIVALENT)
2. LAY PERFORATED DRAIN PIPE ON MINIMUM 0.5% GRADIENT, WIDENING EXCAVATION AS REQUIRED. MAINTAIN PIPE ABOVE 2:1 SLOPE AS SHOWN. USE RIDID PVC PIPE.
3. ALL GRANULAR BACKFILL ABOVE FILTER FABRIC IS RECOMMENDED FOR SUPPORT OF SLABS, PAVEMENTS, ETC. (SEE TEXT FOR STRUCTURAL FILL).
4. DRAIN GRAVEL TO BE CLEAN, WASHED, 3/4" TO 1-1/2" GRAVEL.

FOOTING DRAIN

URS

January 2003
25695168

City of Portland Office of Transportation
Columbia Villa
Portland, Oregon

FIGURE 3

FIELD INVESTIGATION

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Boring B-01-02

Sheet 1 of 2

Date(s) Drilled	12/9/02	Logged By	JOD	Checked By	BMW
Drilling Method	4 1/4" I.D. Hollow Stem Auger	Drill Bit Size/Type	4 1/4" Tri Cone	Total Depth of Borehole	51.5 feet
Drill Rig Type	B-53 Mobile Drill	Drilling Contractor	Subsurface Technologies	Approximate Surface Elevation	80 feet (MSL)
Groundwater Level and Date Measured	Not Encountered	Sampling Method(s)	SPT	Hammer Data	140lb Manual Hammer
Borehole Backfill	Bentonite Chips	Location	Columbia Villa (see Figure 2)		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, Blows/12 in.	Recovery, (in.)	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS AND OTHER TESTS
80	0							TOPSOIL.		
							ML	SILT WITH SAND [ML], 15% fine sand, no organics, no plasticity, stiff, brown, dry.		
75	5		1	17	14					
							SM	SILTY SAND [SM], fine graded sand, medium dense, brown, dry.	24.7	
70	10		2	17	16					
65	15		3	23	16					
60	20		4	25	18		ML	SILT WITH SAND [ML], 5-10% fine sand, low plasticity, very stiff, brown, moist.	23.4	
							GM	SILTY GRAVEL [GM], 15% silt, 10% coarse sand, rounded to subrounded, 2" dia. basaltic gravels, very dense, brown, moist.		
55	25		5	70	18					
50	30									

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Boring B-01-02

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Sampling Resistance, Blows/12 in.	SAMPLES Recovery, (in.)	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS AND OTHER TESTS
-50	30		6	15 50/5"	5		GP	**POORLY GRADED GRAVEL [GP]**, <5% silt & sand, rounded to subrounded, 2" dia. basaltic gravels, very dense, gray, moist.		
-45	35		7	59	14					
-40	40		8	60	6			*Grades to 1/2" - 2" dia. basaltic gravels.*		
-35	45		9	50/6"	0		GM	**SILTY GRAVEL WITH SAND [GM]**, 15% silt, 15% coarse sand, rounded to subrounded, 2" dia. basaltic gravels, very dense, gray, moist.		
-30	50		10	50/3"	0					
								Boring terminated at 51.5 feet bgs on 12/9/02. Boring backfilled with bentonite chips upon completion.		
-25	55									
-20	60									
-15	65									

Report: F_GEO_NO_DD; File: PDOT.GPJ; 1/10/2003 B-01-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Boring B-02-02

Sheet 1 of 2

Date(s) Drilled	12/9/02	Logged By	JOD	Checked By	BMW
Drilling Method	4 1/4" I.D. Hollow Stem Auger	Drill Bit Size/Type	4 1/4" Tri Cone	Total Depth of Borehole	51.5 feet
Drill Rig Type	B-53 Mobile Drill	Drilling Contractor	Subsurface Technologies	Approximate Surface Elevation	80 feet (MSL)
Groundwater Level and Date Measured	Not Encountered	Sampling Method(s)	SPT	Hammer Data	140lb Manual Hammer
Borehole Backfill	Bentonite Chips	Location	Columbia Villa (see Figure 2)		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, Blows/12 in.	Recovery, (in.)	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS AND OTHER TESTS
80	0							TOPSOIL.		
							ML	SILT [ML], trace fine sand, some organics, low plasticity, very stiff, brown, dry.		
75	5		1	20	4					
							SM	SILTY SAND [SM], 15-20% silt, fine graded sand, medium dense, brown, dry.		
70	10		2	15	14				13	
65	15		3	10	18			*Grades to loose and moist with very fine sand.*		
							SP	POORL GRADED SAND [SP], <5% silt, coarse grained sand, dense, brown, moist.		
60	20		4	36	18					
55	25		5	38	18			*Occasional Gravels Encountered.*		
							GM	SILTY GRAVEL WITH SAND [GM], 10-15% silt & coarse sand, rounded to subrounded, 2" dia. basaltic gravels, dense, brown, moist.		
50	30									

GEO_NO_DD; File: PDOT.GPJ; 1/10/2003 B-02-02

Report:

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Boring B-02-02

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, Blows/12 in.	Recovery, (in.)	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS AND OTHER TESTS
-50	30		6	48	12				9.1	
-45	35		7	72	12			*Grades to very dense.*		
-40	40		8	59	18					
-35	45		9	70	6		GP	POORLY GRADED GRAVEL [GP], no silt & sand, rounded to subrounded, 2" dia. basaltic gravels, very dense, brown, moist.		
-30	50		10	48	2					
								Boring terminated at 51.5 feet bgs on 12/9/02. Boring backfilled with bentonite chips upon completion.		
-25	55									
-20	60									
-15	65									

GEO_NO_DD: File: PDOT.GPJ; 1/10/2003 B-02-02

Report:

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Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Boring B-03-02

Sheet 1 of 2

Date(s) Drilled	12/10/02	Logged By	JOD	Checked By	BMW
Drilling Method	4 1/4" I.D. Hollow Stem Auger	Drill Bit Size/Type	4 1/4" Tri Cone	Total Depth of Borehole	51.5 feet
Drill Rig Type	B-53 Mobile Drill	Drilling Contractor	Subsurface Technologies	Approximate Surface Elevation	104 feet (MSL)
Groundwater Level and Date Measured	Not Encountered	Sampling Method(s)	SPT	Hammer Data	140lb Manual Hammer
Borehole Backfill	Bentonite Chips	Location	Columbia Villa (see Figure 2)		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, Blows/12 in.	Recovery, (in.)	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS AND OTHER TESTS
	0							TOPSOIL.		
							ML	SILT [ML], some organics, low plasticity, stiff, reddish-brown, dry.		
100	5		1	36	18			*Grades to very stiff.*		
							GM	SILTY GRAVEL WITH SAND [GM], 10-15% silt & coarse sand, rounded to subrounded, 2" dia. basaltic gravels, dense, brown, dry.		
95	10		2	38	18			*A 6" layer of coarse sand encountered.*		
90	15		3	21	12		GP	POORLY GRADED GRAVEL [GP], <5% silt & sand, angular, 1/4" dia. basaltic gravels, medium dense, brown, moist.		
85	20		4	62	0			*Grades to subangular to subrounded with 1-2" dia. basaltic gravels, very dense.*		
80	25		5	43	0		SP	POORLY GRADED SAND WITH GRAVEL [SP], coarse grained sand, subrounded to subangular, 1-2" dia. basaltic gravels, dense, gray, dry.	1.1	
75	30									

GEO_NO_DD; File: PDOT.GPJ; 1/10/2003 B-03-02

Report:

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Boring B-03-02

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, Blows/12 in.	Recovery, (in.)	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS AND OTHER TESTS
	30									
			6	41	12		SP	**POORLY GRADED SAND [SP]**, coarse grained sand, occasional subrounded to subangular, 1-2" dia. basaltic gravels, dense, gray, moist.		
70										
	35		7	53	18			*Grades to very dense and reddish-brown. 2" seam of fine sand encountered.*		
65										
	40		8	34	18		SP	**POORLY GRADED SAND [SP]**, coarse grained sand, dense, brown, moist.		
60										
	45		9	35	18					
55										
	50		10	53	18			*Grades to very dense.*	9.2	
								Boring terminated at 51.5 feet bgs on 12/10/02. Boring backfilled with bentonite chips upon completion.		
50										
	55									
45										
	60									
40										
	65									

_GEO_NO_DD; File: PDOT.GPJ; 1/10/2003 B-03-02

Report:

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Boring B-04-02

Sheet 1 of 2

Date(s) Drilled	12/10/02	Logged By	JOD	Checked By	BMW
Drilling Method	4 1/4" I.D. Hollow Stem Auger	Drill Bit Size/Type	4 1/4" Tri Cone	Total Depth of Borehole	51.5 feet
Drill Rig Type	B-53 Mobile Drill	Drilling Contractor	Subsurface Technologies	Approximate Surface Elevation	90 feet (MSL)
Groundwater Level and Date Measured	Not Encountered	Sampling Method(s)	SPT	Hammer Data	140lb Manual Hammer
Borehole Backfill	Bentonite Chips	Location	Columbia Villa (see Figure 2)		

Elevation, feet	Depth, feet	Sample Type	Sample Number	Sampling Resistance, Blows/12 in.	Recovery, (in.)	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS AND OTHER TESTS
90	0							TOPSOIL.		
							ML	SILT [ML], organics, low plasticity, stiff, brown, dry.		
85	5		1	23	18			*Grades to very stiff.*		
							GP	POORLY GRADED GRAVEL WITH SAND [GP], <5% silt, coarse grained sand, subrounded 1" dia. basaltic gravels, medium dense, brown, dry.		
80	10		2	22 32 50/4"	16			*Grades to very dense.*		
75	15		3	72	18			*Grades to subangular to subrounded, 60% Gravels, 40% Coarse Grained Sand.*	7.8	
70	20		4	64	0			*Grades to 10% coarse grained gray sand, with 1-2" dia., subrounded to subangular basaltic gravels.*		
65	25		5	56	18		SP	POORLY GRADED SAND [SP], fine grained sand, very dense, brown, dry.		
							GP	POORLY GRADED GRAVEL WITH SAND [GP], fine grained sand, subrounded 1" dia. basaltic gravels, very dense, brown, moist.		
60	30									

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Boring B-04-02

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Sampling Resistance, Blows/12 in.	SAMPLES Recovery, (in.)	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS AND OTHER TESTS
60	30		6	43	18		SP	**POORLY GRADED SAND [SP]**, coarse grained sand, occasional subrounded to subangular, 1-2" dia. basaltic gravels, dense, brown, moist.		
55	35		7	45	18			*Grades to no gravels.*	9.3	
50	40		8	51	18			*Grades to very dense with occasional 1/2" dia., subrounded to subangular gravels.*		
45	45		9	54	18			*Gravel diameter grades to 1".*		
40	50		10	13 8 50/5"	17			Boring terminated at 51.5 feet bgs on 12/10/02. Boring backfilled with bentonite chips upon completion.		
35	55									
30	60									
25	65									

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-01-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	5.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	96 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
96	0				TOPSOIL.	
	1				SILT [ML], occasional gravels, low plasticity, brown, moist.	
94	2					
	3					
92	4					
	5				POORLY GRADED GRAVEL [GP], 5% silt & sand, brown, moist.	
90	6				Testpit terminated at 4.5 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
	7					
88	8					
	9					
86	10					
	11					
84	12					
	13					
82	14					
	15					

Project: Portland DOT - Columbia Villa **Project Location:** Portland, Oregon **Project Number:**	**Log of Test Pit** **TP-02-02**

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	4.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	103 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TOPSOIL.	
102	1			SILT [ML], occasional gravels, low plasticity, brown, moist.	
	2				
100	3				
	4			POORLY GRADED GRAVEL [GP], 5% silt & sand, brown, moist.	
98	5			Testpit terminated at 4.5 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	Percolation Test = 30 in/hr
	6				
96	7				
	8				
94	9				
	10				
92	11				
	12				
90	13				
	14				
88	15				

Report: f:_TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-02-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-03-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	3.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	106 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
106	0				TOPSOIL.	
	1				SILT [ML], low plasticity, brown, dry.	
104	2					
	3				SILTY GRAVEL WITH SAND [GM], 15% silt & sand, 2-3" dia. gravels, brown, moist.	
102	4				Testpit terminated at 3.5 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	
	5					
100	6					
	7					
98	8					
	9					
96	10					
	11					
94	12					
	13					
92	14					
	15					

Report: I TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-03-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-04-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	7.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	112 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
112	0			**TOPSOIL.**	
	1			**SILT [ML]**, low plasticity, brown, dry.	
110	2				
	3				
108	4				
	5				
106	6			**POORLY GRADED SAND WITH SILT [SP-SM]**, coarse grained, brown, dry.	
	7			**SILTY GRAVEL WITH SAND [GM]**, 15% silt & sand, 1-2" dia. gravels, brown, moist.	
104	8			Testpit terminated at 7.5 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	
	9				
102	10				
	11				
100	12				
	13				
98	14				
	15				

Report: _TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-04-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-05-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	5.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	101 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				TOPSOIL.	
100	1				SILT [ML], low plasticity, brown, moist.	
	2					
98	3					
	4				POORLY GRADED GRAVEL WITH SILT AND SAND [GP-GM], 10% silt, 20% coarse sand, 1/4" dia gravels with occasional 1-2" dia, gray, moist.	
96	5				Testpit terminated at 5.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
	6					
94	7					
	8					
92	9					
	10					
90	11					
	12					
88	13					
	14					
86	15					

Report: P..._TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-05-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-06-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	4.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	101 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				TOPSOIL.	
100	1				SILT [ML], low plasticity, brown, moist.	
	2					
98	3					
	4				POORLY GRADED GRAVEL WITH SILT AND SAND [GP-GM], 10% silt, 20% coarse sand, 1/4" dia gravels with occasional 1-2" dia, gray, moist.	
96	5				Testpit terminated at 4.5 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	
	6					
94	7					
	8					
92	9					
	10					
90	11					
	12					
88	13					
	14					
86	15					

Report: I:_TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-06-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-07-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	5.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	104 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
104	0			TOPSOIL.	
	1			SILT [ML], low plasticity, brown, moist.	
102	2				
	3				
100	4			POORLY GRADED GRAVEL WITH SILT AND SAND [GP-GM], 10% silt, 20% coarse sand, 1/4" dia gravels with occasional 1-2" dia, gray, moist.	
	5			Testpit terminated at 5.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
98	6				
	7				
96	8				
	9				
94	10				
	11				
92	12				
	13				
90	14				
	15				

Report F..._TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-07-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-08-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	8.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	108 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
108	0				**TOPSOIL.**	
	1				**SILT [ML]**, low plasticity, brown, dry.	
106	2					
	3					
104	4					
	5					
102	6				**POORLY GRADED SAND WITH SILT [SP-SM]**, coarse grained, brown, dry.	
	7				**SILTY GRAVEL WITH SAND [GM]**, 15% silt & sand, 1-2" dia. gravels, brown, moist.	
100	8				Testpit terminated at 8.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
	9					
98	10					
	11					
96	12					
	13					
94	14					
	15					

Report: I- _TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-08-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-09-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	8.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	92 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
92	0				TOPSOIL.	
	1				SILT [ML], low plasticity, brown, moist.	
90	2					
	3					
88	4					
	5					
86	6					
	7					
84	8				SILTY GRAVEL WITH SAND [GM], 15% silt & sand, 2-3" dia. gravels, brown, moist.	
	9				Testpit terminated at 8.5 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	
82	10					
	11					
80	12					
	13					
78	14					
	15					

Report: _TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-09-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	**Log of Test Pit TP-10-02**

Date(s) Excavated	12/11/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	7.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	97 feet (MSL)
Water Observations	Not Encountered			Weather	Rain, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TOPSOIL.	
96	1			SILT [ML], occasional gravels, low plasticity, brown, moist.	
	2				
94	3				
	4				
92	5				
	6				
90	7			SILTY GRAVEL WITH SAND [GM], 15% silt & sand, 2-3" dia. gravels, brown, moist.	
	8			Testpit terminated at 7.5 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	Percolation Test = 0.14 in/hr
88	9				
	10				
86	11				
	12				
84	13				
	14				
82	15				

Report: _TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-10-02

URS

Project: Portland DOT - Columbia Villa **Project Location:** Portland, Oregon **Project Number:**	**Log of Test Pit** **TP-11-02**

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	9.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	96 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
96	0			TOPSOIL.	
	1			SILT [ML], occasional gravels, low plasticity, brown, moist.	
94	2				
	3				
92	4				
	5				
90	6				
	7				
88	8			SILTY GRAVEL WITH SAND [GM], 15% silt & sand, 2-3" dia. gravels, brown, moist.	
	9			Testpit terminated at 9.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
86	10				
	11				
84	12				
	13				
82	14				
	15				

Report: TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-11-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-12-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	6.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	100 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
100	0				TOPSOIL.	
	1				SILT [ML], low plasticity, brown, moist.	
98	2					
	3					
96	4					
	5					
94	6				POORLY GRADED GRAVEL WITH SILT AND SAND [GP-GM], 10% silt, 20% coarse sand, 1/4" dia gravels with occasional 1-2" dia, gray, moist. Testpit terminated at 6.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
	7					
92	8					
	9					
90	10					
	11					
88	12					
	13					
86	14					
	15					

Report: _TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-12-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-13-02

Date(s) Excavated	12/11/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	10.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	89 feet (MSL)
Water Observations	Not Encountered			Weather	Rain, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TOPSOIL.	
88	1			SILT [ML], 5% fine sand, low plasticity, brown, moist.	
	2				
86	3				
	4				
84	5				
	6				
82	7				
	8			*Sand content increases with depth.*	
80	9				
	10			Testpit terminated at 10.0 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	
78	11				
	12				
76	13				
	14				
74	15				

Report: , .f_TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-13-02

URS

Project: Portland DOT - Columbia Villa **Project Location:** Portland, Oregon **Project Number:**	**Log of Test Pit TP-14-02**

Date(s) Excavated	12/11/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	10.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	93 feet (MSL)
Water Observations	Not Encountered			Weather	Rain, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				**TOPSOIL.**	
92	1				**SILT [ML]**, low plasticity, brown, moist.	
90	3					
88	5					
86	7					
84	9				**SILTY GRAVEL WITH SAND [GM]**, 15% silt & sand, 2-3" dia. gravels, brown, moist.	
	10				Testpit terminated at 10.0 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	
82	11					
80	13					
78	15					

_TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-14-02

Report

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-15-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	8.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	95 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TOPSOIL.	
94	1			SILT [ML], low plasticity, brown, moist.	
	2				
92	3				
	4				
90	5				
	6				
88	7				
	8			SILTY GRAVEL WITH SAND [GM], 15% silt & sand, 2-3" dia. gravels, brown, moist.	
86	9			Testpit terminated at 8.5 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
	10				
84	11				
	12				
82	13				
	14				
80	15				

Report: _TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-15-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-16-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	5.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	99 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				TOPSOIL.	
98	1				SILT [ML], low plasticity, brown, moist.	
	2					
96	3					
	4					
94	5				POORLY GRADED GRAVEL WITH SILT AND SAND [GP-GM], 10% silt, 20% coarse sand, 1/4" dia gravels with occasional 1-2" dia, gray, moist. Testpit terminated at 5.0 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	Percolation Test = 26 in/hr
	6					
92	7					
	8					
90	9					
	10					
88	11					
	12					
86	13					
	14					
84	15					

Report: TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-16-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-17-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	4.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	99 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TOPSOIL.	
98	1			SILT [ML], low plasticity, brown, dry.	
	2				
96	3				
	4			POORLY GRADED SAND WITH SILT [SP-SM], 10% silt, coarse sand, brown, dry.	
				SILTY GRAVEL WITH SAND [GM], 15% silt & sand, 1-2" dia. gravels, brown, moist.	
94	5			Testpit terminated at 4.5 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	Percolation Test = 15 in/hr
	6				
92	7				
	8				
90	9				
	10				
88	11				
	12				
86	13				
	14				
84	15				

Report: _TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-17-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-18-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	11.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	86 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
86	0			TOPSOIL.	
	1			SILT [ML], low plasticity, brown, moist.	
84	2				
	3				
82	4				
	5				
80	6				
	7				
78	8			SILTY SAND [SM], 25% silt, fine sand, gray, moist.	
	9				
76	10				
	11				
74	12			Testpit terminated at 11.5 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	
	13				
72	14				
	15				

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-19-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	11.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	86 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
86	0			TOPSOIL.	
	1			SILT [ML], low plasticity, brown, moist.	
84	2				
	3				
82	4				
	5				
80	6				
	7				
78	8			SILTY SAND [SM], 25% silt, fine sand, gray, moist.	
	9				
76	10				
	11			Testpit terminated at 11.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	Percolation Test = 0.09 in/hr
74	12				
	13				
72	14				
	15				

Report TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-19-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-20-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	10.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	88 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
88	0			**TOPSOIL.**	
	1			**SILT [ML]**, low plasticity, brown, moist.	
86	2				
	3				
84	4				
	5				
82	6				
	7			**SILTY SAND [SM]**, 25% silt, fine sand, gray, moist.	
80	8				
	9			**SILTY GRAVEL WITH SAND [GM]**, 15% silt & sand, 2-3" dia. gravels, brown, moist.	
78	10			Testpit terminated at 10.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
	11				
76	12				
	13				
74	14				
	15				

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-21-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	8.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	93 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TOPSOIL.	
92	1			SILT [ML], low plasticity, brown, moist.	
	2				
90	3				
	4				
88	5				
	6				
86	7			POORLY GRADED GRAVEL WITH SILT AND SAND [GP-GM], 10% silt, 20% coarse sand, 1/4" dia gravels with occasional 1-2" dia, gray, moist.	
	8			Testpit terminated at 8.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
84	9				
	10				
82	11				
	12				
80	13				
	14				
78	15				

Report: TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-21-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-22-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	8.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	90 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation, feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
90	0			TOPSOIL.	
	1			SILT [ML], low plasticity, brown, moist.	
88	2				
	3				
86	4				
	5				
84	6				
	7			POORLY GRADED GRAVEL WITH SILT AND SAND [GP-GM], 10% silt, 15% coarse sand, 1/4" dia gravels with occasional 1-2" dia, gray, moist.	
82	8			Testpit terminated at 8.0 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	
	9				
80	10				
	11				
78	12				
	13				
76	14				
	15				

Report: _TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-22-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-23-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	11.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	86 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
86	0			TOPSOIL.	
	1			SILT [ML], low plasticity, brown, moist.	
84	2				
	3				
82	4				
	5				
80	6				
	7			SILTY SAND [SM], 15% silt, fine sand, gray, moist.	
78	8				
	9				
76	10				
	11				
74	12			Testpit terminated at 11.5 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	Percolation Test = 2.0 in/hr
	13				
72	14				
	15				

Report: _TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-23-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-24-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	8.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	84 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
84	0				TOPSOIL.	
	1				SILT [ML], low plasticity, brown, moist.	
82	2					
	3					
80	4					
	5					
78	6					
	7					
76	8				POORLY GRADED GRAVEL WITH SILT AND SAND [GP-GM], 10% silt, 15% coarse sand, 1/4" dia gravels with occasional 1-2" dia, gray, moist.	
	9				Testpit terminated at 8.5 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	
74	10					
	11					
72	12					
	13					
70	14					
	15					

Report_TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-24-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-25-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	6.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	91 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				TOPSOIL.	
90	1				SILT [ML], occasional gravels, low plasticity, brown, moist.	
	2					
88	3					
	4					
					Grades to moist.	
86	5					
	6				SILTY GRAVEL WITH SAND [GM], 15% silt & sand, 1-4" dia., subrounded to subangular gravels, brown, moist. Testpit terminated at 6.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
84	7					
	8					
82	9					
	10					
80	11					
	12					
78	13					
	14					
76	15					

Report_TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-25-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-26-02

Date(s) Excavated	12/11/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	11.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	82 feet (MSL)
Water Observations	Not Encountered			Weather	Rain, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
82	0				TOPSOIL.	
	1				SILT [ML], 5% fine sand, low plasticity, brown, moist.	
80	2					
	3					
78	4					
	5					
76	6					
	7					
74	8				*Sand content increases with depth.*	
	9					
72	10					
	11				Testpit terminated at 11.0 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	
70	12					
	13					
68	14					
	15					

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-27-02

Date(s) Excavated	12/12/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	11.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	81 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				TOPSOIL.	
80	1				SILT [ML], low plasticity, brown, moist.	
	2					
78	3					
	4					
76	5				*Gray seam of sandier silt.*	
	6				*Sand content increases with depth.*	
74	7					
	8					
72	9					
	10					
70	11				Testpit terminated at 11.0 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	
	12					
68	13					
	14					
66	15					

Report...I_TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-27-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-28-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	8.5 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	82 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
82	0			TOPSOIL.	
	1			SILT [ML], low plasticity, brown, moist.	
80	2				
	3				
78	4				
	5				
76	6				
	7				
74	8			POORLY GRADED GRAVEL WITH SILT AND SAND [GP-GM], 10% silt, 15% coarse sand, 1/4" dia gravels with occasional 1-2" dia, gray, . moist.	
	9			Testpit terminated at 8.5 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
72	10				
	11				
70	12				
	13				
68	14				
	15				

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-31-02

Date(s) Excavated	12/11/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	10.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	73 feet (MSL)
Water Observations	Not Encountered			Weather	Rain, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				TOPSOIL.	
72	1				SILT [ML], low plasticity, light brown, moist.	
	2					
70	3					
	4					
68	5					
	6					
66	7				SILTY SAND [SM], 25% silt, fine sand, gray, moist.	
	8					
64	9					
	10				Testpit terminated at 10.0 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	
62	11					
	12					
60	13					
	14					
58	15					

Repon ..._TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-31-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-32-02

Date(s) Excavated	12/11/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	11.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	78 feet (MSL)
Water Observations	Not Encountered			Weather	Rain, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
78	0				TOPSOIL.	
	1				SILT [ML], some sand & clay, medium plasticity, brown, moist.	
76	2					
	3					
74	4					
	5					
72	6					
	7					
70	8					
	9					
68	10				POORLY GRADED SAND WITH SILT [SP-SM], 10% silt, fine sand, gray, moist.	
	11				Testpit terminated at 11.0 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	
66	12					
	13					
64	14					
	15					

Report: _TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-32-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-33-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	10.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	73 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				TOPSOIL.	
72	1				SILT [ML], some sand & clay, medium plasticity, brown, moist.	
	2					
70	3					
	4					
68	5					
	6					
66	7					
	8					
64	9				SILTY SAND [SM], 25% silt, fine sand, gray, moist.	
	10				Testpit terminated at 10.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	Percolation Test = 0.06 in/hr
62	11					
	12					
60	13					
	14					
58	15					

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-34-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	10.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	79 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TOPSOIL.	
78	1			SILT [ML], some sand & clay, medium plasticity, brown, moist.	
	2				
76	3				
	4				
74	5				
	6			POORLY GRADED SAND WITH SILT [SP-SM], 10% silt, fine sand, gray, moist.	
72	7				
	8				
70	9				
	10			Testpit terminated at 10.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
68	11				
	12				
66	13				
	14				
64	15				

Report: [_TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-34-02

URS

Project: Portland DOT - Columbia Villa
Project Location: Portland, Oregon
Project Number:

Log of Test Pit TP-35-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	10.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	77 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				TOPSOIL.	
76	1				SILT [ML], low plasticity, brown, moist.	
	2					
74	3					
	4					
72	5					
	6				*Sand content increasing with depth.*	
70	7					
	8				SILTY SAND [SM], 20% silt, fine sand, gray, moist.	
68	9					
	10				Testpit terminated at 10.0 feet bgs on 12/12/02. Testpit backfilled with excavated material upon completion.	
66	11					
	12					
64	13					
	14					
62	15					

Report: ..._TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-35-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-36-02

Date(s) Excavated	12/11/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	11.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	60 feet (MSL)
Water Observations	Not Encountered			Weather	Rain, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
60	0				**TOPSOIL.**	
	1				**SILT [ML]**, low plasticity, brown, moist.	
58	2					
	3					
56	4					
	5					
54	6				*Grades from brown to tan.*	
	7					
52	8					
	9					
50	10				**POORLY GRADED SAND [SP]**, fine graded, tan, moist.	
	11				Testpit terminated at 11.0 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	
48	12					
	13					
46	14					
	15					

Report: ...\T_TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-36-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-37-02

Date(s) Excavated	12/13/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	11.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	67 feet (MSL)
Water Observations	Not Encountered			Weather	Cloudy, 55 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type / Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			**TOPSOIL.**	
66	1			**SILT [ML]**, low plasticity, brown, moist.	
	2				
64	3				
	4				
62	5				
	6				
60	7				
	8			**POORLY GRADED SAND [SP]**, fine graded, tan, moist.	
58	9				
	10				
56	11			Testpit terminated at 11.0 feet bgs on 12/13/02. Testpit backfilled with excavated material upon completion.	
	12				
54	13				
	14				
52	15				

Report: .._TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-37-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-38-02

Date(s) Excavated	12/11/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	10.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	68 feet (MSL)
Water Observations	Not Encountered			Weather	Rain, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
68	0				TOPSOIL.	
	1				SILT [ML], trace fine sand, some organics, low plasticity, brown, dry.	
66	2					
	3					
64	4					
	5					
62	6					
	7					
60	8					
	9					
58	10				Testpit terminated at 10.0 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	
	11					
56	12					
	13					
54	14					
	15					

Report: T_TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-38-02

URS

Project: Portland DOT - Columbia Villa **Project Location:** Portland, Oregon **Project Number:**	**Log of Test Pit** **TP-39-02**

Date(s) Excavated	12/11/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	10.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	45 feet (MSL)
Water Observations	Not Encountered			Weather	Rain, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				**TOPSOIL.**	
44	1				**SILT [ML]**, 5% sand, low plasticity, brown, dry.	
	2					
42	3					
	4					
					Grades to moist.	
40	5					
	6				*Grades to reddish-brown.*	
38	7					
	8					
36	9					
	10				Testpit terminated at 10.0 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	
34	11					
	12					
32	13					
	14					
30	15					

Report: [_TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-39-02

URS

Project: Portland DOT - Columbia Villa Project Location: Portland, Oregon Project Number:	Log of Test Pit TP-40-02

Date(s) Excavated	12/11/2002	Logged By	JOD	Checked By	BMW
Length of Excavation	10 feet	Width of Excavation	2 feet	Depth of Excavation	10.0 feet
Excavation Equipment	Case 580 Rubber Tired Backhoe	Excavation Contractor	Brownfield Environmental Construction, LLC	Approximate Surface Elevation	70 feet (MSL)
Water Observations	Not Encountered			Weather	Rain, 50 degrees +/-
Location	Columbia Villa (see Figure 2)			Surface Condition	Grassy, level surface

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
70	0				TOPSOIL.	
	1				SILT [ML], low plasticity, brown, dry.	
68	2					
	3					
66	4					
	5					
64	6					
	7					
62	8				*Finely graded sand content increases.*	
	9					
60	10				Testpit terminated at 10.0 feet bgs on 12/11/02. Testpit backfilled with excavated material upon completion.	
	11					
58	12					
	13					
56	14					
	15					

Report: _TP_NO_MC; File: PDOT.GPJ; 1/10/2003 TP-40-02

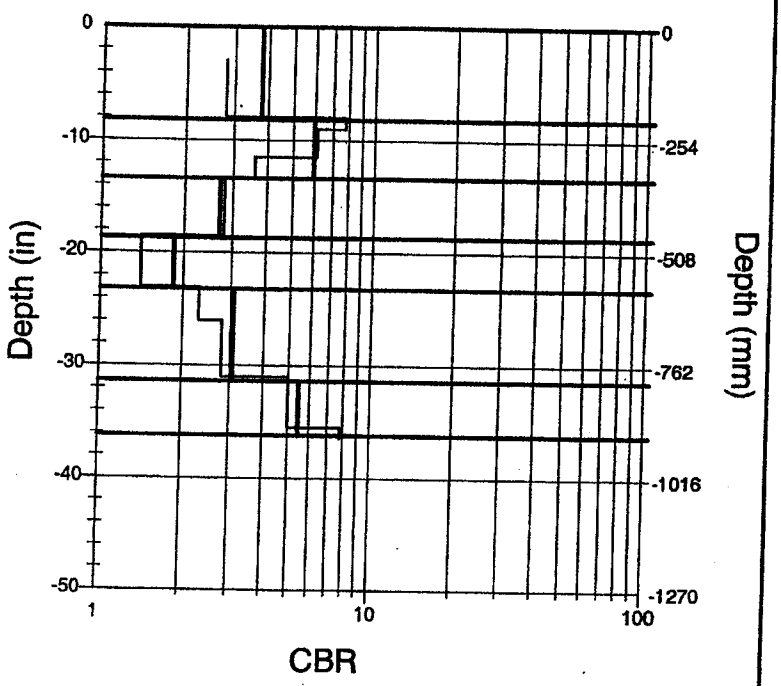
URS

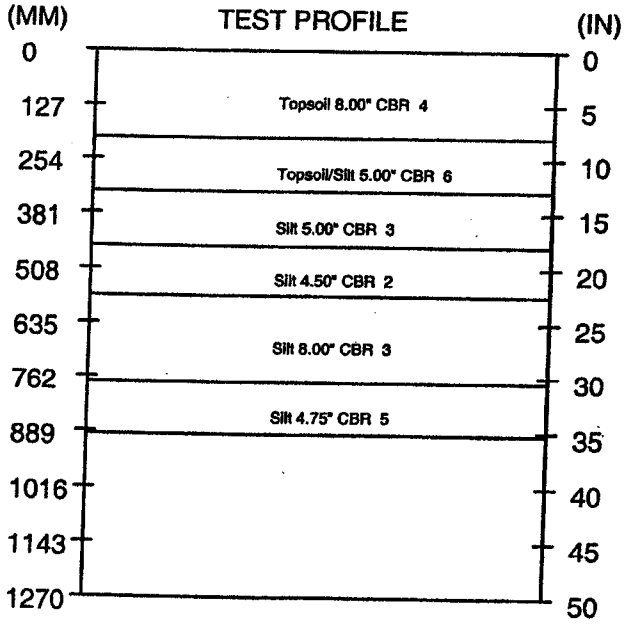
DCP TEST DATA

Project: PDOT - Columbia Villa
Feature: DCP-01-02

Date: 1/3/02
Station: DCP-01-02

No. of Blows	Accumulative Penetration (in)	Type of Hammer
1	3	1
1	5.5	1
1	8	1
1	9	1
1	10.25	1
1	11.5	1
1	13.5	1
1	16	1
1	18.5	1
1	23	1
1	26	1
1	28.5	1
1	31	1
1	32.5	1
1	34	1
1	35.5	1
1	36.5	1



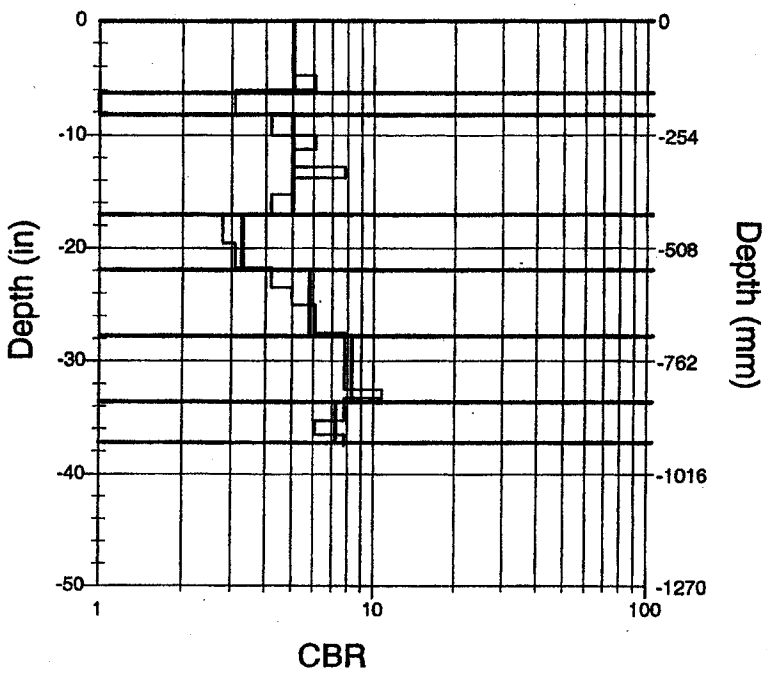


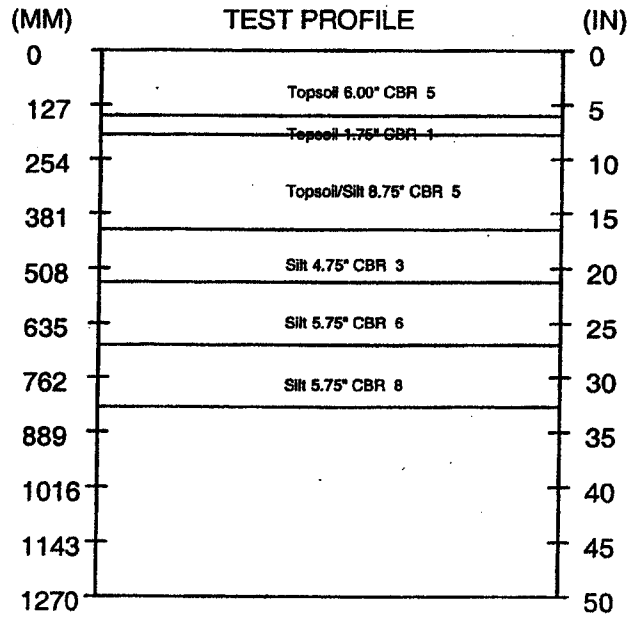
DCP TEST DATA

Project: PDOT - Columbia Villa
Feature: DCP-02-02

Date: 1/3/02
Station: DCP-02-02

No. of Blows	Accumulative Penetration (in)	Type of Hammer
1	3.25	1
1	4.75	1
1	6	1
1	8.25	1
1	10	1
1	11.25	1
1	12.75	1
1	13.75	1
1	15.25	1
1	17	1
1	19.5	1
1	21.75	1
1	23.5	1
1	25	1
1	26.25	1
1	27.5	1
1	28.5	1
1	29.5	1
1	30.5	1
1	31.5	1
1	32.5	1
1	33.25	1
1	34.25	1
1	35.25	1
1	36.5	1
1	37.5	1



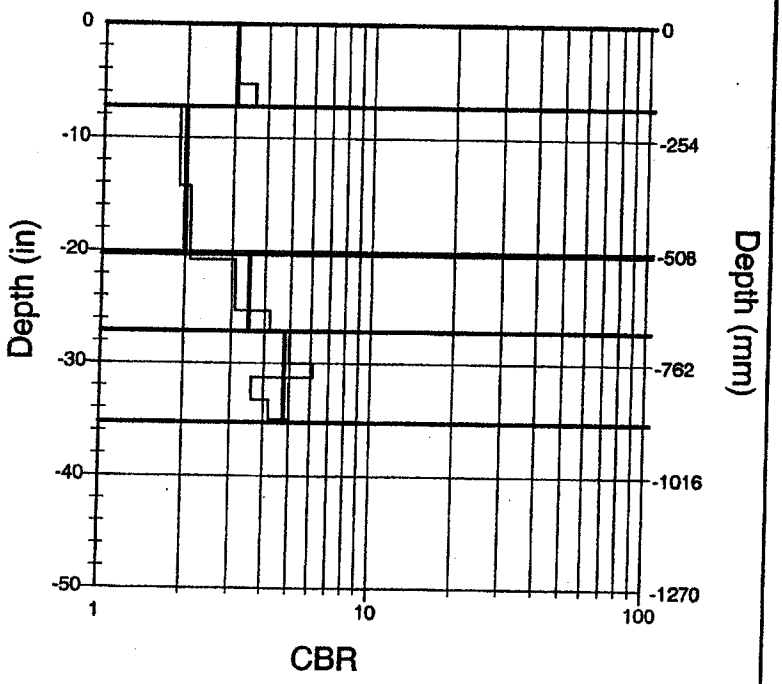


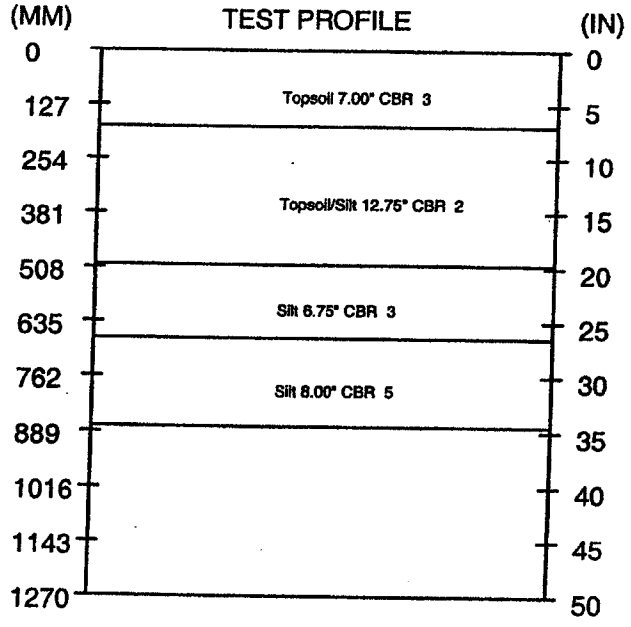
DCP TEST DATA

Project: PDOT - Columbia Villa
Feature: DCP-03-02

Date: 1/3/02
Station: DCP-03-02

No. of Blows	Accumulative Penetration (in)	Type of Hammer
1	3	1
1	5.25	1
1	7.25	1
1	10.75	1
1	14.25	1
1	17.5	1
1	20.75	1
1	23	1
1	25.25	1
1	27	1
1	28.5	1
1	30	1
1	31.25	1
1	33.25	1
1	35	1
1	36.5	1



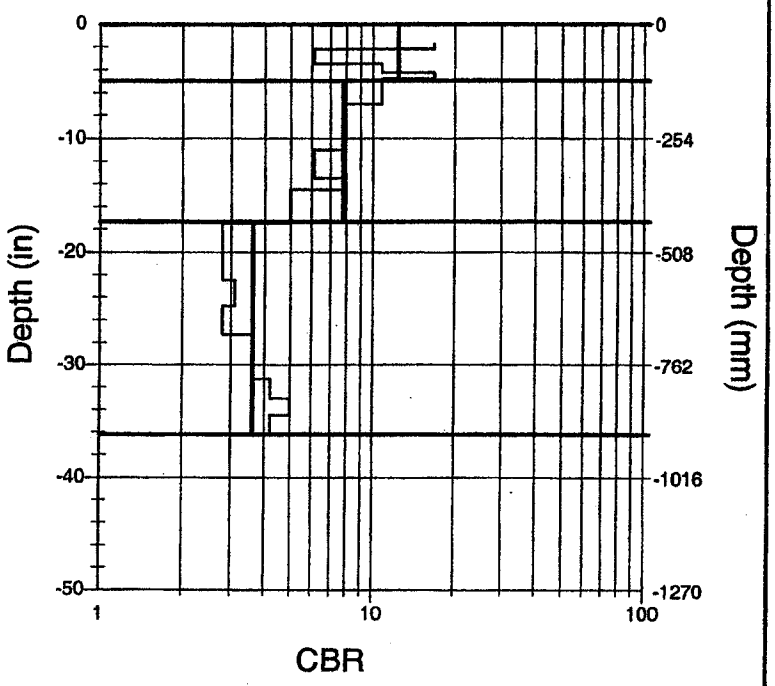


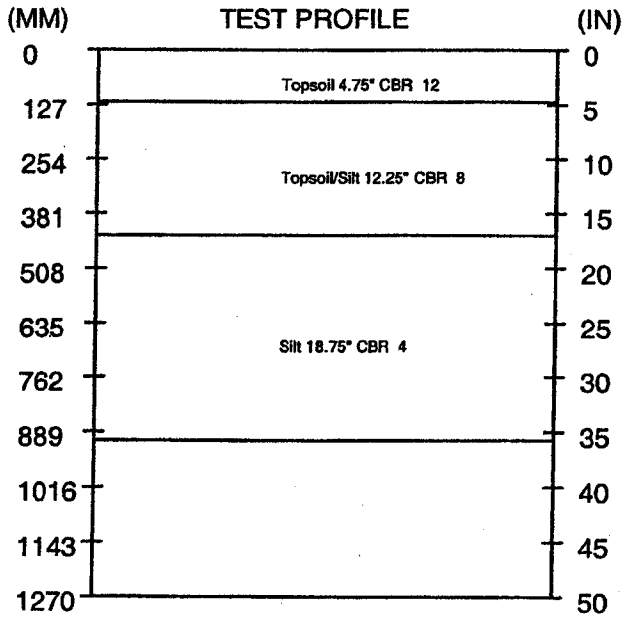
DCP TEST DATA

Project: PDOT - Columbia Villa
Feature: DCP-04-02

Date: 1/3/02
Station: DCP-04-02

No. of Blows	Accumulative Penetration (in)	Type of Hammer
1	1.75	1
1	2.25	1
1	3.5	1
1	4.25	1
1	4.75	1
1	5.5	1
1	6.25	1
1	7	1
1	8	1
1	9	1
1	10	1
1	11	1
1	12.25	1
1	13.5	1
1	14.5	1
1	16	1
1	17.5	1
1	20	1
1	22.5	1
1	24.75	1
1	27.25	1
1	29.25	1
1	31.25	1
1	33	1
1	34.5	1
1	36.25	1



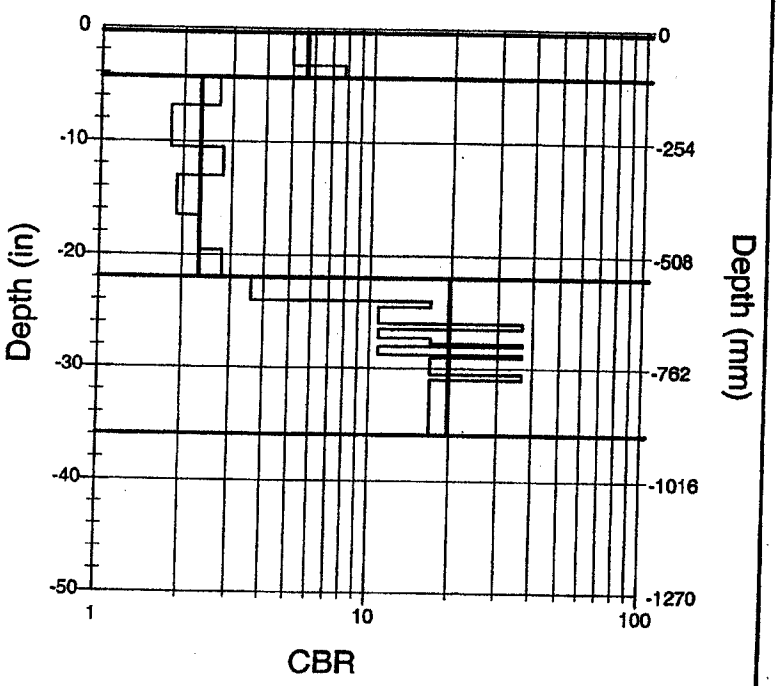


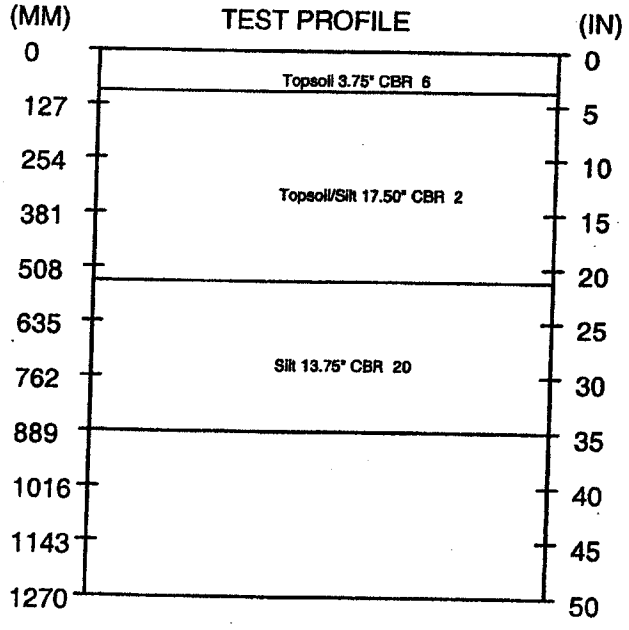
DCP TEST DATA

Project: PDOT - Columbia Villa
Feature: DCP-05-02

Date: 1/3/02
Station: DCP-05-02

No. of Blows	Accumulative Penetration (In)	Type of Hammer
1	1.75	1
1	3.25	1
1	4.25	1
1	6.8	1
1	10.5	1
1	13	1
1	16.5	1
1	19.5	1
1	22	1
1	24	1
1	24.5	1
1	25.25	1
1	26	1
1	26.25	1
1	26.5	1
1	27.25	1
1	27.75	1
1	28	1
1	28.75	1
1	29	1
1	29.5	1
1	30	1
1	30.5	1
1	30.75	1
1	31	1
1	31.5	1
1	32	1
1	32.5	1
1	33	1
1	33.5	1
1	34	1
1	34.5	1
1	35	1
1	35.5	1
1	36	1



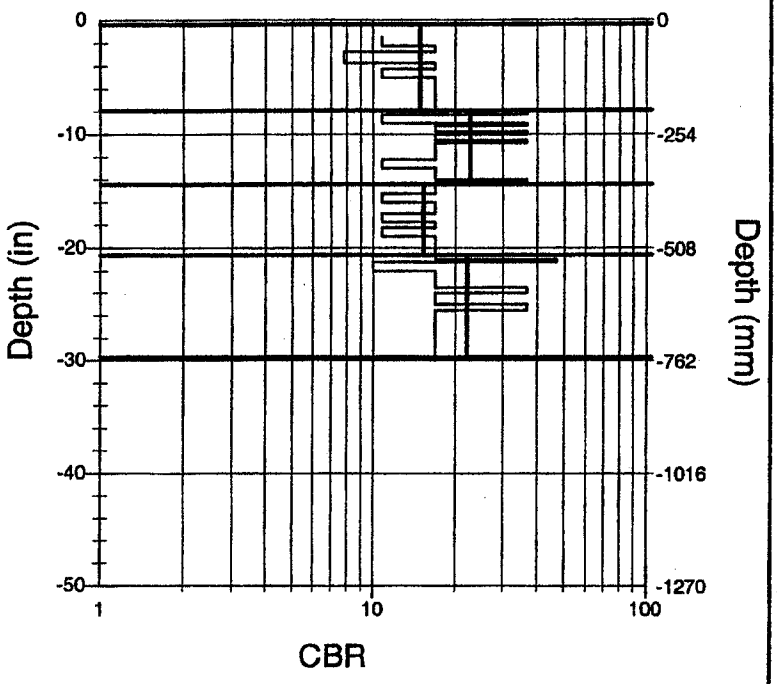


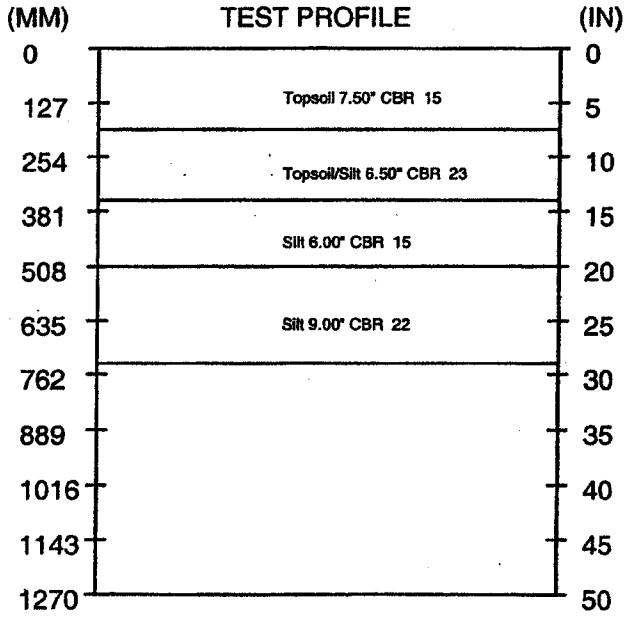
DCP TEST DATA

Project: PDOT - Columbia Villa
Feature: DCP-06-02

Date: 1/3/02
Station: DCP-06-02

No. of Blows	Accumulative Penetration (in)	Type of Hammer
1	1.5	1
1	2.25	1
1	2.75	1
1	3.75	1
1	4.25	1
1	5	1
1	5.5	1
1	6	1
1	6.5	1
1	7	1
1	7.5	1
1	8	1
1	8.25	1
1	9	1
1	9.25	1
1	9.75	1
1	10	1
1	10.5	1
1	10.75	1
1	11.25	1
1	11.75	1
1	12.25	1
1	13	1
1	13.5	1
1	14	1
1	14.25	1
1	14.75	1
1	15.25	1
1	16	1
1	16.5	1
1	17	1
1	17.75	1
1	18.25	1
1	19	1
1	19.5	1
1	20	1



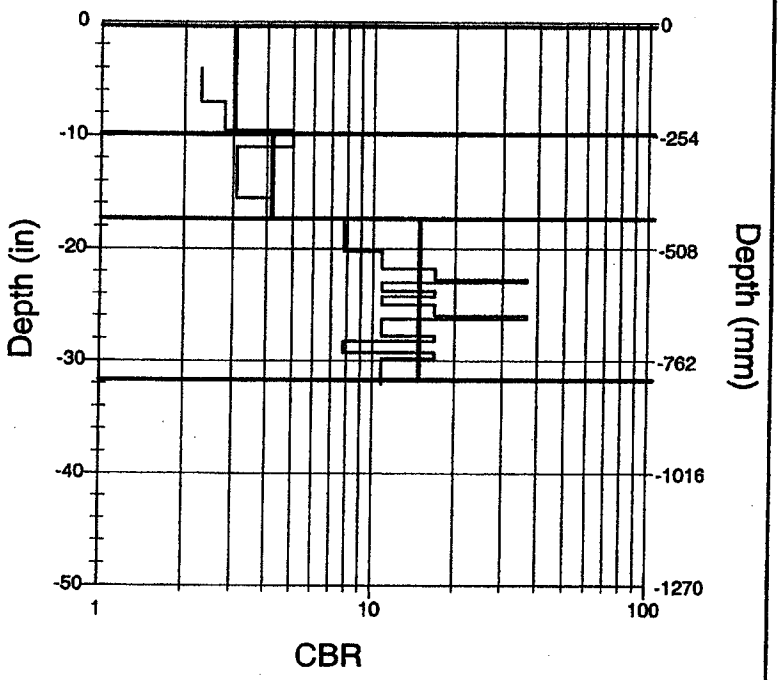


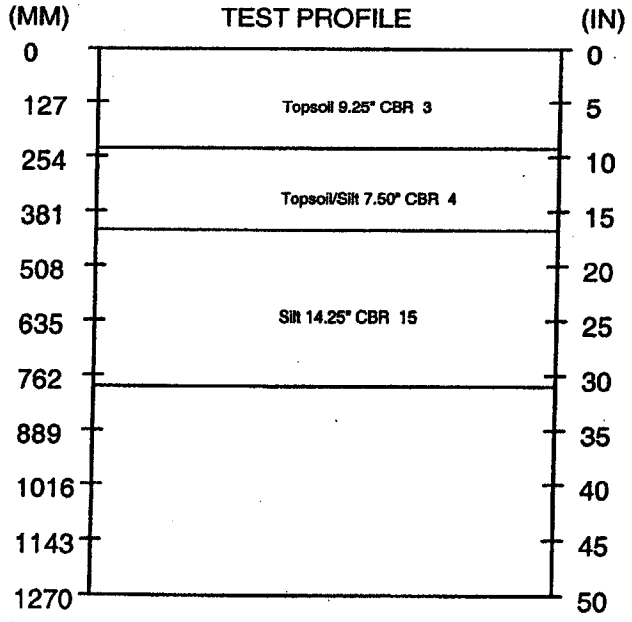
DCP TEST DATA

Project: PDOT - Columbia Villa
Feature: DCP-07-02

Date: 1/3/02
Station: DCP-07-02

No. of Blows	Accumulative Penetration (in)	Type of Hammer
1	4	1
1	7	1
1	9.5	1
1	11	1
1	13.25	1
1	15.5	1
1	17.25	1
1	18.25	1
1	19.25	1
1	20.25	1
1	21	1
1	21.75	1
1	22.25	1
1	22.75	1
1	23	1
1	23.75	1
1	24.25	1
1	25	1
1	25.5	1
1	26	1
1	26.25	1
1	27	1
1	27.75	1
1	28.25	1
1	29.25	1
1	29.75	1
1	30.5	1
1	31.25	1
1	32	1



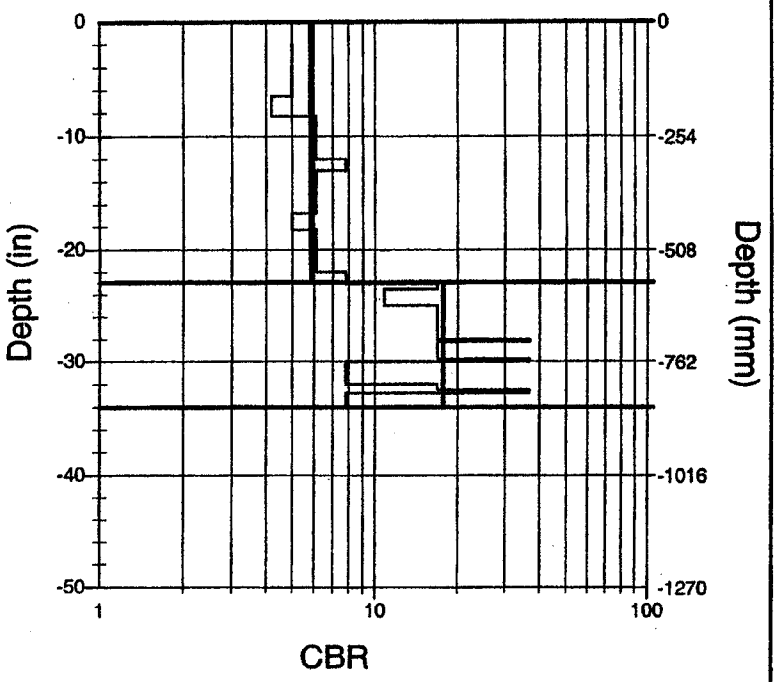


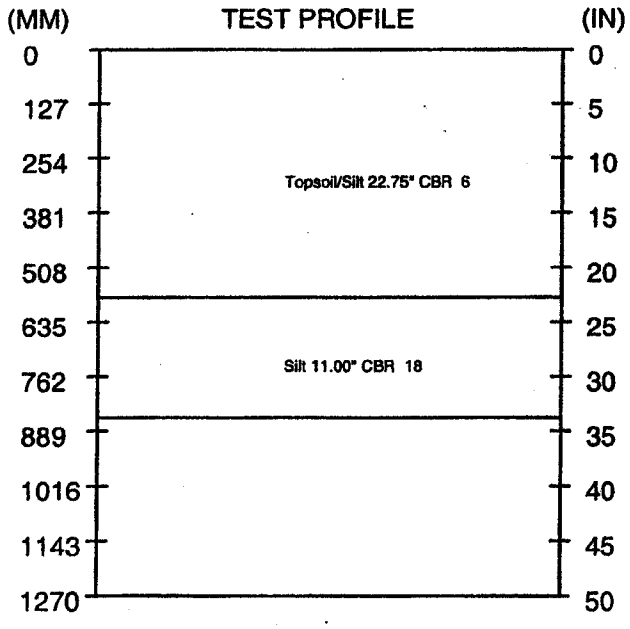
DCP TEST DATA

Project: PDOT - Columbia Villa
Feature: DCP-08-02

Date: 1/3/02
Station: DCP-08-02

No. of Blows	Accumulative Penetration (in)	Type of Hammer
1	2	1
1	3.5	1
1	5	1
1	6.5	1
1	8.25	1
1	9.5	1
1	10.75	1
1	12	1
1	13	1
1	14.25	1
1	15.5	1
1	16.75	1
1	18.25	1
1	19.5	1
1	20.75	1
1	22	1
1	23	1
1	23.5	1
1	24.25	1
1	25	1
1	25.5	1
1	26	1
1	26.5	1
1	27	1
1	27.5	1
1	28	1
1	28.25	1
1	28.75	1
1	29.25	1
1	29.75	1
1	30	1
1	31	1
1	32	1
1	32.5	1
1	32.75	1
1	33.75	1



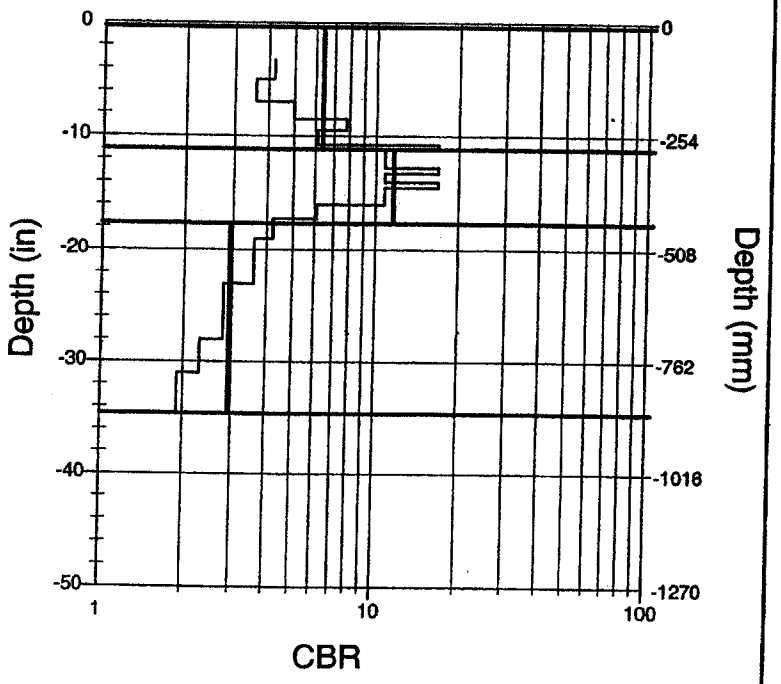


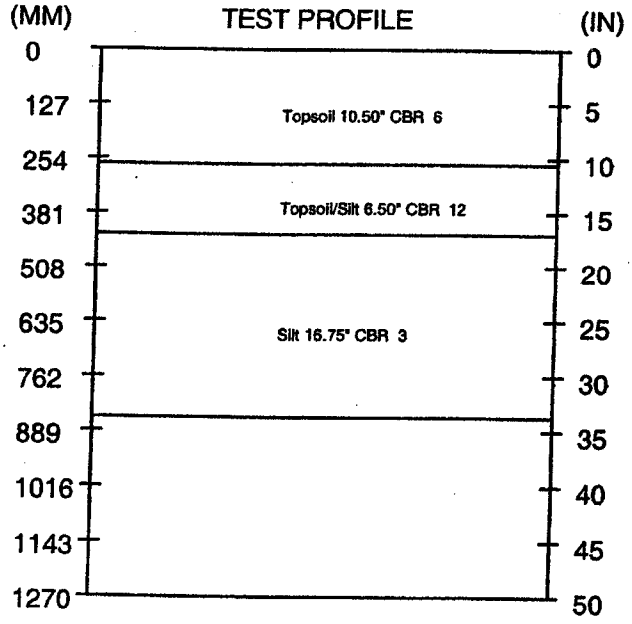
DCP TEST DATA

Project: PDOT - Columbia Villa
Feature: DCP-09-02

Date: 1/3/02
Station: DCP-09-02

No. of Blows	Accumulative Penetration (In)	Type of Hammer
1	3.25	1
1	5	1
1	7	1
1	8.5	1
1	9.5	1
1	10.75	1
1	11.25	1
1	12	1
1	12.75	1
1	13.25	1
1	14	1
1	14.5	1
1	15.25	1
1	16	1
1	17.25	1
1	19	1
1	21	1
1	23	1
1	25.5	1
1	28	1
1	31	1
1	34.5	1



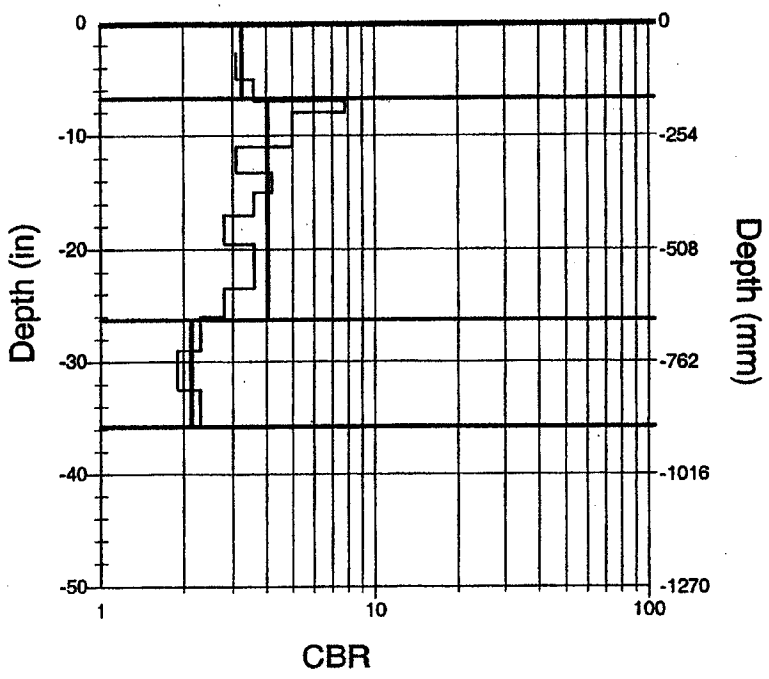


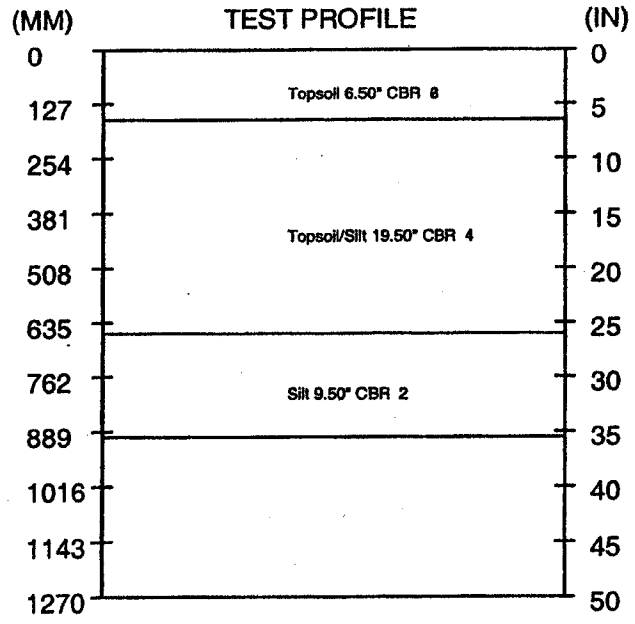
DCP TEST DATA

Project: PDOT - Columbia Villa
Feature: DCP-10-02

Date: 1/3/02
Station: DCP-10-02

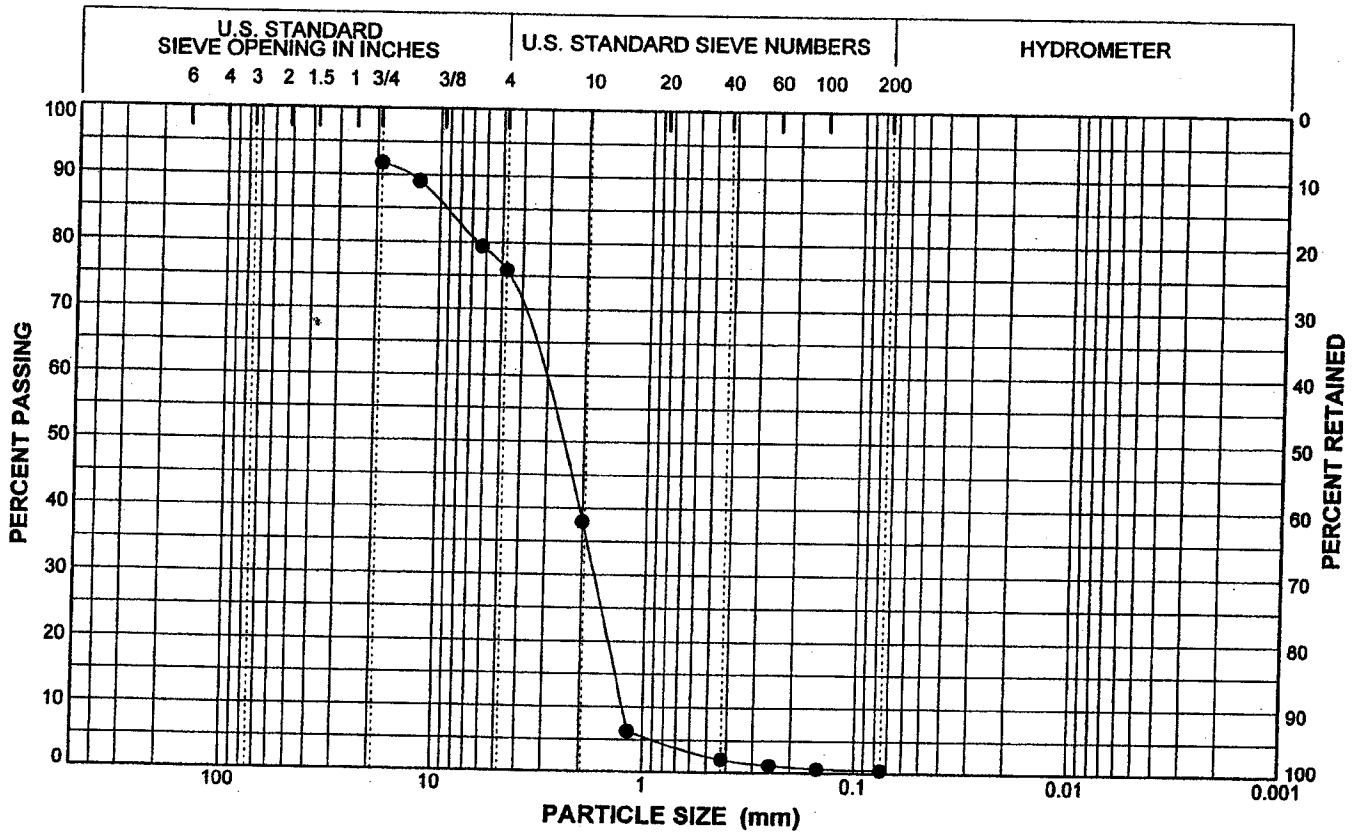
No. of Blows	Accumulative Penetration (in)	Type of Hammer
1	2.75	1
1	5	1
1	7	1
1	8	1
1	9.5	1
1	11	1
1	13.25	1
1	15	1
1	17	1
1	19.5	1
1	21.5	1
1	23.5	1
1	26	1
1	29	1
1	32.5	1
1	35.5	1





LABORATORY TESTING

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	



Boring ID	Sample #	Depth (feet)	Sample Moisture (%)	Dry Density (lbs/ft³)	Symbol	LL	PI	% G	% S	% F	Classification
B-03-02	5	25-26.5	1.1		●			16.0	75.3	0.5	Poorly Graded Sand with Gravel (SP)

Report: SIEVE_4_CURVES_GSF_COLS; File: PDOT.GPJ; 1/10/2003 B-03-02

Portland DOT - Columbia Villa
Portland, Oregon

PARTICLE SIZE DISTRIBUTION CURVES

URS