Targeted Drainage Report for the *Dwayne Lane Island Crossing Dealership Phase I&II Grading Plans*

Prepared for:
Tom Lane
Dwayne Lane's Chrysler/Plymouth
10515 Evergreen Way
Everett, WA 98204

Prepared by:
Derek I. Hann, E.I.T.

Reviewed by:
Todd D. Powell, PE

March 19, 2009

hba DESIGN GROUP
land use planning + civil engineering

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Dwayne Lane Island Crossing Dealership
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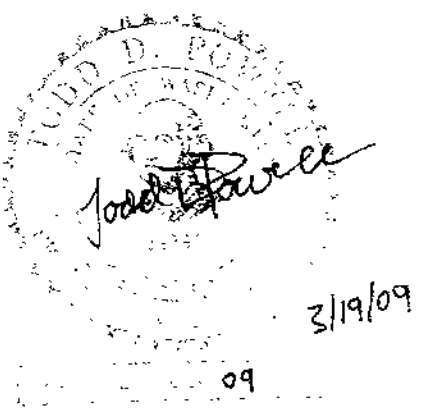


March 19, 2009

SUMMARY

Phases I and II of the Grading Plans for the Dwayne Lane Island Crossing Dealership proposes to raise the elevation of the existing site for future development. The Grading Plan has been prepared with the intention of obtaining a grading permit for the first phases of a longer-term project that will ultimately lead of commercial development on the property.

Structural fill will be hauled onto the site and compacted to structural specifications in two phases. Phase I will involve raising the elevation of the northwest corner of the property and the area providing access to the northwest corner from Smokey Point Boulevard. Additionally Phase I will include the construction of a large compensatory storage swale to be located near the western property boundary. Phase II will raise the elevation of the rest of the site.

The project site is located at 20410 Smokey Point Boulevard in Arlington, Washington between Interstate 5 and Smokey Point Boulevard.

There will be no additional impervious area proposed for the development at this stage of the project. All proposed fill will be seeded to replicate the existing prairie condition of the site. As such, no detention or water quality measures are proposed for this stage of the project other than Temporary Erosion and Sediment Control Measures used to protect the proposed fill soils.

See the Stormwater Pollution Prevention Plan for the project for details on Temporary Erosion and Sedimentation Control Measures.

EXISTING CONDITIONS

The 14.4-acre site is undeveloped and lies on a plateau ranging in elevation from 39 to 43 feet (29 datum). The site is south of Island Crossing & Interstate 5 and on the east side of Interstate 5.

The ground cover over the site is short prairie grasses and brush. All existing stormwater flows from the center of the site to the property boundaries. Slopes onsite range from 1-6% over the majority of the site. The west property boundaries contain drainage ditches with side slopes between 6-10%.

The site to be disturbed includes approximately 8.79 acres during Phase I of the project and 14 acres during Phase II of the project.

The site is in the flood plain and is covered by floodwaters in both the 10year and 100year flood, as modeled by PIE. There is no upstream system that drains onto the site, other than flooding from large storm events, which covers the whole site with floodwaters.

According to the SCS Soil Survey for Snohomish County, the predominant soil type on this site is Puget silty clay loam, hydrologic group C, Symbol 55. (See appendix for Soils Map).

A Geotechnical Report prepared by Western Geotechnical Consultants, Inc. is attached to this drainage report for your review.

DEVELOPED CONDITIONS

There is no impervious area proposed for this project at this time. Additionally the proposed vegetation and grading for the project will approximate current drainage conditions. Therefore no stormwater mitigation is proposed at this stage of the project. Some degree of mitigation will occur onsite due to infiltration into the proposed fill material and within the proposed compensatory storage swale.

FRONTAGE IMPROVEMENTS

There are no frontage improvements proposed for the site at this stage of the project.

WATER QUALITY

There is no impervious area proposed for this project at this time. Therefore water quality will not be provided other than the natural water quality provided by the TESC measures proposed for the site.

UPSTREAM ANALYSIS

Based on site topography, there are no offsite areas tributary to the project site's drainage. However, some change to local flood elevations is anticipated due to the large amount of fill proposed for the project. The fill will provide some displacement of flood waters that may increase the flood event elevations. However, it is anticipated that these effects will be marginal and within the allowable limitations set by FEMA. For details on the effects of the proposed project on the flood elevations see the Island Crossing Hydraulic Study performed by Pacific International Engineer on February 23, 2009.

DOWNSTREAM ANALYSIS

Stormwater leaving the site flows west to the drainage swale near the property line. Stormwater then flows south in a swale along I-5 to Portage creek, which is south of the site. The remainder of flow flows into South Slough, which joins Portage Creek downstream.

In large storm events the site is covered by storm water. The floodwater flows both north and south in swales along I-5. Drainage flowing north enters the South Slough. This slough flows across I-5 through a large arch culvert, and then meanders westerly until it joins Portage Creek. Drainage flowing south enters a swale along I-5 that is tributary to Portage Creek located several hundred feet south of the site.

Some change to local flood elevations is anticipated due to the large amount of fill proposed for the project. The fill will provide some displacement of flood waters that may increase the flood event elevations. However, it is anticipated that these effects will be marginal and within the allowable limitations set by FEMA. For details on the effects of the proposed project on the flood elevations see the Island Crossing Hydraulic Study performed by Pacific International Engineer on February 23, 2009.

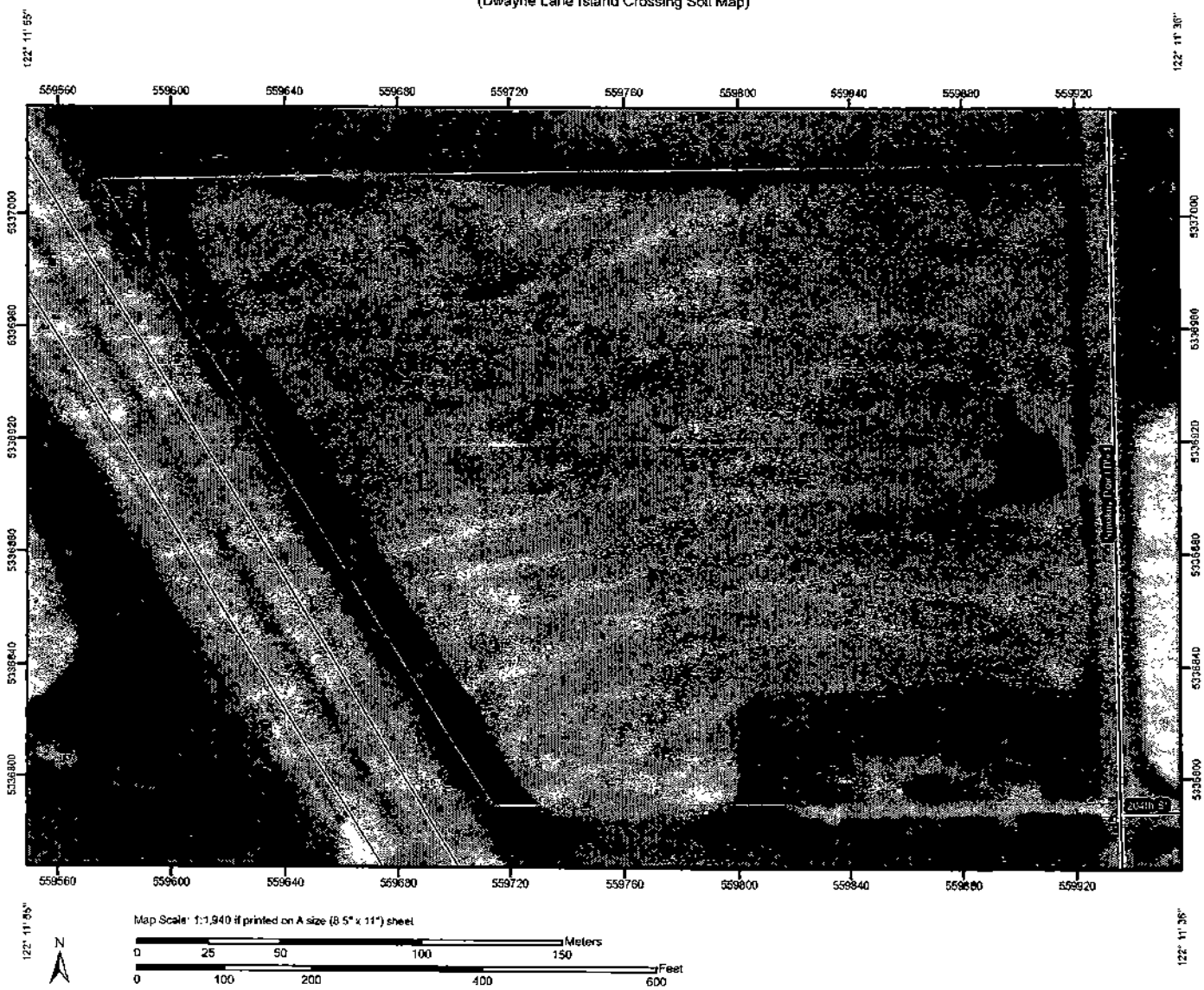
There are no structures or buildings in the downstream flow area for more than ¼ mile from the site.

APPENDIX

Soils Map & Information
Down Stream Analysis Maps
Geotech Report

Soils Map & Information

Soil Map—Snohomish County Area, Washington
(Dwayne Lane Island Crossing Soil Map)



Map Scale: 1:1,940 if printed on A size (8.5" x 11") sheet.

N

Meters: 0, 25, 50, 100, 150

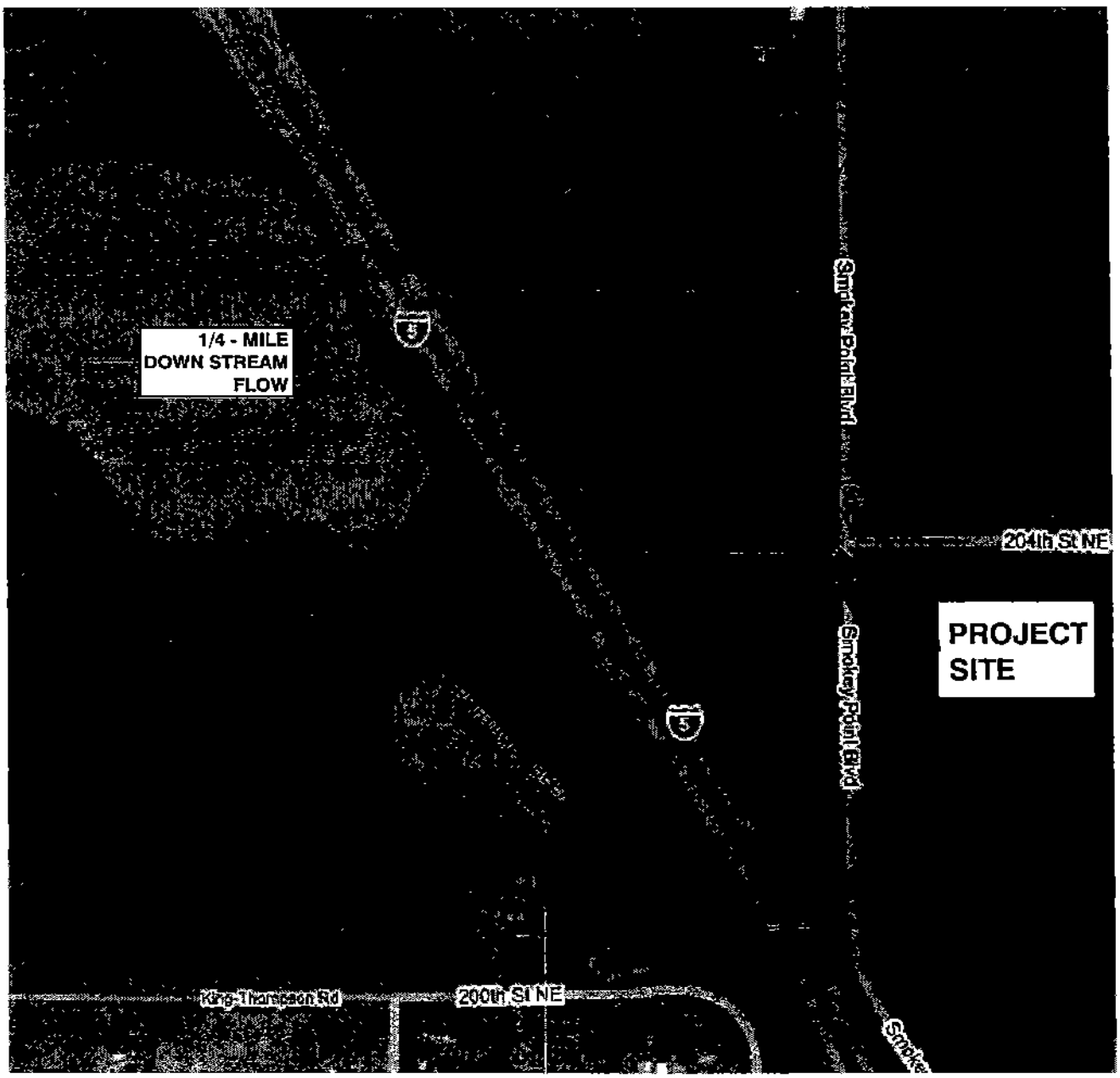
Feet: 0, 100, 200, 400, 600

Map Unit Legend

Snohomish County Area, Washington (WA661)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
55	Puget silty clay loam	15.9	99.7%
56	Puyallup fine sandy loam	0.1	0.3%
Totals for Area of Interest		**15.9**	**100.0%**

Down Stream Analysis Maps

DWAYNE LANE ISLAND CROSSING DEALERSHIP
¼ - MILE DOWNSTREAM ANALYSIS MAP



AERIAL VICINITY MAP

SCALE: 1" = 500'

Reference: ©2009 Google-Imagery ©2009DigitalGlobe, GeoEye, Map data ©2009 Tela Atlas
Accessed January 30, 2009

Geotech Report

Western Geotechnical Consultants, Inc.

4183 Saltsprings Dr., Ferndale, WA 98248 Phone/FAX (360)380-2507

February 9, 2009

Mr. Tom Lane
Dwayne Lane's Chrysler Plymouth
10515 Evergreen Way
Everett, WA 98204

Re: Geotechnical Site Investigation
Dwayne Lane Auto Dealership – Island Crossing Site
20140 Smokey Point Blvd.
Smokey Point Blvd., Arlington, WA

Western Geotechnical Consultants, Inc. is pleased to provide this geotechnical engineering report prepared for the above referenced property. On January 30, 2009 a geotechnical engineer from our firm traveled to the site to oversee the excavation of 5 test pits at the approximate locations shown on the attached Site Plan, Figure 1. The property is about 14.6 acre in size, and the property is located on the west side of Smokey Point Boulevard to the east of Interstate 5 in Arlington, WA. The property will be developed in two phases, with Phase 1 consisting of the northern half of the property (approximately), and Phase 2 the remainder of the property. At this time only the Phase 1 portion will be developed which includes a stormwater swale developed between Interstate 5 and the subject property. The Phase 1 work will also include raising grade with fill material to approximately elevation 47.00 feet. The stormwater swale, which will have an 80 foot wide base, will be excavated down to elevation 36.00 feet with 3H:1V side slopes.

The USDA Soils Classification Service "Soil Survey of Snohomish County Area, Washington" has classified the soils as Puget silty clay loam. Puget soils are very deep, poorly drained soils and are located in depressional areas on flood plains. The soil formed in alluvium. The permeability of Puget soils is moderately slow and the threat of water erosion is slight. The soils encountered during our 2003 site investigation were consistent with the SCS soil description.

The purpose of our investigation was to evaluate the site with respect to developing the site using Low Impact Development (LID) methods. If feasible, the stormwater swale will be developed as a rain garden that will provide temporary stormwater storage and otherwise an infiltration media. The specific scope of our investigation for the site included the following services:

- Review available published geologic, geotechnical and topographic information for the area including soil and groundwater information contained in our files for previous work performed on the site.
- Excavate 5 test pits and obtain samples to explore soil and groundwater conditions across the site. Piezometers were installed in all of the test pits for future monitoring of groundwater levels.
- Classify soils in accordance with the Unified Soils Classification System (USCS).
- Perform field and laboratory testing as deemed necessary in support of our conclusions and recommendations. Lab testing included soil inspection under controlled laboratory conditions, moisture content tests and grain size/hydrometer analyses performed in accordance with the USDA textural triangle methodology so

as to determine design infiltration rates for the site soils. Cation exchange capacity tests were also performed to evaluate the need for pretreatment of stormwater.

- Return to the site February 4, 2009 to read the static groundwater levels through the piezometers.
- Prepare this engineering report including a summary of work performed and our conclusions and recommendations regarding:
  - Soil and groundwater information for use in designing infiltration facilities and possibly porous asphalt concrete access roads within the site.
  - Provide design infiltration rates for use in stormwater facilities design.
  - Provide recommended subgrade strength values (California Bearing Ratio) for use in designing the parking areas.
  - Provide seismic design parameters for structural design.
  - Provide geotechnical recommendations for building construction on the site including foundations, earth supported floor slabs and drainage.
  - Provide lateral earth pressures for designing subsurface walls.
  - Provide rough stripping criteria and the depth to suitable bearing soil for relatively light foundations and paved areas.
  - Structural fill criteria including the suitability of on site material for use as structural fill.
  - General site development recommendations with respect to geotechnical issues identified during our field investigation.

Site Conditions

Surface Conditions

The site is a relatively flat parcel that is 4 sided and approximately 14.6 acres in size. The property is presently mostly grass and weed covered with the exception of a few trees located near Smokey Point Boulevard. The property has historically been used as a farm.

Subsurface Conditions

Subsurface soil and groundwater conditions were explored on January 30, 2009 when a total of 5 test pits were advanced using a small tracked excavator with a 1.5-foot wide bucket. The test pits were excavated at the approximate locations shown on the attached Site Plan, Figure 1. Soil and groundwater conditions were continuously logged using the Unified Soils Classification System (USCS) and soil samples were obtained for inspection and testing under controlled laboratory conditions. Edited tabulated test pit logs are included in this report together with a USCS chart explaining soil descriptions.

Subsurface conditions were found to be relatively similar across the property. The subsurface profile consists of about a foot or less of dark brown clayey organic SILT (topsoil) with numerous roots and organic debris (OL by USCS) that was in a relatively soft and wet state. Below the topsoil layer we encountered brown SILT with trace to some clay, and trace fine sand (ML by USCS) that extended to depths of about 5.0 feet below grade.

This soil unit is underlain by very fine sandy SILT (ML by USCS) that is in a wet state. In Test Pits 4 and 5, which were located 5 to 6 feet below the elevation of the other test pits, we encountered a silty fine to medium SAND (SM by USCS) below about 5 feet.

Groundwater

Groundwater was encountered in all of the test pits at the time of the investigation on January 30, 2009 at depths ranging between 3.8 to 6.5 feet below grade. Piezometers were installed in all of the test pits for future monitoring of the groundwater levels.

We returned to the site on February 4, 2009 to read the piezometers and the water level indicator showed that the water table is between 3.85 and 5.20 feet below grade. The individual readings are summarized below.

Test Pit No.	Water Level (BGS)	Approximate Water Elevation
1	3.85'	37.4'
2	4.97'	36.3'
3	5.20'	37.6'
4	3.90'	32.1'
5	4.59'	31.4'

Laboratory Testing

Laboratory tests were performed on selected soil samples obtained during our test pit investigation. Our testing included sample inspection under controlled laboratory conditions, moisture content determination, grain size/hydrometer test to determine soil infiltration rates and the determination of soil cation exchange capacity for water quality. Cation Exchange capacity tests were performed to evaluate the need for pretreatment of stormwater. The moisture content test results are included in the tabulated log of test pits and the results of the grain size/hydrometer testing are attached to this report in the form of grain size distribution curves. We also plotted the grain size test results on the USDA Textural Triangle for classification purposes. The organic content test results are attached to this report and are also presented in tabular form in the Cation Exchange Capacity section to this report.

Conclusions and Recommendations

General

Based on our geotechnical investigation, we conclude that the site is conducive for the type of development proposed. Relatively light building can be supported on conventional shallow spread footings and the site can support vehicle loading as parking will be part of the development of the property.

The following section provides our analyses and recommendations for design infiltration rate and water quality potential of site soils based on our geotechnical investigation and subsequent laboratory testing of the representative granular soils located below the topsoil layer.

Infiltration Rate

We determined the infiltration rate for representative soils encountered in the test pits at the site in accordance with the 2005 edition of the Washington Department of Ecology (DOE) Stormwater Management Manual for Western Washington. Representative soil samples taken from swale base elevation (36.00') were tested. The soils were classified in the field and are recorded on the test pit logs as fine sandy SILT. A total of five grain size analyses were performed. Subsequent testing using the USDA textural triangle methodology classified the near surface soils as a silt or silt loam. We also tested the underlying sandy soils identified at approximate elevation 30 to 31 feet and this material is classified as a sandy loam.

Based on the testing the Textural Class of the soil at elevation 36.00 is a silt or silt loam. Table 3.7, Vol. 3 of the 2005 Stormwater Management Manual does not allow for infiltration for silt or silt loam. The deeper soil identified at approximate elevation 30 to 31 feet is classified as a sandy loam and the Stormwater Management Manual recommends a long term (design) infiltration rate of 0.25 inches an hour for sandy loam and the USCS classification is silty SAND (SM by USCS).

Cation Exchange Capacity

The requirements for soil treatment exceptions are specified by the City of Marysville and the Washington DOE "Stormwater Management Manual for Western Washington" and a cation exchange capacity of greater than 5 meq. per 100 grams is required to meet the soil treatment exemption criteria. The exemption is satisfied if both of the following criteria are met.

The first 2 feet or more of the soil beneath an infiltration facility must meet one of the following specifications for general protection of groundwater:

a) The soil must have an organic content greater than 0.5% to meet the a cation exchange capacity greater than 5 meq. per 100 grams AND
b) The soil must be composed of less than 25% gravel by weight with at least 75% of the soil passing the #4 sieve, and the portion passing the #4 sieve must meet one of the following gradations:

    1. At least 50% must pass the #40 sieve and at least 2% must pass the #100 sieve, OR
    2. At least 25% must pass the #40 sieve and at least 5% must pass the #200 sieve.

We analyzed site soils using a) organic content. The results are summarized below.

	TP-1/S-1	TP-2/S-1	TP-3/S-2	TP-4/S-1	TP-5/S-1
Organic Content	0.91%	0.50%	0.39%	0.65%	0.96%

We also analyzed the site soils using b)1., namely less than 25% gravel with at least 75% passing the #4 sieve, at least 25% must pass the US #40 sieve, and at least 5% must pass the US #100 sieve. The results of our analyses are summarized below.

Grain Size Distributions for the Soil Treatment Exemption (Category b)1

Test Pit No./Sample No.	TP-1/S-1	TP-2/S-1	TP-3/S-2	TP-4/S-1	TP-5/S-1
Sample Depth	5.4'	5.5'	6.5'	2.5'	1.5'
No. 4 Sieve (Required Passing 75%)	100%	100%	100%	100%	100%
No. 40 Sieve (Required Passing 50%)	100%	100%	100%	100%	100%
No. 100 Sieve (Required Passing 2%)	97%	97%	98%	99%	98%

As the results indicate the site soils meet the Soil Treatment Exemption criteria under category b) 1 except for TP-3 where the organic content fell below the 0.5% threshold. A copy of the grain size distribution curves including the organic contest test results are attached to this report.

General Site Development

The following sections of this report contain recommendations for general site development. Note that these recommendations are based on the limited scope of subsurface exploration performed as a part of our geotechnical services for the project and included a review of test pits advanced by Western Geotechnical Consultants, Inc. across the site in 2003. The 2003 test pit logs, together with a site plan showing the test pit locations is included in the appendix to this report.

Site Preparation: All topsoil or other organic, soft or deleterious material and old foundations, must be stripped and removed from those areas to be developed. Based on our test pit investigation, a stripping depth of about 1 foot should be anticipated. Note that deeper over-excavation may be required where deeper unsuitable soils such tree root balls are encountered.

International Building Code (IBC) Site Classification: Based on our geotechnical investigation the site soils are classified as soil type E, soft soil profile. The earthquake spectral responses (S_{ms} and S_{m1}) may be computed using Soil Class E and Tables 1615.1.2 (1) and 1615.1.2(2) of the IBC.

Structural Fill and Compaction: Part of the Phase 1 plan is to raise grade to elevation 47.00 feet. Structural fill will be required where buildings or other structural improvements will be placed. Structural fill is defined as compacted fill material supporting buildings, parking areas, driveways, etc. All structural fill should be placed and compacted on a horizontal subgrade surface. Structural fill should extend beyond the edge of any future structural improvements by a distance equal to the thickness of the fill beneath the structural improvements.

The on site non-organic silty clayey soils are not acceptable for use as structural fill but we understand that an acceptable fill is available to raise grade.

If an alternate material is required for structural fill, we recommend using an import fill material consisting of relatively clean sandy gravel containing less than 5% fines (GW by USCS). Structural fill should be placed in maximum 8- to 10-inch loose, horizontal lifts and be thoroughly compacted. All structural fill should be compacted to a minimum of 95% of maximum dry density as determined by the ASTM D-1557 test procedure.

Pavement Subgrade Strength Design Parameters
On the basis of our review of site soil conditions on the property a minimum CBR value of 6 should be used for the near surface sandy soils. This value is based on correlation with clayey silty soils and our experience at sites with similar soil conditions.

Some of the important factors that affect the durability of pavement surfacing include stability and permeability of the subgrade soils and base materials, the presence of ground water, design life of the road section, the traffic volume, and the frequency of heavy truck traffic. The road section design should include the factors listed above.

The pavement section should be installed over firm sub-grade. Following excavation and/or filling to establish sub-grade elevation, but immediately prior to paving, the sub-grade surface should be proof rolled with a loaded 10 cubic yard dump truck, or equivalent. Any soft areas exposed by the proof rolling, which cannot be easily compacted should be over-excavated and back filled with compacted granular fill.

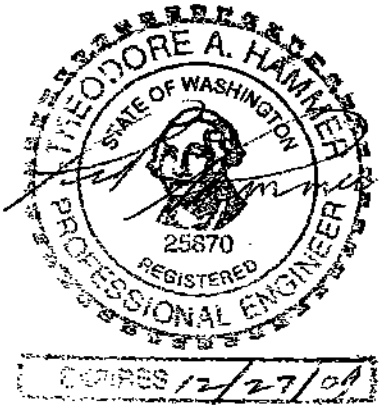
Erosion Control: Erosion control during construction of the proposed facilities can be accomplished through placement of proper sedimentation control facilities. We recommend siltation control facilities, consisting of either hay bales or silt fences, be fabricated around all construction areas. Typical details for siltation control facilities using either hay bales or silt fences are attached to this report.

Siltation devices should be placed down gradient of all construction areas and cleared areas to provide siltation control during construction. All siltation control devices should be maintained in operable condition during construction, and left in operable condition until the site has been revegetated and siltation is no longer a threat. At that time the siltation facilities should be removed.

Thank you for the opportunity to be of assistance to you on this project. If you have any questions regarding the contents of this report or if we can be of further assistance please contact our office.

Sincerely,

Western Geotechnical Consultants, Inc.



Theodore A. Hammer, P.E.
Geotechnical Engineer

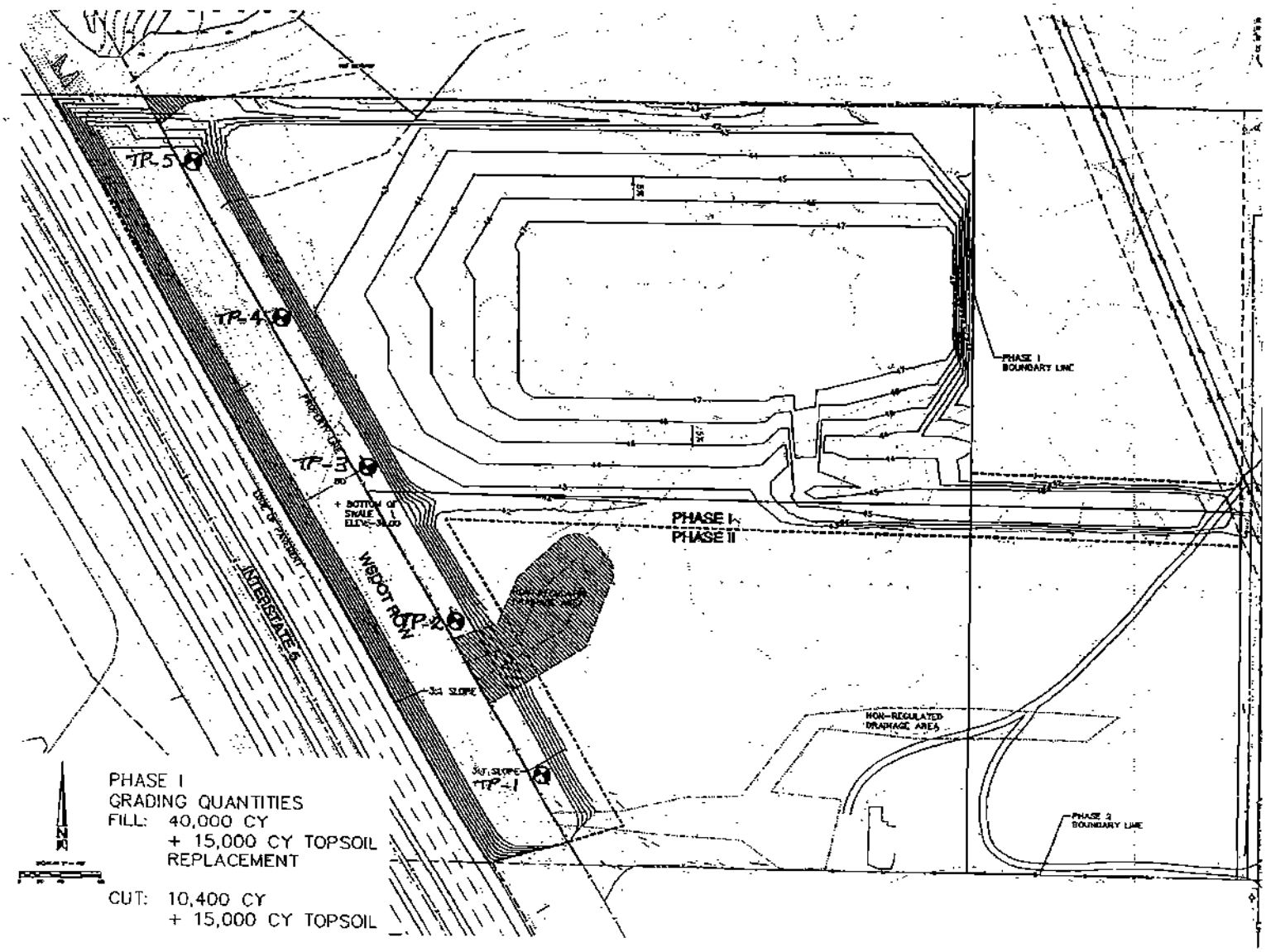
Inclusions: Figure 1, Site Plan and Test Pit locations
USCS Classification Chart
Log of Test Pits

Attachments: Grain Size Distribution Curves with Organic Content Test Results
USDA Textural Triangle
Typical Siltation Control Facilities

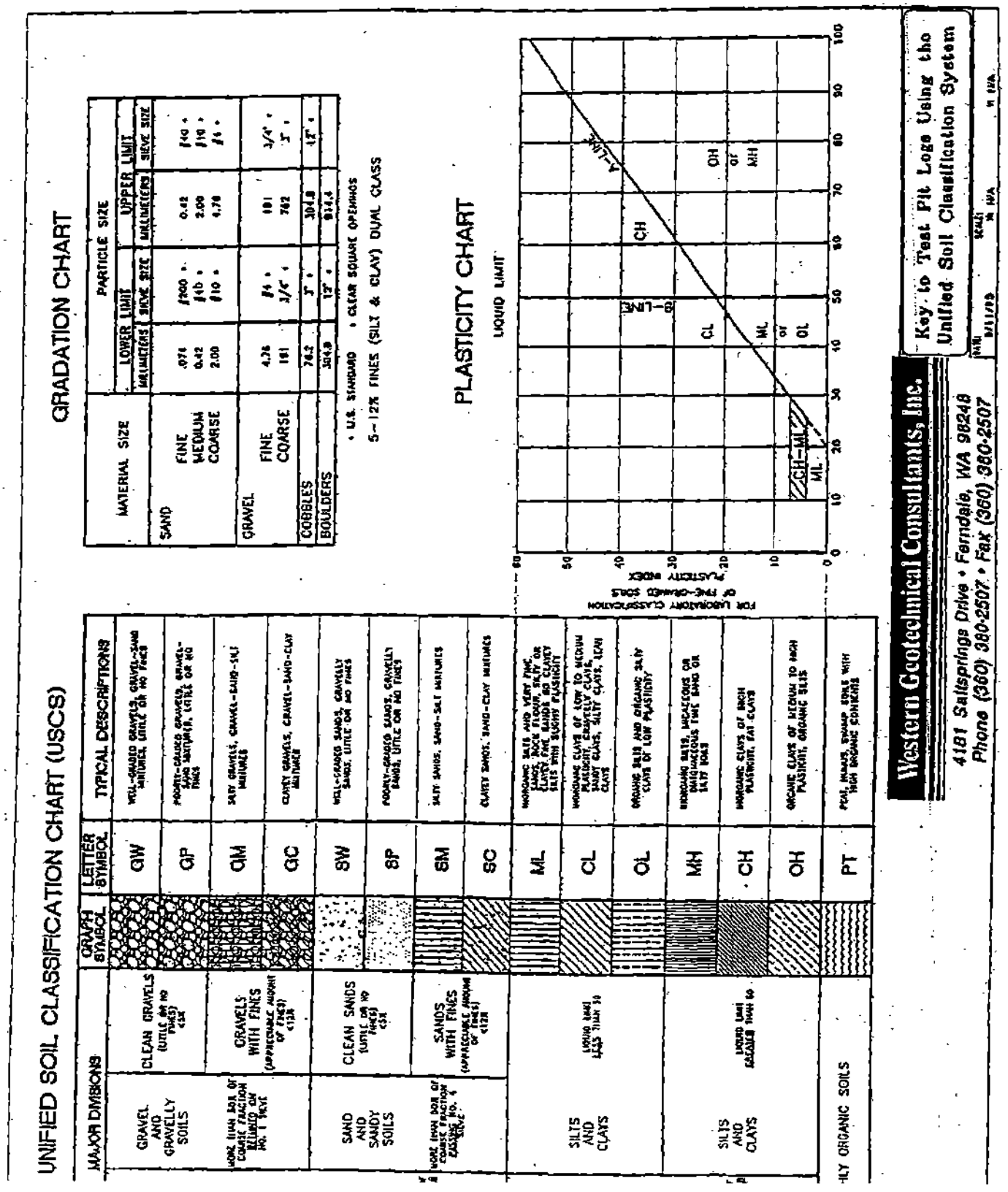
Appendix: Site Plan and 2003 Test Pit Logs

File: 09 07 1

Figure 1
Site Plan & Test Pit Locations
Dwayne Lane Island Crossing Site
Smokey Point Blvd., Washington



USCS Chart & Key to Test Pit Descriptions



			Log of Test Pits		File: 09 07 1	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Lab Testing
TP-1	0.0-0.8	OL	Dark brown clayey organic SILT with numerous roots and organic material (wet, soft) (topsoil)			
	0.8-5.0	ML	Brown SILT, trace to some clay, trace very fine sand (moist grading wet, relatively compact)			
	5.0-7.3	ML	Brown with gray mottling, very fine sandy SILT (wet to saturated, relatively compact) (seepage at 5-1/2') (caving from 5')	1-1/5.4' 1-2/7.0'	37.7% 34.0%	*GS/C

Notes:

- Test Pit terminated on 01/30/09 at feet.
- No groundwater seepage encountered.
- Piezometer installed full depth.
- Piezometer read on 2/4/09 & the water level was measured at 3.85 feet.
- Test pit backfilled upon completion.

*GS/C: Grain size analyses/hydrometer test and cation exchange capacity tests performed.
*GS: Grain size analyses only performed.

			Log of Test Pits		File: 09 07 1	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Lab Testing
TP-2	0.0-1.0	OL	Dark brown clayey organic SILT with numerous roots and organic material (wet, soft) (topsoil)			
	1.0-5.0	ML	Brown SILT, trace to some clay, trace very fine sand (moist grading wet, relatively compact)			
	5.0-7.5	ML	Brown with gray mottling, very fine sandy SILT (wet to saturated, relatively compact) (seepage at 5.7')	2-1/5.5'	35.8%	*GS/C

Notes:

- Test Pit terminated on 01/30/09 at feet.
- No groundwater seepage encountered.
- Piezometer installed full depth.
- Piezometer read on 2/4/09 & the water level was measured at 4.97 feet.
- Test pit backfilled upon completion.

*GS/C: Grain size analyses/hydrometer test and cation exchange capacity tests performed.
*GS: Grain size analyses only performed.

			Log of Test Pits		File: 09 07 1	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Lab Testing
TP-3	0.0-0.7	OL	Dark brown clayey organic SILT with numerous roots and organic material (wet, soft) (topsoil)	3-1/0.5'	69.7%	
	0.7-5.1	ML	Brown SILT, trace to some clay, trace very fine sand (moist grading wet, relatively compact)			
	5.1-8.0	ML	Brown with gray mottling, very fine sandy SILT (wet to saturated, relatively compact)	3-2/6.5	29.9%	*GS/C

Notes:

- Test Pit terminated on 01/30/09 at feet.
- No groundwater seepage encountered.
- Piezometer installed full depth.
- Piezometer read on 2/4/09 & the water level was measured at 5.20 feet.
- Test pit backfilled upon completion.

*GS/C: Grain size analyses/hydrometer test and cation exchange capacity tests performed.
*GS: Grain size analyses only performed.

			Log of Test Pits		File: 09 07 1	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Lab Testing
TP-4	0.0-0.4	OL	Dark brown clayey organic SILT with numerous roots and organic material (wet, soft) (topsoil)			
	0.4-4.0	ML	Brown fine sandy SILT (wet, relatively compact) (seepage at 3.8')	4-1/2.5	36.8%	*GS/C
	4.0-7.0	ML	Brown with gray mottling, very fine sandy SILT (wet to saturated, relatively compact)	4-2/4.5	36/4%	*GS
	7.0-8.4	SM	Brown silty fine to medium SAND	4-3/7.2	31.7%	

Notes:

- Test Pit terminated on 01/30/09 at feet.
- No groundwater seepage encountered.
- Piezometer installed full depth.
- Piezometer read on 2/4/09 & the water level was measured at 3.90.
- Test pit backfilled upon completion.

*GS/C: Grain size analyses/hydrometer test and cation exchange capacity tests performed.
*GS: Grain size analyses only performed.

			Log of Test Pits		File: 09 07 1	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Lab Testing
TP-5	0.0-0.8	OL	Dark brown clayey organic SILT with numerous roots and organic material (wet, soft) (topsoil)			
	0.8-5.0	ML	Brown with gray mottling, silty very fine SAND (wet to saturated, relatively compact) (seepage at 4')	5-1/1.5'	33.8%	*GS/C
	5.0-8.0	SM	Brown silty fine to medium SAND (wet, relatively compact) (caving from 5')	5-2/5.5'	28.4%	*GS

Notes:*GS

- Test Pit terminated on 01/30/09 at feet.
- Groundwater seepage encountered at 4 feet.
- Piezometer installed full depth.
- Piezometer read on 2/4/09 & the water level was measured at 4.59 feet.
- Test pit backfilled upon completion.

*GS/C: Grain size analyses/hydrometer test and cation exchange capacity tests performed.
*GS: Grain size analyses only performed.