

Geotechnical Engineering Services

Greenbridge Areas 9, 10, 11 and
HomeSight Properties
King County, Washington

for

King County Housing Authority

August 19, 2016



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File No. 1329-003-22

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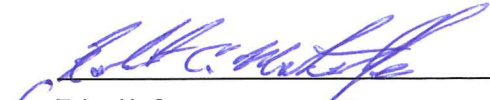
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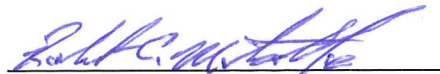
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EXECUTIVE SUMMARY

This report contains the results of our geotechnical engineering services for use in the design of the Greenbridge Areas 9, 10, 11 project and the HomeSight Properties projects in King County, Washington. The projects consist of developing four different areas totaling approximately 20 acres, and each site is separated from one another by residential streets. The sites are currently undeveloped. The sites are shown relative to surrounding physical features on the Vicinity Map, Figure 1 and the Site Plan, Figure 2. The sites will be developed for future construction of townhouses that are expected to be constructed at grade with concrete slab-on-grade construction. Redevelopment also includes construction of new residential streets along with associated underground utilities, sidewalks and hardscape.

This executive summary is presented for introductory purposes only and the complete recommendations presented in this report must be used for project design.

Subsurface Conditions

The subsurface conditions were evaluated by excavating 16 test pits and by reviewing previous explorations pertinent to each site. Based on our explorations, the near-surface soils vary based on location and generally consist of:

■ Greenbridge 9, 10, and 11

The Greenbridge 9, 10, and 11 areas typically have 3 to 8 feet of fill placed across the surface, but the fill is up to 10 feet thick in areas. The fill is underlain by medium dense to very dense weathered and relatively unweathered glacial till. The fill located north of SW 100th Street and placed during the Greenbridge redevelopment project was placed, compacted and tested under GeoEngineers observation and compacted in lifts to at least 90 percent of the maximum dry density (MDD). Prior to placement of the engineered fill north of SW 100th Street, observed organic material and topsoil was removed from the existing ground surface. Placement and compaction of the fill located south of SW 100th Street is not documented and was likely placed prior to original building construction.

■ HomeSight Properties

The HomeSight properties have areas of fill typically 3 feet thick, which is underlain by medium dense to very dense weathered and relatively unweathered glacial till.

Seismic Design

In accordance with the 2012 International Building Code (IBC), the site is classified as Site Class C.

Liquefaction

No groundwater seepage was encountered in any of the test pits and due to the dense to very dense characteristics of the native glacial deposits, they do not have potential for liquefaction during a design earthquake event.

Existing Fill

Existing fill soils north of SW 100th Street are generally in a suitable condition for planned construction and support of residential structures provided the upper two feet below planned foundations and buildings are

compacted to at least 95 percent of the MDD. The observed fill south of SW 100th Street ranges from 5 to 8 feet deep in the areas near TP-55 and TP-70, and is loose and includes debris, which should be removed from below planned buildings in this area.

Reuse of On-site Materials

The native glacial till, as well as existing fill soils, are expected to be suitable for structural fill during the summer months. On-site soils will be very difficult to use in wet weather construction, but may be used as structural fill in the wet weather months provided it is properly moisture conditioned, used in areas only needing 90 percent relative compaction, and by utilizing good construction practices. However, for wet weather construction (typically October through June) we recommended that the project include provisions for using imported gravel borrow.

Foundation Design

The planned residential buildings can be supported on conventional spread footings bearing on medium dense to very dense native glacial deposits or on structural fill placed over these soils. The footings bearing on structural fill over native glacial deposits may be designed using an allowable soil bearing value of 3,000 pounds per square foot (psf). The allowable bearing value may be increased by one-third for short duration loads such as wind or seismic events.

Lateral foundation loads may be resisted by passive resistance on the sides of the footings and by friction on the base of the footings. For footings supported and surrounded by either dense native soils or compacted structural fill, a coefficient of friction of 0.4 and a passive resistance of 350 pounds per cubic foot (pcf) may be used.

Footing drains should be incorporated in the design of all buildings.

Floor Slabs

Concrete slabs-on-grade should be supported on a 4-inch-thick capillary break layer overlain by a vapor retarder.

Subgrade Walls

Drainage will be required behind below grade walls. For subgrade walls constructed either neat against the dense native soils, or backfilled with compacted structural fill we recommend the following equivalent fluid weights:

- Allowable passive – 350 pcf
- Active – 35 pcf
- At rest – 55 pcf

New Residential Pavements

New hot-mix asphalt (HMA) pavement sections for the residential streets should consist of at least 2 inches HMA over 4 inches of base course in the subaccess streets and 4 inches HMA over 6 inches of base course in the subcollector streets, per King County typical pavement sections. The base course may be substituted with 4 inches of asphalt-treated base (ATB) for these roadways.

INTRODUCTION

This report presents the results of our geotechnical engineering services for use in design of the proposed Greenbridge Areas 9, 10, 11 and HomeSight Properties projects, located south of the Seattle city limits, in King County, Washington. The project sites encompass a total area of approximately 20 acres. The sites are shown relative to surrounding physical features on the Vicinity Map, Figure 1 and the Site Plan, Figure 2.

Project Understanding

We understand that the Greenbridge 9, 10, 11 and HomeSight Properties will be developed for future construction of townhouses that are expected to be constructed at grade with concrete slab-on-grade construction. Redevelopment also includes construction of new residential streets along with associated underground utilities, sidewalks and hardscape. The general layout of the proposed construction for Greenbridge Areas 9, 10 and 11 is shown on Figure 3.

Scope of Services

The purpose of our services is to evaluate subsurface soil and groundwater conditions as a basis for developing design criteria for geotechnical aspects of the proposed Greenbridge 9, 10, 11 and HomeSight Properties redevelopment projects. Field explorations and laboratory testing were performed to identify and evaluate subsurface conditions across the sites in order to develop engineering recommendations for use in design of the projects. Engineering assessment and design focused on foundation and floor slab support, and earthwork considerations. Our specific scope of services is outlined in our contract agreements with the King County Housing Authority dated April 11, 2016.

FIELD EXPLORATION AND LABORATORY TESTING

Field Exploration

Subsurface conditions were evaluated as part of the Greenbridge 9, 10, 11, and HomeSight Properties by a field exploration program that consisted of excavating 16 test pits to depths from 5 to 12 feet. The test pits were excavated using a rubber-tired backhoe at the approximate locations shown on Figures 2 and 3.

Locations of the explorations were determined in the field by pacing to existing site features such as sidewalks, roads and fences, and using a hand-held global positioning system (GPS) unit. Vertical elevations of the explorations were later interpolated from a site topographic map produced by Goldsmith Land Development Services. Appendix A includes logs of the explorations and details of the subsurface explorations performed.

Laboratory Testing

Soil samples obtained from the explorations were transported to GeoEngineers, Inc.'s (GeoEngineers) laboratory in Redmond, Washington and examined to confirm or modify field classifications, as well as to evaluate engineering properties of the soil. Representative samples were selected for laboratory testing consisting of moisture content, sieve analyses, and laboratory compacting tests. Appendix B includes a brief discussion of the laboratory tests and test results.

Previous Studies

In addition to the explorations completed as part of this study, the logs of explorations completed as part of previous studies in the project area were reviewed. These studies include:

- GeoEngineers previous borings (B-3 through B-5), which were completed as part of the Preliminary Engineering Geologic and Geotechnical Engineering Services for the project in support of the Environmental Impact Statement, report dated January 26, 2004; and
- GeoEngineers previous borings (B-30) and test pits (TP-50 through TP-55), which were completed as part of the Geotechnical Engineering Services for the Greenbridge Hope VI Redevelopment Project, report dated January 12, 2007.

The logs of these previous explorations are presented in Appendix C. The locations of the explorations are shown on Figures 2 and 3.

SITE CONDITIONS

For discussion purposes, the site surface and subsurface conditions have been divided into four general areas that include: (1) Greenbridge 9, 10, 11 North—area located north of SW 100th Street, (2) Greenbridge 9, 10, 11 South—area located south of SW 100th Street, (3) HomeSight East—property located along SW 102nd Street, and (4) HomeSight West—property located along 8th Avenue SW, as shown on Figures 2 and 3.

Surface Conditions

The overall Greenbridge site is characterized by two north-south trending ridges and a central valley running north-south between approximately 7th Avenue SW and 8th Avenue SW. The western ridge is centered about 9th Place SW and has a maximum elevation of approximately 447 feet. The eastern ridge is centered about 6th Place SW and has a maximum elevation of about 441 feet. Greenbridge 9, 10, 11 and HomeSight East areas are located on the eastern ridge, while HomeSight West is located on the western ridge.

Greenbridge 9, 10, 11 - North and South

The Greenbridge 9, 10, 11 North area has a maximum elevation near the northwest corner of the site at approximately 430 feet and slopes down to the southwest to an elevation of approximately 395 feet. Greenbridge 9, 10, 11 South area has a maximum elevation near the southeast corner of the site at approximately 420 feet and generally slopes down to the north to an elevation of approximately 400 feet.

The north and south areas are undeveloped with vegetation covering a majority of the surface. Vegetation generally consists of grass with scattered brush, and large deciduous and conifer trees.

HomeSight Properties - East and West

The ground surface at the HomeSight East property is generally flat. The ground surface at the HomeSight West property has a maximum elevation along the west edge of the site at approximately 424 feet and the surface slopes down to 8th Avenue SW at an approximate elevation of 408 feet.

Both properties are undeveloped with vegetation covering a majority of each site. Vegetation generally consists of grass with scattered brush and large deciduous and conifer trees.

Subsurface Conditions

Greenbridge 9, 10, 11 North

Three general soil units were encountered in the explorations: topsoil, fill and glacial till. This area has fill up to 10 feet deep, although typically 3 to 8 feet thick, which is underlain by medium dense to very dense glacial till. In general, the soils encountered consisted of the following.

- **Sod/Topsoil.** Three to 8 inches of sod and topsoil were encountered in the explorations. The average sod/topsoil depth in all the explorations was about 5 inches.
- **Fill.** Fill soils were observed in most of the explorations. The fill is up to 10 feet thick in TP-58, but typically ranges from 3 to 8 feet thick across the north area with fill thickness increasing to the north. The fill generally consists of loose (undocumented fill) to dense (engineered fill) silty fine to medium sand with gravel. The fill is typically reworked glacial till soils that were derived from cuts made during previous grading at the site. The fill located north of SW 100th Street and placed during the Greenbridge redevelopment project was placed, compacted and tested under GeoEngineers observation and compacted in lifts to at least 90 percent of the maximum dry density (MDD). Prior to placement of the engineered fill north of SW 100th Street, observed organic material and topsoil was removed from the existing ground surface. Placement and compaction of the fill located south of SW 100th Street is not documented and was likely placed prior to original building construction.
- **Weathered Glacial Till.** Weathered glacial till was encountered below the fill in test pits TP-58, TP-60 and TP-62. The weathered till horizon generally ranged from 1 to 3 feet thick and consists of loose to medium dense silty sand and sandy silt with varying amounts of gravel and cobbles.
- **Unweathered Glacial Till.** Relatively unweathered glacial till was observed below the weathered till or below the fill in most of the explorations. The unweathered glacial till generally consists of dense to very dense silty fine to medium sand with varying amounts of gravel and occasional cobbles. The unweathered glacial till was generally encountered about 3 to 6 feet below the ground surface with the northern portion not encountering the unweathered glacial till until about 10 to 12 feet below ground surface. While not frequently observed in our explorations, glacial till is known to contain occasional boulders.
- **Groundwater.** No seepage was observed in any of the test pits. We anticipate that perched groundwater may exist over the denser native till deposits in areas in response to seasonal changes in precipitation. The dense till is relatively impermeable and water that infiltrates through the ground surface will likely become perched on the till and flow down gradient over the till surface.

Greenbridge 9, 10, 11 South

Four general soil units were encountered in the explorations: topsoil, fill, glacial till, and advance outwash. This area has fill up to 8 feet deep, although typically 1 to 5 feet thick, which is underlain by medium dense to very dense glacial till. In general, the soils encountered consisted of the following.

- **Sod/Topsoil.** Up to 18 inches of sod and topsoil were encountered in the explorations. The average sod/topsoil depth in all the explorations was about 6 inches.
- **Fill.** Fill soils were observed in TP-70, TP-55, and B-4. The fill is up to 8 feet thick in TP-55, but typically ranges from 1 to 5 feet thick across this area with fill thickness varying across the site. The fill generally

consists of loose to medium dense silty fine to medium sand with gravel. The fill generally consisted of reworked glacial till soils that were likely derived from cuts made during previous grading at the site.

- **Unweathered Glacial Till.** Relatively unweathered glacial till was encountered below the fill in test pit TP-70. The unweathered till horizon was 2 feet thick in TP-70 and consists of dense to very dense silty sand with varying amounts of gravel.
- **Weathered Advance Outwash.** Weathered advance outwash was encountered below the fill in test pits TP-53 and TP-54. The weathered advance outwash horizon generally ranged from 1 to 3 feet thick and consists of medium dense to dense silty sand with varying amounts of gravel and cobbles.
- **Unweathered Advance Outwash.** Unweathered advance outwash was encountered below the weathered advance outwash in test pits TP-53 and TP-54, and below the unweathered glacial till in TP-70. The unweathered advance outwash horizon extended to depth of excavation in TP-53, TP-54, and TP-70 and consists of dense fine to medium sand with varying amounts of silt and occasional gravel and cobbles.
- **Groundwater.** No seepage was observed in any of the test pits. We anticipate that perched groundwater may exist over the denser native till deposits in areas in response to seasonal changes in precipitation. The dense till is relatively impermeable and water that infiltrates through the ground surface will likely become perched on the till and flow down gradient over the till surface.

HomeSight East Property

Three general soil units were encountered in the explorations: topsoil, fill and glacial till. This area has fill generally 3 feet thick, which is underlain by medium dense to very dense glacial till. In general, the soils encountered consisted of the following.

- **Sod/Topsoil.** Eight to 10 inches of sod and topsoil were encountered in the TP-71 and TP-72.
- **Fill.** Fill soils were observed in both of the explorations. The fill is about 3 feet thick across this area. The fill generally consists of medium dense silty fine to medium sand with gravel.
- **Weathered Glacial Till.** Weathered glacial till was encountered below the fill in TP-72. The weathered till horizon was approximately 1 foot thick and consists of dense silty fine to medium sand with varying amounts of gravel and cobbles.
- **Unweathered Glacial Till.** Relatively unweathered glacial till was observed below the weathered till and fill in TP-71 and TP-72. The unweathered glacial till generally consists of dense to very dense silty fine to medium sand with varying amounts of gravel and occasional cobbles. The unweathered glacial till was generally encountered about 3 to 5 feet below the ground surface. While not frequently observed in our explorations, glacial till is known to contain occasional boulders.
- **Groundwater.** No seepage was observed in any of the test pits. We anticipate that perched groundwater may exist over the denser native till deposits in areas in response to seasonal changes in precipitation. The dense till is relatively impermeable and water that infiltrates through the ground surface will likely become perched on the till and flow down gradient over the till surface.

HomeSight West Property

Three general soil units were encountered in TP-73: topsoil, fill and glacial till. Based on TP-73, this area has approximately 3.5 feet of fill, which is underlain dense to very dense glacial till. In general, the soils encountered consisted of the following.

- **Sod/Topsoil.** Seven inches of sod and topsoil were observed.
- **Fill.** The fill is up to 3.5 feet thick and generally consists of loose to medium dense silty fine to coarse gravel with sand.
- **Weathered Glacial Till.** Weathered glacial till was observed below the fill. The weathered till horizon was approximately 2 feet thick and consists of medium dense to very dense silty fine to medium sand with varying amounts of gravel and cobbles.
- **Glacial Till.** Relatively unweathered glacial till was observed below the weathered till. The unweathered glacial till consists of dense to very dense silty fine to medium sand with varying amounts of gravel and occasional cobbles. The unweathered glacial till was encountered about 5.5 feet below the ground surface. While not frequently observed in our explorations, glacial till is known to contain occasional boulders.
- **Groundwater.** No seepage was observed in the test pit. We anticipate that perched groundwater may exist over the denser native till deposits in areas in response to seasonal changes in precipitation. The dense till is relatively impermeable and water that infiltrates through the ground surface and looser fill soils will likely become perched on the till and flow down gradient over the till surface.

CONCLUSIONS AND RECOMMENDATIONS

Earthquake Engineering

GeoEngineers has evaluated the site for seismic hazards including liquefaction, lateral spreading and fault rupture. Our evaluation indicates that the site has a low risk of liquefaction, lateral spreading, and fault rupture.

Liquefaction

Liquefaction is a phenomenon where strong vibration or ground shaking, usually from earthquakes, results in development of excess pore pressures in loose, saturated soils and subsequent loss of strength in the soil deposits so affected.

Ground settlement, lateral spreading and/or sand boils may result from soil liquefaction. Structures supported on liquefied soils could suffer foundation settlement or lateral movement that could be severely damaging to the structures.

Conditions favorable for liquefaction occur in loose to medium dense, clean to moderately silty sand that is below the groundwater level. Based on our evaluation of the subsurface conditions encountered in the explorations completed at the site, it is our opinion that potentially liquefiable soils are not present below the site.

Lateral Spreading

Lateral spreading is associated with liquefaction and involves lateral displacements of large volumes of liquefied soil. It can occur on near-level ground as blocks of surface soils displace relative to adjacent blocks. In our opinion, lateral spreading at the site is unlikely because potentially liquefiable soils are not present as discussed above.

Fault Rupture

The northern edge of the Greenbridge 9, 10, 11 North area is located along the south fault splay of the Seattle Fault zone. The Seattle Fault zone is a 2- to 4-mile-wide, east-west trending zone consisting of at least three fault splays. The Seattle fault is a south-dipping reverse thrust fault and is believed to have last ruptured about 1,100 years ago. This most recent event caused broad uplift and subsidence on both sides of the fault. The rate of occurrence of large earthquakes on the Seattle Fault is thought to be on the order of thousands of years. The most recent fault event is believed to have been a magnitude 7 or greater.

Based on mapping we reviewed for this evaluation, the likelihood of fault rupture in the bedrock below the site is moderate. Because the project site is located just south of the Seattle Fault Zone, which is interpreted to have a recurrence interval on the order of 1,000 years, the potential for surface fault rupture at the project site is considered low.

2015 International Building Code Seismic Design Information

For each site, we recommend the International Building Code (IBC) 2015 parameters for Average Field Standard Penetration Resistance, Site Class, short period spectral response acceleration (S_s), 1-second period spectral response acceleration (S_1), and Seismic Coefficients F_A and F_V presented in Table 1.

TABLE 1. 2015 IBC PARAMETERS FOR WEST AND SOUTHEAST AREAS

2012 IBC Parameter	Recommended Value
Site Class	C
Short Period Spectral Response Acceleration, S_s (percent g)	155
1-Second Period Spectral Response Acceleration, S_1 (percent g)	59
Seismic Coefficient, F_A	1.0
Seismic Coefficient, F_V	1.3

Earthwork

Excavation Considerations

Fill and glacial till were observed in the explorations. We anticipate that these soils may be excavated with conventional heavy duty excavation equipment, such as large excavators and dozers. The very dense glacial till may be very difficult to excavate, depending upon the depth of cuts planned, and large excavators and/or dozers equipped with rippers may be needed. Although cobbles and boulders were only occasionally encountered in our explorations, it is our experience that they are commonly encountered in these soil deposits and the contractor should be prepared to deal with them. We recommend that procedures be identified in the project specifications for measurement and payment of work associated with removal of cobbles and boulders.

We anticipate shallow groundwater seepage may enter excavations depending on the time of year construction takes place, especially in the winter months. However, we expect that this seepage water can be handled by digging interceptor trenches in the excavations and pumping from sumps. Seepage water not intercepted and removed from the excavations will make it difficult to place and compact structural fill and may destabilize cut slopes.

Stripping, Clearing and Grubbing

Areas to be graded should be cleared of surface and subsurface deleterious matter including any debris, trees and associated stumps and roots. Graded areas should be stripped of organic laden soils. Based on our explorations and site observations, we estimate that on average stripping depths on the order of 3 to 6 inches (Greenbridge 9, 10, 11 North), 5 to 8 inches (Greenbridge 9, 10, 11 South), 8 to 10 inches (HomeSight East) and about 7 inches (HomeSight West) will be necessary to remove the root zone and surficial soils containing organics in most areas. Deeper excavation may be needed to remove root balls associated with large trees, and local areas having thicker topsoil horizons. Soft soils may exist around the site in localized depressions. If encountered, soft soils should be removed from building areas and organic laden soils associated with fill should be removed from the site or used in landscape areas.

The organic soil strippings can be stockpiled and used later for landscaping purposes or may be spread over disturbed areas following completion of excavation and grading. If spread out, the organic strippings should be in a layer less than 1 foot thick, should not be placed on slopes greater than 3H:1V (horizontal to vertical) and should be track-rolled to a uniformly compacted condition. Materials that cannot be used for landscaping or protection of disturbed areas should be removed from the project site and wasted.

Abandoning Utilities

The following recommendations apply to abandoning utility pipes at each site during mass grading and infrastructure construction:

- All utility pipes greater than or equal to 12 inches diameter and located below building areas may be left in place provided that they are fully grouted and the backfill above the pipe is removed and replaced with structural fill.
- Utility structures should be removed and associated pipes capped to prevent the movement of groundwater.
- All utilities less than 12 inches in diameter and located beneath building areas may be left in place provided the ends are plugged and backfill above the pipes are removed and replaced with structure fill.
- Water mains that remain should be capped at intervals similar to the sanitary sewer and storm systems to prevent the movement of groundwater.
- Utility pipes encountered outside of building areas should be plugged, capped, or removed to prevent movement of groundwater.

The following recommendations apply to utility pipe issues arising during building construction:

- Utility pipes or unsuitable trench backfill encountered during excavation and subgrade preparation for foundations or slabs should be removed or recompacted to a depth of at least 3 feet below the bottom of the footing or slab, and to a distance of at least 3 feet beyond the edges of the foundation. The excavation should be backfilled with structural fill compacted to at least 95 percent MDD. Abandoned utility lines under proposed buildings should be identified during construction and evaluated.

Removal of Unsuitable Fill Soils

Under future structures, we recommend that all existing unsuitable fill be removed to expose medium dense to very dense glacial soils and that these areas be replaced with properly compacted structural fill. Based on our observations, unsuitable fill exists in the southern portion of Greenbridge 9, 10, 11 South, as described in TP-55 and TP-70. The unsuitable fill appears to be 5 to 8 feet deep, is loose, and contains debris and wood.

The fill may be reused as structural fill if the debris is removed, and if the soil can be properly moisture conditioned to within 2 percent of the optimum moisture content and compacted. Existing fill containing significant debris or rubble, should not be used as structural fill and may need to be removed from the site.

Subgrade Preparation

Prior to placing new fills, pavement base course materials or gravel below slabs-on-grade, all subgrade areas should be proofrolled or probed by hand to locate any soft or pumping soils. Proofrolling can be completed using a piece of heavy tire-mounted equipment or a loaded dump truck. If soft or pumping soils are observed, such unsuitable subgrade soils should be overexcavated and replaced with compacted structural fill.

If deep pockets of soft or pumping soils are encountered, it may be possible to limit the depth of overexcavation by placing a non-woven geotextile separator, such as TC Mirafi 500X (or similar geotextile), on the overexcavated subgrade and covering the geotextile with structural fill. The geotextile will provide additional support by bridging over the soft material. A geotextile separator may also be used in the southern portion of Greenbridge 9, 10, 11 (south of SW 100th Street) to limit overexcavation below planned roadways where unsuitable fill soils exist. The actual areas where the geotextile should be placed may be determined during construction when subgrade preparation is being performed, and during the proof-roll to locate unsuitable or soft soils.

After completing the proofrolling, the subgrade areas should be compacted to a firm and unyielding condition, if possible. We recommend that all subgrade areas be compacted to at least 95 percent of the MDD in accordance with the ASTM International (ASTM) D 1557 test procedure.

A representative of GeoEngineers should observe the subgrade preparation operations to help determine the depth of removal of existing fill, soft or pumping soils, and to evaluate if subgrade disturbance or progressive deterioration is occurring. Subgrade disturbance or deterioration could occur if the subgrade becomes wet. If the subgrade deteriorates due to saturation and disturbance from wheeled equipment, the soil will need to be moisture conditioned and recompacted or replaced with imported structural fill prior to placement of base course materials for pavement areas or concrete for the slabs and footings.

Erosion and Sedimentation Control

In our opinion, the erosion potential of the on-site soils is low to moderate. Construction activities including stripping and grading will expose soils to the erosional effects of wind and water. The amount and potential impacts of erosion are partly related to the time of year that construction actually occurs. Wet weather construction will increase the amount and extent of erosion and potential sedimentation.

Potential sources or causes of erosion and sedimentation depend upon construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing and weather. Implementing an erosion and sedimentation control plan will reduce the project impact on erosion-prone areas. The erosion and sedimentation control measures should be designed, installed and maintained in accordance with the requirements of King County. The plan should incorporate basic planning principles including:

- scheduling grading and construction to reduce soil exposure;
- revegetating or mulching denuded areas;
- directing runoff away from denuded areas;
- reducing the length and steepness of slopes with exposed soils;
- decreasing runoff velocities;
- preparing drainage ways and outlets to handle concentrated or increased runoff;
- confining sediment to the project site; and
- inspecting and maintaining control measures frequently.

In addition, we recommend that all disturbed areas be finish graded and seeded as soon as practicable to reduce the risk of erosion. Some sloughing and raveling of slopes with exposed or disturbed soil should be expected. Temporary erosion protection should be used and maintained in areas with exposed or disturbed soils to help reduce erosion and reduce transport of sediment to adjacent areas and receiving waters. Erosion and sedimentation control measures may be implemented by using a combination of interceptor swales, straw bale barriers, silt fences and straw mulch for temporary erosion protection of exposed soils.

Permanent erosion protection should be provided by paving or landscape planting. Until the permanent erosion protection is established and the site is stabilized, site monitoring should be performed by qualified personnel to evaluate the effectiveness of the erosion control measures and to repair and/or modify them as appropriate. Provisions for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

Benching

Where new fill is placed on existing slopes, the new fill should be keyed into the existing slopes as described in Section 2-03.3(14) of the 2016 Washington State Department of Transportation (WSDOT) Standard Specifications for embankment construction, except as noted herein. The benches should be keyed into the slopes and into denser native soils. We recommend that the benches be at least 5 feet wide into the slope, with the vertical height between benches limited to no more than 3 feet. The horizontal portion of each bench should be sloped such that surface water runoff is directed downslope. All existing unsuitable fill and loose soils should be removed from areas to receive fill. If existing fill soils are not removed from

the slopes or entirely from beneath new fills, the performance of the slope and overlying improvements may be jeopardized.

Temporary Slopes

We recommend using temporary cut slopes no steeper than 1½H:1V in the existing fill and weathered till. Temporary cut slopes should be no steeper than 1H:1V in the dense to very dense till. Localized areas of seepage may exist along less permeable lenses or layers within the glacial soils. We also anticipate shallow perched groundwater conditions will exist during the winter and spring months. Cut slope inclinations may need to be modified by the contractor if localized sloughing occurs. For open cuts at the site we recommend that:

- no traffic, construction equipment, stockpiles or building supplies be allowed at the top of the slopes within a distance of at least 5 feet or ½ the height of the cut (whichever is greater), from the top of the cut;
- exposed soil along the slope should be protected from surface erosion using waterproof tarps or plastic sheeting;
- construction activities be scheduled so that the length of time the temporary cut is left open is minimized;
- erosion control measures be implemented as appropriate such that runoff from the site is reduced.
- surface water is diverted away from the excavation; and
- the general condition of the slopes be observed periodically by a geotechnical engineer to identify potential problems.

Since the contractor has control of the construction operations, the contractor should be made responsible for the stability of cut slopes, as well as the safety of the excavations. Shoring and temporary slopes must conform to applicable local, state and federal safety regulations.

Permanent Slopes

Permanent cut and fill slopes should be inclined no steeper than 2H:1V. We recommend that all fill placed to construct permanent slopes be placed and compacted as structural fill. The fill should be compacted at the slope face, or the fill embankment should be overbuilt and cut back. Permanent slopes should be planted or hydroseeded as soon as practicable after grading. Temporary erosion control measures may be necessary until permanent vegetation is established.

Structural Fill

Materials

Materials used to construct building pads, embankments, roads, surface parking areas and used as wall backfill and utility trench backfill are classified as structural fill for the purpose of this report. Structural fill material quality varies depending upon its use as described below:

1. Structural fill placed to construct embankment and parking areas, to backfill utility trenches and below-grade walls, and to support floor slabs and foundations may consist of on-site glacial till, or suitable fill soils provided that the soils are moisture conditioned to within 2 percent of the optimum moisture

content for the required compaction. During dry weather, imported soil should meet the criteria for select borrow as described in Section 9-03.14(2) of the 2016 WSDOT Standard Specifications. On-site soils and imported select borrow will be suitable for use as structural fill during dry weather conditions only. If structural fill is placed during wet weather or the wet season (typically October through June), the structural fill should consist of imported gravel borrow as described in Section 9-03.14(1) of the 2016 WSDOT Standard Specifications, with the additional restriction that the fines content be limited to no more than 5 percent. It may be possible to use on-site soils during wet weather for areas requiring 90 percent compaction provided the earthwork contractor implements good wet weather techniques and the soil is properly moisture conditioned. However, for planning purposes we recommend that gravel borrow be used throughout the project for wet weather construction.

2. Structural fill placed immediately outside below-grade walls (drainage zone) should consist of washed $\frac{3}{8}$ inch to No. 8 pea gravel or conform to Section 9-03.12(4) of the 2016 WSDOT Standard Specifications, as shown on Figure 5.
3. Structural fill placed as crushed surfacing base course below pavements should conform to Section 9-03.9(3) of the 2016 WSDOT Standard Specifications.
4. Structural fill placed as capillary break below slabs should consist of 1-inch minus clean crushed gravel with negligible sand or silt in conformance with Section 9-03.1(4)C, Grading No. 77 of the 2016 WSDOT Standard Specifications.

Reuse of On-site Native Soils

The dense to very dense glacial till deposits are expected to be suitable for structural fill in areas requiring compaction to at least 95 percent of MDD (per ASTM D 1557), provided the work is accomplished during the normally dry season (June through September) and that the soil can be properly moisture conditioned to within 2 percent of the optimum moisture content. It may be necessary to import gravel borrow to achieve adequate compaction for support of pavement areas, floor slabs and structures during wet weather construction. For planning purposes the project should include importing all structural fill for wet weather construction where compaction to at least 90 percent of MDD is required. The use of existing on-site glacial soils as structural fill during wet weather should be planned only for areas requiring compaction to 90 percent of MDD, as long as the soils are properly protected and not placed during periods of precipitation. The contractor should plan to cover all fill stockpiles with plastic sheeting if it will be used as structural fill. The reuse of on-site soils is highly dependent on the skill of the contractor, schedule, and the weather, and we will work with the design team to maximize the reuse of on-site soils during the wet and dry seasons.

Reuse of Existing Fill

Fill soil exists across the site during previous grading activities. Fill soil was observed on the Greenbridge 9, 10 11 site and HomeSight properties. Suitable fill can be reused on site where 95 percent compaction is required if careful construction practices are employed and the fill is properly moisture conditioned to achieve compaction. As with the native till soils, fill soils should be only considered for dry weather construction or during wet weather if protected, properly moisture conditioned and in areas only needing 90 percent compaction. Unsuitable fill or fill with significant organic materials or debris such as on the south portion of Greenbridge 9, 10, 11 South (vicinity of TP-55) should be exported from the site or used in non-structural areas, especially if the debris cannot be removed from the fill. The existing fill soils are typically over their optimum moisture content and drying of the soils will be needed in order to reuse the soils as structural fill.

Reuse of Existing Asphalt, Base and Concrete Rubble

Existing asphalt pavement and portland cement concrete (PCC) rubble may be reused as structural fill if properly crushed during demolition. Recycled PCC rubble and base course materials may be reused as structural fill in confined areas such as under roadways and building footprints. Recycled concrete should not be placed in detention pond areas or in landscape areas. Recycled asphalt may be used under new pavement and hardscape areas and in utility trenches under paved areas. For use as structural fill, the asphalt and concrete rubble should be crushed or otherwise ground up and should meet the gradation requirements for gravel borrow as described in Section 9-03.14(1) of the 2016 WSDOT Standard Specifications. If recycled asphalt and/or concrete will be used under pavement areas, we recommend that it meet the gradation requirements for crushed surfacing base course as described in Section 9-03.9(3) of the 2016 WSDOT Standard Specifications.

Fill Placement and Compaction Criteria

Structural fill should be mechanically compacted to a firm, non-yielding condition. Structural fill should be placed in loose lifts not exceeding 12 inches in thickness when using heavy compaction equipment, and 6 inches when using hand operated compaction equipment. The actual thickness will be dependent on the structural fill material used and the type and size of compaction equipment. Each lift should be moisture conditioned to within 2 percent of the optimum moisture content and compacted to the specified density estimated in accordance with ASTM D 1557 before placing subsequent lifts. Structural fill should be compacted to the following criteria:

1. Structural fill placed below floor slabs and building foundations should be compacted to at least 95 percent of the MDD.
2. Structural fill placed behind below grade walls and within 5 feet of the wall should be compacted to between 90 to 92 percent of the MDD. Care should be taken when compacting fill near the face of below grade walls to avoid over-compaction and hence overstressing the walls. Structural fill placed beyond the zone immediately behind the walls should be compacted to at least 95 percent of the MDD.
3. Structural fill in new pavement areas, including utility trench backfill, should be compacted to at least 90 percent of the MDD, except that the upper 2 feet of fill below final subgrade should be compacted to 95 percent of the MDD (see Figure 4). Local utility agencies may require stricter compaction criteria depending on the utility and its location and these requirements shall supersede our recommendations described above.
4. Structural fill placed on slopes steeper than 5H:1V should be compacted to at least 90 percent of the MDD. In areas intended for future development, a higher degree of compaction should be considered to reduce the settlement potential of the fill soils.
5. Structural fill placed as crushed rock base course below pavements should be compacted to 95 percent of the MDD.
6. Non-structural fill, such as fill placed in landscape areas, should be compacted to at least 85 percent of the MDD.

We recommend that GeoEngineers be present during proof-rolling and to evaluate the exposed subgrade soils in building and pavement areas, and placement of structural fill. We will evaluate the adequacy of the subgrade soils and identify areas needing further work, perform in-place moisture density tests in the fill to

verify compliance with the compaction specifications, and advise on any modifications to the procedures which may be appropriate for the prevailing conditions.

Weather Considerations

Disturbance of near surface soils should be expected if earthwork is completed during periods of wet weather. During dry weather the soils will: (1) be less susceptible to disturbance, (2) provide better support for construction equipment, and (3) be more likely to meet the required compaction criteria.

The wet weather season generally begins in October and continues through May in western Washington; however, periods of wet weather may occur during any month of the year. For earthwork activities during wet weather, we recommend that the following steps be taken:

- The ground surface in and around the work area should be sloped so that surface water is directed away from the work area. The ground surface should be graded so that areas of ponded water do not develop. Measures should be taken by the contractor to prevent surface water from collecting in excavations and trenches. Measures should be implemented to remove surface water from the work area.
- Earthwork activities should not take place during periods of heavy precipitation.
- Slopes with exposed soils should be covered with plastic sheeting.
- The contractor should take necessary measures to prevent on-site soils and soils to be used as fill from becoming wet or unstable. These measures may include the use of plastic sheeting, sumps with pumps, and grading. The site soils should not be left uncompacted and exposed to moisture. Sealing the surficial soils by rolling with a smooth-drum roller prior to periods of precipitation will help reduce the extent that these soils become wet or unstable.
- The contractor should cover all soil stockpiles that will be used as structural fill with plastic sheeting.
- Construction traffic should be restricted to specific areas of the site, preferably areas that are surfaced with the existing asphalt or working pad materials not susceptible to wet weather disturbance.
- Construction activities should be scheduled so that the length of time that soils are left exposed to moisture is reduced to the extent practical.

Routing of equipment on the native till and silty fill subgrade soils during the wet weather months will be difficult and the subgrade will likely become highly disturbed and rutted. In addition, a significant amount of mud can be produced by routing equipment directly on the glacial soils in wet weather. Therefore, to protect the subgrade soils and to provide an adequate wet weather working surface for the contractor's equipment and labor, we recommend that the contractor protect exposed subgrade soils with sand and gravel, crushed gravel, or ATB. The contractor should also plan to limit the size of working areas and to protect other area from access where possible to protect exposed subgrade areas.

Utility Trenches

Trench excavation, pipe bedding, and trench backfilling should be completed using the general procedures described in the 2016 WSDOT Standard Specifications or other suitable procedures specified by the project civil engineer. The native glacial deposits and fill soils encountered at the site are generally of low corrosivity based on our experience in the Puget Sound area.

Utility trench backfill should consist of structural fill and should be placed in loose lifts not exceeding 12 inches when using heavy compaction equipment, and 6 inches when using hand operated compaction equipment, such that adequate compaction can be achieved throughout the lift. Each lift must be compacted prior to placing the subsequent lift. Prior to compaction, the backfill should be moisture conditioned to within 2 percent of the optimum moisture content, if necessary. The backfill should be compacted in accordance with the criteria discussed above. Figure 4 illustrates recommended trench compaction criteria under pavement and non-structural areas. We recommend that the lift thickness as well as the compaction criteria be adhered to in order to reduce potential settlement of trench backfill.

Foundation Support

We recommend that proposed new townhomes be supported on shallow foundations such as isolated spread footings and continuous strip footings. The footings should be constructed on undisturbed medium dense to dense native glacial till or on properly compacted structural fill overlying undisturbed medium dense to dense native glacial till.

Foundation Design

Perimeter footings should be at least 16 inches wide and interior column footings should be at least 24 inches wide. The design frost depth for the Puget Sound area is 12 inches, therefore, we recommend that exterior footings for structures be founded at least 18 inches below lowest adjacent grade. Interior footings should be founded at least 12 inches below top of slab or adjacent finished grade. Design of the building foundations should comply with the 2015 IBC.

For all townhouses we recommend that footings bearing on medium dense to very dense native glacial soils or on properly compacted structural fill extending to the medium dense to very dense glacial soils be designed using an allowable bearing capacity of 3,000 pounds per square foot (psf) for the combination of dead and long-term live loads. The upper 2 feet of existing fill below all building foundations should be compacted to at least 95 percent of the MDD. This allowable bearing capacity may be increased by one-third to account for short-term live loads such as induced by wind or seismic forces.

The depth to suitable bearing soil will depend on the depth of the existing topsoil and suitability of existing fill soils.

Lateral Load Resistance

Lateral loads can be resisted by a combination of friction between the footing and the supporting soil, and by the passive lateral resistance of the soil surrounding the embedded portions of the footings. A coefficient of friction between concrete and soil of 0.4 and a passive lateral resistance corresponding to an equivalent fluid density of 350 pounds per cubic foot (pcf) may be used for design. The friction coefficient and passive lateral resistance are allowable values and include a factor of safety of about 1.5.

If soils adjacent to footings are disturbed during construction, the disturbed soils must be recompacted; otherwise the lateral passive resistance value must be reduced.

Foundation Settlement

We estimate that the post construction settlement of footings founded on the medium dense to dense undisturbed native glacial soils or structural fill extending to the medium dense to dense undisturbed native glacial soils, as recommended above, will be less than ½-inch. Differential settlement between comparably loaded column footings or along a 25-foot section of continuous wall footing should be less than ½ inch. We expect most of the footing settlements will occur as loads are applied. Loose or disturbed soils not removed from footing excavations prior to placing concrete will result in additional settlement.

Immediately prior to placing concrete, all debris and loose soils that accumulated in the footing excavations during forming and steel placement must be removed. Debris or loose soils not removed from the footing excavations will result in increased settlement.

Footing Drains

We recommend that perimeter footing drains be installed around each building. The perimeter drains should be installed at the base of the exterior footings. The perimeter drains should be provided with cleanouts and should consist of at least 4-inch-diameter perforated pipe placed on a 3-inch bed of, and surrounded by, 6 inches of drainage material enclosed in a non-woven geotextile fabric such as Mirafi 140N (or approved equivalent) to prevent fine soil from migrating into the drain material. We recommend that the drainpipe consist of either heavy-wall solid pipe (SDR-35 PVC [polyvinyl chloride], or equal) or rigid corrugated smooth interior polyethylene pipe (ADS N-12, or equal). We recommend against using flexible tubing for footing drainpipes. The drainage material should consist of pea gravel or “Gravel Backfill for Drains” per WSDOT Standard Specifications 2016 Section 9-03.12(4), see Figure 5. The perimeter drains should be sloped to drain by gravity, if practicable, to a suitable discharge point, preferably a storm drain. We recommend that the cleanouts be covered, and be placed in flush mounted utility boxes. Water collected in roof downspout lines must not be routed to the footing drain lines.

Underslab Drainage

Groundwater may also accumulate under buildings designed with below grade walls, such as potential conditions at the HomeSight West property. To mitigate this condition, we recommend that the slab buildings with below-grade walls be provided with underdrainage to collect and discharge groundwater from below the slabs. This can be accomplished by installing a 4-inch-diameter, heavy-wall perforated collector pipe in a shallow trench placed below the capillary break layer. The trench should measure about 1 foot wide by 1 foot deep and should be backfilled with pea gravel wrapped in a nonwoven geotextile such as Tencate Mirafi 140N. We recommend installing a single underdrain collector pipe below the long axis of the buildings.

The collector pipe should be sloped to drain and discharge into the storm water collection system to convey the water off site. If connected to the footing drain pipe, the invert of the underslab drain pipe must be at a higher elevation to prevent water from flowing under the buildings from the perimeter system. The pipe should also incorporate cleanouts, if possible. The cleanouts could be extended through the foundation walls to be accessible from the outside, or could be placed in flush mounted access boxes cast into the floor slabs.

Permanent Subsurface Walls

Cast-in-place Walls

Conventional cast-in-place walls may be necessary for retaining structures located on-site. The lateral soil pressures acting on conventional cast-in-place subsurface walls will depend on the nature, density and configuration of the soil behind the wall and the amount of lateral wall movement which can occur as backfill is placed.

For walls that are free to yield at the top at least one-thousandth of the height of the wall, soil pressures will be less than if movement is limited by such factors as wall stiffness or bracing. Assuming that the walls are backfilled and drainage is provided as outlined in the following paragraphs, we recommend that yielding walls supporting horizontal backfill be designed using an equivalent fluid density of 35 pcf (triangular distribution), while non-yielding walls supporting horizontal backfill be designed using an equivalent fluid density of 55 pcf (triangular distribution). For unrestrained walls with backfill sloping up at 2H:1V, the design lateral earth pressure should be increased to 55 pcf, while restrained walls with a 2H:1V sloping backfill should be designed using an equivalent fluid density of 75 pcf. These lateral soil pressures do not include the effects of surcharges such as floor loads, traffic loads or other surface loading. For seismic loading conditions, a rectangular earth pressure equal to $8H$ psf, where H is the height of the wall, should be added to the active/at-rest pressures presented above. Other surcharge loading should be applied as appropriate, as shown in Figure 6. Traffic surcharges should be incorporated by using a rectangular earth pressure of 70 psf. GeoEngineers can assist in developing recommendations for other surcharge loading, as necessary.

Lateral resistance for conventional cast-in-place walls can be provided by frictional resistance along the base of the wall and passive resistance in front of the wall. The allowable frictional resistance may be computed using a coefficient of friction of 0.4 applied to vertical dead-load forces. The allowable passive resistance may be computed using an equivalent fluid density of 350 pcf (triangular distribution). The above coefficient of friction and passive equivalent fluid density values incorporate a factor of safety of about 1.5.

The above soil pressures assume that wall drains will be installed to prevent the buildup of hydrostatic pressure behind the walls, as discussed below.

Drainage

Positive drainage should be provided behind cast-in-place retaining walls by placing a minimum 2-foot wide zone of wall drainage material, as shown on Figure 5. The drainage zone should extend from the base of the wall to within 2 feet of the finished ground surface. As an alternative to placing a 2-foot wide drainage zone against the walls, the design team may consider using a geocomposite wall drainage panel against the wall, and backfilling against the wall using imported WSDOT Gravel borrow having less than 5 percent fines. The top 2 feet of fill should consist of relatively impermeable soil, such as on-site glacial till underlain by a nonwoven geotextile separator (such as TC Mirafi 140N), to prevent infiltration of surface water into the wall drainage zone.

A 4-inch minimum diameter pipe should be located at the base of the wall in the drainage zone to remove water that collects in this zone. The drainpipe should be placed with 0.25 percent minimum slopes and discharge to an appropriate location. Alternatively, drainage can be provided with weepholes designed in accordance with WSDOT Standard Plans.

Construction Considerations

Backfill placed within 5 feet of below grade walls should be compacted to densities ranging from 90 to 92 percent of the MDD obtained in accordance with the ASTM D 1557 procedure to reduce the potential for development of excess pressure on the walls. If sidewalks or pavement will be placed adjacent to the wall, we recommend that the upper 2 feet of fill be compacted to 95 percent of the MDD. Measures should be taken to prevent the buildup of excess lateral soil pressures due to over-compaction of the backfill behind the wall; for example, by using hand-operated compaction equipment.

Slab-on-Grade Floors

Conventional slabs may be supported on-grade providing the subgrade soils and structural fill are prepared as recommended under the “Earthwork” section of this report. We recommend that slabs be founded on either undisturbed native soils or on structural fill placed over the native soils. Structural fill should be at least 2 feet thick and compacted to at least 95 percent of the MDD below building floor slabs. For slabs designed as a beam on an elastic foundation, a modulus of subgrade reaction of 100 pounds per cubic inch (pci) may be used for subgrade soils prepared as recommended.

We recommend that the slab on grade floors be underlain by a capillary break gravel layer consisting of 4 inches of material meeting the requirements of WSDOT Standard Specification 9-03.1(4)C, Grading No. 67 with the exception that this material should have negligible sand or fines (see Figure 5).

If water vapor migration through the slabs is objectionable, an appropriate vapor barrier, such as 10-mil plastic sheeting, should be placed between the floor slab and the capillary break to reduce the upward migration of moisture through the slab. This will be desirable where the slabs will be surfaced with tile or will be carpeted. It may also be prudent to apply a sealer to the slab to further retard the migration of moisture through the floor.

Pavement Recommendations

Subgrade Preparation

We recommend that the subgrade soils in new residential pavement areas be prepared and evaluated as described in the “Earthwork” section of this report. In cut areas in medium dense to dense native soils, we recommend that the upper 12 inches of the existing site soils be compacted to at least 95 percent of the MDD per ASTM D 1557 prior to placing pavement section materials. If the subgrade soils are loose or soft, it may be necessary to excavate the soils and replace them with structural fill, gravel borrow, or gravel base material. Based on our explorations, the majority of the pavement subgrade soils is expected to consist of medium dense to dense glacial till or structural fill overlying these native soils for Greenbridge 9, 10, 11 North. For the southern portion of Greenbridge 9, 10, 11 South unsuitable fill exists and we recommend that the upper 2 feet below the pavement sections be removed, the exposed subgrade compacted to 95 percent of the MDD, and then structural fill placed to pavement subgrade. Pavement subgrade conditions should be observed and proof-rolled during construction to evaluate the presence of unsuitable subgrade soils and the need for over-excavation and placement of a geotextile fabric. In other areas, we recommended that the upper 24 inches of the subgrade soils be compacted to at least 95 percent of the MDD per ASTM D 1557. This may be accomplished by removing the upper 1 foot and compacting the exposed surface to at least 95 percent of the MDD, then replace the upper 12 inches with structural fill.

Pavement Design Criteria

Pavement design analyses were completed as part of our previous services for the Greenbridge site as summarized in our January 12, 2007 report. As summarized in that report, we recommend that the hot-mix asphalt (HMA) pavement sections presented in Table 2 be used for the project.

TABLE 2. RECOMMENDED NEW HMA PAVEMENT SECTIONS

Material	8th Avenue SW Section Thickness (inches)	Neighborhood Subcollector Section Thickness (inches)	Neighborhood Subaccess Section Thickness (inches)	WSDOT¹ Standard Specifications
½-inch HMA; PG 58-22	3	2.5	2	5-04 and 9-03
Asphalt-Treated Base	3.5	-	-	4-06
Crushed Surfacing Base Course	6	6	4	9-03.9(3)

Notes:

¹WSDOT = Washington State Department of Transportation, 2016, Standard Specifications for Road, Bridge and Municipal Construction.

The crushed surfacing base course should be compacted to at least 95 percent of the MDD prior to the placement of the HMA. We recommend that a proof-roll of the compacted base course be observed by a representative from our firm prior to paving. Soft or yielding areas observed during proof-rolling may require over-excavation and replacement with compacted structural fill.

Asphalt-Treated Base

Because pavements may be constructed during the wet seasons, consideration may be given to covering the areas to be paved with asphalt-treated base (ATB) for protection. Subaccess pavement areas and neighborhood subcollector pavement areas should be surfaced with at least 4 inches of ATB. Prior to placement of the final pavement sections, we recommend that areas of ATB pavement failure be removed and the subgrade repaired. If ATB is used and is serviceable when final pavements are constructed, the crushed surfacing base course can be eliminated, and the design HMA pavement thickness can be placed directly over the ATB.

Permanent Drainage Considerations

We recommend that all surfaces be sloped to drain away from the proposed building areas. Pavement surfaces and open space areas should be sloped such that the surface water is collected and routed to suitable discharge points.

Roof drains should be connected to tightlines that discharge appropriately. Water collected in roof downspout lines should be routed to appropriate discharge points in separate pipe systems. Roof downspout lines must not be connected to the footing drain system.

Recommended Additional Geotechnical Services

Throughout this report, recommendations are provided where we consider additional geotechnical services to be appropriate. These additional services are summarized below:

- GeoEngineers should be retained to review the project plans and specifications when complete to confirm that our design recommendations have been implemented as intended.
- During construction, GeoEngineers should evaluate the suitability of the foundation, pavement and slab subgrades, observe installation of detention systems and subsurface drainage measures, observe and test utility trench and retaining wall backfill, and provide a summary letter of our construction observation services. The purposes of GeoEngineers construction phase services are to confirm that the subsurface conditions are consistent with those observed in the explorations and other reasons described in Appendix D, Report Limitations and Guidelines for Use.

LIMITATIONS

We have prepared this report for use by King County Housing Authority and other members of the design team for use in design of this project.

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

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Please refer to Appendix D titled Report Limitations and Guidelines for Use for additional information pertaining to use of this report.

REFERENCES

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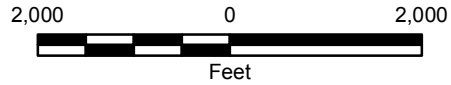
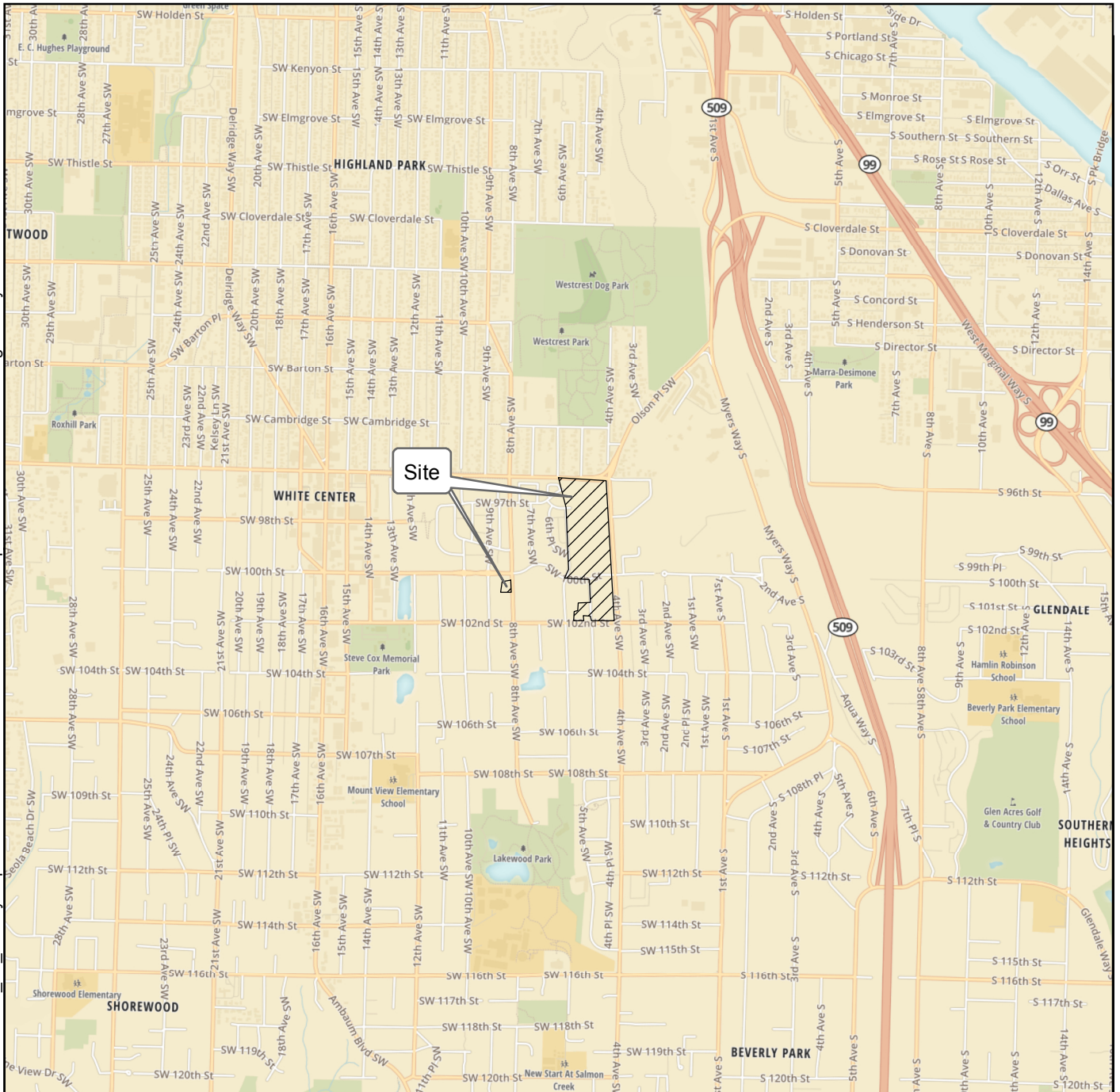
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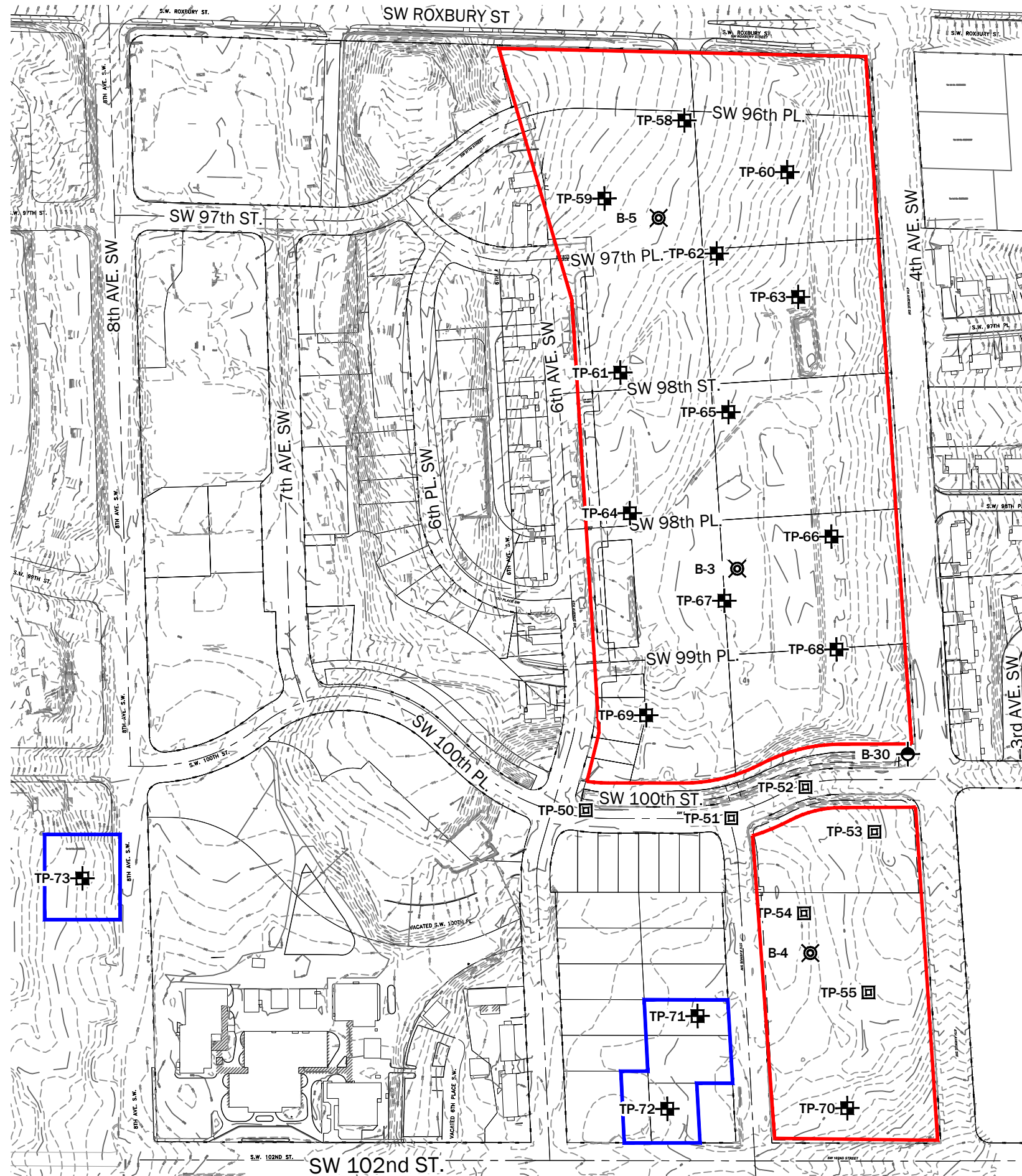
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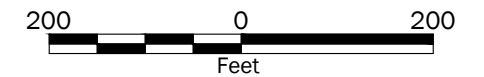
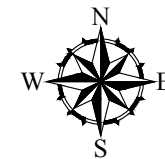
- Notes:
1. The locations of all features shown are approximate.
 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
 3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: Open Street Map 2015
 Transverse Mercator, Zone 10 N North, North American Datum 1983
 North arrow oriented to grid north

Vicinity Map	
Greenbridge Areas 9, 10, 11 and HomeSight Properties King County, Washington	
GEOENGINEERS 	Figure 1



- Legend**
- TP-58 Test Pit by GeoEngineers, 2016
 - B-30 Boring by GeoEngineers, 2006
 - B-3 Boring by GeoEngineers, 2003
 - TP-50 Test Pit by GeoEngineers, 2006
 - HomeSight Properties
 - Greenbridge 9, 10 and 11

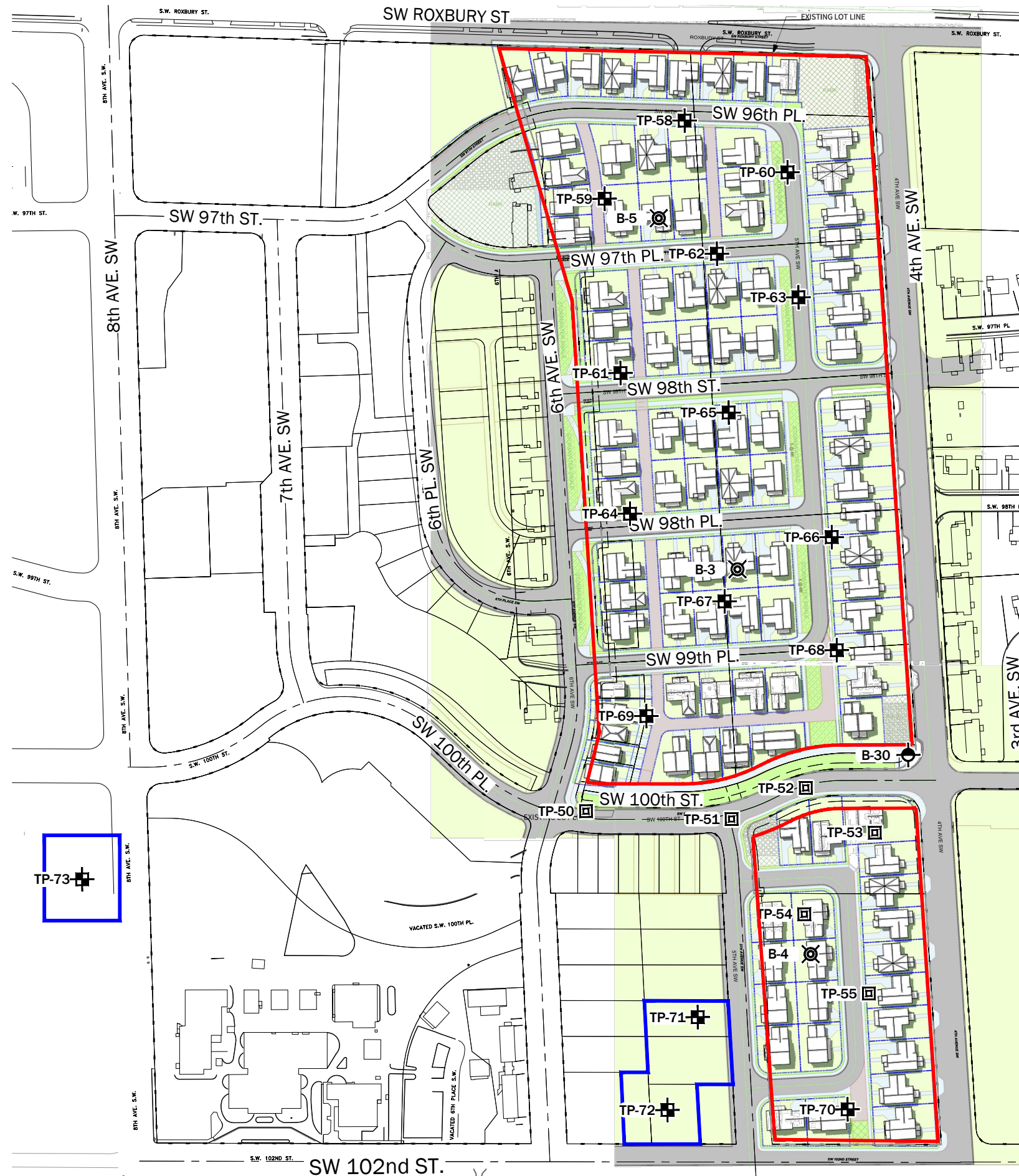


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2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

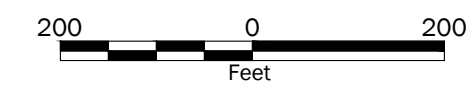
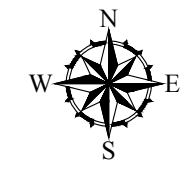
Data Source:
 Drawing entitled "KING COUNTY HOUSING AUTHORITY, VIC. SW ROXBURY & 8TH AVE SW" by Bush, Roed & Hitchings, Inc, dated Nov. 2002, and "Lidar Slope Analysis" dated 02/25/03, and "On-site Slope Analysis" dated 02/07/03, both by Goldsmith & Associates and PDF file by GeoEngineers staff, June, 2016.

Site Plan	
Greenbridge Areas 9, 10, 11 and HomeSight Properties King County, Washington	
	Figure 2



Legend

- TP-58 Test Pit by GeoEngineers, 2016
- B-30 Boring by GeoEngineers, 2006
- B-3 Boring by GeoEngineers, 2003
- TP-50 Test Pit by GeoEngineers, 2006
- HomeSight Properties
- Greenbridge 9, 10 and 11



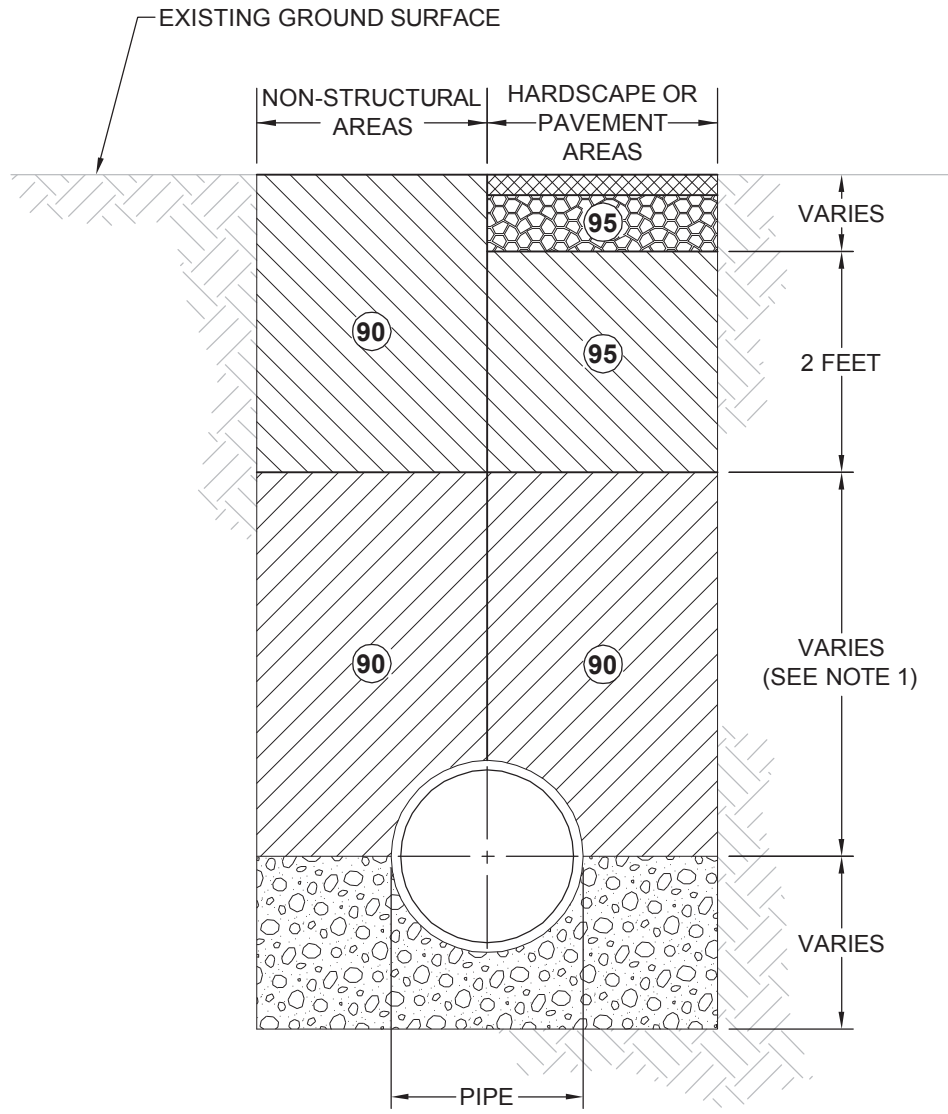
Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source:
 Drawing entitled "KING COUNTY HOUSING AUTHORITY, VIC. SW ROXBURY & 8TH AVE SW" by Bush, Roed & Hitchings, Inc, dated Nov. 2002, and "Lidar Slope Analysis" dated 02/25/03, and "On-site Slope Analysis" dated 02/07/03, both by Goldsmith & Associates and PDF file by GeoEngineers staff, June, 2016.



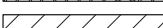
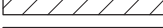
Proposed Construction Plan	
Greenbridge Areas 9, 10, 11 King County, Washington	
	Figure 3

TKC




NOT TO SCALE

LEGEND:

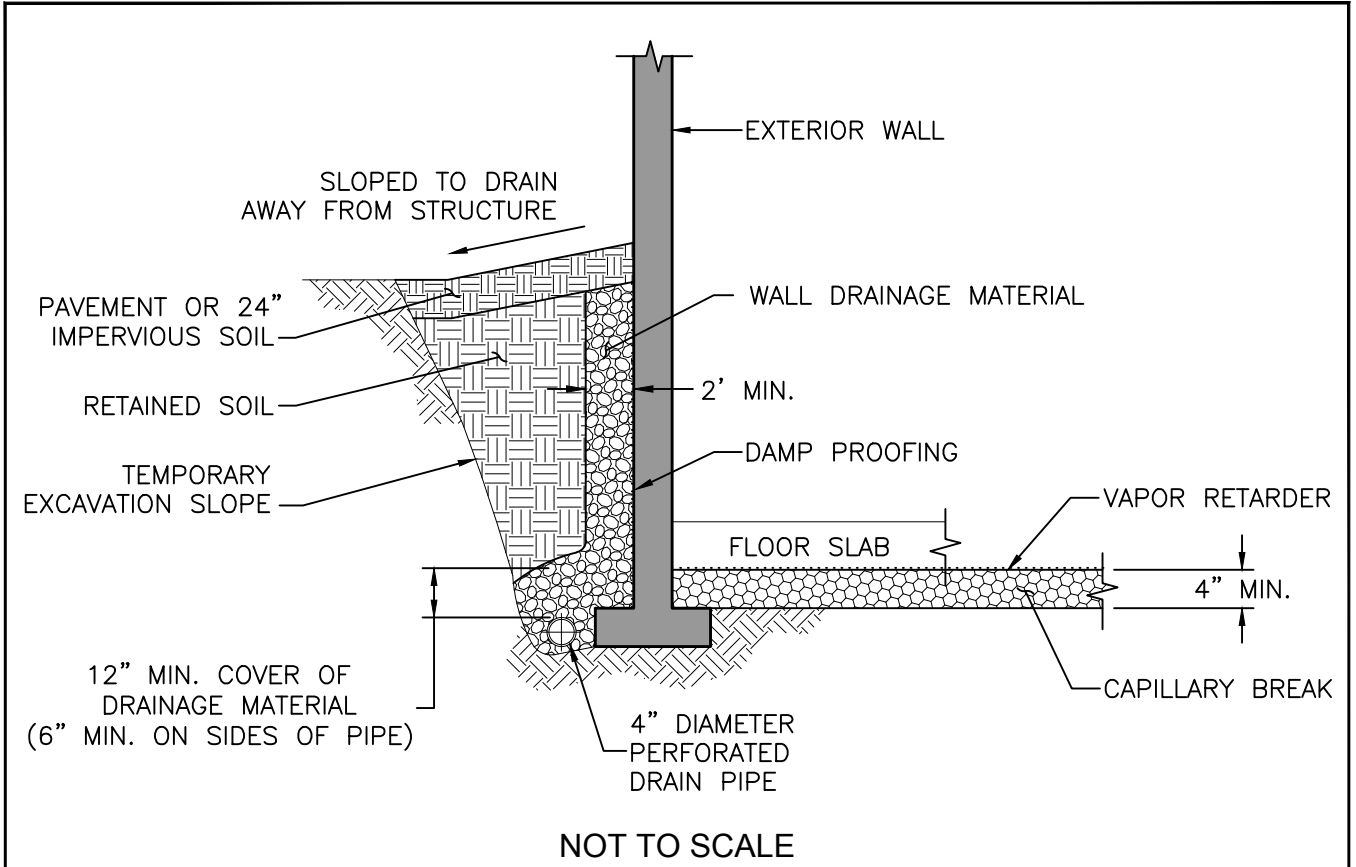
- 95** RECOMMENDED COMPACTION AS A PERCENTAGE OF MAXIMUM DRY DENSITY, BY TEST METHOD ASTM D1557 (MODIFIED PROCTOR)
-  CONCRETE OR ASPHALT PAVEMENT
-  BASE COURSE
-  TRENCH BACKFILL
-  PIPE BEDDING

NOTES:

1. All backfill under building areas should be compacted to at least 95 percent per ASTM D1557.

Compaction Criteria for Trench Backfill	
Greenbridge Areas 9, 10, 11 and HomeSight Properties King County, Washington	
	Figure 4

http://projects/sites/0132900322/Draft/Forms/AllItems.aspx modified on June 20, 2016



Materials

A. WALL DRAINAGE MATERIAL—Must consist of washed 3/8" to No. 8 pea gravel or "Gravel Backfill for Drains" per WSDOT Standard Specification 9-03.12 (or approved equivalent).

B. RETAINED SOIL—Should consist of structural fill, either on-site soil or imported. The backfill should be compacted in loose lifts not exceeding 6 inches. Wall backfill supporting building floor slabs should consist of imported sand and gravel per WSDOT Standard Specification 9-03.1 compacted to at least 90 percent ASTM D1557. Backfill not supporting building floor slabs, sidewalks, or pavement should be compacted to 90 to 92 percent of the maximum dry density per ASTM D1557. Backfill supporting sidewalks or pavement areas should be compacted to at least 90 percent in the upper two feet. Only hand-operated equipment should be used for compaction within 4 feet of the walls and no heavy equipment should be allowed within 4 feet of the wall.

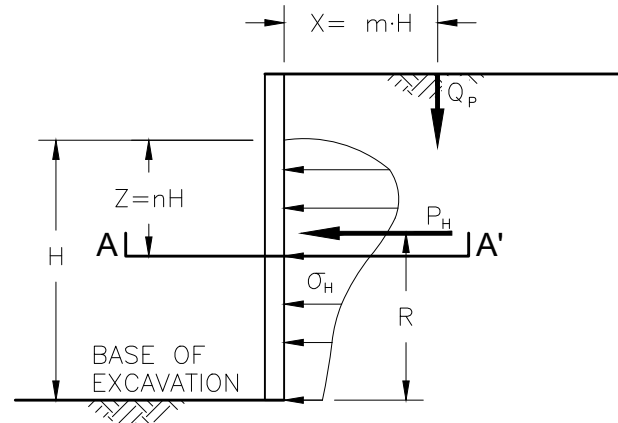
C. CAPILLARY BREAK—Should consist of at least 4 inches of clean crushed gravel with a maximum size of 1 inch and negligible sand or fines, such as WSDOT Standard Specifications Section 9-03.1(4)C, grading No. 67.

D. PERFORATED DRAIN PIPE—Should consist of a 4-inch diameter perforated heavy-wall solid pipe (SDR33 PVC) or rigid corrugated polyethylene pipe (ADS N12) or equivalent. Drain pipes should be placed with 0.2 percent minimum slopes and discharge to the storm water collection system.

P:\101329003\CAD\22\Geotech\0132900322_F05_Wall Drainage and Backfill Detail.dwg_06/15/16

Wall Drainage and Backfill	
Greenbridge Areas 9, 10, 11 and HomeSight Properties King County, Washington	
	Figure 5

LATERAL EARTH PRESSURE FROM POINT LOAD, Q_p (SPREAD FOOTING)



FOR $m \leq 0.4$

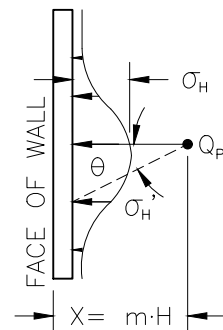
$$\sigma_H = \frac{0.28Q_p n^2}{H^2(0.16+n^2)^3}$$

FOR $m > 0.4$

$$\sigma_H = \frac{1.77Q_p m^2 n^2}{H^2(m^2+n^2)^3}$$

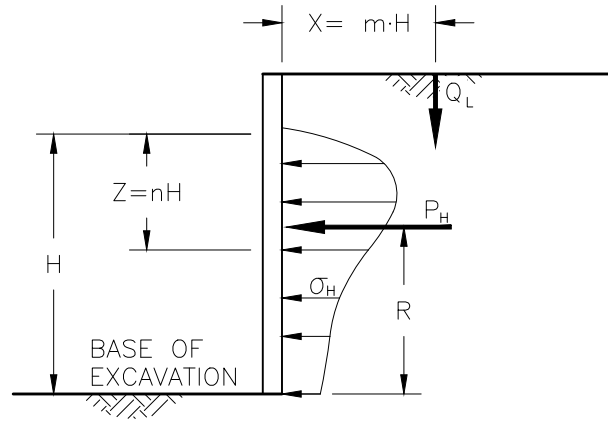
$\sigma_H' = \sigma_H \cos^2(1.1\theta)$

m	$P_H \left(\frac{H}{Q_p} \right)$	R
0.2	0.78	0.59H
0.4	0.78	0.59H
0.6	0.45	0.48H



SECTION A-A'
 Pressures from Point Load Q_p

LATERAL EARTH PRESSURE FROM LINE LOAD, Q_L (CONTINUOUS WALL FOOTING)



FOR $m \leq 0.4$

$$\sigma_H = \frac{0.2n \cdot Q_L}{H(0.16+n^2)^2}$$

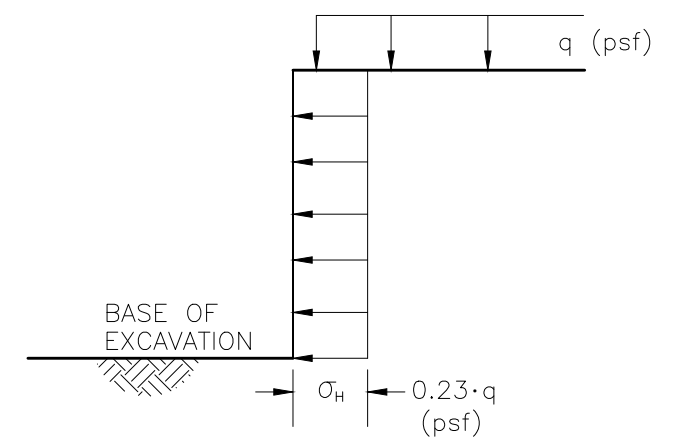
FOR $m > 0.4$

$$\sigma_H = \frac{1.28m^2 n \cdot Q_L}{H(m^2+n^2)^2}$$

RESULTANT $P_H = \frac{0.64Q_L}{(m^2+1)}$

m	R
0.1	0.60H
0.3	0.60H
0.5	0.56H
0.7	0.48H

UNIFORM SURCHARGES, q (FLOOR LOADS, LARGE FOUNDATION ELEMENTS OR TRAFFIC LOADS)



σ_H = LATERAL SURCHARGE PRESSURE FROM UNIFORM SURCHARGE

Definitions:

- Q_p = Point load in pounds
- Q_L = Line load in pounds/foot
- H = Excavation height below footing, feet
- σ_H = Lateral earth pressure from surcharge, psf
- q = Surcharge pressure in psf
- θ = Radians
- σ_H' = Distribution of σ_H in plan view
- P_H = Resultant lateral force acting on wall, pounds
- R = Distance from base of excavation to resultant lateral force, feet

Notes:

1. Procedures for estimating surcharge pressures shown above are based on Manual 7.02 Naval Facilities Engineering Command, September 1986 (NAVFAC DM 7.02).
2. Lateral earth pressures from surcharge should be added to earth pressures presented on Figure 3.
3. See report text for where surcharge pressures are appropriate.

Recommended Surcharge Pressure

Greenbridge Areas 9, 10, 11 and HomeSight Properties
 King County, Washington



Figure 6

APPENDIX A
Field Explorations

APPENDIX A FIELD EXPLORATIONS

Subsurface conditions were explored at the sites by excavating 16 test pits (TP-58 through TP-73) at the approximate locations shown in Figure 2. Locations of the explorations were determined in the field by pacing and tape measuring distances from the exploration locations to the existing site features such as sidewalks and fences, and using a hand-held global positioning system (GPS) unit. Vertical elevations were interpolated from a site topographic map prepared by Goldsmith Land Development Services and are shown on the exploration logs.

We previously explored the vicinity of the sites by advancing four borings (B-3 through B-5, and B-30) and excavating six test pits (TP-50 through TP-55) at the locations shown in Figure 2. These previous explorations were conducted to provide preliminary geotechnical and geologic information for the Environmental Impact Statement and for the Greenbridge Hope VI redevelopment. Logs of the previous explorations performed by GeoEngineers are included in Appendix C.

Test Pits

Twelve test pits (TP-58 through TP-69) were excavated in Greenbridge 9, 10, 11 North, while one test pit (TP-70) was excavated in Greenbridge 9, 10, 11 South as part of this study.

In addition, two test pits (TP-71 and TP-72) were excavated in the HomeSight East property, while one test pit (TP-73) was excavated in the HomeSight West property, as part of this study.

Test pits TP-58 through TP-73 were excavated on June 3, 2016 using a rubber-tired Komatsu WB140 backhoe. The excavating equipment was owned and operated by Kelly's Excavation, Inc. of Pacific, Washington. The test pits were continuously observed by a geotechnical engineer from our firm who examined and classified the soils encountered, obtained representative soil samples, observed groundwater conditions and maintained a detailed log of each test pit. Grab samples of the representative soil types were obtained from the test pits at selected locations, and transported to our laboratory in Redmond, Washington. The soils encountered during the excavation of the test pits were visually classified in the field in general accordance with the Unified Soil Classification System (USCS), ASTM International (ASTM) D 2488, which is summarized in Figure A-1. Test pit logs are shown in Figures A-2 through A-17. These logs are based on our interpretation of the field and laboratory data and indicate the various soils encountered. They also indicate the approximate depths at which the soils or their characteristics change, although the change may be gradual.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS <small>(LITTLE OR NO FINES)</small>		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS <small>(LITTLE OR NO FINES)</small>		SW	WELL-GRADED SANDS, GRAVELLY SANDS
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SM	SILTY SANDS, SAND - SILT MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
		LIQUID LIMIT LESS THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		LIQUID LIMIT LESS THAN 50		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
		LIQUID LIMIT GREATER THAN 50		CH	INORGANIC CLAYS OF HIGH PLASTICITY
		LIQUID LIMIT GREATER THAN 50		OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

	2.4-inch I.D. split barrel
	Standard Penetration Test (SPT)
	Shelby tube
	Piston
	Direct-Push
	Bulk or grab
	Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

A "WOH" indicates sampler pushed using the weight of the hammer.

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS		TYPICAL DESCRIPTIONS
GRAPH	LETTER	
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/Quarry Spalls
	TS	Topsoil/Forest Duff/Sod

Groundwater Contact



Measured groundwater level in exploration, well, or piezometer



Measured free product in well or piezometer

Graphic Log Contact



Distinct contact between soil strata



Approximate contact between soil strata

Material Description Contact



Contact between geologic units



Contact between soil of the same geologic unit

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

KEY TO EXPLORATION LOGS



FIGURE A-1

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 12

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing							
405	1				TS		5 inches topsoil			
404	2	X	1 SA		SM		Brown silty fine to medium sand with gravel, occasional cobbles, asphalt debris (medium dense, moist) (fill)	11	31	Probed 3 to 5 inches
403	3				SM		Grayish brown silty fine to medium sand with gravel (medium dense to dense, moist) (fill)			
402	4	X	2		SM		Dark brown to brown silty fine to medium sand with gravel, roots, burnt wood pieces, flat metal debris (medium dense, moist) (fill)			Probed 1 to 3 inches
401	5				SM					
400	6	X	3 MC		SM			10		
399	7									
398	8									
397	9	X	4				Cement post footing at 8.5 feet			
396	10									
395	11				ML		Gray with oxidation staining sandy silt with occasional gravel, fine roots (medium stiff, moist) (weathered till)			
394	12	X	5 MC					23		

No groundwater seepage observed
 Moderate caving observed at 8 feet

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-58



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-2
 Sheet 1 of 1

Ref:mond: Date:6/29/16 Path:P:\11329003\GINT\132900322.GPJ DB:Template\Lib:Template:GEOENGINEERS_DF_STD_US_GDOT\GIBR_TES\TPT_IP_GEO\TEC_%F

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 5.5

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
421	1			SM		Brownish gray silty fine to medium sand with gravel (very dense, moist) (fill)			Probed 1 to 2 inches
420	2	X	1 MC				7		
419	3					Asphalt debris at 3 feet			Very hard digging at 3.5 feet Probed <1 inches
418	4	X	2 MC	SM		Gray silty fine to medium sand with gravel (very dense, moist) (glacial till)	7		
417	5	X	3						

No groundwater seepage observed
 No caving observed

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-59



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-3
 Sheet 1 of 1

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 5

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
412	1	1		SM		3 inches topsoil			Probed 2 to 4 inches
411	2	2	MC	SM		Gray silty fine to medium sand with gravel (very dense, moist) (weathered till) Heavy oxidation staining between 1.7 to 2.5 feet	8		Probed <1 inch
410	3								
409	4	3	MC	SM		Gray silty fine to medium sand with gravel (very dense, moist) (glacial till)	10		Probed <1 inch
408	5								

No groundwater seepage observed
 No caving observed

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-60



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-4
 Sheet 1 of 1

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 6

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
418	1			TS		6 inches topsoil			
417	2	X	1 SA	SM		Brownish gray silty fine to medium sand (medium dense, moist) (fill)	6	32	Probed 2 inches
416	3			SM		Brownish gray silty fine to medium sand with gravel (very dense, moist) (glacial till)			Very hard digging Probed <1 inch
415	4	X	2						
414	5								
413	6	X	3 MC				7		
No groundwater seepage observed Occasional caving observed from 2 to 3 feet									

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-61



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-5
 Sheet 1 of 1

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 12

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing							
409	1				TS		4 inches topsoil			
408	2	⊗	1 MC		SM		Brownish gray silty fine to medium sand with gravel (medium dense, moist) (fill)	6		Probed 3 to 5 inches Moderate digging effort
407	3				SM		Gray silty fine to medium sand with gravel (medium dense, moist)			
406	4	⊗	2							Probed 2 to 4 inches
405	5									
404	6	⊗	3							
403	7									
402	8									
401	9	⊗	4 MC		ML		Gray with oxidation staining sandy silt with occasional gravel, roots (medium stiff, moist to wet) (weathered till)	34		
400	10				SM		Gray silty fine to medium sand with gravel (very dense, moist to wet) (glacial till)			
399	11									
398	12	⊗	5							Hard digging at 10.5 feet

No groundwater seepage observed
 No caving observed

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-62



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-6
 Sheet 1 of 1

Ref:mont. Date:6/29/16 Path:P:\11329003\GINT\132900322.GPJ DB:Template\Lib\template:GEOENGINEERS_DF_STD_US.GDT\GIBR_TES\TPT_IP_GEO\TEC_%F

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 7

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
408	1			SM		4 inches topsoil			The northern portion of test pit was very difficult digging. The fill consisted of fine to medium sand with gravel and appeared to be cemented. Only able to excavate 3 feet in this area. Probed 0 inches in cemented material.
407	2	X	1 MC			Reddish brown silty fine to medium sand with gravel, occasional cobbles, fine roots, brick debris (medium dense, moist) (fill)	10		
405	4	X	2 MC	SM		Gray silty fine to medium sand with gravel (very dense, moist) (glacial till)	7		Hard digging at 3.5 feet Probed <1 inch
402	7	X	3						

No groundwater seepage observed
 No caving observed

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-63



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-7
 Sheet 1 of 1

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 12

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
408	1	1	MC	GM		6 inches topsoil	5		
407	2	2		SM		Light brown silty fine to coarse gravel with sand, fine roots (medium dense, moist) (fill)			Very hard digging at 1.5 feet Probed <1 inch
405	4	3		SM		Brownish gray silty fine to medium sand with gravel and occasional cobbles (medium dense to dense, moist)			
402	7	4	MC	SM		Brown silty fine to medium sand with gravel, fine roots, burnt wood and concrete debris (medium dense to dense, moist)			Probed 2 to 3 inches
400	9			SM		Gray silty fine to medium sand (dense, moist) (glacial till)	11		
399	10	5							

No groundwater seepage observed
 Minor caving observed at 6 feet

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-64



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-8
 Sheet 1 of 1

Redmond: Date: 6/29/16 Path: P:\11329003\GINT\132900322.GPJ DBTTemplate\Lib\template:GEOENGINEERS_DF_STD_US.GDT\GIBR_TES P\TIP_IP_GEO TEC_%F

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 6

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing							
410	0				TS		2 to 3 inches topsoil			No base course noted
	1				CC		4 inches concrete			
	1				SM		Orangish brown silty fine to medium sand with gravel and occasional cobbles (medium dense to dense, moist) (fill)			
409	2	⊗	1 SA CS					7	14	Probed 2 to 3 inches Moderate to difficult digging at 2 feet
408	3						Large roots extending from 0 to 3 feet below ground surface			
407	4	⊗	2 MC		SM		Gray silty fine sand with gravel (very dense, moist) (glacial till)	11		Probed <1 inch Very difficult digging at 3.5 feet
406	5									
405	6	⊗	3							

No groundwater seepage observed
 No caving observed

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-65



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-9
 Sheet 1 of 1

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 8

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
405	1			TS		8 inches topsoil			
404	2	⊗	1 MC	SM		Brown silty fine to medium sand with gravel, fine roots (loose to medium dense, moist) (fill)	11		Probed 3 to 5 inches
403	3			SM		Orangish brown-gray silty fine to medium sand with gravel (medium dense, moist)			
402	4	⊗	2	SM		Gray with slight oxidation staining silty fine to medium sand with gravel, sand interbeds (very dense, moist) (glacial till)			Probed 1 to 2 inches
401	5			SM					Harder digging at 5 feet
400	6	⊗	3 MC				11		
399	7								
398	8								

No groundwater seepage observed
 No caving observed

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-66



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-10
 Sheet 1 of 1

Ref:mond. Date:6/29/16 Path:P:\11329003\GINT\132900322.GPJ DBTTemplate\Lib\template:GEOENGINEERS_DF STD_US.GDT\TGER_TES PPT_IP_GEO TEC_%F

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 8

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS	
		Testing Sample	Sample Name Testing							
409	1	1		GM		5 inches topsoil				
408	2	2	MC	SM		Brown silty fine to coarse gravel with sand, concrete debris (medium dense, moist) (fill)	11		Probed 2 inches	
407	3					Orangish brown silty fine to medium sand with gravel, brick debris, burnt wood fragments (medium dense, moist)				
406	4	3				Occasional boulders from 3 to 4 feet			Probed 2 inches	
405	5			SM		Becomes grayish brown with fine roots Large 26-inch-diameter boulder at 4.5 feet				
404	6					Gray silty fine to medium sand with gravel (very dense, moist) (glacial till)			Very hard digging at 5.5 feet	
403	7									
402	8	4	MC				10			
						No groundwater seepage observed No caving observed				

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-67



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-11
 Sheet 1 of 1

Ref:mond. Date:6/29/16 Path:P:\11329003\GINT\132900322.GPJ DB:Template\Lib\template:GEOENGINEERS_DF_STD_US.GDT:GIBR_TES:PIT_IP_GEOTECH_%F

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 9

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
404	1			TS		8 inches topsoil			Hard digging from surface
403	2	X	1	GM		Brown silty fine to coarse gravel with sand, brick fragments (medium dense, moist) (fill)			Probed 2 to 5 inches
402	3	X	2 MC	SM		Orangish brown silty fine to medium sand with gravel, roots (dense, moist)	10		Probed 1 to 2 inches
401	4	X	3 MC	SM		Gray silty fine to medium sand with occasional gravel (dense, moist) (glacial till)	11		Probed 1 inch
400	5								
399	6								
398	7								
397	8	X	4			Becomes moist to wet			
396	9								

No groundwater seepage observed
 No caving observed

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-68



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-12
 Sheet 1 of 1

Redmond: Date: 6/29/16 Path: P:\11329003\GINT\132900322.GPJ DBTTemplate\Lib\template\GEOENGINEERS_DF_STD_US.GDT\GIBR_TES TPI1_IP_GEO TEC_%F

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 9

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
407	1			TS		6 inches topsoil			Hard digging from surface
406	2	⊗	1 SA	SM		Brown silty fine to medium sand with gravel (medium dense, moist) (fill)	7	20	Probed 2 inches
405	3			SM		Reddish brown silty fine to medium sand with gravel, roots (loose to medium dense, moist) (fill)			Easier digging at 3.5 feet Probed 3 to 5 inches
404	4	⊗	2	SM		Gray silty fine to medium sand with gravel, light oxidation staining (very dense, moist) (glacial till)			Very hard digging at 6.5 feet
403	5								
402	6			SM					
401	7								
400	8	⊗	3 MC				10		
399	9								

No groundwater seepage observed
 No caving observed

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-69



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-13
 Sheet 1 of 1

Ref:mond: Date:6/29/16 Path:P:\11329003\GINT\132900322.GPJ DB:Template\Lib:template:GEOENGINEERS_DF STD_US.GDT:IGER_TES PPT_IP_GEO TEC_%F

Date Excavated: 6/3/2016

Logged By: TKC

Equipment: Komatsu WB 140 Backhoe

Total Depth (ft) 8

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS	
		Testing Sample	Sample Name Testing							
409	1			TS		5 inches topsoil				
408	2	⊗	1	SM		Light brown silty fine to medium sand with gravel, fine roots (loose to medium dense, moist) (fill)			Probed 3 to 5 inches	
407	3									
406	4	⊗	2 SA				8	24	Probed 3 to 4 inches	
405	5			SM		Gray silty fine to medium sand with gravel (very dense, moist) (glacial till)				
404	6	⊗	3 MC				9		Harder digging at 5.5 feet	
403	7			SP-SM		Gray fine to medium sand with silt and occasional gravel (dense, moist)				
402	8	⊗	4							
						No groundwater seepage observed No caving observed				

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-70



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-14
Sheet 1 of 1

Ref:mond: Date:6/29/16 Path:P:\11329003\GINT\132900322.GPJ DBTTemplate\Lib\template:GEOENGINEERS_DF STD_US.GDT\GIBR_TES\PIIT_IP_GEO\TEC_%.X

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 10

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
408	1			TS		10 inches topsoil			
407	2	X	1 MC	SM		Light brown silty fine to medium sand with gravel, roots (medium dense, moist) (fill)	12		Probed 2 to 3 inches Moderate to difficult digging
406	3			SM		Gray silty fine to medium sand with gravel, oxidation staining (dense, moist) (glacial till)			
405	4	X	2						Probed 1 inch
404	5								
403	6								
402	7	X	3 MC			Becomes moist to wet	12		
401	8								
400	9	X	4						
399	10								

No groundwater seepage observed
 No caving observed

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-71



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-15
 Sheet 1 of 1

Ref:mond: Date:6/29/16 Path:P:\11329003\GINT\132900322.GPJ DBTTemplate\Lib\template:GEOENGINEERS_DF_STD_US.GDT\TIGER_TES\TPT_IP_GEOTEC_MF

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 7

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
411	1			TS		8 inches topsoil			
410	2	1	SA	SM		Light brown silty fine to medium sand with gravel, roots (dense, moist) (fill)	7	27	Probed 1 to 2 inches
409	3	2	MC	SM		Brownish gray with oxidation staining silty fine to medium sand with gravel, sand interbeds, roots (very dense, moist) (weathered till)	8		Probed <1 inch
408	4	3		SM		Gray silty fine to medium sand with gravel (very dense, moist) (glacial till)			Probed <1 inch
407	5			SM					
406	6								
405	7	4							

No groundwater seepage observed
 No caving observed

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-72



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-16
 Sheet 1 of 1

Ref:mond. Date:6/29/16 Path:P:\11329003\GINT\132900322.GPJ DB:Template\Lib\template:GEOENGINEERS_DF_STD_US.GDT\GIBR_TES P\T_IP_GEO TEC_%.F

Date Excavated: 6/3/2016
 Equipment: Komatsu WB 140 Backhoe

Logged By: TKC
 Total Depth (ft) 8

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing							
416	1				TS		7 inches topsoil			
415	2	⊗	1 SA		GM		Brown silty fine to coarse gravel with sand, occasional cobbles, roots (loose to medium dense, moist) (fill)	7	24	Probed 4 to 8 inches
414	3	⊗	2							Probed 2 to 3 inches
413	4				SM		Gray with oxidation staining silty fine to medium sand with gravel (very dense, moist) (weathered till)			Harder digging at 4 feet
412	5	⊗	3 MC				Gray with occasional oxidation staining silty fine to medium sand with gravel, sand interbeds (very dense, moist) (glacial till)	10		Probed 1 inch
411	6	⊗	4		SM					Very hard digging at 6 feet
410	7	⊗	5							
409	8						No groundwater seepage observed No caving observed			

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-73



Project: Greenbridge Areas 9, 10, 11 and HomeSight Properties
 Project Location: King County, Washington
 Project Number: 1329-003-22

Figure A-17
 Sheet 1 of 1

Ref:mond: Date:6/29/16 Path:P:\11329003\GINT\132900322.GPJ DB:Template\Lib\template:GEOENGINEERS_DF STD_US.GDT:IGER_TES PPT_IP_GEO TEC_%F

APPENDIX B
Laboratory Testing

APPENDIX B

LABORATORY TESTING

All soil samples obtained from the explorations were visually classified in the field and/or in our laboratory using a system based on the Unified Soil Classification System (USCS) and ASTM International (ASTM) classification methods. ASTM test method D 2488 was used to visually classify the soil samples, while ASTM D 2487 was used to classify the soils based on laboratory tests results. These classification procedures are incorporated in the test pit logs shown in Figures A-2 through A-17.

Moisture Content Testing

Moisture content tests were completed in general accordance with ASTM D 2216 for representative samples obtained from the explorations. The results of these tests are presented on the test pit logs in Appendix A at the depths at which the samples were obtained.

Percent Passing U.S. No. 200 Sieve

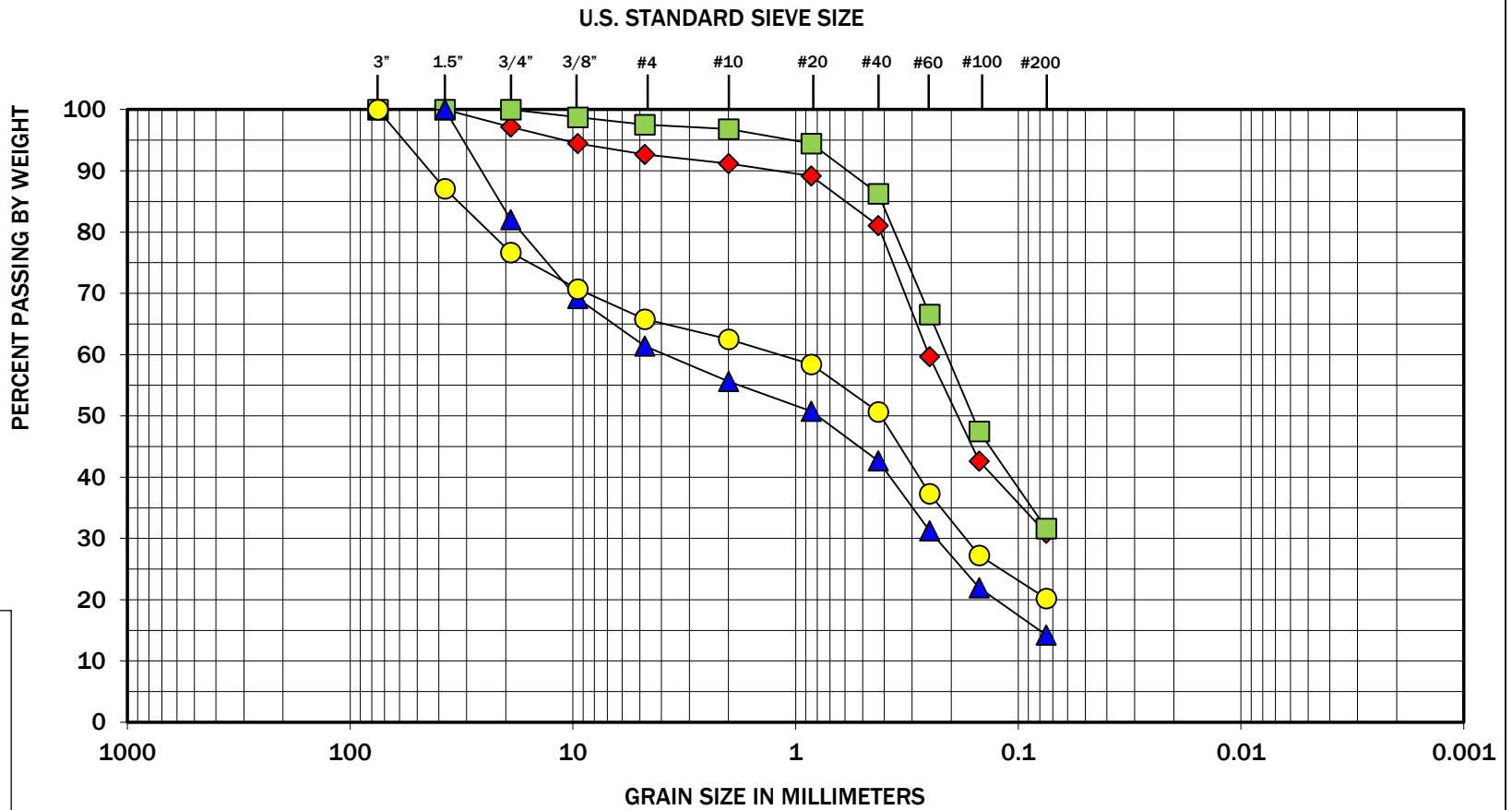
Selected samples were “washed” through the U.S. No. 200 mesh sieve to determine the relative percentages of coarse and fine-grained particles in the soil. The percent passing value represents the percentage by weight of the sample finer than the U.S. No. 200 sieve. These tests were conducted to verify field descriptions and to determine the fines content for analysis purposes. The tests were conducted in general accordance with ASTM D 1140, and the results are shown on the test pit logs at the respective sample depths.

Sieve Analyses

Sieve analyses were performed on selected samples in general accordance with ASTM D 422. The wet sieve analysis method was used to determine the percentage of soil greater than the U.S. No. 200 mesh sieve. The results of the sieve analyses were plotted, classified in general accordance with the USCS, and are presented in Figures B-1 and B-2.

Maximum Density Determination

The maximum dry density was estimated for one bulk soil sample by performing a three-point modified Proctor test on a portion of the sample. The sample was processed through the U.S. ¾-inch sieve prior to performing the test. The sample was divided into three parts. The different moisture contents at which the soil was compacted were obtained by allowing the portions of the soil sample to dry at room temperature (approximately 72 degrees Fahrenheit) or by adding additional water. The test was performed in general accordance with Method C of ASTM D 1557 with a 10-pound hammer free falling a distance of approximately 18 inches. The mold used during the test has a diameter of approximately 6 inches. Following compaction, the soil moisture content was determined by drying back a quarter of the compacted sample at approximately 230°F. The results of the laboratory compaction test are summarized in Figure B-3.



Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	TP-58	2	11.4	Silty sand (SM)
■	TP-61	2	5.9	Silty sand (SM)
▲	TP-65	2	6.6	Silty sand with gravel (SM)
●	TP-69	2	7.4	Silty sand with gravel (SM)

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The grain size analysis results were obtained in general accordance with ASTM D 6913.

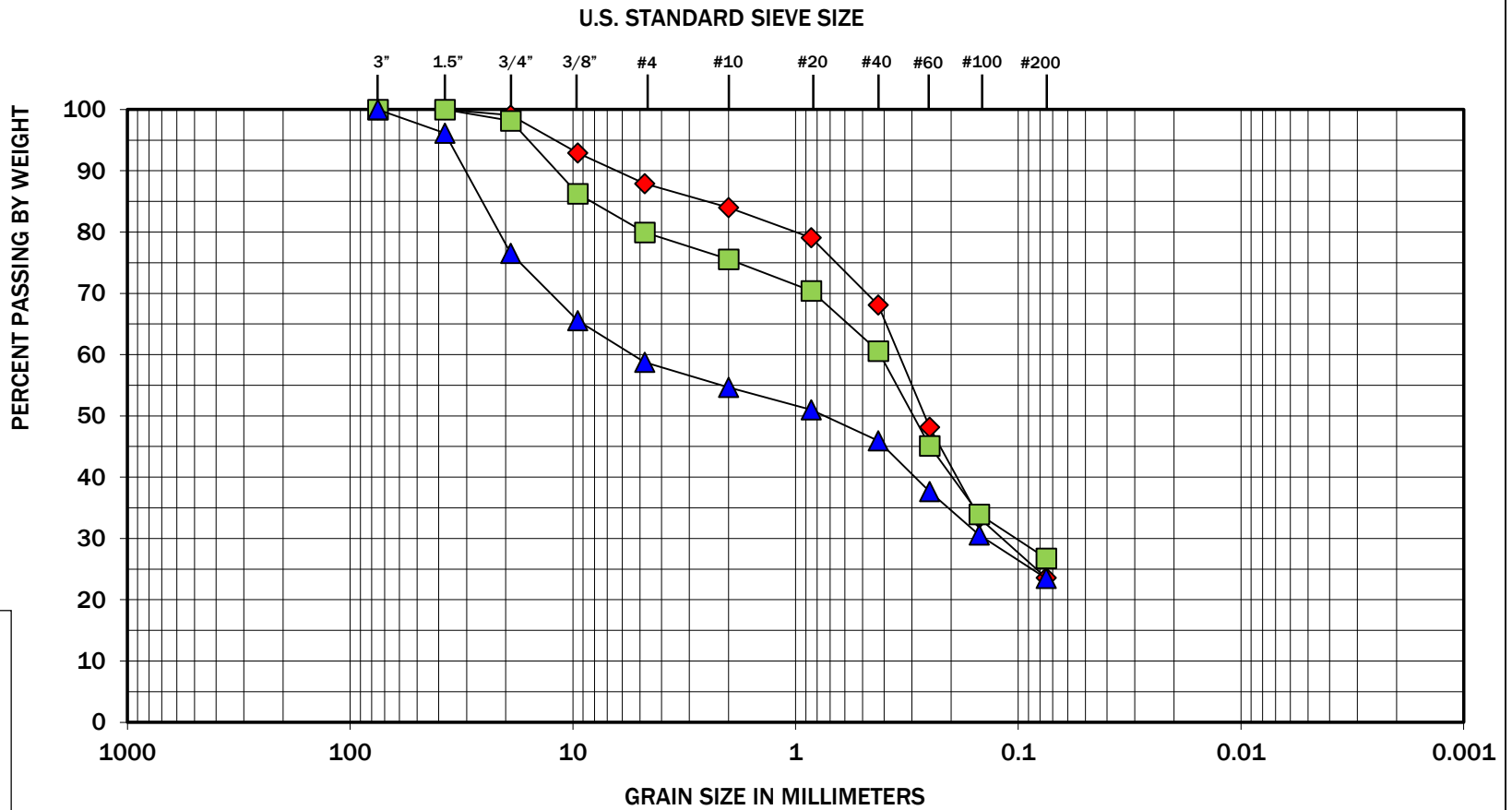
GEOENGINEERS



Figure B-1

Greenbridge 9, 10, 11 and HomeSight Properties
King County, Washington

Sieve Analysis Results



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	TP-70	4	8.0	Silty sand (SM)
■	TP-72	2	6.9	Silty sand with gravel (SM)
▲	TP-73	2	6.9	Silty gravel with sand (GM)

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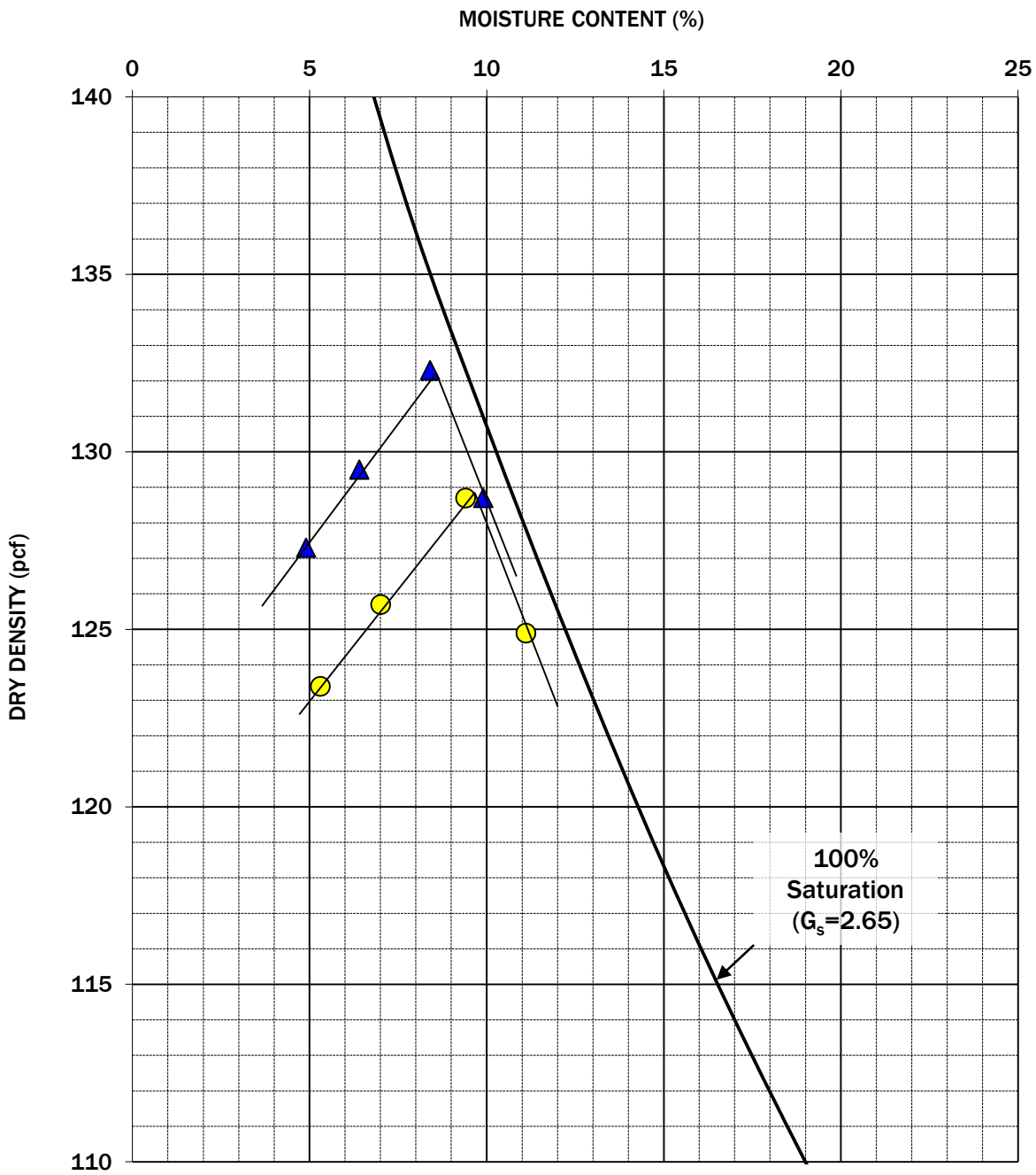
The grain size analysis results were obtained in general accordance with ASTM D 6913.



Greenbridge 9, 10, 11 and HomeSight Properties
King County, Washington

Sieve Analysis Results

Figure B-2



Symbol	Boring Number	Depth (feet)	Soil Description	Optimum Moisture (%)	Maximum Dry Density (pcf)
▲ Corrected	TP-65	2	Silty fine to medium sand with gravel (SM)	8.5	132.3
● Uncorrected				9.6	128.8

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The Proctor results were obtained in general accordance with ASTM D 1557.

Compaction Test Results

Greenbridge 9, 10, 11 and HomeSight Properties
King County, Washington



Figure B-3

APPENDIX C
Logs of Explorations From Previous Studies

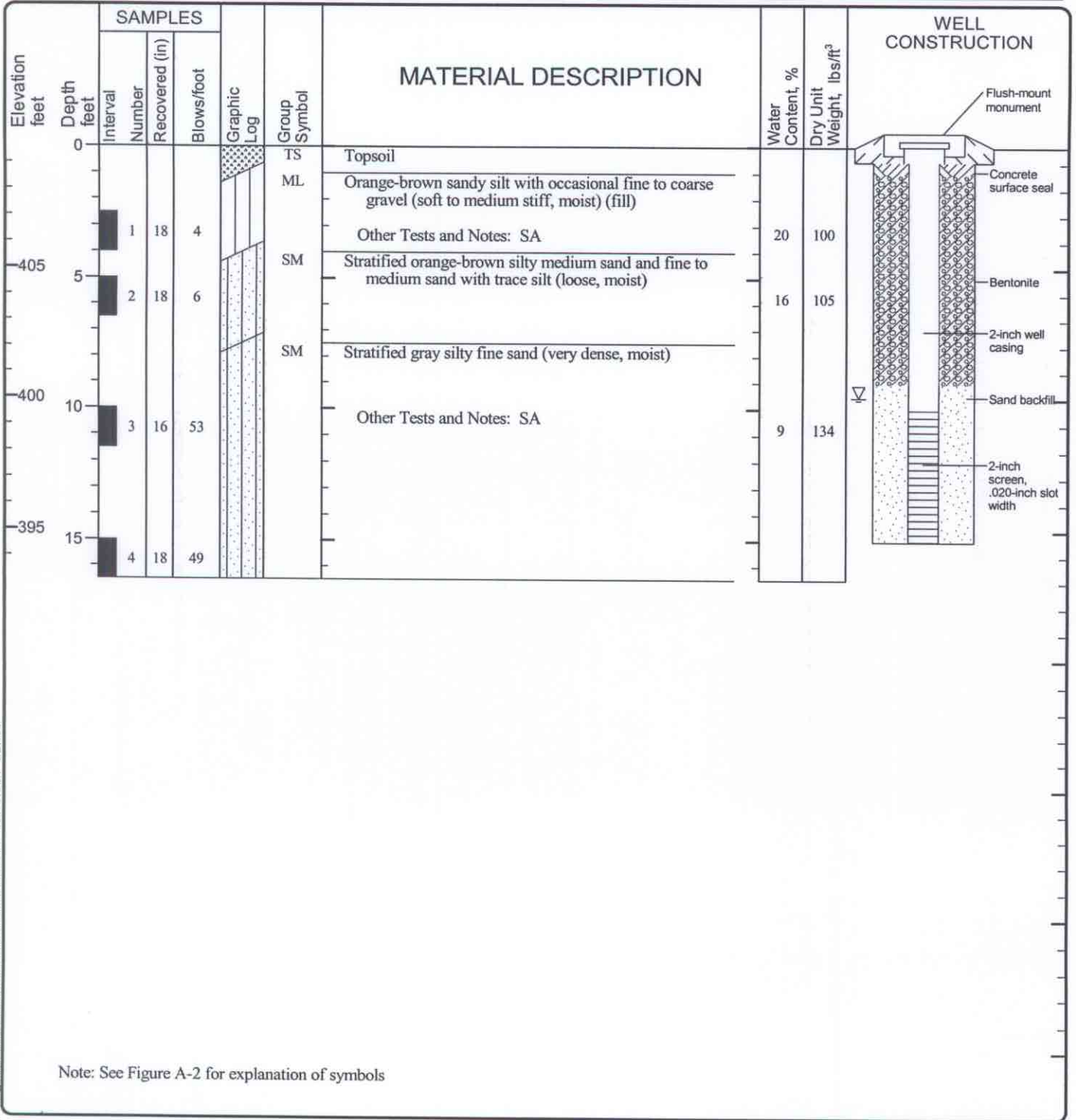
APPENDIX C

LOGS OF EXPLORATIONS FROM PREVIOUS STUDIES

Included in Appendix C are the following relevant boring logs from previous studies completed in the immediate vicinity of the project site:

- Borings B-3 through B-5, GeoEngineers, Inc. March 21, 2003
- Borings B-30, GeoEngineers, Inc. January 12, 2007
- Test Pits TP-50 through TP-55, GeoEngineers, Inc. January 12, 2007

Date(s) Drilled	12/02/02	Logged By	SJW	Checked By	CFE
Drilling Contractor	Gregory Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	Dames & Moore
Total Boring Depth (ft)	16.5	Hammer Data	300 (lb) hammer/ 30 (in) drop	Drilling Equipment	CME 85 Truck-mounted Rig
Well Depth (ft)	15	Top of Well Elevation (ft)	409.61	Groundwater Elevation (ft)	400.06
System/ Datum				Groundwater Level (ft. bgs)	9.55



LOG OF BORING B-3



Project: Park Lake Homes Redevelopment
 Project Location: Seattle, Washington
 Project Number: 1329-003-00

Figure: A-5
 Sheet 1 of 1

1329-003-00 GEI_GEOWELL 2.1.0 P:\111329003\00\FINALS\1329003.GPJ GEIV2.GDT 8/27/03

Figure C-1

Date(s) Drilled	12/03/02	Logged By	SJW	Checked By	CFE
Drilling Contractor	Gregory Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	Dames & Moore
Auger Data	5.25-inch HSA	Hammer Data	300 (lb) hammer/ 30 (in) drop	Drilling Equipment	CME 85 Truck-mounted Rig
Total Depth (ft)	16.5	Surface Elevation (ft)	408.0	Groundwater Level (ft. bgs)	None observed
Datum/ System					

Elevation feet	Depth feet	SAMPLES				Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, lbs/ft ³	OTHER TESTS AND NOTES
		Interval Number	Recovered (in)	Blows/foot								
0							SM	Brown silty fine sand with occasional gravel (loose, moist)				
-405		1	17	25			SM	Gray-brown with weak orange mottles stratified silty sand and fine sand with occasional fine gravel (medium dense, moist)	11	122	SA	
5		2	16	27					10	103	%F	
-400												
10		3	15	16					8	110	SA	
-395												
15		4	16	54								

Note: See Figure A-2 for explanation of symbols

LOG OF BORING B-4



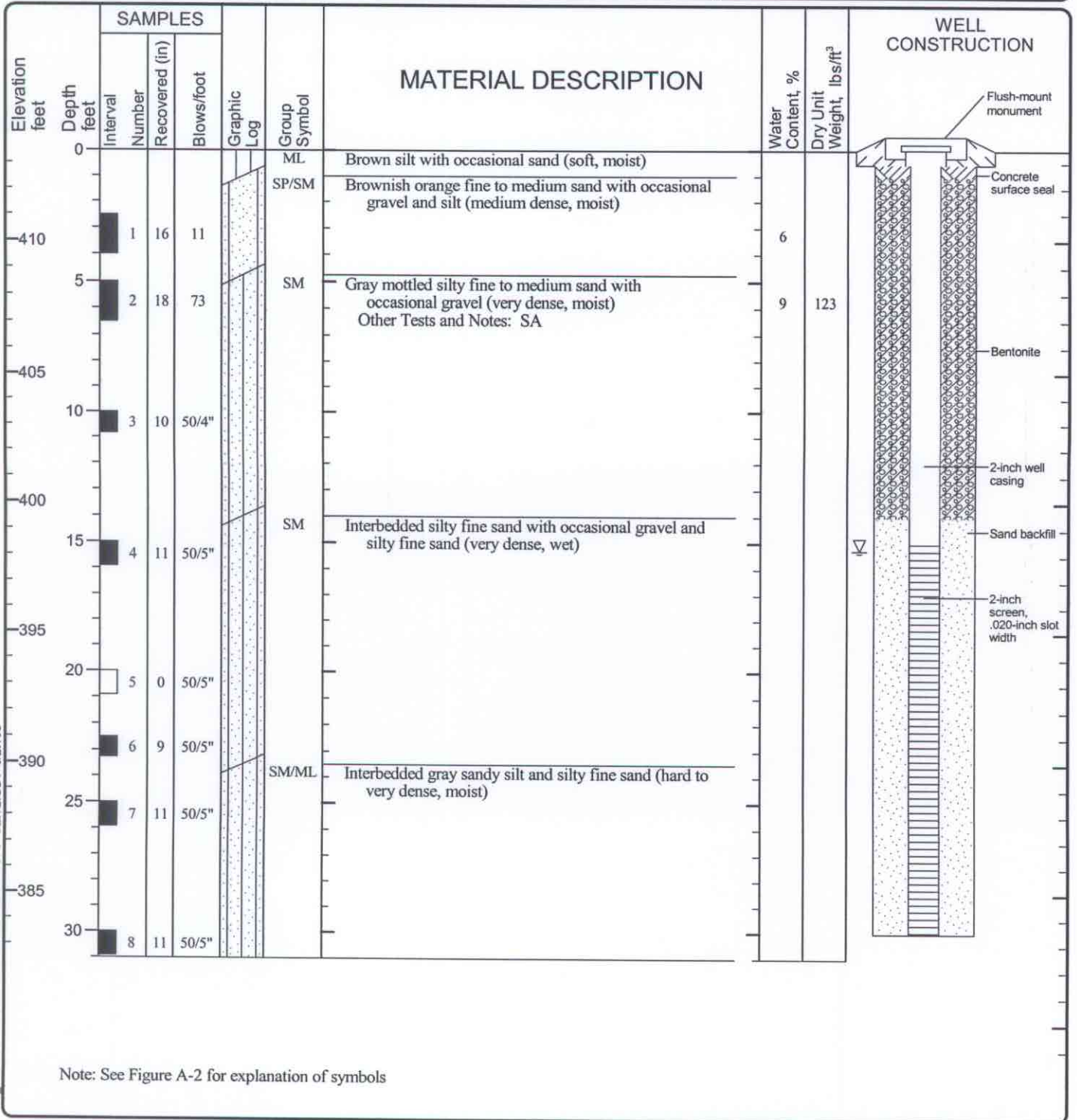
Project: Park Lake Homes Redevelopment
 Project Location: Seattle, Washington
 Project Number: 1329-003-00

Figure: A-6
 Sheet 1 of 1

1329-003-00_GEI_GTBORING_2.1.0_P:\11\1329003\00\FINAL\SI\1329003.GPJ GEIV2_2.GDT 8/27/03

Figure C-2

Date(s) Drilled	12/02/02	Logged By	SJW	Checked By	CFE
Drilling Contractor	Gregory Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	Dames & Moore
Total Boring Depth (ft)	31	Hammer Data	300 (lb) hammer/ 30 (in) drop	Drilling Equipment	CME 85 Truck-mounted Rig
Well Depth (ft)	30	Top of Well Elevation (ft)	413.48	Groundwater Elevation (ft)	398.21
System/ Datum				Groundwater Level (ft. bgs)	15.27



LOG OF BORING B-5



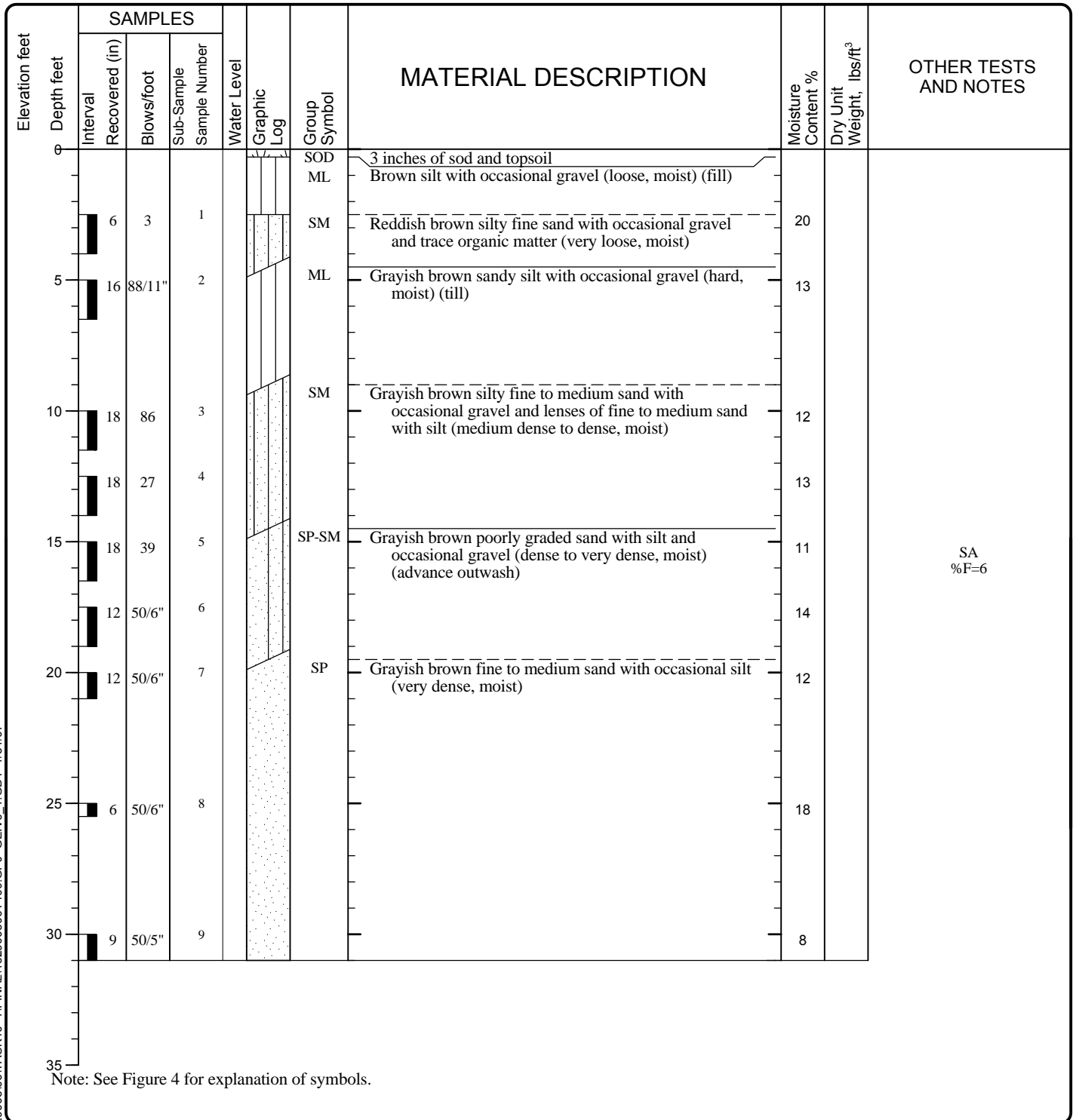
Project: Park Lake Homes Redevelopment
 Project Location: Seattle, Washington
 Project Number: 1329-003-00

Figure: A-7
 Sheet 1 of 1

1329-003-00 GEI GEOWELL 2.1.0 P:\111329003\00\FINAL\11329003.GPJ_GEIV2.GDT 8/27/03

Figure C-3

Date(s) Drilled	11/19/06	Logged By	LCF	Checked By	MAM
Drilling Contractor	Boretac	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	3¼-inch ID	Hammer Data	140 lb hammer/30 in drop rope and cathead	Drilling Equipment	Volvo EC 55 LA
Total Depth (ft)	31	Surface Elevation (ft)	±397	Groundwater Level (ft. bgs)	Not Encountered
Vertical Datum		Datum/System		Easting(x):	Nothing(y):



V6_GTBORING P:\11329003\06\TASK40-1\FINAL\132900306T400.GPJ GEIV6_1.GDT 1/31/07

LOG OF BORING B-30



Project: Greenbridge Hope VI Redevelopment
 Project Location: King County, Washington
 Project Number: 1329-003-06, T400

Figure A-11
 Sheet 1 of 1

Figure C-4

Date Excavated: 1/27/06

Logged by: RDR

Equipment: Case 580 Backhoe

Surface Elevation (ft): 403

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
0					TS	Brown sand with silt and roots (loose, moist) (topsoil)		Probed 4 to 6 inches
					SM	Light brown with orange mottling silty fine to medium sand with gravel and debris (loose to medium dense, moist) (fill)		
400			1			Becomes wet	10	
	5				SM	Light brown silty fine to medium sand with gravel (dense, moist) (till)		
Test pit completed at 5.5 feet Moderate groundwater seepage observed at 4.5 feet Minor caving observed at 4.5 feet								
395								
10								
390								
15								

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

V6_GTTPTT P:\1\1329003\06\TASK40-1\FINAL\132900306TP47-57.GPJ GEIV6_1.GDT 1/31/07

LOG OF TEST PIT TP-50



Project: Greenbrige Hope VI Redevelopment
 Project Location: King County, Washington
 Project Number: 1329-003-06

Figure A-60
 Sheet 1 of 1

Figure C-5

Date Excavated: 1/27/06

Logged by: RDR

Equipment: Case 580 Backhoe

Surface Elevation (ft): 406

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
0					TS	Brown sand with silt and gravel (loose, moist) (topsoil)		
					SM	Brown silty fine sand with gravel (very loose to loose, moist) (fill)		
405								Probed 2 feet
			1				12	
5						Roots		
400					SM	Light brown-gray silty fine to medium sand with gravel (dense, moist) (till)		
						Test pit completed at 7 feet No groundwater seepage observed No caving observed		
10								
395								
15								

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

V6_GTTPTT P:\1\1329003\06\TASK40-1\FINAL\132900306\TP47-57.GPJ GEIV6_1.GDT 1/31/07

LOG OF TEST PIT TP-51



Project: Greenbrige Hope VI Redevelopment
 Project Location: King County, Washington
 Project Number: 1329-003-06

Figure A-61
Sheet 1 of 1

Figure C-6

Date Excavated: 1/27/06

Logged by: RDR

Equipment: Case 580 Backhoe

Surface Elevation (ft): 405

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
405	0				TS	Brown sand with silt and occasional gravel and roots (loose, moist) (topsoil)		Probed 10 inches
					SM	Orange-brown silty fine to medium sand with occasional gravel and few roots (dense, moist) (weathered till)		Probed 2 inches
		X	1		SM	Light gray silty fine to medium sand with gravel (dense, moist) (till)	16	Probed less than 1 inch
400	5	X	2			Test pit completed at 5 feet No groundwater seepage observed No caving observed	11	
395	10							
390	15							

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-52



Project: Greenbrige Hope VI Redevelopment
 Project Location: King County, Washington
 Project Number: 1329-003-06

Figure A-62
Sheet 1 of 1

Figure C-7

V6_GTTPTT P:\1\1329003\06\TASK40~1\FINAL\132900306\TP47-57.GPJ GEIV6_1.GDT 1/31/07

Date Excavated: 1/27/06

Logged by: RDR

Equipment: Case 580 Backhoe

Surface Elevation (ft): 402

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
0					TS	Brown fine to medium sand with gravel and roots (loose, moist) (topsoil)		Probed 10 inches
400		X	1		SM	Orange-light brown silty fine to medium sand with gravel (medium dense, moist) (weathered advance outwash)	18	Probed 8 to 10 inches
					SP	Light brown fine to medium sand with gravel and lenses of silt (dense, moist) (advance outwash)		Probed 1 inch
5		X	2			Becomes damp	14	
395						Boulder		
						Test pit completed at 7 feet No groundwater seepage observed No caving observed		
10								
390								
15								

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

V6_GTTPTT P:\1\1329003\06\TASK40-1\FINAL\132900306\TP47-57.GPJ GEIV6_1.GDT 1/31/07

LOG OF TEST PIT TP-53



Project: Greenbrige Hope VI Redevelopment
 Project Location: King County, Washington
 Project Number: 1329-003-06

Figure A-63
Sheet 1 of 1

Figure C-8

Date Excavated: 1/27/06

Logged by: RDR

Equipment: Case 580 Backhoe

Surface Elevation (ft): 409

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
0					TS	Brown fine to medium sand with silt and occasional gravel and roots (loose, moist) (topsoil)		
					SP-SM	Light brown-orange silty fine to medium sand with gravel (dense, moist) (weathered advance outwash)		Probed 3 inches
405		1	1		SP-SM		13	
					SP-SM	Gray fine to medium sand with silt and gravel and lenses of silt (dense, moist) (advance outwash)		Probed 1 inch
		2	2		SP-SM		13	
400						Test pit completed at 8 feet No groundwater seepage observed No caving observed		
10								
395								
15								

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-54



Project: Greenbrige Hope VI Redevelopment
Project Location: King County, Washington
Project Number: 1329-003-06

Figure A-64
Sheet 1 of 1

Figure C-9

V6_GTTPTT P:\1\1329003\06\TASK40~1\FINAL\132900306\TP47-57.GPJ GEIV6_1.GDT 1/31/07

Date Excavated: 1/27/06

Logged by: RDR

Equipment: Case 580 Backhoe

Surface Elevation (ft): 404

Elevation feet	Depth feet	Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
0					SM	Brown with orange mottling silty fine to medium sand with occasional gravel (loose to medium dense, moist) (fill)		Probed 16 inches
			1			Wood and concrete debris	15	
400						Concrete debris		
			2		SP-SM	Gray fine to medium sand with silt and fine to coarse gravel (medium dense to dense, moist) (advance outwash)	17	
395						Test pit completed at 10 feet No groundwater seepage observed No caving observed		
10								
390								
15								

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

LOG OF TEST PIT TP-55



Project: Greenbrige Hope VI Redevelopment
 Project Location: King County, Washington
 Project Number: 1329-003-06

Figure A-65
Sheet 1 of 1

Figure C-10

V6_GTTPTT P:\1\1329003\06\TASK40~1\FINAL\132900306\TP47-57.GPJ GEIV6_1.GDT 1/31/07

APPENDIX D
Report Limitations and Guidelines for Use

APPENDIX D

REPORT LIMITATIONS AND GUIDELINES FOR USE¹

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

Geotechnical Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by King County Housing Authority and other members of the design team for use in the design of this project. This report may be made available to prospective contractors for bidding or estimating purposes; but our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. No one except King County Housing Authority and members of the design team should rely on this report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

A Geotechnical Engineering or Geologic Report is Based on A Unique Set of Project-Specific Factors

This report has been prepared for the proposed Greenbridge Areas 9, 10, 11 and HomeSight Property projects in Seattle, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

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

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

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

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

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

Subsurface Conditions Can Change

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

Most Geotechnical and Geologic Findings are Professional Opinions

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

Geotechnical Engineering Report Recommendations are Not Final

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

Sufficient monitoring, testing and consultation by GeoEngineers should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation

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

Give Contractors a Complete Report and Guidance

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly

written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

Contractors Are Responsible For Site Safety on Their Own Construction Projects

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

Read These Provisions Closely

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

Geotechnical, Geologic and Environmental Reports Should Not Be Interchanged

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

Biological Pollutants

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



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

June 21, 2018

John Eliason	Permit No.	WAR005863
Development Director	Site Name:	King Co Housing Authority Greenbridge
King County Housing Authority	Location:	9800 8TH AVE SW
600 Andover Park W	City:	Seattle, WA
Tukwila, WA 98188	County:	King

RE: Correction- Coverage under the Construction Stormwater General Permit

Dear Mr. Eliason:

This letter is to notify you that the Washington State Department of Ecology (Ecology) has updated our records to show due to a miscalculation of partial transfer acres, disturbed acres are corrected to reflect 17.0 disturbed acres covered under this permit . **Please retain this letter as the official record for permit coverage for your site.**

As a reminder, please take time to read the permit and contact Ecology if you have any questions.

For Additional Information or Assistance

Ecology is committed to providing assistance to you. Please review our web page at www.ecology.wa.gov/constructionstormwaterpermit. For questions about transfers, terminations, and other administrative issues, please contact Evan Dobrowski of Ecology's Northwest Regional Office in Bellevue at evan.dobrowski@ecy.wa.gov, or (425) 649-7276.

If you have any questions regarding this letter, contact Josh Klimek at josh.klimek@ecy.wa.gov, or (360) 407-7451.

Sincerely,

Vincent McGowan, Manager
Program Development Services Section
Water Quality Program

cc: Ecology Permit Fee Unit, HQ
Stormwater File, HQ



Issuance Date: November 18, 2015
Effective Date: January 1, 2016
Expiration Date: December 31, 2020

CONSTRUCTION STORMWATER GENERAL PERMIT

National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General
Permit for Stormwater Discharges Associated with Construction Activity

State of Washington
Department of Ecology
Olympia, Washington 98504

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

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



Heather R. Bartlett
Water Quality Program Manager
Washington State Department of Ecology

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SUMMARY OF PERMIT REPORT SUBMITTALS

Refer to the Special and General Conditions within this permit for additional submittal requirements. Appendix A provides a list of definitions. Appendix B provides a list of acronyms.

Table 1: Summary of Required Submittals

Permit Section	Submittal	Frequency	First Submittal Date
<u>S5.A</u> and <u>S8</u>	High Turbidity/Transparency Phone Reporting	As Necessary	Within 24 hours
<u>S5.B</u>	Discharge Monitoring Report	Monthly*	Within 15 days following the end of each month
<u>S5.F</u> and <u>S8</u>	Noncompliance Notification – Telephone Notification	As necessary	Within 24-hours
<u>S5.F</u>	Noncompliance Notification – Written Report	As necessary	Within 5 Days of non-compliance
<u>S9.C</u>	Request for Chemical Treatment Form	As necessary	Written approval from Ecology is required prior to using chemical treatment (with the exception of dry ice or CO ₂ to adjust pH)
<u>G2</u>	Notice of Change in Authorization	As necessary	
<u>G6</u>	Permit Application for Substantive Changes to the Discharge	As necessary	
<u>G8</u>	Application for Permit Renewal	1/permit cycle	No later than 180 days before expiration
<u>G9</u>	Notice of Permit Transfer	As necessary	
<u>G20</u>	Notice of Planned Changes	As necessary	
<u>G22</u>	Reporting Anticipated Non-compliance	As necessary	

SPECIAL NOTE: *Permittees must submit electronic Discharge Monitoring Reports (DMRs) to the Washington State Department of Ecology monthly, regardless of site discharge, for the full duration of permit coverage. Refer to Section S5.B of this General Permit for more specific information regarding DMRs.

Table 2: Summary of Required On-site Documentation

Document Title	Permit Conditions
Permit Coverage Letter	See Conditions <u>S2</u> , <u>S5</u>
Construction Stormwater General Permit	See Conditions <u>S2</u> , <u>S5</u>
Site Log Book	See Conditions <u>S4</u> , <u>S5</u>
Stormwater Pollution Prevention Plan (SWPPP)	See Conditions <u>S9</u> , <u>S5</u>

SPECIAL CONDITIONS

S1. PERMIT COVERAGE

A. Permit Area

This Construction Stormwater General Permit (CSWGP) covers all areas of Washington State, except for federal operators and Indian Country as specified in Special Condition S1.E.3.

B. Operators Required to Seek Coverage Under this General Permit:

1. Operators of the following construction activities are required to seek coverage under this CSWGP:
 - a. Clearing, grading and/or excavation that results in the disturbance of one or more acres (including off-site disturbance acreage authorized in S1.C.2) and discharges stormwater to surface waters of the State; and clearing, grading and/or excavation on sites smaller than one acre that are part of a larger common plan of development or sale, if the common plan of development or sale will ultimately disturb one acre or more and discharge stormwater to surface waters of the State.
 - i. This includes forest practices (including, but not limited to, class IV conversions) that are part of a construction activity that will result in the disturbance of one or more acres, and discharge to surface waters of the State (that is, forest practices that prepare a site for construction activities); and
 - b. Any size construction activity discharging stormwater to waters of the State that the Washington State Department of Ecology (Ecology):
 - i. Determines to be a significant contributor of pollutants to waters of the State of Washington.
 - ii. Reasonably expects to cause a violation of any water quality standard.
2. Operators of the following activities are not required to seek coverage under this CSWGP (unless specifically required under Special Condition S1.B.1.b. above):
 - a. Construction activities that discharge all stormwater and non-stormwater to ground water, sanitary sewer, or combined sewer, and have no point source discharge to either surface water or a storm sewer system that drains to surface waters of the State.
 - b. Construction activities covered under an Erosivity Waiver (Special Condition S2.C).
 - c. Routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

C. Authorized Discharges:

1. *Stormwater Associated with Construction Activity.* Subject to compliance with the terms and conditions of this permit, Permittees are authorized to discharge stormwater associated with construction activity to surface waters of the State or to a storm sewer system that drains to surface waters of the State. (Note that “surface waters of the State” may exist on a construction site as well as off site; for example, a creek running through a site.)
2. *Stormwater Associated with Construction Support Activity.* This permit also authorizes stormwater discharge from support activities related to the permitted construction site (for example, an on-site portable rock crusher, off-site equipment staging yards, material storage areas, borrow areas, etc.) provided:
 - a. The support activity relates directly to the permitted construction site that is required to have an NPDES permit; and
 - b. The support activity is not a commercial operation serving multiple unrelated construction projects, and does not operate beyond the completion of the construction activity; and
 - c. Appropriate controls and measures are identified in the Stormwater Pollution Prevention Plan (SWPPP) for the discharges from the support activity areas.
3. *Non-Stormwater Discharges.* The categories and sources of non-stormwater discharges identified below are authorized conditionally, provided the discharge is consistent with the terms and conditions of this permit:
 - a. Discharges from fire-fighting activities.
 - b. Fire hydrant system flushing.
 - c. Potable water, including uncontaminated water line flushing.
 - d. Hydrostatic test water.
 - e. Uncontaminated air conditioning or compressor condensate.
 - f. Uncontaminated ground water or spring water.
 - g. Uncontaminated excavation dewatering water (in accordance with S9.D.10).
 - h. Uncontaminated discharges from foundation or footing drains.
 - i. Uncontaminated water used to control dust. Permittees must minimize the amount of dust control water used.
 - j. Routine external building wash down that does not use detergents.
 - k. Landscape irrigation water.

The SWPPP must adequately address all authorized non-stormwater discharges, except for discharges from fire-fighting activities, and must comply with Special Condition S3.

At a minimum, discharges from potable water (including water line flushing), fire hydrant system flushing, and pipeline hydrostatic test water must undergo the following: dechlorination to a concentration of 0.1 parts per million (ppm) or less, and pH adjustment to within 6.5 – 8.5 standard units (su), if necessary.

D. Prohibited Discharges:

The following discharges to waters of the State, including ground water, are prohibited.

1. Concrete wastewater.
2. Wastewater from washout and clean-up of stucco, paint, form release oils, curing compounds and other construction materials.
3. Process wastewater as defined by 40 Code of Federal Regulations (CFR) 122.2 (see Appendix A of this permit).
4. Slurry materials and waste from shaft drilling, including process wastewater from shaft drilling for construction of building, road, and bridge foundations unless managed according to Special Condition S9.D.9.j.
5. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance.
6. Soaps or solvents used in vehicle and equipment washing.
7. Wheel wash wastewater, unless managed according to Special Condition S9.D.9.
8. Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, unless managed according to Special Condition S9.D.10.

E. Limits on Coverage

Ecology may require any discharger to apply for and obtain coverage under an individual permit or another more specific general permit. Such alternative coverage will be required when Ecology determines that this CSWGP does not provide adequate assurance that water quality will be protected, or there is a reasonable potential for the project to cause or contribute to a violation of water quality standards.

The following stormwater discharges are not covered by this permit:

1. Post-construction stormwater discharges that originate from the site after completion of construction activities and the site has undergone final stabilization.
2. Non-point source silvicultural activities such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance, from which there is natural runoff as excluded in 40 CFR Subpart 122.
3. Stormwater from any federal operator.

4. Stormwater from facilities located on “Indian Country” as defined in 18 U.S.C. §1151, except portions of the Puyallup Reservation as noted below.

Indian Country includes:

- a. All land within any Indian Reservation notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation. This includes all federal, tribal, and Indian and non-Indian privately owned land within the reservation.
- b. All off-reservation Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.
- c. All off-reservation federal trust lands held for Native American Tribes.

Puyallup Exception: Following the *Puyallup Tribes of Indians Land Settlement Act of 1989*, 25 U.S.C. §1773; the permit does apply to land within the Puyallup Reservation except for discharges to surface water on land held in trust by the federal government.

5. Stormwater from any site covered under an existing NPDES individual permit in which stormwater management and/or treatment requirements are included for all stormwater discharges associated with construction activity.
6. Stormwater from a site where an applicable Total Maximum Daily Load (TMDL) requirement specifically precludes or prohibits discharges from construction activity.

S2. APPLICATION REQUIREMENTS

A. Permit Application Forms

1. Notice of Intent Form/Timeline
 - a. Operators of new or previously unpermitted construction activities must submit a complete and accurate permit application (Notice of Intent, or NOI) to Ecology.
 - b. Operators must apply using the electronic application form (NOI) available on Ecology’s website <http://www.ecy.wa.gov/programs/wq/stormwater/construction/index.html>. Permittees unable to submit electronically (for example, those who do not have an internet connection) must contact Ecology to request a waiver and obtain instructions on how to obtain a paper NOI.

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

- c. The operator must submit the NOI at least 60 days before discharging stormwater from construction activities and must submit it on or before the date of the first public notice (see Special Condition S2.B below for details). The 30-day public comment period begins on the publication date of the second public notice. Unless Ecology responds to the complete application in writing, based on public comments, or any other relevant factors, coverage under the general permit will automatically commence on the thirty-first day following receipt by Ecology of a completed NOI, or the issuance date of this permit, whichever is later; unless Ecology specifies a later date in writing as required by WAC173-226-200(2).
- d. If an applicant intends to use a Best Management Practice (BMP) selected on the basis of Special Condition S9.C.4 (“demonstrably equivalent” BMPs), the applicant must notify Ecology of its selection as part of the NOI. In the event the applicant selects BMPs after submission of the NOI, it must provide notice of the selection of an equivalent BMP to Ecology at least 60 days before intended use of the equivalent BMP.
- e. Permittees must notify Ecology regarding any changes to the information provided on the NOI by submitting an updated NOI. Examples of such changes include, but are not limited to:
 - i. Changes to the Permittee’s mailing address,
 - ii. Changes to the on-site contact person information, *and*
 - iii. Changes to the area/acreage affected by construction activity.
- f. Applicants must notify Ecology if they are aware of contaminated soils and/or groundwater associated with the construction activity. Provide detailed information with the NOI (as known and readily available) on the nature and extent of the contamination (concentrations, locations, and depth), as well as pollution prevention and/or treatment BMPs proposed to control the discharge of soil and/or groundwater contaminants in stormwater. Examples of such detail may include, but are not limited to:
 - i. List or table of all known contaminants with laboratory test results showing concentration and depth,
 - ii. Map with sample locations,
 - iii. Temporary Erosion and Sediment Control (TESC) plans,
 - iv. Related portions of the Stormwater Pollution Prevention Plan (SWPPP) that address the management of contaminated and potentially contaminated construction stormwater and dewatering water,
 - v. Dewatering plan and/or dewatering contingency plan.

2. Transfer of Coverage Form

The Permittee can transfer current coverage under this permit to one or more new operators, including operators of sites within a Common Plan of Development, provided the Permittee submits a Transfer of Coverage Form in accordance with General Condition G9. Transfers do not require public notice.

B. Public Notice

For new or previously unpermitted construction activities, the applicant must publish a public notice at least one time each week for two consecutive weeks, at least 7 days apart, in a newspaper with general circulation in the county where the construction is to take place. The notice must contain:

1. A statement that “The applicant is seeking coverage under the Washington State Department of Ecology’s Construction Stormwater NPDES and State Waste Discharge General Permit”.
2. The name, address and location of the construction site.
3. The name and address of the applicant.
4. The type of construction activity that will result in a discharge (for example, residential construction, commercial construction, etc.), and the number of acres to be disturbed.
5. The name of the receiving water(s) (that is, the surface water(s) to which the site will discharge), or, if the discharge is through a storm sewer system, the name of the operator of the system.
6. The statement: “Any persons desiring to present their views to the Washington State Department of Ecology regarding this application, or interested in Ecology’s action on this application, may notify Ecology in writing no later than 30 days of the last date of publication of this notice. Ecology reviews public comments and considers whether discharges from this project would cause a measurable change in receiving water quality, and, if so, whether the project is necessary and in the overriding public interest according to Tier II antidegradation requirements under WAC 173-201A-320. Comments can be submitted to: Department of Ecology, PO Box 47696, Olympia, Washington 98504-7696 Attn: Water Quality Program, Construction Stormwater.”

C. Erosivity Waiver

Construction site operators may qualify for an erosivity waiver from the CSWGP if the following conditions are met:

1. The site will result in the disturbance of fewer than 5 acres and the site is not a portion of a common plan of development or sale that will disturb 5 acres or greater.
2. Calculation of Erosivity “R” Factor and Regional Timeframe:
 - a. The project’s rainfall erosivity factor (“R” Factor) must be less than 5 during the period of construction activity, as calculated (see the CSWGP homepage <http://www.ecy.wa.gov/programs/wq/stormwater/construction/index.html> for a link to the EPA’s calculator and step by step instructions on computing the “R” Factor in the EPA Erosivity Waiver Fact Sheet). The period of construction activity starts when the land is first disturbed and ends with final stabilization. In addition:
 - b. The entire period of construction activity must fall within the following timeframes:
 - i. For sites west of the Cascades Crest: June 15 – September 15.
 - ii. For sites east of the Cascades Crest, excluding the Central Basin: June 15 – October 15.
 - iii. For sites east of the Cascades Crest, within the Central Basin: no additional timeframe restrictions apply. The Central Basin is defined as the portions of Eastern Washington with mean annual precipitation of less than 12 inches. For a map of the Central Basin (Average Annual Precipitation Region 2), refer to <http://www.ecy.wa.gov/programs/wq/stormwater/construction/resourcesguidance.html>.
3. Construction site operators must submit a complete Erosivity Waiver certification form at least one week before disturbing the land. Certification must include statements that the operator will:
 - a. Comply with applicable local stormwater requirements; *and*
 - b. Implement appropriate erosion and sediment control BMPs to prevent violations of water quality standards.
4. This waiver is not available for facilities declared significant contributors of pollutants as defined in Special Condition S1.B.1.b. or for any size construction activity that could reasonably expect to cause a violation of any water quality standard as defined in Special Condition S1.B.1.b.ii.
5. This waiver does not apply to construction activities which include non-stormwater discharges listed in Special Condition S1.C.3.

6. If construction activity extends beyond the certified waiver period for any reason, the operator must either:
 - a. Recalculate the rainfall erosivity “R” factor using the original start date and a new projected ending date and, if the “R” factor is still under 5 *and* the entire project falls within the applicable regional timeframe in Special Condition S2.C.2.b, complete and submit an amended waiver certification form before the original waiver expires; *or*
 - b. Submit a complete permit application to Ecology in accordance with Special Condition S2.A and B before the end of the certified waiver period.

S3. COMPLIANCE WITH STANDARDS

- A. Discharges must not cause or contribute to a violation of surface water quality standards (Chapter 173-201A WAC), ground water quality standards (Chapter 173-200 WAC), sediment management standards (Chapter 173-204 WAC), and human health-based criteria in the National Toxics Rule (40 CFR Part 131.36). Discharges not in compliance with these standards are not authorized.
- B. Prior to the discharge of stormwater and non-stormwater to waters of the State, the Permittee must apply all known, available, and reasonable methods of prevention, control, and treatment (AKART). This includes the preparation and implementation of an adequate SWPPP, with all appropriate BMPs installed and maintained in accordance with the SWPPP and the terms and conditions of this permit.
- C. Ecology presumes that a Permittee complies with water quality standards unless discharge monitoring data or other site-specific information demonstrates that a discharge causes or contributes to a violation of water quality standards, when the Permittee complies with the following conditions. The Permittee must fully:
 1. Comply with all permit conditions, including planning, sampling, monitoring, reporting, and recordkeeping conditions.
 2. Implement stormwater BMPs contained in stormwater management manuals published or approved by Ecology, or BMPs that are demonstrably equivalent to BMPs contained in stormwater technical manuals published or approved by Ecology, including the proper selection, implementation, and maintenance of all applicable and appropriate BMPs for on-site pollution control. (For purposes of this section, the stormwater manuals listed in Appendix 10 of the Phase I Municipal Stormwater Permit are approved by Ecology.)
- D. Where construction sites also discharge to ground water, the ground water discharges must also meet the terms and conditions of this CSWGP. Permittees who discharge to ground water through an injection well must also comply with any applicable requirements of the Underground Injection Control (UIC) regulations, Chapter 173-218 WAC.

S4. MONITORING REQUIREMENTS, BENCHMARKS, AND REPORTING TRIGGERS

A. Site Log Book

The Permittee must maintain a site log book that contains a record of the implementation of the SWPPP and other permit requirements, including the installation and maintenance of BMPs, site inspections, and stormwater monitoring.

B. Site Inspections

The Permittee's site inspections must include all areas disturbed by construction activities, all BMPs, and all stormwater discharge points under the Permittee's operational control. (See Special Conditions S4.B.3 and B.4 below for detailed requirements of the Permittee's Certified Erosion and Sediment Control Lead [CESCL].)

Construction sites one acre or larger that discharge stormwater to surface waters of the State must have site inspections conducted by a certified CESCL. Sites less than one acre may have a person without CESCL certification conduct inspections.

1. The Permittee must examine stormwater visually for the presence of suspended sediment, turbidity, discoloration, and oil sheen. The Permittee must evaluate the effectiveness of BMPs and determine if it is necessary to install, maintain, or repair BMPs to improve the quality of stormwater discharges.

Based on the results of the inspection, the Permittee must correct the problems identified by:

- a. Reviewing the SWPPP for compliance with Special Condition S9 and making appropriate revisions within 7 days of the inspection.
 - b. Immediately beginning the process of fully implementing and maintaining appropriate source control and/or treatment BMPs as soon as possible, addressing the problems no later than within 10 days of the inspection. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when an extension is requested by a Permittee within the initial 10-day response period.
 - c. Documenting BMP implementation and maintenance in the site log book.
2. The Permittee must inspect all areas disturbed by construction activities, all BMPs, and all stormwater discharge points at least once every calendar week and within 24 hours of any discharge from the site. (For purposes of this condition, individual discharge events that last more than one day do not require daily inspections. For example, if a stormwater pond discharges continuously over the course of a week, only one inspection is required that week.) The Permittee may reduce the inspection frequency for temporarily stabilized, inactive sites to once every calendar month.

3. The Permittee must have staff knowledgeable in the principles and practices of erosion and sediment control. The CESCL (sites one acre or more) or inspector (sites less than one acre) must have the skills to assess the:
 - a. Site conditions and construction activities that could impact the quality of stormwater, *and*
 - b. Effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.
4. The SWPPP must identify the CESCL or inspector, who must be present on site or on-call at all times. The CESCL must obtain this certification through an approved erosion and sediment control training program that meets the minimum training standards established by Ecology (see BMP C160 in the manual referred to in Special Condition S9.C.1 and 2).
5. The Permittee must summarize the results of each inspection in an inspection report or checklist and enter the report/checklist into, or attach it to, the site log book. At a minimum, each inspection report or checklist must include:
 - a. Inspection date and time.
 - b. Weather information, the general conditions during inspection and the approximate amount of precipitation since the last inspection, and precipitation within the last 24 hours.
 - c. A summary or list of all implemented BMPs, including observations of all erosion/sediment control structures or practices.
 - d. A description of the locations:
 - i. Of BMPs inspected;
 - ii. Of BMPs that need maintenance and why;
 - iii. Of BMPs that failed to operate as designed or intended; *and*
 - iv. Where additional or different BMPs are needed, and why.
 - e. A description of stormwater discharged from the site. The Permittee must note the presence of suspended sediment, turbidity, discoloration, and oil sheen, as applicable.
 - f. Any water quality monitoring performed during inspection.
 - g. General comments and notes, including a brief description of any BMP repairs, maintenance or installations made following the inspection.
 - h. A summary report and a schedule of implementation of the remedial actions that the Permittee plans to take if the site inspection indicates that the site is out of compliance. The remedial actions taken must meet the requirements of the SWPPP and the permit.

- i. The name, title, and signature of the person conducting the site inspection, a phone number or other reliable method to reach this person, and the following statement: “I certify that this report is true, accurate, and complete to the best of my knowledge and belief.”

Table 3: Summary of Primary Monitoring Requirements

Size of Soil Disturbance¹	Weekly Site Inspections	Weekly Sampling w/ Turbidity Meter	Weekly Sampling w/ Transparency Tube	Weekly pH Sampling²	CESCL Required for Inspections?
Sites that disturb less than 1 acre, but are part of a larger Common Plan of Development	Required	Not Required	Not Required	Not Required	No
Sites that disturb 1 acre or more, but fewer than 5 acres	Required	Sampling Required – either method ³		Required	Yes
Sites that disturb 5 acres or more	Required	Required	Not Required ⁴	Required	Yes

¹ Soil disturbance is calculated by adding together all areas that will be affected by construction activity. Construction activity means clearing, grading, excavation, and any other activity that disturbs the surface of the land, including ingress/egress from the site.

² If construction activity results in the disturbance of 1 acre or more, and involves significant concrete work (1,000 cubic yards of poured over the life of a project) or the use of recycled concrete or engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD], or fly ash), and stormwater from the affected area drains to surface waters of the State or to a storm sewer stormwater collection system that drains to other surface waters of the State, the Permittee must conduct pH sampling in accordance with Special Condition S4.D.

³ Sites with one or more acres, but fewer than 5 acres of soil disturbance, must conduct turbidity or transparency sampling in accordance with Special Condition S4.C.

⁴ Sites equal to or greater than 5 acres of soil disturbance must conduct turbidity sampling using a turbidity meter in accordance with Special Condition S4.C.

C. Turbidity/Transparency Sampling Requirements

1. Sampling Methods

- a. If construction activity involves the disturbance of 5 acres or more, the Permittee must conduct turbidity sampling per Special Condition S4.C.
- b. If construction activity involves 1 acre or more but fewer than 5 acres of soil disturbance, the Permittee must conduct either transparency sampling **or** turbidity sampling per Special Condition S4.C.

2. Sampling Frequency

- a. The Permittee must sample all discharge points at least once every calendar week when stormwater (or authorized non-stormwater) discharges from the site or enters any on-site surface waters of the state (for example, a creek running through a site); sampling is not required on sites that disturb less than an acre.
- b. Samples must be representative of the flow and characteristics of the discharge.
- c. Sampling is not required when there is no discharge during a calendar week.
- d. Sampling is not required outside of normal working hours or during unsafe conditions.
- e. If the Permittee is unable to sample during a monitoring period, the Permittee must include a brief explanation in the monthly Discharge Monitoring Report (DMR).
- f. Sampling is not required before construction activity begins.
- g. The Permittee may reduce the sampling frequency for temporarily stabilized, inactive sites to once every calendar month.

3. Sampling Locations

- a. Sampling is required at all points where stormwater associated with construction activity (or authorized non-stormwater) is discharged off site, including where it enters any on-site surface waters of the state (for example, a creek running through a site).
- b. The Permittee may discontinue sampling at discharge points that drain areas of the project that are fully stabilized to prevent erosion.
- c. The Permittee must identify all sampling point(s) on the SWPPP site map and clearly mark these points in the field with a flag, tape, stake or other visible marker.
- d. Sampling is not required for discharge that is sent directly to sanitary or combined sewer systems.

- e. The Permittee may discontinue sampling at discharge points in areas of the project where the Permittee no longer has operational control of the construction activity.
4. Sampling and Analysis Methods
- a. The Permittee performs turbidity analysis with a calibrated turbidity meter (turbidimeter) either on site or at an accredited lab. The Permittee must record the results in the site log book in nephelometric turbidity units (NTUs).
 - b. The Permittee performs transparency analysis on site with a 1¼-inch-diameter, 60-centimeter (cm)-long transparency tube. The Permittee will record the results in the site log book in centimeters (cm).

Table 4: Monitoring and Reporting Requirements

Parameter	Unit	Analytical Method	Sampling Frequency	Benchmark Value	Phone Reporting Trigger Value
Turbidity	NTU	SM2130	Weekly, if discharging	25 NTUs	250 NTUs
Transparency	cm	Manufacturer instructions, or Ecology guidance	Weekly, if discharging	33 cm	6 cm

5. Turbidity/Transparency Benchmark Values and Reporting Triggers

The benchmark value for turbidity is 25 NTUs or less. The benchmark value for transparency is 33 centimeters (cm). Note: Benchmark values do not apply to discharges to segments of water bodies on Washington State’s 303(d) list (Category 5) for turbidity, fine sediment, or phosphorus; these discharges are subject to a numeric effluent limit for turbidity. Refer to Special Condition S8 for more information.

- a. Turbidity 26 – 249 NTUs, or Transparency 32 – 7 cm:

If the discharge turbidity is 26 to 249 NTUs; or if discharge transparency is less than 33 cm, but equal to or greater than 6 cm, the Permittee must:

- i. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.
- ii. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, addressing the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.

- iii. Document BMP implementation and maintenance in the site log book.
- b. Turbidity 250 NTUs or greater, or Transparency 6 cm or less:

If a discharge point's turbidity is 250 NTUs or greater, or if discharge transparency is less than or equal to 6 cm, the Permittee must complete the reporting and adaptive management process described below.

- i. Telephone or submit an electronic report to the applicable Ecology Region's Environmental Report Tracking System (ERTS) number (or through Ecology's Water Quality Permitting Portal [WQWebPortal] – Permit Submittals when the form is available) within 24 hours, in accordance with Special Condition S5.A.
 - Central Region (Okanogan, Chelan, Douglas, Kittitas, Yakima, Klickitat, Benton): (509) 575-2490
 - Eastern Region (Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman): (509) 329-3400
 - Northwest Region (Kitsap, Snohomish, Island, King, San Juan, Skagit, Whatcom): (425) 649-7000
 - Southwest Region (Grays Harbor, Lewis, Mason, Thurston, Pierce, Clark, Cowlitz, Skamania, Wahkiakum, Clallam, Jefferson, Pacific): (360) 407-6300

Links to these numbers and the ERTS reporting page are located on the following web site:

<http://www.ecy.wa.gov/programs/wq/stormwater/construction/index.html>.

- ii. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.
- iii. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, addressing the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.
- iv. Document BMP implementation and maintenance in the site log book.
- v. Sample discharges daily until:
 - a) Turbidity is 25 NTUs (or lower); *or*
 - b) Transparency is 33 cm (or greater); *or*

- c) The Permittee has demonstrated compliance with the water quality limit for turbidity:
 - 1) No more than 5 NTUs over background turbidity, if background is less than 50 NTUs, *or*
 - 2) No more than 10% over background turbidity, if background is 50 NTUs or greater; *or*
- d) The discharge stops or is eliminated.

D. pH Sampling Requirements – Significant Concrete Work or Engineered Soils

If construction activity results in the disturbance of 1 acre or more, *and* involves significant concrete work (significant concrete work means greater than 1000 cubic yards poured concrete used over the life of a project) or the use of recycled concrete or engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD], or fly ash), and stormwater from the affected area drains to surface waters of the State or to a storm sewer system that drains to surface waters of the State, the Permittee must conduct pH sampling as set forth below. Note: In addition, discharges to segments of water bodies on Washington State's 303(d) list (Category 5) for high pH are subject to a numeric effluent limit for pH; refer to Special Condition S8.

1. For sites with significant concrete work, the Permittee must begin the pH sampling period when the concrete is first poured and exposed to precipitation, and continue weekly throughout and after the concrete pour and curing period, until stormwater pH is in the range of 6.5 to 8.5 (su).
2. For sites with recycled concrete, the Permittee must begin the weekly pH sampling period when the recycled concrete is first exposed to precipitation and must continue until the recycled concrete is fully stabilized and stormwater pH is in the range of 6.5 to 8.5 (su).
3. For sites with engineered soils, the Permittee must begin the pH sampling period when the soil amendments are first exposed to precipitation and must continue until the area of engineered soils is fully stabilized.
4. During the applicable pH monitoring period defined above, the Permittee must obtain a representative sample of stormwater and conduct pH analysis at least once per week.
5. The Permittee must sample pH in the sediment trap/pond(s) or other locations that receive stormwater runoff from the area of significant concrete work or engineered soils before the stormwater discharges to surface waters.
6. The benchmark value for pH is 8.5 standard units. Anytime sampling indicates that pH is 8.5 or greater, the Permittee must either:

- a. Prevent the high pH water (8.5 or above) from entering storm sewer systems or surface waters; *or*
 - b. If necessary, adjust or neutralize the high pH water until it is in the range of pH 6.5 to 8.5 (su) using an appropriate treatment BMP such as carbon dioxide (CO₂) sparging or dry ice. The Permittee must obtain written approval from Ecology before using any form of chemical treatment other than CO₂ sparging or dry ice.
7. The Permittee must perform pH analysis on site with a calibrated pH meter, pH test kit, or wide range pH indicator paper. The Permittee must record pH sampling results in the site log book.

S5. REPORTING AND RECORDKEEPING REQUIREMENTS

A. High Turbidity Reporting

Anytime sampling performed in accordance with Special Condition S4.C indicates turbidity has reached the 250 NTUs or more (or transparency less than or equal to 6 cm) high turbidity reporting level, the Permittee must either call the applicable Ecology Region's Environmental Report Tracking System (ERTS) number by phone within 24 hours of analysis or submit an electronic ERTS report (or submit an electronic report through Ecology's Water Quality Permitting Portal (WQWebPortal) – Permit Submittals when the form is available). See the CSWGP web site for links to ERTS and the WQWebPortal: <http://www.ecy.wa.gov/programs/wq/stormwater/construction/index.html>. Also, see phone numbers in Special Condition S4.C.5.b.i.

B. Discharge Monitoring Reports (DMRs)

Permittees required to conduct water quality sampling in accordance with Special Conditions S4.C (Turbidity/Transparency), S4.D (pH), S8 (303[d]/TMDL sampling), and/or G13 (Additional Sampling) must submit the results to Ecology.

Permittees must submit monitoring data using Ecology's WQWebDMR web application accessed through Ecology's Water Quality Permitting Portal. To find out more information and to sign up for WQWebDMR go to: <http://www.ecy.wa.gov/programs/wq/permits/paris/portal.html>.

Permittees unable to submit electronically (for example, those who do not have an internet connection) must contact Ecology to request a waiver and obtain instructions on how to obtain a paper copy DMR at:

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

Permittees who obtain a waiver not to use WQWebDMR must use the forms provided to them by Ecology; submittals must be mailed to the address above. Permittees shall

submit DMR forms to be received by Ecology within 15 days following the end of each month.

If there was no discharge during a given monitoring period, all Permittees must submit a DMR as required with "no discharge" entered in place of the monitoring results. DMRs are required for the full duration of permit coverage (from issuance date to termination). For more information, contact Ecology staff using information provided at the following web site: www.ecy.wa.gov/programs/wq/permits/paris/contacts.html.

C. Records Retention

The Permittee must retain records of all monitoring information (site log book, sampling results, inspection reports/checklists, etc.), Stormwater Pollution Prevention Plan, copy of the permit coverage letter (including Transfer of Coverage documentation), and any other documentation of compliance with permit requirements for the entire life of the construction project and for a minimum of three years following the termination of permit coverage. Such information must include all calibration and maintenance records, and records of all data used to complete the application for this permit. This period of retention must be extended during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

D. Recording Results

For each measurement or sample taken, the Permittee must record the following information:

1. Date, place, method, and time of sampling or measurement.
2. The first and last name of the individual who performed the sampling or measurement.
3. The date(s) the analyses were performed.
4. The first and last name of the individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

E. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by this permit using test procedures specified by Special Condition S4 of this permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the Permittee's DMR.

F. Noncompliance Notification

In the event the Permittee is unable to comply with any part of the terms and conditions of this permit, and the resulting noncompliance may cause a threat to human health or the environment (such as but not limited to spills of fuels or other materials, catastrophic pond or slope failure, and discharges that violate water quality standards), or exceed

numeric effluent limitations (see S8. Discharges to 303(d) or TMDL Waterbodies), the Permittee must, upon becoming aware of the circumstance:

1. Notify Ecology within 24-hours of the failure to comply by calling the applicable Regional office ERTS phone number (refer to Special Condition S4.C.5.b.i. or www.ecy.wa.gov/programs/wq/stormwater/construction/turbidity.html for Regional ERTS phone numbers).
2. Immediately take action to prevent the discharge/pollution, or otherwise stop or correct the noncompliance, and, if applicable, repeat sampling and analysis of any noncompliance immediately and submit the results to Ecology within five (5) days of becoming aware of the violation.
3. Submit a detailed written report to Ecology within five (5) days, of the time the Permittee becomes aware of the circumstances, unless requested earlier by Ecology. The report must be submitted using Ecology's Water Quality Permitting Portal (WQWebPortal) - Permit Submittals, unless a waiver from electronic reporting has been granted according to S5.B. The report must contain a description of the noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

The Permittee must report any unanticipated bypass and/or upset that exceeds any effluent limit in the permit in accordance with the 24-hour reporting requirement contained in 40 C.F.R. 122.41(1)(6).

Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply. Upon request of the Permittee, Ecology may waive the requirement for a written report on a case-by-case basis, if the immediate notification is received by Ecology within 24 hours.

G. Access to Plans and Records

1. The Permittee must retain the following permit documentation (plans and records) on site, or within reasonable access to the site, for use by the operator or for on-site review by Ecology or the local jurisdiction:
 - a. General Permit
 - b. Permit Coverage Letter
 - c. Stormwater Pollution Prevention Plan (SWPPP)
 - d. Site Log Book
2. The Permittee must address written requests for plans and records listed above (Special Condition S5.G.1) as follows:

- a. The Permittee must provide a copy of plans and records to Ecology within 14 days of receipt of a written request from Ecology.
- b. The Permittee must provide a copy of plans and records to the public when requested in writing. Upon receiving a written request from the public for the Permittee's plans and records, the Permittee must either:
 - i. Provide a copy of the plans and records to the requester within 14 days of a receipt of the written request; *or*
 - ii. Notify the requester within 10 days of receipt of the written request of the location and times within normal business hours when the plans and records may be viewed; and provide access to the plans and records within 14 days of receipt of the written request; *or*
 - iii. Within 14 days of receipt of the written request, the Permittee may submit a copy of the plans and records to Ecology for viewing and/or copying by the requester at an Ecology office, or a mutually agreed location. If plans and records are viewed and/or copied at a location other than at an Ecology office, the Permittee will provide reasonable access to copying services for which a reasonable fee may be charged. The Permittee must notify the requester within 10 days of receipt of the request where the plans and records may be viewed and/or copied.

S6. PERMIT FEES

The Permittee must pay permit fees assessed by Ecology. Fees for stormwater discharges covered under this permit are established by Chapter 173-224 WAC. Ecology continues to assess permit fees until the permit is terminated in accordance with Special Condition S10 or revoked in accordance with General Condition G5.

S7. SOLID AND LIQUID WASTE DISPOSAL

The Permittee must handle and dispose of solid and liquid wastes generated by construction activity, such as demolition debris, construction materials, contaminated materials, and waste materials from maintenance activities, including liquids and solids from cleaning catch basins and other stormwater facilities, in accordance with:

- A. Special Condition S3, Compliance with Standards
- B. WAC 173-216-110
- C. Other applicable regulations

S8. DISCHARGES TO 303(d) OR TMDL WATERBODIES

- A. Sampling and Numeric Effluent Limits For Certain Discharges to 303(d)-listed Waterbodies

1. Permittees who discharge to segments of waterbodies listed as impaired by the State of Washington under Section 303(d) of the Clean Water Act for turbidity, fine sediment, high pH, or phosphorus, must conduct water quality sampling according to the requirements of this section, and Special Conditions S4.C.2.b-f and S4.C.3.b-d, and must comply with the applicable numeric effluent limitations in S8.C and S8.D.
2. All references and requirements associated with Section 303(d) of the Clean Water Act mean the most current listing by Ecology of impaired waters (Category 5) that exists on January 1, 2016, or the date when the operator's complete permit application is received by Ecology, whichever is later.

B. Limits on Coverage for New Discharges to TMDL or 303(d)-listed Waters

Operators of construction sites that discharge to a TMDL or 303(d)-listed waterbody are not eligible for coverage under this permit *unless* the operator:

1. Prevents exposing stormwater to pollutants for which the waterbody is impaired, and retains documentation in the SWPPP that details procedures taken to prevent exposure on site; *or*
2. Documents that the pollutants for which the waterbody is impaired are not present at the site, and retains documentation of this finding within the SWPPP; *or*
3. Provides Ecology with data indicating the discharge is not expected to cause or contribute to an exceedance of a water quality standard, and retains such data on site with the SWPPP. The operator must provide data and other technical information to Ecology that sufficiently demonstrate:
 - a. For discharges to waters without an EPA-approved or -established TMDL, that the discharge of the pollutant for which the water is impaired will meet in-stream water quality criteria at the point of discharge to the waterbody; *or*
 - b. For discharges to waters with an EPA-approved or -established TMDL, that there is sufficient remaining wasteload allocation in the TMDL to allow construction stormwater discharge and that existing dischargers to the waterbody are subject to compliance schedules designed to bring the waterbody into attainment with water quality standards.

Operators of construction sites are eligible for coverage under this permit if Ecology issues permit coverage based upon an affirmative determination that the *discharge will not cause or contribute to the existing impairment.*

C. Sampling and Numeric Effluent Limits for Discharges to Water Bodies on the 303(d) List for Turbidity, Fine Sediment, or Phosphorus

1. Permittees who discharge to segments of water bodies on the 303(d) list (Category 5) for turbidity, fine sediment, or phosphorus must conduct turbidity sampling in accordance with Special Condition S4.C.2 and comply with either of the numeric effluent limits noted in Table 5 below.

2. As an alternative to the 25 NTUs effluent limit noted in Table 5 below (applied at the point where stormwater [or authorized non-stormwater] is discharged off-site), Permittees may choose to comply with the surface water quality standard for turbidity. The standard is: no more than 5 NTUs over background turbidity when the background turbidity is 50 NTUs or less, or no more than a 10% increase in turbidity when the background turbidity is more than 50 NTUs. In order to use the water quality standard requirement, the sampling must take place at the following locations:
 - a. Background turbidity in the 303(d)-listed receiving water immediately upstream (upgradient) or outside the area of influence of the discharge.
 - b. Turbidity at the point of discharge into the 303(d)-listed receiving water, inside the area of influence of the discharge.
3. Discharges that exceed the numeric effluent limit for turbidity constitute a violation of this permit.
4. Permittees whose discharges exceed the numeric effluent limit shall sample discharges daily until the violation is corrected and comply with the non-compliance notification requirements in Special Condition S5.F.

Table 5: Turbidity, Fine Sediment & Phosphorus Sampling and Limits for 303(d)-Listed Waters

Parameter identified in 303(d) listing	Parameter Sampled	Unit	Analytical Method	Sampling Frequency	Numeric Effluent Limit ¹
<ul style="list-style-type: none"> • Turbidity • Fine Sediment • Phosphorus 	Turbidity	NTU	SM2130	Weekly, if discharging	25 NTUs, at the point where stormwater is discharged from the site; OR In compliance with the surface water quality standard for turbidity (S8.C.2.a)

¹Permittees subject to a numeric effluent limit for turbidity may, at their discretion, choose either numeric effluent limitation based on site-specific considerations including, but not limited to, safety, access and convenience.

D. Discharges to Water Bodies on the 303(d) List for High pH

1. Permittees who discharge to segments of water bodies on the 303(d) list (Category 5) for high pH must conduct pH sampling in accordance with the table below, and comply with the numeric effluent limit of pH 6.5 to 8.5 su (Table 6).

Table 6: pH Sampling and Limits for 303(d)-Listed Waters

Parameter identified in 303(d) listing	Parameter Sampled/Units	Analytical Method	Sampling Frequency	Numeric Effluent Limit
High pH	pH /Standard Units	pH meter	Weekly, if discharging	In the range of 6.5 – 8.5

2. At the Permittee’s discretion, compliance with the limit shall be assessed at one of the following locations:
 - a. Directly in the 303(d)-listed waterbody segment, inside the immediate area of influence of the discharge; or
 - b. Alternatively, the Permittee may measure pH at the point where the discharge leaves the construction site, rather than in the receiving water.
 3. Discharges that exceed the numeric effluent limit for pH (outside the range of 6.5 – 8.5 su) constitute a violation of this permit.
 4. Permittees whose discharges exceed the numeric effluent limit shall sample discharges daily until the violation is corrected and comply with the non-compliance notification requirements in Special Condition S5.F.
- E. Sampling and Limits for Sites Discharging to Waters Covered by a TMDL or Another Pollution Control Plan
1. Discharges to a waterbody that is subject to a Total Maximum Daily Load (TMDL) for turbidity, fine sediment, high pH, or phosphorus must be consistent with the TMDL. Refer to <http://www.ecy.wa.gov/programs/wq/tmdl/TMDLsbyWria/TMDLbyWria.html> for more information on TMDLs.
 - a. Where an applicable TMDL sets specific waste load allocations or requirements for discharges covered by this permit, discharges must be consistent with any specific waste load allocations or requirements established by the applicable TMDL.
 - i. The Permittee must sample discharges weekly or as otherwise specified by the TMDL to evaluate compliance with the specific waste load allocations or requirements.
 - ii. Analytical methods used to meet the monitoring requirements must conform to the latest revision of the Guidelines Establishing Test Procedures for the Analysis of Pollutants contained in 40 CFR Part 136. Turbidity and pH methods need not be accredited or registered unless conducted at a laboratory which must otherwise be accredited or registered.
 - b. Where an applicable TMDL has established a general waste load allocation for construction stormwater discharges, but has not identified specific requirements,

compliance with Special Conditions S4 (Monitoring) and S9 (SWPPPs) will constitute compliance with the approved TMDL.

- c. Where an applicable TMDL has not specified a waste load allocation for construction stormwater discharges, but has not excluded these discharges, compliance with Special Conditions S4 (Monitoring) and S9 (SWPPPs) will constitute compliance with the approved TMDL.
 - d. Where an applicable TMDL specifically precludes or prohibits discharges from construction activity, the operator is not eligible for coverage under this permit.
2. Applicable TMDL means a TMDL for turbidity, fine sediment, high pH, or phosphorus that is completed and approved by EPA before January 1, 2016, or before the date the operator's complete permit application is received by Ecology, whichever is later. TMDLs completed after the operator's complete permit application is received by Ecology become applicable to the Permittee only if they are imposed through an administrative order by Ecology, or through a modification of permit coverage.

S9. STORMWATER POLLUTION PREVENTION PLAN

The Permittee must prepare and properly implement an adequate Stormwater Pollution Prevention Plan (SWPPP) for construction activity in accordance with the requirements of this permit beginning with initial soil disturbance and until final stabilization.

A. The Permittee's SWPPP must meet the following objectives:

1. To implement best management practices (BMPs) to prevent erosion and sedimentation, and to identify, reduce, eliminate or prevent stormwater contamination and water pollution from construction activity.
2. To prevent violations of surface water quality, ground water quality, or sediment management standards.
3. To control peak volumetric flow rates and velocities of stormwater discharges.

B. General Requirements

1. The SWPPP must include a narrative and drawings. All BMPs must be clearly referenced in the narrative and marked on the drawings. The SWPPP narrative must include documentation to explain and justify the pollution prevention decisions made for the project. Documentation must include:
 - a. Information about existing site conditions (topography, drainage, soils, vegetation, etc.).
 - b. Potential erosion problem areas.
 - c. The 13 elements of a SWPPP in Special Condition S9.D.1-13, including BMPs used to address each element.

- d. Construction phasing/sequence and general BMP implementation schedule.
 - e. The actions to be taken if BMP performance goals are not achieved—for example, a contingency plan for additional treatment and/or storage of stormwater that would violate the water quality standards if discharged.
 - f. Engineering calculations for ponds, treatment systems, and any other designed structures.
2. The Permittee must modify the SWPPP if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is, or would be, ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The Permittee must then:
 - a. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within 7 days of the inspection or investigation.
 - b. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, addressing the problems no later than 10 days from the inspection or investigation. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when an extension is requested by a Permittee within the initial 10-day response period.
 - c. Document BMP implementation and maintenance in the site log book.

The Permittee must modify the SWPPP whenever there is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

C. Stormwater Best Management Practices (BMPs)

BMPs must be consistent with:

1. Stormwater Management Manual for Western Washington (most current approved edition at the time this permit was issued), for sites west of the crest of the Cascade Mountains; *or*
2. Stormwater Management Manual for Eastern Washington (most current approved edition at the time this permit was issued), for sites east of the crest of the Cascade Mountains; *or*
3. Revisions to the manuals listed in Special Condition S9.C.1. & 2., or other stormwater management guidance documents or manuals which provide an equivalent level of pollution prevention, that are approved by Ecology and incorporated into this permit in accordance with the permit modification requirements of WAC 173-226-230; *or*

4. Documentation in the SWPPP that the BMPs selected provide an equivalent level of pollution prevention, compared to the applicable Stormwater Management Manuals, including:
 - a. The technical basis for the selection of all stormwater BMPs (scientific, technical studies, and/or modeling) that support the performance claims for the BMPs being selected.
 - b. An assessment of how the selected BMP will satisfy AKART requirements and the applicable federal technology-based treatment requirements under 40 CFR part 125.3.

D. SWPPP – Narrative Contents and Requirements

The Permittee must include each of the 13 elements below in Special Condition S9.D.1-13 in the narrative of the SWPPP and implement them unless site conditions render the element unnecessary and the exemption from that element is clearly justified in the SWPPP.

1. Preserve Vegetation/Mark Clearing Limits
 - a. Before beginning land-disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area.
 - b. Retain the duff layer, native topsoil, and natural vegetation in an undisturbed state to the maximum degree practicable.
2. Establish Construction Access
 - a. Limit construction vehicle access and exit to one route, if possible.
 - b. Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking sediment onto roads.
 - c. Locate wheel wash or tire baths on site, if the stabilized construction entrance is not effective in preventing tracking sediment onto roads.
 - d. If sediment is tracked off site, clean the affected roadway thoroughly at the end of each day, or more frequently as necessary (for example, during wet weather). Remove sediment from roads by shoveling, sweeping, or pickup and transport of the sediment to a controlled sediment disposal area.
 - e. Conduct street washing only after sediment removal in accordance with Special Condition S9.D.2.d. Control street wash wastewater by pumping back on site or otherwise preventing it from discharging into systems tributary to waters of the State.
3. Control Flow Rates
 - a. Protect properties and waterways downstream of development sites from erosion and the associated discharge of turbid waters due to increases in the

velocity and peak volumetric flow rate of stormwater runoff from the project site, as required by local plan approval authority.

- b. Where necessary to comply with Special Condition S9.D.3.a, construct stormwater retention or detention facilities as one of the first steps in grading. Assure that detention facilities function properly before constructing site improvements (for example, impervious surfaces).
- c. If permanent infiltration ponds are used for flow control during construction, protect these facilities from siltation during the construction phase.

4. Install Sediment Controls

The Permittee must design, install and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum, the Permittee must design, install and maintain such controls to:

- a. Construct sediment control BMPs (sediment ponds, traps, filters, infiltration facilities, etc.) as one of the first steps in grading. These BMPs must be functional before other land disturbing activities take place.
- b. Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site.
- c. Direct stormwater runoff from disturbed areas through a sediment pond or other appropriate sediment removal BMP, before the runoff leaves a construction site or before discharge to an infiltration facility. Runoff from fully stabilized areas may be discharged without a sediment removal BMP, but must meet the flow control performance standard of Special Condition S9.D.3.a.
- d. Locate BMPs intended to trap sediment on site in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages.
- e. Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration, unless infeasible.
- f. Where feasible, design outlet structures that withdraw impounded stormwater from the surface to avoid discharging sediment that is still suspended lower in the water column.

5. Stabilize Soils

- a. The Permittee must stabilize exposed and unworked soils by application of effective BMPs that prevent erosion. Applicable BMPs include, but are not limited to: temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide

(PAM), the early application of gravel base on areas to be paved, and dust control.

- b. The Permittee must control stormwater volume and velocity within the site to minimize soil erosion.
- c. The Permittee must control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion.
- d. Depending on the geographic location of the project, the Permittee must not allow soils to remain exposed and unworked for more than the time periods set forth below to prevent erosion:

West of the Cascade Mountains Crest

During the dry season (May 1 - September 30): 7 days

During the wet season (October 1 - April 30): 2 days

East of the Cascade Mountains Crest, except for Central Basin*

During the dry season (July 1 - September 30): 10 days

During the wet season (October 1 - June 30): 5 days

The Central Basin*, East of the Cascade Mountains Crest

During the dry season (July 1 - September 30): 30 days

During the wet season (October 1 - June 30): 15 days

*Note: The Central Basin is defined as the portions of Eastern Washington with mean annual precipitation of less than 12 inches.

- e. The Permittee must stabilize soils at the end of the shift before a holiday or weekend if needed based on the weather forecast.
 - f. The Permittee must stabilize soil stockpiles from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.
 - g. The Permittee must minimize the amount of soil exposed during construction activity.
 - h. The Permittee must minimize the disturbance of steep slopes.
 - i. The Permittee must minimize soil compaction and, unless infeasible, preserve topsoil.
6. Protect Slopes
- a. The Permittee must design and construct cut-and-fill slopes in a manner to minimize erosion. Applicable practices include, but are not limited to, reducing continuous length of slope with terracing and diversions, reducing slope steepness, and roughening slope surfaces (for example, track walking).

- b. The Permittee must divert off-site stormwater (run-on) or ground water away from slopes and disturbed areas with interceptor dikes, pipes, and/or swales. Off-site stormwater should be managed separately from stormwater generated on the site.
 - c. At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion.
 - i. West of the Cascade Mountains Crest: Temporary pipe slope drains must handle the peak 10-minute flow rate from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate predicted by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydrology Model (WWHM) to predict flows, bare soil areas should be modeled as "landscaped area."
 - ii. East of the Cascade Mountains Crest: Temporary pipe slope drains must handle the expected peak flow rate from a 6-month, 3-hour storm for the developed condition, referred to as the short duration storm.
 - d. Place excavated material on the uphill side of trenches, consistent with safety and space considerations.
 - e. Place check dams at regular intervals within constructed channels that are cut down a slope.
7. Protect Drain Inlets
- a. Protect all storm drain inlets made operable during construction so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.
 - b. Clean or remove and replace inlet protection devices when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).
8. Stabilize Channels and Outlets
- a. Design, construct and stabilize all on-site conveyance channels to prevent erosion from the following expected peak flows:
 - i. West of the Cascade Mountains Crest: Channels must handle the peak 10-minute flow rate from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate indicated by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis must use the existing land

cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the WWHM to predict flows, bare soil areas should be modeled as "landscaped area."

- ii. East of the Cascade Mountains Crest: Channels must handle the expected peak flow rate from a 6-month, 3-hour storm for the developed condition, referred to as the short duration storm.
 - b. Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches at the outlets of all conveyance systems.
9. Control Pollutants

Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants. The Permittee must:

- a. Handle and dispose of all pollutants, including waste materials and demolition debris that occur on site in a manner that does not cause contamination of stormwater.
- b. Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. On-site fueling tanks must include secondary containment. Secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume contained in the largest tank within the containment structure. Double-walled tanks do not require additional secondary containment.
- c. Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.
- d. Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, such as closed-loop recirculation or upland land application, or to the sanitary sewer with local sewer district approval.
- e. Apply fertilizers and pesticides in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturers' label requirements for application rates and procedures.
- f. Use BMPs to prevent contamination of stormwater runoff by pH-modifying sources. The sources for this contamination include, but are not limited to: bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, recycled concrete stockpiles, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete

pumping and mixer washout waters. (Also refer to the definition for "concrete wastewater" in Appendix A--Definitions.)

- g. Adjust the pH of stormwater or authorized non-stormwater if necessary to prevent an exceedance of groundwater and/or surface water quality standards.
- h. Assure that washout of concrete trucks is performed off-site or in designated concrete washout areas only. Do not wash out concrete trucks or concrete handling equipment onto the ground, or into storm drains, open ditches, streets, or streams. Do not dump excess concrete on site, except in designated concrete washout areas. Concrete spillage or concrete discharge to surface waters of the State is prohibited.
- i. Obtain written approval from Ecology before using any chemical treatment, with the exception of CO₂ or dry ice used to adjust pH.
- j. Uncontaminated water from water-only based shaft drilling for construction of building, road, and bridge foundations may be infiltrated provided the wastewater is managed in a way that prohibits discharge to surface waters. Prior to infiltration, water from water-only based shaft drilling that comes into contact with curing concrete must be neutralized until pH is in the range of 6.5 to 8.5 (su).

10. Control Dewatering

- a. Permittees must discharge foundation, vault, and trench dewatering water, which have characteristics similar to stormwater runoff at the site, into a controlled conveyance system before discharge to a sediment trap or sediment pond.
- b. Permittees may discharge clean, non-turbid dewatering water, such as well-point ground water, to systems tributary to, or directly into surface waters of the State, as specified in Special Condition S9.D.8, provided the dewatering flow does not cause erosion or flooding of receiving waters. Do not route clean dewatering water through stormwater sediment ponds. Note that "surface waters of the State" may exist on a construction site as well as off site; for example, a creek running through a site.
- c. Other dewatering treatment or disposal options may include:
 - i. Infiltration.
 - ii. Transport off site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters.
 - iii. Ecology-approved on-site chemical treatment or other suitable treatment technologies (see S9.D.9.i. regarding chemical treatment written approval).
 - iv. Sanitary or combined sewer discharge with local sewer district approval, if there is no other option.

- v. Use of a sedimentation bag with discharge to a ditch or swale for small volumes of localized dewatering.
- d. Permittees must handle highly turbid or contaminated dewatering water separately from stormwater.

11. Maintain BMPs

- a. Permittees must maintain and repair all temporary and permanent erosion and sediment control BMPs as needed to assure continued performance of their intended function in accordance with BMP specifications.
- b. Permittees must remove all temporary erosion and sediment control BMPs within 30 days after achieving final site stabilization or after the temporary BMPs are no longer needed.

12. Manage the Project

- a. Phase development projects to the maximum degree practicable and take into account seasonal work limitations.
- b. Inspection and monitoring – Inspect, maintain and repair all BMPs as needed to assure continued performance of their intended function. Conduct site inspections and monitoring in accordance with Special Condition S4.
- c. Maintaining an updated construction SWPPP – Maintain, update, and implement the SWPPP in accordance with Special Conditions S3, S4 and S9.

13. Protect Low Impact Development (LID) BMPs

The primary purpose of LID BMPs/On-site LID Stormwater Management BMPs is to reduce the disruption of the natural site hydrology. LID BMPs are permanent facilities.

- a. Permittees must protect all Bioretention and Rain Garden facilities from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the Bioretention and/or Rain Garden facilities. Restore the facilities to their fully functioning condition if they accumulate sediment during construction. Restoring the facility must include removal of sediment and any sediment-laden Bioretention/Rain Garden soils, and replacing the removed soils with soils meeting the design specification.
- b. Permittees must maintain the infiltration capabilities of Bioretention and Rain Garden facilities by protecting against compaction by construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.
- c. Permittees must control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy

construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements.

- d. Permittees must clean permeable pavements fouled with sediments or no longer passing an initial infiltration test using local stormwater manual methodology or the manufacturer's procedures.
- e. Permittees must keep all heavy equipment off existing soils under LID facilities that have been excavated to final grade to retain the infiltration rate of the soils.

E. SWPPP – Map Contents and Requirements

The Permittee's SWPPP must also include a vicinity map or general location map (for example, a USGS quadrangle map, a portion of a county or city map, or other appropriate map) with enough detail to identify the location of the construction site and receiving waters within one mile of the site.

The SWPPP must also include a legible site map (or maps) showing the entire construction site. The following features must be identified, unless not applicable due to site conditions:

1. The direction of north, property lines, and existing structures and roads.
2. Cut and fill slopes indicating the top and bottom of slope catch lines.
3. Approximate slopes, contours, and direction of stormwater flow before and after major grading activities.
4. Areas of soil disturbance and areas that will not be disturbed.
5. Locations of structural and nonstructural controls (BMPs) identified in the SWPPP.
6. Locations of off-site material, stockpiles, waste storage, borrow areas, and vehicle/equipment storage areas.
7. Locations of all surface water bodies, including wetlands.
8. Locations where stormwater or non-stormwater discharges off-site and/or to a surface waterbody, including wetlands.
9. Location of water quality sampling station(s), if sampling is required by state or local permitting authority.
10. Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.
11. Location or proposed location of LID facilities.

S10. NOTICE OF TERMINATION

- A. The site is eligible for termination of coverage when it has met any of the following conditions:
1. The site has undergone final stabilization, the Permittee has removed all temporary BMPs (except biodegradable BMPs clearly manufactured with the intention for the material to be left in place and not interfere with maintenance or land use), and all stormwater discharges associated with construction activity have been eliminated; *or*
 2. All portions of the site that have not undergone final stabilization per Special Condition S10.A.1 have been sold and/or transferred (per General Condition G9), and the Permittee no longer has operational control of the construction activity; *or*
 3. For residential construction only, the Permittee has completed temporary stabilization and the homeowners have taken possession of the residences.
- B. When the site is eligible for termination, the Permittee must submit a complete and accurate Notice of Termination (NOT) form, signed in accordance with General Condition G2, to:

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

When an electronic termination form is available, the Permittee may choose to submit a complete and accurate Notice of Termination (NOT) form through the Water Quality Permitting Portal rather than mailing a hardcopy as noted above.

The termination is effective on the thirty-first calendar day following the date Ecology receives a complete NOT form, unless Ecology notifies the Permittee that the termination request is denied because the Permittee has not met the eligibility requirements in Special Condition S10.A.

Permittees are required to comply with all conditions and effluent limitations in the permit until the permit has been terminated.

Permittees transferring the property to a new property owner or operator/Permittee are required to complete and submit the Notice of Transfer form to Ecology, but are not required to submit a Notice of Termination form for this type of transaction.

GENERAL CONDITIONS

G1. DISCHARGE VIOLATIONS

All discharges and activities authorized by this general permit must be consistent with the terms and conditions of this general permit. Any discharge of any pollutant more frequent than or at a level in excess of that identified and authorized by the general permit must constitute a violation of the terms and conditions of this permit.

G2. SIGNATORY REQUIREMENTS

- A. All permit applications must bear a certification of correctness to be signed:
1. In the case of corporations, by a responsible corporate officer;
 2. In the case of a partnership, by a general partner of a partnership;
 3. In the case of sole proprietorship, by the proprietor; *or*
 4. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.
- B. All reports required by this permit and other information requested by Ecology (including NOIs, NOTs, and Transfer of Coverage forms) must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
1. The authorization is made in writing by a person described above and submitted to Ecology.
 2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.
- C. Changes to authorization. If an authorization under paragraph G2.B.2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph G2.B.2 above must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.
- D. Certification. Any person signing a document under this section must make the following certification:
- “I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my

knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

G3. RIGHT OF INSPECTION AND ENTRY

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

- A. To enter upon the premises where a discharge is located or where any records are kept under the terms and conditions of this permit.
- B. To have access to and copy – at reasonable times and at reasonable cost – any records required to be kept under the terms and conditions of this permit.
- C. To inspect – at reasonable times – any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.
- D. To sample or monitor – at reasonable times – any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G4. GENERAL PERMIT MODIFICATION AND REVOCATION

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

- A. When a change occurs in the technology or practices for control or abatement of pollutants applicable to the category of dischargers covered under this permit.
- B. When effluent limitation guidelines or standards are promulgated pursuant to the CWA or Chapter 90.48 RCW, for the category of dischargers covered under this permit.
- C. When a water quality management plan containing requirements applicable to the category of dischargers covered under this permit is approved, *or*
- D. When information is obtained that indicates cumulative effects on the environment from dischargers covered under this permit are unacceptable.

G5. REVOCATION OF COVERAGE UNDER THE PERMIT

Pursuant to Chapter 43.21B RCW and Chapter 173-226 WAC, the Director may terminate coverage for any discharger under this permit for cause. Cases where coverage may be terminated include, but are not limited to, the following:

- A. Violation of any term or condition of this permit.
- B. Obtaining coverage under this permit by misrepresentation or failure to disclose fully all relevant facts.

- C. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.
- D. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.
- E. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations.
- F. Nonpayment of permit fees or penalties assessed pursuant to RCW 90.48.465 and Chapter 173-224 WAC.
- G. Failure of the Permittee to satisfy the public notice requirements of WAC 173-226-130(5), when applicable.

The Director may require any discharger under this permit to apply for and obtain coverage under an individual permit or another more specific general permit. Permittees who have their coverage revoked for cause according to WAC 173-226-240 may request temporary coverage under this permit during the time an individual permit is being developed, provided the request is made within ninety (90) days from the time of revocation and is submitted along with a complete individual permit application form.

G6. REPORTING A CAUSE FOR MODIFICATION

The Permittee must submit a new application, or a supplement to the previous application, whenever a material change to the construction activity or in the quantity or type of discharge is anticipated which is not specifically authorized by this permit. This application must be submitted at least sixty (60) days prior to any proposed changes. Filing a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not relieve the Permittee of the duty to comply with the existing permit until it is modified or reissued.

G7. COMPLIANCE WITH OTHER LAWS AND STATUTES

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

G8. DUTY TO REAPPLY

The Permittee must apply for permit renewal at least 180 days prior to the specified expiration date of this permit. The Permittee must reapply using the electronic application form (NOI) available on Ecology's website. Permittees unable to submit electronically (for example, those who do not have an internet connection) must contact Ecology to request a waiver and obtain instructions on how to obtain a paper NOI.

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

G9. TRANSFER OF GENERAL PERMIT COVERAGE

Coverage under this general permit is automatically transferred to a new discharger, including operators of lots/parcels within a common plan of development or sale, if:

- A. A written agreement (Transfer of Coverage Form) between the current discharger (Permittee) and new discharger, signed by both parties and containing a specific date for transfer of permit responsibility, coverage, and liability (including any Administrative Orders associated with the Permit) is submitted to the Director; and
- B. The Director does not notify the current discharger and new discharger of the Director's intent to revoke coverage under the general permit. If this notice is not given, the transfer is effective on the date specified in the written agreement.

When a current discharger (Permittee) transfers a portion of a permitted site, the current discharger must also submit an updated application form (NOI) to the Director indicating the remaining permitted acreage after the transfer.

G10. REMOVED SUBSTANCES

The Permittee must not re-suspend or reintroduce collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of stormwater to the final effluent stream for discharge to state waters.

G11. DUTY TO PROVIDE INFORMATION

The Permittee must submit to Ecology, within a reasonable time, all information that Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology, upon request, copies of records required to be kept by this permit [40 CFR 122.41(h)].

G12. OTHER REQUIREMENTS OF 40 CFR

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

G13. ADDITIONAL MONITORING

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

G14. PENALTIES FOR VIOLATING PERMIT CONDITIONS

Any person who is found guilty of willfully violating the terms and conditions of this permit shall be deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars (\$10,000) and costs of prosecution, or by imprisonment at the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit shall incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars (\$10,000) for every such violation. Each and every such violation shall be a separate and distinct offense, and in case of a continuing violation, every day's continuance shall be deemed to be a separate and distinct violation.

G15. UPSET

Definition – “Upset” means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that: 1) an upset occurred and that the Permittee can identify the cause(s) of the upset; 2) the permitted facility was being properly operated at the time of the upset; 3) the Permittee submitted notice of the upset as required in Special Condition S5.F, and; 4) the Permittee complied with any remedial measures required under this permit.

In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. DUTY TO COMPLY

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. TOXIC POLLUTANTS

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. PENALTIES FOR TAMPERING

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment shall be a fine of not more than \$20,000 per day of violation, or imprisonment of not more than four (4) years, or both.

G20. REPORTING PLANNED CHANGES

The Permittee must, as soon as possible, give notice to Ecology of planned physical alterations, modifications or additions to the permitted construction activity. The Permittee should be aware that, depending on the nature and size of the changes to the original permit, a new public notice and other permit process requirements may be required. Changes in activities that require reporting to Ecology include those that will result in:

- A. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b).
- B. A significant change in the nature or an increase in quantity of pollutants discharged, including but not limited to: for sites 5 acres or larger, a 20% or greater increase in acreage disturbed by construction activity.
- C. A change in or addition of surface water(s) receiving stormwater or non-stormwater from the construction activity.
- D. A change in the construction plans and/or activity that affects the Permittee's monitoring requirements in Special Condition S4.

Following such notice, permit coverage may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G21. REPORTING OTHER INFORMATION

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to Ecology, it must promptly submit such facts or information.

G22. REPORTING ANTICIPATED NON-COMPLIANCE

The Permittee must give advance notice to Ecology by submission of a new application or supplement thereto at least forty-five (45) days prior to commencement of such discharges, of any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility or activity which may result in noncompliance with permit limits or conditions. Any maintenance of facilities, which might necessitate

unavoidable interruption of operation and degradation of effluent quality, must be scheduled during non-critical water quality periods and carried out in a manner approved by Ecology.

G23. REQUESTS TO BE EXCLUDED FROM COVERAGE UNDER THE PERMIT

Any discharger authorized by this permit may request to be excluded from coverage under the general permit by applying for an individual permit. The discharger must submit to the Director an application as described in WAC 173-220-040 or WAC 173-216-070, whichever is applicable, with reasons supporting the request. These reasons will fully document how an individual permit will apply to the applicant in a way that the general permit cannot. Ecology may make specific requests for information to support the request. The Director will either issue an individual permit or deny the request with a statement explaining the reason for the denial. When an individual permit is issued to a discharger otherwise subject to the construction stormwater general permit, the applicability of the construction stormwater general permit to that Permittee is automatically terminated on the effective date of the individual permit.

G24. APPEALS

- A. The terms and conditions of this general permit, as they apply to the appropriate class of dischargers, are subject to appeal by any person within 30 days of issuance of this general permit, in accordance with Chapter 43.21B RCW, and Chapter 173-226 WAC.
- B. The terms and conditions of this general permit, as they apply to an individual discharger, are appealable in accordance with Chapter 43.21B RCW within 30 days of the effective date of coverage of that discharger. Consideration of an appeal of general permit coverage of an individual discharger is limited to the general permit's applicability or nonapplicability to that individual discharger.
- C. The appeal of general permit coverage of an individual discharger does not affect any other dischargers covered under this general permit. If the terms and conditions of this general permit are found to be inapplicable to any individual discharger(s), the matter shall be remanded to Ecology for consideration of issuance of an individual permit or permits.

G25. SEVERABILITY

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

G26. BYPASS PROHIBITED

A. Bypass Procedures

Bypass, which is the intentional diversion of waste streams from any portion of a treatment facility, is prohibited for stormwater events below the design criteria for

stormwater management. Ecology may take enforcement action against a Permittee for bypass unless one of the following circumstances (1, 2, 3 or 4) is applicable.

1. Bypass of stormwater is consistent with the design criteria and part of an approved management practice in the applicable stormwater management manual.
2. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limitations or other conditions of this permit, or adversely impact public health.

3. Bypass of stormwater is unavoidable, unanticipated, and results in noncompliance of this permit.

This bypass is permitted only if:

- a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.
 - b. There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, maintenance during normal periods of equipment downtime (but not if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance), or transport of untreated wastes to another treatment facility.
 - c. Ecology is properly notified of the bypass as required in Special Condition S5.F of this permit.
4. A planned action that would cause bypass of stormwater and has the potential to result in noncompliance of this permit during a storm event.

The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:

- a. A description of the bypass and its cause.
- b. An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.
- c. A cost-effectiveness analysis of alternatives including comparative resource damage assessment.
- d. The minimum and maximum duration of bypass under each alternative.
- e. A recommendation as to the preferred alternative for conducting the bypass.

- f. The projected date of bypass initiation.
 - g. A statement of compliance with SEPA.
 - h. A request for modification of water quality standards as provided for in WAC 173-201A-110, if an exceedance of any water quality standard is anticipated.
 - i. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.
5. For probable construction bypasses, the need to bypass is to be identified as early in the planning process as possible. The analysis required above must be considered during preparation of the Stormwater Pollution Prevention Plan (SWPPP) and must be included to the extent practical. In cases where the probable need to bypass is determined early, continued analysis is necessary up to and including the construction period in an effort to minimize or eliminate the bypass.

Ecology will consider the following before issuing an administrative order for this type bypass:

- a. If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.
- b. If there are feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.
- c. If the bypass is planned and scheduled to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve, conditionally approve, or deny the request. The public must be notified and given an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Approval of a request to bypass will be by administrative order issued by Ecology under RCW 90.48.120.

B. Duty to Mitigate

The Permittee is required to take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

APPENDIX A – DEFINITIONS

AKART is an acronym for “all known, available, and reasonable methods of prevention, control, and treatment.” AKART represents the most current methodology that can be reasonably required for preventing, controlling, or abating the *pollutants* and controlling pollution associated with a discharge.

Applicable TMDL means a TMDL for turbidity, fine sediment, high pH, or phosphorus, which was completed and approved by EPA before January 1, 2016, or before the date the operator’s complete permit application is received by Ecology, whichever is later.

Applicant means an *operator* seeking coverage under this permit.

Benchmark means a *pollutant* concentration used as a permit threshold, below which a *pollutant* is considered unlikely to cause a water quality violation, and above which it may. When *pollutant* concentrations exceed benchmarks, corrective action requirements take effect. Benchmark values are not water quality standards and are not numeric effluent limitations; they are indicator values.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: *stormwater* associated with construction activity, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Buffer means an area designated by a local *jurisdiction* that is contiguous to and intended to protect a sensitive area.

Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

Calendar Day A period of 24 consecutive hours starting at 12:00 midnight and ending the following 12:00 midnight.

Calendar Week (same as **Week**) means a period of seven consecutive days starting at 12:01 a.m. (0:01 hours) on Sunday.

Certified Erosion and Sediment Control Lead (CESCL) means a person who has current certification through an approved erosion and sediment control training program that meets the minimum training standards established by Ecology (see BMP C160 in the SWMM).

Chemical Treatment means the addition of chemicals to *stormwater* and/or authorized non-stormwater prior to filtration and discharge to surface waters.

Clean Water Act (CWA) means the Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, and 97-117; USC 1251 et seq.

Combined Sewer means a sewer which has been designed to serve as a sanitary sewer and a storm sewer, and into which inflow is allowed by local ordinance.

Common Plan of Development or Sale means a site where multiple separate and distinct *construction activities* may be taking place at different times on different schedules and/or by different contractors, but still under a single plan. Examples include: 1) phased projects and projects with multiple filings or lots, even if the separate phases or filings/lots will be constructed under separate contract or by separate owners (e.g., a development where lots are sold to separate builders); 2) a development plan that may be phased over multiple years, but is still under a consistent plan for long-term development; 3) projects in a contiguous area that may be unrelated but still under the same contract, such as construction of a building extension and a new parking lot at the same facility; and 4) linear projects such as roads, pipelines, or utilities. If the project is part of a common plan of development or sale, the disturbed area of the entire plan must be used in determining permit requirements.

Composite Sample means a mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increases while maintaining a constant time interval between the aliquots).

Concrete Wastewater means any water used in the production, pouring and/or clean-up of concrete or concrete products, and any water used to cut, grind, wash, or otherwise modify concrete or concrete products. Examples include water used for or resulting from concrete truck/mixer/pumper/tool/chute rinsing or washing, concrete saw cutting and surfacing (sawing, coring, grinding, roughening, hydro-demolition, bridge and road surfacing). When *stormwater* comes in contact with concrete wastewater, the resulting water is considered concrete wastewater and must be managed to prevent discharge to *waters of the State*, including *ground water*.

Construction Activity means land disturbing operations including clearing, grading or excavation which disturbs the surface of the land. Such activities may include road construction, construction of residential houses, office buildings, or industrial buildings, site preparation, soil compaction, movement and stockpiling of topsoils, and demolition activity.

Contaminant means any hazardous substance that does not occur naturally or occurs at greater than natural background levels. See definition of "*hazardous substance*" and WAC 173-340-200.

Contaminated Groundwater means groundwater which contains *contaminants, pollutants, or hazardous substances* that do not occur naturally or occur at levels greater than natural background.

Contaminated Soil means soil which contains *contaminants, pollutants, or hazardous substances* that do not occur naturally or occur at levels greater than natural background.

Demonstrably Equivalent means that the technical basis for the selection of all stormwater BMPs is documented within a SWPPP, including:

1. The method and reasons for choosing the stormwater BMPs selected.

2. The *pollutant* removal performance expected from the BMPs selected.
3. The technical basis supporting the performance claims for the BMPs selected, including any available data concerning field performance of the BMPs selected.
4. An assessment of how the selected BMPs will comply with state water quality standards.
5. An assessment of how the selected BMPs will satisfy both applicable federal technology-based treatment requirements and state requirements to use all known, available, and reasonable methods of prevention, control, and treatment (AKART).

Department means the Washington State Department of Ecology.

Detention means the temporary storage of *stormwater* to improve quality and/or to reduce the mass flow rate of discharge.

Dewatering means the act of pumping *ground water* or *stormwater* away from an active construction site.

Director means the Director of the Washington State Department of Ecology or his/her authorized representative.

Discharger means an owner or *operator* of any facility or activity subject to regulation under Chapter 90.48 RCW or the Federal Clean Water Act.

Domestic Wastewater means water carrying human wastes, including kitchen, bath, and laundry wastes from residences, buildings, industrial establishments, or other places, together with such ground water infiltration or surface waters as may be present.

Ecology means the Washington State Department of Ecology.

Engineered Soils means the use of soil amendments including, but not limited, to Portland cement treated base (CTB), cement kiln dust (CKD), or fly ash to achieve certain desirable soil characteristics.

Equivalent BMPs means operational, source control, treatment, or innovative BMPs which result in equal or better quality of stormwater discharge to *surface water* or to *ground water* than BMPs selected from the SWMM.

Erosion means the wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

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

Federal Operator is an entity that meets the definition of “*Operator*” in this permit and is either any department, agency or instrumentality of the executive, legislative, and judicial branches of

the Federal government of the United States, or another entity, such as a private contractor, performing construction activity for any such department, agency, or instrumentality.

Final Stabilization (same as **fully stabilized** or **full stabilization**) means the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (examples of permanent non-vegetative stabilization methods include, but are not limited to riprap, gabions or geotextiles) which prevents erosion.

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

Hazardous Substance means any dangerous or extremely hazardous waste as defined in RCW 70.105.010 (5) and (6), or any dangerous or extremely dangerous waste as designated by rule under chapter 70.105 RCW; any hazardous substance as defined in RCW 70.105.010(10) or any hazardous substance as defined by rule under chapter 70.105 RCW; any substance that, on the effective date of this section, is a hazardous substance under section 101(14) of the federal cleanup law, 42 U.S.C., Sec. 9601(14); petroleum or petroleum products; and any substance or category of substances, including solid waste decomposition products, determined by the director by rule to present a threat to human health or the environment if released into the environment. The term hazardous substance does not include any of the following when contained in an underground storage tank from which there is not a release: crude oil or any fraction thereof or petroleum, if the tank is in compliance with all applicable federal, state, and local law.

Injection Well means a well that is used for the subsurface emplacement of fluids. (See Well.)

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

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

Notice of Intent (NOI) means the application for, or a request for coverage under this general permit pursuant to WAC 173-226-200.

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

Operator means any party associated with a construction project that meets either of the following two criteria:

- The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or

- The party has day-to-day operational control of those activities at a project that are necessary to ensure compliance with a SWPPP for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions).

Permittee means individual or entity that receives notice of coverage under this general permit.

pH means a liquid's measure of acidity or alkalinity. A pH of 7 is defined as neutral. Large variations above or below this value are considered harmful to most aquatic life.

pH Monitoring Period means the time period in which the pH of *stormwater* runoff from a site must be tested a minimum of once every seven days to determine if *stormwater* pH is between 6.5 and 8.5.

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

Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, domestic sewage sludge (biosolids), munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste. This term does not include sewage from vessels within the meaning of section 312 of the CWA, nor does it include dredged or fill material discharged in accordance with a permit issued under section 404 of the CWA.

Pollution means contamination or other alteration of the physical, chemical, or biological properties of waters of the State; including change in temperature, taste, color, turbidity, or odor of the waters; or such discharge of any liquid, gaseous, solid, radioactive or other substance into any *waters of the State* as will or is likely to create a nuisance or render such waters harmful, detrimental or injurious to the public health, safety or welfare; or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; or to livestock, wild animals, birds, fish or other aquatic life.

Process Wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. If *stormwater* commingles with process wastewater, the commingled water is considered process wastewater.

Receiving Water means the waterbody at the point of discharge. If the discharge is to a *storm sewer system*, either surface or subsurface, the receiving water is the waterbody to which the storm system discharges. Systems designed primarily for other purposes such as for ground water drainage, redirecting stream natural flows, or for conveyance of irrigation water/return flows that coincidentally convey *stormwater* are considered the receiving water.

Representative means a *stormwater* or wastewater sample which represents the flow and characteristics of the discharge. Representative samples may be a grab sample, a time-proportionate *composite sample*, or a flow proportionate sample. Ecology's Construction Stormwater Monitoring Manual provides guidance on representative sampling.

Responsible Corporate Officer for the purpose of signatory authority means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Sanitary Sewer means a sewer which is designed to convey domestic wastewater.

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

Sedimentation means the depositing or formation of sediment.

Sensitive Area means a waterbody, wetland, stream, aquifer recharge area, or channel migration zone.

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

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

Significant Concrete Work means greater than 1000 cubic yards poured concrete used over the life of a project.

Significant Contributor of Pollutants means a facility determined by Ecology to be a contributor of a significant amount(s) of a *pollutant*(s) to waters of the State of Washington.

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

Source Control BMPs means physical, structural or mechanical devices or facilities that are intended to prevent *pollutants* from entering *stormwater*. A few examples of source control

BMPs are erosion control practices, maintenance of stormwater facilities, constructing roofs over storage and working areas, and directing wash water and similar discharges to the *sanitary sewer* or a dead end sump.

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

Storm Drain means any drain which drains directly into a *storm sewer system*, usually found along roadways or in parking lots.

Storm Sewer System means a means a conveyance, or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains designed or used for collecting or conveying *stormwater*. This does not include systems which are part of a *combined sewer* or Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

Stormwater means that portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface waterbody, or a constructed infiltration facility.

Stormwater Management Manual (SWMM) or Manual means the technical Manual published by Ecology for use by local governments that contain descriptions of and design criteria for BMPs to prevent, control, or treat *pollutants* in *stormwater*.

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

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

Temporary Stabilization means the exposed ground surface has been covered with appropriate materials to provide temporary stabilization of the surface from water or wind erosion. Materials include, but are not limited to, mulch, riprap, erosion control mats or blankets and temporary cover crops. Seeding alone is not considered stabilization. Temporary stabilization is not a substitute for the more permanent "*final stabilization*."

Total Maximum Daily Load (TMDL) means a calculation of the maximum amount of a *pollutant* that a waterbody can receive and still meet state water quality standards. Percentages of the total maximum daily load are allocated to the various pollutant sources. A TMDL is the sum of the allowable loads of a single *pollutant* from all contributing point and nonpoint sources. The TMDL calculations must include a "margin of safety" to ensure that the waterbody can be protected in case there are unforeseen events or unknown sources of the *pollutant*. The calculation must also account for seasonable variation in water quality.

Transfer of Coverage (TOC) means a request for transfer of coverage under this general permit as specified by General Condition G9 of this permit.

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

Transparency means a measurement of water clarity in centimeters (cm), using a 60 cm transparency tube. The transparency tube is used to estimate the relative clarity or transparency of water by noting the depth at which a black and white Secchi disc becomes visible when water is released from a value in the bottom of the tube. A transparency tube is sometimes referred to as a "turbidity tube."

Turbidity means the clarity of water expressed as nephelometric turbidity units (NTUs) and measured with a calibrated turbidimeter.

Uncontaminated means free from any contaminant. See definition of "*contaminant*" and WAC 173-340-200.

Waste Load Allocation (WLA) means the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality based effluent limitation (40 CFR 130.2[h]).

Water-only Based Shaft Drilling is a shaft drilling process that uses water only and no additives are involved in the drilling of shafts for construction of building, road, or bridge foundations.

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

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

Well means a bored, drilled or driven shaft, or dug hole whose depth is greater than the largest surface dimension. (See Injection well.)

Wheel Wash Wastewater means any water used in, or resulting from the operation of, a tire bath or wheel wash (BMP C106: Wheel Wash), or other structure or practice that uses water to physically remove mud and debris from vehicles leaving a construction site and prevent track-out onto roads. When *stormwater* combines with wheel wash wastewater, the resulting water is considered wheel wash wastewater and must be managed according to Special Condition S9.D.9.

APPENDIX B – ACRONYMS

AKART	All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment
BMP	Best Management Practice
CESCL	Certified Erosion and Sediment Control Lead
CFR	Code of Federal Regulations
CKD	Cement Kiln Dust
cm	Centimeters
CTB	Cement-Treated Base
CWA	Clean Water Act
DMR	Discharge Monitoring Report
EPA	Environmental Protection Agency
ERTS	Environmental Report Tracking System
ESC	Erosion and Sediment Control
FR	Federal Register
LID	Low Impact Development
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
SWMM	Stormwater Management Manual
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
UIC	Underground Injection Control
USC	United States Code
USEPA	United States Environmental Protection Agency
WAC	Washington Administrative Code
WQ	Water Quality
WWHM	Western Washington Hydrology Model