Storm Drainage Report

For

Park Residence at

8244 se 30th Street

Mercer Island, WA 98040

June, 2024

TABLE OF CONTENTS

APPENDICES

1.0 PROJECTOVERVIEW

This single-family resident a 0.303 acres redevelopment project located in Section 12, Township 24 North, Range 4 East, Willamette Meridian, in City of Mercer Island, King County, Washington. See Figure 1 for project vicinity map.

The subject property address is 8244 Southeast 30th Street in Mercer Island, WA 98040. This project proposed to make additions and alterations to the existing house with 2-story with the total footage of 3,341 sf. The existing residence is a two-story structure located in the middle of the project site. The lower level of the existing house is below grade along its front (south side), and day-lighted along its back. The new addittion to the existing residence will be 656 sf to the east of the house and 426 sf of wooden deck with gaps.

A primary component of redevelopment project plans is the satisfaction of current stormwater management requirements commensurate with Department of Ecology 2019 Stormwater Management Manual for Western Washington (SWMMWW) standards. This Stormwater plan describes the existing drainage characteristics in the project area and presents the proposed On-site Stormwater Management within the project to mitigate for the project impacts.

Figure 1: Vicinity Map

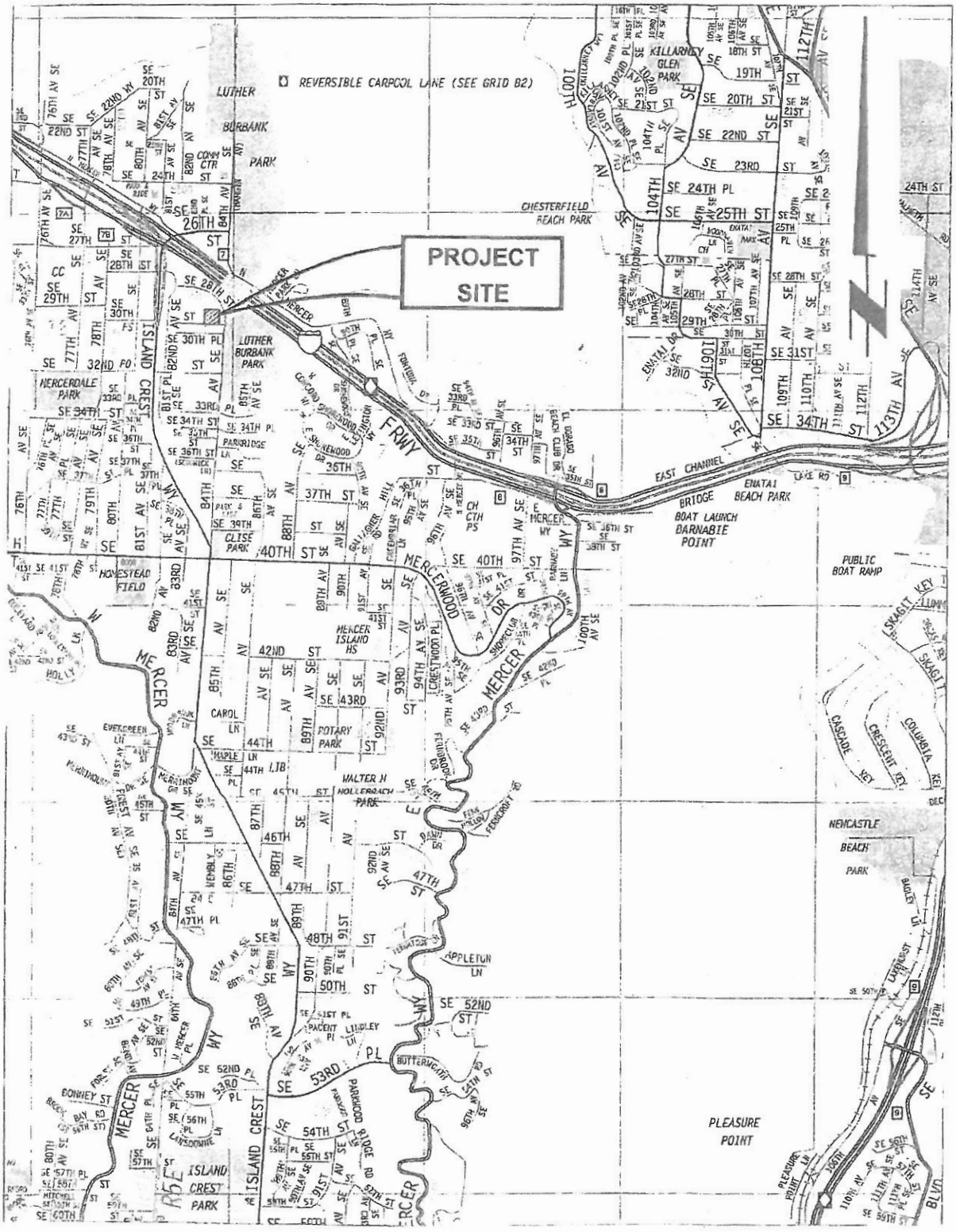


FIGURE 1

VICINITY MAP
PARK RESIDENCE
8244 SE 30TH STREET
MERCER ISLAND, WASHINGTON

JOB NO. 17-061	DATE 7/1/2017	PLATE 1

2.0 SITE CONDITIONS

2.1 EXISTING CONDITIONS

The location of the existing single-family resident is shown on Vicinity Map in Figure 1. The front is level, covered with lawn grass, and lies at an elevation near the main floor level of the existing house. The backyard lying at approximately 10 feet or more below the front yard, is nearly level and is covered with lawn grass with a strip of flower bed along the north fringe. Connecting the front and the backyards is a northerly declining foot path along the east side of the house and a gravel-surfaced driveway along the west side of the house. Flanking the north side of the site is a steep bank stepping several feet down to the neighboring property. See existing site photos in Appendix B.

There is currently no stormwater management facilities located on the property. The existing stormwater runoff for the site disposal by infiltration or surface dispersion The existing land cover is outlined in table 1.0.

Table 1.0 Existing Land Cover

Summary of existing site conditions

Surface Type	Area	Units	Notes
Total Lot	**13,200**	**SF**	
Roof + Patio	1,854	SF	
Driveway + Walkway	1,965	SF	
Impervious Subtotal	**3,819**	**SF**	
Trees/Lawn	956	SF	
Pervious Subtotal	**8,425**	**SF**	

2.2 EXISTING HYDRAULIC FEATURES

At this time there is no storm drainage system on the site to collect runoff. The site stormwater sheet flows in the north direction to the large backyard. The stormwater mostly infiltrates into the ground or disperse across the property. No wetlands have been identified on or adjacent to the site.

2.3 SOILS INFORMATION

According King County Soil Survey Map, the subject property had the soil property of Kitsap silt loam, 2 to 8 percent slopes (KpB). See Appendix A for Soil Map and full soil descriptions. See Geotechnical Investigation Report dated 8-28-2022 for detail soil property for the site in Appendix A.

3.0 DEVELOPED CONDITIONS

3.1 DESIGN REFERENCES

The following design references were utilized in development of the storm water design:

- Department of Ecology Stormwater Management Manual for Western (SWWMM) Washington 2019.

3.2 MINIMUM REQUIREMENTS

Summary of project information for determining minimum Stormwater requirements

Key	Component	Value	Notes
A	Project Site Area	13,200 SF	
B	Existing Impervious Area	3,819 SF	
C	ExistingImpervious Coverage	29%	
D	New Impervious Area	1,082 SF	
E	Replaced Impervious Area	0.00 SF	
F	New Plus Replaced Impervious Area	1,082 SF	
G	Proposed Impervious Area	1,082 SF	
H	Converted pervious: Native vegetation converted to lawn or landscape	0 SF	
I	Converted pervious: Native vegetation converted to pasture	0 SF	
J	Total Area of Land Disturbing Activity	1,300 SF	

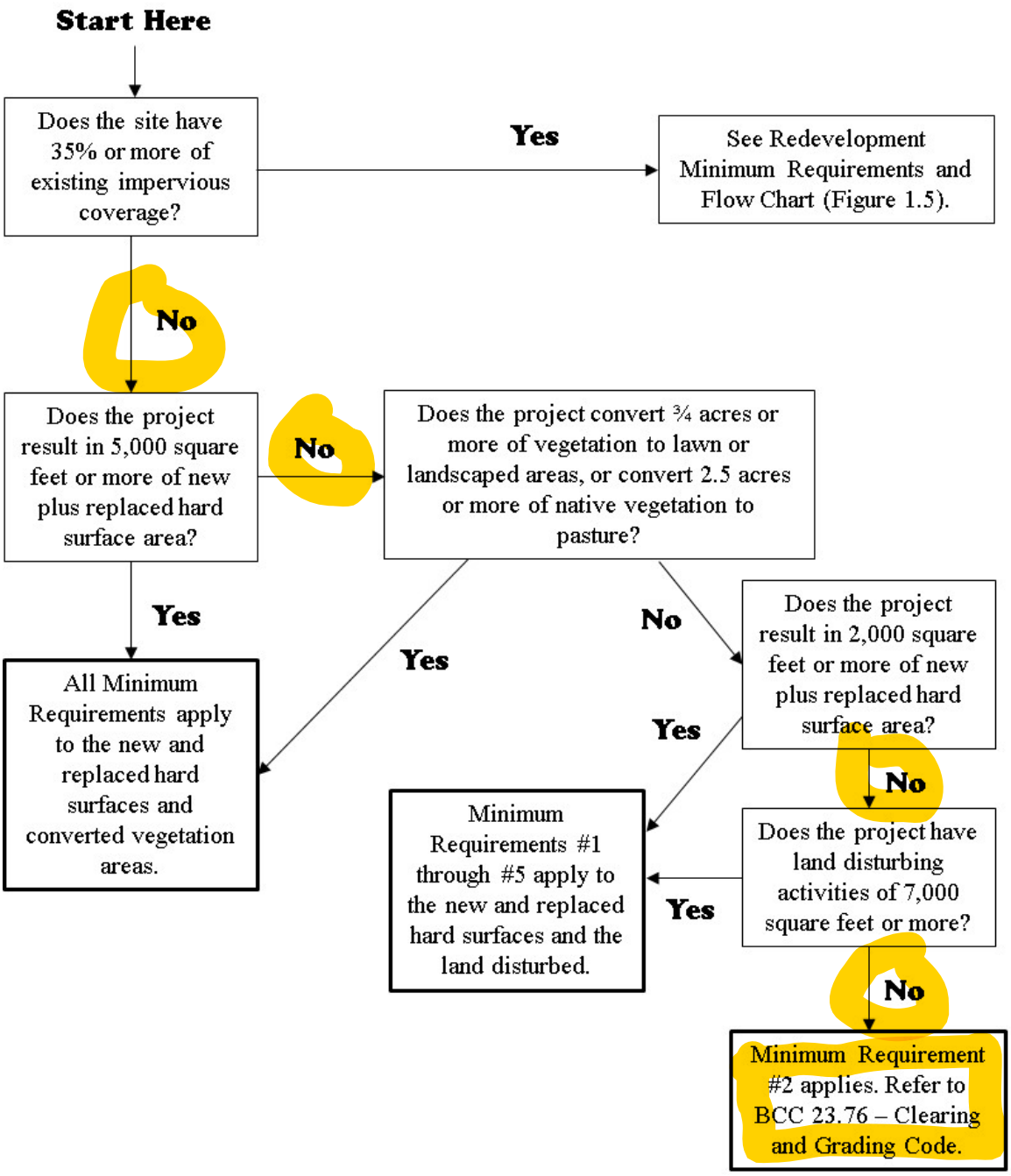


Figure 1.4 – Flow Chart for Determining Minimum Requirements for New Development Projects

Source: Adapted from Figure 2.4.1 of Volume I of the DOE Manual.

3.3 PROPOSED DEVELOPMENT AND ON-SITE STORMWATER MANAGEMENT

The preliminary proposed additions and alternations to the existing 2-story home structure project is outlined in Table 2.0 below.

Table 2.0 Developed Land Cover

Summary of Proposed site conditions

Surface Type	Area	Units	Notes
Total Lot	13,200	**SF**	
Roof	656	SF	
Wooden Deck	426	SF	
Added Impervious Subtotal	1,082	**SF**	
Trees	962	SF	
Lawn	7,582	SF	
Pervious Subtotal	8,544	**SF**	

Per Flow Chart for Determining Requirements for New addition, this project have to comply with Minimum Requirements #2 of the SWMMWW 2019 for the new added impervious surfaces and the land disturbed.

To meet the #2 minimum requirement for the new addition project, several alternatives from List #1: On-Site Stormwater Management BMPs for triggering MR #2 were evaluated including:

- Roof Downspout Dispersion Trench
- Full Dispersion Trench
- Infiltration Trench
- Rain Garden
- Soil Amendment

With above alternatives, the project will utilize roof downspout infiltration trench for the roof runoff and soil amendment for landscaping area.

3.4 DESIGNSATISFACTION OF SMMWW MINIMUM REQUIREMENTS

The following sections outline how the single-family residential new addition project design satisfies the #1 -#5 minimum 2019 SMMWW requirements.

3.4.1 MR #1 -Stormwater Site Plans

Stormwater Site Plans will be prepared for the single-family residential new addition. This report and other supporting studies and drawings will comprise the component Stormwater Site Plan. Not Applicable.

3.4.2 MR #2 -Construction Stormwater Pollution Prevention

The Single-family residential new addition Project included in the contract plans theTESC plan sheets to address erosion and sediment discharge. The 13 elements are detailed in following pages to address potential mechanical or construction related spills that could potentially contaminate stormwater or soils.

3.4.3 MR #3 -Source Control of Pollutants

Pollutants will be prevented from coming in contact and mixing with stormwater by using silt fence along the property line. Construction entrance installed before construction begins to keep dirt from tracking to the roadway. Wheel wash will be available to rinse dirt off if needed during the construction. Not Applicable.

3.4.4 MR #4 -Maintaining the Natural Drainage System

Natural drainage patterns will be restored as a result of the Single-family residential new addition. On-site Stormwater Management facilities will be provided which will more closely mimic the natural drainage of historic pre-developed conditions. Not Applicable.

3.4.5 MR #5 -On-Site Stormwater Management

The project new addition is 656 sf. From List #1, the first choice is full dispersion. Full Dispersion is not feasible for this project due to lack of available land for required flow path. The required flow path is 100 ft minimum per the design guideline. The available flow path for this lot is 38ft. Therefore, full dispersion BMP is infeasible for this project. Next on the List #1 is downspout infiltration system. This project will utilize roof downspout infiltration trench to mitigate for the roof stormwater runoff. See Figure III-3.1.2 in Appendix D for basic layout and Appendix F for design criteria and requirement. The total area for the added new roof and part of existing roof is 966 sq. ft. According to the soil investigation report, the site had soil properties of well-drained, outwash medium sand, some gravel, and occasional cobbles. Per DOE 2014 Stormwater Management Manual for Western Washington Volume III – Appendix B – Page 578, the downspout full infiltration system can be design to meet the minimum design criteria specified as follow;

For following minimum lengths (linear feet) per 1000 sq. ft. of roof area based on soil type may be used for sizing downspout infiltration trenches. This site soil properties fall in the Medium Sand category. According design criteria, for every 1000 sq. ft. of roof area requires 30 LF of trench. The total roof area is 966 sq. ft. The required trench length is 29 Lf.

This project proposed to install a 29 ft x 2 ft downspout infiltration trenches to mitigate for the roof runoff. The roof storm water runoff conveys to a yard drain before enter the downspout infiltration trenches. The trenches will be install according to DOE SWWMM Chapter V of Volume III with BMP T5.10A. See Appendix D for BMP Details and Appendix F for downspout infiltration trench detail and design criterias. See drainage plan for trench location.

3.4.6 Operations and Maintenance

The owner will needs to perform appropriate preventative maintenance steps to ensure that on-site stormwater management facilities are adequately maintained and allow for continued operations according to the maintenance section V-4.6 (Maintenance for Drainage Standards) of the SMMWW 2019 Table V-4.5.2(22) for maintenance standards for roof downspout infiltration trench.

The 13 Elements:

Element #1: Preserve Vegetation/Mark Clearing Limits

Element 1 BMPs - Prior to land-clearing activities, the project will mark all clearing limits on the plan and in the field with high-visibility fences, to protect sensitive areas and their buffers (including vegetation to preserve), as well as adjacent properties. Retain existing vegetation in an undisturbed state to the maximum extent practicable. See TESC plan for BMPs layout.

PHYSICAL BMPS

- Preserving natural vegetation
- High visibility fence

Element #2: Establish Construction Access

Prior to any construction activities, Construction entrance will be installed to prevent dirt tracking to the roadway. Tire wash available to rinse dirt from tires.

PHYSICAL BMPS

- Stabilized construction entrance.
- Tire wash

Element #3: Control Flow Rates

This is an single-family project. Flow control will not be an issue. Silt fence will be install along the property line on the low end of the site to prevent runoff from flows to the adjoined properties.

PHYSICAL BMPS

- Silt fence

Element #4: Install Sediment Control

Wattles will be installed along the backyard to prevent any sediment escaped from the site. Sediment should not be an issue due to the nature of the single-family construction activities. Sediment should be well contained in the foundation footprint.

PHYSICAL BMP

- Wattle

Element #5: Stabilize Soils

In western Washington, cover exposed soil that is not being worked— whether at final grade or not—within the following time limits, using approved soil cover practices:

October 1 through April 30 2 days maximum
May 1 through September 30 7 days maximum

The project will preserve vegetation as much as possible. This project will utilize construction entrance, wattle, and plastic covering to stabilize soils if all necessary.

PHYSICAL BMPS

- Preserving vegetation
- Wattle
- Stabilized construction entrance
- Placing plastic covering

Element #6: Protect Slopes

Not applicable for this project. There is no open cut slopes for this project.

Element #7: Protect Drain Inlets

Not applicable for this project. There is no existing drain inlet within the site.

Element #8: Stabilize Channels and Outlets

Not applicable for this project. There is no channels or outlets within the project site.

Element #9: Control Pollutants

All pollutants, including construction materials, waste materials, and demolition debris, must be handled and disposed of in a manner that does not cause contamination of stormwater.

Methods for controlling pollutants that can be considered hazardous materials, such as hydrocarbons and pH-modifying substances, must be described in the contractor's SPCC plan. The plan must be prepared to meet Washington State Department of Ecology's (Ecology's) standards. Stormwater or groundwater that has come into contact with curing concrete must be sampled to ensure water quality standards are not violated. Process water (for example, concrete washout, slurry water, and hydrodemolition) must be contained and cannot be discharged to waters of the state.

- Concrete Washout Area
- Material Delivery, Storage and Containment

Element #10: Control Dewatering

There will be minimal excavation work that requires dewatering. There are no active seeps or high ground water on site. When groundwater is encountered in an excavation or other area, control, treat, and discharge it at approved site. Discharge foundation and trenching dewatering water, which have characteristics similar to stormwater runoff at the site. Discharge clean, non-turbid de-watering water, such as well-point ground water directly into surface waters of the State, as specific in Element #8, provided the de-watering flow does not cause erosion or flooding of receiving waters or interfere with the operation of the system. Handle highly turbid contaminated dewatering water separately from stormwater.

Element #11: Maintain BMPs

Maintain and repair all temporary and permanent erosion and sediment control BMPs as needed to assure continued performance or their intended function in accordance with BMP specifications. 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.

- Materials On Hand

Element #12: Manage the Project

1. Preserve vegetation and minimize disturbance and compaction of native soil, except as needed for building purposes.

2. Phase development projects to minimize the amount of soil exposed at any one time and prevent the transport of sediment from the site during construction.

3. Time sediment control BMP installation in accordance with Element 4.

4. To minimize erosion, follow soil cover timing requirements and exposure limits in Element 5. Projects that infiltrate all runoff are exempt from the above restrictions.

5. The work of utility contractors and subcontractors is coordinated to meet requirements of both the TESC and SPCC plans.

6. All BMPs are inspected, monitored, and maintained in accordance with Element 11.

- Materials On Hand
- Scheduling

Element #13: Protect Low Impact Development BMPs

Protect low-impact development (LID) BMPs during construction activities to prevent impacts from sedimentation and soil compaction. If LID BMPs are impacted during construction, restore them to their original condition or design requirements.

COMMON LID BMPS:

- Downspout dispersion trench

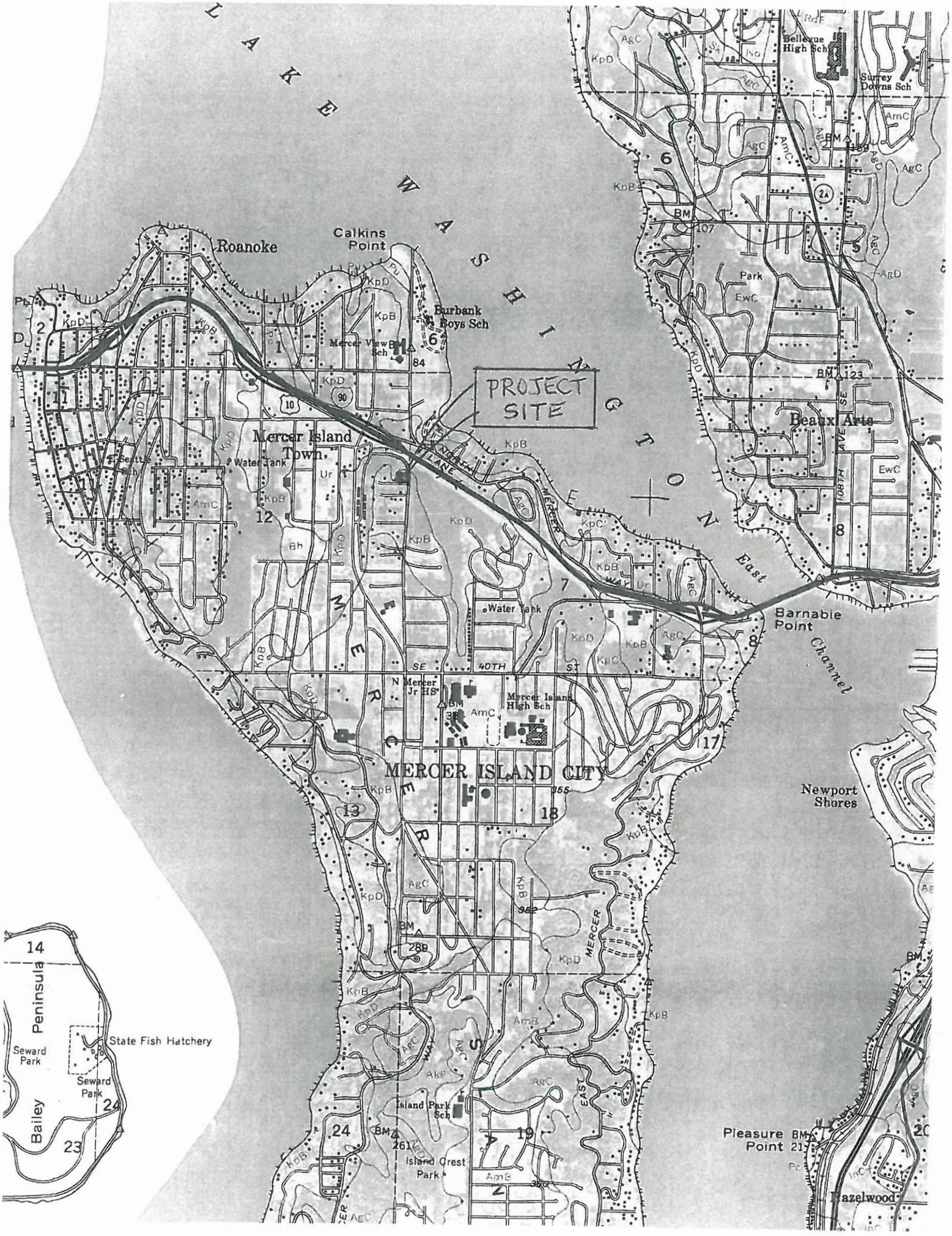
PHYSICAL TEMPORARY BMPs:

- HVF
- Silt Fence
- Check Dams
- Buffer zones
- Temporary curbs and water bars

Appendix A

Soils Survey King County Area

Washington


LAKE WASHINGTON
PROJECT SITE
Roanoke
Calkins Point
Burbank Boys Sch
Mercer View Sch
Mercer Island Town
Water Tank
Bellevue High Sch
Surrey Downs Sch
Park
Beaux Arts
108TH AVE SE
MERCER WAY
East
Barnable Point
Channel
SE 40TH ST
N Mercer Jr HS
Mercer Island High Sch
MERCER ISLAND CITY
Newport Shores
Island Park Sch
Island Crest Park
Pleasure Point
Hazelwood
Peninsula
Seward Park
State Fish Hatchery
Bailey

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, indicates the class of slope. Symbols without a slope letter are those of nearly level soils.

SYMBOL	NAME
AgB	Alderwood gravelly sandy loam, 0 to 6 percent slopes
AgC	Alderwood gravelly sandy loam, 6 to 15 percent slopes
AgD	Alderwood gravelly sandy loam, 15 to 30 percent slopes
AkF	Alderwood and Kitsap soils, very steep
AmB	Arents, Alderwood material, 0 to 6 percent slopes *
AmC	Arents, Alderwood material, 6 to 15 percent slopes *
An	Arents, Everett material *
BeC	Beausite gravelly sandy loam, 6 to 15 percent slopes
BeD	Beausite gravelly sandy loam, 15 to 30 percent slopes
BeF	Beausite gravelly sandy loam, 40 to 75 percent slopes
Bh	Bellingham silt loam
Br	Briscot silt loam
Bu	Buckley silt loam
Cb	Coastal Beaches
Ea	Earlmont silt loam
Ed	Edgewick fine sandy loam
EvB	Everett gravelly sandy loam, 0 to 5 percent slopes
EvC	Everett gravelly sandy loam, 5 to 15 percent slopes
EvD	Everett gravelly sandy loam, 15 to 30 percent slopes
EwC	Everett-Alderwood gravelly sandy loams, 6 to 15 percent slopes
InA	Indianola loamy fine sand, 0 to 4 percent slopes
InC	Indianola loamy fine sand, 4 to 15 percent slopes
InD	Indianola loamy fine sand, 15 to 30 percent slopes
KpB	Kitsap silt loam, 2 to 8 percent slopes
KpC	Kitsap silt loam, 8 to 15 percent slopes
KpD	Kitsap silt loam, 15 to 30 percent slopes
KsC	Klaus gravelly loamy sand, 6 to 15 percent slopes
Ma	Mixed alluvial land
NeC	Neilton very gravelly loamy sand, 2 to 15 percent slopes
Ng	Newberg silt loam
Nk	Nooksack silt loam
No	Norma sandy loam
Or	Orcas peat
Os	Oridia silt loam
OvC	Ovall gravelly loam, 0 to 15 percent slopes
OvD	Ovall gravelly loam, 15 to 25 percent slopes
OvF	Ovall gravelly loam, 40 to 75 percent slopes
Pc	Pilchuck loamy fine sand
Pk	Pilchuck fine sandy loam
Pu	Puget silty clay loam
Py	Puyallup fine sandy loam
RaC	Ragnar fine sandy loam, 6 to 15 percent slopes
RaD	Ragnar fine sandy loam, 15 to 25 percent slopes
RdC	Ragnar-Indianola association, sloping *
RdE	Ragnar-Indianola association, moderately steep *
Re	Renton silt loam
Rh	Riverwash
Sa	Salal silt loam
Sh	Sammamish silt loam
Sk	Seattle muck
Sm	Shalcar muck
Sn	Si silt loam
So	Snohomish silt loam
Sr	Snohomish silt loam, thick surface variant
Su	Sultan silt loam
Tu	Tukwila muck
Ur	Urban land
Wo	Woodinville silt loam

* The composition of these units is more variable than that of the others in the area, but it has been controlled well enough to interpret for the expected use of the soils.

Boundary, natior
State.....
County, Parish
Civil township
Incorporated c
Reservation, n
Small park, ce
Land grant.....
Township or rang
Township or rang
Section line, Uni
Section line, app
Township line, n
Section line, not
Section corner, f
Boundary monum
United States mi

Buildings (dwell
School, church, c
Buildings (barn,
Power transmiss
Telephone line,
Wells other than
Tanks; oil, wate
Located or landm

Horizontal and v
Tablet, spirit
Other recovera
Horizontal contro
Any recoverabl
Vertical control
Other recovera
Checked spot ele
Unchecked spot e

from very dark grayish brown to brown and dark yellowish brown. The C horizon ranges from dark grayish brown to pale olive and from loamy fine sand to sand. Thin lenses of silty material are at a depth of 4 to 7 feet in some places.

Soils included with this soil in mapping make up no more than 25 percent of the total acreage. Some areas are up to 10 percent Alderwood soils, on the more rolling and undulating parts of the landscape; some are up to 8 percent the deep, gravelly Everett and Neilton soils; some are up to 15 percent Kitsap soils, which have platy lake sediments in the subsoil; and some are up to 15 percent Ragnar soils, which have a sandy substratum.

Permeability is rapid. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is slow to medium, and the erosion hazard is slight to moderate.

This soil is used for timber and for urban development. Capability unit IVs-2; woodland group 4s3.

Indianola loamy fine sand, 0 to 4 percent slopes (InA).--This soil occupies smooth terraces in long narrow tracts adjacent to streams. Areas range from about 3 to 70 acres in size.

Soils included with this soil in mapping make up no more than 20 percent of the total acreage. Some areas are up to 5 percent Alderwood soils, on the more rolling and undulating parts of the landscape; some are about 10 percent the deep, gravelly Everett and Neilton soils; some are up to 10 percent Indianola loamy fine sand that has stronger slopes; and some areas are up to 10 percent the poorly drained Norma, Shalcar, Tukwila soils.

Runoff is slow, and the erosion hazard is slight.

This soil is used for timber. Capability unit IVs-2; woodland group 4s3.

Indianola loamy fine sand, 15 to 30 percent slopes (InD).--This soil is along entrenched streams.

Soils included with this soil in mapping make up no more than 25 percent of the total acreage. Some areas are up to 10 percent Alderwood soils; some are about 5 percent the deep, gravelly Everett and Neilton soils; some are up to 15 percent Kitsap soils, which have platy, silty lake sediments in the subsoil; and some are up to 15 percent Indianola loamy fine sand that has milder slopes.

Runoff is medium, and the erosion hazard is moderate to severe.

This soil is used for timber. Capability unit VIe-1; woodland group 4s2.

Kitsap Series

The Kitsap series is made up of moderately well drained soils that formed in glacial lake deposits, under a cover of conifers and shrubs. These soils are on terraces and strongly dissected terrace fronts. They are gently undulating and rolling and moderately steep. Slopes are 2 to 70 percent. Platy, silty sediments are at a depth of 18 to 40 inches. The annual precipitation is 35 to 60 inches, and the mean annual air temperature is about 50° F. The frost-free season is 150 to more than 200 days. Elevation ranges from about sea level to 500 feet.

In a representative profile, the surface layer and subsoil are very dark brown and dark yellowish-brown silt loam that extends to a depth of about 24 inches. The substratum is olive-gray silty clay loam. It extends to a depth of 60 inches or more.

Kitsap soils are used for timber and pasture.

Kitsap silt loam, 2 to 8 percent slopes (KpB).--This undulating soil is on low terraces of the major valleys of the Area. Areas range from 5 acres to more than 600 acres in size and are nearly circular to irregular in shape. Some areas are one-eighth to a half mile wide and up to 3 or 4 miles long.

Representative profile of Kitsap silt loam, 2 to 8 percent slopes, in pasture, 820 feet west and 330 feet south of east quarter corner of sec. 28, T. 25 N., R. 7 E.:

Ap--0 to 5 inches, very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate, medium, granular structure; slightly hard, very friable, nonsticky, nonplastic; many roots; medium acid; abrupt, smooth boundary.

B2--5 to 24 inches, dark yellowish-brown (10YR 3/4) silt loam, brown (10YR 5/3) dry; 2 percent iron concretions; weak, coarse, prismatic structure; slightly hard, friable, slightly sticky, slightly plastic; many roots; slightly acid; abrupt, wavy boundary. 18 to 21 inches thick.

IIC--24 to 60 inches, olive-gray (5Y 5/2) silty clay loam, light gray (5Y 7/2) dry; many, medium and coarse, prominent mottles of dark yellowish brown and strong brown (10YR 4/4 and 7.5YR 5/8); moderate, thin and medium, platy structure; hard, firm, sticky, plastic; few roots to a depth of 36 inches, none below; strongly acid.

The A horizon ranges from very dark brown to dark brown. The B horizon ranges from dark yellowish brown to dark brown and from silt loam to silty clay loam. The platy IIC horizon ranges from grayish brown to olive gray and from silt loam to silty clay loam that has thin lenses of loamy fine sand in places. Brownish mottles are common in the upper part of the IIC horizon.

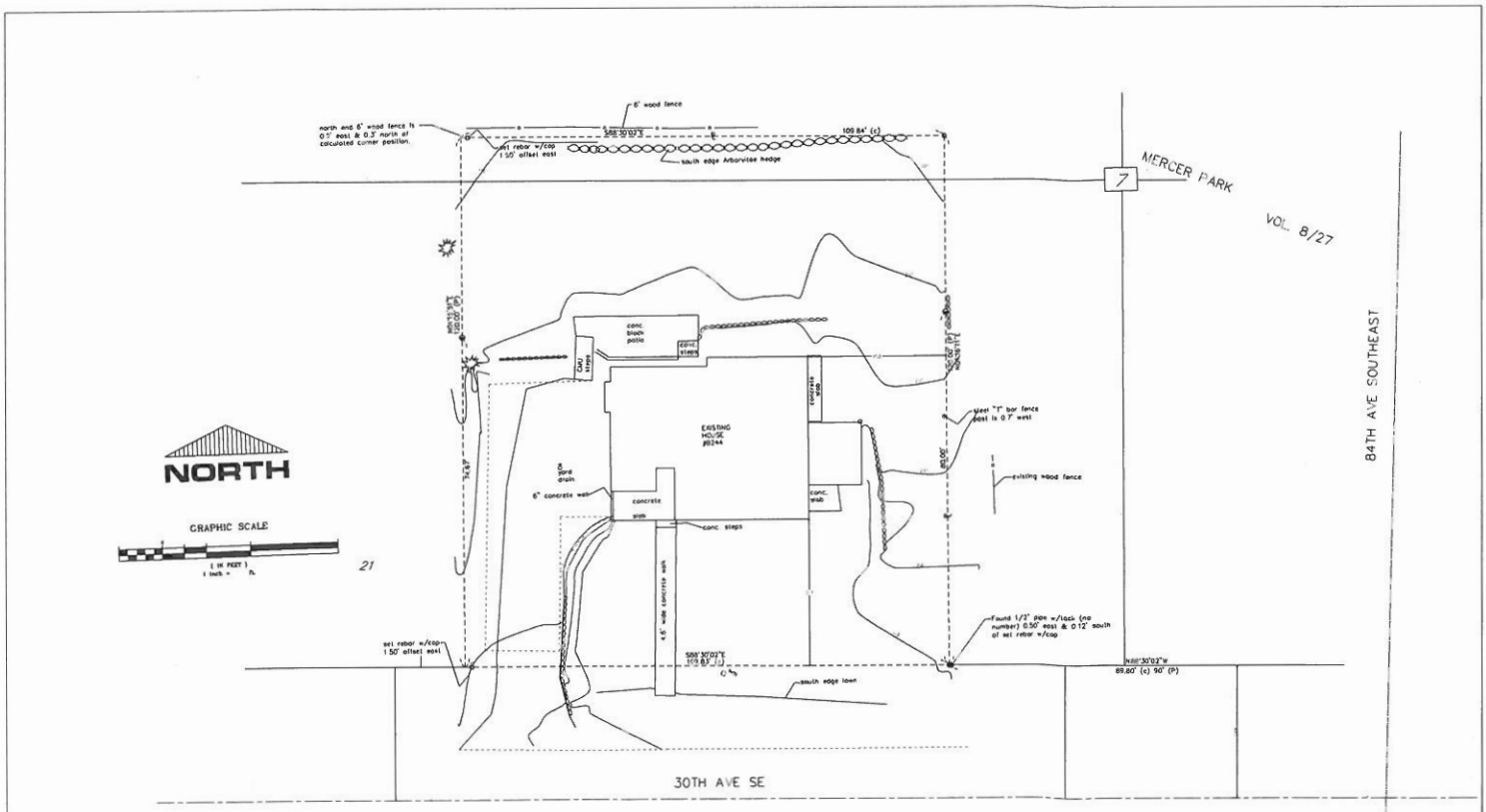
Some areas are up to 10 percent included Alderwood gravelly sandy loam; some are up to 5 percent the very deep, sandy Indianola soils; and some are up to 5 percent the poorly drained Bellingham, Tukwila, and Seattle soils.

Water flows on top of the substratum in winter. Permeability is moderate above the substratum and very slow within it. The effective rooting depth is about 36 inches. Available water capacity is moderate to moderately high. Runoff is slow to medium, and the erosion hazard is slight to moderate.

This soil is used for timber and pasture. Capability unit IIIe-1; woodland group 2d2.

Appendix B

Existing Site Plan



LEGAL DESCRIPTION

THE EAST 30 FEET OF LOT 11, EXCEPT THE NORTH 100 FEET THEREOF, ALL OF LOTS 12 AND 13, EXCEPT THE NORTH 100 FEET THEREOF, THE EAST 30 FEET OF LOT 20 AND ALL OF LOTS 18 AND 19, IN BLOCK 7 OF MERCER PARK, AS PER PLAT RECORDED IN VOLUME 8 OF PLATS, PAGE 27, RECORDS OF KING COUNTY, WASHINGTON.

ELEVATION DATUM

ELEVATION DATUM PER SURVEY CONTROL DATABASE POINT ID 6118, 3/8" COPPER IN CONCRETE MON. DWN 1.1' INTO SE 33RD PL & 84TH AVE SE,
ELEVATION = 256.57 FEET NAVD88

BASIS OF BEARING

BASIS OF BEARING IS THE PLAT OF KERRY HILLS ESTATES, VOL. 152/12

REFERENCE

PLAT OF KERRY HILLS ESTATES, VOL. 157/12
PLAT OF SUNSET RIDGE, VOL. 246/024
CITY OF MERCER ISLAND SURVEY CONTROL

NOTES:

1 Field data for this survey was obtained by direct field measurements. Angular and linear relationships were measured with a Topcon GTS225 theodolite and electronic measuring device, supplemented by a steel tape. Traverse methods used in performing this survey meets or exceeds the standards contained in WAC 332-130-090.
2. This survey has been prepared for the exclusive use of parties whose names appear hereon only, and does not extend to any unnamed third parties without express recertification by the land surveyor.
3 The location of utilities as shown serving the subject property have been taken from public records. We cannot certify to their accuracy and/or completeness. Before commencing construction involving excavation or removal of existing structures, call a locating service or 811 for underground utility locations.
4. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT AND THEREFORE DOES NOT PURPORT TO SHOW ALL EASEMENTS, COVENANTS, CONDITIONS OR RESTRICTION, IF ANY.

LEGEND

SCHROETER LAND SURVEYING
PROFESSIONAL LAND SURVEYORS
SURVEYS / LAND DEVELOPMENT / REPORTS

SURVEY FOR:
UPDATED:11.01.2016
CONT. CONTOUR
RAE M. PARK
SOON J. PARK
8344 SE 36TH STREET
MERCER ISLAND, WA 98040

PROJECT NO. 16162	JOB NO. 676/2	SEC. NE 12-24-4	
DATE FIELD 9/29/16	DWN BY LAW	CHKD. BY	
DATE 10/4/16 REVISED	SCALE 1" = 10'	SHEET 1 OF 1	


Ave SE
84th Ave SE
84th Ave SE
84th Ave SE
84
SE 30th St
SE 30th St
SE 30th St
SE 30th St
8244 Southeast 30th Street

Appendix C

Proposed Site and Drainage Plan

CLEARING AND GRADING STANDARD NOTES

1. ALL CLEARING & GRADING CONSTRUCTION MUST BE IN ACCORDANCE WITH CITY OF MERCER ISLAND CLEARING & GRADING CODE; CLEARING & GRADING EROSION CONTROL STANDARD; LAND USE CODE; UNIFORM BUILDING CODE; PERMIT CONDITIONS; AND ALL OTHER APPLICABLE CODES, ORDINANCES, AND STANDARDS. THE DESIGN ELEMENTS WITHIN THESE PLANS HAVE BEEN REVIEWED ACCORDING TO THESE REQUIREMENT. ANY VARIANCE FROM ADOPTED EROSION STANDARDS IS NOT ALLOWED UNLESS SPECIFICALLYAPPROVED BY THE CITY OF MERCER ISLAND PUBLIC WORKS AND COMMUNITY DEVELOPMENT (PCD) PRIOR TO CONSTRUCTION.

IT IS THE SOLE RESPONSIBILITY OF THE APPLICANT AND THE PROFESSIONAL CIVIL ENGINEER TO CORRECT ANY ERROR, OMISSION, OR VARIATION FROM THE ABOVE REQUIREMENTS FOUND IN THESE PLANS. ALL CORRECTIONS WILL BE AT NO ADDITIONAL COST OR LIABILITY TO THE COB. ALL DETAILS FOR STRUCTURAL WALLS, ROCKERIES OVER FOUR FEET IN HEIGHT, GEOGRID REINFORCED ROCKERIES, AND GEOGRID REINFORCED MODULAR BLOCK WALLS MUST BE STAMPED BY A PROFESSIONAL ENGINEER.

2. A COPY OF THE APPROVED PLANS MUST BE ON-SITE DURING CONSTRUCTION. THE APPLICANT IS RESPONSIBLE FOR OBTAINING ANY OTHER REQUIRED OR RELATED PERMITS PRIOR TO BEGINNING CONSTRUCTION.

3. ALL LOCATIONS OF EXISTING UTILITIES HAVE BEEN ESTABLISHED BY FIELD SURVEY OR OBTAINED FROM AVAILABLE RECORDS AND SHOULD, THEREFORE, BE CONSIDERED ONLY APPROXIMATE AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS AND TO DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN.

4. THE AREA TO BE CLEARED AND GRADED MUST FLAGGED BY THE CONTRACTOR AND APPROVED BY THE CLEARING & GRADING INSPECTOR PRIOR TO BEGINNING ANY WORK ON THE SITE.

5. A REINFORCED SILT FENCE MUST BE INSTALLED AS SHOWN ON THE APPROVED PLANS OR PER THE CLEARING & GRADING INSPECTOR, ALONG SLOPE CONTOURS AND DOWN SLOPE FROM THE BUILDING SITE.

6. A HARD-SURFACE CONSTRUCTION ACCESS PAD IS REQUIRED. THIS PAD MUST REMAIN IN THE PLACE UNTIL PAVING IS INSTALLED.

7. CLEARING WILL BE LIMITED TO THE AREAS WITHIN THE APPROVED DISTURBANCE LIMITS, EXPOSED SOILS MUST BE COVERED AT THE END OF EACH WORKING DAY WHEN WORKING FROM OCTOBER 1ST THROUGH APRIL 30. FROM MAY THROUGH SEPTEMBER 30, EXPOSED SOILS MUST BE COVERED AT THE END OF EACH CONSTRUCTION WEEK AND ALSO AT THE THREAT OF RAIN.

8. ANY EXCAVATED MATERIAL REMOVED FROM THE CONSTRUCTION SITE AND DEPOSITED ON THE PROPERTY WITHIN THE CITY LIMITS MUST BE DONE IN COMPLIANCE WITH VALID CLEARING & GRADING PERMIT. LOCATIONS FOR THE MOBILIZATION AREA AND STOCKPILED MATERIALS MUST APPROVED BY THE CLEARING & GRADING INSPECTOR AT LEAST 24 HOURS IN ADVANCE OF ANY STOCKIPLING.

9. TO REDUCE THE POTENTIAL FOR EROSION OF EXPOSED SOILS, OR WHEN RAINY SEASON CONSTRUCTION IS PERMITTED, THE FOLLOWING BEST MANAGEMENT PRACTICES (BMPS) ARE REQUIRED:
* PRESERVED NATURAL VEGETATION FOR AS LONG AS POSSIBLE OR AS REQUIRED BY THE CLEARING & GRADING INSPECTOR.
* PROTECT EXPOSED SOIL USING PLASTIC (EC-14), EROSION CONTROL BLANKETS, STRAW OR MULCH (COB GUIDE TO MULCH, RATES, AND USE CHART), OR AS DIRECTED BY THE CLEARING & GRADING INSPECTOR.
* INSTALL CATCH BASIN INSERTS AS REQUIRED BY THE CLEARING & GRADING INSPECTOR OR PERMIT CONDITIONS OF APPROVAL.
* INSTALL A TEMPORARY SEDIMENT POND, A SERIES OF SEDIMENTATION TANKS, TEMPORARY FILTER VAULTS, OR OTHER SEDIMENT CONTROL FACILITIES. ISTALLATION OF EXPOSED AGGREGATE SURFACES REQUIRES A SEPARATE EFFLUENT COLLECTION POND ON -SITE.

10. FINAL SITE GRADING MUST DIRECT DRAINAGE AWAY FROM ALL BUILDING STRUCTURES AT MINIMUM 2% SLOPE, PER UNIFORM BUILDING CODE.

11. THE CONTRACTOR MUST MAINTAIN A SWEEPER ON - SITE DURING EARTHWORK AND IMMEDIATELY REMOVE SOIL THAT HAS BEEN TRACKED ONTO PAVED AREAS AS RESULT OF CONSTRUCTION.

12. A PUBLIC INFORMATION SIGN LISTING 24- HOUR EMERGENCY NUMBER FOR THE CITY AND THE CONTRACTOR MAY BE PROVIDED TO THE APPLICANT AT THE TIME THE CLEARING & GRADING PERMIT IS ISSUED. THE APPLICANT MUST POST THE SIGN AT THE PROJECT SITE IN FULL VIEW OF THE PUBLIC AND THE CONTRACTORS, AND IT MUST REMAIN POSTED UNTIL FINAL SIGN -OFF BY THE CLEARING & GRADING INSPECTOR.

13. TURBIDITY MONITORING MAY BE REQUIRED AS A OF CLEARING & GRADING PERMIT APPROVAL. IF REQUIRED, MONITORING MUST BE PERFORMED IN ACCORDANCE WITH THE APPROVED TURBIDITY MONITORING PLAN AND AS DIRECTED BY THE CLEARING & GRADING INSPECTOR. MONITORING MUST DURING SITE (EARTHWORK) CONSTRUCTION UNTIL THE FINAL SIGN - OFF BY THE CLEARING & GRADING INSPECTOR.

14. ANY PROJECT THAT IS SUBJECTED TO RAINY SEASON RESTRICTIONS WILL NOT BE ALLOWED TO PERFORM CLEARING & GRADING ACTIVITIES WITHOUT WRITTEN APPROVAL FROM THE CITY ENGINEER. THE RAINY SEASON EXTENDS FROM NOVEMBER 1ST THROUGH APRIL 30.

GENERAL NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH CITY OF MERCER ISLAND STANDARDS AND THE MOST CURRENT COPY OF WSDOT STANDARD SPECIFICATION FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION, AND THE 2016 EDITION OF THE WASHINGTON STATE DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR THE PUGET SOUND BASIN.

2. ALL WORKS WITHIN THE PLAT AND CITY RIGHT OF WAY SHALL BE SUBJECT TO THE INSPECTION OF THE CITY ENGINEER OR DESIGNATED REPRESENTATIVE.

3. PRIOR TO ANY CONSTRUCTION INCLUDING CLEARING/LOGGING OR GRADING. THE SITE CLEARING LIMITS SHALL BE LOCATED AND FIELD IDENTIFIED BY THE PROJECT SURVEYOR OR PROJECT ENGINEER AS REQUIRED BY THESE PLANS. THE PROJECT SURVEYOR'S NAME AND PHONE NUMBER IS TOM 425-298-4412

4. THE DEVELOPER AND CONTRACTOR IS RESPONSIBLE FOR WATER QUALITY AS DETERMINED BY THE MONITORING PROGRAM ESTABLISHED BY THE PROJECT ENGINEER. THE PROJECT ENGINEERS NAME AND NUMBER IS STEVE 206-795-5674

5. PRIOR TO ANY SITE WORK, THE CONTRACTOR SHALL CONTACT THE DEPARTMENT OF PUBLIC WORKS TO SCHEDULE A PRECONSTRUCTION CONFERENCE. DUE TO FIELD CHANGES, ENGINEERED AS- BUILD IN ACCORDANCE WITH THE 2010 INTERNATIONAL BUILDING CODE SHALL BE REQUIRED PRIOR TO SITE APPROVAL.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS FOR UTILITY, ROAD, AND RIGHT OF WAY CONSTRUCTION. THE CONTRACTOR FOR THIS PROJECT IS _____
CONTACT PERSON _____ MOBILE PHONE _____ EMERGENCY PHONE _____

7. THE TEMPORARY EROSION AND SEDIMENTATION CONTROL (TESC) FACILITIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED TESC PLANS PRIOR TO ANY GRADING OR EXTENSIVE LAND CLEARING. THESE FACILITIES MUST BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION AND LANDSCAPING IS COMPLETED AND THE POTENTIAL FOR ON SITE EROSION HAS PASSED. SEDIMENT LADEN WATERS SHALL NOT ENTER THE NATURAL DRAINAGE SYSTEM.

8. NON COMPLIANCE WITH REQUIREMENTS FOR EROSION CONTROLS, WATER QUALITY AND CLEARING LIMITS MAY RESULT IN REVOCATION OF PROJECT PERMITS, PLAN APPROVAL AND BOND FORECLOSURES.

9. TRENCH BACKFILL OF NEW UTILITIES AND STORM DRAINAGE FACILITIES SHALL BE COMPACTED TO 95% MAXIMUM DENSITY (MODIFIED PROCTOR) UNDER ROADWAYS AND 90% MAXIMUM DENSITY (MODIFIED PROCTOR) OFF ROADWAYS. COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 2-03.3(14) C- METHOD B AS DEFINED IN THE CURRENT EDITION OF THE APWA/WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION.

10. THE OWNER AND CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION. LOCATIONS OF UTILITIES SHOWN ON CONSTRUCTION PLANS ARE BASED ON BEST RECORDS AVAILABLE AND ARE SUBJECT TO VARIATION. FOR ASSISTANCE IN UTILITY LOCATION, CALL 1-800-424-5555.

11. PRIOR TO CONSTRUCTION THE OWNER AND/OR CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER AND THE CITY ENGINEER WHEN CONFLICTS EXIST BETWEEN THE PLANS AND FIELD CONDITIONS. CONFLICTS SHALL BE RESOLVED (INCLUDING PLAN AND PROFILE REVISIONS) AND RESUBMITTED FOR APPROVAL PRIOR TO PROCEEDING WITH CONSTRUCTION.

12. THE CONTRACTOR SHALL KEEP TWO SET OF PLANS ON SITE AT ALL TIME FOR RECORDING AS BUILT INFORMATION, ONE SET SHALL BE SUBMITTED TO THE PROJECT ENGINEER, AND ONE SET SHALL BE SUBMITTED TO THE CITY ENGINEER AT COMPLETION OF CONSTRUCTION AND PRIOR TO FINAL ACCEPTANCE OF WORK.

13. A GRADING PERMIT ISSUED PURSUANT TO THE 2010 INTERNATIONAL BUILDING CODE, AND APPROVAL OF THE TEMPORARY EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE OBTAINED FROM THE PLANNING DEPARTMENT PRIOR TO ANY ON SITE GRADING WORK NOT EXPRESSLY EXCEPT BY THE 2010 INTERNATIONAL BUILDING CODE.

14. PRIOR TO COMMENCEMENT OF FRAMING, FINAL DRAINAGE INSPECTION AND APPROVAL OF THE ROOF LEADER AND POSITIVE FOOTING SYSTEMS SHALL BE COMPLETED BY THE BUILDING DEPARTMENT. CONTRACTOR NEED TO SCHEDULE THE INSPECTION APPOITMENT.

FIELD BOOK: _____
SURVEYED: _____
SURVEY BASE MAP: _____
DESIGN ENTERED: J.W
DESIGNED S.W
CHECKED: S.W

SHAO MIN WU STATE OF WASHINGTON 36655 REGISTERED PROFESSIONAL ENGINEER

TANDEM ENGINEERING CONSULTANT LLC
8822 NE 178TH ST
BOTHELL, WA 98011
(206) 795-5674

GENERAL NOTES

PARK'S RESIDENCE
8244 SE 30TH ST
MERCER ISLAND WA

SHEET 1 OF 5 SHEETS

C-1.00

GENERAL TESC NOTES

Temporary erosion and sedimentaiton control facilities (TESC) (including but not limited to temporary construction entrance, catch basin protection, silt fence installation,interceptor ditches, sedimentation ponds and straw bales) must be in place and Inspected by the City of Mercer Island prior to demolition, clearing/grading, etc. Spoil piles shall be kept covered. All City streets shall be kept free of mud and construction debris. TESC facilities shall be maintained until final landscaping is completed. No sediment-laden water shall enter Lake Washington, the public storm drain system, water courses, sensitive areas or the adjacent properties. Not all of these facilities may be identified on this plan but may be required during construction. Contractor will adhere to additional requirements as conditions warrant and the project progresses, including cleaning of downstream catch basins and drainage facilities of sediment from this project.

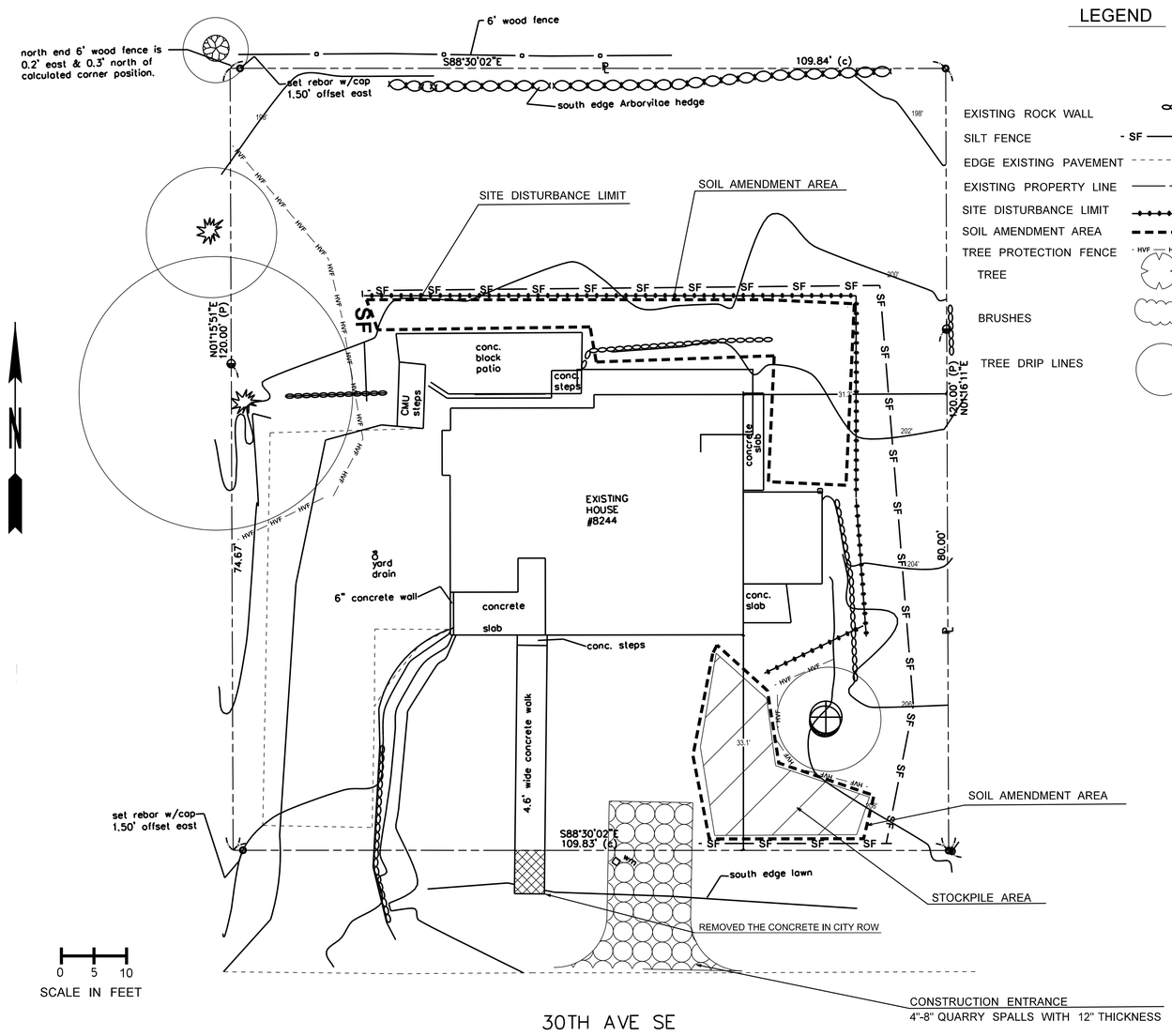
PLAN NOTES

1. Approval of this temporary erosion and sedimentation control (TESC) plan does not constitute an approval of permanent road or drainage design.
2. The implementation of these TESC plans and the construction, maintenance, replacement, and upgrading of these TESC facilities is the responsibility of the owner/agent and/or their contractor until all construction is approved.
3. The boundaires of the clearing limits shown on this plan shall be clearly flagged by a continuous length of survey tape (or fencing, if required) prior to construction. During the construction period, no disturbance beyond the clearing limits shall be permitted. The clearing limits shall be maintained by the owner/agent and/or their contractor for the duration of construction.
4. The TESC facilities shown on this plan must be constructed prior to or in conjunction with all clearing and grading so as to ensure that the transport of sediment to surface waters, drainage systems, and adjacent properties is minimized.
5. The TESC facilities shown on this plan are the minimum requirements for anticipated site conditions. During the construciton period, these TESC facilities shall be upgraded as needed for unexpected storm events and modified to account for changing site conditions (e.g., additional sump pumps, relocation of ditches, hay bales and silt fences, etc.).
6. The TESC facilities shall be inspected daily by the owner/agent and/or their contractor and maintained to ensure continued proper functioning, Written records shall be kept of weekly reviews of the TESC facilities during the wet season (Oct. 1 to April 30) and of monthly reviews during the dry season (May 1 to Sept. 30).
7. Any areas of exposed soils, including roadway embankments, that will not be disturbed for two days during the wet season (Oct. 1 to April 30) or seven days during the dry season (May 1 to Sept. 30), shall be immediately stabilized with approved TESC methods (e.g., seeding, mulching, plastic coverni g, etc.).
8. Any area needing TESC measures that do not require immediate attention shall be addressed within fifteen (15) days.
9. The TESC fa cilities on inactive sites shall be inspected and maintained a minimum of once a month or within forty- eight (48) hours following a storm event.
10. At no time shall more than one (1) foot of sediment be allowed to accumulate within a catch basin. All catch basins and conveyance lines shall be cleaned prior to final grading and/or paving. The cleaning operation shall not flu sh sediment‌l-aden water into the downstream system.
11. Stabilized construction entrances and roads shall be installed at the beginning of construction and maintained for the duration of the project. Additional measures, such as wash pads and sediment traps, may be required to ensure that all paved areas are kept clean for the duration of the project.
12. Any permanent flow control facility used as a temporary settling basin shall be modified with the necessary temporary erosion control measures and shall provide adequate storage capacity.
13. Where straw mulch for temporary erosion control is required, it shall be applied at a minimum thickness of 2 to 3 inches.
14. Prior to the beginning of the wet season (Oct. 1), all disturbed areas shall be reviewed to identify which ones can be seeded in preparation for the winter rains. Disturbed areas shall be seeded within one week of the beginning of the wet season. The City can require seeding of additional areas in order to protect surface waters, adjacent properties, or drainage facilities.

Construction Sequence:

1. Hold an onsite pre-construction meeting.
2. Flag or fence clearing limits.
3. Install catch basin protection, if required.
4. Grade and install construction entrance(s).
5. Install perimeter protection (silt fence, brush barrier, etc.).
6. Construct sediment pond(s) and/or trap(s).
7. Construct surface water controls (interceptor dikes, pipe slope drains, etc.) simultaneously with clearing and grading for project development.
8. Maintain TESC measures in accordance with City standards and manufacturer's recommendations.
9. Relocate surface water controls or TESC measures, or install new measures so that as site conditions change, the TESC is always in accordance with the City of Mercer Island Temporary Erosion and Sedimentation Control Requirements.
10. Cover all areas that will be un-worked for more than two days during the wet season (Oct. 1 to April 30) or seven days during the dry season (May 1 to Sept. 30) with straw, wood fiber mulch, compost, plastic sheeting, or equivalent.
11. Stabilize all areas within seven days of reaching final grade.
12. Seed or sod any areas to remain un-worked for more than 30 days.
13. Upon completion of the project, stabilize all disturbed areas and remove TESC measures if appropriate.

Reference: King County Surface Water Design Manua.l Appendix D - 10.3



LEGEND

- EXISTING ROCK WALL
- SILT FENCE — SF — SF — SF —
- EDGE EXISTING PAVEMENT
- EXISTING PROPERTY LINE
- SITE DISTURBANCE LIMIT
- SOIL AMENDMENT AREA
- TREE PROTECTION FENCE — HVF — HVF — HVF —
- TREE
- BRUSHES
- TREE DRIP LINES

EXPOSED & STOCKPILES SOIL BMP'S

All exposed and unworked soils shall be stabilized per the following criteria:
From October 1 to April 30, no exposed and unworked soils shall remain unstabilized (exposed) for more than two days. Non-erodible, clean, granular base materials shall be applied to stabilize all trafficked areas.
From May 1 to September 30, no exposed and unworked soils on slopes shall remain unstabilized (exposed) for more than seven days.
Exposed and unworked soils will be stabilized with the application of effective BMPs to prevent erosion throughout the life of the project. The specific BMPs will be used on this project include:

- Preserving natural vegetation
-Sodding
- Topsoil
-Mulching
- Check dam
-Soil binding using polyacrylamide
-Wattles
-Biodegradable erosion control blanket
-Compost blanket
-Stabilized construction entrance
-Plastic covering
- Construction road stabilization
-Seeding and planting
-Dust Control
-Bonded Fiber Matrix
-Mechanically Bonded Fiber Matrix

Seeding and mulching will be used to stabilize soils throughout the project following excavation and grading as well as other disturbed areas. During dry weather construction periods, the contractor will provide project specific dust control measures, as needed. Cut and fill slopes will be stabilized as soon as possible and soil stockpiles will be temporarily covered with plastic sheeting to prevent short-term erosion. All stockpiled soils will be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

FIELD BOOK:
SURVEYED:
SURVEY BASE MAP:
DESIGN ENTERED: J.W
DESIGNED S.W
CHECKED: S.W

SHAO MIN WU STATE OF WASHINGTON 34652 REGISTERED PROFESSIONAL ENGINEER

TANDEM ENGINEERING CONSULTANT LLC
8822 NE 178TH ST
BOTHELL, WA 98011
(206) 795-5674

TESC PLAN

PARK'S RESIDENCE
8244 SE 30TH ST
MERCER ISLAND WA

SHEET **2** OF **5** SHEETS

C-2.00

LEGEND

EXISTING EDGE OF PAVEMENT

SPOT ELEVATION +203

TREE FENCE - HVF — HVF — HVF —

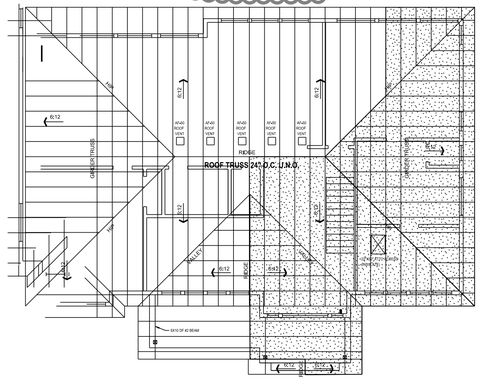
EXISTING TREES

TREE DRIP LINES

FOOTING DRAIN - UD — UD — UD — UD —

EXISTING LOT LINE

ROOF FRAMING



966 S.F NEW & EXISTING ROOF
DRAIN TO THE INFILTRATION TRENCH

NOTE

① 4" FOOTING DRAIN, MIN 2.0% SLOPE, GRADE (ASTM D-3034 PVC)

② 4" ROOFING DRAIN, MIN 2.0% SLOPE, GRADE (ASTM D-3034 PVC)

③ 6" STORM WATER DRAIN, MIN 2% SLOPE, GRADE (ASTM D-3034 PVC)

TREE INVENTORY

Tree #	Species	DBH	Remarks	Condition
1	Douglas Fir	24"	21" radius dripline to east and south, 19' north	Good
2	Pine, White	16"	off -site tree co-dominant 30", risk assessment advise 10" canopy overhang	Fair
3	Western Hemlock	16"	off-site tree, 5'by 8' canopy overhang	Good
4	Japanese lace leaf maple	6"	Vigorous lace leaf worth transplanting/relocating	Excellent

NOTE
NO EXCAVATION ENCROACHMENT INTO TREE DRIP LINE

Post Construction Soil Quality

All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structure fill or slope shall, at project completion, demonstrate the following:

1. A topsoil layer with a minimum organic matter content of 10% dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the undisturbed soil. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.

2. Mulch planting beds with 2 inches of organic material

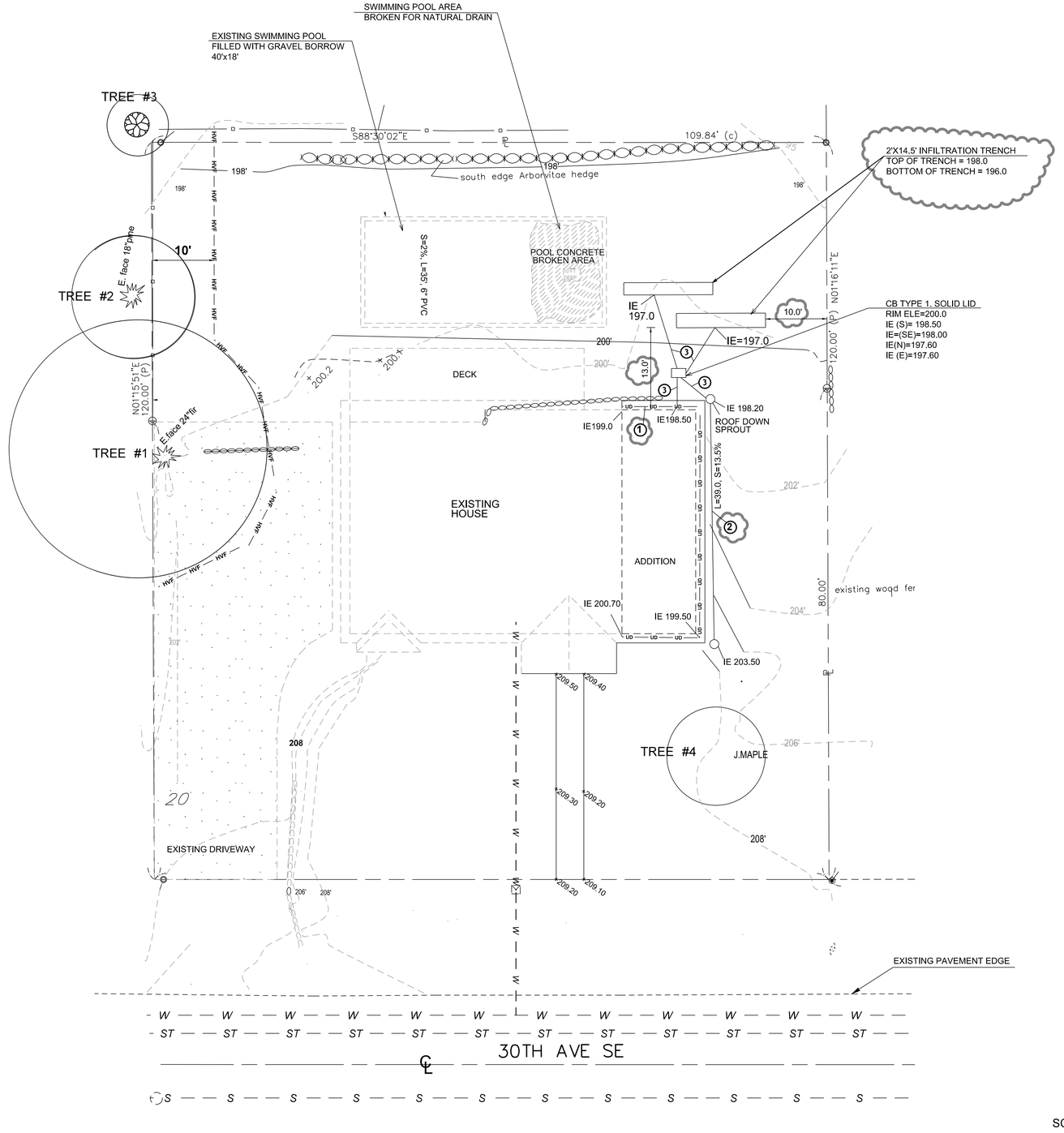
3. Use compost and other materials that meet these organic content requirements:

a. The organic content for "pre-approved" amendment rates can be met only using compost meeting the compost specification for BMP T7.30: Bioretention Cells, Swales, and Planter Boxes (p.959), with the exception- that the compost may have up to 35% biosolids or manure.The compost must also have an organic matter content of 40% to 65%, and a carbon to nitrogen ratio below 25:1.The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region.

b. Calculated amendment rates may be met through use of composted material meeting (a.) above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and not exceeding the contaminant limits identified in Table 220-B, Testing Parameters, in WAC 173-350-220.

Maintenance

1. Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
2. Plant vegetation and mulch the amended soil area after installation.
3. Leave plant debris or its equivalent on the soil surface to replenish organic matter.
4. Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

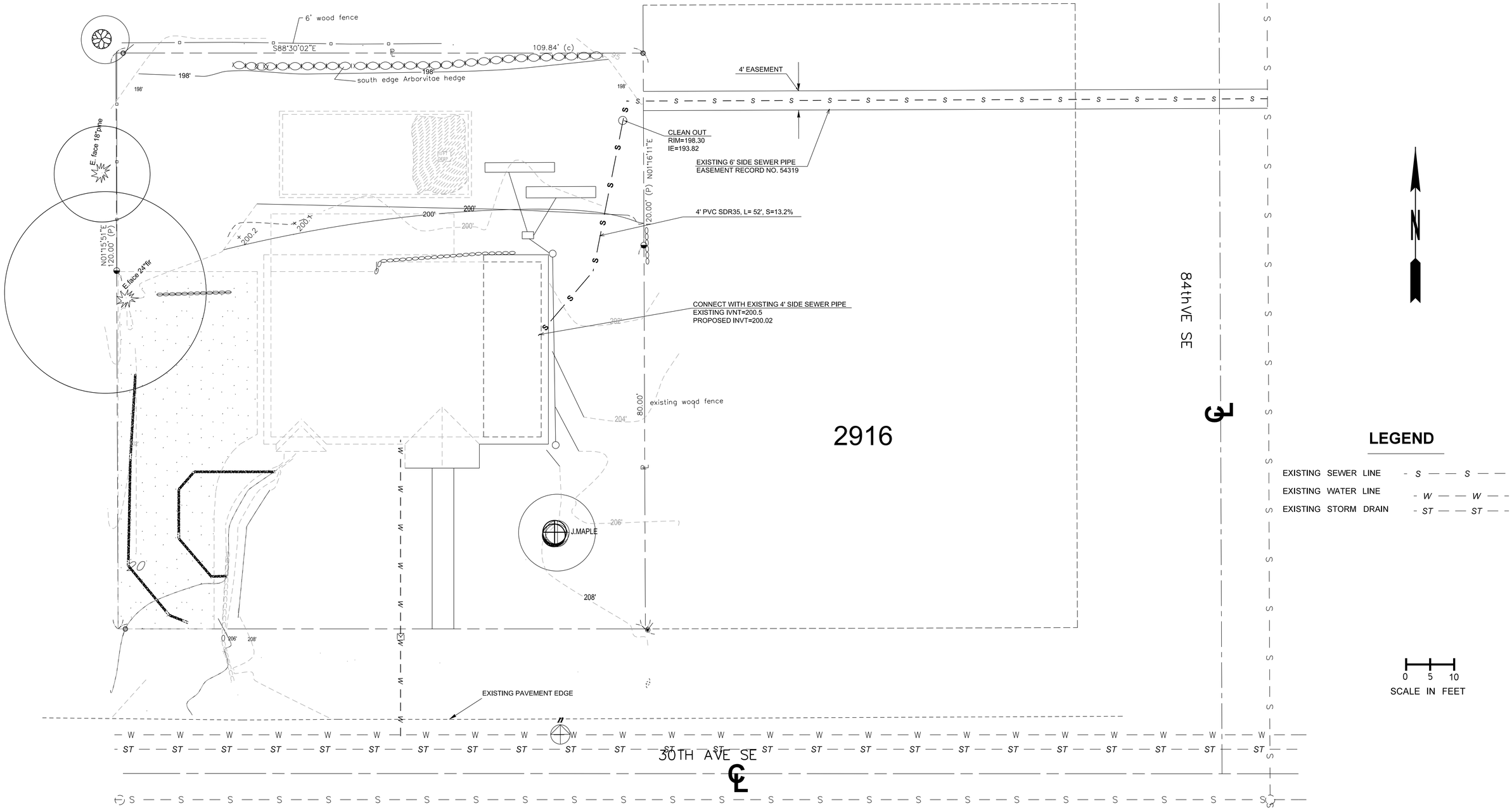


FIELD BOOK:	TANDEM ENGINEERING CONSULTANT LLC 8822 NE 178TH ST BOTHELL, WA 98011 (206) 795-5674	GRADATION & DRAINAGE PLAN	PARK'S RESIDENCE 8244 SE 30TH ST MERCER ISLAND WA
SURVEYED:			
SURVEY BASE MAP:			
DESIGN ENTERED: J.W			
DESIGNED S.W			
CHECKED: S.W			

SHAO MIN WU STATE OF WASHINGTON 38853 REGISTERED PROFESSIONAL ENGINEER

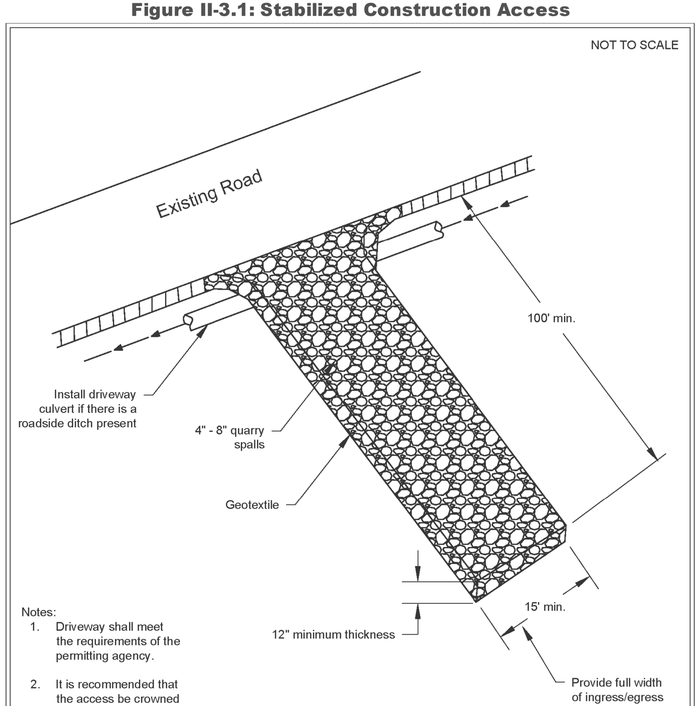
SHEET 3 OF 5 SHEETS

C-3.00

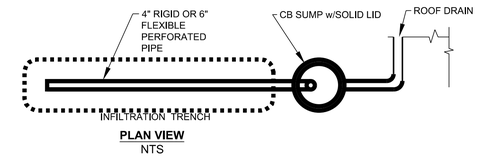


FIELD BOOK:	**TANDEM ENGINEERING CONSULTANT LLC** **8822 NE 178TH ST** **BOTHELL, WA 98011** **(206) 795-5674**	**SEWER & WATER LINE**	**PARK'S RESIDENCE** **8244 SE 30TH ST** **MERCER ISLAND WA**	SHEET **4** OF **5** SHEETS
SURVEYED:				
SURVEY BASE MAP:				
DESIGN ENTERED: **J.W**				
DESIGNED **S.W**				
CHECKED: **S.W**				**C-4.00**

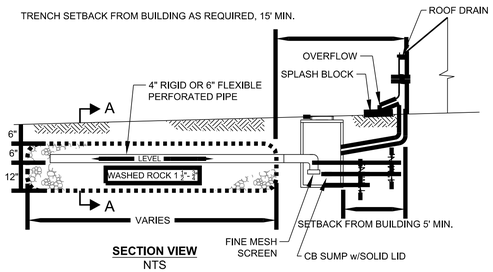
Figure II-3.1: Stabilized Construction Access



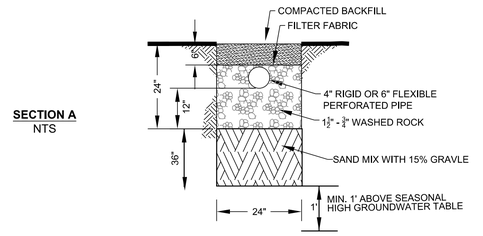
NTS



PLAN VIEW
NTS



SECTION VIEW
NTS



SECTION A
NTS

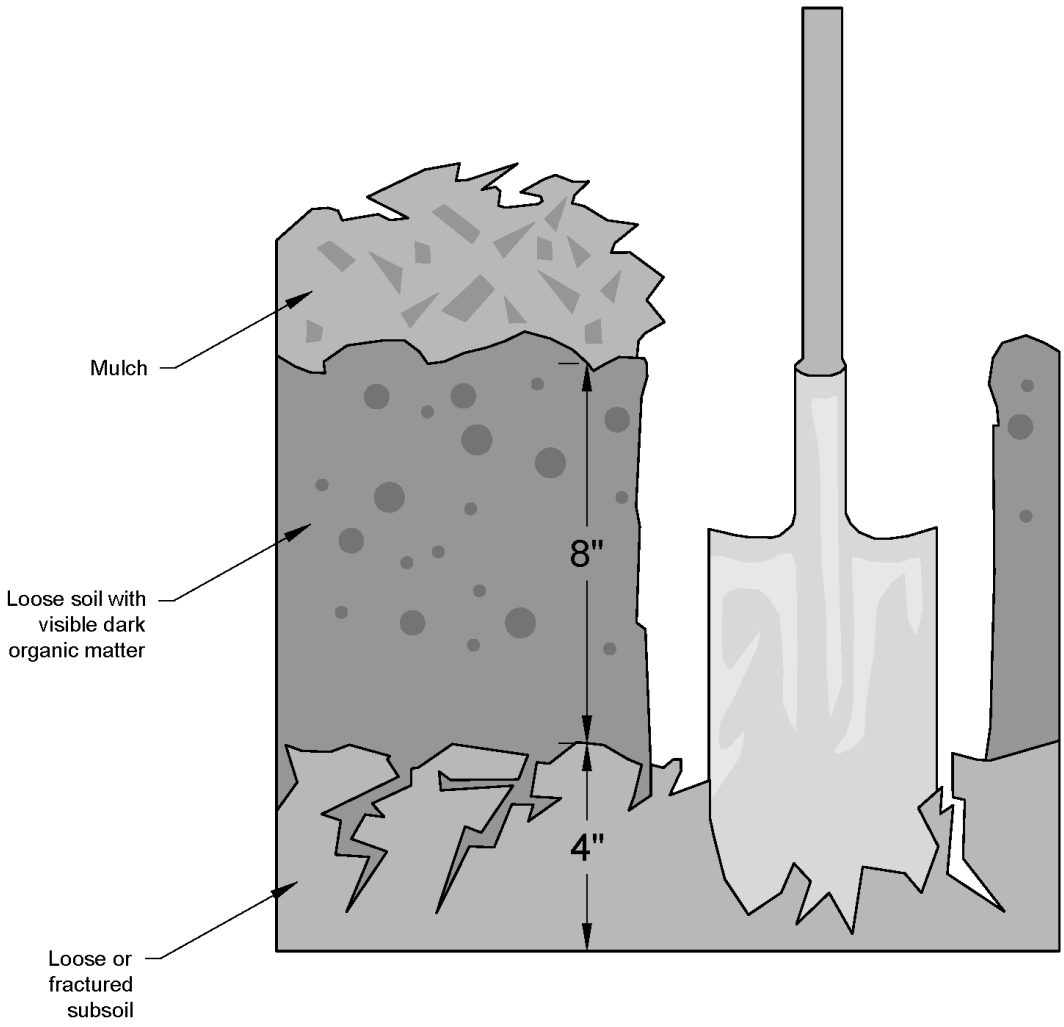
NTS

FIELD BOOK:		**TANDEM ENGINEERING CONSULTANT LLC** **8822 NE 178TH ST** **BOTHELL, WA 98011** **(206) 795-5674**	**DETAILS**	**PARK'S RESIDENCE** **8244 SE 30TH ST** **MERCER ISLAND WA**	SHEET **5** OF **5** SHEETS
SURVEYED:					
SURVEY BASE MAP:					
DESIGN ENTERED:	**J.W**				
DESIGNED	**S.W**				
CHECKED:	**S.W**				**C-5.00**

Appendix D

Typical Downspout Infiltration Trench and Soil Amendment

Figure V-11.1: Planting Bed Cross-Section



Reprinted from *Guidelines and Resources For Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington*, 2010, Washington Organic Recycling Council

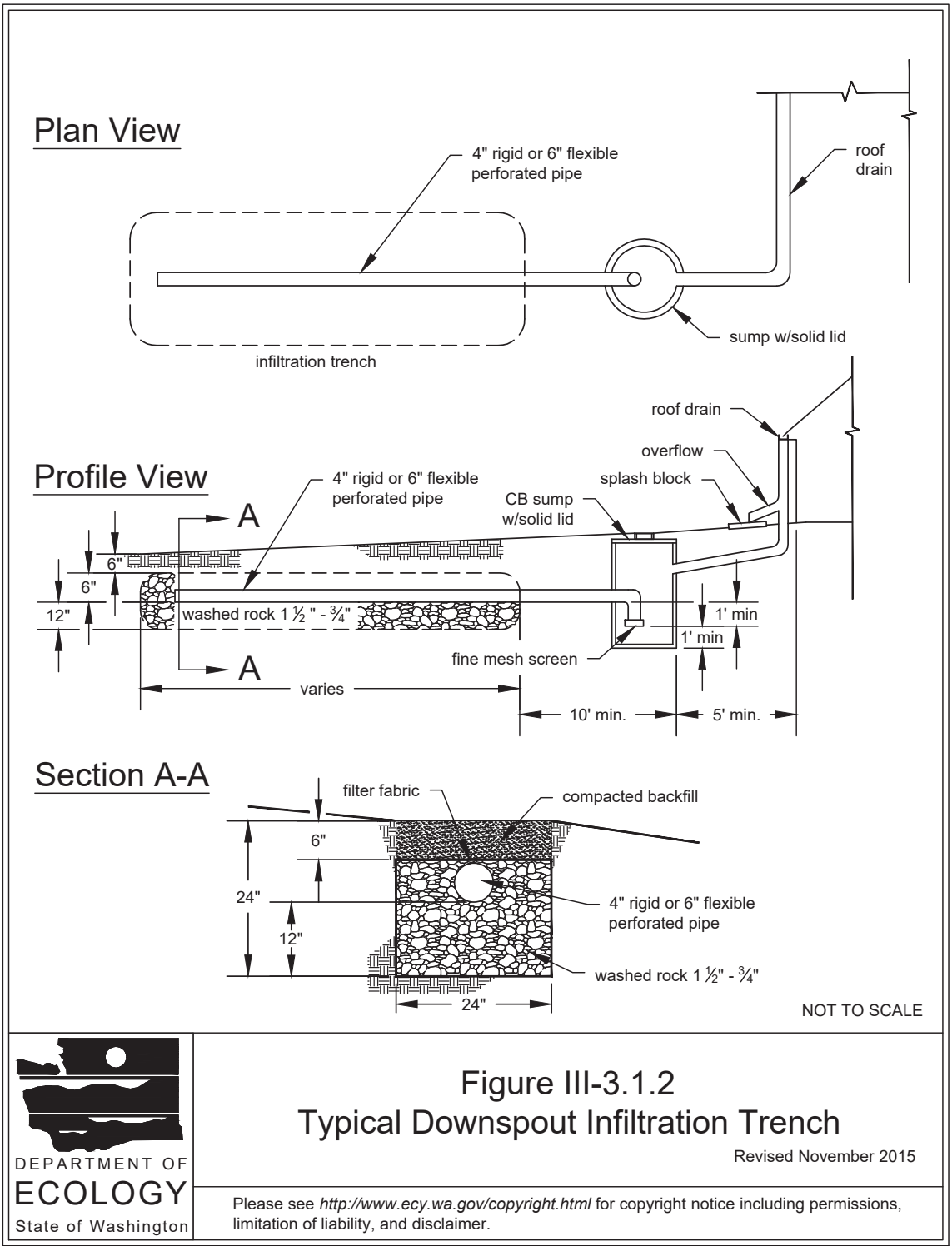
NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Planting Bed Cross-Section

Revised June 2016

Figure III-3.1.2 Typical Downspout Infiltration Trench



DEPARTMENT OF ECOLOGY
State of Washington

Figure III-3.1.2
Typical Downspout Infiltration Trench

Revised November 2015

APPENDIX E

Geotechnical

Investigation Report

Cobalt Geosciences, LLC
P.O. Box 82243
Kenmore, Washington 98028

August 28, 2022

Tae Park
C/O Steve Joo
Steve.joo@hotmail.com

RE: Geotechnical Evaluation
Proposed Additions
8244 SE 30th Street
Mercer Island, Washington

In accordance with your authorization, Cobalt Geosciences, LLC has prepared this letter to discuss the results of our geotechnical evaluation at the referenced site.

The purpose of our evaluation was to provide recommendations for foundation design, grading, and earthwork.

Site Description

The site is located at 8244 SE 30th Street in Mercer Island, Washington. The site consists of one nearly rectangular shaped parcel (No. 5452300816) with a total area of about 13,200 square feet.

The site is developed with a residence with daylight basement and driveway. The remainder of the property is undeveloped and vegetated with grasses, bushes, and variable diameter trees.

Overall, the site slopes downward from south to north at magnitudes of 5 to 15 percent and relief of about 10 feet. There is a short rockery near a deck along the east side of the residence and a likely 3 to 6 feet tall wall near the north property line (mostly obscured by vegetation).

According to the City of Mercer Island GIS maps, the site contains seismic hazard areas. The site is bordered to the north, east, and west by residences, and to the south by SE 30th Street.

The proposed development includes a building addition along the east side of the residence and a new deck along the north side of the building. Foundation loads will be light and site grading will likely include cuts of 3 feet or less. We should be provided with the final plans to verify that our recommendations remain valid and do not require updating.

Area Geology

The Geologic Map of Mercer Island, indicates that the site is underlain by Vashon Recessional Outwash.

Vashon Recessional Outwash includes mixtures of layers of silty-sand poorly graded sands, gravelly soils, and local lacustrine silts and clays.

Soil & Groundwater Conditions

As part of our evaluation, we excavated a test pit in the area of the proposed addition. Liu and Associates previously prepared a geotechnical report for the site (2017). They excavated two test pits and conducted two infiltration tests, located north of the residence. We have included their logs for reference.

The test pit encountered approximately 6 inches of topsoil and vegetation underlain by about 2 feet medium dense, silty-fine to medium grained sand trace gravel (Recessional Outwash). These materials were underlain by approximately 2 feet of medium dense, fine to medium grained sand (Recessional Outwash). These materials were underlain by stiff to very stiff, silt trace to with fine grained sand (pre-Olympia fine grained deposits) which continued to the termination depth of the test pit.

We reviewed numerous nearby explorations conducted by geotechnical consultants. These explorations described recessional type deposits underlain by finer grained materials in some areas. Groundwater was noted on most of these logs at variable depths below grade. The Liu logs were similar to our test pits logs.

Groundwater was not encountered in our test pit or the Liu test pits; however, these explorations were all conducted during the dry season. We anticipate that groundwater may be present above the silt deposits that were observed about 4.5 feet below grade in the test pit. Groundwater would most likely be present during the wet season.

Water table elevations often fluctuate over time. The groundwater level will depend on a variety of factors that may include seasonal precipitation, irrigation, land use, climatic conditions and soil permeability. Water levels at the time of the field investigation may be different from those encountered during the construction phase of the project.

City of Mercer Island GIS Mapped Hazards

The City of Mercer Island GIS maps indicate that the site is within a seismic hazard area. This is likely based on the presence of mapped recessional outwash materials in this area. The thin zone of poorly graded sand could have a slight potential for liquefaction when groundwater is present. We provide foundation recommendations to reduce this risk to acceptable levels.

Statement of Risk

Per Section 19.07.060.D.2 of the Mercer Island City Code, development within geologic hazard areas require that a Geotechnical Engineer licensed within the State of Washington provide a statement of risk with supporting documentation indicating that one of the following conditions can be met:

a. The geologic hazard area will be modified, or the development has been designed so that the risk to the lot and adjacent property is eliminated or mitigated such that the site is determined to be safe; or

b. An evaluation of site specific subsurface conditions demonstrates that the proposed development is not located in a geologic hazard area; or

c. Development practices are proposed for the alteration that would render the development as safe as if it were not located in a geologic hazard area; or

d. The alteration is so minor as not to pose a threat to the public health, safety and welfare.

The project meets the criteria of a from above. We provide specific foundation recommendations that eliminate the risk of liquefaction to the proposed additions.

Erosion Hazard

The Natural Resources Conservation Services (NRCS) maps for King County indicate that most of the site is underlain by Kitsap silt loam (2 to 8 percent slopes). These soils would have a moderate to severe erosion potential in a disturbed state depending on the slope magnitude.

It is our opinion that soil erosion potential at this project site can be reduced through landscaping and surface water runoff control. Typically, erosion of exposed soils will be most noticeable during periods of rainfall and may be controlled by the use of normal temporary erosion control measures, such as silt fences, hay bales, mulching, control ditches and diversion trenches. The typical wet weather season, with regard to site grading, is from October 31st to April 1st. Erosion control measures should be in place before the onset of wet weather.

Seismic Hazard

The overall subsurface profile corresponds to a Site Class *D* as defined by Table 1613.5.2 of the International Building Code (IBC). A Site Class *D* applies to an overall profile consisting of medium dense to very dense soils within the upper 100 feet.

We referenced the U.S. Geological Survey (USGS) Earthquake Hazards Program Website to obtain values for S_S, S_1, F_a, and F_v. The USGS website includes the most updated published data on seismic conditions. The following tables provide seismic parameters from the USGS web site with referenced parameters from ASCE 7-16.

Seismic Design Parameters (ASCE 7-16)

Site Class	Spectral Acceleration at 0.2 sec. (g)	Spectral Acceleration at 1.0 sec. (g)	Site Coefficients		Design Spectral Response Parameters		Design PGA
			F_a	F_v	S_{DS}	S_{D1}	
D	1.395	0.486	1.0	Null	0.93	Null	0.597

Additional seismic considerations include liquefaction potential and amplification of ground motions by soft/loose soil deposits. The liquefaction potential is highest for loose sand with a high groundwater table.

Below the thin sand zone, the site soils would have a low risk of liquefaction. We provide specific foundation recommendations to minimize the risk and effect of liquefaction on the proposed additions. For items listed as "Null" see Section 11.4.8 of the ASCE.

Conclusions and Recommendations

General

The site is underlain by recessional outwash and at depth by denser pre-Olympia fine grained deposits. We recommend supporting new foundation elements on either driven pipe piles or on rock used to replace any outwash sands that underlie foundation areas. The sands could extend 4 to 5 feet below site elevations.

While infiltration appears to be generally feasible in the outwash sands, there is a potential for shallow perched groundwater during the wet season. This is based on our review of nearby explorations that note wet soils and groundwater at shallow depths. Overall, we recommend direct or perforated connection of runoff devices to City infrastructure. If this is not feasible, dispersion, curb cuts, or splash blocks should be considered. If these are not feasible, infiltration could be possible; however, we should discuss system locations and elevations with the civil designer prior to finalization and permitting.

Site Preparation

Trees, shrubs and other vegetation should be removed prior to stripping of surficial organic-rich soil and fill. Based on observations from the site investigation program, it is anticipated that the stripping depth will be 6 to 12 inches. Deeper excavations will be necessary below foundation systems, below large trees, and in any areas underlain by undocumented fill.

The native soils consist of silty-sand with gravel, poorly graded sand, and at depth by silt with sand. Most of the native soils may be used as structural fill provided they achieve compaction requirements and are within 3 percent of the optimum moisture. Some of these soils may only be suitable for use as fill during the summer months, as they will be above the optimum moisture levels in their current state. These soils are variably moisture sensitive and may degrade during periods of wet weather and under equipment traffic.

Imported structural fill should consist of a sand and gravel mixture with a maximum grain size of 3 inches and less than 5 percent fines (material passing the U.S. Standard No. 200 Sieve). Structural fill should be placed in maximum lift thicknesses of 12 inches and should be compacted to a minimum of 95 percent of the modified proctor maximum dry density, as determined by the ASTM D 1557 test method.

Temporary Excavations

Based on our understanding of the project, we anticipate that the grading could include local cuts on the order of approximately 5 feet or less for foundation placement.

Temporary excavations should be sloped no steeper than 1.5H:1V (Horizontal:Vertical) in loose native soils and fill (likely top 1 to 2 feet), and 1H:1V in medium dense native soils. If an excavation is subject to heavy vibration or surcharge loads, we recommend that the excavations be sloped no steeper than 2H:1V, where room permits.

Temporary cuts should be in accordance with the Washington Administrative Code (WAC) Part N, Excavation, Trenching, and Shoring. Temporary slopes should be visually inspected daily by a qualified person during construction activities and the inspections should be documented in daily reports. The contractor is responsible for maintaining the stability of the temporary cut slopes and reducing slope erosion during construction.

Temporary cut slopes should be covered with visqueen to help reduce erosion during wet weather, and the slopes should be closely monitored until the permanent retaining systems or slope configurations are complete. Materials should not be stored or equipment operated within 10 feet of the top of any temporary cut slope.

Soil conditions may not be completely known from the geotechnical investigation. In the case of temporary cuts, the existing soil conditions may not be completely revealed until the excavation work exposes the soil. Typically, as excavation work progresses the maximum inclination of temporary slopes will need to be re-evaluated by the geotechnical engineer so that supplemental recommendations can be made. Soil and groundwater conditions can be highly variable. Scheduling for soil work will need to be adjustable, to deal with unanticipated conditions, so that the project can proceed and required deadlines can be met.

If any variations or undesirable conditions are encountered during construction, we should be notified so that supplemental recommendations can be made. If room constraints or groundwater conditions do not permit temporary slopes to be cut to the maximum angles allowed by the WAC, temporary shoring systems may be required. The contractor should be responsible for developing temporary shoring systems, if needed. We recommend that Cobalt Geosciences and the project structural engineer review temporary shoring designs prior to installation, to verify the suitability of the proposed systems.

Foundation Design

The proposed addition and deck may be supported on shallow spread footing foundation systems bearing on driven pipe piles or on properly compacted structural fill placed on the suitable native soils.

Due to the presence of a thin zone of outwash sands that have a moderate potential of liquefaction, either pipe piles extending to refusal in the denser fine grained soils below the outwash or coarse rock used to replace outwash sands are necessary for foundation support. For the overexcavation option, we recommend removal of all loose sands below new footing areas extending outward at a 1/2H:1V envelope in all directions. The sand should be replaced with coarse clean angular rock 5/8 to 2 inches in size. We should verify soil conditions during foundation excavation work.

For shallow foundation support, we recommend widths of at least 16 and 24 inches, respectively, for continuous wall and isolated column footings supporting the proposed structure. Provided that the footings are supported as recommended above, a net allowable bearing pressure of 3,000 pounds per square foot (psf) may be used for design.

A 1/3 increase in the above value may be used for short duration loads, such as those imposed by wind and seismic events. Structural fill placed on bearing, native subgrade should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Footing excavations should be inspected to verify that the foundations will bear on suitable material.

Exterior footings should have a minimum depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Interior footings should have a minimum depth of 12 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower.

If constructed as recommended, the total foundation settlement is not expected to exceed 1 inch. Differential settlement, along a 25-foot exterior wall footing, or between adjoining column footings, should be less than ½ inch. This translates to an angular distortion of 0.002. Most settlement is expected to occur during construction, as the loads are applied. However, additional

post-construction settlement may occur if the foundation soils are flooded or saturated. All footing excavations should be observed by a qualified geotechnical consultant.

Resistance to lateral footing displacement can be determined using an allowable friction factor of 0.40 acting between the base of foundations and the supporting subgrades. Lateral resistance for footings can also be developed using an allowable equivalent fluid passive pressure of 250 pounds per cubic foot (pcf) acting against the appropriate vertical footing faces (neglect the upper 12 inches below grade in exterior areas). The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance.

Care should be taken to prevent wetting or drying of the bearing materials during construction. Any extremely wet or dry materials, or any loose or disturbed materials at the bottom of the footing excavations, should be removed prior to placing concrete. The potential for wetting or drying of the bearing materials can be reduced by pouring concrete as soon as possible after completing the footing excavation and evaluating the bearing surface by the geotechnical engineer or his representative.

Pin Piles

For the pin pile option, we anticipate that 2 inch diameter pipe piles could be utilized for the new footings. Piles should consist of 2 inch diameter Schedule 80 galvanized steel pipes with mechanical couplers. These should be driven with a 140 pound pneumatic hammer with refusal criteria of 3 cycles of 60 seconds per inch of penetration. Piles may be designed using an axial capacity of 3 tons each.

Slab-on-Grade

If new slab on grade is proposed, the following recommendations may apply.

We recommend that the upper 12 inches of the existing native soils within slab areas be re-compacted to at least 95 percent of the modified proctor (ASTM D1557 Test Method).

Often, a vapor barrier is considered below concrete slab areas. However, the usage of a vapor barrier could result in curling of the concrete slab at joints. Floor covers sensitive to moisture typically requires the usage of a vapor barrier. A materials or structural engineer should be consulted regarding the detailing of the vapor barrier below concrete slabs. Exterior slabs typically do not utilize vapor barriers.

The American Concrete Institutes ACI 360R-06 Design of Slabs on Grade and ACI 302.1R-04 Guide for Concrete Floor and Slab Construction are recommended references for vapor barrier selection and floor slab detailing.

Slabs on grade may be designed using a coefficient of subgrade reaction of 180 pounds per cubic inch (pci) assuming the slab-on-grade base course is underlain by structural fill placed and compacted as outlined above. A 4- to 6-inch-thick capillary break layer should be placed over the prepared subgrade. This material should consist of pea gravel or 5/8 inch clean angular rock.

A perimeter drainage system is recommended unless interior slab areas are elevated a minimum of 12 inches above adjacent exterior grades. If installed, a perimeter drainage system should consist of a 4-inch diameter perforated drain pipe surrounded by a minimum 6 inches of drain rock wrapped in a non-woven geosynthetic filter fabric to reduce migration of soil particles into the drainage system. The perimeter drainage system should discharge by gravity flow to a suitable stormwater system.

Exterior grades surrounding buildings should be sloped at a minimum of one percent to facilitate surface water flow away from the building and preferably with a relatively impermeable surface cover immediately adjacent to the building.

Stormwater Management Feasibility

The site is underlain by weathered to unweathered Vashon Recessional Outwash and at depth by Pre-Olympia Fine Grained Deposits.

While the outwash is very sandy and suitable for infiltration, this suitability decreases during the wet season when we suspect a relatively high groundwater table. Systems typically require specific clearance above the seasonal high groundwater table. If that is maintained, infiltration is generally feasible.

We have provided infiltration design information below; however, overall, we recommend utilizing direct or perforated connection of runoff devices to City infrastructure. If this is not possible, we would suggest utilizing dispersion systems or splash blocks if possible. If infiltration is the only remaining option, we should review the final design for comment and discussion of potential groundwater depths.

Because the recessional deposits have not been overridden by glacial ice, this soil unit is considered normally-consolidated. The Washington State Department of Ecology 2019 Stormwater Management Manual for Western Washington allows determination of infiltration rates of this soil unit by Soil Particle Size Distribution testing. This method involves using a logarithmic equation and grain size values along with correction factors for testing type, soil homogeneity, and influent control.

The equation in conjunction with sieve analysis results yields a design infiltration rate of 0.5 and 0.1 inches per hour for the soils at 3 and 5 feet below grade, respectively. These rates reflect application of correction factors for variability (0.33 used), influent control (0.9), and testing analysis type (0.4). We note that the outwash sands have some infiltration potential if not saturated while the underlying silts are generally impermeable. We note that Liu obtained infiltration rates (with correction factors) of 1.23 and 0.4 inches per hour in the similar outwash sands.

Infiltration systems should extend at least 6 inches into the sand deposits. Any fine grained soils, fill, or interbeds of fine grained soils must be removed prior to rock placement. Soils are consistent with the Medium Sand designation from the King County Surface Water Design Manual.

Systems should be located at least 15 feet from the north property line and at least 5 feet from structures. We assume that any systems would be for the added roof areas only and not the entire residence.

We should be provided with final plans for review to determine if the intent of our recommendations has been incorporated or if additional modifications are needed. Verification testing of infiltration systems should be performed during construction.

Erosion and Sediment Control

Erosion and sediment control (ESC) is used to reduce the transportation of eroded sediment to wetlands, streams, lakes, drainage systems, and adjacent properties. Erosion and sediment control measures should be implemented, and these measures should be in general accordance with local regulations. At a minimum, the following basic recommendations should be incorporated into the design of the erosion and sediment control features for the site:

- Schedule the soil, foundation, utility, and other work requiring excavation or the disturbance of the site soils, to take place during the dry season (generally May through September). However, provided precautions are taken using Best Management Practices (BMP's), grading activities can be completed during the wet season (generally October through April).
- All site work should be completed and stabilized as quickly as possible.
- Additional perimeter erosion and sediment control features may be required to reduce the possibility of sediment entering the surface water. This may include additional silt fences, silt fences with a higher Apparent Opening Size (AOS), construction of a berm, or other filtration systems.
- Any runoff generated by dewatering discharge should be treated through construction of a sediment trap if there is sufficient space. If space is limited other filtration methods will need to be incorporated.

CONSTRUCTION FIELD REVIEWS

Cobalt Geosciences should be retained to provide part time field review during construction in order to verify that the soil conditions encountered are consistent with our design assumptions and that the intent of our recommendations is being met. This will require field and engineering review to:

- Monitor and test structural fill placement and soil compaction
- Observe bearing capacity at foundation locations (if proposed)
- Observe excavations and shoring placement (if required/utilized)
- Observe slab-on-grade preparation

Geotechnical design services should also be anticipated during the subsequent final design phase to support the structural design and address specific issues arising during this phase. Field and engineering review services will also be required during the construction phase in order to provide a Final Letter for the project.

CLOSURE

This report was prepared for the exclusive use of Tae Park and his appointed consultants. Any use of this report or the material contained herein by third parties, or for other than the intended purpose, should first be approved in writing by Cobalt Geosciences, LLC.

The recommendations contained in this report are based on assumed continuity of soils with those of our test holes and assumed structural loads. Cobalt Geosciences should be provided with final architectural and civil drawings when they become available in order that we may review our design recommendations and advise of any revisions, if necessary.

Use of this report is subject to the Statement of General Conditions provided in Appendix A. It is the responsibility of Tae Park who are identified as "the Client" within the Statement of General Conditions, and its agents to review the conditions and to notify Cobalt Geosciences should any of these not be satisfied.

Sincerely,

Cobalt Geosciences, LLC

8/28/2022
Phil Haberman, PE, LG, LEG
Principal

Statement of General Conditions

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Cobalt Geosciences and the Client. Any use which a third party makes of this report is the responsibility of such third party.

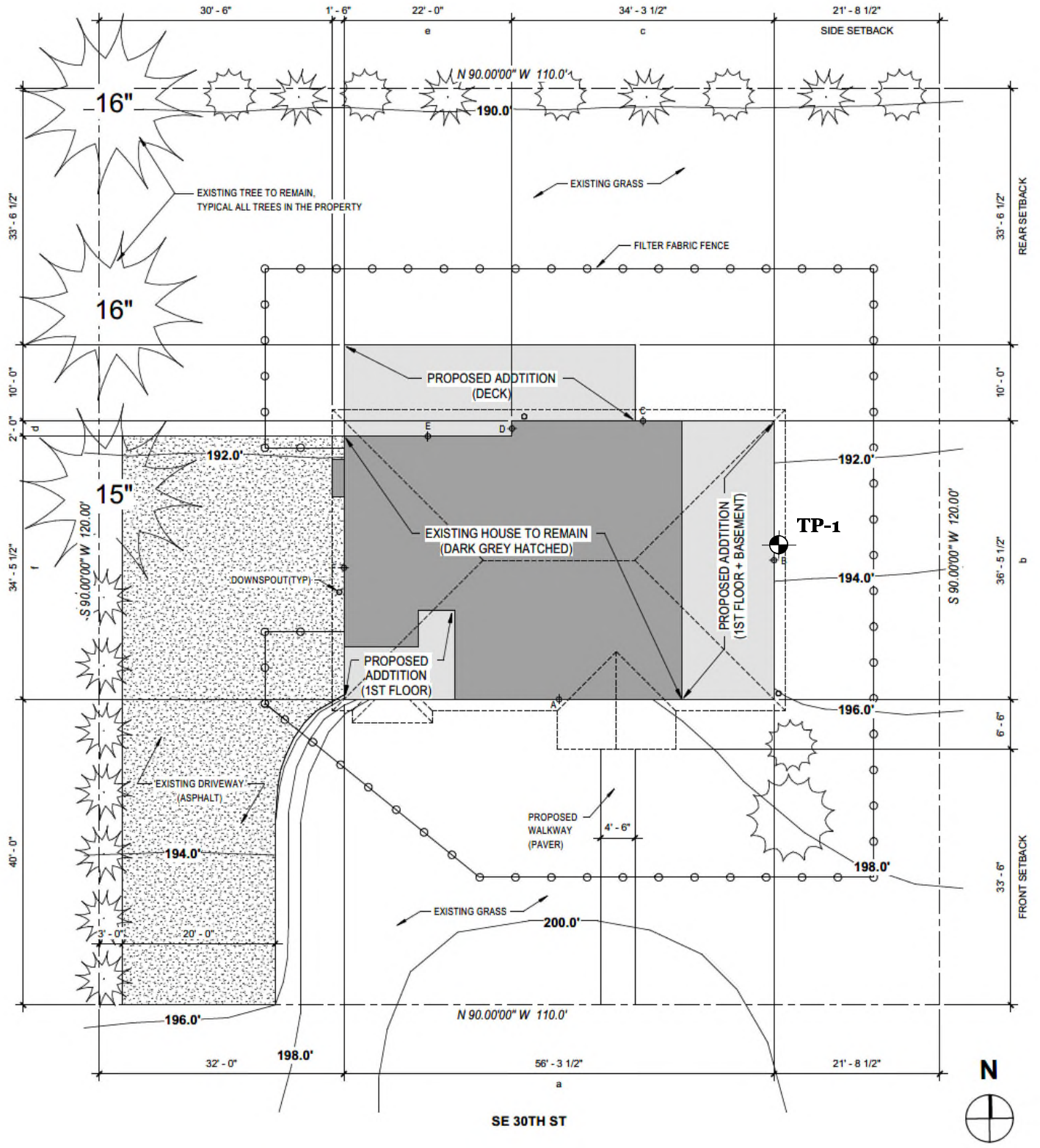
BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Cobalt Geosciences present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Cobalt Geosciences is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state of execution for the specific professional service provided to the Client. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Cobalt Geosciences at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Cobalt Geosciences must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Cobalt Geosciences will not be responsible to any party for damages incurred as a result of failing to notify Cobalt Geosciences that differing site or sub-surface conditions are present upon becoming aware of such conditions.

PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Cobalt Geosciences, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Cobalt Geosciences cannot be responsible for site work carried out without being present.



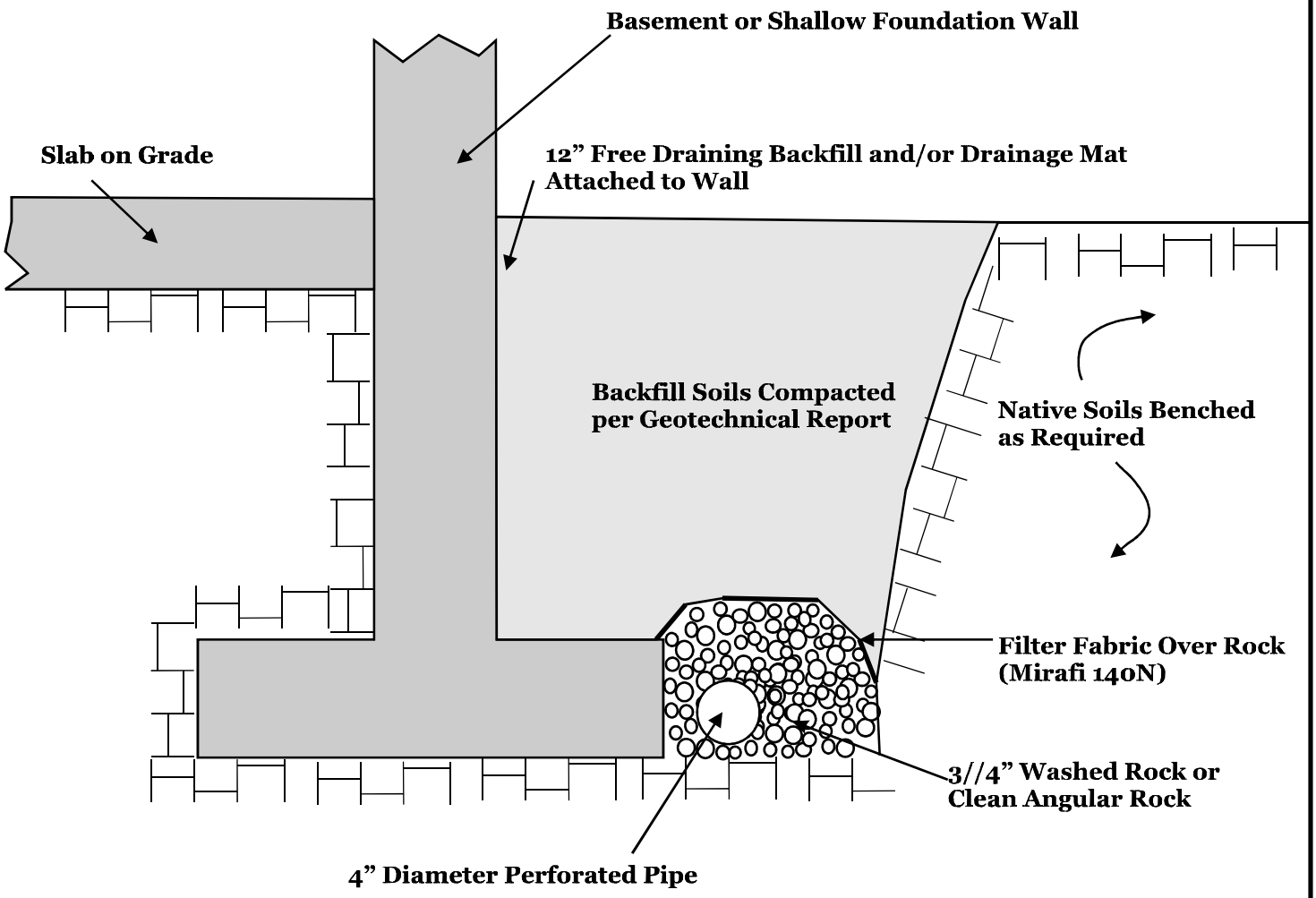
Provided site plan

TP-1 **Approximate Test Pit Location**

Not to Scale

N

COBALT GEOSCIENCES	Proposed Additions 8244 SE 30th Street Mercer Island, Washington	**SITE MAP FIGURE 1**	Cobalt Geosciences, LLC P.O. Box 82243 Kenmore, WA 98028 (206) 331-1097 www.cobaltgeo.com cobaltgeo@gmail.com



Not to Scale

COBALT GEOSCIENCES	**Typical Foundation Drain Detail**	**Attachment**	Cobalt Geosciences, LLC PO Box 1792 North Bend, WA 98045 (206) 331-1097 www.cobaltgeo.com phil@cobaltgeo.com

Unified Soil Classification System (USCS)

MAJOR DIVISIONS			SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS (more than 50% retained on No. 200 sieve)	Gravels (more than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravels with Fines (more than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (50% or more of coarse fraction passes the No. 4 sieve)	Clean Sands (less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
			SP	Poorly graded sand, gravelly sands, little or no fines
		Sands with Fines (more than 12% fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (50% or more passes the No. 200 sieve)	Silts and Clays (liquid limit less than 50)	Inorganic	ML	Inorganic silts of low to medium plasticity, sandy silts, gravelly silts, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays silty clays, lean clays
		Organic	OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays (liquid limit 50 or more)	Inorganic	MH	Inorganic silts, micaceous or diatomaceous fine sands or silty soils, elastic silt
			CH	Inorganic clays of medium to high plasticity, sandy fat clay, or gravelly fat clay
		Organic	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat, humus, swamp soils with high organic content (ASTM D4427)

Classification of Soil Constituents

MAJOR constituents compose more than 50 percent, by weight, of the soil. Major constituents are capitalized (i.e., SAND).

Minor constituents compose 12 to 50 percent of the soil and precede the major constituents (i.e., silty SAND). Minor constituents preceded by "slightly" compose 5 to 12 percent of the soil (i.e., slightly silty SAND).

Trace constituents compose 0 to 5 percent of the soil (i.e., slightly silty SAND, trace gravel).

Grain Size Definitions

Description	Sieve Number and/or Size
Fines	<#200 (0.08 mm)
Sand	
-Fine	#200 to #40 (0.08 to 0.4 mm)
-Medium	#40 to #10 (0.4 to 2 mm)
-Coarse	#10 to #4 (2 to 5 mm)
Gravel	
-Fine	#4 to 3/4 inch (5 to 19 mm)
-Coarse	3/4 to 3 inches (19 to 76 mm)
Cobbles	3 to 12 inches (75 to 305 mm)
Boulders	>12 inches (305 mm)

Relative Density (Coarse Grained Soils)

N, SPT, Blows/FT	Relative Density
0 - 4	Very loose
4 - 10	Loose
10 - 30	Medium dense
30 - 50	Dense
Over 50	Very dense

Consistency (Fine Grained Soils)

N, SPT, Blows/FT	Relative Consistency
Under 2	Very soft
2 - 4	Soft
4 - 8	Medium stiff
8 - 15	Stiff
15 - 30	Very stiff
Over 30	Hard

Moisture Content Definitions

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

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Soil Classification Chart

Figure C1

Test Pit TP-1

Date: August 2022	Depth: 9'	Groundwater: None
Contractor: Jim	Elevation:	Logged By: PH Checked By: SC

Depth (Feet)	Interval	Graphic Log	USCS Symbol	Material Description
				Topsoil/Vegetation
1 – 2			SM	Loose to medium dense, silty-fine to medium grained sand with gravel dark yellowish brown to grayish brown, moist. (Recessional Outwash)
3 – 4			SP	Medium dense, fine to medium grained sand trace gravel, reddish brown to yellowish brown, moist. (Recessional Outwash)
5 – 9			ML	Stiff to very stiff, silt with fine grained sand, mottled tan to yellowish brown, moist. (Pre-Olympia Fine Grained Deposits)
10				End of Test Pit 9'

Groundwater

Moisture Content (%)
Plastic Limit — Liquid Limit

DCP Equivalent N-Value
0 10 20 30 40 50

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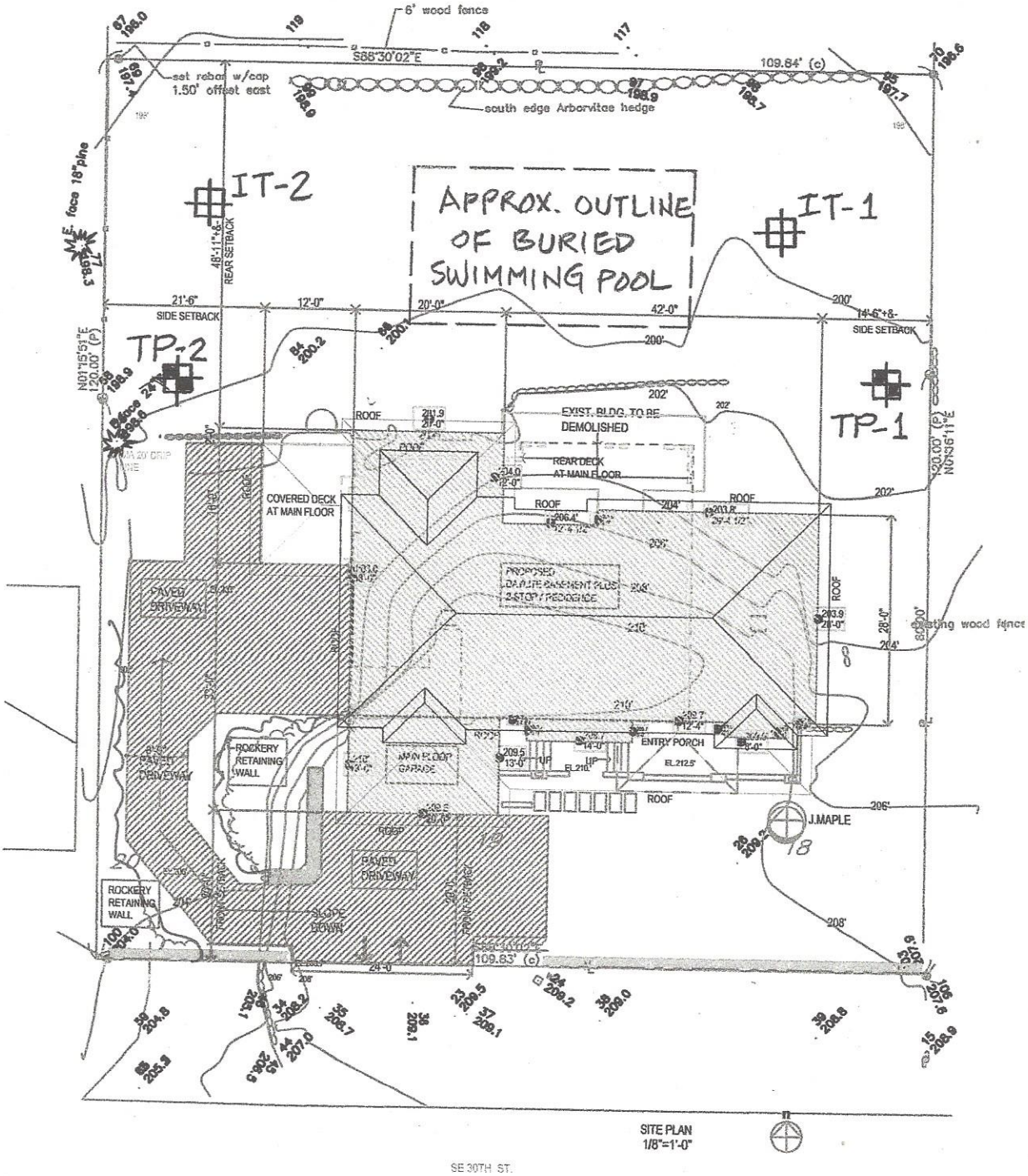

LIU & ASSOCIATES, INC.

Geotechnical Engineering · Engineering Geology · Earth Science

SITE AND EXPLORATION LOCATION PLAN
PARK RESIDENCE
8244 SE 30TH STREET
MERCER ISLAND, WASHINGTON

JOB NO. 17-061	DATE 7/1/2017	PLATE 2

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE-GRAINED SOILS MORE THAN 50% RETAINED ON THE NO. 200 SIEVE	GRAVEL MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE-GRAINED SOILS MORE THAN 50% PASSING ON THE NO. 200 SIEVE	SILT AND CLAY LIQUID LIMIT LESS THAN 50%	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILTY AND CLAY LIQUID LIMIT 50% OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC SILT, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

NOTES:

1. FIELD CLASSIFICATION IS BASED ON VISUAL EXAMINATION OF SOIL IN GENERAL ACCORDANCE WITH ASTM D2488-83.
2. SOIL CLASSIFICATION USING LABORATORY TESTS IS BASED ON ASTM D2487-83.
3. DESCRIPTIONS OF SOIL DENSITY OR CONSISTENCY ARE BASED ON INTERPRETATION OF BLOW-COUNT DATA, VISUAL APPEARANCE OF SOILS, AND/OR TEST DATA.

SOIL MOISTURE MODIFIERS:

DRY - ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH

SLIGHTLY MOIST - TRACE MOISTURE, NOT DUSTY

MOIST - DAMP, BUT NO VISIBLE WATER

VERY MOIST - VERY DAMP, MOISTURE FELT TO THE TOUCH

WET - VISIBLE FREE WATER OR SATURATED, USUALLY SOIL IS OBTAINED FROM BELOW WATER TABLE

TEST PIT NO. 1

Logged By: JSL Date: 6/7/2017 Ground El. ±

Depth ft.	USCS CLASS.	Soil Description	Sample No.	W %	Other Test
1	SM	Tannish-brown, loose, silty fine SAND, trace gravel, moist (FILL?)			
5	SW	Light-gray, loose, gravelly, fine to medium SAND, moist (RECESSIONAL OUTWASH?)			
9	SM/ML	Light-brown, dense, silty fine SAND to fine-sandy SILT, weakly-cemented, moist (TILL like)			
10		Test pit terminated at 9.5 ft; groundwater not encountered.			

TEST PIT NO. 2

Logged By: JSL Date: 6/7/2017 Ground El. ±

Depth ft.	USCS CLASS.	Soil Description	Sample No.	W %	Other Test
1	OL	Dark-brown, loose, organic, silty fine SAND, over plastic liner, moist (FILL?)			
2	SM	Light-brown, loose, silty fine SAND, slightly-moist, moist			
6	SP	Brown-gray, loose to medium-dense, slightly-silty, fine SAND, slightly-moist (RECESSIONAL OUTWASH)			
9	SM	Light-brown, dense, silty fine SAND to fine-sandy SILT, trace gravel, weakly-cemented, moist (TILL like)			
10		Test pit terminated at 9.0 ft; groundwater not encountered.			

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Geotechnical Engineering · Engineering Geology · Earth Science

TEST PIT LOGS
PARK RESIDENCE
8244 SE 30TH STREET
MERCER ISLAND, WASHINGTON

JOB NO. 17-061 DATE 6/7/2017 PLATE 4

APPENDIX F

BMPs Design Criteria and Requirements

meet this BMP be appropriate and beneficial to the plant cover to be established. Likewise, it is important that imported topsoils improve soil conditions and do not have an excessive percent of clay fines.

This BMP can be considered infeasible on till soil slopes greater than 33 percent.

Design Guidelines

Soil Retention

Retain, in an undisturbed state, the duff layer and native topsoil to the maximum extent practicable. In any areas requiring grading, remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas, to be reapplied to other portions of the site where feasible.

Soil Quality

All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structural fill or slope shall, at project completion, demonstrate the following:

1. A topsoil layer with a minimum organic matter content of 10% dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the undisturbed soil. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.
2. Mulch planting beds with 2 inches of organic material.
3. Use compost and other materials that meet the following organic content requirements:
    a. The organic content for “pre-approved” amendment rates can be met only using compost meeting the compost specification for BMP T7.30: Bioretention, with the exception that the compost may have up to 35% biosolids or manure.

       The compost must also have an organic matter content of 40% to 65%, and a carbon to nitrogen ratio below 25:1.

       The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region.

    b. Calculated amendment rates may be met through use of composted material meeting (a.) above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and not exceeding the contaminant limits identified in Table 220-B, Testing Parameters, in WAC 173-350-220.

The resulting soil should be conducive to the type of vegetation to be established.

Implementation Options

The soil quality design guidelines listed above can be met by using one of the methods listed below:

1. Leave undisturbed native vegetation and soil, and protect from compaction during construction.
2. Amend existing site topsoil or subsoil either at default "pre-approved" rates, or at custom calculated rates based on tests of the soil and amendment.
3. Stockpile existing topsoil during grading, and replace it prior to planting. Stockpiled topsoil must also be amended if needed to meet the organic matter or depth requirements, either at a default "pre-approved" rate or at a custom calculated rate.
4. Import topsoil mix of sufficient organic content and depth to meet the requirements.

More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

Planning/Permitting/Inspection/Verification Guidelines & Procedures

Local governments are encouraged to adopt guidelines and procedures similar to those recommended in *Building Soil: Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington* (Stenn et al., 2016).

Maintenance

- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant vegetation and mulch the amended soil area after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

Runoff Model Representation

All areas meeting the soil quality and depth design criteria may be entered into approved runoff models as "Pasture" rather than "Lawn/Landscaping".

least 1 foot below the expected bottom elevation of the infiltration trench or dry well.

Identify the NRCS series of the soil and the USDA textural class of the soil horizon through the depth of the log, and note any evidence of high ground water level, such as mottling.

4. Downspout infiltration is considered feasible on lots or sites that meet all of the following:
    - 3 feet or more of permeable soil from the proposed final grade to the seasonal high ground water table.
    - At least 1-foot of clearance from the expected bottom elevation of the infiltration trench or dry well to the seasonal high ground water table.
    - The downspout full infiltration system can be designed to meet the minimum design criteria specified below.

Design Criteria for Infiltration Trenches

Figure III-3.1.2 Typical Downspout Infiltration Trench (p.455) shows a typical downspout infiltration trench system, and Figure III-3.1.3 Alternative Downspout Infiltration Trench System for Coarse Sand and Gravel (p.456) presents an alternative infiltration trench system for sites with coarse sand and cobble soils. These systems are designed as specified below.

General

1. The following minimum lengths (linear feet) per 1,000 square feet of roof area based on soil type may be used for sizing downspout infiltration trenches.

    Coarse sands and cobbles: 20 LF

    Medium sand: 30 LF

    Fine sand, loamy sand: 75 LF

    Sandy loam: 125 LF

    Loam: 190 LF
2. Maximum length of trench shall not exceed 100 feet from the inlet sump.
3. Minimum spacing between trench centerlines shall be 6 feet.
4. Filter fabric shall be placed over the drain rock as shown on Figure III-3.1.2 Typical Downspout Infiltration Trench (p.455) prior to backfilling.
5. Infiltration trenches may be placed in fill material if the fill is placed and compacted under the direct supervision of a geotechnical engineer or professional civil

engineer with geotechnical expertise, and if the measured infiltration rate is at least 8 inches per hour. Trench length in fill must be 60 linear feet per 1,000 square feet of roof area. Infiltration rates can be tested using the methods described in Section 3.3.

6. Infiltration trenches should not be built on slopes steeper than 25% (4:1). A geotechnical analysis and report may be required on slopes over 15 percent or if located within 200 feet of the top of slope steeper than 40%, or in a landslide hazard area.
7. Trenches may be located under pavement if a small yard drain or catch basin with grate cover is placed at the end of the trench pipe such that overflow would occur out of the catch basin at an elevation at least one foot below that of the pavement, and in a location which can accommodate the overflow without creating a significant adverse impact to downhill properties or drainage systems. This is intended to prevent saturation of the pavement in the event of system failure.

Design Criteria for Infiltration Drywells

Figure III-3.1.4 Typical Downspout Infiltration Drywell (p.457) shows a typical downspout infiltration drywell system. These systems are designed as specified below.

General

1. Drywell bottoms must be a minimum of 1 foot above seasonal high ground water level or impermeable soil layers.
2. When located in course sands and cobbles, drywells must contain a volume of gravel equal to or greater than 60 cubic feet per 1000 square feet of impervious surface served. When located in medium sands, drywells must contain at least 90 cubic feet of gravel per 1,000 square feet of impervious surface served.
3. Drywells must be at least 48 inches in diameter (minimum) and deep enough to contain the gravel amounts specified above for the soil type and impervious surface served.
4. Filter fabric (geotextile) must be placed on top of the drain rock and on trench or drywell sides prior to backfilling.
5. Spacing between drywells must be a minimum of 10 feet.
6. Downspout infiltration drywells must not be built on slopes greater than 25% (4:1). Drywells may not be placed on or above a landslide hazard area or on slopes greater than 15% without evaluation by a professional engineer with geotechnical expertise or a licensed geologist, hydrogeologist, or engineering geologist, and with jurisdiction approval.