Draft SEPA Environmental Checklist

Mercer Island Center for the Arts

February 2, 2016

SEPA environmental checklist

Purpose of checklist:
Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

***Instructions for applicants*:**
This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:
Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:
For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the supplemental sheet for nonproject actions (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background

1. Name of proposed project, if applicable:
Mercer Island Center for the Arts

2. Name of applicant:
Lesley Bain, Architect for Mercer Island Center for the Arts

3. Address and phone number of applicant and contact person:
Framework Cultural Placemaking
1429 12th Avenue, Suite C,
Seattle WA 98101

4. Date checklist prepared:
January 25, 2016

5. Agency requesting checklist:
City of Mercer Island

6. Proposed timing or schedule (including phasing, if applicable):
The lease agreement, the trigger for this review, is expected to be approved in winter or spring of 2016. Construction expected to begin in 2017.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.
No. The intent of the project is construction of a performing arts/educational center building.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

a. *Geotechnical Engineering Design Report, Proposed Mercer Island Center for the Arts, Hart Crowser, March 31, 2015*
b. *Supplemental Memorandum, Hart Crowser, May 6, 2015*
c. *Wetland Delineation Report, Mercer Island Center for the Arts, The Watershed Company. May 21, 2015*
d. *Mercer Island Center for the Arts Conceptual Mitigation Plan. The Watershed Company, August 20, 2015*
e. *Parking and Access sketches, Transpo. August 25, 2015*
f. *Phase 1 Environmental Review*

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal?
No.

10. List any government approvals or permits that will be needed for your proposal, if known.
Land Use Approval, City of Mercer Island
Building Permit Approval, City of Mercer Island

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The proposal is to build a center for the arts, which includes a building approximately 34,000 gsf housing a 300-seat main stage theatre, a 100-seat black box theatre and a 100-seat recital hall. Educational spaces include classrooms for art, dance and music. A public lobby faces the park; public bathrooms accessible from the exterior and storage space for the Mercer Island Farmers Market are provided.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The location is generally on the Southwest corner of 77th Avenue SE and SE 32nd Street. See Attachment A: Proposed Lease Boundary, and Attachment B: Proposed Building Footprint.

B. environmental elements

Earth

a. General description of the site:

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other __
Partially flat, partially sloped

b. What is the steepest slope on the site (approximate percent slope)?
The steepest portion of the slope is approximately 22%

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat,

muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

According to the geotechnical report, soils are fine-grained glacial deposits, overlain by non-glacial deposits, clay and Vashon till. For more detail, see Geotechnical Report, Attachment B

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

According to the geotechnical report, the site is in a landslide location and partially within mapped landslide deposits. In the opinion of the geotechnical engineers, the construction of the building will not increase or decrease the landslide hazard in the vicinity. There is a risk that debris could travel down slope if there were a landslide up the hill to the west. The slope near the proposed building, according to the report, is not considered steep enough to pose a seismic slope stability risk.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Excavation: *Will be required at hillside. (cubic yards tbd by civil)*
Fill: *Some fill will be used to shape grade below the first floor. (cubic yards tbd by civil; fill source by contractor)*

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

No.

• About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

A majority of the area within the lease boundary will be impervious surface: building, plaza or fire access. (percentage by civil tbd)

• Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Multiple best management practices will be used including a construction entrance, silt fence, a concrete truck and pump washout area and catch basin inserts. Strict maintenance and monitoring criteria will be provided so that the temporary erosion and sediment control systems are in good working order throughout the duration of construction.

2. Air

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

Typical emissions from construction equipment during construction.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

None needed.

3. **Water**

a. Surface Water:

• Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Wetlands are in the vicinity, as described in Attachment E: Wetland Delineation Report, Mercer Island Center for the Arts, The Watershed Company.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Work is anticipated outside of the minimum allowed buffer of 25 feet near the wetland. Wetland mitigation will be proposed per City of Mercer Island requirements, 19.07.080(C).

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

No fill or dredge material will be placed in or removed from the wetland.

4) Will the proposal require surface water withdrawals or diversions? Give general

description, purpose, and approximate quantities if known.

No

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No

b. Ground Water:

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

No

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

None

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

The on-site stormwater management requirement requires roof downspout controls to be utilized. Infiltration and dispersion is infeasible due to the presence of fine grained, poorly draining soils and the possibility of high groundwater conditions. As such, roof downspouts will be directed to a bioretention area to the south of the building. The bioretention cell will be lined and contain underdrains that will collect the treated water prior to discharging it into the proposed detention vault. Additional underdrains may be required under the liner if groundwater is present.

Stormwater runoff from the non-pollution generating areas of the site will be collected in area drains and catch basins before being routed to the public storm drainage system. Runoff from pollution generating impervious surfaces (i.e. the northern fire lane and loading dock) will be routed through a StormFilter treatment device. The southern fire lane will contain a gate with a knox box off of SE 34th Street and thus the impervious surfaces associated with these improvements will not require treatment emergency fire truck traffic will be seldom. It is understood that the landscape will not be subject to fertilizers or pesticides and thus only the northern fire lane and loading dock areas will be treated.

2) Could waste materials enter ground or surface waters? If so, generally describe.

No

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

No

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

Surface runoff from the hillside will be intercepted by the proposed swale that will be strategically graded into the hillside to minimize impacts to the existing vegetation. The swale will convey hillside runoff to the wetland. Shoring wall drainage will also be directed to the wetland. The wetland will overflow into the bioretention cell that will overflow into a catch basin on the edge of the path. A new storm drainage pipe will be installed from this catch basin to the connection to the existing storm drain system on SE 32nd Street.

Wetland mitigation for buffer reduction is addressed in Attachment F: Mercer Island Center for the Arts Conceptual Mitigation Plan, prepared by The Watershed Company.

4. **Plants**

• Check the types of vegetation found on the site:

__x__deciduous tree: alder, maple, aspen, other
__x__evergreen tree: fir, cedar, pine, other
__x__shrubs
____grass
____pasture
____crop or grain
____ Orchards, vineyards or other permanent crops.

_____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
_____water plants: water lily, eelgrass, milfoil, other
_____other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

Vegetation will be removed on the portion of the site that is not currently impervious. The vegetation is in fill dirt and is not generally healthy.

c. List threatened and endangered species known to be on or near the site.

None known.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Site will be replanted around new building with new trees and shrubs that will be planted in appropriate soil and growing conditions.

e. List all noxious weeds and invasive species known to be on or near the site.

Some invasive ivy is on site.

5. **Animals**

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Examples include:

birds: hawk, heron, eagle, songbirds, other:
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other
typical bird and small mammal species are likely to be on the site

b. List any threatened and endangered species known to be on or near the site.

None known

c. Is the site part of a migration route? If so, explain.

No

d. Proposed measures to preserve or enhance wildlife, if any:

The project will include planting healthier native habitat.

e. List any invasive animal species known to be on or near the site.

None known.

6. **Energy and Natural Resources**

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electricity will be used to power variable air volume heat pump units for heating, cooling and ventilation.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

The building will meet, at a minimum, the provisions of the Washington State Energy Code, and LEED Silver. We expect a well-insulated building envelope and energy efficient building systems.

7. **Environmental Health**

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

• Describe any known or possible contamination at the site from present or past uses.

A Phase 1 Environmental Review was done by on the site, and indicates that any environmental contamination is highly unlikely. The review found that no Phase 2 Review would be merited. See Attachment H.

• Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

None known.

• Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

None known.

• Describe special emergency services that might be required.

No special emergency services are anticipated.

• Proposed measures to reduce or control environmental health hazards, if any:

No measures anticipated to be necessary.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

None.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Sounds generated within the building will primarily stay within the building.

3) Proposed measures to reduce or control noise impacts, if any:

Attention to acoustic performance by a professional acoustical engineer.

8. **Land and Shoreline Use**

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

Much of the site was used as a recycle center until 2010. On the north end of the site is a plaza with seating and a flagpole, built in 1976 for the country's bicentennial, and the Farmers New World Life Insurance office building. To the west is a wooded slope and to the east is the lawn of Mercerdale Park. To the south is a vegetated area located on top of fill dirt, generally in poor condition. A skatepark is also to the south.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

No

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

No

c. Describe any structures on the site.

The site has a one-story structure built in the 1970's for a recycle center. The site also has public restrooms, and sinks used by the Farmers Market.

d. Will any structures be demolished? If so, what?

The structures described above will be demolished.

e. What is the current zoning classification of the site?

Public Institution—P

f. What is the current comprehensive plan designation of the site?

Park

g. If applicable, what is the current shoreline master program designation of the site?

Not applicable

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

Yes. The Landslide Hazard Area Map (MICC 19.16.010) indicates that there has been an identified landslide on the site. The area is identified for potential high water table and near a spring. For more specific information, refer to the geotechnical report.

i. Approximately how many people would reside or work in the completed project?
It is estimated that MICA would have approximately a dozen staff.

j. Approximately how many people would the completed project displace?

None

k. Proposed measures to avoid or reduce displacement impacts, if any:

None

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Regulations for the P-zone will need to be adjusted by the City of Mercer Island to allow building permit approval for the project.

m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any:

Not applicable

9. **Housing**

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

None

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None

c. Proposed measures to reduce or control housing impacts, if any:

Not applicable

10. **Aesthetics**

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

The tallest portion of the structure is approximately 35' high. The exterior building materials on the most visible facade will be heavily glazed.

b. What views in the immediate vicinity would be altered or obstructed?

The design is intended to include landscaping along the edge of the park to soften the edge of the building.

• Proposed measures to reduce or control aesthetic impacts, if any:

The portion of the building along the edge of the park will be lowered for scale, with quality materials and views into the cafe, lobby, a reclaimed wood truss roof and art gallery.

11. **Light and Glare**

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Light from the interior of the building will be visible along the path. Supplemental lighting may be included if needed to make walking in the vicinity feel safe after dark.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No

c. What existing off-site sources of light or glare may affect your proposal?

None

d. Proposed measures to reduce or control light and glare impacts, if any:

Landscape screening will control glare from across the park.

12. **Recreation**

a. What designated and informal recreational opportunities are in the immediate vicinity?

Mercerdale Park's lawn and walking path; trails through the woods; a skatepark and exercise equipment. A children's play area is also nearby, to the southeast of the lawn area. The Farmers Market takes place in the adjacent streets during warmer months. SE 32nd Street and 77th Avenue SE are closed on Sundays from 10 to 3 for the Farmers Market, and for Summer Celebration weekend. Concerts and other events take place on the lawn during the summer.

b. Would the proposed project displace any existing recreational uses? If so, describe.

The project will remove public restrooms available to park users and sinks used by the Farmers Market. The flagpole and concrete plaza at Bicentennial Park will be removed. Part of what was once referred to as the native plant garden will be removed.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

Mercer Island Center for the Arts has been working with the Parks Department and the Farmers Market to ensure that these recreational activities are supported by MICA's new facility. The project will provide the same number of public restrooms; it will replace the sinks and provide storage for the Farmers Market.A plaza area with seating will be provided by the new project, and the flagpole will be relocated. The design will incorporate outdoor performance space. The addition of the new center for the arts is expected to increase usage of the park.

13. **Historic and cultural preservation**

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers located on or near the site? If so, specifically describe.

No

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

No

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

Not applicable

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Not applicable

14. **Transportation**

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

The site is served by the street grid of Mercer Island's Town Center. The site is southwest of the intersection of 77th Avenue SE and SE 32nd Street; access will be from that intersection.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

The Town Center is well served by King County Metro and Sound Transit at the Park and Ride, which is approximately a ten minute walk from the site. Metro routes 201 and 204 have stops a block to the east of the site, on 78th Avenue SE. Buses from the Mercer Island School District also take children to and from schools, and are expected to be a major source of transportation for classes.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?
The project will not eliminate any parking spaces. There will be accessible parking available on SE 32nd Street.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

Some work will likely be done near the intersection of 77th Avenue SE and SE 32nd Street for access, drop-off and accessible parking. Sketch alternatives have been looked at by the Transpo Group. See Attachment G: Parking and Access sketches, Transpo. August 25, 2015.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

Transpo is engaged to do a transportation study and a transportation management plan for MICA.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

No

h. Proposed measures to reduce or control transportation impacts, if any:

No

15. **Public Services**

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

No

b. Proposed measures to reduce or control direct impacts on public services, if any.

None

16. **Utilities**

a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other _____

electricity, natural gas, water, refuse service, telephone, sanitary sewer are available

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

Electricity:	*Puget Sound Energy*
Water:	*City of Mercer Island*
Refuse Service:	*Allied Waste*
Sanitary Sewer	*City of Mercer Island contracting with King County Wastewater Treatment*

C. Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____
Name of signee _____
Position and Agency/Organization _____
Date Submitted: _____

Attachments

Attachment A: Proposed Lease Boundary

Attachment B: Proposed Building Footprint

Attachment C: Geotechnical Engineering Design Report, Proposed Mercer Island Center for the Arts, Hart Crowser, March 31, 2015

Attachment D: Supplemental Memorandum, Hart Crowser, May 6, 2015

Attachment E: Wetland Delineation Report, Mercer Island Center for the Arts, The Watershed Company. May 21, 2015

Attachment F: Mercer Island Center for the Arts Conceptual Mitigation Plan. The Watershed Company, August 20, 2015

Attachment G: Parking and Access sketches, Transpo. August 25, 2015

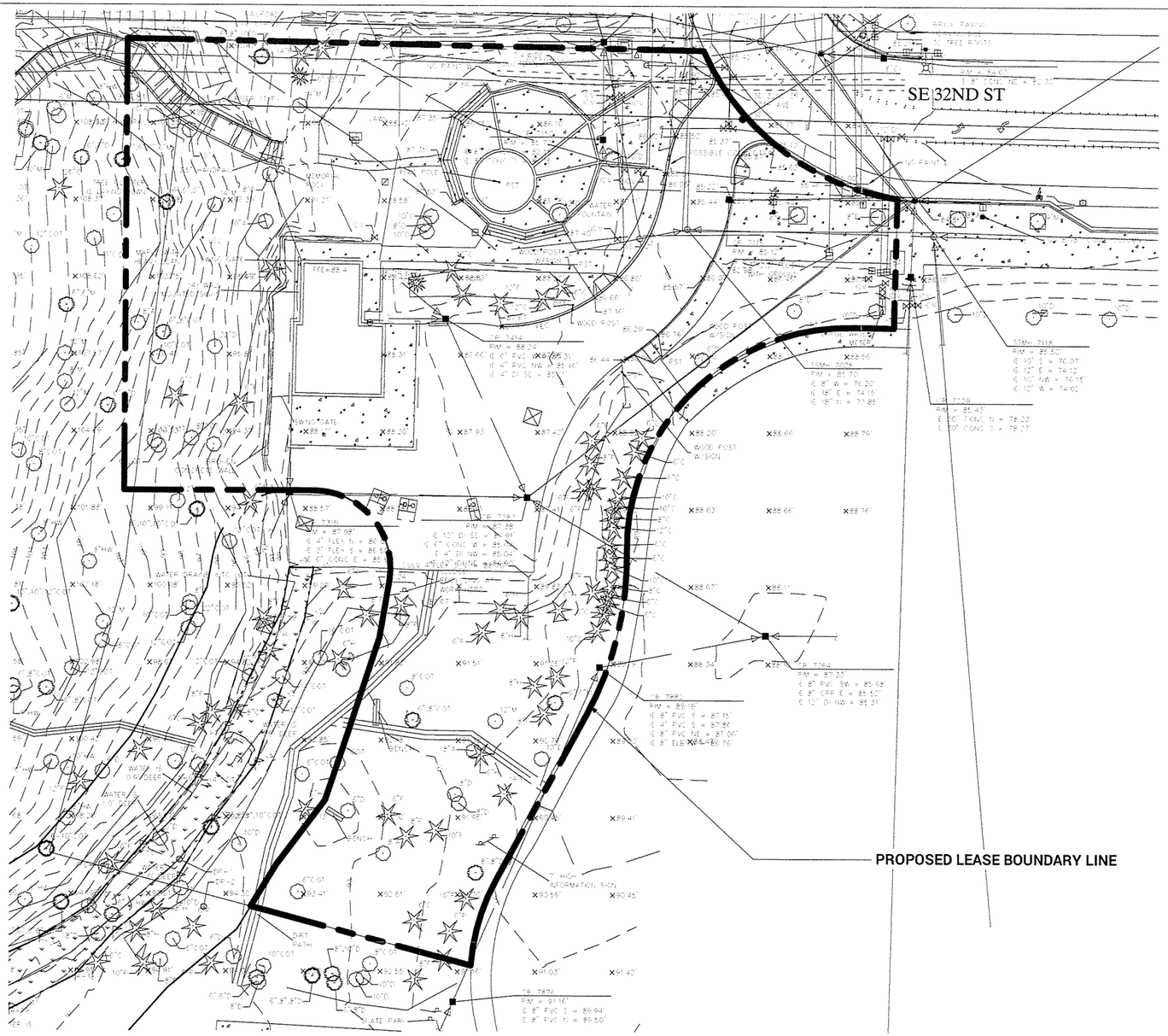
Attachment H: Phase 1 Environmental Review

Draft SEPA Environmental Checklist

Mercer Island Center for the Arts

Attachment A
Proposed Lease Boundary

February 2, 2016



framework
1433 12TH AVE
SEATTLE, WA 98122 / 206.347.8533

ORA
1205 East Pike Street Suite 2B
Seattle, WA 98122 / 206.625.0941

MICA
MERCER ISLAND CENTER FOR THE ARTS

PROJECT:
MERCER ISLAND CENTER FOR THE ARTS
PREPARED FOR:
MICA
LOCATION:
MERCER ISLAND, WA

SHEET NAME
PROPOSED LEASE BOUNDARY LINE
SCALE
1" = 40'-0"

ORIGINAL SHEET SIZE 11"X17" 1/5/2016 12:04:23 PM

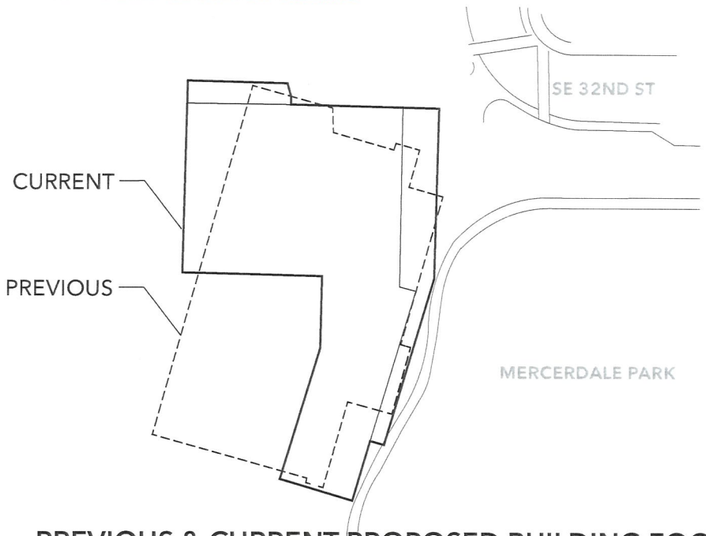
Draft SEPA Environmental Checklist
Mercer Island Center for the Arts

Attachment B
Proposed Building Footprint

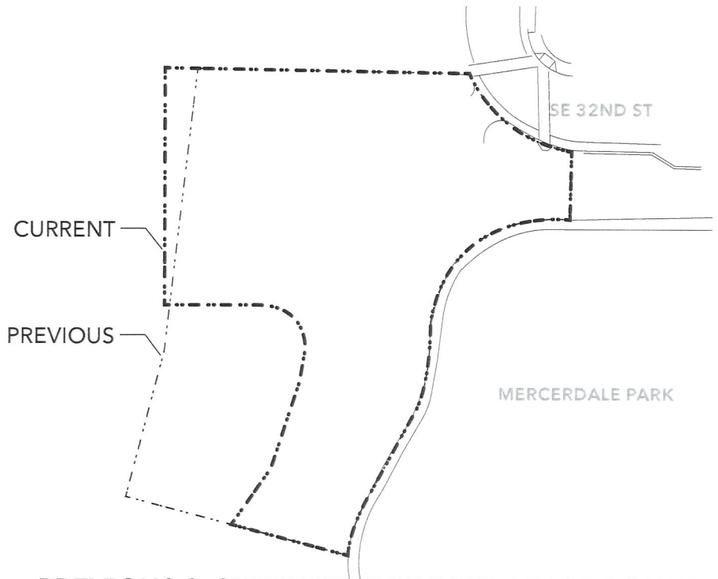
February 2, 2016

MICA

MERCER ISLAND CENTER FOR THE ARTS



PREVIOUS & CURRENT PROPOSED BUILDING FOOTPRINTS



PREVIOUS & CURRENT PROPOSED LEASE BOUNDARIES

CURRENT PROPOSED LEASE BOUNDARY AND BUILDING FOOTPRINT

Draft SEPA Environmental Checklist
Mercer Island Center for the Arts

Attachment C
Geotechnical Engineering Design Report,
Proposed Mercer Island Center for the Arts,
Hart Crowser, March 31, 2015

February 2, 2016

Geotechnical Engineering Design Report

Proposed Mercer Island Center for the Arts Building

Mercer Island, Washington

Prepared for

Mercer Island Center for the Arts

March 31, 2015

19120-00

HARTCROWSER

celebrating 40 YEARS HARTCROWSER

Geotechnical Engineering Design Report

Proposed Mercer Island Center for the Arts Building

Mercer Island, Washington

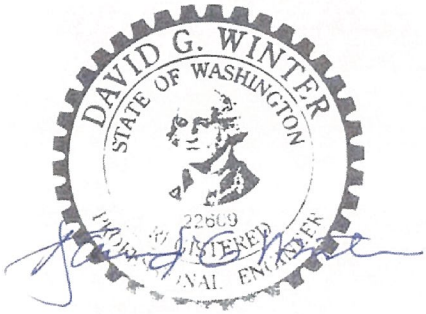
Prepared for

Mercer Island Center for the Arts

March 31, 2015
19120-00

Prepared by

Hart Crowser, Inc.



3/31/15

Matthew W. Veenstra, PE
Geotechnical Engineer

David G. Winter, PE
Vice President

1700 Westlake Avenue North, Suite 200
Seattle, Washington 98109-6212
Fax 206.328.5581
Tel 206.324.9530

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FIGURES

APPENDIX A

Field Exploration Methods and Analysis

APPENDIX B

Laboratory Testing Program

APPENDIX C

Historical Explorations

Geotechnical Engineering Design Report

Proposed Mercer Island Center for the Arts Building

Mercer Island, Washington

This report provides our geotechnical engineering recommendations for the proposed Mercer Island Center for the Arts building in Mercer Island, Washington.

Our scope of work was to:

- Collect and assess subsurface conditions from historical explorations;
- Drill seven borings from 21.5 to 51 feet deep;
- Prepare logs of the soil explorations;
- Assess groundwater conditions;
- Conduct engineering analysis; and
- Prepare this report.

We completed this work in general accordance with our contract dated February 5, 2015. This report is for the exclusive use of Mercer Island Center for the Arts and their design consultants for specific application to this project and site. We completed this work in accordance with generally accepted geotechnical engineering practices for the nature and conditions of the work completed in the same or similar localities, at the time the work was performed. We make no other warranty, express or implied.

PROJECT AND SITE DESCRIPTION

The site vicinity map and exploration plan are shown on Figures 1 and 2.

The proposed building will be located on city-owned land adjacent to the northwest corner of the Mercerdale Park. The property consists of a relatively flat, mowed lawn area to the east and a wooded slope to the west.

The top of the wooded slope begins near 74th Place SE, about elevation 280 feet, and descends eastward down to about elevation 90 feet at the toe. Upslope from the building site, the slope gradient varies from about 20 percent to greater than 40 percent across the western half of the slope and the gradient varies from less than 5 percent to about 22 percent across the eastern half of the slope. The portion of the slope that was surveyed for this study (about 120 feet west of the toe) has average gradients of about 5 to 22 percent.

Slope vegetation is primarily Alder and Maple with occasional Douglas Fir and Western Red Cedar. The Alder and Maple are frequently bowed downhill which suggests possible downhill soil creep.

The eastern half of the site varies from about elevation 88 to 91 feet and primarily consists of landscaped grass lawn and paved walking paths. The northern portion of the building site, adjacent to SE 32nd Street, is partially occupied by asphalt pavement, a one-story building, and a concrete paved area. We understand that the eastern half of the site was filled about 48 years ago when a school building was planned, but never built (Shannon & Wilson 1985).

We understand that the building location, size, and ground floor elevation are subject to change. However, we have been provided two preliminary concepts, Concept A and Concept C. Concept A is oriented slightly farther from the slope than Concept C. This report assumes Concept C because it is the worst-case scenario from a geotechnical perspective. The building is expected to be two stories tall and have a roughly 28,000 square foot footprint. The finish floor elevation is expected to be between elevations 88 to 91 feet in both concepts. The building may be cut into the west slope and retained soil cuts could be on the order of 12 to 18 feet tall.

We understand that there is no new surface parking planned at this time, but there will be a new paved fire lane.

MAPPED GEOLOGY

According to the Geologic Map of Mercer Island, Washington (Troost & Wisher 2006), the mapped geology in the vicinity of the building site includes Quaternary Vashon recessional lacustrine deposits overlain by landslide deposits and artificial fill. The encountered soils are consistent with the mapped geology.

Upslope from the site, the soils are mapped as Pre-Olympia fine-grained glacial deposits, overlain by pre-Fraser nonglacial deposits, overlain by Lawton Clay, overlain by Vashon advance outwash, overlain by Vashon subglacial till.

SUBSURFACE CONDITIONS

Subsurface Explorations

Subsurface exploration locations are shown on Figure 2 and generalized subsurface cross sections A-A' and B-B' are shown on Figures 3 and 4 respectively.

Our understanding of the subsurface conditions is based on current and historical explorations at the site and laboratory analysis of samples from the borings. On February 25 and 27, 2015, we completed seven borings, HC-1 to HC-7, to depths of 21.5 to 51.0 feet below ground surface (bgs). The exploration logs are provided in Appendix A. The results of laboratory tests are provided in Appendix B.

We also reviewed historical logs of explorations and laboratory results by Shannon & Wilson Inc. (1985). These included five soil borings, B-1 to B-5, drilled to depths of 24.5 to 39.5 feet bgs and seven test pits, TP-1 to TP-7, excavated to 10.5 to 13 feet bgs. Relevant explorations in the vicinity of the building site are SW-B-5 and SW-TP-1.

We also reviewed the historical logs of explorations and laboratory results by Hart Crowser & Associates, Inc. (1979) for the Farmers Insurance Group Building immediately north of the building site. Relevant explorations near the building site include boring HC-B-5.

Relevant historical exploration locations are shown on Figure 2 and the historical boring logs, test pit logs and laboratory results are provided in Appendix C.

Soil Conditions

The interpreted soil conditions in the vicinity of the building site generally consists of three basic soil units:

Soil Unit 1: Fill and Colluvium Soils

Interpreted fill or colluvium soils were encountered in all of explorations done for this study as well as HC-B-5, SW-B-5, and SW-TP-1 and typically consisted of as much as 2 feet of silty gravel or silty sand typically overlaying medium stiff to stiff silt, silty clay, and clay to about 4 to 9 feet bgs. Boring HC-3 encountered loose sand to 9.5 feet bgs. Test pit SW-TP-1 encountered remnant topsoil from 5 to 6.5 feet bgs and boring HC-4 encountered remnant topsoil from about 5 to 5.5 feet bgs. This soil unit is generally not suitable for heavy foundation loads or large tieback loads.

Soil Unit 2: Fine-Grained Recessional Lacustrine Soils

This soil unit generally consists of normally consolidated soft to stiff silt, clayey silt, and clay soils with occasional loose to medium dense silty and gravelly sand layers. The consistency of this soil unit is variable and is not considered suitable for support of heavy loads or settlement-sensitive structures. This soil unit is generally not suitable for heavy foundation loads or large tieback loads.

Soil Unit 3: Fine-Grained Glacially Overridden Soils

This soil unit generally consists of stiff to hard clayey silt and clay soils with occasional slickensides and highly organic zones. The depth to the top of this unit varied from about 13 to 33 feet bgs but was typically encountered within about 25 feet bgs. We recommend that pile foundations and soldier piles bear within this soil unit.

Groundwater Conditions

At the time of our visit, the ground surface was wet and soft across the site because the near-surface soils are typically fine-grained and poorly drained.

Borings HC-3, HC-4, and HC-7 encountered groundwater at about 20 feet bgs during drilling. However, most of the current and historical explorations did not encounter free water at the time of drilling/excavation but indicate groundwater levels within 1 to 2 feet bgs, suggesting excess water pressure within the relatively permeable (sandy) soil layers below ground surface (Shannon & Wilson 1985).

The regional groundwater table is deeper than the borings done for this project; however, perched groundwater within sandy soil layers and poorly draining near-surface soils can lead to local water within a couple feet of ground surface. Also, excavations into the hillside may encounter water seepage in sandy zones that can cause running or caving soils and reduced face stability.

Based on the observed and reported groundwater conditions, we recommend that drainage and waterproofing for walls and foundations be designed assuming the groundwater table is at the ground surface.

Note that water levels were measured at the times and under conditions stated on the boring logs. Fluctuations in the groundwater conditions may be caused by variations in rainfall, temperature, season, and other factors. Subsurface conditions interpreted from explorations at discrete locations on the site and the soil properties inferred from the field and laboratory tests, formed the basis of the geotechnical recommendations in this report. The nature and extent of variations between explorations may not become evident until additional explorations are performed or construction begins. If variations are encountered, it may be necessary to reevaluate the recommendations in this report.

MAPPED LANDSLIDE HAZARD REVIEW

We reviewed the Mercer Island Landslide Hazard Assessment map (Troost & Wisher 2009) for the site location. The site is mapped as an identified land slide location and is partially within mapped landslide deposits. Upslope from the building site, the map identifies areas of historic slope failure. These include:

- Slopes steeper than 15 percent (3.7H:1V) intersecting a geologic contact of relatively permeable deposits over relatively impermeable deposits with groundwater seepage
- Areas of slope steeper than 40 percent (1.2H:1V) with a vertical relief of ten or more feet (Qualifications i, ii, iii, ix)

In our opinion, construction of this building will not increase or decrease the landslide hazard in this vicinity. There is a risk that if a landslide occurs upslope from the site, the resulting landslide debris could travel down the slope and impact the proposed building. It is outside the scope of this report to provide recommendations for the potential impacts on the proposed building caused by a landslide well upslope of the building site.

GEOTECHNICAL ENGINEERING CONCLUSIONS AND RECOMMENDATIONS

Our recommendations are based on our understanding of the project and the subsurface conditions interpreted from explorations at and near the site by Hart Crowser and others. If the nature or location of the facilities is different than we have assumed, we should be notified so we can review, change, and/or confirm our recommendations.

Earthquake Engineering

Seismic Setting

The seismicity of western Washington is dominated by the Cascadia Subduction Zone (CSZ), where the offshore Juan de Fuca plate subducts beneath the continental North American plate. Three main types of earthquakes are typically associated with subduction zone environments: crustal, intraplate, and interplate earthquakes. Seismic records in the Puget Sound area clearly indicate a distinct shallow zone of crustal seismicity, the Seattle Fault, which may have surficial expressions and can extend to depths of 25 to 30 km. A deeper zone is associated with the subducting Juan de Fuca plate and produces intraplate earthquakes at depths of 40 to 70 km beneath the Puget Sound region (e.g., the 1949, 1965, and 2001 earthquakes) and interplate earthquakes at shallow depths near the Washington coast (e.g., the 1700 earthquake with an approximate magnitude of 9.0).

Seismic Hazards

- **Liquefaction induced subsidence**. There appear to be isolated zones of medium dense, wet sand beneath the building site that could lose strength during or after an earthquake. However, because significant free water and a continuous sand layer was not encountered, it is our opinion that the risk of liquefaction-induced subsidence is low.

- **Slope stability.** The slope within 120 feet or so of the Concept C building (about 14 to 18 percent slope) site is not steep enough to pose a seismic slope stability risk. Further upslope there are mapped historic failures, steep slopes, and groundwater seepage that present a risk of future landslides which could impact the proposed building. An earthquake would increase the risk of a landslide occurring.

- **Fault rupture**. The mapped northernmost splay of the Seattle Fault is about 0.3 miles south of the site. There is a remote potential for surface rupture at the site from a new splay of the Seattle Fault. However, this hazard is very low based on the Seattle Fault's 3,000-year recurrence interval, the many possible locations for surface rupture, and the likelihood that the fault would not produce surface rupture at this location.

Building Code Seismic Parameters

Based on the measured and extrapolated average SPT blowcount in the top 100 feet of soil, it is our opinion that the site class is best characterized as D.

Table 1 provides 2012 International Building Code (IBC) seismic design parameters for the site and the recommended soil Site Class. The parameters were obtained from the USGS US Seismic Design Maps web application (http://earthquake.usgs.gov/designmaps/us/application.php) accessed March 2015.

Table 1 – 2012 IBC Seismic Design Parameters

Parameter	Value
Latitude	47.58151
Longitude	-122.23552
Site Class	D
PGA	0.572 g
S_S	1.388 g
S_1	0.538 g
F_a	1.0
F_v	1.5

Excavation and Shoring Options

We understand that the location of the building is subject to change. If the building is situated west of the toe of the existing slope, then shoring and/or regrading will be required to maintain soil cut and slope stability. We recommend considering the following options:

Option 1. Locate the building beyond the toe of the slope. The advantage of this option is that shoring would not need to be designed or built. The building would also not need to accommodate the relatively large static and seismic loads of the retained soil.

Option 2. Locate the building within the existing slope and retain the cut using temporary shoring; also, place the permanent building wall directly against the shoring so that the soil loads are transferred to the building structure. With this option, the building will need to be designed for the static and seismic earth pressures of the retained sloping soils.

Option 3a. Locate the building within the existing slope and retain the soil cut using permanent shoring that is not structurally connected to the building structure. With this option, the building will not need to be designed for the static or seismic earth pressures from the retained slope. The shoring will need to be designed as a permanent structure, which is more expensive than temporary shoring.

Option 3b. Locate the building about 4 feet interior of the temporary shoring wall. The gap between the shoring wall and permanent wall can be backfilled with gravel. The shoring tiebacks would be de-stressed as the gravel backfill is placed. The permanent building wall can then be designed for a conventional triangular active earth pressure distribution.

Option 4. Locate the building within the existing slope, but regrade and move the toe of the slope west, outside the building footprint. This option would not require temporary shoring and the building would not need to be designed to accommodate retained earth pressures. A permanent slope would need to be designed to be no steeper than 2H:1V.

Temporary Shoring Recommendations

Shoring should be designed by a professional structural engineer registered in the State of Washington. We recommend that we be given the opportunity to review the geotechnical aspects of the shoring design before construction. It is not the purpose of this report to provide specific criteria for the contractor's construction means and methods. The shoring contractor should be responsible for verifying actual ground conditions and determining the construction methods and procedures needed to install an appropriate shoring system.

This section addresses a temporary shoring wall built into the existing slope at the west side of the Concept C building location. Assuming an excavation down to elevation 88 feet, the slope cut could be on the order of 12 to 18 feet tall.

We did not do soil explorations along a substantial portion of the Concept C west building line, so we have assumed that the retained soils would primarily consist of Soil Unit 1 or 2.

Lateral Pressures

We expect that temporary shoring will consist of soldier piles and timber lagging with cantilevered and tied-back sections and that active earth pressures are applicable. Active earth pressures assume that the top of the shoring is allowed to deform on the order of 0.001 to 0.002 times the shoring height.

For cantilevered walls, we recommend a triangular earth pressure distribution. For tied-back walls, we recommend a trapezoidal earth pressure distribution. Our recommended earth pressures for temporary shoring are provided on Figure 5.

Timber lagging is expected to freely drain so that water does not build up behind the walls. Assuming a free-draining wall, the temporary shoring does not need to be designed for water pressure behind the wall.

Additional lateral pressures due to surcharge loads (e.g., buildings, footings, heavy equipment, large material stockpiles) should be calculated using methods shown on Figure 7. These loads would be added to the loads calculated for the shoring walls. We recommend Hart Crowser review or calculate the estimated surcharge loads when surcharge loads, footprints, and foundation plans of adjacent structures are available.

Soldier Pile Design

We make the following recommendations for soldier pile design:

- Use the axial pile capacity parameters in Table 2 to calculate the vertical capacity of the soldier piles. We recommend embedding piles at least 10 feet into the fine-grained glacially overridden soils (Soil Unit 3). Neglect the pile-side friction above the bottom of the excavation.

Table 2 - Axial Capacity Parameters for Drilled Soldier Piles

Soil Unit	Allowable Unit Side Capacity	Allowable Unit End Capacity
1 and 2	0.2 ksf	N/A
3	1.0 ksf	30 ksf

- Design soldier piles for bending using a uniform loading value equivalent to 80 percent of the design values and analyze for shear using total load.
- To design against kickout, compute the lateral resistance using the passive pressure on Figure 5 acting over two times the diameter of the concrete shaft section or the pile spacing, whichever is less.
- The embedded portion of the pile shaft should be at least 2 feet in diameter.

These recommendations assume proper installation of the soldier piles as discussed in the construction recommendations section of this report.

Lagging Design

Temporary lagging should be designed in accordance with FHWA GEC 4 (FHWA 1999), structural engineering guidelines, soil type, and local experience. Table 3 provides recommended lagging thicknesses based on the FHWA recommendations.

Based on our site investigation, we recommend using a Soil Type of "Competent."

Table 3 – Recommended Temporary Lagging Thickness

Soil Type	Exposed Wall Height (feet)	Clear Span of Lagging (feet)					
		5	6	7	8	9	10
		Minimum Actual Thickness of Rough Cut Timber Lagging (inches)					
Competent[1]	25 and under	2	3	3	3	4	4
	Over 25 to 60	3	3	3	4	4	5
Difficult[1]	25 and under	3	3	3	4	4	5
	Over 25 to 60	3	3	4	4	5	5
Potentially Dangerous[1]	15 and under	3	3	4	5	See Note[2]	See Note[2]
	Over 15 to 25	3	4	5	6	See Note[2]	See Note[2]
	Over 25	4	5	6	See Note[2]	See Note[2]	See Note[2]

[1]Soil Type as defined in WSDOT Standard Specifications section 6-16.3(6)A

[2]For exposed wall heights exceeding the limits in Table 3, or where minimum rough cut lagging thickness is not provided, the Contractor should design the lagging in accordance structural engineering guidelines and local experience. Soldier pile and lagging shoring may not be appropriate in these cases.

Tieback Design

We recommend the tentative allowable tieback pullout values in Table 4 for a typical 6-inch-diameter drilled hole with a pressure-grouted bond zone. The allowable transfer load includes a recommended factor of safety of 2.0. The factor of safety should be confirmed by completing at least two successful verification tests in each soil type. Additionally, each tieback should be proof tested to 133 percent of the design load. Our recommended tieback testing program is provided in the construction recommendations section of this report. We recommend that the shoring contractor and/or designer determine a final design tieback pullout resistance based on their previous experience on Mercer Island, which must then be confirmed by field testing.

Table 4 – Tentative Pullout Capacity for Temporary Tiebacks with Pressure-Grouted Bond Zone

Soil Unit	Allowable Capacity
1 and 2	1 kip per foot
3	3 kip per foot

We make the following additional recommendations for tieback design:

- Do not install the bond zone within Soil Units 1 or 2, if possible.
- Tieback bond zones should be located outside of the no-load zone. The no-load zone is shown on Figure 5 as a zone bounded by a 60-degree line to the horizontal that starts at a distance of H/4 from the bottom of the excavation where H is the excavation height.
- Locate anchors at least three tieback diameters apart.

- Design anchor lengths so that they do not conflict with any underground support elements of adjacent structures.
- Identify existing facilities adjacent to the project site including buried utilities and foundations, as these may affect the location and the length of the anchors.
- Allow the contractor to select the tieback anchor material and the installation technique. The shoring contractor should be contractually responsible for the design of the tieback anchors, as tieback capacity is largely a function of the means and methods of installation. The selected installation method must be confirmed using verification and proof testing as discussed below.
- Hart Crowser should review the design for anchor locations, capacities, and related criteria prior to implementation.

Permanent Subgrade Walls

This section addresses permanent walls built against temporary shoring that would retain cuts into the existing slope on the west side of the building. This section also addresses backfilled walls that are not connected to temporary shoring.

Earth Pressures

Permanent subsurface walls constructed adjacent to soldier pile shoring may be designed using the same earth pressure values and distribution that was used for shoring design. If there is a gap between the shoring and permanent walls then use a conventional active earth pressure for the backfill material. The earth pressure does not include surcharge loads such as loads from adjacent buildings; these must be calculated separately and added to get the total permanent lateral pressure.

Permanent walls that are backfilled and are not adjacent to shoring walls should be designed using a triangular earth pressure distribution. For typical granular fill soil, active and at-rest pressures may be determined using the equivalent fluid unit weights in Table 5. Note that the equivalent fluid density does not include any surface loading conditions or loading due to groundwater hydrostatic pressure; also, the ground surface behind the wall is assumed to be horizontal. Walls without drainage must be designed for full hydrostatic pressure.

The use of active and passive pressure is appropriate if the wall is allowed to yield a minimum 0.001 times the wall height. For a non-yielding wall, at-rest pressures should be used.

Table 5 - Soil Equivalent Fluid Unit Weights for Walls Backfilled with Structural Fill

Soil Type	Parameter	Value (pcf)
Structural Fill	Active Earth Pressure	35
	At-Rest Earth Pressure	55
	Passive Earth Pressure [a]	300

Notes:

a. Includes a factor of safety of 1.5.

Hydrostatic Groundwater Pressure

We recommend full height drainage for all walls and foundations in order to preclude water pressure loads against the walls or foundations.

Seismic Earth Pressure on Walls

For walls retaining the soil slope, use a seismic earth pressure increment of 13H psf. For wall retaining level backfill use a seismic earth pressure increment of 9H psf. These earth pressures assume Soil Units 1 or 2 are present behind the wall with an average soil backslope of 7H:1V (8 degrees). The seismic earth pressure is calculated using the 2012 IBC design hazard level (2/3 of the MCE) for the site.

Apply the seismic increments as a uniform pressure from the top to the bottom of the wall as shown on Figure 6.

Surcharge Pressures on Walls

The pressures shown on Figures 5 and 6 do not include surcharge loads due to buildings, footings, heavy equipment, large stockpiles, etc. These loads must be calculated separately, using the methods shown on Figure 7, or similar, and added to the pressures determined using Figures 5 and 6.

We recommend Hart Crowser that review or complete the estimated surcharge loads when surcharge loads, footprints, and foundation plans of adjacent structures are available.

Foundation Design Recommendations

Axial Pile Capacity

We recommend pile foundations for the building because the upper soils are relatively weak and compressible and we expect that the building loads will be relatively high. In our opinion, the most suitable pile type is augercast piles because they typically offer the best combination of capacity and cost. Driven piles are not recommended because of potential noise issues and also ground vibrations that could adversely affect nearby slope stability.

Calculate the diameter and length of the piles using the allowable unit side and end capacities in Table 6. Do not include base capacity when calculating the total uplift capacity. Neglect side friction of the upper 5 feet of the shaft to accommodate potential soil disturbance. All piles should be embedded a minimum of 10 feet into Soil Unit 3.

Table 6 - Axial Capacity Parameters for Augercast Piles

Soil Unit	Allowable Unit Side Capacity	Allowable Unit End Capacity
1 and 2	0.2 ksf	Note recommended
3	1 ksf	35 ksf

Axial Pile Group Effects

To avoid axial group effects, we recommend a minimum center-to-center pile spacing of 3D, where D is the smallest pile diameter.

Lateral Pile Capacity

Lateral loads are resisted primarily by the horizontal bearing support of near-surface soils around the piles and pile caps. The lateral capacity of a pile depends on its length, stiffness in the direction of loading, proximity to other piles, and degree of fixity at the head, as well as on the engineering properties of the upper soils. The design lateral capacity of vertical piles will depend largely on the allowable lateral deflections of the piles.

Lateral pile analysis may be done using LPILE software using the soil parameters in Table 7.

Table 7 – LPILE Soil Parameters

Soil Unit	Soil Model	Effective Unit Weight (pcf)	Undrained Cohesion (psf)	Strain Factor, E50 (pci)
1 and 2	Soft Clay	110	600	Default
3	Stiff Clay w/o Free Water	120	4,000	Default

Lateral Pile Group Effects

Lateral group effects must be considered for pile spacings less than 5D, where D is the smallest pile diameter. We recommend the group reduction factors in Table 8 be used for LPILE analysis.

Table 8 – LPILE Reduction Factors for Lateral Pile Group Effects

Pile Center-to-Center Spacing (ft)	P-Multipliers, Pm		
	Row 1	Row 2	Row 3 and higher
3D	0.8	0.4	0.3
5D	1.0	0.85	0.7

Lateral Earth Pressures for Pile Caps and Beams

Active and passive earth pressures act over the embedded portion of pile caps and grade beams. We recommend backfilling around pile caps and beams with structural fill. We recommend using the values in Table 9 to determine the lateral earth pressure for pile caps and beams. Neglect the upper 1 foot of soil resistance unless the soil surface is covered by pavement or slabs. Passive resistance assumes a safety factor of 1.5, which may be increased by 1/3 for short-term loads such as wind or earthquake.

Table 9 – Lateral Earth Pressure Determination for Pile Caps and Beams

Parameter	Soil Type	Value (pcf)
Active Earth Pressure	Structural Fill	35
Passive Earth Pressure	Structural Fill	300

Mobilization of passive pressure may be calculated from Figure 4-6 of ASCE 41-06 for varying degrees of movement as calculated iteratively using LPILE. Alternatively, full passive pressure may be used for movement of 0.05H, where H is the depth below ground surface to the bottom of the pile cap or beam.

Bearing Layer Depth for Piles

As previously discussed, we recommend that all piles penetrate at least 10 feet into Soil Unit 3, the bearing layer. Table 10 provides the depth to the bearing layer at specific exploration locations. The depth to the top of Soil Unit 3 varied from about 13 to 33 feet bgs in the soil borings but was typically encountered within about 25 feet bgs. The depth to the bearing layer could vary significantly within unexplored areas of the site.

Table 10 – Depth Top of Soil Unit 3 at Exploration Locations

Exploration ID	Depth to Bearing Layer (feet)
HC-3	27
HC-4	33
HC-5	Greater than 21.5
SW-B5	21
HC-6	13
HC-7	23
HC-B-5	26

The depth to the top of Soil Unit 3 is likely highly variable across the site; therefore, for estimating pile drilling and material quantities, we recommend adding 5 feet to the calculated pile lengths. The final pile lengths should be should be established during drilling based on interpreted soil conditions. If

unexpected subsurface conditions are encountered during construction, the pile lengths may need to be adjusted.

Note on that borings HC-5 an SW-B-5 were drilled close to each other; however, the SPT blowcounts in SW-B5 are considerably higher at shallower depths than in HC-5, in fact HC-5 did not encounter suitable bearing soils to the depth drilled. This is indicative of a high potential for unexpected subsurface conditions and variability across the site that can cause uncertainty and variability of construction estimates and actual construction costs.

To reduce the uncertainty of as-built pile lengths and potential construction cost overruns, additional explorations could be done across the finalized building footprint to refine the depth to the top of Soil Unit 3. For the sake of time and cost efficiency, we recommend doing these explorations using a Cone Penetration Test (CPT) or drilled borings. These explorations should be done after the building location is finalized and the resulting information should be provided to pile contractors as part of the request for bid.

GROUNDWATER CONTROL

Temporary Construction Dewatering

Water collected and discharged during construction will include stormwater, groundwater, and process water from construction activities.

Groundwater was not encountered during drilling in most of the current and historical borings; however, borings HC-3, HC-4, and HC-7, encountered water at about 20 feet bgs. Also, historical reports (Hart Crowser 1979, Shannon & Wilson 1985) show accumulated groundwater in monitoring wells near the ground surface within several hours after drilling.

For the planned finish floor elevation of about elevation 88 to 91 feet, groundwater inflow is expected to be minimal during excavation, manageable using trenches and sumps. Excavations left open for several hours may accumulate groundwater near the ground surface. Deep excavations for building spaces below the finish floor, such as elevator pits, may require active dewatering prior to excavation. Active dewatering may include wellpoints or sumps installed around the perimeter of the excavation.

The amount of water discharged from the site depends on many factors including design and operation of the dewatering system (if applicable), the excavation depth and extent, and the variability in soil and groundwater properties. Note that rainfall, surface water, and groundwater from adjacent utility trenches can significantly increase short-term water discharge rates. Also, the time of year and nearby construction dewatering activities can affect groundwater flows.

Permanent Drainage

Walls Placed against Shoring

We recommend installing drainage board (e.g., Miradrain 6100) between the shoring and permanent wall from the ground surface down to the full depth of the wall. The purpose of the drainage board is to prevent hydrostatic groundwater pressure buildup caused by surface water infiltration or perched groundwater above the water table. The drainage board can be connected to a pipe and discharged into a sump. We also recommend full coverage waterproofing for all below-grade, occupied spaces to provide a dry space. If the permanent wall has backfill behind it, install a perforated drain pipe at the bottom of the backfill to convey water to a suitable discharge point.

Slabs-on-Grade

- Slab-on-grade floors should be underlain by at least 6 inches of capillary break consisting of mineral aggregate Type 21 or Type 22, City of Seattle Standard Specification 9-03.16, with the exception that this material should have less than 10 percent sand and less than 3 percent fines.
- Any soil that is to be considered as capillary break and/or drainage material should be submitted to Hart Crowser for gradation analysis and approval.
- Provide underslab drainage using a combination of perimeter and cross drains. Drains should consist of perforated pipe placed in trenches at least 12 inches deep where the top of the trench is the bottom of the capillary break.
- Cross drains should be spaced about 30 to 40 feet apart and perimeter drains should extend around the perimeter of the building. The cross drains and the perimeter drains should be tied together and sloped to drain to a suitable discharge point.
- A layer of polyethylene sheeting should be used to protect the drainage layer from concrete as the floor slab is poured.
- Drainage material should be compacted to 90 percent of maximum dry density as determined by the Modified Proctor Method, ASTM D 1557.

Backfilled Walls

Walls with soil backfilled on one side only will require drainage or they must be designed for full hydrostatic pressure. We recommend the following:

- Backfill with a minimum thickness of 18 inches of free-draining sand or sand and gravel that is well-graded (i.e., has a wide range in particle size).
- Install drains behind any backfilled subgrade walls. The drains, with cleanouts, should consist of a minimum 4-inch-diameter perforated pipe that is placed on a bed of, and surrounded by, at least 6

inches of free-draining sand or sand and gravel. The drains should be sloped to carry the water to a sump or other suitable discharge.

- The backfill should be continuous and envelop the drainage behind the wall.
- The drainage fill surrounding the pipe should be compatible with the size of the holes in the pipe.
- Where dry interior spaces are required, backfilled walls should be waterproofed.

Final Site Drainage

The site should be graded in such a way that surface water will not pond near the structures. Roof drains should not be connected to the subgrade drainage system and should be sloped and tightlined to a suitable outlet away from the proposed building.

Pavement Areas

The pavement areas should be graded in such a way that surface water will not pond and will drain to a suitable outlet.

Pavement Design

We understand that new pavement is limited to a fire lane that will approach the building from the south.

For asphalt pavement we recommend 6 inches of hot mix asphalt (HMA) in high-traffic or heavy-duty zones and 3 inches of HMA in light-duty zones. HMA should be underlain by 6 inches of crushed rock base course conforming to City of Seattle Standard Spec Aggregate Type 2 – 3/4" Minus Crushed Gravel.

The subgrade beneath the crushed rock base course should be compacted to 95 percent of maximum dry density as determined by the modified Proctor test (ASTM D 1557) or otherwise deemed acceptable by Hart Crowser. Where the existing subgrade consists of fine-grained native soils or uncontrolled fill, we recommend excavation and replacement with up to 1.5 feet of compacted structural fill. Structural fill should conform to City of Seattle Standard Spec Aggregate Type 17. The structural fill should be underlain by a woven geotextile such as Mirafi 500x or better.

GEOTECHNICAL RECOMMENDATIONS FOR CONSTRUCTION

Recommendations for Soldier Pile Installation

- Conditions such as caving soil and groundwater can loosen soil at the bottom of the soldier pile borehole and reduce bearing capacity in the zone of disturbed soil.

- Tieback de-tensioning and shoring failure could occur if bearing capacity is inadequate and soldier piles settle under the vertical component of the inclined tieback load. We recommend that a Hart Crowser representative closely monitor soldier pile installation for these conditions so that construction methods can be adjusted accordingly.

- The contractor should be prepared to case the soldier pile holes where loose soils or groundwater seepage could cause loss of ground. Fill soils can be especially prone to caving and may require casing. The actual need for casing should be determined in the field at the time of installation.

- If the shaft excavation contains water or slurry, the contractor should place backfill using a tremie. Lean mix, concrete, and controlled density fill should not be end-dumped through water or slurry.

- The contractor should be prepared to excavate the soldier piles in a manner that prevents heave or boiling at the bottom of the soldier pile excavation. It may be possible to over-drill the borehole and backfill the bottom of the borehole with structural concrete bearing on undisturbed soil.

- Drilling mud should not be used unless use of the mud is reviewed and approved by Hart Crowser, the shoring designer, and the structural engineer.

- Soldier-pile shoring construction may be difficult if cobbles or loose sand and gravel are encountered in the excavation. If these conditions are encountered, substantial soil raveling could occur.

Recommendations for Lagging Installation

- Prompt and careful installation of lagging, particularly in areas of seepage and loose soil, is important to maintain the integrity of the excavation. The contractor should be prepared to place lagging in small vertical increments and to backfill voids caused by ground loss behind the shoring system. Proper installation to prevent soil failure and sloughing and loss of ground, and to provide safe working conditions, should be the responsibility of the shoring contractor.

- Backfill voids greater than 1 inch using sand, pea gravel, or a porous slurry. Backfill the void spaces progressively as the excavation deepens. The backfill must not allow hydrostatic pressure buildup behind the wall. Drainage behind the wall must be maintained or hydrostatic water pressure should be added to the recommended lateral earth pressures.

- If there is a slope above the wall, install extra lagging above the shoring wall to provide a partial barrier for material that could ravel down from the slope face and fall into the excavation.

Recommendations for Tieback Installation

- Pump structural grout into the anchor zone using a grout hose or tremie hose placed at the bottom of the anchor.

- Fill the portion of the tieback in the no-load zone with a non-cohesive mixture of sand-pozzolan-water or equivalent; or, install a bond breaker such as plastic sheathing or a polyvinyl chloride (PVC) pipe around the tie rods within the no-load zone.
- Grout and backfill tiebacks immediately after placing the anchor. To prevent collapse of anchor holes, ground loss, and surface subsidence, do not leave anchor holes open overnight.
- Take care not to mine out large cavities in granular soil.
- If using pneumatic drilling techniques near utility vaults, corridors, or subgrade slabs, maintain continuous cutting return so those structures are not damaged by the air pressure.
- Install anchors to minimize ground loss and do not disturb previously installed anchors. During tieback drilling, wet or saturated zones may be encountered and caving or blow-in could occur. Drilling with a casing may reduce the potential for these conditions and ground loss.
- Test the tiebacks to confirm the appropriateness of the anchor design values and to verify that a suitable installation is achieved.

Recommendations for Tieback Testing

The tieback anchor testing program should include verification testing of select tiebacks and proof testing of all production tiebacks. We recommend that tieback testing be done in general accordance with the recommendations in the publication Recommendations for Prestressed Rock and Soil Anchors by the Post Tensioning Institute (PTI 2004) and the recommendations below.

Verification Tests

We recommend a minimum of two verification tests per soil type before installation of production anchors to validate the design pullout value. The geotechnical engineer will select the testing locations with input from the shoring subcontractor. The geotechnical engineer or shoring designer may require additional verification tests when creep susceptibility is suspected or when varying ground conditions are encountered.

Verification tiebacks should be installed by the same methods and personnel, using the same material and equipment, as the production tiebacks; the engineer will determine whether deviations require additional verification testing. At least two successful verification tests should be performed for each installation method and each soil type.

Verification tests load the tieback to 200 percent of the DL and include a 60-minute hold time at 150 percent of the DL. The tieback DLs will be on the shoring drawings. The tieback load should not exceed 80 percent of the steel's ultimate tensile strength. Verification test tiebacks should be incrementally loaded and unloaded using the schedule in Table 11.

Table 11 – Tieback Verification Test Schedule

Load Level	Hold Time
Alignment load	Until stable
0.25DL	10 min
0.5DL	10 min
0.75DL	10 min
1.0DL	10 min
1.25DL	10 min
1.5DL	**60 min**
1.75DL	10 min
2.0DL	10 min

The alignment load should be the minimum load required to align the testing assembly and should be less than 5 percent of the DL. The dial gauge should be zeroed after the alignment load has stabilized. Perform a creep test at 1.5DL by holding the load constant to within 50 psi and recording deflections at 1, 2, 3, 5, 6, 10, 20, 30, 50, and 60 minutes.

The acceptance criteria for a verification test are:

- The creep rate at 1.5DL is less than 0.08 inches between 6 and 60 minutes and the creep rate is linear or decreasing during the creep test;
- The total tieback displacement is greater than 80 percent of the theoretical elastic elongation of the design unbonded length plus the jack length; and
- The anchor does not pull out under repeated loading.

Proof Tests

Proof tests load the tieback to 1.33DL and include a 10-minute hold time at 1.33DL. The tieback DLs should be on the shoring drawings. The tieback load should not exceed 80 percent of the steel's ultimate tensile strength. Proof tests should be incrementally loaded and unloaded using the schedule in Table 12.

Table 12 – Tieback Proof Test Schedule

Load Level	Hold Time
Alignment load	Until stable
0.25DL	1 min
0.5DL	1 min
0.75DL	1 min
1.0DL	1 min
1.33DL	10 min

The alignment load should be the minimum load required to align the testing assembly and should be less than 5 percent of the design load. The dial gauge should be zeroed after the alignment load has stabilized.

The load should be held constant to within 50 psi and deflections recorded at 1, 2, 3, 5, 6 and 10 minutes. If the tieback deflection between 1 and 10 minutes at 1.33DL exceeds 0.04 inches, the load should be held for an additional 50 minutes and deflections recorded at 20, 30, 50, and 60 minutes.

The acceptance criteria for a proof test are:

- The creep rate at 1.33DL is less than 0.04 inches between 1 and 10 minutes or less than 0.08 inches between 6 and 60 minutes and the creep rate is linear or decreasing during the creep test;
- The total tieback displacement is greater than 80 percent of the theoretical elastic elongation of the design unbonded length plus the jack length; and
- The anchor does not pull out under repeated loading.

Shoring Monitoring Program

A shoring monitoring program is recommended to provide early warning of shoring not performing as expected and to identify potential remedial measures. For this project, potential shoring includes a wall to retain soil cuts into the west slope and structures below finish grade, such as elevator or orchestra pits.

Prior to shoring, we recommend doing a pre-construction survey. A preconstruction survey documents the condition of pavement, utilities, buildings and upslope areas. The survey should include video and/or photographic documentation. The size and location of existing cracks in streets and buildings should receive special attention and may be monitored with a crack gauge.

During construction, we recommend optical surveys of horizontal and vertical movements of (1) the surface of the sloping ground above the building, (2) buildings adjacent to the site, and (3) the shoring system itself. The points on the adjacent buildings can be set either at the base or on the roof of the buildings. Points on the shoring should be set on every soldier pile.

For shoring that cuts into the west slope, we recommend installing a minimum of two slope inclinometer casings, one inclinometer casing attached to a soldier pile and the other inclinometer casing installed upslope from the shoring at a horizontal distance equal to the wall height.

The optical survey, or other measuring systems, should have an accuracy of at least 0.001 foot. All reference points on the ground surface should be installed and read before excavation begins. The frequency of readings will depend on the results of previous readings and the rate of construction. At a minimum, readings on the external points should be taken twice a week through construction until below-grade structural elements (such as floors, decks, columns) are completed, or as specified by the structural and geotechnical engineers. Readings on the top of soldier piles and the face of existing

buildings on or adjacent to the property should be taken at least twice a week during this time. We recommend that the owner hire an independent surveyor to record the data at least once per week; the surveyor or contractor could take the other weekly reading.

For buildings and streets adjacent to excavations we recommend a post-construction survey. A post-construction survey includes reviewing the preconstruction survey and comparing it to post-construction conditions. The survey should include video and/or photographic documentation. Changes in the number, size, or location of cracks in streets and buildings should be given special attention.

Augercast Pile Construction

We recommend that we observe the installation of augercast piles, so we can evaluate the contractor's operation and collect and interpret the installation data. Because a completed pile is below the ground surface and cannot be observed during construction, judgment and experience must be used to aid in determining the acceptability of the pile. We recommend close monitoring of installation procedures such as installation sequence, auger withdrawal rate, grouting pressure, and quantity of grout used per pile. Variations from the established pattern, such as low grout pressure, excessive settlement of grout in a completed pile, etc., would make the pile susceptible to rejection.

We make the following recommendations for augercast pile installation:

- Do not install two piles within 5-pile diameters of each other (center to center spacing) within a 12-hour period. This is intended to prevent interconnection of grout between piles.
- Require the contractor to provide a pressure gage in the grout line.
- Minimum pressures should be those required to maintain a steady flow of grout to the auger. A typical value of 100 pounds per square inch (psi) should be used for this purpose.
- Rapid drops in the grout pressure of 50 psi or more occurring when otherwise accepted procedures are used should be specified as a possible cause for reconstructing the pile.
- The rate of grout injection and rate of auger withdrawal from the soils should be able to maintain a positive grout head of at least 10 feet above the bottom of the auger. Loss of head during grout injection due to interrupted grout flow should be remedied by reinsertion of the auger 5 to 10 feet below the depth at which the interruption occurred, or to the bottom of the pile if the depth is unknown.
- Withdraw auger from hole at a slow rate so that pressure on the grout column is maintained.
- Require contractor to provide a means of monitoring quantity of grout used per pile. A stroke counter on the grout pump is the most efficient means to obtain grout quantity. Each time a new grout pump is used a new calibration in cubic yards per stroke should be provided. Typically, the ratio of measured to theoretical grout volume should be maintained between 1.2 and 1.5.

- Require the contractor to rotate the auger after initial grout pumping (about 2 cubic feet) prior to the beginning of auger withdrawal to help establish a firm bearing condition at the end of the pile.

Earthwork

Site Preparation and Grading

We recommend all site grading, paving, and any utility trenching be conducted during relatively dry weather conditions. At the time of our site explorations the ground surface was wet, soft and muddy. The existing ground surface is not suitable for construction traffic or staging areas. Working areas will need to be built using geotextile, quarry spalls, etc. Maintaining an adequate working surface should be the responsiblity of the contractor.

It may be necessary to relocate or abandon some utilities. Excavation of these utility lines will probably occur through fill. Abandoned underground utilities should be removed or completely grouted. Ends of remaining abandoned utility lines should be sealed to prevent piping of soil or water into the pipe. Soft or loose backfill should be removed, and excavations should be backfilled with structural fill. Coordination with the utility agency is generally required.

Structural Fill

Backfill placed within the building area or below paved areas should be considered structural fill. We make the following recommendations for structural fill:

- For imported soil to be used as structural fill, use a clean, well-graded sand or sand and gravel with less than 5 percent by weight passing the No. 200 mesh sieve (based on the minus 3/4-inch fraction). Compaction of soil containing more than about 5 percent fines may be difficult if the material is wet or becomes wet during rainy weather.

- Place and compact all structural fill in lifts with a loose thickness no greater than 10 inches. For hand-operated "jumping jack" compactors, loose lifts should not exceed 6 inches. For small vibrating plate/sled compactors, loose lifts should not exceed 3 inches.

- Compact all structural fill to at least 95 percent of the modified Proctor maximum dry density (as determined by ASTM D 1557 test procedure).

- Control the moisture content of the fill to within 2 percent of the optimum moisture. Optimum moisture is the moisture content corresponding to the maximum Proctor dry density.

- In wet subgrade areas, clean material with a gravel content of at least 30 to 35 percent may be necessary. Gravel is material coarser than a US No. 4 sieve.

- Before filling begins, provide samples of the structural and drainage fill for laboratory testing. Laboratory testing will include a Proctor test and gradation for structural fill and a gradation for drainage fill. Field testing with a nuclear density gauge uses the maximum dry density determined

from a Proctor test so it is important to complete the laboratory testing as soon as possible in order to not delay backfilling.

Use of On-Site Soil as Structural Fill

Our explorations indicated that the near-surface site soil includes silty to very silty, slightly gravelly to gravelly sand, silt, and clay with scattered organic material; we do not recommend using these soils for structural fill.

Temporary Cuts

Because of the variables involved, actual slope grades required for stability in temporary cut areas can only be estimated before construction. We recommend that stability of the temporary slopes used for construction be the sole responsibility of the contractor, since the contractor is in control of the construction operation and is continuously at the site to observe the nature and condition of the subsurface. Excavations should be made in accordance with all local, state, and federal safety requirements.

The stability and safety of open trenches and cut slopes depend on a number of factors, including the soil conditions, seepage conditions, depth of cuts, duration, proximity to surcharge loads and soil stockpiles, and general care and methods used by the contractor.

Temporary excavations should either be shored or sloped in accordance with Part N, WAC 296-155-650 through 296-155-66411. For planning purposes, we recommend maximum temporary cuts of 2H:1V.

In addition to the WAC requirements, we recommend limiting the depth and duration of temporary cuts and using plastic sheeting to protect the soil from rain. Also, if groundwater seepage is encountered during excavation, the contractor should install temporary drainage to reduce caving or sloughing of cut faces and to protect adjacent soil from becoming wet and soft. Temporary cuts that encounter seepage may need to be flattened to maintain stability.

RECOMMENDATIONS FOR CONTINUING GEOTECHNICAL SERVICES

Before construction begins, we recommend that we continue to meet with the design team, as needed, to address geotechnical questions that may arise throughout the remainder of the design and permitting process. We also recommend that we review the project plans and specifications to confirm that the geotechnical engineering recommendations have been properly interpreted.

During construction, we recommend that Hart Crowser be retained to perform the following tasks:

- Review contractor submittals;
- Observe shoring installation;

- Observe foundation installations;
- Observe foundation drainage installation;
- Other observations as required by the city of Mercer Island;
- Attend meetings, as needed; and
- Provide geotechnical engineering support that may arise during construction.

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Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

3,000 1,500 0 3,000

Scale in Feet

N

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Vicinity Map

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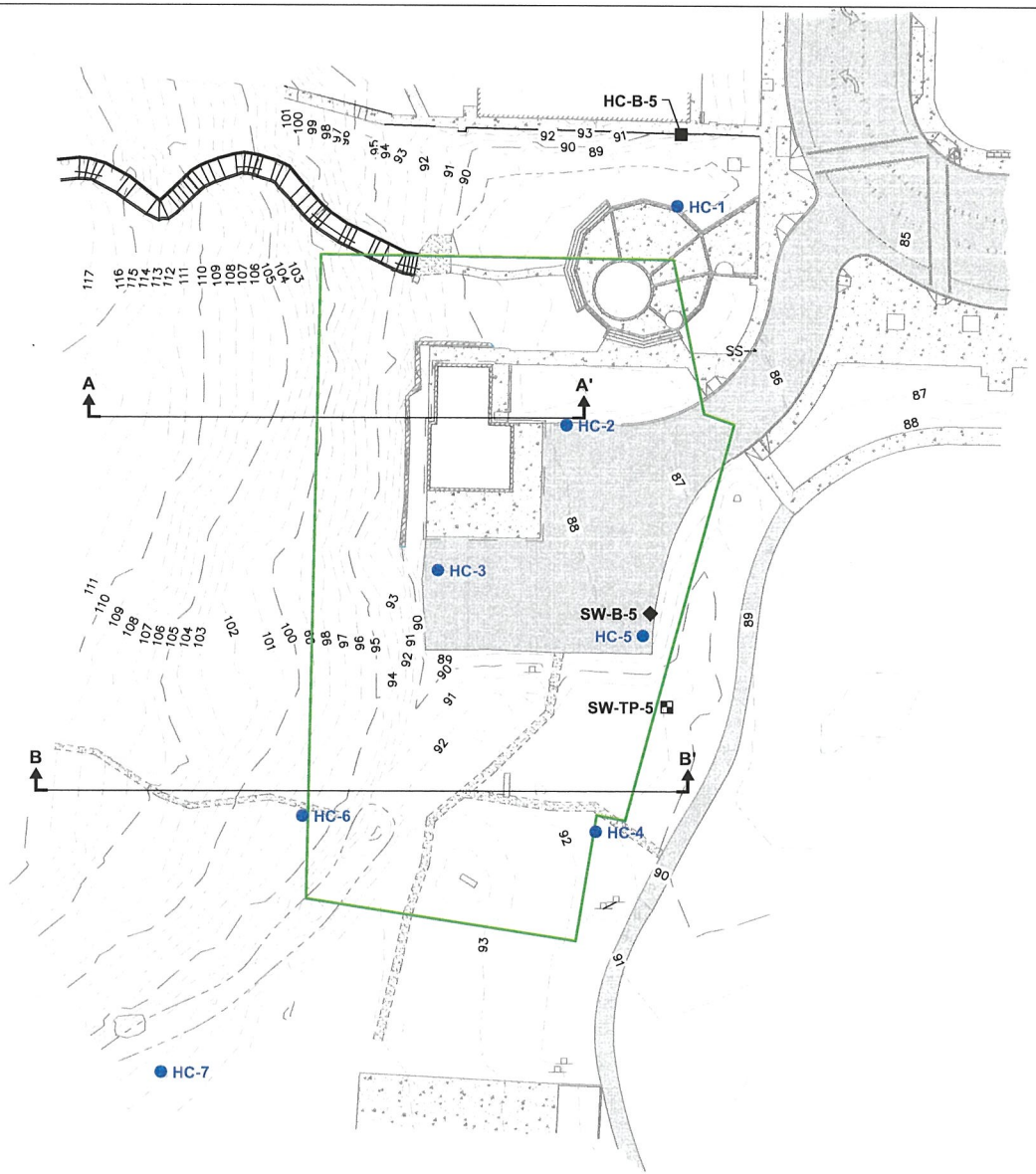
Figure
1

EAL 03/30/15 1912000-AB (VMap).mxd



Legend

- HC-1 ● Boring (Hart Crowser 2015)
- SW-B-5 ◆ Boring (Shannon & Wilson 1985)
- SW-TP-5 ▪ Test Pit (Shannon & Wilson 1985)
- HC-B-5 ■ Boring (Hart Crowser 1980)
- Proposed building (Concept C)
- A A' Cross section

N

0 40 80
Scale in Feet

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Site and Exploration Plan

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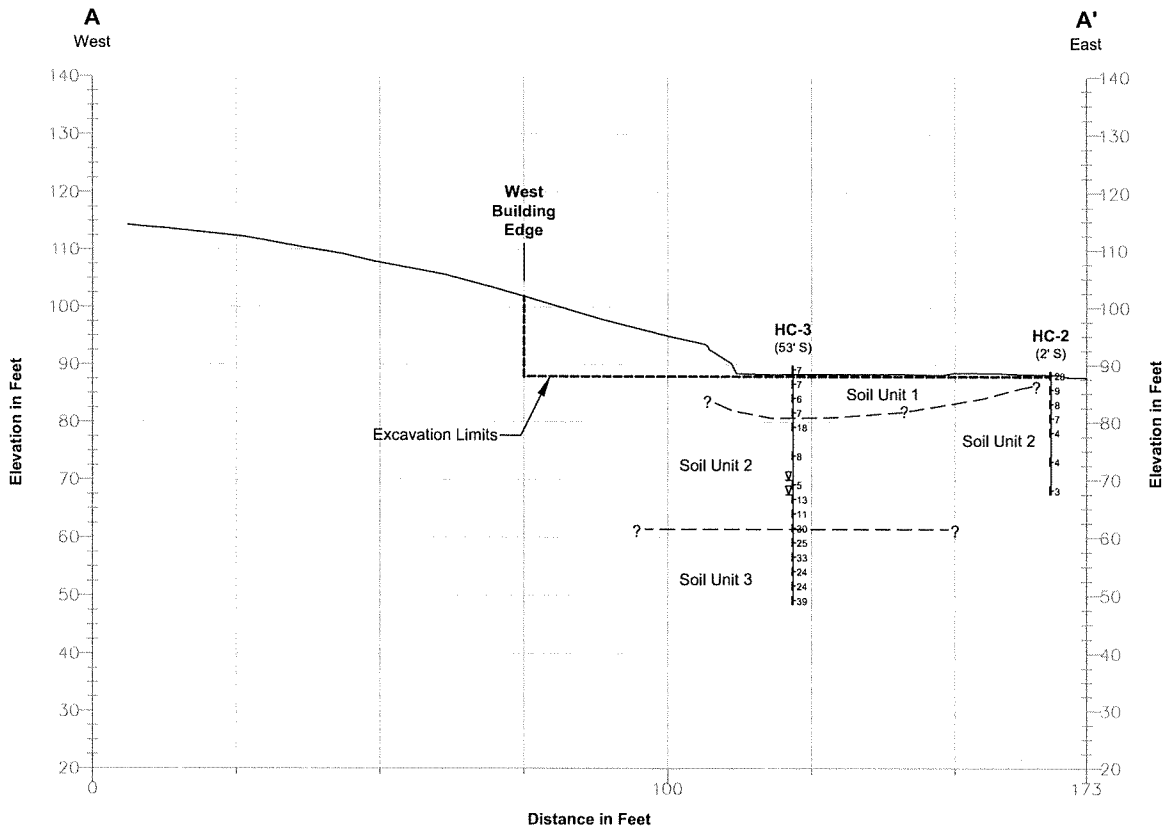
Figure 2

EAL 03/30/15 19120000-004 (SPlan).dwg



HC-2 (2' S) Exploration number (Offset distance and direction)

Exploration

Water level

9 Standard penetration resistance in blows per foot

0 20 40
Scale in Feet

Note:
Contact between soil units is interpolated between borings and represents our interpretation of subsurface conditions based on currently available data.

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Generalized Subsurface Cross Section A-A'

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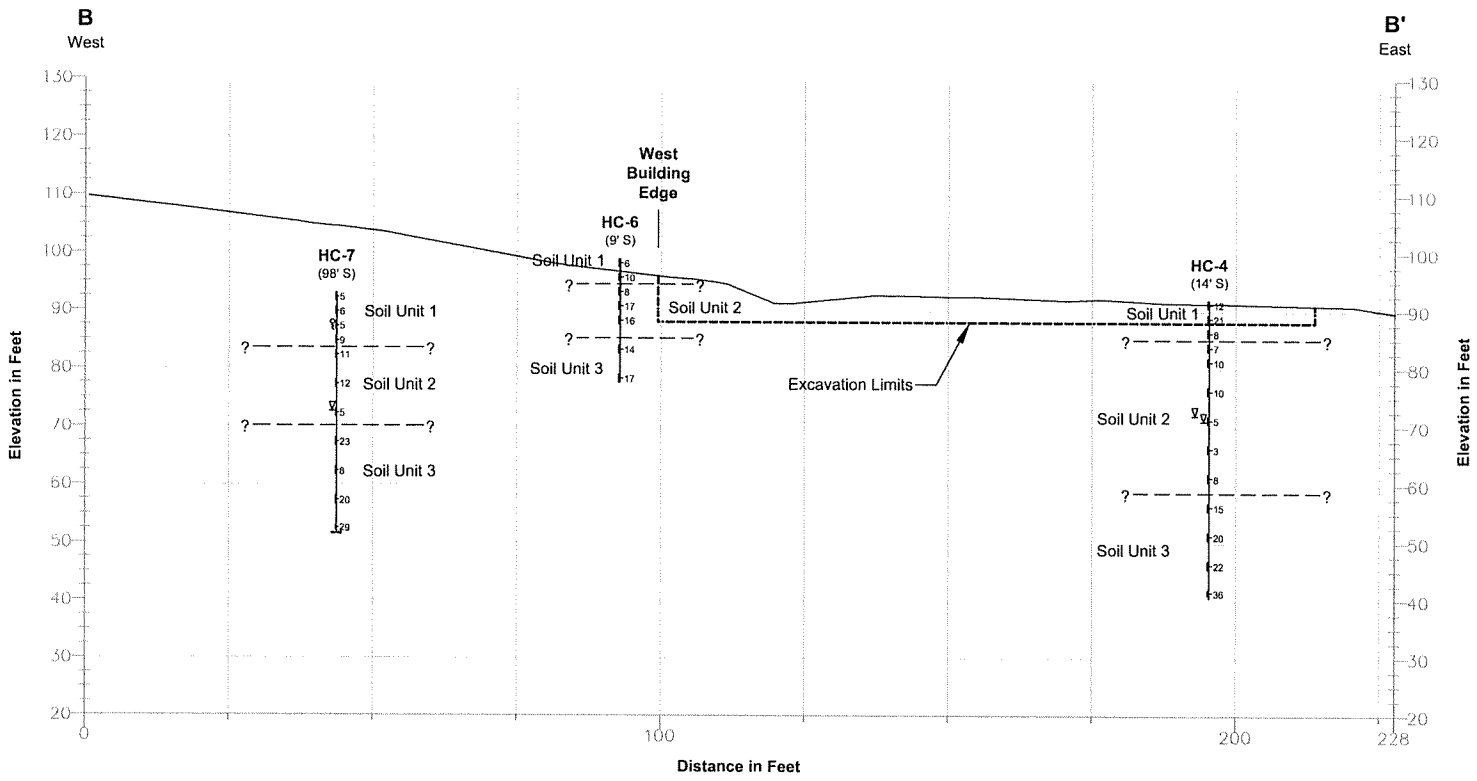
Figure 3

EAL 03/30/15 19120000-003 (XSec).dwg



Note:
Contact between soil units is interpolated between borings and represents our interpretation of subsurface conditions based on currently available data.

HC-2 (2' S) Exploration number (Offset distance and direction)

Exploration

Water level

9 Standard penetration resistance in blows per foot

0 20 40
Scale in Feet

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Generalized Subsurface Cross Section B-B'

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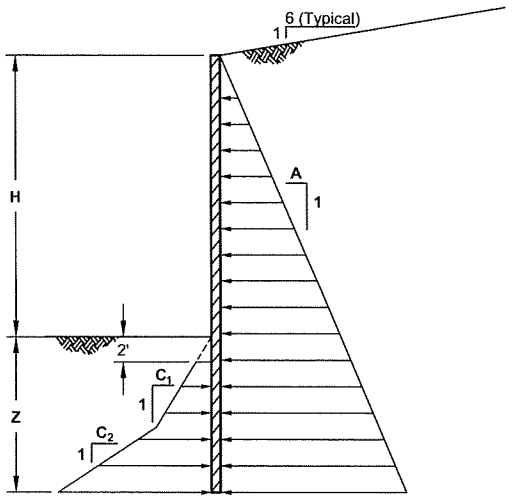
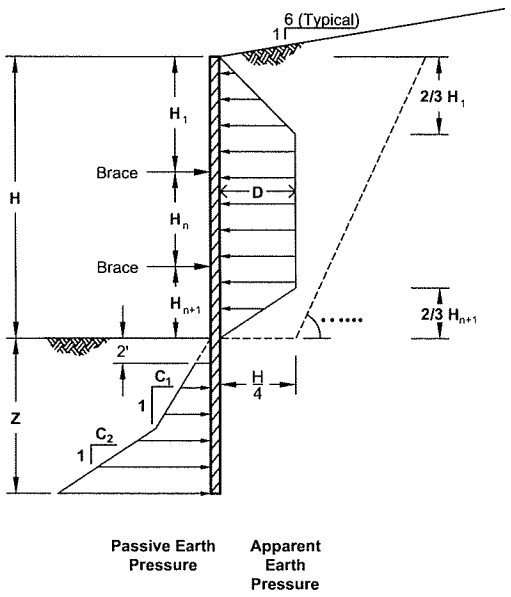
Figure 4

EAL 03/30/15 I:\19200-003 (XSect).dwg



Cantilever Soldier Pile and Single-Braced Wall



Multiple-Braced Wall

Recommended Lateral Earth Pressures

	A	C_1 (Soil Units 1-2)	C_2 (Soil Unit 3)	D
Active	60 pcf	-	-	38H
Passive	-	215 pcf	350 pcf	-

Notes:

1. For design, add 2 feet to the retained height.
2. B and D are recommended equivalent uniform values.
3. All earth pressures are in units of pounds per square foot.
4. Minimum recommended embedment (Z) is 10 feet.
5. Passive pressures are allowable values and include a 1.5 factor of safety.
6. Passive pressure acts over 2.5 times the concreted diameter of the soldier pile or the pile spacing, whichever is less.
7. Apparent earth pressure and surcharge act over the pile spacing above the base of the excavation.
8. Active pressure acts over the pile diameter below the excavation.
9. Additional surcharge (e.g. from footings, large stockpiles, heavy equipment), must be added to these pressures.
10. All dimensions are in feet.
11. Diagrams are not to scale.

Legend

H	Total height of excavation (feet)
H_1	Depth to uppermost tieback (feet)
H_n	Height between tiebacks (feet)
H_{n+1}	Distance from base of excavation to lowermost tieback (feet)
Z	Embedment depth (feet)
A,B,C, ...	Earth pressure factors
--------	No-load zone

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Lateral Earth Pressures for Temporary Shoring

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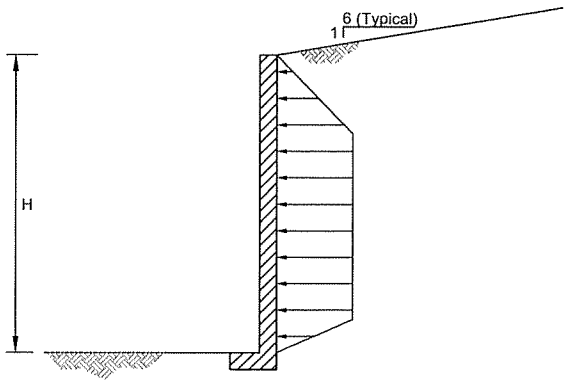
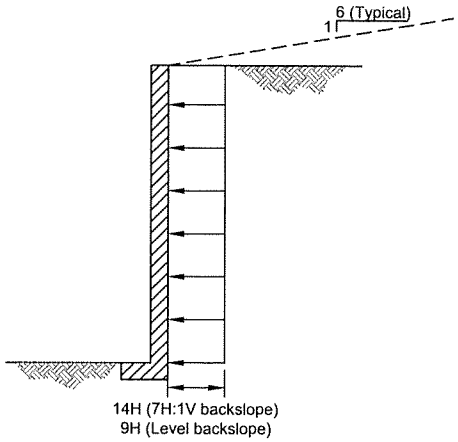
Figure 5



Earth Pressure*

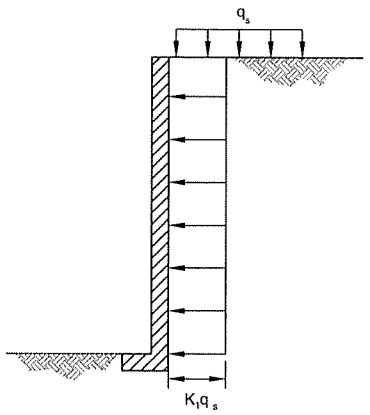
* The same earth pressure distributions determined for temporary shoring should be used for permanent walls constructed against shoring (See Figure 5).

+



Dynamic Inertial Increment

+



Uniform Surcharge

Notes

1. All pressures are in units of pounds per square foot.
2. Diagrams do not include surcharge loading due to adjacent structures; see Figure 7.
3. Diagrams not to scale.

Legend

H	Height from bottom of excavation to ground surface (feet)
q_s	Traffic surcharge
h_w	Depth of excavation below groundwater table

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Lateral Pressures for Permanent Walls Constructed against Shoring

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Figure 6

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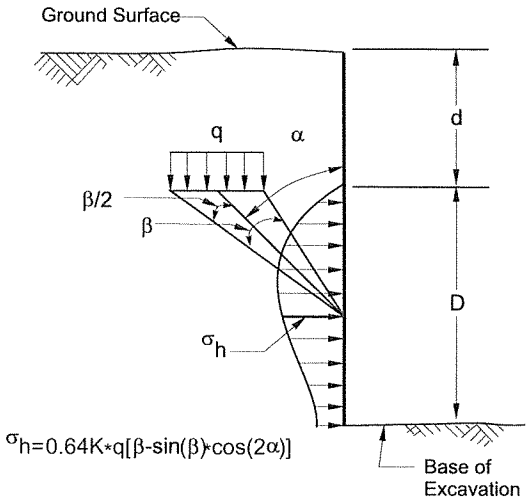
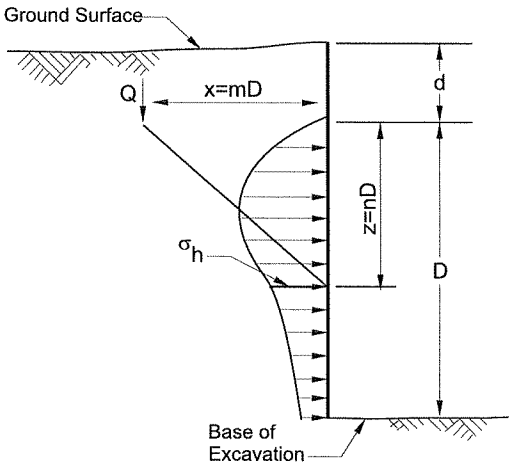
A. Strip Footing
Cross Section View



$\sigma_h = 0.64K * q[\beta - \sin(\beta) * \cos(2\alpha)]$

B(1). Small Isolated Footing
Cross Section View



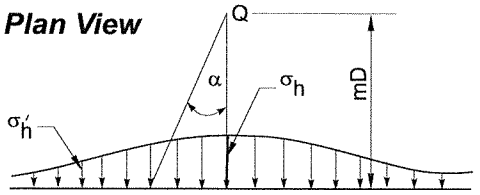
(For m> 0.4)

$$\sigma_h = K_1 \frac{1.77Q}{D^2} \frac{m^2n^2}{(m^2+n^2)^3}$$

(For m≤ 0.4)

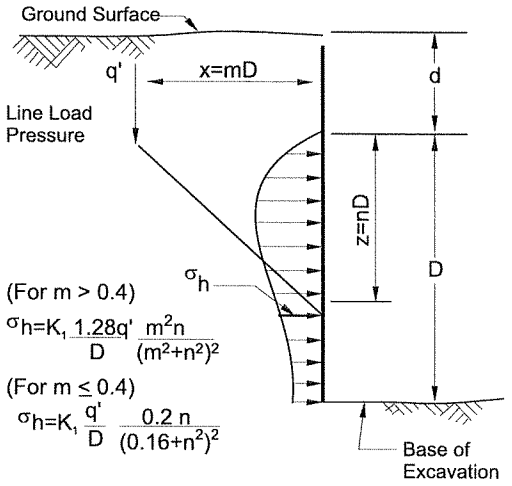
$$\sigma_h = K_1 \frac{0.28Q}{D^2} \frac{n^2}{(0.16+n^2)^3}$$

B(2). Plan View



$\sigma'_h = \sigma_h \cos^2(1.1\alpha)$

C. Continuous Wall Footing
Parallel to Excavation
Cross Section View



(For m > 0.4)

$$\sigma_h = K_1 \frac{1.28q'}{D} \frac{m^2n}{(m^2+n^2)^2}$$

(For m ≤ 0.4)

$$\sigma_h = K_1 \frac{q'}{D} \frac{0.2\,n}{(0.16+n^2)^2}$$

Definition and Units

Q	Footing Load in Pounds
D	Excavation Depth below Footing in Feet
d	Depth to Base of Footing in Feet
σ_h	Lateral Soil Pressure in PSF
q	Unit Loading Pressure in PSF
q'	Footing Load in Pounds per Foot
α, β	Radians

K_1	Conditions
0.35	Active earth pressure on a flexible wall (e.g., shoring)
0.5	At-rest conditions, where surcharge loads exist prior to excavation
1.0	At-rest conditions, where surcharge loads are applied after construction of permanent wall

Notes:
1. Lateral pressures from adjacent structures should be added to lateral pressures on Figures 5 and 6.
2. Wall footings acting other than parallel to the excavation can be treated as series of discrete point loads, using Approach B.
3. Contact Hart Crowser for surcharge recommendations, if necessary.

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Figure 7

Determination of Lateral Pressure Acting on Adjacent Shoring from Surcharge Load

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Mercer Island Center for the Arts
Mercer Island, Washington

APPENDIX A
Field Exploration Methods and Analysis

APPENDIX A

Field Exploration Methods and Analysis

This appendix documents the processes Hart Crowser used to determine the nature of the soils at the project site, and discusses:

- Explorations and their locations;
- Auger borings; and
- Standard Penetration Test procedures.

Explorations and Their Locations

The exploration logs in this appendix show our interpretation of the drilling, sampling, and testing data. These logs indicate the approximate depth where the soils change. Note that the soil changes may be gradual and may vary in depth across the site.

In the field, we classified the soil samples according to the methods shown on Figure A-1 - Key to Exploration Logs. This figure also provides a legend explaining the symbols and abbreviations used on the logs.

Figure 2 shows the explorations, located with a measuring tape from existing physical features. Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88) and were estimated from the provided topographic survey.

Auger Borings

Borings were drilled with a 2.5-inch-inside-diameter, 6.5-inch-outside-diameter, hollow-stem auger and were advanced with a track-mounted drill rig subcontracted by Hart Crowser. The drilling was continuously observed by a geologist from Hart Crowser. A detailed field log was prepared for the boring. Using the Standard Penetration Test (SPT), we obtained samples at minimum 5-foot intervals.

Standard Penetration Test Procedures

The SPT is an approximate measure of soil density and consistency. To be useful, the results must be interpreted in conjunction with other tests. The SPT (as described in ASTM D 1586) was used to obtain disturbed soil samples.

This test employs a standard 2-inch-outside-diameter, split-spoon sampler. Using a 140-pound autohammer, free-falling 30 inches, the sampler is driven into the soil for 18 inches. The number of blows required to drive the sampler the last 12 inches is the Standard Penetration Resistance. This resistance, or blow count, measures the relative density of granular soils and the consistency of cohesive soils. The blow counts are plotted on the boring logs at their respective sample depths.

Soil samples were recovered from the split-spoon sampler, field classified, and placed into watertight jars. They were taken to Hart Crowser's laboratory for further testing.

In the Event of Hard Driving

Occasionally, very dense materials preclude driving the total 18-inch sample. When this happens, the penetration resistance is entered on logs as follows:

Penetration less than 6 inches. The log indicates the total number of blows over the number of inches of penetration.

Penetration greater than 6 inches. The blow count noted on the log is the sum of the total number of blows completed after the first 6 inches of penetration. This sum is expressed over the number of inches driven that exceed the first 6 inches. The number of blows needed to drive the first 6 inches are not reported. For example, a blow count series of 12 blows for 6 inches, 30 blows for 6 inches, and 50 (the maximum number of blows counted within a 6-inch increment for SPT) for 3 inches would be recorded as 80/9.

Key to Exploration Logs

Sample Description

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits and probes is estimated based on visual observation and is presented parenthetically on the logs.

SAND or GRAVEL Density	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance (N) in Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 to 4	Very soft	0 to 2	<0.125
Loose	4 to 10	Soft	2 to 4	0.125 to 0.25
Medium dense	10 to 30	Medium stiff	4 to 8	0.25 to 0.5
Dense	30 to 50	Stiff	8 to 15	0.5 to 1.0
Very dense	>50	Very stiff	15 to 30	1.0 to 2.0
		Hard	>30	>2.0

Sampling Test Symbols

- 1.5" I.D. Split Spoon
- Grab (Jar)
- 3.0" I.D. Split Spoon
- Shelby Tube (Pushed)
- Bag
- Cuttings
- Core Run

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, likely below optimum
Moist	Likely near optimum moisture content
Wet	Much perceptible moisture, likely above optimum

Minor Constituents	Estimated Percentage
Trace	<5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

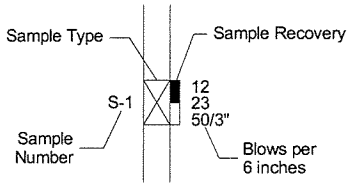
Laboratory Test Symbols

GS	Grain Size Classification
CN	Consolidation
UU	Unconsolidated Undrained Triaxial
CU	Consolidated Undrained Triaxial
CD	Consolidated Drained Triaxial
QU	Unconfined Compression
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits Water Content in Percent Liquid Limit Natural Plastic Limit
PID	Photoionization Detector Reading
CA	Chemical Analysis
DT	In Situ Density in PCF
OT	Tests by Others

Groundwater Indicators

- Groundwater Level on Date or (ATD) At Time of Drilling
- Groundwater Seepage (Test Pits)

Sample Key



HARTCROWSER

19120-00 *2/15*

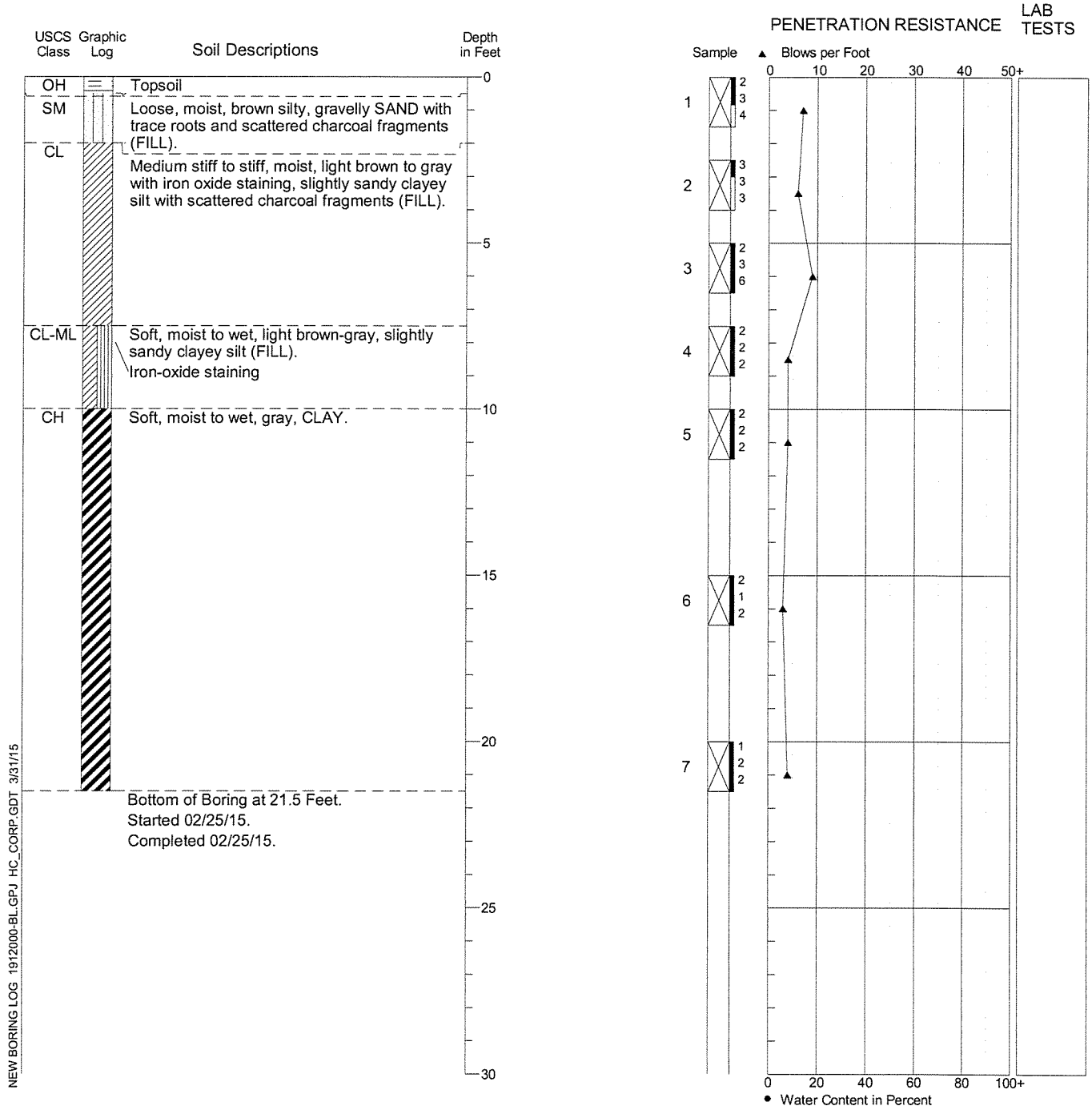
Figure A-1

KEY SHEET 1912000-BL.GPJ HC_CORP.GDT 3/27/15

Boring Log HC-1

Approx. Location: 47.581844, -122.235290
Approximate Ground Surface Elevation: 87
Horizontal Datum: WGS84
Vertical Datum: NAVD88

Drill Equipment: Bobcat Minitrack (MT55)
Hammer Type: SPT
Hole Diameter: 6.5 inches
Logged By: M. Smith Reviewed By: M. Veenstra



NEW BORING LOG 1912000-BL.GPJ HC_CORP.GDT 3/31/15

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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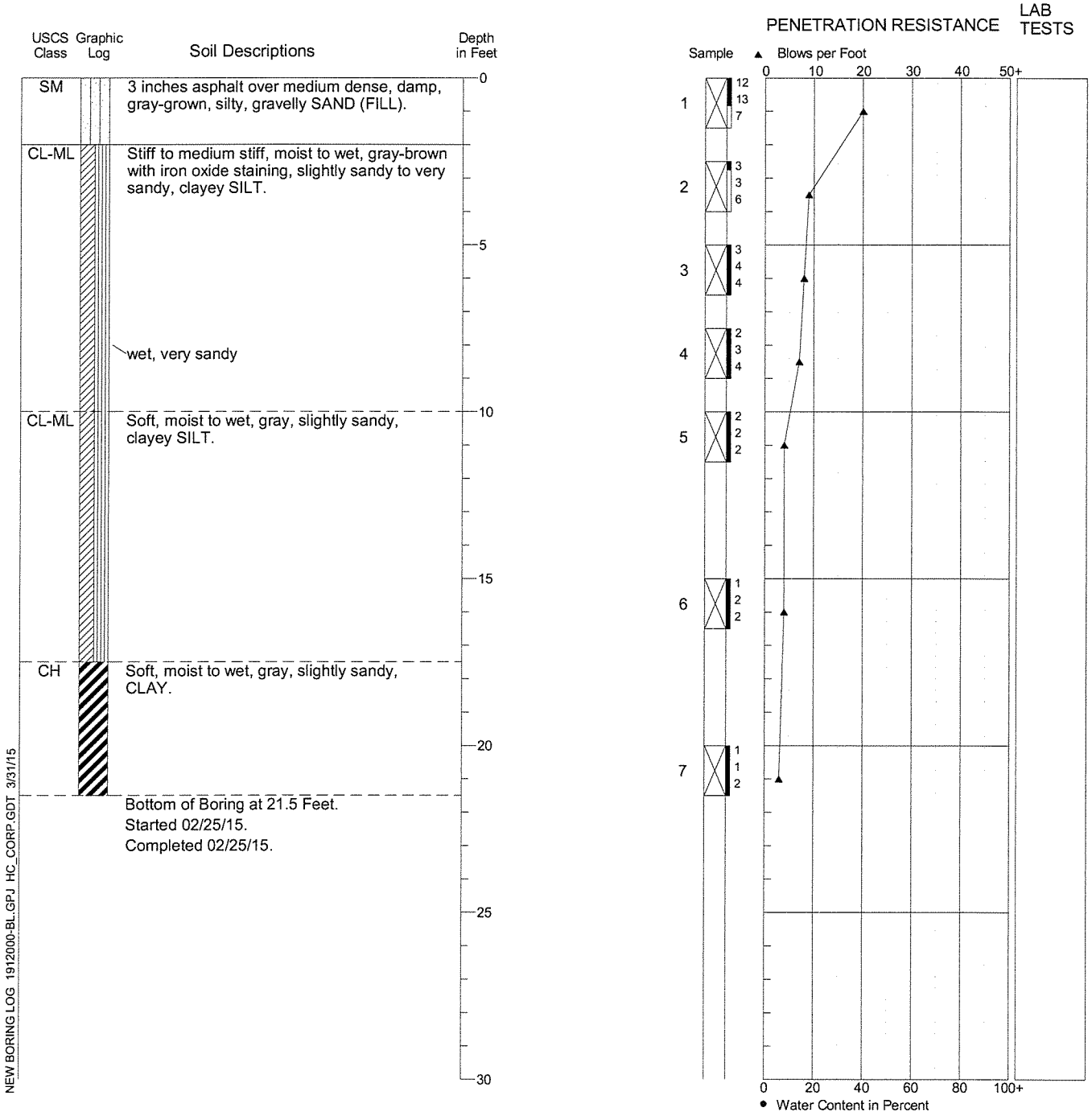
Figure A-2

Boring Log HC-2

Approx. Location: 47.581633, -122.235440
Approximate Ground Surface Elevation: 89
Horizontal Datum: WGS84
Vertical Datum: NAVD88

Drill Equipment: Bobcat Minitrack (MT55)
Hammer Type: SPT
Hole Diameter: 6.5 inches
Logged By: M. Smith Reviewed By: M. Veenstra



NEW BORING LOG 1912000-BL.GPJ HC_CORP.GDT 3/31/15

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
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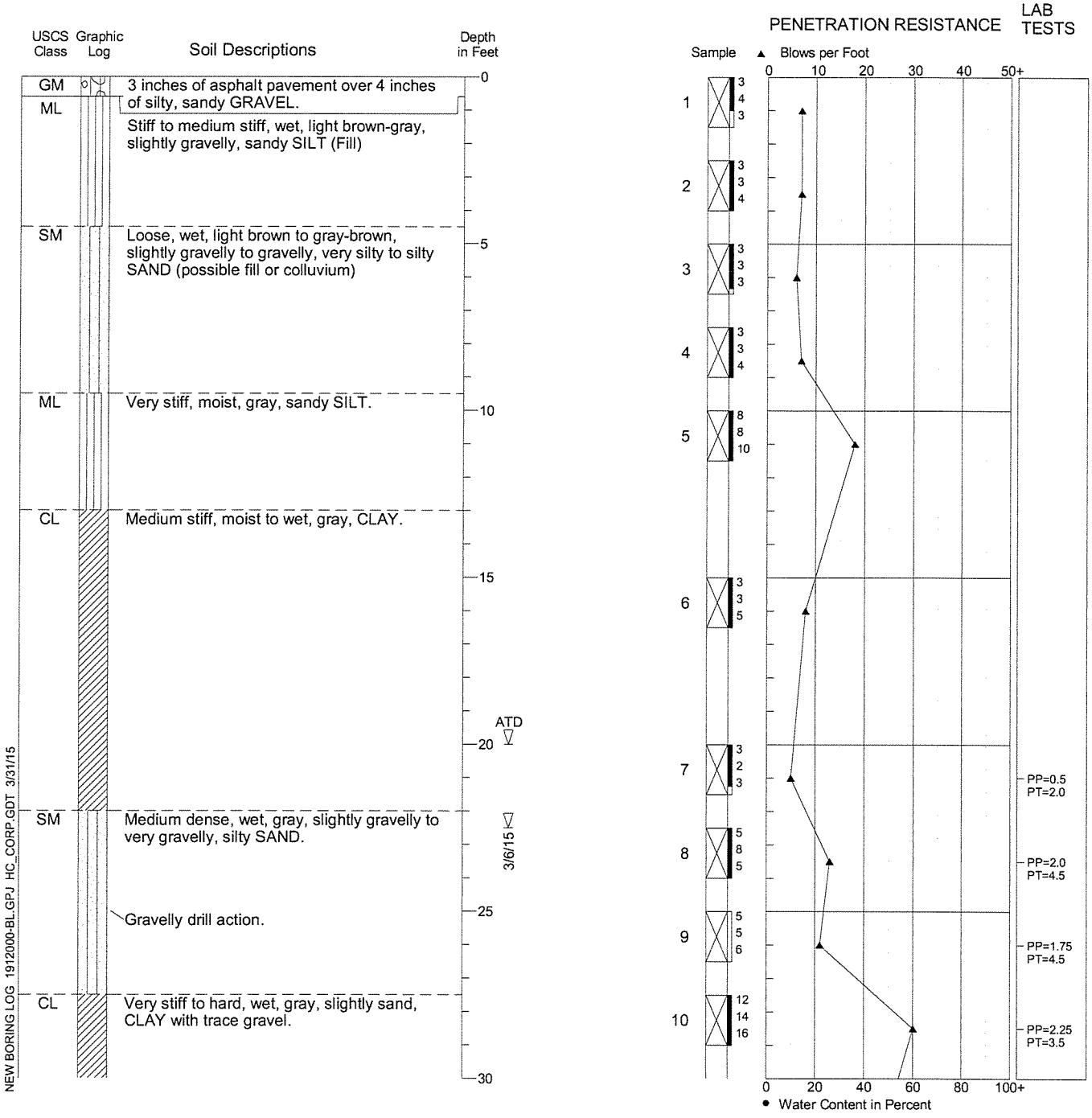
Figure A-3

Boring Log HC-3

Approx. Location: 47.581493, -122.235618
Approximate Ground Surface Elevation: 90
Horizontal Datum: WGS84
Vertical Datum: NAVD88

Drill Equipment: Bobcat Minitrack (MT55)
Hammer Type: SPT
Hole Diameter: 6.5 inches
Logged By: M. Smith Reviewed By: M. Veenstra



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

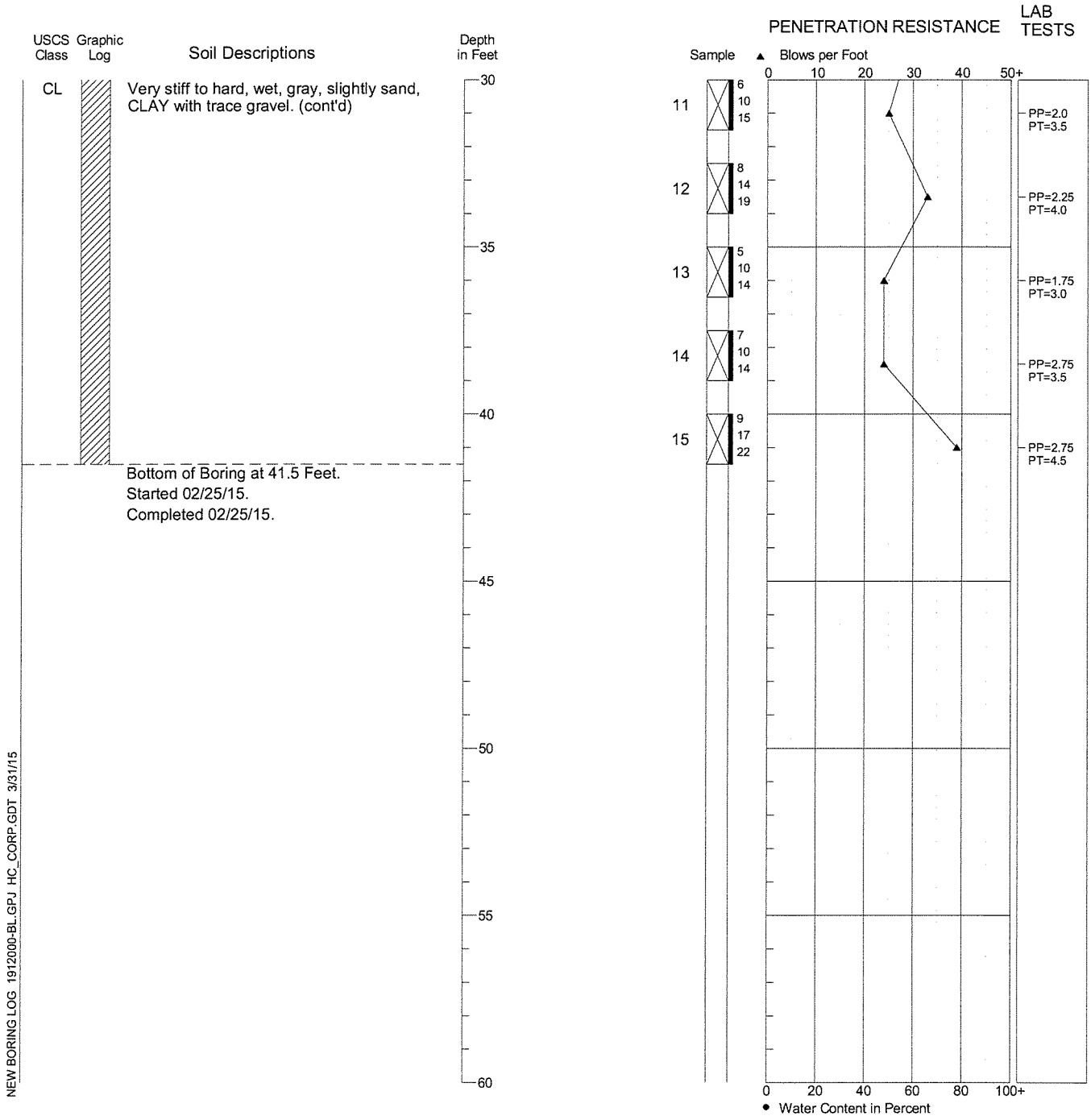
HARTCROWSER

19120-00 *2/15*
Figure A-4 *1/2*

Boring Log HC-3

Approx. Location: 47.581493, -122.235618
Approximate Ground Surface Elevation: 90
Horizontal Datum: WGS84
Vertical Datum: NAVD88

Drill Equipment: Bobcat Minitrack (MT55)
Hammer Type: SPT
Hole Diameter: 6.5 inches
Logged By: M. Smith Reviewed By: M. Veenstra



NEW BORING LOG 1912000-BL.GPJ HC_CORP.GDT 3/31/15

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

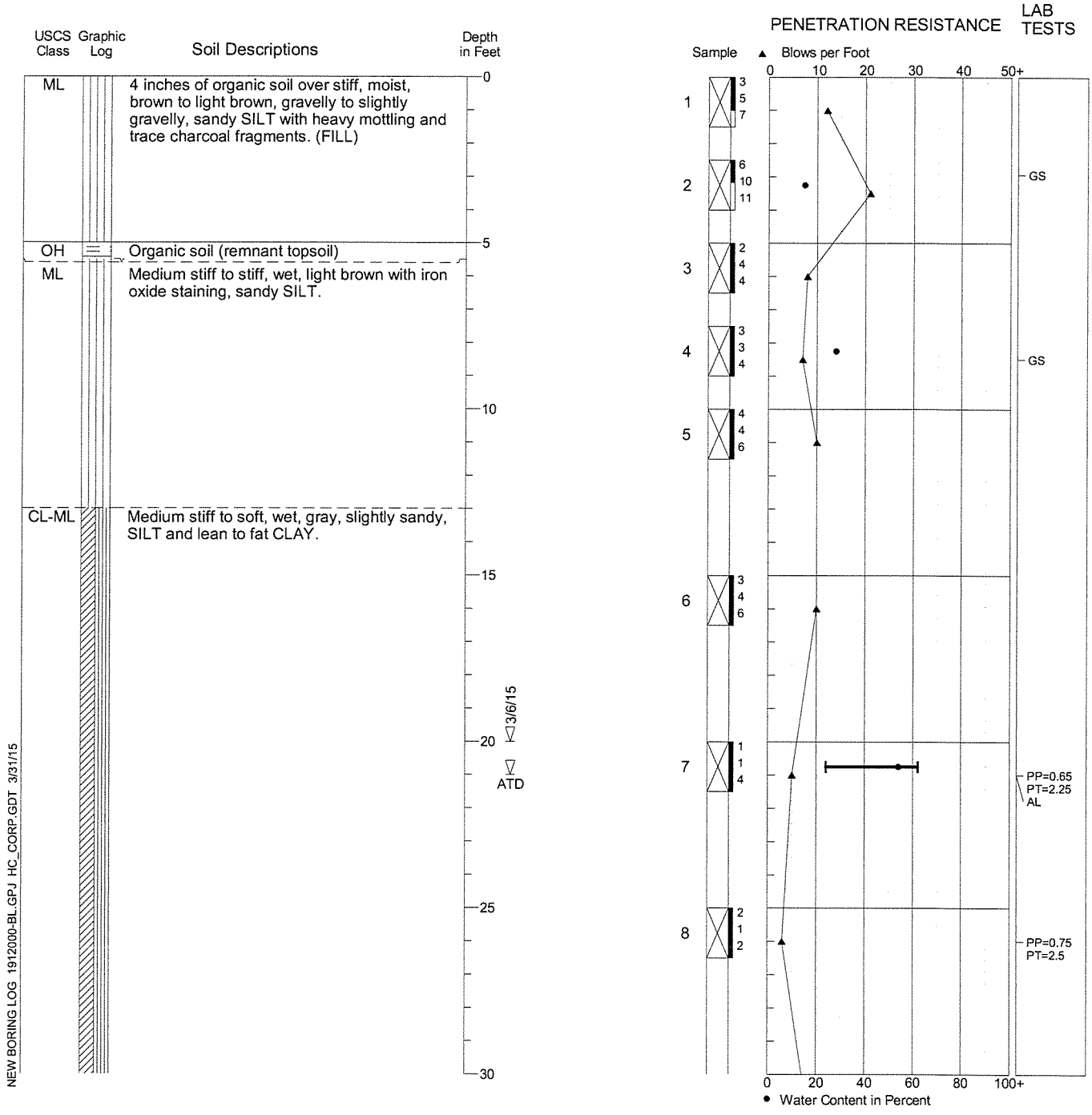
HARTCROWSER

19120-00 *2/15*
Figure A-4 *2/2*

Boring Log HC-4

Approx. Location: 47.581246, -122.235387
Approximate Ground Surface Elevation: 92
Horizontal Datum: WGS84
Vertical Datum: NAVD88

Drill Equipment: Bobcat Minitrack (MT55)
Hammer Type: SPT
Hole Diameter: 6.5 inches
Logged By: M. Smith Reviewed By: M. Veenstra



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

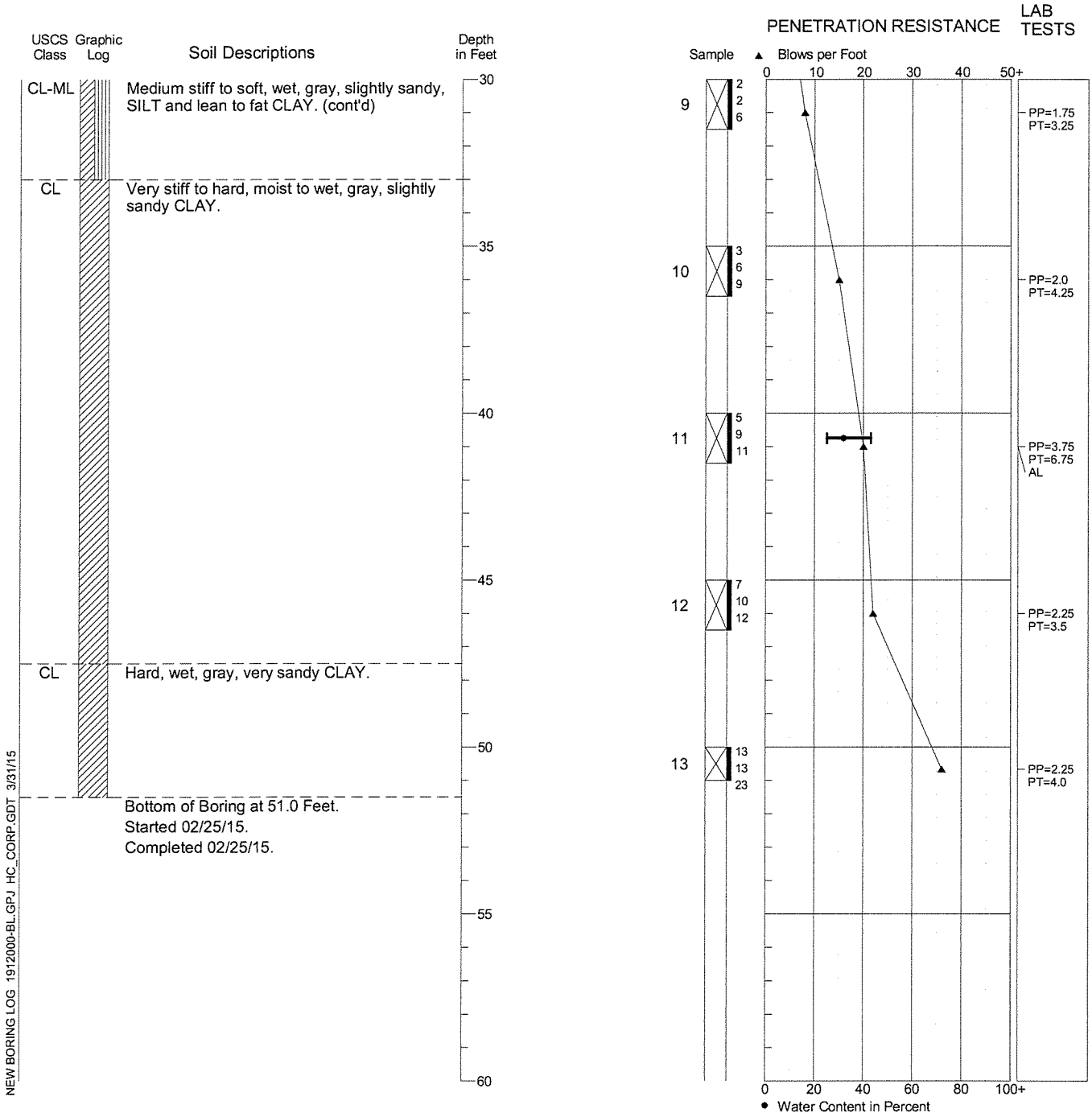
HARTCROWSER

19120-00 *2/15*
Figure A-5 *1/2*

Boring Log HC-4

Approx. Location: 47.581246, -122.235387
Approximate Ground Surface Elevation: 92
Horizontal Datum: WGS84
Vertical Datum: NAVD88

Drill Equipment: Bobcat Minitrack (MT55)
Hammer Type: SPT
Hole Diameter: 6.5 inches
Logged By: M. Smith Reviewed By: M. Veenstra



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

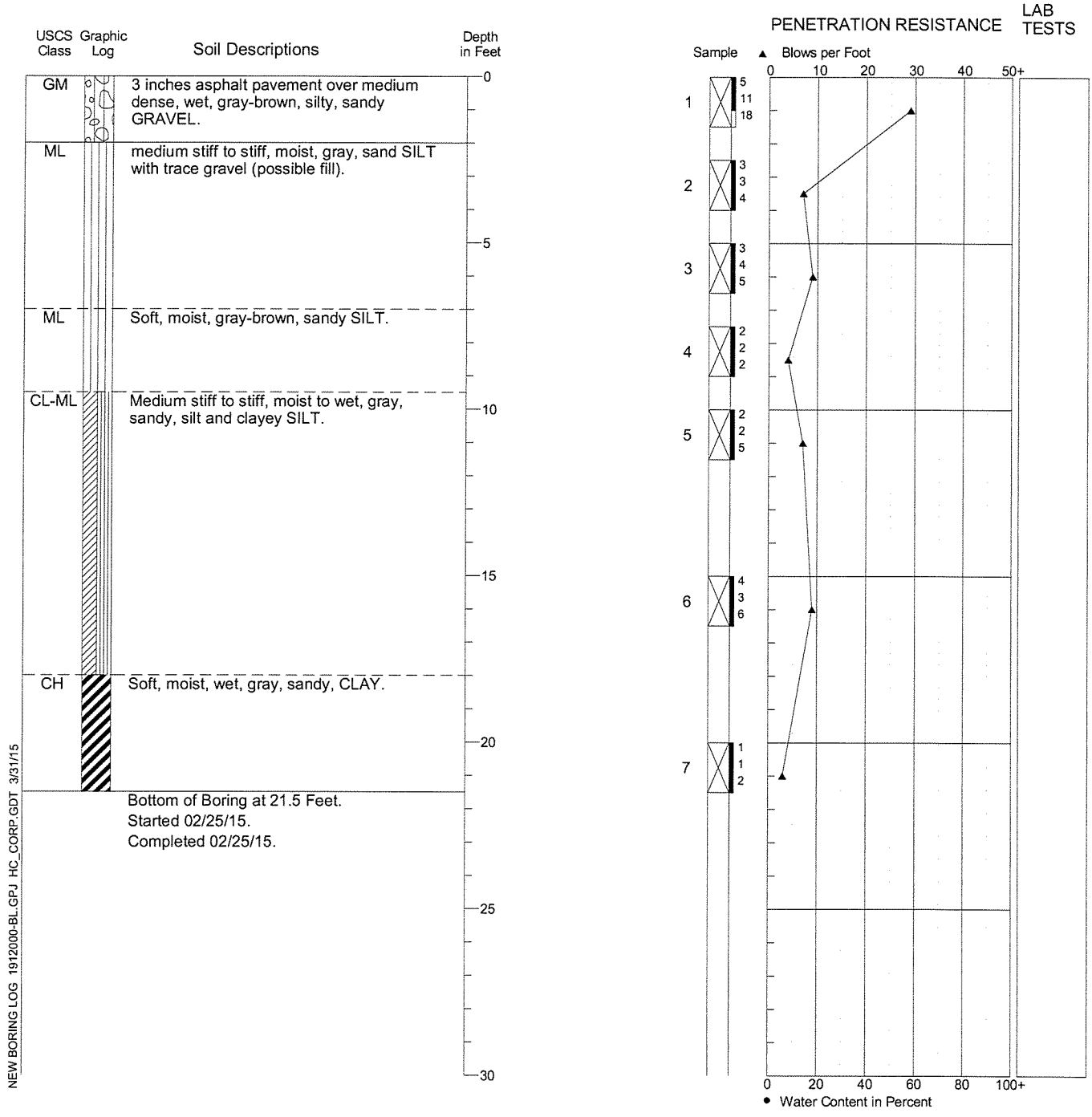
HARTCROWSER

19120-00 *2/15*
Figure A-5 *2/2*

Boring Log HC-5

Approx. Location: 47.581433, -122.235326
Approximate Ground Surface Elevation: 88
Horizontal Datum: WGS84
Vertical Datum: NAVD88

Drill Equipment: Bobcat Minitrack (MT55)
Hammer Type: SPT
Hole Diameter: 6.5 inches
Logged By: M. Smith Reviewed By: M. Veenstra



NEW BORING LOG 1912000-BL.GPJ HC_CORP.GDT 3/31/15

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

HARTCROWSER

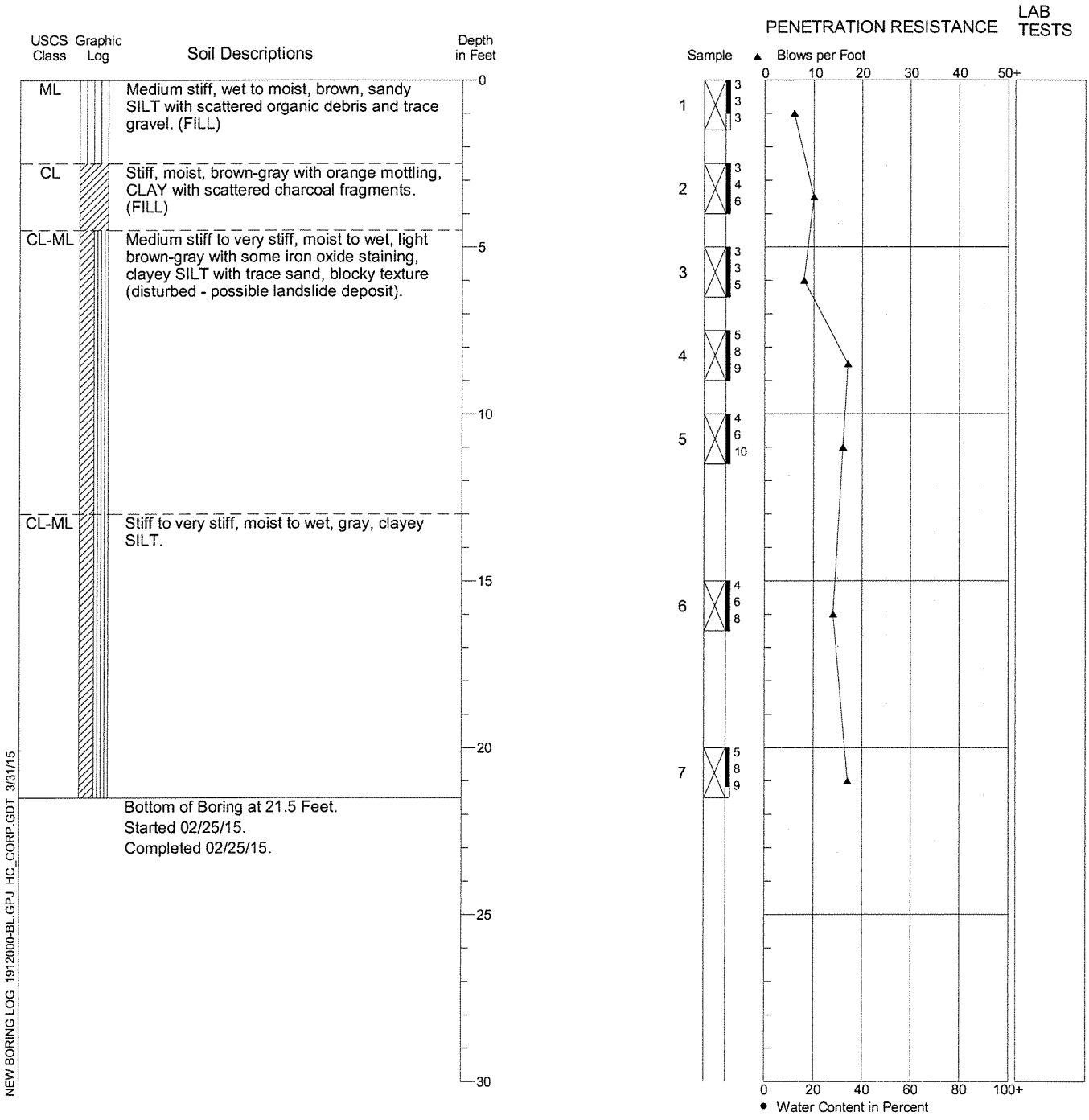
19120-00 *2/15*

Figure A-6

Boring Log HC-6

Approx. Location: 47.581256, -122.235803
Approximate Ground Surface Elevation: 99
Horizontal Datum: WGS84
Vertical Datum: NAVD88

Drill Equipment: Bobcat Minitrack (MT55)
Hammer Type: SPT
Hole Diameter: 6.5 inches
Logged By: M. Smith Reviewed By: M. Veenstra



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

HARTCROWSER

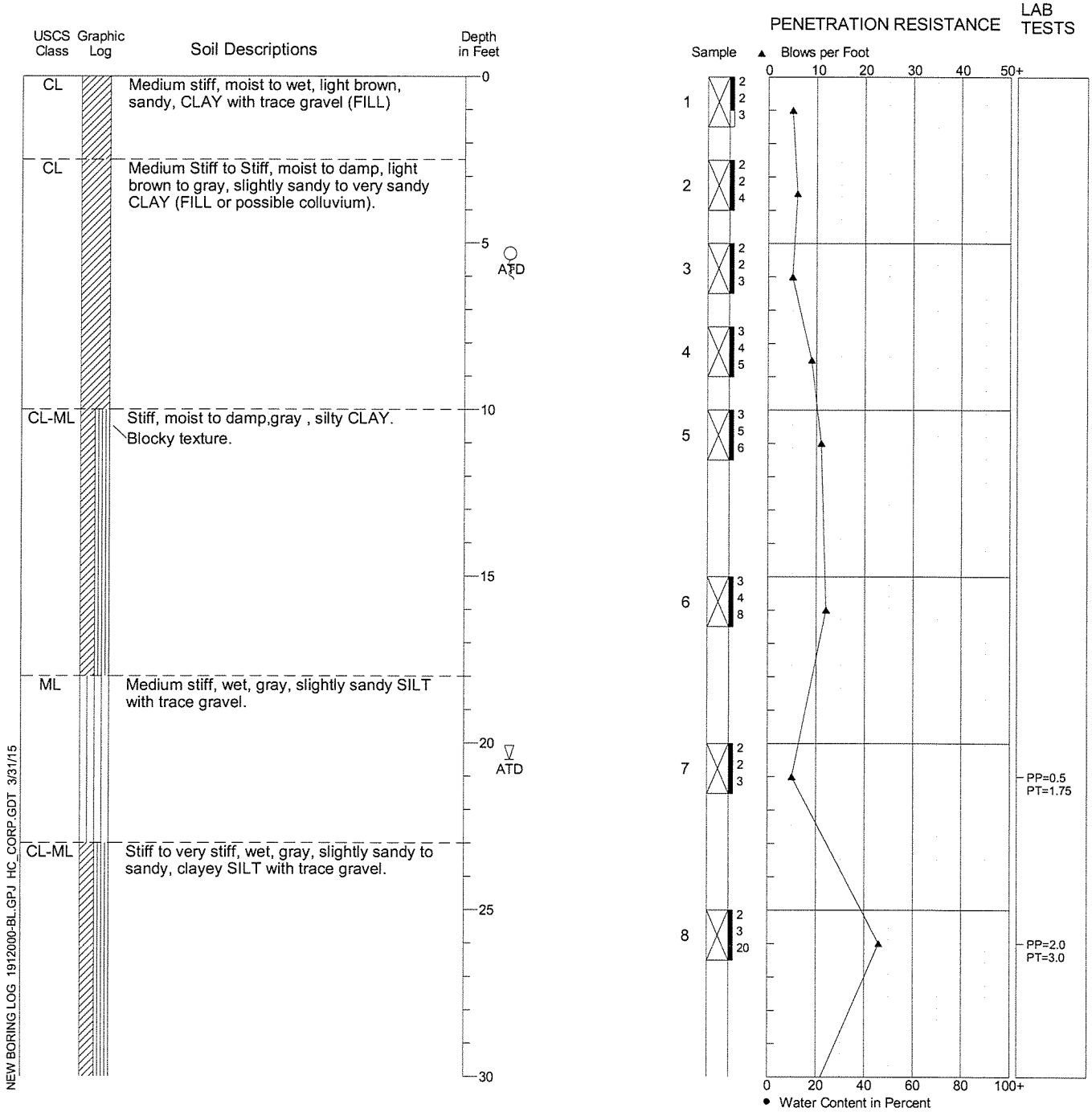
19120-00 *2/15*

Figure A-7

Boring Log HC-7

Approx. Location: 47.581010, -122.235996
Approximate Ground Surface Elevation: 93
Horizontal Datum: WGS84
Vertical Datum: NAVD88

Drill Equipment: Bobcat Minitrack (MT55)
Hammer Type: SPT
Hole Diameter: 6.5 inches
Logged By: M. Smith Reviewed By: M. Veenstra



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

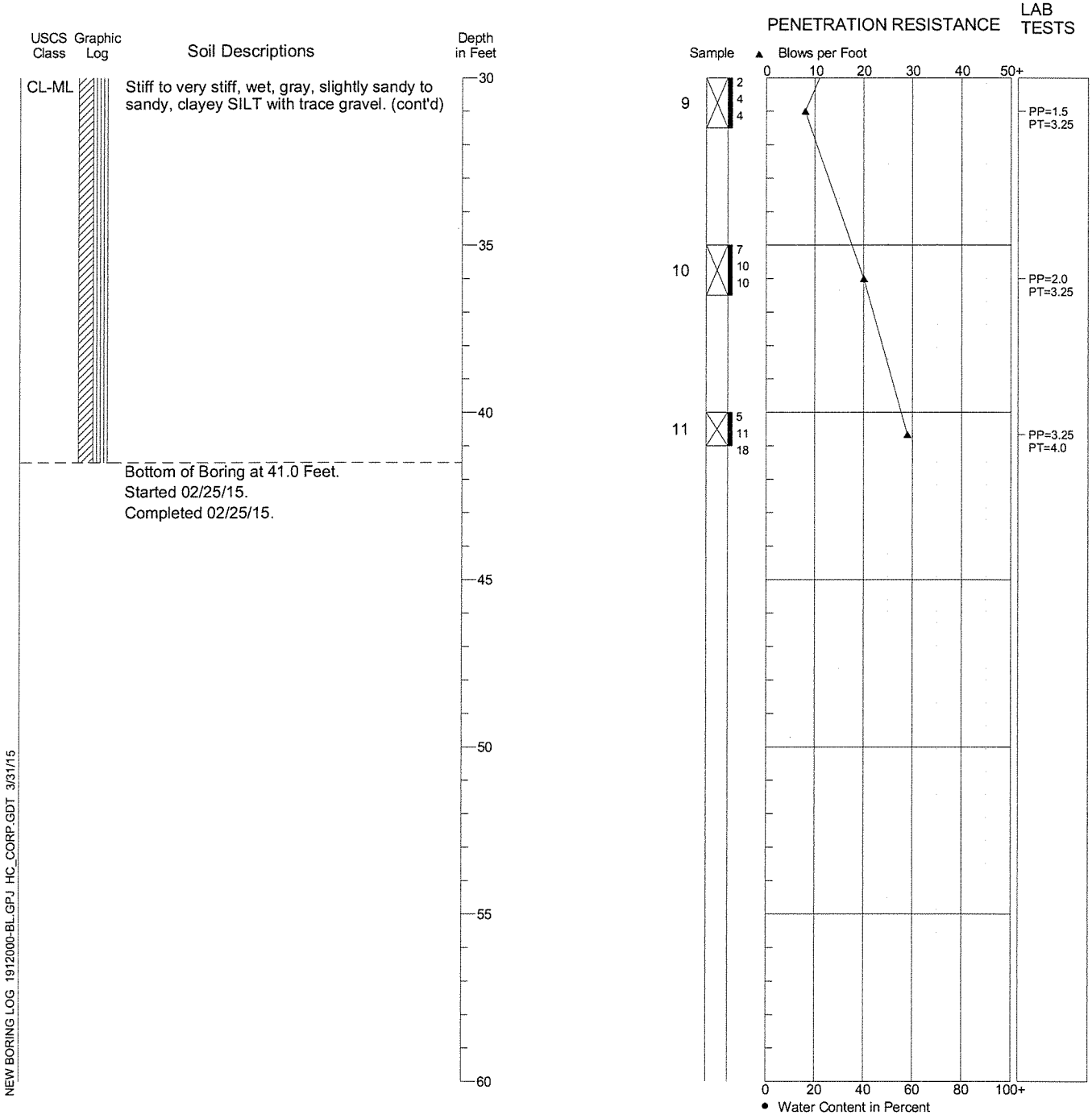
HARTCROWSER

19120-00 *2/15*
Figure A-8 *1/2*

Boring Log HC-7

Approx. Location: 47.581010, -122.235996
Approximate Ground Surface Elevation: 93
Horizontal Datum: WGS84
Vertical Datum: NAVD88

Drill Equipment: Bobcat Minitrack (MT55)
Hammer Type: SPT
Hole Diameter: 6.5 inches
Logged By: M. Smith Reviewed By: M. Veenstra



NEW BORING LOG 1912000-BL.GPJ HC_CORP.GDT 3/31/15

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

HARTCROWSER

19120-00 *2/15*
Figure A-8 *2/2*

APPENDIX B
Laboratory Testing Program

APPENDIX B

Laboratory Testing Program

A laboratory testing program was performed for this study to evaluate the basic index and geotechnical engineering properties of the site soils. Both disturbed and relatively undisturbed samples were tested. The tests performed and the procedures followed are outlined below.

Soil Classification

Soil samples from the explorations were visually classified in the field and then taken to our laboratory where the classifications were verified in a relatively controlled laboratory environment. Field and laboratory observations include density/consistency, moisture condition, and grain size and plasticity estimates.

The classifications of selected samples were checked by laboratory tests such as Atterberg limits determinations and grain size analysis. Classifications were made in general accordance with the Unified Soil Classification (USC) System, ASTM D 2487, as presented on Figure B-1.

Atterberg Limits

We determined Atterberg limits for selected fine-grained soil samples. The liquid limit and plastic limit were determined in general accordance with ASTM D4318-84. The results of the Atterberg limits analyses and the plasticity characteristics are summarized in the Liquid and Plastic Limits Test Report, Figures B-2 and B-3. This relates the plasticity index (liquid limit minus the plastic limit) to the liquid limit. The results of the Atterberg limits tests are shown graphically on the boring logs as well as where applicable on figures presenting various other test results.

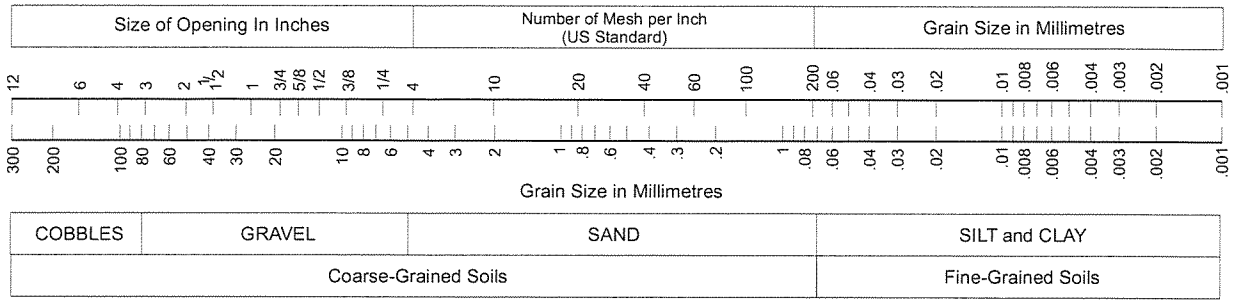
Grain Size Analysis

Grain size distribution was analyzed on representative samples in general accordance with ASTM D 422. Wet sieve analysis was used to determine the size distribution greater than the US No. 200 mesh sieve. The size distribution for particles smaller than the No. 200 mesh sieve was determined by the hydrometer method for a selected number of samples. The results of the tests are presented as curves plotting percent finer by weight versus grain size.

Water Content Determination

Water content was determined for several samples in general accordance with ASTM D 2216, as soon as possible following their arrival in our laboratory. Water content was not determined for very small samples or samples where large gravel content would result in unrepresentative values. The results of these tests are plotted at the respective sample depth on the exploration logs.

Unified Soil Classification (USC) System
Soil Grain Size



Coarse-Grained Soils

G W	G P	G M	G C	S W	S P	S M	S C
Clean GRAVEL <5% fines		GRAVEL with >12% fines		Clean SAND <5% fines		SAND with >12% fines	
GRAVEL >50% coarse fraction larger than No. 4				SAND >50% coarse fraction smaller than No. 4			
Coarse-Grained Soils >50% larger than No. 200 sieve							

G W and S W $\left(\frac{D_{60}}{D_{10}}\right)$ >4 for G W >6 for S W & $1 \leq \left(\frac{(D_{30})^2}{D_{10} \times D_{60}}\right) \leq 3$

G P and S P Clean GRAVEL or SAND not meeting requirements for G W and S W

G M and S M Atterberg limits below A line with PI <4

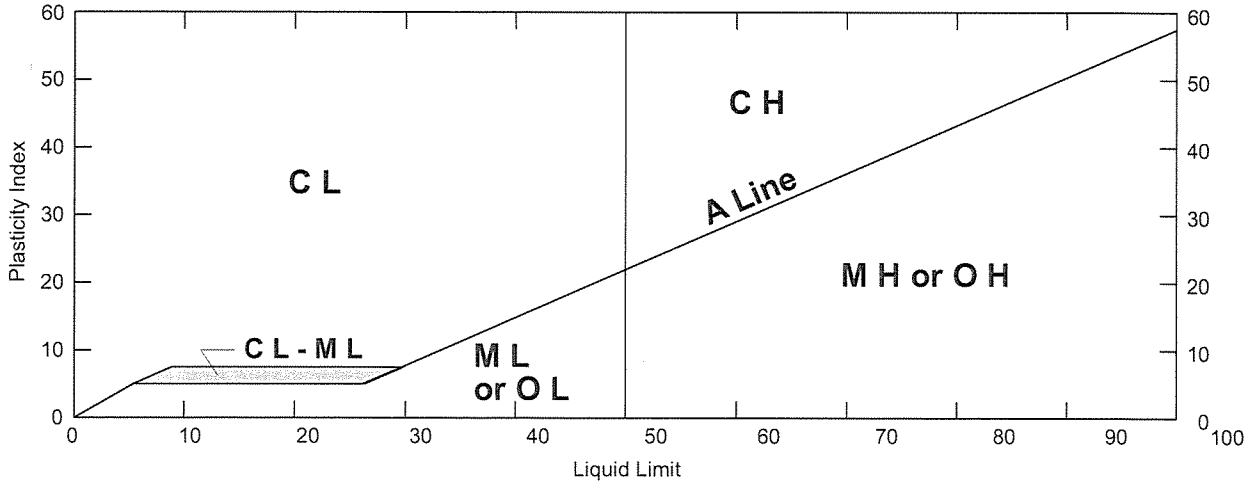
G C and S C Atterberg limits above A Line with PI >7

* Coarse-grained soils with percentage of fines between 5 and 12 are considered borderline cases requiring use of dual symbols.

D_{10}, D_{30}, and D_{60} are the particles diameter of which 10, 30, and 60 percent, respectively, of the soil weight are finer.

Fine-Grained Soils

M L	C L	O L	M H	C H	O H	Pt
SILT	CLAY	Organic	SILT	CLAY	Organic	Highly Organic Soils
Soils with Liquid Limit <50%			Soils with Liquid Limit >50%			
Fine-Grained Soils >50% smaller than No. 200 sieve						



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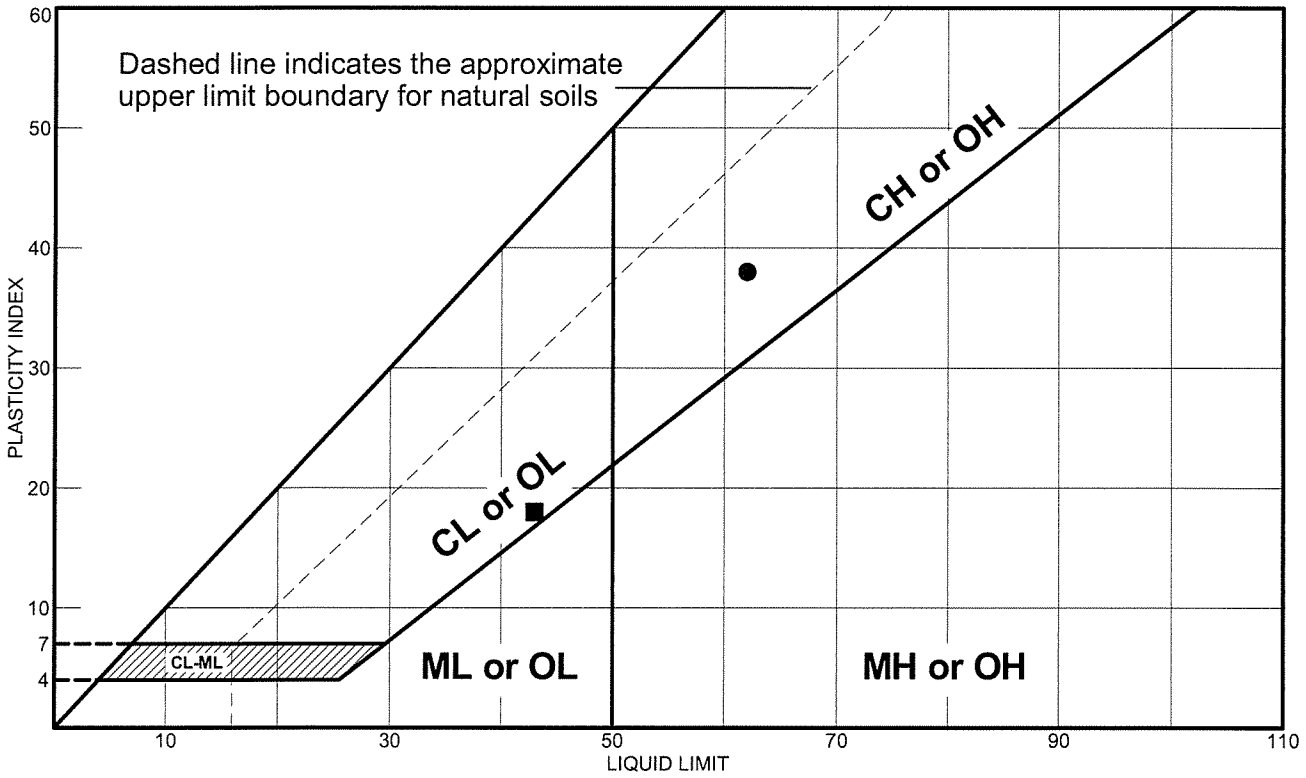
SRF Grain Size (B-1).cdr 3/06

19122-00 2/15

Figure B-1

Liquid and Plastic Limits Test Report



Location + Description	LL	PL	PI	-200	USCS
● Source: HC-4 Sample No.: 7 Depth: 20 Clay	62	24	38		CH
■ Source: HC-4 Sample No.: 11 Depth: 40 Clay	43	25	18		CL

Remarks:

●

■

Project: Mercer Island Center for the Arts

Client: Mercer Island Center for the Arts

Location: Mercer Island, WA

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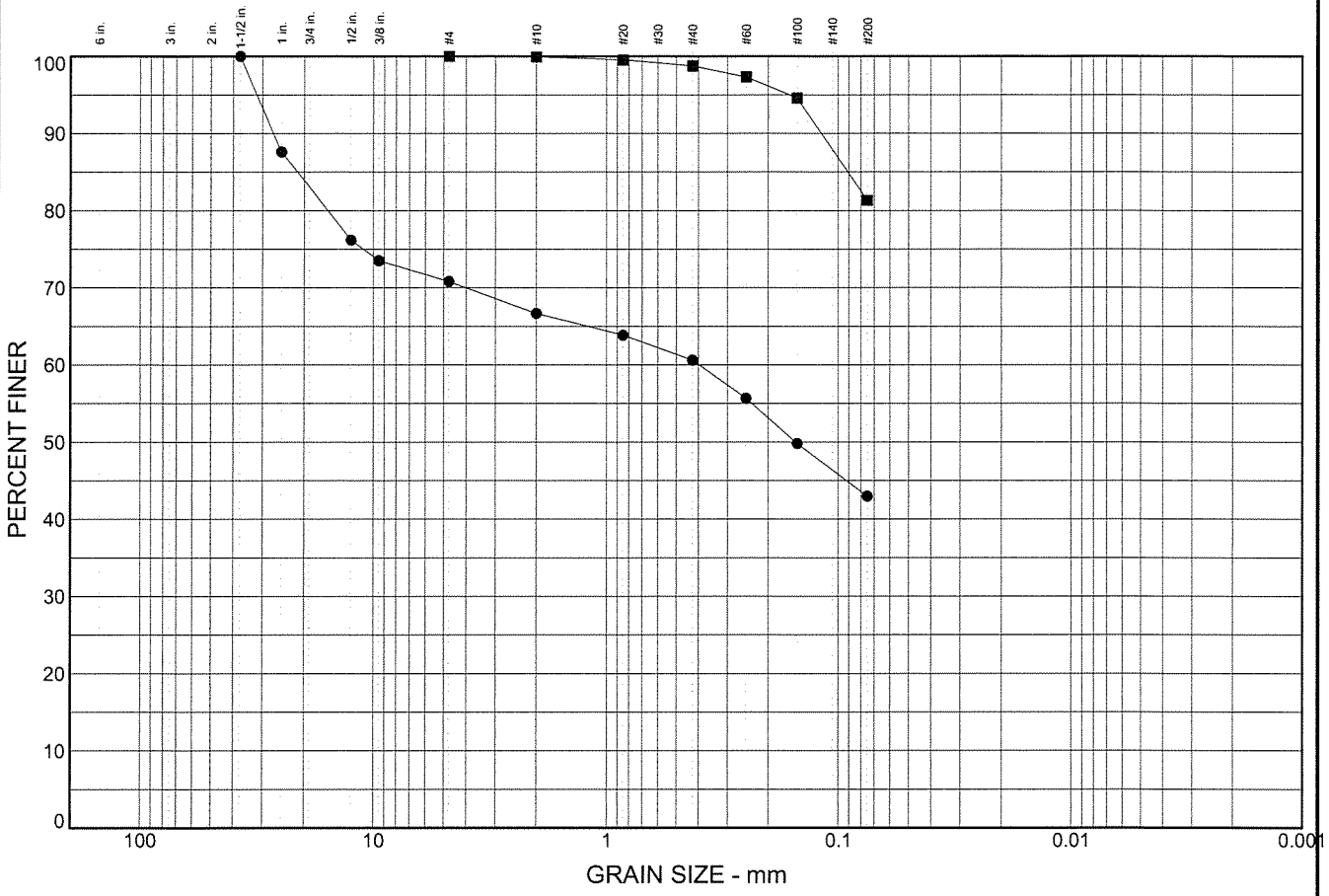
19120-00 *2/15*

Figure B- 2

ATTERBERG LIMITS 1912000-BL.GPJ HC_CORP.GDT 3/27/15

Particle Size Distribution Test Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	29.2	27.8	43.0	
■	0.0	0.0	18.7	81.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			21.324	0.398	0.152					
■			0.091							

MATERIAL DESCRIPTION	USCS	NAT. MOIST.
● sandy clayey GRAVEL	GC	14.8%
■ sandy SILT	ML	27.9%

Remarks:

●

■

Project: Mercer Island Center for the Arts

Client: Mercer Island Center for the Arts

● Source: HC-4 Sample No.: 2 Depth: 2.5 to 4.0

■ Source: HC-4 Sample No.: 4 Depth: 7.5 to 9.0

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Figure B-3

GRAIN SIZE 1912000-BL.GPJ HC_CORP.GDT 3/27/15

APPENDIX C
Historical Explorations

Historical Explorations

Historical exploration logs are included in this appendix as follows:

Hart Crowser 1980. Design Phase Subsurface Explorations and Geotechnical Engineering Study, Proposed Office Building And Parking Structure for Farmers New World Life Insurance Company, Mercer Island, Washington. January 4, 1980. J-857-01.

Shannon & Wilson 1985. Preliminary Geotechnical Report, Mercer Island Civic Center, Mercer Island, Washington. August, 1985. Partial report accessed from the DNR Subsurface Geology Information System, Document ID 13758, https://fortress.wa.gov/dnr/geology.

Logs and test reports by others are included as they were produced by others for reference only and Hart Crowser is not responsible for the accuracy or completeness of the information presented in the logs. Approximate locations of the explorations by others are shown on Figure 2; actual locations may differ from those shown.

Area: Mercer Island

Status:

DocID 13758

Source: City of Mercer Island DSG-Archive

Local ID#: 8978

Local ID#2:

Site Address 3249 78th Ave SE

Date Copied: 11/3/04 By: PTI

- [x] **Title page with the following information:**
  - *Company (Author) name*
  - *Report date*
  - *Project Name*
  - *Company's job number*
  - *Site address*
- [x] Executive Summary / Introduction of the report
- [x] Table of contents
- [x] Project Location Map / Vicinity Map
- [x] **Site / Exploration Plans, Boring Location Plans**
- [x] Cross-sections / Subsurface profiles
- [x] **Exploration Logs**
- [ ] Monitoring Well Logs
- [ ] Cone Penetrometer Logs
- [ ] Groundwater Elevation Tables / Data

- [ ] Includes data from Previous Reports
- [ ] No new data /data review
- [ ] Missing Data / Illegible Data
  Explanation _____

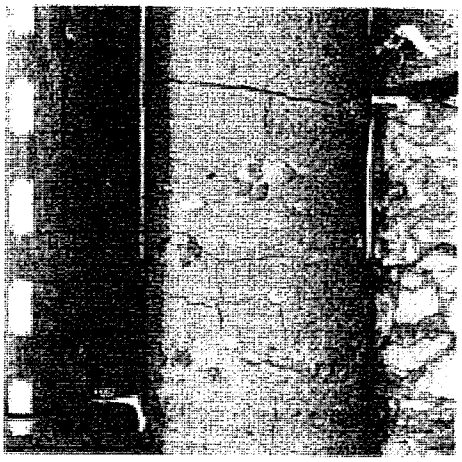
Comments: _____

City Hall construction Bot 3 of 4

ArcView RW Layers RW

Checked RW Checked AF

Preliminary Geotechnical Report
Mercer Island Civic Center
Mercer Island, Washington

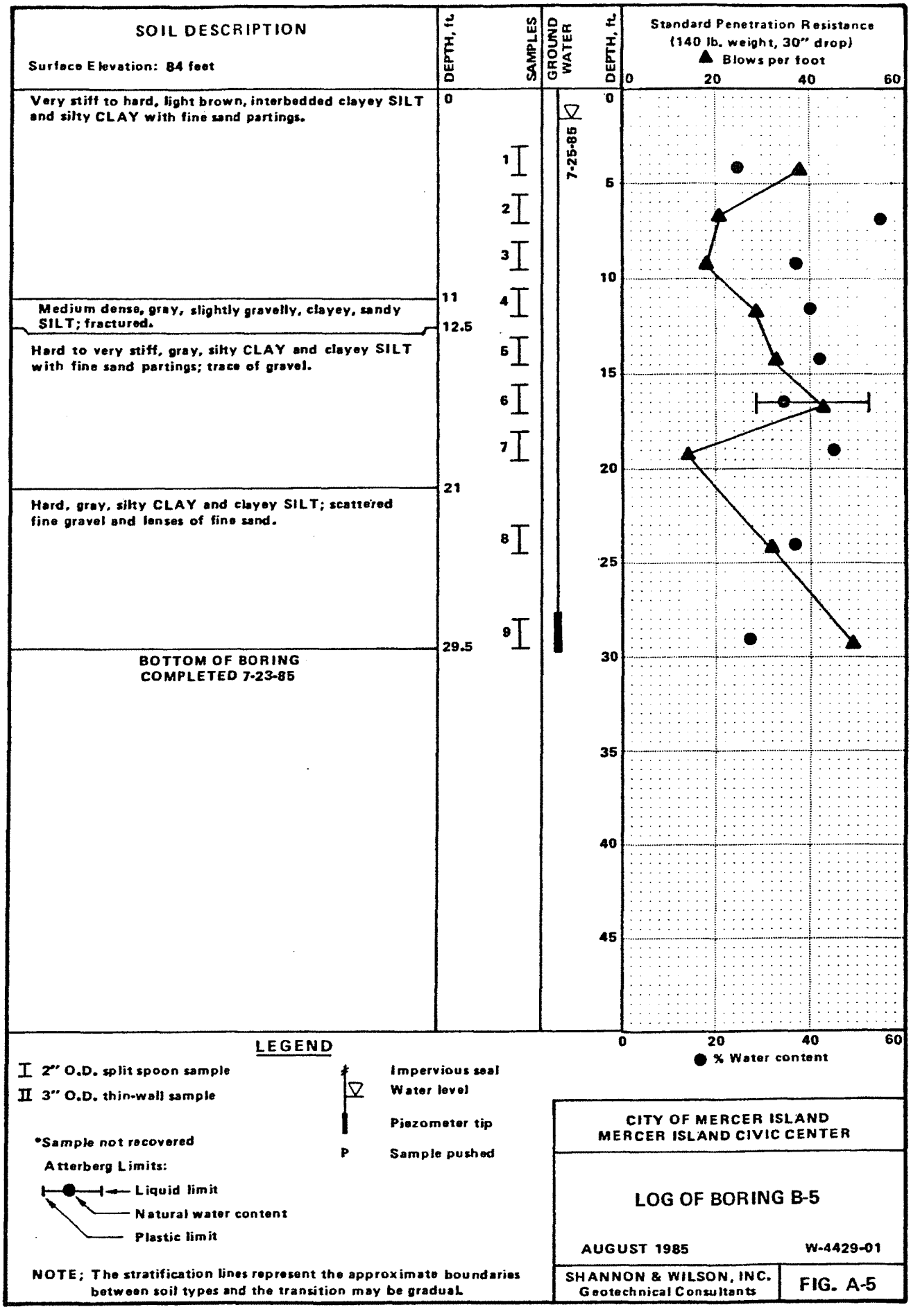


City of Mercer Island
3505 88th Avenue S.E.
Mercer Island, Washington 98040

August 1985

SHANNON & WILSON, INC.

W-4429-01


SOIL DESCRIPTION
Surface Elevation: 84 feet
DEPTH, ft.
SAMPLES
GROUND WATER
DEPTH, ft.
Standard Penetration Resistance
(140 lb. weight, 30" drop)
Blows per foot
0
20
40
60
Very stiff to hard, light brown, interbedded clayey SILT and silty CLAY with fine sand partings.
0
1
2
3
7-25-85
11
Medium dense, gray, slightly gravelly, clayey, sandy SILT; fractured.
12.5
4
5
Hard to very stiff, gray, silty CLAY and clayey SILT with fine sand partings; trace of gravel.
6
7
21
Hard, gray, silty CLAY and clayey SILT; scattered fine gravel and lenses of fine sand.
8
9
29.5
BOTTOM OF BORING
COMPLETED 7-23-85
5
10
15
20
25
30
35
40
45
% Water content
LEGEND
2" O.D. split spoon sample
3" O.D. thin-wall sample
*Sample not recovered
Atterberg Limits:
Liquid limit
Natural water content
Plastic limit
Impervious seal
Water level
Piezometer tip
P
Sample pushed
NOTE; The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.
CITY OF MERCER ISLAND
MERCER ISLAND CIVIC CENTER
LOG OF BORING B-5
AUGUST 1985
W-4429-01
SHANNON & WILSON, INC.
Geotechnical Consultants
FIG. A-5

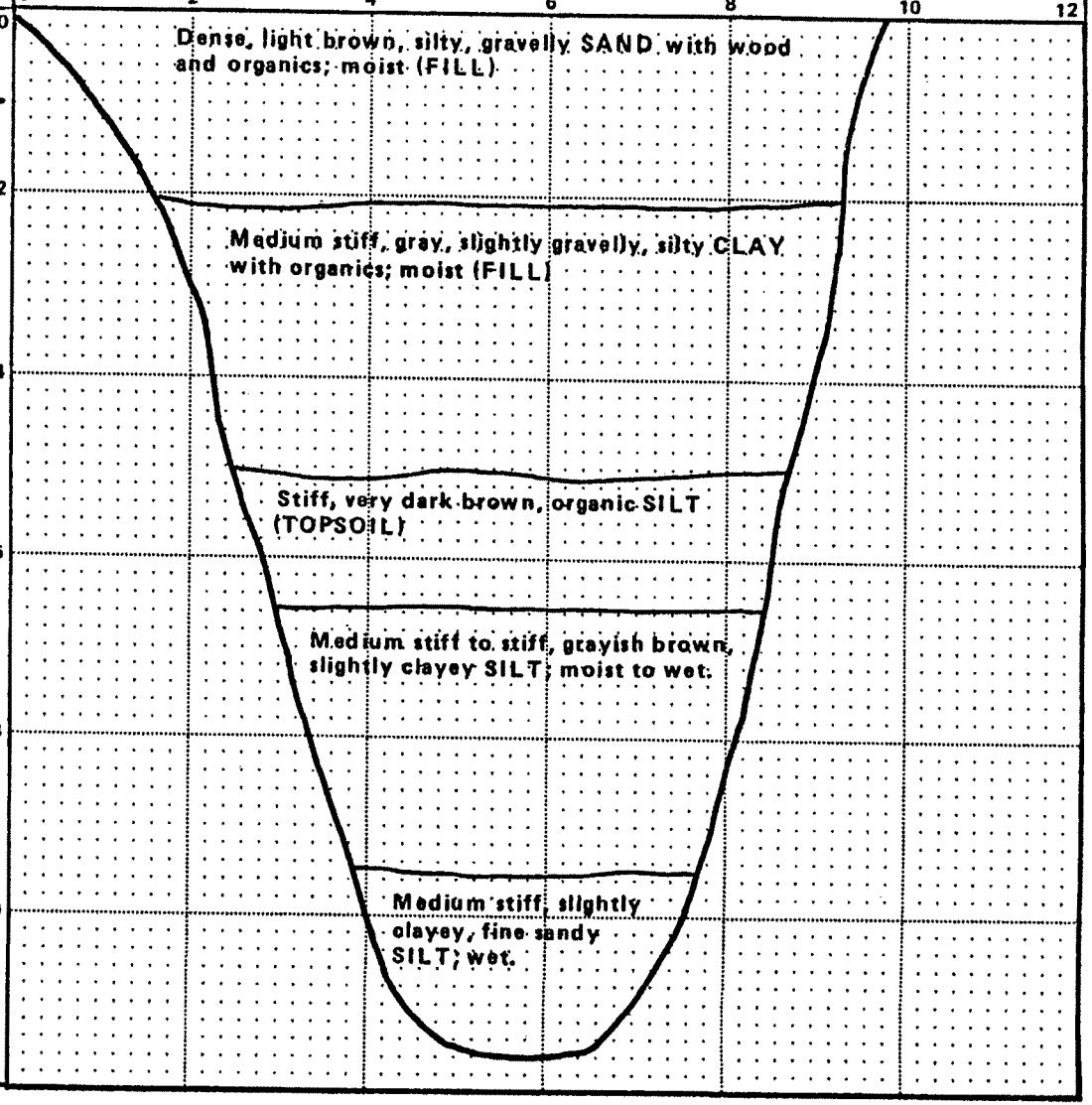
SHANNON & WILSON, INC.
Geotechnical Consultants

JOB NO. W-4429-01 DATE 7-19-85 LOCATION NW CORNER

PROJECT CITY OF MERCER ISLAND, MERCER ISLAND CIVIC CENTER

LOG OF TEST PIT TP-1

SKETCH OF SOUTH PIT SIDE SURFACE ELEVATION: 88 FEET



REMARKS	Moisture Content %	Ground Water	Samples
	8.8	NONE OBSERVED	S-1
	23.5		S-2, B-2
LIQUID LIMIT = 32 PLASTIC LIMIT = 26 PLASTICITY INDEX = 6	32.3		S-3
DILATANT	29.2		S-4

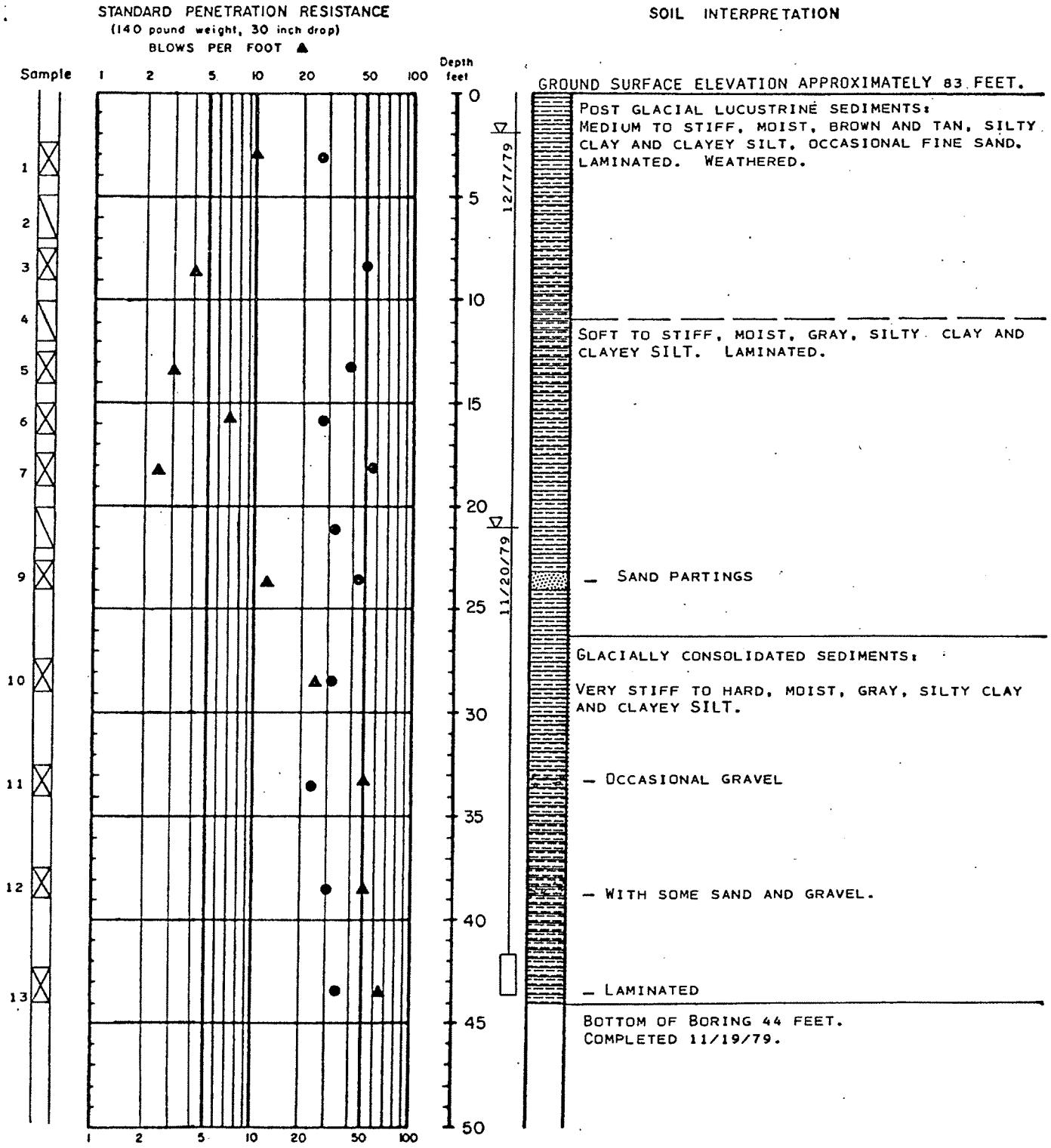
FIG. A-6

DESIGN PHASE SUBSURFACE EXPLORATIONS AND GEOTECHNICAL ENGINEERING STUDY
PROPOSED OFFICE BUILDING AND PARKING STRUCTURE FOR FARMERS NEW WORLD LIFE INSURANCE COMPANY
MERCER ISLAND, WASHINGTON

J-857-01

HART CROWSER & associates inc.
GEOTECHNICAL ENGINEERING

BORING LOG B-5



LEGEND

- ⊠ 2" O.D. Split Spoon Sample
- ▨ 3" O.D. Shelby Sample
- ★ No Sample Recovery
- ▽ Water Level
- ▯ Observation Well

NOTE: Soil descriptions are interpretive and actual changes may be gradual.

J-857-01 December 1979

HART-CROWSER & associates inc.

Figure A-9

Draft SEPA Environmental Checklist
Mercer Island Center for the Arts

Attachment D
Supplemental Memorandum,
Hart Crowser, May 6, 2015

February 2, 2016

MEMORANDUM

DATE: May 6, 2015

TO: Katie Oman, Mercer Island Center for the Arts

FROM: David Winter, PE, and Matt Veenstra, PE

RE: **Design Memorandum – Supplemental**
Mercer Island Center for the Arts
Mercer Island, Washington
19120-00

CC: Matt Jones, MKA

As the project evolves, additional geotechnical design criteria have been developed to supplement the recommendations in our March 31, 2015, report.

We understand that the current plans call for a fire lane to be built behind the back wall of the building. As a result, the shoring wall installed to allow excavation into the hillside and construction of the lowest level at elevation 90 feet will need to be designed as a permanent wall. This requires the following modifications to the design.

- Permanent tieback anchors must include corrosion protection.
- Pullout capacities for permanent anchors are estimated using a factor of safety of 2.5 (instead of 2.0 for temporary anchors). For Soil Units 1 and 2 the estimated allowable capacity is 0.8 kips per foot. For Soil Unit 3 the estimated allowable capacity is 2.4 kips per foot. The actual allowable capacity will need to be confirmed using field load testing.
- The first two permanent anchors should be tested using the supplementary extended creep tests described in section 8.3.4 of the Recommendations for Prestressed Rock and Soil Anchors (PTI 2004).
- Soil pressures on the permanent wall are the same as in Figures 5 and 6 of the geotechnical report (Hart Crowser 2015).

1700 Westlake Avenue North, Suite 200
Seattle, Washington 98109-5212
Fax 206.328.5581
Tel 206.324.9530

- In order to avoid hydrostatic pressures, we recommend installing weep holes between the soldier piles at 1 and 6 feet above the base of the wall. The weep holes should be fitted with a 3-inch-diameter slotted pipe extending into the soil. Water from the weep holes should be channeled at the base of the wall with a curb and routed to a suitable discharge point. Alternatively, waffle drain material can be installed behind the permanent facing of the wall and an outlet into a drain pipe at the base of the wall. As another alternative, if the wall facing will simply be treated lagging boards, then the wall will likely be permeable enough without the addition of drainage sheets.

Additional supplemental design recommendations include the following:

- Design the lowest level floor slab as a structural slab. All other recommendations regarding underslab drainage and construction from page 15 of the report will apply.

- According to the Mercer Island Design Code, the frost penetration depth is 12 inches. We recommend that any footings for temporary or permanent structures be embedded at least 18 inches below the adjacent site grade, or well below the frost level.

- Underslab drains are typically 3- or 4- inch-diameter slotted flexible pipe or rigid perforated pipe. The pipes may be wrapped in filter fabric or placed in a trench 12 inches wide and deep and lined with non-woven filter fabric such as Mirafi 140N or better. We have not calculated the potential flows into an underslab drainage system, but we expect the flow to be less than 30 gallons per minute.

- Shallow spread footings are not recommended for occupied building structures or other settlement sensitive structures. For support of small, lightly loaded facilities, we recommend placing footings on structural fill. The structural fill should extend 2 feet below the base of the footing and laterally 2 feet beyond the outer edges of the footing. Structural fill should be surrounded by a woven geotextile such as Mirafi HP370 or better. Structural fill should be compacted to a minimum of 95 percent of the modified Proctor maximum dry density. If compaction causes excessive subgrade disturbance, the first 1.5 feet of structural should consist of quarry spalls or similar angular rock that can be tamped into placed and will provide adequate subgrade for compaction of overlying structural fill. If constructed as described, the footing may be designed for an allowable vertical bearing capacity of 2,000 psf. Calculate the lateral sliding resistance using a coefficient of friction of 0.35 for footings bearing on granular structural fill. Lateral bearing pressure for footings bearing against Soil Units 1 and 2 may be calculated using a triangular, passive earth pressure distribution of 100 psf/foot below grade. Ignore passive earth pressure in the upper 2 feet unless the ground surface is protected by pavement or concrete floor slabs.

Subgrade Recommendations for Pre-Manufactured Permeable Pavers

- Permeable pavers are a proprietary product, follow the manufacturer's recommendations for design and installation.
- We recommend the minimum subgrade sections in Table 1 for all types of permeable pavers.

Table 1 – Subgrade Sections for Permeable Pavers

Loading Type	Sub-base Geotextile	Sub-base	Base Course
Pedestrian	Mirafi 160N or better	N/A	12 inches of COS Type 1 (3/4" Minus Crushed Gravel)
Light passenger vehicles	Mirafi HP370 or better	12 inches of COS Type 1 (3/4" Minus Crushed Gravel)	6 inches of COS Type 1 (3/4" Minus Crushed Gravel)
Heavy vehicles	Mirafi RS280i or better	18 inches of COS Type 1 (3/4" Minus Crushed Gravel)	6 inches of COS Type 1 (3/4" Minus Crushed Gravel)

- Reinforcing geotextile should be placed on relatively undisturbed native soil. Construction traffic should not be allowed on native soil subgrade beyond what is necessary for excavation prior to backfilling.
- For pedestrian areas, the gravel backfill should be placed in a single lift and compacted to at least 90 percent of maximum dry density.
- For light vehicle sections the sub-base should be placed in a single lift and compacted to at least 90 percent of maximum dry density. The base course should be compacted to 95 percent of maximum dry density.
- For heavy vehicle sections, the sub-base should be placed in a single lift and the upper 12 inches compacted to at least 92 percent of maximum dry density. The base course should be compacted to 95 percent of maximum dry density.
- Vibratory compaction should not be allowed unless it is demonstrated to not degrade the native subgrade (e.g. cause subgrade pumping).
- Note that nuclear density tests may not provide reliable results in gravelly backfill. Hart Crowser may elect to evaluate adequacy of backfill compaction by visual inspection and proof rolling.
- Just prior to placing Grasspave pavers, the prepared subgrade should be proof-rolled using a loaded dump truck or similar equipment. The proof roll must be observed by a Hart Crowser representative.

- If drain pipes are placed within the sub-base, the drain pipes should be wrapped in geotextile filter fabric such as Mirafi 160N or better and placed at least 12 inches below light wheel loads and at least 18 inches below heavy wheel loads.

Note that the native subgrade soils are silt and clay and have very low infiltration capacity such that storm water infiltration into the native soils is not practical. Any water that infiltrates the pavers will be confined within the underlying gravel backfill and will need to be drained. The choice of gravel backfill will influence how much water is stored and how quickly water reaches the drain pipes. A more poorly-graded backfill than that recommended in Table 1 may be desirable if rapid infiltration to a drain pipe is desired.

L:\Notebooks\1912000_MI Center for the Arts\Deliverables\Memos\Supplemental\MI Arts Supplemental Memo.docx

Draft SEPA Environmental Checklist
Mercer Island Center for the Arts

Attachment E
Wetland Delineation Report,
Mercer Island Center for the Arts,
The Watershed Company. May 21, 2015

and
Supplemental Regulatory Evaluation,
September 11, 2015.

February 2, 2016

THE WATERSHED COMPANY

SCIENCE & DESIGN

May 21, 2015

Mercer Island Center for the Arts
Attn: Louise Kincaid
Executive Director
Via email: koman@ams-online.com

Re: Mercer Island Center for the Arts Wetland Delineation Study
The Watershed Company Reference Number: 150320

Dear Katie:

On May 7, 2015 Ecologist Ryan Kahlo and I completed a wetland delineation study at the site of the proposed Mercer Island Center for the Arts (MICA) at Mercerdale Park located at 77th SE & SE 32nd Street (parcel # 1224049068) in the City of Mercer Island. The purpose of this study is to determine the jurisdictional boundary, size, classification, and associated buffer widths of Wetland A identified in the study area during a reconnaissance-level site investigation.

This letter summarizes the findings of this study and details applicable federal, state, and local regulations. The following attachments are included:

- Wetland Delineation Sketch
- Wetland Determination Data Forms
- Wetland Rating Forms

Methods

Public-domain information on the subject property was reviewed for this delineation study. These sources include USDA Natural Resources Conservation Service Soil maps, National Wetland Inventory maps, Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species interactive mapping system (PHS on the Web), King County's GIS mapping website (iMAP), and Mercer Island's GIS mapping website (Mercer Island GIS Portal).

The study area was evaluated for wetlands using methodology from the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region Version 2.0* (Regional Supplement) (US Army Corps of Engineers [Corps] May 2010). Wetland boundaries were determined on the basis of an examination of vegetation, soils, and hydrology. Areas meeting the criteria set forth in the Regional Supplement were determined to be wetland. Soil, vegetation, and

750 Sixth Street South | Kirkland, WA 98033
p 425.822.5242 | f 425.827.8136 | watershedco.com

hydrologic parameters were sampled at several locations along the wetland boundaries to make the determination. Data points on-site are marked with yellow- and black-striped flags. Data were recorded at three of these locations.

Areas meeting wetland parameters were marked with pink- and black-striped flags. The boundary of the South Wetland was marked using 33 flags. Delineated wetlands were classified using the *Western Washington Wetland Rating System* (Ecology Rating System) (Ecology, Aug 2004, version 2).

Findings

Mercerdale Park is on the north end of Mercer Island, south of the downtown area. The MICA-identified study area is located north of the Mercerdale Skate Park (Figure 1) in the Cedar-Sammamish Water Resource Inventory Area (WRIA 8); Township 24N, Range 04E, Section 12. Developed areas are present north and northwest of the study area. A forested hillside with trails is located to the west, and a maintained park lawn area is present to the east.

Figure 1. MICA study area provided by AMS Planning and Research.

The study area contains a paved parking lot and building accessed from SE 32nd Street. The rest of the study area is undeveloped. Non-wetland, undeveloped areas are dominated by forested vegetation including Douglas-fir, red alder, bigleaf maple, and Oregon ash in the canopy. One wetland, referred to here as Wetland A, is present in the study area and is described below.

Wetland A

Wetland A is narrow and located at the toe of a forested slope within the study area. Outside of the study area, the wetland unit extends to the south, and includes a relatively large forested slope to the southwest. The approximate wetland location is depicted in Figure 2, below.

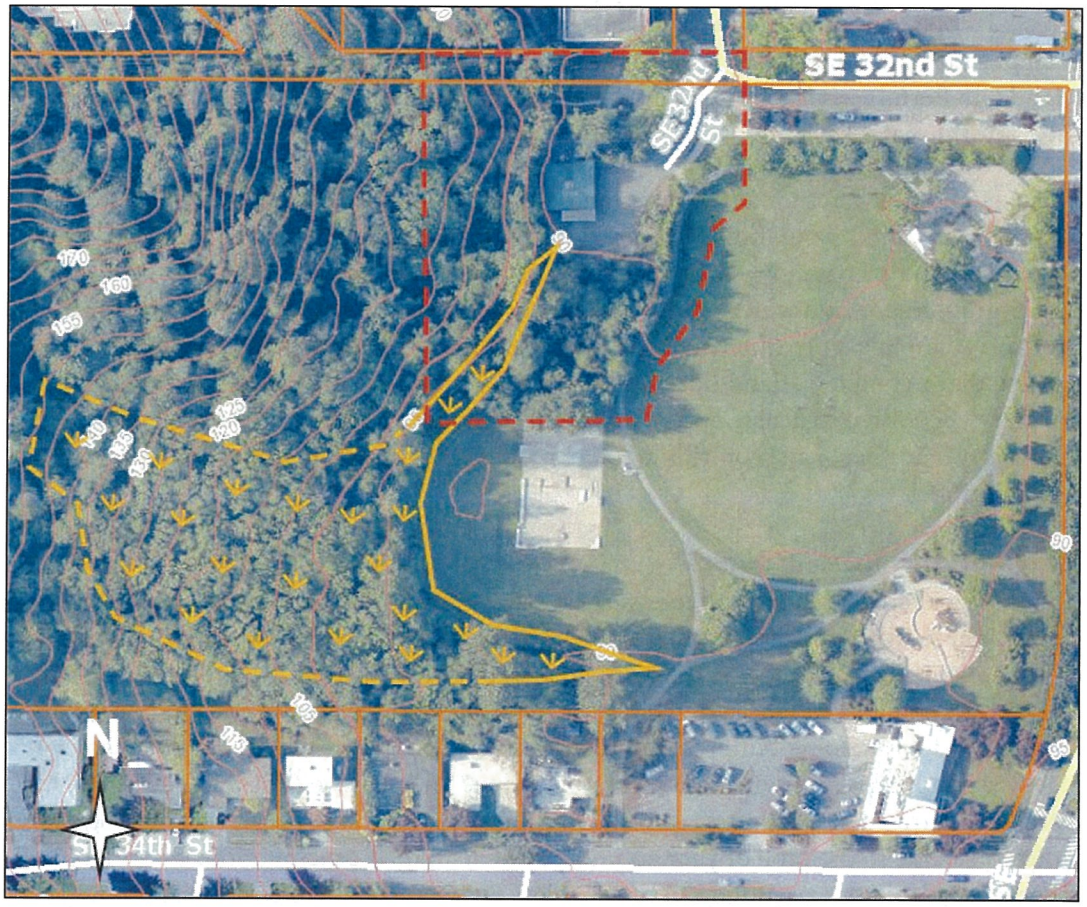


Figure 2. Approximate location and extent of Wetland A (yellow) with study area shown (red).

Wetland A contains slope and depressional hydrogeomorphic (HGM) classes; the depressional class is estimated to be less than 10 percent of the wetland unit. Therefore, Wetland A is rated as a slope wetland. Cowardin vegetation classes that are present in the wetland include palustrine forested and palustrine scrub-shrub. Common plants observed during the site visit include Oregon ash, red alder, and black cottonwood in the canopy, with red-twig dogwood, Sitka willow, Dewey's sedge, creeping buttercup, soft rush, small-fruited bullrush, and giant horsetail in the shrub and herbaceous layers.

Sampled wetland soils in the study area contain a layer from 6 to 15 inches that is a dark (10 YR 3/1) clay loam with redox features present. Sampled soils meet hydric soil indicator Redox Dark Surface (F6). Soils were saturated to the surface during the field visit and a water table was observed at 6 inches below the soil surface. Several inches of standing water were present in a depressional area near the toe of the slope. The hydrology of Wetland A is provided by groundwater- and surface water-flow from the forested slope located to the west; water seasonally ponds at the toe of the slope near the extent of the maintained park area. According to the City's storm utility maps (Mercer Island GIS Portal), surface water from Wetland A flows both north and south into the City's storm-water system.

This wetland unit rates moderate for water quality functions, low for hydrologic functions, and moderate for habitat functions. The presence of dense herbaceous vegetation, and proximity to urban areas give this wetland the potential and opportunity to provide water quality functions. Hydrologic functions provided by Wetland A are low since flow from the wetland drains into the City's storm utility system; therefore the wetland does not have the opportunity to reduce flooding and erosion. Vegetative structure and diversity, and habitat features such as large woody debris and standing snags contribute to the moderate habitat functions score for this wetland unit.

Marginal Area (Non-wetland)

One marginal area is present on the western study area boundary; this area does not meet all three wetland criteria and is not considered a jurisdictional wetland. Vegetation at this location is dominated by a marginal, facultative vegetation assemblage including Oregon ash and bigleaf maple in the canopy with planted conifers in the understory and Dewey's sedge, creeping buttercup, and grass in the herbaceous layer. Sampled soils meet the conditions for hydric soil indicator Redox Dark Surface (F6). However, soils were not saturated at the time of sampling and did not meet any primary hydrology indicators. Due to the time of year and normal year-to-date precipitation, the lack of observed hydrology was judged to be reliable[1]. Furthermore, two or more secondary hydrology indicators were not met. When compared to similar forested slopes of Wetland A, this area is much dryer, and the vegetation assemblage generally reflects this observation.

---

[1] Precipitation data gathered from National Oceanic and Atmospheric Administration's (NOAA's) National Weather Service Website (http://w2.weather.gov/climate/index.php?wfo=sew). On May 7, 2015, recorded precipitation for the Seattle-Tacoma area was within 0.3 inches of the normal year-to-date value.

Local Regulations

Wetlands in Mercer Island are regulated under the Mercer Island City Code (MICC) Unified Land Development Code Chapter 19.07, Environment. The Mercerdale Park parcel is zoned Public Institution (P).

Wetlands

Wetland A scored 12 points for water quality, 5 points for hydrology, and 15 points for habitat, for a total of 32 points. This score qualifies the Wetland A as a Category III wetland. Category III wetlands require a standard buffer width of 50 feet.

In general, site plans should avoid and minimize impacts to wetlands and buffers. However, the City may allow modification of the standard wetland buffer either through buffer reduction (19.07.08[C][2]) or buffer averaging (19.07.080[C][3]). The buffer reduction option would require a critical area study and mitigation, while the buffer averaging option does not require a critical area study but may require a mitigation plan.

Wetland buffers may be reduced to 25 feet via buffer reduction in accordance with an approved critical area study if the code official determines the following:

- That a smaller area is adequate to protect the wetland functions,
- Impacts will be mitigated consistent with MICC 19.07.070(B)(2), and
- The proposal will result in no net loss of wetland buffer functions.

Wetland buffers may be averaged in accordance with the following provisions outlined in MICC 19.07.070(B)(3):

- The proposal will result in a net improvement of critical area function;
- The proposal will include replanting of the averaged buffer using native vegetation;
- The total area contained in the averaged buffers on the development proposal site is not decreased below the total area that would be provided if the maximum width were not averaged;
- The standard buffer width is not reduced to a width that is less than the minimum buffer width (25 feet) at any location; and
- That portion of the buffer that has been reduced in width shall not contain a steep slope.

Direct wetland impacts are allowed for Category III wetlands less than one acre in size if proposed mitigation will result in equivalent or greater function (MICC 19.07.080(D)). Wetland A is greater than 2 acres, thereby exceeding the alteration threshold. In addition, the City's reasonable use criteria found in MICC 19.07.030(B) is not applicable since an existing use (City park) has already been established on the parcel.

State and Federal Regulations

Wetlands are also regulated by the Corps under Section 404 of the Clean Water Act. Any filling of Waters of the U.S., including wetlands (except isolated wetlands), would require notification and permits from the Corps. Wetland A would likely not be considered isolated. Federally permitted actions that could affect endangered species (i.e. salmon or bull trout) may also require a biological assessment study and consultation with the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service. Application for Corps permits may also require an individual 401 Water Quality Certification and Coastal Zone Management Consistency determination from Ecology.

In general, neither the Corps nor Ecology regulates wetland buffers, unless direct impacts are proposed. When direct impacts are proposed, mitigated wetlands may be required to employ buffers based on Corps and Ecology joint regulatory guidance.

The information contained in this letter or report is based on the application of technical guidelines currently accepted as the best available science and in conjunction with the criteria outlined in the methods section. All discussions, conclusions and recommendations reflect the best professional judgment of the author(s) and are based upon information available to us at the time the study was conducted. All work was completed within the constraints of budget, scope, and timing. The findings of this report are subject to verification and agreement by the appropriate local, State and Federal regulatory authorities. No other warranty, expressed or implied, is made.

Please call if you have any questions or if we can provide you with any additional information.

Sincerely,

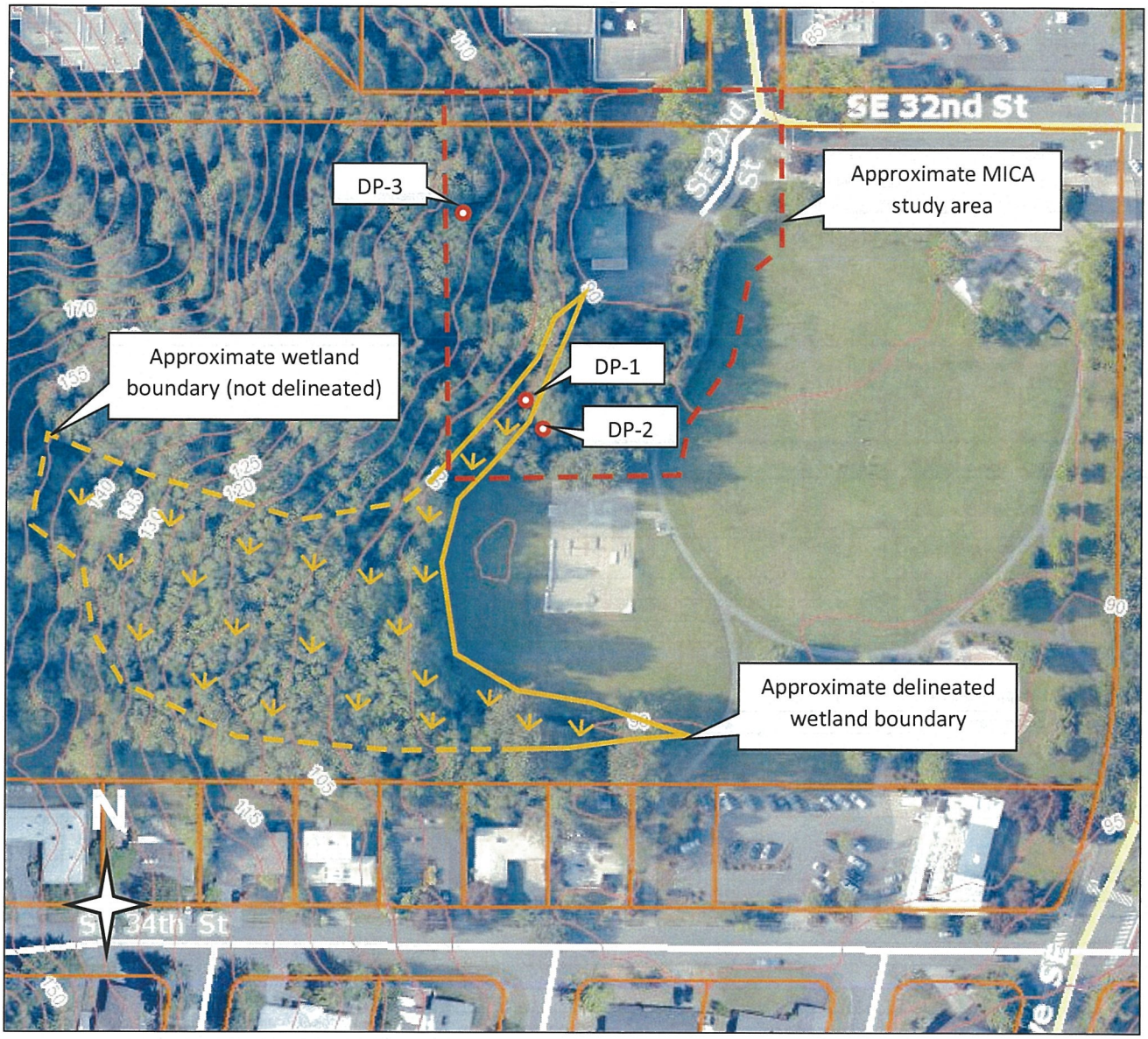
Katy Crandall

Katy Crandall, WPIT
Ecologist

Enclosures

THE WATERSHED COMPANY

750 Sixth Street South | Kirkland | WA 98033
p 425.822.5242 f 425.827.8136



Note: This is a field sketch. Wetland areas not surveyed. Areas depicted are approximate and not to scale.

LEGEND:

- Wetland edge, delineated
- Wetland edge, not delineated
- Wetland area
- Data Point (DP)

Wetland Delineation Sketch
Prepared for: Katie Oman, AMS Planning and Research
Located at: Mercerdale Park
Parcel Number 1224049068
3205 77th Ave. SE
Mercer Island, WA 98040

Site Visits: April 2 and May 7, 2015
TWC Ref. No. 150320

THE WATERSHED COMPANY

WETLAND DETERMINATION DATA FORM

Western Mountains, Valleys, and Coast Supplement to the 1987 COE Wetlands Delineation Manual

DP- 1

750 Sixth Street South
Kirkland, Washington 98033
(425) 822-5242
watershedco.com

Project Site:	**Mercerdale Park**	Sampling Date:	**4/2/2015**
Applicant/Owner:	**MICA**	Sampling Point:	DP- **1**
Investigator:	**K. Crandall**	City/County:	**Mercer Island**
Sect., Township, Range:	S **12** T **24N** R **04E**	State:	**WA**
Landform (hillslope, terrace, etc): **Toe of slope**	Slope (%): **5**	Local relief (concave, convex, none): **Concave**	
Subregion (LRR): **A**	Lat:	Long:	Datum:
Soil Map Unit Name: **Bh – Bellingham silt loam**		NWI classification: **NA**	
Are climatic/hydrologic conditions on the site typical for this time of year? ☒ Yes ☐ No		(If no, explain in remarks.)	
Are "Normal Circumstances" present on the site? ☒ Yes ☐ No			
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed?			
Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic		(If needed, explain any answers in Remarks.)	

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampling Point within a Wetland?**	Yes ☒	No ☐
Hydric Soils Present?	Yes ☒	No ☐			
Wetland Hydrology Present?	Yes ☒	No ☐			

Remarks: **Wetland A in-pit**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m diam.)	Absolute % Cover	Dominant Species?	Indicator Status
1. ***Pseudotsuga menzeisii* (dying and rooted upslope)**			
2. ***Crataegus monogyna***	**30**	**Y**	**FAC**
3. ***Populus balsamifera***	**15**	**Y**	**FAC**
4. ***Fraxinus latifolia***	**3**	**N**	**FACW**
	48	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m diam.)			
1. ***Cornus sericea***	**20**	**Y**	**FACW**
2.			
3.			
4.			
5.			
	20	= Total Cover	
Herb Stratum (Plot size: 1m diam.)			
1. ***Ranunculus repens***	**40**	**Y**	**FAC**
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. ***Rubus armeniacus***	**20**	**Y**	**FACU**
2.			
	20	= Total Cover	

% Bare Ground in Herb Stratum:

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species that are OBL, FACW, or FAC: **80** (A/B)

Prevalence Index Worksheet

	Total % Cover of	Multiply by
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column totals	(A)	(B)

Prevalence Index = B / A =

Hydrophytic Vegetation Indicators

- ☒ Dominance test is > 50%
- ☐ Prevalence test is ≤ 3.0 *
- ☐ Morphological Adaptations * (provide supporting data in remarks or on a separate sheet)
- ☐ Wetland Non-Vascular Plants *
- ☐ Problematic Hydrophytic Vegetation * (explain)

* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point – DP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					Clay loam	
6-12	10YR 3/1	93	7.5YR 3/4	7	C	M	Clay loam	
12-15	10YR 3/1	80	7.5YR 3/4	20	C	M	Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Loc: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]

- ☐ 2cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)
- ☐

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric soil present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply):

- ☒ Surface water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves **(except MLRA 1, 2, 4A & 4B)** (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (explain in remarks)

Secondary Indicators (2 or more required):

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A & 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks

Field Observations

Surface Water Present?	Yes ☒	No ☐	Depth (in):	**~10 nearby**
Water Table Present?	Yes ☒	No ☐	Depth (in):	**6 BGS**
Saturation Present? (includes capillary fringe)	Yes ☒	No ☐	Depth (in):	**0 BGS**

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **BGS = below ground surface**

THE WATERSHED COMPANY

WETLAND DETERMINATION DATA FORM

Western Mountains, Valleys, and Coast Supplement to the 1987 COE Wetlands Delineation Manual

DP- 2

750 Sixth Street South
Kirkland, Washington 98033
(425) 822-5242
watershedco.com

Project Site:	**Mercerdale Park**	Sampling Date:	**4/2/2015**
Applicant/Owner:	**MICA**	Sampling Point:	DP- **2**
Investigator:	**K. Crandall**	City/County:	**Mercer Island**
Sect., Township, Range:	S **12** T **24N** R **04E**	State:	**WA**
Landform (hillslope, terrace, etc): **Terrace**	Slope (%): **0**	Local relief (concave, convex, none): **None**	
Subregion (LRR): **A**	Lat:	Long:	Datum:
Soil Map Unit Name: **Bh – Bellingham silt loam**		NWI classification: **NA**	

Are climatic/hydrologic conditions on the site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks.)
Are "Normal Circumstances" present on the site? ☒ Yes ☐ No
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed?
Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒			
Hydric Soils Present?	Yes ☒	No ☐	**Is the Sampling Point within a Wetland?**	Yes ☐	No ☒
Wetland Hydrology Present?	Yes ☐	No ☒			

Remarks: **Out-pit adjacent to Wetland A**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m diam.)	Absolute % Cover	Dominant Species?	Indicator Status
1. ***Pseudotsuga menzeisii***	**50**	**Y**	**FACU**
2. ***Alnus rubrra***	**50**	**Y**	**FAC**
3. ***Acer macrophyllum***	**10**	**N**	**FACU**
4. ***Fraxinus latifolia***	**10**	**N**	**FACW**
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m diam.)			
1. ***Rosa gymnocarpa***	**5**	**Y**	**FACU**
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 1m diam.)			
1. ***Polystichum munitum***	**10**	**Y**	**FACU**
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum:			

Remarks:

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: **2** (A)
Total Number of Dominant Species Across All Strata: **4** (B)
Percent of Dominant Species that are OBL, FACW, or FAC: **50** (A/B)

Prevalence Index Worksheet

	Total % Cover of	Multiply by
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column totals	(A)	(B)

Prevalence Index = B / A =

Hydrophytic Vegetation Indicators

- ☐ Dominance test is > 50%
- ☐ Prevalence test is ≤ 3.0 *
- ☐ Morphological Adaptations * (provide supporting data in remarks or on a separate sheet)
- ☐ Wetland Non-Vascular Plants *
- ☐ Problematic Hydrophytic Vegetation * (explain)

* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☐ No ☒

SOIL **Sampling Point – DP-2**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-8	10YR 2/2	100					Gravelly sandy loam	
8-14	10YR 3/2	95	7.5YR 4/6	5	C	M	Gravelly sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Loc: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]

- ☐ 2cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)
- ☐

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric soil present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply):

- ☐ Surface water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves **(except MLRA 1, 2, 4A & 4B)** (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (explain in remarks)

Secondary Indicators (2 or more required):

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A & 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks

Field Observations

Surface Water Present?	Yes ☐	No ☒	Depth (in):
Water Table Present?	Yes ☐	No ☒	Depth (in):
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (in):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Damp, not saturated**

THE WATERSHED COMPANY

WETLAND DETERMINATION DATA FORM

Western Mountains, Valleys, and Coast Supplement to the 1987 COE Wetlands Delineation Manual

DP- 3

750 Sixth Street South
Kirkland, Washington 98033
(425) 822-5242
watershedco.com

Project Site:	**Mercerdale Park**	Sampling Date:	**5/7/2015**
Applicant/Owner:	**MICA**	Sampling Point:	DP- **3**
Investigator:	**K. Crandall, R. Kahlo**	City/County:	**Mercer Island**
Sect., Township, Range:	S **12** T **24N** R **04E**	State:	**WA**
Landform (hillslope, terrace, etc): **Terrace**	Slope (%): **5**	Local relief (concave, convex, none): **Concave**	
Subregion (LRR): **A**	Lat:	Long:	Datum:
Soil Map Unit Name: **KbP – Kitsap silt loam**		NWI classification: **NA**	

Are climatic/hydrologic conditions on the site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks.)
Are "Normal Circumstances" present on the site? ☒ Yes ☐ No
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed?
Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	☒	No	☐	
Hydric Soils Present?	Yes	☒	No	☐	**Is the Sampling Point within a Wetland?** Yes ☐ No ☒
Wetland Hydrology Present?	Yes	☐	No	☒	

Remarks: **Marginal non-wetland area**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m diam.)	Absolute % Cover	Dominant Species?	Indicator Status
1. ***Acer macrophyllum***	**50**	**Y**	**FACU**
2. ***Fraxinus latifolia***	**50**	**Y**	**FACW**
3.			
4.			
	100	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m diam.)			
1. ***Thuja plicata***	**10**	**Y**	**FAC**
2.			
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 1m diam.)			
1. ***Ranunculus repens***	**70**	**Y**	**FAC**
2. ***Carex deweyana***	**60**	**Y**	**FAC**
3. ***Unk. Grass***	**40**	**Y**	**FAC***
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	170	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum:			

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: **5** (A)
Total Number of Dominant Species Across All Strata: **6** (B)
Percent of Dominant Species that are OBL, FACW, or FAC: **83** (A/B)

Prevalence Index Worksheet

	Total % Cover of	Multiply by
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column totals	(A)	(B)

Prevalence Index = B / A =

Hydrophytic Vegetation Indicators

☒ Dominance test is > 50%
☐ Prevalence test is ≤ 3.0 *
☐ Morphological Adaptations * (provide supporting data in remarks or on a separate sheet)
☐ Wetland Non-Vascular Plants *
☐ Problematic Hydrophytic Vegetation * (explain)

* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks: ***Presumed FAC**

SOIL

Sampling Point – DP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-8	2.5Y 3/1	92	7.5 YR 3/4	8	C	M	Silty clay loam	
8-14	10 YR 4/1	80	10 YR 4/6	20	C	M	Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

[2]Loc: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]

- ☐ 2cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)
- ☐

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric soil present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply):

- ☐ Surface water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves **(except MLRA 1, 2, 4A & 4B)** (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (explain in remarks)

Secondary Indicators (2 or more required):

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A & 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks

Field Observations

Surface Water Present?	Yes ☐	No ☒	Depth (in):
Water Table Present?	Yes ☐	No ☒	Depth (in):
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (in):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Damp, not saturated**

Wetland name or number: A

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 – Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): Wetland A Date of site visit: 5/7/2015

Rated by: K. Crandall, R. Kahlo Trained by Ecology? Yes ☒ No ☐ Date of Training 09/2014

SEC: 12 TWNSHP: 24N RNGE: 04E Is S/T/R in Appendix D? Yes ☐ No ☒

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I ☐ II ☐ III ☒ IV ☐

Category I = Score ≥70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for Water Quality Functions	12
Score for Hydrologic Functions	5
Score for Habitat Functions	15
TOTAL score for functions	**32**

Category based on SPECIAL CHARACTERISTICS of wetland

I ☐ II ☐ Does not Apply ☒

Final Category (choose the "highest" category from above) **III**

Check the appropriate type and class of wetland being rated.

Wetland Type		Wetland Class	
Estuarine	☐	**Depressional**	☐
Natural Heritage Wetland	☐	**Riverine**	☐
Bog	☐	**Lake-fringe**	☐
Mature Forest	☐	**Slope**	☒
Old Growth Forest	☐	**Flats**	☐
Coastal Lagoon	☐	**Freshwater Tidal**	☐
Interdunal	☐		
None of the above	☒	Check if unit has multiple HGM classes present	☐

Does the wetland unit being rated meet any of the criteria below?

If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands That May Need Additional Protection (in addition to the protection recommended for its category)	YES	NO
SP1. *Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered **animal** or **plant** species (T/E species)?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.		X*
SP2. *Has the wetland unit been documented as habitat for any State listed Threatened or Endangered **animal** species?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category I Natural Heritage Wetlands (see p. 19 of data form).		X*
SP3. *Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?*		X*
SP4. *Does the wetland unit have a local significance in addition to its functions*? For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.		X

***The study area was reviewed for the presence of endangered, threatened, and priority species using WDFW online Priority Habitat and Species Data, PHS on the Web (http://wdfw.wa.gov/mapping/phs/).**

To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.

The hydrogeomorphic classification groups wetlands into those that function in similar ways. Classifying the wetland first simplifies the questions needed to answer how it functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

Classification of Wetland Units in Western Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in Questions 1-7 apply, and go to Question 8.

1. Are the water levels in the wetland unit usually controlled by tides (i.e. except during floods)?

☒ NO – go to 2 ☐☐ **YES** – the wetland class is **Tidal Fringe**

If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)? **YES – Freshwater Tidal Fringe NO – Saltwater Tidal Fringe (Estuarine)**

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is rated as an **Estuarine** wetland.* Wetlands that were called estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term "Estuarine" wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p.).

2. The entire wetland unit is flat and precipitation is only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit

☒ NO – go to 3 ☐ **YES** – The wetland class is **Flats**

If your wetland can be classified as a "Flats" wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland unit **meet both** of the following criteria?

☐ The vegetated part of the wetland is on the shores of a body of open water (without any vegetation on the surface) at least 20 acres (8 ha) in size;

☐ At least 30% of the open water area is deeper than 6.6 ft (2 m)?

☒NO – go to 4 ☐**YES** – The wetland class is **Lake-fringe (Lacustrine Fringe)**

4. Does the entire wetland unit **meet all** of the following criteria?

☒ The wetland is on a slope (*slope can be very gradual*),

☒ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.

☒ The water leaves the wetland **without being impounded**?
NOTE: *Surface water does not pond in these types of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3ft diameter and less than a foot deep).*

☐ NO – go to 5 ☒ **YES** – The wetland class is **Slope**

5. Does the entire wetland unit **meet all** of the following criteria?

☐ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river.

☐ The overbank flooding occurs at least once every two years

NOTE: The riverine unit can contain depressions that are filled with water when the river is not flooding.

☒ NO - go to 6 ☐ **YES** – The wetland class is **Riverine**

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

☒ NO – go to 7 ☐ **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding. The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

☒ NO – go to 8 ☐ **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit, classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	*HGM Class to Use in Rating*
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine along stream within boundary	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

Wetland name or number: A

S	Slope Wetlands	Points
	WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality	
S	**S 1. Does the wetland have the potential to improve water quality?**	*(see p. 64)*
S	S 1.1 Characteristics of average slope of wetland: Slope is1% or less *(a 1% slope has a 1 foot vertical drop in elevation horizontal distance) for every 100 ft* ..... points = 3 Slope is 1% - 2% ..... points = 2 Slope is 2% - 5% ..... points = 1 Slope is greater than 5% ..... points = 0	0
S	S 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions).* YES = 3 points NO = 0 points	0
S	S 1.3 Characteristics of the vegetation in the wetland that trap sediments and pollutants: *Choose the points appropriate for the description that best fits the vegetation in the wetland. Dense vegetation means you have trouble seeing the soil surface. Dense vegetation means you have trouble seeing the soil surface (>75% cover) and uncut means not grazed or mowed and plants are higher than 6 inches.* Dense, ungrazed, herbaceous vegetation > 90% of the wetland area ..... points = 6 Dense, ungrazed, herbaceous vegetation > 1/2 of area ..... points = 3 Dense, woody, vegetation > ½ of area ..... points = 2 Dense, ungrazed, herbaceous vegetation > 1/4 of area ..... points = 1 Does not meet any of the criteria above for vegetation ..... points = 0	6
S	**Total for S 1** *Add the points in the boxes above*	6
S	**S 2. Does the wetland have the opportunity to improve water quality?** *(see p. 67)* Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? *Note which of the following conditions provide the sources of pollutants.A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* ☐ Grazing in the wetland or within 150 ft ☐ Untreated stormwater discharges to wetland ☐ Tilled fields, logging or orchards within 150 ft of wetland ☐ A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging ☒ Residential, urban areas, or golf courses are within 150 ft upslope of wetland ☐ Other_____ **YES** multiplier is **2** **NO** multiplier is **1**	(see p. 67) multiplier 2
S	**TOTAL - Water Quality Functions** Multiply the score from S 1 by S 2 ***Add score to table on p. 1***	**12**

Wetland name or number: A

S	Slope Wetlands	Points
	HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream erosion	
	S 3. Does the wetland have the potential to reduce flooding and erosion?	*(see p. 68)*
S	S 3.1 Characteristics of vegetation that reduce the velocity of surface flows during storms. *Choose the points appropriate for the description that best fit conditions in the wetland. (stems of plants should be thick enough (usually > 1/8in), or dense enough, to remain erect during surface flows)* Dense, uncut, **rigid** vegetation covers > 90% of the area of the wetland. ..... points = 6 Dense, uncut, **rigid** vegetation > 1/2 area of wetland ..... points = 3 Dense, uncut, **rigid** vegetation > 1/4 area ..... points = 1 More than 1/4 of area is grazed, mowed, tilled or vegetation is not rigid ..... points = 0	3
S	S 3.2 Characteristics of slope wetland that holds back small amounts of flood flows: The slope wetland has small surface depressions that can retain water over at least 10% of its area. YES points = 2 NO points = 0	2
S	**Total for S 3** *Add the points in the boxes above*	5
S	**S 4. Does the wetland have the opportunity to reduce flooding and erosion?** *(see p. 70)* Is the wetland in a landscape position where the reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows? *Note which of the following conditions apply.* ☐ Wetland has surface runoff that drains to a river or stream that has flooding problems ☐ Other_____ *(Answer NO if the major source of water to the wetland is controlled by a reservoir or the wetland is tidal fringe along the sides of a dike)* **YES** multiplier is **2** **NO** multiplier is **1**	(see p. 70) multiplier **1**
S	**TOTAL - Hydrologic Functions** Multiply the score from S 3 by S 4 ***Add score to table on p. 1***	**5**

Comments

S 4 – Using the Mercer Island GIS Portal website, it appears that surface water leaving the wetland is directed into the City's storm utility system.

Wetland name or number: A

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that wetland functions to provide important habitat

H 1. Does the wetland have the potential to provide habitat for many species?

H 1.1 Vegetation structure ***(see p. 72)***

Check the types of vegetation classes present (as defined by Cowardin) if the class is ¼ acre or covers more than 10% of the area of the wetland if unit smaller than 2.5 acres.

- ☐ Aquatic bed
- ☐ Emergent plants
- ☒ Scrub/shrub (areas where shrubs have >30% cover)
- ☒ Forested (areas where trees have >30% cover)
- ☒ Forested areas have 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon

Add the number of vegetation types that qualify. If you have:

4 structures or more ..... points = 4
3 structures ..... points = 2
2 structures ..... points = 1
1 structure ..... points = 0

2

H 1.2. Hydroperiods ***(see p. 73)***

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ acre to count. (see text for descriptions of hydroperiods)

- ☐ Permanently flooded or inundated — 4 or more types present ..... points = 3
- ☐ Seasonally flooded or inundated — 3 types present ..... points = 2
- ☒ Occasionally flooded or inundated — 2 types present ..... points = 1
- ☒ Saturated only — 1 types present.....points = 0
- ☐ Permanently flowing stream or river in, or adjacent to, the wetland
- ☐ Seasonally flowing stream in, or adjacent to, the wetland
- ☐ ***Lake-fringe wetland*** **= 2 points**
- ☐ ***Freshwater tidal wetland*** **= 2 points**

1

H 1.3. Richness of Plant Species ***(see p. 75)***

Count the number of plant species in the wetland that cover at least 10 ft^2. (*different patches of the same species can be combined to meet the size threshold)*

You do not have to name the species.

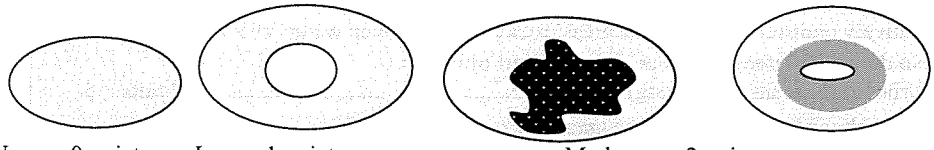
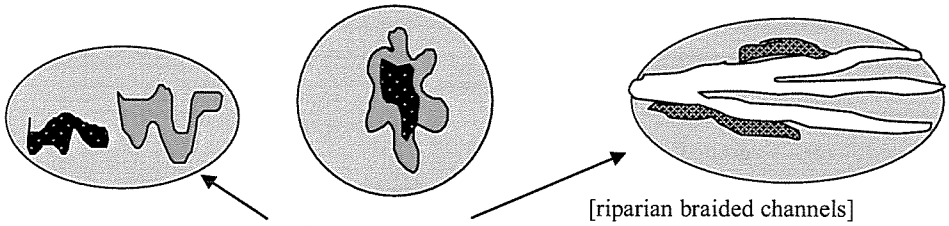
Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle

If you counted: > 19 species ..... points = 2
List species below if you want to: 5 - 19 species ..... points = 1
< 5 species ..... points = 0

2

FRLA, POBA, ALRU, THPL, ACMA, SASI, SALU, COSE, RUAR, POMU, JUEF, ATFI, SCMI, CADE, RARE, EQTE, EQAR, OESA, COAR, Grass1

Wetland name or number: A

H 1.4. Interspersion of habitats *(see p. 76)* Decide from the diagrams below whether interspersion between Cowardin vegetation classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.  None = 0 points Low = 1 point Moderate = 2 points  High = 3 points [riparian braided channels] NOTE: If you have four or more vegetation types or three vegetation types and open water the rating is always "high".	1
H 1.5. Special Habitat Features: *(see p. 77)* *Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.* ☒ Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long). ☒ Standing snags (diameter at the bottom > 4 inches) in the wetland ☐ Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream for at least 33 ft (10m) ☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (>30degree slope) OR signs of recent beaver activity are present ☐ At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated.*(structures for egg-laying by amphibians)* ☒ Invasive plants cover less than 25% of the wetland area in each stratum of plants *Note: The 20% stated in early printings of the manual on page 78 is an error.*	3
H 1. TOTAL Score - potential for providing habitat *Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5*	9

Wetland name or number: A

H 2. Does the wetland have the opportunity to provide habitat for many species?	
H 2.1 Buffers ***(see p. 80)*** *Choose the description that best represents condition of buffer of wetland. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed."* ☐ 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No developed areas within undisturbed part of buffer. (relatively undisturbed also means no-grazing) ..... Points = 5 ☐ 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference..... Points = 4 ☐ 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference..... Points = 4 ☐ 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference..... Points = 3 ☐ 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference..... Points = 3 **If buffer does not meet any of the criteria above** ☐ No paved areas (except paved trails) or buildings within 25 m (80ft) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK..... Points = 2 ☒ No paved areas or buildings within 50m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK..... Points = 2 ☐ Heavy grazing in buffer. ..... Points = 1 ☐ Vegetated buffers are <2m wide (6.6ft) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland ..... Points = 0 ☐ Buffer does not meet any of the criteria above..... Points = 1	2
H 2.2 Corridors and Connections ***(see p. 81)*** H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? (*dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor*). YES = **4 points** (*go to H 2.3*) **NO** = go to H 2.2.2 H 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR** a **Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? YES = **2 points** (*go to H 2.3*) **NO** = H 2.2.3 H 2.2.3 Is the wetland: within 5 mi (8km) of a brackish or salt water estuary OR within 3 mi of a large field or pasture (>40 acres) OR within 1 mi of a lake greater than 20 acres? YES = **1 point** NO = **0 points**	1

Wetland name or number: A

H 2.3 Near or adjacent to other priority habitats listed by WDFW ***(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)*** Which of the following priority habitats are within 330ft (100m) of the wetland? *(NOTE: the connections do not have to be relatively undisturbed)* ☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acres). ☒ **Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full description in WDFW PHS report p. 152*) ☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock. ☐ **Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests.) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest. ☐ **Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158.)* ☐ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*) ☐ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. ☐ **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. *(full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A.)* ☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human. ☐ **Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft. ☐ **Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. ☒ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of >51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30cm (12 in) in diameter at the largest end, and > 6m (20 ft) long. If wetland has **3 or more** priority habitats = **4 points** If wetland has **2** priority habitats = **3 points** If wetland has **1** priority habitat = **1 point** No habitats = **0 points** *Note: All vegetated wetland are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H2.4.*	3

H 2.4 Wetland Landscape *(choose the **one** description of the landscape around the wetland that best fits)* ***(see p. 84)*** There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. ..... points = 5 The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile ..... points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed ..... points = 3 The wetland is Lake-fringe on a lake **with** disturbance and there are 3 other lake-fringe wetland within ½ mile ..... points = 3 There is at least 1 wetland within ½ mile. ..... points = 2 There are no wetlands within ½ mile. ..... points = 0	0
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1, H2.2, H2.3, H2.4*	6
TOTAL for H1 from page 14	9
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	15

H 2.4 – No *known* wetlands within ½ mile

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Please determine if the wetland meets the attributes described below and circle the appropriate Category.

Wetland Type *Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.*	**Category**
SC 1.0 Estuarine wetlands (*see p. 86)* Does the wetland unit meet the following criteria for Estuarine wetlands? ☐ The dominant water regime is tidal, ☐ Vegetated, and ☐ With a salinity greater than 0.5 ppt. YES = Go to SC 1.1 NO ☒	
SC 1.1 Is the wetland unit within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-151? ☐ YES = Category I ☒ NO = go to SC 1.2	**Cat. I**
SC 1.2 Is the wetland unit at least 1 acre in size and meets at least two of the following three conditions? ☐ YES = Category I ☐ NO = Category II ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. If the non-native Spartina spp. are the only species that cover more than 10% of the wetland, then the wetland should be given a dual rating (I/II) The are aof Spartina would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category I. Do not, however, exclude the area of Spartina in determining the size threshold of 1 acre. ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed wetland. ☐ The wetland has at least 2 or the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.	**Cat. I** **Cat. II** **Dual rating I/II**

SC 2.0 Natural Heritage Wetlands *(see p. 87)* Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species. SC 2.1 Is the wetland being rated in a Section/Township/Range that contains a Natural Heritage wetland? *(this question is used to screen out most sites before you need to contact WNHP/DNR)* S/T/R information from Appendix D ☒ or accessed from WNHP/DNR web site ☐ YES ☐ – contact WNHP/DNR (see p. 79) and go to SC 2.2 NO ☒ SC 2.2 Has DNR identified the wetland as a high quality undisturbed wetland or as or as a site with state threatened or endangered plant species? YES = Category I NO ☐ Not a Heritage Wetland	**Cat. I**
SC 3.0 Bogs *(see p. 87)* Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below to identify if the wetland is a bog. If you answer yes, you will still need to rate the wetland based on its functions.* 1. Does the wetland have organic soils horizons (i.e. layers of organic soil), either peats or mucks, that compose 16" or more of the first 32 inches of the soil profile? (See Appendix B for a field key to identify organic soils.) Yes - go to Q.3 NO - go to Q.2 2. Does the wetland have organic soils, either peats or mucks, that are less than 16 inches deep over bedrock or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes - go to Q.3 NO ☒ is not a bog for purpose of rating 3. Does the wetland have more than 70% cover of mosses at ground level, AND other plants, if present, consist of the "bog" species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists species in Table 3)? Yes – Is a bog for purpose of rating NO - go to Q.4 *NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16" deep. If the pH is less than 5.0 and the "bog" plant species in Table 3 are present, the wetland is a bog.* 4. Is the wetland forested (>30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine, WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover (*>30% coverage of the total shrub/herbaceous* cover)? YES = Category I NO ☐ is not a bog for purpose of rating	**Cat. I**

SC 4.0 Forested Wetlands ***(see p. 90)***	
Does the wetland have at least 1 acre of forest that meet one of these criteria for the Department of Fish and Wildlife's forests as priority habitats? *If you answer yes you will still need to rate the wetland based on its functions.*	
☐ Old growth forests: (west of Cascade crest) Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 inches (81 cm) or more. *Note: The criterion for dbh is based on measurements for upland forests. Two hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is and "OR" so old-growth forests do not necessarily have to have trees of this diameter.*	
☐ Mature forests: (west of the Cascade crest) Stands where the largest trees are 80-200 years old OR have average diameters (dbh) exceeding 21 in (53 cm); crown cover may be less than 100%; decay, decadence, numbers of snags, and quanitity of large downed material is generally less than that found in old-growth	
YES = Category 1 NO ☒ not a forested wetland with special characteristics	**Cat. I**
SC 5.0 Wetlands in Coastal Lagoons (see p. 91)	
Does the wetland meet all of the following criteria of a wetland in a coastal lagoon?	
☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks.	
☐ The lagoon in which the wetland is located contains surgace water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon (*needs to be measured near the bottom*)	
YES – Go to SC 5.1 NO ☒ not a wetland in a coastal lagoon	**Cat. I**
SC 5.1 Does the wetland meet all of the following three conditions?	
☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of invasive plant species (see list of invasive species on p. 74).	
☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.	**Cat. II**
☐ The wetalnd is larger than 1/10 acre (4350 square feet)	
YES = Category I NO = Category II	

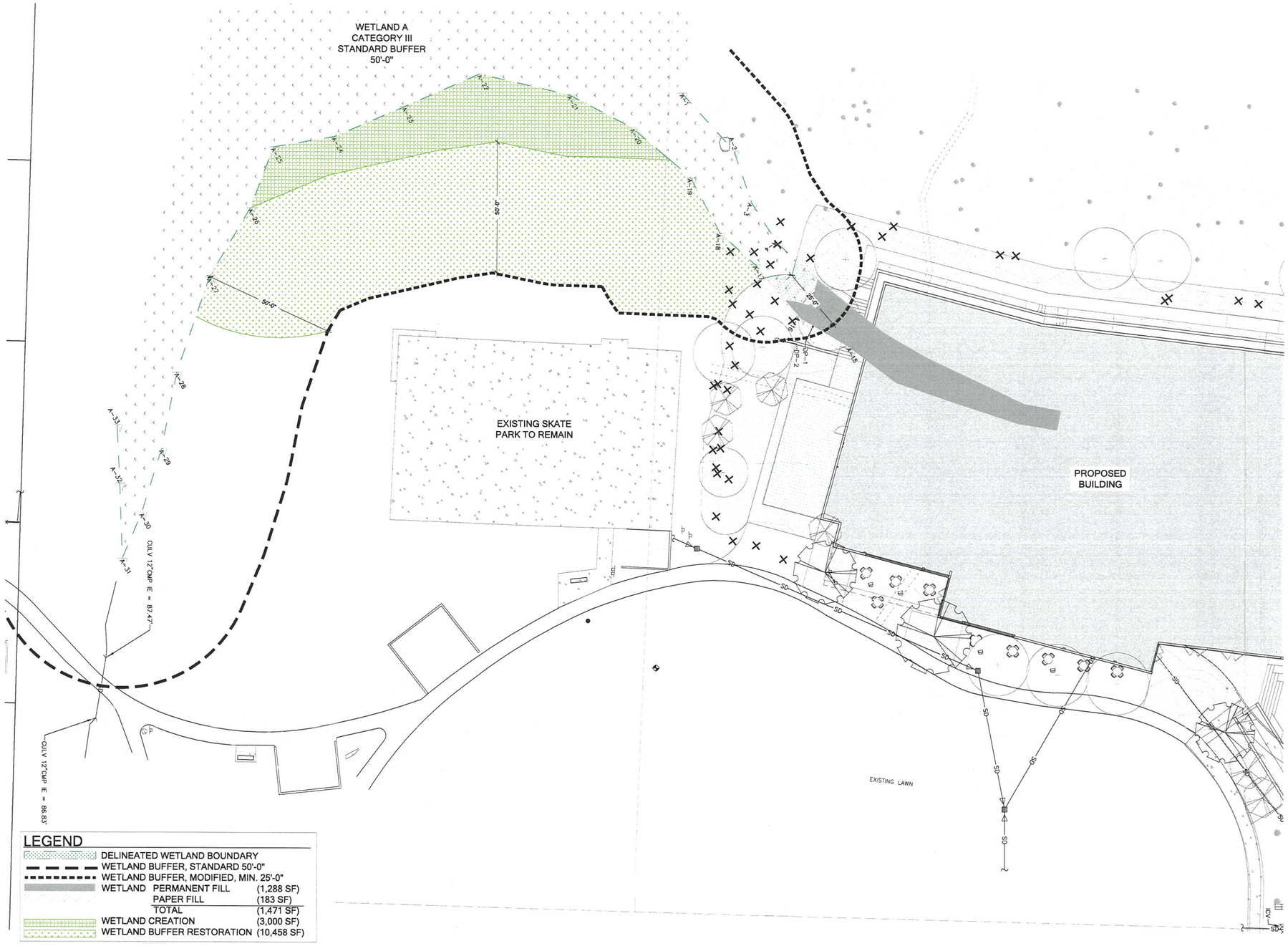
SC 6.0 Interdunal Wetlands (see p. 93) Is the wetalnd unit west of the 1889 line (also called the Westarn Boundary of Upland Ownership or WBUO)? YES – go to SC 6.1 NO ☒ not an interdunal wetland for rating *If you answer yes you will still need to rate the wetland based on its functions.* In practical terms that means the following geographic areas: – Long Beach Peninsula – lands west of SR 103 – Grayland-Westport – lands west of SR 105 – Ocean Shores-Copalis – lands west of SR 115 and SR 109 SC 6.1 Is the wetland 1 acre or larger, or is it in a mosaic of wetlands that is 1 acre or larger? YES = Category II NO – go to SC 6.2 SC 6.2 Is the unit between 0.1 and 1 acre, or is it in a mosaic of wetlands that is between 0.1 and 1 acre? YES = Category III	**Cat. II** **Cat. III**
Category of wetland based on Special Characteristics *Choose the "highest" rating if wetland falls into several categorie, and record on p. 1 .* If you answered NO for all types enter "Not Applicable" on p.1.	NA

Draft SEPA Environmental Checklist
Mercer Island Center for the Arts

Attachment F
Mercer Island Center for the Arts
Conceptual Mitigation Plan
The Watershed Company, August 20, 2015

February 2, 2016

MERCER ISLAND CENTER FOR THE ARTS CONCEPTUAL MITIGATION PLAN



LEGEND

	DELINEATED WETLAND BOUNDARY	
	WETLAND BUFFER, STANDARD 50'-0"	
	WETLAND BUFFER, MODIFIED, MIN. 25'-0"	
WETLAND	PERMANENT FILL	(1,288 SF)
	PAPER FILL	(183 SF)
	TOTAL	(1,471 SF)
	WETLAND CREATION	(3,000 SF)
	WETLAND BUFFER RESTORATION	(10,458 SF)

DRAFT IMPACTS & MITIGATION

0 10' 20' 40' 80'

THE WATERSHED COMPANY
750 Sixth Street South
Kirkland WA 98033
p 425.822.5242
www.watershedco.com
Science & Design

MERCER ISLAND CENTER FOR THE ARTS
CONCEPTUAL MITIGATION PLAN
PREPARED FOR AMS PLANNING & RESEARCH
PROJECT LOCATION:
77TH SE & SE 32ND STREET (PARCEL # 1224049068)
MERCER ISLAND, WA 98040

SUBMITTALS & REVISIONS

NO.	DATE	DESCRIPTION	BY
1	06-21-15	REVIEW SET	MSF

SHEET SIZE:
ORIGINAL PLAN IS 22" x 34".
SCALE ACCORDINGLY.

PROJECT MANAGER: HM
DESIGNED: I
DRAFTED: MSF
CHECKED: KC/KB
JOB NUMBER: 150320
SHEET NUMBER: W1 OF 1

FILENAME: TWC-150320-MIT.DWG
PRINTED BY: MARINA FRERICH
DATE: 8/20/2015

Draft SEPA Environmental Checklist
Mercer Island Center for the Arts

Attachment G
Parking and Access sketches,
Transpo. August 25, 2015

February 2, 2016

N

NOT TO SCALE

PUMPER FIRE TRUCK ACCESSING REAR OF PROPOSED BUILDING

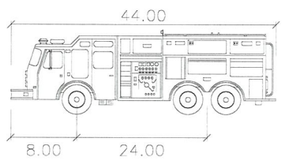
PUMPER FIRE TRUCK TURNAROUND AREA

PUMPER FIRE TRUCK ACCESSING FRONT OF PROPOSED BUILDING

PROPOSED PEDESTRIAN PLAZA

77TH AVE SE

SE 32ND ST



Pumper Fire Truck

	feet
Width	: 8.50
Track	: 8.50
Lock to Lock Time	: 6.0
Steering Angle	: 37.8

Turning Path - Fire Truck Access

Mercer Island Center for the Arts - August 20, 2015

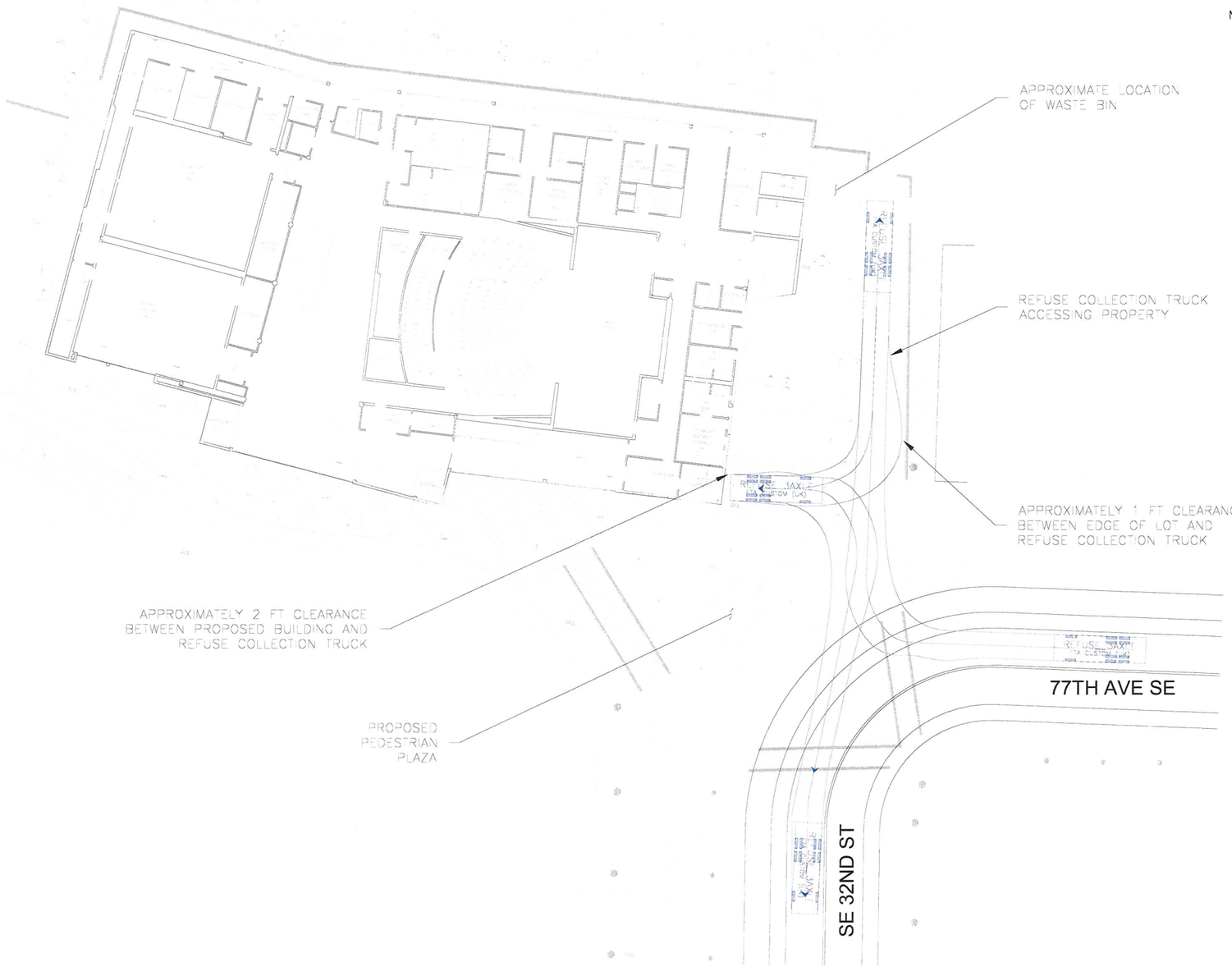
M:\15\15249.00 - Mercer Island Center for the Arts\Engineering\CAD\Conceptual\MICA Turning Movement Concepts 2015-08-19.dwg<C1>Shane Binger 8/25/2015 12:14 PM

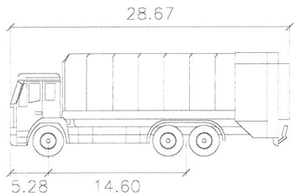
FIGURE
1

transpogroup
WHAT TRANSPORTATION CAN BE.

N

NOT TO SCALE





REFUSE 3AXLE feet

Width	: 8.20
Track	: 8.20
Lock to Lock Time	: 6.0
Steering Angle	: 35.3

Turning Path - Refuse Collection Truck Access

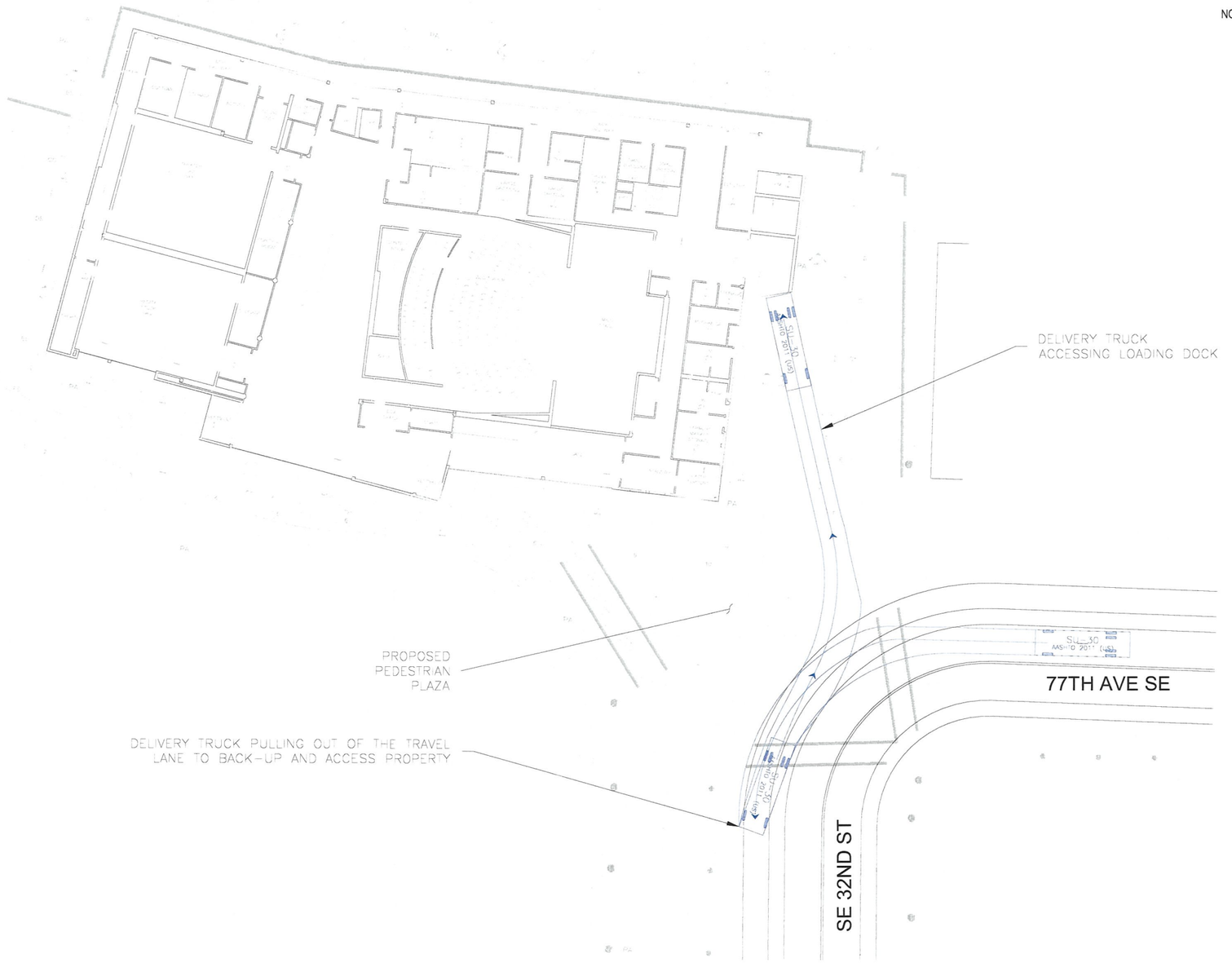
Mercer Island Center for the Arts - August 20, 2015

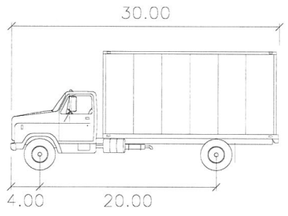
FIGURE
2

transpogroup
WHAT TRANSPORTATION CAN BE.

N

NOT TO SCALE





SU-30	feet
Width	: 8.00
Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 31.8

Turning Path - Single Unit Delivery Truck Access

Mercer Island Center for the Arts - August 20, 2015

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FIGURE
3

transpogroup
WHAT TRANSPORTATION CAN BE.

PARKING SUMMARY	
ADA	STANDARD
4	0
OR	
0	4

TURNOUT PROS:

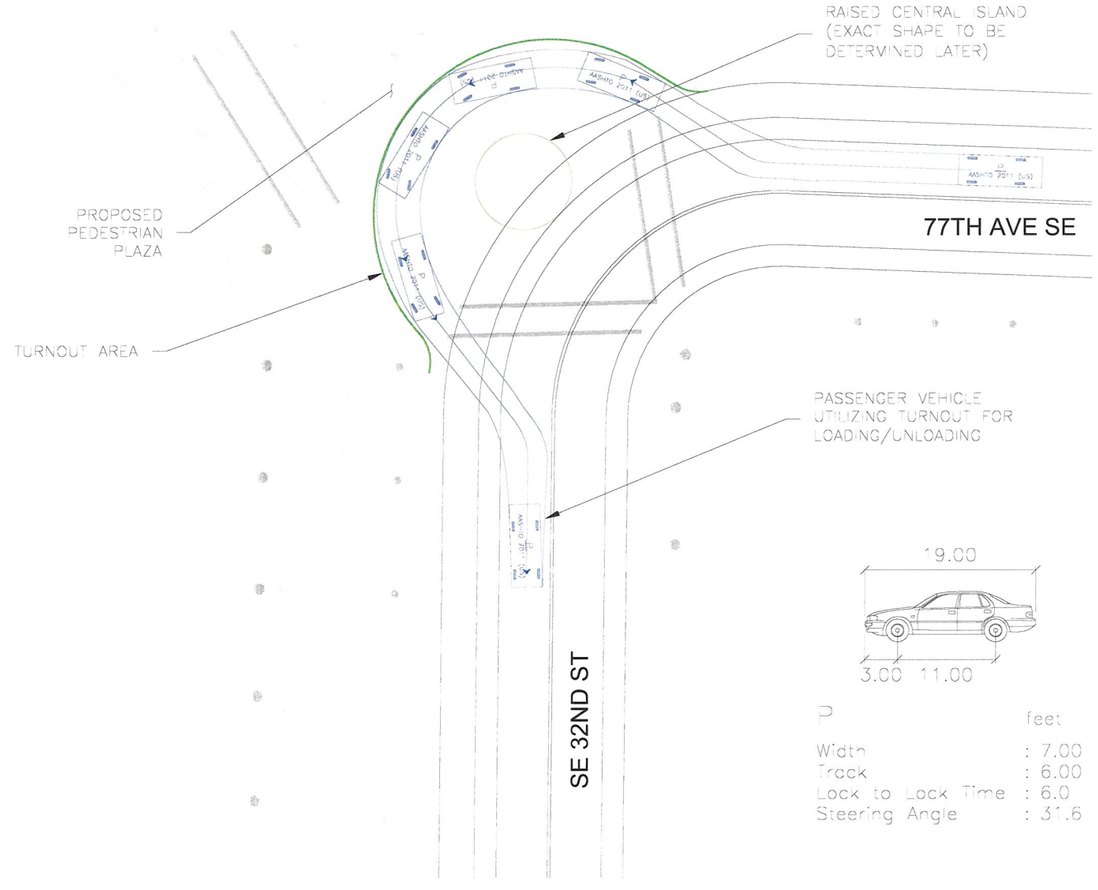
- 4 TO 5 PASSENGER VEHICLES CAN QUEUE AT A TIME
- LOADING/UNLOADING AREA IS NEAR THE PROPOSED BUILDING

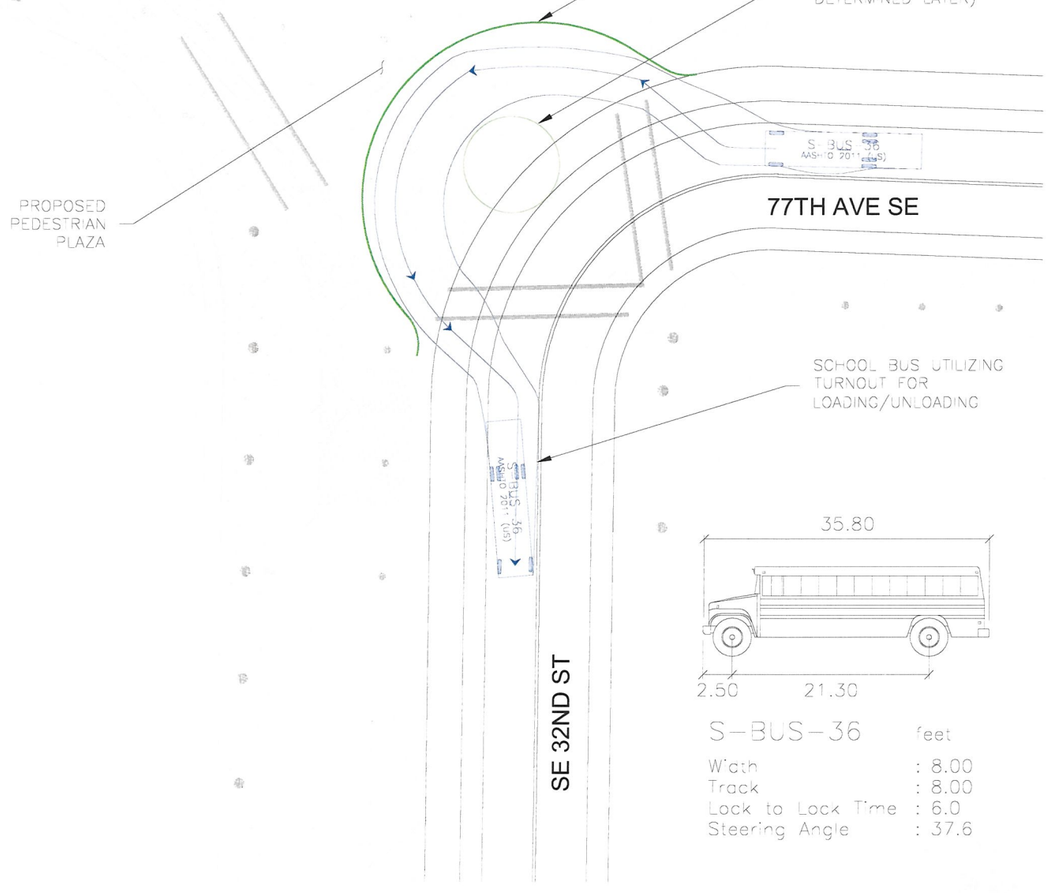
TURNOUT CONS:

- ADDITIONAL CONFLICT POINTS ARE ADDED TO AN EXISTING INTERSECTION WITH VULNERABLE USER GROUPS
- THE AWKWARD LAYOUT MAY LEAD TO CONFUSION REGARDING VEHICLE MOVEMENT PRIORITY
- SPACE FOR PEDESTRIANS AND TREES IN THE PLAZA ARE REDUCED
- CENTRAL ISLAND MAKES TRUCK ACCESS TO SITE CHALLENGING
- MAINTAINING ONE-WAY COMPLIANCE WILL BE CHALLENGING AND MAY LEAD TO ADDITIONAL CONFLICTS WITHIN THE PASSENGER LOADING/UNLOADING AREA
- PEDESTRIAN EXPOSURE IS INCREASED ON THE OUTSIDE OF A ROADWAY CURVE

N

NOT TO SCALE





Turning Path - Plaza Turnout Options

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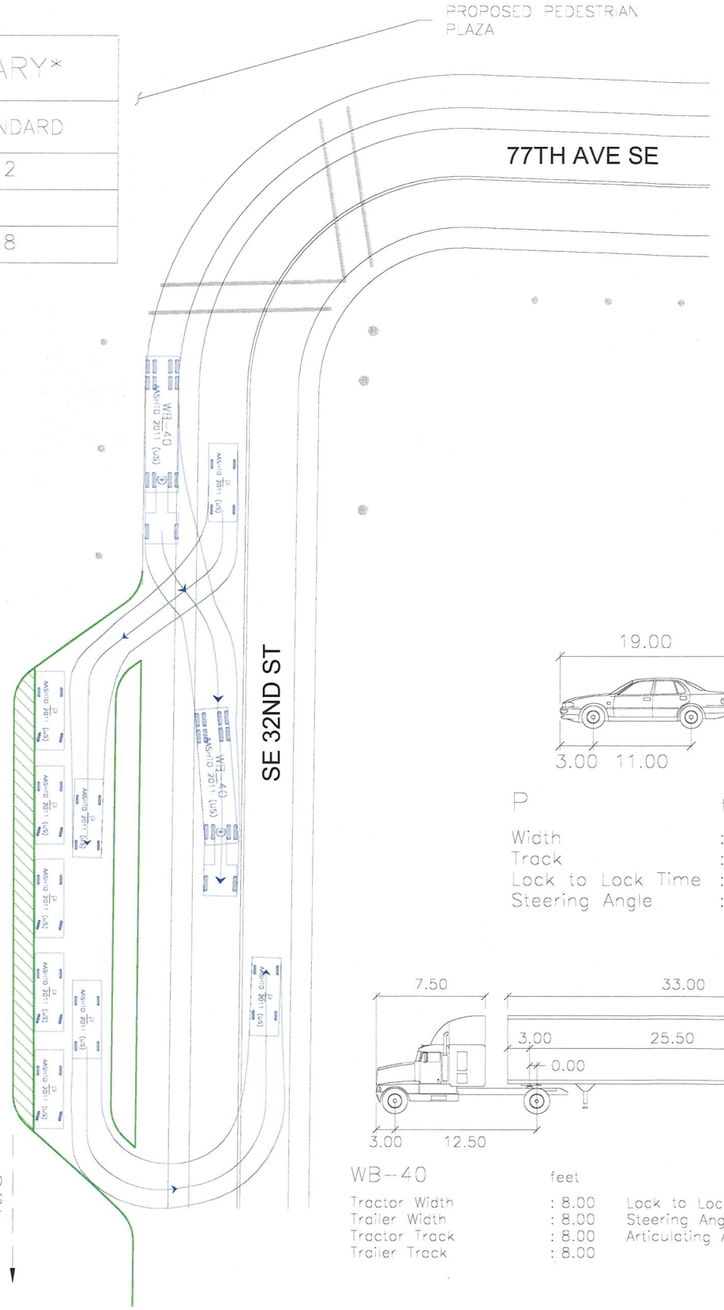
FIGURE

4

transpogroup
WHAT TRANSPORTATION CAN BE.

PARKING SUMMARY*	
ADA	STANDARD
6	2
OR	
0	8

*ASSUMES PARKING HAS BEEN EXTENDED FURTHER EAST



OFF-STREET PARKING PROS:

- SEPARATES PARKING MANEUVERS FROM TRAFFIC
- POTENTIAL FOR DROP-OFFS ON NORTH SIDE OF ISLAND

OFF-STREET PARKING CONS:

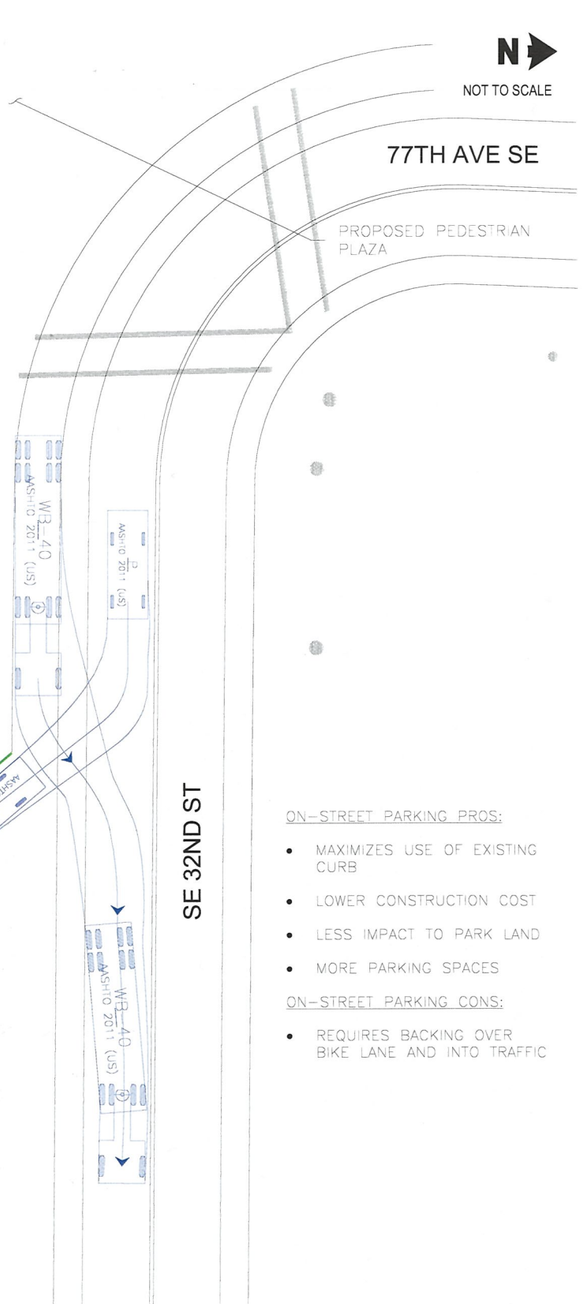
- HIGHER CONSTRUCTION COST
- MORE IMPACT TO PARK LAND
- FEWER PARKING SPACES
- RAISED ISLAND MAY IMPACT USEABLE SPACE FOR FARMERS MARKET

P	feet
Width	: 7.00
Track	: 6.00
Lock to Lock Time	: 6.0
Steering Angle	: 31.6

WB-40	feet		
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.00	Steering Angle	: 20.3
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.00		

PARKING SUMMARY*	
ADA	STANDARD
9	2
OR	
0	17

*ASSUMES PARKING HAS BEEN EXTENDED FURTHER EAST



ON-STREET PARKING PROS:

- MAXIMIZES USE OF EXISTING CURB
- LOWER CONSTRUCTION COST
- LESS IMPACT TO PARK LAND
- MORE PARKING SPACES

ON-STREET PARKING CONS:

- REQUIRES BACKING OVER BIKE LANE AND INTO TRAFFIC

Turning Movement - SE 32nd Street Parking Options

Mercer Island Center for the Arts - August 20, 2015

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FIGURE
5

transpogroup
WHAT TRANSPORTATION CAN BE.

77th Ave SE Parallel Parking

Mercer Island Center for the Arts - August 20, 2015

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transpogroup
WHAT TRANSPORTATION CAN BE.

FIGURE
6

Draft SEPA Environmental Checklist

Mercer Island Center for the Arts

Attachment H
Phase 1 Environmental Review

February 2, 2016

Compliant with All Appropriate Inquiry
Final Rule: 40 CFR Part 312

PHASE I
ENVIRONMENTAL
SITE ASSESSMENT

Subject Property:

MERCER ISLAND CENTER FOR THE ARTS

Southwest Corner of 78th Avenue Southeast and Southeast 32nd Street
Mercer Island, Washington 98040

Prepared for:
Mercer Island Center for the Arts
Post Office Box 1702
Mercer Island, Washington 98040

Prepared by:
AEROTECH
ENVIRONMENTAL CONSULTING, INC.
13925 Interurban Avenue South, Suite No. 210
Seattle, Washington 98168
Fax (206) 402-3872
(360) 710-5899
www.AerotechEnvironmental.com

Compliant with All Appropriate Inquiry
Final Rule: 40 CFR Part 312

PHASE I
ENVIRONMENTAL
SITE ASSESSMENT

Clients:	**MERCER ISLAND CENTER FOR THE ARTS** Post Office Box 1702 Mercer Island, Washington 98040
Point of Contact:	Mr. Benjamin S. Pariser Mercer Island Center for the Arts (206) 963-4818
Property:	**MERCER ISLAND CENTER FOR THE ARTS** Southwest Corner of 78th Avenue Southeast and Southeast 32nd Street Mercer Island, Washington 98040
County:	King County, Washington Parcel Number: 122404-9068
S.I.C. Code:	Not provided
Commercial Activity:	Recreational Park
Environmental Assessor:	Ms. Tiffany A. Chaussee
Project Number:	No. 215 - 5266
Report Date:	December 18, 2015

EXECUTIVE SUMMARY

The subject of this Phase I Environmental Site Assessment is a rectangular-shaped approximately 12.26-acre Parcel of land located on the southwest corner of the intersection of Southeast 78th Avenue and Southeast 32nd Street in Mercer Island, Washington.

The subject Property occupies *Mercerdale Park*. The majority of the land consists of a large open lawn that is bordered by a paved footpath that encircles the entire Site. Along the footpath are exercise stations. A playground is located along the southeastern side of the Site and a skatepark is located on the southwestern. On the west side of the park is an access point to trails that lead up the hillside into seven-acres of natural open space. The northeast corner of the park houses a paved picnic area with a covered pergola that faces the intersection of Southeast 32nd Street and 78th Avenue Southeast. On the northwestern side of the Property is an approximately 1,120 square foot, single story structure. This building houses two public restrooms located in the north side of the building and a separate storage room occupies the southern portion of the building. Outdoor sinks are located along the west exterior wall of the building and an attached canopy is located along the southeastern side of the building and covers a paved area.

The subject Property was originally developed in 1975 with the construction of the single story, 1,120 square foot building on the northwestern side of the Property. The building was used as a small recycling center by a "Committee To Save The Earth" and the Mercer Island High School. Around the 1970s, the Property was land was cleared as a field. The pedestrian pathways were added in the mid to late 1990s. In 2002, the present-day playground and skate park were constructed. Today, the northwest building appears to only be utilized as a maintenance storage shed for the park and the northern side of the building houses public restrooms. *The Mercer Island Center for the Arts* is anticipated to occupy the northwestern shop building in the near future.

The Property is located in downtown Mercer Island. To the north is Southeast 32nd Street followed by a retail strip building and Rite Aid. To the south is Mercer Island Thrift Shop ,a parking lot, and residences to the southwest. To the east is 78th Avenue Southeast followed by the Mercerdale Professional Center. To the west is heavily wooded land.

Upon completion of the Site investigation, historical research, document file review, and other tasks as stipulated in the Scope of Work, the following Recognized Environmental Conditions, potential environmental concerns, or recommended actions were identified:

- **Recommendation: No Further Action Indicated.** As a result of the on-site Reconnaissance, records research, historical investigation, and review of Federally reported environmental information, this Assessment has revealed no obvious evidence of potential environmental risks or Recognized Environmental Conditions indicating the presence of hazardous or other conditions. It is reasonable and prudent to believe that the risk of contamination is so minimal that no further investigation is warranted.

Upon the completion of this Assessment, no further investigation, remediation, or response actions are indicated, suggested, or recommended relative the potential environmental conditions at the subject Property other than those previously discussed. Based upon this Phase I Environmental Site Assessment, with those exceptions, it is reasonable and prudent for the Client to believe there is no other significant risk of contamination.

ASTM PROTOCOL CONCLUSION

We have performed a *Phase I Environmental Site Assessment* in conformance with the scope and limitations of ASTM Practice 1527 (Revision 2013) for Southwest Corner of 78th Avenue Southeast and Southeast 32nd Street in Mercer Island, Washington, the *property*. Any exceptions to, or deletions from, this practice are described in Possible Report Exceptions To All Appropriate Inquiry Rule Section[1] of this *report*.

This Assessment has no revealed evidence of *recognized environmental conditions*[2] in connection with the *property*.

This Assessment has no revealed evidence of an *historical recognized environmental condition* in connection with the *property*[3].

This Assessment has no revealed evidence of a *controlled recognized environmental conditions*[4] in connection with the *property*.

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[1] Refer to page 5 of this Assessment.

[2] *Recognized Environmental Condition* - the presence of likely presence of any *hazardous substances* or *petroleum products* in, on, or at a *property* under conditions that indicate an existing release, a past release, or a *material threat* of a release of any *hazardous substances* or *petroleum products* into structures on the *property* or into the ground, ground water, or surface water of the *property*. The term includes *hazardous substances* or *petroleum products* even under conditions in compliance with laws. The tern is not intended to include *de minimis conditions* that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be de minimis are not *recognized environmental conditions*.

[3] *Historical Recognized Environmental Condition* – a past release of any hazardous substance or petroleum product that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory agency or meeting the unrestricted residential use criteria established by a regulatory authority, without subjecting the property to any required controls such as property use restrictions, activity and use limitations, institutional controls, or engineering controls – at the time of the completion of the Environmental Site Assessment.

[4] *Controlled Recognized Environmental Condition* – a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority with hazardous substances or petroleum products allowed by remain in place subject to the implementation of required controls. A condition identified as a Controlled Recognized Environmental Condition does not imply that the Assessment has evaluated or confirmed the adequacy, implementation, or continued effectiveness of the required control that has been, or is intended to be implemented.

This Phase I Environmental
Site Assessment was performed in
Compliance with the
All Appropriate Inquiry (AAI)
Final Rule: 40 CFR Part 312[5]

POTENTIAL REPORT EXCEPTIONS TO ALL APPROPRIATE INQUIRY RULE:

§ 40 CFR Part 312.25 Searches for recorded environmental cleanup liens. (a) All appropriate inquiry must include a search for the existence of environmental cleanup liens against the subject property that are filed or recorded under federal, tribal, state, or local law.

§ 40 CFR Part 312.28 Specialized knowledge or experience on the part of the defendant. (a) Persons to whom this part is applicable per § 312.1(b)[6] must take into account, their specialized knowledge of the subject property, the area surrounding the subject property, the conditions of adjoining properties, and any other experience relevant to the inquiry, for the purpose of identifying conditions indicative of releases or threatened releases at the subject property, as defined in § 312.1(c).

§ 40 CFR Part 312.29 The relationship of the purchase price to the value of the property, if the property were not contaminated. (a) Persons to whom this part is applicable per § 312.1(b) must consider whether the purchase price of the subject property reasonably reflects to fair market value of the property, if the property were not contaminated.

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[5] A copy of excerpts from the *Standards and Practices for All Appropriate Inquiries; Final Rule* U.S. EPA, 40 CFR Part 312, 70 FR 66070, November 1, 2005, in included in the Appendix of this Report, in the Section entitled Supplemental Documents.

[6] § 312.1(b). *Applicability*. The requirements of this part are applicable to: (1) Persons seeking to establish: (i) The innocent landowner defense pursuant to CERCLA sections 101(35) and 197(b)(3); (ii) The bona fide prospective purchaser liability protection pursuant to CERCLA sections 101(40) and 107(r); (iii) The contiguous property owner liability protection pursuant to CERCLA section 107(q); and (2) persons conducting site characterization and assessments with the use of a grant awarded under CERCLA section 104(k)(2)(B).

ASSESSMENT OVERVIEW

Purpose:

The purpose of this Assessment is to comply with selected sections of the standards and practices for "all appropriate inquiry" for the purposes of CERCLA sections 101(35)(B)(i)(I) and 101(35)(B)(ii) and (iii), as defined in *Standards and Practices for All Appropriate Inquiries; Final Rule*, U.S. EPA, 40 CFR Part 312 (70 FR 66070). Some of the requires contained in Part 312 are excluded from this Assessment, as delineated in the preceding Section entitled "Report Exceptions to All Appropriate Inquiry Rule."

The business purpose of this Phase I Environmental Site Assessment was to investigate, review, assess, and evaluate – through historical research, document and record review, generally available environmental data, visual or physical observations, and inspection by a trained assessor – the presence or likely existence of:

- Contamination by hazardous materials, generally recognized environmental contaminants, visible pollutants, underground contaminants, and asbestos-containing materials.
- The possibility that these materials are or may have been introduced – by internal generation, external introduction, or unknown sources – into the structure or subject Property.
- A brief overview, evaluation, and assessment of the severity of the current potential environmental risk based upon known standards or applicable regulations.

Unless specifically noted within the text of this Report, this Phase I Environmental Site Assessment does not include or address groundwater, soil, or extraneous material contamination upon or under the surface soils, with respect to testing, coring, or sampling analysis.

Protocol:

The procedure for this Environmental Site Assessment was to perform in practical and reasonable steps-- employing currently available technology, existing regulations, and generally acceptable engineering practices – an investigation to ascertain the possibility, presence, or absence of environmental releases, threatened releases, or Recognized Environmental Conditions, as limited by the Scope of Work. As such, this Assessment was performed in substantial compliance with the ASTM Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (Designation E 1527-13).

Objectives:

- To attempt to accomplish all appropriate inquiry into ownership and uses of the Property consistent with good commercial or customary practice, in an effort to minimize liability.
- To conduct an investigation of the Property that will assist ownership's positioning within the "safe harbor" section of the Federal Superfund liability in 42 U.S.C. §9601(35), the Lender Liability Final Rule, and the CERCLA amendments enacted as part of the 2002 Brownfields Act.
- To provide environmental information that will assist in evaluating ownership's risk of potential loss or value impairment of the security interest due to environmental defects; and information for decisions and operational limitations concerning the National Pollution Contingency Plan.

While this Phase I Assessment cannot absolutely quantify and qualify every possible past and present environmental risk, the Assessment does provide a partial information basis for reasonable decision making regarding the potential for environmental liabilities and risk, based upon the current Site-specific situation, Assessment limitations, and methods of evaluation.