ENVIRONMENTAL CHECKLIST

N26 and E2 Lots Fleet Charging Project

UNIVERSITY *of* WASHINGTON

October 2023

Purpose

The State Environmental Policy Act (SEPA), Chapter 43.21 RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. The purpose of this checklist is to provide information to help identify impacts from the proposal (and to reduce or avoid impacts, if possible) and to help the University of Washington to make a SEPA threshold determination.

A.Background

1. **Name of proposed project, if applicable:**

   University of Washington N26 and N2 Lots Fleet Charging Project

2. **Name of applicant:**

   University of Washington

3. **Address and phone number of applicant and contact person:**

   Applicant
   University of Washington
   Facilities, Asset Management
   Box 352205
   Seattle, WA 98195-2205

   Contact
   Julie Blakeslee
   Environmental and Land Use Planner
   University of Washington
   Facilities, Asset Management
   Box 352205
   Seattle, WA 98195-2205
   jblakesl@uw.edu

4. **Date checklist prepared:**

   The Checklist was prepared on October 31, 2023 by the University of Washington as the lead agency under the authority of WAC 478-324

5. **Agency requesting checklist:**

   University of Washington
   Facilities, Asset Management
   Box 352205
   Seattle, WA 98195-2205

6. **Proposed timing of schedule (including phasing, if applicable):**

   Project construction is anticipated to begin in spring 2024 and have a duration of approximately 12 months.

7. **Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.**

   No future plans for further development of the project site are proposed.

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

   The following environmental review documents were prepared for the University of Washington 2018 Seattle Campus Master Plan:

   - University of Washington 2018 Seattle Campus Master Plan Draft EIS (2016)
   - University of Washington 2018 Seattle Campus Master Plan Final EIS (2017)

   The following environmental review information was prepared in support of the proposed project and can be found in the appendix of this document:

   - *Fleet Charging Stations & Security, Parking Lots N26 & E2, Geotechnical Engineering Report* (GeoEngineers, 2023)) – Appendix A

9. **Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.**

   There are no known other applications that are pending approval for this site.

10. **List any government approvals or permits that will be needed for your proposal, if known.**

    University of Washington
    - Project approval, design approval, authorization to prepare contract documents, and authorization to Call-for-Bids.

    City of Seattle Department of Construction and Inspections

    Permits/approvals associated with the proposed project, including:
    - Grading/Shoring Permit
    - Electrical Permit
    - Comprehensive Drainage Control Plan and Construction Stormwater Control Plan Approval
    - Environmental Critical Areas Exemption

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site.

Lot E2

The project will also provide 74 (level 2) plus 6 (level 3, fast) electric vehicle (EV) charging stations at the E2 parking lot (see **Figure 1**). This is a UW Fleet Services lot and the project will support the increasing percentage of UW Fleet converting to electric vehicles. The scope of work includes the associated power requirements to support the electrical load of new chargers. This includes excavation and trenching needed to support the installation of electrical equipment and conduit runs. The project would also address site conditions for protection/security to deter vehicle vandalism and/or theft in the form of a fence and gate.

Lot N26

The project will provide 38 (level 2) electric vehicle (EV) charging stations at the UW Plant Services building (see **Figures 2 and 3**). This is the UW Fleet Services yard and the project will support the increasing percentage of UW Fleet converting to electric vehicles. The scope of work includes the associated power requirements to support the electrical load of new chargers. This includes excavation and trenching needed to support the installation of electrical equipment and conduit runs. The project would also address site conditions for protection/security to deter vehicle vandalism and/or theft in the form of a fence and gate.

Level 3 chargers are anticipated to be installed in a later phase of this project.

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).

The proposed project lots are located in the northeast portion of the Central Campus area. The N26 parking lot is located west of the UW Plant Services building and adjacent to the Burke-Gilman Trail at 4523 Pend Oreille Place NE. The E2 parking lot located south of the NE 45th Street viaduct, west of Montlake Blvd NE, north of NE 44th Place, and east of 25th Avenue NE at 2500 NE 44th Place (see **Figures 1-3**).

B. Environmental Elements

1. Earth

a. General description of the site:

Circle or highlight one: Flat, rolling, hilly, steep slopes, mountainous, other:

The lots are generally flat.

b. What is the steepest slope on the site (approximate percent slope)?

The City of Seattle's Environmental Critical Areas (ECA) Maps indicate there are no steep slopes on the sites but located west of Lot N26.

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.

Soils mapped in the immediate vicinity of Parking Lot N-26 are mapped as pre-Fraser deposits on the west side of the site and peat and artificial fill on the east side of the site. Parking Lot E-02 is mapped as peat deposits and artificial fill.

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

No surface indications are present. The Lot E-2 is constructed over the top of the old landfill and peat deposits. The N-26 lot is adjacent to steep slope areas but this project is outside of the slopes and buffers.

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.

It is anticipated that construction of the proposed project would require approximately 1200 cubic yards of material to be removed from the N26 lot and 1900 cubic yards of material to be removed from the E2 lot. Any soil removed would be transported to an approved location. The source of fill is unknown at this time but would also be from an approved source.

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

Temporary erosion is possible in conjunction with any construction activity. Site work would expose soils on the site, but the implementation of a Temporary Erosion Sedimentation Control (TESC) plan that is consistent with City of Seattle standards and the implementation of best management practices (BMPs) during construction would mitigate any potential impacts.

Once the project is operational, no erosion is anticipated.

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

The majority of the site is currently covered with existing impervious surfaces, including the existing parking lots and other impervious surfaces (walkways, sidewalks, etc.). With the proposed project, the existing parking lot paving would be replaced with new paving with the charger and conduit installation. The 2018 Seattle Campus Master Plan EIS identifies anticipated increases in impervious surfaces with future development of the campus and states that "development would result in an overall increase in hard

surfaces associated with buildings and paths/walkways; however, there would be a reduction in hard surfaces associated with streets and surface parking areas". Similarly, the proposed project would generally replace existing hard surfaces and any change in hard surface area would be anticipated to be negligible.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any.

The site is identified on the City of Seattle ECA maps as within a peat-settlement prone area. However, geotechnical investigations encountered only minor amounts of peat on site and recommended that deep foundations could be utilized to mitigate potential settlement issues due to peat (see Appendix A).

The Geotechnical Report acknowledges that the site location is within a methane buffer. Given the open air nature of the project (parking lot) and the inclusion of the existing passive methane collection and venting system the report indicates that no additional measures are needed (see Appendix A).

Pursuant to the Overview Policy at SMC 25.05.665, no further mitigation is warranted.

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.

During construction, the project could result in temporary increases in localized air emissions associated with particulates and construction-related vehicles. It is anticipated that the primary source of temporary, localized increases in air quality emissions would result from particulates associated with demolition of a paved surface, on-site excavation and site preparation. While the potential for increased, air quality emissions could occur throughout the construction process, the timeframe of greatest potential impact would be at the outset of the project in conjunction with the site preparation and excavation/grading activities. However, as described above under the Earth discussion, minimal amounts of excavation would be required for the project and air quality emission impacts are not anticipated to be significant.

Temporary, localized emissions associated with carbon monoxide and hydrocarbons would result from diesel and gasoline-powered construction equipment operating on-site, construction traffic accessing the project site, and construction worker traffic. However, emissions from these vehicles and equipment would be small and temporary and are not anticipated to result in a significant impact.

Upon completion of the project, operation of the site would be similar to today but over time with more electric vehicles resulting in lower emissions. As a result, significant adverse air quality impacts would not be anticipated.

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

The primary off-site source of emissions in the site vicinity is vehicle traffic on surrounding roadways, including Montlake Boulevard NE and 25th Avenue NE. here are no known offsite sources of air emissions or odors that would affect the proposed project.

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

Short term impacts to air quality arising for construction, (fugitive dust and airborne particulates) are mitigated by adherence to Puget Sound Clean Air Agency regulations PSCAA - Reg 1 - Section 9.15 (1-9 Emission Standards), PSCAA – Reg 3 – Article 4 (Asbestos Control Standards), the Seattle Stormwater Drainage Code 22.800, and Grading Code 22.170 and the best management practices for controlling erosion described above from the Seattle Municipal Code.

Pursuant to the Overview Policy at SMC 25.05.665, no further mitigation is warranted.

3. Water

a. Surface:

1. 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.

There is no surface water body on or in the immediate vicinity of the project site.

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.

No.

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.

None.

4. Will the proposal require surface water withdrawals or diversions? Give a 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:

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 a 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 (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.**

   No.

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.**

   With the proposed project, stormwater from the site would be designed in accordance with the City of Seattle Stormwater and Drainage Code, SMC Title 22 and similar to the rest of campus, stormwater would ultimately discharge to the University of Washington storm drainage system which drains to the Union Bay area of Lake Washington.

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

   The existing and proposed stormwater management system for the site would continue to ensure that waste materials would not enter ground or surface waters as a result of the proposed project.

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:

Stormwater for the proposed project site would discharge to the University of Washington's storm drainage system which ultimately drains to the Union Bay area of Lake Washington. The existing on-site system at UW is estimated to have adequate capacity for the proposed project.

Additionally, all existing local regulations under the Stormwater and Drainage Code, SMC Title 22, apply.

4. Plants

Find help answering plants questions

a. **Check the types of vegetation found on the site:**

☒ **deciduous tree: alder, maple, aspen, other**

☒ **evergreen tree: fir, cedar, pine, other**

☒ **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?**

Minimal to no vegetation would be removed. Minor areas of grass or shrubs may be removed or pruned for purposes of construction/installation.

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

None.

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

Restoration of the site would occur if plant material is removed.

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

None known.

5. Animals

a. **List any birds and other animals that 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: squirrels, raccoons, rats, mice**
- **Fish:** bass, salmon, trout, herring, shellfish, **other: None**

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

None.

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

The entire Puget Sound area is within the Pacific Flyway, which is a major north-south flyway for migratory birds in America—extending from Alaska to Patagonia. Every year, migratory birds travel some or all of this distance both in spring and in fall, following food sources, heading to breeding grounds, or travelling to overwintering sites.

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

None.

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

Invasive species known to be located in King County include European starling, house sparrow and eastern gray squirrel.

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 are the primary source of energy that would serve the proposed project and would generally be utilized for lighting and charging. The project design is also evaluating the potential for including a solar photovoltaic panel system adjacent to the site to serve the chargers or electrical demand.

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

The proposed project would not affect the use of solar energy by adjacent properties.

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 proposed development would conform to the applicable provisions of the State of Washington Energy Code and the City of the Seattle Energy Code. The project itself is designed to reduce demand for gasoline.

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 because of this proposal? If so, describe.

As with any construction project, accidental spills of hazardous materials from equipment or vehicles could occur during the construction of the project; however, a spill prevention plan would minimize the potential of an accidental release of hazardous materials into the environment.

According to the City of Seattle ECA Maps, the project site is located within the 1,000-foot methane buffer area of an abandoned landfill in the E2 lot. Geotechnical analysis provides preventative measures such as continuation of methane monitoring (see Appendix A for details).

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

   The E2 lot site is also located in an area of a former abandoned landfill. It is anticipated that the fill over the former landfill is at a depth where there is a possibility to encounter waste during excavation activities on the site. Debris piling, testing, and appropriate disposal and safety protocols would be followed in accordance with the University's Montlake Landfill Project Guide and no significant impacts would be anticipated.

2. **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 identified.

3. **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.**

   During construction, gasoline and other petroleum-based products would be used for the operation of construction vehicles and equipment.

   During the operation, gasoline would be used on the site would be limited to vehicles until full conversion to electric vehicles.

4. **Describe special emergency services that might be required.**

   No special emergency services are anticipated to be required as a result of the project. As is typical of urban development, it is possible that normal fire, medical, and other emergency services may, on occasion, be needed from the City of Seattle.

5. **Proposed measures to reduce or control environmental health hazards, if any.**

   Washington State occupational health and safety standards and local fire code requirements ensuring the use of toxic or flammable materials is adequately addressed in the campus setting. Measures to monitor or prevent the potential accumulation of methane gas would also be provided as part of construction (see Appendix A for details).

b. Noise

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

   Traffic noise from adjacent streets (NE 45th Street viaduct, Montlake Blvd. NE, 25th Avenue NE) are the primary source of noise in the vicinity. Existing noise in the vicinity is not anticipated to affect the proposed project.

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)?**

   Short-Term Noise

   Temporary construction-related noise would occur as a result of on-site construction activities associated with the project. The proposed project would comply with provisions of Seattle's Noise Code (SMC, Chapter 25.08) as it relates to construction-related noise to reduce noise impacts during construction.

   Long-Term Noise

   The proposed project would likely result in no increase in noise as the use would continue to be service vehicles travelling to and from the site. No significant noise impacts would be anticipated.

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

   No.

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.**

   The current and proposed use is parking lots near the UW Plant Services building and surrounded by city streets, parking lots, the University of Washington to the south and west and U-Village to the north and east. No affect to land use or adjacent properties are anticipated.

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 because 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.

No structures existing in the parking lots.

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

No structures would be demolished.

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

The site is currently zoned as Major Institution Overlay with a 65-foot height limit (MIO-65) for the N26 lot and an 80-foot height limit (MIO 90'/80') for the E2 lot established pursuant to the 2019 Seattle Campus Master Plan.

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

The current comprehensive plan designation for the site is Major Institution. (City of Seattle, 2022).

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.

Steep slopes have been identified adjacent to the project on lot N-26. Both parking lots are within or adjacent to the capped and abandoned Montlake landfill.

i. Approximately how many people would reside or work in the completed project?

None.

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.

None necessary.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

The project site is not located near agricultural or forest lands and no mitigation measures are necessary.

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:

None necessary.

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?

Not applicable, no structures exist within the lots or are proposed.

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

None.

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

None necessary.

11. Light and glare

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

Short-Term/Construction Light and Glare

At times during the construction process, area lighting of the project site (to meet safety requirements) may be necessary, which would be noticeable proximate to the project site. In general, however, light and glare from construction of the proposed project are not anticipated to adversely affect adjacent land uses.

Long-term/Operational Light and Glare

Existing lighting would remain with new, supplemental fixtures added that would provide downward directed illumination of the N26 lot and back of the UW Plant Services building. Existing light fixtures will be replaced with new fixtures providing downward directed illumination in the E2 lot.

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

Light and glare associated with the proposed project would not be expected to cause a safety hazard or interfere with views.

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:

None necessary.

12. Recreation

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

No recreational opportunities are in the immediate vicinity. The closest opportunites are all of the UW Recreation and Intercollegiate Athletic facilities across Montlake Blvd NE and approximately ¼ mile or more to the southeast including intramural playfields.

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

No.

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

None necessary.

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? 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.

The DAHP website, WISAARD, and the City of Seattle Department of Neighborhoods Landmarks Map and List were consulted to identify any potential historic or cultural sites in the surrounding area, as well as the potential for encountering archaeological resources in the area.

Additionally, the cultural resources sensitivity analysis in the 2019 Seattle Campus Master Plan EIS indicates that the site has a low potential for sensitive cultural resource conditions.

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.

None.

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.

Lot N26 is accessed by UW streets and 25th Avenue NE. Lot E2 is accessed by NE 44th Place and will continue to do so with the proposed project.

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?

Transit with numerous routes operate along 25th Avenue NE, NE 45th Street, and Montlake Blvd. NE with bus stops in close proximity to the two lots.

c. 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).

No.

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

No.

e. 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?

Construction of the proposed project would temporarily generate some additional vehicle trips associated with construction workers and equipment/vehicles travelling to and from the site during the construction process. Construction activities would be in compliance with applicable University of Washington and City of Seattle regulations, which would include preparation of a Construction Management Plan to minimize potential construction-related transportation issues.

The proposed project is not anticipated to generate increased demand vehicle trips to the site or the overall University campus due to the fact that the project would be utilized by employees that are already traveling to campus currently.

f. 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.

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

Construction activities would occur in compliance with applicable University of Washington and City of Seattle regulations, and would include the preparation of a Construction Management Plan to control and minimize potential construction-related transportation issues.

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.**

The project is not anticipated to generate an increase in the need for public services.

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:

All utilities are currently available on site, including electricity, natural gas, water, sanitary sewer, telephone, and cable/internet services.

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.**

Both parking lots will require the installation of electrical duct banks to transmit power to the proposed EV charging infrastructure. Lot E2 will require a new electrical service provided by Seattle City Light (SCL). The project will require the installation of electrical and communication conduit and cables, control and electrical service control cabinets, pad mounted electrical transformers.

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.

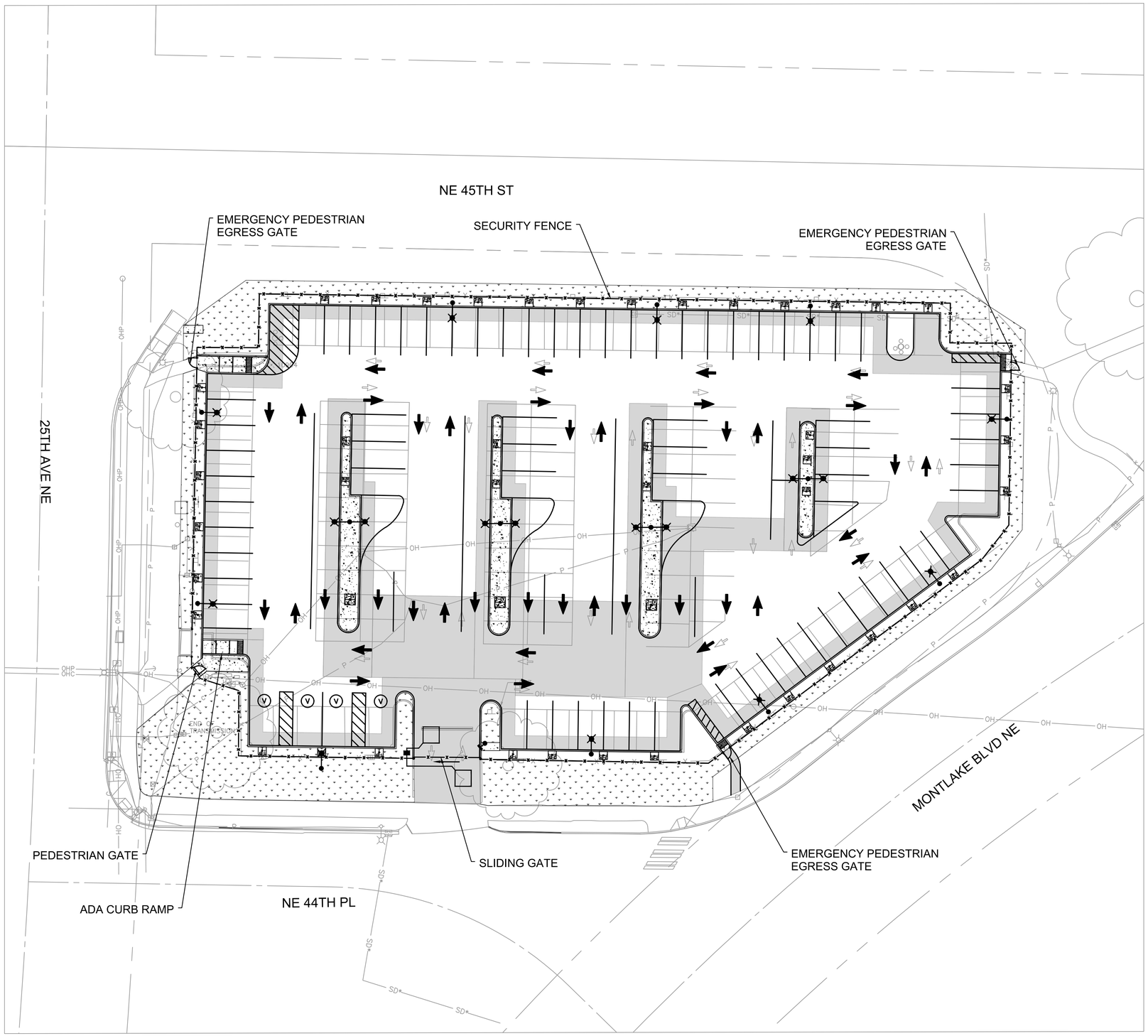
X _____

Type name of signee: Julie Blakeslee

Position and agency/organization: University Environmental & Land Use Planner, SEPA Responsible Official, University of Washington Facilities

Date submitted: 10/31/23

Figures 1, 2, and 3
Lot E2 and N26 Drawings



LEGEND:

- 2–VEHICLE LEVEL 2 EV CHARGER
- 1–VEHICLE LEVEL 2 EV CHARGER
- 2–VEHICLE LEVEL 3 CHARGER
- LIGHTING FOR CHARGERS/SECURITY
- SECURITY FENCE
- SLIDING GATE
- PEDESTRIAN GATE
- LANDSCAPING
- ASPHALT PAVEMENT FULL DEPTH
- CONCRETE PAVEMENT
- GORE STRIPING
- VAN ACCESSIBLE ADA STALL

GENERAL NOTES:

1. SEE SHEET C2.01 FOR PAVING PLAN.
2. SEE SHEET C3.01 FOR ELECTRICAL PLAN.
3. SEE SHEET C4.01 FOR FENCE, GATE, AND CHANNELIZATION PLAN.

N

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UNIVERSITY OF WASHINGTON

N26 AND E2 CHARGING STATIONS AND SECURITY PROJECT NO. 208048

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT PRINCIPAL:	JLD
PROJECT MANAGER:	TWN
DESIGNED:	TWN
DRAWN:	IKD
CHECKED:	TWN
DATE:	AUGUST 21, 2023
PROJECT NUMBER:	25.2023.003

TRAVIS W. NEIL — STATE OF WASHINGTON — 45379 — REGISTERED PROFESSIONAL ENGINEER

PRELIMINARY

9/5/2023

SHEET TITLE

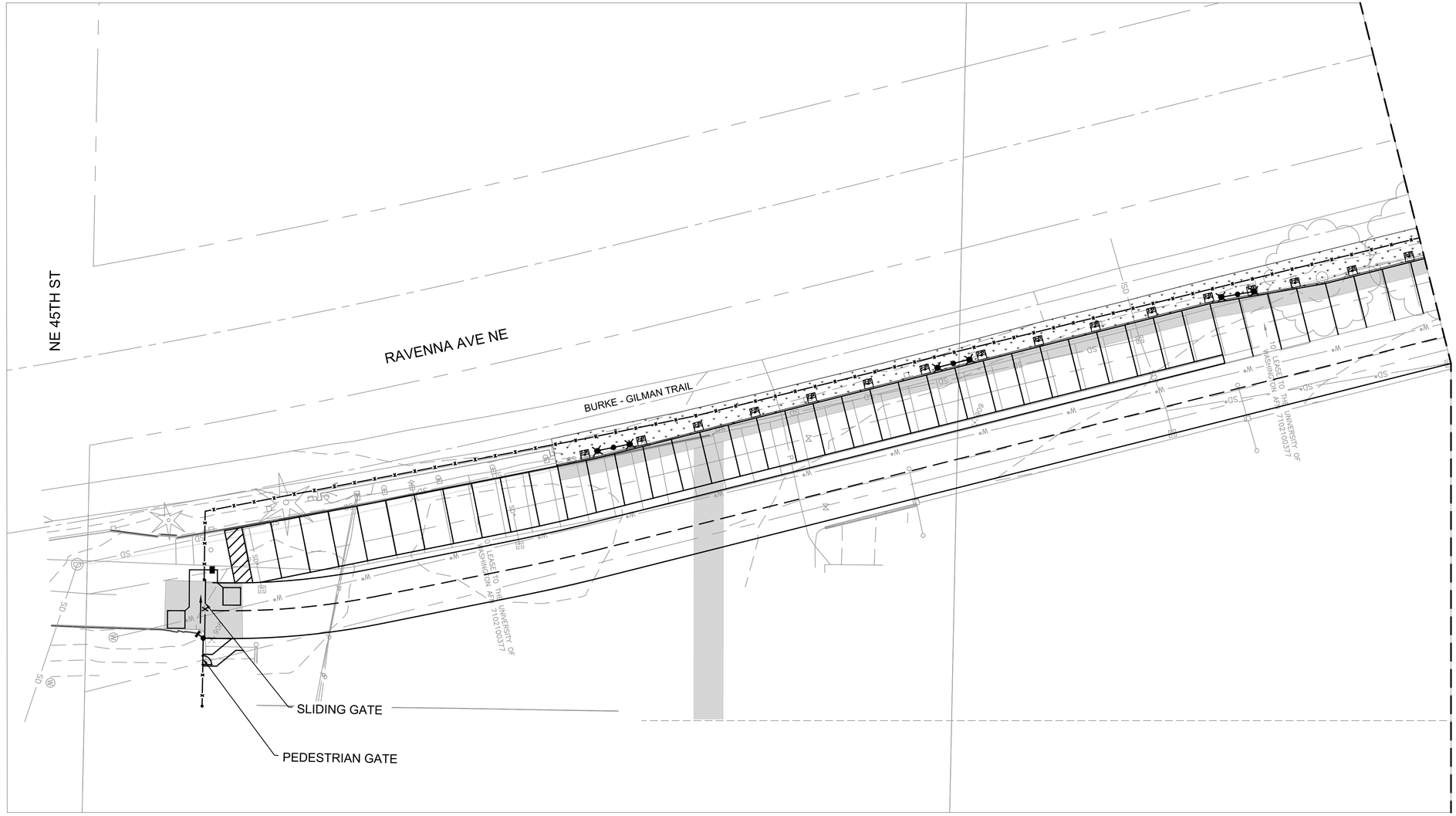
E2 LOT LAYOUT PLAN

SHEET NUMBER

C1.01

5 OF 16 SHEETS

09/11/2023 4:01pm H:\25St\23\003 UW N2 & E02 Fleet Charging Stations & Security\Drafting\Design – CAD 2020\C1.01 E2.dwg



LEGEND:

- 2–VEHICLE LEVEL 2 EV CHARGER
- 1–VEHICLE LEVEL 2 EV CHARGER
- 2–VEHICLE LEVEL 3 CHARGER
- LIGHTING FOR CHARGERS/SECURITY
- SECURITY FENCE
- SLIDING GATE
- PEDESTRIAN GATE
- LANDSCAPING
- ASPHALT PAVEMENT FULL DEPTH
- CONCRETE PAVEMENT
- GORE STRIPING
- VAN ACCESSIBLE ADA STALL

GENERAL NOTES:

1. SEE SHEET C2.02–C2.03 FOR PAVING PLAN.
2. SEE SHEET C3.02–C3.03 FOR ELECTRICAL PLAN.
3. SEE SHEET C4.02–C4.03 FOR FENCE, GATE, AND CHANNELIZATION PLAN.

SCALE IN FEET
20 0 20 40

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Ph: 425 741-3800
Fax: 425 741-3900

UNIVERSITY OF WASHINGTON

N26 AND E2 CHARGING STATIONS AND SECURITY PROJECT NO. 208048

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT PRINCIPAL:	JLD
PROJECT MANAGER:	TWN
DESIGNED:	TWN
DRAWN:	IKD
CHECKED:	TWN
DATE:	AUGUST 21, 2023
PROJECT NUMBER:	25.2023.003

TRAVIS W. NEIN — STATE OF WASHINGTON — 45379 — REGISTERED PROFESSIONAL ENGINEER — PRELIMINARY

9/5/2023

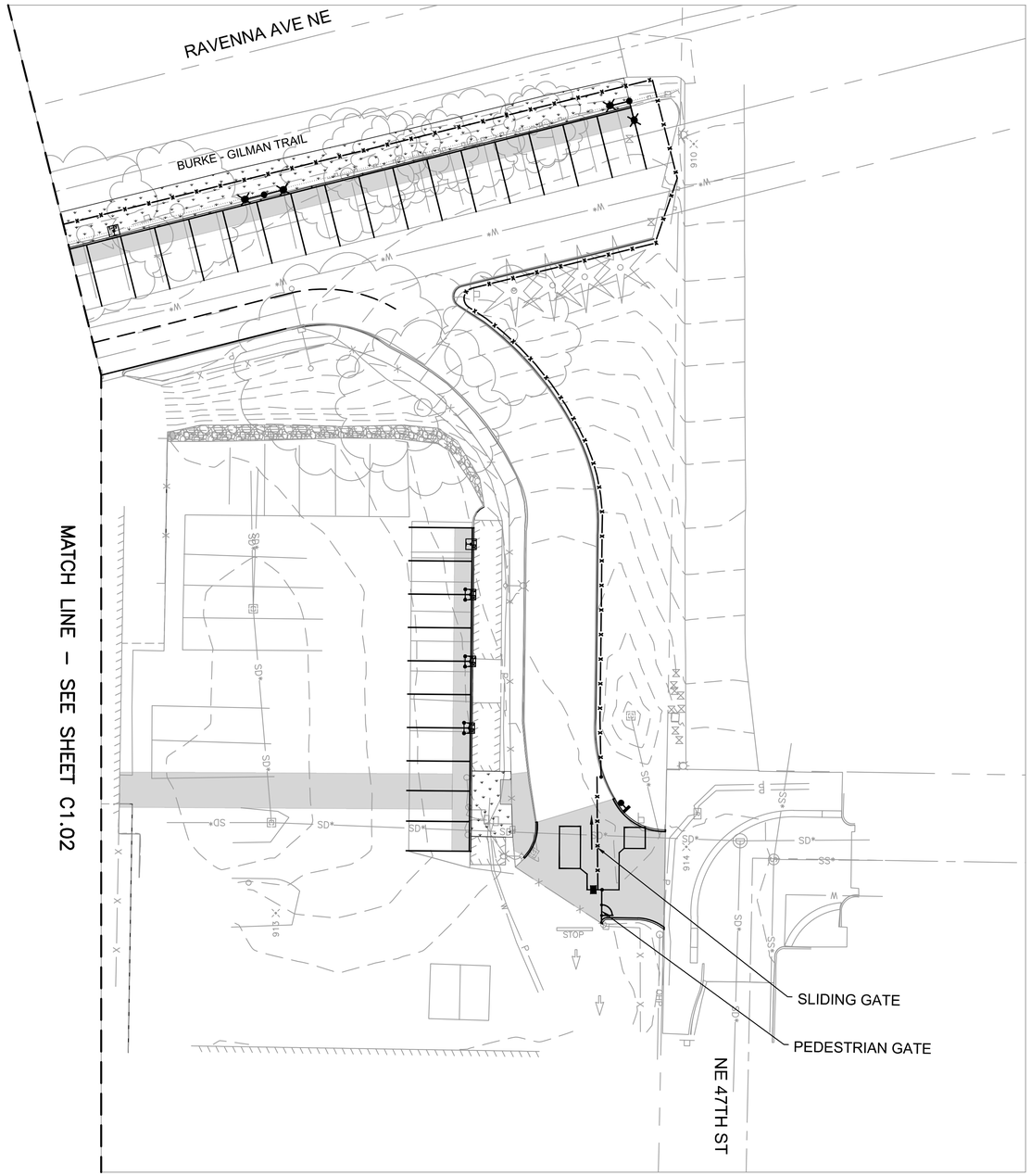
SHEET TITLE

N26
LOT LAYOUT PLAN

SHEET NUMBER

C1.02

6 OF 16 SHEETS



LEGEND:

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- 1–VEHICLE LEVEL 2 EV CHARGER
- 2–VEHICLE LEVEL 3 CHARGER
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- (V) VAN ACCESSIBLE ADA STALL

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TRAVIS W. NEIL — STATE OF WASHINGTON — 45379 — REGISTERED PROFESSIONAL ENGINEER — PRELIMINARY

9/5/2023

SHEET TITLE

N26 LOT LAYOUT PLAN

SHEET NUMBER

C1.03

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Appendix A

Geotechnical Report

Geotechnical Engineering Services

Fleet Charging Stations & Security
Parking Lots N-26 & E-02
Seattle, Washington

for
University of Washington

September 22, 2023

GeoEngineers

17425 NE Union Hill Road, Suite 250
Redmond, Washington 98052
425.861.6000

Geotechnical Engineering Services

Fleet Charging Stations & Security Parking Lots N-26 & E-02 Seattle, Washington

File No. 0183-155-00

September 22, 2023

Prepared for:

University of Washington
Capital Planning & Development
Facilities Services Administration Building
UW Box 352205, Seattle, Washington 98105

Attention: Warren Phillips

Prepared by:

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Colton W. McInelly, PE
Geotechnical Engineer

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Robert C. Metcalfe, PE, LEG
Principal

CWM:RCM:tlm:nld

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APPENDICES

1.0 INTRODUCTION

This geotechnical engineering report presents the results of GeoEngineers, Inc.'s (GeoEngineers) geotechnical engineering services to support design and construction of the Fleet Charging Stations & Security – Parking Lots N-26 & E-02 project at the University of Washington (UW) campus in Seattle, Washington. The location of the site and general configuration of the parking lots are shown on the Vicinity Map and Overall Site Plan, Figures 1 and 2, respectively.

1.1. Project Description

The UW is planning to provide new electric vehicle (EV) charging stations and install security enhancements in both parking lots. Parking Lot N-26 and the UW Fleet Services yard are located between the Plant Services Building and the Burke Gilman Trail, as shown on Figure 3, and are located within the former Montlake Landfill 1,000-foot buffer. Parking Lot E-02 is located directly northeast of the intersection of 25th Avenue Northeast and Northeast 44th Street, as shown on Figure 4, and is also located within the former Montlake Landfill footprint.

Our understanding of the project is based on discussions with, and information provided by the UW. We understand the project consists of:

- Installing 38 level 2 solar capable EV charging stations at Parking Lot N-26.
- Installing 74 level 2 solar capable EV charging stations and providing infrastructure for future installation of four level 3 EV charging stations at Parking Lot E-02.
- Designing and constructing site security enhancements, including fencing/gates, access control, lighting, and camera systems to Parking Lots E-02 and N-26 as well as the UW Fleet Services Yard.

1.2. Purpose and Scope

The purpose of our services is to evaluate existing soil and groundwater conditions as a basis for developing design criteria for the geotechnical aspects of the project. Our services were performed in general accordance with our contract with the UW for Project No. 208048 dated July 26, 2023.

1.3. Previous Studies

Subsurface soil and groundwater conditions at each site were evaluated by reviewing existing explorations previously performed by GeoEngineers and others at the parking lots or in the immediate vicinity of the parking lots. The approximate locations of relevant explorations are shown on Figures 2, 3 and 4, and logs of the explorations referenced for this study are presented in Appendix A.

2.0 SITE DESCRIPTION

2.1. Surface Conditions

2.1.1. Parking Lot N-26 and UW Fleet Services Yard

The site is currently occupied by Pend Oreille Place Northeast and associated parking spaces (Parking Lot N-26 and the Fleet Services Yard) and is bounded by an adjacent developed property to the north, the Plant Services and Fleet Services Buildings and associated parking to the east, the Northeast 45th Street overpass to the south, and the Burke Gilman Trail to the west. Site grades are relatively flat at about

Elevation 51 feet in the south portion of the site. Grades gradually slope down to the north along Pend Oreille Place Northeast to about Elevation 47 feet in the northwest corner where Pend Oreille Place Northeast turns to the east and moderately slopes down to about Elevation 37 feet at the north entrance to the UW Fleet Services Yard. Grades in the UW Fleet Services Yard are relatively flat and range from approximately Elevation 33 to 37 feet.

An approximately 16- to 20-foot-tall retaining wall separates the parking lot to the west of the Plant Services Building (east of Pend Oreille Place Northeast) and the UW Fleet Services Yard. The Plant Services Building has a below-grade basement beneath the parking lot to the west of the building. Large deciduous trees line the Burke Gilman Trail and are located on the west side of the Fleet Services Yard area.

2.1.2. Parking Lot E-02

Parking Lot E-02 is bounded by the Northeast 45th Street overpass to the north, Montlake Boulevard Northeast to the east, Northeast 44th Street to the south, and 25th Avenue Northeast to the west. Site grades slope gently down to the northeast from approximately Elevation 37 feet in the southwest corner to Elevation 29 feet in the northeast corner. The site is covered with asphalt pavement and an entryway allows access to the parking lot off of Northeast 44th street on the south side of the site. Medium sized deciduous and coniferous trees line the perimeter of the site.

2.2. Site Geology

We reviewed the Geologic Map of Northeastern Seattle (Part of the Seattle North 7.5'x15' Quadrangle), King County (Booth et al. 2009). The soils across most of the campus located upslope and west of Montlake Boulevard are mapped as glacial till, which generally consists of dense to very dense silty sand with gravel, cobbles and occasional boulders deposited below glaciers. Glacial till commonly includes an upper medium dense weathered zone.

The lower slope on the east side of the campus near Montlake Boulevard is mapped as advance outwash and pre-Fraser deposits. Advance outwash generally consists of dense to very dense well sorted sand and gravel which were glacially overridden. Pre-Fraser deposits generally consists of very dense interbedded sand, gravel, silt, and widely sorted sediment that was deposited prior to the last glaciation and subsequently consolidated by glaciers.

The area east of Montlake Boulevard and the slope on the east side of campus is mapped as peat deposits, landfill debris and artificial fill. The highly compressible peat was deposited in shallow water at the north end of Union Bay, and this soil was exposed when the level of Lake Washington was dropped after the completion of the Ballard Locks. The Montlake (Ravenna) Landfill located immediately southeast of Parking Lot E-02 was operated from about 1926 to 1966, and landfill materials were placed on top of the peat deposits. Artificial fill is mapped throughout the area east of Montlake Boulevard and east of the lower slope on the east side of campus and is associated with previous development and landfilling activities.

Soils mapped in the immediate vicinity of Parking Lot N-26 are mapped as pre-Fraser deposits on the west side of the site and peat and artificial fill on the east side of the site. Parking Lot E-02 is mapped as peat deposits and artificial fill.

2.3. Geologic Hazards

Our assessment of the geologic hazards at the site includes reviewing the environmentally critical areas (ECAs) defined by the City of Seattle Department of Construction and Inspections (SDCI). Based on our review, both the Parking Lot N-26 and E-02 sites are located in liquefaction prone and peat settlement prone areas as well as the 1,000-foot abandoned landfill buffer associated with the Montlake Landfill. A steep slope is mapped within the Parking Lot N-26 site, and steep slopes are also mapped directly west of the Parking Lot N-26 site, above the Burke-Gilman Trail. Further discussion on these ECAs is presented in Section 3.1.

2.4. Subsurface Soil Conditions

Our understanding of subsurface soil conditions is based on our review of existing geotechnical information from previous studies in the vicinity of the site (see Figures 2, 3 and 4 for the exploration locations). In general, the soils at the sites consist of relatively shallow fill overlying peat, alluvial sands and lacustrine clay deposits as well as pre-Fraser deposits, which is consistent with the geologic map for the project area.

2.4.1. Parking Lot N-26 and UW Fleet Services Yard

The soils at Parking Lot N-26 and the UW Fleet Services Yard generally consist of fill, peat, alluvial sands and glacially consolidated pre-Fraser deposits. The depth to the pre-Fraser deposits varies across the site, and the unit is relatively shallow and close to the ground surface on the west side of the site where it directly underlies the fill. On the east side of the site, it is much deeper and underlies the fill, peat and alluvial sands.

Fill at the site generally consists of very loose to medium dense silty sand with varying amounts of gravel and organic matter, as well as medium stiff to stiff sandy silt and clay with varying amounts of gravel and organic matter. Various plastic and wood debris, as well as rubble, was encountered within the fill in several of the previous explorations. The fill ranges from about 6 to 10 feet deep below the ground surface on the west side of the site, and 7 to 19 feet deep on the east side of the site.

Soft peat exists along the east portion of the site beneath the fill and ranges in thickness from approximately 6 to 10 feet. Alluvial deposits generally underly the peat and consist of loose to medium dense sand with varying amounts of silt, gravel and organic matter. The alluvial deposits extend up to 50 feet beneath site grades.

Pre-Fraser deposits exist beneath the fill, peat and alluvial sands and generally consists of very stiff to hard silt and clay as well as dense to very dense silty sand with varying amounts of gravel. The pre-Fraser deposits, where encountered, were observed to the depths explored.

2.4.2. Parking Lot E-02

In general, the soils at Parking Lot E-02 consist of relatively shallow fill overlying peat and sand with interlayered peat deposits. Alluvial sand and lacustrine clay deposits underlie the peat, and recessional outwash underlies this sand and clay at depth.

Fill encountered generally consists of very loose to medium dense silty sand and medium stiff to stiff sandy silt and was observed about 6½ to 10 feet below existing grades. The fill contains various amounts of gravel, organic content, and wood debris.

Very soft to medium stiff peat and loose to medium dense sand with peat interlayers were observed beneath the fill in the deeper borings. The interlayered peat and sand deposits typically ranged in thickness from about 14 to 40 feet thick, although they were observed as deep as 53 feet beneath the ground surface.

The alluvial sand observed beneath the peat generally consists of medium dense to dense sand with varying amounts of silt and is up to 24 feet thick. Lacustrine clay generally underlies the alluvial sand; however, in some instances it is interlayered with the alluvial sand. The lacustrine clay ranges in consistency from very soft to very stiff, contains varying amounts of sand, and is up to 36 feet thick.

Recessional outwash was observed at depths of about 80 to 94 feet beneath the ground surface and consists of medium dense to very dense sand with varying amounts of silt and gravel. The recessional outwash was observed to the depths explored, when encountered.

Landfill refuse was observed in explorations completed for the UW driving range across Montlake Boulevard Northeast from the project site. The landfill refuse overlies the peat and was observed about 7½ to 11 feet below existing site grades and was up to about 9 feet thick. No landfill refuse was documented in explorations completed on the same side of Montlake Boulevard Northeast as Parking Lot E-02; however, it could exist below the site and the contractor should be prepared to deal with it in excavations for the project.

2.5. Groundwater Conditions

2.5.1. Parking Lot N-26 and UW Fleet Services Yard

Groundwater was observed to be perched on top of the relatively impermeable silt and clay pre-Fraser deposits on the west side of the site at a depth of about 7 feet. On the east side of the site groundwater was observed to be within the peat and alluvial sand deposits and ranges from about 10 to 17 feet below the ground surface. This corresponds approximately to Elevations 18 to 26 feet.

2.5.2. Parking Lot E-02

Groundwater was not observed in the two test pits located across 25th Avenue Northeast from Parking Lot E-02. It was observed at depths ranging from the ground surface to about 2 feet below the ground surface in the explorations to the northeast of Parking Lot E-02. Artesian conditions were observed within HB-1 at the time it was completed in 1974. The depths to groundwater in these explorations correspond to about Elevations 22 to 27 feet. The borings directly across Montlake Boulevard Northeast from the parking lot encountered groundwater about 4 to 10 feet below site grades, which corresponds roughly to Elevations 10 to 17½ feet.

Groundwater observations represent conditions observed during the explorations and will not represent the groundwater conditions throughout the year. Perched water should also be expected within more permeable layers of the pre-Fraser deposits and on top of less permeable fill and alluvial soils. Groundwater seepage should be expected above the groundwater table, where encountered, on and within the pre-Fraser deposits and fill soils, and will fluctuate as a result of season, precipitation, and other factors. Observed groundwater elevations within the peat and alluvial sands may be associated with Lake Washington, and may fluctuate with the lake level, as well as in response to precipitation, season, and other factors.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our review of existing explorations and the results of our engineering analysis, we conclude that the proposed improvements to the parking lots can be completed as planned. Geotechnical considerations and our recommendations for the projects are presented in the following sections of this report.

3.1. Environmentally Critical Areas

Based on our review of ECA maps on the SDCI GIS website, Parking Lots N-26 and E-02 are located in liquefaction prone and peat settlement prone ECAs as well as within the 1,000-foot abandoned landfill buffer ECA associated with the Montlake Landfill. A steep slope ECA is mapped within Parking Lot N-26, and steep slopes are also mapped directly west of Parking Lot N-26, above the Burke-Gilman Trail.

3.1.1. Liquefaction Prone ECA

The liquefaction prone ECA is associated with lake deposits around Lake Washington as encountered in explorations within the site vicinity. Based on these explorations, the east side of Parking Lot N-26 and UW Fleet Services Yard and Parking Lot E-02 are susceptible to liquefaction induced settlement during a significant earthquake. In our opinion, since no structures are planned as part of the improvements, liquefaction mitigation is not needed. The parking lots may settle during a significant earthquake and some differential settlement may occur, and cracking and damage to hardscape features should be expected.

3.1.2. Peat Settlement-Prone ECA

The peat settlement prone ECA is associated with historic peat deposits from Lake Washington and are present in the lowlands in the vicinity of Montlake Boulevard, including Parking Lots N-26 and E-02. Based on existing explorations, peat is present below the east side of Parking Lot N-26 and below Parking Lot E-02.

Existing site grades will not be changed as part of this project, only replacement of asphalt and installation of new utilities; therefore, loading conditions of the peat will effectively remain the same and the improvements should not induce significant additional settlement of the peat. That is not to say that the peat will not continue to settle over time, just to say that the planned improvements will not cause significant additional settlement of the peat. The peat will continue to settle over time at the same rate as existing conditions. If the recommendations in this report are followed for subgrade preparation and backfill placement and compaction, the improvements will not impact the peat any more than the existing conditions already impact the peat.

3.1.3. Abandoned Landfill Buffer ECA

Both parking lots are located within 1,000 feet of the Montlake landfill, which is an abandoned methane-producing landfill. Seatle Municipal Code (SMC) 25.09.220 requires evaluation of methane gas accumulation.

The UW has methane mitigation measures in place in the vicinity that prevent the buildup of potential methane gas from below parking lots in the area. Passive ventilation of potential methane gas is provided by collection systems and vent pipes that are located in strategic locations throughout the area. The system vents methane gas into the atmosphere. Furthermore, the parking lots are open spaces which allow methane gas to be positively ventilated to the atmosphere naturally. No confined spaces, such as buildings or other structures, are planned as part of the improvements. Because of this, it is our opinion that methane gas accumulation is a low risk for the project.

3.1.4. Steep Slope ECA

SDCI designates slopes as "steep slopes" when they are inclined greater than 40 percent and more than 10 feet in height. Steep slopes are subject to a 15-foot buffer from the top and toe of the slope. A steep slope is mapped on the north side of Parking Lot N-26, at the slope west of the UW Fleet Services Yard and at the retaining wall that separates the UW Fleet Services Yard from Pend Oreille Place Northeast and the parking lot directly west of the Plan Services Building. There are also steep slopes mapped west of Parking Lot N-26, above the Burke-Gilman Trail. The slopes inclined at 40 percent or more immediately around Parking Lot N-26 are typically man-made from past grading activities.

Since the site is located within and adjacent to 40 percent steep slope ECAs and their buffers, the project will need to be designed in accordance with the City of Seattle requirements, as follows:

- Development of steep slope areas should follow Seattle Municipal Code (SMC) 25.09.090, which states that "development is prohibited on steep slope erosion hazard areas, unless the applicant demonstrates that the provisions of subsections 25.09.070C, 25.09.070.D, 25.09.090.B.2, 25.09.090.D, 25.09.090.E, or 25.09.090.F apply, or the slope is on a parcel in a Downtown zone or high-rise zone."

  In our opinion, the provisions of subsection 25.09.090.B.2 apply. The improvements to Parking Lot N-26 and the UW Fleet Services Yard are planned to occur within the footprint of existing paved areas. Also, the mapped steep slope on the site was created through previous legal grading activities associated with construction of the Plant Services Building and Pend Oreille Place Northeast. A part of the steep slope is actually a retaining/basement wall of the Plant Services Building and separates the parking lot directly west of the Plant Services Building (above the basement) and the UW Fleet Services Yard. Furthermore, the exposed steep slope on the west side of the UW Fleet Services Yard is less than 20 feet in vertical rise with elevations at the top of the slope ranging from about Elevation 47 to 49 feet and at the bottom ranging from about Elevation 35 to 37 feet. In addition, the slope is more than 30 feet away from the other steep slope erosion hazard area mapped above the Burke-Gilman Trail.

  The proposed improvements for the Parking Lot N-26 site are greater than 15 feet away from the bottom of the steep slopes mapped to the west of the site, above the Burke-Gilman Trail; therefore, they are outside of the steep slope buffer at the toe of the slope.

  In our opinion, the proposed improvements will not adversely impact the steep slopes, provided the recommendations regarding earthwork and erosion control are followed in this report.

- Grading at the site is restricted to occur between October 31 and April 1 per SMC 25.09.060.G and Director's Rule 26-2015, unless a Grading Season Extension Letter is granted by the Director.

3.2. Temporary Dewatering

Excavations for new utility trenches and other improvements will be above the regional groundwater table at both parking lots based on existing explorations. However, based on the previous explorations and our experience in the area, perched groundwater is present within and overlying the glacially consolidated soils, notably at the contact between glacially consolidated soils and the overlying looser soils, and within more permeable layers within the native glacial soils. Perched groundwater should also be expected on top of less permeable layers within the existing fill.

We anticipate that the contractor will be able to use sumps and pumps located within utility trench excavations for required temporary dewatering to control perched groundwater seepage emanating from the excavations.

Sump pumping involves removing water that has seeped into an excavation by pumping from a sump that has been excavated at one or more locations in an excavation. Drainage ditches that lead to the sump are typically excavated along the excavation sidewalls at the base of an excavation. The excavation for the sump and discharge drainage ditches should be backfilled with gravel or crushed rock to reduce the amount of erosion and associated sediment in the water pumped from the sump. In our experience, a slotted casing or perforated 55-gallon drum that is installed in the sump backfill provides suitable housing for a submersible pump.

For planning purposes, perched groundwater flow rates of up to 10 gallons per minute (gpm) can be assumed for site excavations. Surface water from rainfall will contribute significantly to the volume of water that needs to be removed from the excavation during construction and will vary as a function of season and precipitation. Disposal of soil and water pumped from excavations should be in compliance with any environmental handling requirements for excavations in these areas.

3.3. Earthwork

Based on the subsurface soil conditions described in the existing explorations, we anticipate that the soils at the sites may be excavated using conventional construction equipment. The materials encountered are generally very loose to medium dense fill or dense to very dense/very stiff to hard glacially consolidated soils. The fill may contain variable debris and rubble typical of fill under previously developed sites and the contractor should be prepared to deal with debris in the fill, if encountered.

The fill and pre-Fraser deposits contain a high percentage of fines (material passing the U.S. Standard No. 200 sieve) that are extremely moisture-sensitive and susceptible to disturbance, especially when wet. Ideally, earthwork should be undertaken during extended periods of dry weather. We recommend that all earthwork equipment be routed on the surrounding asphalt pavement and not tracked on the fill, if at all possible. Where new pavement is planned and the existing pavement is to be removed, the contractor should only track on the soils as needed to complete the work.

3.3.1. Subgrade Preparation

Prior to placing new fills, pavement or base course materials exposed subgrade areas should be compacted to the extent practical using a hoe-pack mounted to an excavator and then probed and evaluated by the geotechnical engineer.

If deep pockets of soft or pumping soils are encountered, it may be possible to limit the depth of overexcavation by placing a woven geotextile such as Mirafi 600X (or equivalent material) on the exposed subgrade prior to placing structural fill or subbase materials. The geotextile will provide additional support by bridging over the soft material.

Exposed subgrade areas should be compacted to a firm condition, if possible. The achievable degree of compaction will depend on the subgrade materials and when construction is performed. If the work is performed during dry weather conditions, we recommend that all subgrade areas be recompacted to at least 95 percent of the maximum dry density (MDD) in accordance with the ASTM D 1557 test procedure (modified Proctor), if possible. If the work is performed during wet weather conditions, it may not be possible to recompact the subgrade to 95 percent of the MDD. In this case, we recommend that the subgrade be compacted to the extent possible without causing undue weaving or pumping of the subgrade soils.

Subgrade disturbance or deterioration could occur if the subgrade is wet and cannot be dried. If the subgrade deteriorates during compaction, it may become necessary to modify the compaction criteria or methods.

3.3.2. Subgrade Protection

Site soils contain significant fines content (silt/clay) and will be highly sensitive and susceptible to moisture and equipment loads. The contractor should take necessary measures to prevent site subgrade soils from becoming disturbed or unstable. Construction traffic during the wet season should be restricted to specific areas of the site, preferably areas that are surfaced with existing pavement or crushed rock materials not susceptible to wet weather disturbance.

3.3.3. Structural Fill

All fill which will support pavement or hardscape areas, or in utility trenches should generally meet the criteria for structural fill presented below. The suitability of soil for use as structural fill depends on its gradation and moisture content.

3.3.3.1. Materials

Materials used as backfill for utility trenches and paved areas are classified as structural fill for the purpose of this report. We recommend specifying materials using the 2023 City of Seattle Standard Specifications (Seattle Mineral Aggregate). Structural fill material quality varies depending upon its use as described below:

1. **Site fill.** Gravel backfill placed to support pavement areas and to backfill utility trenches should meet the requirements of Mineral Aggregate Type 17 (bank run gravel) or Type 2, City of Seattle Standard Specification 9-03.14, unless approved otherwise by GeoEngineers.
2. **Crushed surfacing base course.** Crushed surfacing base course (CSBC) placed below pavements and sidewalks should meet the requirements of Mineral Aggregate Type 2 (1¼-inch minus crushed rock), City of Seattle Standard Specification 9-03.14.
3. **Subbase.** The 6-inch subbase layer below the CSBC layer should meet the requirements of Mineral Aggregate Type 17 (bank run gravel) or Type 2, City of Seattle Standard Specification 9-03.14, unless approved otherwise by GeoEngineers.

3.3.3.2. Reuse of On-site Soils

Based on our understanding after discussions with the UW and Environmental Health and Safety (EH&S), because both parking lots are located within the 1,000-foot buffer of the former Montlake Landfill, all existing on-site soils will be treated as contaminated and will be disposed of accordingly. Because of this, on-site soils should not be re-used as structural fill. All structural fill should be imported to the site.

3.3.3.3. Fill Placement and Compaction Criteria

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

1. Structural fill in new pavement and hardscape areas, including utility trench backfill, should be compacted to at least 90 percent of the MDD, except that the upper 2 feet of fill below final subgrade should be compacted to at least 95 percent of the MDD as shown in Figure 5.
2. Non-structural fill, such as fill placed in landscape areas, should be compacted to at least 90 percent of the MDD.

3.3.3.4. Weather Considerations

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

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

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

Routing of equipment on the fill subgrade soils during the wet weather months will be difficult and the subgrade will likely become highly disturbed and rutted. In addition, a significant amount of mud can be produced by routing equipment directly on the existing fill soils in wet weather. Therefore, to protect the subgrade soils and to provide an adequate wet weather working surface for the contractor's equipment and labor, we recommend that the contractor protect exposed subgrade soils with crushed rock.

3.3.1. Excavations

For planning purposes, temporary unsupported cut slopes more than 4 feet high may be inclined at 1H:1V maximum steepness within the dense to very dense/very stiff to hard glacially consolidated soils, and 1½H:1V maximum steepness in the fill. If significant seepage is present on the cut face, then the cut slopes may have to be flattened. The cuts should be covered with plastic sheeting that is adequately ballasted.

The above guidelines assume that surface loads such as traffic, construction equipment, stockpiles or building supplies will be kept away from the top of the cut slopes a sufficient distance so that the stability of the excavations are not affected. We recommend that this distance be at least 5 feet from the top of the cut for temporary cuts made at 1H:1V or flatter.

Temporary cut slopes should be planned such that they do not encroach on a 1H:1V influence line projected down from the edges of nearby or planned foundation elements.

Water that enters the excavation must be collected and routed away from prepared subgrade areas. We expect that this may be accomplished by installing a system of drainage ditches and sumps along the toe of the cut slopes. Some sloughing and raveling of the cut slopes should be expected. Temporary covering, such as heavy plastic sheeting with appropriate ballast, should be used to protect these slopes during periods of wet weather. Surface water runoff from above cut slopes should be prevented from flowing over the slope face by using berms, drainage ditches, swales or other appropriate methods.

If temporary cut slopes experience excessive sloughing or raveling during construction, it may become necessary to modify the cut slopes to maintain safe working conditions. Slopes experiencing problems can be flattened, regraded to add intermediate slope benches or additional dewatering can be provided if the poor slope performance is related to groundwater seepage.

The contractor performing the work has the primary responsibility for the protection of workers and adjacent improvements. In our opinion, the contractor will be in the best position to observe subsurface conditions continuously throughout the construction process and to respond to variable soil and groundwater conditions. Therefore, the contractor should have the primary responsibility for deciding whether or not to use open cut slopes for much of the excavations rather than some form of temporary excavation support, and for establishing the safe inclination of the cut slope. Acceptable slope inclinations for utilities and ancillary excavations should be determined during construction. Because of the diversity of construction techniques and available shoring systems, the design of temporary shoring is most appropriately left up to the contractor proposing to complete the installation. Temporary cut slopes and shoring must comply with the provisions of Title 296 Washington Administration Code (WAC), Part N, “Excavation, Trenching and Shoring.”

3.3.2. Permanent Cut and Fill Slopes

We recommend that permanent cut or fill slopes be constructed at inclinations of 2H:1V or flatter and be blended into existing slopes with smooth transitions. To achieve uniform compaction, we recommend that fill slopes be overbuilt 2 to 3 feet and subsequently cut back using a smooth-edged bucket to expose well compacted fill.

To reduce erosion, newly constructed slopes should be planted or hydroseeded shortly after completion of grading. Until the vegetation is established, some sloughing and raveling of the slopes should be expected. This may necessitate localized repairs and reseeding. Temporary covering such as clear heavy plastic sheeting, jute fabric or erosion control blankets (such as American Excelsior Curlex 1 or North American Green SC150) could be used to protect the slopes during periods of rainfall.

3.3.3. Utility Trenches

Trench excavation, pipe bedding and trench backfilling should be completed using the general procedures described in the City of Seattle Municipal Code or other suitable procedures specified by the project civil engineer. The native glacial deposits and fill soils encountered at the site are generally of low corrosivity, while peat and organic laden soils have high corrosivity, based on our experience on campus.

Utility trench backfill should consist of structural fill and should be placed in loose lifts not exceeding 12 inches in thickness when using heavy compaction equipment and not more than 6 inches when using hand-operated compaction equipment such that adequate compaction can be achieved throughout the lift. Each lift must be compacted prior to placing the subsequent lift. Prior to compaction, the backfill should be moisture conditioned to within 2 percent of the optimum moisture content, if necessary. The backfill should be compacted in accordance with the criteria in Section 3.3.3.3. Figure 5 illustrates recommended trench compaction criteria under pavement and non-structural areas.

3.3.4. Sedimentation and Erosion Control

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

Erosion and sedimentation control measures may be implemented by confining the work areas to areas where the asphalt pavement has been removed and not routing equipment on the exposed soils, except when necessary. The vertical cuts in the pavement should help contain surface water during storm events and for temporary erosion protection of exposed soils. All disturbed areas should be finish graded and paved as soon as practicable to reduce the risk of erosion. Erosion and sedimentation control measures should be installed and maintained in accordance with the requirements of the City of Seattle and handling of all stormwater and sediment should be in accordance with the UW environmental requirements for the project.

3.4. Pavement Recommendations

3.4.1. Subgrade Preparation

We recommend the subgrade soils in new pavement areas be prepared and evaluated as described in Section 3.3. We recommend placing a 6-inch-thick granular subbase layer below the pavement sections described below. The subbase material should meet the requirements of Mineral Aggregate Type 17 (City of Seattle Standard Specification, 9-03.14). Prior to placing the subbase layer, the exposed subgrade should be thoroughly compacted with a hoe-pack mounted to an excavator or with another piece of heavy compaction equipment to at least 95 percent maximum dry density per ASTM D 1557. If the subgrade soils are excessively loose or soft, it may be necessary to excavate localized areas and replace them with additional gravel borrow or gravel base material, as approved by the geotechnical engineer. After compacting the exposed subgrade, a woven reinforcement geotextile such as Mirafi 600X should be placed over the subgrade prior to placing the subbase layer. Geotextile panels should be overlapped a minimum of 12 inches.

3.4.2. New Hot Mix Asphalt Pavement

In light duty pavement areas (e.g., pedestrian access or passenger car parking), we recommend a pavement section consisting of at least a 3-inch thickness of ½-inch hot-mix asphalt (HMA) (PG 58-22) per City of Seattle Standard Specifications Sections 5-04 and 9-03.8 and 9-03, over a 4-inch thickness of densely compacted CSBC per Mineral Aggregate Type 2, City of Seattle Standard Specification 9-03.14. The CSBC should be placed over the 6-inch subbase layer and reinforcement geotextile as described above.

In heavy duty pavement areas (e.g., service trucks, fire trucks, etc.), we recommend a pavement section consisting of at least a 4-inch thickness of ½-inch HMA (PG 58-22) over a 6-inch thickness of densely compacted crushed surfacing top course (CSTC) per Mineral Aggregate Type 1, City of Seattle Standard Specification 9-03.14. Pavement sections may be reduced depending on the specific loading demand. Note that the heavy-duty pavement sections are not for bus traffic. More robust pavement recommendations can be provided as needed.

The crushed surfacing base course and underlying subbase layer should be compacted to at least 95 percent of the MDD (ASTM D 1557). We recommend that a proof-roll of the compacted base course be observed by a representative from our firm prior to paving. Soft or yielding areas observed during proof-rolling may require overexcavation and replacement with compacted crushed rock.

3.5. Recommended Additional Geotechnical Services

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

- GeoEngineers should be retained to review the project plans and specifications when complete to confirm that our design recommendations have been implemented as intended and submit a review letter to the City of Seattle as required.
- During construction, GeoEngineers should observe removal of unsuitable soils, evaluate the suitability of pavement and hardscape subgrades, observe and test structural backfill, and provide a summary letter of our construction observation services, as required by the City of Seattle. The purposes of GeoEngineers construction phase services are to confirm that the subsurface conditions are consistent with those observed in the explorations, are required by the City of Seattle, and other reasons described in Appendix B.

4.0 LIMITATIONS

We have prepared this report for use by the UW for design and construction of the proposed projects.

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

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

Please refer to Appendix B for additional information pertaining to use of this report.

5.0 REFERENCES

City of Seattle, 2023, Seattle Department of Construction & Inspections GIS website, accessed via: h http://seattlecitygis.maps.arcgis.com/apps/webappviewer/index.html?id=f822b2c6498c4163b0cf908e2241e9c2.

City of Seattle, 2023, "Standard Specifications for Road, Bridge and Municipal Construction."

City of Seattle, 2023, "Seattle Municipal Code," ordinances codified through January 26, 2023.

City of Seattle, 1989, Boring Log dated 1989.

City of Seattle, 1972, Boring Logs dated 1972.

GeoEngineers, Inc., 2016, "Geotechnical Engineering Services, Plant Services South Parking Lot, University of Washington, Seattle, Washington," dated February 15, 2016.

HartCrowser and Associates, Inc., 1977, Boring Logs dated 1977.

Metropolitan Engineers, 1972, "Final Report, Soils Exploration, North Trunk Sewer – Section N16, Seattle, Washington," dated June 15, 1972.

Shannon & Wilson, Inc., 2001, "Geotechnical Report, University of Washington Golf Driving Range, Seattle, Washington," dated September 17, 2001.

Shannon & Wilson, Inc., 1994, "Ravenna Creek Storm Drainage Project, NE 54th Street Diversion, Seattle, Washington," dated March 21, 1994.

Shannon & Wilson, Inc., 1992, "Phase 2, NE 45th Street Viaduct, Seattle, Washington," dated March 16, 1992.

Shannon & Wilson, Inc., 1974, "Foundation Investigation for East Approach Replacement, NE 45th Street Viaduct, Seattle, Washington," dated July 12, 1974.

Shannon & Wilson, Inc., 1970, "Supplemental Foundation Investigation, Phase II Construction, Physical Plant Services Building, University of Washington," dated April 27, 1970.

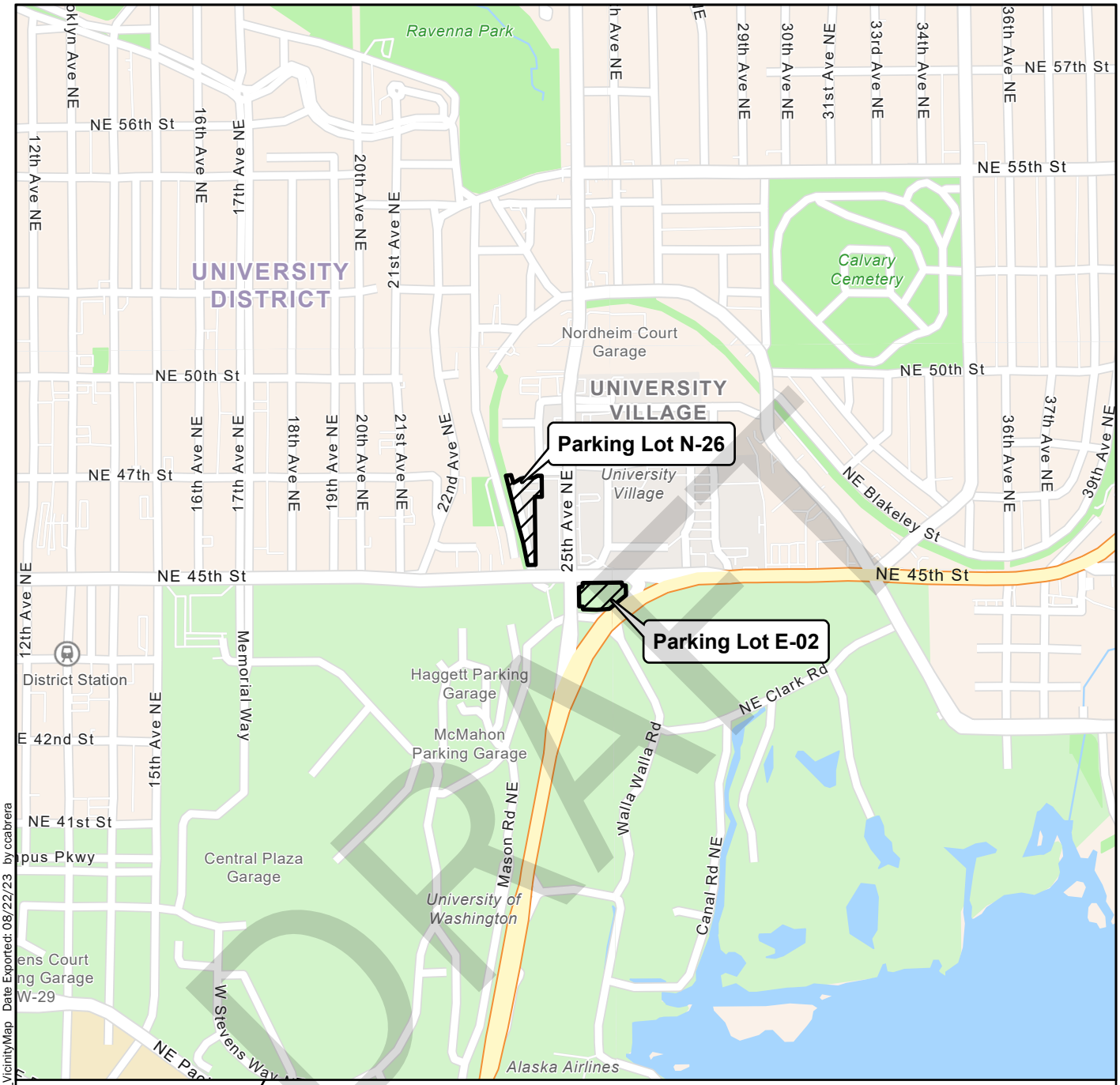
Shannon & Wilson, Inc., 1969, "Foundation Investigation for Physical Plant Services Building, Phase II Construction, University of Washington," dated November 7, 1969.

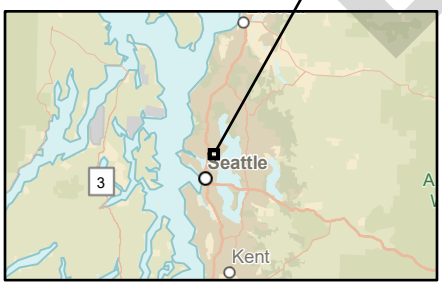
Shannon & Wilson, Inc., 1969, "University of Washington, Physical Plant Services Building, Phase II," dated July 14, 1969.

Troost, K.G., Booth, D.B., and Shimel, S.A., 2009, "Geologic Map of Northeastern Seattle (Part of the Seattle North 7.5'x15' Quadrangle, King County," U.S. Department of the Interior, U.S. Geological Survey, 2009.

Washington State Department of Transportation, Geotechnical Design Manual, 2022.

Washington State Department of Transportation, 2023, "Standard Specifications for Road, Bridge and Municipal Construction."





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Vicinity Map

Fleet Charging Stations & Security
Parking Lots N-26 & E-02
Seattle, Washington

GeoEngineers

Figure 1

Source(s):
- ESRI

Coordinate System: NAD 1983 UTM Zone 10N

Disclaimer: This figure was created for a specific purpose and project. Any use of this figure for any other project or purpose shall be at the user's sole risk and without liability to GeoEngineers. The locations of features shown may be approximate. GeoEngineers makes no warranty or representation as to the accuracy, completeness, or suitability of the figure, or data contained therein. The file containing this figure is a copy of a master document, the original of which is retained by GeoEngineers and is the official document of record.

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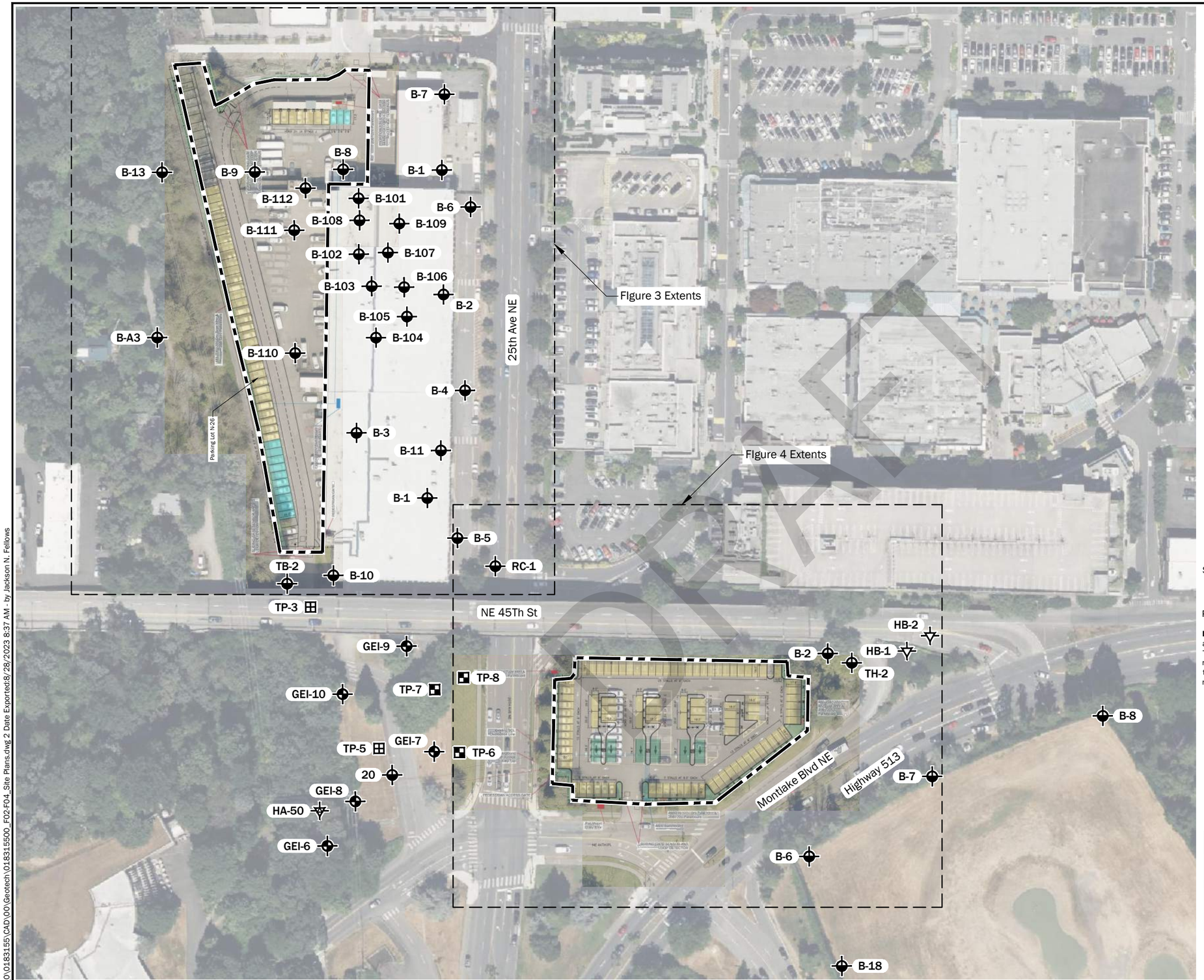

Legend

- Site Boundary
- GEI-10 — Boring by GeoEngineers, Inc., 2014
- TP-5 — Test Pit by GeoEngineers, Inc, 2014
- HA-50 — Hand Auger by GeoEngineers, Inc, 2014
- HB-1 — Hand Auger by Others
- TP-3 — Test Pit by Others
- BH-5 — Boring by Others

Source(s):

- Aerial from Bing, dated 2023
- Proposed Layout by Reid Middleton, dated 4/23

Projection: WA State Plane, North Zone, NAD83, US Foot

Disclaimer: This figure was created for a specific purpose and project. Any use of this figure for any other project or purpose shall be at the user's sole risk and without liability to GeoEngineers. The locations of features shown may be approximate. GeoEngineers makes no warranty or representation as to the accuracy, completeness, or suitability of the figure, or data contained therein. The file containing this figure is a copy of a master document, the original of which is retained by GeoEngineers and is the official document of record.

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Overall Site Plan

Fleet Charging Stations & Security
Parking Lots N-26 & E-02
Seattle, Washington

GeoEngineers

Figure 2

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Legend

- Site Boundary
- BH-5 — Boring by Others

Source(s):

- Aerial from Bing, dated 2023
- Proposed Layout by Reid Middleton, dated 4/23

Projection: WA State Plane, North Zone, NAD83, US Foot

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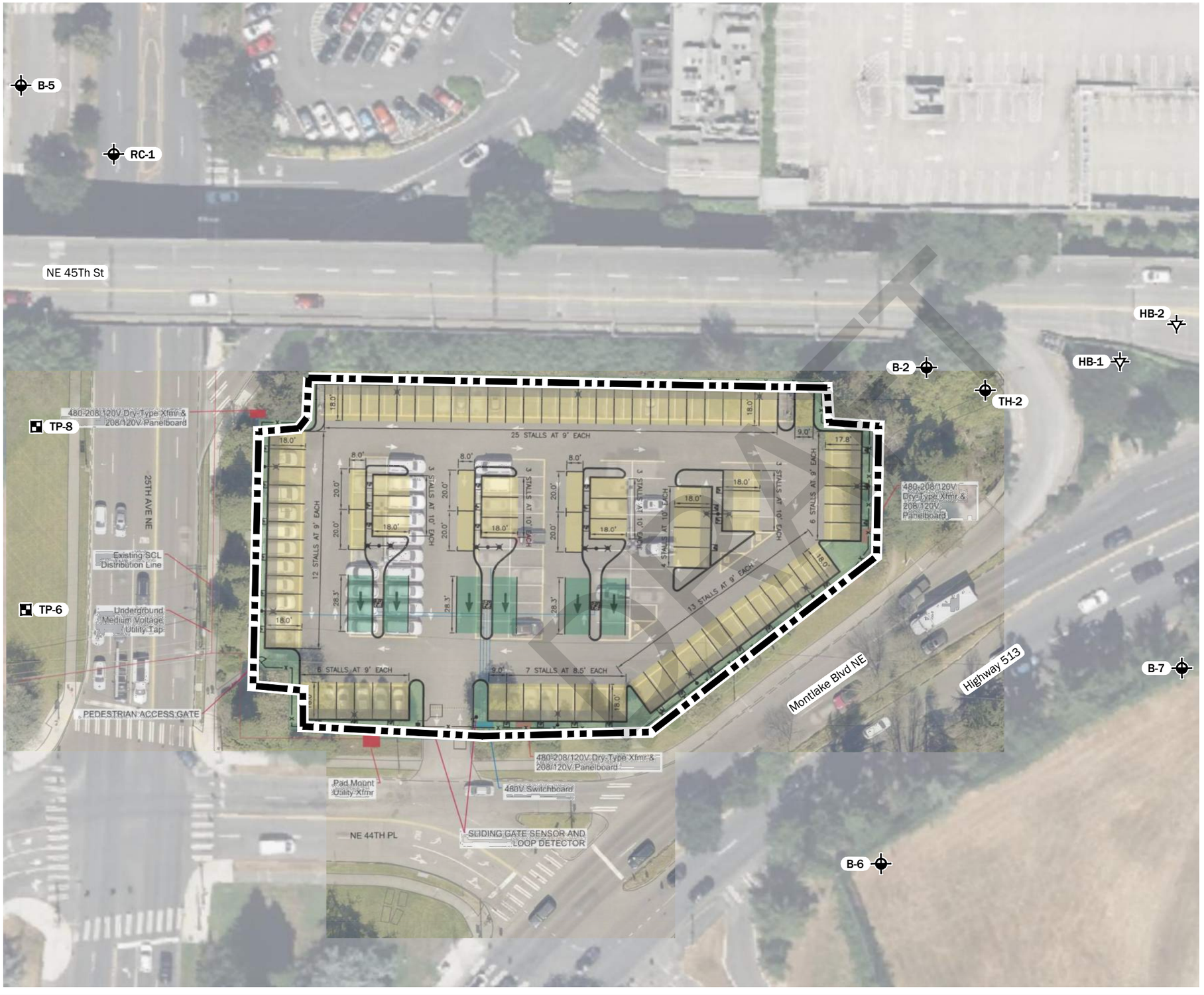
Feet

Parking Lot N-26

Fleet Charging Stations & Security
Parking Lots N-26 & E-02
Seattle, Washington

GeoEngineers

Figure 3



Legend

- Site Boundary
- TP-5 Test Pit by GeoEngineers, Inc, 2014
- HB-1 Hand Auger Others
- BH-5 Boring by Others

Source(s):

- Aerial from Bing, dated 2023
- Proposed Layout by Reid Middleton, dated 4/23

Projection: WA State Plane, North Zone, NAD83, US Foot

Disclaimer: This figure was created for a specific purpose and project. Any use of this figure for any other project or purpose shall be at the user's sole risk and without liability to GeoEngineers. The locations of features shown may be approximate. GeoEngineers makes no warranty or representation as to the accuracy, completeness, or suitability of the figure, or data contained therein. The file containing this figure is a copy of a master document, the original of which is retained by GeoEngineers and is the official document of record.

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Feet

Parking Lot E-02

Fleet Charging Stations & Security
Parking Lots N-26 & E-02
Seattle, Washington

GeoEngineers

Figure 4

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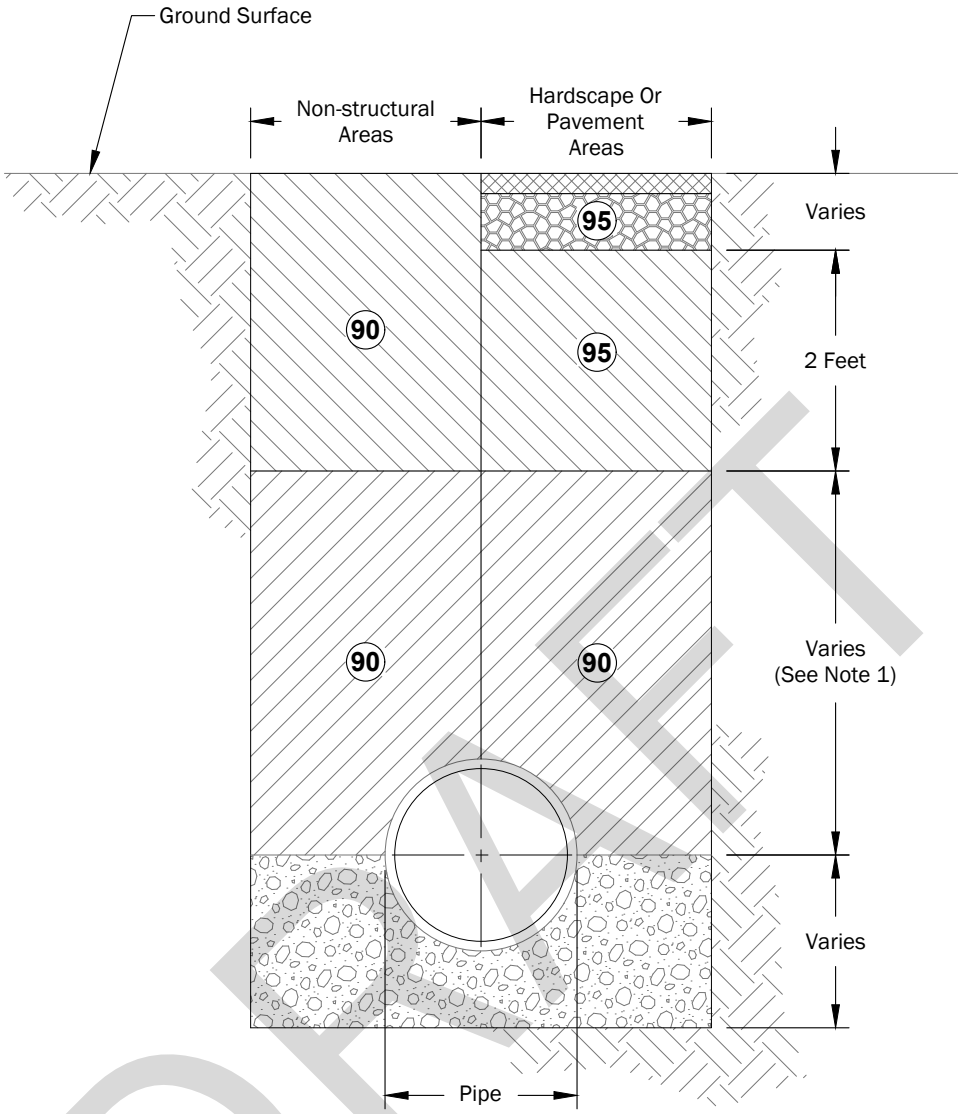

Not To Scale

Legend

(95)	Recommended Compaction as a Percentage of Maximum Dry Density, by Test Method ASTM D1557 (Modified Proctor)
	Concrete or Asphalt Pavement
	Base Course
	Trench Backfill
	Pipe Bedding

Notes:

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

Compaction Criteria for Trench Backfill

Fleet Charging Stations & Security
Parking Lots N-26 & E-02
Seattle, Washington

GeoEngineers

Figure 5

APPENDIX A
Exploration Logs from Previous Studies

APPENDIX A
EXPLORATION LOGS FROM PREVIOUS STUDIES

Appendix A includes relevant exploration logs from the following reports completed previously in vicinity of the projects:

- City of Seattle completed in 1972 and 1989.
- GeoEngineers, Inc., 2016, "Geotechnical Engineering Services, Plant Services South Parking Lot, University of Washington, Seattle, Washington," dated February 15, 2016.
- HartCrowser and Associates, Inc., completed in 1977.
- Metropolitan Engineers, 1972, "Final Report, Soils Exploration, North Trunk Sewer – Section N16, Seattle, Washington," dated June 15, 1972.
- Shannon & Wilson, Inc., 2001, "Geotechnical Report, University of Washington Golf Driving Range, Seattle, Washington," dated September 17, 2001.
- Shannon & Wilson, Inc., 1994, "Ravenna Creek Storm Drainage Project, NE 54th Street Diversion, Seattle, Washington," dated March 21, 1994.
- Shannon & Wilson, Inc., 1992, "Phase 2, NE 45th Street Viaduct, Seattle, Washington," dated March 16, 1992.
- Shannon & Wilson, Inc., 1974, "Foundation Investigation for East Approach Replacement, NE 45th Street Viaduct, Seattle, Washington," dated July 12, 1974.
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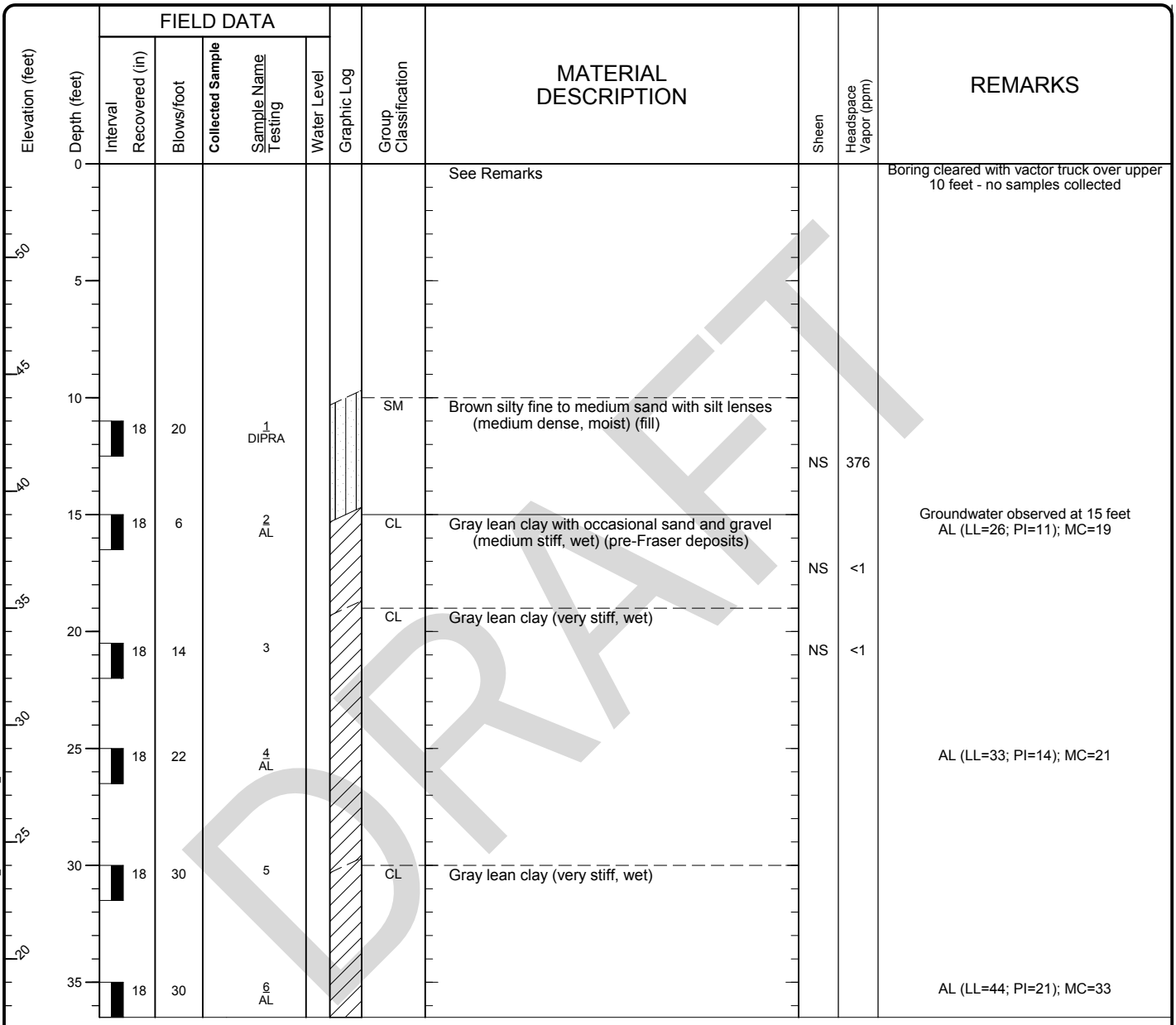
- Shannon & Wilson, Inc., 1969, "Foundation Investigation for Physical Plant Services Building, Phase II Construction, University of Washington," dated November 7, 1969.
- Shannon & Wilson, Inc., 1969, "University of Washington, Physical Plant Services Building, Phase II," dated July 14, 1969.

Drilled	Start 4/30/2014	End 4/30/2014	Total Depth (ft) 36.5	Logged By APL / Checked By CW	Driller Geologic Drill	Drilling Method Hollow-Stem Auger
Surface Elevation (ft) 54 / Vertical Datum NAVD88			Hammer Data Rope and Cathead		Drilling Equipment MT52 Mini Track	
Easting (X) 1278574 / Northing (Y) 244375			System Datum NAD83		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft) — See Remarks	

Notes: Elevations and coordinates are approximate. The elevations and coordinates shown are based on surface elevations from the topographic site survey.



Note: See Figure A-1 for explanation of symbols.

Log of Boring GEI-6

GeoEngineers

Project: UW - Plant Services Building South Parking Lot
Project Location: Seattle, Washington
Project Number: 0183-089-04

Figure A-3
Sheet 1 of 1

Drilled	Start 4/29/2014	End 4/29/2014	Total Depth (ft)	41.5	Logged By / Checked By	APL / CW	Driller	Geologic Drill	Drilling Method	Hollow-Stem Auger
Surface Elevation (ft) / Vertical Datum	39 NAVD88		Hammer Data	Rope and Cathead			Drilling Equipment	MT52 Mini Track		
Easting (X) / Northing (Y)	1278707 244485		System Datum	NAD83			Groundwater	Date Measured	Depth to Water (ft)	Elevation (ft)
Notes:	Elevations and coordinates are approximate. The elevations and coordinates shown are based on surface elevations from the topographic site survey.							See Remarks		

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
35	0	17	39	1			SM	Brown silty fine to medium sand with gravel and occasional organic matter (dense, moist) (fill)			
	5	2	9	2			GW	Brown fine sand (dense, moist)			
30		9	3	3 %F			SM	Brown silty fine sand, gravel and organic matter (soft, moist to wet)			MC=29; %F=20
	10	14	2	4 AL			CL	Gravely lean clay with sand (very soft to soft, wet) (alluvial deposits)			Groundwater observed at 10 feet AL (LL=29; PI=8); MC=32
25	15	18	2	5 SA			SP-SM	Gray fine to coarse sand with silt and gravel (very loose, wet)			MC=11; SA (%F=7)
20	20	18	39	6 %F			SP-SM	Brown fine to coarse sand with silt and gravel (dense, wet)			MC=8; %F=10
15	25		12	7			SM	Brown silty fine to coarse sand with gravel (medium dense, wet)			
10	30	18	20	8 %F			SP-SM	Brown fine to medium sand with silt and trace of gravel (medium dense, wet) (pre-Fraser deposits)			MC=15; %F=16
5	35	18	23	9 SA			SP	Brown fine to medium sand with trace silt and occasional gravel (medium dense, wet)			MC=17; SA (%F=5)
0							SP-SM	Brown fine to medium sand with silt and gravel (dense, wet)			
	40	18	37	10							

Note: See Figure A-1 for explanation of symbols.

Log of Boring GEI-7

GeoEngineers

Project: UW - Plant Services Building South Parking Lot
Project Location: Seattle, Washington
Project Number: 0183-089-04

Figure A-4
Sheet 1 of 1

Drilled: Start 4/30/2014 End 4/30/2014	Total Depth (ft): 31.5	Logged By: APL Checked By: CW	Driller: Geologic Drill	Drilling Method: Hollow-Stem Auger	
Surface Elevation (ft): 47 Vertical Datum: NAVD88		Hammer Data: Rope and Cathead		Drilling Equipment: MT52 Mini Track	
Easting (X): 1278606 Northing (Y): 244417		System Datum: NAD83		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft): None Observed	

Notes: Elevations and coordinates are approximate. The elevations and coordinates shown are based on surface elevations from the topographic site survey.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
45	0							See Remarks			Boring cleared with vactor truck over upper 10 feet - no samples collected
40	5										
35	10	18	15	1 AL			CH	Gray fat clay (very stiff, moist) (pre-Fraser deposits)			AL (LL=62; PI=36); MC=27
30	15	18	25	2			ML	Brownish gray clayey silt (very stiff, moist)			
25	20	18	37	3 AL			CL	Gray lean clay (hard, moist)			AL (LL=47; PI=25); MC=22
20	25	18	26	4			CL	Gray sandy clay (very stiff, moist)			
	30		28	5							

Note: See Figure A-1 for explanation of symbols.

Log of Boring GEI-8

GeoEngineers

Project: UW - Plant Services Building South Parking Lot
Project Location: Seattle, Washington
Project Number: 0183-089-04

Figure A-5
Sheet 1 of 1

Drilled	Start 4/29/2014	End 4/29/2014	Total Depth (ft)	36.5	Logged By / Checked By	APL / CW	Driller	Geologic Drill	Drilling Method	Hollow-Stem Auger
Surface Elevation (ft) / Vertical Datum	41 / NAVD88		Hammer Data	Rope and Cathead	Drilling Equipment	MT52 Mini Track				
Easting (X) / Northing (Y)	1278668 / 244613		System Datum	NAD83	Groundwater	Date Measured	Depth to Water (ft)	Elevation (ft)	See Remarks	

Notes: Elevations and coordinates are approximate. The elevations and coordinates shown are based on surface elevations from the topographic site survey.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
40	0						SM	Brown silty fine to medium sand with gravel and organic matter (loose, moist) (fill)			
		16	11	1			SM	Brown silty fine to medium sand with gravel (medium dense, moist)			
35	5	14	22	2			SM	Dark brown silty fine to medium sand with occasional gravel and wood debris (medium dense, moist to wet)			
		9	17	3			SM	Brown silty fine to medium sand with gravel and occasional organic matter (very loose, moist to wet)			
30	10	13	3	4 %F			SP-SM	Brown fine to medium sand with silt and gravel (loose to medium dense, wet) (alluvial deposits)			Groundwater observed at 10 feet MC=22; %F=19
25	15	18	15	5 SA							
20	20	18	23	6			GM	Gray silty fine to coarse gravel (medium dense, wet)			
		18	17	7 SA			SM	Grayish brown silty fine to medium sand with gravel (medium dense, wet)			
10	30	18	14	8							
5	35	16	66	9 %F			SP	Grayish brown fine to medium sand (very dense, wet) (pre-Fraser deposits)			MC=15; %F=5

Note: See Figure A-1 for explanation of symbols.

Log of Boring GEI-9

GeoEngineers

Project: UW - Plant Services Building South Parking Lot
Project Location: Seattle, Washington
Project Number: 0183-089-04

Figure A-6
Sheet 1 of 1

Drilled	Start 4/29/2014	End 4/29/2014	Total Depth (ft)	31.5	Logged By / Checked By	APL / CW	Driller	Geologic Drill	Drilling Method	Hollow-Stem Auger
Surface Elevation (ft) / Vertical Datum	48 / NAVD88		Hammer Data	Rope and Cathead	Drilling Equipment	MT52 Mini Track				
Easting (X) / Northing (Y)	1278593 / 244555		System Datum	NAD83	Groundwater	Date Measured	Depth to Water (ft)	See Remarks	Elevation (ft)	

Notes: Elevations and coordinates are approximate. The elevations and coordinates shown are based on surface elevations from the topographic site survey.

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							See Remarks			Boring cleared with vactor truck over upper 10 feet - no samples collected
45											
	5										
40											
	10	13	32	1 SA			SC	Gray clayey fine to medium sand with gravel (very stiff, wet) (pre-Fraser deposits)			Groundwater observed at 10 feet
35											
	15	18	27	2 AL			CL	Gray lean clay (very stiff, wet)			AL (LL=42; PI=20); MC=28
30											
	20	18	24	3			CL	Brownish gray sandy clay with silt (very stiff, wet)			
25							CL	Gray lean clay (very stiff, moist)			
	25	18	31	4 AL							AL (LL=37; PI=15); MC=23
20											
	30	12	30	5							

Note: See Figure A-1 for explanation of symbols.

Log of Boring GEI-10

GeoEngineers

Project: UW - Plant Services Building South Parking Lot
Project Location: Seattle, Washington
Project Number: 0183-089-04

Figure A-7
Sheet 1 of 1

Date Excavated: 6/12/2014 Logged By: CW

Equipment: Backhoe Total Depth (ft) 6.5

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor	Notes
43	1				SM		Brown silty fine to medium sand with gravel and roots/grass (loose, moist) (fill)	NS	<1	
					SM		Brown with orange staining silty fine to medium sand with gravel and organic debris (medium dense, moist)			
42	2									
41	3				SM		Brownish orange silty fine to medium sand with gravel, charcoal and wood chips (medium dense, moist)			
40	4	X	1		SM		Brownish orange silty fine to medium sand with gravel, charcoal and wood chips (medium dense, moist to wet)			
39	5									
38	6	X	2		SM		Brownish, orangish gray silty fine to medium sand with gravel and organic matter (medium dense, moist to wet)			

No groundwater seepage observed
No caving observed
Easting: 1278633; Northing: 244487; Elevation 44 feet
The elevation shown is based on surface elevation from the topographic site survey

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

Log of Test Pit TP-5

GeoEngineers

Project: UW - Plant Services Building South Parking Lot
Project Location: Seattle, Washington
Project Number: 0183-089-04

Figure A-12
Sheet 1 of 1

Date Excavated: 6/12/2014 Logged By: CW

Equipment: Backhoe Total Depth (ft) 6

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor	Notes
36	1				SM		Brown silty fine to medium sand with gravel and trace organic matter (fine roots) (loose, moist) (fill)			
35	2	X	1					NS	<1	
34	3				SM		Brownish gray silty fine to medium sand with gravel (medium dense, moist)			Caving observed at approximately 3 feet
33	4									
32	5				SM		Brownish red silty fine to coarse sand with gravel (medium dense, moist)			
31	6	X	2					NS	<1	

No groundwater seepage observed
Easting: 1278731; Northing: 244483; Elevation 37 feet
The elevation shown is based on surface elevation from the topographic site survey

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

Log of Test Pit TP-6

GeoEngineers

Project: UW - Plant Services Building South Parking Lot
Project Location: Seattle, Washington
Project Number: 0183-089-04

Figure A-13
Sheet 1 of 1

Date Excavated: 6/12/2014 Logged By: CW

Equipment: Backhoe Total Depth (ft) 7

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor	Notes
39	1				SM		Brown silty fine to medium sand with gravel and roots (loose, moist) (fill)			
38	2				SM		Brown silty fine to medium sand with gravel and occasional fine roots (medium dense, moist)			
37	3	X	1		SM		Brown silty fine to medium sand with gravel (medium dense, moist)	NS	<1	
36	4				SM		Brown silty fine to medium sand with gravel and cobbles, wood and branches (medium dense, moist)			
35	5				ML		Brownish gray sandy silt with gravel, wood chips, orange staining (stiff, moist)			
34	6				ML		Brownish gray sandy silt with gravel and wood chips (stiff, moist)			
33	7	X	2					NS	<1	

No groundwater seepage observed
No caving observed
Easting: 1278692; Northing: 244557; Elevation 40 feet
The elevation shown is based on surface elevation from the topographic site survey

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

Log of Test Pit TP-7

GeoEngineers

Project: UW - Plant Services Building South Parking Lot
Project Location: Seattle, Washington
Project Number: 0183-089-04

Figure A-14
Sheet 1 of 1

Date Excavated: 6/12/2014 Logged By: CW

Equipment: Backhoe Total Depth (ft) 7.5

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor	Notes
36	1				SM		Brown silty fine to medium sand with gravel, trace organic matter (medium dense, moist) (fill)	NS	<1	
					SM		Brown silty fine to medium sand with gravel, trace organic matter (dense, moist)			
35	2				SM		Gray silty fine to medium sand with gravel and silt lenses (medium dense, moist)			
34	3				ML		Gray sandy silt with gravel, occasional cobbles, fine roots (stiff, moist)			
33	4	X	1		ML		Gray sandy silt with occasional gravel, wood chips and roots (stiff, moist)	NS	<1	
32	5				ML		Gray sandy silt with occasional gravel, wood chips and roots (stiff, moist to wet)			
31	6				SM		Gray silty fine to medium sand with silt lenses, gravel, wood chips (medium dense, moist to wet)			
30	7									

No groundwater seepage observed
No caving observed
Easting: 1278731; Northing: 244574; Elevation 37 feet
The elevation shown is based on surface elevation from the topographic site survey

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

Log of Test Pit TP-8

GeoEngineers

Project: UW - Plant Services Building South Parking Lot
Project Location: Seattle, Washington
Project Number: 0183-089-04

Figure A-15
Sheet 1 of 1

Date Excavated: 5/1/2014 Logged By: EAW/APL

Equipment: Hand Auger Total Depth (ft) 3

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
					TS		Approximately 6 inches grass/topsoil			
			1		SM		Dark brown to brownish gray silty fine to medium sand with occasional gravel (loose to medium dense, moist) (fill)	NS	<1.0	probes 6"
53	1		2							probes <1"
52	2									
			3							probes 4"
51	3									

No groundwater seepage observed
No caving observed
Easting: 1278564; Northing: 244412: Elevation: 54 feet
The elevation shown is based on surface elevation from the topographic site survey

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

Log of Hand Auger HA-50

GeoEngineers

Project: UW - Plant Services Building South Parking Lot
Project Location: Seattle, Washington
Project Number: 0183-089-04

Figure A-18
Sheet 1 of 1

LOG OF GEOPROBE

Date Started 11/8/06	Location S of Plant Services Bldg.	Ground Elevation: Approx. NA feet
Date Completed 11/8/06		Typical Run Length feet
Total Depth (ft) 14.0	Drilling Company: ESN Northwest	Hole Diameter: 2 inches

Depth (ft)	Probe Run	Soil Description	Depth, ft.	Symbol	PID, ppm	Ground Water	Sample Number, Description, and Results	Depth (ft)
		Refer to the report text for a proper understanding of the subsurface materials and probing methods. The stratification lines indicated below represent the approximate boundaries between soil types. Actual boundaries may be different if soil shifted inside sample tubes during extraction.						
		TOPSOIL.						
		Dark orange/brown, slightly to trace gravelly, sandy SILT to silty SAND, trace of coarse sand; moist to wet; SM/ML.	0.8					
		Soil gas sample: @ 2.5 feet Methane = 0.0% Carbon dioxide = 3.6% Oxygen = 10.2% Atmospheric pressure: 29.8%					P20-1	
5		Soil gas sample: @ 5.0 feet Methane = 0.0% Carbon dioxide = 0.0% Oxygen = 20.9% Atmospheric pressure: 29.8%	5.5				P20-2	5
		Orange-brown, slightly gravelly to gravelly, slightly silty SAND; moist to wet; SM.	7.0				P20-3	
		Light brown, slightly silty, sandy GRAVEL; GM.						
10		Soil gas sample: @ 7.5 feet Methane = 0.0% Carbon dioxide = 0.3% Oxygen = 20.3% Atmospheric pressure: 29.8%	10.0			▽ During Drilling		10
		Gray, slightly silty, gravelly SAND; moist; SP.	11.5					
		Brown to gray, slightly silty, sandy GRAVEL to gravelly SAND; wet; SP/GP.						
15		BOTTOM OF PROBE COMPLETED 11/8/2006	14.0					15

Typ: EET Rev: Log: CMJ

GEOPROBE 21-12202.GPJ 21-20447.GPJ 4/20/07

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.
4. CT = corrosion test sample; TR = thermal resistivity sample; EN = environmental sample; GE = geotechnical sample; AR = archeological sample.

LEGEND

3 — Run No.
2" Plastic Tube - No Soil Recovery
2" Plastic Tube with Soil Recovery
▽ Estimated Water Level

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Seattle, Washington

LOG OF GEOPROBE P-20

April 2007 21-1-12202-001

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FIG. A-20

SOIL DESCRIPTION

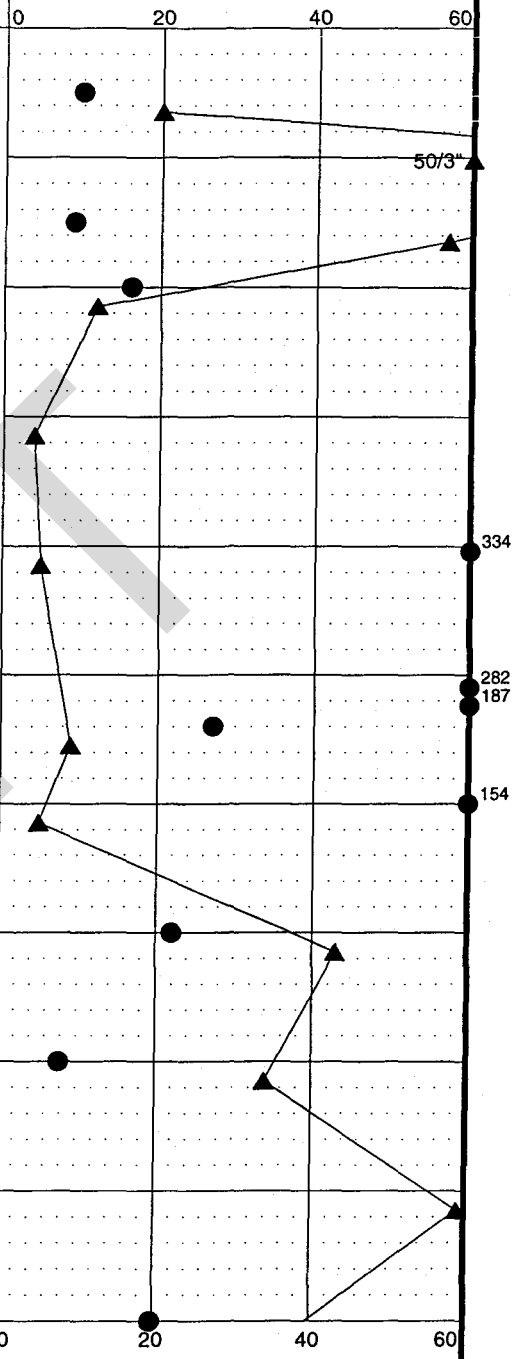
Approx. Coordinates: N: 150 E: 150
Surface Elevation: Approx. 19.8 Ft.

Depth (ft)	Soil Description
	Very dense and medium dense, brown to gray, silty, gravelly SAND; dry to moist; massive; (Hf) SM.
	- Gravel inferred from drill action at 6.5 feet
11.3	Loose to medium dense, Municipal Solid Waste; glass, plastic, cinders, wood, and silty sand; (MSW).
20.2	Medium stiff, dark brown PEAT; moist; massive; (Hp) PT.
26.0	Loose, gray, fine to medium SAND, trace of silt; wet; massive; (Ha) SP.
30.5	Medium stiff, dark brown PEAT; moist; massive; (Hp) PT.
34.0	Dense to very dense, gray, slightly silty to silty, gravelly SAND grading to slightly silty, fine SAND, trace of gravel; wet; massive to bedded, scattered clayey silt and fine sandy silt layers below 50.0 feet; (Ha) SP-SM/SM.

CONTINUED NEXT PAGE

Depth (ft) | Symbol | Samples | Ground Water | Depth (ft)

Standard Penetration Resistance
(140 lb. weight, 30-inch drop)
▲ Blows per foot



● % Water Content
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2-inch O.D. Split Spoon Sample
3-inch O.D. Shelby Tube Sample
3.0" O.D. Osterberg Sample
▽ Ground Water Level ATD

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Groundwater level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USCS designation is based on visual-manual classification and selected laboratory index testing.

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Golf Driving Range
Seattle, Washington

LOG OF BORING B-6

September 2001 21-1-08689-003

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FIG. A-7
Sheet 1 of 3

DRAFT

MASTER_LOG 21-08689.GPJ SHAN_WIL.GDT 9/6/01 Log: WND Rev: Typ: MGI

SOIL DESCRIPTION

Approx. Coordinates: N: 150 E: 150
Surface Elevation: Approx. 19.8 Ft.

Depth (ft)	Soil Description
	- iron-oxide staining at 50.3 feet
58.0	Very stiff to stiff, interbedded, slightly clayey, fine sandy SILT, silty CLAY, and silty, fine SAND; wet; bedded; (HI) ML/CL.
	- 3-inch fine to medium sand seam at 61.1 feet
75.2	- 2-inch silty fine sand seam at 75.0 feet
	Very stiff to very soft, gray, silty CLAY; wet; massive to bedded with scattered seams of silty fine sand; (HI) CL.
	- scattered seams of silty fine sand with trace of clay at 80.0 feet
94.0	Very dense to medium dense, gray, slightly silty SAND; wet; massive; (Qvro) SP-SM/SM.

CONTINUED NEXT PAGE

Depth (ft) | Symbol | Samples | Ground Water | Depth (ft)

Samples: 13, 14, 15, 16, 17, 18, 19, 20, 21

Standard Penetration Resistance
(140 lb. weight, 30-inch drop)
▲ Blows per foot

0 20 40 60

55 60 65 70 75 80 85 90 95

50/6"

0 20 40 60

● % Water Content
Plastic Limit |—●—| Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2-inch O.D. Split Spoon Sample
3-inch O.D. Shelby Tube Sample
3.0" O.D. Osterberg Sample
▽ Ground Water Level ATD

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Groundwater level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USCS designation is based on visual-manual classification and selected laboratory index testing.

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LOG OF BORING B-6

September 2001 21-1-08689-003

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FIG. A-7
Sheet 2 of 3

DRAFT

MASTER LOG 21-08689.GPJ SHAN_WIL.GDT 9/6/01 Log: WND Rev: Typ: MGI

SOIL DESCRIPTION	Depth (ft)	Symbol	Samples	Ground Water	Depth (ft)
Approx. Coordinates: N: 150 E: 150 Surface Elevation: Approx. 19.8 Ft.					
- scattered 1/2-inch silty clay seams at 100.0 feet	101.5		22		
BOTTOM OF BORING COMPLETED ON 06/07/2001					

Standard Penetration Resistance
(140 lb. weight, 30-inch drop)
▲ Blows per foot

0 20 40 60

105 110 115 120 125 130 135 140 145

LEGEND

* Sample Not Recovered
2-inch O.D. Split Spoon Sample
3-inch O.D. Shelby Tube Sample
3.0" O.D. Osterberg Sample
▽ Ground Water Level ATD

● % Water Content
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Groundwater level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USCS designation is based on visual-manual classification and selected laboratory index testing.

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LOG OF BORING B-6

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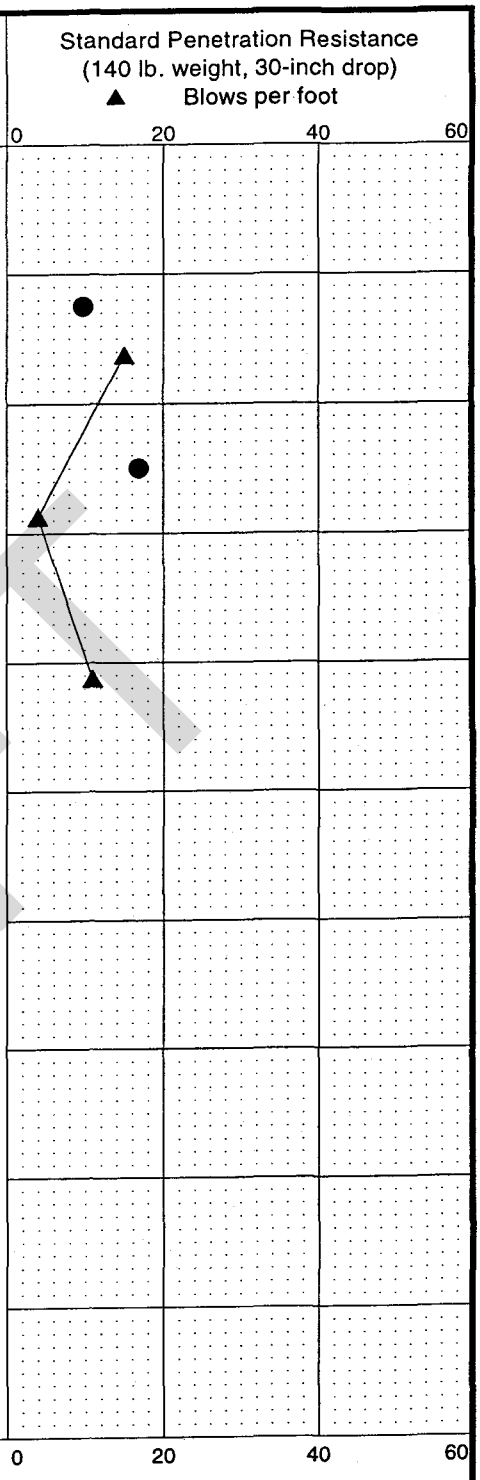
FIG. A-7
Sheet 3 of 3

DRAFT

MASTER LOG 21-08689.GPJ SHAN_WIL.GDT 9/6/01 Log: WND Rev: Typ: MGI

SOIL DESCRIPTION	Depth (ft)	Symbol	Samples	Ground Water
Approx. Coordinates: N: 160 E: 160 Surface Elevation: Approx. 21.9 Ft.				
Medium dense, brown, silty, gravelly SAND; dry to moist; (Hf) SM.			1	
Loose, dark gray, silty SAND; wet; massive, organic odor; (Hf/MSW) SM.	4.2		2	
Medium dense Municipal Solid Waste; wet; (MSW).	7.5		3	
BOTTOM OF BORING COMPLETED ON 06/05/2001	9.0			



LEGEND

- * Sample Not Recovered
- 2-inch O.D. Split Spoon Sample
- 3-inch O.D. Shelby Tube Sample
- 3.0" O.D. Osterberg Sample
- ▽ Ground Water Level ATD
- ● % Water Content
- Plastic Limit ⊢●⊣ Liquid Limit
- Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Groundwater level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USCS designation is based on visual-manual classification and selected laboratory index testing.

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LOG OF BORING B-7

September 2001 21-1-08689-003

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FIG. A-8

DRAFT

Log: WDN Rev: Typ: MGI

MASTER_LOG 21-08689.GPJ SHAN_WIL.GDT 9/6/01

SOIL DESCRIPTION

Approx. Coordinates: N: 170 E: 170
Surface Elevation: Approx. 23.1 Ft.

Dense to very loose, brown to dark gray, silty, sandy GRAVEL to silty, gravelly SAND; dry to wet; massive; (Hf) SM/GM.

12.0

Very loose Municipal Solid Waste; wet; (MSW).

20.2

Soft and medium stiff, dark brown, PEAT; moist; massive, scattered fine sand seams; (Hp) PT.

- 3-inch fine sand seam at 26.2 feet

- 2-inch fine sand seam at 30.2 feet

- 1-inch fine sand seams at 35.5 and 35.8 feet

39.0

Dense to very dense, gray-brown to gray, trace of silt to slightly silty, fine to medium SAND; wet; locally gravelly, faintly bedded, scattered fine sandy silt seams; (Ha) SP-SM/SP.
- gravel inferred from drill action at 45.0 feet

CONTINUED NEXT PAGE

Depth (ft) | Symbol | Samples | Ground Water | Depth (ft)

During Drilling

Standard Penetration Resistance
(140 lb. weight, 30-inch drop)
▲ Blows per foot

0 20 40 60

5 10 15 20 25 30 35 40 45

390 445 195 91

0 20 40 60

● % Water Content
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2-inch O.D. Split Spoon Sample
3-inch O.D. Shelby Tube Sample
3.0" O.D. Osterberg Sample
▽ Ground Water Level ATD

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Groundwater level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USCS designation is based on visual-manual classification and selected laboratory index testing.

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LOG OF BORING B-8

September 2001 21-1-08689-003

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FIG. A-9
Sheet 1 of 3

DRAFT

MASTER_LOG 21-08689.GPJ SHAN_WIL.GDT 9/6/01 Log: WDN Rev: Typ: MGI

SOIL DESCRIPTION

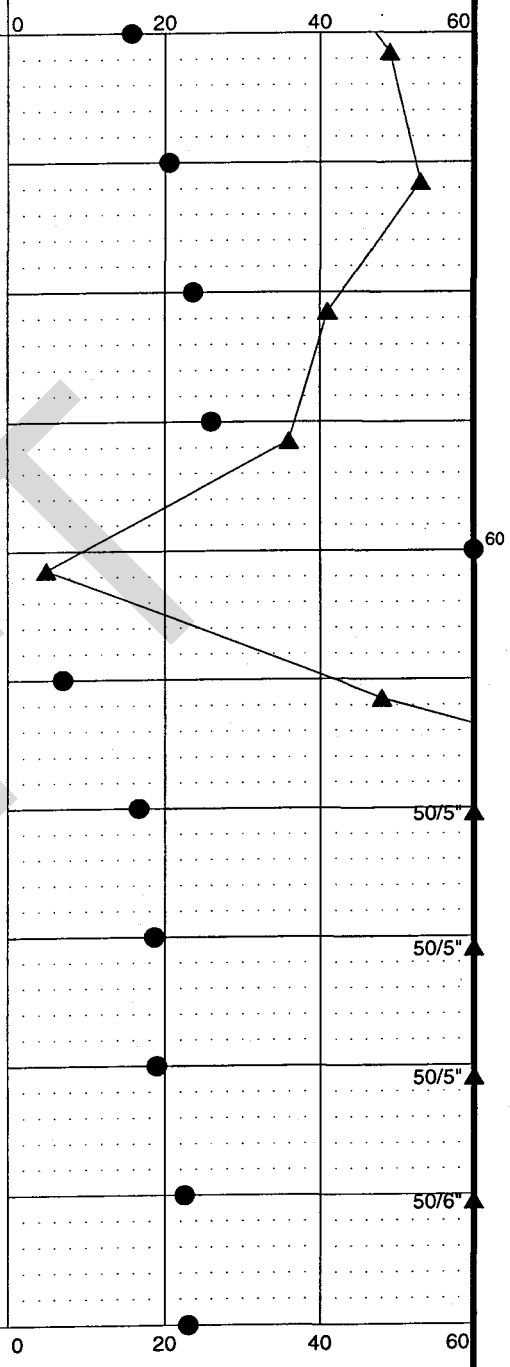
Approx. Coordinates: N: 170 E: 170
Surface Elevation: Approx. 23.1 Ft.

Depth (ft)	Soil Description
	- grades to fine sand at 60.0 feet
62.0	Hard to medium stiff, gray, silty CLAY; moist to wet; massive to bedded, abundant lenses of silty, fine sand above 65.4 feet; (Hl) CL.
73.5	Very dense, gray, slightly silty, fine to medium SAND; wet; gravelly at top, faintly bedded; (Qvro) SP-SM/SP.
	- grades to slightly silty fine sand at 95.3 feet

CONTINUED NEXT PAGE

Depth (ft) | Symbol | Samples | Ground Water | Depth (ft)

Standard Penetration Resistance
(140 lb. weight, 30-inch drop)
▲ Blows per foot



LEGEND

* Sample Not Recovered
2-inch O.D. Split Spoon Sample
3-inch O.D. Shelby Tube Sample
3.0" O.D. Osterberg Sample
▽ Ground Water Level ATD

● % Water Content
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Groundwater level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USCS designation is based on visual-manual classification and selected laboratory index testing.

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LOG OF BORING B-8

September 2001 21-1-08689-003

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FIG. A-9
Sheet 2 of 3

DRAFT

MASTER_LOG 21-08689.GPJ SHAN_WIL.GDT 9/6/01 Log: WDN Rev: Typ: MGI

SOIL DESCRIPTION	Depth (ft)	Symbol	Samples	Ground Water	Depth (ft)	Standard Penetration Resistance (140 lb. weight, 30-inch drop) ▲ Blows per foot
Approx. Coordinates: N: 170 E: 170 Surface Elevation: Approx. 23.1 Ft.						0 20 40 60
	101.3		23			98/10"
BOTTOM OF BORING COMPLETED ON 06/06/2001					105 110 115 120 125 130 135 140 145	

LEGEND

* Sample Not Recovered
2-inch O.D. Split Spoon Sample
3-inch O.D. Shelby Tube Sample
3.0" O.D. Osterberg Sample
Ground Water Level ATD

● % Water Content
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Groundwater level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USCS designation is based on visual-manual classification and selected laboratory index testing.

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LOG OF BORING B-8

September 2001 21-1-08689-003

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FIG. A-9
Sheet 3 of 3

DRAFT

MASTER_LOG 21-08689.GPJ SHAN_WIL.GDT 9/6/01 Log: WDN Rev: Typ: MGI

SOIL DESCRIPTION

Approx. Coordinates: N: 100 E: 100

Surface Elevation: Approx. 18.8 Ft.

Very dense to loose, gray to dark gray, slightly gravelly to gravelly, silty SAND; moist; massive; (Hf) SM.

9.5

Loose Municipal Solid Waste; wet; (MSW).

11.5

BOTTOM OF BORING
COMPLETED ON 06/12/2001

Depth (ft)

Symbol

Samples

Ground Water Depth (ft)

Standard Penetration Resistance
(140 lb. weight, 30-inch drop)
▲ Blows per foot

0 20 40 60

2 4 6 8 10 12 14 16 18

0 20 40 60

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

LEGEND

* Sample Not Recovered

2-inch O.D. Split Spoon Sample

3-inch O.D. Shelby Tube Sample

3.0" O.D. Osterberg Sample

▽ Ground Water Level ATD

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Groundwater level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USCS designation is based on visual-manual classification and selected laboratory index testing.

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LOG OF BORING B-18

September 2001 21-1-08689-003

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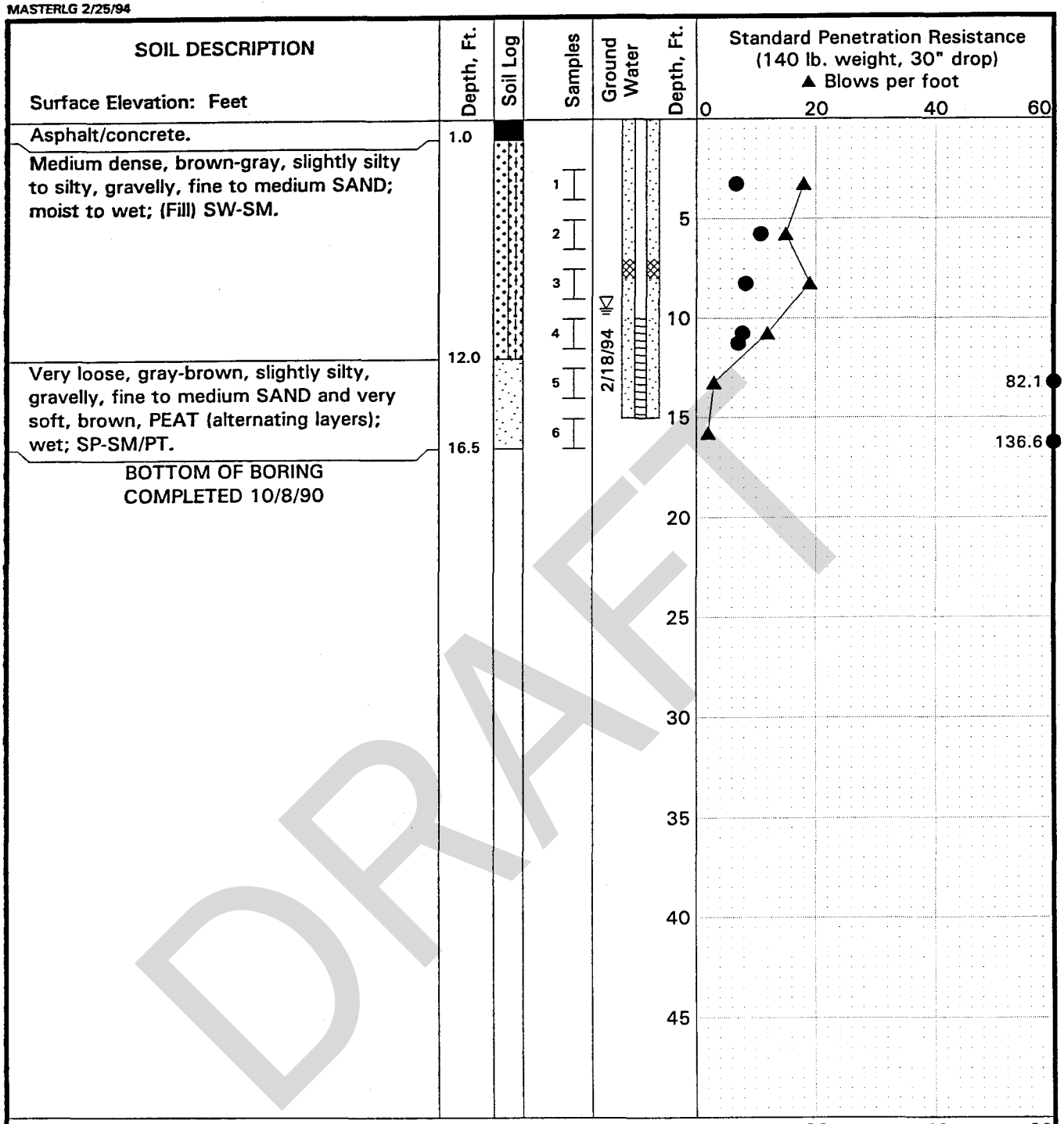
FIG. A-19

DRAFT

MASTER_LOG 21-08689.GPJ SHAN_WIL.GDT 9/6/01 Log: WDN Rev: Typ: MGI

MASTERLG 2/25/94



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- Surface Seal
- Annular Sealant
- Piezometer Screen
- Grout
- Water Level

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of 'Soil Log' symbols and definitions.
5. USC letter symbol based on visual classification.

Ravenna Creek Storm Drainage Project
Seattle, Washington

LOG OF BORING RC-1

February 1994 W-5525-05

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FIG. 3

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LOG OF TEST PIT TP-3

JOB NO: W-6017-02 DATE: 2-26-92 LOCATION: See Site Plan

PROJECT: N.E. 45th Street Viaduct, West Approach

SOIL DESCRIPTION	Ground Water	% Water Content	Samples	Depth, Ft.
① Loose, brown, silty, fine SAND; trace organics (roots); moist (FILL)			S-1 S-2 S-3 S-4 S-5 S-6	0
② Medium dense, gray, slightly sandy to sandy, slightly gravelly to gravelly SILT; trace organics (roots); moist (FILL)				7
③ Medium dense, brown, silty, gravelly, fine to coarse SAND with some iron-oxide staining; moist (FILL)				14
④ Medium dense to dense, gray-brown grading to rust-colored, slightly silty to silty, slightly gravelly to gravelly, fine to coarse SAND;layered; scattered organics; iron and manganese-oxide staining; moist to wet at bottom of layer (FILL)				28
⑤ Hard, gray CLAY; moist				35

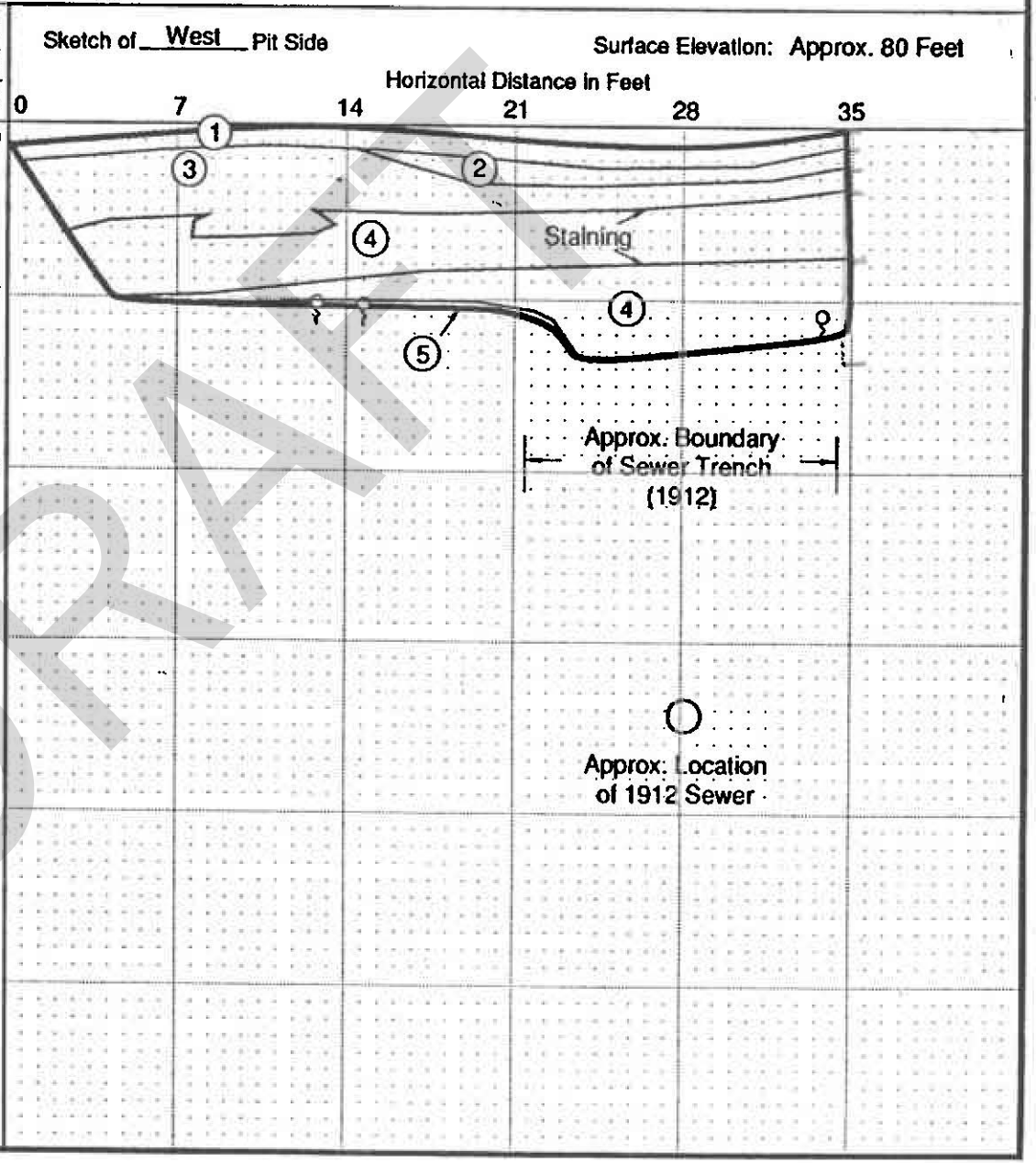


FIG. A-3

SEATTLE ENGINEERING DEPARTMENT
MATERIALS LABORATORY

CB 7.241

LOG OF TEST BORING

1/2

DATE 2-16-89 HOLE NO. 2

PROJECT N. E. 45TH ST. VIADUCT (UNDER VIADUCT) GRD. ELEV. 60'±

LOCATION 15'E/O WEST MOST WOOD COLUMN BENT (ABOVE BURKE GILMAN TRAIL) & 5'N/O NORTH VIADUCT EDGE

STRATA	DEPTH	SAMPLE NO.	BLOW COUNT	STD. PEN.	DESCRIPTION OF MATERIAL: COMPOSITION	CONSISTENCY	MOISTURE	COLOR	WATER LEVEL
					LUMPY FILL			GRAY	
CLAY MIXED WITH SAND	5	A	7 12 13	25	FINE SANDY CLAY & FINE ARGILLACEOUS SANDY CLAY	STIFF	MOIST	TAN BROWN	▽ ? = 2-19-89
					5½" FINE-MED. SANDY CLAY		MOIST		
	10	B	14 18 21	39	1½" MED.-COARSE SAND	HARD	WET	GRAY	
					11" CLAY		DRY		
		C	6 8 10	18	CLAY	STIFF	DRY	GRAY	
	15				BELOW PLASTIC LIMIT				
		D	10 16 21	37	CLAY	HARD	DRY	GRAY	
	20				BELOW PLASTIC LIMIT				▽ = 2-24-89
		E	9 14 16	30	CLAY	HARD	DRY	GRAY	
	25				BELOW PLASTIC LIMIT				▽ = 2-21-89
		F	9 15 21	36	CLAY	HARD	DRY	GRAY	
	30				BELOW PLASTIC LIMIT				

EASY DRILLING

HARD DRILLING

CLAY

INSPECTOR JON M.

11300 2/2

SEATTLE ENGINEERING DEPARTMENT
MATERIALS LABORATORY

CB 7.241

LOG OF TEST BORING

DATE 2-16-89 HOLE NO. 2 (CONT'D)

PROJECT N.E. 45TH ST. VIADUCT (UNDER VIADUCT) GRD. ELEV.

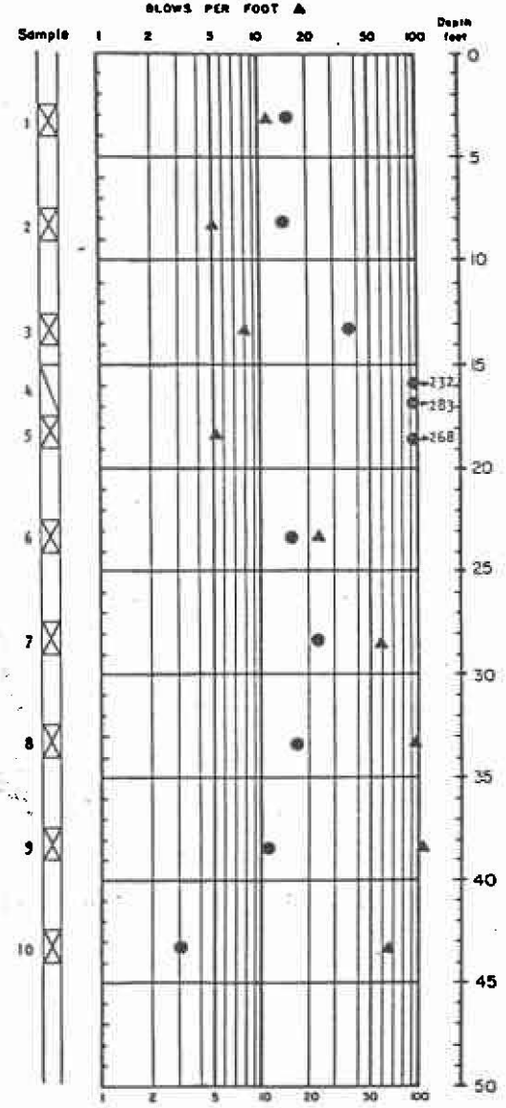
LOCATION 15'E/O WEST MOST WOOD COLUMN BENT (ABOVE BURKE GILMAN TRAIL) & 5'N/O NORTH VIADUCT EDGE

STRATA	DEPTH	SAMPLE NO.	BLOW COUNT	STD. PEN.	DESCRIPTION OF MATERIAL: COMPOSITION	CONSISTENCY	MOISTURE	COLOR	WATER LEVEL
VERY HARD DRILLING									
CLAY									
		G	16 25 25	50	CLAY	V. HARD	DRY	GRAY	
B.O.H.	35				BELOW PLASTIC LIMIT				PIEZO. TIP

INSPECTOR JON M.

BORING LOG B-3

STANDARD PENETRATION RESISTANCE
(140 pound weight, 30 inch drop)
BLOWS PER FOOT ▲



WATER CONTENT
PERCENT ●

SOIL INTERPRETATION

Ground Surface Elevation 264 feet ± foot

FILL

Moist to saturated, gray, silty, slightly gravelly, fine to coarse SAND

PEAT

Soft to medium stiff, wet to saturated, brown, silty, fibrous PEAT (Pt)

SAND

Medium dense to very dense, saturated, gray, slightly silty, gravelly, fine to coarse SAND (SP-SM)

Bottom of Boring
Completed 11/08/77

LEGEND

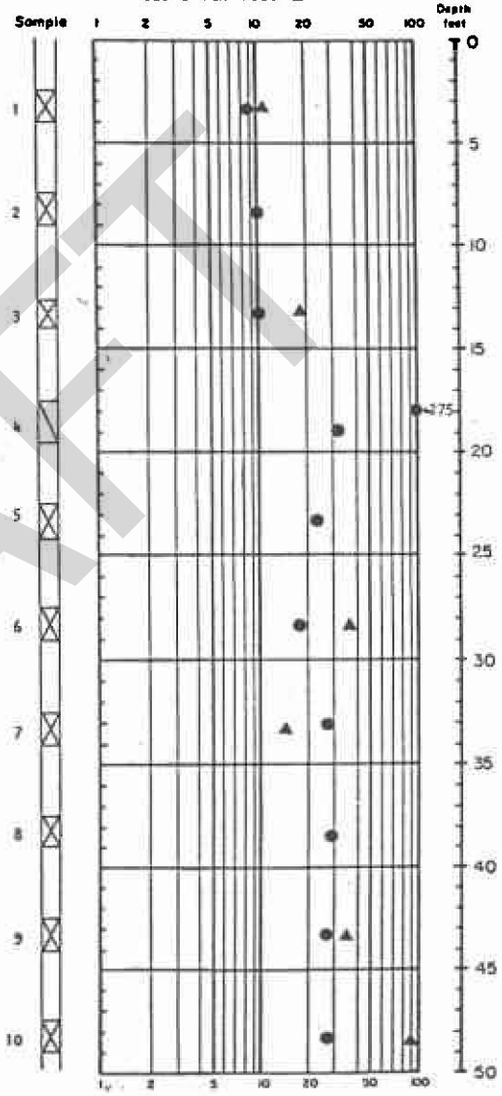
- ⊠ 2" O.D. Split Spoon Sample
- ⊠ 3" O.D. Shelby Sample
- ★ No Sample Recovery
- ▽ Water Level
- ▯ Observation Well

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

J-552 December 1977
HART-CROWSER & associates inc.
Figure A-2

BORING LOG B-1

STANDARD PENETRATION RESISTANCE
(140 pound weight, 30 inch drop)
BLOWS PER FOOT ▲



WATER CONTENT
PERCENT ●

SOIL INTERPRETATION

Ground Surface Elevation 261 feet ± foot

FILL

Moist to saturated, gray, silty, slightly gravelly, fine to coarse SAND

PEAT

Soft to medium stiff, wet to saturated, brown, silty, fibrous PEAT (Pt)

SAND

Medium dense to very dense, saturated, gray, slightly silty, gravelly, fine to coarse SAND (SP-SM)

Bottom of Boring
Completed 11/08/77

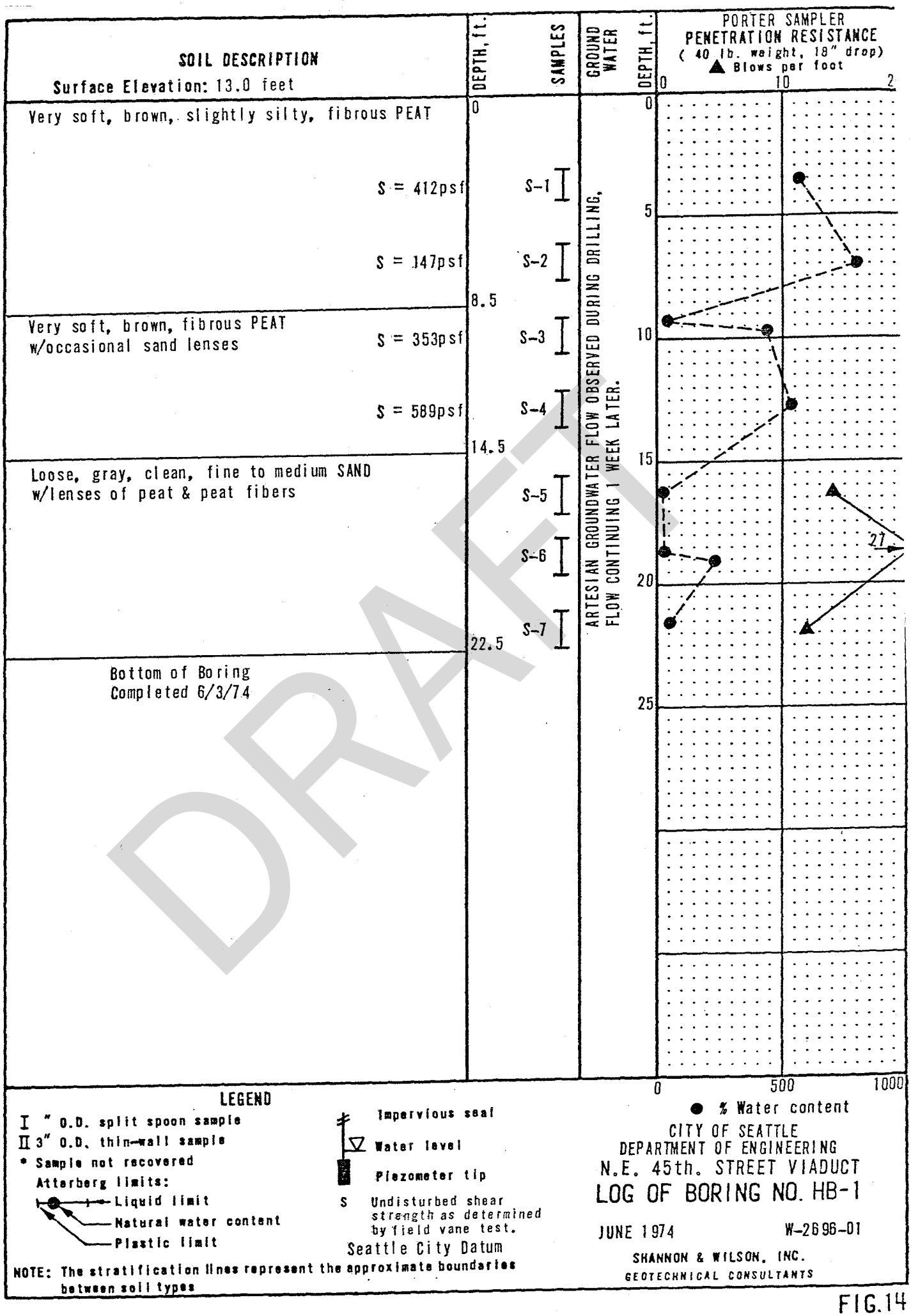
LEGEND

- ⊠ 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.

09989
581882

J-552 December 1977
HART-CROWSER & associates inc.
Figure A-1



NOTE: The stratification lines represent the approximate boundaries between soil types

FIG.14

SOIL DESCRIPTION Surface Elevation: 13.0 Feet	DEPTH, ft.	SAMPLES	GROUND WATER	DEPTH, ft.	● % Water Content 0 500 1000
Very soft light brown organic clayey SILT, (possibly weathered ash), and very soft brown fiberous PEAT Q_u = 0.099 TSF γ_w = 63.7 PCF γ_d = 16.1 PCF		S-1 P	6-4-74	0	188.3 524.3 294.7
	3.0			2	760 401.2
Very soft brown fiberous PEAT Partially decayed reeds, twigs, and wood chips. Q_u = 0.11 TSF γ_w = 58.4 PCF γ_d = 6.3 PCF	4.0	S-2 P		4	831.5 760.3
	6.0	S-3 P		6	777.8
	9.0			8	588.2
		S-4 * P		10	
Bottom of Hole Completed 6-3-74	12.0			12	

Qu = Unconfined Compression Strength
γ_w = Saturated Unit Weight
γ_d = Dry Unit Weight

3" O.D. Thin walled Shelby Tubes, Hand pushed and Extracted.

LEGEND

I 2" O.D. split spoon sample
II 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

Seattle City Datum

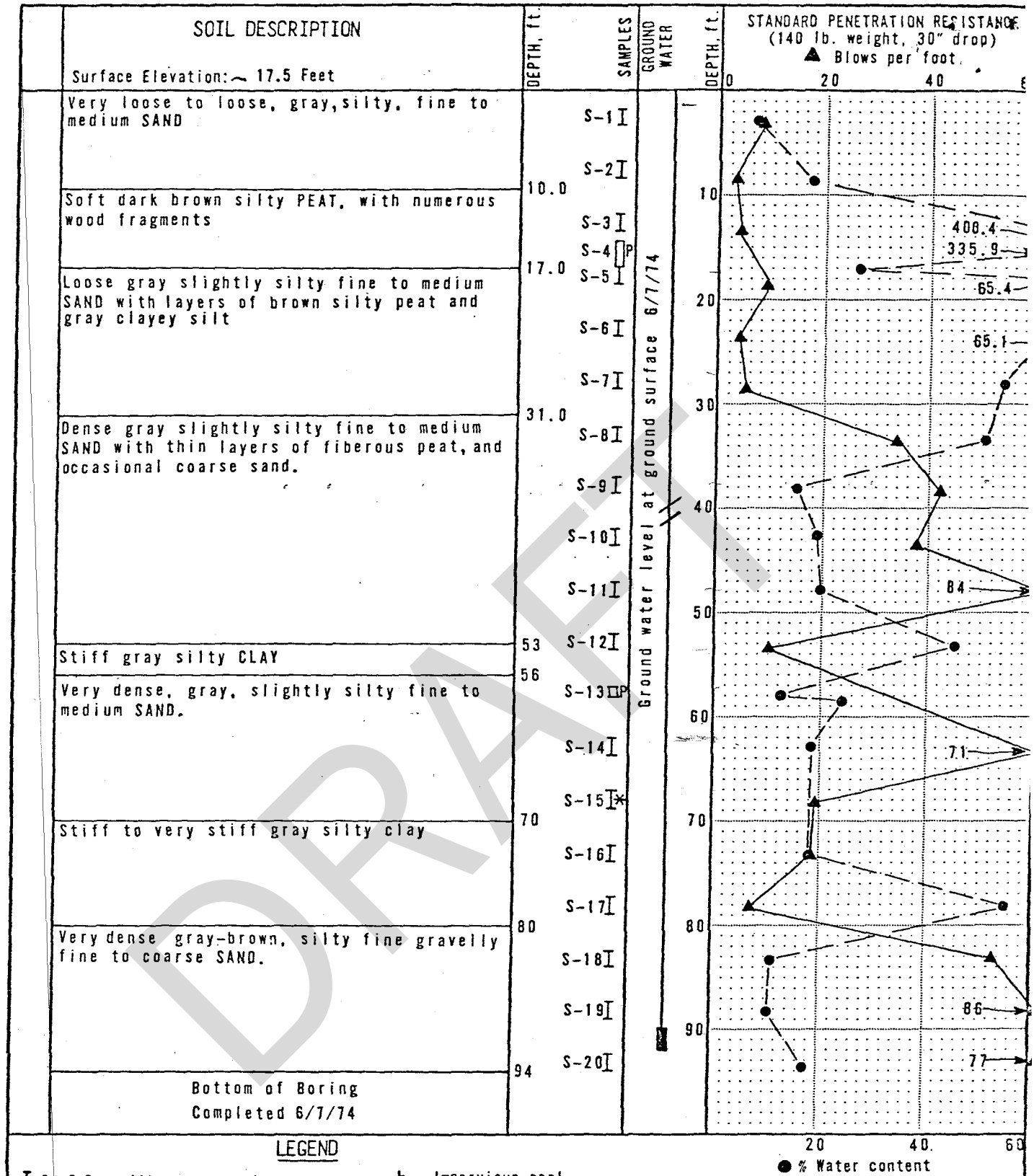
BORING HB-2

June 1974 W-2696-01

NOTE: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.

SHANNON & WILSON, INC.
GEOTECHNICAL CONSULTANTS

FIG. 15



LEGEND

I 2" O.D. split spoon sample

II 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

CITY OF SEATTLE
DEPARTMENT OF ENGINEERING
N.E. 45TH STREET VIADUCT

BORING B-2

June 1974 W-2696-01

SHANNON & WILSON, INC.
GEOTECHNICAL CONSULTANTS

NOTE: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.

FIG. 17

SEATTLE ENGINEERING DEPARTMENT
MATERIALS LABORATORY

CS 7.241

1/2

LOG OF TEST BORING

DATE 5-12-72 HOLE NO. 2

PROJECT NE 45th St VIADUCT - EAST APPROACH GRD. ELEV.

LOCATION 25ft So. VIADUCT ℄ in line with 3rd bent from West

STRATA	DEPTH	SAMPLE NO.	BLOW COUNT	STD. PEN.	DESCRIPTION OF MATERIAL: COMPOSITION	CONSISTENCY	MOISTURE	COLOR	WATER LEVEL
Loose, SAND & silty SAND					Top 2" brn SAND				
					both 1' gray wet SAND				5-19-72
									5-16-72
	5	A	2 2 2	4	silty SAND w/gravel & organics	Loose	sat.	gray	5-15-72
Very Soft PEAT									
	10	B	— 1 —	1	No Recovery — PEAT on Auger	Very Soft		brn	5-12-72
									Piezometer Installed 5-12-72
	15	C	X — 1 —	1	fiberous PEAT w/ gravel trace	Very Soft	wet	brn	
Loose, SAND w/Layers PEAT	20	D	1 2 1	3	SAND w/thin layers PEAT	Loose	sat	gray	
					Add Baroid @ 23ft				
	25	E	- 1 - 1	1	SAND w/PEAT LAYERS	Loose	sat	gray	
	30	F	X 3 2	5	SAND w/Pockets PEAT	Loose	sat	gray	

INSPECTOR AC Rice

SEATTLE ENGINEERING DEPARTMENT
MATERIALS LABORATORY

CS 7.241

2/2

LOG OF TEST BORING

DATE 5-12-72 HOLE NO. 2

PROJECT NE 45th St VIADUCT GRD. ELEV.

LOCATION

STRATA	DEPTH	SAMPLE NO.	BLOW COUNT	STD. PEN.	DESCRIPTION OF MATERIAL: COMPOSITION	CONSISTENCY	MOISTURE	COLOR	WATER LEVEL
	35	G	3 3 5	8	SAND w/PEAT & GRAVEL LAYERS	Loose	wet	gray	
Firm to Compact, SAND & fine SAND	40	H	5 12 13	25	fine SAND	firm	sat	gray	
	45	I	9 17 23	40	SAND w/trace gravel	compact	sat	brn	
					SAND			brn	
Mixed Layers, SILT SAND & clayey SILT	50	J	12 18 9	27	Layers SILT, f. SAND & SAND	firm -		brn	
		J1			Layers clayey SILT & SILT	stiff		gray	

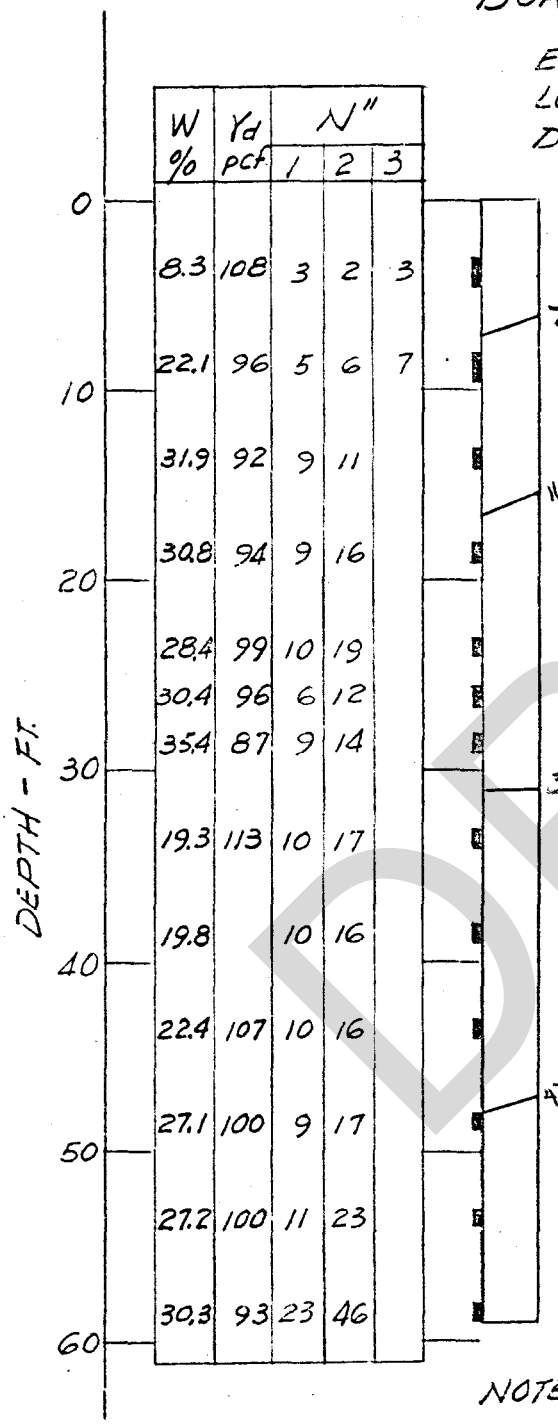
INSPECTOR AC Rice

CALCULATION SHEET

METROPOLITAN ENGINEERS
SEATTLE, WASHINGTON

BORING A3

ELEVATION 71.6 ± (MSL)
LOCATION RAVENNA AVE. (NE 46TH)
DATE DRILLED 3-23, 24-72



BROWN FINE SAND WITH MED.-COARSE SAND, PEBBLES, SOME GRAVEL AND ROOTS - LOOSE

7 GRAY BROWN SILT AND VERY FINE SANDY SILT WITH LAYERS OF BROWN FINE SAND AND SILTY FINE SAND, OCCASIONAL PEBBLES AND ROOTS — MED. COMPACT
GRADES TO BROWN CLAY WITH THIN SEAMS OF VERY FINE SAND (TO 30° DIP) - VERY STIFF

10.5 GRAY SILT AND CLAY - VERY STIFF

GRADES TO IRREGULARLY LAYERED AND LAMINATED GRAY SILT AND CLAY - VERY STIFF

GRADES CLAYEY

GRADES TO CLAY

31 GRAY FINE SANDY CLAY WITH OCCASIONAL PEBBLES (TILL ?) - VERY STIFF

47.5 GRAY CLAY - VERY STIFF

NOTES (1) UPON COMPLETION, BORING BACKFILLED WITH PEA GRAVEL

(2) WATER LEVEL NOT RECORDED

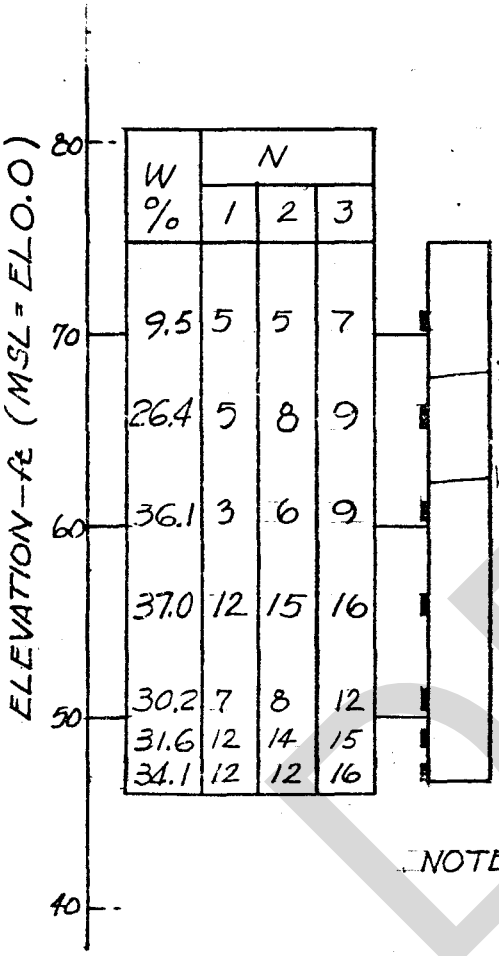
DATE	BY	JOB NO.	TITLE	PLATE
3-25-72		M250C	LOG OF BORING	28

CALCULATION SHEET

METROPOLITAN ENGINEERS
SEATTLE, WASHINGTON

BORING B13

ELEVATION 74.9
LOCATION N 245 229 E 1638225
DATE DRILLED 3-23-72



W %	N 1	2	3
9.5	5	5	7
26.4	5	8	9
36.1	3	6	9
37.0	12	15	16
30.2	7	8	12
31.6	12	14	15
34.1	12	12	16

BROWN SILTY FINE SAND WITH OCCASIONAL GRAVEL LOOSE TO MEDIUM COMPACT

7 GRAYISH-BROWN IRREGULARLY LAYERED VERY FINE SANDY SILT & SILT - STIFF

12,13 GRAYISH-BROWN CLAYEY SILT - STIFF

VERY STIFF

GRADES TO GRAY CLAYEY SILT & SILTY CLAY

DECOMPOSED WOOD AT EL 46.2 WITH SILTY CLAY BELOW. HARD AT EL 46.7 (MORTAR FRAGMENTS)

NOTE: UPON COMPLETION AUGER WAS REMOVED & HOLE CAVED TO EL 56.9. BORING BACK-FILLED TO SURFACE WITH PEA GRAVEL

DATE	BY	JOB NO.	TITLE	PLATE
		M 250 C	LOG OF BORING	15

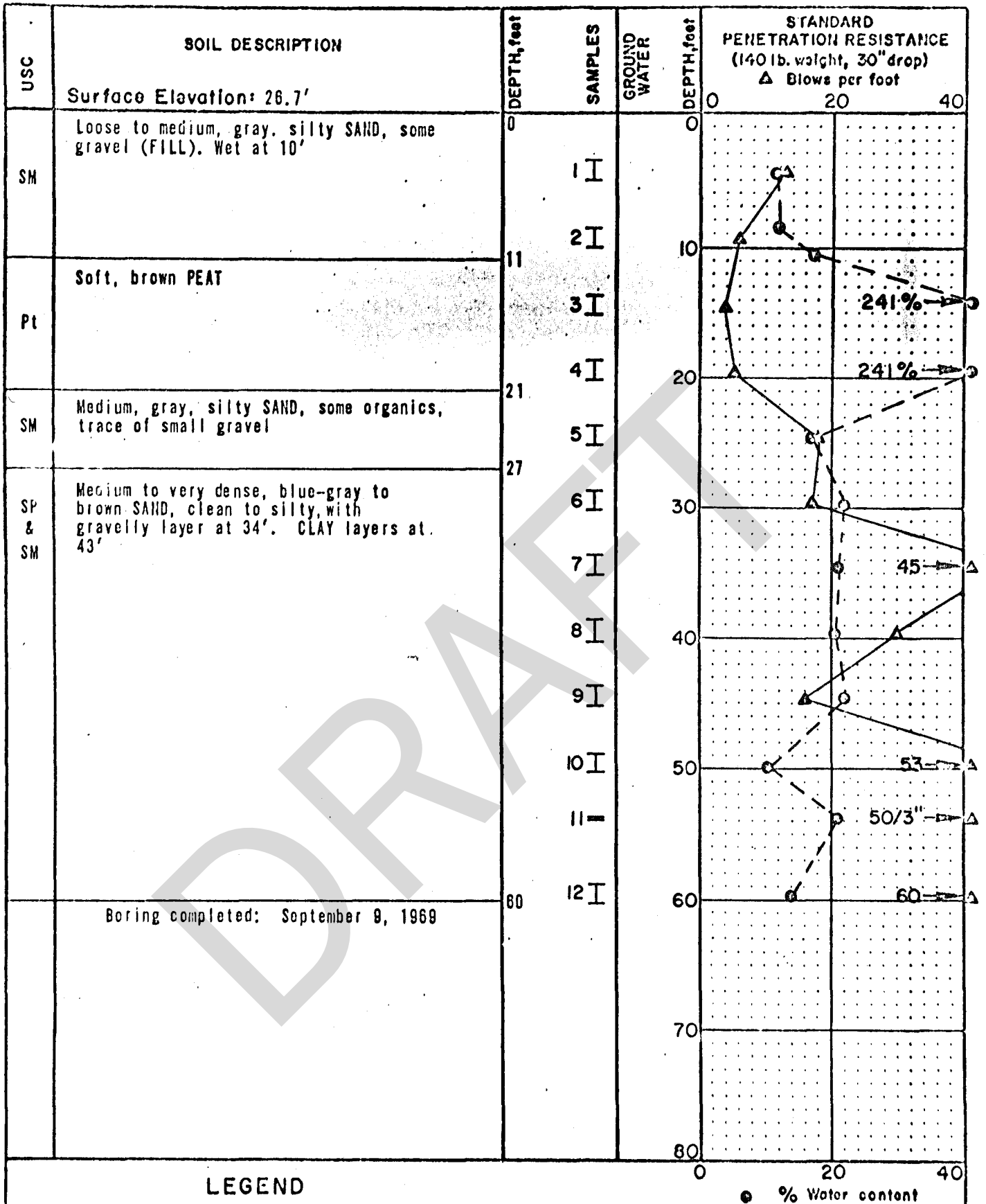
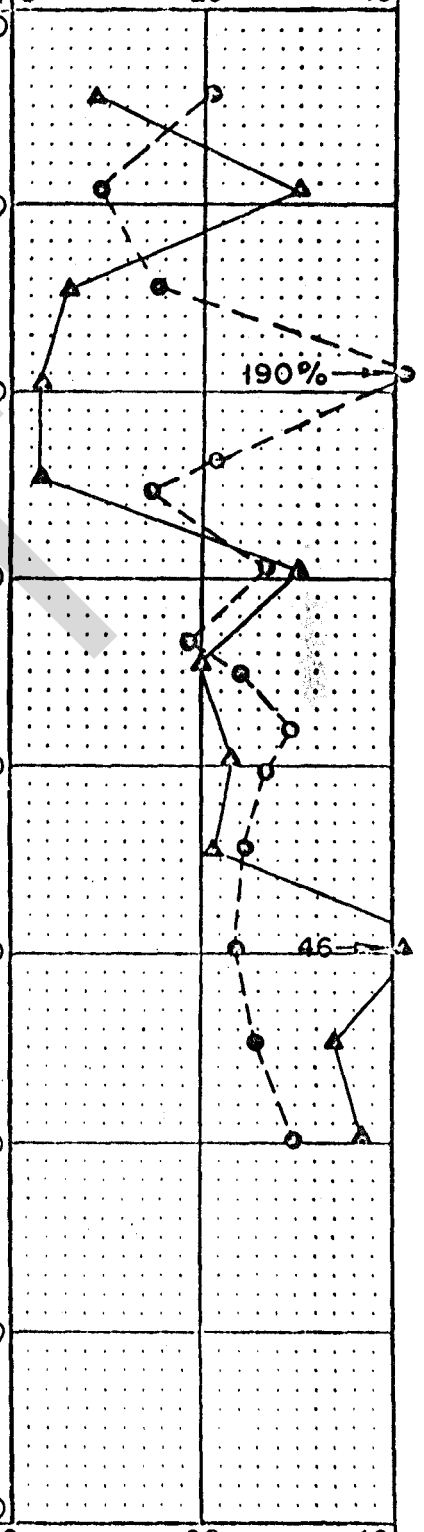

USC
SOIL DESCRIPTION
Surface Elevation: 26.7'
DEPTH, feet
SAMPLES
GROUND WATER
DEPTH, feet
STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
Δ Blows per foot
0
20
40
SM
Loose to medium, gray, silty SAND, some gravel (FILL). Wet at 10'
0
1
2
11
Pt
Soft, brown PEAT
3
4
21
SM
Medium, gray, silty SAND, some organics, trace of small gravel
5
27
SP & SM
Medium to very dense, blue-gray to brown SAND, clean to silty, with gravelly layer at 34'. CLAY layers at 43'
6
7
8
9
10
11
60
12
Boring completed: September 9, 1969
241%
241%
45
53
50/3"
60
0
10
20
30
40
50
60
70
80
0
20
40
% Water content
LEGEND
2.0" O.D. split spoon sample
3.0" O.D. thin-wall sample
Sample not recovered
Atterberg limits:
Liquid limit
Natural water content
Plastic limit
Impervious seal
Water level
Piezometer tip
P Sampler pushed
USC Unified Soil Classification
UNIVERSITY OF WASHINGTON
PHYSICAL PLANT SERVICES BUILDING, PHASE II
U. OF W. P.O. 279050 - S
LOG OF BORING NO. B-101
OCTOBER 31, 1969
W-1828-1
SHANNON & WILSON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. A-1

USC	SOIL DESCRIPTION Surface Elevation: 29.8'	DEPTH, feet	SAMPLES
CL	Stiff, gray and brown CLAY with trace of organics, ash. (FILL)	0	
SM	Medium dense, gray, silty, fine SAND (FILL)	4	I 1
			I 2
Pt	Soft, brown PEAT	14	I 3
			I 4
SM	Loose, dark gray, silty SAND with organics	24	I 5
SP	Medium dense, gray, clean, medium to coarse SAND. Wet	28	I 6
CL-CH	Stiff to very stiff, gray CLAY with sandy CLAY layer at 40'	35	I 7
			I 8
			I 9
			I 10
			I 11
	Boring completed: September 9, 1969	00	I 12

GROUND WATER

STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot



LEGEND

I 2.0" O.D. split spoon sample
II 3.0" O.D. thin-wall sample
Sample not recovered
Attorberg limits: L Liquid limit; Natural water content; Plastic limit
Impervious seal
Water level
Piezometer tip
P Sampler pushed
USC Unified Soil Classification

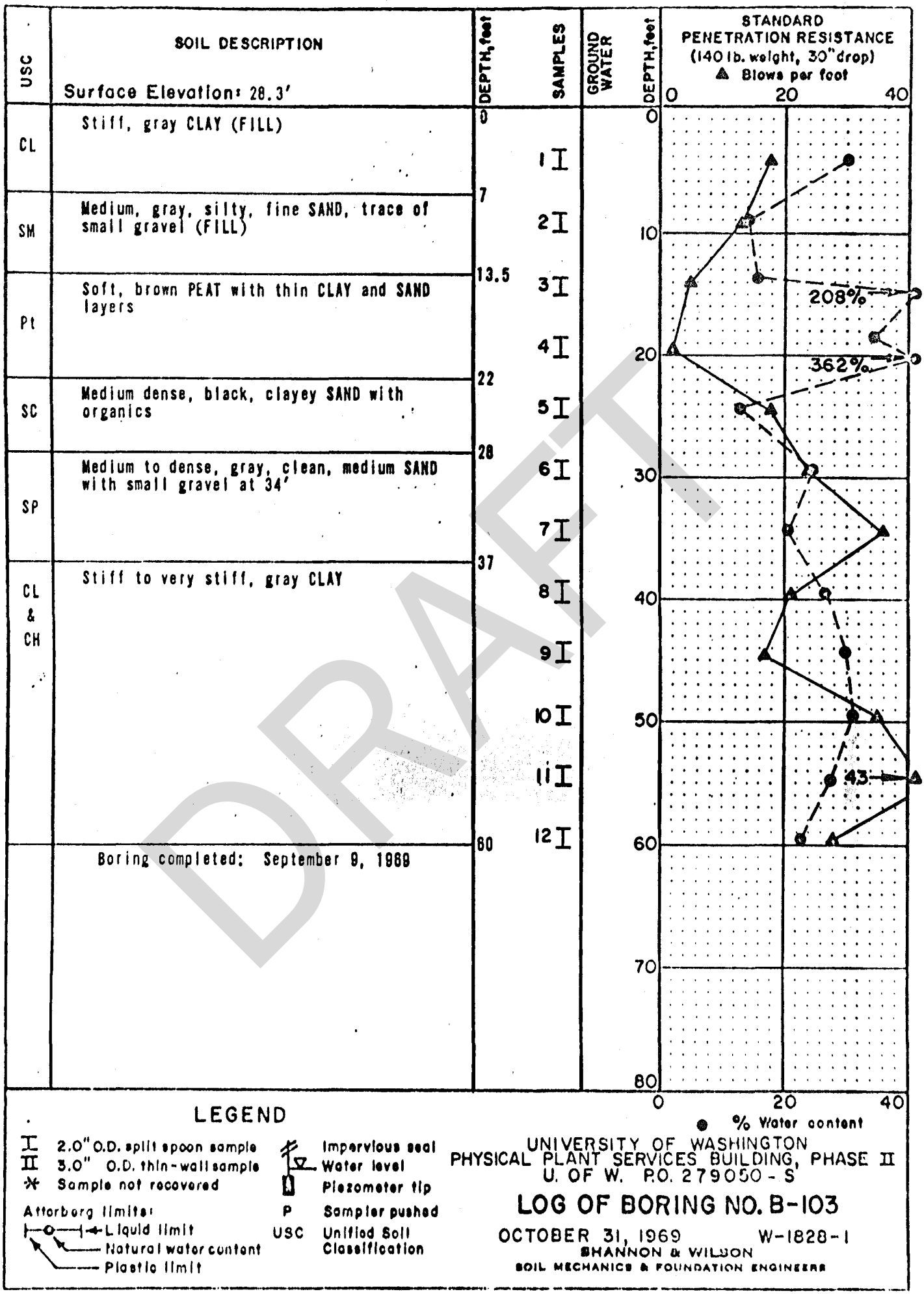
UNIVERSITY OF WASHINGTON
PHYSICAL PLANT SERVICES BUILDING, PHASE II
U. OF W. P.O. 279050 - S

LOG OF BORING NO. B-102

OCTOBER 31, 1969 W-1828-1

SHANNON & WILDON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. A-2



LEGEND

- I 2.0" O.D. split spoon sample
- II 3.0" O.D. thin-wall sample
- ✱ Sample not recovered
- Attorberg limits: Liquid limit; Natural water content; Plastic limit
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

UNIVERSITY OF WASHINGTON
PHYSICAL PLANT SERVICES BUILDING, PHASE II
U. OF W. P.O. 279050 - S

LOG OF BORING NO. B-103

OCTOBER 31, 1969 W-1828-1

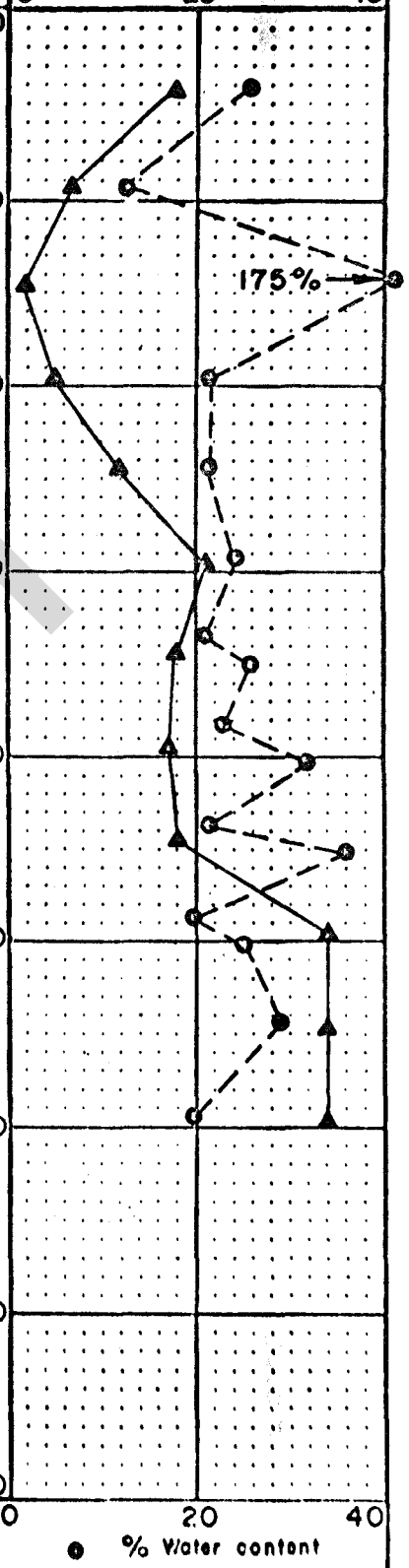
SHANNON & WILSON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. A-3

USC	SOIL DESCRIPTION Surface Elevation: 26.0'	DEPTH, feet	SAMPLES
CL	Stiff, gray CLAY (FILL)	0	I 1
SM	Loose, gray, silty, fine SAND with gravel and some organics (FILL)	7	I 2
Pt	Soft, brown PEAT	11	I 3
SC	Loose, dark gray, clayey SAND with organics	17	I 4
SP	Medium dense, gray, clean, medium SAND	22	I 5 I 6
CL-CH	Very stiff to hard, gray CLAY	33	I 7 I 8 I 9 I 10 I 11 I 12
	Boring completed: September 10, 1969 NOTE: The top half of samples 7, 8, and 9 consisted of clean, medium SAND which is believed to have come from the upper SAND layers during drilling	60	

GROUND WATER

STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot



LEGEND

I 2.0" O.D. split spoon sample
II 3.0" O.D. thin-wall sample
✱ Sample not recovered

Attorberg limits:
Liquid limit
Natural water content
Plastic limit

Impervious seal
Water level
Piezometer tip
P Sampler pushed
USC Unified Soil Classification

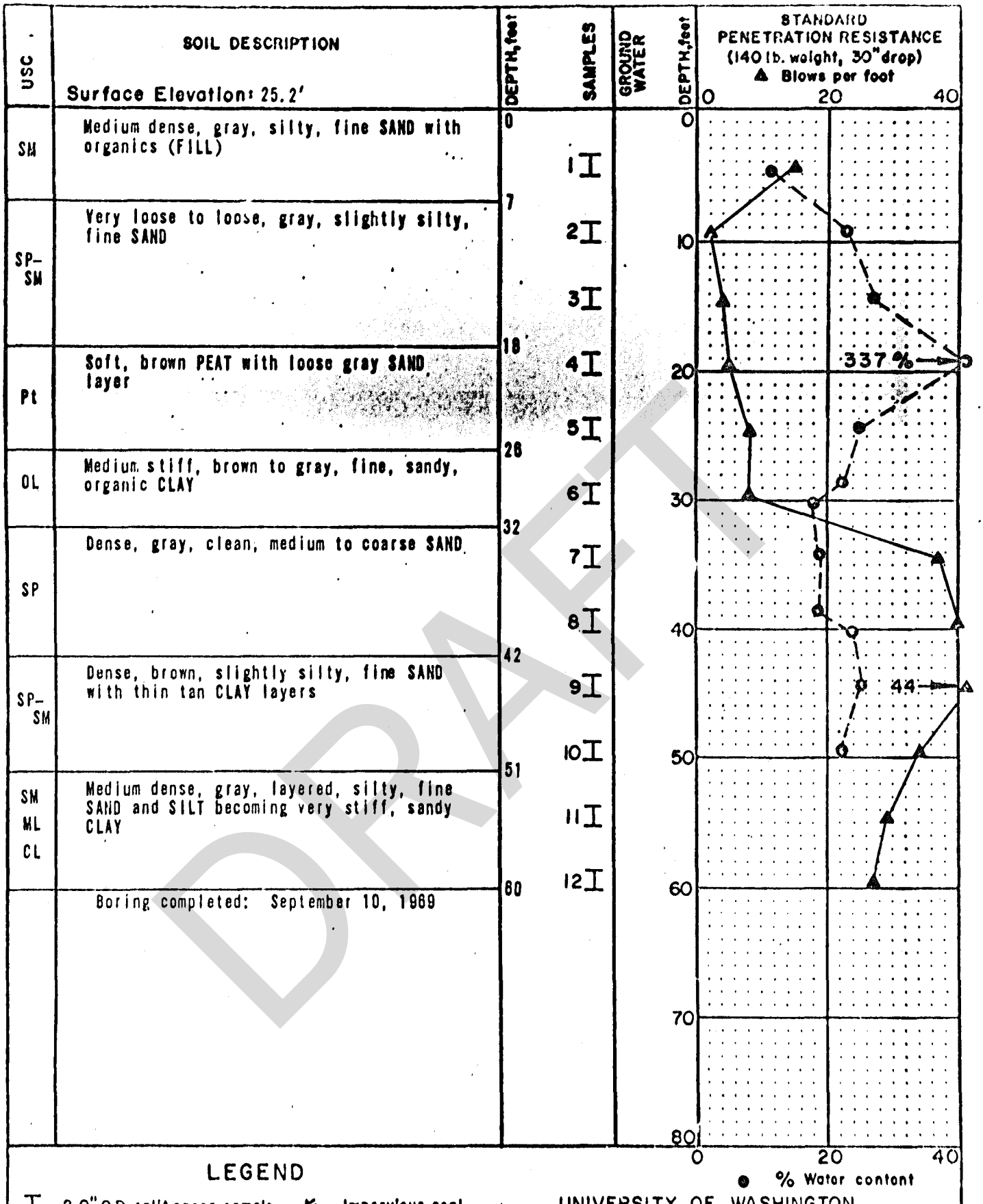
UNIVERSITY OF WASHINGTON
PHYSICAL PLANT SERVICES BUILDING, PHASE II
U. OF W. P.O. 279050 - S

LOG OF BORING NO. B-104

OCTOBER 31, 1969 W-1828-1

SHANNON & WILSON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG A-1



LEGEND

- I — 2.0" O.D. split spoon sample
- II — 3.0" O.D. thin-wall sample
- ✳ — Sample not recovered
- Atterberg limits: Liquid limit, Natural water content, Plastic limit
- Impervious seal
- Water level
- Piezometer tip
- P — Sampler pushed
- USC — Unified Soil Classification

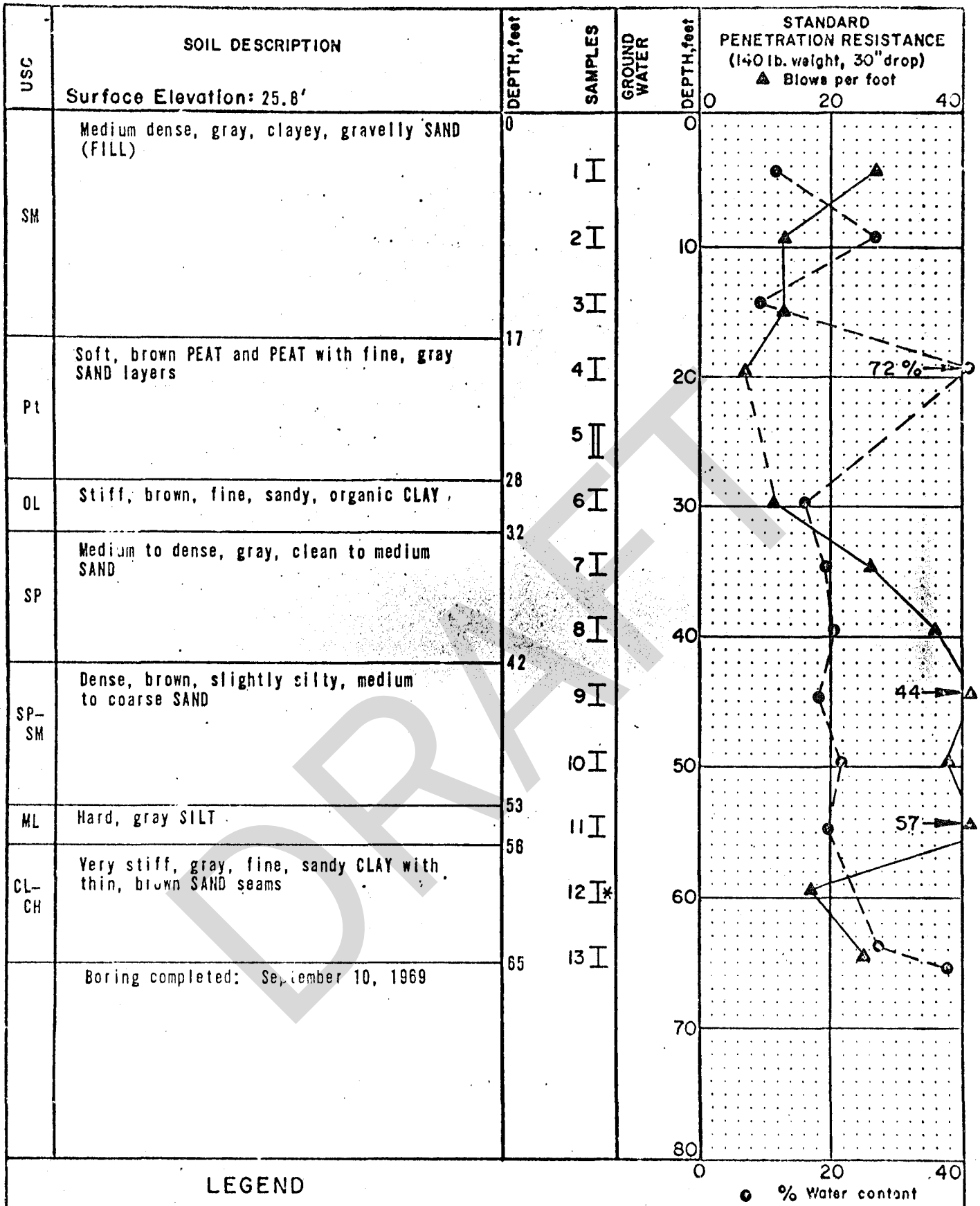
UNIVERSITY OF WASHINGTON
PHYSICAL PLANT SERVICES BUILDING, PHASE II
U. OF W. P.O. 279050-S

LOG OF BORING NO. B-105

OCTOBER 31, 1969 W-1828-1

SHANNON & WILSON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. A-5



LEGEND

- I 2.0" O.D. split spoon sample
- II 3.0" O.D. thin-wall sample
- * Sample not recovered
- Atterberg limits: Liquid limit; Natural water content; Plastic limit
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

UNIVERSITY OF WASHINGTON
PHYSICAL PLANT SERVICES BUILDING, PHASE II
U. OF W. P.O. 279050-S

LOG OF BORING NO. B-106

OCTOBER 31, 1969 W-1828-1

SHANNON & WILSON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. A-6

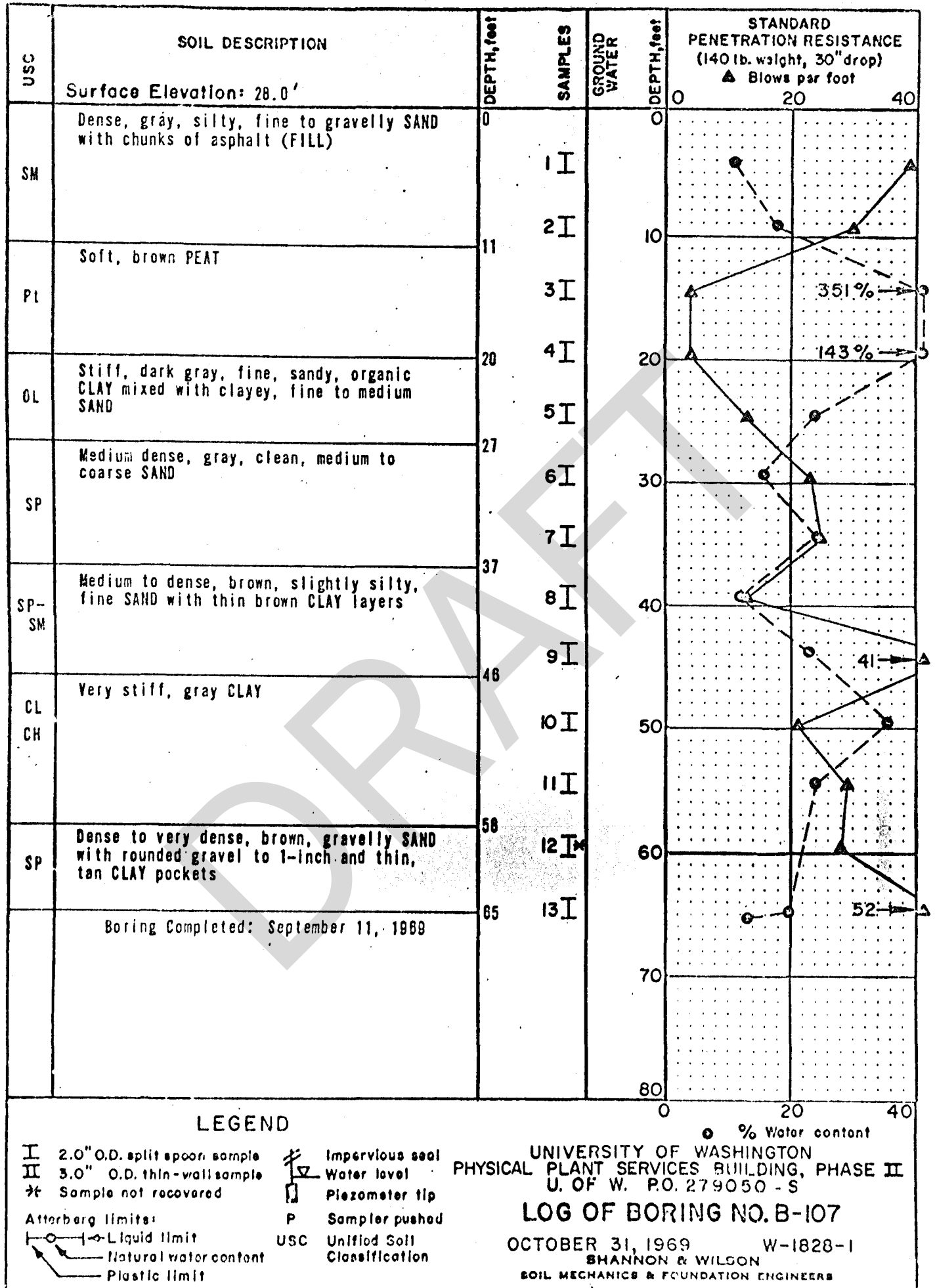

USC
SOIL DESCRIPTION
Surface Elevation: 28.0'
DEPTH, feet
SAMPLES
GROUND WATER
DEPTH, feet
STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot
0
20
40
SM
Dense, gray, silty, fine to gravelly SAND with chunks of asphalt (FILL)
0
Pt
Soft, brown PEAT
11
OL
Stiff, dark gray, fine, sandy, organic CLAY mixed with clayey, fine to medium SAND
20
SP
Medium dense, gray, clean, medium to coarse SAND
27
SP-SM
Medium to dense, brown, slightly silty, fine SAND with thin brown CLAY layers
37
CL CH
Very stiff, gray CLAY
46
SP
Dense to very dense, brown, gravelly SAND with rounded gravel to 1-inch and thin, tan CLAY pockets
58
65
Boring Completed: September 11, 1969
1
2
3
4
5
6
7
8
9
10
11
12
13
10
20
30
40
50
60
70
80
351%
143%
41
52
0
20
40
% Water content
LEGEND
2.0" O.D. split spoon sample
3.0" O.D. thin-wall sample
Sample not recovered
Atterberg limits:
Liquid limit
Natural water content
Plastic limit
Impervious seal
Water level
Piezometer tip
P Sampler pushed
USC Unified Soil Classification
UNIVERSITY OF WASHINGTON
PHYSICAL PLANT SERVICES BUILDING, PHASE II
U. OF W. P.O. 279050 - S
LOG OF BORING NO. B-107
OCTOBER 31, 1969
W-1828-1
SHANNON & WILSON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. A-7

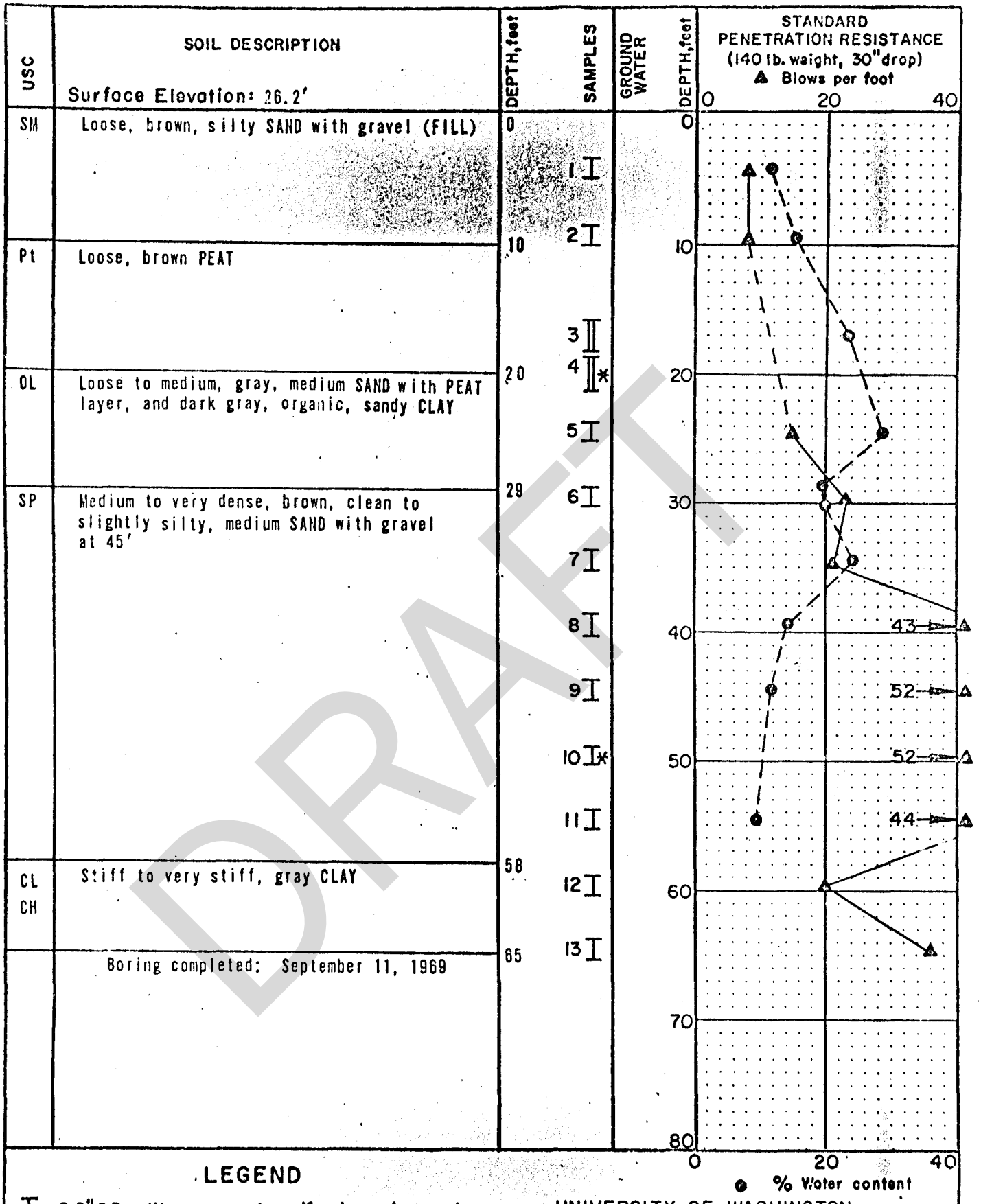
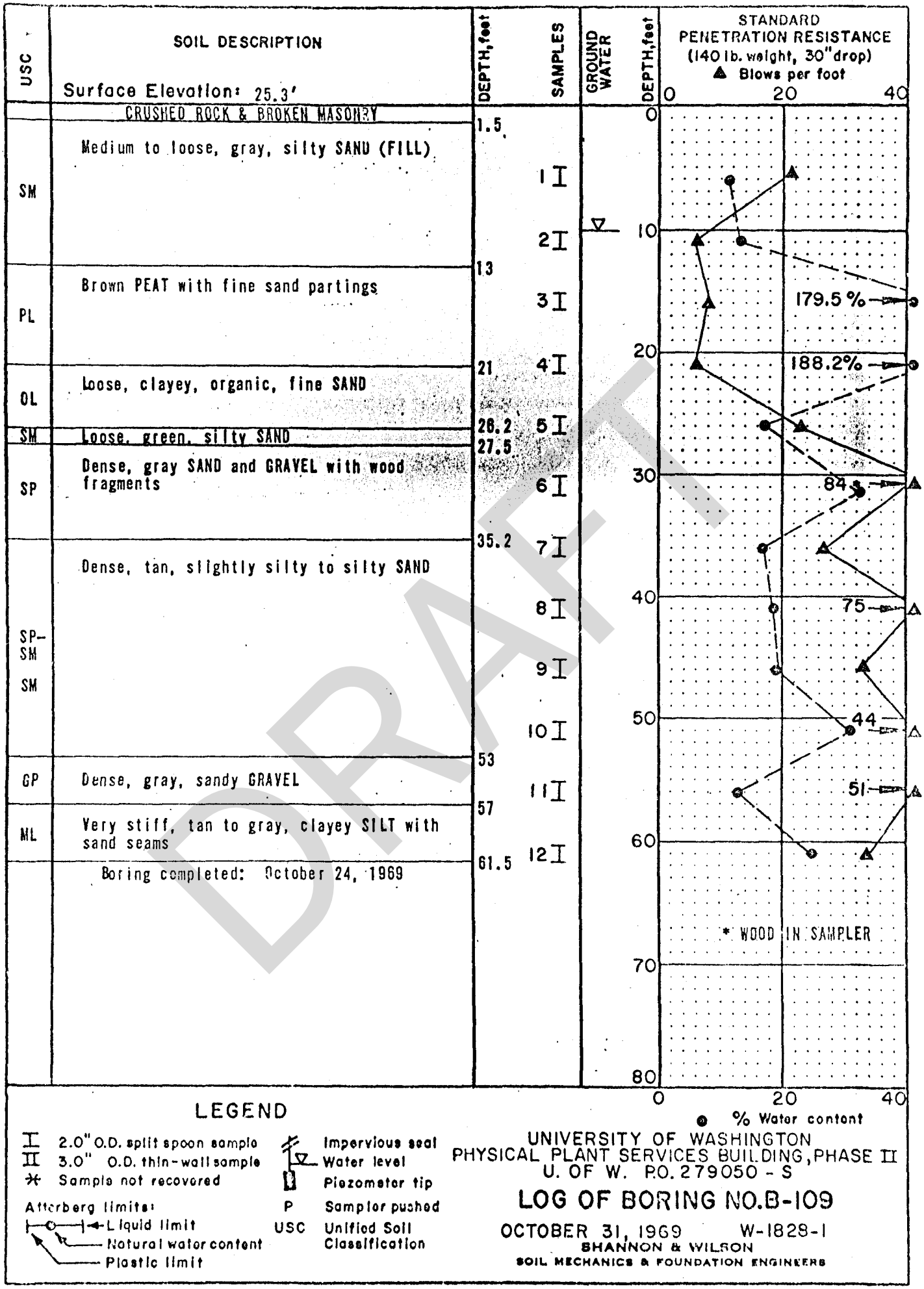

USC
SOIL DESCRIPTION
Surface Elevation: 26.2'
DEPTH, feet
SAMPLES
GROUND WATER
DEPTH, feet
STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot
0
20
40
SM
Loose, brown, silty SAND with gravel (FILL)
0
1
2
Pt
Loose, brown PEAT
10
3
4
OL
Loose to medium, gray, medium SAND with PEAT layer, and dark gray, organic, sandy CLAY
20
5
SP
Medium to very dense, brown, clean to slightly silty, medium SAND with gravel at 45'
29
6
7
8
9
10
11
CL
CH
Stiff to very stiff, gray CLAY
58
12
Boring completed: September 11, 1969
65
13
43
52
52
44
10
20
30
40
50
60
70
80
% Water content
LEGEND
2.0" O.D. split spoon sample
3.0" O.D. thin-wall sample
Sample not recovered
Atterberg limits:
Liquid limit
Natural water content
Plastic limit
Impervious seal
Water level
Piezometer tip
P Sampler pushed
USC Unified Soil Classification
UNIVERSITY OF WASHINGTON
PHYSICAL PLANT SERVICES BUILDING, PHASE II
U. OF W. P.O. 279050 - S
LOG OF BORING NO. B-108
OCTOBER 31, 1969
W-1828-1
SHANNON & WILSON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. A-9



LEGEND

- I 2.0" O.D. split spoon sample
- II 3.0" O.D. thin-wall sample
- Sample not recovered
- Atterberg limits: Liquid limit; Natural water content; Plastic limit
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

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PHYSICAL PLANT SERVICES BUILDING, PHASE II
U. OF W. P.O. 279050 - S

LOG OF BORING NO. B-109

OCTOBER 31, 1969 W-1828-1

SHANNON & WILSON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. A-9

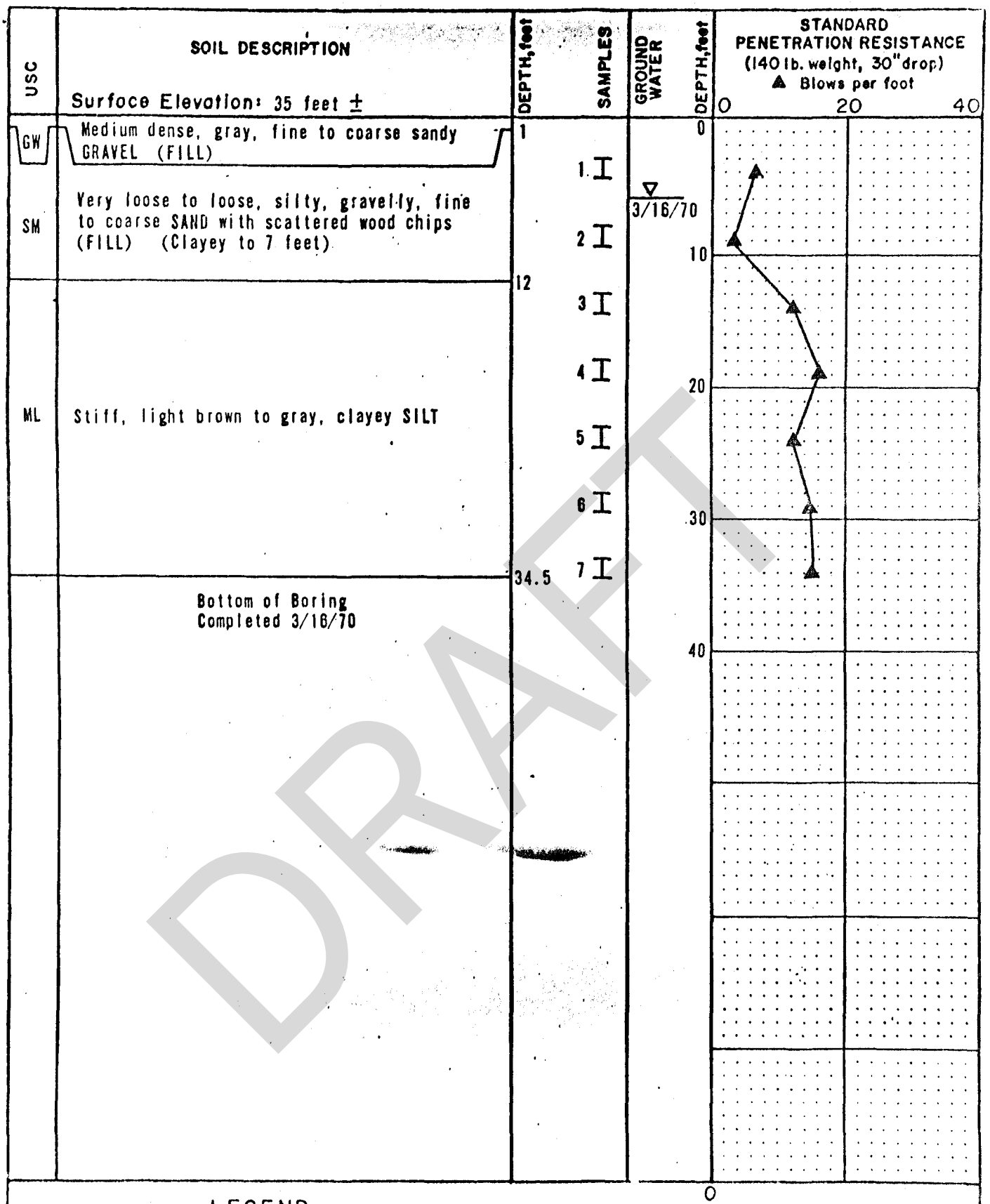

USC
SOIL DESCRIPTION
Surface Elevation: 35 feet ±
DEPTH, feet
SAMPLES
GROUND WATER
DEPTH, feet
STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot
0
20
40
GW
Medium dense, gray, fine to coarse sandy GRAVEL (FILL)
1
1 I
SM
Very loose to loose, silty, gravelly, fine to coarse SAND with scattered wood chips (FILL) (Clayey to 7 feet)
3/16/70
2 I
12
3 I
4 I
ML
Stiff, light brown to gray, clayey SILT
5 I
6 I
34.5
7 I
Bottom of Boring
Completed 3/16/70
0
10
20
30
40
DRAFT
LEGEND
I 2.0" O.D. split spoon sample
II 3.0" O.D. thin-wall sample
* Sample not recovered
Water level during drilling
Atterberg limits:
Liquid limit
Natural water content
Plastic limit
P Sampler pushed
USC Unified Soil Classification
% Water content
UNIVERSITY OF WASHINGTON
PHYSICAL PLANT SERVICES BUILDING
UofW P.O. 374934-S
LOG OF BORING NO. B-110
APRIL 6, 1970
W-1828-01
SHANNON & WILSON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. 2

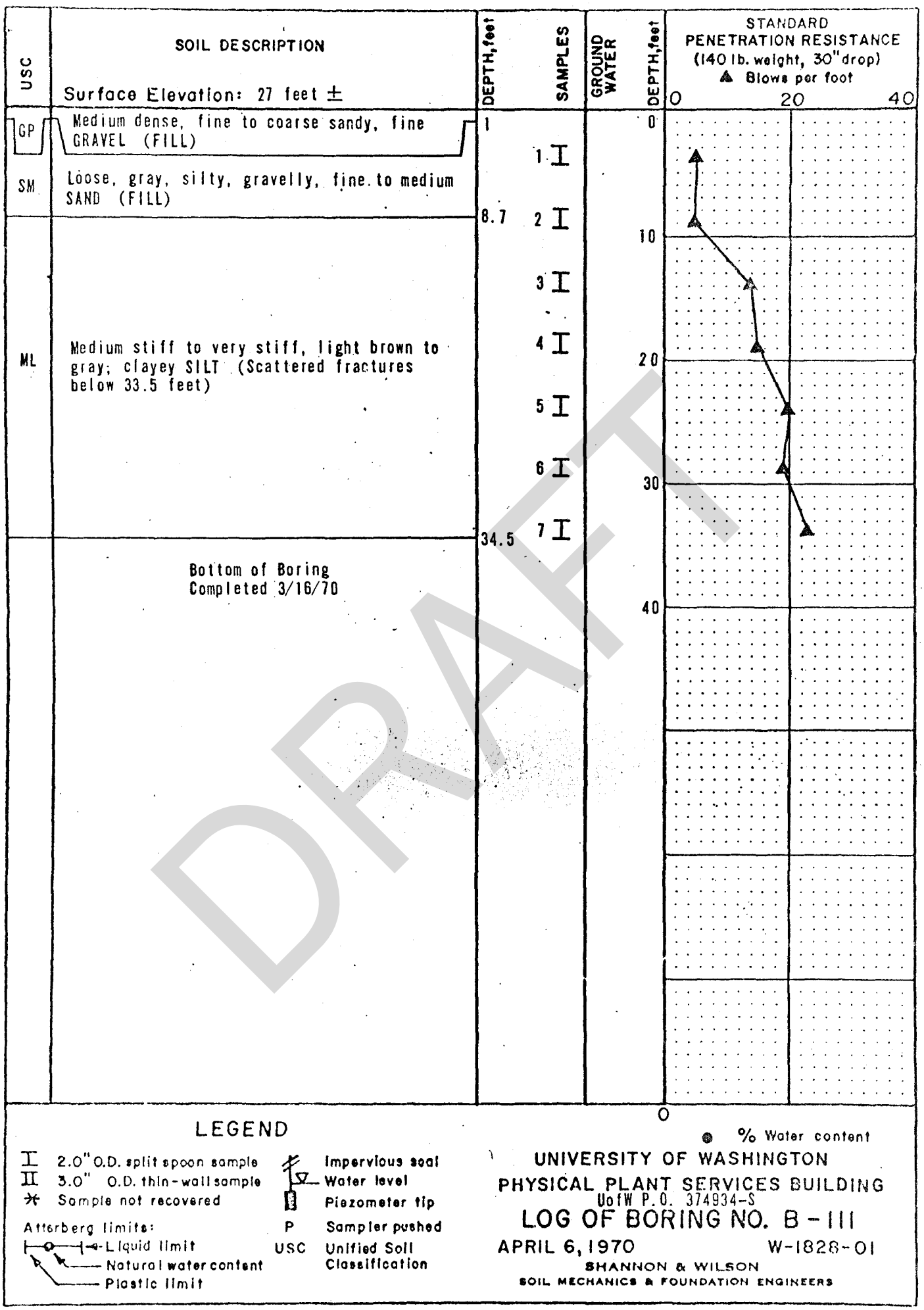
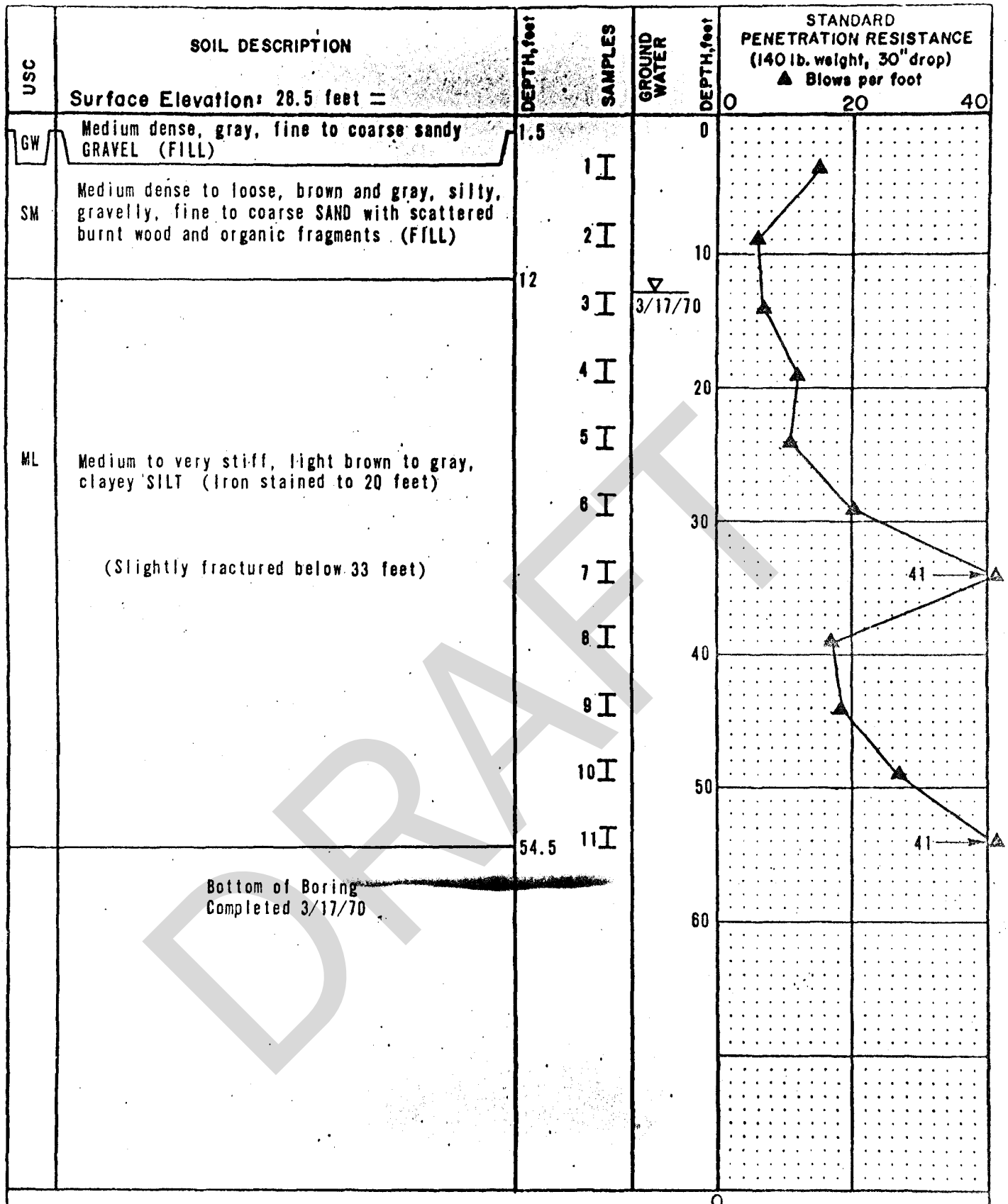

USC
SOIL DESCRIPTION
Surface Elevation: 27 feet ±
DEPTH, feet
SAMPLES
GROUND WATER
DEPTH, feet
STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot
0
20
40
GP
Medium dense, fine to coarse sandy, fine GRAVEL (FILL)
1
1
SM
Loose, gray, silty, gravelly, fine to medium SAND (FILL)
8.7
2
3
4
ML
Medium stiff to very stiff, light brown to gray; clayey SILT (Scattered fractures below 33.5 feet)
5
6
34.5
7
Bottom of Boring Completed 3/16/70
0
10
20
30
40
DRAFT
LEGEND
2.0" O.D. split spoon sample
3.0" O.D. thin-wall sample
Sample not recovered
Atterberg limits:
Liquid limit
Natural water content
Plastic limit
Impervious seal
Water level
Piezometer tip
P Sampler pushed
USC Unified Soil Classification
% Water content
UNIVERSITY OF WASHINGTON
PHYSICAL PLANT SERVICES BUILDING
UofW P.O. 374934-S
LOG OF BORING NO. B-111
APRIL 6, 1970
W-1828-01
SHANNON & WILSON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. 3

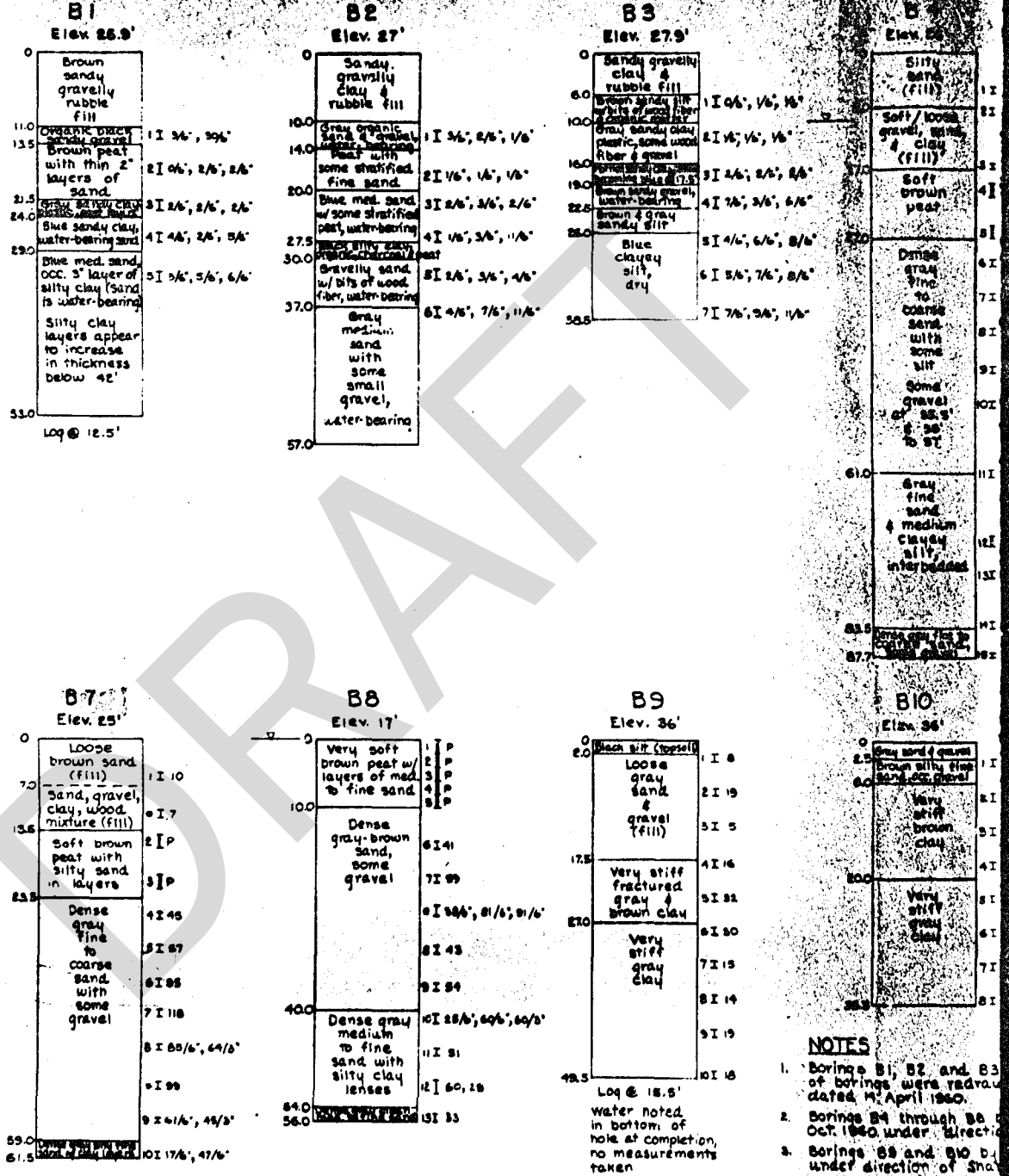


LEGEND

I 2.0" O.D. split spoon sample
II 3.0" O.D. thin-wall sample
✳ Sample not recovered
▽ Water level during drilling
P Sampler pushed
USC Unified Soil Classification
Atterberg limits: Liquid limit, Natural water content, Plastic limit
● % Water content

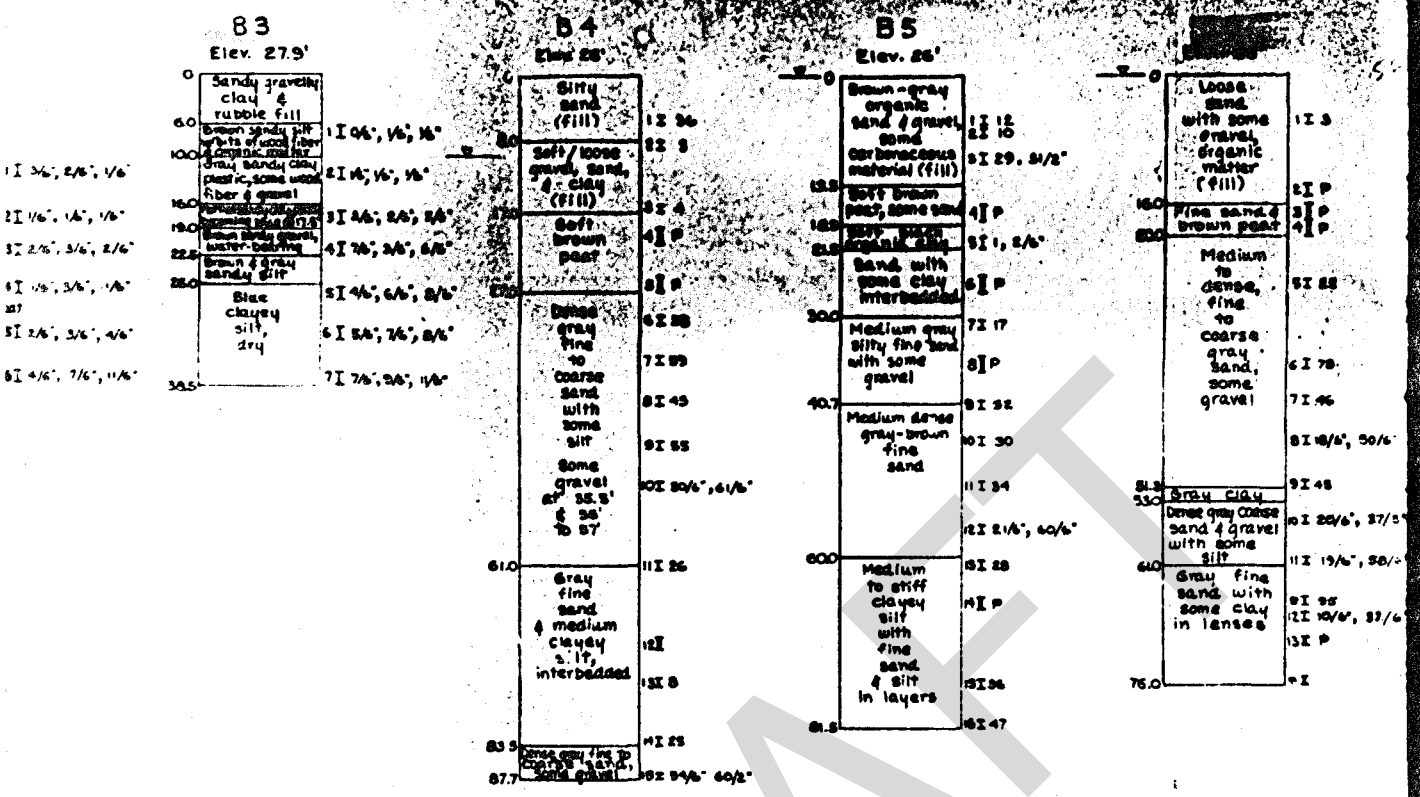
UNIVERSITY OF WASHINGTON
PHYSICAL PLANT SERVICES BUILDING
UofW P.O. 374934-S
LOG OF BORING NO. B-112
APRIL 6, 1970 W-1828-01
SHANNON & WILSON
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. 4



NOTES

1. Borings B1, B2 and B3 of borings were redra... dated 19 April 1960.
2. Borings B4 through B8 ... Oct. 1960 under direct...
3. Borings B9 and B10 b... under direction of Sha...
4. Boring B11 was made b... direction of Shannon &...



LEGEND

2.0	Depth of boring in feet
▽	Ground water level in boring
I	Split spoon 2" OD Std. penetration sample
I	Shelby sample 3" OD
#	Sample not recovered

Figures to right of sample symbol indicate number of b... 30 inches required to drive sampler 12 inc...

P — Sampler pushed

NOTES

1. Borings B1, B2 and B3 by Pacific Testing Laboratories. Logs of borings were redrawn from Horton Dennis & Assoc. Dwg. dated 19 April 1960.
2. Borings B4 through B8 by Raymond Concrete Pile Co. in Sept. - Oct. 1960 under direction of Shannon & Wilson.
3. Borings B9 and B10 by Pacific Testing Laboratories in Oct. 1960 under direction of Shannon & Wilson.
4. Boring B11 was made by R.H. Lyster in Nov. 1960 under direction of Shannon & Wilson.

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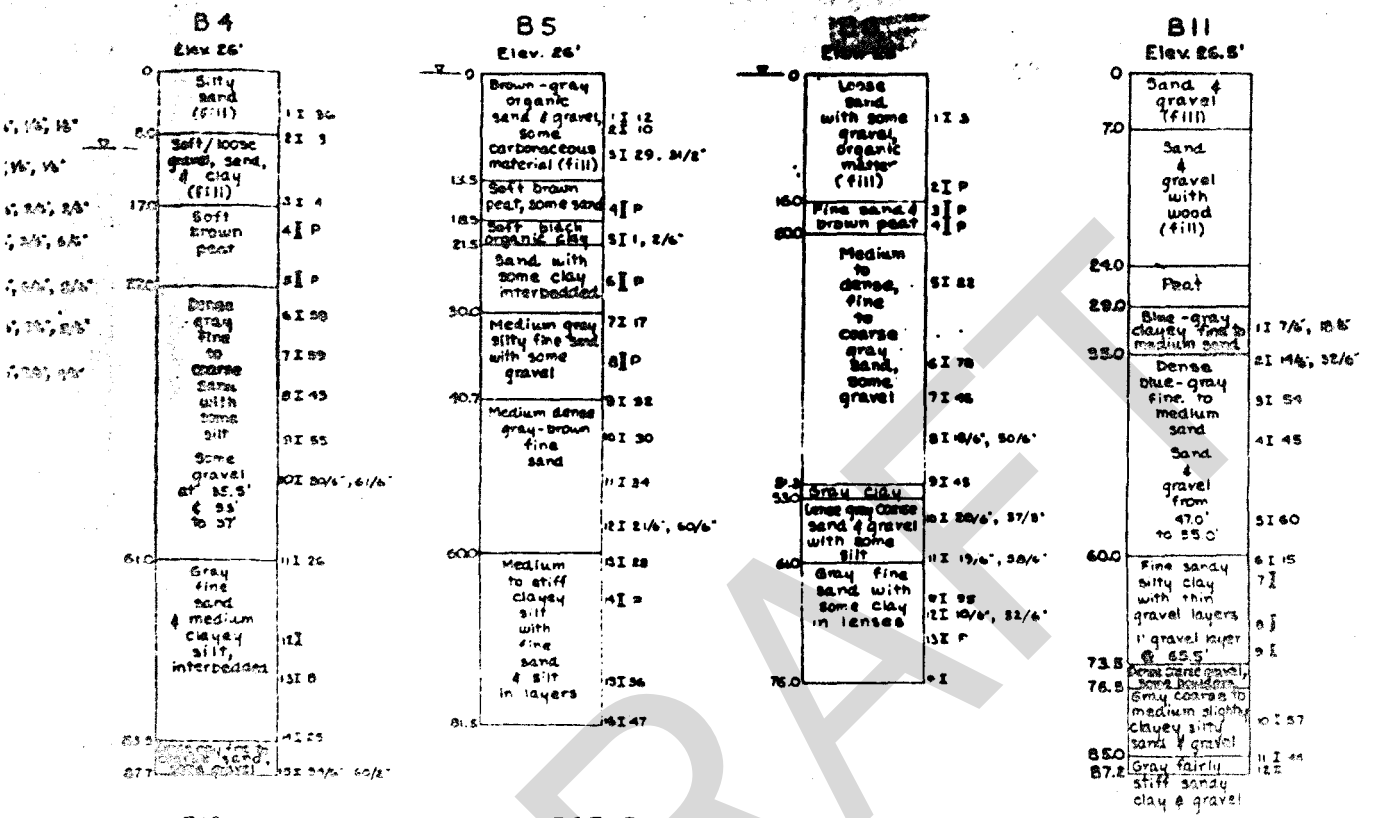

LEGEND

- 20 — Depth of boring in feet
- ▽ — Ground water level in boring
- I — Split spoon 2" OD Std penetration sample
- II — Shelby sample 3" OD
- * — Sample not recovered

Figures to right of sample symbol indicate number of blows of a 140 lb. weight dropping 30 inches required to drive sampler 12 inches, unless otherwise indicated.

- P — Sampler pushed

NOTES

1. Borings B1, B2 and B3 by Pacific Testing Laboratories. Logs of borings were redrawn from Horton Dennis & Assoc. Dwg. dated 11 April 1960.
2. Borings B4 through B8 by Raymond Concrete Pile Co. in Sept. - Oct. 1960 under direction of Shannon & Wilson.
3. Borings B9 and B10 by Pacific Testing Laboratories in Oct. 1960 under direction of Shannon & Wilson.
4. Boring B11 was made by R.H. Lyster in Nov. 1960 under direction of Shannon & Wilson.

PHYSICAL PLANT SERVICES BUILDING
UNIVERSITY OF WASHINGTON
BORING LOGS

Shannon and Wilson
Soil mechanics and foundation engineers
Seattle

J-874

FIG. 3

APPENDIX B
Report Limitations and Guidelines for Use

APPENDIX B
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

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

Geotechnical Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by the University of Washington for planning purposes for these projects. This report may be made available to prospective contractors for bidding or estimating purposes; but our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

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

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

This report has been prepared for the proposed UW Fleet Charging Stations & Security – Parking Lots N-26 and E-02 projects at the University of Washington in Seattle. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

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

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

- The function of the proposed structure;
- Elevation, configuration, location, orientation or weight of the proposed structure;

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

- Composition of the design team; or
- Project ownership.

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

Subsurface Conditions Can Change

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

Most Geotechnical and Geologic Findings are Professional Opinions

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

Geotechnical Engineering Report Recommendations are Not Final

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

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

A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation

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

Do not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable but recognize that separating logs from the report can elevate risk.

Give Contractors a Complete Report and Guidance

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

Contractors Are Responsible for Site Safety on Their Own Construction Projects

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

Read These Provisions Closely

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

Geotechnical, Geologic and Environmental Reports Should Not Be Interchanged

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

Biological Pollutants

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