DATE: Oct. 27, 2020

TO: Recipients of the State Environmental Policy Act Determination of Nonsignificance (SEPA DNS) for West Seattle Elementary School Addition

FROM: Fred Podesta, SEPA official

Seattle Public Schools (SPS) has determined that the Final SEPA environmental checklist dated Oct. 16, 2020, meets our environmental review needs for the current proposal to construct additional building space at West Seattle Elementary School. The proposal would be funded by a Distressed School Grant, a K-3 Classroom Size Reduction Grant, as well as the Building V (BEX V) levy. Project construction is scheduled to begin in June 2021 and be complete by June 2022. Students and staff would be relocated to a temporary school at the former Schmitz Park Elementary site during the 2021-2022 school year.

After conducting an independent review, SPS has determined that the project does not have significant adverse impacts on the environment as documented in the checklist and the enclosed DNS.

The final SEPA checklist discusses the potential environmental impacts that could result from construction of the project. A draft of the checklist was released for public comment initially from June 26, 2020 to July 27, 2020. Comments received informed revisions to the final SEPA checklist on which the DNS is based. The responses to written comments received are summarized in the SEPA Public Comments and Seattle Public Schools Responses, included as Attachment 1 to the SEPA checklist.

Thank you for your participation in the Seattle Public Schools SEPA process. Your involvement has helped to make the West Seattle Elementary School Addition proposal a much better project.

Fred Podesta, Chief Operations Officer
P.O. Box 34165, MS 22-183, Seattle WA 98124 * 206-252-0102

WAC 197-11-970 Determination of Nonsignificance (DNS)

STATE ENVIRONMENTAL POLICY ACT
DETERMINATION OF NONSIGNIFICANCE (DNS)
WEST SEATTLE ELEMENTARY SCHOOL ADDITION PROPOSAL

Date of issuance: Nov. 3, 2020
Lead agency: Seattle Public Schools
Location of proposal: West Seattle Elementary School, 6760 34th Ave. NW, Seattle, WA (SW Qtr of NW Qtr, Section 25, Township 24, Range 3)

Description of proposal – The proposal would add approximately 21,400 square feet of new permanent building space and renovate portions of the existing building; the five existing portables would also be removed from the site. With the completion of the project, the school building would be approximately 71,400 square feet. There is an option to add approximately 3,000 square feet of covered play area in the southwest corner of the campus within the existing hard surface play area. The building addition would increase student capacity from the existing 378 students to approximately 500 students (current enrollment is approximately 427 students). No change to bus and parent vehicle access or the parking lot would occur. Existing recreation space would be expanded and renovated, including the hard surface play area, new play structures, a new student garden area, and a renovated grass field.

The lead agency for this proposal has determined that it will not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request at the following location: John Stanford Center, 2445 3rd Ave. S, Seattle, WA 98124-1165 (Attn: David L. Jackson, Phone: 206-252-0674) and online at: http://www.seattleschools.org/sepa

This DNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal prior to Nov. 18, 2020 (at least 15 days from the issuance date listed above). This DNS may be appealed by written notice setting forth specific factual objections received no later than Nov. 18, 2020 (at least 15 days), sent to:

Superintendent
Seattle Public Schools
P.O. Box 34165, MS 32-151
Seattle, WA 98124-1165

Name of agency making threshold determination: Seattle Public Schools
Responsible Official: Fred Podesta, Chief Operations Officer, Seattle Public Schools
Phone: 206-252-0102
Address: MS 22-183, P.O. Box 34165, Seattle, WA 98124-1165

Date: 10/27/2020 **Signature:** Fred Podesta

West Seattle Elementary School Addition Project

Final SEPA Checklist

Seattle Public Schools is committed to making its online information accessible and usable to all people, regardless of ability or technology. Meeting web accessibility guidelines and standards is an ongoing process that we are consistently working to improve.

While Seattle Public Schools endeavors to only post documents optimized for accessibility, due to the nature and complexity of some documents, an accessible version of the document may not be available. In these limited circumstances, the district will provide equally effective alternate access.

For questions and more information about this document, please contact the following:

David L. Jackson
Project Manager
dljackson2@seattleschools.org

While the West Seattle Elementary School Addition Project Final State Environmental Policy Act (SEPA) Checklist is accessible and ADA compliant, the attached figures and appendices which support the checklist contain complex material that are not accessible. The following is a description of what is contained in the figures and appendices:

- Figure 1 – West Seattle Elementary School Site Vicinity Map
  Figure 1 is a vicinity map that shows the West Seattle Elementary School campus and the surrounding neighborhood in the site vicinity. The school campus site is outlined in red on the map.

- Figure 2 – West Seattle Elementary School Aerial Map
  Figure 2 is an aerial map of the West Seattle Elementary School campus and the surrounding neighborhood in the site vicinity. The school campus site is outlined in red on the map.

- Figure 3 – Proposed Site Plan
  Figure 3 is a site plan of the proposed project. The entire school campus is shown on the plan and the extent of the project area on the school campus is outlined in a black dashed line. The proposed new classroom addition and other proposed project site features are labeled on the site. Existing building areas and site features that would remain on the campus are also labeled.

- Appendix A – Geotechnical Report
  Appendix A consists of the Geotechnical Report that is titled "Subsurface Exploration, Geologic Hazard, Infiltration Feasibility and Preliminary Geotechnical Engineering Report" that was prepared by Associated Earth Sciences Incorporated (AESI). The report presents the results of the subsurface exploration, limited infiltration testing, geologic hazard analysis, preliminary geotechnical engineering, and stormwater infiltration feasibility for the proposed project. Historic exploration logs, subsurface exploration logs completed for this study, laboratory tests and infiltration test data are included as appendices to this report.

- Appendix B – Construction Best Management Practices
  Appendix B consists of construction best management practices that could be implemented during the construction of the proposed project.

- Appendix C – SEPA Greenhouse Gas Emissions Worksheet
  Appendix C consists of the Greenhouse Gas Emissions Worksheet for the project. This worksheet provides a calculation of the greenhouse gas emissions that would be anticipated to be generated with the development of the proposed project.

- Appendix D – Arborist Report
  Appendix D consists of the Arborist Report and Tree Inventory that was prepared for the project by Tree Solutions, Inc. The report provides an inventory of the existing trees on the project site. Trees on neighboring properties are also documented if they extend

over the property line or may be affected by construction access. An analysis of construction impacts is provided, as well as recommendations and tree protection measures. A Table of Trees is included as part of the report which describes the characteristics and measurements for each tree on the site. A map documenting the location of each tree is also provided.

- Appendix E – Preliminary Limited Hazardous Materials Survey Report
  Appendix E consists of the Limited Hazardous Materials Survey Report for the project. The report was prepared by PBS Engineering and Environmental, Inc. and documents the results of the hazardous materials survey that was completed for the existing building. Interior areas of the building were inspected for the presence of Asbestos-Containing Materials (ACM) and Lead-Containing Paint (LCP). Appendices to the report include bulk sampling information, historical sampling data, and certifications.

- Appendix F – Cultural Resources Assessment Report
  Appendix F consists of the Cultural Resources Assessment Report for the project that was prepared by Perteet. Due to the confidential nature of archaeological materials discussed in the report, a full copy of the report is not included in this electronic version. However, a redacted version of the report is available upon request from Seattle Public Schools.

- Appendix G – Transportation Technical Report
  Appendix G consists of the Transportation Technical Report for the project that was prepared by Heffron Transportation, Inc. The report provides a description and analysis of background transportation conditions for the area surrounding the school, including traffic volumes, traffic operations (level of service), parking, transit, and non-motorized facilities. The report analyzes and addresses potential impacts with the proposed project on those same transportation conditions. The document includes level of service definitions and parking utilization study data as appendices to the report.

- Appendix H – Public Comments and Responses
  Appendix H consists of a summary of the public comments that were received on the Draft SEPA Checklist and responses to those comments.

This concludes the description of the Final SEPA Checklist figures and appendices for the West Seattle Elementary School Addition Project.

FINAL ENVIRONMENTAL CHECKLIST

for the proposed

West Seattle Elementary School Addition Project

prepared by

October 16, 2020

EA Engineering, Science, and Technology, Inc., PBC
AESI
Tree Solutions, Inc.
PBS Engineering
Perteet
Heffron Transportation, Inc.

PREFACE

The purpose of this Final Environmental Checklist is to identify and evaluate probable environmental impacts that could result from the ***West Seattle Elementary School Addition Project*** and to identify measures to mitigate those impacts. The ***West Seattle Elementary School Addition Project*** would add approximately 21,400 gross square feet (gsf) of new building space to the existing building (total building space with the project would be approximately 71,400 gsf). The new building addition would be located to the east of the existing building and existing portables would be removed from the site. The proposed addition would increase the student capacity of the school from an existing capacity of approximately 387 students (including the existing portables) to a new capacity of approximately 500 students.

The State Environmental Policy Act (SEPA)[1] requires that all governmental agencies consider the environmental impacts of a proposal before the proposal is decided upon. A Draft Environmental Checklist for the project was issued on June 26, 2020 with a public comment period through July 27, 2020. This Final Environmental Checklist responds to comments on the Draft Environmental Checklist and has been prepared in compliance with the State Environmental Policy Act; the SEPA Rules, effective April 4, 1984, as amended (Chapter 197-11, Washington Administrative Code); and the Seattle City Code (25.05), which implements SEPA.

This document is intended to serve as SEPA review for site preparation work, building construction, and operation of the proposed development comprising the ***West Seattle Elementary School Addition Project.*** Analysis associated with the proposed project contained in this Environmental Checklist is based on Schematic Design plans for the project, which are on-file with Seattle Public Schools. While not construction-level detail, the schematic plans accurately represent the eventual size, location and configuration of the proposed project and are considered adequate for analysis and disclosure of environmental impacts.

This Environmental Checklist is organized into three major sections. *Section A* of the Checklist (starting on page 1) provides background information concerning the *Proposed Action* (e.g., purpose, proponent/contact person, project description, project location, etc.). *Section B* (beginning on page 5) contains the analysis of environmental impacts that could result from implementation of the proposed project, based on review of major environmental parameters. This section also identifies possible mitigation measures. *Section C* (page 34) contains the signature of the proponent, confirming the completeness of this Environmental Checklist.

Appendices to this Environmental Checklist include: the *Geotechnical Engineering Report* (AESI, 2020), *Summary of Construction Best Management Practices*, the *Greenhouse Gas Emissions Worksheet* (EA Engineering, 2019), the *Tree Inventory and Arborist Report* (Tree Solutions, Inc., 2019), the *Limited Hazardous Building Materials Survey Report* (PBS Engineering, 2020), the *Cultural Resources Assessment*[2] (Perteet, 2020), and the *Transportation Technical Report* (Heffron Transportation, Inc., 2020). Public comments on the Draft Environmental Checklist and responses to those comments are also included in this document as an appendix.

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1 Chapter 43.21C. RCW

2 On-file with Seattle Public Schools

Table of Contents

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 Seattle Public Schools to make a SEPA threshold determination.

A. BACKGROUND

1. Name of Proposed Project:

West Seattle Elementary School Addition Project

2. Name of Applicant:

Seattle School District No. 1 (Seattle Public Schools)

3. Address and Phone Number of Applicant and Contact Person:

David L. Jackson
Project Manager
Seattle Public Schools
2445 – 3rd Ave. S.
MS 22-334
Seattle, WA 98124-1165
206-252-0674

4. Date Checklist Prepared

October 16, 2020

5. Agency Requesting Checklist

Seattle School District No. 1
2445 – 3rd Avenue South
MS 22-332, P.O. Box 34165
Seattle, WA 98124-1165

6. Proposed Timing or Schedule (including phasing, if applicable):

The ***West Seattle Elementary School Addition Project*** that is analyzed in this Final Environmental Checklist involves site preparation work, construction, and operation of the project. Site preparation and construction could begin in approximately June 2021 with building occupancy in approximately June 2022. Students and staff would be relocated to a temporary school at the former Schmitz Park Elementary site during the construction process for the 2021-2022 school year.

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 information has been prepared for the project and is included as appendices to this Checklist:

- *Geotechnical Engineering Report* (AESI, March 2020);
- *Greenhouse Gas Emission Worksheet* (EA Engineering, August 2019);
- *Tree Inventory and Arborist Report* (Tree Solutions, November 2019);
- *Limited Hazardous Building Materials Survey Report* (PBS Engineering, March 2020);
- *Cultural Resources Assessment* (Perteet, April 2020)[3];
- *Transportation Technical Report* (Heffron Transportation, June 2020);
- *Construction Best Management Practices* (Seattle Public Schools, 2020).

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 the ***West Seattle Elementary School Addition Project*** site.

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

City of Seattle

- *Seattle Department of Construction and Inspections*

  Permits/approvals associated with the proposed project, including:
  - Demolition Permit
  - Grading/Shoring Permit
  - Building Permit
  - Mechanical Permits
  - Electrical and Fire Alarm Permits
  - Drainage and Side Sewer Permit
  - Comprehensive Drainage Control Plan Approval
  - Drainage Control Plan with Construction Best Management Practices, Erosion and Sediment Control Approval

[3] This document is on-file with Seattle Public Schools.

- *Seattle Department of Transportation (SDOT)*
  - Street Use and Construction Use Permit (temporary – construction related)
  - Street Use and Utility Permit

King County

- Plumbing Permit
- Sewer Treatment Capacity Charge Approval

Puget Sound Clean Air Agency

- Air Quality Permit – Demolition

11. Give a brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

Existing Site Conditions

The proposed ***West Seattle Elementary School Addition Project*** site is located within Seattle's High Point neighborhood (see **Figures 1** and **2**). The school campus is generally bounded by existing residences to the north, 31st Avenue SW to the east, the High Point Community Center and Walt Hundley Playfield to the south, and 34th Avenue SW to the west.

The existing one- and two-story West Seattle Elementary School contains approximately 50,000 gross sq. ft. (gsf) of building space with 15 classrooms, a library, a gymnasium, a cafeteria, a music room, an art room, and offices/administrative space; five portable buildings are also located to the south of the existing building and contain approximately 4,480 gsf of building space. A hard surface play area, playground, and grass play areas are located to the south of the existing building. A grass and vegetated area is located to the east of the building. A parking lot with approximately 44 parking stalls (including ADA spaces) is located to the west of the existing building. The school has an existing capacity for approximately 320 students (approximately 387 student capacity including existing portable buildings) [4].

The site of the proposed addition is located immediately east of the existing building and is generally comprised of grass and paved walkway areas.

Proposed Project

The proposed ***West Seattle Elementary School Addition Project*** is intended to address school capacity issues and upgrade the quality of the student learning environment at the school. The proposed project would add approximately 21,400 gsf

[4] It should be noted that existing enrollment for the school (2019-2020 school year) was approximately 427 students.

of new permanent building space and renovate portions of the existing building, including the building entrance; the five existing portables would also be removed from the site[5]. With completion of the project, the school would contain approximately 71,400 gross sq. ft. of building space.

The new building addition would be located to the east of the existing building (see **Figure 3** for the proposed site plan). The project also includes an option for an approximately 3,000 sq. ft. covered play area in the southwest corner of the campus within the existing hard surface play area. The project would be funded by a Distressed Schools Grant and a K-3 Classroom Size Reduction Grant that was awarded to Seattle Public Schools by the State of Washington, as well as the BEX V levy.

The proposed building addition would contain four kindergarten classrooms, a small group workroom, and a book/technology room on the first level. The second level of the addition would include eight classrooms for grades 2 and 3, two learning commons rooms and an occupational therapy/physical therapy room. The proposed addition would increase the student capacity of the school by approximately 113 students, from an existing capacity of approximately 387 (including the existing portable buildings) to a new capacity of approximately 500 students.

No changes to bus and parent vehicle access to the site would occur. Bus loading/unloading and parent vehicle loading/unloading would continue to occur along the north side of the existing school building. The existing parking lot located to the west of the building would be retained and continue to provide space for approximately 44 vehicles.

As part of the project, existing recreation space on the campus would be expanded and renovated, including an expanded and renovated hard surface play area, new play structures, a new student garden area, and a renovated grass field area. The project also includes an option for an approximately 3,000 sq. ft. covered play area in the southwest corner of the campus.

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. If a proposal would occur over a range of area, provide the range or boundaries of the site(s).

The proposed ***West Seattle Elementary School Addition Project*** site is located at 6760 34th Avenue NW within Seattle's High Point neighborhood (a portion of the SW Quarter of the NW Quarter of Section 25, Township 24, and Range 3). The school campus is generally bounded by existing residences to the north, 31st Avenue SW to the east, the High Point Community Center and Walt Hundley Playfield to the south, and 34th Avenue SW to the west (see **Figures 1** and **2**). The site of the proposed building addition is located to the east of the existing building.

[5] Net new building area when considering the removal of the existing portables would be approximately 16,920 gsf.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other:_____

The West Seattle Elementary School campus is generally flat with some hilly topography in certain areas of the site (eastern and southern portions of the site). In general, the campus slopes from south to north. The ***West Seattle Elementary School Addition Project*** site follows the general slope of the campus with topography that transitions from south to north.

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

According to the City of Seattle's Environmentally Critical Areas (ECA) Maps, small portions of the western and southern edge of the school campus contain slopes that are approximately 40 percent or greater and are classified as an environmentally critical area (*City of Seattle, 2020*). Based on observations in the field, these areas are generally associated with engineered retaining walls along 34th Avenue SW and the adjacent Hight Point Community Center property to the south.

The site of the proposed addition contains areas that are close to, but do not meet the geometric criteria for classification as a steep slope area. In order to be classified as a steep slope area, the slope must be at least 40 percent and they must be 10 feet tall (SMC 25.09.012) and the slopes onsite are shorter than 10 feet based on a review of topographic information (*AESI, 2020*).

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.

A geotechnical report was completed for the project site by Associated Earth Sciences, Inc. and included seven site exploration borings. Borings were completed to a depth of 16.5 to 66.5 feet deep. The soils encountered on the site generally consisted of fill of varying thickness overlaying native sediments interpreted as Vashon lodgement till and Vashon advance outwash (see **Appendix A**).

The proposed project site does not contain agricultural land areas of commercial significance.

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

There are no indications or history of unstable soils on the site or adjacent to the site and no evidence of landslide activity or unstable soils was observed during the preparation of the Geotechnical Report (see **Appendix A**). According to the City of Seattle's Environmentally Critical Areas (ECA) Maps, there are no potential slide areas or liquefaction-prone areas on the site or adjacent to the site (*City of Seattle, 2020*).

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

Approximately 12,000 cubic yards of material would be excavated from the site during construction activities and approximately 7,000 cubic yards of structural fill would be imported to the site. The specific source of fill material is not known at this time but would be obtained from a source approved by the City of Seattle.

f. Could erosion occur as a result 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)?

Approximately 55 percent of the school campus is currently covered with impervious surfaces, including buildings, paved play areas, walkways, parking areas and other impervious surfaces. The site of the proposed addition is generally comprised of existing grass area and paved walkways.

With the completion of the addition project, approximately 68 percent of the campus would be covered with impervious surfaces. New impervious surfaces would primarily consist of the proposed building addition.

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

The proposed project would comply with City of Seattle regulations, including providing a Temporary Erosion and Sedimentation Control (TESC) Plan and Best Management Practices (BMPs). **Appendix B** also provides a summary of Construction BMPs that are typically utilized by Seattle Public Schools during the construction process. The following measures would be implemented during construction to control erosion:

- Design and construction of the proposed project shall comply with the recommendations of the Geotechnical Engineer (see **Appendix A**);
- Provide storm drain inlet protection;
- Route surface water away from work areas;
- Keep staging areas and travel areas clean and free of track-out;
- Cover work areas and stockpiled soils when not in use; and,
- Compete earthwork during dry weather and site conditions, if possible.

2. Air

a. What type of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

During construction, the ***West Seattle Elementary School Addition 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, 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, the primary source of emissions would be from vehicles travelling to and from the site. Seattle Public Schools maintains an anti-idling policy for buses which minimizes potential emissions. As a result, significant adverse air quality impacts would not be anticipated.

Another consideration with regard to air quality and climate relates to Greenhouse Gas Emissions (GHG). In order to evaluate climate change impacts of the proposed project relative to the requirements of the City of Seattle, a Greenhouse Gas Emissions Worksheet has been prepared (see **Appendix C** of this Environmental Checklist). This Worksheet estimates the emissions from the following sources: embodied emissions; energy-related emissions; and, transportation-related emissions. In total, the estimated lifespan emissions for the proposed project would be approximately 22,370 $MTCO_2e$[6]. Based on an assumed building life of 62.5 years[7], the proposed building addition project would be estimated to generate approximately 360 $MTCO_2e$ annually. For reference, the Washington State Department of Ecology threshold for potential significant GHG emissions is 25,000 $MTCO_2e$ annually. Therefore, the proposed project would not be anticipated to generate a significant amount of GHG emissions.

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 32nd Avenue SW, 34th Avenue SW, and 35th Avenue SW. There are no known offsite sources of air emissions or odors that may affect the proposed project.

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

The following measure would be provided to reduce/control air quality impacts during construction:

- Construction activities would be required to comply with Puget Sound Clean Air Agency (PSCAA) regulations, including Regulation I, Section 9.11 (prohibiting the emission of air contaminants that would be injurious to human health) and Regulation I, Section 9.15 (prohibiting the emission of fugitive dust, unless reasonable precautions are employed). Additional

[6] $MTCO_2e$ is defined as Metric Ton Carbon Dioxide Equivalent and is a standard measure of amount of CO2 emissions reduced or sequestered.

[7] According to the Greenhouse Gas Emissions Worksheet, 62.5 years is the assumed building life for educational buildings.

mitigation measures to minimize air quality impacts during construction are identified in **Appendix B**.

- Operation of the project would comply with Seattle Public School's anti-idling policy for buses.

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 ***West Seattle Elementary School Addition Project*** site. The nearest surface water body is High Point Pond, which is located approximately 0.5 mile to the northeast of the project site (see **Figure 1**).

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.

The proposed project will not require any work over, in, or adjacent (within 200 feet) to any water body.

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

No fill or dredge material would be placed in or removed from any surface water body as a result of the proposed project.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

The proposed project would not require any surface water withdrawals or diversions.

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

The proposed project site does not lie within a 100-year floodplain and is not identified as a flood prone area on the City of Seattle Environmentally Critical Areas map (*City of Seattle, 2020)*.

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.**

There would be no discharge of waste materials to surface waters.

b. Ground:

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

No groundwater would be withdrawn or water discharged to ground water as part of the proposed project. A two-inch diameter ground water monitoring well was installed as part of geotechnical drilling investigations. The groundwater monitoring well was installed to a depth of approximately 66.5 feet below ground surface and groundwater was not encountered during the investigation. Perched groundwater was also not observed during investigations, but it is possible that limited zones of shallow perched water could be encountered elsewhere on the site, particularly during wetter months (*AESI, 2020*). Construction dewatering may be required during development of the project and could be accomplished with ditches and sumps (see **Appendix A**).

2) **Describe waste material that will be discharged into the ground from septic tanks or other sources; 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.**

Waste material would not be discharged into the ground from septic tanks or other sources as a result of the proposed project.

c. Water Runoff (including storm water):

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.**

Approximately 55 percent of the existing West Seattle Elementary campus is comprised of impervious surfaces, including existing buildings and paved surfaces (parking areas, play areas, walkways, etc.). The site of the proposed addition is generally comprised of grass areas and paved surfaces. Existing stormwater from the

existing school and paved play area is routed to a 60-inch corrugated metal pipe (CMP) with a flow control structure. The CMP pipe discharges to the school's 8-inch conveyance system which drains to a culvert located on the adjacent parcel to the north. The existing stormwater flow in the system continues to the northeast and ultimately discharges at the pond at High Point Pond Park.

With completion of the ***West Seattle Elementary School Addition Project***, approximately 68 percent of the campus would be comprised of impervious surfaces. The site stormwater design for the project would be consistent with the City of Seattle's 2017 storm water manual and flow control (detention) and onsite stormwater management (OSM) would be required. The project would include an onsite detention/infiltration system for new and replaced hard surfaces (likely consisting of an underground vault with a flow control structure). The detention/infiltration vault would collect runoff from the proposed addition and asphalt play area but not all new and replaced hard surfaces would be able to be routed to the proposed detention/infiltration facility and some will have to be bypassed. To compensate for the bypassed areas, the existing asphalt play area and asphalt drive access at the southwest portion of the site would be routed to the proposed detention/infiltration facility. The facility will discharge to the existing 8-inch conveyance system on the school campus. It is anticipated that the proposed detention/infiltration facility will meet OSM requirements per the City of Seattle and other OSM BMPs may be included such as bioretention facilities, pervious pavement, and/or large tree planting. With the implementation of the proposed stormwater facility and measures, no significant runoff impacts would be anticipated.

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.*

The proposed project would not alter or otherwise affect drainage patterns in the site vicinity.

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

The following measures would be implemented to control surface, ground and runoff water impacts:

- A Temporary Erosion and Sedimentation Control (TESC) Plan and Best Management Practices (BMPs) would be implemented during construction to reduce erosion and minimize impacts to water resources.

- Stormwater management for the proposed addition would comply with applicable City requirements, including the City's Stormwater Code (*SMC 22.800*).

4. Plants

a. Check or circle types of vegetation found on the site:

X deciduous tree:
X evergreen tree:
X shrubs
X grass
__ pasture
__ crop or grain
__ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
__ water plants: water lily, eelgrass, milfoil, other
_ other types of vegetation

A tree inventory and assessment (**Appendix D**) was completed for the project. Approximately 52 trees are located on the school campus, including Honeylocust, Norway maple, Bitter cherry, River birch, and Black locust. The trees range in size from 6 inches in diameter to 18 inches in diameter. Three of the trees on the school campus meet the City of Seattle's criteria for an exceptional tree (*City of Seattle Director's Rule 16-2008*), including a London plane, a multi-stemmed Pacific madrone, and a Honeylocust.

In addition, 16 trees located adjacent to the site were also documented, including six trees that are located in an exceptional grove on the High Point Community Center site.

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

A total of approximately 34 existing trees would be removed from the project site as part of the ***West Seattle Elementary School Addition Project***, including 16 trees that would be removed within the proposed development area and 18 trees that would be removed for safety/maintenance issues that are located at the south end of the site as part of a Black locust thicket. Existing trees that would be removed, include Norway spruce, Paper birch, Honeylocust, Incense cedar, Black locust, and Bitter cherry.

All other trees on the school campus, including the three exceptional trees, would be retained and protected during construction by following tree protection measures that are outlined in **Appendix D**; off-site

exceptional trees that are located adjacent to the campus would also be retained and protected, as necessary.

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

No known threatened or endangered species are located on or proximate to the project site.

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

New landscaping would be provided on the site as part of the ***West Seattle Elementary School Addition Project***, including landscaping within the setback area along 32nd Avenue SW and within school garden and landscape areas surrounding the building.

Consistent with City of Seattle regulations, new replacement trees would also be provided on the site at a 1:1 ratio to replace those trees that would be removed as part of the construction process. All retained trees on the school campus would be protected during construction by following tree protection measures that are outlined in **Appendix D**.

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

Noxious weeds or invasive species that could be present in the vicinity of the site include giant hogweed, English Ivy and Himalayan blackberry.

5. Animals

a. Circle (underlined) any birds and animals that have been observed on or near the site or are known to be on or near the site:

birds: **songbirds,** hawk, heron, eagle**, other: seagulls, pigeons,**
mammals: deer, bear, elk, beaver**, other: squirrels, raccoons, rats, mice**
fish: bass, salmon, trout, herring, shellfish**, other: None.**

Birds and small mammals tolerant of urban conditions may use and may be present on and near the ***West Seattle Elementary School Addition Project*** site. Mammals likely to be present in the site vicinity include: raccoon, eastern gray squirrel, mouse, rat, and opossum.

Birds common to the area include: European starling, house sparrow, rock dove, American crow, seagull, western gull, Canada goose, American robin, and house finch.

In addition, the Longfellow Creek Greenspace is located approximately 1,400 feet to the east of the project site and is designated as wildlife habitat by the City of Seattle Environmental Critical Areas Maps (City of Seattle, 2020).

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

The following are listed threatened or endangered species that could be affected by development on the site or surrounding vicinity based on data from the U.S. Fish and Wildlife Service: marbled murrelet, streaked horned lark, yellow-billed cuckoo, bull trout, grey wolf and north american wolverine[8]. However, it should be noted that none of these species have been observed at the site and due to the urban location of the site, it is unlikely that these animals are present on or near the site

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

The proposed project site is not located within a specific migration route. However, in general, 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:

New landscaping would be provided within the setback area along 32nd Avenue SW and within school garden and landscape areas surrounding the building. New trees would also be planted on site to replace those trees that would be removed during construction. The project is not anticipated to have a substantial impact on wildlife located in the vicinity of the site.

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

There are no known invasive animal species on or adjacent to the project site; however, invasive species known to be located in King County include European starling, house sparrow and eastern gray squirrel.

[8] U.S. Fish and Wildlife Service. IPaC. https://ecos.fws.gov/ipac/location/index. Accessed March 2020.

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 and natural gas are the primary source of energy that would serve the proposed ***West Seattle Elementary School Addition Project*** and would generally be utilized for lighting, electronics, and heating.

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.

d. 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 project would be required to meet or exceed the requirements of the City of Seattle Energy Code, as well as the Washington Sustainable Schools Protocol. The proposed addition would be constructed with an efficient building envelope and a heating, ventilation and air conditioning (HVAC) system with a dedicated outdoor air system (DOAS) and heat recovery.

7. Environmental Health

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

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

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

Based on information from the Washington State Department of Ecology website, there are no documented cases of soil contamination on or in the immediate vicinity of the project site (*Washington State Department of Ecology, 2020*).

A Limited Hazardous Building Materials Survey was completed for the project by PBS Engineering and Environmental, Inc. (see **Appendix E**). Nine bulk samples were collected for suspect asbestos-containing materials (ACM) from multiple locations within the existing building and none of the materials were found to contain detectable asbestos.

Low concentrations of lead-containing paint (LCP) in paint coatings may exist in inaccessible areas of the building or in secondary coatings on building components. If paint with detectable concentrations of lead is found in the building it is required that construction activities be performed in accordance with Washington Department of Labor and Industries regulations for lead in construction (WAC 296-155-176)

All fluorescent lamps in the building are assumed to include mercury-containing components and should be carefully handled and recycled/disposed of in accordance with applicable regulations. All light ballasts should also be inspected and presumed to contain PCBs. Ballasts should be removed and disposed in accordance with WAC 173-303 (see **Appendix E** for further details).

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.

As described above, the existing building is assumed to contain some levels of LCP, mercury-containing components, and PCBs, which would require removal and disposal in accordance with applicable regulations. Although ACM was not encountered in the testing samples from the building, all untested materials should be presumed to be asbestos-containing and removed in accordance with regulations or tested prior to impact from development.

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 of the school, chemicals that would be used on the site would be limited to cleaning supplies and would be stored in an appropriate and safe location.

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:

A spill prevention plan would be developed and implemented during construction to minimize the potential for an accidental release of hazardous materials into the environment.

In accordance with the *Limited Hazardous Building Materials Survey* (see **Appendix E**) that was completed for the project, all untested materials should be presumed to be asbestos-containing and removed in accordance with regulations or tested prior to impact from development. Impact of paint with detectable concentrations of lead would require that construction activities be performed in accordance with Washington Department of Labor and Industries regulations for lead in construction (WAC 296-155-176). All fluourescent lamps and light ballasts should be removed and disposed in accordance with applicable regulations, including WAC 173-303.

b. Noise

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

Traffic noise associated with adjacent roadways (32th Avenue SW, 34th Avenue SW, and 35th Avenue SW) is the primary source of noise in the vicinity of the project site. Existing noise in the site vicinity is not anticipated to adversely affect the proposed ***West Seattle Elementary School Addition 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 site.

Short-Term Noise

Temporary construction-related noise would occur as a result of on-site construction activities associated with the project. Existing residential land uses surrounding the school would be the most sensitive noise receptors and could experience occasional noise-related impacts throughout the construction process. Pursuant to Seattle's Noise Code (SMC, Chapter 25.08), maximum sound

levels in residential communities shall not exceed 55 dBA. However, per SMC 25.08 and based on the Low-Rise Residential 1 zoning for the site, construction activities are allowed to exceed the maximum noise levels between 7 AM and 7 PM on weekdays and 9 AM to 7 PM on weekends. Construction equipment may exceed the sound level limits during construction periods by 25 dB(A) and portable powered equipment may exceed the limits by 20 dB(A).

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. Contractors are aware of the City of Seattle Noise Ordinance requirements and are contractually required by Seattle Public Schools to abide by them.

Long-Term Noise

The proposed ***West Seattle Elementary School Addition Project*** and associated increase in student capacity would likely result in a potential minor increase in noise from human voices and vehicles travelling to and from the site, particularly during the school day and during student drop-off and pickup. The potential increase in noise is anticipated to be minor and would not extend beyond 10 PM. As a result, no significant noise impacts would be anticipated.

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

The following measures would be provided to reduce noise impacts:

- As noted, the project would comply with provisions of the City's Noise Ordinance (*SMC 25.08*); specifically: construction hours would be limited to standard construction hours (non-holiday) from 7 AM to 7 PM and Saturdays and Sundays from 9 AM to 7 PM.

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 site would continue to be utilized as a school and would not be anticipated to affect current land uses on adjacent properties.

The West Seattle Elementary school campus is comprised of the existing one- to two-story building which is located on the north side of the campus. An existing surface parking lot is located to the west of the existing building and contains space for approximately 44 vehicles. Existing play areas, a playground, and a field are located in the south

portion of the campus. A grass/vegetated area is located to the east of the existing building. School bus loading/unloading and parent vehicle loading/unloading is located within the access driveway to the north of the existing building.

The site of the proposed ***West Seattle Elementary School Addition Project*** is located immediately to the east of the existing building. The site of the proposed addition is currently comprised of grass and paved areas (see **Figure 2** for an aerial photo of the existing site and **Figure 3** for the proposed site plan of the project).

Adjacent land uses to the north, east and west of the school campus are generally comprised of one- to three-story single family residences and townhome residences. The area to the south of the campus is comprised of the High Point Community Center and the Walt Hundley Playfield.

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

The project site has no recent history of use as a working farmland or forest land.

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:

The project site is located in an urban area and would not affect or be affected by working farm or forest land; no working farm or forest land is located in the vicinity of this urban site.

c. Describe any structures on the site.

The one- and two-story West Seattle Elementary School contains approximately 50,000 gross sq. ft. of building space with 15 classrooms, a library, a gymnasium, a cafeteria, a music room, an art room, and offices/administrative space; five portable buildings are also located to the south of the existing building and contain approximately 4,480 gsf of building space. The site of the proposed addition is comprised of grass and paved areas and does not contain any structures.

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

Portions of the existing building would be demolished as a result of the proposed project to allow for internal connections between the existing building and proposed addition. The five portable buildings would also be removed from the site.

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

The site is currently zoned as Low-Rise Residential 1 (LR1). The LR1 is intended for lower density multifamily residential uses such as townhomes, rowhouses and smaller scale apartments. Public schools are also a permitted use in the LR1 zone.

The surrounding areas to the immediate north, south, and east of the campus are also currently zoned as LR1. To the west and further to the south are Single Family Residential zoned areas (SF 5000)

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

The current comprehensive plan designation for the site is Multifamily Residential (*City of Seattle, 2018*).

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

The project site is not located within the City's designated shoreline boundary.

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

As noted in Section 1b, according to the City of Seattle's Environmentally Critical Areas (ECA) Maps, small portions of the western and southern edge of the school campus contain slopes that are approximately 40 percent or greater and are classified as an environmentally critical area (*City of Seattle, 2020*). Based on observations in the field, these areas are generally associated with engineered retaining walls along 34th Avenue SW and the adjacent Hight Point Community Center property to the south. The site of the proposed addition does not contain any steep slope areas.

No other environmentally critical areas are located on or adjacent to the project site.

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

The proposed ***West Seattle Elementary School Addition Project*** would not provide any residential opportunities. Development of the project would create new classroom space that would increase the student capacity for the school to approximately 500 students (current capacity is approximately 387 students, including the existing portables).

Currently, the school includes approximately 86 full-time and part-time and employees. It is anticipated that the proposed addition would also provide space for approximately 8 new employees at the school which would result in a total of approximately 94 employees at the school

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

The proposed project would not displace any people.

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

No displacement impacts would occur and no mitigation measures are necessary.

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

The proposed project is compatible with existing land uses and plans and is an addition to an existing school. As with most Seattle Public Schools facilities, it is located within a residential neighborhood.

m. Proposed measures to ensure the proposal is compatible with nearby 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.

No housing units would be provided as part of the ***West Seattle Elementary School Addition Project***.

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

No housing presently exists on the site and none would be eliminated.

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

No housing impacts would occur and no mitigation would be 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?

The height of the existing one- to two-story school is approximately 30 feet tall at its tallest point of the building. The proposed two-story addition would be intended to closely match the height of the existing building. The exterior building materials for the proposed ***West Seattle Elementary School Addition Project*** would be intended to match as closely as possible to the existing building materials. The new building addition would be constructed of brick masonry, metal cladding, aluminum storefront windows and concrete to be complementary with the existing building.

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

Views of the site would generally remain similar to the existing conditions and would be reflective of the existing school uses on the site. The proposed addition would increase the amount of building area on the site, but as noted above, the proposed height of the addition would be intended to closely match the existing building. Proposed building materials would also be selected to closely match the existing building. Views of the proposed addition would primarily be available from areas that are proximate to the north, east, and south boundaries of the school campus (see **Figure 3** for the proposed site plan).

The City's public view protection policies are intended to "protect public views of significant natural and human-made features: Mount Rainier, the Olympic and Cascade Mountains, the downtown skyline, and major bodies of water including Puget Sound, Lake Washington, Lake Union and the Ship Canal, from public places consisting of specified viewpoints, parks, scenic routes, and view corridors identified in Attachment 1" to the SEPA code[9]. The Myrtle Street Reservoir site (35th Avenue SW and SW Myrtle Street) is identified as a protected public

[9] Seattle Municipal Code Chap. 25.05.675 P.2.a.i. and the accompanying *Seattle Views: An Inventory of 86 Public View Sites Protected under SEPA (May 2002)* document.

viewpoint and is located approximately 400 feet to the southwest of the West Seattle Elementary School campus. The Myrtle Street Reservoir viewpoint is located at the south side of the property and provides panoramic views to the east and west of the Olympic Mountains, Puget Sound and the Downtown skyline. Since the West Seattle Elementary Campus is located to the northeast of the viewpoint and the site of the proposed addition is located on the east side of the existing school building it is anticipated that there would be no impacts to views from the Myrtle Street Reservoir.

View protection from City-designated Scenic Routes is also encouraged[10] but there are no designated scenic routes in the vicinity of the site.

Views of designated historic structures are also a consideration[11]. However, there are no designated landmarks or historic structures on or adjacent to the project site.

There are no designated views of the Space Needle on or adjacent to the project site[12].

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

No significant impacts are anticipated with regard to aesthetic impacts and no measures are proposed.

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 Light and Glare

At times during the construction process, area lighting of the job 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 Light and Glare

Under the proposed ***West Seattle Elementary School Addition Project***, there would be an increase in light and glare with the proposed building addition; however, this increase would be minimal and light and

[10] Ord. #97025 (Scenic Routes Identified by the Seattle Engineering Department's Traffic Division) and Ord. #114057 (Seattle Mayor's Recommended Open Space Policies).

[11] Seattle Municipal Code Chapter 25.05.675 P.2.b.i.

[12] Seattle Municipal Code Chap. 25.05.675 P. and Seattle DCLU, 2001

glare levels would generally remain similar to the existing conditions. Light and glare sources would primarily consist of interior and exterior building lighting, as well as lights from vehicles travelling to and from the site. Exterior building lighting would be designed to focus light on the site and minimize impacts to adjacent properties. Shadows from the site would also increase with the construction of the new addition but would generally appear as a continuation from the existing building and would not represent a significant impact.

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?

No off-site sources of light or glare are anticipated to affect the proposed project.

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

Interior and exterior building lighting would be programmed as part of the building facilities system to limit the amount of light utilized when the building is not in use and all exterior lighting would be shielded and directed toward the site to minimize light spillage. Evening activities/events currently occur periodically during the school year and increase light during the evening on those days; however, the number of evening events is not anticipated to substantially change with the proposed addition and the amount of light would not be anticipated to result in a significant impact.

12. Recreation

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

The West Seattle Elementary School campus includes recreation areas that are generally located to the south of the existing building, including hard surface play areas, a playground/play structure, and a grass field; a small play area and play structure is also located to the immediate northwest of the existing building. The site of the proposed addition project is comprised of a grass area to the east of the existing building; however, this area is not utilized by the school as a formal recreation space. In total, approximately 119,150 sq. ft. of recreation space is currently located on the campus.

There are also several parks and recreation areas in the vicinity of the project site (approximately 1.0 mile), including:

- High Point Community Center is located immediately to the south of the site
- Walt Hundley Playfield is located immediately south of the site.
- The Myrtle Street Reservoir is located approximately 0.1 miles to the southwest.
- High Point Commons Park is located approximately 0.2 miles to the north.
- Orchard Street Ravine is located approximately 0.3 miles to the southwest.
- Viewpoint Park is located approximately 0.4 miles to the north.
- High Point Pond Park is located approximately 0.5 miles to the north.
- E.C. Hughes Playground is located approximately 0.5 miles to the southeast.
- Morgan Junction Park is located approximately 0.8 miles to the west.
- West Seattle Golf Course is located approximately 0.9 miles to the northeast.

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

Development of the proposed project would remove the existing grass area to the east of the existing building; however, this area is not utilized as a formal recreation space. The proposed project would result in an overall increase in the available recreation space on the campus as a result of the removal of the existing portables and other onsite development. Approximately 134,270 sq. ft. of recreation space would be provided on campus with the project (compared to approximately 119,150 sq. ft. under existing conditions), including an expanded and renovated hard surface play area, new play structures, a new student garden area, and a renovated grass field area. The project also includes an option for an approximately 3,000 sq. ft. covered play area in the southwest corner of the campus which would provide enhanced recreation opportunities during rainy days.

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

The proposed project would increase the amount of recreation space on the campus (approximately 134,270 sq. ft. compared to approximately 119,150 sq. ft. under existing conditions). An expanded and renovated hard surface play area, new play structures, a new student garden area, and a renovated grass field area would be provided as part of the project; an option for a covered play area is also included.

No impacts to recreation would occur and no additional mitigation is 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 located on or near the site? If so, specifically describe.

The current West Seattle Elementary building was constructed in 1988 and is not listed on any national, state or local preservation registers. Per correspondence with the City of Seattle's Historic Preservation Coordinator, the building is not old enough to require a review for landmark nomination[13]. According to the Washington State Department Archaeology and Historic Preservation's (DAHP) Washington Information System for Architectural and Archaeological Records Data (WISAARD), the closest listed structures are Gorst Field (located approximately 1.4 miles to the northeast) and the White Center Field House and Caretaker Cottage (located approximately 2.0 miles to the southeast), both of which are listed on the Washington Heritage Register (WHR) and the National Register of Historic Places (NRHP).

According to the City of Seattle Landmarks Map and Database (*City of Seattle, 2020*), the closest listed City of Seattle Landmarks are Fire Station 37 (located approximately 0.4 miles to the south) and the E.C. Hughes School (located approximately 0.5 miles to the south).

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.

The project site is not located within an area that is designated as the Government Meander Line Buffer area in the City of Seattle and only properties located within that area are required to prepare an archaeological investigation as part of the SEPA and MUP processes. A review of Washington Information System for Architectural and Archaeological Records Data (WISAARD) indicates that the site and surrounding areas are considered a moderate to high potential for archaeological resources based on the WISAARD predictive model.

[13] Personal correspondence with Erin Doherty, City of Seattle Historic Preservation Coordinator, March, 30, 2020.

However, a cultural resources assessment was completed for the project site (*Perteet, 2020*) and included an analysis of the natural and cultural setting, a discussion of previous cultural resource investigations in the site vicinity, review of geotechnical investigations on the site, and an on-site investigation. Onsite investigations were conducted on the project site, including a pedestrian survey of the site and three shovel probe subsurface investigations. Near surface deposits in all excavations were generally comprised of fill; glacial outwash was observed in one excavation at a depth of approximately 32 cm below ground surface. Two of the excavations were terminated before reaching glacial sediments due to the presence of buried large, non-diagnostic historical or modern artifacts and debris (one was suspected to contain asbestos and another a large piece of asphalt). Since fill directly overlaid glacial sediments, it is unlikely that any undisturbed native surfaces are present within the site area, and it is anticipated that there is a very low potential for encountering archaeological materials in the project site. As a result, no further archaeological assessments are recommended at this time (*Perteet, 2020*). See **Appendix F** for further details.

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 City of Seattle Landmarks website 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.

In addition, a Cultural Resources Assessment was completed for the school site (*Perteet, 2020*). The assessment included a review of existing documentation on the natural, cultural and historic setting of the site and surrounding area; a review of previous studies that were conducted in the project area; and, on-site surface and subsurface investigations.

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.

The Cultural Resources Assessment (*Perteet, 2020*) included the preparation of an Inadvertent Discovery Plan (IDP) which would be utilized as necessary during project construction. Although no impacts to historic or cultural resources are anticipated with the proposed project, the following measure would be implemented to minimize impacts from a potential inadvertent discovery of cultural resources:

- Although archaeological resources are not anticipated on the site, an inadvertent discovery plan (IDP) has been prepared as part of the Cultural Resources Assessment (**Appendix F**) that details procedures that would be followed in the event that pre-contact or historic period cultural resources are inadvertently encountered during construction, including contacts with local tribes (Duwamish, Muckleshoot, Snoqualmie, Stillaguamish, Suquamish, and Tulalip Tribes) in the event of an inadvertent discovery.

14. Transportation

A Transportation Technical Report for the ***West Seattle Elementary School Addition Project*** was prepared by Heffron Transportation, Inc. (*Heffron Transportation, 2020)*. Information from the technical report is summarized in this section. See **Appendix G** for the full technical report.

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

West Seattle Elementary School is located at 6760 – 34th Avenue SW in the West Seattle/High Point neighborhood of Seattle. The school is bounded by 34th Avenue SW to the west, 31st Avenue SW to the east, private residences to the north, and the High Point Community Center and Walt Hundley Playfield to the south.

A 44-space surface parking lot is located on the northwest corner of the site. It is accessed primarily by a driveway on 34th Avenue SW; there is also an access driveway on 31st Avenue SW but it is used only for outbound school buses and taxies during the school day.

The project would not change site access or neighborhood vehicular and pedestrian circulation patterns to and around the site.

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

King County Metro Transit (Metro) provides bus service in the site vicinity. The closest bus stops are located at 35th Avenue SW at SW Holly Street, about 650 feet west of the site, and on SW Sylvan Way at SW Holly Street, about 800 feet east of the school. These stops are served by Routes 21 and 128. Route 21 provides daily full-day service between Downtown, High Point, Roxhill, White Center, and Arbor Heights with headways (time between consecutive buses) of 15

minutes. Route 128 provides daily full-day service between Admiral District, Alaska Junction, High Point, White Center, Tukwila, and South Center with headways of 30 minutes.

c. How many additional parking spaces would the completed project have? How many would the project or proposal eliminate?

A 44-space surface parking lot is located on the northwest corner of the site and parking is allowed along both the 31st Avenue SW and 34th Avenue SW frontages. The project would not change on-site or on-street parking.

An analysis of existing parking conditions and the expected change in parking demand due to the project was completed as part of the Transportation Technical Report for the project; the analysis was completed in accordance with the City's preferred methodology and requirements (see **Appendix G**). On-street parking utilization in the vicinity of the site is approximately 37 percent in the early morning and 36 percent during the school day with more than 350 unused spaces. Up to 10 additional parked vehicles generated by the additional staff and visitor parking demand may be added due to the project; this could be accommodated by the unused spaces and significant impacts to parking would not be anticipated.

Added enrollment could also increase event-related demand at the school during evening events. However, due to the relative infrequency of large events and proportionally small project-related increase in demand, the event-related parking impacts would not be considered significant (see **Appendix G**).

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

The proposal would not require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities.

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

The project would not use or occur in the immediate vicinity of water, rail, or air transportation.

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

The traffic analysis (see **Appendix G**) conducted for this SEPA Checklist reflected conditions with the classroom addition and increased enrollment capacity up to 500 students (a net increase of about 73 students compared to winter 2020 enrollment). Based on daily trip generation rates published for elementary schools by the Institute of Transportation Engineers, the added capacity at West Seattle Elementary School is expected to generate a net increase of about 140 trips per day (70 in, 70 out). The peak traffic volumes are expected to occur in the morning just before classes begin (between 7:15 and 8:15 a.m.) and in the afternoon around dismissal (between 2:15 and 3:15 p.m.).

The number of school-bus and delivery trips that would occur at the site is not expected to change with the classroom addition.

For more information about the anticipated school traffic generation, refer to **Appendix G**.

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

There are no agricultural or forest product uses in the immediate site vicinity and the project would not interfere with, affect or be affected by the movement of agricultural or forest products.

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

Construction is planned to begin in Summer 2021 with occupancy by Fall 2023. During construction, the students will be temporarily located at Schmitz Park Elementary.

The construction effort would include some earthwork to support site upgrades. Updated grading and truck trip estimates reflecting more current project information were completed for this analysis. The project is estimated to require removal of about 5,000 cubic yards (cy) of material from the site. Assuming an average of 20-cubic yards per truck (truck/trailer combination), the excavation and fill would generate about 250 truckloads (250 trucks in and 250 trucks out). Without the trailer (10 cy per truck), the excavation and fill would generate approximately

500 truckloads (500 trucks in and 500 trucks out). The earthwork activities are expected to occur over about a 13-week duration. This would correspond to an average of 8 to 16 truck trips per day (4 to 8 in, 4 to 8 out) and 1 to 2 truck trips per hour during the earthwork transport. Estimated truck trips would be fewer than those analyzed in the Draft Checklist and would not result in significant impacts to traffic operations in the site vicinity.

The construction of the project would also generate employee and equipment trips to and from the site. It is anticipated that construction workers would arrive at the construction site before the AM peak traffic period on local area streets and depart the site prior to the PM peak period; construction work shifts for schools are usually from 7:00 A.M. to 3:30 P.M., with workers arriving between 6:30 and 6:45 A.M., but work not starting until 7:00 A.M. The number of workers at the project site at any one time would vary depending upon the construction element being implemented.

With the project, some traffic congestion is expected during school operations for the morning arrival and afternoon dismissal along roadways that surround the site, similar to existing conditions. However, while additional traffic and pedestrian activity would add small amounts of delay at area intersections during those periods, the intersections would continue to operate at acceptable levels with the project.

School-day parking demand would also increase with the project by up to 10 vehicles. New parking demand is expected to occur on-street in the surrounding areas and there is adequate on-street parking supply to accommodate the added demand associated with the project.

With the larger enrollment capacity, events could draw proportionately larger attendances. Based on the observed evening utilization of parking in the site vicinity (35 to 38 unused spaces on site, and on-street utilization of 36% with 368 unused spaces), there is adequate capacity to accommodate parking generated by typical events. Due to the relative infrequency of large events and the proportionally small project-related increase in demand (approximately 15 to 25 additional vehicles during large events with the project), the event-related parking impacts would not be considered significant.

Even though the proposed West Seattle Elementary School classroom addition project would not adversely affect the transportation system in the site vicinity, the following measure is recommended to reduce the traffic and parking impacts with the project.

- Construction Transportation Management Plan (CTMP) – The District would require the selected contractor to develop a CTMP that addresses traffic and pedestrian control during construction of the new facility. It would define truck routes, lane closures, walkway closures, and parking or load/unload area

disruptions, as necessary. To the extent possible, the CTMP would direct trucks along the shortest route to arterials and away from residential streets to avoid unnecessary conflicts with resident and pedestrian activity. The CTMP may also include measures to keep adjacent streets clean on a daily basis at the truck exit points (such as street sweeping or on-site truck wheel cleaning) to reduce tracking dirt offsite.

15. Public Services

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

While the ***West Seattle Elementary School Addition Project*** would add student capacity to the school, it is not anticipated to generate a significant increase in the need for public services. To the extent that emergency service providers have planned for gradual increases in service demands, no significant impacts are anticipated.

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

The increase in capacity of the school and number of students and staff on the site may result in incrementally greater demand for emergency services; however, it is anticipated that adequate service capacity is available within the High Point area to preclude the need for additional public facilities/services.

16. Utilities

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

All utilities are currently available at the site.

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 immediate vicinity that might be needed.

Electrical (Seattle City Light) and telephone/internet (Comcast) would continue to be provided to the school and no new service connections would be required to serve the proposed addition.

Water service, sewer service and stormwater are provided by Seattle Public Utilities. Water service for the existing school is located on the west side of the main building and connect to an eight-inch water main

in 34th Avenue SW. Domestic water service and fire service for the ***West Seattle Elementary School Addition Project*** would be provided through the connections within the existing building and would not require any upgrades. Sewer service is provided through existing side sewer connections which ultimately flow to the northeast to an eight-inch sewer main in SW Holly Street. It is anticipated that the proposed project would be served by an interior extension from the existing building; however, some existing sewer lines within the proposed building footprint area would need to be relocated as part of the project.

C. SIGNATURES

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

Signature:

David L. Jackson

Name of Signee:

David L. Jackson

Position and Agency/Organization:

Project Manager, Seattle Public Schools

Date:

October 16, 2020

REFERENCES

Associated Earth Sciences, Inc. *Subsurface Exploration, Geologic Hazard, Infiltration Feasibility and Preliminary Geotechnical Report for the West Seattle Elementary School Addition*. March 16, 2020.

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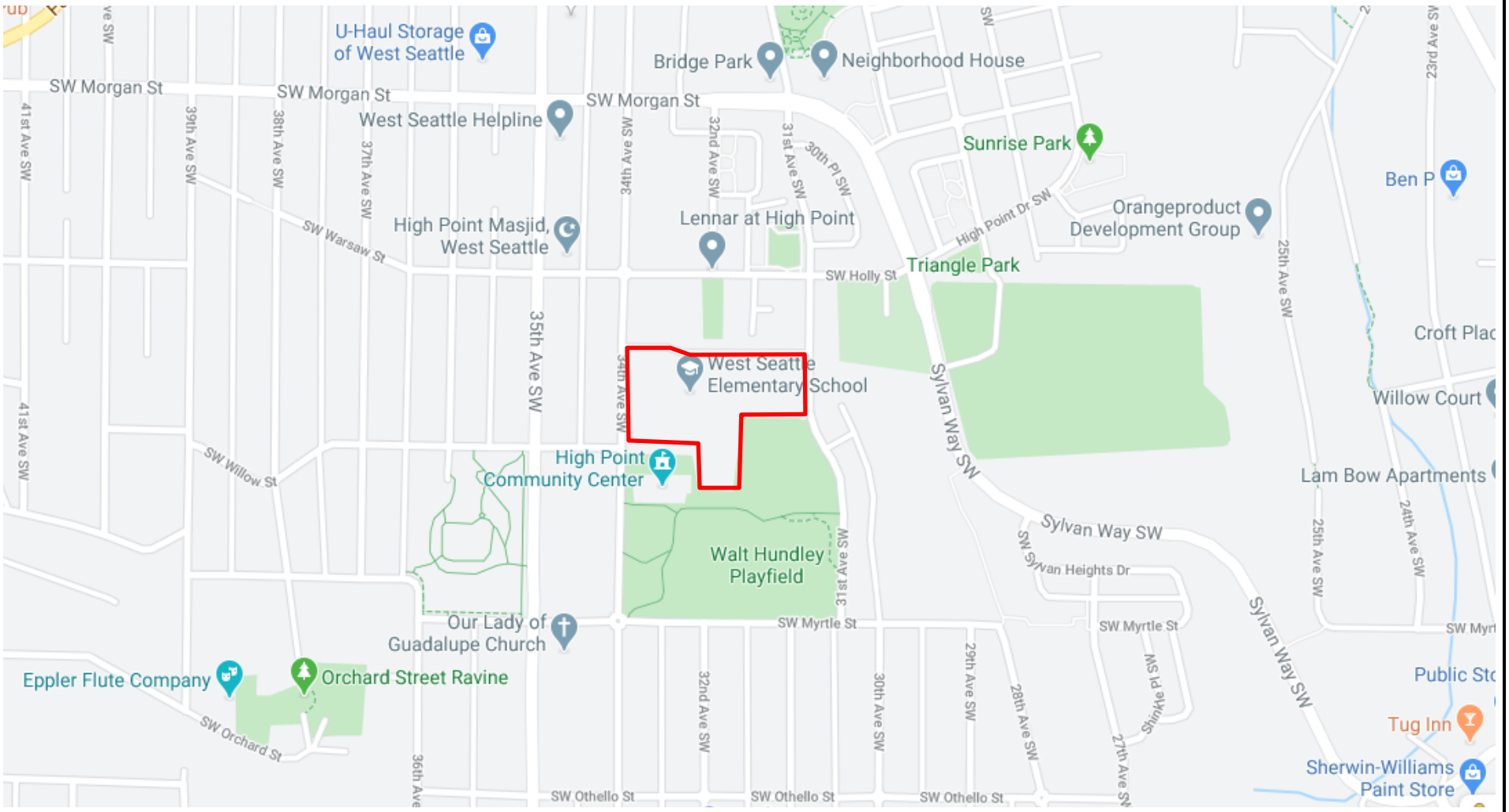
Figures



Project Site

Note: This figure is not to scale.

North

Source: Google Maps and EA Engineering, 2020

EA Engineering, Science, and Technology, Inc., PBC

Figure 1

Vicinity Map

West Seattle Elementary School Addition Project
Environmental Checklist

Project Site

Note: This figure is not to scale.

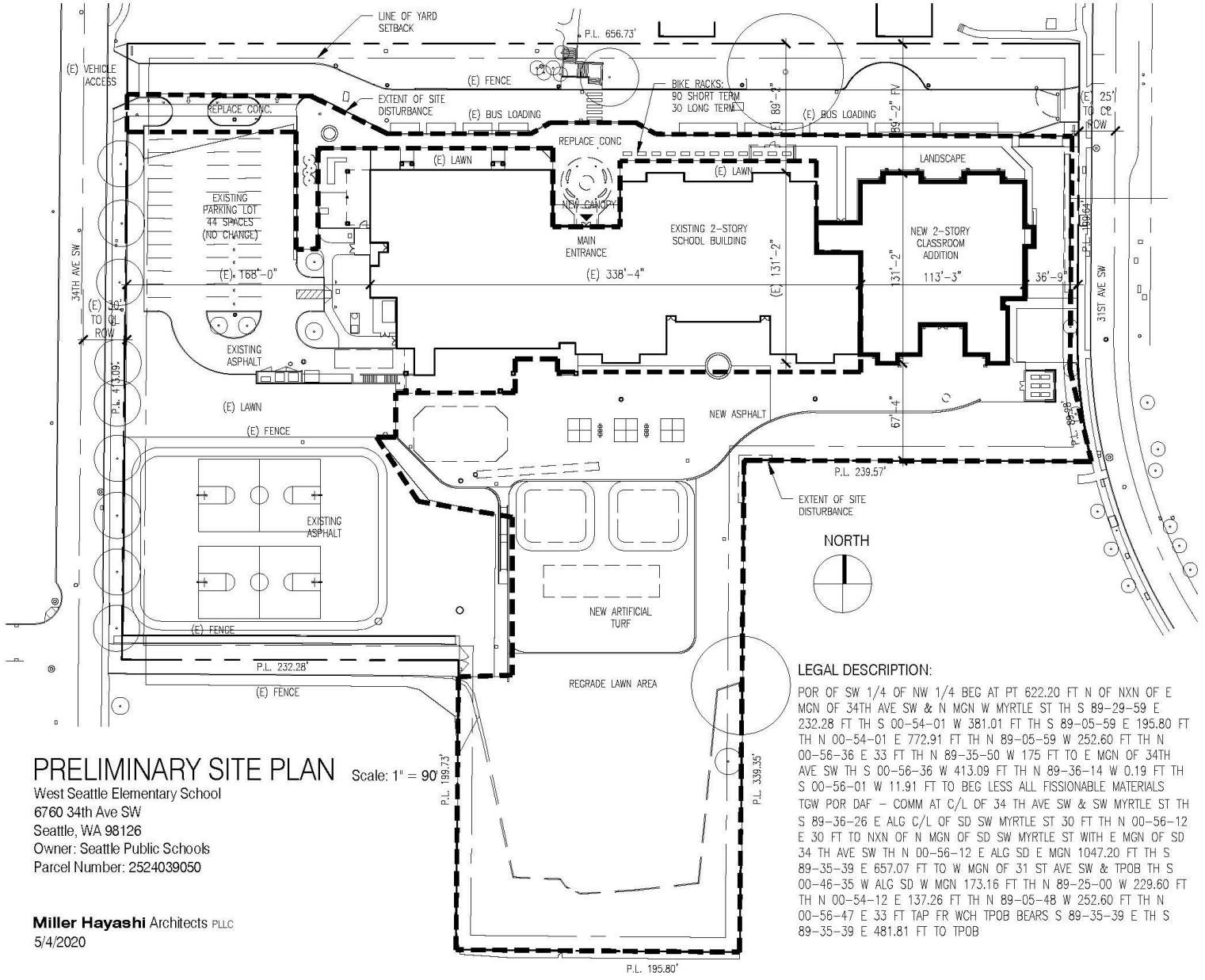
North

Source: Google Maps and EA Engineering, 2020

EA Engineering, Science, and Technology, Inc., PBC

Figure 2

Aerial Map



PRELIMINARY SITE PLAN

Scale: 1" = 90'

West Seattle Elementary School
6760 34th Ave SW
Seattle, WA 98126
Owner: Seattle Public Schools
Parcel Number: 2524039050

Miller Hayashi Architects PLLC
5/4/2020

LEGAL DESCRIPTION:

POR OF SW 1/4 OF NW 1/4 BEG AT PT 622.20 FT N OF NXN OF E MGN OF 34TH AVE SW & N MGN W MYRTLE ST TH S 89-29-59 E 232.28 FT TH S 00-54-01 W 381.01 FT TH S 89-05-59 E 195.80 FT TH N 00-54-01 E 772.91 FT TH N 89-05-59 W 252.60 FT TH N 00-56-36 E 33 FT TH N 89-35-50 W 175 FT TO E MGN OF 34TH AVE SW TH S 00-56-36 W 413.09 FT TH N 89-36-14 W 0.19 FT TH S 00-56-01 W 11.91 FT TO BEG LESS ALL FISSIONABLE MATERIALS TGW POR DAF – COMM AT C/L OF 34 TH AVE SW & SW MYRTLE ST TH S 89-36-26 E ALG C/L OF SD SW MYRTLE ST 30 FT TH N 00-56-12 E 30 FT TO NXN OF N MGN OF SD SW MYRTLE ST WITH E MGN OF SD 34 TH AVE SW TH N 00-56-12 E ALG SD E MGN 1047.20 FT TH S 89-35-39 E 657.07 FT TO W MGN OF 31 ST AVE SW & TPOB TH S 00-46-35 W ALG SD W MGN 173.16 FT TH N 89-25-00 W 229.60 FT TH N 00-54-12 E 137.26 FT TH N 89-05-48 W 252.60 FT TH N 00-56-47 E 33 FT TAP FR WCH TPOB BEARS S 89-35-39 E TH S 89-35-39 E 481.81 FT TO TPOB

Source: Miller Hayashi Architects, 2020

EA Engineering, Science, and Technology, Inc., PBC

Figure 3
Site Plan

Appendix A

GEOTECHNICAL REPORT

associated
earth sciences
incorporated

Subsurface Exploration, Geologic Hazard, Infiltration Feasibility, and Preliminary Geotechnical Engineering Report

WEST SEATTLE ELEMENTARY SCHOOL ADDITION

Seattle, Washington

Prepared For:

SEATTLE PUBLIC SCHOOLS

Project No. 20190258E001
March 16, 2020

Associated Earth Sciences, Inc.
911 5th Avenue
Kirkland, WA 98033
P (425) 827 7701

associated
earth sciences
incorporated

March 16, 2020
Project No. 20190258E001

Seattle Public Schools
MS 22-334
2445 3rd Avenue South
Seattle, Washington 98134

Attention: Mr. Paul Wight

Subject: Subsurface Exploration, Geologic Hazard, Infiltration Feasibility, and Preliminary Geotechnical Engineering Report
West Seattle Elementary School Addition
6760 34th Avenue SW
Seattle, Washington

Dear Mr. Wight:

We are pleased to present the enclosed copy of the referenced report. This report summarizes the results of tasks including subsurface exploration, limited infiltration rate testing, geologic hazard analysis, infiltration feasibility assessment, and preliminary geotechnical engineering, and offers preliminary geotechnical recommendations for design of the proposed project.

We have enjoyed working with you on this study and are confident that the preliminary recommendations presented in this report will aid in the successful completion of your project. Please contact me if you have any questions or if we can be of additional help to you.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

Kurt D. Merriman, P.E.
Senior Principal Engineer

KDM/ld
20190258E001-3

SUBSURFACE EXPLORATION, GEOLOGIC HAZARD, INFILTRATION FEASIBILITY, AND PRELIMINARY GEOTECHNICAL ENGINEERING REPORT

WEST SEATTLE ELEMENTARY SCHOOL ADDITION

Seattle, Washington

Prepared for:
Seattle Public Schools
MS 22-334
2445 3rd Avenue South
Seattle, Washington 98134

Prepared by:
Associated Earth Sciences, Inc.
911 5th Avenue
Kirkland, Washington 98033
425-827-7701

March 16, 2020
Project No. 20190258E001

I. PROJECT AND SITE CONDITIONS

1.0 INTRODUCTION

This report presents the results of Associated Earth Sciences, Inc.'s (AESI's) subsurface exploration, limited infiltration testing, geologic hazard analysis, preliminary geotechnical engineering, and stormwater infiltration feasibility for the proposed addition to the existing West Seattle Elementary School in Seattle, Washington. Our understanding of the project is based on a topographic survey titled "West Seattle Elementary School," prepared by AHBL, dated September 17, 2019, and an undated conceptual site plan provided by the project architect. Other background data which we reviewed included a limited geotechnical engineering feasibility analysis report dated May 2, 2018 prepared by AESI as part of the Building Excellence (BEX) V Site Evaluations program. We also reviewed subsurface exploration logs prepared by another consultant for a 1986 design study of existing buildings. Historical subsurface exploration data is discussed in further detail later in this report. Our recommendations are preliminary in that the project is still in the design phase. The site location is shown on the "Vicinity Map," Figure 1. The approximate locations of explorations completed for this study are shown on the "Site and Exploration Plan," Figure 2. Interpretive exploration logs of subsurface explorations completed for this study, historical exploration logs by others, and laboratory test data are included in Appendix A. Infiltration test data and City of Seattle Pilot Infiltration Checklist forms are included in Appendix B.

1.1 Purpose and Scope

The purpose of this study was to provide subsurface soil and groundwater data to be utilized in the design of the West Seattle Elementary School Addition project. Our study included reviewing available geologic literature, advancing seven exploration borings, installing one groundwater observation well, completing two infiltration rate tests, completing laboratory testing of soil grain-size distribution, and performing a geologic study to assess the type, thickness, distribution, and physical properties of the subsurface sediments and shallow groundwater. Geotechnical engineering studies were completed to determine the type of suitable foundations, allowable foundation soil bearing pressures, anticipated foundation settlements, erosion considerations, drainage considerations, and to provide infiltration feasibility recommendations. This report summarizes our current fieldwork and offers preliminary design recommendations based on our present understanding of the project.

1.2 Authorization

Authorization to proceed with this study was given to AESI by Mr. Paul Wight with Seattle Public Schools. Our study was accomplished in general accordance with our proposal, dated January 31,

2020. This report has been prepared for the exclusive use of Seattle Public Schools and their agents, for specific application to this project. Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted geotechnical engineering and engineering geology practices in effect in this area at the time our report was prepared. No other warranty, express or implied, is made.

2.0 PROJECT AND SITE DESCRIPTION

The project site is that of the existing West Seattle Elementary School. The existing school was constructed in 1988. The existing school buildings are situated on the north-central part of the site, with a paved parking area to the west, paved and natural turf play areas to the south, natural turf play areas to the east, and a bus drop-off lane to the north. Walt Hundley playground is adjacent offsite to the south. On-site topography slopes down to the north, with overall vertical relief across the site of approximately 30 feet. Vertical relief is concentrated in two areas: in cut slopes descending to the north from the south edge of the site, and in a slope that descends to the north and crosses the site in an approximately east-west orientation near the center of the site. Some of these slopes are close to, but do not meet the geometric criteria for treatment as Steep Slope Critical Areas by the City of Seattle.

Based on discussions with the project team, we understand that an addition is planned east of the existing building. The project civil engineer indicated that stormwater infiltration will be included in the project if it is feasible north of the proposed addition and south of the existing school building near the existing portable classrooms. We anticipate that the new building addition would be constructed close to existing grade without the need for deep cuts or thick fills. Subsurface data summarized later in this report demonstrates that existing fill is present in significant thickness in some locations onsite. Remedial preparation of existing fill below the planned building addition is expected to be required as part of the project design and construction.

3.0 SITE EXPLORATION

Our field studies were conducted for this project in February 2020 and included advancing seven exploration borings, installing one groundwater observation well, and completing two infiltration rate tests. The existing site conditions , and the approximate locations of subsurface explorations referenced in this study are presented on the "Site and Exploration Plan" (Figure 2). The various types of sediments, as well as the depths where the characteristics of the sediments changed, are indicated on the exploration logs presented in Appendix A. The depths indicated on the logs where conditions changed may represent gradational variations between sediment types. If changes occurred between sample intervals in our exploration borings, they were interpreted.

Our explorations were approximately located in the field by measuring from known site features depicted on the previously referenced topographic survey.

The conclusions and recommendations presented in this report are based, in part, on the explorations completed for this study. The number, locations, and depths of the explorations were completed within site and budgetary constraints. Because of the nature of exploratory work below ground, extrapolation of subsurface conditions between field explorations is necessary. It should be noted that differing subsurface conditions may be present due to the random nature of deposition and the alteration of topography by past grading and/or filling. The nature and extent of variations between the field explorations may not become fully evident until construction. If variations are observed at that time, it may be necessary to re-evaluate specific recommendations in this report and make appropriate changes.

3.1 Exploration Borings

For this study, the seven exploration borings were completed by advancing an 8-inch, outside-diameter, hollow-stem auger using a track-mounted drill. During the drilling process, samples were generally obtained at 2½- to 5-foot-depth intervals. The borings were continuously observed and logged by a geologist from our firm. The exploration logs presented in Appendix A are based on the field logs, drilling action, and observation of the samples collected.

Disturbed, but representative samples were obtained by using the Standard Penetration Test (SPT) procedure in accordance with *ASTM International* (ASTM) D-1586. This test and sampling method consists of driving a standard 2-inch, outside-diameter, split-barrel sampler a distance of 18 inches into the soil with a 140-pound hammer free-falling a distance of 30 inches. The number of blows for each 6-inch interval is recorded, and the number of blows required to drive the sampler the final 12 inches is known as the Standard Penetration Resistance ("N") or blow count. If a total of 50 is recorded within one 6-inch interval, the blow count is recorded as the number of blows for the corresponding number of inches of penetration. The resistance, or N-value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils; these values are plotted on the attached exploration boring logs.

The samples obtained from the split-barrel sampler were classified in the field and representative portions placed in watertight containers. The samples were then transported to our laboratory for further visual classification and laboratory testing, as necessary.

3.2 Exploration Boring Completed as an Observation Well

One exploration boring was completed as a 2-inch-diameter observation well designated as EB-1W. The well was installed to allow for monitoring of groundwater levels over time. Well EB-1W was constructed with 10 feet of machine-slotted Schedule 40 polyvinyl chloride (PVC) well

screen, 54 feet of solid, non-slotted, Schedule 40 PVC casing, and a flush monument. The sand pack materials consisted of 10/20 Colorado Silica Sand. The well was sealed with a combination of bentonite chips and concrete. The PVC well casing was capped with a locked plastic compression cap. Well construction details are presented on the geologic and well construction log in Appendix A. On February 7, 2020, a representative from AESI developed the well by adding water, and sounded the well. No groundwater was present in the well at the time of development. Water was not expected in the well based on our observations at the time of drilling. Demonstration that the proposed infiltration receptor is unsaturated below infiltration facilities is valuable, and therefore the well provides valuable information regarding vertical separation requirements even if it remains dry.

3.4 Infiltration Test Pits

Two infiltration test pits were excavated at the site using a Bobcat E55 rubber track-mounted excavator with an approximately 3-foot-wide toothed bucket. The pits permitted direct, visual observation of subsurface conditions. Materials encountered in the infiltration test pits were studied and classified in the field by an engineering geologist from our firm. The approximate locations of the infiltration test pits are shown on Figure 2. Logs of exploration pits are presented in Appendix A.

Samples collected from the infiltration test pits were classified in the field and representative portions placed in watertight containers. The samples were then transported to our laboratory for further visual classification and laboratory testing, as necessary.

4.0 SUBSURFACE CONDITIONS

4.1 Regional Geologic Map and Information by Others

Published geologic mapping for the site and immediate vicinity were reviewed on *The Geologic Map of Seattle – A Progress Report*, by Kathy Goetz Troost, Derek B. Booth, Aaron P. Wisher, and Scott A. Shimel, United States Geological Survey (USGS) Open File Report 2005-1252, 2005. This map depicts near-surface geology at the site consisting of advance outwash sediments.

We reviewed a partial geotechnical report prepared by TCW Consulting Engineers (TCW) in 1986. The report was prepared in support of the design of the existing school building. The 1986 geotechnical report included logs of six auger borings that encountered soils consistent with those observed in our exploration borings. Copies of the exploration logs from the TCW report are included in Appendix A for reference.

4.2 Site Stratigraphy

Subsurface conditions at the project site were inferred from the field explorations accomplished for this study, review of previously completed exploration borings by others, visual reconnaissance of the site, and review of selected applicable geologic literature. As shown on the exploration logs, soils encountered at the site consisted of fill of variable thickness overlying native sediments interpreted as Vashon advance outwash. The following section presents more detailed subsurface information on the sediment types encountered at the site.

Topsoil

Organic-rich brown topsoil and grass were encountered at the ground surface in IT-1 and in exploration borings completed in existing lawn areas extending to a depth of approximately 1 foot.

Fill

Fill soils (those not naturally placed), were encountered in all of our explorations including all seven exploration borings, and both infiltration test pits to depths ranging from 1 to 8 feet below the existing ground surface. Figure 2 of this report includes the observed fill depths at AESI exploration locations. Explorations by TCW in 1986 encountered fills of thicknesses up to 12 feet from the surface. The fill generally consisted of loose to medium dense, moist, brown, fine to medium sand with variable silt content, variable gravel content, and minor organics. Existing fill is uncontrolled and is not considered suitable for foundation support and may require mitigation below new paving. Excavated existing fill material is suitable for reuse in structural fill applications if such reuse is specifically allowed by project plans and specifications, if excessively organic and any other deleterious materials are removed, and if moisture content is adjusted to allow compaction to the specified level and to a firm and unyielding condition. Fill soils are also likely present in unexplored areas of the site near the existing buildings, such as in existing utility trench areas, landscaped or yard areas, and at previously graded/backfilled areas. Existing fill is not suitable for infiltration of stormwater runoff.

Vashon Lodgement Till

A thin layer of dense brownish-gray, non-stratified, silty, fine-grained sand with some gravel interpreted as Vashon lodgement till was encountered beneath the topsoil and fill in IT-1, and was underlain by Vashon advance outwash. The Vashon till was deposited by basal, debris-laden, glacial ice during the Vashon Stade of the Fraser Glaciation, approximately 12,500 to 15,000 years ago. The high relative density characteristic of the Vashon lodgement till is due to its consolidation by the massive weight of the glacial ice from which it was deposited. Lodgement till was observed in very limited areas, and is not expected to be handled in substantial amounts

during site work for the project. Lodgement till is typically silty and moisture-sensitive when excavated and placed as structural fill, and is expected to require drying during favorable weather conditions if it is to be reused for fill in structural areas.

Vashon Advance Outwash

Stratigraphically underlying the fill, all of our explorations encountered typically dense to very dense, stratified sand with varying amounts of silt and gravel interpreted as Vashon advance outwash. The observed depth to advance outwash sediments ranged from 1 to 8 feet below the existing ground surface. Advance outwash was deposited by meltwater streams from an advancing ice sheet and was glacially overridden and compacted. Advance outwash is suitable for support of structural loads when prepared as recommended in this report. Advance outwash may contain a significant fine-grained fraction, and may be sensitive to excess moisture during placement in structural fill applications. Reuse of advance outwash in structural fill applications is feasible if allowed by project specifications, and will require drying to achieve moisture contents within 1 to 2 percent of optimum for compaction purposes.

4.3 Hydrology

Groundwater was not encountered in any of the borings advanced for this study at the time they were completed (February 2020). Perched groundwater was not observed, but is possible during the wetter winter months within the Vashon advance outwash above localized silty interbeds or above the Vashon till, if present. Perched water occurs when surface water infiltrates down through relatively permeable soils, such as existing fill or coarser-grained natural strata, and becomes trapped or "perched" atop a comparatively low-permeability barrier, such as silty interbeds within the advance outwash or the surface of the hard, unweather till. When water becomes perched, it may travel laterally and may will follow flow paths related to ground surface topography. The duration and quantity of perched groundwater seepage will largely depend on the soil grain-size distribution, topography, seasonal precipitation, on- and off-site land usage, and other factors.

Well EB-1W was installed in support of our infiltration feasibility study for the project. EB-1W was constructed with a well screen interval approximately 54 to 64 feet below the existing ground surface in Vashon advance outwash to demonstrate that a substantial unsaturated thickness of advance outwash is present beneath the site. AESI sounded EB-1W during two site visits in February 2020 and we have not observed the presence of any groundwater.

4.4 Laboratory Testing

Grain-Size Analysis

AESI performed six grain-size analyses (sieves) on representative samples of Vashon advance outwash sediments collected from EB-1W at depths of 7.5 and 12.5 feet, EB-7 at depths of 10 and 15 feet, IT-1 at a depth of 5.5 feet, and IT-2 at a depth of 5 feet. The grain-size analyses test results are included in Appendix A. The grain-size analyses test results are summarized below in Table 1 with soil descriptions based on ASTM D-2487 Unified Soil Classification System (USCS). The respective fine-grained content for each sample was measured on the No. 200 sieve and is presented in Table 1.

Table 1
Summary of Grain-Size Analyses

Exploration Number	Depth (feet)	Geologic Unit	USCS Soil Description	Fines Content (%)
EB-1W	7.5	Vashon Advance Outwash	Very gravelly silty SAND (SM)	14.1
EB-1W	12.5	Vashon Advance Outwash	Gravelly SAND some silt (SW-SM)	6.6
EB-7	10	Vashon Advance Outwash	Gravelly SAND some silt (SW-SM)	8.8
EB-7	15	Vashon Advance Outwash	Very gravelly SAND some silt (SW-SM)	7.0
IT-1	5.5	Vashon Advance Outwash	SAND Trace Gravel Trace Silt (SW-SP)	2.4
IT-2	5	Vashon Advance Outwash	SAND Some Gravel Trace Silt (SP)	1.5

USCS - Unified Soil Classification System
% = percent of total weight passing the U.S. No. 200 Sieve

5.0 INFILTRATION TESTING AND METHODS

Infiltration testing was conducted in the Vashon advance outwash at the site to evaluate the suitability of the natural on-site sediments for stormwater infiltration. Infiltration testing was conducted in accordance with the Small Pilot Infiltration Test (PIT) procedure, as described in Appendix D of the 2017 *City of Seattle Stormwater Manual* (2017 Seattle Manual). The Small PIT procedure consists of excavating a flat-bottomed pit with an area of at least 12 square feet. The base of the pit extends into the intended receptor soil stratum. The "constant-head" portion of the test is then conducted by discharging water into the pit for a "soaking period" of 6 hours to allow the receptor soils in the immediate vicinity of the pit to become saturated. After completion

of the soaking period, water continues to be discharged into the pit at a rate sufficient to maintain a fairly consistent head over a period of 1 hour. The final "falling-head" portion of the test consists of monitoring the rate of head decline in the pit after the discharge of water into the pit is stopped.

Testing for this study was conducted in infiltration test pit IT-1, located near the northeast corner of the existing school, and in infiltration test pit IT-2, on the south side of the school building near the portable classrooms, as shown on Figure 2. At both test locations, infiltration testing was conducted in the dense, unweathered Vashon advance outwash in IT-1 and IT-2 at a depth of approximately 5 feet below the existing grade. Following completion of infiltration testing, infiltration test pit IT-1 was excavated to a depth of approximately 12 feet, and IT-2 was excavated to a depth of 13.5 feet to observe soil conditions below the test depth. Vashon advance outwash sediments were encountered to the total depth explored in both infiltration test pits. Based on our exploration borings EB-1W and EB-7, the Vashon advance outwash sediments are present to at least 36.5 to 66.5 feet below ground surface at those boring locations, respectively. No seepage or groundwater was observed below either infiltration test at the completion of testing, or in our exploratory borings. An unfactored field infiltration rate of approximately 35.3 inches per hour (iph) and 12.6 iph was measured during the constant-head infiltration test in IT-1 and IT-2, respectively. A copy of the infiltration test data and City of Seattle Pilot Infiltration Checklist forms are included in Appendix B.

II. GEOLOGIC HAZARDS AND MITIGATIONS

The following discussion of potential geologic hazards is based on the geologic, slope, and ground and surface water conditions, as observed and discussed herein.

6.0 LANDSLIDE HAZARDS AND MITIGATIONS

Chapter 25.09 of the *Seattle Municipal Code* (SMC) provides definitions and regulations and guidelines regarding landslide hazards. The SMC separates landslide hazards into three main categories: Known Landslide Areas, Potential Slide Areas, and Steep Slope Erosion Hazard Areas. The site contains localized areas that are close to, but do not meet the geometric criteria for classification as Steep Slope Areas by the City of Seattle. In order to be classified as Steep Slope Areas, the slopes must be inclined at least 40 percent, and they must be at least 10 feet tall (SMC 25.09.012). The slopes onsite that meet the 40 percent steepness criteria are shorter than 10 feet based on our review of the referenced topographic survey. No potential slide areas or known landslide areas were identified onsite. A large potential slide area is located approximately 1,500 feet east of the site.

Based on visual reconnaissance of the site, the existing slopes appear to have performed well, with no visual indication of unusual erosion or slope instability. The project as currently proposed does not require modification of any of the site slopes, or their buffers. No detailed quantitative assessment of site slopes was completed as part of this study, and none is warranted to support the project as currently proposed, in our opinion.

7.0 SEISMIC HAZARDS AND MITIGATIONS

We do not expect that site conditions will trigger City of Seattle regulations related to seismic hazards. The following discussion is a more general assessment of seismic hazards that is intended to be useful to the project design team in terms of understanding seismic issues, and to the structural engineer for preliminary structural design.

Earthquakes occur regularly in the Puget Lowland. The majority of these events are small and are usually not felt by people. However, large earthquakes do occur, as evidenced by the 1949, 7.2-magnitude event; the 1965, 6.5-magnitude event; and the 2001, 6.8-magnitude event. The 1949 earthquake appears to have been the largest in this region during recorded history and was centered in the Olympia area. Evaluation of earthquake return rates indicates that an earthquake of the magnitude between 5.5 and 6.0 is likely within a given 20-year period.

Generally, there are three types of potential geologic hazards associated with large seismic events: 1) surficial ground rupture, 2) liquefaction, and 3) ground motion. The potential for each of these hazards to adversely impact the proposed project is discussed below.

7.1 Surficial Ground Rupture

Generally, the largest earthquakes that have occurred in the Puget Sound area are sub-crustal events with epicenters ranging from 50 to 70 kilometers in depth. Earthquakes that are generated at such depths usually do not result in fault rupture at the ground surface. Current research indicates that surficial ground rupture is possible in areas close to the Seattle and South Whidbey Island Fault Zones.

The site is located within the mapped limits of the Seattle Fault Zone. The Seattle Fault Zone extends approximately east-west across the Seattle area, with a fault zone width of approximately 3 miles north to south. Within the Seattle Fault Zone, individual fault strands are not precisely known or mapped. Several potentially active fault strands are thought to exist within the Seattle Fault Zone and run approximately east-west and approximately parallel to the long axis of the fault zone. Faults in the project area have the potential to experience surface rupture, and evidence of historical surface displacements is known to exist within the Seattle Fault Zone at locations distant from the project. Surficial cover by easily eroded sediments and pervasive man-caused modification of the ground surface conceal possible expressions of previous surface displacements, so it is impossible to know if historical surface displacements have occurred along fault traces at or near the site. A more detailed study of potential surface rupture due to faulting could be completed on request but is not included in our current scope of work.

7.2 Liquefaction

Liquefaction is a temporary loss in soil shear strength that can occur when loose granular soils below the groundwater table are exposed to cyclic accelerations, such as those that occur during earthquakes. The observed site sediments were observed to be unsaturated and are not expected to be prone to liquefaction due to their generally high density and absence of shallow groundwater. A detailed liquefaction hazard analysis was not performed as part of this study, and none is warranted, in our opinion.

7.3 Ground Motion/Seismic Site Class (2015 *International Building Code*)

Structural design of the building addition should follow 2015 *International Building Code* (IBC) standards. We recommend that the project be designed in accordance with Site Class "C" in accordance with the 2015 IBC, and the publication *American Society of Civil Engineers* (ASCE) 7 referenced therein, the most recent version of which is ASCE 7-10.

If the project will be permitted under the 2018 version of the IBC, we should be allowed to review the Site Class recommendations presented above. At the time this report was written, Seattle has not yet adopted the 2018 IBC and 2015 IBC is in effect until July 1, 2020.

8.0 EROSION CONTROL

Project plans should include implementation of temporary erosion controls in accordance with local standards of practice. Control methods should include limiting earthwork to seasonally drier periods, typically April 1 to October 31, use of perimeter silt fences, stabilized construction entrances, and straw mulch in exposed areas. Removal of existing vegetation should be limited to those areas that are required to construct the project, and new landscaping and vegetation with equivalent erosion mitigation potential should be established as soon as possible after grading is complete. During construction, surface water should be collected as close as possible to the source to minimize silt entrainment that could require treatment or detention prior to discharge and track-out onto City streets should be avoided. Timely implementation of permanent drainage control measures should also be a part of the project plans, and will help reduce erosion and generation of silty surface water onsite.

III. PRELIMINARY DESIGN RECOMMENDATIONS

9.0 INTRODUCTION

Our explorations indicate that, from a geotechnical engineering standpoint, the proposed project is feasible provided the recommendations contained herein are properly followed. The bearing stratum was observed to vary from 1 to 8 feet below the existing ground surface. Conventional foundations should perform well with proper subgrade preparation. Existing fill encountered in our explorations ranges in thickness from 1 to 8 feet and will require removal and replacement where present under the new foundation. The existing fill can be left in place below slab-on-grade floors and pavements provided the upper 2 feet of the fills are moisture-conditioned and compacted to 95 percent relative density. Our explorations generally encountered medium dense to dense Vashon advance outwash below the existing fill. Existing fill is also likely present around existing structures and above buried utilities and may require removal and recompaction at the time of construction. Vashon advance outwash is considered a suitable receptor for infiltration. Since this report is preliminary, AESI should be allowed to review the final project plans once they have been developed to update our recommendations as necessary.

10.0 SITE PREPARATION

Erosion and surface water control should be established around the perimeter of the excavation to satisfy City of Seattle requirements. Site preparation should include removal of all existing pavement, structures, buried utilities, and any other deleterious material from new building pad. After any required demolition is complete, disturbed soils below finished grade should be removed. Existing fill should be removed from below the building foundations until suitable native soils are exposed, and fill removal should extend laterally at least 2 feet beyond the footing limits. The resulting surface should be proof-rolled and compacted, then structural fill should be placed to reach planned grades. During any required demolition, excavation, and foundation construction, support for the existing building foundations should be maintained. Excavation into the support soils for the existing foundations should not be attempted unless underpinning or other risk management strategies are used. AESI should be allowed to offer situation-specific recommendations anywhere that disturbance of existing foundation support soils is necessary. Existing foundation support soils should be considered to include all soils below a line projected down and away from existing footings at an inclination of 1H:1V (Horizontal:Vertical).

10.1 Temporary Cut Slopes

In our opinion, stable construction slopes should be the responsibility of the contractor and should be determined during construction based on the conditions encountered at that time. For

estimating purposes, however, we anticipate that temporary, unsupported cut slopes in loose to medium dense fill and medium dense to dense advance outwash sediments be planned at a maximum slope of 1.5H:1V. Steeper temporary slopes in advance outwash sediments may be feasible if needed depending on site-specific conditions, but may not be needed for the project as currently proposed. Temporary cut slopes may need to be adjusted in the field at the time of construction based on the presence of surface water or perched seepage zones. As is typical with earthwork operations, some sloughing and raveling may occur, and cut slopes may have to be adjusted in the field. In addition, WISHA/OSHA regulations should be followed at all times. If steeper or deeper cuts are required, then temporary shoring may be necessary.

10.2 Site Disturbance

Some of the on-site soils contain a high percentage of fine-grained material, which makes them moisture-sensitive and subject to disturbance when wet. The contractor must use care during site preparation and excavation operations so that the underlying soils are not softened, particularly during wet weather conditions. If disturbance occurs in areas of conventional footings, the softened soils should be removed and the area brought to grade with clean crushed rock fill. Because of the moisture-sensitive nature of the soils, we anticipate that wet weather construction would significantly increase the earthwork costs over dry weather construction.

10.3 Winter Construction

The existing fill material and portions of the Vashon advance outwash contain substantial silt and are considered highly moisture-sensitive. Soils excavated onsite will likely require drying during favorable dry weather conditions to allow their reuse in structural fill applications. Care should be taken to seal all earthwork areas during mass grading at the end of each workday by grading all surfaces to drain and sealing them with a smooth-drum roller. Stockpiled soils that will be reused in structural fill applications should be covered whenever rain is possible.

If winter construction is expected, crushed rock fill should be used to provide construction staging areas where exposed soil is present. The stripped subgrade should be observed by the geotechnical engineer, and should then be covered with a geotextile fabric, such as Mirafi 500X or equivalent. Once the fabric is placed, we recommend using a crushed rock fill layer at least 10 inches thick in areas where construction equipment will be used. Soil-cement treatment is another approach to providing a workable site during the winter. We are available to provide more detailed cement treatment recommendations on request and if allowed by the governing jurisdiction.

10.4 Frozen Subgrades

If earthwork takes place during freezing conditions, all exposed subgrades should be allowed to thaw, and then be recompacted prior to placing subsequent lifts of structural fill. Alternatively, the frozen material could be stripped from the subgrade to reveal unfrozen soil prior to placing subsequent lifts of fill. The frozen soil should not be reused as structural fill until allowed to thaw and adjusted to the proper moisture content, which may not be possible during winter months.

11.0 STRUCTURAL FILL

Should structural fill be necessary, it should be placed and compacted according to the recommendations presented in this section and requirements included in project specifications. All references to structural fill in this report refer to subgrade preparation, fill type, placement, and compaction of materials, as discussed in this section. If a percentage of compaction is specified under another section of this report, the value given in that section should be used.

Structural fill is defined as non-organic soil, acceptable to the geotechnical engineer, placed in maximum 8-inch loose lifts, with each lift being compacted to at least 95 percent of the modified Proctor maximum dry density using ASTM D-1557 as the standard. In the case of roadway and utility trench filling, the backfill should be placed and compacted in accordance with City of Seattle standards. For planning purposes, we recommend the use of a well-graded sand and gravel for road and utility trench backfill. Controlled density fill (CDF), can also be used for backfill. At this time we are not aware of any planned right-of-way work associated with the project. Any fill placed in the right-of-way should be constructed in accordance with City requirements.

The contractor should note that AESI should evaluate any proposed fill soils prior to their use in fills. This would require that we have a sample of the material at least 3 business days in advance of filling activities to perform a Proctor test and determine its field compaction standard. Soils in which the amount of fine-grained material (smaller than the No. 200 sieve) is greater than approximately 5 percent (measured on the minus No. 4 sieve size) should be considered moisture-sensitive. Use of moisture-sensitive soil in structural fills is not recommended during the winter months or under wet site and weather conditions. Most of the on-site soils are moisture-sensitive and have natural moisture contents over optimum for compaction and will likely require moisture-conditioning before use as structural fill. In addition, construction equipment traversing the site when the soils are wet can cause considerable disturbance. If import soil is required, a select import material consisting of a clean, free-draining gravel and/or sand should be used. Free-draining fill consists of non-organic soil with the amount of fine-grained material limited to 5 percent by weight when measured on the minus No. 4 sieve fraction and at least 30 percent retained on the No. 4 sieve. City of Seattle Mineral Aggregate

Type 17 (Seattle 2020 Standard Specifications for Municipal Construction 9-03.14) is one example of a suitable import aggregate specification.

A representative from our firm should observe the subgrades and be present during placement of structural fill to observe the work and perform a representative number of in-place density tests. In this way, the adequacy of the earthwork may be evaluated as filling progresses and any problem areas may be corrected at that time. It is important to understand that taking random compaction tests on a part-time basis will not assure uniformity or acceptable performance of a fill. As such, we are available to aid the owner in developing a suitable monitoring and testing frequency.

12.0 FOUNDATIONS

Spread footings may be used for building support when founded either directly on medium dense to dense Vashon advance outwash sediments properly prepared as described in this report, or on structural fill placed over these materials after removal of existing fill. If loose advance outwash sediments are discovered below planned foundation areas at the time of construction, we recommend that the upper 12 inches of the advance outwash be recompacted to a firm and unyielding condition prior to structural fill placement. For footings founded either directly upon recompacted advance outwash, or on structural fill placed over these sediments, we recommend that an allowable bearing pressure of 3,500 pounds per square foot (psf) be used for design purposes, including both dead and live loads. An increase in the allowable bearing pressure of one-third may be used for short-term wind or seismic loading. If structural fill is placed below footing areas, the structural fill should extend horizontally beyond the footing by at least 1 foot. Based on explorations completed for this study, advance outwash sediments suitable for foundation support were observed 1 to 8 feet below the existing ground surface.

Perimeter footings should be buried at least 18 inches into the surrounding soil for frost protection. However, all foundations must penetrate to the prescribed bearing strata, and no foundations should be constructed in or above loose, organic, or existing fill soils. Anticipated settlement of footings founded as recommended should be less than 1 inch with differential settlement one-half of the anticipated total settlement. Most of this movement should occur during initial dead load applications. However, disturbed material not removed from footing trenches prior to footing placement could result in increased settlements. All footing areas should be observed by AESI prior to placing concrete to verify that the foundation subgrades are undisturbed and construction conforms to the recommendations contained in this report. Foundation bearing verification by AESI will likely be required by the City as a condition of permitting. Perimeter footing drains should be provided as discussed under the "Drainage Considerations" section of this report.

It should be noted that the area bounded by lines extending downward at 1H:1V from any footing must not intersect another footing or intersect a filled area that has not been compacted to at least 95 percent of ASTM D-1557. In addition, a 1.5H:1V line extending down and away from any footing must not daylight because sloughing or raveling may eventually undermine the footing. Thus, footings should not be placed near the edges of steps or cuts in the bearing soils.

The contractor must use care during site preparation and excavation operations so that the underlying soils are not softened. If disturbance occurs, the softened soils should be removed and foundations extended down to competent natural soil. If foundation excavation will occur during the wet season, consideration should be given to "armoring" the exposed subgrade with a thin layer of rock to provide a working surface during foundation construction. We recommend a 6-inch layer of crushed rock for this purpose.

13.0 DRAINAGE CONSIDERATIONS

Traffic across the on-site soils when they are damp or wet will result in disturbance of the otherwise firm stratum. Therefore, during site work and construction, the contractor should provide surface drainage and subgrade protection, as necessary.

Any retaining walls and all perimeter foundation walls should be provided with a drain at the footing elevation. Drains should consist of rigid, perforated, PVC pipe surrounded by washed gravel. The level of the perforations in the pipe should be set at the bottom of the footing, and the drains should be constructed with sufficient gradient to allow gravity discharge away from the building. The perforations should be located on the lower portion of the pipe. In addition, any retaining or subgrade walls should be lined with a minimum, 12-inch-thick, washed gravel blanket, backfilled completely with free-draining material over the full height of the wall (excluding the first 1 foot below the surface). Composite drainage mats such as Mira Drain 6000 installed in accordance with manufacturer's recommendations may be used in lieu of the free-draining aggregate blanket for walls that will not be completed as habitable space on the interior. This drainage aggregate or composite should tie into and freely communicate with the footing drains. Roof and surface runoff should not discharge into the footing drain system, but should be handled by a separate, rigid, tightline drain.

To minimize erosion, stormwater discharge or concentrated runoff should not be allowed to flow down any steep slopes. In planning, exterior grades adjacent to walls should be sloped downward away from the structures at an inclination of at least 3 percent to achieve surface drainage. Runoff water from impervious surfaces should be collected by a storm drain system that discharges into the site stormwater system.

14.0 FLOOR SUPPORT

Floor slabs can be supported directly by medium dense advance outwash sediments, by new structural fill placed above medium dense advance outwash after removal of any existing fill, or by loose advance outwash that has been recompacted to a firm and unyielding condition prior to placement of new structural fill. If loose advance outwash soils are to be recompacted, we recommend that the upper 12 inches be recompacted to a firm and unyielding condition. All fill placed beneath the slab must be compacted to at least 95 percent of ASTM D-1557. The floors should be cast atop a minimum of 4 inches of washed pea gravel or washed crushed rock to act as a capillary break where moisture migration through the slabs is to be controlled. The capillary break material should be overlain by a 10-mil-thick vapor barrier material prior to concrete placement. American Concrete Institute (ACI) recommendations should be followed for all concrete placement.

15.0 FOUNDATION WALLS

The following preliminary recommendations may be applied to conventional walls up to 8 feet tall. We should be allowed to offer situation-specific input for taller walls. All backfill behind foundation walls or around foundation units should be placed as per our recommendations for structural fill and as described in this section of the report. Horizontally backfilled walls, which are free to yield laterally at least 0.1 percent of their height, may be designed to resist lateral earth pressure represented by an equivalent fluid equal to 35 pounds per cubic foot (pcf). Fully restrained, horizontally backfilled, rigid walls that cannot yield should be designed for an equivalent fluid of 50 pcf. Walls with sloping backfill up to a maximum gradient of 2H:1V should be designed using an equivalent fluid of 55 pcf for yielding conditions or 75 pcf for fully restrained conditions. If parking areas are adjacent to walls, a surcharge equivalent to 2 feet of soil should be added to the wall height in determining lateral design forces.

As required by the 2015 IBC, retaining wall design should include a seismic surcharge pressure in addition to the equivalent fluid pressures presented above. Considering the site soils and the recommended wall backfill materials, we recommend a seismic surcharge pressure of 5H and 10H psf, where H is the wall height in feet for the "active" and "at-rest" loading conditions, respectively. The seismic surcharge should be modeled as a rectangular distribution with the resultant applied at the midpoint of the walls. If the project will be permitted under the 2018 version of the IBC, we should be allowed to review seismic surcharge recommendations presented above. Seattle has adopted 2015 IBC at this time, and will update to 2018 IBC on July 1, 2020.

The lateral pressures presented above are based on the conditions of a uniform backfill consisting of excavated on-site soils, or imported structural fill compacted to 90 percent of ASTM D-1557

within about 3 feet of the wall. A higher degree of compaction is not recommended, as this will increase the pressure acting on the walls. A lower compaction may result in settlement of the slab-on-grade or other structures supported above the walls. Thus, the compaction level is critical and must be tested by our firm during placement. Surcharges from adjacent footings or heavy construction equipment must be added to the above values. Perimeter footing drains should be provided for all retaining walls, as discussed under the "Drainage Considerations" section of this report.

It is imperative that proper drainage be provided so that hydrostatic pressures do not develop against the walls. Wall drainage recommendations are presented in Section 13.0 of this report.

15.1 Passive Resistance and Friction Factors

Lateral loads can be resisted by friction between the foundation and the natural soils or supporting structural fill soils, and by passive earth pressure acting on the buried portions of the foundations. The foundations must be backfilled with structural fill and compacted to at least 95 percent of the maximum dry density to achieve the passive resistance provided below. We recommend the following allowable design parameters which include a factor of safety of 1.5:

- Passive equivalent fluid = 250 pcf
- Coefficient of friction = 0.35

16.0 SHALLOW INFILTRATION FEASIBILITY AND PRELIMINARY DESIGN INFILTRATION ESTIMATES

The City of Seattle requires a Subsurface Investigation as described in the 2017 Seattle Manual, Volume 3, Chapter 3, Step 3 to assess the feasibility of infiltration. Generally, our explorations encountered existing fill soils underlain by Vashon advance outwash. Groundwater was not encountered during any of our subsurface explorations and our explorations have demonstrated that unsaturated conditions exist in the advance outwash below the site to a depth of 64 feet below the existing ground surface at the location of EB-1W. Existing fill soils are not considered to be a suitable receptor soil for stormwater infiltration due to their high variability and high percentage of fine-grained particles. Shallow infiltration into advance outwash sediments is feasible in our opinion using conventional shallow infiltration strategies such as open-bottomed vaults, infiltration trenches, or infiltrating rain gardens. Infiltration rates available for design can be increased if desired through the use of gravel-filled "pit drains" below the infiltration facilities. Pit drains are constructed by excavating below the base of the infiltration facility and backfilling with free-draining aggregate consisting of clean coarse sand or washed pea gravel. We are available to work with the project civil engineer to develop an infiltration system design based on infiltration rate testing and soil grain-size data included in this report.

16.1 Infiltration Considerations

Design Infiltration Rate

Unfactored field infiltration rates of approximately 41 iph and 15.8 iph were measured during the constant-head infiltration test in IT-1, and IT-2, respectively. The falling-head infiltration rates were approximately 35 iph and 12.6 iph, respectively, for IT-1, and IT-2. The measured infiltration rate must be reduced by the application of a correction factor, as described in the 2017 Seattle Manual, Section D-4. The correction factor ranges from 0.2 to 0.5, and is based on consideration of site variability and number of locations tested, uncertainty of test method, and the degree of influent control to prevent siltation and bio-buildup. The correction factor is applied as follows:

Preliminary Design Infiltration Rate = Measured Infiltration Rate x Correction Factor

Infiltration design is conceptual at the time of this report, no specific facility details were available. We recommend a correction factor as specified below be applied to the field-based infiltration rates. The correction factor includes considerations for site variability (variable grain sizes within the outwash) and the test method. The civil engineer should determine whether additional reductions to the design infiltration rate are warranted due to influent control concerns and potential for long-term siltation or bio-buildup based on anticipated runoff quality, water quality treatment, and the likelihood of maintenance. The correction factors are applied as follows:

Facility at location and depth of IT-1

- Lowest Field Infiltration Rate = 35 inches per hour
- Correction Factor = 0.33
- Preliminary Design Infiltration Rate = **11.5 inches per hour**

Facility at location and depth of IT-2

- Field Infiltration Rate = 12.6 inches per hour
- Correction Factor = 0.33
- Preliminary Design Infiltration Rate = **4 inches per hour**

AESI completed the City of Seattle Pilot Infiltration Checklist for each test, which is attached to this report as Appendix B.

For the design infiltration rate to be achieved, the infiltration facility base must be excavated through any encountered existing fill and glacial till soils, if encountered, and that the base of the

infiltration facility be embedded a minimum of 2 feet into the Vashon advance outwash that is consistent with the outwash encountered during infiltration testing.

Protection of Subgrade and Infiltration Facilities During Construction

We recommend that excavation equipment should not be allowed on the infiltration facility subgrade, and care should be taken to minimize disturbance and compaction of the infiltration surface.

Once the facility is excavated and constructed, the contractor must provide temporary protection of the facility to keep turbid water and fine-grained sediments out of the facility. Uncontrolled runoff into the infiltration facility will contaminate the subgrade with fine-grained sediments, constitute failure of the subgrade, requiring removal of all backfill materials and contaminated subgrade, and replacement with clean backfill materials.

The infiltration facility must be kept isolated from influent flows until after the site has been stabilized, so that construction runoff is not introduced into any infiltration facility.

Seasonal High Ground Water Level

To date, groundwater has not been encountered to the maximum depth of our explorations at the site including monitoring well EB-1W, dry to a depth of 64 feet below ground surface.

16.2 Recommendations for Future Infiltration-Related Study

We recommend a review of infiltration design details prior to final plans and if any adjustments are needed we will recommend them at that time. Once infiltration designs are available, we recommend that we review the locations and quantity of proposed stormwater infiltration relative to the project proposal and surrounding properties. Final design of an infiltration system may warrant additional on-site testing depending on the location(s) and design of infiltration facilities, groundwater mounding, or additional studies.

17.0 PAVEMENT AND SIDEWALK RECOMMENDATIONS

The pavement sections included in this report section are for driveway and parking areas onsite, and are not applicable to right-of-way improvements. At this time, we are not aware of any planned right-of-way improvements; however, if any new paving of public streets is required, we should be allowed to offer situation-specific recommendations.

Pavement and sidewalk areas should be prepared in accordance with the "Site Preparation" section of this report. If the stripped native soil or existing fill pavement subgrade can be compacted to 95 percent of ASTM D-1557 and is firm and unyielding, no additional overexcavation is required. Soft or yielding areas should be overexcavated to provide a suitable subgrade and backfilled with structural fill. The upper 2 feet of pavement subgrade should be recompacted to 95 percent of ASTM D-1557. If required, structural fill may then be placed to achieve desired subbase grades.

New paving may include areas subject only to light traffic loads from passenger vehicles driving and parking, and may also include areas subject to heavier loading from vehicles that may include buses, fire trucks, food service trucks, and garbage trucks. In light traffic areas, we recommend a pavement section consisting of 3 inches of hot-mix asphalt (HMA) underlain by 4 inches of crushed surfacing base course, such as City of Seattle mineral aggregate Type 2, as the recommended minimum in areas of planned passenger car lanes and parking. In heavy traffic areas, a minimum pavement section consisting of 4 inches of HMA underlain by 2 inches of crushed surfacing top course, such as City of Seattle mineral aggregate Type 1, and 4 inches of crushed surfacing base course, such as City of Seattle mineral aggregate Type 2, is recommended. The crushed rock will provide improved and consistent drainage, which will extend the service life of paved areas. The crushed rock courses must be compacted to 95 percent of the maximum density, as determined by ASTM D-1557. All paving materials should meet gradation criteria contained in the current Washington State Department of Transportation (WSDOT) Standard Specifications.

Depending on construction staging and desired performance, the crushed base course material may be substituted with asphalt treated base (ATB) beneath the final asphalt surfacing if desired. The substitution of ATB should be as follows: 4 inches of crushed rock can be substituted with 3 inches of ATB, and 6 inches of crushed rock may be substituted with 4 inches of ATB. ATB should be placed over a native or structural fill subgrade compacted to a minimum of 95 percent relative density, and a 1½- to 2-inch thickness of crushed rock to act as a working surface. If ATB is used for construction access and staging areas, some rutting and disturbance of the ATB surface should be expected to result from construction traffic. The general contractor should remove affected areas and replace them with properly compacted ATB prior to final surfacing.

18.0 PROJECT DESIGN AND CONSTRUCTION MONITORING

We recommend that AESI perform a geotechnical review of the plans prior to final design completion. In this way, we can confirm that our recommendations have been correctly interpreted and implemented in the design. The City may require a plan review by the geotechnical engineer as a condition of permitting.

The City may also require geotechnical special inspections during construction and preparation of a final summary letter when construction is complete. We are available to provide geotechnical engineering services during construction. The integrity of the earthwork and foundations depends on proper site preparation and construction procedures. In addition, engineering decisions may have to be made in the field in the event that variations in subsurface conditions become apparent

We have enjoyed working with you on this study and are confident these recommendations will aid in the successful completion of your project. If you should have any questions or require further assistance, please do not hesitate to call.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

Peter E. Linton, G.I.T.
Staff Geologist

Bruce W. Guenzler, L.E.G.
Associate Geologist

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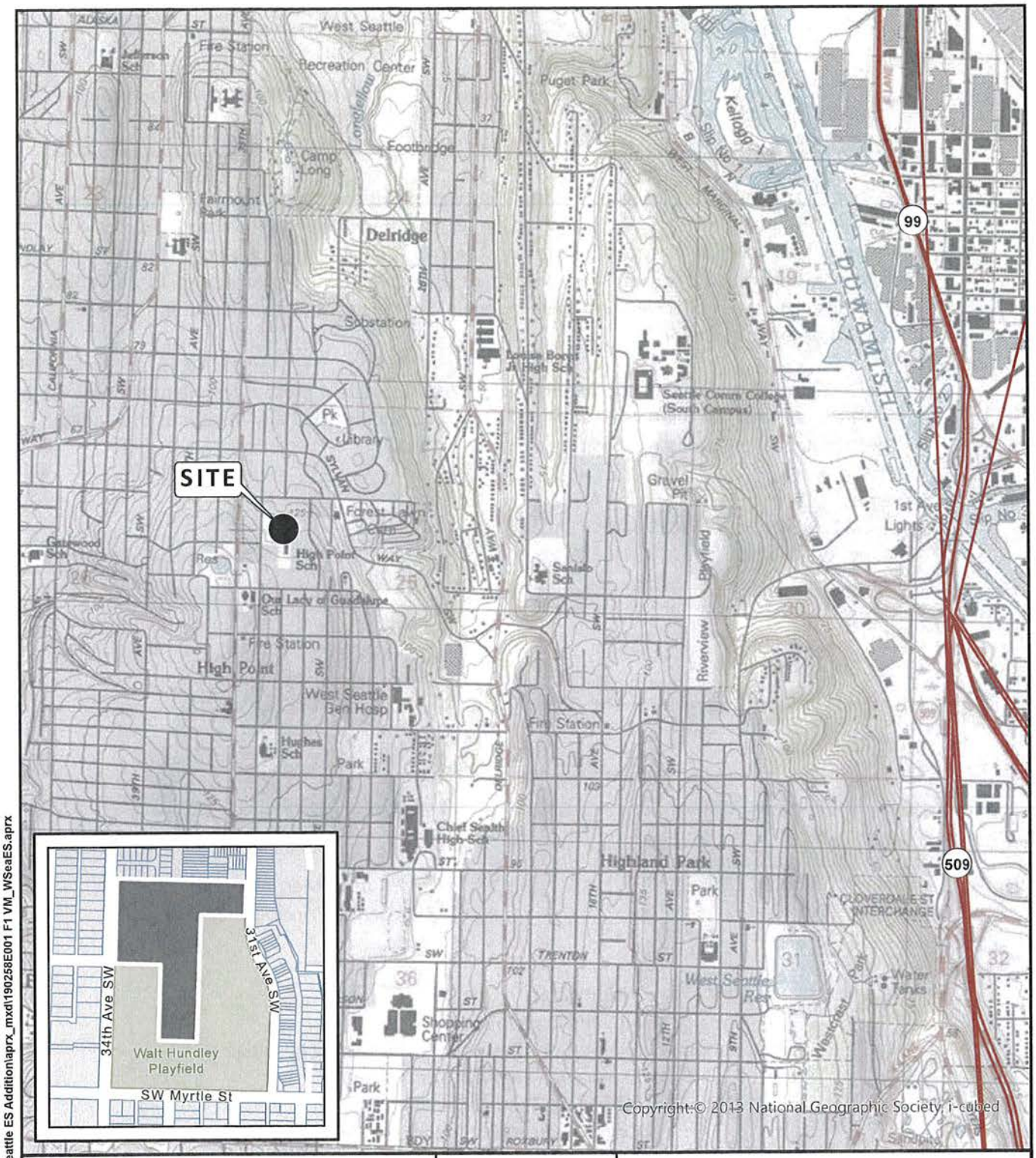
Senior Principal Engineer

Attachments:
Figure 1: Vicinity Map
Figure 2: Site and Exploration Plan
Appendix A: Exploration Logs, Laboratory Testing Results , Exploration Logs by Others (1986)
Appendix B: Infiltration Testing Results, City of Seattle Pilot Infiltration Checklist Forms



DATA SOURCES / REFERENCES:
USGS: 7.5' SERIES TOPOGRAPHIC MAPS, ESRI/I-CUBED/NGS 2013
KING CO: STREETS, CITY LIMITS 1/19, PARCELS 4/19
LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE

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NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION

associated earth sciences incorporated

VICINITY MAP

WEST SEATTLE ES ADDITION
SEATTLE, WASHINGTON

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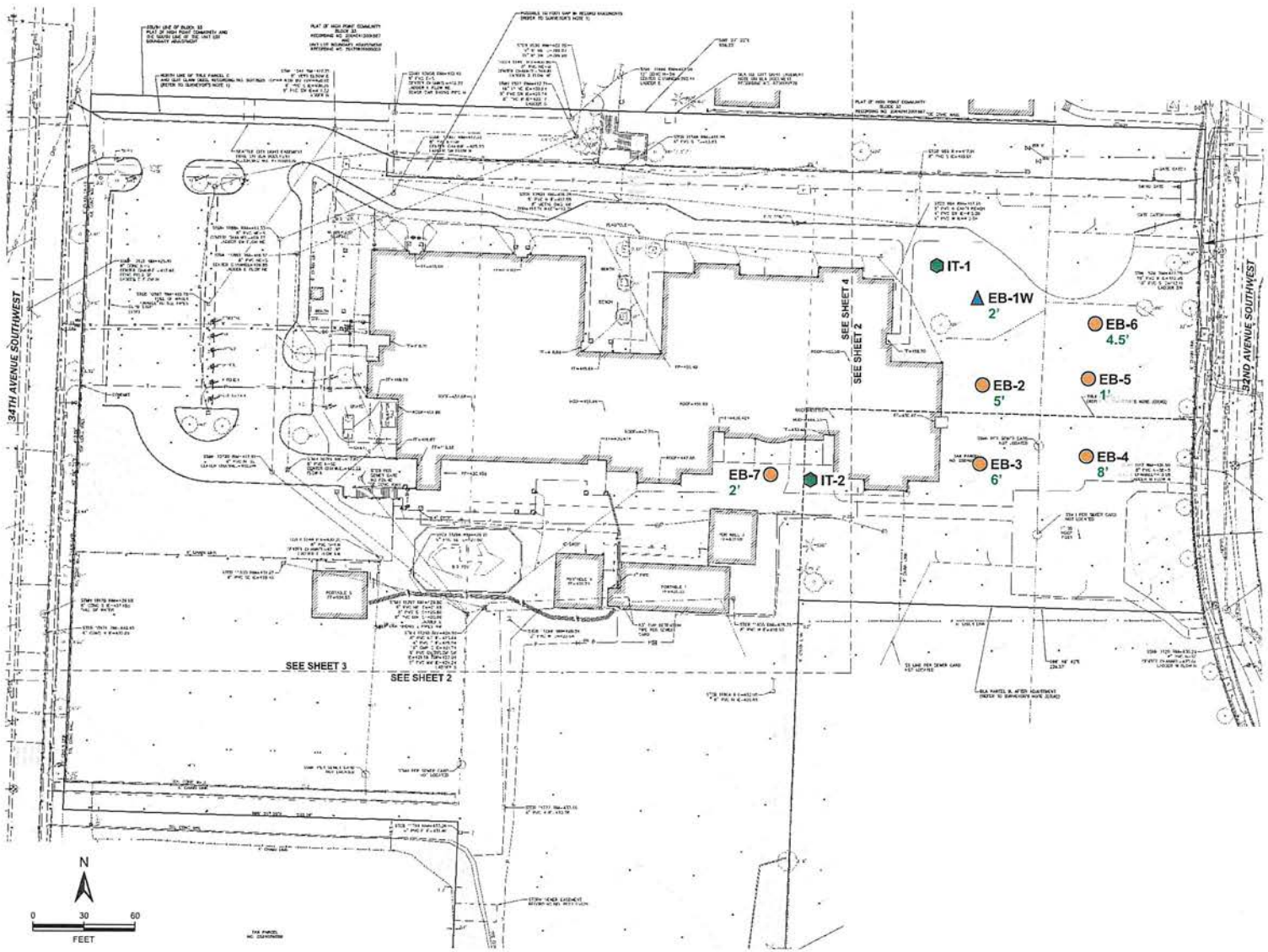
20190258E001	2/20	1

\\kirkfile2\GIS\GIS_Projects\aaY2019\190258 W Seattle ES Addition\aprx_mxd\190258E001 F1 VM_WSeaES.aprx



LEGEND:

- EB — EXPLORATION BORING
- EBW — MONITORING WELL
- X.X — DEPTH (FT) OF EXISTING FILL
- IT — INFILTRATION TEST

CONTOUR INTERVAL = 1'

NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE.

NOTES:

1. BASE MAP REFERENCE: AHBL, WEST SEATTLE ELEMENTARY SCHOOL, TOPOGRAPHIC SURVEY, SHEETS 2, 3, AND 4, 9/17/19

BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

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SITE AND EXPLORATION PLAN

WEST SEATTLE ELEMENTARY SCHOOL ADDITIONS
SEATTLE, WASHINGTON

PROJ NO.	DATE:	FIGURE:
20190258E001	3/20	2

190258 W Seattle ES \ 20190258E001 F2 S-E.cdr

APPENDIX A

Exploration Logs

Laboratory Testing Results

Exploration Logs by Others (1986)

associated earth sciences incorporated

Geologic & Monitoring Well Construction Log

Project Number	Well Number	Sheet
20190258E001	EB-1W	1 of 2

Project Name: West Seattle ES Addition
Location: Seattle, WA
Elevation (Top of Well Casing):
Surface Elevation (ft):
Water Level Elevation:
Date Start/Finish: 2/7/20,2/7/20
Drilling/Equipment: Advance Drill Technologies / D-50
Hole Diameter (in): 8
Hammer Weight/Drop: 140# / 30"

Depth (ft)	Water Level	WELL CONSTRUCTION	ST	Blows/ 6"	Graphic Symbol	DESCRIPTION
		Flush mount monument with J-Cap Concrete 0 to 4.3 feet		2 5 8		**Topsoil - 6 inches** Upper 12 inches: moist, brown, silty, fine SAND, some gravel; frequent rootlets (SM).
				7 15 32		**Fill** Lower 6 inches: moist, brown, fine to medium SAND, some gravel (angular), trace silt; unsorted (SP).
5				15 14 41		**Vashon Advance Outwash** Moist, grayish brown, sandy, GRAVEL, trace silt; gravel is lodged in sampler tip, blowcounts are overstated (GP). Gravelly drill action. Moist, brown with slight oxidation, fine to medium SAND, some gravel to gravelly, some silt; unsorted (SP).
				28 40 47		Moist, brown, very gravelly, SAND, some silt; occasional roots/fine organics; broken gravel in sample; unsorted; zone (1 inch thick) of massive, tan, silt; bouncing on rock at 7.5 feet, broke rock with spike and re-did blowcounts (SM).
10		Bentonite chips 4.3 to 51 feet		18 30 50/5"		Moist, brown, sandy GRAVEL, trace silt; broken gravel within sampler; slightly stratified; moisture increases above silty interbeds (GP).
				13 14 18		Moist, brown, gravelly, fine to medium SAND, some silt, grading to fine to medium, SAND, trace gravel, trace silt; massive; gradual transition (SW-SM).
15		2-inch I.D. Sch 40 PVC casing 0 to 54 feet		18 24 34		Moist, brown, fine to medium SAND, trace silt, trace gravel ranging to gravelly, fine to medium SAND, some silt; stratified (SP).
				15 22 30		Upper 6 inches: moist, brown, fine to medium SAND, trace to some gravel, trace silt (SP). Lower 12 inches: moist, brown, fine SAND, trace silt; slight stratification (SP).
20				11 20 31		Upper 6 inches: moist, brown, SAND, trace silt (SP). Lower 12 inches: moist, brown, fine SAND, trace silt; thin bed of trace to some silt; massive (SP).
				21 38 41		Moist, brown, fine SAND, trace silt; single piece of broken gravel at 23 feet; massive to faintly stratified (SP). Pounding on rock at 23.5 feet.
25				24 25 21		Moist, brown, SAND, trace silt; massive (SP).
30				27 32 40		Upper 6 inches: moist to very moist, slightly oxidized brown, fine to medium SAND, trace silt; massive; bed (1 inch thick) of silty, fine to medium sand, trace gravel; stratified (SP/SM). Mid 6 inches: moist, brown, fine to medium SAND, trace silt; massive (SP). Lower 6 inches: moist, grayish brown, silty, fine to medium SAND; stratified (SP).
35				25 50/6"		Moist, gray, mostly medium SAND, trace to some gravel, trace silt; slightly stratified (SM). Grinding action at 36 feet.

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: PL/CRC
Approved by: JHS

NWWELL- B 20190258E001.GPJ BORING.GDT 3/5/20

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Geologic & Monitoring Well Construction Log

Project Number	Well Number	Sheet
20190258E001	EB-1W	2 of 2

Project Name: West Seattle ES Addition
Location: Seattle, WA
Elevation (Top of Well Casing):
Surface Elevation (ft):
Water Level Elevation:
Date Start/Finish: 2/7/20,2/7/20
Drilling/Equipment: Advance Drill Technologies / D-50
Hole Diameter (in): 8
Hammer Weight/Drop: 140# / 30"

Depth (ft)	Water Level	WELL CONSTRUCTION	ST	Blows/ 6"	Graphic Symbol	DESCRIPTION
				42 50/6"		Upper 12 inches: moist, brown, fine to medium SAND, trace silt (SP). Lower 6 inches: moist, brown, fine SAND, trace to some silt, trace gravel; massive beds (SP).
45				23 50/6"		Moist, grayish brown, fine to medium SAND, trace silt becoming fine to coarse SAND, trace gravel, trace silt; increase in coarse sand towards bottom of sample (SP). Driller adds water to ease drill action of auger at 45 feet after sample pounded.
50				29 50/5"		Moist, brownish gray, fine to medium SAND, trace silt, trace gravel becoming mostly fine SAND, trace to some silt (SP). Intermittent grinding 50 to 55 feet.
		10/20 sand pack 51 to 65 feet				
55		2-inch I.D. Sch 40 PVC well screen 0.020-inch slot width 54 to 64 feet		25 35 48		Moist, brown, fine to medium SAND, trace silt, trace gravel; massive towards top of sample (SP).
60				50/6"		Moist, brown to grayish brown, fine to medium SAND, some gravel, trace silt (SP).
		Twist end cap				
65				24 46 50/4"		Moist, grayish brown, fine to fine to medium SAND, trace silt; massive (SP).
		Well tag # BKU 990				Boring terminated at 66.5 feet Well completed at 64 feet on 2/7/20. No groundwater encountered.
70						
75						

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture

Water Level ()

Water Level at time of drilling (ATD)

Logged by: PL/CRC

Approved by: JHS

NWWELL- B 20190258E001.GPJ BORING.GDT 3/5/20

associated earth sciences incorporated

Exploration Boring

Project Number	Exploration Number	Sheet
20190258E001	EB-2	1 of 1

Project Name	West Seattle ES Addition	Ground Surface Elevation (ft)	
Location	Seattle, WA	Datum	Unknown
Driller/Equipment	Advance Drill Technologies / D-50	Date Start/Finish	2/10/20,2/10/20
Hammer Weight/Drop	140# / 30"	Hole Diameter (in)	8

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Topsoil					
				Fill					
		S-1		Slightly moist, brown with areas of darker brown, fine to medium SAND, some silt, some gravel; occasional fine organics (SM).			9 10 13	▲23	
5		S-2		**Vashon Advance Outwash** Pounded 2-inch sampler, no recovery due to gravel in tip, blowcounts are overstated. Drove 3-inch sampler. Moist, brown, gravelly, fine to medium SAND, some silt, some gravel (SP).			15 16 22	▲38	
				Gravelly drilling at 9 feet.					
10		S-3		Upper 6 inches: moist, brown, fine to medium SAND, trace silt, trace gravel (SP). Lower 12 inches: moist, brown, gravelly, fine to coarse SAND, some silt; pounding on rock in last 6 inches (SP). Returned to 2-inch sampler.			19 25 39	▲64	
15		S-4		Moist becoming wet in bottom 6 inches, brown, fine to coarse SAND, some gravel, trace silt (SW).			12 28 32	▲60	
				Bottom of exploration boring at 16.5 feet No groundwater encountered.					
20									
25									
30									
35									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture

- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: PL/CRC
Approved by: JHS

AESIBOR 20190258E001.GPJ March 5, 2020

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Exploration Boring

Project Number	Exploration Number	Sheet
20190258E001	EB-3	1 of 1

Project Name	West Seattle ES Addition	Ground Surface Elevation (ft)	
Location	Seattle, WA	Datum	Unknown
Driller/Equipment	Advance Drill Technologies / D-50	Date Start/Finish	2/10/20,2/10/20
Hammer Weight/Drop	140# / 30"	Hole Diameter (in)	8

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Topsoil					
				Fill					
		S-1		Moist, brown, silty, fine to medium SAND, trace gravel, trace debris (trash) (SM).			4 6 5	▲11	
5		S-2		Moist, brown, fine to medium SAND, some silt, some gravel becoming fine SAND, trace silt in lower 6 inches (SP).			6 5 5	▲10	
				Vashon Advance Outwash					
				Bed (7 inches thick) of fine to medium sand.					
10		S-3		Moist to very moist, brown, fine to medium SAND, trace silt, trace gravel; poor recovery; resampled with 3-inch sampler (SP). Occasional beds of silty, fine sand.			12 18 18	▲36	
15		S-4		Returned to 2-inch sampler. Moist to very moist, brown, gravelly, fine to medium SAND to sandy, GRAVEL, some silt; slightly stratified; contains broken gravel towards top of sampler (SP).			14 22 33	▲55	
				Bottom of exploration boring at 16.5 feet No groundwater encountered.					
20									
25									
30									
35									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: PL/CRC
Approved by: JHS

AESIBOR 20190258E001.GPJ March 5, 2020

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Exploration Boring

Project Number	Exploration Number	Sheet
20190258E001	EB-4	1 of 1

Project Name: West Seattle ES Addition
Location: Seattle, WA
Driller/Equipment: Advance Drill Technologies / D-50
Hammer Weight/Drop: 140# / 30"

Ground Surface Elevation (ft):
Datum: Unknown
Date Start/Finish: 2/10/20,2/10/20
Hole Diameter (in): 8

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Topsoil					
				Fill					
		S-1		Moist, brown, silty, SAND, some gravel; occasional organics (SM).			2 5 4	▲9	
5		S-2		Moist, brown to slightly reddish brown, fine to medium SAND, trace gravel, trace silt; massive (SP).			3 4 3	▲7	
				Gravelly drilling at 8 feet.					
				Vashon Advance Outwash					
10		S-3		Moist, brown, fine to medium SAND, some gravel, trace silt; fractured gravel (SP).			5 17 20	▲37	
15		S-4		Moist, brown, fine to coarse SAND, some gravel, trace silt becoming silty, fine to medium SAND in bottom 6 inches; stratified (SW).			21 23 33	▲56	
				Bottom of exploration boring at 16.5 feet No groundwater encountered.					
20									
25									
30									
35									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: PL/CRC
Approved by: JHS

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Exploration Boring

Project Number	Exploration Number	Sheet
20190258E001	EB-5	1 of 1

Project Name: West Seattle ES Addition
Location: Seattle, WA
Driller/Equipment: Advance Drill Technologies / D-50
Hammer Weight/Drop: 140# / 30"

Ground Surface Elevation (ft): ____
Datum: Unknown
Date Start/Finish: 2/10/20,2/10/20
Hole Diameter (in): 8

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Topsoil					
				Fill					
				Vashon Advance Outwash					
		S-1		Moist, brown, fine to medium SAND, some gravel, trace silt (SP).			6 16 18	▲34	
5		S-2		Moist, brown, fine to medium SAND, some gravel, trace silt; stratified to massive; fractured gravel near top of sample (SP).			14 13 13	▲26	
10		S-3		No recovery with 2-inch sampler due to gravel in tip, switched to 3-inch sampler. Moist, brown, gravelly, SAND, some silt; pounded on rock, blowcounts are overstated (SP).			37 38 37	▲75	
15		S-4		Switched back to 2-inch sampler. Moist, brown, medium to coarse sandy, GRAVEL, some silt; fractured gravel (GP).			12 21 32	▲53	
				Bottom of exploration boring at 16.5 feet No groundwater encountered.					
20									
25									
30									
35									

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
Water Level ()
Water Level at time of drilling (ATD)

Logged by: PL/CRC
Approved by: JHS

AESIBOR 20190258E001.GPJ March 5, 2020

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Exploration Boring

Project Number	Exploration Number	Sheet
20190258E001	EB-6	1 of 1

Project Name: West Seattle ES Addition
Location: Seattle, WA
Driller/Equipment: Advance Drill Technologies / D-50
Hammer Weight/Drop: 140# / 30"

Ground Surface Elevation (ft):
Datum: Unknown
Date Start/Finish: 2/10/20,2/10/20
Hole Diameter (in): 8

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Topsoil					
				Fill					
		S-1		Moist, brown, fine to medium SAND, trace gravel, trace silt; massive (SP).			6 7 13	▲20	
5		S-2		**Vashon Advance Outwash** Moist, brown, fine to medium SAND, trace silt; bedded with fine to coarse sand, some gravel, and trace silt; some gravel is fractured (SP).			12 15 20	▲35	
				Gravelly drilling at 8 feet.					
10		S-3		Moist, brown, fine to medium SAND, trace silt, trace gravel; beds of coarse sand; beds of silty, fine sand (SP).			12 15 17	▲32	
				Rocky drilling at 13 feet.					
15		S-4		Very moist, brown, fine to coarse SAND, some gravel, trace silt (SP).			11 11 13	▲24	
				Bottom of exploration boring at 16.5 feet No groundwater encountered.					
20									
25									
30									
35									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: PL/CRC
Approved by: JHS

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Exploration Boring

Project Number	Exploration Number	Sheet
20190258E001	EB-7	1 of 1

Project Name	West Seattle ES Addition	Ground Surface Elevation (ft)	
Location	Seattle, WA	Datum	Unknown
Driller/Equipment	Advance Drill Technologies / D-50	Date Start/Finish	2/10/20,2/10/20
Hammer Weight/Drop	140# / 30"	Hole Diameter (in)	8

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Asphalt - 4 inches					
				Fill Moist, brown, silty, fine SAND, some gravel to gravelly; unsorted (SM).					
				Vashon Advance Outwash					
5		S-1		Moist, brown, fine to medium SAND, trace to some silt, trace gravel; contains fractured gravel (SP).			11 13 12	▲25	
10		S-2		Moist, brown, gravelly, fine to medium SAND, some silt; contains beds of silty, fine sand; fractured gravel near tip; stratified (SW-SM).			12 21 23	▲44	
		S-3		Moist, brown, fine to medium SAND, trace silt, trace gravel becoming mostly medium SAND, some gravel, trace silt; fractured gravel near tip (SP).			16 24 33	▲57	
15		S-4		Moist, brown, very gravelly, fine to coarse SAND, some silt; contains fractured gravel (SP).			2 33 37	▲70	
		S-5		Moist, brown, gravelly, fine to coarse SAND, trace silt; fractured gravel near tip (SP). Gravelly drilling at 18 feet.			28 35 40	▲75	
20		S-6		Moist, brown, gravelly, fine to coarse SAND, trace silt; contains fractured gravel (SP).			30 39 41	▲80	
25		S-7		Moist, brown, fine SAND, some silt (at tip of sample), trace gravel; massive (SP).			20 26 31	▲57	
30		S-8		Moist, brown, fine, SAND, trace silt, trace gravel; massive (SP).			18 25 39	▲64	
35		S-9		Moist, brown, fine SAND, trace silt, trace gravel; massive (SP).			20 25 30	▲55	
				Bottom of exploration boring at 36.5 feet No groundwater encountered.					

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: PL/CRC
Approved by: JHS

AESIBOR 20190258E001.GPJ March 5, 2020

EXPLORATION PIT NO. IT-1

Depth (ft)

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

DESCRIPTION

Elev: ~420 ft

Topsoil

Loose, moist, dark brown, silty, fine SAND; organic rich; abundant fine roots (SM).

1

Fill

Vashon Lodgement Till

2 Dense, slightly moist, brownish gray with occasional mottling, silty, fine SAND, some gravel; unsorted; diamict (SM).

Vashon Advance Outwash

3 Dense, slightly moist, brown, fine SAND, some silt to gravelly, fine to medium SAND, trace silt; stratified (SP-SM/SP).

4

5 Dense, very moist, brown, sandy, GRAVEL, trace silt (GP).

Dense, very moist, brown, fine to medium SAND, trace silt, trace gravel (SP).

6 Dense, very moist, brown, fine to medium, SAND, trace gravel, trace silt to sandy, GRAVEL, trace silt; occasional cobbles; stratified; stratified beds (GP).

7

8

9

10

11

12

Bottom of exploration pit at depth 12 feet
No seepage. No caving. Infiltration test performed at 5 feet. Moisture below 5 feet likely increased by water from infiltration testing.

13

14

15

KCTP3 20190258E001.GPJ March 10, 2020

West Seattle ES Addition
Seattle, WA

Logged by: PL
Approved by: JHS

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Project No. 20190258E001

2/19/20

EXPLORATION PIT NO. IT-2

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

Depth (ft)	DESCRIPTION	Elev: ~430.5 ft
	Asphalt - 2.5 inches	
	Crushed Recycled Cement - ~8 inches	
1	**Fill**	
	Medium dense, slightly moist to moist, brown, silty, fine SAND, some gravel to gravelly (SM).	
2	**Vashon Advance Outwash**	
	Dense, slightly moist to moist, brown, fine SAND, some gravel, trace to some silt; faint stratification; occasional lightly oxidized horizontal bedding (1 inch thick) (SP-SM/SP).	
3		
4		
5	Very moist below 5 feet.	
	Sand ranges to fine to medium in stratified beds (SP).	
6	Gravel ranges to gravelly (SP).	
7		
8		
	Occasional cobbles observed.	
9		
10		
11	Ranges to wet.	
12		
13		
14	Bottom of exploration pit at depth 13.5 feet Minor seepage from SE corner at 11 feet. No caving. Infiltration test performed at 5 feet. Moisture below 5 feet likely increased by water from infiltration testing.	
15		

West Seattle ES Addition
Seattle, WA

Logged by: PL
Approved by: JHS

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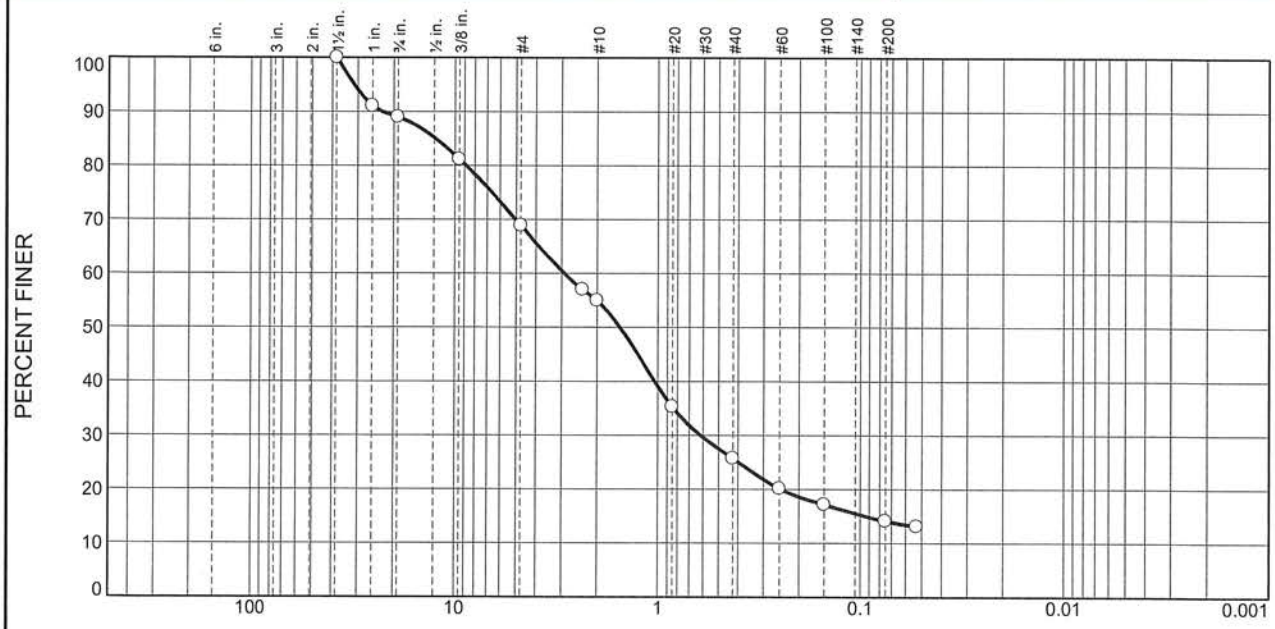
Project No. 20190258E001

2/19/20

KCTP3 20190258E001.GPJ March 10, 2020

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.0	20.1	14.0	29.2	11.6	14.1	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	91.0		
3/4"	89.0		
3/8"	81.1		
#4	68.9		
#8	57.0		
#10	54.9		
#20	35.3		
#40	25.7		
#60	20.1		
#100	17.2		
#200	14.1		
#270	13.1		

* (no specification provided)

Material Description

Very gravelly silty SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

D_{90}= 22.8651 D_{85}= 12.5238 D_{60}= 2.9168
D_{50}= 1.5471 D_{30}= 0.6165 D_{15}= 0.0944
D_{10}= C_u= C_c=

Remarks

Date Received: 2/11/20 **Date Tested:** 2/13/20

Tested By: MS

Checked By: BG

Title:

Location: Onsite
Sample Number: EB-1W **Depth:** 7.5' **Date Sampled:** 2/7/20

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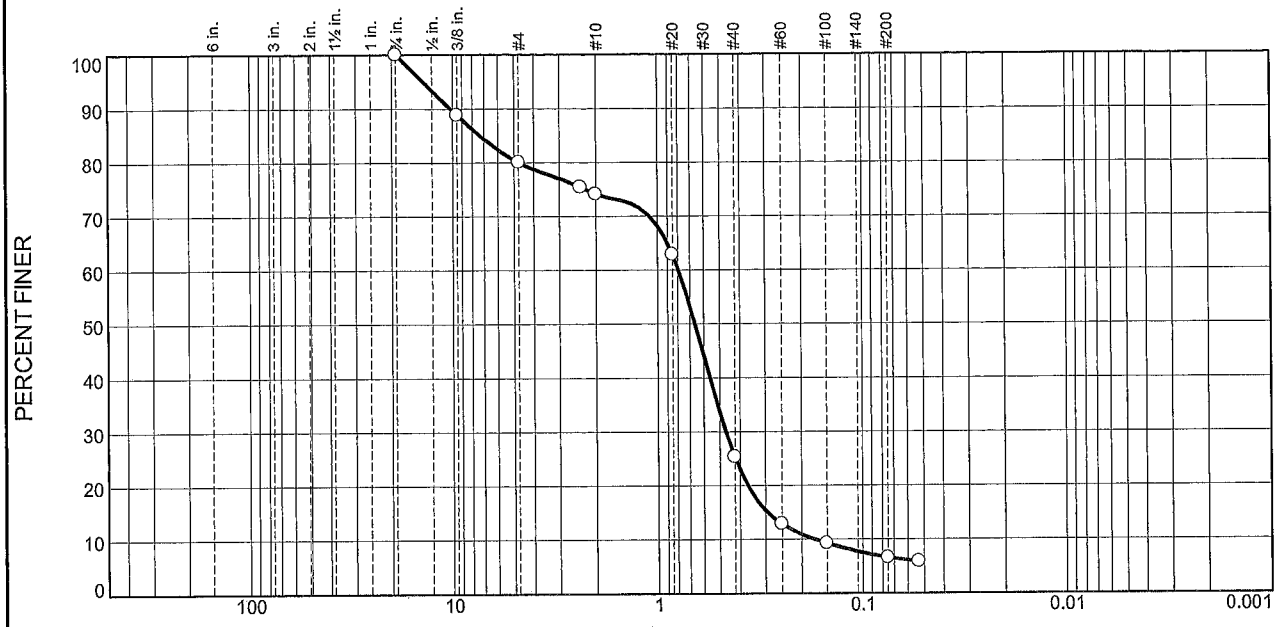
Client: Seattle Public Schools
Project: West Seattle Elementary School Addition

Project No: 20190258 E001 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	20.0	5.9	48.7	18.8	6.6	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
3/8"	88.8		
#4	80.0		
#8	75.4		
#10	74.1		
#20	62.9		
#40	25.4		
#60	12.9		
#100	9.3		
#200	6.6		
#270	5.9		

* (no specification provided)

Material Description

Gravelly SAND some silt

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D_{90}= 10.2698 D_{85}= 7.3318 D_{60}= 0.7962
D_{50}= 0.6606 D_{30}= 0.4684 D_{15}= 0.2939
D_{10}= 0.1732 C_u= 4.60 C_c= 1.59

Remarks

Date Received: 2/11/20 **Date Tested:** 2/13/20

Tested By: MS

Checked By: BG

Title:

Location: Onsite **Date Sampled:** 2/7/20

Sample Number: EB-1W **Depth:** 12.5'

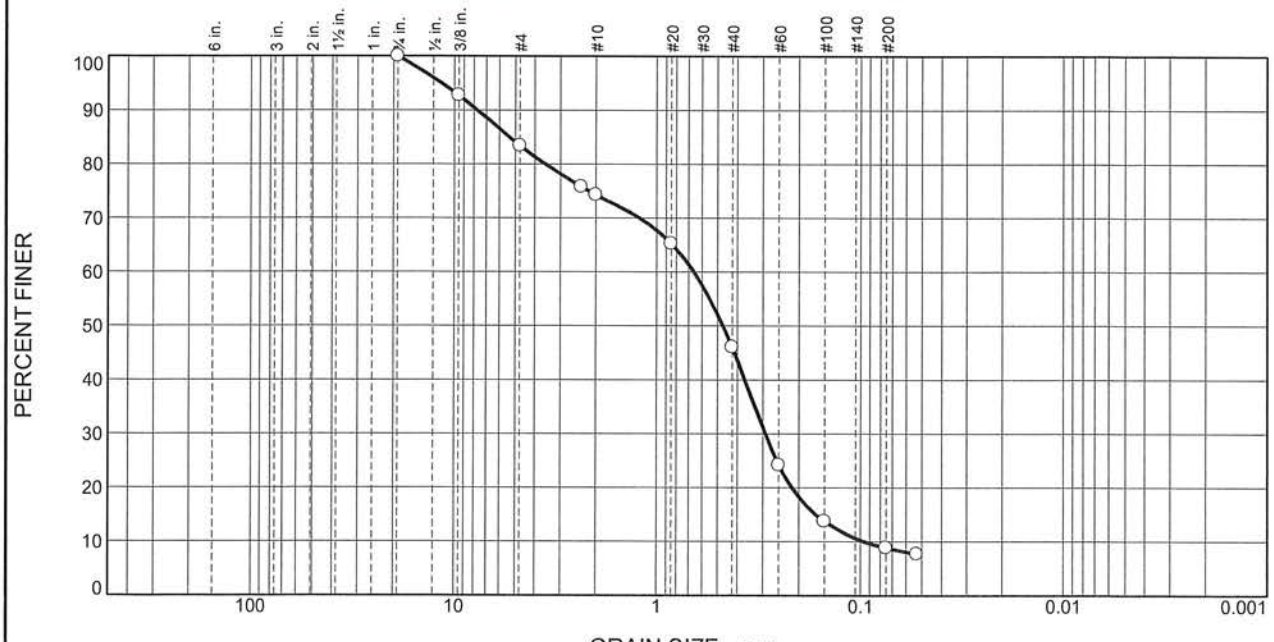
associated earth sciences incorporated

Client: Seattle Public Schools

Project: West Seattle Elementary School Addition

Project No: 20190258 E001 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	16.6	9.1	28.3	37.2	8.8	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
3/8"	92.7		
#4	83.4		
#8	75.8		
#10	74.3		
#20	65.2		
#40	46.0		
#60	24.2		
#100	13.8		
#200	8.8		
#270	7.7		

* (no specification provided)

Material Description

Gravelly SAND some silt

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SW-SM AASHTO (M 145)= A-1-b

Coefficients

D_{90}= 7.7548 D_{85}= 5.3787 D_{60}= 0.6595
D_{50}= 0.4719 D_{30}= 0.2921 D_{15}= 0.1651
D_{10}= 0.0961 C_u= 6.86 C_c= 1.35

Remarks

Date Received: 2/11/20 **Date Tested:** 2/13/20

Tested By: MS

Checked By: BG

Title:

Location: Onsite
Sample Number: EB-7 **Depth:** 10'

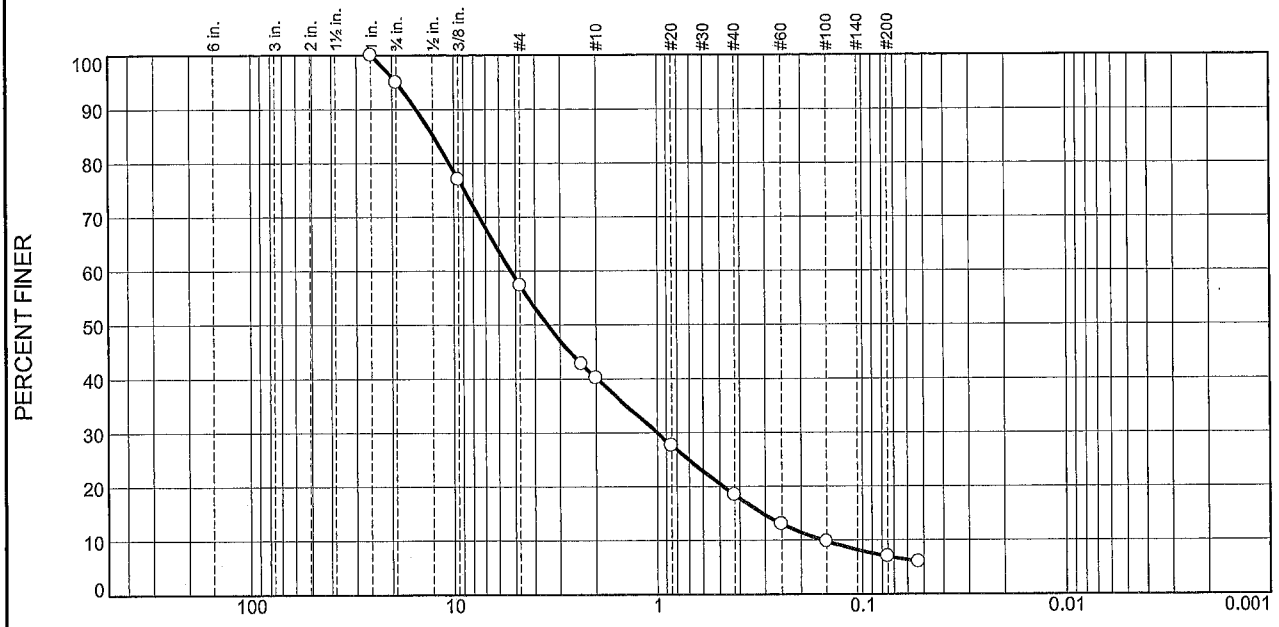
Date Sampled: 2/10/20

associated earth sciences incorporated

Client: Seattle Public Schools
Project: West Seattle Elementary School Addition

Project No: 20190258 E001 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.0	37.7	17.1	21.7	11.5	7.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	95.0		
3/8"	77.0		
#4	57.3		
#8	42.7		
#10	40.2		
#20	27.6		
#40	18.5		
#60	13.0		
#100	9.8		
#200	7.0		
#270	6.0		

* (no specification provided)

Material Description

Very gravelly SAND some silt

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SW-SM AASHTO (M 145)= A-1-a

Coefficients

D_{90}= 15.2536 D_{85}= 12.5883 D_{60}= 5.2653
D_{50}= 3.4771 D_{30}= 1.0052 D_{15}= 0.3101
D_{10}= 0.1571 C_u= 33.51 C_c= 1.22

Remarks

Date Received: 2/11/20 **Date Tested:** 2/13/20

Tested By: MS

Checked By: BG

Title:

Location: Onsite **Date Sampled:** 2/10/20

Sample Number: EB-7 **Depth:** 15'

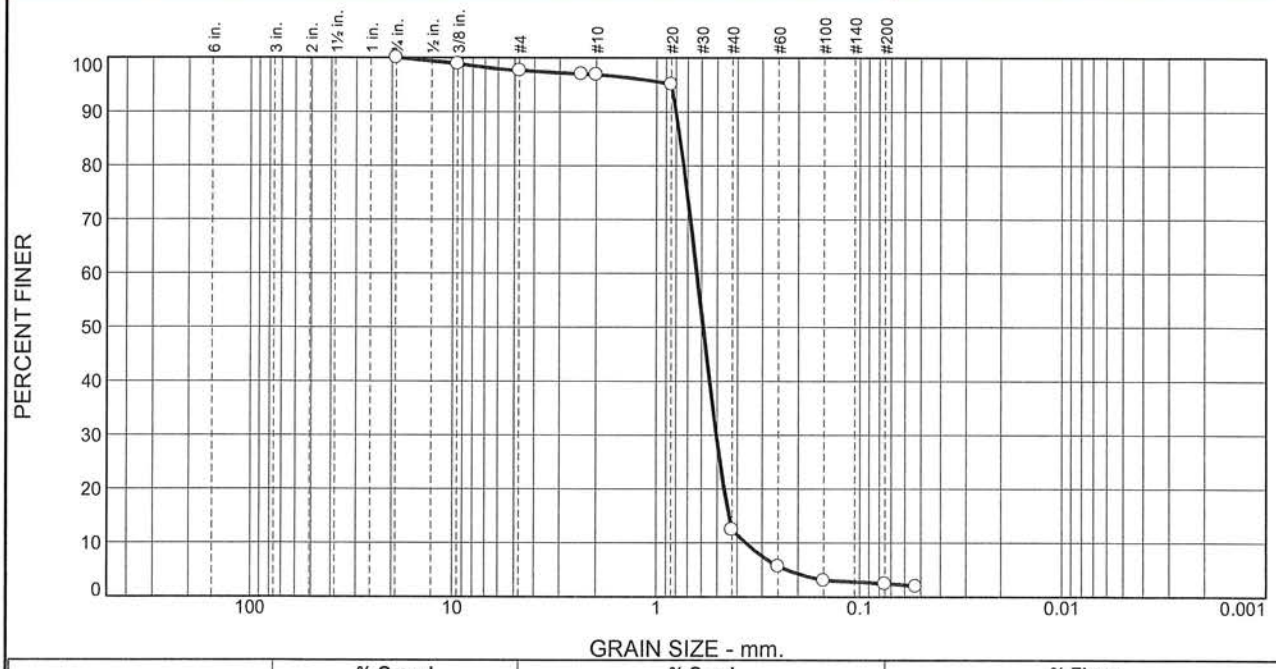
associated earth sciences incorporated

Client: Seattle Public Schools

Project: West Seattle Elementary School Addition

Project No: 20190258 E001 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.3	0.8	84.5	10.0	2.4	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
3/8"	98.9		
#4	97.7		
#8	97.0		
#10	96.9		
#20	95.1		
#40	12.4		
#60	5.6		
#100	3.0		
#200	2.4		
#270	1.9		

* (no specification provided)

Material Description

SAND Trace Gravel Trace Silt

Atterberg Limits (ASTM D 4318)

PL= np LL= nv PI=

Classification

USCS (D 2487)= SP AASHTO (M 145)= A-1-b

Coefficients

D_{90}= 0.8036 D_{85}= 0.7666 D_{60}= 0.6319
D_{50}= 0.5884 D_{30}= 0.5064 D_{15}= 0.4391
D_{10}= 0.3637 C_u= 1.74 C_c= 1.12

Remarks

Date Received: 2-20-20 **Date Tested:** 2-20-20

Tested By: MS

Checked By: BG

Title:

Location: Onsite
Sample Number: IT-1 **Depth:** 5.5'

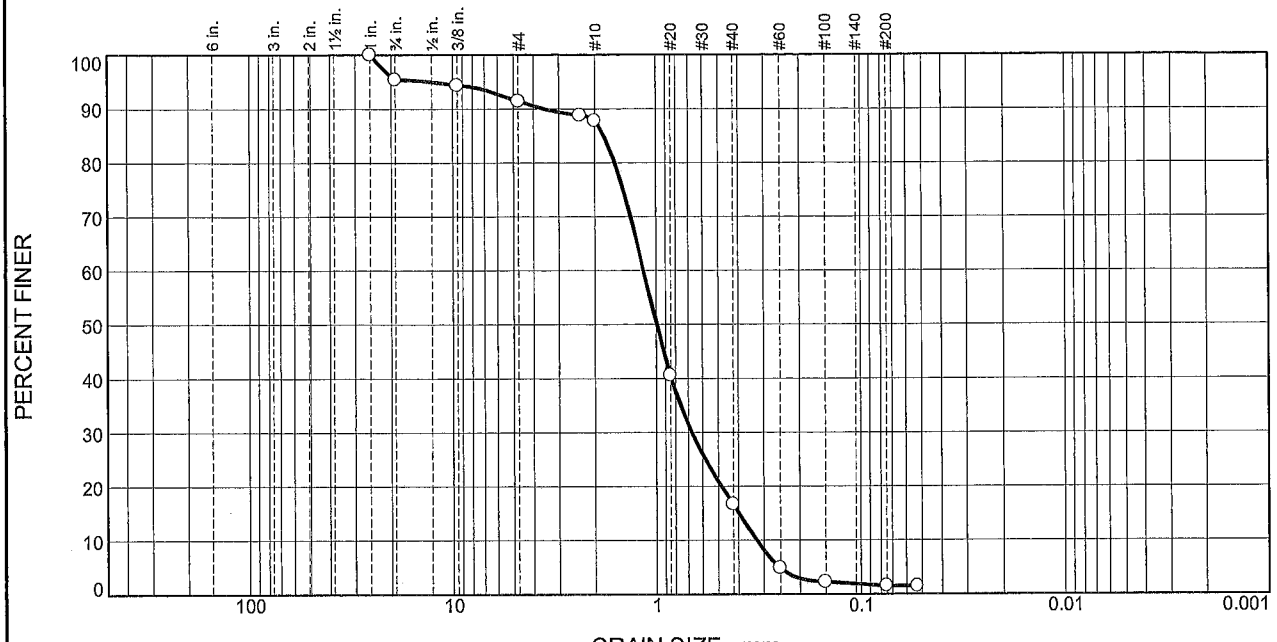
Date Sampled: 2-18-20

associated earth sciences incorporated

Client: Seattle Public Schools
Project: West Seattle Elementary School Addition

Project No: 20190258 E001 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.6	4.0	3.6	71.1	15.2	1.5	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	95.4		
3/8"	94.3		
#4	91.4		
#8	88.8		
#10	87.8		
#20	40.6		
#40	16.7		
#60	4.8		
#100	2.3		
#200	1.5		
#270	1.4		

* (no specification provided)

Material Description

SAND Some Gravel Trace Silt

Atterberg Limits (ASTM D 4318)

PL= np LL= nv PI=

Classification

USCS (D 2487)= SP AASHTO (M 145)= A-1-b

Coefficients

D_{90}= 3.5599 D_{85}= 1.7941 D_{60}= 1.1518
D_{50}= 0.9929 D_{30}= 0.6738 D_{15}= 0.3981
D_{10}= 0.3265 C_u= 3.53 C_c= 1.21

Remarks

Date Received: 2-20-20 **Date Tested:** 2-20-20

Tested By: MS

Checked By: BG

Title:

Location: Onsite **Date Sampled:** 2-18-20

Sample Number: IT-2 **Depth:** 5'

associated earth sciences incorporated

Client: Seattle Public Schools

Project: West Seattle Elementary School Addition

Project No: 20190258 E001 **Figure**

- ☐ City box number 33rd - 38th Ave
- ☐ Title/cover page w/the following info:
  - ☑ Company (author) name
  - ☑ Report Date
  - ☑ Project name
  - ☐ Company's job number
  - ☑ City DCLU project number (7-digit number)
  - ☑ City Permit number (6-digit number)
  - ☑ Kroll map index number (3-digit number, w?/E,W,N,S)
  - ☐ Green label
  - ☑ Site address (may be on 1st or 2nd page of text)
- ☐ Executive Summary and associated figures
- ☑ Table of Contents
- ☑ Project Location Plan/Map or Vicinity Map
- ☑ Site Plans, Boring Location Plans, or Exploration Plans
- ☐ Survey
- ☐ Geologic Maps
- ☐ Cross Sections/Subsurface Profiles
- ☑ Fill or Peat Thickness Maps and Contour Maps
- ☑ Boring Logs
- ☐ Geology Text (if no logs)
- ☐ Soil Classification Key/Boring Log Key
- ☐ Probe Logs
- ☐ Test Pit Logs
- ☐ Monitoring Well Logs
- ☐ Cone Penetrometer Logs
- ☐ Shear Wave Velocity Measurements
- ☐ Groundwater Maps
- ☐ GW Elevation Tables/Data
- ☐ Soils Lab Testing (Geotechnical) Summary Tables
  - ☑ Grain Size Analyses/Hydrometer Analyses
  - ☐ Atterberg Limits
  - ☐ Strength tests: Triaxial, Unconfined, Direct Shear
  - ☐ Organic Content
  - ☐ ^{14}C or Radiocarbon Testing
  - ☐ Other_____
- ☐ Soil Chemical Analytical Testing Summary Tables
- ☐ Water/Groundwater Chemical Analytical Summary Tables
- ☐ Comments_____

_____

- ☐ Date Copied 7-26-99 By AB

2/9/99

SITE STUDIES #8701277

REPORT ON GEOTECHNICAL EXPLORATION

Proposed High Point Elementary School

34th Avenue Southwest and Southwest Holly Street
Seattle, Washington

632116
69W

Prepared for:

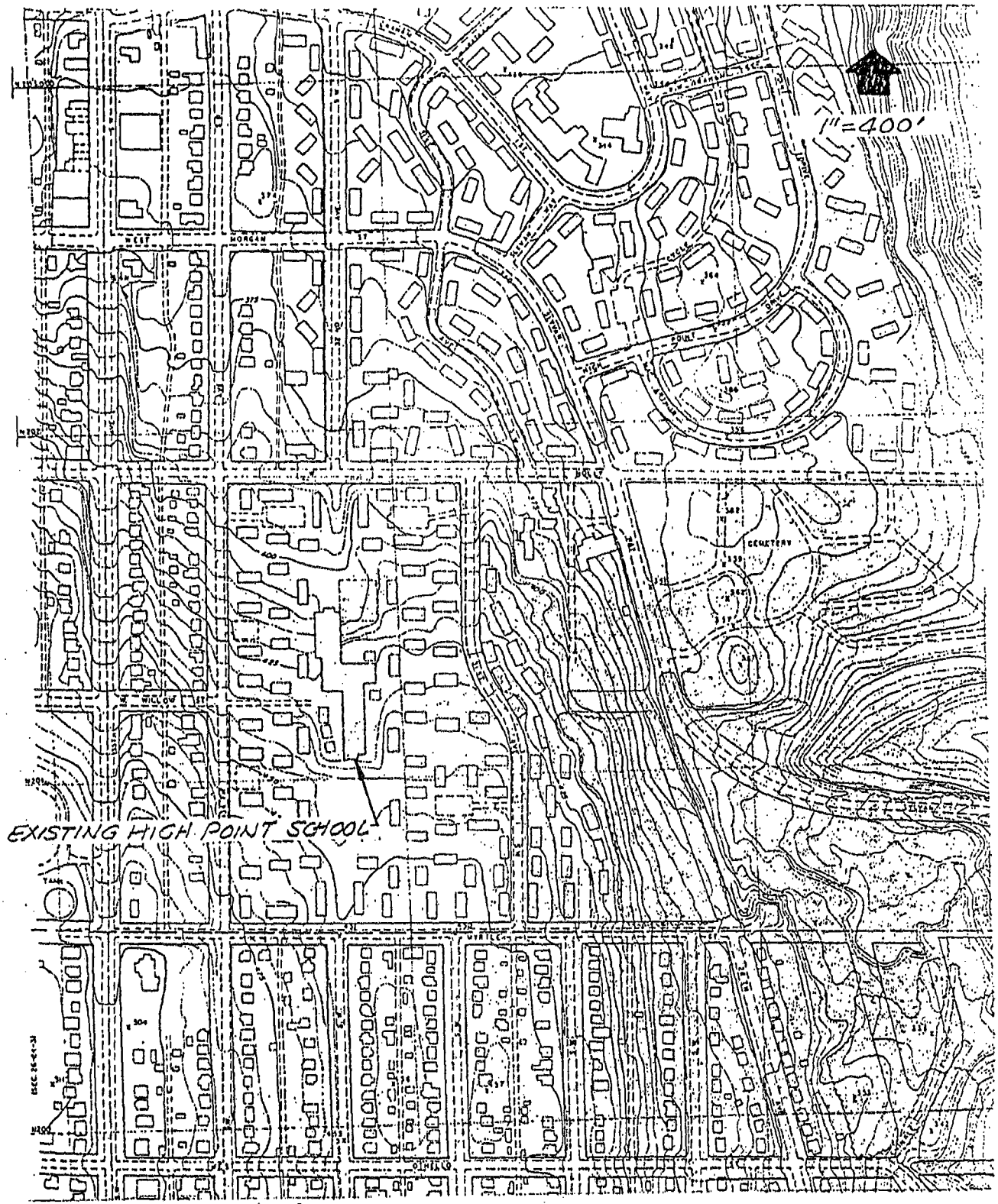
Seattle Public Schools

November 13, 1986

6760 34TH AV SW

TCW consulting engineers

TABLE OF CONTENTS

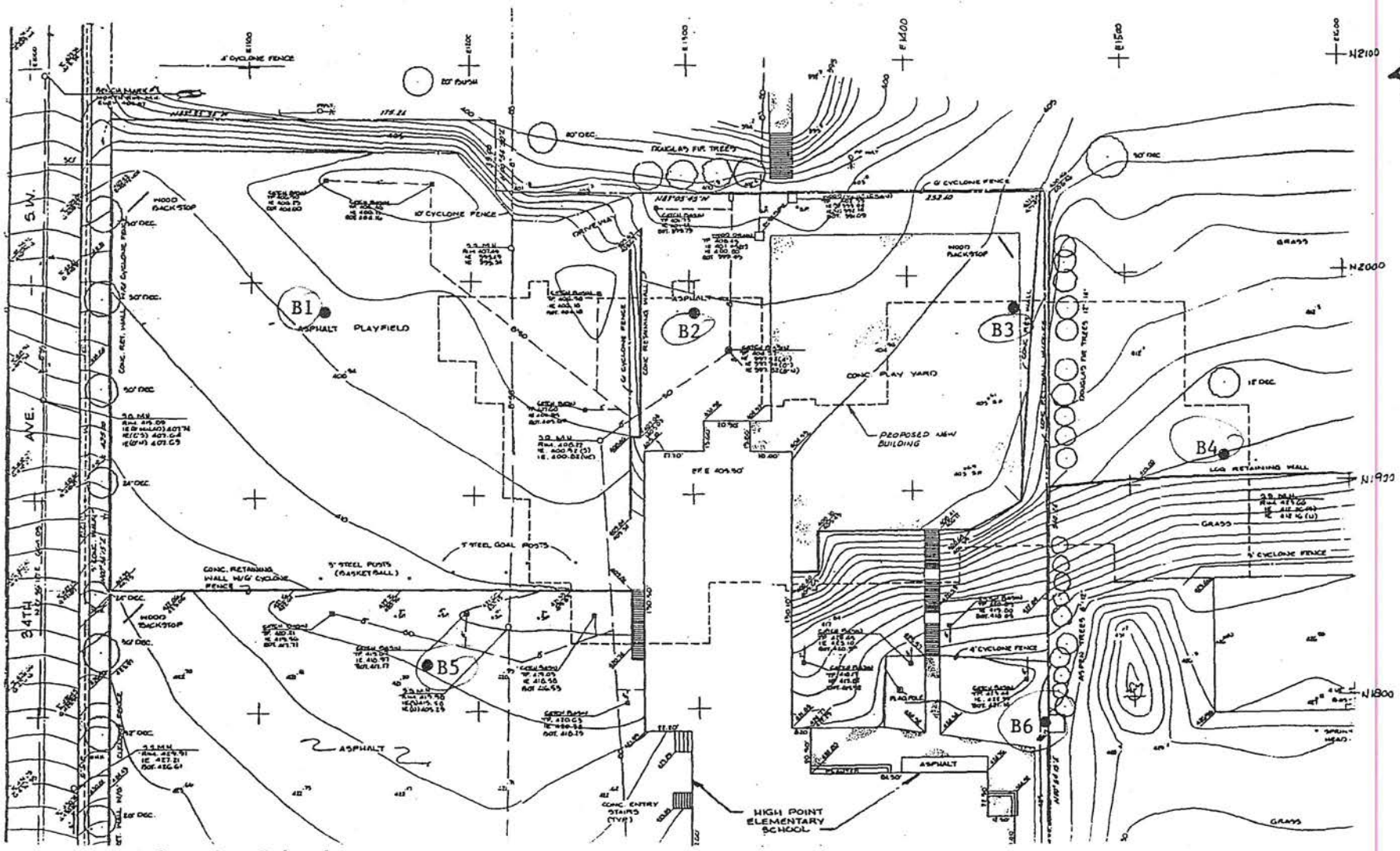


High Point School

VICINITY MAP

(1958 topographic map, City of Seattle Datum)

PLATE 1

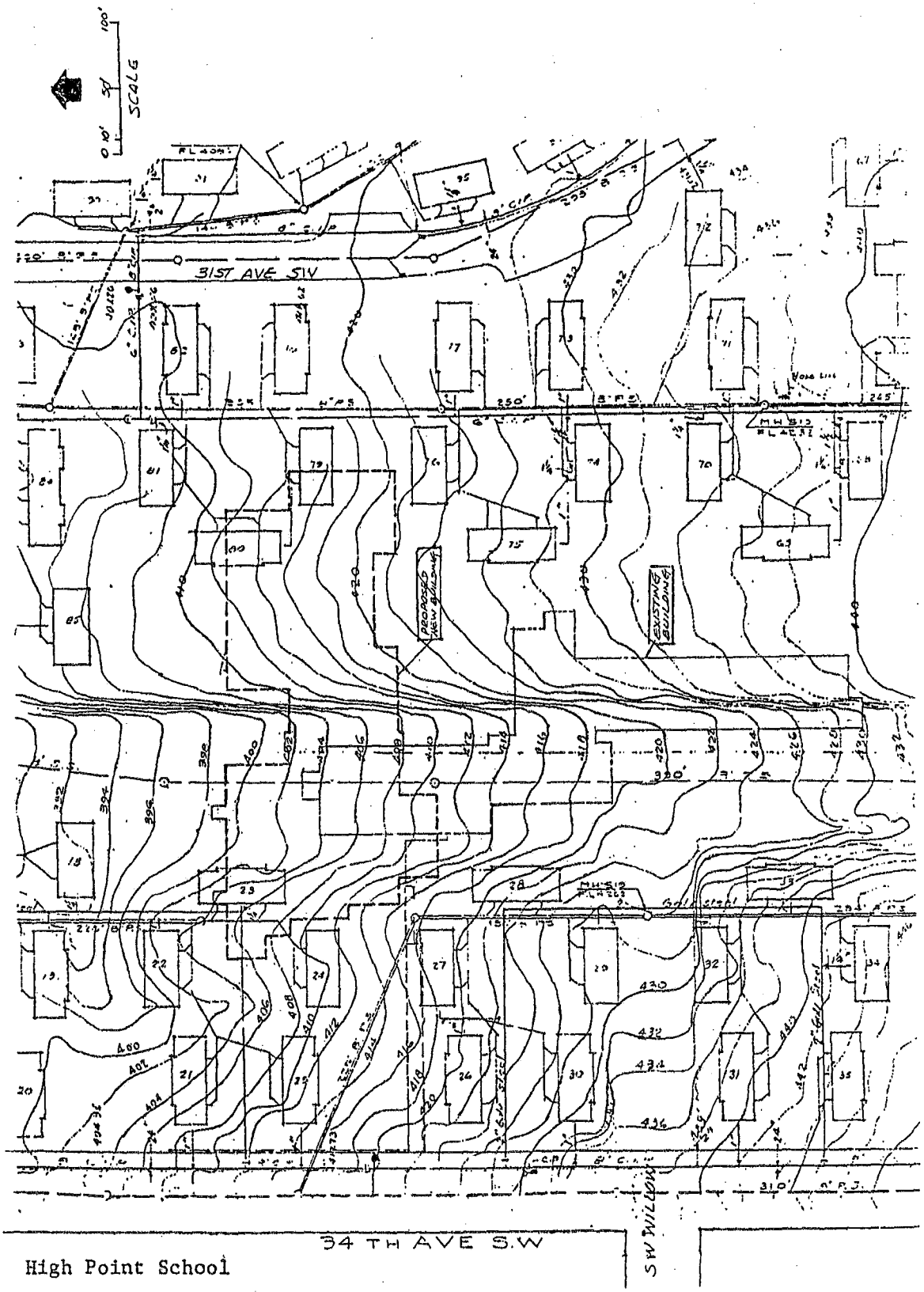


High Point School

SITE PLAN

August 5, 1986 Survey Map

PLATE 2



SITE TOPOGRAPHY, 1942

(From Jan. 6, 1942 Utilities Map of Defense Housing Project)

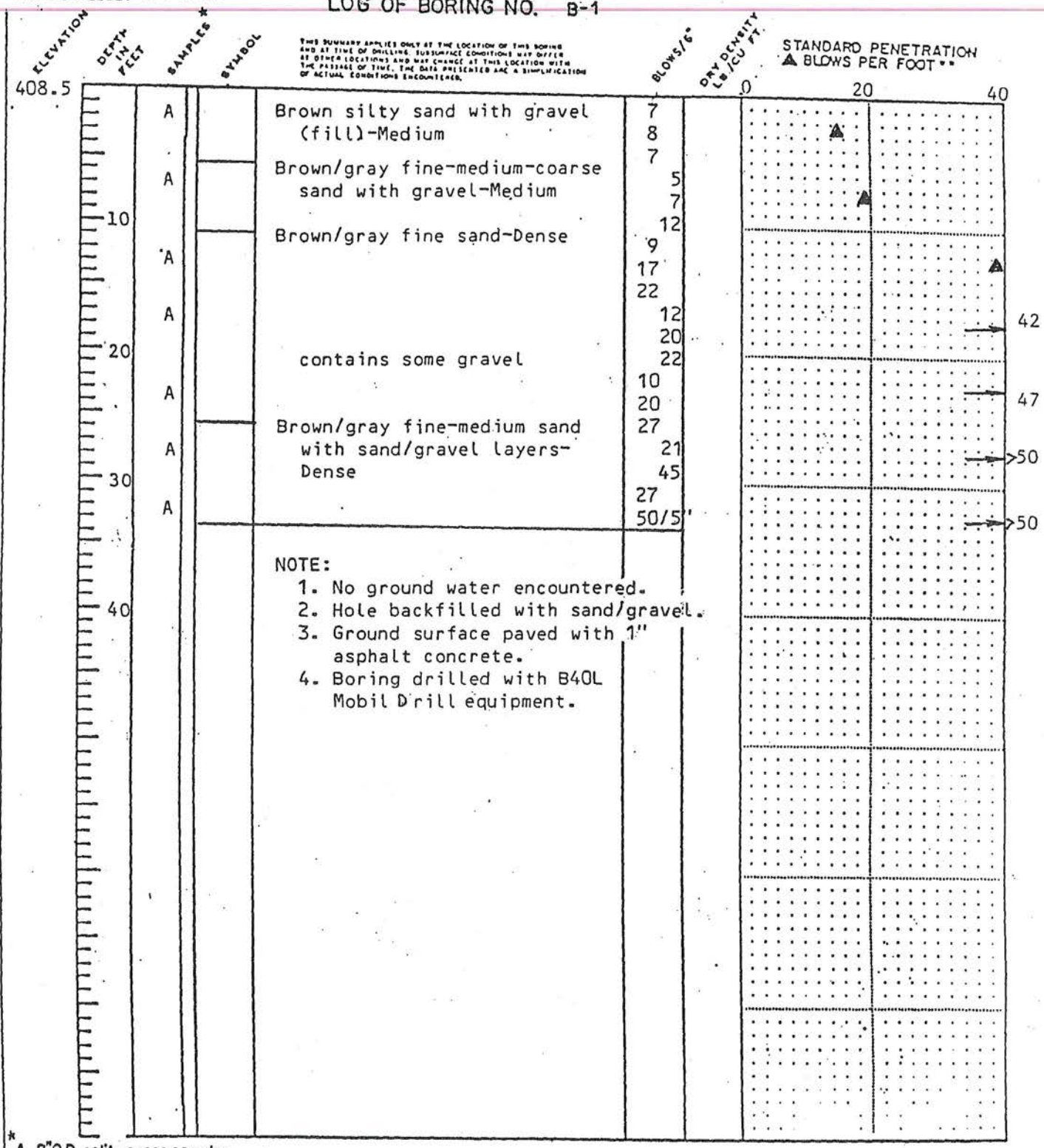
PLATE 3

TCW ASSOCIATES, INC

DATE DRILLED. 3/11/86

LOG OF BORING NO. B-1

HIGH POINT SCHOOL



NOTE:

1. No ground water encountered.
2. Hole backfilled with sand/gravel.
3. Ground surface paved with 1" asphalt concrete.
4. Boring drilled with B40L Mobil Drill equipment.

* A. 2"O.D. split-spoon sampler
B. 3"O.D. thin-wall sampler
C. 3-1/4" O.D. x 2-1/2" liner
D. 3-1/2" O.D. split barrel sampler
X. sample not recovered

** Standard Penetration Resistance except for 2" O.D. split-spoon samples estimated using non-standard procedures.

▽ water level
impervious seal
piezometer tip

WATER CONTENT - % dry weight
plastic limit — liquid limit
natural water content

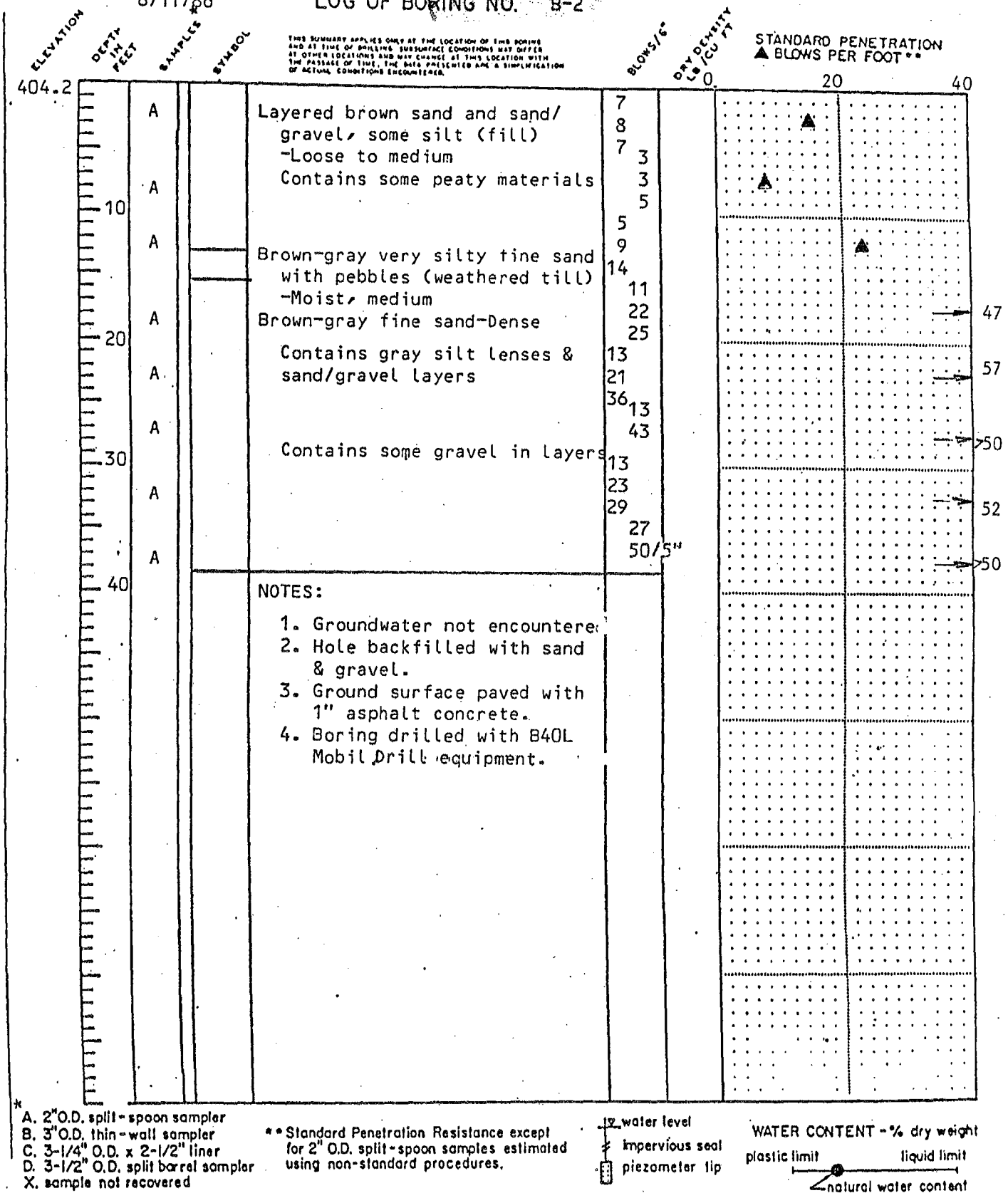
PLATE 4

TCW ASSOCIATES, INC

DATE DRILLED 8/11/86

LOG OF BORING NO. B-2

HIGH POINT SCHOOL



* A. 2"O.D. split-spoon sampler
B. 3"O.D. thin-wall sampler
C. 3-1/4" O.D. x 2-1/2" liner
D. 3-1/2" O.D. split barrel sampler
X. sample not recovered

** Standard Penetration Resistance except for 2" O.D. split-spoon samples estimated using non-standard procedures.

▽ water level
impervious seal
piezometer tip

WATER CONTENT - % dry weight
plastic limit — liquid limit
natural water content

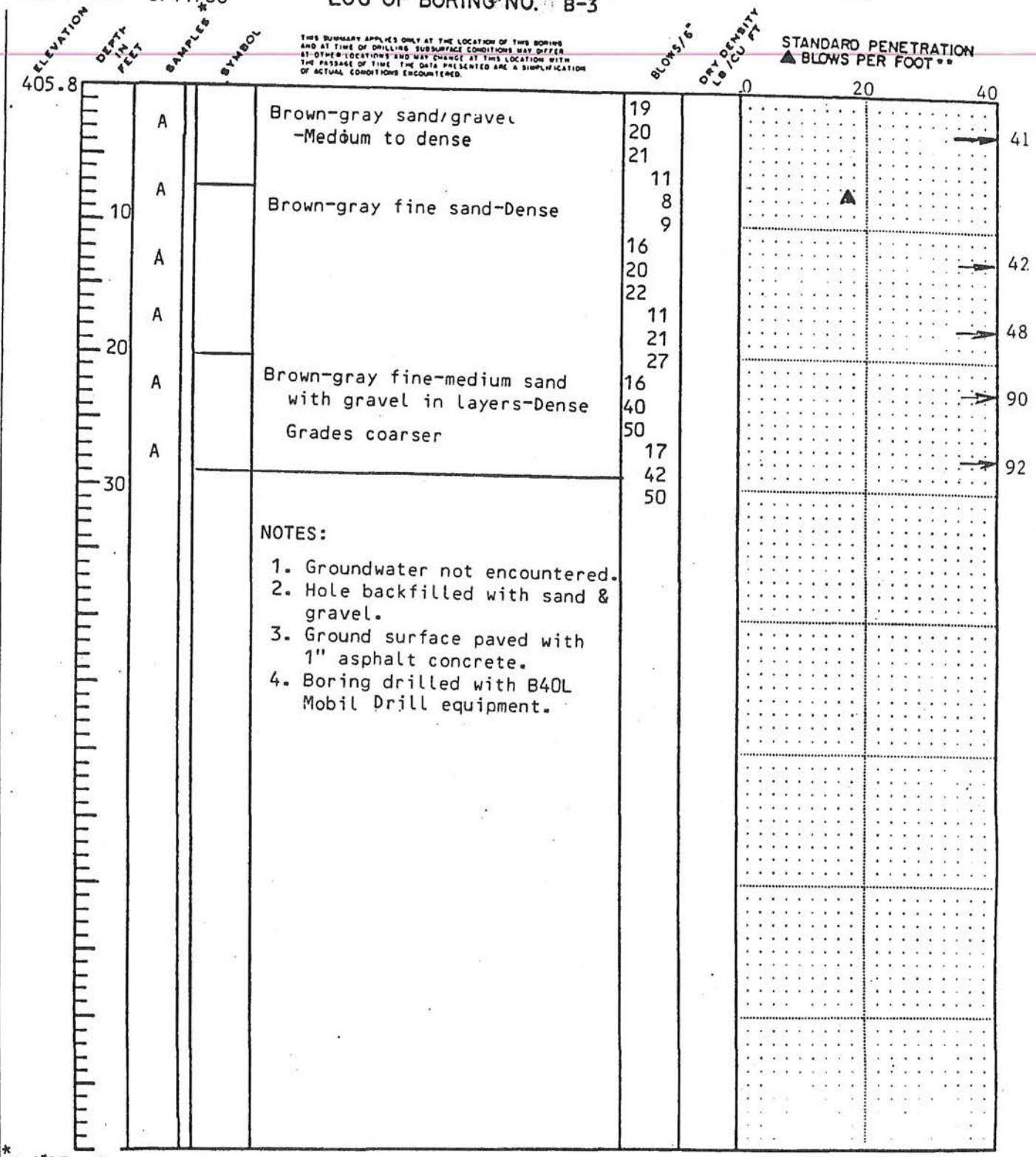
PLATE 5

TCW ASSOCIATES, INC

DATE DRILLED 8/11/86

LOG OF BORING NO. B-3

HIGH POINT SCHOOL



NOTES:

1. Groundwater not encountered.
2. Hole backfilled with sand & gravel.
3. Ground surface paved with 1" asphalt concrete.
4. Boring drilled with B40L Mobil Drill equipment.

* A. 2"O.D. split-spoon sampler
B. 3"O.D. thin-wall sampler
C. 3-1/4" O.D. x 2-1/2" liner
D. 3-1/2" O.D. split barrel sampler
X. sample not recovered

** Standard Penetration Resistance except for 2" O.D. split-spoon samples estimated using non-standard procedures.

▽ water level
impervious seal
piezometer tip

WATER CONTENT - % dry weight
plastic limit — liquid limit
natural water content

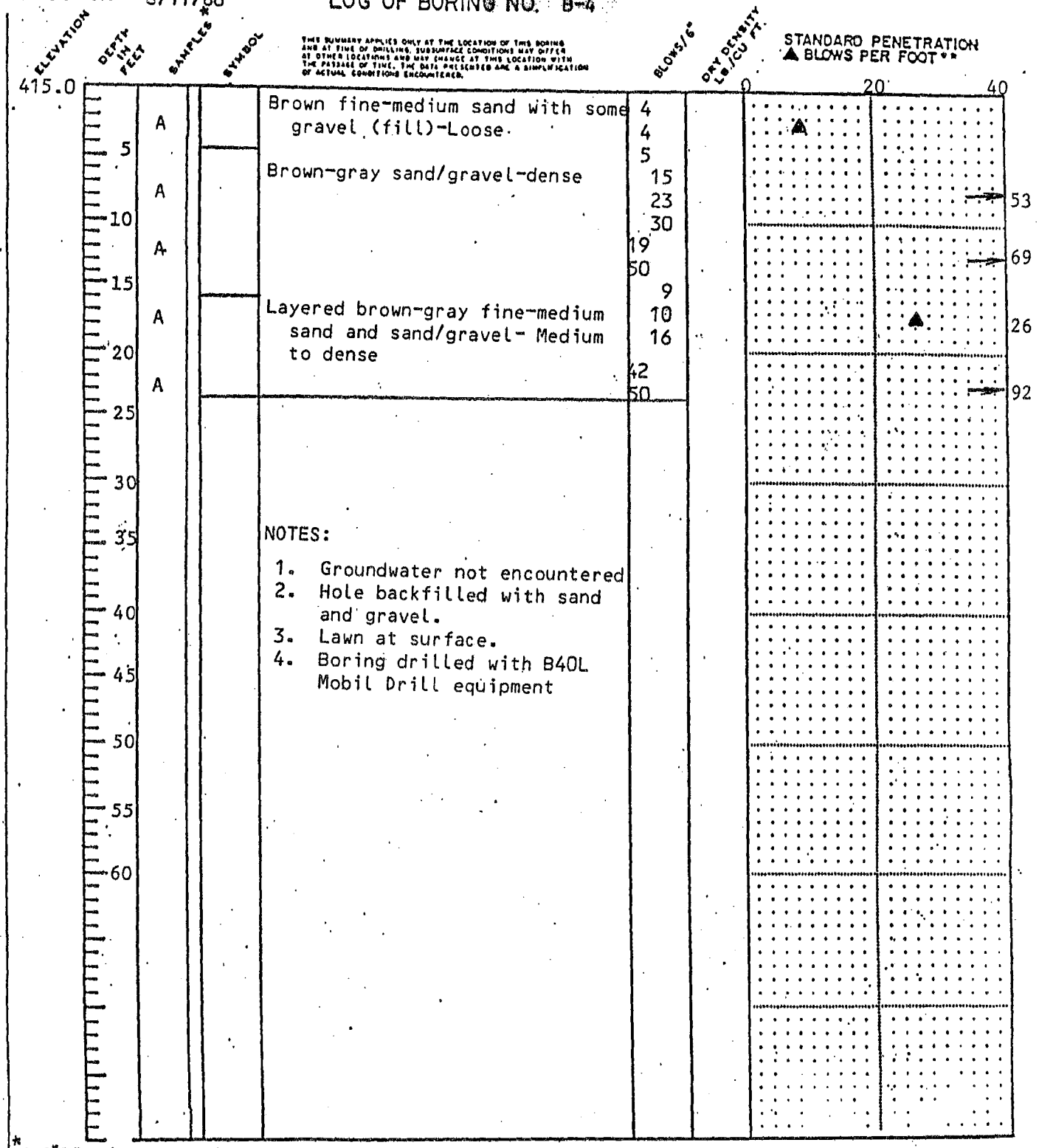
PLATE 6

TCW ASSOCIATES, INC

HIGH POINT SCHOOL

DATE DRILLED: 8/11/86

LOG OF BORING NO. B-4



* A. 2"O.D. split-spoon sampler
B. 3"O.D. thin-wall sampler
C. 3-1/4" O.D. x 2-1/2" liner
D. 3-1/2" O.D. split barrel sampler
X. sample not recovered

** Standard Penetration Resistance except for 2" O.D. split-spoon samples estimated using non-standard procedures.

▽ water level
impervious seal
piezometer tip

WATER CONTENT - % dry weight
plastic limit — liquid limit
natural water content

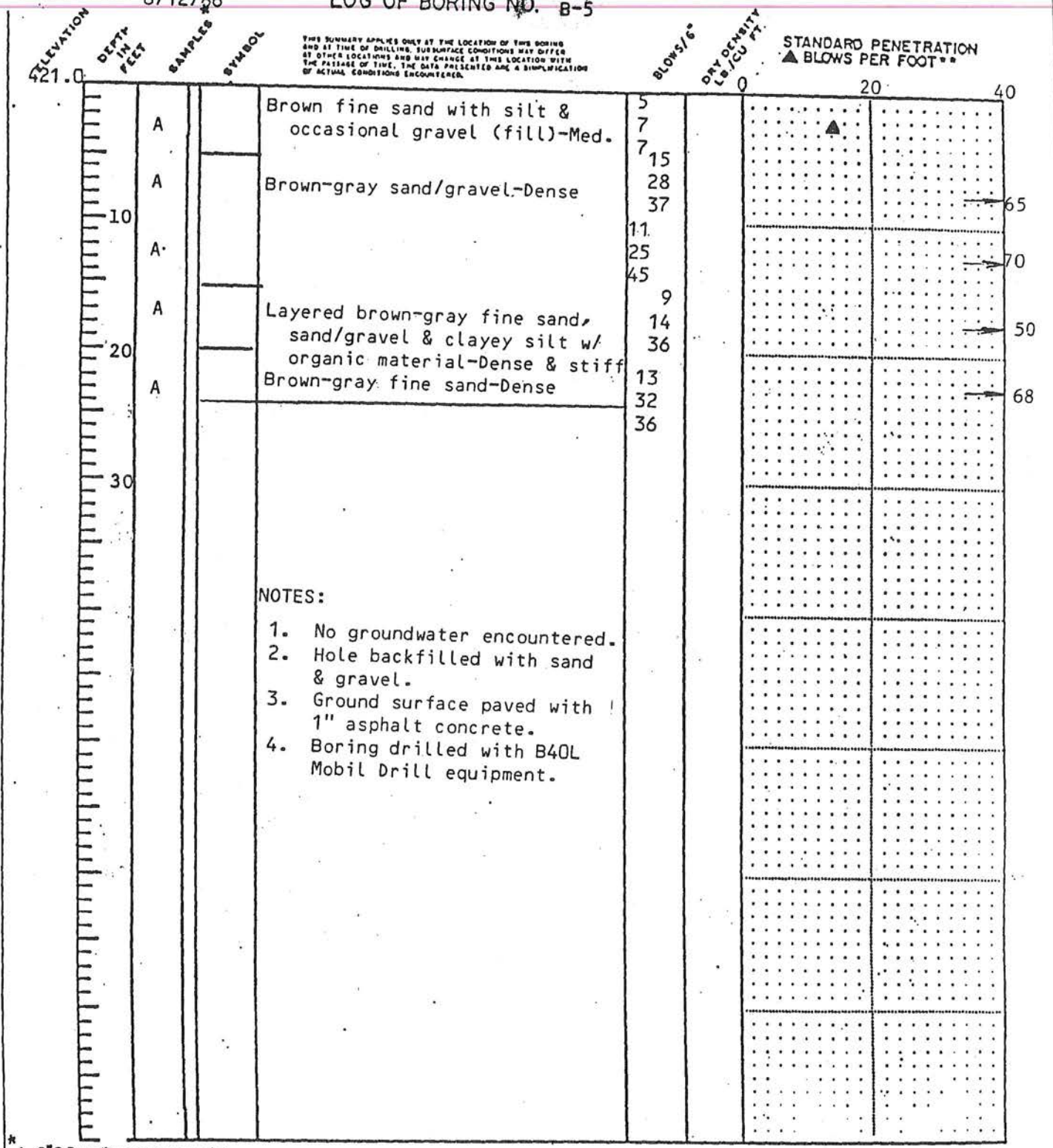
PLATE 7

TCW ASSOCIATES, INC

DATE DRILLED: 8/12/86

LOG OF BORING NO. B-5

HIGH POINT SCHOOL



* A. 2"O.D. split-spoon sampler
B. 3"O.D. thin-wall sampler
C. 3-1/4" O.D. x 2-1/2" liner
D. 3-1/2" O.D. split barrel sampler
X. sample not recovered

** Standard Penetration Resistance except for 2" O.D. split-spoon samples estimated using non-standard procedures.

water level
impervious seal
piezometer tip

WATER CONTENT - % dry weight
plastic limit — liquid limit
natural water content

PLATE 8

TCW ASSOCIATES, INC

HIGH POINT SCHOOL

DATE DRILLED. 8/12/86

LOG OF BORING NO. B-6

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED ARE A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

ELEVATION	DEPTH IN FEET	SAMPLES *	SYMBOL		BLOWS/6"	DRY DENSITY LB./CU FT.	STANDARD PENETRATION ▲ BLOWS PER FOOT** 0 20 40
425.0		A		Brown sand/gravel-Dense	9 14 21		▲
		A		Layered brown-gray fine-medium sand and sand/gravel-dense	16 30 30		→ 60
	10	A			14 24 30		→ 54
		A			11 38		→ 69
	20	A			31 18 37		→ >50
		A			30/2" 17 50/5.5"		→ >50
	30			NOTES: 1. No groundwater encountered. 2. Hole backfilled with sand & gravel. 3. Ground surface paved with 1" asphalt concrete. 4. Boring drilled with B40L Mobil Drill equipment.			

* A. 2"O.D. split-spoon sampler
B. 3"O.D. thin-wall sampler
C. 3-1/4" O.D. x 2-1/2" liner
D. 3-1/2" O.D. split barrel sampler
X. sample not recovered

** Standard Penetration Resistance except for 2" O.D. split-spoon samples estimated using non-standard procedures.

▽ water level
impervious seal
piezometer tip

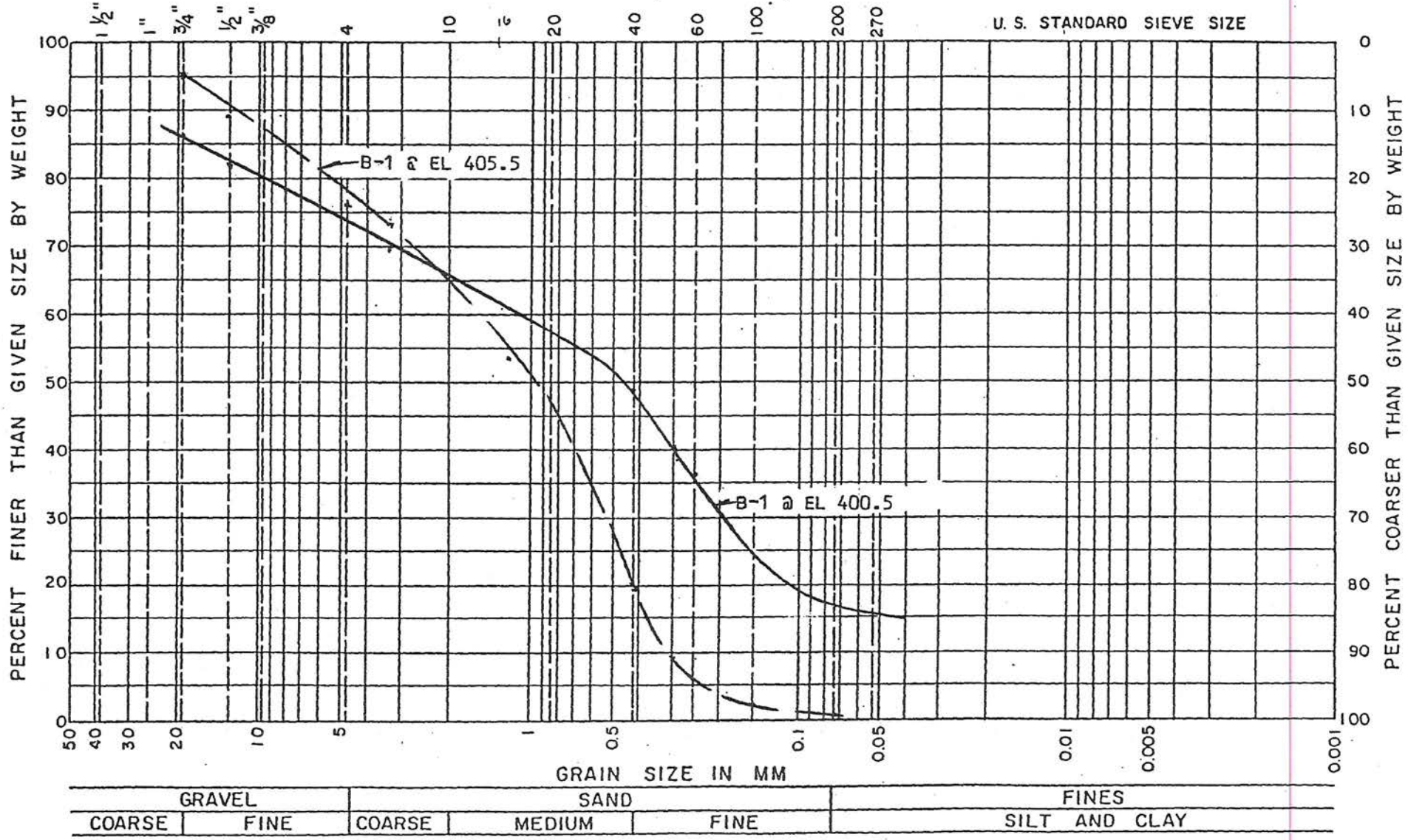
WATER CONTENT - % dry weight
plastic limit — liquid limit
natural water content

PLATE 9

TCW CONSULTING ENGINEERS

BORING B-1 DEPTH _____ ELEVATION 408.5 DATE TESTED _____ BY _____

SOIL CLASSIFICATION _____



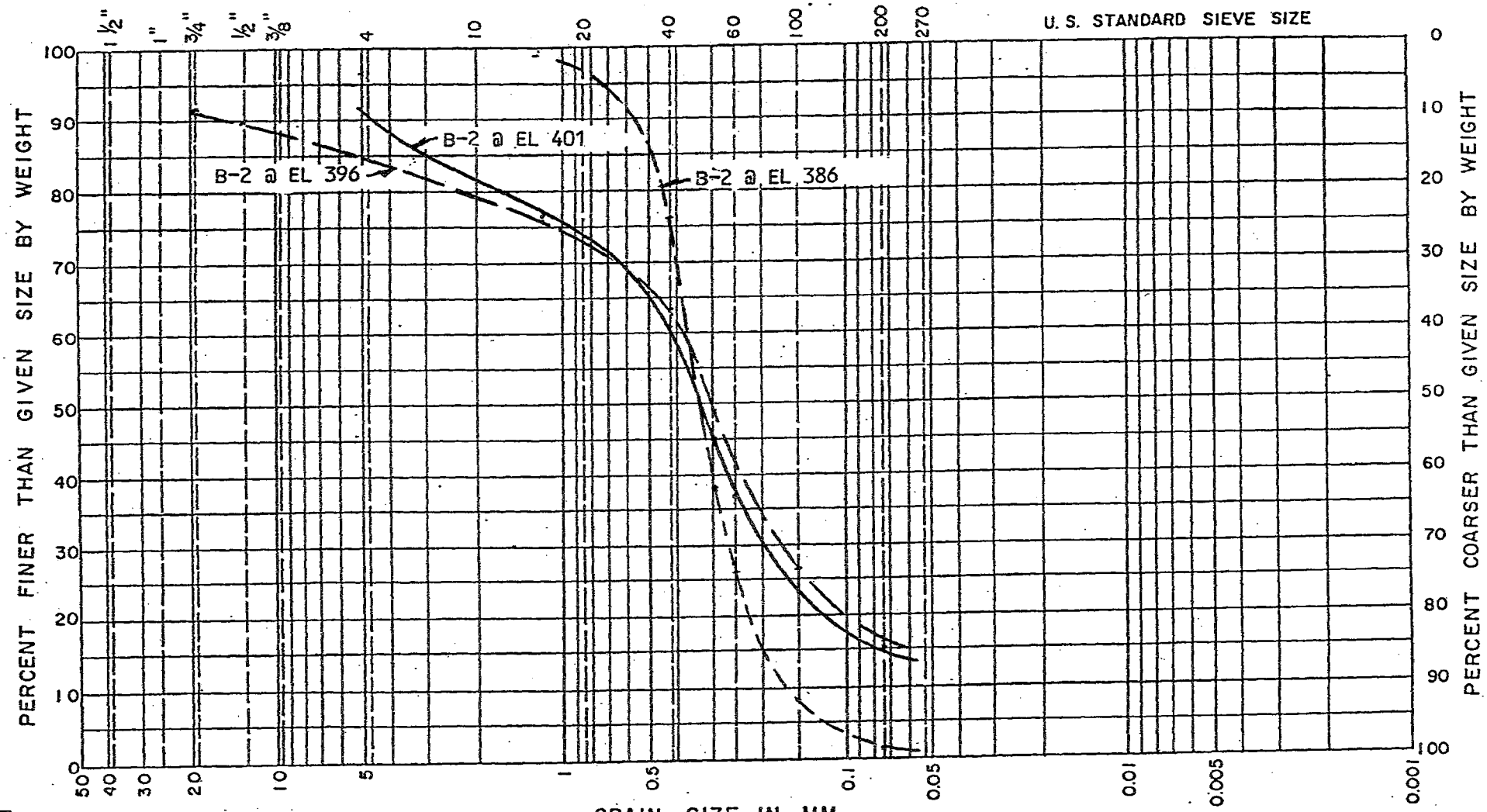
GRAIN - SIZE DISTRIBUTION

HIGH POINT SCHOOL

TCW CONSULTING ENGINEERS

BORING B-2 DEPTH _____ ELEVATION 404.2 DATE TESTED _____ BY _____

SOIL CLASSIFICATION _____



GRAIN-SIZE DISTRIBUTION

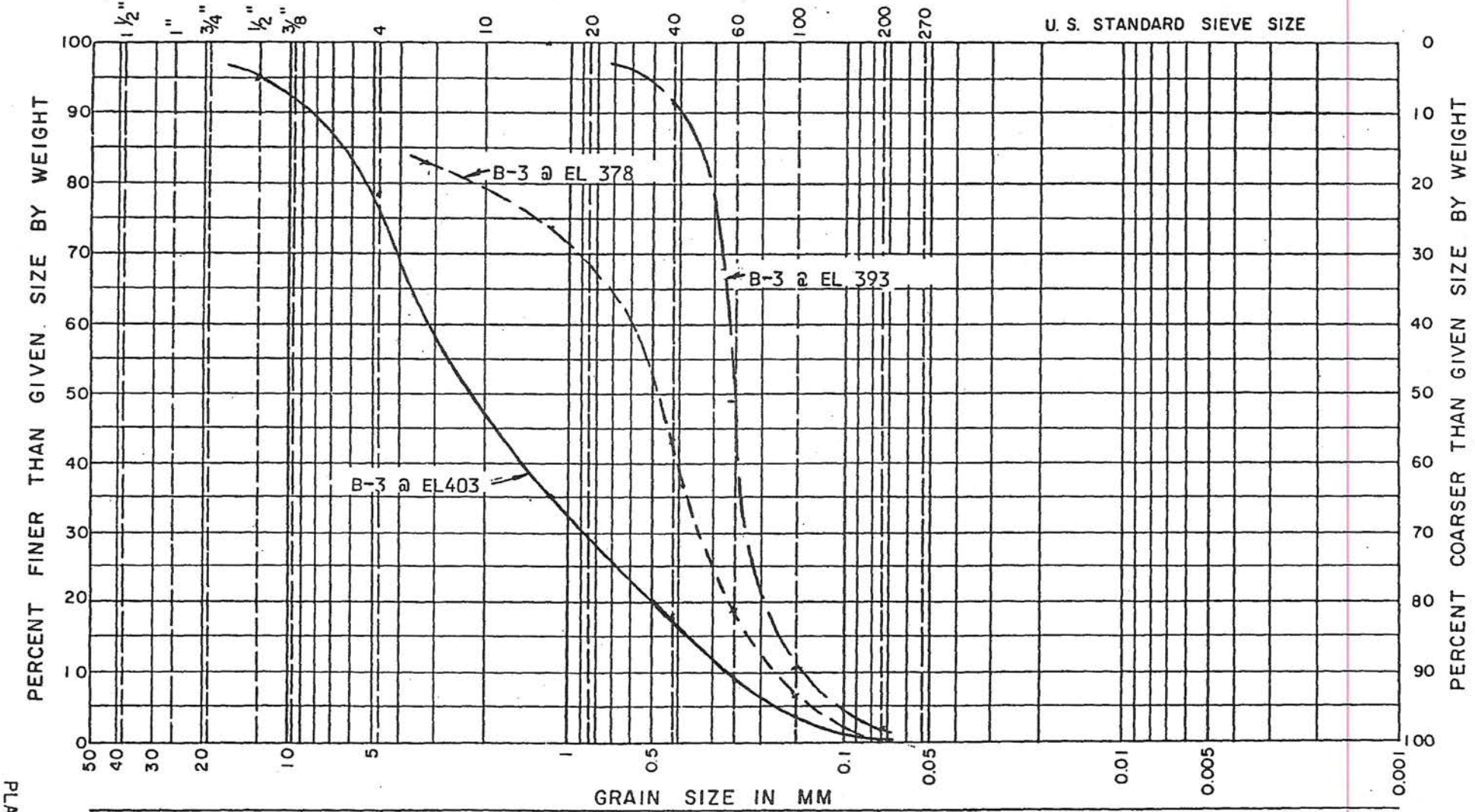
HIGH POINT SCHOOL

PLATE 11

TCW CONSULTING ENGINEERS

BORING B-3 DEPTH _____ ELEVATION 405.8 DATE TESTED _____ BY _____

SOIL CLASSIFICATION _____



GRAIN-SIZE DISTRIBUTION

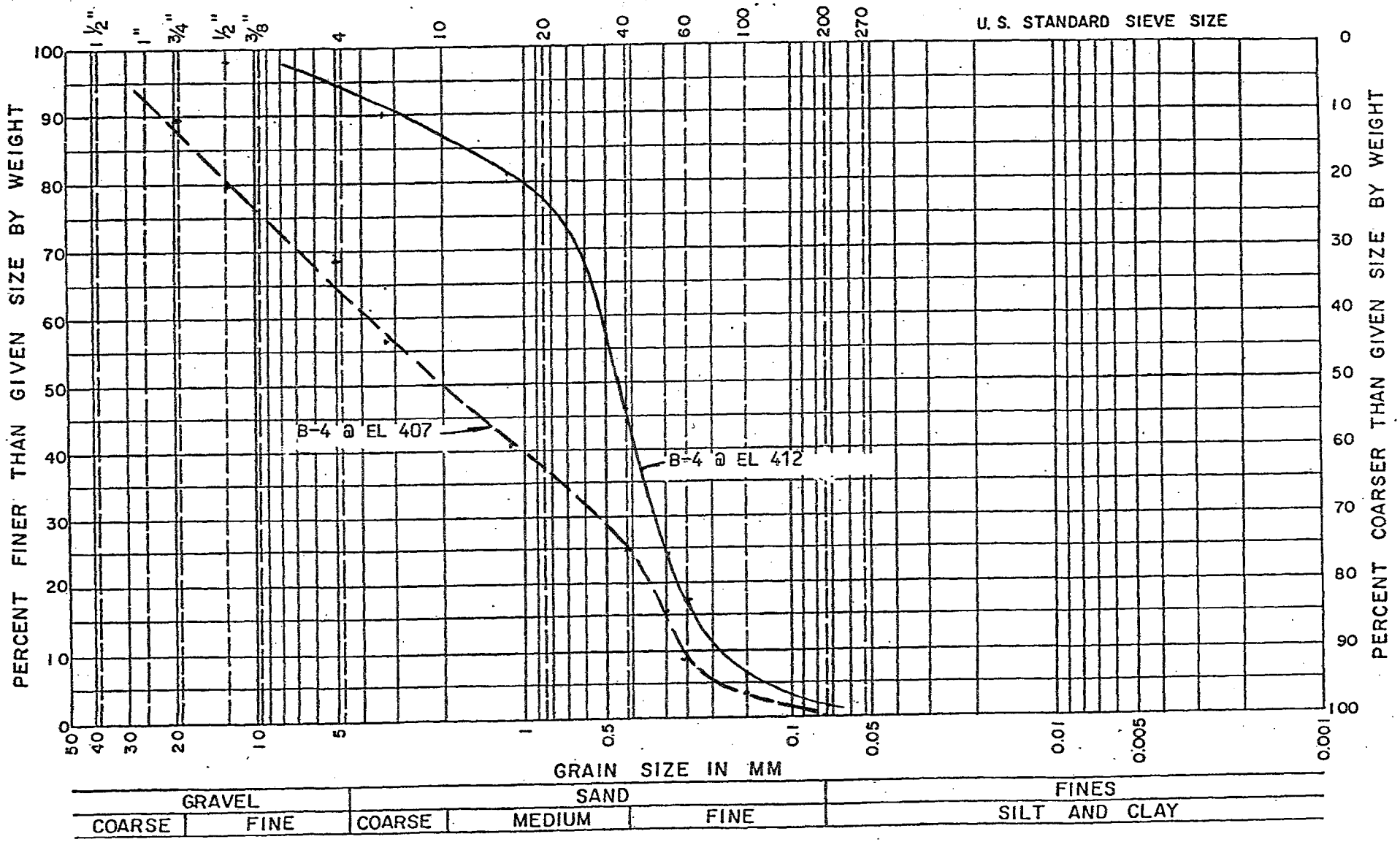
HIGH POINT SCHOOL

PLATE 12

TCW CONSULTING ENGINEERS

BORING B-4 DEPTH _____ ELEVATION 415.0 DATE TESTED _____ BY _____

SOIL CLASSIFICATION _____



GRAIN-SIZE DISTRIBUTION

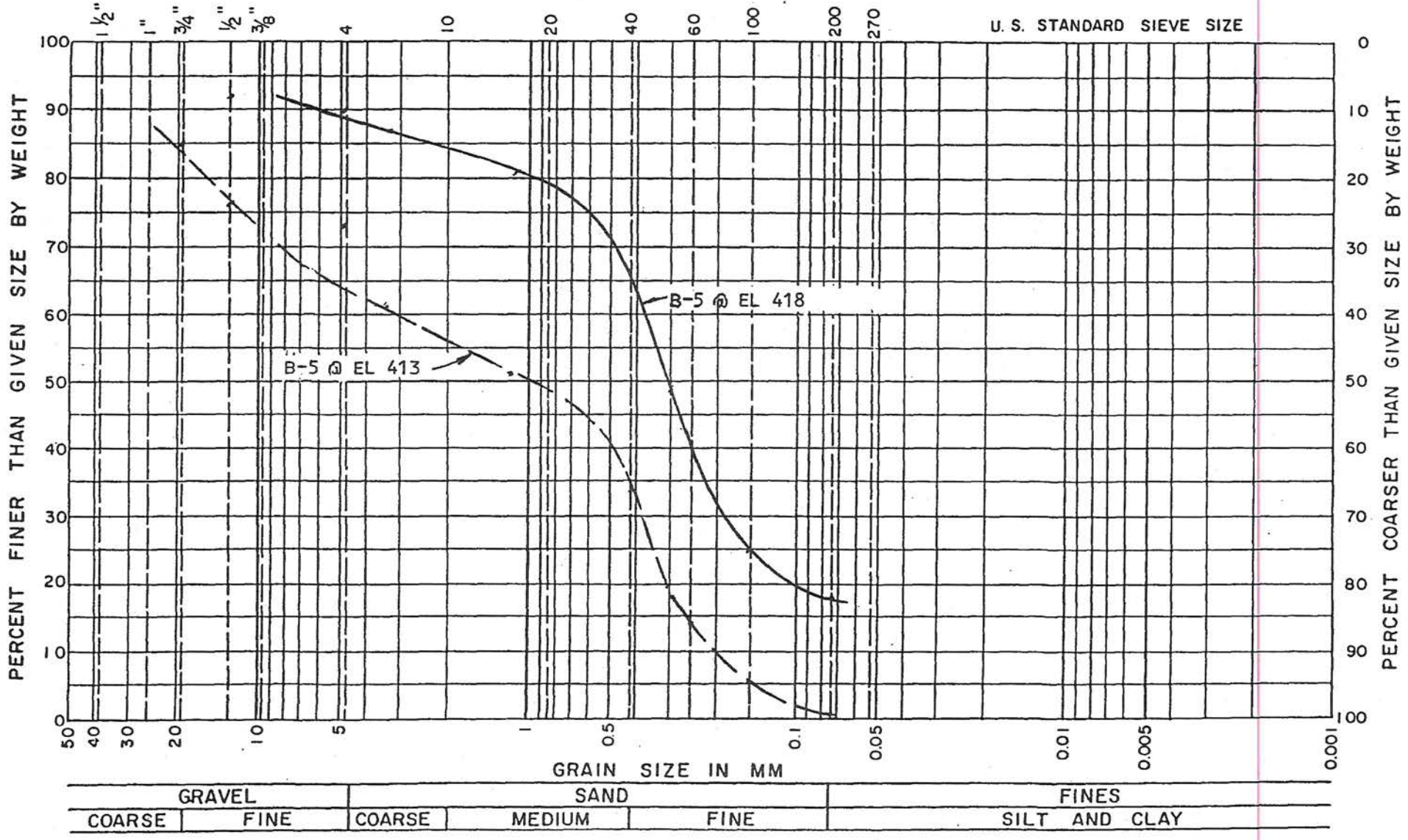
HIGH POINT SCHOOL

PLATE 13

TCW CONSULTING ENGINEERS

BORING B-5 DEPTH _____ ELEVATION 421.0 DATE TESTED _____ BY _____

SOIL CLASSIFICATION _____



HIGH POINT SCHOOL

GRAIN-SIZE DISTRIBUTION

PLATE 14

TCW CONSULTING ENGINEERS

BORING B-6 DEPTH _____ ELEVATION 425.0 DATE TESTED _____ BY _____

SOIL CLASSIFICATION _____

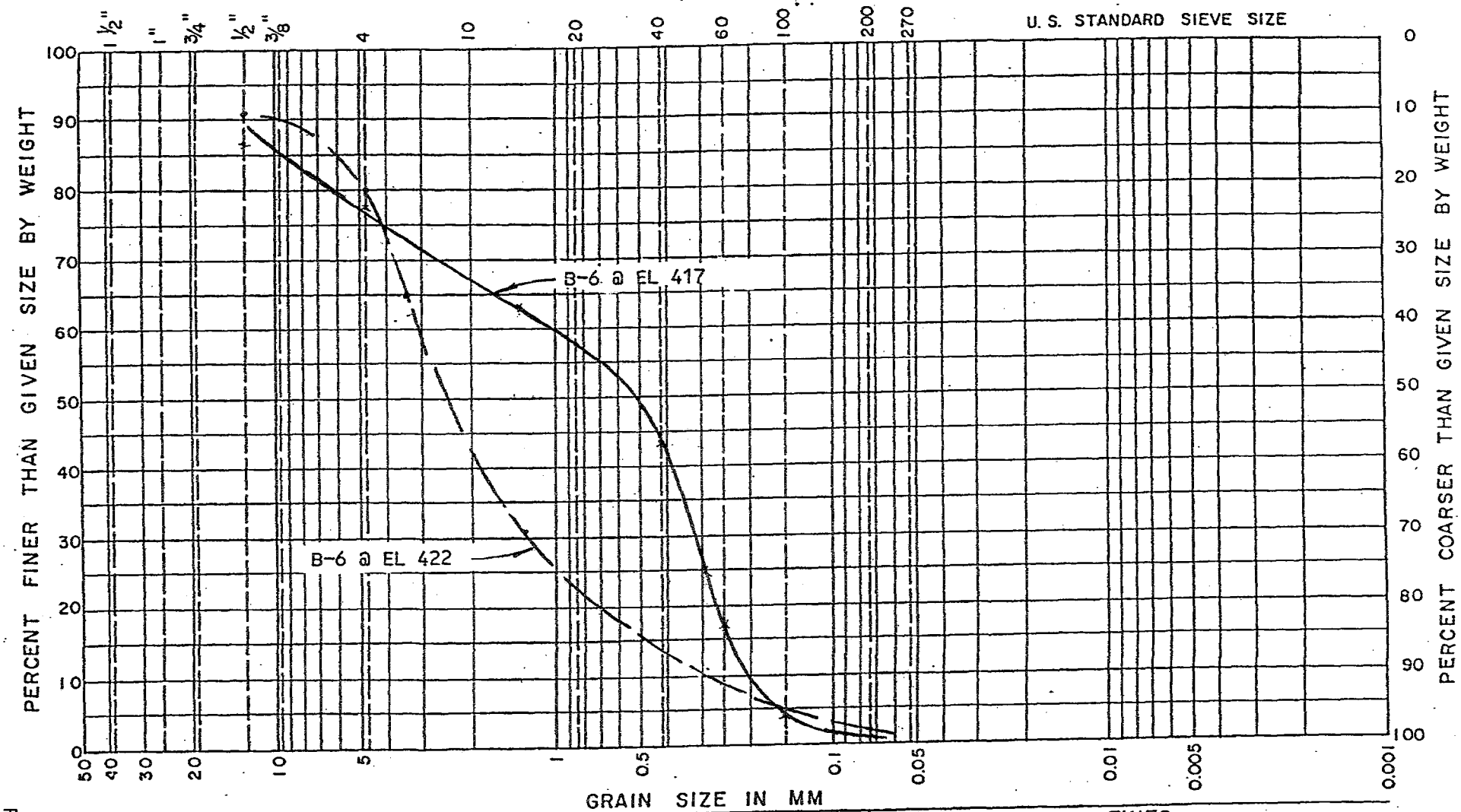


PLATE 15

High Point School

GRAIN-SIZE DISTRIBUTION

APPENDIX B

Infiltration Testing Results

City of Seattle Pilot Infiltration Checklist Forms

City of Seattle
Department of Construction and Inspections
Applicant Services Center
700 Fifth Ave, Suite 2000, P.O. Box 34019
Seattle, WA 98124-4019
www.seattle.gov/sdci

Phone: 206-684-8850

City of Seattle
Pilot Infiltration Test (PIT) Checklist

Call before you dig – Utility Locates 811

Project Address: 6760 34th Ave SW Seattle, 98126 Date: Test Date: February 19, 2020

Permit Number: _____

Other Project Information: AESI Project Number 20190258E001 Infiltration Test #1

This Infiltration Test was performed by:

Company Name: Associated Earth Sciences Inc. Primary Contact Name: Peter Linton

Phone Number: 425-301-8648 Email Address: Plinton@aesgeo.com

☑ Include site map or drainage control plan, with test locations clearly marked. **See Figure 2 of the report**

The intent of this checklist is to provide a summary of stormwater BMP infiltration testing requirements associated with the Pilot Infiltration Test (PIT). All projects and associated plans are also subject to the minimum requirements outlined in the City of Seattle Stormwater Manual and SMC Chapters 22.800 – 22.808, as well as the specific subsurface investigation and infiltration testing requirements outlined in Volume 3, Chapter 3 and Appendix D of the 2016 City of Seattle Stormwater Manual. See also Appendix C for site constraints that preclude infiltration facility feasibility (such as site slope > 8%).

This checklist does not preclude the use of professional judgment to evaluate and manage risk associated with design, construction, and operation of infiltration BMPs. Justification for testing procedures that deviate from the minimum investigation requirements specified in Appendix D shall be documented in a stamped and signed letter from a State of Washington licensed professional (licensed professional engineer, engineering geologist, geologist, or hydrogeologist) who has experience in infiltration and groundwater testing and infiltration facility design.

Before you start call Utility Locates 811 to request locates of utilities at your site.

SMALL PILOT INFILTRATION TEST (SMALL PIT) AND LARGE PILOT INFILTRATION TEST (LARGE PIT):
Note: The test methods outlined below may be modified due to site conditions if recommended by the licensed professional and the reasoning is documented in the testing report.

1. Indicate type of test:
   - ◯ Small PIT
   - ◯ Large PIT
2. Date and time of tests: 2/19/20 8:00
3. Is the infiltration test within the footprint of the proposed infiltration facility? (Yes / No) No, Facility plans not availible
4. If "no," is testing being conducted within 50 feet of the proposed infiltration facility? (Yes / No) No
   Explain why: The final location of the facility has not been determined.

5. What is the total proposed impervious area (does not include permeable pavement surfaces) to be infiltrated on the site? TBD ft²
(Note: acceptance testing is required if testing was performed greater than 50 feet from the proposed infiltration facility, and greater than 5,000 ft² infiltrated on the site [see City of Seattle Stormwater Manual, Volume 3, Section 3.2].)
6. ☑ Dig an infiltration test pit
7. Test pit excavated to bottom elevation of the proposed infiltration facility (Yes / No)
(See City of Seattle Stormwater Manual, Appendix D for additional details.)

Likely, final design depth is still unknown.

8. Test pit surface dimensions (ft): Length: 8 Width: 5 Depth: 5
9. Test pit bottom dimensions (ft): Length: 4.6 Width: 3.4
10. Test pit bottom area (ft²): 15.6
11. Small PIT only: Is the surface area of the test pit bottom at least 12 ft²? (Yes / No) Yes
12. Large PIT only: Is the surface area of the test pit bottom at least at least 32 ft²? (Yes / No)
    a. If "no," indicate why: _____
13. Large PIT only: The test pit bottom area should be as close to the bottom area of the proposed infiltration facility as is feasible.
    a. Bottom area of proposed infiltration facility: _____ ft²
    b. Bottom area of test pit: _____ ft²
14. Identify device used to measure water level in test pit:
    ☐ Pressure transducer (recommended for areas with slow draining soils), or
    ☑ Vertical rod (min 5 ft long, ½-inch increments, placed in center of pit)
15. Identify method of delivering water to the bottom of the test pit (e.g., rigid pipe with a splash plate):
    Non-collapse hose with diffuser.
    (The method of delivery must reduce erosion in the test pit that could cause clogging of the infiltration receptor)

16. **Testing Procedure:**
    a. **Pre-soak period**: Add water to maintain water level at least 12 inches above the bottom of the test pit for at least 6 hours. Record the time and depth of water hourly in the table below.

Time of Measurement (hh:mm)	Depth of Water (inches)
08:05	0.00 (Feet)
09:00	0.84 (Feet)
10:00	0.59 (Feet)
11:00	0.59 (Feet)
11:59	0.63 (Feet)
13:00	0.65 (Feet)
14:00	0.68 (Feet)

See attached table for additional readings

    b. **Steady-state period**: The steady-state data is used to establish the measured infiltration rate (see step 17)
        i. Add water to the test pit at a rate that will maintain a depth of 12 inches above the bottom of the test pit for 1 full hour. During this hour, record the time, depth of water, cumulative volume, and instantaneous flow rate every 15-minutes in the table below.
        ii. Calculate the infiltration rate for each 15-minute interval. First convert the flow rate to in³/hr and the test pit bottom area (recorded in step 10) into in². Divide the flow rate by the bottom area and record the result in the table below.

Time of Measurement (hh:mm)	Depth of Water (inches)	Cumulative Volume (gallons)	Flow Rate (gpm)	Infiltration Rate (in/hr)
14:10	0.68 (Feet)	68	6.54	40.3
14:20	0.69 (Feet)	132	6.56	40.5
14:30	0.69 (Feet)	197	6.56	40.5
14:52	0.70 (Feet)	262	6.54	40.3
15:00	0.70 (Feet)	404	6.66	41.1

[1] gallon = 231 in^3, 1 ft^2 = 144 in^2 See attached table for additional readings

c. **Falling head period**: The falling head data is used to confirm the measured infiltration rate calculated from the steady- state data.
   i. At the end of the steady-state period, turn off the water and immediately record the time and depth of water in the table below. Record the time and depth of water every 15-minutes for a minimum of 1 hour, or until the pit is empty. (Note: in areas with slow draining soils, a pressure transducer is recommended to improve the accuracy of change in depth readings. In addition, users are encouraged to extend the testing period and use longer intervals to improve accuracy.)
   ii. Calculate the infiltration rate for each 15-minute interval (change in depth at each interval x 4) and record the results in the table below. Alternatively, users may also record the total time for fixed intervals of changes in depth, and use those values to compute the infiltration rates.

Time of Measurement (15-minute minimum intervals)	Depth of Water (inches)	Infiltration Rate (in/hr)
15:01	0.70	---
15:03	0.65	18.0
15:04	0.61	21.6
15:06	0.51	27.4
15:07	0.45	30.0
15:08	0.40	30.9
15:10	0.30	32.0
15:11	0.25	32.4
15:12	0.20	32.7
15:13	0.16 test terminated, readings below	32.4
	obstructed by slough	

d. **Check for high groundwater / immediate groundwater mounding:**
   1. ☑ Within 24 hours after the falling head period, excavate the bottom of the pit *(Minimum excavation depths are provided in the City of Seattle Stormwater Manual, Appendix D, Section D-3.3 Step 9, and Section D-2.)*
   2. Is standing water or seepage visible in the excavation hole? (Yes / No) None observed
   3. If "yes," record depth: No Seepage

Note: Additional Groundwater Monitoring requirements may apply. See Table 3.1 and Table 3.2 in Volume 3, Section 3.2 of the City of Seattle Stormwater Manual.

17. Data Analysis/"Measured Infiltration Rate" Selection *(use the falling head data to confirm the measured*

infiltration rate calculated from the steady- state data):

a. Steady-state measured infiltration rate: Provide the lowest infiltration rate from steady-state table above: 40.3 in/hr
b. Selected "Measured Infiltration Rate" 35.3 in/hr
(Include an explanation if the selected rate deviates from the steady-state rate in step 16a.)
Average infiltration rate from falling head test.
c. If the lowest measured infiltration rate is less than the minimum rate associated with an infiltration BMP, that BMP cannot be used.
d. If the measured infiltration rate is less than all minimum infiltration rates for infiltration BMPs (see Table 1 in the Reference Tables at the end of this document), no further investigation is required.

18. Calculate "Design Infiltration Rate": The design infiltration rate shall be calculated by applying the appropriate correction factor to the above measured infiltration rate (see the *City of Seattle Stormwater Manual, Appendix D, Section D-4).*

a. Select a correction factor.
b. Calculate the Design Infiltration Rate below.

☑ Design infiltration rate = 35.3 (Measured infiltration rate (in/hr)) x 0.33 (Correction Factor*) = 11.5 in/hr

*A Correction Factor of 0.5 must be used for all projects unless a lower value is warranted by site conditions, as recommended and documented by a licensed professional, and shall not be less than 0.2. See Appendix D, Section D-4.2.

19. Supporting Documents and Additional Analysis Required:

a. Include a report for the Small and Large PIT that includes documentation of the testing procedure (including this checklist and any supporting documentation), analysis, and results to assess infiltration feasibility, and an explanation of the correction factor used to determine the design infiltration rate. In addition, include the following information.
b. One or more of the following analysis/reports will be required. *See Table 3.1 and Table 3.2 in Volume 3, Section 3.2 of the City of Seattle Stormwater Manual.* Indicate which analysis/reports are required below and include them in the report.

- ☐ **Standard Subsurface Investigation Report** (*Appendix D, Section D-2.4)*
- ☑ **Comprehensive Subsurface Investigation Report** (*Appendix D, Section D-2.5)*
- ☐ **Groundwater Monitoring Report** (*Appendix D, Section D-5)*
- ☐ **Characterization of Infiltration Receptor** (*Appendix D, Section D-6)*
- ☐ **Groundwater Mounding and Seepage Analysis** (*Appendix D, Section D-7)*

SIGNATURES ARE REQUIRED

The Small and Large PIT report shall be prepared by a licensed professional.

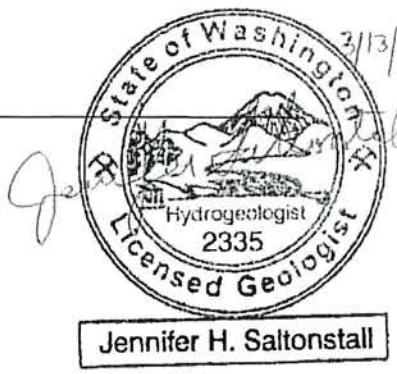
I certify that I have followed the procedures outlined in this document to determine the infiltration BMP infiltration rate.

Infiltration Test performed by:

Print Name Peter Linton under the direction of Jennifer Saltonstall, L.G., L.Hg.

Signature _____ Date 3/12/2020

Professional Stamp:



3/13/2020

REFERENCE TABLES

Table 1. Minimum Measured Infiltration Rates (Taken from the 2016 City of Seattle Stormwater Manual, Vol. 3, Section 3.2 – Table 3.3)

Infiltration BMP	Minimum Measured Infiltration Rate for On-site List Approach (in/hr)	Minimum Allowed Measured Infiltration Rate for Meeting Flow Control, Water Quality Treatment, and On-site Performance Standards (in/hr)
Infiltration Trenches	5	5
Drywells	5	5
Infiltrating Bioretention without underdrain	0.6	0.6
Infiltrating Bioretention with underdrain	0.3	No minimum
Rain Gardens	0.3	Not applicable (only for On-site List Approach)
Permeable Pavement Facility	0.3	0.3b
Permeable Pavement Surface	0.3a	No minimum
Perforated Stub-out Connections	0.3	Not applicable (only for On-site List Approach)
Infiltration Basins	Not applicable	0.6
Infiltration Chambers	Not applicable	0.6

a Infiltration testing not required, only necessary to prove infeasibility.
b No minimum infiltration rate if underdrain is installed.

Project Name:	West Seattle ES Addition	**Water Source:**	Hose Spigot
Project Number:	20190258E001	**Meter:**	AESI FM#4
			15.7 SF Wetted; Prior to test: ~3.2 x 4.1 =
Date:	2/19/2020	**Pit Area (sq. feet):**	~13.1 SF
Weather:	Clear, 40's	**Ring Area (sq. feet):**	NA
Test No.:	IT-1	**Test Depth (feet):**	5
Performed By:	PEL	**Receptor Soils:**	Advance Outwash

Time (24-hr)	Flow Rate (gpm)	Stage (feet)	Totalizer (gallons)	Comments
8:05	0	0	0.0	Flow on
8:15	8.92	0.34	92.8	
8:30	8.92	0.63	220	Excavator crossed hose
8:45	8.91	0.76	353	slight caving
9:00	8.91	0.84	489	reduced to 8.42GPM at 9:04
9:04	8.42			
9:08	4.56	0.86	560	
9:15	4.54	0.78	592	
9:17	0	0.62	600	Bucket test, water off;
9:22	6.74	0.35	629	Flow on after bucket test
9:30	6.75	0.46	681	some silt settled during bucket test
9:45	6.75	0.56	783	
10:00	6.74	0.59	885	
10:15	5.88	0.48	975	Site visitor accidentally kicked valve down to 1.44GPM for 3-4 min btw ~10:00 and 10:15
10:30	5.88	0.47	1056	Increased up to 6.63GPM at 10:30
10:45	6.63	0.55	1155	
11:00	6.63	0.59	1255	
11:15	6.58	0.60	1354	
11:29	6.58	0.61	1446	
11:47	6.54	0.62	1563	
11:59	6.53	0.63	1644	
12:14	6.48	0.63	1714	
12:30	6.53	0.64	1844	
12:45	6.53	0.65	1942	
13:00	6.53	0.65	2040	
13:16	6.54	0.66	2146	
13:30	6.54	0.67	2239	
13:46	6.53	0.68	2343	
14:00	6.56	0.68	2433	
14:10	6.54	0.68	2501	
14:20	6.56	0.69	2565	
14:30	6.56	0.69	2630	
14:40	6.56	0.69	2695	
14:52	6.54	0.70	2775	
15:00	6.56	0.70	2837	
15:01	0	0.70		Flow off
15:03		0.65		Begin falling head
15:04		0.61		
15:06		0.51		
15:07		0.45		
15:08		0.40		
15:10		0.30		
15:11		0.25		
15:12		0.20		
15:13		0.16		End of test, readings on staff below 0.16' obstructed by slough

Average Infiltration Rate (in/hr) during last hour of inflow:	41.0
Average Infiltration Rate (in/hr) during falling head:	35.3

Note:

Meter zeroed at start of test.

Calculated infiltration rate accounts for change in storage during course of test.

City of Seattle
Department of Construction and Inspections
Applicant Services Center
700 Fifth Ave, Suite 2000, P.O. Box 34019
Seattle, WA 98124-4019
www.seattle.gov/sdci

Phone: 206-684-8850

City of Seattle
Pilot Infiltration Test (PIT) Checklist

Call before you dig – Utility Locates 811

Project Address: 6760 34th Ave SW Seattle, 98126 Date: Test Date: February 19, 2020

Permit Number: _____

Other Project Information: AESI Project Number 20190258E001 Infiltration Test #1

This Infiltration Test was performed by:

Company Name: Associated Earth Sciences Inc. Primary Contact Name: Peter Linton

Phone Number: 425-301-8648 Email Address: Plinton@aesgeo.com

☑ Include site map or drainage control plan, with test locations clearly marked. **See Figure 2 of the report**

The intent of this checklist is to provide a summary of stormwater BMP infiltration testing requirements associated with the Pilot Infiltration Test (PIT). All projects and associated plans are also subject to the minimum requirements outlined in the City of Seattle Stormwater Manual and SMC Chapters 22.800 – 22.808, as well as the specific subsurface investigation and infiltration testing requirements outlined in Volume 3, Chapter 3 and Appendix D of the 2016 City of Seattle Stormwater Manual. See also Appendix C for site constraints that preclude infiltration facility feasibility (such as site slope > 8%).

This checklist does not preclude the use of professional judgment to evaluate and manage risk associated with design, construction, and operation of infiltration BMPs. Justification for testing procedures that deviate from the minimum investigation requirements specified in Appendix D shall be documented in a stamped and signed letter from a State of Washington licensed professional (licensed professional engineer, engineering geologist, geologist, or hydrogeologist) who has experience in infiltration and groundwater testing and infiltration facility design.

Before you start call Utility Locates 811 to request locates of utilities at your site.

SMALL PILOT INFILTRATION TEST (SMALL PIT) AND LARGE PILOT INFILTRATION TEST (LARGE PIT):
Note: The test methods outlined below may be modified due to site conditions if recommended by the licensed professional and the reasoning is documented in the testing report.

1. Indicate type of test:
   - ☐ Small PIT
   - ☐ Large PIT
2. Date and time of tests: 2/19/20 8:00
3. Is the infiltration test within the footprint of the proposed infiltration facility? (Yes / No) No, Facility plans not availible
4. If "no," is testing being conducted within 50 feet of the proposed infiltration facility? (Yes / No) No
   Explain why: The final location of the facility has not been determined.

5. What is the total proposed impervious area (does not include permeable pavement surfaces) to be infiltrated on the site? TBD _____ ft^2

(Note: acceptance testing is required if testing was performed greater than 50 feet from the proposed infiltration facility, and greater than 5,000 ft^2 infiltrated on the site [see City of Seattle Stormwater Manual, Volume 3, Section 3.2].)

6. ☑ Dig an infiltration test pit
7. Test pit excavated to bottom elevation of the proposed infiltration facility (Yes / No) Likely, final design depth is still unknown.

(See City of Seattle Stormwater Manual, Appendix D for additional details.)

8. Test pit surface dimensions (ft): Length: 8 _____ Width: 5 _____ Depth: 5 _____
9. Test pit bottom dimensions (ft): Length: 4.6 _____ Width: 3.4 _____
10. Test pit bottom area (ft^2): 15.6 _____
11. Small PIT only: Is the surface area of the test pit bottom at least 12 ft^2? (Yes / No) Yes
12. Large PIT only: Is the surface area of the test pit bottom at least at least 32 ft^2? (Yes / No)
    a. If "no," indicate why: _____
13. Large PIT only: The test pit bottom area should be as close to the bottom area of the proposed infiltration facility as is feasible.
    a. Bottom area of proposed infiltration facility: _____ ft^2
    b. Bottom area of test pit: _____ ft^2
14. Identify device used to measure water level in test pit:
    ☐ Pressure transducer (recommended for areas with slow draining soils), or
    ☑ Vertical rod (min 5 ft long, ½-inch increments, placed in center of pit)
15. Identify method of delivering water to the bottom of the test pit (e.g., rigid pipe with a splash plate):
    Non-collapse hose with diffuser.

(The method of delivery must reduce erosion in the test pit that could cause clogging of the infiltration receptor)

16. **Testing Procedure:**
    a. **Pre-soak period**: Add water to maintain water level at least 12 inches above the bottom of the test pit for at least 6 hours. Record the time and depth of water hourly in the table below.

Time of Measurement (hh:mm)	Depth of Water (inches)
08:05	0.00 (Feet)
09:00	0.84 (Feet)
10:00	0.59 (Feet)
11:00	0.59 (Feet)
11:59	0.63 (Feet)
13:00	0.65 (Feet)
14:00	0.68 (Feet)

See attached table for additional readings

    b. **Steady-state period**: The steady-state data is used to establish the measured infiltration rate (see step 17)
        i. Add water to the test pit at a rate that will maintain a depth of 12 inches above the bottom of the test pit for 1 full hour. During this hour, record the time, depth of water, cumulative volume, and instantaneous flow rate every 15-minutes in the table below.
        ii. Calculate the infiltration rate for each 15-minute interval. First convert the flow rate to in^3/hr and the test pit bottom area (recorded in step 10) into in^2. Divide the flow rate by the bottom area and record the result in the table below.

Time of Measurement (hh:mm)	Depth of Water (inches)	Cumulative Volume (gallons)	Flow Rate (gpm)	Infiltration Rate (in/hr)
14:10	0.68 (Feet)	---	---	---
14:20	0.69 (Feet)	132	6.56	40.5
14:30	0.69 (Feet)	197	6.56	40.5
14:52	0.70 (Feet)	262	6.54	40.3
15:00	0.70 (Feet)	404	6.66	41.1

[1] gallon = 231 in^3, 1 ft^2 = 144 in^2

See attached table for additional readings

c. **Falling head period**: The falling head data is used to confirm the measured infiltration rate calculated from the steady- state data.
   i. At the end of the steady-state period, turn off the water and immediately record the time and depth of water in the table below. Record the time and depth of water every 15-minutes for a minimum of 1 hour, or until the pit is empty. (Note: in areas with slow draining soils, a pressure transducer is recommended to improve the accuracy of change in depth readings. In addition, users are encouraged to extend the testing period and use longer intervals to improve accuracy.)
   ii. Calculate the infiltration rate for each 15-minute interval (change in depth at each interval x 4) and record the results in the table below. Alternatively, users may also record the total time for fixed intervals of changes in depth, and use those values to compute the infiltration rates.

Time of Measurement (15-minute minimum intervals)	Depth of Water (inches)	Infiltration Rate (in/hr)
15:01	0.70	---
15:03	0.65	18.0
15:04	0.61	21.6
15:06	0.51	27.4
15:07	0.45	30.0
15:08	0.40	30.9
15:10	0.30	32.0
15:11	0.25	32.4
15:12	0.20	32.7
15:13	0.16 test terminated, readings below	32.4
	obstructed by slough	

d. **Check for high groundwater / immediate groundwater mounding:**
   1. ☑ Within 24 hours after the falling head period, excavate the bottom of the pit *(Minimum excavation depths are provided in the City of Seattle Stormwater Manual, Appendix D, Section D-3.3 Step 9, and Section D-2.)*
   2. Is standing water or seepage visible in the excavation hole? (Yes / No) None observed
   3. If "yes," record depth: No Seepage

Note: Additional Groundwater Monitoring requirements may apply. See Table 3.1 and Table 3.2 in Volume 3, Section 3.2 of the City of Seattle Stormwater Manual.

17. Data Analysis/"Measured Infiltration Rate" Selection *(use the falling head data to confirm the measured*

infiltration rate calculated from the steady- state data):

a. Steady-state measured infiltration rate: Provide the lowest infiltration rate from steady-state table above: 15.8 in/hr
b. Selected "Measured Infiltration Rate" 12.6 in/hr
(Include an explanation if the selected rate deviates from the steady-state rate in step 16a.)
Average infiltration rate from falling head test.
c. If the lowest measured infiltration rate is less than the minimum rate associated with an infiltration BMP, that BMP cannot be used.
d. If the measured infiltration rate is less than all minimum infiltration rates for infiltration BMPs (see Table 1 in the Reference Tables at the end of this document), no further investigation is required.

18. Calculate "Design Infiltration Rate": The design infiltration rate shall be calculated by applying the appropriate correction factor to the above measured infiltration rate (see the *City of Seattle Stormwater Manual, Appendix D, Section D-4).*

a. Select a correction factor.
b. Calculate the Design Infiltration Rate below.

☑ Design infiltration rate = 12.6 (Measured infiltration rate (in/hr)) x 0.33 (Correction Factor*) = 4.2 in/hr

*A Correction Factor of 0.5 must be used for all projects unless a lower value is warranted by site conditions, as recommended and documented by a licensed professional, and shall not be less than 0.2. See Appendix D, Section D-4.2.

19. Supporting Documents and Additional Analysis Required:

a. Include a report for the Small and Large PIT that includes documentation of the testing procedure (including this checklist and any supporting documentation), analysis, and results to assess infiltration feasibility, and an explanation of the correction factor used to determine the design infiltration rate. In addition, include the following information.
b. One or more of the following analysis/reports will be required. *See Table 3.1 and Table 3.2 in Volume 3, Section 3.2 of the City of Seattle Stormwater Manual.* Indicate which analysis/reports are required below and include them in the report.

- ☐ **Standard Subsurface Investigation Report** (*Appendix D, Section D-2.4)*
- ☑ **Comprehensive Subsurface Investigation Report** (*Appendix D, Section D-2.5)*
- ☐ **Groundwater Monitoring Report** (*Appendix D, Section D-5)*
- ☐ **Characterization of Infiltration Receptor** (*Appendix D, Section D-6)*
- ☐ **Groundwater Mounding and Seepage Analysis** (*Appendix D, Section D-7)*

SIGNATURES ARE REQUIRED

The Small and Large PIT report shall be prepared by a licensed professional.

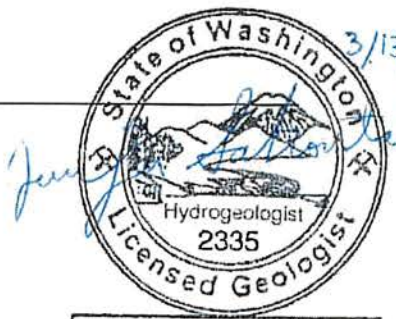
I certify that I have followed the procedures outlined in this document to determine the infiltration BMP infiltration rate.

Infiltration Test performed by:

Print Name Peter Linton under the direction of Jennifer Saltonstall, L.G., L.Gh.

Signature _____ Date 3/12/ 2020

Professional Stamp:



REFERENCE TABLES

Table 1. Minimum Measured Infiltration Rates (Taken from the 2016 City of Seattle Stormwater Manual, Vol. 3, Section 3.2 – Table 3.3)

Infiltration BMP	Minimum Measured Infiltration Rate for On-site List Approach (in/hr)	Minimum Allowed Measured Infiltration Rate for Meeting Flow Control, Water Quality Treatment, and On-site Performance Standards (in/hr)
Infiltration Trenches	5	5
Drywells	5	5
Infiltrating Bioretention without underdrain	0.6	0.6
Infiltrating Bioretention with underdrain	0.3	No minimum
Rain Gardens	0.3	Not applicable (only for On-site List Approach)
Permeable Pavement Facility	0.3	0.3b
Permeable Pavement Surface	0.3a	No minimum
Perforated Stub-out Connections	0.3	Not applicable (only for On-site List Approach)
Infiltration Basins	Not applicable	0.6
Infiltration Chambers	Not applicable	0.6

a Infiltration testing not required, only necessary to prove infeasibility.
b No minimum infiltration rate if underdrain is installed.

Project Name:	West Seattle ES Addition	**Water Source:**	Hose Spigot
Project Number:	20190258E001	**Meter:**	AESI FM#8
Date:	2/19/2020	**Pit Area (sq. feet):**	~4.3 x 3.0 = ~12.9 SF
Weather:	Clear, 40's	**Ring Area (sq. feet):**	NA
Test No.:	IT-2	**Test Depth (feet):**	5
Performed By:	PEL	**Receptor Soils:**	Advance Outwash

Time (24-hr)	Flow Rate (gpm)	Stage (feet)	Totalizer (gallons)	Comments
9:00	0	0	0	Flow on
9:15	1.84	0.1	27.8	
9:31	1.83	0.17	57.6	
9:45	2.31	0.2	82.5	
10:00	2.35	0.3	118	
10:15	2.36	0.37	153	
10:30	2.35	0.4	187	
10:45	2.34	0.45	223	
11:01	2.33	0.48	261	
11:15	2.31	0.51	294	
11:30	2.31	0.53	328	
11:45	2.29	0.55	361	
11:53	2.29	0.57	380	
11:58	0	0.46	380	Flow off Bucket test
12:02	2.24	0.38	400	Flow on
12:17	2.25	0.45	435	
12:30	2.25	0.5	464	
12:45	2.26	0.54	497	
13:00	2.26	0.57	531	
13:15	2.27	0.59	567	
13:29	2.27	0.6	597	
13:45	2.27	0.62	634	Caving
14:00	2.27	0.65	668	
14:14	2.12	0.65	700	
14:30	2.12	0.65	734	
14:47	2.12	0.65	770	
15:00	2.12	0.64	797	
15:10	2.13	0.64	819	
15:20	2.13	0.64	842	Slight Caving
15:30	2.12	0.65	863	
15:40	2.13	0.65	883	
15:50	2.13	0.65	904	
16:00	2.12	0.65	925	
16:01	0	0.63		Diffuser removed, begin falling head
16:03	0	0.6		
16:05	0	0.56		
16:07	0	0.52		
16:09	0	0.48		
16:11	0	0.45		
16:13	0	0.42		
16:15	0	0.38		
16:17	0	0.34		
16:19	0	0.32		Faling head test ended at .32' due to slough obstructir

Average Infiltration Rate (in/hr) during last hour of inflow:	15.8
Average Infiltration Rate (in/hr) during falling head:	12.6

Note:

Meter zeroed before testing

Appendix B

CONSTRUCTION BEST MANAGEMENT PRACTICES

APPENDIX B

CONSTRUCTION BEST MANAGEMENT PRACTICES

The contractor will be required to implement measures to ensure the minimal environmental impacts throughout the construction process, which could include the following:

- The contractor will submit a written earthwork plan to the Project Engineer for approval prior to the commencing with any mass excavation or filling. The earthwork plan will also include:
  - Sequencing of the earthwork and grading activities;
  - Proposed equipment to be utilized;
  - Surface water diversion and control (description of how existing catch basins at the project site would remain intact and measures used to protect them from sediment during construction);
  - Proposed protection methods for excavated stockpiled fill materials and trenches;
  - Soil drying procedures; and,
  - Any other information pertinent to the manner in which the earthwork and grading will be performed.

- The contractor will obtain the City of Seattle's Department of Construction and Inspection approval that erosion control measures are in place and functioning, and will maintain erosion control measures as earthwork and utility construction commences in accordance with City of Seattle Standards.

- Surface water controls (i.e., temporary interceptor swales, check dams, silt fences, etc.) will be constructed simultaneously with clearing and grading for project development.

- Surface water and erosion control measures will be relocated or new measures will be installed so as site conditions change, erosion control measures remain in accordance with City of Seattle Best Management Practice (BMP) requirements during the construction period.

- All construction areas inactive for more than seven days during the dry season (April 1st to October 31st) or two days during the wet season (November 1st to March 31st) will be covered.

- Mitigation measures to reduce and/or control impacts to air will include:
  - Watering surfaces to control dust, the use of temporary ground covers, sprinkling the project site with approved dust palliatives, or use of temporary stabilizations practices upon the completion of grading.
  - Wheel-cleaning stations will be provided to ensure construction vehicle wheels and undercarriages do not carry excess dirt from the site onto adjacent roadways.

  - Streets will be regularly cleaned to ensure excess dust and debris is not transported from the construction site onto adjacent roads.
  - Construction activities will be planned to minimize exposing areas of earth for extended periods.
  - The contractor will be required to comply with the Puget Sound Clean Air Agency's (PSCAA) Regulation I, Section 9.15, requiring reasonable precautions to avoid dust emissions and Regulation I, Section 9.11, requiring the best available measures to control emissions of odor-bearing contaminants. The contractor will be required to comply with recommendations in the Washington Associated General Contractor brochure "Guide to Handling Fugitive Dust from Construction Projects."

- During construction, BMPs would be implemented to ensure that sediment originating from disturbed soils would be retained within the limits of disturbance. BMP measures may include installation of filter fabric between grate and rings of all catch basin inlets, fabric fencing, barriers, check dams, etc.

- Construction activities will be restricted to hours designated by the City of Seattle Noise Control Ordinance (SMC 25.08.425). If construction activities exceed permitted noise levels, the District would instruct the contractor to implement measures to reduce noise impacts to comply with the Noise Ordinance, which may include additional muffling of equipment.

- Construction vehicle traffic to and from the site will be minimized during peak traffic hours.

- Construction vehicles will not be parked in traffic lanes.

- Flaggers will be provided as required.

- Barriers, flashing lights, walkways, guardrails, and night lighting will be provided as required for safety and control.

- Fire lanes and roadways to existing buildings will be retained, as required by the fire department.

- Walkways leading past the site will remain clear of construction vehicles and debris and will remain safe at all times.

Appendix C

GREENHOUSE GAS EMISSIONS WORKSHEET

City of Seattle Department of Planning and Development
SEPA GHG Emissions Worksheet
Version 1.7 12/26/07

Introduction

The Washington State Environmental Policy Act (SEPA) requires environmental review of development proposals that may have a significant adverse impact on the environment. If a proposed development is subject to SEPA, the project proponent is required to complete the SEPA Checklist. The Checklist includes questions relating to the development's air emissions. The emissions that have traditionally been considered cover smoke, dust, and industrial and automobile emissions. With our understanding of the climate change impacts of GHG emissions, the City of Seattle requires the applicant to also estimate these emissions.

Emissions created by Development

GHG emissions associated with development come from multiple sources:

- The extraction, processing, transportation, construction and disposal of materials and landscape disturbance (Embodied Emissions)
- Energy demands created by the development after it is completed (Energy Emissions)
- Transportation demands created by the development after it is completed (Transportation Emissions)

GHG Emissions Worksheet

This GHG Emissions Worksheet has been developed to assist applicants in answering the SEPA Checklist question relating to GHG emissions. The worksheet was originally developed by King County, but the City of Seattle and King County are working together on future updates to maintain consistency of methodologies across jurisdictions.

The SEPA GHG Emissions worksheet estimates all GHG emissions that will be created over the life span of a project. This includes emissions associated with obtaining construction materials, fuel used during construction, energy consumed during a buildings operation, and transportation by building occupants.

Using the Worksheet

1. Descriptions of the different residential and commercial building types can be found on the second tabbed worksheet ("Definition of Building Types"). If a development proposal consists of multiple projects, e.g. both single family and multi-family residential structures or a commercial development that consists of more than on type of commercial activity, the appropriate information should be estimated for each type of building or activity.

2. For paving, estimate the total amount of paving (in thousands of square feet) of the project.

3. The Worksheet will calculate the amount of GHG emissions associated with the project and display the amount in the "Total Emissions" column on the worksheet. The applicant should use this information when completing the SEPA checklist.

4. The last three worksheets in the Excel file provide the background information that is used to calculate the total GHG emissions.

5. The methodology of creating the estimates is transparent; if there is reason to believe that a better estimate can be obtained by changing specific values, this can and should be done. Changes to the values should be documented with an explanation of why and the sources relied upon.

6. Print out the “Total Emissions” worksheet and attach it to the SEPA checklist. If the applicant has made changes to the calculations or the values, the documentation supporting those changes should also be attached to the SEPA checklist.

West Seattle Elementary Addition Project

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e)			**Lifespan Emissions (MTCO2e)**
			Embodied	Energy	Transportation	
Single-Family Home	0		98	672	792	**0**
Multi-Family Unit in Large Building	0		33	357	766	**0**
Multi-Family Unit in Small Building	0		54	681	766	**0**
Mobile Home	0		41	475	709	**0**
Education		21.4	39	646	361	**22373**
Food Sales		0.0	39	1,541	282	**0**
Food Service		0.0	39	1,994	561	**0**
Health Care Inpatient		0.0	39	1,938	582	**0**
Health Care Outpatient		0.0	39	737	571	**0**
Lodging		0.0	39	777	117	**0**
Retail (Other Than Mall)		0.0	39	577	247	**0**
Office		0.0	39	723	588	**0**
Public Assembly		0.0	39	733	150	**0**
Public Order and Safety		0.0	39	899	374	**0**
Religious Worship		0.0	39	339	129	**0**
Service		0.0	39	599	266	**0**
Warehouse and Storage		0.0	39	352	181	**0**
Other		0.0	39	1,278	257	**0**
Vacant		0.0	39	162	47	**0**

Section II: Pavement

Pavement		0.00				**0**

Total Project Emissions: **22373**

Definition of Building Types

Type (Residential) or Principal Activity (Commercial)	Description
Single-Family Home.....	Unless otherwise specified, this includes both attached and detached buildings
Multi-Family Unit in Large Building	Apartments in buildings with more than 5 units
Multi-Family Unit in Small Building	Apartments in building with 2-4 units
Mobile Home.....	
Education	Buildings used for academic or technical classroom instruction, such as elementary, middle, or high schools, and classroom buildings on college or university campuses. Buildings on education campuses for which the main use is not classroom are included in the category relating to their use. For example, administration buildings are part of "Office," dormitories are "Lodging," and libraries are "Public Assembly."
Food Sales	Buildings used for retail or wholesale of food.
Food Service	Buildings used for preparation and sale of food and beverages for consumption.
Health Care Inpatient	Buildings used as diagnostic and treatment facilities for inpatient care.
Health Care Outpatient	Buildings used as diagnostic and treatment facilities for outpatient care. Doctor's or dentist's office are included here if they use any type of diagnostic medical equipment (if they do not, they are categorized as an office building).
Lodging	Buildings used to offer multiple accommodations for short-term or long-term residents, including skilled nursing and other residential care buildings.
Retail (Other Than Mall).....	Buildings used for the sale and display of goods other than food.
Office	Buildings used for general office space, professional office, or administrative offices. Doctor's or dentist's office are included here if they do not use any type of diagnostic medical equipment (if they do, they are categorized as an outpatient health care building).
Public Assembly	Buildings in which people gather for social or recreational activities, whether in private or non-private meeting halls.
Public Order and Safety	Buildings used for the preservation of law and order or public safety.
Religious Worship	Buildings in which people gather for religious activities, (such as chapels, churches, mosques, synagogues, and temples).
Service	Buildings in which some type of service is provided, other than food service or retail sales of goods
Warehouse and Storage	Buildings used to store goods, manufactured products, merchandise, raw materials, or personal belongings (such as self-storage).
Other	Buildings that are industrial or agricultural with some retail space; buildings having several different commercial activities that, together, comprise 50 percent or more of the floorspace, but whose largest single activity is agricultural, industrial/ manufacturing, or residential; and all other miscellaneous buildings that do not fit into any other category.
Vacant	Buildings in which more floorspace was vacant than was used for any single commercial activity at the time of interview. Therefore, a vacant building may have some occupied floorspace.

Sources: .....

Residential 2001 Residential Energy Consumption Survey
Square footage measurements and comparisons
http://www.eia.doe.gov/emeu/recs/sqft-measure.html

Commercial Commercial Buildings Energy Consumption Survey (CBECS),
Description of CBECS Building Types
http://www.eia.doe.gov/emeu/cbecs/pba99/bldgtypes.html

Embodied Emissions Worksheet

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# thousand sq feet/ unit or building	Life span related embodied GHG missions (MTCO2e/ unit)	Life span related embodied GHG missions (MTCO2e/ thousand square feet) - See calculations in table below
Single-Family Home	2.53	98	39
Multi-Family Unit in Large Building	0.85	33	39
Multi-Family Unit in Small Building	1.39	54	39
Mobile Home	1.06	41	39
Education	25.6	991	39
Food Sales	5.6	217	39
Food Service	5.6	217	39
Health Care Inpatient	241.4	9,346	39
Health Care Outpatient	10.4	403	39
Lodging	35.8	1,386	39
Retail (Other Than Mall)	9.7	376	39
Office	14.8	573	39
Public Assembly	14.2	550	39
Public Order and Safety	15.5	600	39
Religious Worship	10.1	391	39
Service	6.5	252	39
Warehouse and Storage	16.9	654	39
Other	21.9	848	39
Vacant	14.1	546	39

Section II: Pavement

All Types of Pavement			50

	Columns and Beams	Intermediate Floors	Exterior Walls	Windows	Interior Walls	Roofs		
Average GWP (lbs CO2e/sq ft): Vancouver, Low Rise Building	5.3	7.8	19.1	51.2	5.7	21.3		
Average Materials in a 2,272-square foot single family home	0.0	2269.0	3206.0	285.0	6050.0	3103.0	Total Embodied Emissions (MTCO2e)	Total Embodied Emissions (MTCO2e/ thousand sq feet)
MTCO2e	0.0	8.0	27.8	6.6	15.6	30.0	88.0	38.7

Sources

All data in black text — King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

Residential floorspace per unit
2001 Residential Energy Consumption Survey (National Average, 2001)
Square footage measurements and comparisons
http://www.eia.doe.gov/emeu/recs/sqft-measure.html

Floorspace per building
EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

Average GWP (lbs CO2e/sq ft): Vancouver, Low Rise Building
Athena EcoCalculator
Athena Assembly Evaluation Tool v2.3- Vancouver Low Rise Building
Assembly Average GWP (kg) per square meter
http://www.athenasmi.ca/tools/ecoCalculator/index.html
Lbs per kg 2.20
Square feet per square meter 10.76

Average Materials in a 2,272-square foot single family home
Buildings Energy Data Book: 7.3 Typical/Average Household
Materials Used in the Construction of a 2,272-Square-Foot Single-Family Home, 2000
http://buildingsdatabook.eren.doe.gov/?id=view_book_table&TableID=2036&t=xls
See also: NAHB, 2004 Housing Facts, Figures and Trends, Feb. 2004, p. 7.

Average window size
Energy Information Administration/Housing Characteristics 1993
Appendix B, Quality of the Data. Pg. 5.
ftp://ftp.eia.doe.gov/pub/consumption/residential/rx93hcf.pdf

Pavement Emissions Factors
MTCO2e/thousand square feet of asphalt
or concrete pavement

50 (see below)

Embodied GHG Emissions…….Worksheet Background Information

Buildings
Embodied GHG emissions are emissions that are created through the extraction, processing, transportation, construction and disposal of building materials as well as emissions created through landscape disturbance (by both soil disturbance and changes in above ground biomass).

Estimating embodied GHG emissions is new field of analysis; the estimates are rapidly improving and becoming more inclusive of all elements of construction and development.

The estimate included in this worksheet is calculated using average values for the main construction materials that are used to create a typical family home. In 2004, the National Association of Home Builders calculated the average materials that are used in a typical 2,272 square foot single-family household. The quantity of materials used is then multiplied by the average GHG emissions associated with the life-cycle GHG emissions for each material.

This estimate is a rough and conservative estimate; the actual embodied emissions for a project are likely to be higher. For example, at this stage, due to a lack of comprehensive data, the estimate does not include important factors such as landscape disturbance or the emissions associated with the interior components of a building (such as furniture).

King County realizes that the calculations for embodied emissions in this worksheet are rough. For example, the emissions associated with building 1,000 square feet of a residential building will not be the same as 1,000 square feet of a commercial building. However, discussions with the construction community indicate that while there are significant differences between the different types of structures, this method of estimation is reasonable; it will be improved as more data become available.

Additionally, if more specific information about the project is known, King County recommends two online embodied emissions calculators that can be used to obtain a more tailored estimate for embodied emissions: www.buildcarbonneutral.org and www.athenasmi.ca/tools/ecoCalculator/.

Pavement
Four recent life cycle assessments of the environmental impacts of roads form the basis for the per unit embodied emissions of pavement. Each study is constructed in slightly different ways; however, the aggregate results of the reports represent a reasonable estimate of the GHG emissions that are created from the manufacture of paving materials, construction related emissions, and maintenance of the pavement over its expected life cycle. For specifics, see the worksheet.

Special Section: Estimating the Embodied Emissions for Pavement

Four recent life cycle assessments of the environmental impacts of roads form the basis for the per unit embodied emissions of pavement. Each study is constructed in slightly different ways; however, the aggregate results of the reports represent a reasonable estimate of the GHG emissions that are created from the manufacture of paving materials, construction related emissions, and maintenance of the pavement over its expected life cycle.

The results of the studies are presented in different units and measures; considerable effort was undertaken to be able to compare the results of the studies in a reasonable way. For more details about the below methodology, contact matt.kuharic@kingcounty.gov.

The four studies, Meil (2001), Park (2003), Stripple (2001) and Treolar (2001) produced total GHG emissions of 4-34 MTCO2e per thousand square feet of finished paving (for similar asphalt and concrete based pavements). This estimate does not including downstream maintenance and repair of the highway. The average (for all concrete and asphalt pavements in the studies, assuming each study gets one data point) is ~17 MTCO2e/thousand square feet.

Three of the studies attempted to thoroughly account for the emissions associated with long term maintenance (40 years) of the roads. Stripple (2001), Park et al. (2003) and Treolar (2001) report 17, 81, and 68 MTCO2e/thousand square feet, respectively, after accounting for maintenance of the roads.

Based on the above discussion, King County makes the conservative estimate that 50 MTCO2e/thousand square feet of pavement (over the development's life cycle) will be used as the embodied emission factor for pavement until better estimates can be obtained. This is roughly equivalent to 3,500 MTCO2e per lane mile of road (assuming the lane is 13 feet wide).

It is important to note that these studies estimate the embodied emissions for roads. Paving that does not need to stand up to the rigors of heavy use (such as parking lots or driveways) would likely use less materials and hence have lower embodied emissions.

Sources:

Meil, J. A Life Cycle Perspective on Concrete and Asphalt Roadways: Embodied Primary Energy and Global Warming Potential. 2006. Available: http://www.cement.ca/cement.nsf/eee9ec7bbd630126852566c40052107b/6ec79dc8ae03a782852572b90061b914/$FILE/ATTK0WE3/athena%20report%20Feb.%202%202007.pdf

Park, K, Hwang, Y., Seo, S., M.ASCE, and Seo, H. , "Quantitative Assessment of Environmental Impacts on Life Cycle of Highways," Journal of Construction Engineering and Management , Vol 129, January/February 2003, pp 25-31, (DOI: 10.1061/(ASCE)0733-9364(2003)129:1(25)).

Stripple, H. Life Cycle Assessment of Road. A Pilot Study for Inventory Analysis. Second Revised Edition. IVL Swedish Environmental Research Institute Ltd. 2001. Available: http://www.ivl.se/rapporter/pdf/B1210E.pdf

Treloar, G., Love, P.E.D., and Crawford, R.H. Hybrid Life-Cycle Inventory for Road Construction and Use. Journal of Construction Engineering and Management. P. 43-49. January/February 2004.

Energy Emissions Worksheet

Type (Residential) or Principal Activity (Commercial)	Energy consumption per building per year (million Btu)	Carbon Coefficient for Buildings	MTCO2e per building per year	Floorspace per Building (thousand square feet)	MTCE per thousand square feet per year	MTCO2e per thousand square feet per year	Average Building Life Span	Lifespan Energy Related MTCO2e emissions per unit	Lifespan Energy Related MTCO2e emissions per thousand square feet
Single-Family Home	107.3	0.108	11.61	2.53	4.6	16.8	57.9	672	266
Multi-Family Unit in Large Building	41.0	0.108	4.44	0.85	5.2	19.2	80.5	357	422
Multi-Family Unit in Small Building	78.1	0.108	8.45	1.39	6.1	22.2	80.5	681	489
Mobile Home	75.9	0.108	8.21	1.06	7.7	28.4	57.9	475	448
Education	2,125.0	0.124	264.2	25.6	10.3	37.8	62.5	16,526	646
Food Sales	1,110.0	0.124	138.0	5.6	24.6	90.4	62.5	8,632	1,541
Food Service	1,436.0	0.124	178.5	5.6	31.9	116.9	62.5	11,168	1,994
Health Care Inpatient	60,152.0	0.124	7,479.1	241.4	31.0	113.6	62.5	467,794	1,938
Health Care Outpatient	985.0	0.124	122.5	10.4	11.8	43.2	62.5	7,660	737
Lodging	3,578.0	0.124	444.9	35.8	12.4	45.6	62.5	27,826	777
Retail (Other Than Mall)	720.0	0.124	89.5	9.7	9.2	33.8	62.5	5,599	577
Office	1,376.0	0.124	171.1	14.8	11.6	42.4	62.5	10,701	723
Public Assembly	1,338.0	0.124	166.4	14.2	11.7	43.0	62.5	10,405	733
Public Order and Safety	1,791.0	0.124	222.7	15.5	14.4	52.7	62.5	13,928	899
Religious Worship	440.0	0.124	54.7	10.1	5.4	19.9	62.5	3,422	339
Service	501.0	0.124	62.3	6.5	9.6	35.1	62.5	3,896	599
Warehouse and Storage	764.0	0.124	95.0	16.9	5.6	20.6	62.5	5,942	352
Other	3,600.0	0.124	447.6	21.9	20.4	74.9	62.5	27,997	1,278
Vacant	294.0	0.124	36.6	14.1	2.6	9.5	62.5	2,286	162

Sources

All data in black text — King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

Energy consumption for residential buildings

2007 Buildings Energy Data Book: 6.1 Quad Definitions and Comparisons (National Average, 2001)
Table 6.1.4: Average Annual Carbon Dioxide Emissions for Various Functions
http://buildingsdatabook.eren.doe.gov/
Data also at: http://www.eia.doe.gov/emeu/recs/recs2001_ce/ce1-4c_housingunits2001.html

Energy consumption for commercial buildings and Floorspace per building

EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

Note: Data in plum color is found in both of the above sources (buildings energy data book and commercial buildings energy consumption survey).

Carbon Coefficient for Buildings

Buildings Energy Data Book (National average, 2005)
Table 3.1.7. 2005 Carbon Dioxide Emission Coefficients for Buildings (MMTCE per Quadrillion Btu)
http://buildingsdatabook.eere.energy.gov/?id=view_book_table&TableID=2057
Note: Carbon coefficient in the Energy Data book is in MTCE per Quadrillion Btu.
To convert to MTCO2e per million Btu, this factor was divided by 1000 and multiplied by 44/12.

Residential floorspace per unit

2001 Residential Energy Consumption Survey (National Average, 2001)
Square footage measurements and comparisons
http://www.eia.doe.gov/emeu/recs/sqft-measure.html

average lief span of buildings, estimated by replacement time method

	Single Family Homes	Multi-Family Units in Large and Small Buildings	All Residential Buildings	
New Housing Construction, 2001	1,273,000	329,000	1,602,000	
Existing Housing Stock, 2001	73,700,000	26,500,000	100,200,000	
Replacement time:	57.9	80.5	62.5	(national average, 2001)

Note: Single family homes calculation is used for mobile homes as a best estimate life span.
Note: At this time, KC staff could find no reliable data for the average life span of commercial buildings.
Therefore, the average life span of residential buildings is being used until a better approximation can be ascertained.

Sources:

New Housing Construction, 2001
Quarterly Starts and Completions by Purpose and Design - US and Regions (Excel)
http://www.census.gov/const/quarterly_starts_completions_cust.xls
See also: http://www.census.gov/const/www/newresconstindex.html

Existing Housing Stock, 2001
Residential Energy Consumption Survey (RECS) 2001
Tables HC1:Housing Unit Characteristics, Million U.S. Households 2001
Table HC1-4a. Housing Unit Characteristics by Type of Housing Unit, Million U.S. Households, 2001
Million U.S. Households, 2001
http://www.eia.doe.gov/emeu/recs/recs2001/hc_pdf/housunits/hc1-4a_housingunits2001.pdf

Transportation Emissions Worksheet

Type (Residential) or Principal Activity (Commercial)	# people/ unit or building	# thousand sq feet/ unit or building	# people or employees/ thousand square feet	vehicle related GHG emissions (metric tonnes CO2e per person per year)	MTCO2e/ year/ unit	MTCO2e/ year/ thousand square feet	Average Building Life Span	Life span transportation related GHG emissions (MTCO2e/ per unit)	Life span transportation related GHG emissions (MTCO2e/ thousand sq feet)
Single-Family Home	2.8	2.53	1.1	4.9	13.7	5.4	57.9	792	313
Multi-Family Unit in Large Building	1.9	0.85	2.3	4.9	9.5	11.2	80.5	766	904
Multi-Family Unit in Small Building	1.9	1.39	1.4	4.9	9.5	6.8	80.5	766	550
Mobile Home	2.5	1.06	2.3	4.9	12.2	11.5	57.9	709	668
Education	30.0	25.6	1.2	4.9	147.8	5.8	62.5	9247	361
Food Sales	5.1	5.6	0.9	4.9	25.2	4.5	62.5	1579	282
Food Service	10.2	5.6	1.8	4.9	50.2	9.0	62.5	3141	561
Health Care Inpatient	455.5	241.4	1.9	4.9	2246.4	9.3	62.5	140506	582
Health Care Outpatient	19.3	10.4	1.9	4.9	95.0	9.1	62.5	5941	571
Lodging	13.6	35.8	0.4	4.9	67.1	1.9	62.5	4194	117
Retail (Other Than Mall)	7.8	9.7	0.8	4.9	38.3	3.9	62.5	2394	247
Office	28.2	14.8	1.9	4.9	139.0	9.4	62.5	8696	588
Public Assembly	6.9	14.2	0.5	4.9	34.2	2.4	62.5	2137	150
Public Order and Safety	18.8	15.5	1.2	4.9	92.7	6.0	62.5	5796	374
Religious Worship	4.2	10.1	0.4	4.9	20.8	2.1	62.5	1298	129
Service	5.6	6.5	0.9	4.9	27.6	4.3	62.5	1729	266
Warehouse and Storage	9.9	16.9	0.6	4.9	49.0	2.9	62.5	3067	181
Other	18.3	21.9	0.8	4.9	90.0	4.1	62.5	5630	257
Vacant	2.1	14.1	0.2	4.9	10.5	0.7	62.5	657	47

Sources

All data in black text — King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

people/ unit

Estimating Household Size for Use in Population Estimates (WA state, 2000 average)
Washington State Office of Financial Management
Kimpel, T. and Lowe, T. Research Brief No. 47. August 2007
http://www.ofm.wa.gov/researchbriefs/brief047.pdf
Note: This analysis combines Multi Unit Structures in both large and small units into one category;
the average is used in this case although there is likely a difference

Residential floorspace per unit

2001 Residential Energy Consumption Survey (National Average, 2001)
Square footage measurements and comparisons
http://www.eia.doe.gov/emeu/recs/sqft-measure.html

employees/thousand square feet

Commercial Buildings Energy Consumption Survey commercial energy uses and costs (National Median, 2003)
Table B2 Totals and Medians of Floorspace, Number of Workers, and Hours of Operation for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set1/2003excel/b2.xls

Note: Data for # employees/thousand square feet is presented by CBECS as square feet/employee.
In this analysis employees/thousand square feet is calculated by taking the inverse of the CBECS number and multiplying by 1000.

vehicle related GHG emissions

Estimate calculated as follows (Washington state, 2006)_

56,531,930,000	2006 Annual WA State Vehicle Miles Traveled Data was daily VMT. Annual VMT was 365*daily VMT. http://www.wsdot.wa.gov/mapsdata/tdo/annualmileage.htm
6,395,798	2006 WA state population http://quickfacts.census.gov/qfd/states/53000.html
8839	vehicle miles per person per year
0.0506	gallon gasoline/mile This is the weighted national average fuel efficiency for all cars and 2 axle, 4 wheel light trucks in 2005. This includes pickup trucks, vans and SUVs. The 0.051 gallons/mile used here is the inverse of the more commonly known term “miles/per gallon” (which is 19.75 for these cars and light trucks). Transportation Energy Data Book. 26th Edition. 2006. Chapter 4: Light Vehicles and Characteristics. Calculations based on weighted average MPG efficiency of cars and light trucks. http://cta.ornl.gov/data/tedb26/Edition26_Chapter04.pdf Note: This report states that in 2005, 92.3% of all highway VMT were driven by the above described vehicles. http://cta.ornl.gov/data/tedb26/Spreadsheets/Table3_04.xls
24.3	lbs CO2e/gallon gasoline The CO2 emissions estimates for gasoline and diesel include the extraction, transport, and refinement of petroleum as well as their combustion. Life-Cycle CO2 Emissions for Various New Vehicles. RENew Northfield. Available: http://renewnorthfield.org/wpcontent/uploads/2006/04/CO2%20emissions.pdf Note: This is a conservative estimate of emissions by fuel consumption because diesel fuel,
2205	with a emissions factor of 26.55 lbs CO2e/gallon was not estimated.
4.93	lbs/metric tonne
	vehicle related GHG emissions (metric tonnes CO2e per person per year)

average lief span of buildings, estimated by replacement time method — See Energy Emissions Worksheet for Calculations

Commercial floorspace per unit — EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

Appendix D

TREE INVENTORY AND ARBORIST REPORT

Tree Solutions Inc
Consulting Arborists

Project No. TS - 6962

Arborist Report DRAFT

TO:	Seattle Public Schools c/o Paul Wight
SITE:	West Seattle Elementary School, 6760 34th Ave SW, Seattle WA 98126
RE:	Tree Inventory
DATE:	November 14, 2019
PROJECT ARBORIST:	Sean Dugan, ISA Certified Arborist #PN-5459B Registered Consulting Arborist 457 ISA Qualified Tree Risk Assessor
	Andrea Starbird, Arborist Technician
ATTACHED:	Table of Trees, Annotated Survey with Tree Locations

Summary

Tree Solutions inventoried and assessed 52 trees on the site listed above. Based on the City of Seattle Municipal Code, trees measuring six inches or greater in diameter at standard height (DSH) are required to be assessed for development projects.[1] Of the trees assessed, three met the exceptional tree criteria outlined in the Seattle Director's Rule 16-2008.[2]

Trees on neighboring properties, including the right-of-way, were documented if they appeared to be greater than 6 inches diameter and their driplines extended over the property line, or if their presence might impact construction access. All trees on adjacent properties were estimated from the subject site or public property such as the adjacent right-of-way. Sixteen trees adjacent to the site required documentation for this property. Six of these trees are located in a grove on neighboring High Point Community Center property and are therefore considered exceptional. The City defines an exceptional grove as eight or more trees each with a diameter measuring twelve inches or greater with continuously overlapping canopies.

Assignment & Scope of Report

This report outlines the site inspection by Sean Dugan and Andrea Starbird of Tree Solutions Inc, on October 30, 2019. Included are observations and data collected at the site located at 6760 34th Ave SW in the city of Seattle. We were asked to document and evaluate all regulated trees on the site and identify any exceptional trees as defined by Seattle Director's Rule 16-2008. We were asked to produce an Arborist Report outlining our findings. Paul Wight, of Seattle Public Schools, requested these services to acquire information for project planning.

[1] SMC 25.11

[2] Sugimura, D.W. "DPD Director's Rule 16-2008". Seattle, WA, 2009

On-site trees were assigned a numerical identifier and are physically tagged. The numbers shown on the annotated survey correspond with the physical tags on-site. Off-site trees were assigned an alphabetical identifier for the purpose of this report but are not tagged.

Observations & Discussion

Site

The 300,284 square foot site fronts 34th Ave SW in West Seattle. A brick elementary school building, a parking lot, and play areas currently exist on-site. According to the Seattle SCDI GIS map, portions of this site are listed as Steep Slope Environmentally Critical Areas. (Figure 1)

Trees

Specific details about each tree on-site, including size, health condition, and a single-stem equivalent diameter value (for multi-stem trees) are listed in the attached table of trees.

On-site trees

There were 52 regulated trees on-site, present species were primarily Honeylocust (*Gleditsia triacanthos*), Norway maple (*Acer platanoides*), Bitter cherry (*Prunus emarginata var. mollis*), River birch (*Betula nigra*) and Black locust (*Robinia pseudoacacia*) trees. Three of these trees (#415, 419, 420) are in fair health condition and good structural condition. Two trees (#411, 430) are in good health condition but are in fair structural condition. The remaining 47 trees are in both good health and structural condition.

Three of the 52 regulated trees met the exceptional tree criteria as outlined in the Seattle Director's Rule 16-2008.[3]

Tree 405 is an exceptional London plane (*Platanus x acerifolia*) tree with DSH of 44 inches and is in good health and structural condition (Photo 1).

Tree 406 is a multi-stemmed exceptional Pacific madrone (*Arbutus menziesii*) tree with a DSH of 29 inches at the narrowest point below the union. It is in good health and structural condition, though we observed a small area of decay on the west side (Photos 2a, 2b).

Tree 432 is an exceptional Honeylocust (*Gleditsia triacanthos*) tree with a DSH of 22 inches. We observed heavy ivy growth on the central trunk of this tree.

Off-site trees

Sixteen trees required documentation for this property. Specific details about off-site trees can be found in the attached table of trees.

Trees G through L are all Norway Spruce (*Picea abies*) trees and make up a portion of an exceptional grove on the High Point Community Center that overhangs part of the West Seattle Elementary play field at the south east portion of the property. The City defines an exceptional grove as eight or more trees each with a diameter measuring twelve inches or greater with continuously overlapping canopies.

[3] Sugimura, D.W. "DPD Director's Rule 16-2008". Seattle, WA, 2009

Construction Impacts

This report is preliminary as we have not reviewed final construction plans for this site.

Planned Development

Based on the document provided by Paul Wight of Seattle Public Schools titled "7.1 West Seattle Elementary School" produced by BEX V MASTER PLANNING and dated February 2019, construction of an addition to the existing school building, improvements to play areas and additional landscaping are planned. At the time of this report, Tree Solutions has not been provided any grading plans or construction plans. Tree Solutions can provide comments and recommendations regarding tree impacts, retention and removal when a completed plan set is provided.

According to design schematic plans provided, the majority of the trees on-site are planned for retention, as they do not appear to be in conflict with planned development; however, Tree Solutions can discuss impacts to specific trees once finalized construction plans are provided.

Depending on required grading for landscape areas and playfields, trees 429 through 431 near the proposed learning garden, and trees 432 through 452 surrounding the existing playfield may require removal.

Any demolition of hardscape within the dripline of protected trees should be done by hand and be supervised by an ISA Certified Arborist.

Any excavation within the dripline of protected trees will require pneumatic air excavation and arborist monitoring.

All trees to be retained within the interior of the school site should be protected following the tree protection specifications outlined in Appendix B. This includes chain-link fencing surrounding all retained trees to, at a minimum, the dripline of the tree unless otherwise specified, and addition of wood chip mulch to mitigate the stress from construction impacts.

Recommendations

- Site planning around exceptional trees must follow the guidelines outlined in SMC 25.11.050[4].
- Site planning around trees in critical areas must follow the guidelines outlined in SMC 25.09.070[5].
- All pruning should be conducted by an ISA certified arborist and following current ANSI A300 specifications[6].
- Involve Tree Solutions in the development planning process early on to consult on tree retention and identify appropriate limits of disturbance.
- Provide finalized plan sets to Tree Solutions for recommendations around tree removal, retention and tree impacts.

[4] Seattle Municipal Code 25.11.050. General Provisions for Exceptional Trees

[5] Seattle Municipal Code 25.09.070 Standards for Trees and Vegetation in Critical Areas

[6] ANSI A300 (Part 1) – 2017 American National Standards Institute. American National Standard for Tree Care Operations: Tree, Shrub, and Other Woody Plant Maintenance: Standard Practices (Pruning). New York: Tree Care Industry Association, 2017.

Environmentally Critical Areas

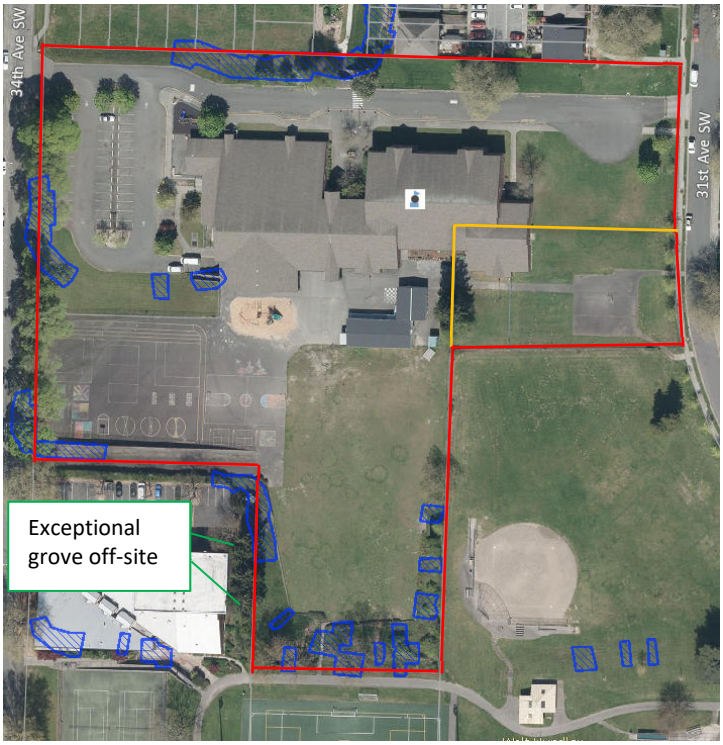


Figure 1. An aerial view of the site. The red lines indicate the approximate boundaries of the property. The orange lines indicate the discrepancy between the SDCI GIS map parcel boundary, and the most recent survey dated September 17, 2019. The blue diagonal lines indicate Steep Slope Environmentally Critical Areas (Image source: Seattle Department of Construction and Inspections GIS)

Photographs

Photograph 1. Tree 405, an exceptional London Plane.

Photograph 2a, b. Tree 406, an exceptional Pacific madrone with an area of decay on the west side.

Appendix A - Assumptions & Limiting Conditions

1. Consultant assumes that the Site and its use do not violate, and is in compliance with all applicable codes, ordinances, statutes or regulations.

2. The Consultant may provide report or recommendation based on published municipal regulations. The Consultant assumes that the municipal regulations published on the date of the report are current municipal regulations and assumes no obligation related to unpublished city regulation information.

3. Any report by Consultant and any values expressed therein represent the opinion of the Consultant, and the Consultant's fee is in no way contingent upon the reporting of a specific value, a stipulated result, the occurrence of a subsequent event, or upon any finding to be reported.

4. All photographs included in our reports were taken by Tree Solutions, Inc. during the documented Site visit, unless otherwise noted. Sketches, drawings and photographs in any report by Consultant, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys. The reproduction of any information generated by architects, engineers or other consultants and any sketches, drawings or photographs is for the express purpose of coordination and ease of reference only. Inclusion of such information on any drawings or other documents does not constitute a representation by Consultant as to the sufficiency or accuracy of the information.

5. Unless otherwise agreed, (1) information contained in any report by Consultant covers only the items examined and reflects the condition of those items at the time of inspection; and (2) the inspection is limited to visual examination of accessible items without dissection, excavation, probing, climbing, or coring.

6. These findings are based on the observations and opinions of the authoring arborist, and does not provide guarantees regarding the future performance, health, vigor, structural stability or safety of the plants described assessed.

7. Measurements are subject to typical margins of error, considering the oval or asymmetrical cross-section of most trunks and canopies.

8. Tree Solutions did not review any reports or perform any tests related to the soil located on the subject property unless outlined in the scope of services. Tree Solutions staff are not and do not claim to be soils experts. An independent inventory and evaluation of the site's soil should be obtained by a qualified professional if an additional understanding of the site's characteristics is needed to make an informed decision.

9. Our assessments are made in conformity with acceptable evaluation/diagnostic reporting techniques and procedures, as recommended by the International Society of Arboriculture.

Appendix B – Tree Protection Specifications

- **Tree Protection Fencing:** All trees planned for retention or on neighboring properties that overhang the site shall be protected for the entire duration of the construction project. Tree protection fencing shall consist of high visibility mesh or chain link fencing installed at the extent of the tree protection area. Where trees are being retained as a group the fencing should encompass the entire area.
- **Soil Protection:** No parking, materials storage, or dumping (including excavated soils) are allowed within the tree protection area. Any heavy machinery should remain outside of the protection area unless soils are protected from the load. Acceptable methods of soil protection include applying 1 inch plywood over 3 to 4 inches of wood chip mulch, or use of Alturna mats (or equivalent product).
- **Duff/Mulch:** Retain and protect as much of the existing duff and understory as possible. Retained trees in areas where there are exposed soils shall have 4 to 6 inches of wood chips applied to help prevent water evaporation and compaction. Keep mulch 1 foot away from the base of the tree.
- **Excavation:** Excavation done at or within the tree protection area should be carefully planned to minimize disturbance. Where feasible consider using alternative methods such as pneumatic excavation which uses pressurized air to blow soil away from the root system, directional drilling to bore utility lines, or hand excavation to expose roots. Excavation done with machinery (backhoe) in proximity of trees should be performed slowly with flat front buckets, removing small amounts of soil at a time with one person on the ground spotting for roots. When roots are encountered, excavation should stop and roots should be cleanly pruned as needed so they are not ripped or torn.
- **Root Pruning:** Root pruning should be limited to the extent possible. All roots shall be pruned with a sharp saw making clean cuts. Avoid fracturing and breaking roots with excavation equipment. Root cuts shall be immediately covered with soil or mulch and kept moist.
- **Irrigation:** Retained trees will require supplemental water if construction occurs during summer drought periods.
- **Pruning:** Any pruning required for construction and safety clearance shall be done with a pruning specification provided by the project arborist in accordance with American National Standards Institute ANSI A300 Standard Practices for Pruning. Use of an arborist with an International Society of Arboriculture Certification to perform pruning is strongly advised.

Tree Solutions Inc
Consulting Arborists

Table of Trees

6760 34th Ave SW, Seattle, WA 98126

Arborist: Sean Dugan
Date of Inventory: October 30, 2019
Table Prepared: November 14, 2019

DSH (Diameter at Standard Height) is measured 4.5 feet above grade, or as specified in the Guide for Plant Appraisal, 10th Edition , published by the Council of Tree and Landscape Appraisers.
DSH for multi-stem trees are noted as a single stem equivalent, which is calculated using the method defined in the Director's Rule 16-2008.
Letters are used to identify trees on neighboring property with overhanging canopies.
Dripline is measured from the center of the tree to the outermost extent of the canopy.

Tree ID	Scientific Name	Common Name	DSH (inches)	DSH Multistem	Health Condition	Structural Condition	N	E	S	W	Exceptional Threshold	Exceptional by Size	Notes
On-site Regulated Trees													
401	*Gleditsia triacanthos*	Honeylocust	8.0		Good	Good	14.0	14.0	14.0	14.0	*20.0*	-	Root infrastructure damage
402	*Gleditsia triacanthos*	Honeylocust	6.0		Good	Good	12.0	12.0	12.0	12.0	*20.0*	-	Root infrastructure damage
403	*Gleditsia triacanthos*	Honeylocust	10.3		Good	Good	14.0	14.0	14.0	14.0	*20.0*	-	Root infrastructure damage
404	*Gleditsia triacanthos*	Honeylocust	7.4		Good	Good	12.0	12.0	12.0	12.0	*20.0*	-	Root infrastructure damage
405	*Platanus x acerifolia*	London planetree	44.0		Good	Good	26.0	26.0	26.0	26.0	*30.0*	Exceptional	
406	*Arbutus menziesii*	Pacific madrone	29.0		Good	Good	20.0	20.0	20.0	20.0	*6.0*	Exceptional	Measured at narrowest point below union; small central area of decay between a canker area on the west side
407	*Prunus emarginata var. mollis*	Bitter cherry	6.7		Good	Good	9.0	9.0	9.0	9.0	*Not Exceptional except in grove*	-	
408	*Prunus emarginata var. mollis*	Bitter cherry	6.5		Good	Good	8.0	8.0	8.0	8.0	*Not Exceptional except in grove*	-	
409	*Prunus emarginata var. mollis*	Bitter cherry	6.4		Good	Good	8.0	8.0	8.0	8.0	*Not Exceptional except in grove*	-	Ivy on trunk
410	*Prunus emarginata var. mollis*	Bitter cherry	18.6	12,11,9	Good	Good	12.0	12.0	12.0	12.0	*Not Exceptional except in grove*	-	3 stems, narrow attachment, included bark at seams, gummosis at junctions, 2 inch hanging branch north east side
411	*Malus spp.*	Apple	11.4	6,3,3,3,4,5,5	Good	Fair	11.0	11.0	11.0	11.0	*30.0*	-	Canker present
412	*Malus spp.*	Apple	7.4	3,3,3,3.5,4	Good	Good	9.0	9.0	9.0	9.0	*30.0*	-	Very scrubby
413	*Acer platanoides*	Norway maple	14.0		Good	Good	16.0	16.0	16.0	16.0	*30.0*	-	Surface roots, girdling roots, root infrastructure damage
414	*Acer platanoides*	Norway maple	11.0		Good	Good	12.0	12.0	12.0	12.0	*30.0*	-	Surface roots, girdling roots
415	*Acer platanoides*	Norway maple	10.5		Fair	Good	10.0	10.0	10.0	10.0	*30.0*	-	Stunted growth
416	*Tilia cordata*	Littleleaf linden	9.8		Good	Good	11.0	11.0	11.0	11.0	*30.0*	-	Surface roots, compacted soil, girdling roots
417	*Acer platanoides*	Norway maple	8.1		Good	Good	10.0	10.0	10.0	10.0	*30.0*	-	Surface roots, girdling roots
418	*Acer platanoides*	Norway maple	10.1		Good	Good	12.0	12.0	12.0	12.0	*30.0*	-	Dumpster at base of tree
419	*Acer platanoides*	Norway maple	7.3		Fair	Good	9.0	9.0	9.0	9.0	*30.0*	-	Stunted, compacted
420	*Acer platanoides*	Norway maple	6.7		Fair	Good	9.0	9.0	9.0	9.0	*30.0*	-	Stunted, compacted
421	*Acer platanoides*	Norway maple	12.0		Good	Good	15.0	15.0	15.0	15.0	*30.0*	-	Root infrastructure damage
422	*Quercus palustris*	Pin oak	18.6		Good	Good	23.0	23.0	23.0	23.0	*30.0*	-	
423	*Acer platanoides*	Norway maple	10.2		Good	Good	15.0	15.0	15.0	15.0	*30.0*	-	
424	*Acer platanoides*	Norway maple	13.6		Good	Good	14.0	14.0	14.0	14.0	*30.0*	-	
425	*Betula nigra 'Heritage'*	River birch	6.1		Good	Good	12.0	12.0	12.0	12.0	*25.4*	-	
426	*Betula nigra 'Heritage'*	River birch	6.7		Good	Good	12.0	12.0	12.0	12.0	*25.4*	-	Surface roots
427	*Betula nigra 'Heritage'*	River birch	6.9		Good	Good	13.0	13.0	13.0	13.0	*25.4*	-	
428	*Betula nigra 'Heritage'*	River birch	7.5		Good	Good	14.0	14.0	14.0	14.0	*25.4*	-	
429	*Picea abies*	Norway spruce	22.8		Good	Good	18.0	18.0	18.0	18.0	*30.0*	-	
430	*Picea abies*	Norway spruce	15.8		Good	Fair	12.0	12.0	12.0	12.0	*30.0*	-	Resin flow at junction between trunks, canopy asymmetrical
431	*Betula papyrifera*	Paper birch	14.7		Good	Good	21.0	21.0	21.0	21.0	*20.0*	-	Possible bronze birch borer (*Agrilus anxius*) activity, known to be in the area
432	*Gleditsia triacanthos*	Honeylocust	22.0		Good	Good	25.0	25.0	25.0	25.0	*20.0*	Exceptional	Heavy ivy on trunk
433	*Calocedrus decurrens*	Incense cedar	19.1	13,14	Good	Good	7.0	7.0	7.0	7.0	*30.0*	-	Codominant at base, good junction
434	*Robinia pseudoacacia*	Black locust	7.8		Good	Good		12.0			*30.0*	-	Canopy asymmetric

Tree Solutions Inc
Consulting Arborists

Table of Trees

6760 34th Ave SW, Seattle, WA 98126

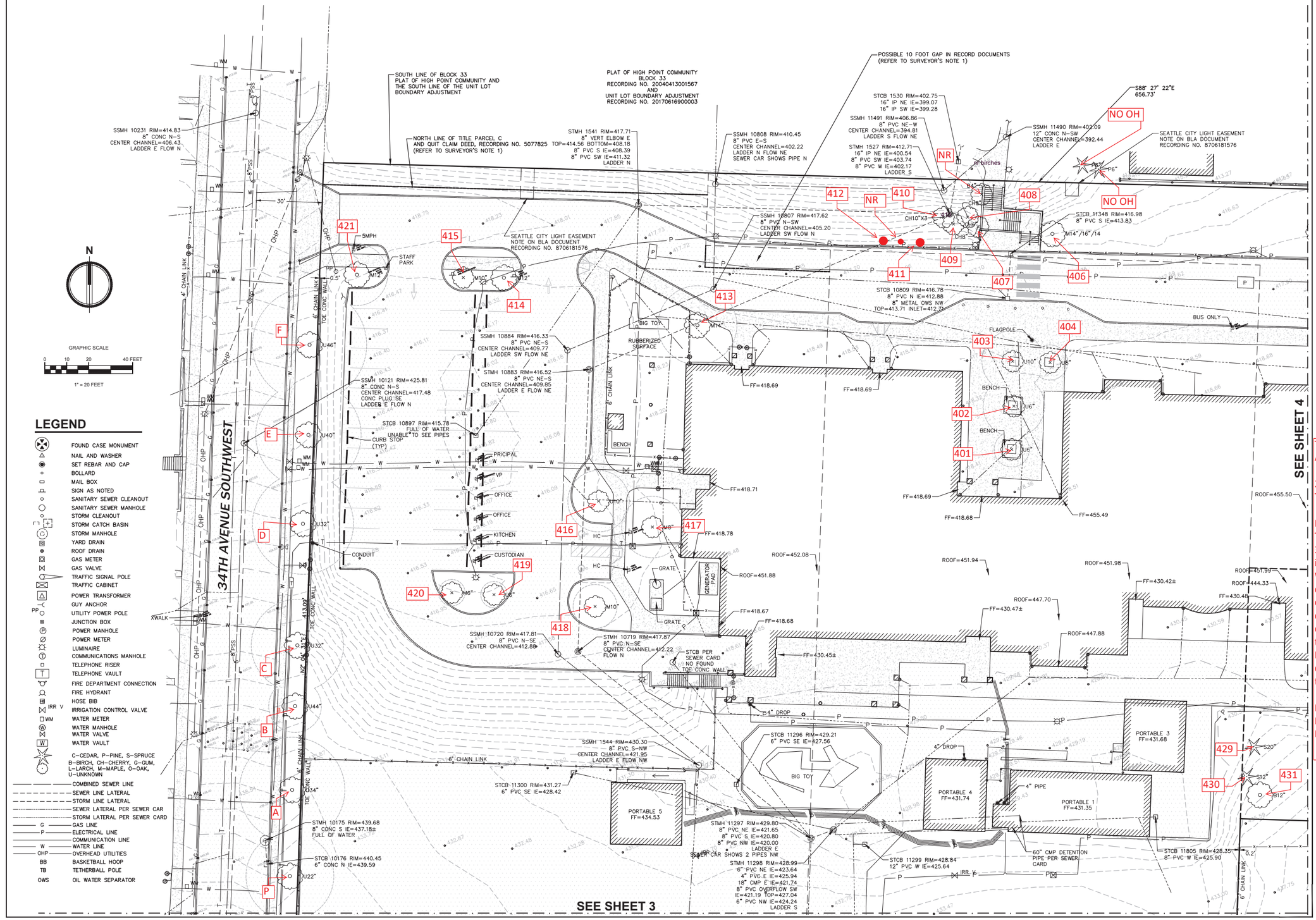
Arborist: Sean Dugan
Date of Inventory: October 30, 2019
Table Prepared: November 14, 2019

Tree ID	Scientific Name	Common Name	DSH (inches)	DSH Multistem	Health Condition	Structural Condition	N	E	S	W	Exceptional Threshold	Exceptional by Size	Notes
435	*Robinia pseudoacacia*	Black locust	6.4		Good	Good		12.0			*30.0*	-	Canopy asymmetric
436	*Robinia pseudoacacia*	Black locust	8.2		Good	Good		12.0			*30.0*	-	Canopy asymmetric
437	*Robinia pseudoacacia*	Black locust	7.5		Good	Good		12.0			*30.0*	-	Canopy asymmetric
438	*Robinia pseudoacacia*	Black locust	6.0		Good	Good		12.0			*30.0*	-	Canopy asymmetric
439	*Robinia pseudoacacia*	Black locust	11.8	7.5,9.1	Good	Good		12.0			*30.0*	-	Canopy asymmetric
440	*Robinia pseudoacacia*	Black locust	8.1		Good	Good		12.0			*30.0*	-	Canopy asymmetric
441	*Robinia pseudoacacia*	Black locust	7.7		Good	Good		12.0			*30.0*	-	Canopy asymmetric
442	*Robinia pseudoacacia*	Black locust	13.2	9,6.7,6.9	Good	Good		12.0			*30.0*	-	Canopy asymmetric
443	*Robinia pseudoacacia*	Black locust	6.0		Good	Good		12.0			*30.0*	-	Canopy asymmetric
444	*Robinia pseudoacacia*	Black locust	7.5		Good	Good		12.0			*30.0*	-	Canopy asymmetric
445	*Robinia pseudoacacia*	Black locust	12.4	9,8.5	Good	Good		12.0			*30.0*	-	Canopy asymmetric
446	*Robinia pseudoacacia*	Black locust	8.7		Good	Good		12.0			*30.0*	-	Canopy asymmetric
447	*Robinia pseudoacacia*	Black locust	6.8		Good	Good		12.0			*30.0*	-	Canopy asymmetric
448	*Robinia pseudoacacia*	Black locust	9.6	4.5,5.5,6.5	Good	Good		12.0			*30.0*	-	Canopy asymmetric
449	*Robinia pseudoacacia*	Black locust	9.1		Good	Good		12.0			*30.0*	-	Canopy asymmetric
450	*Robinia pseudoacacia*	Black locust	21.1	15,14,5	Good	Good			18.0		*30.0*	-	Heavy ivy on trunk
451	*Prunus emarginata var. mollis*	Bitter cherry	14.3	6,13	Good	Good	15.0	15.0	15.0	15.0	*Not Exceptional except in grove*	-	Heavy ivy on trunk
452	*Robinia pseudoacacia*	Black locust	24.0		Good	Good	22.0	22.0	22.0	22.0	*30.0*	-	Heavy ivy on trunk
Off-site Regulated Trees with Overhanging Canopies													
A	*Ulmus pumila*	Siberian elm	26.0		Fair	Fair		27.0			*30.0*	-	Estimated DSH
B	*Populus nigra 'Italica'*	Lombardy poplar	48.0		Fair	Good		15.0			*30.0*	-	Estimated DSH
C	*Ulmus pumila*	Siberian elm	24.0		Fair	Fair		6.0			*30.0*	-	Estimated DSH; significant dieback over school property
D	*Ulmus pumila*	Siberian elm	26.0		Good	Good		22.0			*30.0*	-	Estimated DSH
E	*Ulmus pumila*	Siberian elm	26.0		Good	Good		22.0			*30.0*	-	Estimated DSH
F	*Ulmus pumila*	Siberian elm	30.0		Good	Good		34.0			*30.0*	-	Estimated DSH; previously hat racked
G	*Picea abies*	Norway spruce	18.4	13,13	Good	Good		15.0			*30.0*	Grove	Estimated DSH; part of a larger grove that connects with the oak trees on the community center property
H	*Picea abies*	Norway spruce	15.0		Good	Good		15.0			*30.0*	Grove	Estimated DSH; part of a larger grove that connects with the oak trees on the community center property
I	*Picea abies*	Norway spruce	16.0		Good	Good		15.0			*30.0*	Grove	Estimated DSH; part of a larger grove that connects with the oak trees on the community center property
J	*Picea abies*	Norway spruce	12.0		Good	Good		15.0			*30.0*	Grove	Estimated DSH; part of a larger grove that connects with the oak trees on the community center property
K	*Picea abies*	Norway spruce	17.0		Good	Good		15.0			*30.0*	Grove	Estimated DSH at narrowest point below union; part of a larger grove that connects with the oak trees on the community center property
L	*Picea abies*	Norway spruce	14.0		Good	Good		15.0			*30.0*	Grove	Estimated DSH; part of a larger grove that connects with the oak trees on the community center property
M	*Pinus contorta var. contorta*	Shore pine	6.0		Good	Good		4.0			*12.0*	-	Estimated DSH
N	*Ulmus pumila*	Siberian elm	25.0		Fair	Fair		17.0			*30.0*	-	Moderate density of medium deadwood in canopy overhanging playground area
O	*Ulmus pumila*	Siberian elm	26.0		Good	Good		18.0			*30.0*	-	
P	*Ulmus pumila*	Siberian elm	24.0		Fair	Fair		16.0			*30.0*	-	Deadwood overhanging playground area

WEST SEATTLE ELEMENTARY SCHOOL

A PORTION OF THE SW 1/4 OF THE NW 1/4 OF SEC. 25, TWN. 24 N., RGE. 03 E. W.M.

CITY OF SEATTLE, KING COUNTY, WASHINGTON.



N

GRAPHIC SCALE

0 10 20 40 FEET

1" = 20 FEET

LEGEND

- FOUND CASE MONUMENT
- NAIL AND WASHER
- SET REBAR AND CAP
- BOLLARD
- MAIL BOX
- SIGN AS NOTED
- SANITARY SEWER CLEANOUT
- SANITARY SEWER MANHOLE
- STORM CLEANOUT
- STORM CATCH BASIN
- STORM MANHOLE
- YARD DRAIN
- ROOF DRAIN
- GAS METER
- GAS VALVE
- TRAFFIC SIGNAL POLE
- TRAFFIC CABINET
- POWER TRANSFORMER
- GUY ANCHOR
- UTILITY POWER POLE
- JUNCTION BOX
- POWER MANHOLE
- POWER METER
- LUMINAIRE
- COMMUNICATIONS MANHOLE
- TELEPHONE RISER
- TELEPHONE VAULT
- FIRE DEPARTMENT CONNECTION
- FIRE HYDRANT
- HOSE BIB
- IRRIGATION CONTROL VALVE
- WATER METER
- WATER MANHOLE
- WATER VALVE
- WATER VAULT
- C-CEDAR, P-PINE, S-SPRUCE B-BIRCH, CH-CHERRY, G-GUM, L-LARCH, M-MAPLE, O-OAK, U-UNKNOWN
- COMBINED SEWER LINE
- SEWER LINE LATERAL
- STORM LINE LATERAL
- SEWER LATERAL PER SEWER CAR
- STORM LATERAL PER SEWER CARD
- GAS LINE
- ELECTRICAL LINE
- COMMUNICATION LINE
- WATER LINE
- OVERHEAD UTILITIES
- BB BASKETBALL HOOP
- TB TETHERBALL POLE
- OWS OIL WATER SEPARATOR

AHBL
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Project Title:

WEST SEATTLE ELEMENTARY SCHOOL

Client:

SEATTLE
PUBLIC SCHOOLS

PO BOX 34165
SEATTLE, WA 98124-1165

PAUL WIGHT

Job No.

2190525.50

Issue Set & Date:

SEPTEMBER 17, 2019

DAVID C. FOLLANSBEE
STATE OF WASHINGTON
45161
REGISTERED
PROFESSIONAL LAND SURVEYOR

Tree Solutions Inc.
Arborist: Sean Dugan, Andrea Starbird

206-528-4670
Tree Inventory

November 14, 2019
Tree inventory took place on October 30, 2019 and included all trees 6-inches diameter or greater on the site. We also assessed trees with overhanging canopies. Tree icons used on the survey do not denote canopy drip lines. Drip line measurements and other tree specifics are listed in the tree table produced by Tree Solutions Inc. and should be added to this drawing prior to any design relating to tree protection.

NR - not regulated
MS - multistemmed
NO OH - no overhang
● - not on survey

TOPOGRAPHIC SURVEY

Designed by: TD | Drawn by: | Checked by: DF

Sheet No.

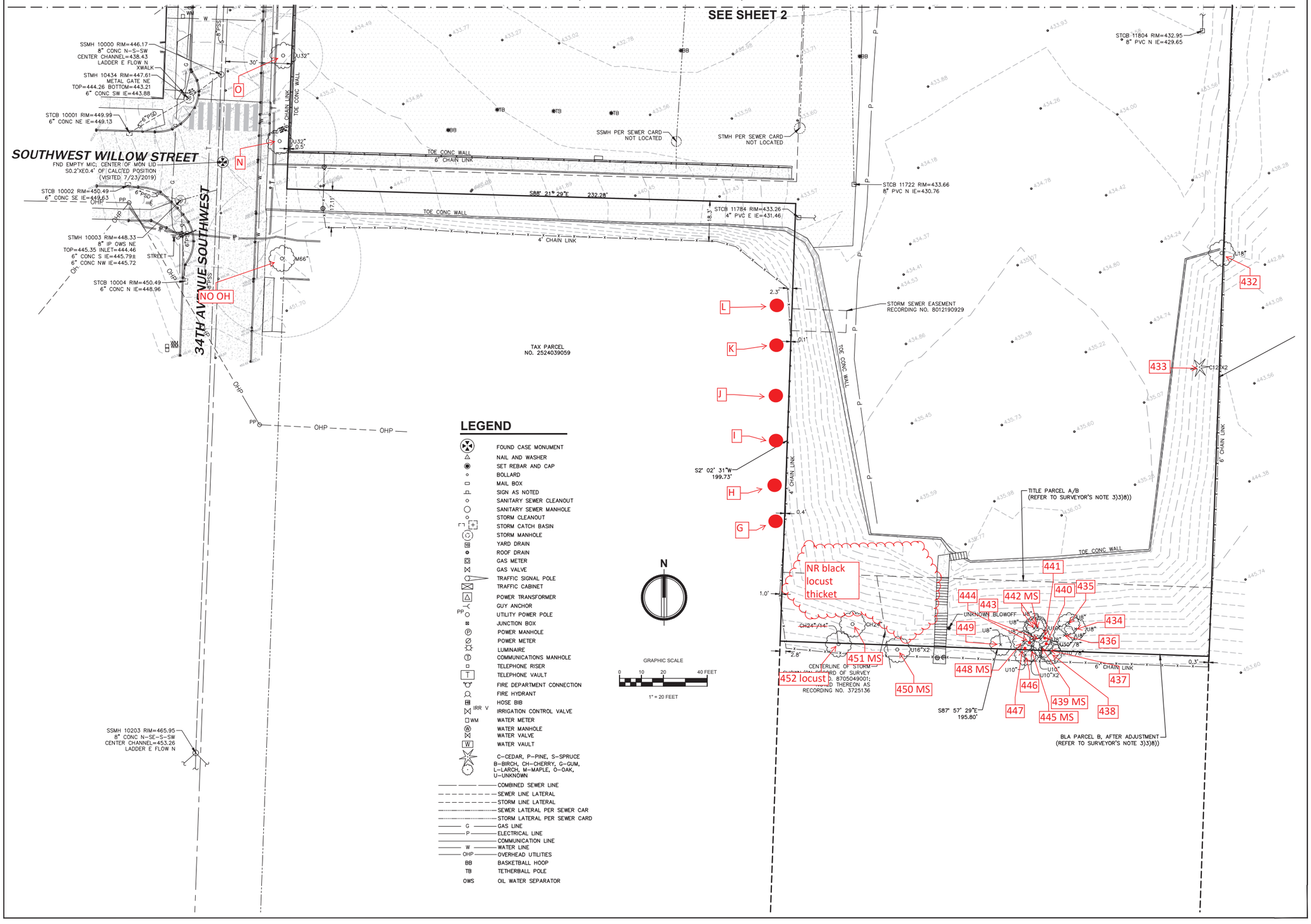
2

2 of 4 Sheets

WEST SEATTLE ELEMENTARY SCHOOL

A PORTION OF THE SW 1/4 OF THE NW 1/4 OF SEC. 25, TWN. 24 N., RGE. 03 E. W.M.

CITY OF SEATTLE, KING COUNTY, WASHINGTON.



LEGEND

- FOUND CASE MONUMENT
- NAIL AND WASHER
- SET REBAR AND CAP
- BOLLARD
- MAIL BOX
- SIGN AS NOTED
- SANITARY SEWER CLEANOUT
- SANITARY SEWER MANHOLE
- STORM CLEANOUT
- STORM CATCH BASIN
- STORM MANHOLE
- YARD DRAIN
- ROOF DRAIN
- GAS METER
- GAS VALVE
- TRAFFIC SIGNAL POLE
- TRAFFIC CABINET
- POWER TRANSFORMER
- GUY ANCHOR
- UTILITY POWER POLE
- JUNCTION BOX
- POWER MANHOLE
- POWER METER
- LUMINAIRE
- COMMUNICATIONS MANHOLE
- TELEPHONE RISER
- TELEPHONE VAULT
- FIRE DEPARTMENT CONNECTION
- FIRE HYDRANT
- HOSE BIB
- IRR V — IRRIGATION CONTROL VALVE
- WM — WATER METER
- WATER MANHOLE
- WATER VALVE
- WATER VAULT
- C—CEDAR, P—PINE, S—SPRUCE B—BIRCH, CH—CHERRY, G—GUM, L—LARCH, M—MAPLE, O—OAK, U—UNKNOWN
- COMBINED SEWER LINE
- SEWER LINE LATERAL
- STORM LINE LATERAL
- SEWER LATERAL PER SEWER CAR
- STORM LATERAL PER SEWER CARD
- G — GAS LINE
- P — ELECTRICAL LINE
- COMMUNICATION LINE
- W — WATER LINE
- OHP — OVERHEAD UTILITIES
- BB — BASKETBALL HOOP
- TB — TETHERBALL POLE
- OWS — OIL WATER SEPARATOR

AHBL
TACOMA • SEATTLE • SPOKANE • TRI-CITIES
2215 North 30th Street, Suite 300 Tacoma, WA 98403
253.383.2422 TEL 253.383.2572 FAX www.ahbl.com WEB

Project Title:

WEST SEATTLE ELEMENTARY SCHOOL

Client:

SEATTLE PUBLIC SCHOOLS

PO BOX 34165
SEATTLE, WA 98124-1165

PAUL WIGHT

Job No.

2190525.50

Issue Set & Date:

SEPTEMBER 17, 2019

DAVID C. FOLLANSBEE — STATE OF WASHINGTON — 45101 REGISTERED PROFESSIONAL LAND SURVEYOR

Revisions:

Sheet Title:

TOPOGRAPHIC SURVEY

Designed by:	Drawn by:	Checked by:
	TD	DF

Sheet No.

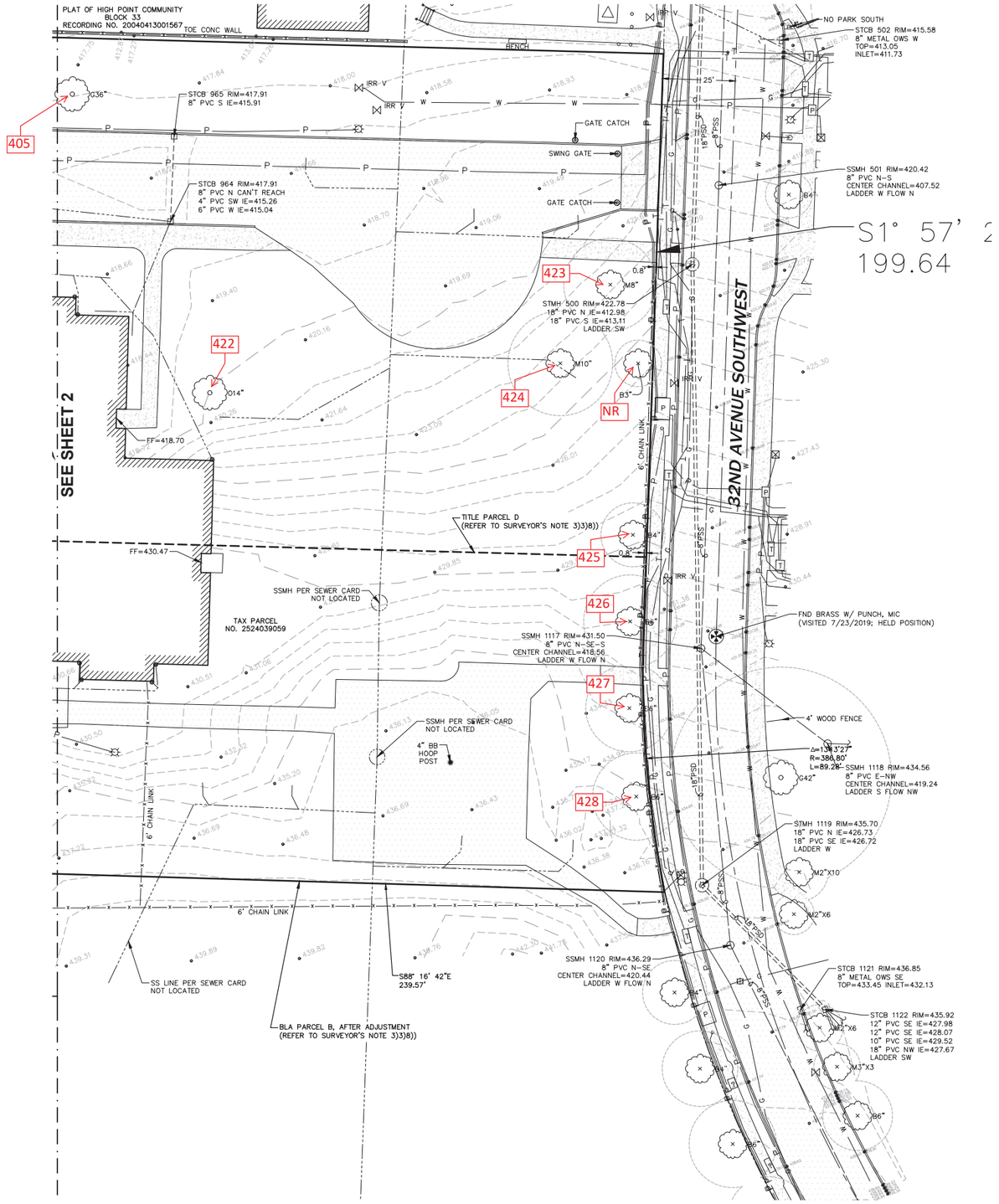
3

3 of 4 Sheets

WEST SEATTLE ELEMENTARY SCHOOL

A PORTION OF THE SW 1/4 OF THE NW 1/4 OF SEC. 25, TWN. 24 N., RGE. 03 E. W.M.

CITY OF SEATTLE, KING COUNTY, WASHINGTON.



N

GRAPHIC SCALE

0 10 20 40 FEET

1" = 20 FEET

LEGEND

	FOUND CASE MONUMENT
	NAIL AND WASHER
	SET REBAR AND CAP
	BOLLARD
	MAIL BOX
	SIGN AS NOTED
	SANITARY SEWER CLEANOUT
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	GAS VALVE
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	TRAFFIC CABINET
	POWER TRANSFORMER
	GUY ANCHOR
PP	UTILITY POWER POLE
	JUNCTION BOX
P	POWER MANHOLE
	POWER METER
	LUMINAIRE
T	COMMUNICATIONS MANHOLE
	TELEPHONE RISER
T	TELEPHONE VAULT
	FIRE DEPARTMENT CONNECTION
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BB	BASKETBALL HOOP
TB	TETHERBALL POLE
OWS	OIL WATER SEPARATOR

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Project Title:

WEST SEATTLE ELEMENTARY SCHOOL

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SEATTLE
PUBLIC SCHOOLS

PO BOX 34165
SEATTLE, WA 98124-1165

PAUL WIGHT

Job No.

2190525.50

Issue Set & Date:

SEPTEMBER 17, 2019

DAVID C. FOLLANSBEE
STATE OF WASHINGTON
45101
REGISTERED
PROFESSIONAL LAND SURVEYOR

3 _____

2 _____

1 _____

Revisions:

Sheet Title:

TOPOGRAPHIC SURVEY

Designed by:	Drawn by:	Checked by:
	TD	DF

Sheet No.

4

4 of 4 Sheets

Appendix E

LIMITED HAZARDOUS MATERIALS BUILDING SURVEY REPORT

Preliminary Limited Hazardous Materials Survey Report

West Seattle Elementary School Modernization

6760 34th Ave SW, Seattle, WA 98126
Seattle, WA 98101

Prepared for:
Seattle Public Schools
Mail Stop 22-331
PO Box 34165
Seattle, WA

March 17, 2020
PBS Project No. 40008.261

PBS
2517 EASTLAKE AVENUE EAST
SUITE 100
SEATTLE, WA 98102
206.233.9639 MAIN
866.727.0140 FAX
PBSUSA.COM

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Project Background

PBS Engineering and Environmental, Inc. (PBS) performed a limited hazardous materials survey of West Seattle Elementary School located at 6760 34th Ave SW in Seattle, Washington. The intent of this investigation is to ensure that Seattle Public Schools to provide preliminary information on the disposition of hazardous materials at the building in conjunction with planning of renovations.

At the request of Seattle Public Schools, the majority of accessible interior areas of the building were inspected for the presence of Asbestos-Containing Materials (ACMs) and Lead Containing Paint (LCP).

The West Seattle Elementary School is a two-story concrete/masonry structure constructed in 1988. The following interior finishes were observed in the building. Floors are carpeted in classrooms and with 12" vinyl floor tile in front of sinks and throughout the hallways. Walls consist of gypsum wallboard and vinyl base trim. Ceilings throughout the whole place consists of gypsum wallboard, 12" glued-on ceiling tiles, 2'x4' suspended ceiling tiles. Exterior walls consist of concrete, brick and mortar. Roofing consist of composite shingles throughout the pitched roof.

1.2 Survey Process

Accessible areas included in the project scope were inspected by AHERA Certified Building Inspector Cel Alvarez (Cert. No. 176590 Exp. 1/22/21) on January 17, 2020. PBS endeavored to inspect all accessible areas within the scope of work. Inaccessible areas consist of those requiring selective demolition, fall protection, or confined space entry protocols in order to gain access.

When observed, suspect materials were sampled. All samples were assigned a unique identification number and transmitted for analysis to Seattle Asbestos Test (NVLAP #201057-0) under chain-of-custody protocols. Samples were analyzed according to EPA Method 600R-93/116 using Polarized Light Microscopy (PLM), which has a reliable limit of quantification of 1% asbestos by volume. Information regarding the type and location of sampled materials can be found on the attached PLM Sample Inventory.

PBS reviewed historical survey data collected. Pertinent information has been incorporated into our investigation and summaries of historical sampling can be found in Appendix D.

Suspect ACMs may exist in inaccessible areas of West Seattle Elementary School. PBS endeavored to determine the presence and estimate the condition of suspect materials in all accessible areas. While PBS has endeavored to identify the ACM that may be found in concealed locations, additional unidentified ACM may exist.

PBS has not inspected certain portions of the building at this time, including the roof, kitchen, bathrooms and various support spaces. These areas will be inspected, and any suspect ACMs and representative LCP will be sampled as appropriate.

2 FINDINGS

2.1 Asbestos-Containing Materials (ACMs)

Nine (9) bulk samples were collected of suspect asbestos-containing materials as part of this investigation.

- None of the materials sampled were found to contain detectable asbestos.

The following materials were sampled and found to contain no asbestos:

- Carpet mastic – throughout;
- 12" Black vinyl floor tile with black mastic – throughout;
- 4" Black cove base with cream mastic - throughout;
- 12" White ceiling tile with mastic -throughout;
- Window caulking – throughout;
- Door caulking – throughout;
- White sink undercoat – throughout;
- 2' x 4' ceiling panel (fissure pattern) - throughout – (Previous Data);
- Joint compound and gypsum wallboard – throughout – (Previous Data).

Refer to Appendix A for a complete listing of current PLM bulk sampling and associated laboratory analysis. See Appendix D for historical sampling information.

Roofing materials, ceramic tiles and associated mortar, sealants, mastics, insulations, etc. require confirmation sampling to confirm asbestos content. These and any other suspect ACMs that may exist in portions of the building not accessed to date will be sampled for asbestos content as appropriate.

2.2 Lead-Containing Paint (LCP)

Sampling of representative painted coatings for the presence of lead is pending. Low concentrations of lead are expected to exist in select painted coatings at various locations throughout the building. Impact of painted surfaces with detectable concentrations of lead requires construction activities to be performed according to Washington Labor and Industries regulations for Lead in Construction.

2.3 Mercury-Containing Components

All fluorescent light tubes are presumed to contain mercury. PBS counted the number of fluorescent tubes in the work area for the purposes of mercury vapor recovery prior to demolition activities. Approximately, 1,100 four-foot and four (4) two-foot fluorescent bulbs were identified during PBS survey. Caution should be exercised during demolition to prevent breakage of mercury-containing lamps/compact fluorescent tubes.

2.4 PCB-Containing Components

PBS used a Phillips Ballast Checker to inspect all fluorescent light fixture ballasts throughout the building.

- All light fixture ballasts inspected were observed to be electronic.

The potential exists for magnetic, suspect PCB-containing ballasts to exist in older light fixtures. Any such ballasts encountered should be considered PCB-containing and properly handled, containerized, transported and disposed of per applicable regulations. PBS recommends all light ballasts be visually inspected prior to disposal.

3 RECOMMENDATIONS

3.1 ACMs

The possibility exists that suspect ACM may be present in equipment, wall and ceiling cavities, and in select areas included in the scope of renovations. These may include, but are not limited to pipe insulation, below slab components vapor barriers, and construction adhesives and wall mastics. In the event that suspect ACM is uncovered during construction, contractors should stop work immediately and inform the owner promptly for confirmation testing. All untested materials should be presumed asbestos-containing or tested for asbestos content prior to impact.

3.2 LCP

Low concentration of lead in paint coatings may exist in inaccessible areas of the building or in secondary coatings on building components. Any previously unidentified painted coatings should be considered lead containing until sampled and proven otherwise.

Impact of paint with detectable concentrations of lead requires construction activities to be performed in accordance with the State of Washington Department of Labor and Industries regulation for Lead in Construction (WAC 296-155-176).

All construction activities performed in pre-1978 residential buildings require compliance with the EPA and State of Washington lead paint regulations including but not limited to 40 CFR 745 Renovation, Repair and Painting (RRP) program regulations.

3.3 Mercury-Containing Components

Fluorescent lamps are known to contain mercury and mercury vapors. All fluorescent lamps at this site are presumed to be mercury-containing. PBS recommends that all fluorescent lamps be carefully handled and recycled/disposed of in accordance with the contract documents and applicable regulations during demolition activities. Breakage of lamps should be avoided to prevent potential exposures to mercury. Washington Department of Safety and Health requires specific training, handling, engineering controls and disposal practices when performing this work. All waste shall be handled in accordance with WAC 173-303.

3.4 PCB-Containing Components

PBS recommends all light ballasts be inspected prior to disposal. Magnetic ballasts should be presumed to contain PCBs and properly removed, stored, transported and disposed of in accordance with Washington Administrative Code (WAC) 173-303 Dangerous Waste Regulations and 40 CFR Part 761 Subpart D. Electronic ballasts do not contain PCBs and can be disposed of as general debris in compliance with applicable codes and endpoint facility requirements.

Report prepared by:

Cel Alvarez
AHERA Building Inspector
Cert. #176590 Exp. 1/24/2020

Report reviewed by:

Tim Ogden
Principal/ Sr. Project Manager,
AHERA Building Inspector
Cert. #IR-19-2008A, Exp. 4/02/2020

APPENDIX A

PLM Asbestos Bulk Sampling Information

PLM Asbestos Bulk Sample Inventory

PLM Asbestos Bulk Sample Laboratory Data Sheets

Chain of Custody

PLM ASBESTOS SAMPLE INVENTORY

PBS Sample #	Material Type	Sample Location	Lab Description	Lab Result	Lab
40008.248 -01	12" Beige vinyl floor tile w/ tan mastic	2nd Floor, hallway by Room 112	Layer 1: Trace yellow mastic with debris Layer 2: Beige/off-white tile Layer 3: Yellow mastic	NAD NAD NAD	SAT
40008.248 -02	12" Beige vinyl floor tile w/ tan mastic	1st Floor, Hallway	Layer 1: Trace clear/yellow mastic Layer 2: Beige/off-white tile Layer 3: Yellow/clear mastic with debris	NAD NAD NAD	SAT
40008.248 -03	12" Beige vinyl floor tile w/ tan mastic under carpet	1st Floor, Room 8	Layer 1: Beige/off-white tile Layer 2: Yellow mastic Layer 3: Trace gray brittle material	NAD NAD NAD	SAT
40008.248 -04	4" beige cove base Tan mastic	2nd Floor by Room 8	Layer 1: Beige/brown rubbery material Layer 2: Tan/yellow mastic Layer 3: Trace white powdery material	NAD NAD NAD	SAT
40008.248 -05	4" black cove base Cream mastic	1st Floor hallway	Layer 1: Black rubber material Layer 2: Off-white matic Layer 3: Trace white powdery material with paint	NAD NAD NAD	SAT
40008.248 -06	12" White ceiling tile Brown mastic	2nd Floor, hallway by elevator lobby	Layer 1: Gray fibrous material with paint Layer 2: Brown mastic	NAD NAD	SAT
40008.248 -07	Window caulking	North elevation, exterior	Layer 1: Gray soft/elastic	NAD	SAT
40008.248 -08	Dook caulking	2nd Floor, SE doors	Layer 1: Gray solft/elastic material with trace paint	NAD	SAT

PLM ASBESTOS SAMPLE INVENTORY

PBS Sample #	Material Type	Sample Location	Lab Description	Lab Result	Lab
40008.248 -09	White sink undercoat	1st Floor Health Office	Layer 1: White soft/loose material	NAD	SAT

SEATTLE ASBESTOS TEST, LLC

Seattle Laboratory: 4500 9th Ave. NE, Suite 300, Seattle, WA 98105, Tel: 206.633.1111, Fax: 206.633.4747, NVLAP Lab Code: 201057-0

www.seattleasbestostest.com, admin@seattleasbestostest.com

Project Manager:	Mr. Tim Ogden, Mr. Cel Alvarez, Ms. Eman Jabali	Date Analyzed:	1/23/2020
Client:	PBS Engineering and Environmental, Seattle	Client Job#:	40008.261
Address:	214 E Galer Street, Suite 300, Seattle, WA 98102	Project Location:	West Seattle Elem. School
Tel:	206.233.9639	Laboratory batch#:	202019097
		Samples Received:	9

Enclosed please find the test results for the bulk samples submitted to our laboratory for asbestos analysis. Analysis was performed using polarized light microscopy (PLM) in accordance with Test Method US EPA - 40 CFR Appendix E of Part 763, Interim Method of Determination of Asbestos in Bulk Insulation Samples and Test Method US EPA/600/R-93/116.

Percentages for this report are done by visual estimate and relate to the suggested acceptable error ranges by the method. Since variation in data increases as the quantity of asbestos decreases toward the limit of detection, the EPA recommends point counting for samples containing between <1% and 10% asbestos (NESHAP, 40 CFR Part 61). Statistically, point counting is a more accurate method. If you feel a point count might be beneficial, please feel free to call and request one.

The test results refer only to the samples or items submitted and tested. The accuracy with which these samples represent the actual materials is totally dependent on the acuity of the person who took the samples. This report must not be used by the client to claim product certification, approval, or endorsement by Seattle Asbestos Test, LLC, NVLAP, NIST, or any agency of the Federal government. The test report or calibration certificate shall not be reproduced except in full, without written approval of the laboratory.

This report is highly confidential and will not be released without your consent. Samples are archived for 30 days after the analysis, and disposed of as hazardous waste thereafter.

Thank you for using our service and let us know if we can further assist you.

Sincerely

SZhang

Steve (Fanyao) Zhang
President

202019097

LABORATORY CHAIN OF CUSTODY

Project: West Seattle Elem. School **Project #:** 400068.261

Analysis requested: PLM **Date:** 1-22-20

Relinq'd by/Signature: [signature] **Date/Time:** 1-22-2020 12:16

Received by/Signature: Carolyn Yeo [signature] **Date/Time:** 1-22-2020 12:25

Analyzed by: Carolyn Yeo [signature] Date/Time: 1-23-2020 9:05

E-mail results to:

- ☐ Brian Stanford
- ☐ Willem Mager
- ☐ Gregg Middaugh
- ☐ Mark Hiley
- ☒ Tim Ogden
- ☐ Ryan Hunter
- ☐ Prudy Stoudt-McRae
- ☒ Cel Alvarez
- ☐ Janet Murphy
- ☐ Kaitlin Soukup
- ☐ Martin Estira
- ☐ Holly Tuttle
- ☐ Filmon Embaye
- ☐ Mike Smith
- ☐ Ferman Fletcher
- ☒ ~~Melissa Mearns~~ Eman Jabali

TURN AROUND TIME:

- ☐ 1 Hour
- ☐ 2 Hours
- ☐ 4 Hours
- ☒ 24 Hours
- ☐ 48 Hours
- ☐ 3-5 Days
- ☐ Other_____

SAMPLE DATA FORM

Sample #	Material	Location	Lab
400068.261-01	12" Beige VFT w/ tan mastic	2nd Fl, Hallway by Rm 112	SAT
-02	↓	1st Fl, Hallway	
-03	12" Beige VFT w/ tan mastic under carpet	1st Fl, Rm 80	
-04	4" Beige Cove Base, Tan Mastic	2nd Fl, By Rm 112	
-05	4" Black Cove Base, Cream mastic	1st Fl, Hallway	
-06	12" White Ceiling Tile w/ brown mastic	2nd Fl, Hallway by Elevator lobby	
-07	Window Caulk	10. Elevation Exterior	
-08	Door Caulk	2nd FL SE Doors	
-09	White sink undercoat	1st Floor, Health office	

SEATTLE ASBESTOS TEST

Seattle Laboratory: 4500 9th Ave. NE, Suite 300, Seattle, WA 98105, Tel: 206.633.1111, Fax: 206.633.4747, NVLAP Lab Code: 201057-0

ANALYTICAL LABORATORY REPORT

PLM by Method EPA/600/R-93/116

Attn.:	Mr. Tim Ogden, Mr. Cel Alvarez, Ms. Eman Jabali	**Client:**	PBS Engineering and Environmental, Seattle	**Address:**	214 E Galer Street, Suite 300, Seattle, WA 98102
Job#:	40008.261	**Batch#:**	202019097	**Date Received:**	1/22/2020
Samples Rec'd:	9	**Date Analyzed:**	1/23/2020	**Samples Analyzed:**	9
Project Loc.:	West Seattle Elem. School				

Analyzed by: Carolyn Yeo

Reviewed by: Steve (Fanyao) Zhang, President

Lab ID	Client Sample ID	Layer	Description	%	Asbestos Fibers	Non-fibrous Components	%	Non-asbestos Fibers
1	40008.261-01	1	Trace yellow mastic with debris		**None detected**	Mastic/binder, Debris	5	Cellulose
		2	Beige/off-white tile		**None detected**	Vinyl/binder, Mineral grains	2	Cellulose
		3	Yellow mastic		**None detected**	Mastic/binder	3	Cellulose
2	40008.261-02	1	Trace clear/yellow mastic		**None detected**	Mastic/binder	3	Cellulose
		2	Beige/off-white tile		**None detected**	Vinyl/binder, Mineral grains	2	Cellulose
		3	Yellow/clear mastic with debris		**None detected**	Mastic/binder, Debris	4	Cellulose
3	40008.261-03	1	Beige/off-white tile		**None detected**	Vinyl/binder, Mineral grains	2	Cellulose
		2	Yellow mastic		**None detected**	Mastic/binder	3	Cellulose
		3	Trace gray brittle material		**None detected**	Binder, Filler	2	Cellulose
4	40008.261-04	1	Beige/brown rubbery material		**None detected**	Rubber/binder	2	Cellulose
		2	Tan/Yellow mastic		**None detected**	Mastic/binder	2	Cellulose
		3	Trace white powdery material		**None detected**	Binder, Filler	3	Cellulose
5	40008.261-05	1	Black rubbery material		**None detected**	Rubber/binder	2	Cellulose
		2	Off-white mastic		**None detected**	Mastic/binder	2	Cellulose
		3	Trace white powdery material with paint		**None detected**	Binder, Filler, Paint	3	Cellulose
6	40008.261-06	1	Gray fibrous material with paint		**None detected**	Paint, Filler, Perlite	67	Cellulose
		2	Brown mastic		**None detected**	Mastic/binder	2	Cellulose
7	40008.261-07	1	Gray soft/elastic material with trace paint		**None detected**	Binder, Filler, Paint	3	Cellulose
8	40008.261-08	1	Gray soft/elastic material with trace paint		**None detected**	Binder, Filler, Paint	2	Cellulose
9	40008.261-09	1	White soft/loose material		**None detected**	Filler, Fine particles	4	Cellulose

APPENDIX B

Historical Sampling Data

138 S.W. 154th Street
Suite B
Burien, WA. 98166
Phone: 206.244.1060
Fax: 206.244.1063

NORTHERN
Laboratory & Consulting Services, Inc.

February 25, 2008

Mr. Robert Shore
SEATTLE PUBLIC SCHOOLS
Project Manager
Mail Stop 21-350
P.O. Box 34165
Seattle, Washington 98124-1165

Transmitted via E-Mail to: rqshore@seattleschools.org

NLCS Project No. 0070-073.009

RE: Good Faith Inspection Letter
High Point Elementary School - Wireless Microphone Project

Dear Robert:

On January 2, 2008, Jason Carlson, (Asbestos Inspector Certification #: 10270065 / Certification Expiration Date: 12/25/08), from Northern Laboratory & Consulting Services, Inc. (NLCS) conducted a targeted regulated building materials investigation of classrooms within of High Point Elementary School located at 6760 34th Ave SW in Seattle, Washington (subject property).

The inspection included the sampling of suspect asbestos-containing materials (ACM), and the assessment of suspect lead-containing paints (LCP).

The purpose of the asbestos survey was to provide information in order to meet the AHERA asbestos sampling protocol as stated in 40 CFR 763.86. This sampling protocol is required for all asbestos surveys prior to renovation or demolition of a building under the Washington State Department of Ecology.

In addition, the survey assists the building owner in meeting the "Good Faith Inspection" requirements as stated in Washington Administrative Code 296-62-07721, (Communication of Hazards to Employees). Under the regulation, the Owner of a building to be renovated or demolished must present a contractor with a written statement whether the materials to be disturbed contain asbestos prior to submitting a bid.

The lead paint assessment was performed in order to provide information to assist in complying with WAC 296-155-176, lead-in-construction and WAC 296-173-303. The lead-in-construction regulations are designed to protect workers from lead hazards during renovation, demolition, and other types of construction projects which may impact lead-containing materials.

PROJECT INFORMATION

Seattle Public Schools is planning a renovation project involving the installation of wireless microphone/amplified sound systems within the majority of existing elementary school classrooms throughout the district.

Based on our conversations and brief pre-site evaluation walk through of representative classrooms at three (3) separate school sites on October 1, 2007, NLCS understand that the installation of the system involves the following tasks:

- Installation of a wall mounted head unit/receiver device near an existing electrical receptacle;
- Installation of ceiling mounted audio speakers at a central location within the classroom;
- Installation of a ceiling mounted signal sensing device at a central location within the classroom near the above speaker location.

Generally speaking the installation of the system would involve various attachments to existing wall and ceiling surfaces within the classrooms. The head unit/receiver will plug directly into the existing electrical receptacle. No new electrical or data work is anticipated to be required to support the system.

WORK AREA DESCRIPTION

Installation of the wireless microphone/amplified sound system is presumed to require attachments to the following surfaces within typical classrooms at High Point Elementary:

Wall Surfaces

- Primarily gypsum wallboard;
- Chalkboards, white boards, and tack board;
- Wood casework and shelving etc.,

Ceiling Surfaces

- Typical classrooms have suspended metal grid ceilings with 2'x4' lay-in type panels. The ceiling panels appear to be homogenous throughout the school.
- Ceiling space areas above the lay-in panels are corrugated metal pan decking and steel structural beams;
- In addition, ceiling space areas above the lay-in panels contain non-insulated sprinkler piping, sheet metal HVAC ducting, plumbing piping insulated with fiberglass, and various metal conduit system.

Suspect Asbestos-Containing Materials within Typical Classrooms

The following suspect ACM are present within classrooms, however they are not anticipated to be disturbed by the installation process. All necessary precautions shall be taken to ensure that these materials are not disturbed by any portion of the work.

- Vinyl floor tiles and associated mastic at select portions of classrooms within the project area;
- Adhesive associated with carpeting located throughout most classrooms within the project area;
- Stainless steel sinks with suspect ACM undercoating within existing casework;
- Vinyl wall base and associated mastic located at gypsum wallboard walls (bottom 4" only) throughout the entire project area.

METHODS OF THE SURVEY

Asbestos-Containing Materials

A walk through inspection of classrooms throughout the school was performed to identify suspect ACM. Sub-surface suspect materials were not investigated.

The survey was performed following a modified sampling protocol for the demolition as outlined under AHERA, 40 CFR 763, and the State of Washington Department of Labor and Industries WAC 296-62-077021. The inspectors determined approximate quantity of each homogeneous material by field measurements.

Materials within the classrooms that were similar throughout in terms of color, texture, and date of material application were identified as a homogenous sampling area (HSA) and recorded. Representative bulk samples from each homogenous sampling area were collected in accordance with protocols outlined in the USEPA AHERA regulations.

Sections of the material were removed and placed in sealed containers, marked with a sample identifier and delivered under proper chain of custody procedures to our

laboratory for analysis. All samples were taken within EPA guidelines to minimize potential contamination to the surrounding area. Bulk sample locations, notes, and observations were made on-site at the time of sampling.

A total of nine (9) bulk material samples was collected and analyzed for asbestos. Samples, copies of the field data sheets, and chain-of-custody submittal sheets were delivered to our own Burien laboratory for asbestos analysis. As specified in 40 CFR Chapter I (1-1-87 edition) Part 763, Subpart F, Appendix A, each sample was analyzed using polarized light microscopy (PLM)/dispersion staining techniques, in accordance with U.S. EPA Method 600/M4-82-020. Detection limits for this type of analysis are approximately one percent (by volume). Materials containing more than one-percent asbestos are considered to be asbestos-containing materials (ACM). NLCS performs reanalysis of 10% of all bulk samples analyzed for asbestos, as part of their Quality Management Program. Results of the laboratory analyses are contained in Attachment 1.

Lead-Containing Paint

For the lead-containing paint assessment no sampling was performed. Our results are based on historical sampling data, visual observations and research.

SAMPLING RESULTS AND DISCUSSION

Asbestos-Containing Materials

The following is a summary of the bulk asbestos samples collected during the inspection and their laboratory results:

Material Description	Sample #	Layer	Location	Friability	Lab Result
2'x4' ceiling panel (fissured pattern)	HIGH01		Room 1 lower level	F	NAD
Joint compound	HIGH02		Room 1 lower level	F	NAD
Wallboard	HIGH02		Room 1 lower level	F	NAD
Joint compound	HIGH03		Room 5 lower level	F	NAD
Wallboard	HIGH03		Room 5 lower level	F	NAD
Joint compound	HIGH04		Room 7 lower level	F	NAD
Wallboard	HIGH04		Room 7 lower level	F	NAD
Joint compound	HIGH05		Room 9 lower level	F	NAD
Wallboard	HIGH05		Room 9 lower level	F	NAD

Material Description	Sample #	Layer	Location	Friability	Lab Result
2'x4' ceiling panel (fissured pattern)	HIGH06		Room 111 upper level	F	NAD
Joint compound	HIGH07		Room 111 upper level	F	NAD
Wallboard	HIGH07		Room 111 upper level	F	NAD
Joint compound	HIGH08		Room 114 upper level	F	NAD
Wallboard	HIGH08		Room 114 upper level	F	NAD
Joint compound	HIGH09		Room 103 upper level	F	NAD
Wallboard	HIGH09		Room 103 upper level	F	NAD

Legend:

F: Friable (can be reduced to powder using hand pressure) NF: Non-friable

Ch: Chrysotile Asbestos Am: Amosite Asbestos TR: Tremolite Asbestos

NAD: No Asbestos Detected

Note: Determination of friability was made in field for sampling purposes only

Each of the suspect materials sampled during our inspection were non-asbestos-containing. Based on the scope of work described in the project, and work area description sections, it is not anticipated that the installation of the wireless microphone/amplified sound system at High Point Elementary will require the disturbance of ACM.

Lead Containing Paint

Painted building components may contain some amount of lead paint. Renovation operations are likely to disturb lead-containing building materials and result in potential worker exposure to lead. Necessary precautions shall be taken to prevent or minimize the release of lead in the form of dust, fumes or mists from lead-containing building materials into the air or onto surrounding environments. All workers and supervisory personnel who will be at the job site must be informed of the potential hazards of lead and of necessary precautions and housekeeping procedures to reduce the potential for exposure in areas where lead is known or suspected to be present.

For work on painted building components, which may result in personnel exposures, the contractor must assess the hazard. Based on the assessment, and previous similar work and exposure monitoring results, the contractor may have to provide any or all of the following for employees per WAC 296-155-176:

- Respiratory protection.

- Protective clothing.
- Clean change areas.
- Clean hand washing facilities.
- Biological monitoring to consist of blood sampling and analysis for lead and zinc protoporphyrin levels.
- Hazard communication training.

Initial employee exposure monitoring must be conducted for each separate task involving the handling of lead containing painted building materials. If 8-hour time-weighted average (TWA) exposures exceed the action level of 30 micrograms of lead per cubic meter of air ($\mu g/m^3$), the contractor must continue to conduct periodic air monitoring at specified intervals, and institute medical surveillance and comprehensive training programs. If the WAC/OSHA 8-hour TWA permissible exposure limit (PEL) of 50 $\mu g/m^3$ for lead is exceeded, more stringent and additional requirements become effective, such as engineering controls, respiratory protection, regulated work areas and warning signs in lead work areas.

Final cleaning operations may require the cleaning of dusts and debris associated with installation activities that may have impacted lead-containing paints. All vacuum cleaners used on the project shall be equipped with high efficiency particulate air (HEPA) filtration system capable of trapping and retaining at least 99.97% of monodisperse dioctyl phthalate (DOP) particles having a mean particle diameter of 0.3 micrometer.

LIMITATIONS

Limiting Conditions

The inspection was limited to accessible spaces within classrooms throughout the school. An accessible space is defined as an area that can be physically entered and investigated without requiring destructive measures. We did not attempt to disassemble equipment. Building equipment could contain asbestos materials that may not be discovered until exposed during renovation/demolition activities.

If during the course of renovation, suspect materials are discovered that are not identified in this report, the materials should be treated as asbestos containing until the material is sampled by an AHERA Certified Building Inspector and analyzed by an accredited laboratory.

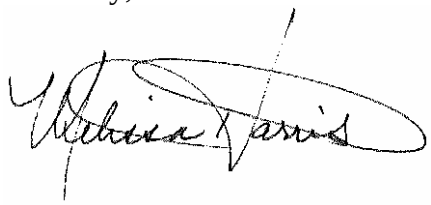
Limitations of the Survey

The conclusions of the report are professional opinions based solely upon visual site observations and interpretations of laboratory analyses as described in our report. The opinions presented herein apply to the site conditions existing at the time of our investigation, and interpretation of current regulations pertaining to asbestos-containing building materials. Therefore, our opinions and recommendations may not apply to future conditions that may exist at the building, which we have not had the opportunity to evaluate. The regulations should always be verified prior to any work involving asbestos-containing building materials.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No other hazardous materials/wastes were investigated. No other conditions, expressed or implied, should be understood.

It is a pleasure doing business with you. If you have questions or require additional information please contact me at 206.244.1060 or via email at nlcrich@msn.com. Thank you.

Sincerely,



Melissa Harris
Staff Consultant
Northern Laboratory and Consulting Services

Reviewed By:

Richard L. Carlson
Vice President of Operations
Northern Laboratory and Consulting Services

1 – Sampling Data - Bulk Asbestos Laboratory Data Sheets
2 – Certifications

ATTACHMENT 1

BULK ASBESTOS LABORATORY DATA SHEETS

NLCS
Novo Laboratory & Consulting Services, Inc.

138 SW 154th Street Burien, WA 98166
OFFICE: 206.244.1060 FAX: 206.244.1063

PLM Asbestos Analysis Report*

NLCS, INC
138 SW 154th Street
Burien, WA 98166
Project Location: Highpoint

NLCS,Inc Number: 08-0010
Client Number: 0070.073.009
Turn Around Time: 5 Day
Samples Analyzed: 9

Client Sample Number: **HIGH01** Lab Sample Number: **08-0010.001**
Samples Description: **2x4 ceiling tile**
Sample Location: Room 1
Analysis Comment:

Paint on gray fibrous compressed material

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED	35% Cellulose	30% Filler and binder
	35% Mineral wool	

Client Sample Number: **HIGH02** Lab Sample Number: **08-0010.002**
Samples Description: **JC/WB**
Sample Location: Room 1
Analysis Comment:

Layer 1 Paint on white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED		100% Filler and binder

Layer 2 Tan papery material with white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED	30% Cellulose	70% Filler and binder

Client Sample Number: **HIGH03** Lab Sample Number: **08-0010.003**
Samples Description: **JC/WB**
Sample Location: Room 5
Analysis Comment:

Layer 1 Paint on white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED		100% Filler and binder

Layer 2 Tan papery material with white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED	30% Cellulose	70% Filler and binder

Sampled By: Jason Carlson **1/2/2008**
Received By: Jill Strode **1/2/2008**
Reviewed By: Crystal Wright **1/9/2008**

Crystal Wright, Laboratory Supervisor

NLCS
Novo Laboratory & Consulting Services, Inc.

138 SW 154th Street Burien, WA 98166
OFFICE: 206.244.1060 FAX: 206.244.1063

PLM Asbestos Analysis Report*

NLCS, INC
138 SW 154th Street
Burien, WA 98166
Project Location: Highpoint

NLCS,Inc Number: 08-0010
Client Number: 0070.073.009
Turn Around Time: 5 Day
Samples Analyzed: 9

Client Sample Number: **HIGH04** Lab Sample Number: **08-0010.004**
Samples Description: **JC/WB**
Sample Location: Room 7
Analysis Comment:

Layer 1 Paint on white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED		100% Filler and binder

Layer 2 Tan papery material with white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED	30% Cellulose	70% Filler and binder

Client Sample Number: **HIGH05** Lab Sample Number: **08-0010.005**
Samples Description: **JC/WB**
Sample Location: Room 9
Analysis Comment:

Layer 1 Paint on white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED		100% Filler and binder

Layer 2 Tan papery material with white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED	30% Cellulose	70% Filler and binder

Client Sample Number: **HIGH06** Lab Sample Number: **08-0010.006**
Samples Description: **2x4 ceiling panel**
Sample Location: Room 111
Analysis Comment:

Paint on gray fibrous compressed material

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED	30% Cellulose	40% Filler and binder
	30% Mineral wool	

Sampled By: Jason Carlson **1/2/2008**
Received By: Jill Strode **1/2/2008**
Reviewed By: Crystal Wright **1/9/2008**

Crystal Wright, Laboratory Supervisor

NLCS
Novo Laboratory & Consulting Services, Inc.

138 SW 154th Street Burien, WA 98166
OFFICE: 206.244.1060 FAX: 206.244.1063

PLM Asbestos Analysis Report*

NLCS, INC
138 SW 154th Street
Burien, WA 98166
Project Location: Highpoint

NLCS,Inc Number: 08-0010
Client Number: 0070.073.009
Turn Around Time: 5 Day
Samples Analyzed: 9

Client Sample Number: **HIGH07** Lab Sample Number: **08-0010.007**
Samples Description: **JC/WB**
Sample Location: Room 111
Analysis Comment:

Layer 1 Paint on white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED		100% Filler and binder

Layer 2 Tan papery material with white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED	30% Cellulose	70% Filler and binder

Client Sample Number: **HIGH08** Lab Sample Number: **08-0010.008**
Samples Description: **JC/WB**
Sample Location: Room 114
Analysis Comment:

Layer 1 Paint on white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED		100% Filler and binder

Layer 2 Tan papery material with white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED	30% Cellulose	70% Filler and binder

Client Sample Number: **HIGH09** Lab Sample Number: **08-0010.009**
Samples Description: **JC/WB**
Sample Location: Room 103
Analysis Comment:

Layer 1 Paint on white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED		100% Filler and binder

Layer 2 Tan papery material with white powder

Asbestos Fibrous Component:	Non Asbestos Fibrous Component:	Non Fibrous Component:
NO ASBESTOS DETECTED	30% Cellulose	70% Filler and binder

Sampled By: Jason Carlson **1/2/2008**
Received By: Jill Strode **1/2/2008**
Reviewed By: Crystal Wright **1/9/2008**

Crystal Wright, Laboratory Supervisor

ATTACHMENT 2

CERTIFICATIONS

Certificate of Completion

Jason Carlson

has successfully completed the requisite training and examination for
accreditation under TSCA Title II
EPA AHERA (Asbestos Hazard Emergency Response Act)
and ASHARA Model Accreditation program requirements for
AHERA BUILDING INSPECTOR
as presented by
Clayton Group Services, Inc.

Course Date: 4/18/01 **through** 4/20/01 **Expiration Date:** 4/20/02

Examination Date: 4/20/01

535984432.03

ID #:

Clayton GROUP SERVICES

Course Instructor
Dave Yacono

4636 E. Marginal Way S. Suite 215 Seattle, WA 98134 (206) 763-7364 fax(206)763-4189

Certificate of Completion

This is to certify that

Jason S. Carlson

has satisfactorily completed
4 hours of refresher training as an

Asbestos Building Inspector

to comply with the training requirements of
TSCA Title II / 40 CFR 763 (AHERA)

Certificate Number: 10270065

Instructor

EPA Provider Cert. Number: 1085

ARGUS PACIFIC
TRAINING • CONSULTING

Dec 26, 2007
Date(s) of Training

Exam Score: NA

Expiration Date: Dec 25, 2008

Argus Pacific, Inc. • 1900 W. Nickerson, Suite 315 • Seattle, Washington • 98119 • (206) 285.3373 • fax (206) 285.3927

APPENDIX C

PBS Certifications

Certificate of Completion

This is to certify that

Cel A. Alvarez

has satisfactorily completed
4 hours of refresher training as an

AHERA Building Inspector

to comply with the training requirements of
TSCA Title II, 40 CFR 763 (AHERA)

EPA Provider # 1085

176590
Certificate Number

ARGUS PACIFIC
TRAINING • CONSULTING
A Terracon COMPANY

Jan 22, 2020 — Expires in 1 year.
Date(s) of Training

Exam Score: N/A
(if applicable)

Instructor

ARGUS PACIFIC, INC / 21905 64th AVE W, SUITE 100 / MOUNTLAKE TERRACE, WASHINGTON 98043 / 206.285.3373 / ARGUSPACIFIC.COM

THIS IS TO CERTIFY THAT

TIM OGDEN

HAS SUCCESSFULLY COMPLETED THE TRAINING COURSE

for

ASBESTOS INSPECTOR REFRESHER

In accordance with TSCA Title II, Part 763, Subpart E, Appendix C of 40 CFR

Course Date: 04/02/2019

Course Location: Portland, OR

Certificate: IR-19-2008A

PBS

4-Hour AHERA Inspector Refresher Training; AHERA is the Asbestos Hazard Emergency Response Act enacting Title II of Toxic Substance Control Act (TSCA)

Expiration Date: 04/02/2020

For verification of the authenticity of this certificate contact:
PBS Environmental
4412 SW Corbett Avenue
Portland, OR 97239
(503) 248-1939

Greg Baker, Instructor

Appendix F

CULTURAL RESOURCES ASSESSMENT

(On-File with Seattle Public Schools)

Appendix G

TRANSPORTATION TECHNICAL REPORT

TRANSPORTATION TECHNICAL REPORT

for

West Seattle Elementary School Modernization

PREPARED FOR:

Seattle Public Schools

PREPARED BY:

heffron transportation inc
6544 NE 61st Street, Seattle, WA 98115
ph: (206) 523-3939 ◆ fx: (206) 523-4949

June 4, 2020

TABLE OF CONTENTS

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1. INTRODUCTION

This report presents the transportation impact analyses for the Seattle Public Schools' (SPS) proposed modernization of West Seattle Elementary School. The scope of analysis and approach were based on extensive past experience performing transportation analyses for projects throughout the City of Seattle, including numerous analyses prepared for SPS projects. This report documents the existing conditions in the site vicinity, presents estimates of project-related traffic, and evaluates the anticipated impacts to the surrounding transportation system including traffic operations, parking, transit and non-motorized facilities, and safety. These analyses were prepared to support the SEPA Checklist for this project.

1.1.1. Project Description

SPS is proposing to modernize West Seattle Elementary School, located at 6760–34th Avenue in the High Point neighborhood of West Seattle. The project site location is shown on Figure 1.The following sections describe the existing school site and the proposed project.

1.1.2. Existing School Site

The school site is bounded by 34th Avenue SW to the west, 31st Avenue SW to the east, private residences to the north, and the High Point Community Center and Walt Hundley Playfield to the south. The existing school has one primary building located in the center portion of the site. There are six portable classrooms on the south side of the main building. A 44-space surface parking lot is located on the northwest corner of the site. It is accessed primarily by a driveway on 34th Avenue SW; there is also an access driveway on 31st Avenue SW, but it is used only for outbound school buses and taxies during the school day. There is a hard-surface play area on the southwest portion of the site, and a gated emergency access road to the south of the play area. The existing permanent building has about 50,058 square feet (sf) of floor area.[1]

According to information published in *Building for Learning, Seattle Public Schools Histories, 1862-2000,*[2] High Point School was originally built on the site in 1944, to serve children of the High Point federal housing community that was comprised largely of workers and their families who arrived from around the country to work in Seattle's shipyards and airplane factories during World War II. The property was deeded to the District by the federal government in 1947. In 1948, two classrooms in the High Point Child Care Center were rented for use as kindergarten classes and the building became known as the High Point Annex. Between 1960 and 1963, 12 portable classrooms were added at the south end of the site. The school reached its highest enrollment in 1963 with 1,263 students. After that, the size of the housing project was reduced and enrollment declined to 340 students by 1972. The school was closed in 1976, but was reopened the following year as the result of a lawsuit. The school building was replaced in 1988; in 2007 it was renamed West Seattle Elementary.

In February 2020, at the time traffic data were collected for this analysis, enrollment was 427 students[3] in grades pre-Kindergarten through 5th. Currently, the school includes approximately 86 full-time and part-time and employees.[4]

1 Existing building areas from Miller Hayashi Architects, Building Summary, March 31, 2020.
2 Nile Thompson and Carolyn J. Marr; *Building for Learning, Seattle Public Schools Histories, 1862-2000;* 2002.
3 Seattle Public Schools, P223 Enrollment Data for Basic Enrollment report, February 2020.
4 Email communication from Paul Wight at Seattle Public Schools, May 8, 2020.

West Seattle ES Modernization

Figure 1

Site Location and Vicinity

heffron transportation inc

06.04.20

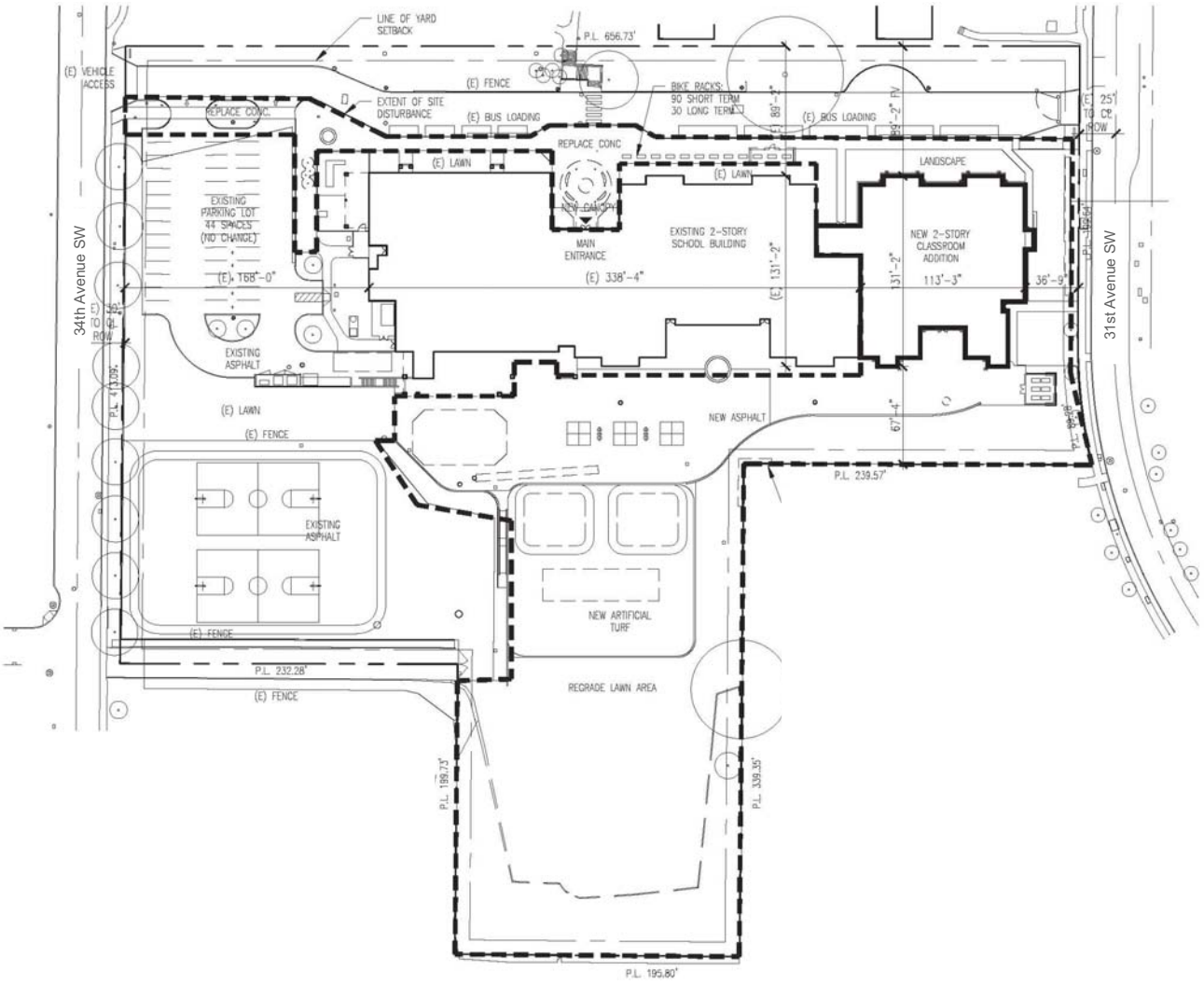
1.1.3. Proposed Site Changes

The proposed project would construct a new, two-story addition to the existing two-story building, increasing the building size from 50,058 sf to 71,397 sf,[5] renovate the interior and entrance, and improve the outside play area. The existing portable classrooms would be removed. The addition would be funded by the BEX V Capital Improvement Program (approved by voters in February 2019), K-3 Classroom Reduction Grant, and Distressed School Grant. The project would increase the total capacity of the school to 500 students (a net increase of 73 students compared to current enrollment). Based on the current staffing level and the proposed increase in enrollment capacity, the number of employees could increase to a total of 94. 30 long-term bicycle parking spaces would be provided on site, as well as 90 short-term bicycle parking spaces.

No other changes are proposed to the overall site, assembly spaces, on-site parking lot, or the site access driveways. The school-bus load/unload zone would remain at its existing on-site location; passenger-car load/unload would continue to occur in the school parking lot and the adjacent streets (during the peak dismissal period, passenger-car pick-up occurs only on-street). Figure 2 shows the proposed site plan.

Construction is planned to begin in Summer 2021 with occupancy by Fall 2023. During construction, the students will be temporarily located at the Schmitz Park Elementary site. Future analyses (without and with the project) presented in this report reflect year 2023 conditions.

[5] Miller Hayashi, March 2020.



Source: Miller Hayashi Architects, May 4, 2020

West Seattle ES Modernization

Figure 2

Site Plan

heffron transportation inc

06.04.20

2. BACKGROUND CONDITIONS

This section presents the existing and future conditions without the proposed project. The impacts of the proposed project were evaluated against these base conditions. For comparison, and to provide an analysis of potential new traffic and parking impacts, year 2023 without-project conditions assume West Seattle Elementary School would continue to operate in the existing facilities at its current enrollment level. The following sections describe the existing roadway network, traffic volumes, traffic operations (in terms of levels of service), traffic safety, transit facilities, non-motorized facilities, and parking.

Seven off-site intersections plus the main site access driveway were selected for study based on traffic counts and field observations of the travel routes used by family drivers, buses, and staff to access and egress the site area. In addition to the site access driveway intersection, the following off-site intersections were identified for analysis for both the morning and afternoon peak hours.

One- or Two-Way Stop Controlled

- SW Holly Street / 35th Avenue SW
- SW Holly Street / Sylvan Way SW
- SW Willow Street / 35th Avenue SW

Traffic Circle Controlled

- SW Holly Street / 31st Avenue SW
- SW Holly Street / 34th Avenue SW

Uncontrolled

- SW Willow Street / 34th Avenue SW

2.1. Roadway Network

The following describes key roadways in the site vicinity. Roadway classifications are based on the City's Street Classification Map.[6] Unless otherwise posted, the speed limit on Seattle's arterial streets is 25 miles per hour (mph) and 20 mph on non-arterial streets.

SW Holly Street is an east-west local access street that connects between 37th Avenue SW and Sylvan Way SW. West of 37th Avenue SW, it becomes SW Warsaw Street and connects to 39th Avenue SW. Near the site, it is 25 feet wide with curbs, gutters, and sidewalks on both sides. Parallel parking is allowed on both sides. There is a speed hump on the segment between 32nd and 34th Avenues SW, adjacent to the school. Between 34th Avenue SW and Sylvan Way SW, it is part of the south leg of the High Point Neighborhood Loop, an extension of the West Seattle Neighborhood Greenway.

SW Willow Street is an east-west local access street that connects 40th Avenue SW on the west to 34th Avenue SW along the site frontage. Near the site, it is 25 feet wide with curbs, gutters, and sidewalks on both sides. Parking is allowed on both sides. There is a school zone speed (20 mph) adjacent to the site that is in effect when children are present.

35th Avenue SW is a north-south Principal Arterial that connects SW Admiral Way and Fauntleroy Way SW to the north; and extends to the south, becoming Marine View Drive near the Seattle city limits. Near the site, there is one travel lane in each direction, and a center two-way left-turn lane that begins south of SW Holly Street. It has curbs, gutters, sidewalks, and parking allowed on both sides. The posted speed limit is 30 mph, with a school zone speed limit of 20 mph in the vicinity of the school that is in effect when beacons flash.

34th Avenue SW is a north-south local access street that extends from SW Morgan Street on the north to SW 108th Street on the south. Near the site, it is 30 feet wide with curbs, gutters, and sidewalks on both sides. Parking is allowed on both sides of the street. Between SW Kenyon Street and SW Graham

[6] SDOT, Street Classification Maps, accessed March 2020.

Street, 34th Avenue SW is part of the West Seattle Neighborhood Greenway. Between SW Graham Street and SW Holly Street, it is also the west leg of the High Point Neighborhood Loop. There are two speed humps on the segment between SW Holly and SW Willow Streets, adjacent to the school. There is a 20-mph school zone in the vicinity of the school that is in effect when children are present.

31st Avenue SW is a north-south local access street that connects SW Morgan Street and SW Myrtle Street. Adjacent to the site, it is 25 feet wide with curbs, gutters, and sidewalks on both sides. Parking is allowed on both sides of the street.

Sylvan Way SW is a northwest-southeast Principal Arterial that connects SW Morgan Street to the north with SW Orchard Street to the south. It has one travel lane in each direction both marked with sharrows (indicating lanes should be shared by bicycles and motorists). To the north of SW Holly Street, it has curbs, gutters, and sidewalks on both sides. To the south, there are no curbs or gutters and an asphalt path is provided on the east side of the street. There is no parking allowed on either side of the street. North of SW Holly Street there are curb pullouts and providing additional space for bus stops and on-street parking. In the vicinity of the school there is a school zone speed limit of 20 mph that is in effect when beacons flash.

The following documents were reviewed to determine if any planned transportation improvements could affect the roadways and intersections near West Seattle Elementary School by 2023 when the school modernization would be completed.

City of Seattle's Proposed 2020-2025 Proposed Capital Improvement Program (CIP)[7] – No improvements to the transportation network were identified in the site vicinity.

Adopted Seattle Bicycle Master Plan (BMP)[8] – The *Seattle Bicycle Master Plan – 2019 to 2024 Implementation Plan*[9] includes funding for construction of Phases 2a and 2b of the West Seattle Neighborhood Greenway, with work to be completed in 2020.

Neighborhood Greenway Work Plan[10] – This plan, covering the years from 2019 to 2024, includes funding for construction of Phases 2a and 2b of the West Seattle Neighborhood Greenway, which includes segments along SW Holly Street and 34th Avenue SW in the vicinity of the school that have already been completed; the Phase 2 work is planned to be completed in 2020.

Levy to Move Seattle – Workplan Report[11] – This document outlines the Seattle Department of Transportation's (SDOT's) workplan to deliver citywide transportation projects and services funded in part or in full by the *Levy to Move Seattle* (approved by voters in 2015). The nine-year workplan (2016-2024) documents achievements and challenges and sets the agency's plan for future years. There are no projects defined in the site vicinity.

None of the planning documents include any transportation improvements expected to affect the roadway network operations or intersection capacity within the study area by 2023. Therefore, the existing roadway and intersection configurations were assumed to remain unchanged for the 2023 analysis presented in this report.

7 City of Seattle, Updated Sep. 2019.
8. City of Seattle, March 2015.
9 SDOT, June 2019.
10 SDOT, June 2019.
11 SDOT, November 2018.

2.2. Traffic Volumes

2.2.1. Existing Conditions

The school day at West Seattle Elementary School starts at 7:55 A.M. and ends at 2:25 P.M. To capture the existing traffic conditions during the school arrival and dismissal peak periods, traffic counts were performed at the study area intersections from 7:00 to 9:00 A.M. and from 1:30 to 3:30 P.M. on Thursday, February 6, 2020. The counts indicated that the morning and afternoon peak hours for school traffic occurred from 7:15 to 8:15 A.M. and from 2:15 to 3:15 P.M., respectively; Figure 3 shows the existing traffic volumes for the school peak hours.

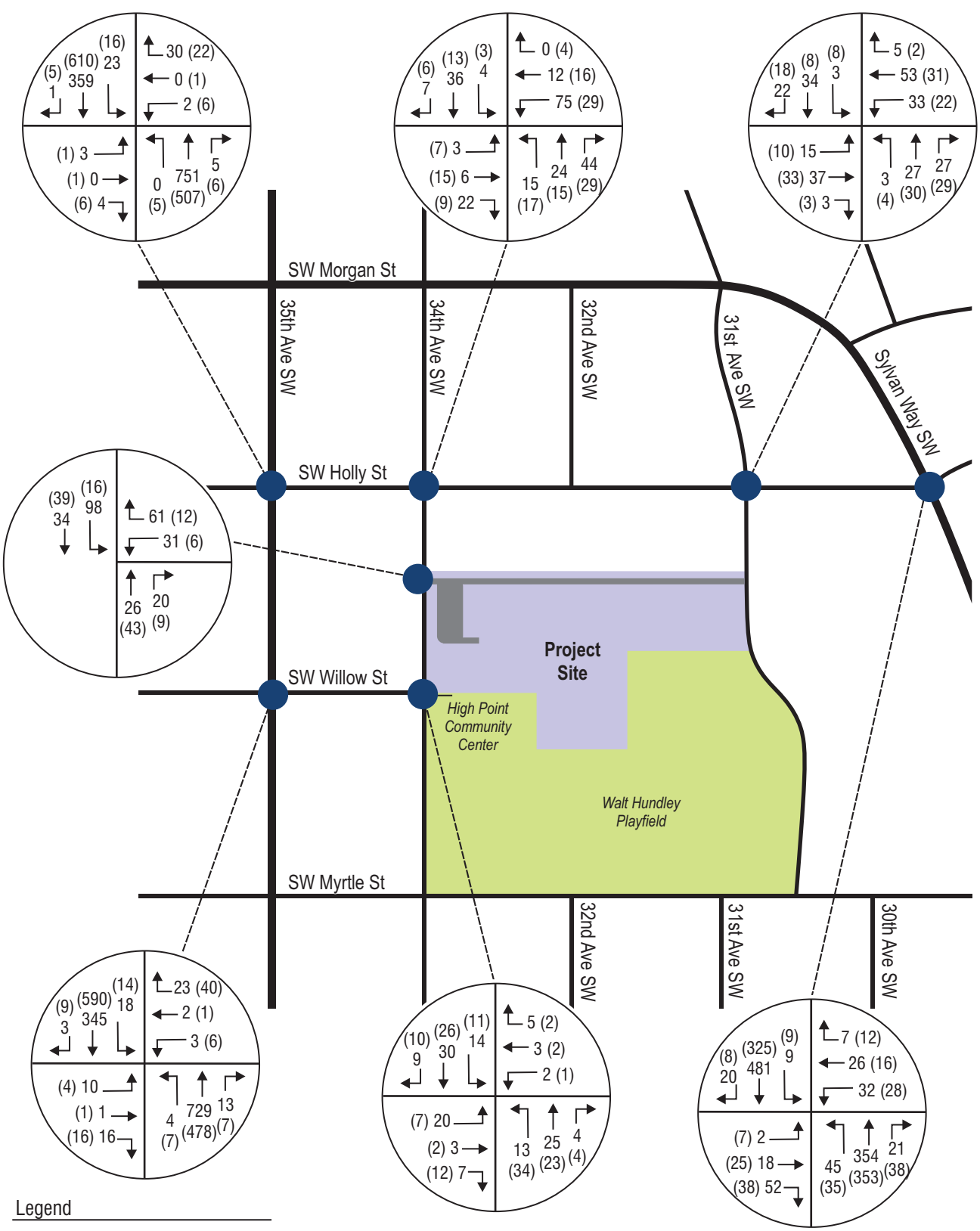
The count data included pedestrian activity during the peak hours, with about 20 to 50 pedestrian crossings recorded at the intersections adjacent to the school. The count data indicated low bicycle volumes, with zero or one bike recorded through each study area intersection. It is noted that the counts were conducted in February when bicycle usage may be lower than average. Peak bicycle usage at the school site has been observed by staff to range between 10 and 25.

2.2.2. Future Without-Project Conditions

To estimate year 2023 background traffic for the study area intersections, a compound annual growth rate was selected and applied to the existing (2020) traffic volumes.

The growth rate was determined after review of available recent historical traffic count data collected in the vicinity of the site by SDOT on 35th Avenue S at S Willow Street.[12] Compared to the 2020 count conducted for this analysis, morning peak hour data from 2015 indicate overall volumes have declined. Although the available data indicate a decline in traffic volumes, it is acknowledged that some increase in traffic is possible and a 1% compound annual growth rate was selected. This rate, which reflects a conservatively high growth assumption, was applied to the existing non-school-related traffic volumes to estimate 2023 background traffic volumes without the project. This rate also accounts for potential new pipeline development that may occur in the area and is consistent with rates typically applied for traffic analyses of other developments throughout Seattle. Figure 4 shows the 2023-without-project morning and afternoon peak hour traffic volumes.

[12] Seattle Department of Transportation, 24-hour machine counts, 2007 through 2017.



West Seattle ES Modernization

Figure 3
Existing (2020) Traffic Volumes
Morning and Afternoon Peak Hours

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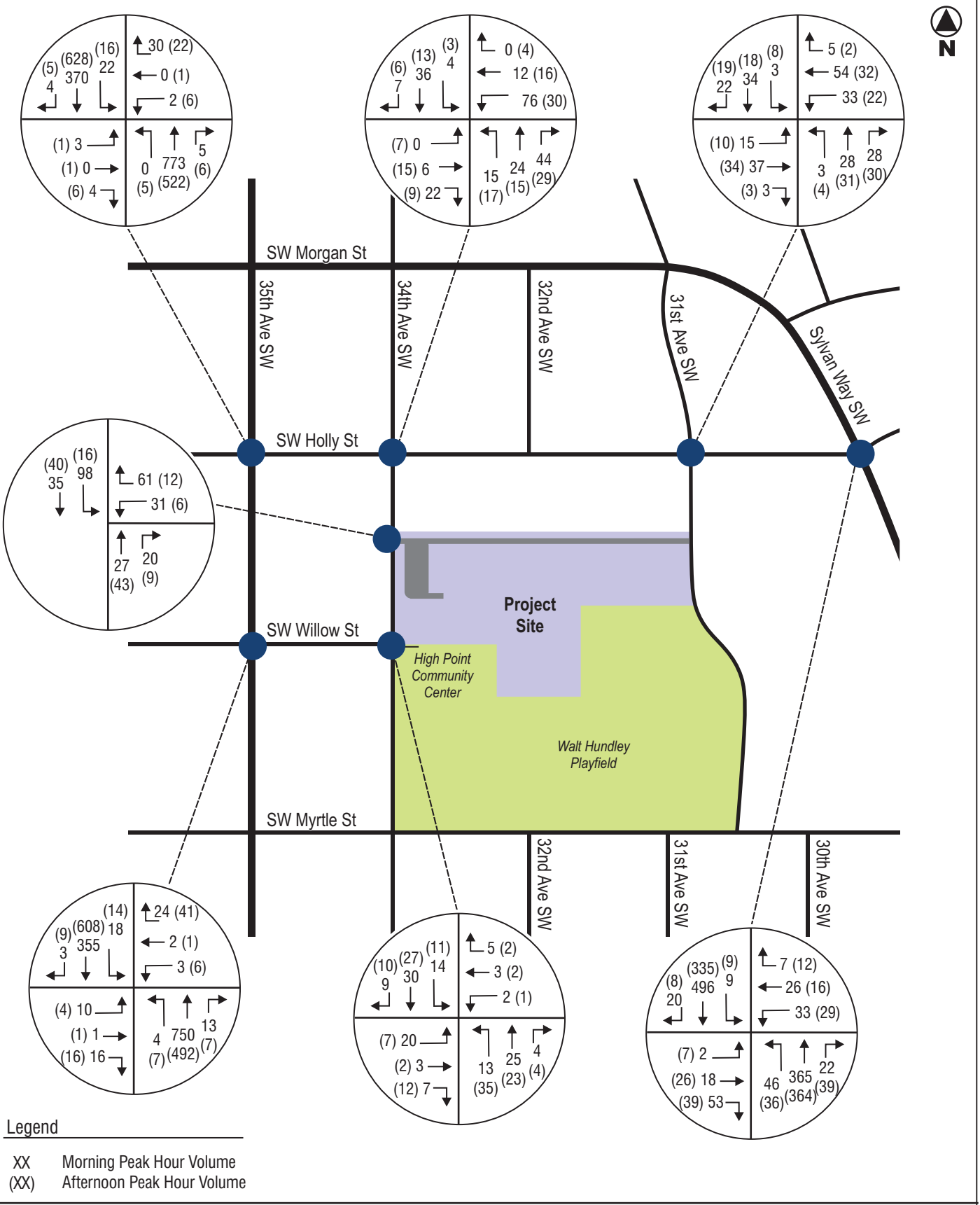

West Seattle ES Modernization

Figure 4
Forecast (2023) Without-Project Traffic Volumes
Morning and Afternoon Peak Hours

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2.3. Traffic Operations

2.3.1. Off-Site Study Area Intersections

Traffic operations are evaluated based on level-of-service (LOS), which is a qualitative measure used to characterize intersection operating conditions. Six letter designations, "A" through "F," are used to define level of service. LOS A is the best and represents good traffic operations with little or no delay to motorists. LOS F is the worst and indicates poor traffic operations with long delays. The City of Seattle does not have adopted intersection level of service standards; however, project-related intersection delay that causes a signalized intersection to operate at LOS E or F, or increases delay at a signalized intersection that is projected to operate at LOS E or F without the project, may be considered a significant adverse impact, if increases are greater than 5 seconds. The City may tolerate LOS E/F conditions at unsignalized locations where traffic control measures (such as conversion to all-way-stop-control or signalization) are not applicable or desirable.

Levels of service for the study area intersections were determined using methodologies established in the *Highway Capacity Manual (HCM), 6th Edition.*[13] Appendix A summarizes HCM level of service thresholds and definitions for unsignalized intersections. Levels of service for the study area intersections were determined using the *Synchro 10. 3 (Build 122)* analysis software and reported using the *HCM 6* module for unsignalized intersections. The geometries at the study area intersections and key roadways were all field-verified. The models reflect existing intersection geometries and channelization; these characteristics were assumed to remain unchanged for future 2023 conditions. Table 1 summarizes existing and forecast 2023 levels of service without the proposed project for both the morning and afternoon peak hour conditions.

As shown, all study-area intersections operate at LOS A overall. The westbound stop-controlled movement at the SW Holly Street / Sylvan Way SW intersection currently operates at LOS E during the morning peak hour, and LOS C during the afternoon peak hour. All movements at the other study area intersections operate at LOS C or better during both peak hours. The assumed increases in background traffic are forecast to add small amounts of delay to the study area intersections by 2023 (less than 5 seconds per vehicle), but are not expected to change the overall levels of service.

[13] Transportation Research Board, 2016.

Table 1. Level of Service Summary – Existing and 2023-Without-Project Conditions

Intersections	Morning Peak Hour				Afternoon Peak Hour			
	Existing		2023 w/o Project		Existing		2023 w/o Project	
One- or Two-Way Stop Controlled	LOS [1]	Delay [2]	LOS	Delay	LOS	Delay	LOS	Delay
SW Holly Street / 35th Avenue SW [3] *(overall)*	*A*	*2.0*	*A*	*2.1*	*A*	*1.5*	*A*	*1.6*
Eastbound movements	A	2.1	A	1.8	A	1.7	A	1.7
Westbound movements	A	1.6	A	1.4	A	2.1	A	2.4
Northbound left turns	-	-	-	-	A	5.5	A	5.5
Southbound left turns	A	7.2	A	7.3	A	5.4	A	5.7
SW Holly Street / Sylvan Way SW (*overall*)	*A*	*4.2*	*A*	*4.4*	*A*	*3.1*	*A*	*3.2*
Eastbound movements	B	13.2	B	13.4	B	12.6	B	12.8
Westbound movements	E	38.5	E	42.6	C	22.2	C	23.4
Northbound left turns	A	8.8	A	8.9	A	8.2	A	8.2
Southbound left turns	A	8.2	A	8.3	A	8.4	A	8.4
SW Willow Street / 35th Avenue SW (*overall*)	*A*	*1.2*	*A*	*1.2*	*A*	*1.0*	*A*	*1.0*
Eastbound movements	B	14.7	B	15.0	B	13.9	B	14.2
Westbound movements	C	15.7	C	16.1	B	13.8	B	14.0
Northbound left turns	A	8.3	A	8.3	A	8.9	A	9.0
Southbound left turns	A	9.6	A	9.7	A	8.8	A	8.8
SW Willow Street / 34th Avenue SW [4] (*overall*)	*A*	*4.4*	*A*	*4.4*	*A*	*4.1*	*A*	*4.7*
Eastbound movements	A	9.3	A	9.3	A	9.2	A	9.2
Northbound left turns	A	7.3	A	7.3	A	7.4	A	7.4
Traffic Circle	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
SW Holly Street / 34th Avenue SW	A	3.8	A	3.8	A	3.5	A	3.5
SW Holly Street / 31st Avenue SW	A	4.0	A	4.0	A	3.8	A	3.9

Source: Heffron Transportation, Inc., April 2020.

1. *LOS = Level of service.*
2. *Delay = Average seconds of delay per vehicle.*
3. *HCM & Synchro unable to evaluate intersection configuration due to proximity of signalized pedestrian crossing. Results reported from SimTraffic microsimulation model. Average of eleven 1-hour simulations.*
4. *Uncontrolled, operation most similar to eastbound stop-control*

2.3.2. Site Access

As described previously, vehicle access to the school's on-site parking lot is located on 34th Avenue SW, between its intersections with SW Holly and SW Willow Streets. There is also a driveway on 31st Avenue SW that is primarily used by exiting buses during the peak hours. Operational analyses indicate that all access movements operate at LOS A during both the morning and afternoon peak hours. The projected increases in background traffic are expected to add a small amount of delay to the driveways by 2023, but all movements would continue to operate at LOS A during both periods.

2.4. Parking Supply and Occupancy

On-street parking at and around the West Seattle Elementary School site was surveyed to determine the existing parking supply and parking occupancy. This information was then used to estimate how parking utilization could be affected by new parking demand generated by the proposed modernization pro-

ject and increased school capacity (which is presented later in Section 0). The following sections describe the on-street parking supply as well as the current parking occupancy and utilization rates.

2.4.1. Methodology and Study Area

A detailed on-street parking study was performed and supply was documented according to the methodology outlined in the City of Seattle's TIP #117.[14] Although Tip #117 was created for another purpose, it outlines the City's preferred methodology to determine the number and type of on-street parking spaces that may exist within a defined study area, and how much of that supply is currently utilized at different times of the day. This analysis was completed to document the existing supply and how it is currently utilized.

The study area for the on-street parking analysis included all roadways within an 800-foot walking distance from the school site, as is typically required by the City of Seattle for evaluations of new development for SEPA review. The 800-foot walking distance results in a study area that extends just west of 36th Avenue SW, just South of SW Morgan Street, just south of SW Myrtle Street, and just east of Sylvan Way SW. Details about parking supply and occupancy are provided in the following sections. The study area consists primarily of single-family residences. Many of the residential garages and driveways in the vicinity are accessed via alleys; area residents also use on-street parking.

Existing On-Street Parking Supply

Within the study area, all local access streets are 25-feet wide with curb and gutter on both sides. Along these streets, parking supply was considered to exist on both sides unless otherwise signed. A block face consists of one side of a street between two cross-streets. For example, the east side of 34th Avenue SW, between SW Holly Street and SW Willow Street is one block face (identified as 'BB' for this study). The study area and block face designations are shown on Figure 5.

Each block face was measured and analyzed to determine the number of legal on-street parking spaces. First, common street features—such as driveways, fire hydrants, and special parking zones—and their buffer requirements were identified. No on-street parking capacity was assumed within 30 feet of a signalized or marked intersection, within 20 feet of an uncontrolled intersection, within 15 feet on either side of a fire hydrant, or within 5 feet on either side of a driveway or alley. The remaining unobstructed lengths between street features were converted to legal on-street parking spaces using values in the City's Tip #117. It should be noted that the curb-face values in Tip #117 reflect variable parking space lengths. Based on extensive past experience of Heffron Transportation preparing on-street parking studies, it has been observed that increased use of smaller cars and the tendency for drivers to park closer together in areas with higher utilization can result in more parking supply than would be suggested by the Tip #117 guidance. No adjustments were made to these values for this analysis and as a result, the reported supply may be conservatively low.

The parking supply survey determined that there are 575 on-street parking spaces within the study area and 561 have no restrictions. During the school day, there are school-bus and no parking zones on SW Myrtle along the frontage of Our Lady of Guadalupe Catholic School, and this area was not included in the mid-morning parking supply. The resulting total supply is 575 spaces during the early morning, 568 spaces during mid-morning, and 575 spaces during evenings. Detailed parking supply by block face is provided in Appendix B.

[14] Seattle Department of Planning and Development, Tip 117, *Parking Waivers for Accessory Dwelling Units*, Updated May 12, 2011.

West Seattle ES Modernization

Figure 5
Study Area for On-Street Parking Utilization Surveys

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Existing On-Street Parking Occupancy

Existing parking occupancy counts within the study area were performed in February 2020. School-day occupancy counts were performed during times when the school could generate added parking demand due to the increased enrollment capacity provided by the modernization project. Counts were performed early morning (between 7:00 and 7:45 A.M.) to reflect conditions when some staff may be arriving at the school and using on-street supply and mid-morning (between 10:30 and 11:15 A.M.) to reflect conditions when school-day parking is typically highest. Evening counts were performed (between 7:30 and 8:15 P.M.) to reflect conditions when occasional school events could occur; it is noted that during both evening counts, the adjacent Walt Hundley Playfield was being used for soccer practices and/or camps. The results of the parking occupancy surveys are summarized in Table 2. Detailed summaries of the on-street parking occupancy by block face for all counts are also provided in Appendix B.

Table 2. Parking Occupancy Survey Results – February 2020

Time Period Surveyed	Parking Supply	Total Vehicles Parked	% Utilization
Weekday Early Morning (7:00 A.M. to 7:45 A.M.)			
Tuesday 2/25/2020	575	208	36%
Thursday 2/27/2020	575	215	37%
Average	575	*212*	37%
Weekdays Mid-Morning (10:30 A.M. to 11:15 A.M.) [a]			
Tuesday 2/25/2020	568	207	36%
Thursday 2/27/2020	568	199	35%
Average	568	*203*	*36%*
Weekday Evenings (7:30 P.M. to 8:15 P.M.)			
Tuesday 2/25/2020 [b]	575	221	38%
Thursday 2/27/2020 [b]	575	193	34%
Average	*575*	*207*	*36%*

Source: Heffron Transportation, Inc., April 2020.

a. SW Myrtle Street between 35th Avenue SW and 34th Avenue SW is closed during school days resulting in decreased supply.

b. Soccer practices or camps on Walt Hundley Playfield, 40-50 players, coaches and parents.

On-street parking utilization was calculated using the methodology described in Tip #117 and is the number of vehicles parked on-street divided by the number of legal on-street parking spaces within the study area or on a specific block face. The study area utilization totals are also summarized in Table 2. For the purpose of evaluating the potential on-street parking impacts associated with new development, the City of Seattle considers utilization rates of 85% or higher to be effectively full. As shown, on-street parking occupancy in the study area is well below that threshold during all time periods surveyed. Within the study area, the number of unused parking spaces ranged from 354 to 382 over six observations.

2.4.2. On-Site Parking

As described previously, there is one on-site parking lot (with 44 spaces) located on the northwest corner of the school property. Parking occupancy counts of this lot were also performed in February 2020 on the same days and time periods as the on-street parking occupancy counts. Parking occupancy in the lot ranged from 41 to 44 vehicles on school days and 6 to 9 vehicles in the evenings.

2.5. Traffic Safety

Collision data for the study area intersections and roadway segments were obtained from SDOT's Open Data Portal. Data covered the period between January 1, 2016 and the most recent records available as of February 19, 2020 (4.1 years). The data were examined to determine if there are any unusual traffic safety conditions that could impact or be impacted by the proposed project. Table 3 below summarizes the collision data.

Unsignalized intersections with five or more collisions per year and signalized intersections with 10 or more collisions per year are considered high collision locations by the City. As shown, all of the study area intersections averaged one or fewer collisions per year, and none meet the criteria for a high collision location for the period of time evaluated. None of the reported collisions resulted in fatalities. Overall, these data do not indicate any unusual traffic safety conditions.

Table 3. Historical Collision Summary

Intersection	Number of Collisions by Type						Total (4.1 Yrs)	Avg / Year
	Rear-End	Side Swipe	Left Turn	Right Angle	Ped / Cycle	Other		
SW Holly Street / 35th Avenue SW	0	0	0	1	0	0	1	0.2
SW Holly Street / 34th Avenue SW	0	0	0	1	0	0	1	0.2
SW Holly Street / 31st Avenue SW	0	0	0	0	0	0	0	0.0
SW Holly Street / Sylvan Way SW	1	0	0	2	1	0	4	1.0
SW Willow Street / 35th Avenue SW	0	0	0	0	0	0	0	0.0
WSES access / 34th Avenue SW	0	0	0	0	0	0	0	0.0
SW Willow St / 34th Avenue SW	0	0	0	0	0	0	0	0.0

Source: City of Seattle Department of Transportation, Data from January 1, 2016 through February 19, 2020. https://data-seattlecitygis.opendata.arcgis.com/datasets/collisions, Accessed February 19, 2020.

2.6. Transit Facilities and Service

King County Metro Transit (Metro) provides bus service in the site vicinity. The closest bus stops are located about 650 feet northwest of the site at the 35th Avenue SW / SW Holly Street intersection, and about 850 feet northeast of the school at the SW Sylvan Way / SW Holly Street intersection. Table 4 describes the bus routes that serve these stops. It is noted that transit service is continually changing as routes are added, changed, or eliminated; the data in Table 4 reflect service as of April 2020.

Table 4. Existing Transit Service within One-Quarter Mile of the Project Site

Metro Route	Closest Stop	Areas Served	Typical Headway [a] (minutes)
21	34th Avenue SW / SW Holly Street	Downtown, SODO, High Point, Roxhill, White Center, Arbor Heights	15
128	Sylvan Way SW / SW Holly Street	Admiral District, Alaska Junction, High Point, White Center, Tukwila, South Center	30

Sources: King County Metro Transit, April 2020.

a. Typical weekday frequency between buses (headways) in minutes, per direction.

In January 2017, King County Metro adopted 'Metro Connects,'[15] the 25-year vision plan that will serve as the guiding policy framework for future improvements to the transit network. The plan identifies continued, frequent service along 35th Avenue SW and local service along Sylvan Way SW in the study area in 2025, with potential for a Rapid Ride route on Sylvan Way SW by 2040; no changes are expected to be in place by 2023 when the modernization project would be complete.

School bus transportation is made available to West Seattle Elementary School students who qualify for transportation. The existing school is served by four full-size school buses and two smaller SPED buses.

2.7. Non-Motorized Transportation Facilities

As described in the *Roadway Network* section, most roadways in the study area have sidewalks on both sides; intersections near the school with marked crosswalks are listed below.

- SW Holly Street / 35th Avenue SW: pedestrian-actuated signal with crosswalk on south leg
- SW Holly Street / 34th Avenue SW: crosswalks on west and south legs
- SW Holly Street / 32nd Avenue SW: crosswalk on north and east legs
- SW Holly Street / Sylvan Way SW: crosswalk all legs; rectangular rapid flashing beacons (RRFBs) on the north and south legs
- SW Willow Street / 34th Avenue SW: crosswalk on north leg
- SW Myrtle Street / 35th Avenue SW: pedestrian-actuated signal with crosswalk on north leg and crosswalk on east leg
- SW Myrtle Street / 34th Avenue SW: crosswalks on east and south legs

The West Seattle Neighborhood Greenway and High Point Loop includes segments of SW Holly Street and 34th Avenue SW adjacent to the school site. This greenway currently extends between SW Roxbury Street and SW Morgan Street. The High Point Loop was also created to enhance the connection between the High Point neighborhood and the West Seattle Neighborhood Greenway. There are also sharrows provided in both directions on Sylvan Way SW. The *Seattle Bicycle Master Plan – 2019 to 2024 Implementation Plan* identifies construction of Phases 2a and 2b of the West Seattle Neighborhood Greenway in 2020. This work would extend the existing greenway north along a route that includes 34th Avenue SW, SW Graham Street, 38th Avenue SW, SW Findlay Street, and 42nd Avenue SW, ending at SW Edmunds Street.

The City of Seattle's currently adopted *CIP* and the *Seattle Pedestrian Master Plan – 2020 to 2024 Implementation Plan and Progress Report*[16] were reviewed to determine if any pedestrian facility improvements are planned in the area. The proposed *2019-2024 CIP* includes funding over the next five years to advance the *Pedestrian Master Plan*[17] recommendations. The roadways and intersections around West Seattle Elementary are identified as part of the Priority Investment Network (PIN), however, no specific planned non-motorized facility improvements are listed for the study area roadways or intersections in the *CIP* or the *Seattle Pedestrian Master Plan 2020-2024 Implementation Plan and Progress Report.*

15 King County Metro, January 2017.
16 SDOT, December 2019.
17 SDOT, June 2017.

3. PROJECT IMPACTS

This section describes forecast conditions with the West Seattle Elementary School modernization project and the school operating at its planned enrollment capacity of up to 500 students. Vehicle trip estimates associated with the school addition were added to the 2023-without-project traffic volume forecasts. Level of service analyses were performed to determine the proposed project's impact on traffic operations in the study area. The potential changes in parking demand and on-street parking utilization were also estimated.

3.1. Roadway Network

No changes to the surrounding roadway network or site access are proposed.

3.2. Traffic Volumes

The proposed project and the added enrollment capacity could result in increased vehicular, pedestrian, and bicycle activity on the surrounding transportation network. With the project, the school is expected to have an enrollment capacity of up to 500 students, an increase of 73 students compared to its existing enrollment. The following describes the method used to estimate project-generated traffic.

3.2.1. School Trip Generation

Trip generation estimates for school projects can be developed using one of two methods. For new schools, rates published in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*[18] are typically applied. For modernizations and/or expansions of existing schools, it is preferred to use counts of traffic at the existing school. This method works best for schools located in areas where school-related traffic can easily be isolated and identified, and traffic counts can be used to develop rates specifically for that school. At West Seattle Elementary drivers use both the on-site lot and on-street areas for student drop-off in the morning. In the afternoon, passenger vehicle pickup occurs on the adjacent streets (31st and 34th Avenues SW). Trip generation estimates were derived from the video traffic counts performed at surrounding intersections near the school. The resulting estimates were compared to rates derived for other Seattle elementary schools and those published by ITE.

Based on the data collected, the school currently generates an estimated 0.71 trips per student in the morning peak hour and 0.37 trips per student in the afternoon peak hour. These rates are similar to the average rates published for Elementary Schools (Land Use 520) in the *Trip Generation Manual* (0.67 trips per student in the morning peak hour and 0.34 trips per student in the afternoon peak hour) and are consistent with rates derived from counts at other Seattle elementary schools. Since these rates were derived specifically for West Seattle Elementary School, they are most appropriate for use in evaluating future conditions with the project and added enrollment capacity.

The derived rates were applied to the proposed new enrollment capacity at West Seattle Elementary (500 students). Table 5 presents the resulting trip estimates for the expanded West Seattle Elementary School. These estimates include school bus trips, employee trips, and family-vehicle trips. No change to the number of school buses is anticipated as a result of the project. As shown, the project is expected to increase trip generation at the site by 53 trips (28 in, 25 out) in the morning peak hour and by 25 trips (12 in, 13 out) in the afternoon peak hour.

[18] ITE, 10th Edition, September 2017.

Table 5. West Seattle Elementary School Modernization Project – Trip Generation Estimates

Site Condition	Enrollment	Morning Peak Hour			Afternoon Peak Hour		
		In	Out	Total	In	Out	Total
Modernized School with Added Capacity	500 students [a]	192	163	355	85	100	185
Existing School	427 students [b]	164	138	302	73	87	160
Net Change	73 students	28	25	53	12	13	25

Source: Heffron Transportation, Inc., April 2020.

a. Proposed future capacity of the school with modernization.

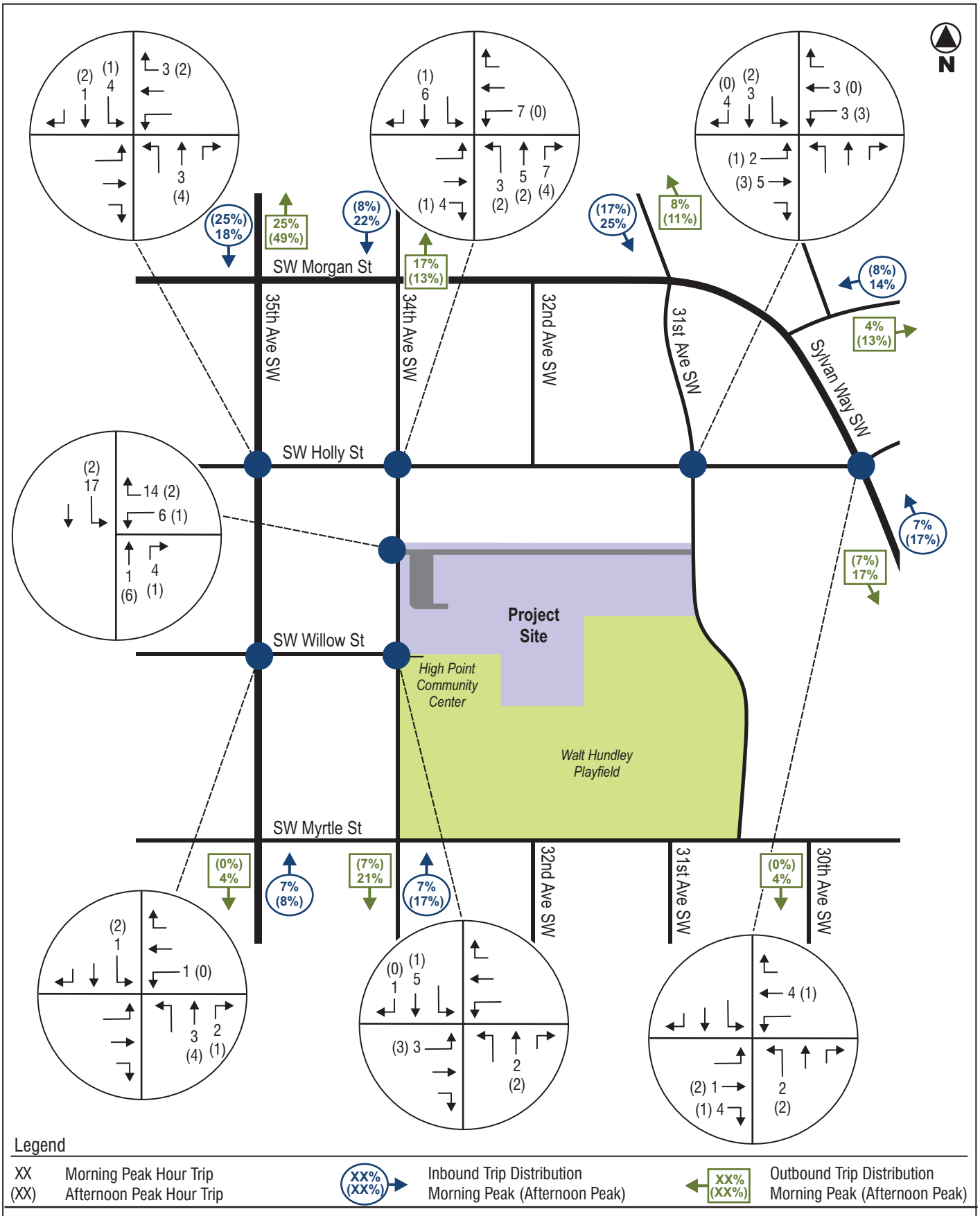
b. Enrollment of the existing school at the time of site traffic counts (February 2020).

3.2.2. Trip Distribution and Assignment

The expanded West Seattle Elementary School is expected to accommodate growth largely within the existing enrollment area for the school. Trip distribution patterns for the new trips within the project study area were developed based on existing patterns surrounding the school. These distribution patterns reflect the existing and expected future travel characteristics of the local roadway network including the location of parking supply, student drop-off/pick-up areas, bus loading area, and the access driveways. Most of the morning and afternoon peak hour trips are expected to consist of student drop off and pick up, with some trips generated by teachers or staff.

School buses would continue to approach the site using 34th Avenue SW. The load/unload zone for buses is planned to remain on site along the north side of the school building. Passenger-vehicle load/unload for students is expected to continue to occur on site and on street in the morning, and on street only in the afternoon. Family drivers generally use curb space along 31st Avenue SW and 34th Avenue SW for on-street student load/unload.

Figure 6 shows the projected traffic distribution patterns and assignments of new trips during both the morning and afternoon peak hours. The net new peak hour school trips were added to the forecast 2023 without-project traffic volumes to reflect future conditions with the renovated school. Figure 7 shows the forecast 2023 with-project morning and afternoon peak hour traffic volumes.



West Seattle ES Modernization

Figure 6
Project Trip Distribution and Assignment
Morning and Afternoon Peak Hours

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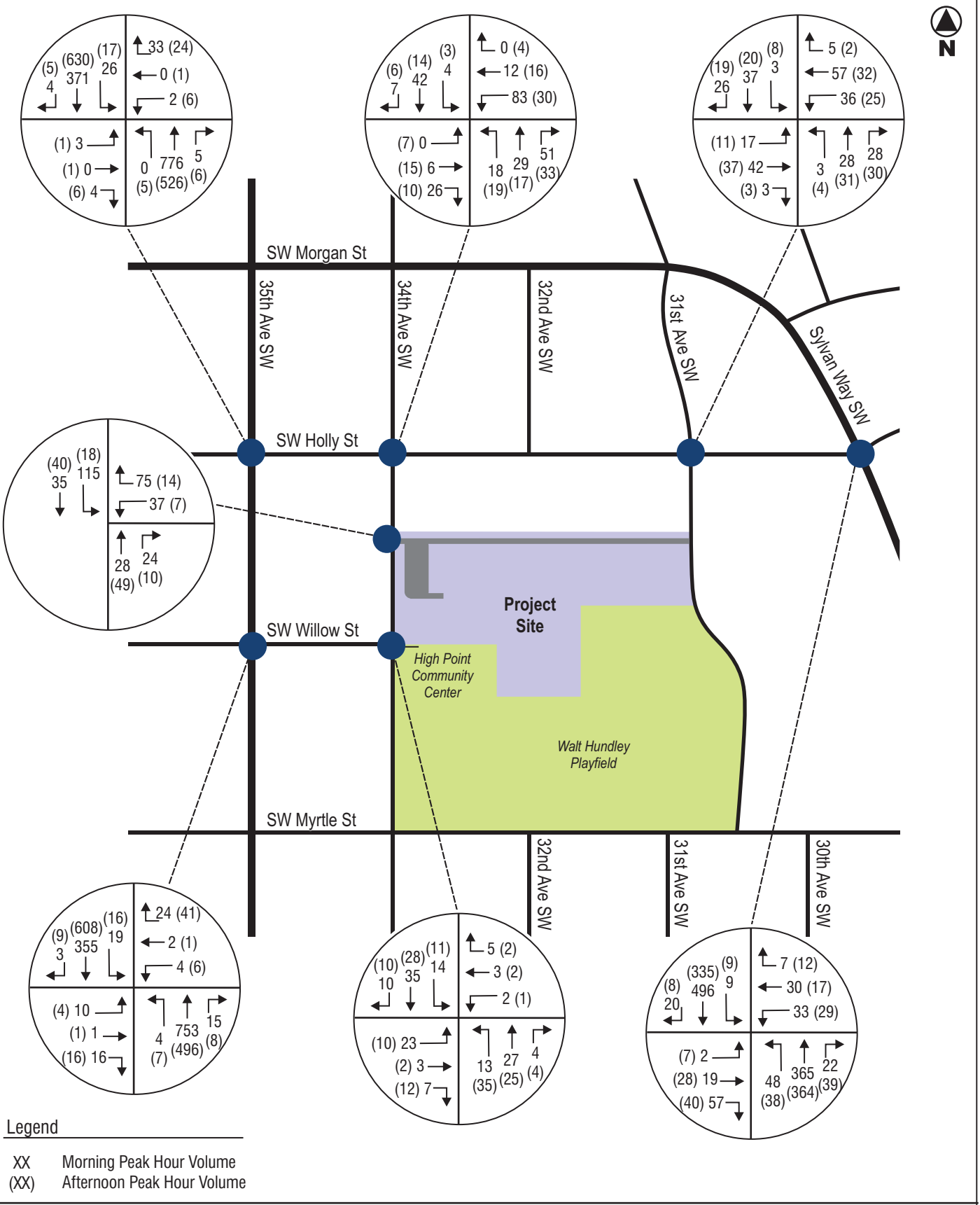

West Seattle ES Modernization

Figure 7
Forecast (2023) With-Project Traffic Volumes
Morning and Afternoon Peak Hours

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3.3. Traffic Operations

Intersection levels of service for future with-project conditions were evaluated using the same methodology described previously. The additional enrollment capacity could result in increased pedestrian trips and could increase the number of pedestrian crossings at the nearby study intersections. The operational analyses accounted for potential increases in pedestrian crossing activity and the peaking characteristics of school traffic (school drop-off and pick-up primarily occurs during about 20 minutes in the peak hour) projected to result from the project.

3.3.1. Off-Site Study Area Intersections

Levels of service for the off-site study area intersections were calculated using the 2023-with-project traffic volumes. Table 6 shows the results of the analysis; levels of service for the 2023-without-project conditions are provided for comparison.

Table 6. Level of Service Summary – 2023 Conditions With- and Without-Project

Intersection	Morning Peak Hour				Afternoon Peak Hour			
	Without Project		With Project		Without Project		With Project	
One- or Two-Way Stop Controlled	LOS [1]	Delay [2]	LOS	Delay	LOS	Delay	LOS	Delay
SW Holly Street / 35th Avenue SW [3] *(overall)*	*A*	*2.1*	*A*	*2.1*	*A*	*1.6*	*A*	*1.6*
Eastbound movements	A	1.8	A	1.8	A	1.7	A	1.7
Westbound movements	A	1.4	A	1.7	A	2.4	A	2.1
Northbound left turns	-	-	-	-	A	5.5	A	5.2
Southbound left turns	A	7.3	A	7.4	A	5.7	A	5.4
SW Holly Street / Sylvan Way SW *(overall)*	*A*	*4.4*	*A*	*4.9*	*A*	*3.2*	*A*	*3.3*
Eastbound movements	B	13.4	B	13.5	B	12.8	B	13.0
Westbound movements	E	42.6	E	45.6	C	23.4	C	24.0
Northbound left turns	A	8.9	A	8.9	A	8.2	A	8.2
Southbound left turns	A	8.3	A	8.3	A	8.4	A	8.4
SW Willow Street / 35th Avenue SW *(overall)*	*A*	*1.2*	*A*	*1.2*	*A*	*1.0*	*A*	*1.0*
Eastbound movements	B	15.0	B	15.0	B	14.2	B	14.2
Westbound movements	C	16.1	C	16.4	B	14.0	B	14.1
Northbound left turns	A	8.3	A	8.3	A	9.0	A	9.0
Southbound left turns	A	9.7	A	9.7	A	8.8	A	8.9
SW Willow Street / 34th Avenue SW [4] *(overall)*	*A*	*4.4*	*A*	*4.3*	*A*	*4.7*	*A*	*4.7*
Eastbound movements	A	9.3	A	9.3	A	9.2	A	9.3
Northbound left turns	A	7.3	A	7.3	A	7.4	A	7.4
Traffic Circle	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
SW Holly Street / 34th Avenue SW	A	3.8	A	3.9	A	3.5	A	3.6
SW Holly Street / 31st Avenue SW	A	4.0	A	4.1	A	3.9	A	3.9

Source: Heffron Transportation, Inc., April 2020.

1. *LOS = Level of service.*
2. *Delay = Average seconds of delay per vehicle.*
3. *HCM & Synchro unable to evaluate intersection configuration due to proximity of signalized pedestrian crossing. Results reported from SimTraffic microsimulation model. Average of eleven 1-hour simulations.*
4. *Uncontrolled, operation most similar to eastbound stop-control*

As shown, the additional traffic and pedestrian activity generated by the proposed increase in enrollment capacity is expected to add small amounts of average delay (3 seconds per vehicle or less) to several of the study area intersections and turning movements during both the morning and afternoon peak hours. However, all intersections would continue operating at LOS A overall during both analysis hours. The westbound stop-controlled movement at the SW Holly Street / Sylvan Way SW intersection would remain at LOS E; all other movements at the study area intersections would remain at LOS C or better during both peak hours with the project.

3.3.2. Site Access

Analysis of the site access driveway indicates it would continue to operate at LOS A overall with the project, with all movements operating at LOS B or better during both peak hours.

3.4. Parking Demand and Supply

3.4.1. School Day Parking

School-day parking at elementary schools is primarily influenced by staffing levels and family-volunteer activity. With the modernization project and added enrollment capacity up to 500 students, SPS estimates the school could have an additional eight employees Future parking demand estimates were developed based on studies at similar elementary schools in the area and rates published by ITE. Observations performed by Heffron Transportation at numerous Seattle elementary schools indicate school-day peak parking demand rates ranging from 1.06 to 1.23 vehicles parked per employee. ITE's *Parking Generation*[19] includes rates of 0.13-vehicles-per-student and 0.95-vehicles-per-employee. Based on the range of rates available, the proposed project is estimated to increase peak parking demand by between 8 and 10 vehicles.

Parking counts indicated that parking demand at the school lot is at or near capacity during the school day. However, on-street parking within the site vicinity averages 36% occupied during the school day, with about 365 unused spaces. Therefore, the unused spaces could easily accommodate the additional staff or volunteer parking demand that may be added due to the school addition.

3.4.2. Event Parking

West Seattle Elementary School would continue to host events periodically throughout the school year. Some events are relatively small (such as monthly family teas), while larger events may be held once per month or once every other month during the school year and typically include the annual open house (or Curriculum Night), athletics (basketball), chess tournaments, and performances (dramas/musicals), as well as Multicultural Nights. The project is not expected to increase the frequency of events, but with larger enrollment, these events could draw proportionately larger attendances. The evening parking observations performed for this project did not capture conditions with an event at the school. However, counts and observations performed during large events at other Seattle elementary schools suggest event parking demand could range from 100 to 150 vehicles at the existing school. With the larger enrollment capacity, large event demand could increase by 15 to 25 vehicles. As noted previously, the on-street parking surveys indicated about 370 unused on-street parking spaces in the school vicinity on evenings without an event, but with nighttime use of the nearby Walt Hundley Playfield. Based on these findings, it is expected that the combination of on-site parking supply (44 spaces) and unused on-street capacity

[19] ITE, 5th Edition, January 2019.

would accommodate evening events and that on-street parking utilization in the overall area would remain below 70% for the largest event (which typically occurs once per year).

3.5. Traffic Safety

The collision data provided for the study area did not indicate any unusual collision patterns that would impact or be impacted by the proposed project. The school expansion is expected to increase traffic and pedestrian traffic activity around the school site. However, the existing measures implemented around the school, including school-zone speed limits, would continue. The greenway improvements in the school vicinity including speed humps and enhanced pedestrian crossings also improve safety conditions during peak arrival and dismissal periods. The project is not expected to result in any adverse safety impacts.

3.6. Transit

A small number of transit trips may be generated by the teachers or staff at the site; however, the traffic estimates do not rely on reductions in auto trips to account for any staff transit usage. The closest bus stops are located on 35th Avenue SW and SW Sylvan Way. The project is not expected to result in adverse impacts to transit facilities or service.

3.7. Non-Motorized Transportation Facilities

West Seattle Elementary School, with increased enrollment capacity, is expected to generate some additional pedestrian trips within the site vicinity. It is anticipated that the largest increases in pedestrian activity would occur along 34th Avenue SW and 31st Avenue SW adjacent to the school. There may also be increases in bicycle trips within the site vicinity due to the proposed project. Assuming increase in bike usage proportional to the expected increase in staff, a peak bike parking demand of 11 to 27 bicycles is estimated. This could be accommodated by the proposed 30 long-term bicycle parking spaces that would be provided. The project would also provide bike racks to accommodate short-term parking for 90 bicycles. The site frontages have sidewalks, and there are numerous marked crosswalks along primary school walking routes. No significant adverse impacts to non-motorized access or facilities is expected, and no further improvements to non-motorized facilities would be needed for the project.

3.8. Short-term Impacts from Construction

Construction is planned to begin in Summer 2021 with occupancy by Fall 2023. During construction, the students will be temporarily located at Schmitz Park Elementary.

3.8.1. Construction Period Demolition, Earthwork, and Employee Activity

The construction effort would include some earthwork to support site upgrades. It is estimated to require removal of about 12,000 cubic yards (cy) of material from the site and import of about 7,000 cy fill. Assuming an average of 20-cubic yards per truck (truck/trailer combination), the excavation and fill would generate about 950 truckloads (950 trucks in and 950 trucks out). The earthwork activities are likely to occur over about 56 weeks. This would correspond to an average of 34 truck trips per day (17 in, 17 out) and 4 to 5 truck trips per hour during the earthwork transport. This volume of truck traffic may be noticeable to residents living adjacent to the site, but would not result in significant impacts to traffic operations in the site vicinity.

The construction of the project would also generate employee and equipment trips to and from the site. It is anticipated that construction workers would arrive at the construction site before the AM peak traf-

fic period on local area streets and depart the site prior to the PM peak period; construction work shifts for schools are usually from 7:00 A.M. to 3:30 P.M., with workers arriving between 6:30 and 6:45 A.M., but work not starting until 7:00 A.M. Generally, it is preferred that construction employee arrival and departures as well as transport and delivery of materials for construction not occur during student arrival or dismissal times to avoid conflicts. The number of workers at the project site at any one time would vary depending upon the construction element being implemented.

3.8.2. Construction-Period Parking Conditions

Construction staging is expected to occur primarily on site. Some construction employee parking may also occur on street Although parking demand generated by construction workers could be noticeable to local residents, the parking occupancy on the surrounding roadways was found to be about 36% utilized during weekdays with more than 350 unused spaces. It is noted that there would be no school-related parking during construction. Therefore, the unused supply is expected to accommodate the temporary added demand during the 18-month construction period and it is not expected to result in significant adverse impacts to study-area parking conditions.

4. FINDINGS AND RECOMMENDATIONS

The following sections summarize the findings and recommendations of the analysis.

4.1. Short-Term Conditions – Construction

- Construction is planned to begin in Summer 2021 with occupancy by Fall 2023. During construction, the students will be temporarily located at Schmitz Park Elementary.
- Earthwork transport during construction is estimated to require an average of 34 truck trips per day (17 in, 17 out) and 4 to 5 truck trips per hour, which may be noticeable to residents living adjacent to the site, but would not result in significant impacts to traffic operations.
- Construction staging is expected to occur primarily on site. Some construction employee parking may also occur on street Although parking demand generated by construction workers would likely be noticeable to local residents, the parking occupancy on the surrounding roadways was found to be about 36% utilized during weekdays with more than 350 unused spaces. Therefore, the unused supply is expected to accommodate the temporary added demand during the 18-month construction period and it is not expected to result in significant adverse impacts to study-area parking conditions.

It is recommended that the contractor and SPS develop a Construction Transportation Management Plan. Details to be included in this plan are described in Section 4.3.

4.2. Long-Term Conditions – Operations

- The proposed modernization of West Seattle Elementary School is expected to increase student capacity to 500 (up from its current enrollment, with the use of portables, of 427) and could have an additional eight employees.
- At the proposed capacity and compared to the site's current enrollment, the expanded school is projected to generate a net increase of 53 trips during the morning peak hour (from 7:15 to 8:15 A.M.) and 25 trips during the afternoon peak hour (from 2:15 to 3:15 P.M.).
- The additional traffic and pedestrian activity generated by the proposed increase in enrollment capacity is expected to add small amounts of average delay (3 seconds per vehicle or less) to several of the study area intersections and turning movements during both the morning and afternoon peak hours. However, all study-area intersections operate at LOS A overall. The westbound stop-controlled movement at the SW Holly Street / Sylvan Way SW intersection would remain at LOS E; all other movements at the study area intersections would remain at LOS C or better.
- At the proposed enrollment capacity of 500 students, school-day parking demand may increase by between 8 and 10 vehicles. There is adequate unused on-street parking supply to accommodate the estimated increase in school-day demand.
- The school would continue to host events periodically throughout the school year. Events are typically held once per month or once every other month. The project is not expected to increase the frequency of events, but with larger enrollment, these events could draw proportionately larger attendances. With the larger enrollment capacity, large event demand could increase by 15 to 25 vehicles. The combination of on-site parking supply and unused on-street capacity would accommodate evening events and on-street parking utilization in the overall area would remain below 70% for the largest event (which typically occurs once per year).

- Expected peak bicycle demand could be accommodated by the proposed 30 long-term bicycle parking spaces that would be provided with the project. The project would also provide bike racks to accommodate short-term parking for 90 bicycles. The project is not expected to result in adverse impact to transit or non-motorized facilities.

Based the above findings, the project would not result in significant adverse impacts to traffic operations or parking.

4.3. Recommendation

Even though the proposed West Seattle Elementary School modernization project would not adversely affect the transportation system in the site vicinity, the following measure is recommended to reduce the traffic and parking impacts associated with construction of the project.

Construction Transportation Management Plan (CTMP): The District should require the selected contractor to develop a Construction Transportation Management Plan (CTMP) that addresses traffic and pedestrian control during construction of the new facility. It would define truck routes, lane closures, walkway closures, and parking or load/unload area disruptions, as necessary. To the extent possible, the CTMP would direct trucks along the shortest route to arterials and away from residential streets to avoid unnecessary conflicts with resident and pedestrian activity. The CTMP may also include measures to keep adjacent streets clean on a daily basis at the truck exit points (such as street sweeping or on-site truck wheel cleaning) to reduce tracking dirt offsite.

APPENDIX A
Level of Service Definitions

Levels of service (LOS) are qualitative descriptions of traffic operating conditions. These levels of service are designated with letters ranging from LOS A, which is indicative of good operating conditions with little or no delay, to LOS F, which is indicative of stop-and-go conditions with frequent and lengthy delays. Levels of service for this analysis were developed using procedures presented in the *Highway Capacity Manual, Sixth Edition* (Transportation Research Board, 2016).

Unsignalized Intersections

For unsignalized intersections, level of service is based on the average delay per vehicle for each turning movement. The level of service for all-way stop or roundabout-controlled intersections is based upon the average delay for all vehicles that travel through the intersection. The level of service and delay for a one- or two-way, stop-controlled intersection is related to the availability of gaps in the main street's traffic flow, and the ability of a driver to enter or pass through those gaps. Table A-2 shows the level of service criteria for unsignalized intersections from the *Highway Capacity Manual, Sixth Edition*.

Table A-1. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Delay per Vehicle
A	Less than 10.0 seconds
B	10.1 to 15.0 seconds
C	15.1 to 25.0 seconds
D	25.1 to 35.0 seconds
E	35.1 to 50.0 seconds
F	Greater than 50.0 seconds

Source: Transportation Research Board, Highway Capacity Manual, 2016.

APPENDIX B
Parking Utilization Study Data

Project **West Seattle ES - Modernization**

				Parking Supply							
Block Face ID	Street Name	Street Segment	Side of Street	Unrestricted Parallel Parking	30 Minute L/U 7a-6p exc Sun/Hol	30 Minute L/U Only	3 Minute PLZ, Street Closed During School Days ~8a-4p	School Load Only 8-10a, 2-4p, exc Sat/Sun/Hol	**Weekday Early Morning (7:00 A.M. to 7:45 A.M.)**	**Weekdays Mid-Morning (10:30 A.M. to 11:15 A.M.)**	**Weekday Evenings (7:30 P.M. to 8:15 P.M.)**
AA	35TH AVE SW	800' BOUNDARY AND SW HOLLY ST	W	6	0	0	0	0	**6**	**6**	**6**
AB	35TH AVE SW	800' BOUNDARY AND SW HOLLY ST	E	5	0	0	0	0	**5**	**5**	**5**
AC	34TH AVE SW	800' BOUNDARY AND SW HOLLY ST	W	22	0	0	0	0	**22**	**22**	**22**
AD	34TH AVE SW	800' BOUNDARY AND SW HOLLY ST	E	12	0	0	0	0	**12**	**12**	**12**
AE	32ND AVE SW	800' BOUNDARY AND SW HOLLY ST	W	15	0	0	0	0	**15**	**15**	**15**
AF	32ND AVE SW	800' BOUNDARY AND SW HOLLY ST	E	24	0	0	0	0	**24**	**24**	**24**
AG	31ST AVE SW	800' BOUNDARY AND SW HOLLY ST	W	21	0	0	0	0	**21**	**21**	**21**
AH	31ST AVE SW	800' BOUNDARY AND SW HOLLY ST	E	21	0	0	0	0	**21**	**21**	**21**
AI	SYLVAN WAY SW	SW MORGAN E ST AND HIGH POINT DR SW	W	0	0	0	0	0	**0**	**0**	**0**
AJ	SYLVAN WAY SW	SW MORGAN E ST AND HIGH POINT DR SW	E	0	0	0	0	0	**0**	**0**	**0**
AK	SW HOLLY ST	35TH AVE SW AND 800' BOUNDARY	N	5	0	0	0	0	**5**	**5**	**5**
AL	SW HOLLY ST	35TH AVE SW AND 800' BOUNDARY	S	5	0	0	0	0	**5**	**5**	**5**
AM	SW HOLLY ST	34TH AVE SW AND 35TH AVE SW	N	8	0	0	0	0	**8**	**8**	**8**
AN	SW HOLLY ST	34TH AVE SW AND 35TH AVE SW	S	8	0	0	0	0	**8**	**8**	**8**
AO	SW HOLLY ST	32ND AVE SW AND 34TH AVE SW	N	9	0	0	0	0	**9**	**9**	**9**
AP	SW HOLLY ST	32ND AVE SW AND 34TH AVE SW	S	12	0	0	0	0	**12**	**12**	**12**
AQ	SW HOLLY ST	31ST AVE SW AND 32ND AVE SW	N	12	0	0	0	0	**12**	**12**	**12**
AR	SW HOLLY ST	31ST AVE SW AND 32ND AVE SW	S	7	0	0	0	0	**7**	**7**	**7**
AS	SW HOLLY ST	SYLVAN WAY SW AND 31ST AVE SW	N	14	0	0	0	0	**14**	**14**	**14**

Project **West Seattle ES - Modernization**

				Parking Supply							
Block Face ID	Street Name	Street Segment	Side of Street	Unrestricted Parallel Parking	30 Minute L/U 7a-6p exc Sun/Hol	30 Minute L/U Only	3 Minute PLZ, Street Closed During School Days ~8a-4p	School Load Only 8-10a, 2-4p, exc Sat/Sun/Hol	**Weekday Early Morning (7:00 A.M. to 7:45 A.M.)**	**Weekdays Mid-Morning (10:30 A.M. to 11:15 A.M.)**	**Weekday Evenings (7:30 P.M. to 8:15 P.M.)**
AT	SW HOLLY ST	SYLVAN WAY SW AND 31ST AVE SW	S	6	0	0	0	0	**6**	**6**	**6**
AU	IGH POINT DR S	800' BOUNDARY AND SYLVAN WAY SW	NW	2	0	0	0	0	**2**	**2**	**2**
AV	IGH POINT DR S	800' BOUNDARY AND SYLVAN WAY SW	SE	1	0	0	0	0	**1**	**1**	**1**
AW	36TH AVE SW	800' BOUNDARY AND SW WILLOW ST	W	6	0	0	0	0	**6**	**6**	**6**
AX	36TH AVE SW	800' BOUNDARY AND SW WILLOW ST	E	6	0	0	0	0	**6**	**6**	**6**
AY	35TH AVE SW	SW HOLLY ST AND SW WILLOW ST	W	0	0	0	0	0	**0**	**0**	**0**
AZ	35TH AVE SW	SW HOLLY ST AND SW WILLOW ST	E	27	1	0	0	0	**28**	**28**	**28**
BA	34TH AVE SW	SW HOLLY ST AND SW WILLOW ST	W	29	0	0	0	0	**29**	**29**	**29**
BB	34TH AVE SW	SW HOLLY ST AND SW WILLOW ST	E	21	0	0	0	0	**21**	**21**	**21**
BC	31ST AVE SW	SW HOLLY ST AND SW MYRTLE E ST	W	60	0	0	0	0	**60**	**60**	**60**
BD	31ST AVE SW	SW HOLLY ST AND SW MYRTLE E ST	E	55	0	0	0	0	**55**	**55**	**55**
BE	SYLVAN WAY SW	H POINT DR SW AND SW SYLVAN HEIGHT	SW	0	0	0	0	0	**0**	**0**	**0**
BF	SYLVAN WAY SW	H POINT DR SW AND SW SYLVAN HEIGHT	NE	0	0	0	0	0	**0**	**0**	**0**
BG	SW WILLOW ST	36TH AVE SW AND 800' BOUNDARY	N	2	0	0	0	0	**2**	**2**	**2**
BH	SW WILLOW ST	36TH AVE SW AND 800' BOUNDARY	S	3	0	0	0	0	**3**	**3**	**3**
BI	SW WILLOW ST	35TH AVE SW AND 36TH AVE SW	N	9	0	0	0	0	**9**	**9**	**9**
BJ	SW WILLOW ST	35TH AVE SW AND 36TH AVE SW	S	10	0	0	0	0	**10**	**10**	**10**
BK	SW WILLOW ST	34TH AVE SW AND 35TH AVE SW	N	8	0	0	0	0	**8**	**8**	**8**
BL	SW WILLOW ST	34TH AVE SW AND 35TH AVE SW	S	6	0	0	0	0	**6**	**6**	**6**

Project **West Seattle ES - Modernization**

				Parking Supply							
Block Face ID	Street Name	Street Segment	Side of Street	Unrestricted Parallel Parking	30 Minute L/U 7a-6p exc Sun/Hol	30 Minute L/U Only	3 Minute PLZ, Street Closed During School Days ~8a-4p	School Load Only 8-10a, 2-4p, exc Sat/Sun/Hol	**Weekday Early Morning (7:00 A.M. to 7:45 A.M.)**	**Weekdays Mid-Morning (10:30 A.M. to 11:15 A.M.)**	**Weekday Evenings (7:30 P.M. to 8:15 P.M.)**
BM	36TH AVE SW	SW WILLOW ST AND DEAD END 2	W	5	0	0	0	0	**5**	**5**	**5**
BN	36TH AVE SW	SW WILLOW ST AND DEAD END 2	E	0	0	0	0	0	**0**	**0**	**0**
BO	35TH AVE SW	SW WILLOW ST AND 800' BOUNDARY	W	21	0	0	0	0	**21**	**21**	**21**
BP	35TH AVE SW	SW WILLOW ST AND 800' BOUNDARY	E	19	0	0	0	0	**19**	**19**	**19**
BQ	34TH AVE SW	SW WILLOW ST AND SW MYRTLE ST	W	29	0	0	0	0	**29**	**29**	**29**
BR	34TH AVE SW	SW WILLOW ST AND SW MYRTLE ST	E	13	0	1	0	0	**14**	**14**	**14**
BS	SW MYRTLE ST	34TH AVE SW AND 800' BOUNDARY	N	0	0	0	1	0	**3**	**0**	**3**
BT	SW MYRTLE ST	34TH AVE SW AND 800' BOUNDARY	S	0	0	0	0	0	**4**	**0**	**4**
BU	SW MYRTLE ST	800' BOUNDARY AND 34TH AVE SW	N	7	0	0	0	0	**7**	**7**	**7**
BV	SW MYRTLE ST	800' BOUNDARY AND 34TH AVE SW	S	5	0	0	0	0	**5**	**5**	**5**
BW	34TH AVE SW	SW MYRTLE ST AND 800' BOUNDARY	W	0	0	0	0	5	**5**	**5**	**5**
BX	34TH AVE SW	SW MYRTLE ST AND 800' BOUNDARY	E	5	0	0	0	0	**5**	**5**	**5**
			TOTAL	**561**	**1**	**1**	**1**	**5**	**575**	**568**	**575**

Project **West Seattle ES - Modernization**

				Supply			Parking Occupancy								
							Morning			Midday			Evening		
Block Face ID	Street Name	Street Segment	Side of Street	Weekday Early Morning (7:00 A.M. to 7:45 A.M.)	Weekdays Mid-Morning (10:30 A.M. to 11:15 A.M.)	Weekday Evenings (7:30 P.M. to 8:15 P.M.)	Tuesday 2/25/2020 7:00AM	Thursday 2/27/2020 7:00AM	Average	Tuesday 2/25/2020 10:30AM	Thursday 2/27/2020 10:30AM	Average	Tuesday 2/25/2020 7:00PM	Thursday 2/27/2020 7:00PM	Average
AA	35TH AVE SW	800' BOUNDARY AND SW HOLLY ST	W	**6**	**6**	**6**	5	5	5	4	6	5	3	4	4
AB	35TH AVE SW	800' BOUNDARY AND SW HOLLY ST	E	**5**	**5**	**5**	4	5	5	5	3	4	2	4	3
AC	34TH AVE SW	800' BOUNDARY AND SW HOLLY ST	W	**22**	**22**	**22**	19	18	19	16	15	16	19	17	18
AD	34TH AVE SW	800' BOUNDARY AND SW HOLLY ST	E	**12**	**12**	**12**	14	13	14	15	11	13	14	14	14
AE	32ND AVE SW	800' BOUNDARY AND SW HOLLY ST	W	**15**	**15**	**15**	15	16	16	16	12	14	14	15	15
AF	32ND AVE SW	800' BOUNDARY AND SW HOLLY ST	E	**24**	**24**	**24**	19	16	18	14	14	14	18	14	16
AG	31ST AVE SW	800' BOUNDARY AND SW HOLLY ST	W	**21**	**21**	**21**	12	11	12	11	8	10	11	14	13
AH	31ST AVE SW	800' BOUNDARY AND SW HOLLY ST	E	**21**	**21**	**21**	13	7	10	8	8	8	8	6	7
AI	SYLVAN WAY SW	SW MORGAN E ST AND HIGH POINT DR SW	W	**0**	**0**	**0**	0	0	0	0	0	0	0	0	0
AJ	SYLVAN WAY SW	SW MORGAN E ST AND HIGH POINT DR SW	E	**0**	**0**	**0**	0	0	0	0	0	0	0	0	0
AK	SW HOLLY ST	35TH AVE SW AND 800' BOUNDARY	N	**5**	**5**	**5**	2	2	2	0	0	0	2	2	2
AL	SW HOLLY ST	35TH AVE SW AND 800' BOUNDARY	S	**5**	**5**	**5**	0	0	0	0	0	0	0	0	0
AM	SW HOLLY ST	34TH AVE SW AND 35TH AVE SW	N	**8**	**8**	**8**	5	2	4	3	3	3	9	4	7
AN	SW HOLLY ST	34TH AVE SW AND 35TH AVE SW	S	**8**	**8**	**8**	1	2	2	5	2	4	8	3	6
AO	SW HOLLY ST	32ND AVE SW AND 34TH AVE SW	N	**9**	**9**	**9**	2	0	1	2	3	3	5	3	4
AP	SW HOLLY ST	32ND AVE SW AND 34TH AVE SW	S	**12**	**12**	**12**	0	3	2	3	3	3	0	0	0
AQ	SW HOLLY ST	31ST AVE SW AND 32ND AVE SW	N	**12**	**12**	**12**	10	11	11	10	9	10	10	9	10
AR	SW HOLLY ST	31ST AVE SW AND 32ND AVE SW	S	**7**	**7**	**7**	7	7	7	8	6	7	4	5	5
AS	SW HOLLY ST	SYLVAN WAY SW AND 31ST AVE SW	N	**14**	**14**	**14**	5	8	7	6	4	5	6	7	7
AT	SW HOLLY ST	SYLVAN WAY SW AND 31ST AVE SW	S	**6**	**6**	**6**	3	2	3	3	0	2	2	1	2
AU	IGH POINT DR SV	800' BOUNDARY AND SYLVAN WAY SW	NW	**2**	**2**	**2**	0	1	1	0	1	1	1	1	1
AV	IGH POINT DR SV	800' BOUNDARY AND SYLVAN WAY SW	SE	**1**	**1**	**1**	0	1	1	1	1	1	1	1	1
AW	36TH AVE SW	800' BOUNDARY AND SW WILLOW ST	W	**6**	**6**	**6**	1	1	1	2	1	2	0	3	2
AX	36TH AVE SW	800' BOUNDARY AND SW WILLOW ST	E	**6**	**6**	**6**	1	3	2	3	1	2	2	2	2
AY	35TH AVE SW	SW HOLLY ST AND SW WILLOW ST	W	**0**	**0**	**0**	0	0	0	0	0	0	0	0	0

Project **West Seattle ES - Modernization**

				Supply			Parking Occupancy								
							Morning			Midday			Evening		
Block Face ID	Street Name	Street Segment	Side of Street	Weekday Early Morning (7:00 A.M. to 7:45 A.M.)	Weekdays Mid-Morning (10:30 A.M. to 11:15 A.M.)	Weekday Evenings (7:30 P.M. to 8:15 P.M.)	Tuesday 2/25/2020 7:00AM	Thursday 2/27/2020 7:00AM	Average	Tuesday 2/25/2020 10:30AM	Thursday 2/27/2020 10:30AM	Average	Tuesday 2/25/2020 7:00PM	Thursday 2/27/2020 7:00PM	Average
AZ	35TH AVE SW	SW HOLLY ST AND SW WILLOW ST	E	**28**	**28**	**28**	9	6	8	9	6	8	11	9	10
BA	34TH AVE SW	SW HOLLY ST AND SW WILLOW ST	W	**29**	**29**	**29**	7	9	8	7	19	13	7	0	4
BB	34TH AVE SW	SW HOLLY ST AND SW WILLOW ST	E	**21**	**21**	**21**	0	10	5	0	16	8	1	9	5
BC	31ST AVE SW	SW HOLLY ST AND SW MYRTLE E ST	W	**60**	**60**	**60**	14	13	14	13	13	13	14	10	12
BD	31ST AVE SW	SW HOLLY ST AND SW MYRTLE E ST	E	**55**	**55**	**55**	19	14	17	11	13	12	20	18	19
BE	SYLVAN WAY SW	H POINT DR SW AND SW SYLVAN HEIGHTS	SW	**0**	**0**	**0**	0	0	0	0	0	0	0	0	0
BF	SYLVAN WAY SW	H POINT DR SW AND SW SYLVAN HEIGHTS	NE	**0**	**0**	**0**	0	0	0	0	0	0	0	0	0
BG	SW WILLOW ST	36TH AVE SW AND 800' BOUNDARY	N	**2**	**2**	**2**	0	0	0	0	0	0	0	0	0
BH	SW WILLOW ST	36TH AVE SW AND 800' BOUNDARY	S	**3**	**3**	**3**	0	0	0	0	0	0	1	0	1
BI	SW WILLOW ST	35TH AVE SW AND 36TH AVE SW	N	**9**	**9**	**9**	4	4	4	4	3	4	2	3	3
BJ	SW WILLOW ST	35TH AVE SW AND 36TH AVE SW	S	**10**	**10**	**10**	0	0	0	0	0	0	0	0	0
BK	SW WILLOW ST	34TH AVE SW AND 35TH AVE SW	N	**8**	**8**	**8**	1	1	1	1	0	1	2	1	2
BL	SW WILLOW ST	34TH AVE SW AND 35TH AVE SW	S	**6**	**6**	**6**	2	2	2	1	1	1	3	2	3
BM	36TH AVE SW	SW WILLOW ST AND DEAD END 2	W	**5**	**5**	**5**	0	0	0	0	0	0	0	0	0
BN	36TH AVE SW	SW WILLOW ST AND DEAD END 2	E	**0**	**0**	**0**	0	0	0	0	0	0	0	0	0
BO	35TH AVE SW	SW WILLOW ST AND 800' BOUNDARY	W	**21**	**21**	**21**	3	3	3	3	3	3	3	2	3
BP	35TH AVE SW	SW WILLOW ST AND 800' BOUNDARY	E	**19**	**19**	**19**	4	3	4	4	3	4	2	2	2
BQ	34TH AVE SW	SW WILLOW ST AND SW MYRTLE ST	W	**29**	**29**	**29**	1	8	5	9	3	6	0	1	1
BR	34TH AVE SW	SW WILLOW ST AND SW MYRTLE ST	E	**14**	**14**	**14**	0	3	2	4	2	3	4	2	3
BS	SW MYRTLE ST	34TH AVE SW AND 800' BOUNDARY	N	**3**	**0**	**3**	0	0	0	0	0	0	1	0	1
BT	SW MYRTLE ST	34TH AVE SW AND 800' BOUNDARY	S	**4**	**0**	**4**	0	0	0	0	0	0	0	0	0
BU	SW MYRTLE ST	800' BOUNDARY AND 34TH AVE SW	N	**7**	**7**	**7**	0	1	1	1	1	1	2	1	2
BV	SW MYRTLE ST	800' BOUNDARY AND 34TH AVE SW	S	**5**	**5**	**5**	3	2	3	2	3	3	4	2	3
BW	34TH AVE SW	SW MYRTLE ST AND 800' BOUNDARY	W	**5**	**5**	**5**	1	0	1	0	0	0	2	0	1
BX	34TH AVE SW	SW MYRTLE ST AND 800' BOUNDARY	E	**5**	**5**	**5**	2	2	2	3	2	3	3	2	3

Project **West Seattle ES - Modernization**

				Supply			Parking Occupancy								
							Morning			Midday			Evening		
Block Face ID	Street Name	Street Segment	Side of Street	**Weekday Early Morning (7:00 A.M. to 7:45 A.M.)**	**Weekdays Mid-Morning (10:30 A.M. to 11:15 A.M.)**	**Weekday Evenings (7:30 P.M. to 8:15 P.M.)**	Tuesday 2/25/2020 7:00AM	Thursday 2/27/2020 7:00AM	Average	Tuesday 2/25/2020 10:30AM	Thursday 2/27/2020 10:30AM	Average	Tuesday 2/25/2020 7:00PM	Thursday 2/27/2020 7:00PM	Average
		TOTAL		**575**	**568**	**575**	**208**	**215**	**212**	**207**	**199**	**203**	**221**	**193**	**207**

Project **West Seattle ES - Modernization**

				Supply			Parking Utilization								
							Morning			Midday			Evening		
Block Face ID	Street Name	Street Segment	Side of Street	Weekday Early Morning (7:00 A.M. to 7:45 A.M.)	Weekdays Mid-Morning (10:30 A.M. to 11:15 A.M.)	Weekday Evenings (7:30 P.M. to 8:15 P.M.)	Tuesday 2/25/2020 7:00AM	Thursday 2/27/2020 7:00AM	Average	Tuesday 2/25/2020 10:30AM	Thursday 2/27/2020 10:30AM	Average	Tuesday 2/25/2020 7:00PM	Thursday 2/27/2020 7:00PM	Average
AA	35TH AVE SW	800' BOUNDARY AND SW HOLLY ST	W	**6**	**6**	**6**	83%	83%	83%	67%	100%	83%	50%	67%	58%
AB	35TH AVE SW	800' BOUNDARY AND SW HOLLY ST	E	**5**	**5**	**5**	80%	100%	90%	100%	60%	80%	40%	80%	60%
AC	34TH AVE SW	800' BOUNDARY AND SW HOLLY ST	W	**22**	**22**	**22**	86%	82%	84%	73%	68%	70%	86%	77%	82%
AD	34TH AVE SW	800' BOUNDARY AND SW HOLLY ST	E	**12**	**12**	**12**	117%	108%	113%	125%	92%	108%	117%	117%	117%
AE	32ND AVE SW	800' BOUNDARY AND SW HOLLY ST	W	**15**	**15**	**15**	100%	107%	103%	107%	80%	93%	93%	100%	97%
AF	32ND AVE SW	800' BOUNDARY AND SW HOLLY ST	E	**24**	**24**	**24**	79%	67%	73%	58%	58%	58%	75%	58%	67%
AG	31ST AVE SW	800' BOUNDARY AND SW HOLLY ST	W	**21**	**21**	**21**	57%	52%	55%	52%	38%	45%	52%	67%	60%
AH	31ST AVE SW	800' BOUNDARY AND SW HOLLY ST	E	**21**	**21**	**21**	62%	33%	48%	38%	38%	38%	38%	29%	33%
AI	SYLVAN WAY SW	SW MORGAN E ST AND HIGH POINT DR SW	W	**0**	**0**	**0**	NS	NS	NS	NS	NS	NS	NS	NS	NS
AJ	SYLVAN WAY SW	SW MORGAN E ST AND HIGH POINT DR SW	E	**0**	**0**	**0**	NS	NS	NS	NS	NS	NS	NS	NS	NS
AK	SW HOLLY ST	35TH AVE SW AND 800' BOUNDARY	N	**5**	**5**	**5**	40%	40%	40%	0%	0%	0%	40%	40%	40%
AL	SW HOLLY ST	35TH AVE SW AND 800' BOUNDARY	S	**5**	**5**	**5**	0%	0%	0%	0%	0%	0%	0%	0%	0%
AM	SW HOLLY ST	34TH AVE SW AND 35TH AVE SW	N	**8**	**8**	**8**	63%	25%	44%	38%	38%	38%	113%	50%	81%
AN	SW HOLLY ST	34TH AVE SW AND 35TH AVE SW	S	**8**	**8**	**8**	13%	25%	19%	63%	25%	44%	100%	38%	69%
AO	SW HOLLY ST	32ND AVE SW AND 34TH AVE SW	N	**9**	**9**	**9**	22%	0%	11%	22%	33%	28%	56%	33%	44%
AP	SW HOLLY ST	32ND AVE SW AND 34TH AVE SW	S	**12**	**12**	**12**	0%	25%	13%	25%	25%	25%	0%	0%	0%
AQ	SW HOLLY ST	31ST AVE SW AND 32ND AVE SW	N	**12**	**12**	**12**	83%	92%	88%	83%	75%	79%	83%	75%	79%
AR	SW HOLLY ST	31ST AVE SW AND 32ND AVE SW	S	**7**	**7**	**7**	100%	100%	100%	114%	86%	100%	57%	71%	64%
AS	SW HOLLY ST	SYLVAN WAY SW AND 31ST AVE SW	N	**14**	**14**	**14**	36%	57%	46%	43%	29%	36%	43%	50%	46%
AT	SW HOLLY ST	SYLVAN WAY SW AND 31ST AVE SW	S	**6**	**6**	**6**	50%	33%	42%	50%	0%	25%	33%	17%	25%
AU	IGH POINT DR S	800' BOUNDARY AND SYLVAN WAY SW	NW	**2**	**2**	**2**	0%	50%	25%	0%	50%	25%	50%	50%	50%
AV	IGH POINT DR S	800' BOUNDARY AND SYLVAN WAY SW	SE	**1**	**1**	**1**	0%	100%	50%	100%	100%	100%	100%	100%	100%
AW	36TH AVE SW	800' BOUNDARY AND SW WILLOW ST	W	**6**	**6**	**6**	17%	17%	17%	33%	17%	25%	0%	50%	25%
AX	36TH AVE SW	800' BOUNDARY AND SW WILLOW ST	E	**6**	**6**	**6**	17%	50%	33%	50%	17%	33%	33%	33%	33%
AY	35TH AVE SW	SW HOLLY ST AND SW WILLOW ST	W	**0**	**0**	**0**	NS	NS	NS	NS	NS	NS	NS	NS	NS
AZ	35TH AVE SW	SW HOLLY ST AND SW WILLOW ST	E	**28**	**28**	**28**	32%	21%	27%	32%	21%	27%	39%	32%	36%
BA	34TH AVE SW	SW HOLLY ST AND SW WILLOW ST	W	**29**	**29**	**29**	24%	31%	28%	24%	66%	45%	24%	0%	12%
BB	34TH AVE SW	SW HOLLY ST AND SW WILLOW ST	E	**21**	**21**	**21**	0%	48%	24%	0%	76%	38%	5%	43%	24%

Project **West Seattle ES - Modernization**

Block Face ID	Street Name	Street Segment	Side of Street	Supply			Parking Utilization								
							Morning			Midday			Evening		
				Weekday Early Morning (7:00 A.M. to 7:45 A.M.)	Weekdays Mid-Morning (10:30 A.M. to 11:15 A.M.)	Weekday Evenings (7:30 P.M. to 8:15 P.M.)	Tuesday 2/25/2020 7:00AM	Thursday 2/27/2020 7:00AM	Average	Tuesday 2/25/2020 10:30AM	Thursday 2/27/2020 10:30AM	Average	Tuesday 2/25/2020 7:00PM	Thursday 2/27/2020 7:00PM	Average
BC	31ST AVE SW	SW HOLLY ST AND SW MYRTLE E ST	W	**60**	**60**	**60**	23%	22%	23%	22%	22%	22%	23%	17%	20%
BD	31ST AVE SW	SW HOLLY ST AND SW MYRTLE E ST	E	**55**	**55**	**55**	35%	25%	30%	20%	24%	22%	36%	33%	35%
BE	SYLVAN WAY SW	HIGH POINT DR SW AND SW SYLVAN HEIGHTS DR	SW	**0**	**0**	**0**	NS	NS	NS	NS	NS	NS	NS	NS	NS
BF	SYLVAN WAY SW	HIGH POINT DR SW AND SW SYLVAN HEIGHTS DR	NE	**0**	**0**	**0**	NS	NS	NS	NS	NS	NS	NS	NS	NS
BG	SW WILLOW ST	36TH AVE SW AND 800' BOUNDARY	N	**2**	**2**	**2**	0%	0%	0%	0%	0%	0%	0%	0%	0%
BH	SW WILLOW ST	36TH AVE SW AND 800' BOUNDARY	S	**3**	**3**	**3**	0%	0%	0%	0%	0%	0%	33%	0%	17%
BI	SW WILLOW ST	35TH AVE SW AND 36TH AVE SW	N	**9**	**9**	**9**	44%	44%	44%	44%	33%	39%	22%	33%	28%
BJ	SW WILLOW ST	35TH AVE SW AND 36TH AVE SW	S	**10**	**10**	**10**	0%	0%	0%	0%	0%	0%	0%	0%	0%
BK	SW WILLOW ST	34TH AVE SW AND 35TH AVE SW	N	**8**	**8**	**8**	13%	13%	13%	13%	0%	6%	25%	13%	19%
BL	SW WILLOW ST	34TH AVE SW AND 35TH AVE SW	S	**6**	**6**	**6**	33%	33%	33%	17%	17%	17%	50%	33%	42%
BM	36TH AVE SW	SW WILLOW ST AND DEAD END 2	W	**5**	**5**	**5**	0%	0%	0%	0%	0%	0%	0%	0%	0%
BN	36TH AVE SW	SW WILLOW ST AND DEAD END 2	E	**0**	**0**	**0**	NS	NS	NS	NS	NS	NS	NS	NS	NS
BO	35TH AVE SW	SW WILLOW ST AND 800' BOUNDARY	W	**21**	**21**	**21**	14%	14%	14%	14%	14%	14%	14%	10%	12%
BP	35TH AVE SW	SW WILLOW ST AND 800' BOUNDARY	E	**19**	**19**	**19**	21%	16%	18%	21%	16%	18%	11%	11%	11%
BQ	34TH AVE SW	SW WILLOW ST AND SW MYRTLE ST	W	**29**	**29**	**29**	3%	28%	16%	31%	10%	21%	0%	3%	2%
BR	34TH AVE SW	SW WILLOW ST AND SW MYRTLE ST	E	**14**	**14**	**14**	0%	21%	11%	29%	14%	21%	29%	14%	21%
BS	SW MYRTLE ST	34TH AVE SW AND 800' BOUNDARY	N	**3**	**0**	**3**	0%	0%	0%	NS	NS	NS	33%	0%	17%
BT	SW MYRTLE ST	34TH AVE SW AND 800' BOUNDARY	S	**4**	**0**	**4**	0%	0%	0%	NS	NS	NS	0%	0%	0%
BU	SW MYRTLE ST	800' BOUNDARY AND 34TH AVE SW	N	**7**	**7**	**7**	0%	14%	7%	14%	14%	14%	29%	14%	21%
BV	SW MYRTLE ST	800' BOUNDARY AND 34TH AVE SW	S	**5**	**5**	**5**	60%	40%	50%	40%	60%	50%	80%	40%	60%
BW	34TH AVE SW	SW MYRTLE ST AND 800' BOUNDARY	W	**5**	**5**	**5**	20%	0%	10%	0%	0%	0%	40%	0%	20%
BX	34TH AVE SW	SW MYRTLE ST AND 800' BOUNDARY	E	**5**	**5**	**5**	40%	40%	40%	60%	40%	50%	60%	40%	50%
			TOTAL	**575**	**568**	**575**	**36%**	**37%**	**37%**	**36%**	**35%**	**36%**	**38%**	**34%**	**36%**

TECHNICAL MEMORANDUM

Project: West Seattle Elementary School Modernization

Subject: Addendum for Earthwork Quantities Update

Date: September 30, 2020

Author: Jennifer Barnes, P.E.

This technical memorandum presents additional transportation analysis that reflects updates to the estimated earthwork quantities that have been refined since publication of the draft SEPA Checklist for the project. This addendum is intended to supplement the analysis presented in the *Transportation Technical Report for West Seattle Elementary School Modernization*.[1]

1. Background

The previous analysis assumed that the estimated excavation quantity would all be hauled off site and the estimated fill quantity would be hauled to the site, in their respective entireties. However, the District and design team have since confirmed that earthwork would be balanced on site (with a portion of the excavated material retained on site to be used later as fill) and that only the surplus excavated material is expected to be hauled away from the site. Additionally, the District and design team have determined that the duration of earthwork activity would be shorter than what was reflected in the previous analysis. The updated truck estimate based upon the more recent information is provided in the following section.

2. Updated Earthwork Quantities and Duration

The prior analysis noted that the construction effort would include earthwork that would consist of excavation that could remove up to 12,000 cubic yards (cy) of material from the site, and fill of up to 7,000 cy of material imported to the site. Hauling of the total volume material, was conservatively estimated to generate an average of 34 truck trips per day (4 to 5 trips per hour) during the transport period.

Although the overall excavation and fill estimates have not changed, balancing of the earthwork is estimated to result in a net export of about 5,000 cy. Assuming an average of 20-cubic yards per truck (truck/trailer combination), the excavation and fill transport would generate about 250 truckloads (250 trucks in, 250 trucks out). Without the trailer (10-cy per truck), the excavation and fill could generate about 500 truckloads (500 trucks in, 500 trucks out). The earthwork activities are likely to occur over the first summer of construction, about a 13-week duration. This would correspond to an average of between 8 and 16 truck trips per day (4 to 8 in, 4 to 8 out) and about 1 or 2 truck trips per hour during the earthwork transport.

With the updated haul quantity and duration, the estimated daily truck loads and truck trips are expected to be fewer than those presented previously in the referenced transportation technical report. No changes to the conclusions or recommendations are required.

[1] Heffron Transportation, Inc., June 4, 2020.

6544 NE 61st Street Seattle, WA 98115 206-523-3939 hefftrans.com

Appendix H

PUBLIC COMMENTS AND RESPONSES

West Seattle Elementary Addition Project

Public Comment Summary and Responses

The Draft Environmental Checklist for the West Seattle Elementary Addition Project was issued on June 26, 2020 and the public comment period was held from June 26, 2020 through July 27, 2020. SEPA regulations recommend that public comments be considered and responded to but provide flexibility on how the comments and responses are presented. One public comment letter/email was received on the Draft Environmental Checklist during the comment period; additional comments were received after the end of the comment period. Public comments are summarized below and responses are provided.

Comment: On-street parking is not available during the day for residents along the west side of 34th Ave SW and school staff should refrain from parking in this area. Parking should be provided for staff on the upper lot at the southeast side of the school.

Response: The City of Seattle considers on-street parking as a public resource available to all users. In some instances, the City has prohibited on-street parking on school days near school sites; however, those restrictions apply to all users, not just school-related demand. It is acknowledged that school-generated parked vehicles may be more concentrated in the areas nearest the school. However, on-street parking surveys completed for the project found an average overall on-street parking occupancy of 36% within an 800-foot walking distance of the site, with greater than 350 unused spaces. The expected project-generated school parking demand of up to 10 vehicles could be accommodated within the available capacity and would have a negligible effect on the overall parking characteristics in the neighborhood (see Appendix G for further details regarding on-street parking).

The project is not proposing to add new on-site parking. As discussed in Appendix G, although the existing school parking lot is at or near capacity during the school day, the on-street parking surveys found about over 350 unused on-street parking spaces in the school vicinity on school days and on evenings without an event. Based on these findings, it is expected that the combination of on-site parking supply (44 spaces) and unused on-street capacity would accommodate school-related demand.

Comment: Seattle Public Schools should issue a Determination of Significance (DS) and prepare an Environmental Impact Statement for the project.

Response: Seattle Public Schools considered these comments in making a final SEPA determination for the project. As SEPA lead agency, Seattle Public Schools reviewed the SEPA Environmental Checklist and supporting documentation (including mitigation measures), considered comments received during the SEPA process, and determined that no probable significant adverse environmental impacts would occur under the proposal.

Comment: The project is removing too many trees on the site.

Response: As noted in Section B.4 of the SEPA Checklist, approximately 34 existing trees would be removed on the project site, including 18 trees that would be removed for safety and maintenance issues at the south end of the site (please refer to Figure 3 for a site plan of the project and Appendix D for further details on trees and tree removal). All other trees, include the three existing exceptional trees would be retained and protected during construction. Consistent with City of Seattle regulations, new replacement trees would be provided on the site at a 1:1 ratio to replace those trees that would be removed as part of the construction process.

Comment: The project is proposing too large of an increase in impervious surfaces on the site.

Response: As noted in Section B.3 of the SEPA Checklist, approximately 55% of the site is currently comprised of impervious surfaces and with the project, the site would be comprised of approximately 68% of impervious surfaces. The site stormwater design for the project would be consistent with the City of Seattle's 2017 storm water manual and flow control (detention) and onsite stormwater management (OSM) would be required. The project would include an onsite detention/infiltration system for new and replaced hard surfaces (likely consisting of an underground vault with a flow control structure). The detention/infiltration vault would collect runoff from the proposed addition and asphalt play area but not all new and replaced hard surfaces would be able to be routed to the proposed detention/infiltration facility and some will have to be bypassed. To compensate for the bypassed areas, the existing asphalt play area and asphalt drive access at the southwest portion of the site would be routed to the proposed detention/infiltration facility. The facility will discharge to the existing 8-inch conveyance system on the school campus. It is anticipated that the proposed detention/infiltration facility will meet OSM requirements per the City of Seattle and other OSM BMPs may be included such as bioretention facilities, pervious pavement, and/or large tree planting. With the implementation of the proposed stormwater facility and measures, no significant runoff impacts would be anticipated.

Comment: There are some areas within the project site that appear to be steep slopes

Response: As indicated in Section B.1 of the SEPA Checklist and the Geotechnical Report (Appendix A), the site of the proposed addition contains areas that are close to, but do not meet the geometric criteria for classification as a steep slope area. In order to be classified as a steep slope area, the slope must be at least 40 percent and they must be 10 feet tall (SMC 25.09.012) and the slopes onsite are shorter than 10 feet based on a review of topographic information.

Comment: Construction noise could affect surrounding neighbors. Clarify the hours of construction for the project.

Response: As noted in Section B.7 of the SEPA Checklist, temporary construction-related noise would occur as a result of on-site construction activities associated with the project. Existing residential land uses surrounding the school would be the most sensitive noise receptors and could experience occasional noise-related impacts throughout the construction process. Pursuant to Seattle's Noise Code (SMC, Chapter 25.08) and based on the Low-Rise Residential 1 zoning for the site, construction activities are allowed to exceed the maximum noise levels between 7 AM and 7 PM on weekdays and 9 AM to 7 PM on weekends. The proposed project would comply with provisions of Seattle's Noise Code as it relates to construction-related noise to reduce noise impacts during construction.

Comment: Larger schools can have greater impacts on neighborhoods and affect other schools in the vicinity.

Response: SPS does not have additional land available to provide additional capacity for the projected enrollment and must utilize the sites that it currently owns in Seattle to accommodate the projected student enrollments at its schools. The proposed project is intended to help address current and projected school capacity issues and the design would be consistent with the applicable provisions of the City of Seattle Land Use Code.

Comment: Construction trucks and traffic could affect residents in the vicinity of the site.

Response: As noted in Section B.14 of the SEPA Checklist and Appendix G, truck traffic is expected to be generated by earthwork activity during project construction. Updated truck estimates reflecting more current information have been documented in the *Addendum for Earthwork Quantities Update* (Heffron Transportation, September 30, 2020). The updated information results in an estimate of average 8 to 16 truck trips per day and 1 or 2 per hour generated during the earthwork activity. The estimated truck trips are expected to be fewer

than those presented previously in the referenced transportation technical report. No changes to the conclusions or recommendations are required. See Appendix G for further details

Comment: The project would affect on-street parking utilization in the area for residents.

Response: As indicated in Section B.14 of the SEPA Checklist and Appendix G, the proposed project would be anticipated to generate a potential increase in parking demand of up to 10 additional parked vehicles during the school day by the additional staff and visitors due to the project, which could be accommodated by the unused on-street parking spaces (found to be more than 350 spaces) identified within the on-street parking surveys completed for the project.

Appendix G also documents that with the larger enrollment capacity, large event demand could increase by 15 to 25 vehicles. As noted in the report, the on-street parking surveys indicated about 370 unused on-street parking spaces in the school vicinity on evenings without an event, but with nighttime use of the nearby Walt Hundley Playfield. Based on these findings, it is expected that the combination of on-site parking supply (44 spaces) and unused on-street capacity would accommodate evening events and that on-street parking utilization in the overall area would remain below 70% for the largest event (which typically occurs once per year).

Comment: What transportation impacts would occur with the use of the interim site during construction?

Response: Use of Schmitz Park Elementary as an interim school site and potential impacts associated with those uses will be analyzed as part of a separate SEPA process for that specific site.

Comment: Is the cultural resources report available for the public to review?

Response: A cultural resources assessment was prepared for the project and is summarized in Section B.13. The document is included as an appendix to the SEPA Checklist (Appendix F). Due to the confidential nature of some information contained in the assessment, a redacted copy of this document is available from Seattle Public Schools upon request.

Comment: Is there a potential for archaeological resources to be located on the site?

Response: As noted in Section B.13 of the SEPA Checklist, the Washington Information System for Architectural and Archaeological Records Data (WISAARD) includes a predictive model which provides a general, high-level assessment of archaeological resources probability across the state. WISAARD indicates that the site and surrounding area have a moderate to high potential for archaeological resources based on their predictive model.

More specifically, a cultural resources assessment was also completed for the project site (Appendix F) and included an analysis of the natural and cultural setting, a discussion of previous cultural resource investigations in the site vicinity, review of geotechnical investigations on the site, and an onsite investigation. Onsite investigations were conducted on the project site, including a pedestrian survey of the site and three shovel probe subsurface investigations. Since fill directly overlaid glacial sediments, it is unlikely that any undisturbed native surfaces are present within the site area, and it is anticipated that there is a very low potential for encountering archaeological materials in the project site. As a result, no further archaeological assessments were recommended.

Comment: Were public notices posted on the site for the project?

Response: Notification of the environmental review for the project was posted on the Seattle Public Schools website, mailed to residents within a two-block radius of the site, and posted on the school site.

Comment: Is there a public meeting for the project?

Response: Public meetings are not required for SEPA Checklists and are not required as part of the City permit process for this project. A public comment period was included as part of the issuance of the Draft SEPA Checklist to solicit comments from the public, agencies and organizations.