Ballou Junior High School Track Replacement

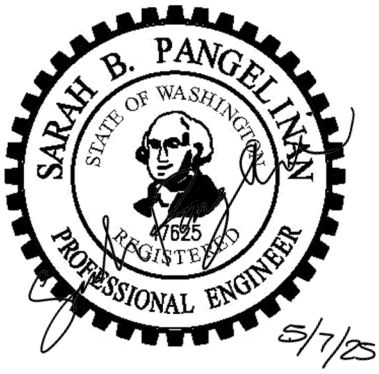
9916 136th Street East

Puyallup, WA 98373

Stormwater Site Plan

May 7, 2025

The information contained in this report was prepared by and under the direct supervision of the undersigned:



Prepared For:

Puyallup School District
323 12th Street NW
Puyallup, WA 98371
(253) 841-1301

LPD Engineering, PLLC
1932 1st Avenue, Suite 500
Seattle, WA 98101
Contact: Sarah Pangelinan, P.E.
(206) 725-1211

DA Hogan & Associates
1450 114th Avenue SE, Suite 225
Bellevue, WA 98004
Contact: Jeff Burke
(206) 285-0400

BALLOU JUNIOR HIGH SCHOOL
TRACK REPLACEMENT
STORMWATER SITE PLAN

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Figure 3: Soils Map
Figure 4: Downstream Drainage Map
Figure 5: Proposed Conditions

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Appendix C – Construction Stormwater Pollution Prevention Plan (SWPPP)

Appendix D – Geotechnical Report

BALLOU JUNIOR HIGH SCHOOL

TRACK REPLACEMENT

STORMWATER SITE PLAN

MAY 7, 2025

SECTION 1 – PROPOSED PROJECT DESCRIPTION

This Stormwater Site Plan is for the track restoration at Ballou Junior High School addressed at 9916 136th St E in unincorporated Pierce County. The school property is located on two parcels (0419164008 and 0419164005) in Section 16, Township 19 North, Range 4 East. The track being replaced is located in the northeast section of parcel 0419164008, with stormwater services extending south into parcel 0419164005.Refer to **Figure 1 – Vicinity Map** for the site location.

The proposed project will consist of replacement of the existing cinder track surface with rubberized surface. The project will expand the current track layout to provide an 8-lane straight away and will maintain the 6-lane layout for the remainder of the track. A shot-put pad and cinder landing surface will be installed adjacent to the field. Additional rubberized surfacing will be added in the southern curve of the track for long jump, triple jump and high jump events.

This Stormwater Site Plan address the requirements of the 2021 Pierce County Stormwater Management and Site Development Manual (SMSDM). This report will adhere to the report format/guidelines as noted in section 3.3.4 of the 2021 Pierce County SMSDM. Refer to the Minimum Requirements section of this report for the project classification and the minimum requirements that are applicable to the project area.

MINIMUM REQUIREMENTS

Per section 2.3 of the Pierce County SMSDM, if the existing lot coverage is greater than 35% impervious, the project is classified as a **redevelopment**. The determination of existing impervious surface coverage for the entire school property was based on survey drawings and as-builts of the recently completed demolition and redevelopment of Old Firgrove Elementary School campus which was completed in Spring of 2023. The parking lot, walking paths, building roof areas, and all other paved hard surfaces were considered to be impervious. The existing impervious coverage for the entire property is approximately 38.65%. Therefore, this project is considered a **redevelopment**. Refer to **Figure 2 – Existing Impervious Coverage**.

The minimum requirements for **redevelopment** are established by Figure 2.2, from Volume I Chapter 2 of the 2021 Pierce County SMSDM. Per Figure 2.2, the project involves greater than 2,000 square feet (sf) of new plus replaced hard surface, therefore minimum requirements (#1-5) apply to the **new plus replaced hard surfaces** and the **land disturbed**. Since the project adds more than 5,000 sf of new hard surfaces, minimum requirements (#1-10) apply to the **new and replaced hard surfaces** and **converted vegetation areas.**

Figure 2.2

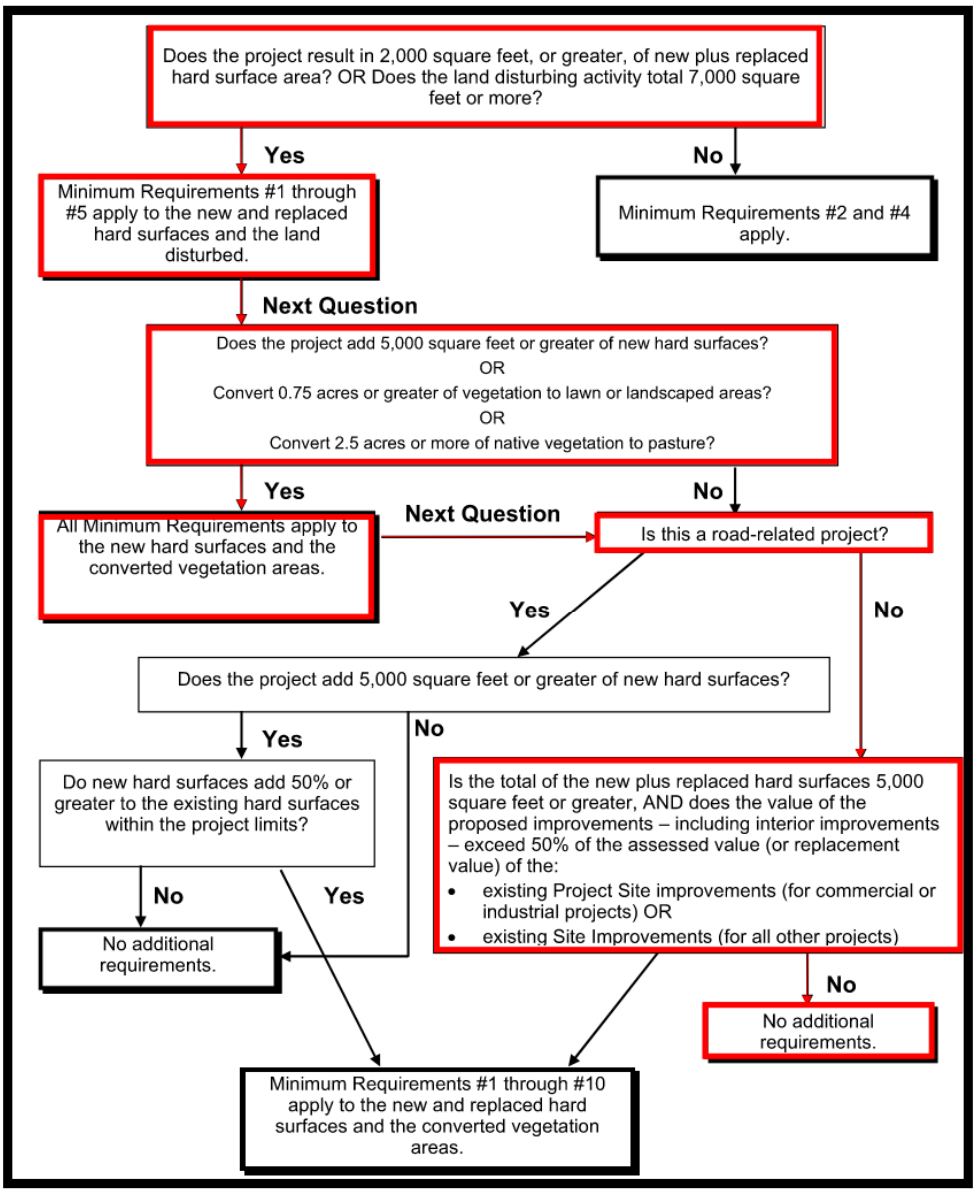


Figure 2.2. Flow Chart for Determining Requirements for Redevelopment.

The following is a description of each of the minimum requirements and how this project addresses them:

Minimum Requirement #1 – Preparation of Stormwater Site Plans (MR1): This document is the Stormwater Site Plan. It outlines the existing and proposed site and drainage conditions, and presents the stormwater management analysis.

Minimum Requirement #2 – Construction Stormwater Pollution Prevention Plan (SWPPP) (MR2): The construction SWPPP narrative is included in Appendix C of this report.

Minimum Requirement #3 – Source Control of Pollution (MR3): This project shall adhere to the applicable (mandatory) operational source control BMPs, as listed by Volume IV of the 2021 Pierce County SMSDM. The source controls that apply for this project are the following: A3.6 Landscaping and Lawn/Vegetation Management and A7.14 Maintenance of Stormwater Drainage and Treatment Facilities. Copies of these BMPs have been included with the Maintenance Covenant under separate cover. Construction source control measures are outlined in the SWPPP narrative.

Minimum Requirement #4 – Preservation of Natural Drainage Systems and Outfalls (MR4): The downstream drainage system is not anticipated to change or be adversely affected by the site improvements. Runoff from the site will be collected by trench drain and catch basins and routed to a flow control facility before connecting to the existing storm drainage system. The existing storm drainage system discharges to the detention pond west of the Firgrove Elementary School building. See the Offsite Analysis sub-section in Section 9 of this report for further explanation.

Minimum Requirement #5 – On-Site Stormwater Management (MR5): This project is subject to on-site stormwater management per Volume I Chapter 2.4.5 of the 2021 Pierce County SMSDM. This project cannot feasibly meet the on-site performance standard, and therefore the project will adhere to List #2 to evaluate the feasibility of on-site stormwater management BMPs. The OSM BMPs to be used on this project include amended soils (BMP T5.13) and Sheet flow dispersion (BMP T5.12). Please see the On-Site Stormwater Management sub-section in Section 9 of this report for more information.

Minimum Requirement #6 – Runoff Treatment (MR6): There are no pollution generating surfaces associated with this project.

Minimum Requirement #7 – Flow Control (MR7): As mentioned previously, flow control is required for the **new and replaced hard surfaces** and **converted vegetation areas**. Flow control will be provided using a StormTech Chamber system and associated flow control structure. See the Flow Control sub-section in Section 9 of this report for further information.

Minimum Requirement #8 – Wetlands Protection (MR8): There is a protected wetland area located on the west side of the property. There will not be any work associated with this project taking place within the wetland or its buffer.

Minimum Requirement #9 – Operations and Maintenance (MR9): The maintenance and operations guidelines for the associated proposed stormwater facilities are included with the Maintenance Covenant which will be submitted under separate cover.

Minimum Requirement #10 – Financial Liability (MR10): A bond quantities worksheet is not required since the project owner is the Puyallup School District, which is a public agency per RCW

35A.21.250, a city is prohibited from requiring that a "unit of local government" like the School District secure "a surety bond or other financial security device, including cash or assigned account" as a condition of the city issuing a permit.

SECTION 2 – EXISTING CONDITIONS DESCRIPTION

The existing track is located in the northeast region of the property, directly east of Ballou Junior High School and northeast of Firgrove Elementary School.

As indicated previously, the existing impervious coverage for the entire property is greater than 35% coverage, which classifies this project as a "redevelopment" according to Pierce County SMSDM. Refer to **Figure 2 – Existing Impervious Coverage**.

The existing track consists of a six-lane cinder track. The interior of the track and areas adjacent to the track consist of grass field which are largely planned to be maintained or replaced in-kind where it will be impacted by the construction of the new track.

The topography of the existing track and associated field areas generally slopes from north to south at approximately 1%, from an elevation of 473 feet to approximately 465 feet. There are steeper slopes located on the eastern edges of the field. Refer to Section 9 of this report for a complete description of the downstream drainage system.

Runoff from the existing track and field are collected by catch basins at the south end of the field and conveyed west to an existing retention pond west of Firgrove Elementary School. The pond was constructed prior to 1990, and does not appear to infiltrate since it retains water for an extended period after rainfall. It does have a weir approximately 8-inches below the berm that appears to set the maximum water level. Since it operates only as a retention pond, it is not considered for mitigation in the development of the new track.

Based on Pierce County environmental mapping, various critical areas have been identified on the west side of the campus property including a regulated floodplain and delineated wetland. County map data also indicates the site is within an aquifer recharge area. The project site dos not propose any work within the vicinity of the wetland or floodplain.

SECTION 3 – SOILS REPORT

The Web Soil Survey by USDA Natural Resources Conservation Service indicates that the soils within the project consist of Kapowsin Gravelly Ashy Loam soils, 0 to 6 percent slopes and Kitsap Silt Loam, 2 to 8 percent slopes. Refer to **Figure 3 – Soils Map**.

In a Geotech report conducted for the construction of Firgrove Elementary by GeoEngineers prepared November 17, 2016, three borings (B-1, B-2, and B-3) were drilled surrounding the project site. These borings encountered approximately 2 feet of silty fine to coarse sand with occasional gravel and organic matter which were then underlain by 1.5 feet to 5 feet of weathered till with glacial till below.

Perched groundwater was observed at a depth of 2.5 feet during the drilling of B-2, but was not observed in B-1 nor B-3.

SECTION 4 – WELLS AND SEPTIC SYSTEMS

There are no existing wells or septic systems on the site.

SECTION 5 – FUEL TANKS

There are no existing fuel tanks, in-use or abandoned on the project site.

SECTION 6 – SUB-BASIN DESCRIPTION

All drainage tributary to the project is onsite in the proposed condition, with one main sub-basin associated with the site. Refer to **Figure 5 -Proposed Drainage Map**.

Basin #1 Track and Field (3.33 ac) **See Figure 5.**
This basin includes the track and field and interior surfacing for long jump, high jump and triple jump events. A trench drain running along the interior of the track will collect stormwater from the track surfacing as well as the existing grass field and convey it to a proposed StormTech chamber detention facility and flow control structure before discharging to the existing stormwater system south of the track.

Basin #2 Shot-Put Pad and Cage (0.01) **See Figure 5.**
This basin includes the shot-put pad and cage north of the track and field. Stormwater in this basin is expected to sheet flow disperse through the adjacent lawn.

SECTION 7 – FLOODPLAIN ANALYSIS

Per the FEMA Flood Map, there is a floodplain along the western edge of the school property. The 100-year elevation is indicated as 464, so the 100-year floodplain follows the 464 contour. The remainder of the property is not within a flood zone. There will not be any project disturbance within the floodplain.

SECTION 8 – AESTHETIC CONSIDERATIONS FOR FACILITIES

This project will be updating the surfacing of the track and restore portions of the natural grass where impacted by construction. At the south end of the track a long jump/triple jump runway, take-off boards, and sand pit landing will be installed. These restoration and improvement proposals will improve the track and field function and appearance. Proposed flow control facilities will be underground structure, allowing for more open space.

SECTION 9 – FACILITY SIZING AND OFFSITE ANALYSIS

Downstream Analysis

The site is occupied by the existing track and field for Ballou Junior High School.
As-builts of the site's drainage system, survey information, Pierce County GIS, FEMA Maps, and site visits were utilized for the downstream analysis of the site.

Define and Map Study Area

The project site was mapped by a topographical field survey. The field survey was provided through DA Hogan to LPD Engineering for use in the design of new site improvements. The field

survey for the property was performed in November of 2016 and updated in February and March of 2020 and was prepared by Sitts & Hill Engineers, Inc.

Drainage System Description and Problem Descriptions

The onsite and downstream drainage analysis was based on the survey provided to LPD Engineering, record drawings, and site visits for prior projects on the property.

Storm runoff sheet flows across the existing field to three catch basins at the south end of the field. Refer to **Figure 4 – Downstream Drainage Map**. The downstream drainage course for the project is described as follows:

1. Stormwater sheet flow into the existing catch basins flows into a 6-inch PVC pipe running south for approximately 350 feet.
2. The pipe then upsizes to 8-inch PVC and continues to run south for approximately 140 feet.
3. Combining with several other pipes, stormwater conveyance then upsizes to 12-inch PVC and flows northwest for roughly 280 feet.
4. The stormwater system then upsizes to 24-inch pipe traveling northwest approximately 500 feet.
5. From there, 24-inch concrete pipe conveys the water west roughly 230 feet to a flow splitter.
6. At the flow splitter, stormwater first discharges south (~20 ft concrete pipe) to an existing retention pond then overflow is discharged north (~40 ft concrete pipe) into the closed depression.

According to GIS and FEMA mapping, the closed depression is approximately 3,700' long with an average width of 300', extending from 136th Ct SE to 148th St SE at is southern terminus. It is heavily wooded, with limited access. It is shown on the FEMA Map with an elevation of 464'. The wetland includes a 50-foot buffer.

During a site visit for the demolition of old Firgrove Elementary School there was no observed issues with the downstream system. The project is not expected to adversely affect the downstream drainage path.

Flow Control

As mentioned previously, the project is required to address Minimum Requirement #7 – Flow Control for the target surfaces that include **new plus replaced hard surfaces** and the **converted vegetation areas**. Per Volume 1 Glossary of the 2021 SMSDM, the definition of "converted vegetation areas," means any native vegetation, pasture, scrub/shrub or unmaintained non-native vegetation that are converted to lawn or landscaped areas, or where native vegetation is converted to pasture. The existing pervious areas within the project site consist mainly of maintained grass that will either be replaced with lawn or landscaping in the proposed condition, which is not considered a converted vegetation area. Therefore, there are no converted vegetation areas associated with this project.

The "target" hard surface requiring flow control mitigation consists of just the new plus replaced hard surfaces associated with the track and the shot put pad. Per the Pierce County 2021 SMSDM, standard flow control requires matching the predeveloped discharge rates from 50 percent of the 2-year recurrence interval peak flow up to the full 50-year peak flow. MGS Flood, which is an approved continuous runoff model, will be the modeling program used for this project.

New plus replaced hard surface (Target Hard Surface) associated with the proposed improvements totals 45,723 square feet (1.05 acres). Target Hard Surface will be mitigated to forested (predeveloped) conditions. The Table 1 below lists the target new plus replaced hard surface associated with the proposed improvements:

Table 1 –Target Hard Surface

Surface Type	Square Feet	Acres
Track & Concrete Curb	45,469	1.04
Shot Put Pad & Curb	254	0.01
Total New Plus Replaced Hard Surface (TARGET HARD SURFACE)	**45,723**	**1.05**

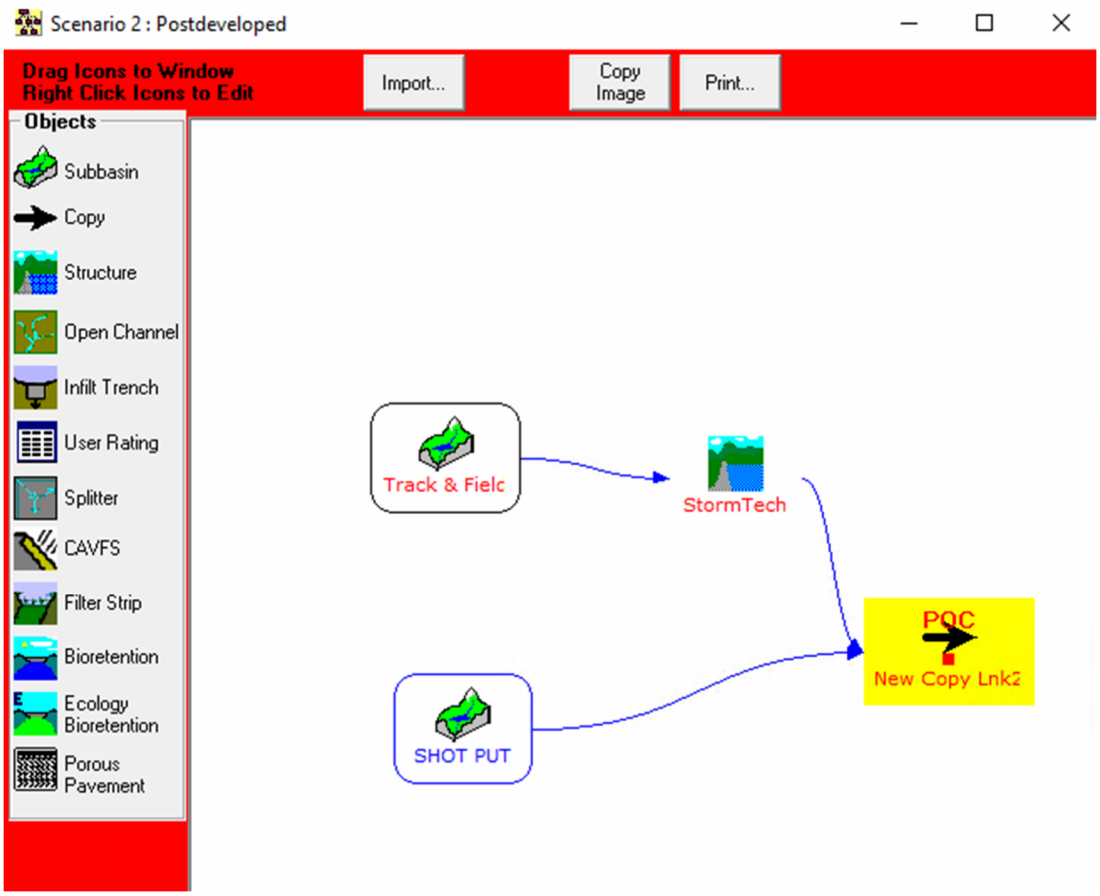
The proposed track surfaces are modeled as 100% impervious. The shot-put pad is expected to be sheet flow dispersed and is included in the detention model as grass which will bypass the detention facility. The existing grass field is modeled as grass which will be routed through the detention facility. See Table 2 below and **Figure 5 – Proposed Conditions** for the breakdown of modeled areas and visual representation of the proposed areas.

Table 2 – Detention Basin

Surface Type	Square Feet	Acres
Track & Concrete Curb	45,469	1.04
Shot Put Pad & Curb	254	0.01
Existing Grass Field	99,559	2.29
Total Detention Basin	**145,2882**	**3.34**

The predeveloped basin areas from **Figure 5 – Proposed Conditions** were entered into MGS Flood as a single predeveloped basin, connected to the point of compliance. The detention basin areas from **Figure 5 – Proposed Conditions** were entered into MGS flood as the mitigated scenario, with two basins, one flowing directly to the StormTech detention system connected to the point of compliance and the second including the shot-put pad bypassing the detention system and connected to the point of compliance. See Figure 1 below for a depiction of the modeled developd condition.

Figure 1: MGS Flood Postdeveloped Scenario



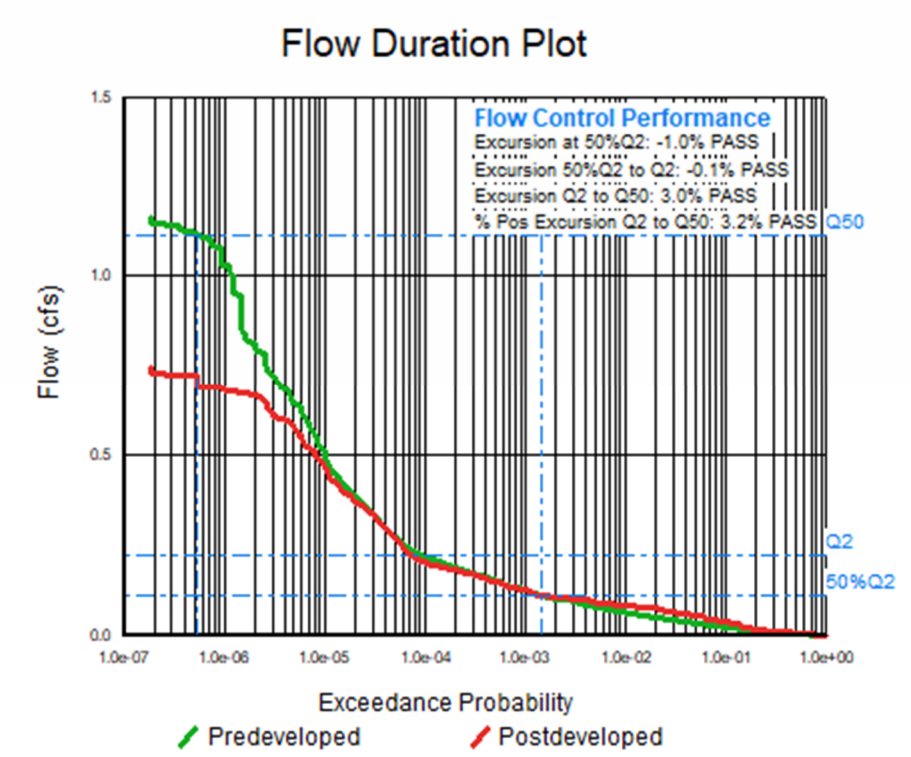
Flow Control System

The proposed flow control facility will consist of a SC-310 StormTech chamber system located southeast of the track. The StormTech will have 399 chambers with 40 rows and 10 chambers per row (except for the northmost end row that has 9 chambers). The StormTech system will have 6 inches of stone above and below. Including the voids in the gravel the total storage volume is 12,413 cubic feet. See the Stage Storage Table Spreadsheet in Appendix B.

A flow control structure will be located downstream of the StormTech Chamber system, located near the southeast corner of the StormTech system. Due to the drop between the chambers and the control structure, although the actual storage section in the StormTech chambers is 2.33 feet; due to the gravity discharge form the track to the control structure, the true height of the riser will be greater. The flow control riser will have one orifice and a rectangular sharp crest weir. Refer to the flow control structure outlet pipe conveyance in the Conveyance System Analysis and Design section of this report. Refer to Sheet F-2.20 for the flow control structure detail.

Refer to the complete MGS Flood output provided in Appendix B. The following graph (Graph 1) shows the flow duration analysis graph from MGS Flood for the project. The StormTech chamber detention system and flow control structure proposed are in compliance with Minimum Requirement #7, which as previously mentioned requires that stormwater discharges shall match developed discharge duration to predeveloped discharge durations for the range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow.

Graph 1: Flow Duration Plot from MGS Flood



On-Site Stormwater Management

The project is required to evaluate the feasibility of OSM BMPs included as part of List #2 of Chapter 2.4.5 in Volume 1 of the 2021 Pierce County SMSDM. On-Site Stormwater Management feasibility is described below in Table 3 for the target hard surfaces.

Table 3 – On-site Stormwater Management BMP Evaluation

BMP	Feasibility	Explanation
Lawn/Landscaped Areas		
Soil Preservation and Amendment	Yes	Soil not disturbed shall be preserved while disturbed landscaping/law areas shall be amended according to Department of Ecology BMP T5.13. Landscaping/lawn areas to be disturbed and restored include the areas along the exterior and interior of the track on all sides, the construction access and areas disturbed for installation for the stormwater facilities and conveyance pipe.
Roof – N/A. No roof surfaces proposed.		
Other Hard Surfaces		
Full Dispersion	No	Due to the existing topography and existing lawn areas adjacent to the track a minimum forested or native vegetation flow path length of 100 feet cannot be achieved.
Permeable Pavement	No	Bioretention would not be feasible. Geotechnical investigations identified hydraulically restrictive layer as well as fill layers. Based on the Geotechnical report the anticipated infiltration rates based on the Soil Grain size analysis per Method 3 of Appendix III-A of the SMSDM is less than 0.25 in/hr and therefore the minimum infiltration rate of 0.3 inches per hour could not be met.
Bioretention	No	Bioretention would not be feasible. Geotechnical investigations identified hydraulically restrictive layer as well as fill layers. Based on the geotechnical report the anticipated infiltration rates based on the Soil Grain size analysis per Method 3 of Appendix III-A of the SMSDM is less than 0.25 in/hr and therefore the minimum infiltration rate of 0.3 inches per hour could not be met.
Sheet flow Dispersion	Yes	The track surfacing is sloped towards the interior of the track, per standard track design and are not proposed to sheet flow over the field in order to maintain playability of the field throughout the year. The proposed shot-put pad and landing cinders will be fully dispersed over the adjacent lawn areas.

Water Quality Treatment

There are no pollution generating surfaces associated with the project, therefore water quality treatment is not required nor proposed.

Conveyance System Analysis and Design

An analysis of the onsite conveyance systems was performed for the inlet pipe to the StormTech Chambers, and the outlet pipe of the flow control structure. Refer to the Conveyance Analysis Spreadsheet and MGS Flood output included in Appendix B. At a minimum, the new pipe system must be able to convey the 25-year peak runoff event per Volume III Section 4.2 of the SMSDM, which was determined using MGS Flood with 15-minute time steps. The 100-year peak runoff event was also determined as a conservative measure. These values were compared to the full flow capacity of the pipes, which was determined using Manning's equation.

The inflow to from the StormTech Chambers which conveys the proposed track and existing field in its entirety was analyzed. The pipe is a 10-inch CPEP (n=0.012) at 0.5% slope, with a full-flow capacity of 1.65 and 1.54 cfs for the inflow and outflow respectively. Based on the MGS Flood model, the 25-year peak flow and 100-year peak flow were found to be 0.75 and 1.14 cfs, respectively. Thus, this pipe will have adequate conveyance capacity for the proposed conditions.

The outlet pipe of the flow control structure to the existing catch basin was analyzed. The pipe is an 8-inch CPEP (n=0.012) at 0.5% slope, with a full-flow capacity of 0.91 cfs. Based on the MGS Flood model, the 25-year peak flow and 100-year peak flow were found to be 0.55 and 0.69 cfs, respectively. Thus, this pipe will have adequate conveyance capacity for the proposed conditions.

SECTION 10 – UTILITIES

No new sewer nor water lines are proposed nor are existing lines anticipated to be impacted.

SECTION 11 – COVENANTS, DEDICATIONS, EASEMENTS

A Maintenance Covenant for the drainage control plan will be required per section 3.3.7 of Volume I of the Pierce County SMSDM prior to the start of construction. The Maintenance Covenant will be submitted under separate cover.

SECTION 12 – PROPERTY OWNERS' ASSOCIATION ARTICLES OF INCORPORATION

Not Applicable.

SECTION 13 – OTHER PERMITS OR CONDITIONS PLACED ON THE PROJECT

The site disturbance is over one acre, and therefore an NPDES notice of intent (NOI) permit will be required. This will be permitted directly with the Washington State Department of Ecology.

SECTION 14 – CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A construction SWPPP narrative for the project has been included in Appendix C and is based on the 2021 Pierce County SWSDM requirements. An NPDES permit from the Washington State Department of Ecology will be required for the project because it will disturb over one (1) acre of land area.

The TESC plan includes a temporary sediment settling tank. A minimum volume was calculated using the methodology from Volume II of the 2021 Pierce County SWSDM, with the 2-year developed flow rate from MGS Flood. A copy of the Sediment Facility Sizing Calculations worksheet and associated MGS Flood Output used for this exercise is attached in Appendix B-2.

TESC elements in the project include the following:

- Preserving Natural Vegetation, per BMP C101
- Stabilized Construction Entrance/Exit, per BMP C105
- Plastic Covering, per BMP C123
- Sawcutting and Surfacing Pollution Prevention, per BMP C152
- Interceptor Swale, per BMP C200
- Check Dams, per BMP C207
- Storm Drain Inlet Protection, per BMP C220
- Silt Fence, per BMP C233
- Temporary Sediment Tank per BMP C241
- Tree Protection Fencing

The TESC elements shown are intended to be the minimum allowable. The NPDES permit will require periodic inspection of the TESC elements to confirm they are holding up and continuing to function as intended. During construction, the contractor is responsible for upgrading these facilities as necessary. The implementation of the TESC plan and construction maintenance, replacement and upgrading of the TESC facilities are the responsibility of the contractor, per the contract documents. The TESC facilities will be constructed prior to and in conjunction with all clearing and grading activity and in a manner in which sediment or sediment laden water does not leave the project site, enter the drainage system, or violate applicable water quality standards.

FIGURES

Figure 1: Vicinity Map
Figure 2: Existing Impervious Coverage
Figure 3: Soils Map
Figure 4: Downstream Drainage Map
Figure 5: Proposed Conditions



BALLOU JUNIOR HIGH SCHOOL

LPD engineering pllc
1932 1st Ave,
Suite 500
Seattle, WA 98101
p. 206.725.1211
f. 206.973.5344
www.lpdengineering.com

DESCRIPTION

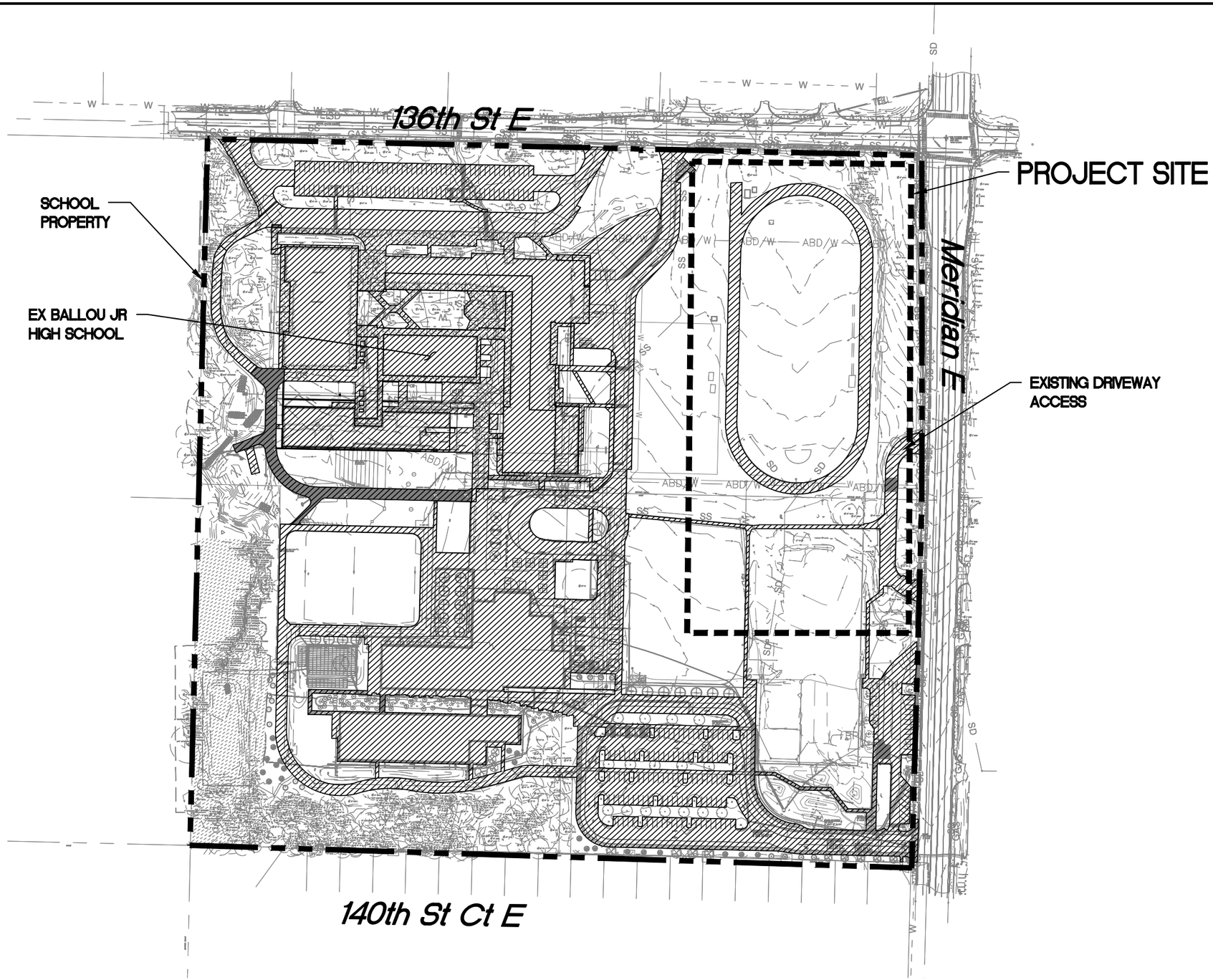
VICINITY MAP

MAY 7, 2025

FIGURE

1

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EXISTING IMPERVIOUS AREA	
Existing Impervious	15.46 AC
Total Property Area	40.00 AC
Percentage of Site Impervious	38.65%

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BALLOU JUNIOR HIGH SCHOOL

LPD engineering pllc
1932 1st Ave,
Suite 500,
Seattle, WA 98101
p. 206.725.1211
f. 206.973.5344
www.lpdengineering.com

DESCRIPTION

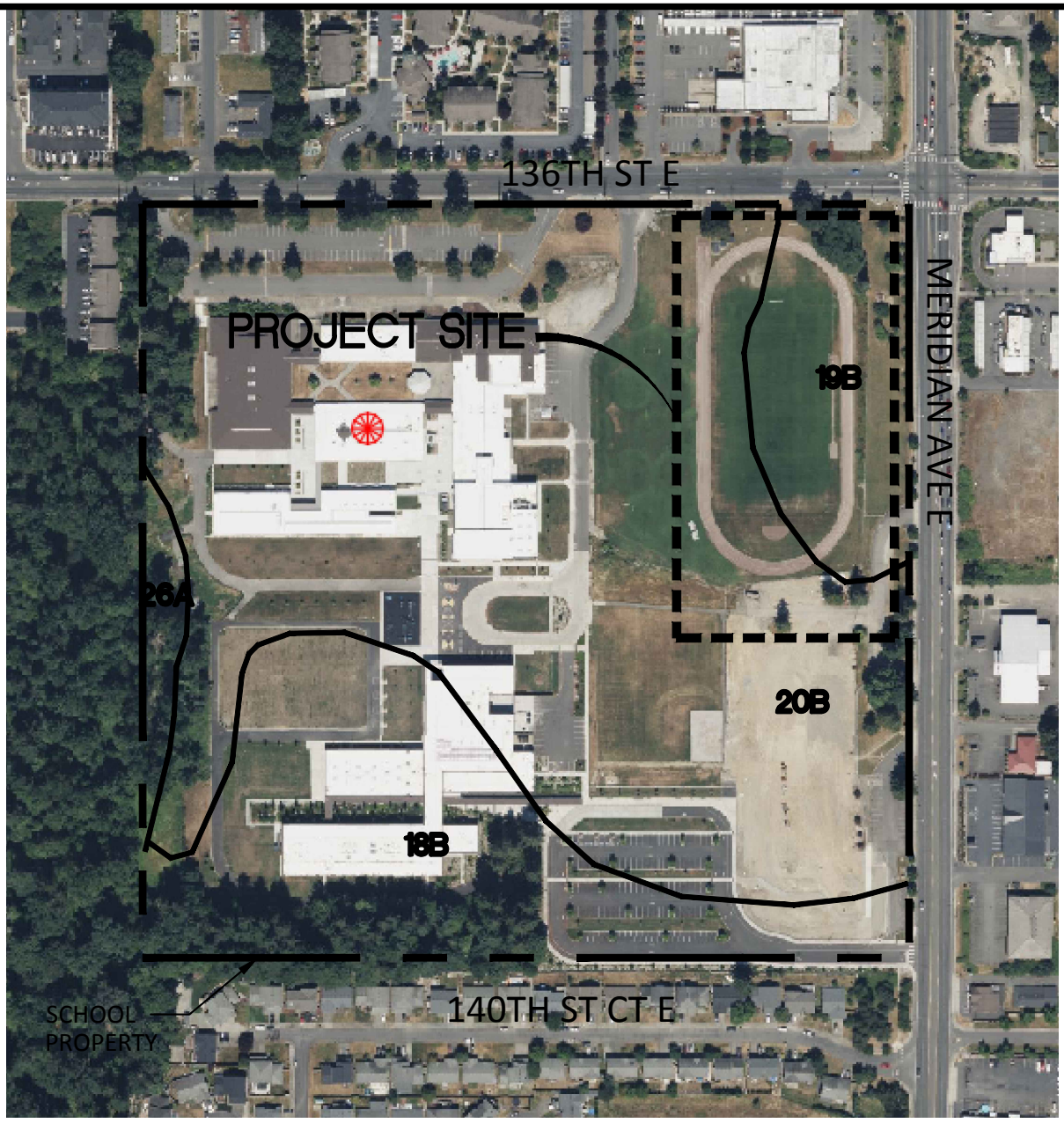
EXISTING IMPERVIOUS COVERAGE AND CONDITIONS

MAY 7, 2025

FIGURE

2

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PIERCE COUNTY AREA, WASHINGTON (WA653)

MAP UNIT SYMBOL	MAP UNIT NAME
18B	Indianola Loamy Sand, 0% to 5% slopes
19B	Kapowsin Gravelly Ashy Loam, 0% to 6% slopes
20B	Kitsap Silt Loam, 2% to 8% slopes
26A	Norma Fine Sandy Loam

BALLOU JUNIOR HIGH SCHOOL

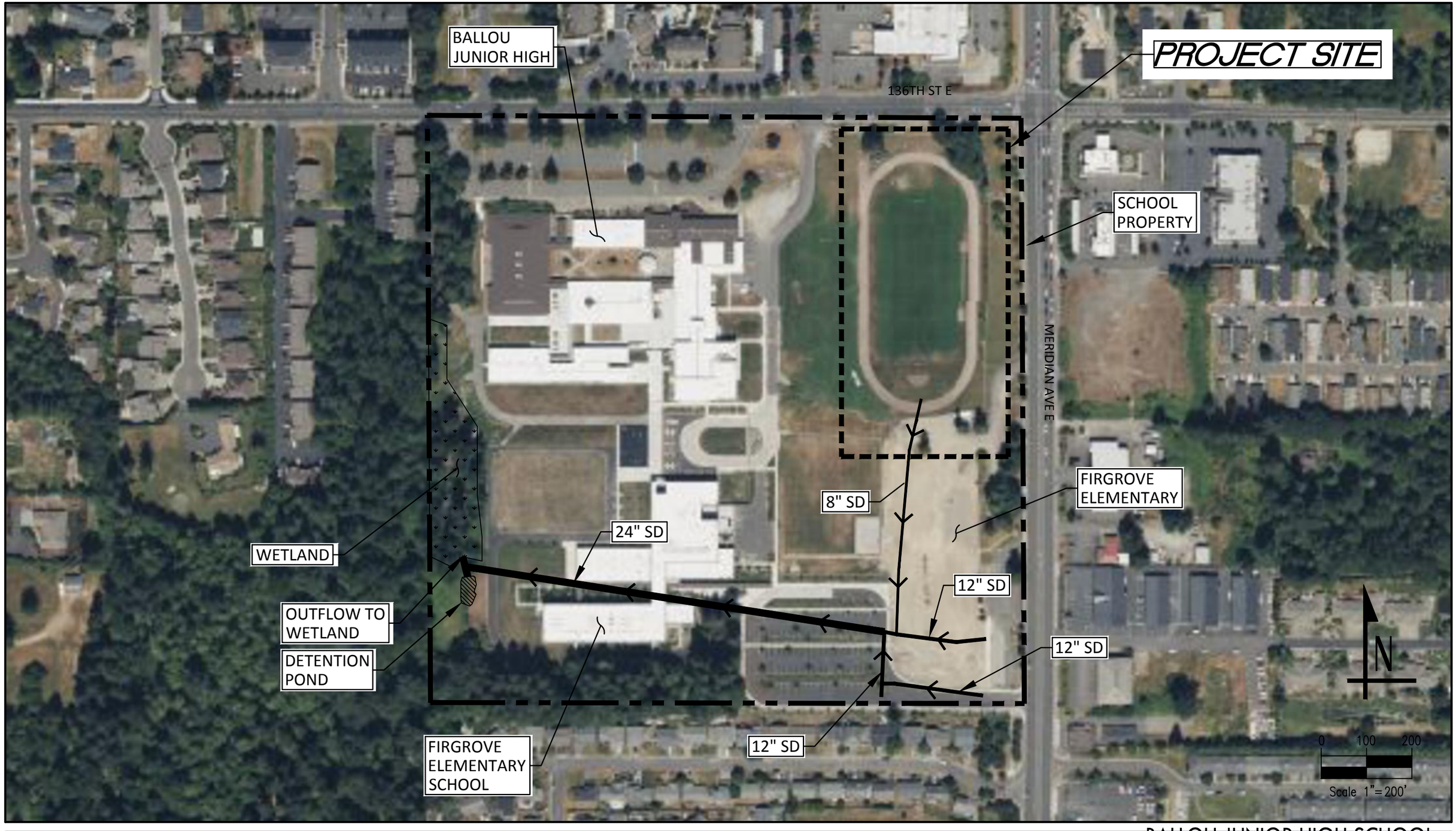
LPD engineering pllc
1932 1st Ave,
Suite 500,
Seattle, WA 981041
p. 206.725.1211
f. 206.973.5344
www.lpdengineering.com

DESCRIPTION

SOILS MAP

MAY 7, 2025

FIGURE 3



BALLOU JUNIOR HIGH SCHOOL

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LPD engineering pllc
1932 First Ave,
Suite 500,
Seattle, WA 98101
p. 206.725.1211
f. 206.973.5344
www.lpdengineering.com

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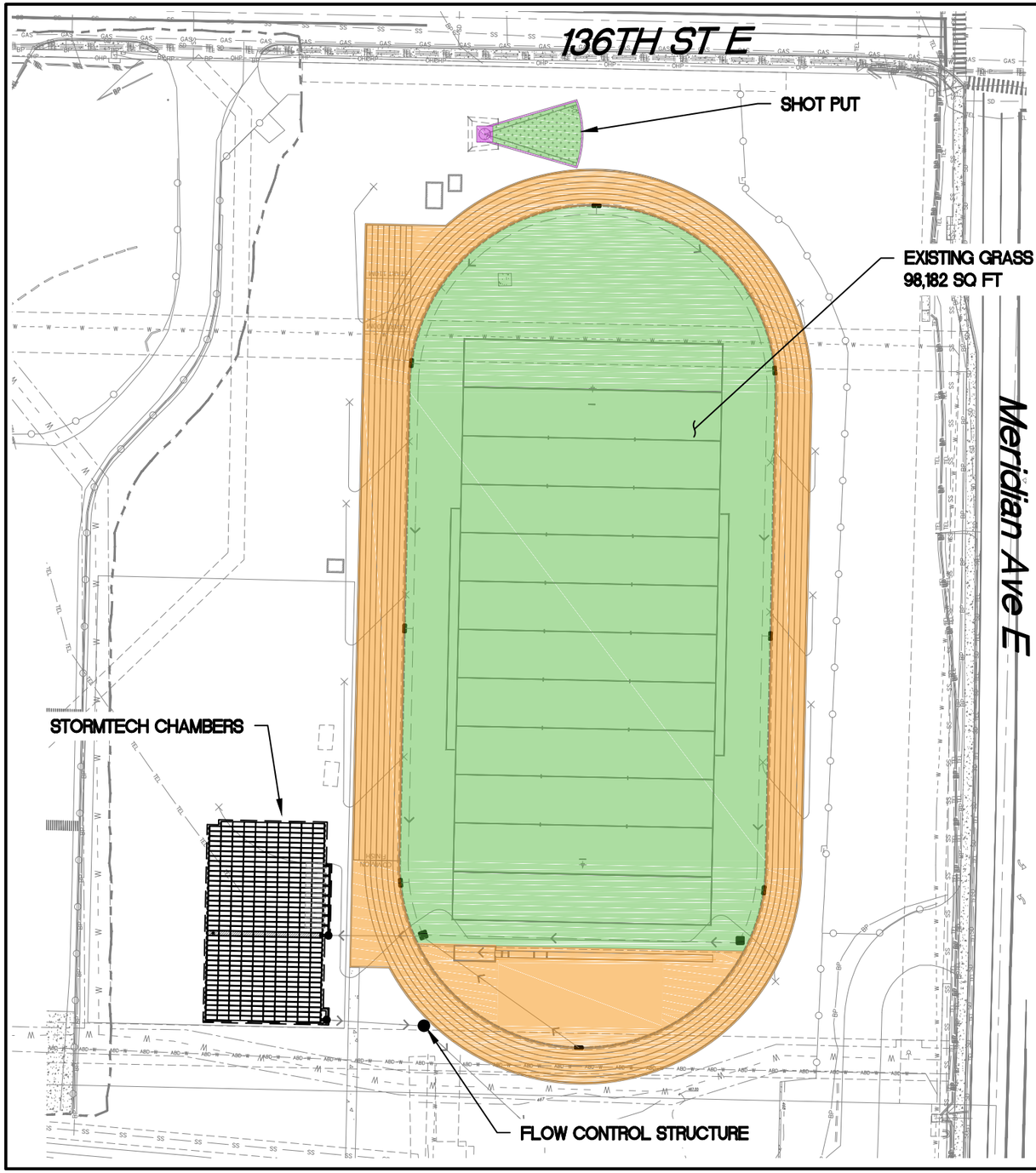
DOWNSTREAM DRAINAGE MAP

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FIGURE

4

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0 40' 80'

Scale 1"=80'

Target Hard Surface Summary

	TRACK – RUBBERIZED SURFACE & CONCRETE	45,469 SF (1.044 AC)
	SHOT PUT – CONCRETE	254 SF (0.005 AC)
	TOTAL NEW PLUS REPLACED HARD SURFACE (OSM TARGET HARD SURFACE)	45,723 SF (1.049 AC)

s:\lpd engineering pllc\projects\da hogan\ballou track restoration\drainage\tir exhibits\figure 5 - proposed conditions target surfaces.dwg ads 5/7/2025 4:16 PM

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BALLOU JUNIOR HIGH SCHOOL

LPD engineering pllc
1932 1st Ave,
Suite 500,
Seattle, WA 98101
p. 206.725.1211
f. 206.973.5344
www.lpdengineering.com

DESCRIPTION

PROPOSED CONDITIONS TARGET SURFACES

MAY 7, 2025

FIGURE

5

APPENDIX A

Design Drawings

PRIVATE IMPROVEMENTS

PERMIT #

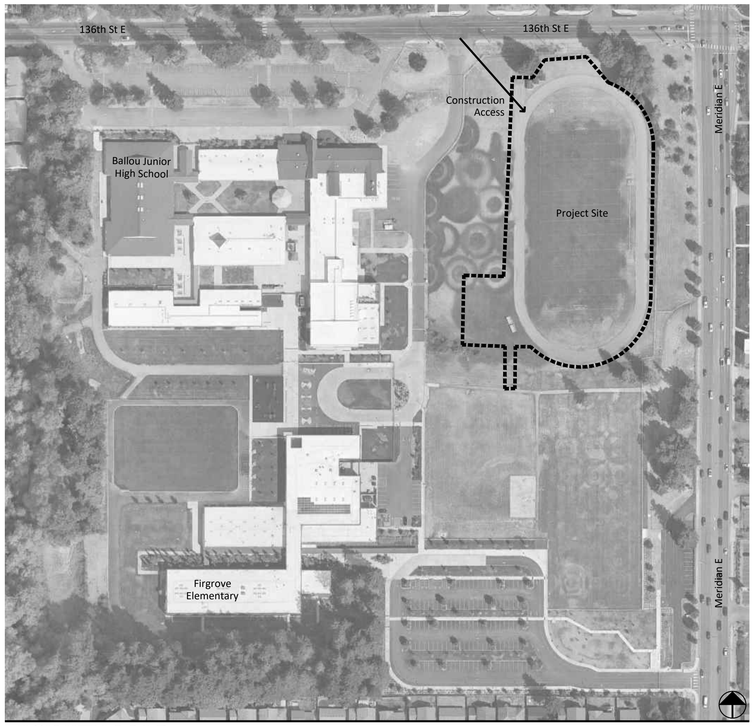
DEVELOPMENT ENGINEER — DATE

PIERCE COUNTY ORDINANCE NOs: STORM _____ ROAD _____

1. A PRE-CONSTRUCTION MEETING SHALL BE REQUESTED AT LEAST 48-HOURS IN ADVANCE OF THE START OF CONSTRUCTION. CONTACT _____ THE AREA INSPECTOR, AT 253-798-_____.
2. APPOINT A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD WHO SHALL BE PROVIDED A COPY OF THE SWPPP, EROSION CONTROL PLAN & INSPECTION SCHEDULE.
3. FAILURE TO OBTAIN REQUIRED INSPECTIONS MAY ENDANGER OR DELAY PROJECT APPROVAL.
4. ALL WORK IN THE PUBLIC RIGHT-OF-WAY REQUIRES A GENERAL RIGHT-OF-WAY PERMIT FROM PIERCE COUNTY PLANNING AND PUBLIC WORKS.

PUYALLUP SCHOOL DISTRICT

BALLOU JUNIOR HIGH SCHOOL
TRACK REPLACEMENT



VICINITY MAP

Project Site:
Ballou Junior High School
9916 136th Street E,
Puyallup WA 98373



SITE PLAN

Owner
Puyallup School District
302 2nd Street SE,
Puyallup, WA 98372
(253) 841-1301 Phone

Prime Consultant
D.A. Hogan & Associates, Inc.
1450 114th Avenue SE., Suite 225
Bellevue, WA 98004
(206) 285-0400 Phone

Civil Engineer
LPD Engineering
1932 1st Avenue, Suite 500
Seattle, WA 98101
(206) 725-1211 Phone

Legal Description
Parcel Number: 0419164008

Legal Description: Section 16 Township 19 Range 04 Quarter 41 N 1/2 OF NE OF SE & SW OF NE OF SE EXC POR CYD TO P CO PER ETN 4391894 EXC RD DC00461727 11/2/16 KG
RTSQQ: 04191641

Drawing Index

F-0.00	Cover & Index	F-1.10	Layout Plan	F-2.10	Typical Sections
F-0.10	Overall Survey & Easements	F-1.20	Grading Plan	F-2.20	Detention Details
F-0.11	Site Survey	F-1.30	Drainage Plan	F-2.30	Track Details
F-0.20	TESC Plan	F-1.40	Dimensioning Plan	F-2.40	Field Event Details
F-0.30	TESC Details			F-2.50	Field Event Details
F-0.40	TESC Notes				
F-0.50	Demolition Plan				

REVISION — DATE

PUYALLUP SCHOOL DISTRICT
A Tradition of Excellence

BALLOU JUNIOR HIGH SCHOOL TRACK REPLACEMENT

DA HOGAN
1450 114th Ave. SE, Suite 225
Bellevue, WA 98004
p. 206.285.0400
www.dahogan.com

DAVID J. ANDERSON — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

PERMIT SET

DATE	5-7-25
SCALE	AS NOTED
DRAWN	LRB
CHECKED	JAB

COPYRIGHT © 2025 D.A. HOGAN & ASSOCIATES

COVER SHEET & DRAWING INDEX

SHEET
F-0.00

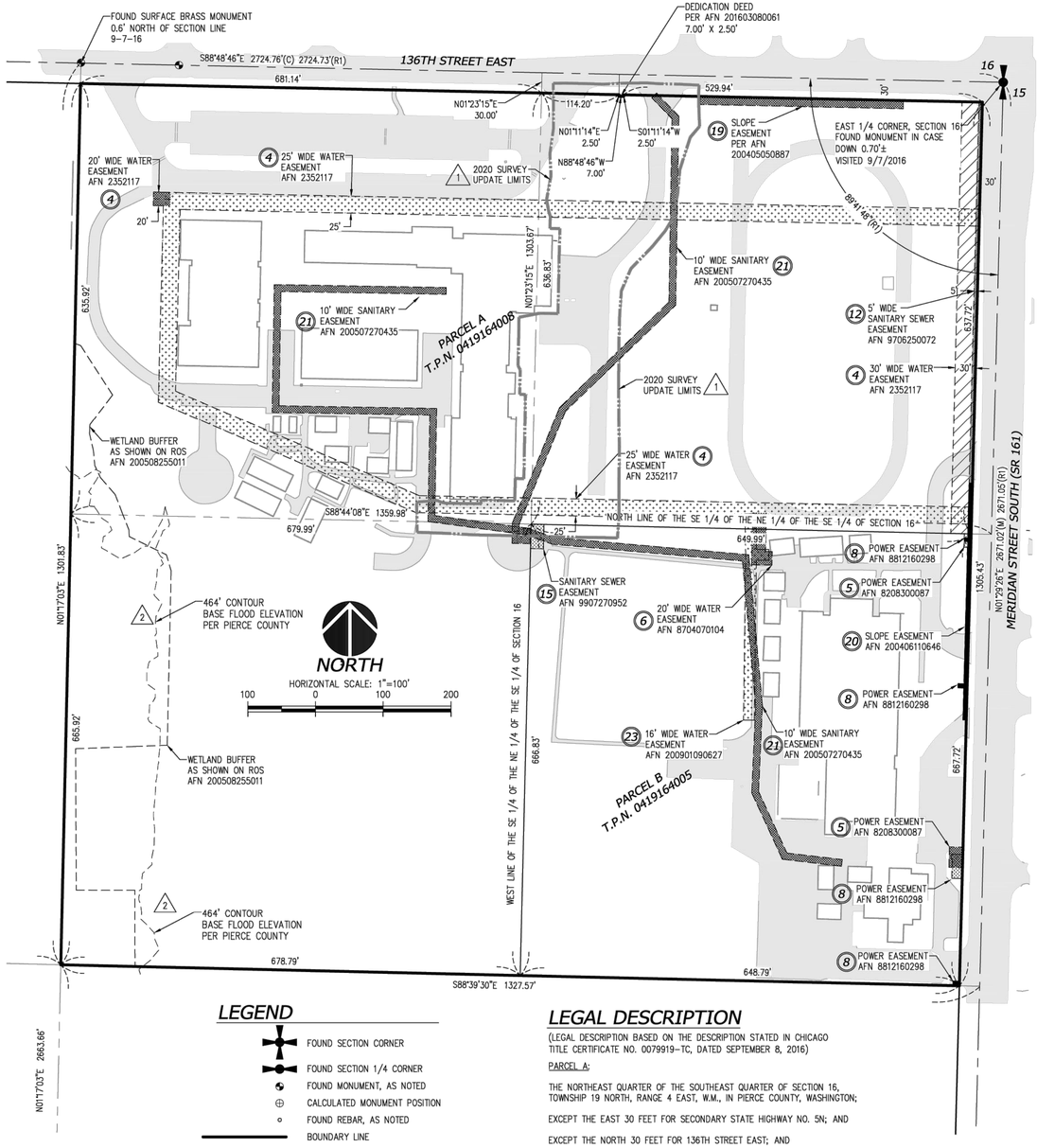
File: F-0.00 Cover Sheet & Drawing Index.dwg Plotted by: Lorrin8 Date: 07-May-25 2:14:40pm

SCHEDULE B EXCEPTIONS

BASED ON CHICAGO TITLE COMPANY CERTIFICATE NUMBER 0079919-TC, DATED SEPTEMBER 8, 2016

EXCEPTION NUMBER	AFN	DESCRIPTION
1	*9206080137	QUIT CLAIM DEED GRANTED FROM THE STATE OF WASHINGTON TO PUYALLUP SCHOOL DISTRICT. EXCEPTIONS AND RESERVATIONS CONTAINED IN DEED WHEREBY THE GRANTOR EXCEPTS AND RESERVES ALL OIL, GASES, COAL, ORES, MINERALS, FOSSILS, ETC., AND THE RIGHT OF ENTRY FOR OPENING, DEVELOPING AND WORKING THE SAME AND PROVIDING THAT SUCH RIGHTS SHALL NOT BE EXERCISED UNTIL PROVISION HAS BEEN MADE FOR FULL PAYMENT OF ALL DAMAGES SUSTAINED BY REASON OF SUCH ENTRY. RIGHT OF THE STATE OF WASHINGTON OR ITS SUCCESSORS, SUBJECT TO PAYMENT OF COMPENSATION, TO ACQUIRE RIGHTS OF WAY FOR PRIVATE RAILROADS, SKID ROADS, FLUMES, CANALS, WATER COURSES OR OTHER EASEMENTS FOR TRANSPORTING AND MOVING TIMBER, STONE, MINERALS AND OTHER PRODUCTS FROM THIS AND OTHER LAND, AS RESERVED IN ABOVE-REFERENCED DEED. AFFECTS THE ENTIRETY OF TPN 0419164008 (PARCEL A) AND IS NOT DEPICTED HEREON.
2	*1639513	EASEMENT FOR COUNTY ROAD CALLED OUT AS "SUBJECT TO" PORTION WITHIN INSTRUMENT; AFFECTS TPN 0419164008 (PARCEL A), NOT DEPICTED HEREON. RECORDED 11-21-1952
3	*2347029	5 FOOT WIDE EASEMENT GRANTED TO PUGET SOUND POWER AND LIGHT; LOCATION IS CENTERED OVER AS-CONSTRUCTED FACILITIES; AFFECTS TPN 0419164008 (PARCEL A) AND IS NOT DEPICTED HEREON. AFFECTS RECORDED 6-30-1970
4	2352117	WATERLINE EASEMENT GRANTED TO THE CITY OF TACOMA FOR CONSTRUCTION, OPERATION AND MAINTENANCE OF WATER MAINS, HYDRANTS AND METERS; VARIES IN WIDTH AND INCLUDES 30' WIDE SEGMENT, 25' WIDE SEGMENT AND 20' WIDE SEGMENT. AFFECTS TPN 0419164008 (PARCEL A) AND IS DEPICTED HEREON. RECORDED 7-2-1970
5	8208300087	POWER EASEMENT GRANTED TO PUGET SOUND POWER AND LIGHT FOR CONSTRUCTION, OPERATION AND MAINTENANCE OF POWER FACILITIES; VARIES IN WIDTH AND INCLUDES 20' WIDE SEGMENT AND 10' WIDE SEGMENT. AFFECTS TPN 0419164005 (PARCEL B) AND IS DEPICTED HEREON. RECORDED 8-30-1982
6	8704070104	20 FOOT WIDE WATERLINE EASEMENT GRANTED TO THE CITY OF TACOMA FOR WATER MAINS; AFFECTS BOTH PARCELS AND IS LOCATED NEAR THE MIDPOINT OF THE NORTHERLY PORTION OF TPN 0419164005 (PARCEL B), AND IS DEPICTED HEREON. RECORDED 4-7-1987
7	8807050190	WAIVER OF CLAIM FOR DAMAGES RELATED TO THE RIGHT OF WAY; INSTRUMENT AFFECTS TPN 0419164008 (PARCEL A) AND IS BLANKET IN NATURE; NOT DEPICTED HEREON. RECORDED 7-5-1988
8	8812160298	POWER EASEMENT GRANTED TO PUGET SOUND POWER AND LIGHT IN MULTIPLE LOCATIONS ALONG THE EAST LINE OF TPN 0419164005 (PARCEL B); EACH AREA VARIES IN SIZE AND ARE ALL DEPICTED HEREON. RECORDED 12-16-1988
9	*9206080137	INSTRUMENT ALSO CITED AS EXCEPTION NUMBER 1 HEREIN
10	*9206080137	INSTRUMENT ALSO CITED AS EXCEPTION NUMBER 1 HEREIN
11	*9206080137	INSTRUMENT ALSO CITED AS EXCEPTION NUMBER 1 HEREIN
12	9706250072	5 FOOT WIDE EASEMENT FOR SANITARY SEWER GRANTED TO PIERCE COUNTY PUBLIC WORKS ALONG THE EAST LINE OF TPN 0419164008 (PARCEL A), AND IS DEPICTED HEREON. RECORDED 6-25-1997
13	*9810050041	ON SITE SEWAGE SYSTEM OPERATION AND MAINTENANCE PERMIT WITH THE TACOMA PIERCE COUNTY HEALTH DEPARTMENT; AFFECTS TPN 0419164008 (PARCEL A) AND IS NOT DEPICTED HEREON. RECORDED 10-05-1998
14	*9810050044	ON SITE SEWAGE SYSTEM OPERATION AND MAINTENANCE PERMIT WITH THE TACOMA PIERCE COUNTY HEALTH DEPARTMENT; AFFECTS TPN 0419164005 (PARCEL B) AND IS NOT DEPICTED HEREON. RECORDED 10-05-1998
15	9907270952	CORPORATE SANITARY SEWER EASEMENT, AFFECTS THE N.W. CORNER OF TPN 0419164005 (PARCEL B) AND IS DEPICTED HEREON. RECORDED 7-27-1999
16	9908250809	WETLAND AND WETLAND BUFFER NOTICE, AFFECTS THE WESTERLY PORTION OF TPN 0419164008 (PARCEL A). NOTE: RECORD OF SURVEY AFN 200508255011 DELINEATES THE EASTERLY EXTENTS OF THE WETLAND AREA AND THOSE LIMITS ARE SHOWN HEREON. RECORDED 8-25-1999
17	*9911010294	RIGHT OF ENTRY AGREEMENT GRANTED TO PIERCE COUNTY FOR INSPECTION OF SITE DEVELOPMENT IN ASSOCIATION WITH SITE DEVELOPMENT PERMIT 280535. AFFECTS TPN 0419164008 (PARCEL A) AND IS NOT DEPICTED HEREON. RECORDED 11-01-1999
18	*200110080843	COMMERCIAL/INDUSTRIAL AGREEMENT TO MAINTAIN STORMWATER FACILITIES AND TO IMPLEMENT A POLLUTION SOURCE CONTROL PLAN, INCLUDING THE TERMS AND PROVISIONS THEREOF. AFFECTS TPN 0419164008 (PARCEL A) AND IS NOT DEPICTED HEREON. RECORDED 10-08-2001
19	200405050887	SLOPE EASEMENT
20	200406110646	SLOPE EASEMENT
21	200507270435	LETTER OF UNDERSTANDING AND COVENANT BETWEEN PUYALLUP SCHOOL DISTRICT AND PIERCE COUNTY RELATED TO PRIVATE SEWER LINE CONNECTION, AFFECTS BOTH PARCELS A & B (TPN 0419164008 & TPN 0419164005) AND IS DEPICTED HEREON. RECORDED 7-27-2005
22	*200509061637	PIERCE COUNTY PLANNING AND LAND SERVICES WETLAND AND/OR WETLAND BUFFER NOTICE CITING CATEGORY 2 WETLAND ON SITE. THIS INSTRUMENT STATES "THIS WETLAND APPROVAL CONTAINS CONDITIONS THAT HAVE BEEN PLACED ON THE SITE TO ALLOW FOR THE CONSTRUCTION OF FOUR CLASSROOM PORTABLES AND ONE TOILET PORTABLE, WITHIN THREE YEARS FROM THE DATE OF ISSUANCE. AT THE END OF THREE YEARS, ANY BUILDING WHICH WAS NOTE COMPLETED, AND ANY NEWLY PROPOSED CONSTRUCTION MAY UNDERGO ADDITIONAL WETLAND REVIEW." SIMILAR TO EXCEPTION #16, THERE IS A RECORD OF SURVEY AFN 200508255011 DELINEATES THE EASTERLY EXTENTS OF THE WETLAND AREA AND THOSE LIMITS ARE SHOWN HEREON. AFFECTS TPN 0419164008 (PARCEL A). RECORDED 9-6-2005
23	200901090627	16 FOOT WIDE WATERLINE EASEMENT GRANTED TO FIRGROVE MUTUAL WATER COMPANY LYING OVER BOTH PARCELS A & B (TPN 0419164008 & 0419164005) AND IS DEPICTED HEREON. RECORDED 1-9-2009
24	200508255011 200409135004	RECORDS OF SURVEY ILLUSTRATING THE SITE

* CANNOT BE SHOWN HEREON DUE TO AMBIGUOUS OR INSUFFICIENT LEGAL DESCRIPTION
** COVERS ENTIRE PARCEL



LEGEND

- FOUND SECTION CORNER
- FOUND SECTION 1/4 CORNER
- FOUND MONUMENT, AS NOTED
- CALCULATED MONUMENT POSITION
- FOUND REBAR, AS NOTED
- BOUNDARY LINE
- LOT LINE
- SURVEY CENTERLINE
- R.O.W. LINE
- SECTION LINE
- EASEMENT LINE
- CHAIN LINK FENCE
- WOOD FENCE
- (4) EXCEPTION NUMBER
- (1) 2020/02/25 – UPDATED MAPPING OF SITE IMPROVEMENTS
- (2) 2020/03/25 – ADDED BASE FLOOD ELEVATION (464' CONTOUR)

LEGAL DESCRIPTION

(LEGAL DESCRIPTION BASED ON THE DESCRIPTION STATED IN CHICAGO TITLE CERTIFICATE NO. 0079919-TC, DATED SEPTEMBER 8, 2016)

PARCEL A:

THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 16, TOWNSHIP 19 NORTH, RANGE 4 EAST, W.M., IN PIERCE COUNTY, WASHINGTON;

EXCEPT THE EAST 30 FEET FOR SECONDARY STATE HIGHWAY NO. 5N; AND

EXCEPT THE NORTH 30 FEET FOR 136TH STREET EAST; AND

EXCEPT THAT PORTION CONVEYED TO PIERCE COUNTY BY STATUTORY WARRANTY DEED RECORDED UNDER RECORDING NUMBER 201603080061; AND

EXCEPT THE SOUTHEAST QUARTER THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 16, TOWNSHIP 19 NORTH, RANGE 4 EAST, OF THE W.M.;

PARCEL B:

THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 16, TOWNSHIP 19 NORTH, RANGE 4 EAST, W.M., IN PIERCE COUNTY, WASHINGTON.

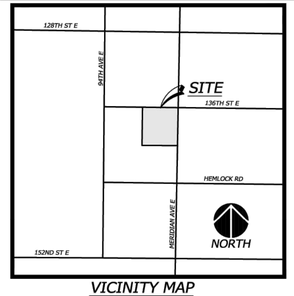
PRIVATE IMPROVEMENTS

PERMIT #

DEVELOPMENT ENGINEER — DATE

PIERCE COUNTY ORDINANCE NOs: STORM _____ ROAD _____

1. A PRE-CONSTRUCTION MEETING SHALL BE REQUESTED AT LEAST 48-HOURS IN ADVANCE OF THE START OF CONSTRUCTION. CONTACT _____ THE AREA INSPECTOR, AT 253-798-_____.
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VICINITY MAP
N.T.S.

BASIS OF BEARING

WASHINGTON STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD 83/2011 BASED ON GPS OBSERVATION UTILIZING THE WSRN (WASHINGTON STATE REFERENCE NETWORK)

MEASURED NORTH 01°29'26" EAST 2671.02 FEET ALONG THE EAST LINE OF THE S.E. ¼ OF SECTION 16 BETWEEN TWO FOUND MONUMENTS ALONG MERIDIAN STREET SOUTH (SR 161) AT THE INTERSECTIONS OF 136TH ST EAST AND HEMLOCK RD (144TH ST EAST).

VERTICAL DATUM

NAVD 88

ESTABLISHED BY GPS OBSERVATION UTILIZING THE WASHINGTON STATE REFERENCE NETWORK WITH THE GEOID 2012A LOADED

MONUMENT LOCATED AT THE INTERSECTION OF 136TH STREET EAST & MERIDIAN (SR 161)

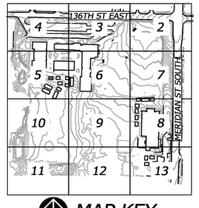
ELEVATION = 481.81

SITE DATA

1. TAX PARCEL NOS. 0419164008 & 0419164005
2. ADDRESS: 9916 136TH ST E, PUYALLUP, WA 98373

NOTES

1. EQUIPMENT USED: TOPCON QS ROBOTIC TOTAL STATION AND TOPCON GR3 RTK/GPS
2. THIS SURVEY WAS PERFORMED BY FIELD TRAVERSE WITH THE FINAL RESULTS MEETING OR EXCEEDING THE CURRENT TRAVERSE STANDARDS CONTAINED IN W.A.C. 332-130-090. ALL MEASUREMENTS WERE MADE WITH A TOPCON QS ROBOTIC TOTAL STATION AND/OR A TOPCON GR3 RTK/GPS IN ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S SPECIFICATIONS.
3. IN ACCORDANCE WITH THE REVISED CODE OF WASHINGTON (R.C.W.) 58.09 AND THE WASHINGTON ADMINISTRATIVE CODE (W.A.C.) 332-130, THIS SURVEY MAY DEPICT OCCUPATIONAL INDICATORS THAT DIFFER FROM THE DEEDED LOT LINES. THESE INDICATORS, IF AT ALL PRESENT, MAY REPRESENT A POTENTIAL FOR CLAIMS OF UNWRITTEN TITLE. THIS SURVEY DOES NOT PURPORT TO RESOLVE SUCH ITEMS.
4. FIELD WORK PERFORMED IN SEPTEMBER 2016 UNDER SITTS & HILL PROJECT NUMBER 17085. ADDITIONAL, UPDATED MAPPING WAS COMPLETED IN FEBRUARY 2020 WITHIN THE AREAS ILLUSTRATED ON SHEETS 3 AND 6 AND IDENTIFIED BY A REVISION TRIANGLE WITH DESIGNATION "1" AND A HEAVY PHANTOM LINE. (1)
5. UTILITIES AS SHOWN HEREON ARE BASED ON FIELD SURVEY OBSERVATION OF UTILITY LOCATE SERVICES PERFORMED BY MOUNTAIN VIEW LOCATING SERVICES, LLC IN SEPTEMBER 2016 FOR THIS SURVEY. THIS HAS BEEN SUPPLEMENTED BY RECORD INFORMATION PROVIDED BY (AGENCY). RECORD UTILITY LINES SHOWN HEREON ARE DEPICTED WITH A DASHED LINETYPE AS SHOWN IN THE LEGEND. UTILITIES OTHER THAN SHOWN MAY EXIST ON THE SITE. THE SURVEYOR DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. THE SURVEYOR DOES CERTIFY THAT THEY ARE SHOWN AS ACCURATELY AS POSSIBLE FROM FIELD SURVEY AND PAINTED UTILITY LOCATE LINES. COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA IS CONSISTENT WITH QUALITY LEVEL (B) OF THE ASCE STANDARD GUIDELINES 38-02.
6. THIS SURVEY COMPLIES WITH W.A.C. 332-130-145. THE CONTOURS DEPICTED HEREON ARE BASED ON DATA FROM DIRECT FIELD MEASUREMENTS. SPOT ELEVATIONS ARE BASED ON DIRECT FIELD MEASUREMENTS AND ARE DEPICTED FOR REFERENCE. THE PURPOSE OF THIS TOPOGRAPHIC MAP IS TO SERVE AS A BASE MAP FOR CONTEMPLATED SITE IMPROVEMENTS AND DESIGN.
7. ADDITIONAL IMPROVEMENTS MAY EXIST WITHIN THE ORIGINAL MAPPING LIMITS, COMPLETED IN 2016. REFERENCE FULL SITE IMPROVEMENT PLANS FOR ADDITIONAL INFORMATION.
8. BASE FLOOD ELEVATION DETERMINED TO BE THE 464-FOOT CONTOUR PER PIERCE COUNTY 03/25/2020 (2)



MAP KEY

REVISION	DATE

PUYALLUP SCHOOL DISTRICT
A Tradition of Excellence

BALLOU JUNIOR HIGH SCHOOL TRACK REPLACEMENT

DA HOGAN
1450 114th Ave. SE, Suite 225
Bellevue, WA 98004
p. 206.285.0400
www.dahogan.com

PERMIT SET

DATE	5-7-25
SCALE	AS NOTED
DRAWN	-
CHECKED	-

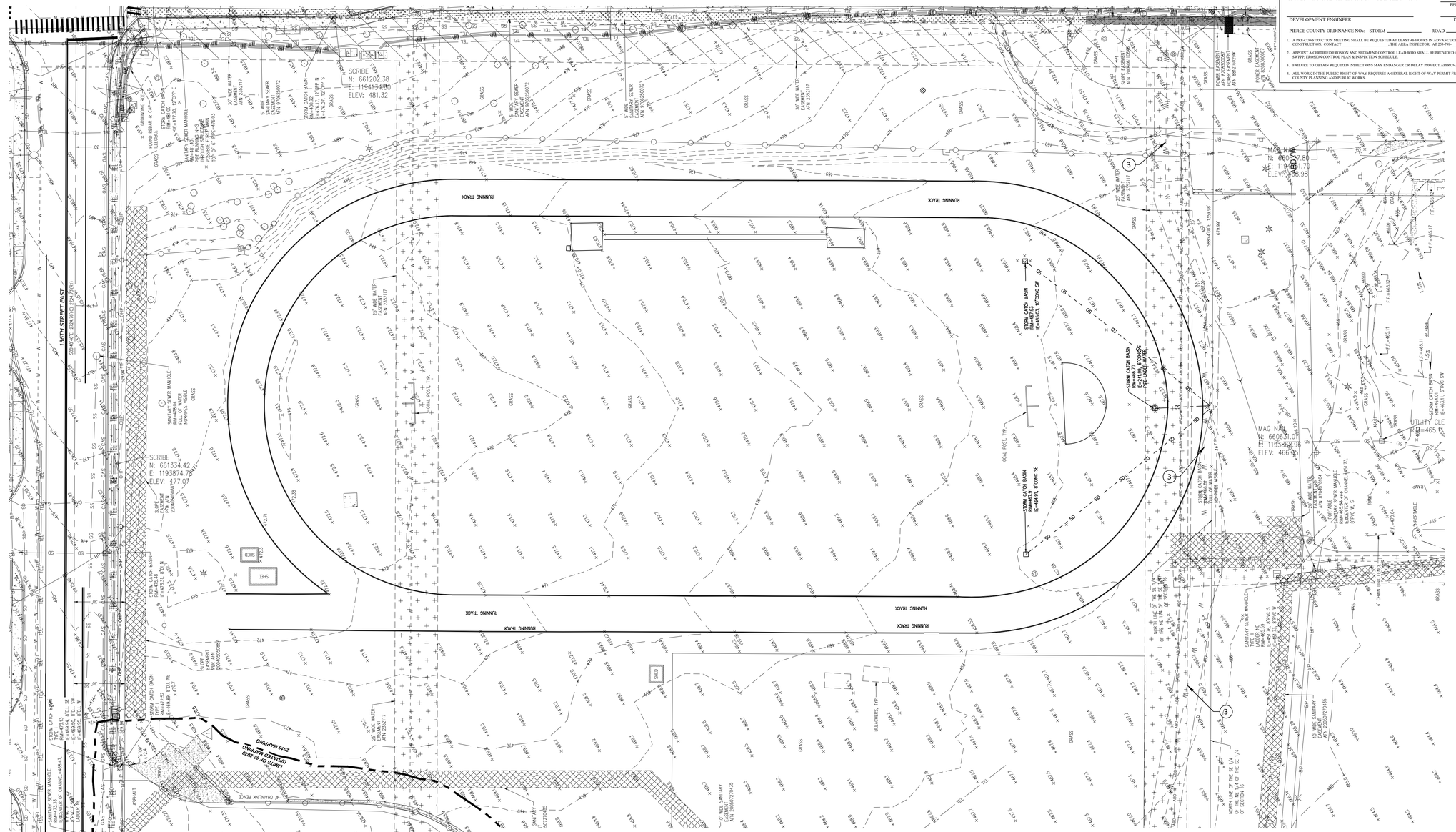
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OVERALL SURVEY & EASEMENTS

SHEET

F-0.10

File: F-0.1 Ballou JH CURRENT 24x36.dwg Plotted by: LorrinB Date: 07-May-25 2:17:56pm



HORIZONTAL DATUM

WASHINGTON STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD 83/2011
BASED ON GPS OBSERVATION UTILIZING THE WSRN (WASHINGTON STATE REFERENCE NETWORK)

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VERTICAL DATUM

NAVD 88

ESTABLISHED BY GPS OBSERVATION UTILIZING THE WASHINGTON STATE REFERENCE NETWORK WITH THE GEOID 2012A LOADED

MONUMENT LOCATED AT THE INTERSECTION OF 136TH STREET EAST & MERIDIAN (SR 161)

ELEVATION = 481.81

SITE DATA

TAX PARCEL NOS. 0419164008 & 0419164005

ADDRESS: 9916 136TH ST E, PUYALLUP, WA 98373

NOTES

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7. ADDITIONAL IMPROVEMENTS MAY EXIST WITHIN THE ORIGINAL MAPPING LIMITS, COMPLETED IN 2016. REFERENCE FULL SITE IMPROVEMENT PLANS FOR ADDITIONAL INFORMATION.

LEGEND

- FOUND MONUMENT AS NOTED
- CALCULATED MONUMENT POSITION
- HUB AND TACK
- MAG NAIL OR SCRIBE
- FOUND REBAR
- STORM DRAIN MANHOLE
- STORM CATCH BASIN
- ROOF DRAIN
- CULVERT
- SANITARY SEWER MANHOLE
- WATER VALVE
- FIRE HYDRANT
- WATER METER
- WATER VAULT
- IRRIGATION CONTROL VALVE
- FIRE DEPARTMENT CONNECTION
- POST INDICATOR VALVE
- POWER VAULT
- TRAFFIC SIGNAL LIGHT
- JUNCTION BOX
- PEDESTRIAN X-ING LIGHT
- POWER POLE
- GUY ANCHOR
- ELECTRIC METER
- POWER TRANSFORMER
- LIGHT POLE
- TELECOM RISER
- TELECOM VAULT
- GAS VALVE
- GAS METER
- SIGN
- DECIDUOUS TREE
- EVERGREEN TREE
- GATE POST
- BOLLARD
- SOIL BORE
- FF FINISH FLOOR ELEVATION
- BOUNDARY LINE
- LOT LINE
- SURVEY CENTERLINE
- R.O.W. LINE
- CHAIN LINK FENCE
- WOOD FENCE
- BURIED POWER LINE
- GAS BURIED GAS LINE
- SD BURIED STORM LINE
- SS BURIED SANITARY LINE
- W BURIED WATER LINE
- ABD_W ABANDONED WATER LINE
- TEL BURIED TELECOM LINE
- SD RECORD BURIED STORM LINE
- SS RECORD BURIED SANITARY LINE
- W RECORD BURIED WATER LINE
- EDGE OF VEGETATION LINE
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- RIP-RAP SURFACE
- 1 2020/02/25 – UPDATED MAPPING OF SITE IMPROVEMENTS

NOTE:
1. STAMPED/ SIGNED SURVEY ON FILE
2. NOT ALL UTILITIES SHOWN ARE FIELD VERIFIED - D.A. HOGAN HAS MODIFIED THE SURVEY IN SOME INSTANCES TO INCLUDE AS-BUILT UTILITY INFORMATION PROVIDED BY THE OWNER. FIELD VERIFY AT INITIAL SITE PREPARATION WHERE NOTED.
3. WATER LINE LOCATION BASED ON 2020 WATER MAIN RELOCATION PROJECT. EXISTING WATER LINE ABANDONED IN PLACE "ABD_W"

REVISION	DATE

PUYALLUP SCHOOL DISTRICT
A Tradition of Excellence

BALLOU JUNIOR HIGH SCHOOL TRACK REPLACEMENT

DA HOGAN
1450 114th Ave. SE, Suite 225
Bellevue, WA 98004
p. 206.285.0400
www.dahogan.com

NORTH

0 30' 60'

SCALE: 1" = 30'

PERMIT SET

DATE	5-7-25
SCALE	1"=30'
DRAWN	-
CHECKED	-

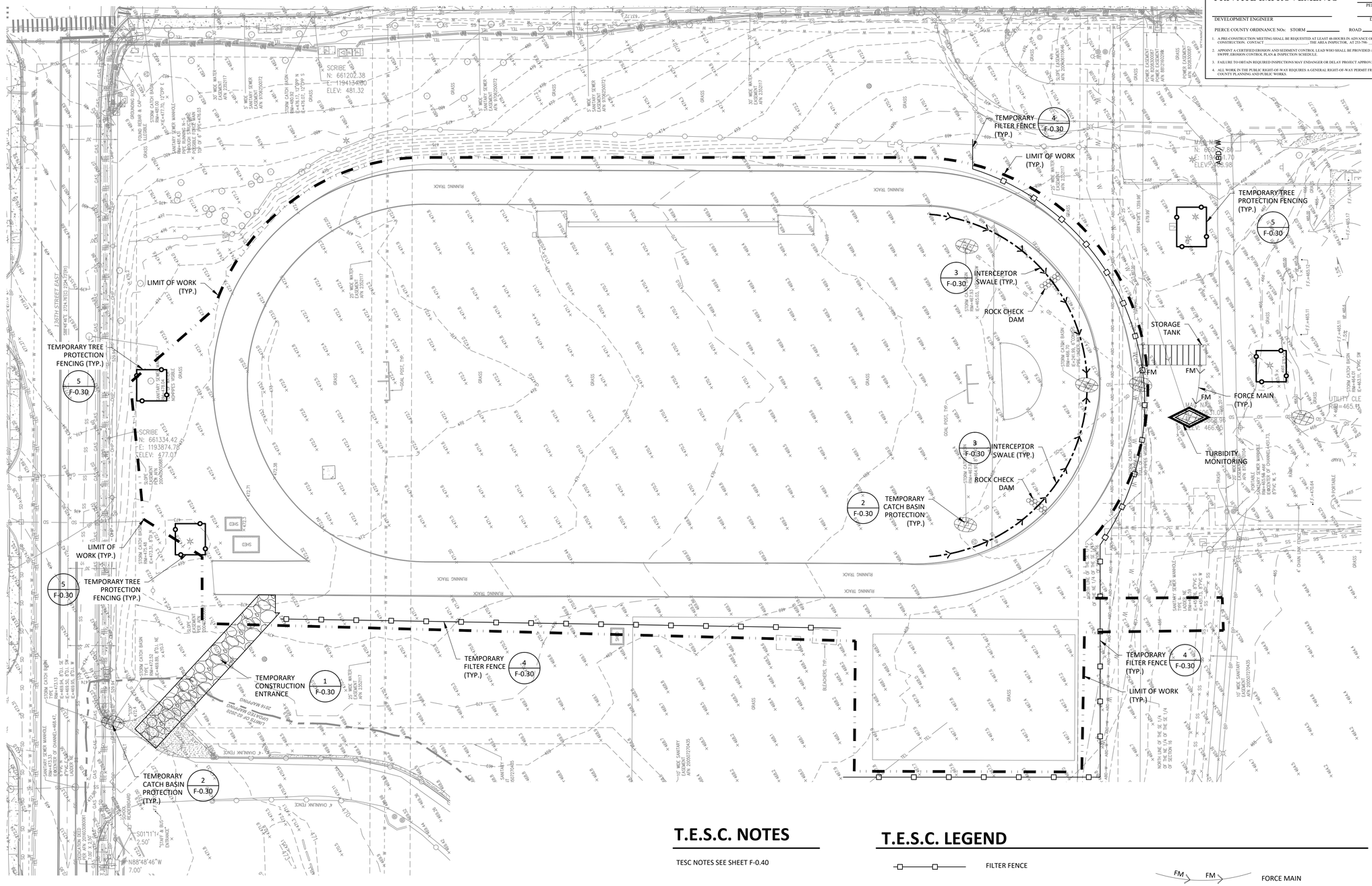
COPYRIGHT © 2025 D.A. HOGAN & ASSOCIATES

SITE SURVEY

SHEET

F-0.11

File: F-0.1 Ballou JH CURRENT 24x36.dwg Plotted by: LorrinB Date: 07-May-25 2:20:36pm



T.E.S.C. NOTES

TESC NOTES SEE SHEET F-0.40

T.E.S.C. LEGEND

- FILTER FENCE
- TEMPORARY INTERCEPTOR SWALE
- ROCK CHECK DAM
- CATCH BASIN PROTECTION
- TEMPORARY CONSTRUCTION ENTRANCE
- TEMPORARY TREE PROTECTION FENCE
- TURBIDITY MONITORING LOCATION
- FORCE MAIN
- TEMPORARY SUMP
- 18,100 GALLON CAPACITY STORAGE TANK
- LIMIT OF WORK

Know what's below. Call before you dig.

PRIVATE IMPROVEMENTS

PERMIT #

DEVELOPMENT ENGINEER — DATE

PIERCE COUNTY ORDINANCE NOs: STORM _____ ROAD _____

1. A PRE-CONSTRUCTION MEETING SHALL BE REQUESTED AT LEAST 48-HOURS IN ADVANCE OF THE START OF CONSTRUCTION: CONTACT THE AREA INSPECTOR, AT 253-798-_____.
2. APPOINT A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD WHO SHALL BE PROVIDED A COPY OF THE SWPPP, EROSION CONTROL PLAN & INSPECTION SCHEDULE.
3. FAILURE TO OBTAIN REQUIRED INSPECTIONS MAY ENDANGER OR DELAY PROJECT APPROVAL.
4. ALL WORK IN THE PUBLIC RIGHT-OF-WAY REQUIRES A GENERAL RIGHT-OF-WAY PERMIT FROM PIERCE COUNTY PLANNING AND PUBLIC WORKS.

REVISION	DATE

PUYALLUP SCHOOL DISTRICT
A Tradition of Excellence

BALLOU JUNIOR HIGH SCHOOL TRACK REPLACEMENT

DA HOGAN
1450 114th Ave. SE, Suite 225
Bellevue, WA 98004
p. 206.285.0400
www.dahogan.com

DAVID J. ANDERSON — STATE OF WASHINGTON — 21615 — REGISTERED PROFESSIONAL ENGINEER

NORTH

0 30' 60'

SCALE: 1" = 30'

PERMIT SET

DATE	5-7-25
SCALE	1"=30'
DRAWN	LRB
CHECKED	JAB

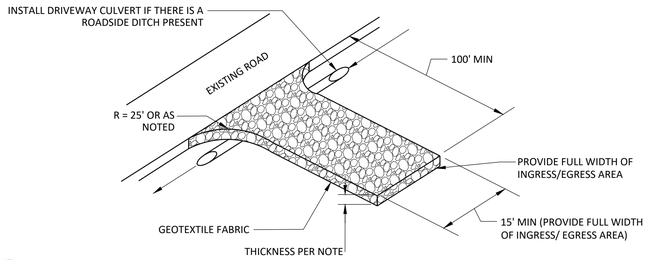
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TESC PLAN

SHEET

F-0.20

File: F-0.1 Ballou JH CURRENT 24x36.dwg Plotted by: LorrinB Date: 07-May-25 2:26:51pm



NOTES:
1. INSTALL A MINIMUM 12" THICK PAD OF 4"-8" QUARRY SPALLS, A MINIMUM OF 4" COURSE OF ASPHALT TREATED BASE, EXISTING PAVEMENT, OR A MINIMUM OF 12" THICK PAD OF PERMEABLE BALLAST MEETING THE THE REQUIREMENTS OF WSDOT'S STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION SECTION 9-03.9(2).

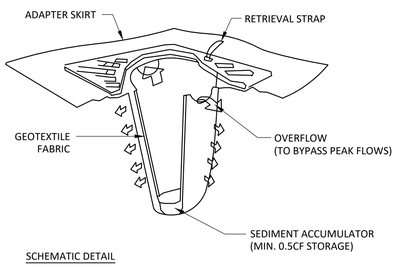
2. FOR SINGLE-FAMILY RESIDENCE CONSTRUCTION, CONCRETE PAD MAY BE CLEAN 1.5" MINIMUM AGGREGATE PLACED AT LEAST 8" THICK.

3. MANUFACTURED ALTERNATIVES TO CONSTRUCTION ENTRANCE MAY BE USED PROVIDED THEY ENSURE NO TRACK-OUT.

4. DO NOT USE CRUSHED CONCRETE, CEMENT, OR ASPHALT RUBBLE FOR THE STABILIZED CONSTRUCTION ENTRANCE.

1 F-0.30 STABILIZED CONSTRUCTION ENTRANCE

NOT TO SCALE



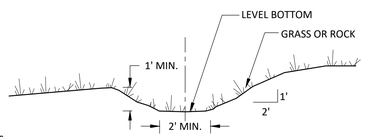
SCHEMATIC DETAIL

PROVIDE "ULTRA-DRAIN GUARD INLET FILTER" OR APPROVED EQUAL

MANUFACTURER'S NAME: ACF ENVIRONMENTAL

2 F-0.30 TEMPORARY CATCH BASIN PROTECTION

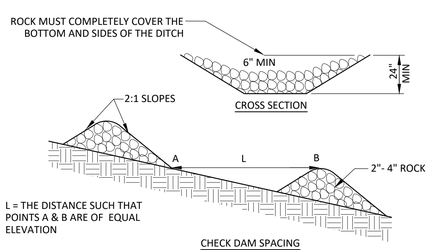
NOT TO SCALE



NOTES:
GRADE: MAX 5% WITH POSITIVE DRAINAGE TO A SUITABLE OUTLET SUCH AS A SEDIMENT TRAP

STABILIZATION: SEED, COVER MEASURES, OR ROCK 12" THICK, PRESSED INTO SWALE BANK

NATURAL SWALE SECTION



MAINTENANCE STANDARDS

1. ANY SEDIMENT DEPOSITION OF MORE THAN 0.5 FEET SHALL BE REMOVED SO THAT THE CHANNEL IS RESTORED TO ITS DESIGN CAPACITY.

2. IF THE CHANNEL CAPACITY IS INSUFFICIENT FOR THE DESIGN STORM, IT MUST BE DETERMINED WHETHER THE PROBLEM IS LOCAL (E.G., A CONSTRICTION OR BEND) OR THE CHANNEL IS UNDERDESIGNED. IF THE PROBLEM IS UNDERDESIGN, THE DESIGN ENGINEER SHALL BE NOTIFIED AND THE CHANNEL REDESIGNED TO A MORE CONSERVATIVE STANDARD TO BE APPROVED BY THE ENGINEER.

3. THE CHANNEL SHALL BE EXAMINED FOR SIGNS OF SCOURING AND EROSION OF THE BED AND BANKS. IF SCOURING OR EROSION HAS OCCURRED, AFFECTED AREAS SHALL BE PROTECTED BY RIP-RAP OR AN EROSION

3 F-0.30 INTERCEPTOR SWALE & ROCK CHECK DAM

NOT TO SCALE

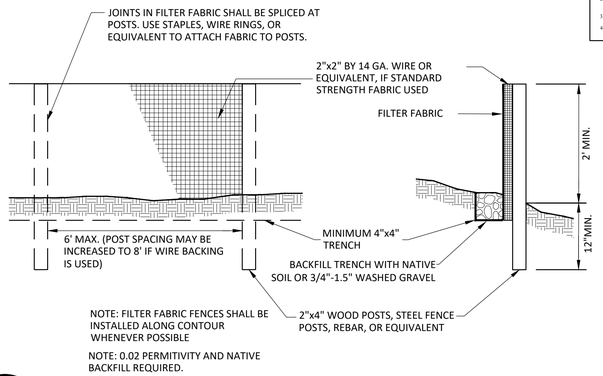
PRIVATE IMPROVEMENTS

PERMIT #

DEVELOPMENT ENGINEER DATE

PIERCE COUNTY ORDINANCE NOs: STORM _____ ROAD _____

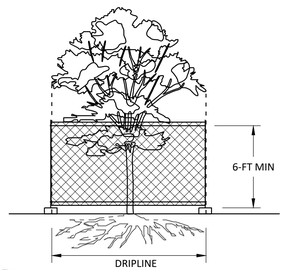
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NOTE: 0.02 PERMITIVITY AND NATIVE BACKFILL REQUIRED.

4 F-0.30 TEMPORARY FILTER FABRIC FENCE

NOT TO SCALE

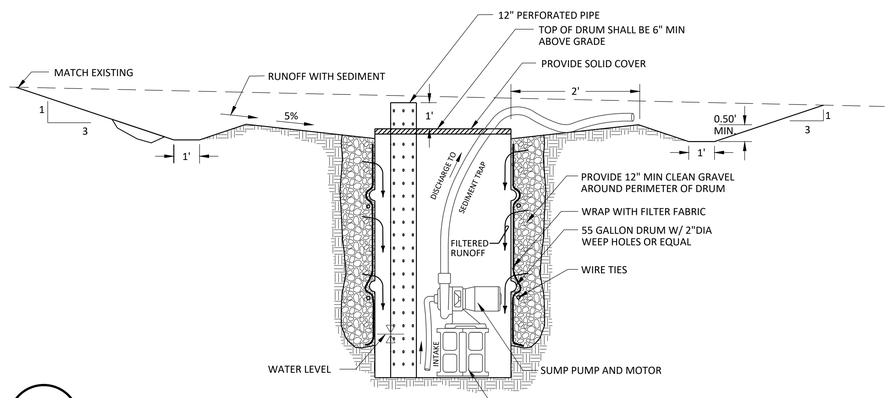


NOTES:

1. 6-FT. HIGH TEMPORARY CHAIN LINK FENCE SHALL BE PLACED AT THE DRIPLINE OF THE TREE TO BE SAVED. FENCE SHALL COMPLETELY ENCIRCLE THE TREE(S). INSTALL FENCE POSTS USING PIER BLOCKS ONLY. AVOID DRIVING POSTS OR STAKES INTO MAJOR ROOTS.
2. FOR ROOTS OVER 1-IN DIA. THAT ARE DAMAGED DURING CONSTRUCTION, MAKE A CLEAN, STRAIGHT CUT TO REMOVE THE DAMAGED PORTION. ALL EXPOSED ROOTS SHALL BE TEMPORARILY COVERED WITH DAMP BURLAP TO PREVENT DRYING, AND SHALL BE COVERED WITH SOIL AS SOON AS POSSIBLE.
3. WORK WITHIN PROTECTION FENCE SHALL BE DONE MANUALLY. NO STOCKPILING OF MATERIALS, VEHICULAR TRAFFIC, OR STORAGE OF EQUIPMENT OR MACHINERY SHALL BE ALLOWED WITHIN THE LIMIT OF THE FENCING.

5 F-0.30 TREE PROTECTION

NOT TO SCALE



6 F-0.30 SEDIMENT SUMP PUMP DETAIL

NOT TO SCALE

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TESC DETAILS

SHEET

F-0.30

File: F-0.30 TESC Details.dwg Plotted by: LorriB Date: 07-May-25 2:30:10pm

T.E.S.C. NOTES

1. APPROVAL OF THIS EROSION AND SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G., SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
2. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/ESC SUPERVISOR UNTIL ALL CONSTRUCTION IS APPROVED.
3. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED BY A CONTINUOUS LENGTH OF SURVEY TAPE (OR FENCING, IF REQUIRED) PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE CLEARING LIMITS SHALL BE PERMITTED. THE CLEARING LIMITS SHALL BE MAINTAINED BY THE APPLICANT/ESC SUPERVISOR FOR THE DURATION OF CONSTRUCTION.
4. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED PRIOR TO OR IN CONJUNCTION WITH ALL CLEARING AND GRADING SO AS TO ENSURE THAT THE TRANSPORT OF SEDIMENT TO SURFACE WATERS, DRAINAGE SYSTEMS, AND ADJACENT PROPERTIES IS MINIMIZED.
5. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND MODIFIED TO ACCOUNT FOR CHANGING SITE CONDITIONS (E.G., ADDITIONAL SUMP PUMPS, RELOCATION OF DITCHES AND SILT FENCES, ETC.).
6. THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE APPLICANT/ESC SUPERVISOR AND MAINTAINED TO ENSURE CONTINUED PROPER FUNCTIONING. WRITTEN RECORDS SHALL BE KEPT OF WEEKLY REVIEWS OF THE ESC FACILITIES DURING THE WET SEASON (OCT. 1 TO APRIL 30) AND OF MONTHLY REVIEWS DURING THE DRY SEASON (MAY 1 TO SEPT. 30).
7. ANY AREAS OF EXPOSED SOILS, INCLUDING ROADWAY EMBANKMENTS, THAT WILL NOT BE DISTURBED FOR TWO DAYS DURING THE WET SEASON OR SEVEN DAYS DURING THE DRY SEASON SHALL BE IMMEDIATELY STABILIZED WITH THE APPROVED ESC METHODS (E.G., SEEDING, MULCHING, PLASTIC COVERING, ETC.) DURING THE WET SEASON EXPOSED SOILS SHALL BE STABILIZED AT THE END OF THE WORK DAY PRIOR TO A WEEKEND, HOLIDAY, OR PREDICTED EVENT.
8. ANY AREA NEEDING ESC MEASURES THAT DO NOT REQUIRE IMMEDIATE ATTENTION SHALL BE ADDRESSED WITHIN FIFTEEN (15) DAYS.
9. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITH FORTY-EIGHT (48) HOURS FOLLOWING A STORM EVENT.
10. AT NO TIME SHALL MORE THAN ONE (1) FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A CATCH BASIN. ALL CATCH BASINS REQUIRE CLEANING PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER INTO THE DOWNSTREAM SYSTEM.
11. STABILIZED CONSTRUCTION ENTRANCES AND ROADS SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES, SUCH AS WASH PADS, MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
12. ANY PERMANENT FLOW CONTROL FACILITY USED AS A TEMPORARY SETTLING BASIN SHALL BE MODIFIED WITH THE NECESSARY EROSION CONTROL MEASURES AND SHALL PROVIDE ADEQUATE STORAGE CAPACITY. IF THE FACILITY IS TO FUNCTION ULTIMATELY AS AN INFILTRATION SYSTEM, THE TEMPORARY FACILITY MUST BE GRADED SO THAT THE BOTTOM AND SIDES ARE AT LEAST THREE FEET ABOVE THE FINAL GRADE OF THE PERMANENT FACILITY.
13. WHERE STRAW MULCH FOR TEMPORARY EROSION CONTROL IS REQUIRED, IT SHALL BE APPLIED AT A MINIMUM THICKNESS OF 2 TO 3 INCHES.
14. PRIOR TO THE BEGINNING OF THE WET SEASON (OCT. 1), ALL DISTURBED AREAS SHALL BE REVIEWED TO IDENTIFY WHICH ONES CAN BE SEEDED IN PREPARATION FOR THE WINTER RAINS. DISTURBED AREAS SHALL BE SEEDED WITHIN ONE WEEK OF THE BEGINNING OF THE WET SEASON. A SKETCH MAP OF THOSE AREAS TO BE SEEDED AND THOSE AREAS TO REMAIN UNCOVERED SHALL BE SUBMITTED TO THE DDES INSPECTOR. THE DDES INSPECTOR CAN REQUIRE SEEDING OF ADDITIONAL AREAS IN ORDER TO PROTECT SURFACE WATERS, ADJACENT PROPERTIES, OR DRAINAGE FACILITIES.

GENERAL NOTES

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT JURISDICTION STANDARDS. WASHINGTON STATE DEPARTMENT OF TRANSPORTATION/AMERICAN PUBLIC WORKS ASSOCIATION STANDARD SPECIFICATIONS OF ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION, AND CURRENT WSDOT HYDRAULIC MANUAL.
2. ALL WORK PERTAINING TO THIS PROJECT SHALL BE SUBJECT TO INSPECTION BY THE INSPECTOR OR HIS DESIGNATED REPRESENTATIVE. PRIOR TO ANY SITE WORK, THE CONTRACTOR SHALL CONTACT THE INSPECTOR TO SCHEDULE A PRE-CONSTRUCTION CONFERENCE.
3. PRIOR TO ANY SITE DISTURBING ACTIVITY INCLUDING CLEARING, LOGGING OR GRADING, THE SITE CLEARING LIMITS AS SHOWN ON THESE PLANS SHALL BE LOCATED AND FIELD IDENTIFIED BY THE PROJECT SURVEYOR OR ENGINEER,
4. THE DEVELOPER AND PROJECT ENGINEER ARE RESPONSIBLE FOR WATER QUALITY. THE PROJECT ENGINEER HAS ESTABLISHED A MONITORING PROGRAM.
5. APPROVAL IS REQUIRED FOR ALL CHANGES TO THE CONSTRUCTION PLANS BY THE DESIGN ENGINEER AND JURISDICTION BEFORE CONSTRUCTION OCCURS. NONCOMPLIANCE WITH THE CONSTRUCTION PLANS, EROSION CONTROL REQUIREMENTS, WATER QUALITY REQUIREMENTS AND/OR CLEARING LIMITS MAY RESULT IN REVOCATION OF PROJECT PERMITS, PLAN APPROVAL AND BOND FORECLOSURES.
6. PUBLIC STREETS ARE TO BE KEPT CLEAR OF DIRT AND DEBRIS DURING CONSTRUCTION EXCAVATION AND FILL OPERATIONS. MATERIAL SHALL BE REMOVED FROM THE STREETS BY SWEEPING. PAVED SURFACES MUST BE CLEANED AT THE END OF EACH DAY.
7. SEDIMENT CONTROL FACILITIES SHOWN ON THESE PLANS SHALL BE INSTALLED AS PART OF THE PLAN TO REMOVE SEDIMENT FROM THE WATER AND MEET WATER QUALITY STANDARDS BEFORE CLEARING AND GRADING IS ALLOWED. THIS MAY INCLUDE SEDIMENT PONDS, SILT FENCES, SWALES, CHANNELS, BERMS, BARRIERS AND OUTER MEASURES. SEE THE CONSTRUCTION SEQUENCE FOR ORDER OF INSTALLATION.
8. STABILIZE ALL EXPOSED AND NON-WORKED SOIL FROM MAY 1 TO SEPTEMBER 30 NO SOIL MAY REMAIN EXPOSED FOR MORE THAN 7 DAYS.
9. INSTALL INLET PROTECTION ON ALL STORM DRAIN INLETS DURING CONSTRUCTION SO THAT SEDIMENT AND SILT LADEN WATER IS FILTERED OR TREATED TO MINIMIZE SEDIMENT THAT ENTERS THE INLET.
10. THE CONSTRUCTION EROSION CONTROL BMP'S SHALL BE INSPECTED AFTER EACH SIGNIFICANT RAIN EVENT. MAINTENANCE SHALL BE PERFORMED AS NEEDED TO MAINTAIN THE PERFORMANCE AND FUNCTION.
11. SILT BARRIERS AND SEDIMENT PONDS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL.
12. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH RAINFALL.
13. DEPOSITS MUST BE REMOVED WHEN THE LEVEL OF DEPOSITION REACHES APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER, CHECK DAM OR OTHER CATCHMENT.
14. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDED.
15. THE EMBANKMENT OF SEDIMENT BASINS SHOULD BE CHECKED REGULARLY TO INSURE THAT IT IS STRUCTURALLY SOUND AND HAS NOT BEEN DAMAGED BY EROSION OR CONSTRUCTION EQUIPMENT.

PRIVATE IMPROVEMENTS

PERMIT #

DEVELOPMENT ENGINEER — DATE

PIERCE COUNTY ORDINANCE NOs: STORM _____ ROAD _____

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DUST CONTROL NOTES

1. CONTRACTOR SHALL MINIMIZE THE PERIOD OF SOIL EXPOSURE THROUGH USE OF TEMPORARY GROUND COVER AND OTHER TEMPORARY STABILIZATION SUCH AS SEEDING AND MULCHING, AND EROSION BLANKETS.
2. DURING CONSTRUCTION AND DRY WEATHER, SPRINKLE THE SITE WITH WATER UNTIL SURFACE AREA IS WET. REPEAT THE PROCESS AS NEEDED DURING THE DAY.
3. ALL TRUCK TRAFFIC MUST USE THE CONSTRUCTION ENTRANCE AS SHOWN ON THE T.E.S.C. PLANS TO PREVENT CARRYING SOIL INTO STREET.
4. DURING CONSTRUCTION, ALL PROPERTIES AND ALL PUBLIC STREETS ADJACENT TO PROJECT WHICH WILL BE USED BY CONSTRUCTION TRAFFIC SHALL BE KEPT CLEAN OF ALL MATERIAL DEPOSITS RESULTING FROM ON-SITE CONSTRUCTION.

TREE PROTECTION NOTES

WHERE THE DRIP LINE OF A TREE OVERLAPS CONSTRUCTION, THE FOLLOWING TREE PROTECTION MEASURES SHALL BE EMPLOYED.

1. THE CONTRACTOR MAY NOT FILL, EXCAVATE, STACK OR STORE ANY EQUIPMENT, OR COMPACT THE EARTH IN ANY WAY WITH THE AREA DEFINED BY THE DRIP ON THE ANY TREE TO BE RETAINED.
2. THE CONTRACTOR SHALL PROVIDE SUPERVISION WHENEVER EQUIPMENT OR TRUCKS ARE MOVING NEAR TREES.
3. THE GRADE LEVEL AROUND ANY TREE TO BE RETAINED MAY NOT BE LOWERED WITHIN THE GREATER OF THE FOLLOWING AREAS: A) THE AREA DEFINED BY THE DRIP LINE OF THE TREE, B) THE AREA AROUND THE TREE EQUAL TO ONE FOOT IN DIAMETER FOR EACH ONE INCH OF TREE CALIPER.

CONSTRUCTION SEQUENCE

1. HOLD THE PRE-CONSTRUCTION MEETING.
2. FLAG OR FENCE CLEARING LIMITS.
3. POST A SIGN WITH THE NAME AND PHONE NUMBER OF THE ESC SUPERVISOR.
4. INSTALL CATCH BASIN PROTECTION.
5. GRADE AND INSTALL CONSTRUCTION ENTRANCE.
6. INSTALL PERIMETER PROTECTION (SILT FENCE, BRUSH BARRIER, ETC.).
7. MAINTAIN EROSION CONTROL MEASURES IN ACCORDANCE WITH KITSAP COUNTY STANDARDS AND MANUFACTURER'S RECOMMENDATIONS.
8. RELOCATE SURFACE WATER CONTROLS OR EROSION CONTROL MEASURES, OR INSTALL NEW MEASURES SO THAT AS SITE CONDITIONS CHANGE, THE EROSION AND SEDIMENT CONTROL IS ALWAYS IN ACCORDANCE WITH THE KITSAP COUNTY EROSION AND SEDIMENT CONTROL STANDARDS.
9. COVER ALL AREAS THAT WILL BE UNWORKED FOR MORE THAN SEVEN (7) DAYS DURING THE DRY SEASON OR TWO (2) DAYS DURING THE WET SEASON WITH STRAW, WOOD FIBER MULCH, COMPOST, PLASTIC SHEETING, OR EQUIVALENT.
10. STABILIZE ALL AREAS WITHIN SEVEN (7) DAYS OF REACH FINAL GRADE.
11. SEED OR SOD ANY AREAS TO REMAIN UNWORKED FOR MORE THAN 30 DAYS.
12. UPON COMPLETION OF THE PROJECT, STABILIZE ALL DISTURBED AREAS AND REMOVE BMP'S IF APPROPRIATE.

REVISION	DATE

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TESC NOTES

SHEET

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File: F-0.40 TESC Notes.dwg Plotted by: Lorrin8 Date: 07-May-25 2:32:32pm

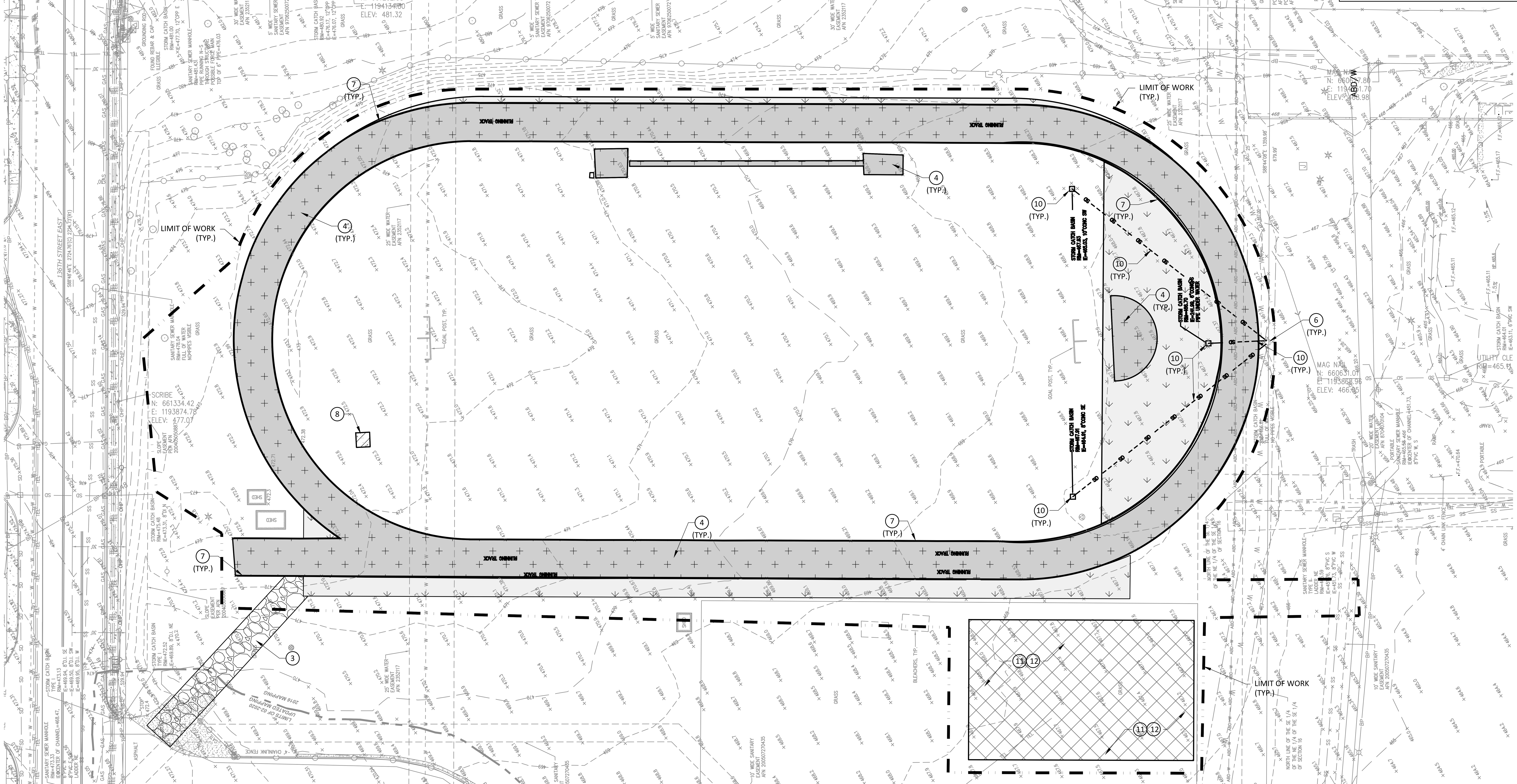
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DEMOLITION NOTES

NOTE LEGEND

1. (INDICATES GENERAL CONSTRUCTION NOTE)

(3.) (INDICATES SPECIFIC CONSTRUCTION KEYNOTE)

1. CALL 8-1-1 BEFORE YOU DIG. LOCATE, IDENTIFY, AND VERIFY CONDITIONS OF ALL SITE UTILITIES PRIOR TO COMMENCING THE WORK.
2. PROTECT EXISTING ADJACENT SURFACES FROM DAMAGE DURING CONSTRUCTION. RESTORE ALL DISTURBED AREAS TO ORIGINAL OR BETTER CONDITION.
3. (3.) CONSTRUCTION ACCESS. CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL GATES AND FENCES AT PERIMETER OF THE SITE TO ESTABLISH A SECURE WORK AREA. WORK MAY INCLUDE TEMPORARY FENCING. MINIMUM SECURITY FENCE TO BE 6-FEET HEIGHT, CHAIN LINK.
4. (4.) APPROVED EXISTING CIDERS MAY BE INCORPORATED INTO THE EARTHWORK AFTER REMOVAL AND DISPOSAL OF THE ORGANIC MATERIALS. ALL EXCESS MATERIAL TO BE DISPOSED OF OFF SITE.
5. PROTECT ALL UTILITIES TO REMAIN. EXISTING WATER LINE TOP OF PIPE APPROXIMATELY 462.90, CONTRACTOR SHALL FIELD VERIFY.
6. (6.) PROTECT THE EXISTING CATCH BASIN.
7. (7.) REMOVE EXISTING CONCRETE CURB AND DISPOSE OF OFF SITE.
8. (8.) REMOVE EXISTING CONCRETE PAD AND SHOT PUT TOE BOARD.
9. BACKFILL ALL VOIDS AND EXCAVATE D-AREAS WITH APPROVED STRUCTURAL FILL MATERIAL IN 12-INCH MAXIMUM LIFTS, COMPACTED TO 95% MINIMUM.
10. (10.) REMOVE EXISTING CATCH BASIN AND STORM DRAINAGE PIPE AND DISPOSE OF OFF SITE. BACKFILL WITH STRUCTURAL FILL AND COMPACT TO 95%. PLUG PENETRATION AT STORM DRAINAGE OUTFALL IN THE NEXT DOWNSTREAM STRUCTURE.
11. (11.) CAREFULLY REMOVE AND SALVAGE EXISTING NATURAL TURF SOD FOR REINSTALLATION AT EXISTING AT DETENTION BASIN AREA.
12. (12.) REMOVE AND STOCKPILE EXISTING ORGANIC ROOT ZONE SOIL FOR REINSTALLATION AT EXISTING BATTING CAGE LOCATION.

DEMOLITION LEGEND

- EXISTING NATURAL TURF TO BE REMOVED AND DISPOSED OF OFF SITE
- EXISTING CINDER TRACK AND BASE TO BE REMOVED AND DISPOSED OF OFF SITE
- CONCRETE PAVING TO BE REMOVED AND DISPOSED OF OFFSITE
- REMOVE EXISTING NATURAL TURF AND SITE SOIL, SALVAGE FOR REINSTALLATION
- TEMPORARY CONSTRUCTION ENTRANCE
- LIMIT OF WORK
- EXISTING CONCRETE CURBING TO BE REMOVED AND DISPOSED OF OFF SITE

811. Know what's below. Call before you dig.

REVISION	DATE

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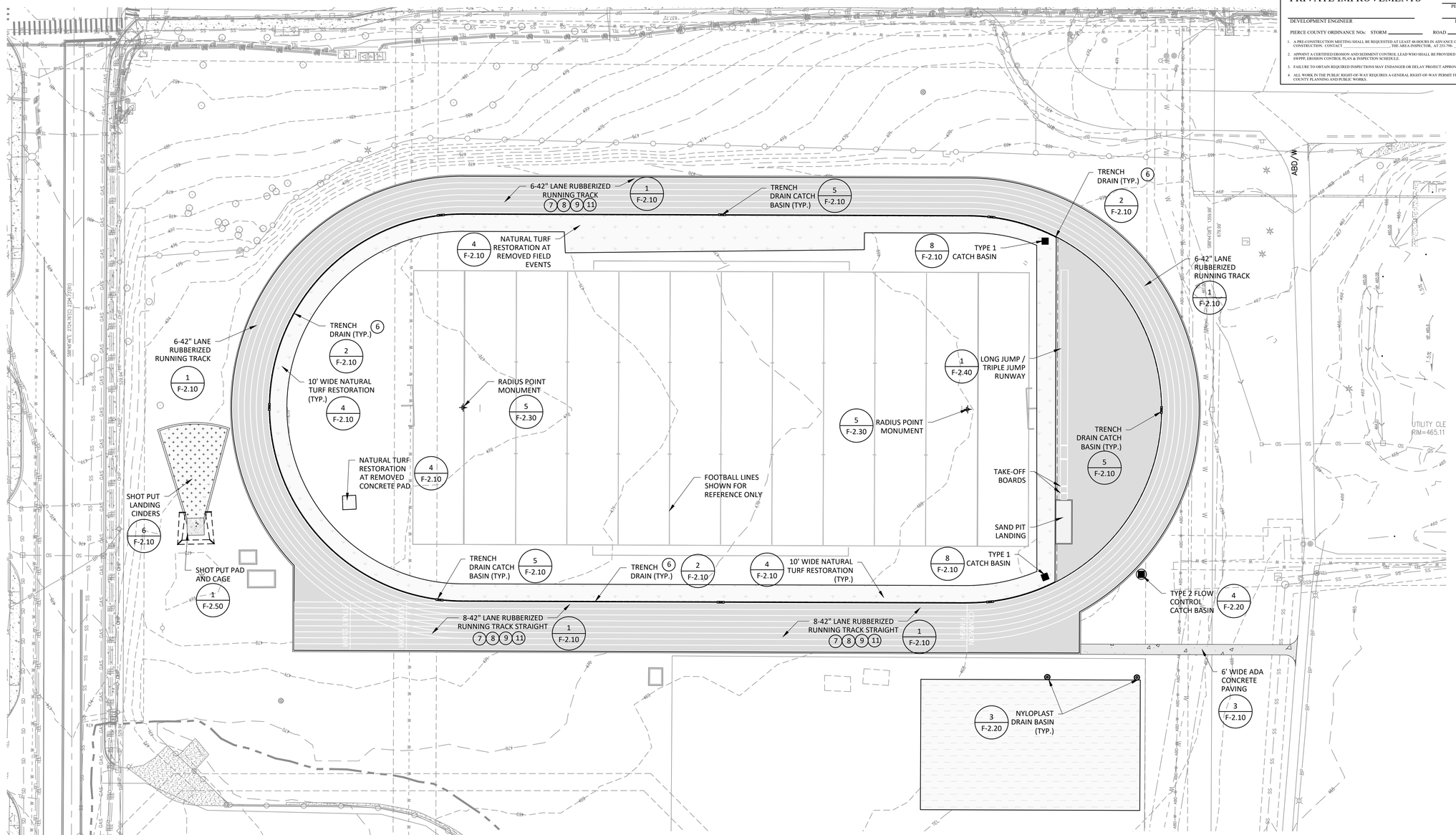
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DEMOLITION PLAN

SHEET

F-0.50

File: F-0.1 Ballou JH CURRENT 24x36.dwg Plotted by: LorrinB Date: 07-May-25 2:34:06pm



LAYOUT NOTES

NOTE LEGEND
1. (INDICATES GENERAL CONSTRUCTION NOTE)
(3.) (INDICATES SPECIFIC CONSTRUCTION KEYNOTE)

1. TRACK DIMENSIONING PLAN ON SHEET F-1.40. DIGITAL DATA PROVIDED TO THE CONTRACTOR AFTER BID AWARD UPON REQUEST.
2. TRACK TO BE STANDARD 6 LANE TRACK WITH TWO ADDITIONAL LANES ON WESTERN STRAIGHTAWAY.
(3.) UTILIZE SALVAGED NATURAL TURF AND ORGANIC SOIL MATERIALS FOR REINSTALLATION. CONTRACTOR SHALL SUPPLEMENT ANY REMAINING RESTORATION AREA WITH NATURAL TURF SOD.
4. CONTRACTOR TO RESTORE ALL DISTURBED NON SURFACE AREAS TO EXISTING OR BETTER CONDITION.
5. FLAG EXISTING IRRIGATION HEAD PRIOR TO START OF CONSTRUCTION. ADJUST SPRINKLER HEAD LOCATION, SPRAY COVERAGE, OR NOZZLE SIZE TO ACCOMMODATE NEW IMPROVEMENTS AND RESTORATION AREAS.
(6.) FURNISH AND INSTALL TRENCH DRAIN AND CONCRETE ENCASEMENT AROUND ENTIRE INSIDE PERIMETER OF THE RUNNING TRACK. TRENCH DRAIN SHALL BE INSTALLED WITH UNIFORM ALIGNMENT AND SHALL NOT DEVIATE LATERALLY MORE THAN 1/4 INCH IN 10 FEET.

RUBBERIZED SURFACE NOTES

(7.) IMMEDIATELY PRIOR TO RUBBERIZED SURFACING APPLICATION, ASPHALT SHALL BE THOROUGHLY CLEANED OF ALL DIRT, DEBRIS OR ANY OTHER SUBSTANCES THAT WILL BE DETRIMENTAL TO THE INSTALLATION. ALL SURFACES TO BE PRESSURED WASHED.

(8.) FINISH SURFACE PLANARITY OF THE ASPHALT BENEATH THE RUBBERIZED SURFACING SHALL NOT DEVIATE MORE THAN 1/8" WHEN MEASURED WITH A 10-FOOT STRAIGHT EDGE IN ALL DIRECTIONS.

(9.) APPLY SUCH PRIMING MATERIAL AS MAY BE NECESSARY TO ASSURE COMPLETE BOND OF POLYURETHANE RUBBERIZED TRACK AND FIELD EVENT SURFACING TO THE EXISTING ASPHALT PAVING.

10. CONTRACTOR SHALL PROTECT ALL ADJACENT AREAS FROM ANY CONTAMINATION OR OVER SPRAY FROM RUBBERIZED SURFACING INSTALLATION PROCEDURES. TAPE PLASTIC SHEETING TO EDGING OR ADJACENT EXPOSED ASPHALT OR CONCRETE PAVING TO PROTECT FIELD SURFACING, ADJACENT AREAS AND STRUCTURES, INCLUDING FENCING AND BLEACHERS.

(11) FURNISH AND INSTALL COMPLETE TRACK AND FIELD EVENT LINES AND MARKINGS.

12. UPON COMPLETION OF THE TRACK MARKINGS, THE TRACK SURFACING CONTRACTOR SHALL FURNISH AN ACCEPTABLE DOCUMENT OR CERTIFICATE OF ACCURACY TO THE OWNER ATTESTING TO THE ACCURACY OF THE MARKINGS AND MEASUREMENTS AND SHALL INCLUDE COPIES OF THE COMPUTATIONS, CALCULATIONS, AND DRAWINGS THAT WERE USED TO OBTAIN THIS ACCURACY.

LAYOUT LEGEND

- SOD BASED NATURAL TURF
- RUBBERIZED SURFACING AND ASPHALT PAVING
- CINDERS
- CONCRETE PAVING
- JUMP PIT SAND
- SITE RESTORATION
- CONCRETE CURBING
- TRENCH DRAIN
- TRENCH DRAIN CATCH BASIN
- TYPE 1 CATCH BASIN
- TYPE 2 FLOW CONTROL CATCH BASIN
- NYLOPLAST BASIN

PRIVATE IMPROVEMENTS

PERMIT #

DEVELOPMENT ENGINEER — DATE

PIERCE COUNTY ORDINANCE NO:s: STORM _____ ROAD _____

1. A PRE-CONSTRUCTION MEETING SHALL BE REQUESTED AT LEAST 48-HOURS IN ADVANCE OF THE START OF CONSTRUCTION. CONTACT THE AREA INSPECTOR, AT 253-798-
2. APPOINT A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD WHO SHALL BE PROVIDED A COPY OF THE SWPPP, EROSION CONTROL PLAN & INSPECTION SCHEDULE.
3. FAILURE TO OBTAIN REQUIRED INSPECTIONS MAY ENDANGER OR DELAY PROJECT APPROVAL.
4. ALL WORK IN THE PUBLIC RIGHT-OF-WAY REQUIRES A GENERAL RIGHT-OF-WAY PERMIT FROM PIERCE COUNTY PLANNING AND PUBLIC WORKS.

REVISION	DATE

PUYALLUP SCHOOL DISTRICT
A Tradition of Excellence

BALLOU JUNIOR HIGH SCHOOL TRACK REPLACEMENT

DA HOGAN
1450 114th Ave. SE, Suite 225 p. 206.285.0400
Bellevue, WA 98004 www.dahogan.com

DAVID J. ANDERSON — STATE OF WASHINGTON — 25015 — REGISTERED PROFESSIONAL ENGINEER

NORTH

0 30' 60'

SCALE: 1" = 30'

PERMIT SET

DATE	5-7-25
SCALE	1"=30'
DRAWN	LRB
CHECKED	JAB

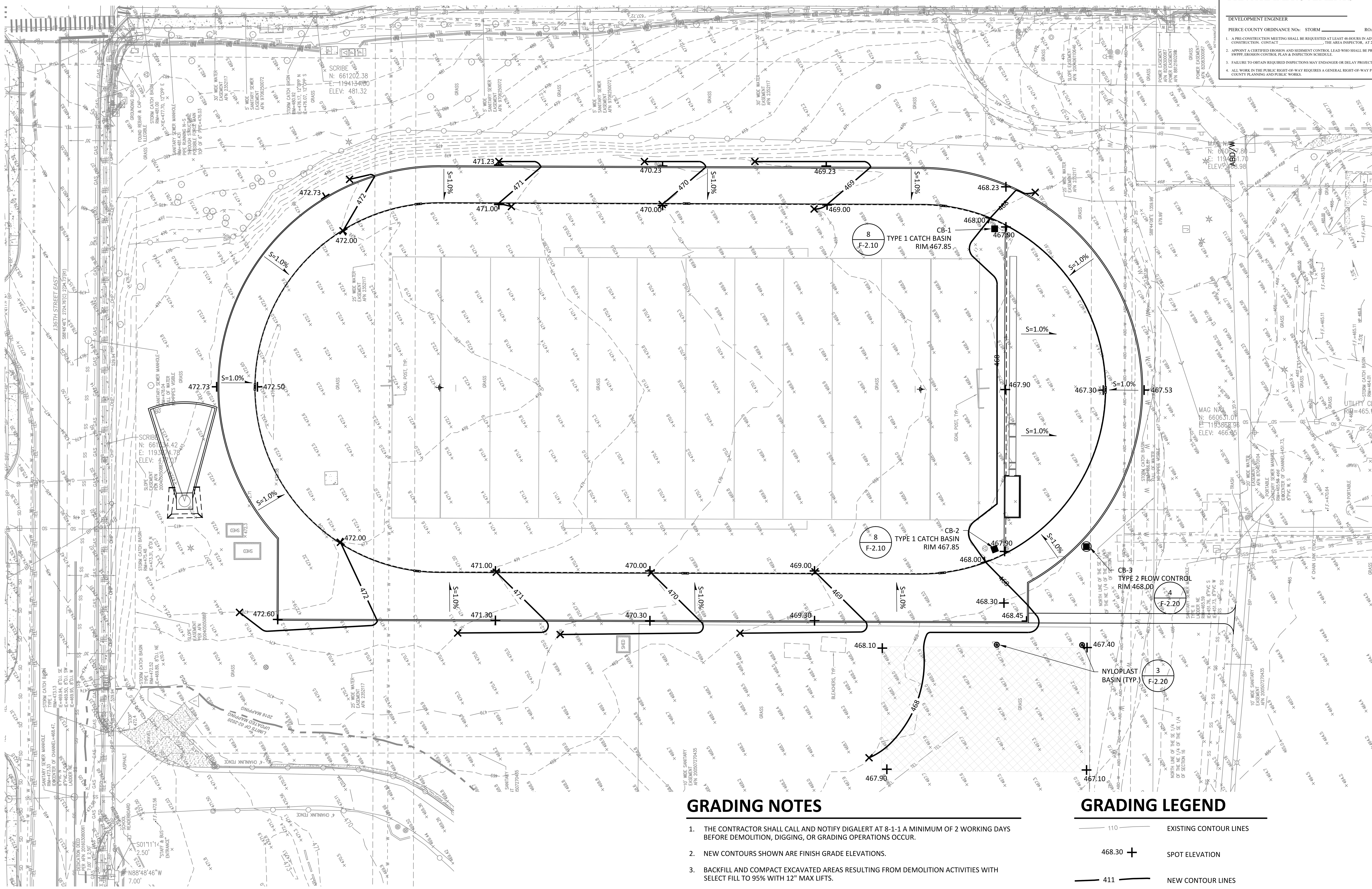
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LAYOUT PLAN

SHEET

F-1.10

File: F-0.1 Ballou JH CURRENT 24x36.dwg Plotted by: LorriB Date: 07-May-25 2:35:22pm



PRIVATE IMPROVEMENTS

PERMIT #

DEVELOPMENT ENGINEER

DATE

PIERCE COUNTY ORDINANCE NOs: STORM ______ ROAD ______

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GRADING NOTES

1. THE CONTRACTOR SHALL CALL AND NOTIFY DIGALERT AT 8-1-1 A MINIMUM OF 2 WORKING DAYS BEFORE DEMOLITION, DIGGING, OR GRADING OPERATIONS OCCUR.
2. NEW CONTOURS SHOWN ARE FINISH GRADE ELEVATIONS.
3. BACKFILL AND COMPACT EXCAVATED AREAS RESULTING FROM DEMOLITION ACTIVITIES WITH SELECT FILL TO 95% WITH 12" MAX LIFTS.
4. CONTRACTOR SHALL SURVEY PROPOSED FINISH GRADES OF TRACK PRIOR TO INSTALLATION AND REVIEW WITH ENGINEER FOR APPROVAL TO PROCEEDING.
5. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN THE EVENT OR DISCOVERY OF POOR SOILS, GROUNDWATER OR DISCREPANCIES IN THE EXISTING CONDITIONS AS NOTED ON THE PLANS.
6. ALL PERIMETER PAVING SHALL MEET AND MATCH ADJACENT SURFACES.

NOTE LEGEND

1. (INDICATES GENERAL CONSTRUCTION NOTE)
(3.) (INDICATES SPECIFIC CONSTRUCTION KEYNOTE)

GRADING LEGEND

110	EXISTING CONTOUR LINES
468.30 +	SPOT ELEVATION
411	NEW CONTOUR LINES
411.5	NEW HALF CONTOUR LINES
S=2.0%	SURFACE SLOPE
	MATCH TO EXISTING
	CATCH BASIN INLET (C.B.I.) TYPE 1
	CATCH BASIN INLET (C.B.I.) TYPE 2 FLOW CONTROL
	NYLOPLAST BASIN
	LIMIT OF DETENTION AGGREGATE AND PERMEABLE AGGREGATE

811. Know what's below. Call before you dig.

REVISION	DATE

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DAVID L. ANDERSON
STATE OF WASHINGTON
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PROFESSIONAL ENGINEER

NORTH

0 30' 60'

SCALE: 1" = 30'

PERMIT SET

DATE	5-7-25
SCALE	1"=30'
DRAWN	LRB
CHECKED	JAB

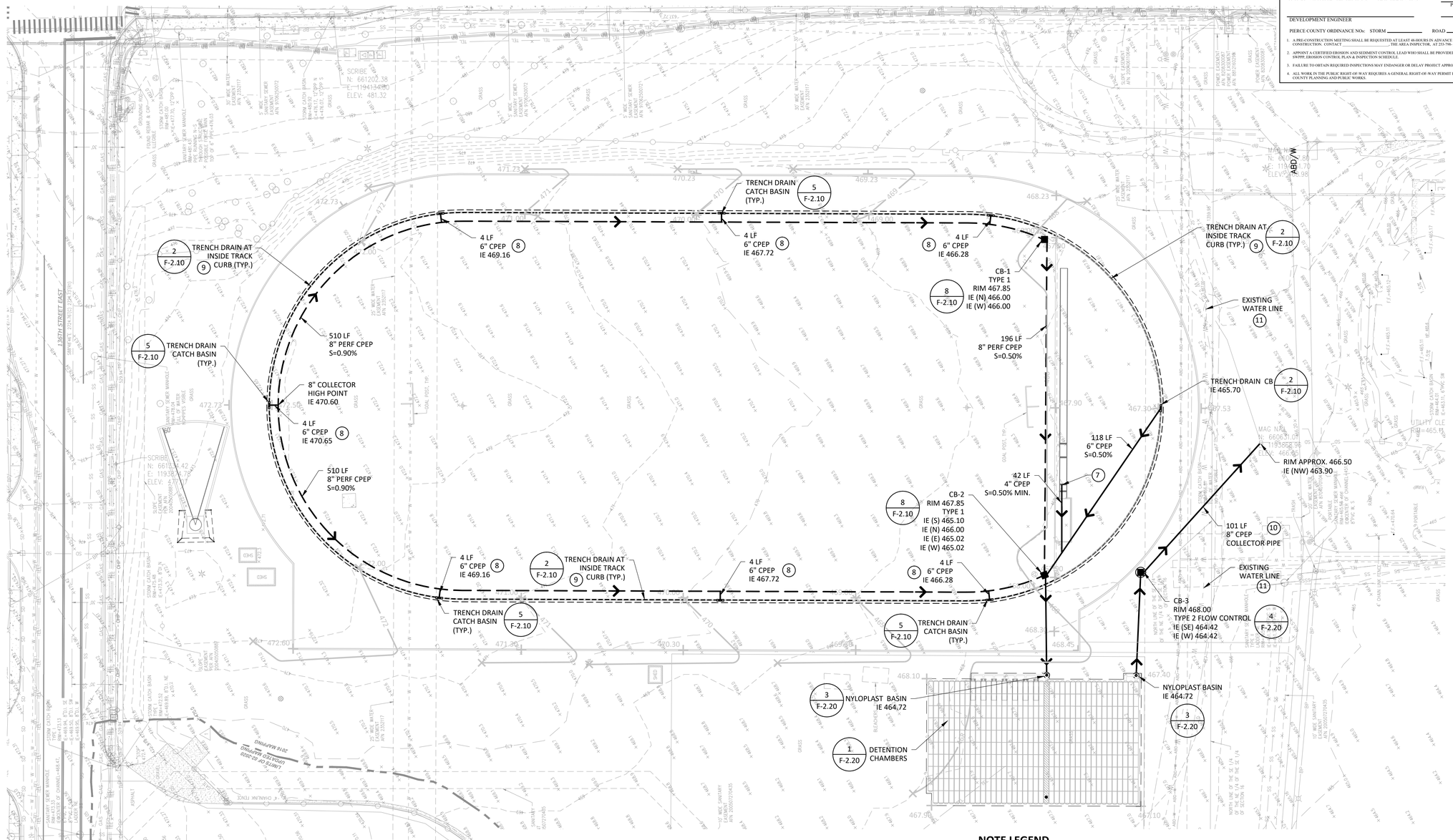
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GRADING PLAN

SHEET

F-1.20

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NOTE LEGEND

1. (INDICATES GENERAL CONSTRUCTION NOTE)
(3.) (INDICATES SPECIFIC CONSTRUCTION KEYNOTE)

DRAINAGE NOTES

1. TRENCH EXCAVATION SHALL BE MADE TO THE ALIGNMENT, ELEVATION, GRADE AND SLOPE AS INDICATED ON THE DRAWINGS. TRENCHING SHALL BE ACCOMPLISHED UTILIZING EQUIPMENT WITH SLOPE AND DEPTH CONTROL, SUCH AS "LASER PLANE CONTROL SYSTEM", SO AS TO ENSURE ACCURACY IN THE BOTTOM OF THE TRENCH.
2. NO HIGH POINTS ABOVE DESIGNATED INVERT OR CALCULATED TRENCH BOTTOM ELEVATION WILL BE PERMITTED. NO SLOUGHING OF SITE MATERIAL OR LOOSE EXCAVATED SOIL WILL BE PERMITTED TO REMAIN IN THE TRENCHES.
3. EXCAVATION BELOW INVERT GRADE MUST BE ESTABLISHED TO A DEPTH SO AS TO PROVIDE FOR SPECIFIED PLACEMENT OF PEA GRAVEL BEDDING AT BOTTOM OF PIPE ELEVATION PRIOR TO LAYING THE PERFORATED PIPE.
4. NO FOREIGN MATERIAL WILL BE PERMITTED INSIDE, ALONGSIDE, UNDER, OR ON TOP OF THE PERFORATED DRAIN PIPE.
5. THE BACKFILL FOR ALL PERFORATED PIPE SHALL BE CLEAN WASHED PEA GRAVEL. REFER TO THE SPECIFICATIONS FOR THE GRADATION REQUIREMENTS.
6. DURING PLACEMENT OF SPECIFIED TRENCH BACKFILL, PIPE MUST BE HELD IN PLACE TO PREVENT DISPLACEMENT AND PROVIDE FOR ACHIEVING SPECIFIED INVERT ELEVATION. DO NOT DAMAGE PIPE OR ALLOW PIPE TO BE DISPLACED BY PLACEMENT OF BACKFILL MATERIAL.
7. CONNECT TAKE OFF BOARD DRAIN TO 4" DRAINAGE LATERAL. 4" DRAINAGE LATERAL SHALL CONNECT TO 8" COLLECTOR.
8. CONNECT TRENCH DRAIN CATCH BASIN TO 8" COLLECTOR WITH 6" CPEP PIPE.
9. CONCRETE CONTAINMENT AT TRENCH DRAIN SHALL BE SET FLUSH WITH ASPHALT PAVING. ALL INTERIOR TRENCH DRAIN CONCRETE SHALL RECEIVE 1/2" RUBBERIZED SURFACING.
10. CONNECT NEW 8" CPEP TO EXISTING CATCH BASIN. EXISTING OUTLET TO BE CAPPED AND ABANDONED. GROUT EXISTING OUTLET.
11. CONTRACTOR SHALL FIELD VERIFY EXISTING WATER MAIN DEPTH 462.90 PRIOR TO INSTALLATION OF STORM DRAINAGE.

DRAINAGE LEGEND

- PERFORATED CPEP SUBSURFACE DRAINAGE COLLECTOR
- STORM DRAIN PIPE
- S=0.50% SLOPE
- FLOW DIRECTION
- IE 414.30 INVERT ELEVATION
- CIE 413.00 COLLECTOR INVERT ELEVATION
- CATCH BASIN INLET (CBI) TYPE 1
- CATCH BASIN INLET (CBI) TYPE 2 FLOW CONTROL
- EXISTING CATCH BASIN INLET
- TRENCH DRAIN CATCH BASIN
- TRENCH DRAIN
- STORMTECH CHAMBER (SC -310)
- NYLOPLAST CATCH BASIN

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NORTH
0 30' 60'
SCALE: 1" = 30'

PERMIT SET

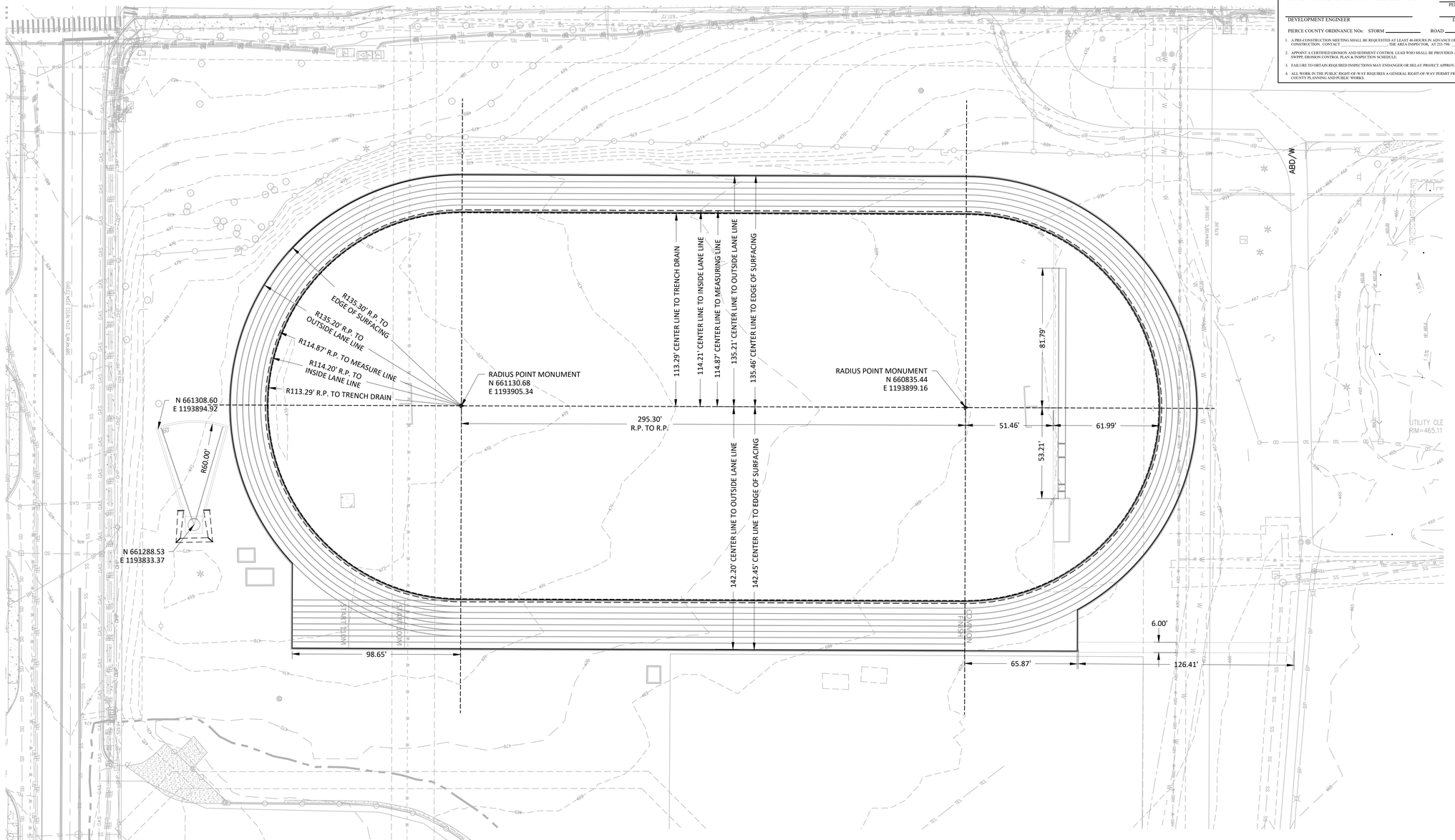
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DRAINAGE PLAN

SHEET
F-1.30

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TRACK LAYOUT TABLE

LAYOUT SUMMARY	FEET		METERS
DISTANCE RP TO RP	295.300		90.01
RP TO MEASURING LINE	114.870		35.01
RUNNING LENGTH	1312.351		400.00
INSIDE LANE LINE TO MEASURING LINE	0.656		0.20
DISTANCE RP TO INSIDE LANE LINE	114.214		34.81
INSIDE LANE LINE TO MEASURING LINE	0.200		0.06
LANE WIDTH	3.500		1.07
DISTANCE RP TO LANE 2 LINE	117.714		35.88
LANE WIDTH	3.500		1.07
DISTANCE RP TO LANE 3 LINE	121.214		36.95
LANE WIDTH	3.500		1.07
DISTANCE RP TO LANE 4 LINE	124.714		38.01
LANE WIDTH	3.500		1.07
DISTANCE RP TO LANE 5 LINE	128.214		39.08
LANE WIDTH	3.500		1.07
DISTANCE RP TO LANE 6 LINE	131.714		40.15
LANE WIDTH	3.500		1.07
DISTANCE RP TO LANE 7 LINE	135.214		41.21
LANE WIDTH	3.500		1.07
DISTANCE RP TO LANE 8 LINE	138.714		42.28
LANE WIDTH	3.500		1.07
DISTANCE RP TO OUTSIDE LANE LINE	142.214		43.35
LANE LINE + ADDITIONAL SURFACING	0.417		0.13
DISTANCE RP TO EDGE OF SURFACING	142.631		43.47

LAYOUT CONTROL NOTES

1. DIMENSIONS INDICATED ARE TYPICALLY TO FACE OF CURB/WALL OR EDGE OF PAVEMENT.
2. CONTRACTOR WILL BE FURNISHED AUTOCAD FILES USED FOR DESIGN FOR USE DURING CONSTRUCTION.
3. TRACK RADII POINTS ARE THE INITIAL SETUP POINTS FOR WORK IN THIS AREA. IN THE EVENT OF A CONFLICT, ALL OTHER POINTS SHOULD BE CONSIDERED RELATIVE.
4. EXACT PATHWAY LAYOUT TO BE FIELD CONFIRMED BY CIVIL ENGINEER.
5. TRACK TO BE STANDARD 6 LANE TRACK WITH TWO ADDITIONAL LANES ON WESTERN STRAIGHTAWAY.

PRIVATE IMPROVEMENTS

PERMIT #

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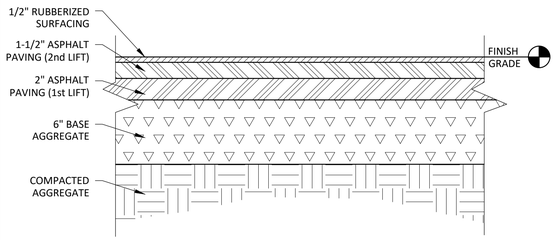
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DIMENSIONING PLAN

SHEET

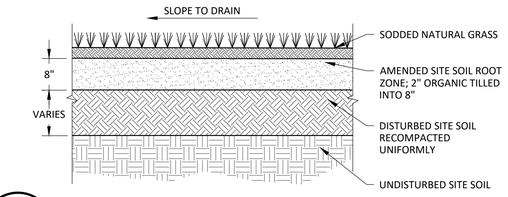
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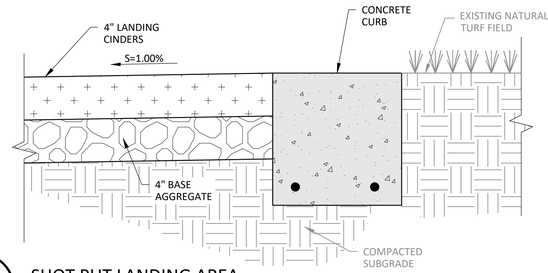
1 F-2.10 RUBBERIZED TRACK SECTION

NOT TO SCALE



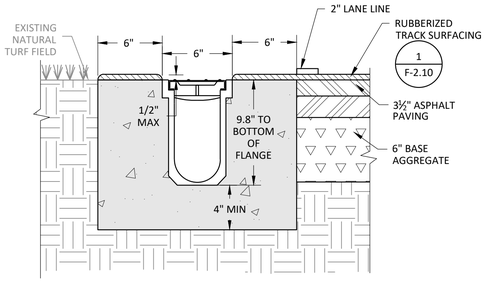
4 F-2.10 SODDED SITE SOIL RESTORATION

NOT TO SCALE



6 F-2.10 SHOT PUT LANDING AREA

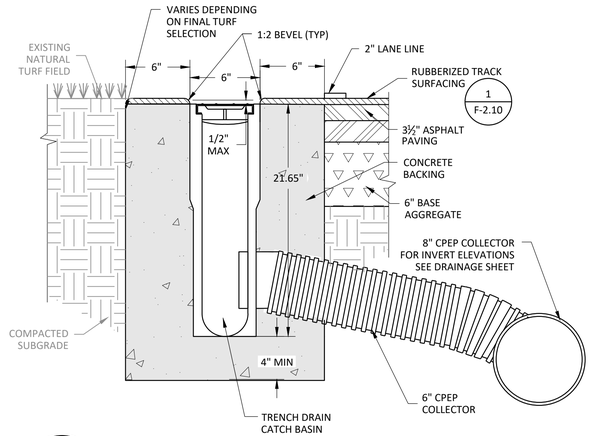
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1 MAXIMUM GRATE OPENINGS TO BE ½" PER CBC/ACCESSIBILITY REQUIREMENTS (TYP. ALL GRATED AREAS)

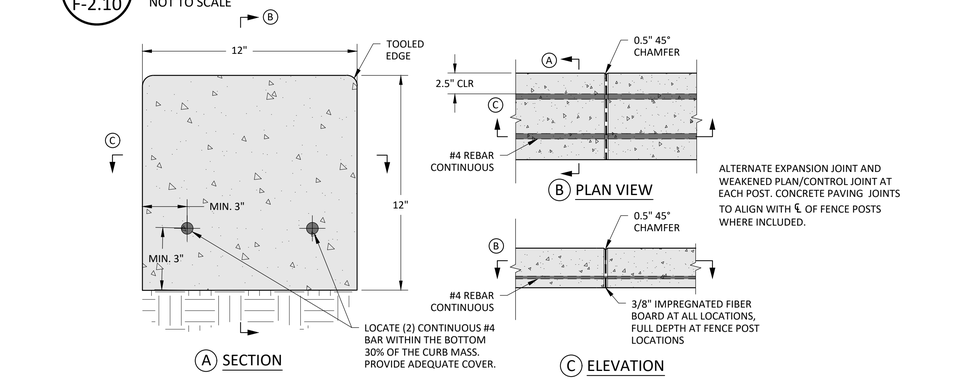
2 F-2.10 TRENCH DRAIN

NOT TO SCALE



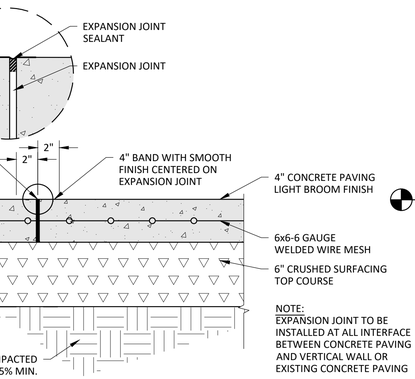
5 F-2.10 TRENCH DRAIN CATCH BASIN

NOT TO SCALE

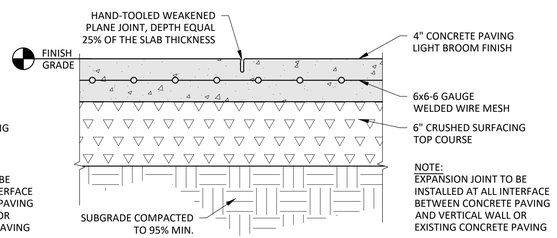


7 F-2.10 CONCRETE CURB & EXPANSION JOINT

NOT TO SCALE



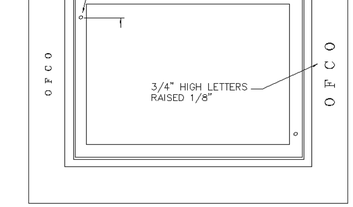
A: CONCRETE PAVEMENT AT EXPANSION JOINT

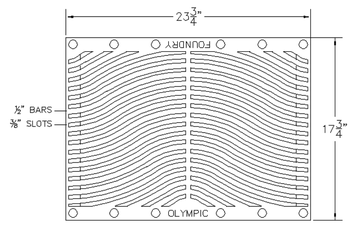


B: CONCRETE PAVING WITH WEAKENED PLANE JOINT

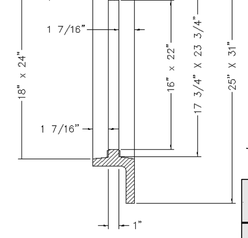
3 F-2.10 CONCRETE PAVING

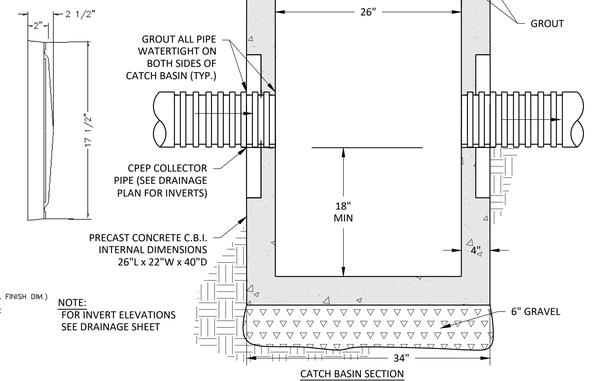
NOT TO SCALE





CATCH BASIN GRATE





CATCH BASIN SECTION

8 F-2.10 TYPE 1 CATCH BASIN

NOT TO SCALE

PRIVATE IMPROVEMENTS

PERMIT #

DEVELOPMENT ENGINEER — DATE

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PERMIT SET

DATE	5-7-25
SCALE	AS NOTED
DRAWN	LRB
CHECKED	JAB

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TYPICAL SECTIONS

SHEET

F-2.10

File: F-2.10 Typical Sections.dwg Plotted by: LorrinB Date: 07-May-25 2:39:03pm

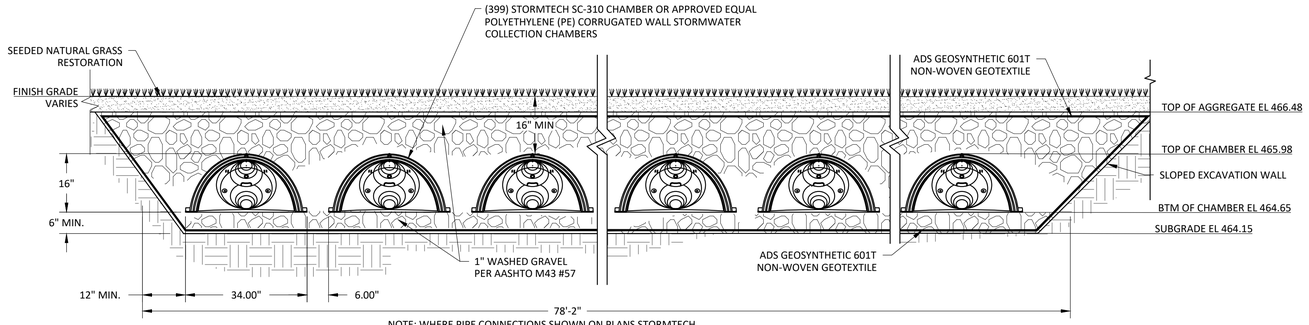
PRIVATE IMPROVEMENTS

PERMIT #

DEVELOPMENT ENGINEER — DATE

PIERCE COUNTY ORDINANCE NOs: STORM _____ ROAD _____

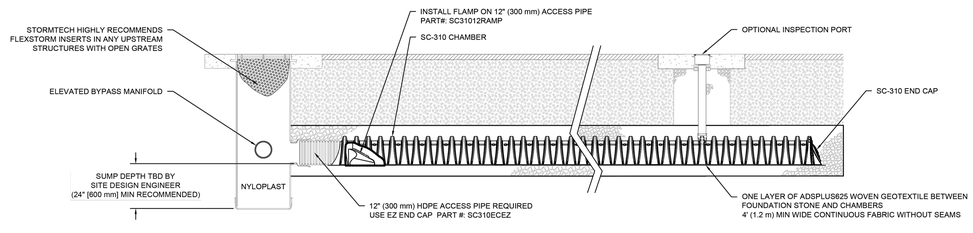
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NOTE: WHERE PIPE CONNECTIONS SHOWN ON PLANS STORMTECH CHAMBER END CAPS TO BE SUPPLIED WITH 12" LONG PRE-STUBBED PIPES FACTORY WELDED TO END CAPS AT ELEVATIONS PER PLAN

1 / F-2.20 — SC-310 DETENTION CHAMBERS

NOT TO SCALE

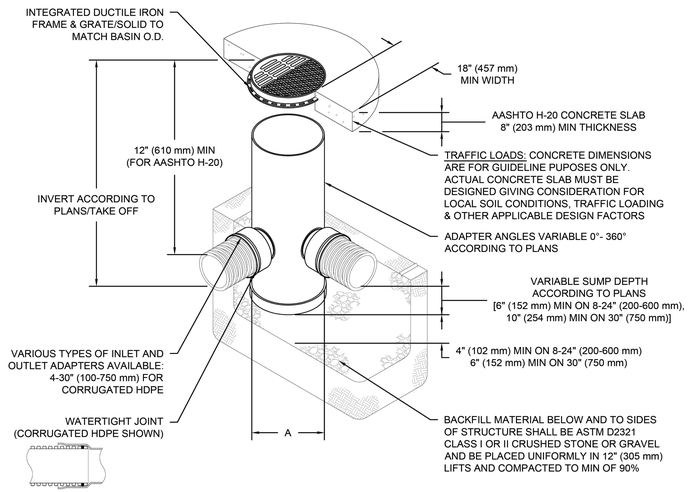


SC-310 ISOLATOR ROW PLUS DETAIL

NTS

2 / F-2.20 — SC-310-ISOLATOR ROW

NOT TO SCALE

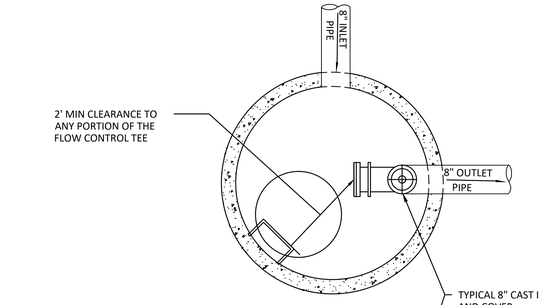


NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

3 / F-2.20 — NYLOPLAST BASIN

NOT TO SCALE



TYPE 2 CB-54"

NOT TO SCALE

4 / F-2.20 — FLOW CONTROL STRUCTURE

NOT TO SCALE

REVISION	DATE

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A Tradition of Excellence

BALLOU JUNIOR HIGH SCHOOL TRACK REPLACEMENT

DA HOGAN
1450 114th Ave. SE, Suite 225
Bellevue, WA 98004
p. 206.285.0400
www.dahogan.com

DAVID J. ANDERSON — STATE OF WASHINGTON — PROFESSIONAL ENGINEER

PERMIT SET

DATE	5-7-25
SCALE	AS NOTED
DRAWN	LRB
CHECKED	JAB

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DETENTION DETAILS

SHEET

F-2.20

File: F-2.20 Detention Details.dwg Plotted by: LorrinB Date: 07-May-25 3:01:06pm

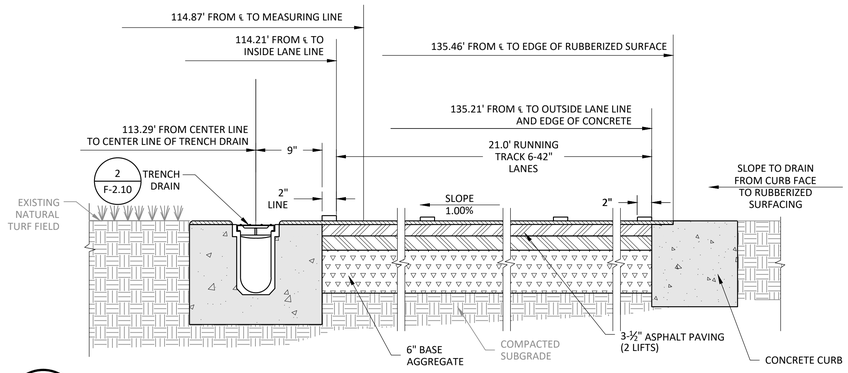
PRIVATE IMPROVEMENTS

PERMIT #

DEVELOPMENT ENGINEER — DATE

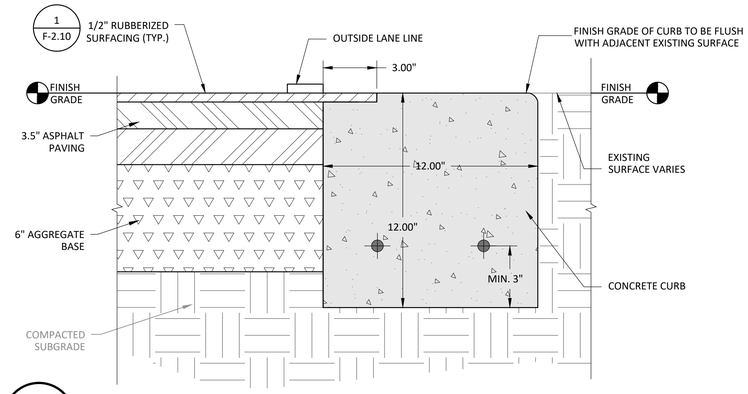
PIERCE COUNTY ORDINANCE NOs: STORM _____ ROAD _____

1. A PRE-CONSTRUCTION MEETING SHALL BE REQUESTED AT LEAST 48-HOURS IN ADVANCE OF THE START OF CONSTRUCTION. CONTACT _____ THE AREA INSPECTOR, AT 253-798-_____.
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3. FAILURE TO OBTAIN REQUIRED INSPECTIONS MAY ENDANGER OR DELAY PROJECT APPROVAL.
4. ALL WORK IN THE PUBLIC RIGHT-OF-WAY REQUIRES A GENERAL RIGHT-OF-WAY PERMIT FROM PIERCE COUNTY PLANNING AND PUBLIC WORKS.



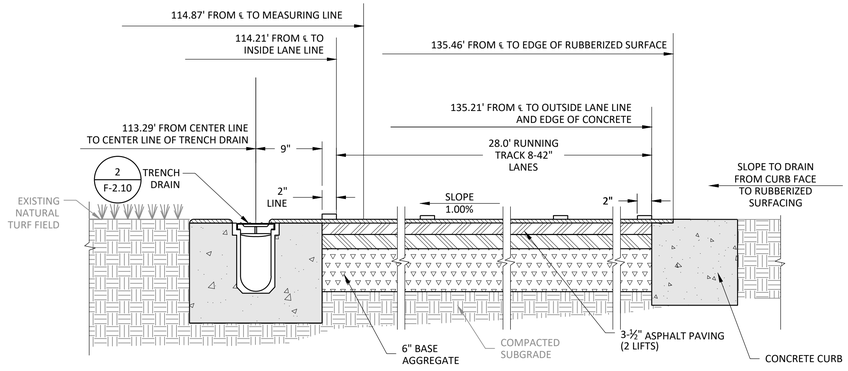
1 F-2.30 TYPICAL TRACK SECTION

NOT TO SCALE



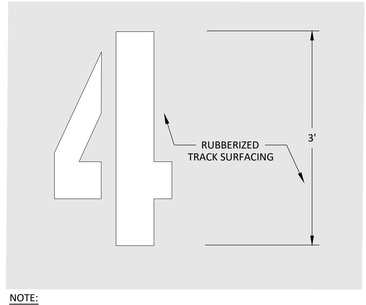
3 F-2.30 RUBBERIZED SURFACE EDGE

NOT TO SCALE



2 F-2.30 TRACK SECTION STRAIGHTAWAY

NOT TO SCALE

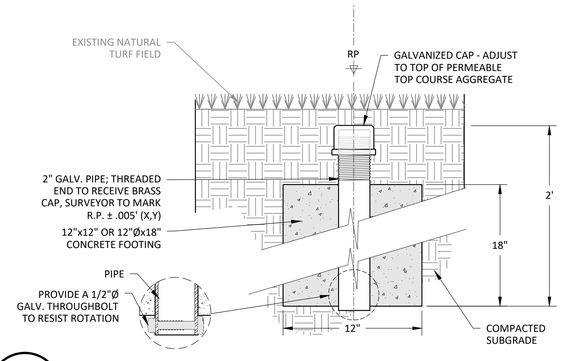


NOTE:

1. CENTER NUMBER IN LANE
2. SUBMIT STENCIL EXAMPLE TO ENGINEER FOR APPROVAL BEFORE APPLICATION

4 F-2.30 TYPICAL TRACK NUMBER

NOT TO SCALE



5 F-2.30 RADIUS POINT MONUMENT

NOT TO SCALE

REVISION	DATE

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DATE	5-7-25
SCALE	AS NOTED
DRAWN	LRB
CHECKED	JAB

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TRACK DETAILS

SHEET

F-2.30

File: F-2.30 Track Details.dwg Plotted by: LorrinB Date: 07-May-25 2:30:15pm

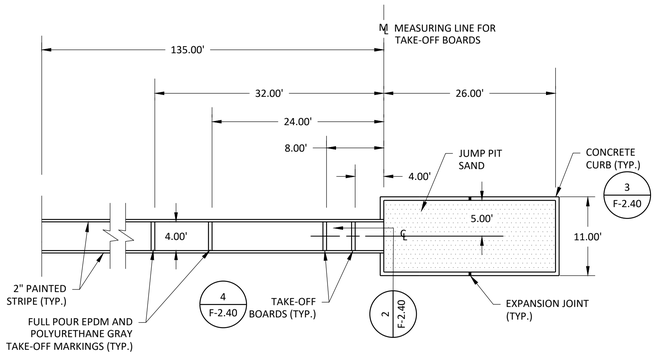
PRIVATE IMPROVEMENTS

PERMIT #

DEVELOPMENT ENGINEER — DATE

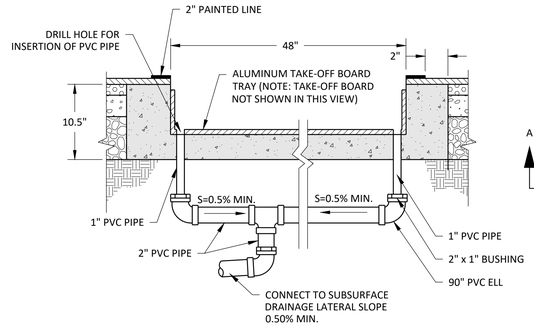
PIERCE COUNTY ORDINANCE NOs: STORM _____ ROAD _____

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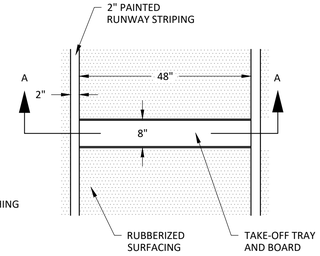


1 F-2.40 LONG JUMP TRIPLE JUMP PLAN VIEW

NOT TO SCALE



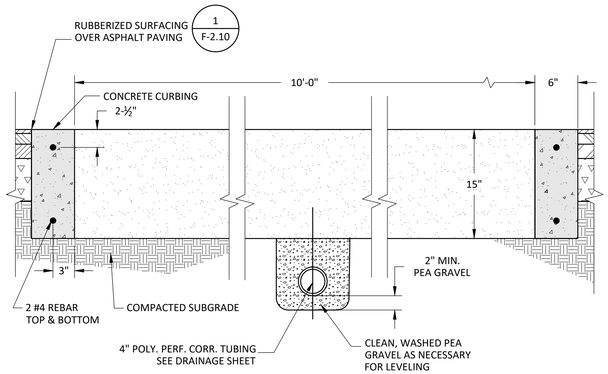
SECTION A-A



PLAN

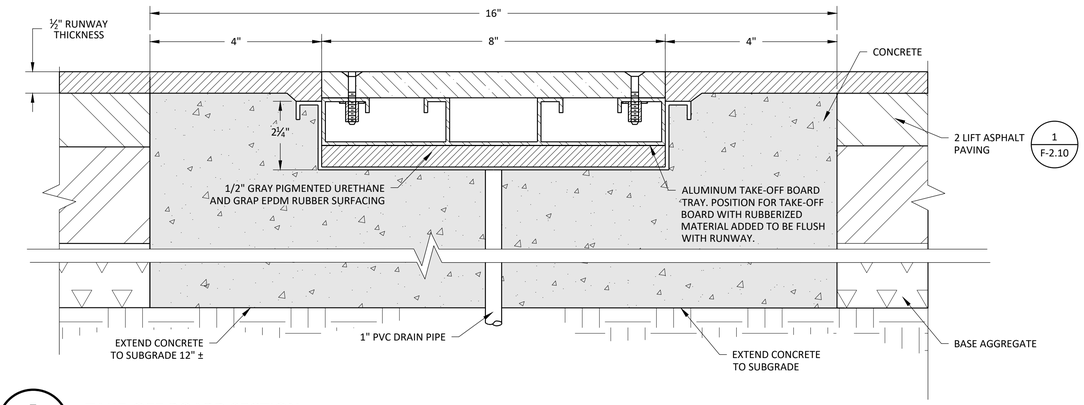
4 F-2.40 TAKE-OFF BOARD TRAY

NOT TO SCALE



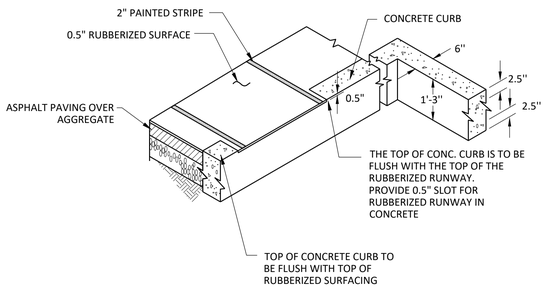
2 F-2.40 JUMP PIT SECTION

NOT TO SCALE



5 F-2.40 TAKE-OFF BOARD SECTION

NOT TO SCALE



3 F-2.40 RUNWAY AT JUMP PIT CURB

NOT TO SCALE

File: F-2.40 Field Event Details.dwg Plotted by: LorinB Date: 07-May-25 2:50:37pm

REVISION	DATE

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PERMIT SET

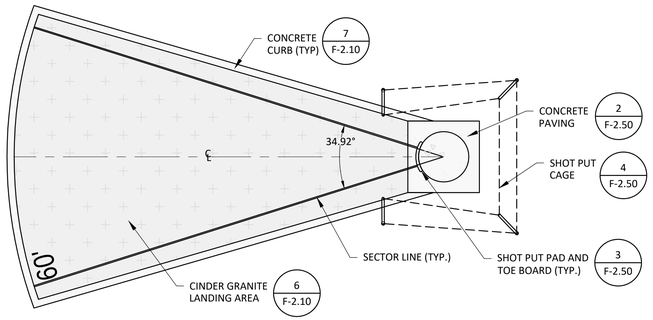
DATE	5-7-25
SCALE	AS NOTED
DRAWN	LRB
CHECKED	JAB

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FIELD EVENT DETAILS

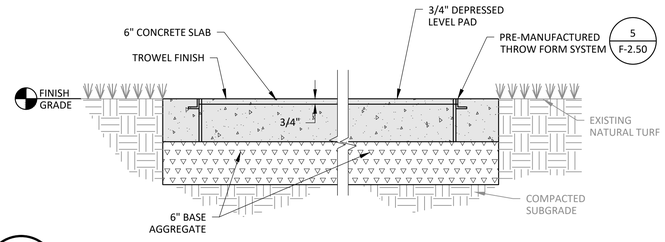
SHEET

F-2.40



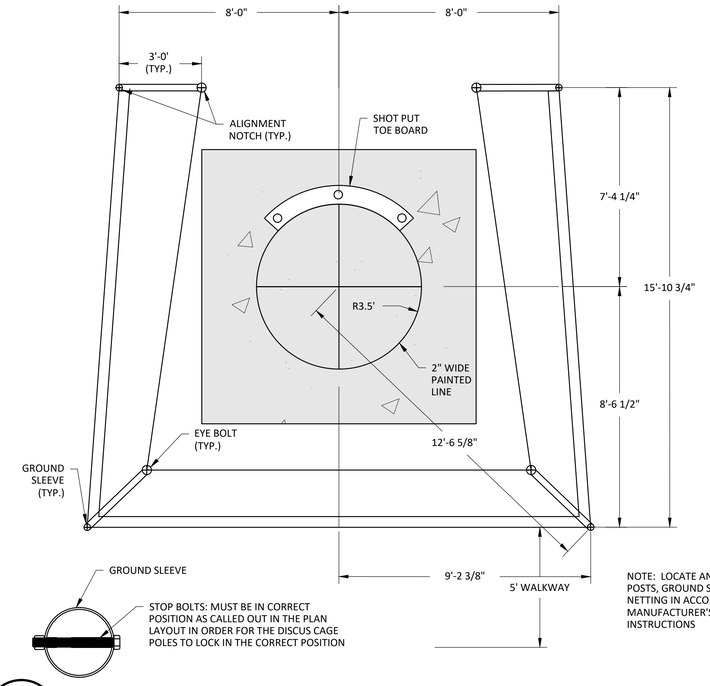
1 / F-2.50 SHOT PUT - PLAN VIEW

NOT TO SCALE



2 / F-2.50 SHOT PUT PAD SECTION

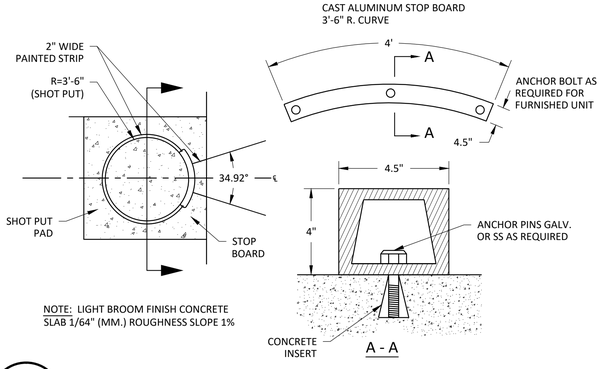
NOT TO SCALE



NOTE: LOCATE AND INSTALL POSTS, GROUND SLEEVES, AND NETTING IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS

4 / F-2.50 SHOT PUT GROUND SLEEVE LAYOUT

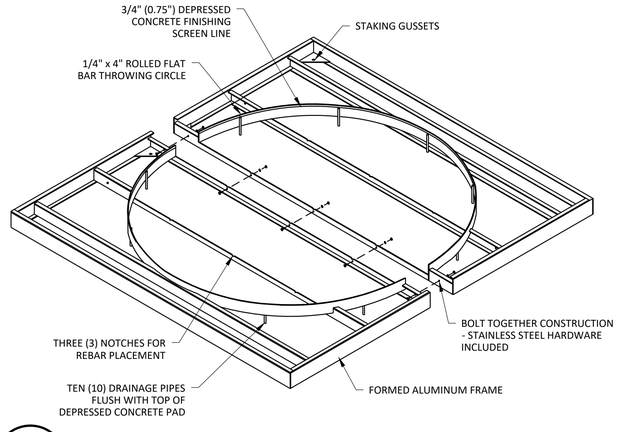
NOT TO SCALE



NOTE: LIGHT BROOM FINISH CONCRETE SLAB 1/64" (MM.) ROUGHNESS SLOPE 1%

3 / F-2.50 SHOT PUT PAD-TOE BOARD

NOT TO SCALE



5 / F-2.50 THROW FORM SYSTEM

NOT TO SCALE

PRIVATE IMPROVEMENTS

PERMIT #

DEVELOPMENT ENGINEER — DATE

PIERCE COUNTY ORDINANCE NOs: STORM _____ ROAD _____

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REVISION	DATE

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PERMIT SET

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SCALE	AS NOTED
DRAWN	LRB
CHECKED	JAB

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FIELD EVENT DETAILS

SHEET

F-2.50

File: F-2.50 Field Event Details.dwg Plotted by: Lorrin8 Date: 07-May-25 2:50:56pm

APPENDIX B

Design Calculations and Supporting Information

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.64
Program License Number: 201410003
Project Simulation Performed on: 05/07/2025 12:43 PM
Report Generation Date: 05/07/2025 12:43 PM

Input File Name: Detention.fld
Project Name: Ballou Junior HS
Analysis Title: Detention
Comments:

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected

Full Period of Record Available used for Routing

Climatic Region Number: 16
Precipitation Station : 96004405 Puget East 44 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961044 Puget East 44 in MAP

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : Ecology Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	3.304	3.304
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	3.304	3.304

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Project Site ----------
-------Area (Acres) --------
C, Forest, Flat 1.050
C, Lawn, Flat 2.254

Subbasin Total 3.304

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Track & Field ----------

	-------Area (Acres) --------
C, Lawn, Flat	2.254
SIDEWALKS/FLAT	1.044
Subbasin Total	3.298

---------- Subbasin : SHOT PUT ----------

	-------Area (Acres) --------
C, Lawn, Flat	0.003
SIDEWALKS/FLAT	0.003
Subbasin Total	0.006

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 0

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 2

Link Name: StormTech
Link Type: Structure
Downstream Link Name: New Copy Lnk2

User Specified Elevation Volume Table Used

Elevation (ft)	Pond Volume (cu-ft)
100.00	0.
100.08	318.
100.17	636.
100.25	954.
100.33	1272.
100.42	1590.
100.50	1908.
100.58	2570.
100.67	3224.
100.75	3869.
100.83	4504.
100.92	5127.
101.00	5736.

101.08	6330.
101.17	6910.
101.25	7471.
101.33	8011.
101.42	8526.
101.50	9013.
101.58	9461.
101.67	9843.
101.75	10198.
101.83	10530.
101.92	10848.
102.00	11166.
102.08	11484.
102.17	11802.
102.25	12120.
102.33	12438.

Constant Infiltration Option Used
Infiltration Rate (in/hr): 0.00

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 6.00
Common Length (ft) : 0.000
Riser Crest Elevation : 101.83 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.00
Diameter (in) : 1.90
Orientation : Horizontal
Elbow : No

--- Device Number 2 ---
Device Type : Rectangular Weir that Intersects the Riser Top
Invert Elevation (ft) : 101.12
Length (ft) : 0.040

Link Name: New Copy Lnk2
Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS*********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 0

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2
Number of Links: 2

*************Groundwater Recharge Summary ***************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Project Site	490.345
Total:	490.345

Total Post Developed Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin: Track & Field		290.524
Subbasin: SHOT PUT		0.387
Link:	StormTech	Not Computed
Link:	New Copy Lnk2	0.000
Total:		290.910

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 3.103 ac-ft/year, Post Developed: 1.841 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 0

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: New Copy Lnk2 **********

2-Year Discharge Rate : 0.098 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.08 cfs
Off-line Design Discharge Rate (91% Exceedance): 999.00 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 1079.11
Inflow Volume Including PPT-Evap (ac-ft): 1079.11
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 1079.11

Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

**********Compliance Point Results **********

Scenario Predeveloped Compliance Subbasin: Project Site

Scenario Postdeveloped Compliance Link: New Copy Lnk2

*** Point of Compliance Flow Frequency Data ***
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.221	2-Year	9.828E-02
5-Year	0.390	5-Year	0.144
10-Year	0.553	10-Year	0.210
25-Year	0.749	25-Year	0.549
50-Year	1.111	50-Year	0.639
100-Year	1.143	100-Year	0.689
200-Year	1.155	200-Year	0.724
500-Year	1.170	500-Year	0.771

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

**** Flow Duration Performance ****

Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	-1.0%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	-0.1%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	3.0%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	3.2%	PASS

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

**** LID Duration Performance ****

Excursion at Predeveloped 8%Q2 (Must be Less Than 0%):	65.2%	FAIL
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%):	234.0%	FAIL

LID DURATION DESIGN CRITERIA: FAIL

Ballou JHS Project
Conveyance Analysis Spreadsheet

5/7/2025

No.	Pipe Run	Size *(inches)*	Mannings N	Plan Slope *(ft/ft)*	Qfull *(cfs)*	Tributary Basins	Total Tributary Area *(ac)*	Tributary Impervious *(ac)*	Tributary Grass *(ac)*	Qtrib (MGS Flood, 25-yr) *(cfs)*	% Full (25-year)	Qtrib (MGS Flood, 100-yr) *(cfs)*	% Full (100-year)
1	Inflow (CB-2 to Nyloplast)	10	0.012	0.005	**1.65**	Track & Field	3.298	1.044	2.254	**0.75**	**45%**	**1.14**	**69%**
2	Flow Controlled (CB-3 to EX)	8	0.012	0.005	**0.91**	Track & Field	3.298	1.044	2.254	**0.55**	**61%**	**0.69**	**76%**

MGS FLOOD
PROJECT REPORT – TESC SIZING

Program Version: MGSFlood 4.64
Program License Number: 201410003
Project Simulation Performed on: 05/06/2025 10:10 AM
Report Generation Date: 05/06/2025 10:11 AM

Input File Name: Detention.fld
Project Name: Ballou Junior HS
Analysis Title: TESC
Comments:

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected

Full Period of Record Available used for Routing

Climatic Region Number: 16
Precipitation Station : 96004405 Puget East 44 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961044 Puget East 44 in MAP

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : Ecology Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	3.298	3.298
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	3.298	3.298

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Project Site ----------
-------Area (Acres) --------
C, Forest, Flat 1.044
C, Lawn, Flat 2.254

Subbasin Total 3.298

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Track & Field ----------
-------Area (Acres) --------
C, Lawn, Flat 2.254
SIDEWALKS/FLAT 1.044

Subbasin Total 3.298

********** LINK DATA **********

----------SCENARIO: PREDEVELOPED
Number of Links: 0

********** LINK DATA **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 0

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 0

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 0

**********Groundwater Recharge Summary **********
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation
Model Element Recharge Amount (ac-ft)

Subbasin: Project Site 489.204
_____
Total: 489.204

Total Post Developed Recharge During Simulation
Model Element Recharge Amount (ac-ft)

Subbasin: Track & Field 290.524
_____
Total: 290.524

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 3.096 ac-ft/year, Post Developed: 1.839 ac-ft/year

*************Water Quality Facility Data **************

----------SCENARIO: PREDEVELOPED

Number of Links: 0

----------SCENARIO: POSTDEVELOPED

Number of Links: 0

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Subbasin: Project Site

Scenario Postdeveloped Compliance Subbasin: Track & Field

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.221	2-Year	0.634
5-Year	0.389	5-Year	0.866
10-Year	0.553	10-Year	1.114
25-Year	0.748	25-Year	1.435
50-Year	1.111	50-Year	1.843
100-Year	1.143	100-Year	2.335
200-Year	1.154	200-Year	2.358
500-Year	1.169	500-Year	2.373

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

****** Flow Duration Performance ******

Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	687.1%	FAIL
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	1443.5%	FAIL
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	99999.0%	FAIL
Percent Excursion from Q2 to Q50 (Must be less than 50%):	100.0%	FAIL

FLOW DURATION DESIGN CRITERIA: FAIL

****** LID Duration Performance ******

Excursion at Predeveloped 8%Q2 (Must be Less Than 0%):	34.7%	FAIL
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%):	687.1%	FAIL

LID DURATION DESIGN CRITERIA: FAIL

Sediment Sizing Calculations

Per the 2021 Pierce County Stormwater Mangement and Site Development Manual

Project Name: Ballou Junior High School Track Replacement

Required Sediment Trap Surface Area (SA):

SA =2*Q/Vsed

Where:

Q = 2-year developed flow rate from MGS Flood

Vsed = Settling Velocity (0.00096 ft/sec)

Calculation:

multiplier =	2	
Q =	0.634	cfs
Vsed =	0.00096	fps
Required SA =	**1320.8**	**square feet**

Sediment Pond Volume:

Excavation for proposed detention pond to be used as sediment settling facility:

Length of Top Surface Area =	65	feet
Width of Top Surface Area =	21	feet
Surface Area Provided =	**1365**	square feet
Side Slope =	3	(H:1V)
Total Depth of Sediment Trap =	3.5	feet
Bottom Length of Sediment Trap =	44	feet
Bottom Width of Sediment Trap =	0	feet
Total Pond Volume =	**2,389**	cubic feet
	17,869	gallons

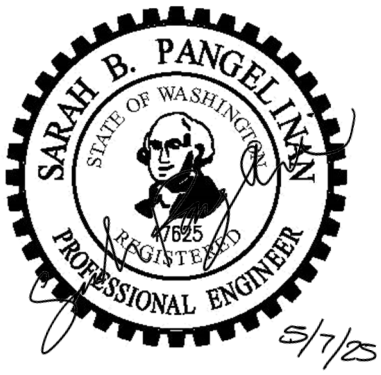
APPENDIX C

Construction Stormwater Pollution Prevention Plan (SWPPP)

Ballou Junior High School
Track Replacement

9916 136th Street E
Puyallup, WA 98373

CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN
May 7, 2025



I hereby state that this Construction Stormwater Pollution Prevention Plan for the Ballou Junior High School Project has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that Pierce County does not and will not assume liability for the sufficiency, suitability, or performance of Construction SWPPP BMPs prepared by me.

LPD Engineering, PLLC
1932 First Ave, Suite 500
Seattle, WA 98101
Contact: Sarah Pangelinan, P.E.
(206) 725-1211
Sarahp@lpdengineering.com

Prepared for:

Puyallup School District
302 2nd Street SE
Puyallup, WA 98372
(253) 841-1301

BALLOU JUNIOR HIGH TRACK REPLACEMENT
STORMWATER POLLUTION PREVENTION PLAN (SWPPP) NARRATIVE
MAY 7, 2025

The following Construction Storm Water Pollution Prevention Plan (SWPPP) narrative is for the track replacement at Ballou Junior High at 9916 136th Street E, in Unincorporated Pierce County, Washington. The narrative supplements the Temporary Erosion and Sediment Control (TESC) plan. This narrative and the drawings address the requirements of Volume II of the 2021 Pierce County Stormwater and Site Design Manual. Refer to the TESC plans (Sheet F-0.20 through C-103) and TESC details (Sheet F-0.30) for more information regarding any erosion or sedimentation control measures involved in this project.

Construction Stormwater Pollution Prevention Elements

Erosion Control Element # 1 – Preserve Vegetation/Mark Clearing Limits

The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County and State of Washington erosion control requirements as described below:

Preserve existing vegetation – BMP C101
Silt Fence – BMP C233
Tree Protection Fencing

The limits of clearing and grading will be delineated on the plans and on site, no vegetation outside of the clearing limits will be removed. Silt fence will be installed per the TESC drawings.

Requirements

The contractor shall meet the following requirements during all phases of the project:

1. Prior to beginning land disturbing activities, including clearing and grading, the Contractor shall clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area. (These areas shall be clearly marked in the field and on the TESC plans to prevent damage and offsite impacts.)
2. Project documents will specify methods of clearing limit marking.
3. The duff layer, native top soil, and natural vegetation shall be retained in an undisturbed state to the maximum extent practicable. If it is not practicable to retain the duff layer in place, it will be stockpiled on-site, covered to prevent erosion, and replaced immediately upon completion of the ground disturbing activities.

Erosion Control Element # 2 - Establish Construction Access

The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County and State of Washington erosion control requirements as described below:

Stabilized Construction Entrance/Exist – BMP C105

Wheel Wash – BMP C106

A construction access to the field will be provided from existing driveways near the northwest corner of the track.

Requirements

The contractor shall meet the following requirements during all phases of the project:

1. Construction vehicle access and exit shall be limited to one route, if possible, or two for linear projects such as roadways where more than one access is necessary for large equipment maneuvering. See project documents.
2. Access point(s) shall be stabilized with a pad of quarry spalls or crushed rock prior to traffic leaving the construction site to minimize the tracking of soil onto public roads.
3. Wheel wash or tire baths should be located on site, if applicable.
4. If soil is tracked off site, the Contractor shall clean paved roads if necessary to prevent sediment from entering surface waters. Sediment shall be removed from roads by shoveling or pickup sweeping and shall be transported to a controlled sediment disposal area. Street washing is not allowed.

Erosion Control Element # 3 - Control Flow Rates

The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County and State of Washington erosion control requirements as described below:

Temporary Interceptor Swale – BMP C200
Check Dams – BMP C207
Temporary Sediment Tank – BMP C241

Interceptor swale will be installed to direct runoff to traps, located at existing catch basin locations. The traps will be located throughout the project site. The contractor is responsible for ensuring discharge water meets the Pierce County standards. Refer to the Appendix B of the project's Stormwater Site Plan for sizing calculations.

Requirements

The contractor shall meet the following requirement during all phases of the project:

1. Any stormwater retention/detention facilities that are part of providing temporary erosion control for the project shall be constructed as one of the first steps in grading.

Erosion Control Element # 4 - Install Sediment Controls

The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County and State of Washington erosion control requirements as described below:

Storm drain inlet protection, BMP C220
Silt Fence, BMP C233
Temporary Sediment Tank – BMP C241

The following BMPs are proposed for sediment control: silt fencing, storm drain inlet protection, and temporary sediment settling tank. Sediment control during construction will be achieved by keeping exposed soils covered. In the event that unexpected conditions arise during construction, the contractor is expected to contract with a third-party erosion control monitor to help manage the site and prevent any discharges of turbid water to the downstream system. The contractor's Certified Erosion and Sediment Control Lead (CESCL) will be responsible for the required sampling of stormwater discharges from the site as required by the DOE stormwater permit.

Turbidity and pH monitoring of stormwater during construction by the third-party erosion control monitor will be required per a project Turbidity Monitoring Plan. Monitoring test results will be provided to the contractor, and are to be kept on site for reference and review if requested by County representatives or other agencies. Monthly summary reports will be required to be prepared and signed by the NPDES permit holder, and submitted to DOE. The CESCL is also required to perform weekly inspection (at a minimum) of TESC BMPs throughout the site during all phases of the project.

Requirements
The contractor shall meet the following requirements if applicable:

1. Prior to leaving the construction site, stormwater runoff from disturbed areas shall pass through a sediment pond or other appropriate sediment removal BMP. Runoff from fully stabilized areas may be discharged without a sediment removal BMP, but must meet the flow control performance standard of protecting properties and waterways downstream from development sites from erosion due to increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site, as required by the Pierce County.

   (Full stabilization means concrete or asphalt paving; quarry spalls used as ditch lining; or the use of rolled erosion products, a bonded fiber matrix product, or established vegetative cover in a manner that will fully prevent soil erosion.)

2. Sediment trap, vegetated buffer strips, sediment barriers or filters, dikes, and other BMPs intended to trap sediment on site shall be constructed as one of the first steps in grading. These BMPs shall be functional before other land disturbing activities take place.

3. Earthen structures such as dams, dikes and diversion, that are part of the erosion control plan, shall be seeded and mulched according to the timing indicated in Element #5.

4. BMPs intended to trap sediment on site must be located in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages, often during non-storm events, in response to rain event changes in stream elevation or wetted area.

Erosion Control Element # 5 - Stabilize Soils

The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County and State of Washington erosion control requirements as described below:

Preserve natural vegetation – BMP C101
Temporary & Permanent Seeding – BMP C120
Mulching – BMP C121
Nets & blankets – BMP C122

Plastic Covering – BMP C123

The following BMPs will be used to stabilize exposed soils; preserve natural vegetation (per BMP C101), plastic covering, erosion control blankets, or mulching (per BMP C121).

Requirements
The contractor shall meet the following requirements:

1. From October 1 through April 30, no soils shall remain exposed and unworked for more than 2 days. From May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days. This condition applies to all soils on site, whether at final grade or not. These time limits may be adjusted by the County if it can be shown that the average time between storm events justifies a different standard. (Requests to modify these timeframes must be made in writing and approved by the Pierce County before any deviation in these erosion control measures is permitted.)

2. Soil shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.

3. Soil stockpiles must be stabilized from erosion, protected with sediment trapping measures when possible, be located away from storm drain inlets, waterways and drainage channels.

4. Linear construction activities, including trenching for utilities, shall be conducted to meet the soil stabilization requirements. Contractors shall install the bedding materials, roadbeds, structures, pipeline, or utilities and re-stabilize the disturbed soils so that:

   From October 1 through April 30, no soils shall remain exposed and unworked for more than 2 days and from May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days.

Erosion Control Element # 6 – Protect Slopes
The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County and State of Washington erosion control requirements as described below:

Temporary & Permanent Seeding – BMP C120
Nets & blankets – BMP C122
Plastic Covering – BMP C123
Check Dams – BMP C207
Silt Fence – BMP C233

BMPs for slope protection will be utilized during construction. Geotechnical recommendations for permanent and temporary slopes are also included in the project specifications.

Requirements

The contractor shall meet the following requirements where applicable or as directed by project documents:

1. Off-site stormwater (run-on) will be diverted away from slopes and disturbed areas with interceptor dikes and/or swales. Off-site stormwater will be managed separately from stormwater generated on the site.
2. Runoff at the top of slopes will be collected in temporary pipe slope drains or protected channels to prevent erosion. Sizing of the temporary pipe slope drains shall handle the peak flow from a 10-year, 24-hour event assuming a Type 1A rainfall distribution.
3. Provide drainage to remove ground water intersecting the slope surface of exposed soil areas. Excavated material will be placed on the uphill side of trenches, consistent with safety and space considerations.
4. Check dams will be placed at regular intervals within channels that are cut down a slope. Soils shall be stabilized as specified in Element # 5.
5. Minimize cut slope length and steepness. Slope surfaces shall be roughened.

Erosion Control Element # 7 – Protect Drain Inlets

The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County and State of Washington erosion control requirements as described below:

Storm drain inlet protection – BMP C220

Catch basin inserts will be installed on all catch basins located within or adjacent to the project area. Drainage structures in areas where no work occurs will remain and will be protected; discharge points to the public storm drain main line will also remain. Proposed inlets will also be protected with catch basin inserts, and where feasible, their outlets will be temporarily plugged until the site is stabilized.

Requirements

The contractor shall meet the following requirements during all phases of the project:

1. All storm drain inlets made operable during construction shall be protected so that stormwater runoff does not enter the conveyance system without first being treated to remove sediment.
2. All approach roads shall be kept clean. Sediment shall not be allowed to enter storm drains without prior and adequate treatment unless on-site treatment is provided before the storm drain discharges to surface waters.
3. Inlets should be inspected weekly at a minimum and daily during storm events. Inlet protection devices should be cleaned or removed and replaced when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer.)

Erosion Control Element # 8 – Stabilize Channel and Outlets

The following Best Management Practices will be implemented during all phases of the project by the Contractor on the project site to meet the Pierce County and State of Washington erosion control requirements as described below:

Check Dams – BMP C207

There are no existing or proposed channels to be stabilized. Should this become necessary, other BMPs such as Channel Lining (BMP C202), Nets and Blankets (BMP C122), and Check Dams (BMPC C207) may be used.

Requirements
The contractor shall meet the following requirements during all phases of the project:

1. All temporary on-site conveyance channels shall be designed, constructed and stabilized to prevent erosion from the expected peak 10-minute velocity of flow from a Type 1A, 10-year, 24-hour frequency storm for the developed condition.
2. Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream reaches shall be provided at the outlets of all conveyance systems.

Erosion Control Element # 9 – Control Pollutants
The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County and State of Washington erosion control requirements as described below:

Saw cutting and Surfacing Pollution Prevention – BMP C152
Material Delivery, Storage, and Containment – BMP C153

All construction debris will be removed from the site. Contractor will be responsible for managing their construction equipment per DOE-approved BMPs. Stabilized construction entrances are assumed to be sufficient for the construction period; if something more substantial is required, contractor is to coordinate with the Owner's Representative and the Pierce County inspector.

Requirements
The contractor shall meet the following requirements:

1. All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater. Woody debris may be chopped and spread on site if shown or allowed by the contract documents.
2. Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site (see Chapter 173-304 WAC for the definition of inert waste). If on-site fueling tanks are allowed by the Contract documents, on-site fueling tanks shall include secondary containment.
3. All maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted off site unless specifically allowed by the contract documents. If allowed the Contractor shall use spill

prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident.

4. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle. Wheel wash or tire bath wastewater shall be discharged to a separate on-site treatment system or to the sanitary sewer, when permitted.
5. If allowed by the contract documents, application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations for application rates and procedures shall be followed.
6. BMPs shall be used to prevent or treat contamination of stormwater runoff by pH modifying sources. These sources include, but are not limited to, bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, and concrete pumping and mixer washout waters. Stormwater discharges shall not cause or contribute to a violation of the water quality standard for pH in the receiving water.
7. Construction sites with significant concrete work shall adjust the pH of stormwater if necessary to prevent violations of water quality standards.

Erosion Control Element # 10 – Control De-Watering

The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County and State of Washington erosion control requirements as described below:

Temporary Sediment Tank, BMP C241

In the event that perched groundwater is encountered during construction, the Contractor shall pump the water to the sediment settling facility.

Requirements

The contractor shall meet the following requirements:

1. Foundation, vault, and trench de-watering water, which have similar characteristics to stormwater runoff at the site, shall be discharged into a controlled conveyance system prior to discharge to a sediment trap or sediment pond. Channels must be stabilized, as specified in Element #8.
2. Clean, non-turbid de-watering water, such as well-point ground water, can be discharged to systems tributary to waters, as specified in Element #8, provided the de-watering flow does not cause erosion or flooding. These clean waters should not be routed through stormwater sediment ponds.
3. Highly turbid or contaminated dewatering water from construction operation shall be treated separately from stormwater as necessary.

Erosion Control Element # 11 – Maintain BMPs

The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County and Pierce County erosion control requirements as described below:

Certified Erosion and Sediment Control Lead – BMP C160
Maintain and repair in accordance with BMP specifications

The contractor shall maintain erosion control measures in accordance with Pierce County, DOE Standards and manufacturer's recommendations. The standard Pierce County SWPPP notes are on the project drawings.

Requirements
The contractor shall meet the following requirements:

1. All temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with the BMP specifications.
2. All temporary erosion and sediment control BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed.
3. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs or vegetation shall be permanently stabilized.

Erosion Control Element # 12 – Manage the Project
The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County erosion control requirements as described below:

Manage the project in accordance with BMP requirements and specifications

The contractor shall maintain erosion control measures in accordance with Pierce County, DOE Standards and manufacturer's recommendations. Phased construction does not apply to this project. The Contractor shall inspect, monitor and maintain erosion control measures in accordance with Pierce County and DOE Standards and manufacturer’s recommendations. A contact list has been provided and will be posted at the job site. Contractor shall be responsible for completing inspections and forms in accordance with Pierce County Standards.

Requirements
The contractor shall meet the following requirements:

1. Development projects shall be phased where feasible in order to prevent soil erosion and, to the maximum extent practicable, the transport of soil from the site during construction.
2. Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities for any phase.
3. Clearing and grading activities for developments shall be permitted only if conducted pursuant to an approved site development plan (e.g., subdivision approval) that establishes permitted areas of clearing, grading, cutting, and filling.

4. Seasonal Work Limitations: From October 1 through April 30, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the local permitting authority that silt-laden runoff will be prevented from leaving the site through a combination of the following:

5. Coordination with Utilities and Other Contractors: The primary project proponent shall evaluate, with input from utilities and other Contractors, the stormwater management requirements for the entire project, including the utilities, when preparing the CSWPPP.

6. Inspection and Monitoring: All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. The person must have the skills to 1) assess the site conditions and construction activities that could impact the quality of stormwater, and 2) assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.

7. An Erosion and Sediment Control Lead shall be identified in the Construction SWPPP and shall be on site or on-call at all times. Whenever inspection and/or monitoring reveals that the BMPs identified in the Construction SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMPs or design changes shall be implemented as soon as possible. The Contractor shall maintain and modify the Construction SWPPP in accordance with No. 8 below.

8. The Construction SWPPP shall be retained on-site with the construction drawings. The Contractor shall modify the CSWPPP whenever there is a change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to surface waters. The Contractor shall modify the CSWPPP if, during inspections or investigations conducted by the owner/operator or the City or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) days following the inspection. Temporary sump and pump facilities to provide the second level of interception of pollutants. The pump systems will then route stormwater via force mains into the temporary sediment storage pond. The sediment storage pond(s) shall have a surface bottom area of at least 1,913 square feet. Construction debris will be removed from the site. The Contractor will be responsible for managing their construction equipment per DOE-approved BMPs. If a truck wheel wash is required, truck wheel wash water and concrete truck washout water shall be collected and discharged to the public sanitary sewer (SS) system. To apply for and obtain a SS release, contact the local sewer purveyors) for authorization.

Erosion Control Element # 13 – Protect Low Impact Development BMPs
The following Best Management Practices will be implemented by the Contractor on the project site to meet the Pierce County erosion control requirements as described below:

Silt Fence – BMP C233

The project proposes no LID BMPs.

Requirements
The contractor shall meet the following requirements:

1. Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements, including permeable pavement subgrade, reservoir course, or wearing course.

2. Pavements fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures shown in Volume III of the 2015 Pierce County Stormwater and Site Development Manual or the manufacturer's procedures.

3. Keep all heavy equipment off existing soils under LID facilities that have been excavated to final grade to retain the infiltration rate of the soils.

2. Project Description

The proposed project improvement will consist of restoring the track with rubberized surfacing and resurfacing the existing field with in-kind landscaping. Additionally, a shot-put pad will be installed adjacent to the field.

The project proposes 45,469 square feet (SF) [1.05 acres] of new plus replaced hard surface. Where feasible, proposed hard surfaces will be mitigated using sheet flow dispersion. Flow control will be provided by a detention tank facility. Refer to the project's stormwater site plan for more information.

Estimated earthwork quantities for the project are to be determined. Soil exported from the site will be disposed of at a legal off-site disposal facility and soil imported to the site will be from an approved off-site source. These quantities are estimates only and intended for municipal permitting. These quantities shall not be used by the Contractor as a basis for any contractual information. The Contractor shall prepare their own earthwork quantities based upon the information provided in the contract documents.

3. Existing Site Conditions

The project site is located at 9916 136th St E in Unincorporated Pierce County, Washington. The project site is located in Section 16, Township 19 North, Range 4 East. The school and fields are located on two parcels (0419164008 and 0419164005) which total 40.00 acres. The parcels are owned by the Puyallup School District.

The topography of the existing field that the track lays upon generally slopes from north to south at approximately 1%, from an elevation of 473 feet to approximately 465 feet. There are steeper slopes located on the eastern edges of the field.

4. Adjacent Areas

The existing track is located in the northeast region of the property, east of Ballou Junior High School. The site is bounded by Ballou Junior High School to the west, 136th St E to the north, Meridian E to the east, and Firgrove Elementary School campus to the south.

5. Critical Areas

Based on Pierce County environmental mapping, various critical areas have been identified on the west side of the campus property including a regulated floodplain and delineated wetland. County map data also indicates the site is within an aquifer recharge area. The project site does not propose any work within the vicinity of the wetland or floodplain.

6. Soils

The Web Soil Survey by USDA Natural Resources Conservation Service indicates that the soils within the project consist of Kapowsin Gravelly Ashy Loam soils, 0 to 6 percent slopes and Kitsap Silt Loam, 2 to 8 percent slopes. Refer to **Figure 3 – Soils Map**.

In a Geotech report conducted for the construction of Firgrove Elementary by GeoEngineers prepared November 17, 2016, three borings (B-1, B-2, and B-3) were drilled surrounding the project site. B-1 to the northwest contained 2 feet of silty fine to coarse sand with occasional gravel and organic matter as fill material underlain by 5.5 feet of weathered till with 0.5 feet glacial till underneath to a total drill depth of 8 feet. B-2 to the west by southwest contained 2 feet of silty fine to medium sand with occasional gravel and organic matter as fill material underlain by 4 feet of weathered till with 4.25 feet of glacial till beneath to ta total drill depth of 10.25 feet. B-3 to the east by southeast contained 2.5 feet of silty fine to coarse sand with occasional gravel and organic matter underlain by 1.5 feet of weathered till with 5 feet of glacial till beneath to a total drill depth of 9 feet. Perched groundwater was observed at a depth of 2.5 feet during the drilling of B-2, but was not observed in B-1 nor B-3. The weathered glacial till of B-2 was described with a preliminary long-term design infiltration rate of 0.25 inches per hours based on the procedures outlined in the 2012 Department of Ecology Stormwater Management Manual for Western Washington.

7. Potential Erosion Problem Areas

Per the proposed contract documents, the contractor is to provide protection for soils to limit the exposure to erosion. The limitation of disturbance, adequate cover practices, seasonal work limitation, and runoff control are the most effective methods for reduction of turbidity in stormwater runoff. Any runoff that occurs will be mitigated using silt fences and storm drain inlet protection. Areas that have not been permanently stabilized will be addressed using DOE-approved BMPs, per the construction documents.

8. Construction Phasing

This project is not expected to be formally phased. The contractor is responsible for coordinating work of all subcontractors to keep the duration of site disturbance limited to the maximum extent possible.

9. Construction Schedule

Construction is expected to begin in the Summer 2025 and be completed by Fall 2025.

Should any wet weather conditions occur during construction, the contractor shall implement the de-watering procedures outlined in this SWPPP and applicable BMPs including, but not limited to C123, Plastic Covering; C121, Mulching; C122, Nets and Blankets; C126, Polyacrylamide for Soil Erosion Protection; C130, Surface Roughening.

10. Financial/Ownership Responsibilities

This property is owned and operated by the Puyallup School District. The accepted low bidder on the project will be responsible for posting a performance and payment bond with the Puyallup School District, and thus will be the responsible party for any liability associated with erosion and sedimentation impact.

11. Engineering Calculations

A copy of any calculations performed during design of the project and relevant storm drainage modeling discussions is included in the project's Drainage Report.

APPENDIX D

Geotechnical Report

GeoEngineers

1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

March 31, 2021

Puyallup School District
323 12th Street NW
Puyallup, Washington 98371

Attention: Lester Gerstmann, AIA, LEED BC+D

Subject: Letter Report
Geotechnical Engineering Services
Old Firgrove Elementary School Demolition and Redevelopment Project
Puyallup, Washington
File No. 2017-006-02

INTRODUCTION

This letter presents our supplemental geotechnical recommendations for the Old Firgrove Elementary School Demolition and Redevelopment Project. The project site is located at 13918 Meridian Ave South in Puyallup Washington. Our understanding of the project is based on our communications with the project civil engineer (LPD Engineering); review of the Permit Plan Set Civil drawings dated March 1, 2021; and our prior experience working on the Firgrove Elementary School property. We have prepared a geotechnical report and a report addendum dated November 17, 2016 and May 5, 2017, respectively, to support design and construction of the new Firgrove Elementary School, which is located to the west of the existing school building. We have attached our prior reports to this letter for reference. We were also the geotechnical engineers of record during construction of the new Firgrove Elementary School.

We understand that existing facilities associated with the old Firgrove Elementary School are to be demolished and removed from the site. Existing facilities include the portable classroom buildings; the wood framed portion of the old Firgrove Elementary School; and select underground utilities. Existing pavements surrounding the site including parking areas, driveways, play areas and walkways will be left in place as much as practical.

The original Firgrove Elementary School Building is a brick structure located in the southeast corner of the property. Demolition of this structure is currently included in the project plans; however, recent decisions may require this structure to remain in place. This is still being decided.

As part of the site redevelopment, existing utilities at the site will either be removed, abandoned in place or repaired. Some site grading is envisioned, primarily in the southern portion of the site where several landscaping berms on the order of 3 to 4 feet tall will be constructed. Existing asphalt pavements at the

site will be fog sealed and several new concrete sidewalks will be constructed to provide pedestrian access around the site. The majority of the site will be restored with sod. Stormwater infiltration facilities are not planned as part of this project.

PURPOSE AND SCOPE OF SERVICES

The purpose of our services is to review the project civil plans and our November 17, 2016 geotechnical report in order to confirm that the recommendations in that report are suitable to support design and construction of the demolition and restoration project and to provide supplement geotechnical recommendations, as necessary and appropriate. Our services are being provided in accordance with our signed agreement dated March 29, 2021.

CONCLUSIONS AND SUPPLIMENTAL RECOMMENDATIONS

General

Based on our understanding of the project and review of the project plans, in our opinion, the recommendations provided in our November 17, 2016 Geotechnical Report prepared for the Firgrove Elementary School project are appropriate for use on the Old Firgrove Elementary School Demolition and Redevelopment Project. Below we provide supplemental geotechnical recommendations for the project. The recommendations below should be used in conjunction with the recommendations in our November 17, 2016 report.

Additional Geotechnical Recommendations

Demolition

We recommend that concrete foundations and slabs-on-grade be completely removed as part of demolition of the existing structures. If the remnant foundations cannot be removed with conventional excavation equipment, or if removal of the concrete would require significant excavations or impact surrounding improvements, we recommend that the concrete be demolished/removed to a depth of at least 2 feet below existing site grades prior to backfilling the area. It may be beneficial to record or document the location of the concrete to know for future construction planning. During removal of these features, disturbance of surficial soils may occur, especially if left exposed to wet conditions. Disturbed soils may require additional remediation during construction and grading.

Utility Decommissioning

We understand that some of the existing utilities at the site be decommissioned as part of this project. In areas below existing or planned pavements or other structural elements, we recommend that the utilities to be decommissioned either be removed or abandoned in place by filling the utility line with a flowable cementitious fill (controlled density fill or similar). If the utilities to be decommissioned are located within landscape areas, in our opinion, it not necessary to remove or fill the existing utilities, provided some long-term settlement of the area around the utility alignment is acceptable.

Pavement Section Review

We understand that new concrete pedestrian sidewalks and areas of new asphalt concrete (AC) pavement are planned for the site. Asphalt pavements are primarily planned in vehicular parking and play areas. Based on our review of the civil plans, the proposed sidewalk pavement section is 4 inches of Portland cement concrete (PCC) over 4 inches of crushed surfacing base course (CSBC) over existing subgrade soils. The proposed asphalt pavement section is 2 inches of asphalt underlain by 4 inches of CSBC over 6 inches of subbase.

In our opinion, the proposed pavement sections are suitable for their intended use, provided the subgrades are prepared as recommended in our November 17, 2016 report. The proposed asphalt pavement section is suitable for support of light-duty traffic loads typical of automobile driveway and parking areas. If asphalt paved areas will be subject to heavy-duty traffic such as school buses, a thicker asphalt pavement section should be considered. Our recommended typical heavy-duty asphalt pavement section is provided in our November 17, 2016 report.

Earthwork Recommendations

In our opinion, the earthwork recommendations, including recommendations for fill materials, provided in our November 17, 2016 report are suitable for use on this project. The majority of soils at the site will likely have a relatively high fines (silt and clay-sized particles passing the U.S. Standard No. 200 sieve) content. Soil with a high fines content is more sensitive to small changes in moisture content and may be difficult to work with and is susceptible to disturbance when wet. Wet weather earthwork recommendations are provided in our November 17, 2016 report.

As discussed in our November 17, 2016 report, fill material placed in landscaping areas should be compacted to a firm condition that will support construction equipment, as necessary, typically around 85 to 90 percent of the theoretical maximum dry density (MDD) per ASTM International (ASTM) D 1557. In our opinion, this complication criteria is applicable for landscape areas at this site, provided some settlement within the landscape area is acceptable. If some settlement is not acceptable, we recommend that fill materials in landscape areas be complicated to at least 92 percent of the MDD.

LIMITATIONS

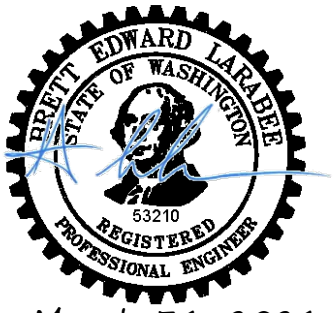
We have prepared this report for the Puyallup School District for the Old Firgrove Elementary School Demolition and Redevelopment Project in Puyallup, Washington. Puyallup School District may distribute copies of this report to owner and owner's authorized agents and regulatory agencies as may be required for the Project.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices for geotechnical engineering in this area at the time this report was prepared. The conclusions, recommendations and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty, express or implied, applies to the services or this report.

Please refer to Appendix C titled "Report Limitations and Guidelines for Use" in our November 17, 2016 report for additional information pertaining to use of this report.

We trust this letter meets your needs at this time.

Sincerely,
GeoEngineers, Inc.



March 31, 2021

Brett E. Larabee, PE
Senior Geotechnical Engineer

Dennis J. (D.J.) Thompson, PE
Associate

BEL:DJT:ms:mce

Attachments:

Geotechnical Engineering Services Report, Firgrove Elementary School, dated November 17, 2016

Geotechnical Engineering Services Report Addendum, Firgrove Elementary School, dated May 5, 2017

One copy submitted electronically.

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Geotechnical Engineering Services Report

Firgrove Elementary School
Puyallup, Washington

for
Puyallup School District

November 17, 2016

GeoEngineers
Earth Science + Technology

Geotechnical Engineering Services Report

Firgrove Elementary School
Puyallup, Washington

for
Puyallup School District

November 17, 2016

GeoEngineers

1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Geotechnical Engineering Services Report

Firgrove Elementary School
Puyallup, Washington

File No. 2017-006-00

November 17, 2016

Prepared for:

Puyallup School District
323 12th Street NW
Puyallup, Washington

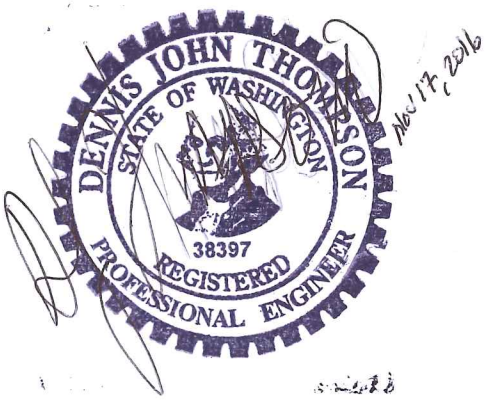
Attention: Mike Meadows

Prepared by:

GeoEngineers, Inc.
1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.384.4940

Brett E. Larabee, PE
Geotechnical Engineer

Dennis (D.J.) Thompson, PE
Associate



BEL:DJT:tt

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INTRODUCTION AND PROJECT UNDERSTANDING

This report presents the results of our geotechnical investigation performed for the Firgrove Elementary School project located at 13918 Meridian Avenue East in Puyallup, Washington. The approximate project boundaries are shown on the Vicinity Map, Figure 1. Our understanding of the project is based on our discussions with you, members of the project team and information provided including a preliminary Site Plan dated October 28, 2016 and a site survey.

We understand that the existing Firgrove Elementary School is to be demolished and new school building and associated facilities will be constructed to the west of the existing building location. The proposed building location is shown on the Site Plan, Figure 2. We understand that the new school building will be a one- or two-story structure supported on shallow foundations and slab-on-grade. School bus access to the new school will be provided via 136th Street East. An additional access route to the school along with parking will be provided via Meridian Avenue. We understand that the existing track located to the north of the current Firgrove Elementary School building will be relocated toward the east. Other planned improvements at the site include stormwater storage and/or infiltration facilities and play areas.

SCOPE OF SERVICES

The purpose of our services is to evaluate subsurface conditions and provide geotechnical and earthwork recommendations to support planning and design of the proposed improvements. Our specific scope of services outlined in our August 31, 2016 signed agreement is provided below:

1. Reviewing readily available published geologic data, critical area maps and our relevant in-house files for existing information on subsurface conditions in the project vicinity.
2. Visiting the project site to mark out preliminary locations for explorations and contacting the "One-Call" Utility Notification Center, as required by Washington State law.
3. Exploring subsurface conditions within the project area by advancing 12 borings using subcontracted equipment and operators. Borings depths ranged from 7.5 to 21.5 feet below ground surface (bgs).
4. Conducting geotechnical laboratory testing on selected soil samples. Laboratory testing included particle size gradation analyses, moisture content determinations, cation exchange capacity (CEC) and organic content (OC).
5. Providing a discussion of soil and groundwater conditions encountered in our explorations.
6. Providing geotechnical seismic design information in accordance with the 2012 International Building Code (IBC) criteria and discuss our opinion on the potential for liquefaction and lateral spreading at the site.
7. Providing recommendations for site preparation and earthwork. We discuss temporary erosion and sedimentation controls, temporary and permanent slopes, estimated stripping and clearing depths, fill placement and compaction requirements, suitability of on-site material for use as structural fill, import fill requirements, wet weather considerations, groundwater handling and site drainage.

8. Providing design recommendations for shallow foundations. We include bearing surface preparation recommendations, minimum recommended size, allowable bearing pressures, estimates of settlement and allowable passive soil pressures and friction for resisting lateral loads.
9. Providing design considerations for building slab design, including subgrade preparation, modulus of subgrade reaction and capillary break thickness and materials.
10. Providing recommended active, passive and at-rest lateral earth pressures for retaining walls and below-grade structures. We have also included recommendations for seismic surcharge pressures and drainage criteria.
11. Providing a discussion of suitability of site soils for stormwater infiltration, including preliminary estimated infiltration rates based on laboratory sieve analysis results and the criteria described in the 2014 Washington State Department of Ecology (Ecology) Stormwater Management Manual for Western Washington (SWMMWW). We have also provided recommendations for further infiltration studies that may be necessary at the site.
12. Providing layer thickness recommendations for conventional asphalt concrete pavement (ACP) design sections, including subgrade preparation. We include typical pavement sections for heavy and light traffic areas based on our experience and subsurface conditions.
13. Providing layer thickness recommendations for pervious cement concrete pavement, based on our experience and information provided in the Low Impact Development (LID) Technical Guidance Manual for Puget Sound.
14. Preparing this written geotechnical report presenting our findings, conclusions and recommendations.

SITE CONDITIONS

Surface Conditions

The project site is "L-shaped" and generally bounded by Meridian Avenue to the east, a residential housing development to the south, a wooded area to the west and 136th Street East to the north. The existing Firgrove Elementary School building is located in the southeast quarter of the site, a grass field is located in the southwest quarter, the Ballou Junior High School facilities are located northwest of the site and an unpaved running track is located in the northeast quarter of the site.

The existing school is a single-story structure. We understand that the southern portion of the school building is the original historic schoolhouse. Paved parking areas are located to the south and east of the building. A baseball field, paved and unpaved play areas and portable structures used as classrooms are located to the west and north of the existing building. Vegetation around the site generally consists of grass and trees and small shrubs planted in hardscaped areas. Large coniferous trees are located along the southern and western site boundaries and sporadically within some of the field areas.

The proposed building footprint will encompass areas of the site that are currently undeveloped and are used as grass playfields. In general the site is relatively flat. Based on the survey provided, it appears that the difference in the existing ground surface elevation between the west and east sides of the proposed building area is around 4 feet.

Published Geology

We reviewed relevant in-house files and the *Geologic Map of the Puyallup Quadrangle, Washington* (Troost, *In Review*). The geologic map indicates soils in the project vicinity generally consist of gravel outwash deposits (Qvs) and ice-contact deposits (Qvi). The gravel outwash deposits are described in the literature as poorly to well sorted sands and gravels that were deposits during glacial lake outburst floods. Ice-contact deposits are described as interbedded outwash (sand and gravel), lacustrine beds (fine-grained sands and silts) and glacial till. Ice-contact soils were deposited within meltwater at the margins of glaciers.

SUBSURFACE CONDITIONS

Subsurface Explorations

We explored subsurface conditions at the site by advancing 12 borings (designated B-1 through B-12) at the approximate locations shown on Figure 2. The borings were advanced to depths ranging from about 8 feet bgs to about 20.5 feet bgs. Details regarding our subsurface exploration program are provided in Appendix A. A key to our boring logs is presented as Figure A-1 and the exploration logs are presented as Figure A-2 through Figure A-13.

Selected samples from our borings were tested in order to evaluate engineering properties and to confirm or modify field classifications. A description of our laboratory testing program and testing results including the results of the CEC and OC tests are included in Appendix B.

Subsurface Conditions

Soil Conditions

We observed what we interpret to be three general geologic units in our explorations, fill or reworked soils (fill), lacustrine ice-contact deposits (lacustrine soils), and glacial till like soils (glacial till). While mapped in the project vicinity, we did not encounter what we typically interpret to be gravel outwash deposits.

All of our explorations with the exception of B-12 were advanced within areas covered with sod. The sod thickness observed in our explorations was on the order of 1 to 2 inches. B-12 was advanced in an asphalt paved area; observed asphalt thickness was 2.5 inches. Below the sod in borings B-1 through B-6 and B-8 we encountered what we interpret to be fill to a depth ranging from about 2 to 4 feet bgs. The fill generally consisted of very loose to medium dense silty sand with occasional organic material (roots) and variable gravel content and gravel with silt and sand. Below the fill material in B-1, B-2, B-3, B-5 and B-6 we encountered what we interpret to be glacial till. Encountered glacial till typically consisted of silty gravel with sand, gravel with silt and sand, silty sand with variable gravel content and sandy silt with gravel. Relative consistency of the glacial till ranged from medium dense to very dense or hard. The glacial till appeared to be weathered within the upper 1.5 to 5 feet of the deposit in borings B-1, B-2, B-3 and B-6. Borings B-1, B-2, B-3, B-5 and B-6 were terminated within the glacial till like ice-contact deposits at depths ranging from 8 to 16 feet bgs.

Below the fill in borings B-4 and B-8 we encountered what we interpret to be lacustrine soils. The lacustrine soils typically consisted of stiff sandy silt and silt with sand and medium dense sand. The lacustrine deposits extended to the full depth explored in B-4 (11.5 feet bgs) and to around 9 feet bgs in

B-8. The lacustrine soils were underlain by glacial till soils in B-8. The glacial till encountered in B-8 generally consisted of dense to very dense silty sand with gravel.

Directly below the sod in B-7 we encountered what we interpret to be glacial till which extended to the full depth explored (20.5 feet). Starting below the sod and extending to about 7.5 feet bgs the glacial till was observed to be medium dense to dense silty sand with gravel, which we interpreted to be a weathered zone. Below about 7.5 feet bgs the glacial till consisted of very dense gravel with silt and sand.

Directly below the sod in B-9, B-10, B-11 and B-12 we encountered what we interpret to be lacustrine soils typically consisting of loose to medium dense silty sand and medium stiff sandy silt. The lacustrine soils extended to between about 6.5 feet bgs and 11.5 feet bgs in these boings. B-10 was terminated within the lacustrine soils at 11.5 feet bgs. The lacustrine soils were underlain by glacial till in B-9, B-11 and B-12. The glacial till was observed to be weathered in B-11 between about 10 feet and 11 feet bgs and in B-12 between about 6.5 feet bgs and 9 feet bgs. Encountered glacial till typically consisted of medium dense to very dense silty sand with variable gravel content. B-9, B-11 and B-12 were terminated within the glacial till at depths ranging from 9 to 20.5 feet bgs.

Groundwater Conditions

We observed what we interpret to be perched groundwater at the time of drilling at approximately 2.5 feet and 6 feet bgs in B-2, around 2.5 feet bgs in B-4, around 7.5 feet in B-10, and 10 feet bgs in B-11. We did not encounter what we interpret to be the regional groundwater table in our explorations. We anticipate that perched groundwater could be encountered at other areas of the site and is most likely to occur at contacts between soils with relatively different permeability's such as the contact between fill soils and glacial till deposits or within different layers of the ice-contact deposits. The amount of perched groundwater encountered will vary depending on a variety of conditions including season, irrigation activities and rainfall events. We anticipate that the likelihood for encountering perched groundwater will be lowest during the dryer months of the year, typically between June and September in this region.

CONCLUSIONS AND RECOMMENDATIONS

General

Based on our understanding of the project, the explorations performed for this study and our experience, it is our opinion that the proposed improvements can be constructed generally as envisioned with regard to geotechnical considerations. A summary of the primary geotechnical considerations for the project is provided below and is followed by our detailed recommendations.

- Structures at the site can be adequately supported on conventional shallow foundations.
- The depth to dense to very dense glacial till soils varies across the site but generally appears to be deeper around the west half of the proposed structure. In areas where glacial till is located near the ground surface, foundations can likely be supported directly on the glacial till. Because of the variability in density of the fill and lacustrine deposits, areas where glacial till soils are located at depth, foundations will need to be supported on structural fill. Overexcavation and replacement of foundation bearing soils is recommended for the approximate west half of the proposed structure. Foundation bearing surface preparation and structural fill recommendations are described further in this report.

- Infiltrating stormwater into the site soils appears to be feasible, however, additional field explorations will likely be required in order to establish the final design infiltration rate for infiltration facilities. Overall, preliminary infiltration rates appear to be low, which is expected given the glacial soil types encountered.
- A majority of soils encountered in our borings have a relatively high fines (silt and clay-sized particles passing the U.S. Standard No. 200 sieve) content. Soil with a high fines content is more sensitive to small changes in moisture content and may be difficult to work with and is susceptible to disturbance when wet.

Seismic Design Considerations

International Building Code Seismic Design Parameters

We evaluated seismic site response using map-based methods described in the 2012 IBC. The parameters provided below should be used for design.

TABLE 1: SEISMIC DESIGN CRITERIA

2012 IBC Seismic Design Parameters	
Spectral Response Acceleration at Short Periods (S_S)	1.243g
Spectral Response Acceleration at 1-Second Periods (S_1)	0.477g
Site Class	C
Design Peak Ground Acceleration (PGA_M)	0.50g
Design Spectral Response Acceleration at Short Periods (S_{DS})	0.828g
Design Spectral Response Acceleration at 1-Second Periods (S_{D1})	0.421g

Liquefaction, Lateral Spreading, and Surface Rupture

Liquefaction

Liquefaction refers to a condition where vibration or shaking of the ground, usually from earthquake forces, results in development of excess pore pressures in loose, saturated soils and subsequent loss of strength in the deposit of soil so affected. In general, soils that are susceptible to liquefaction include loose to medium dense sands to silty sands that are below the water table. Based on the soil type, relative density of the soils encountered, and the absence of near-surface groundwater levels observed in our explorations it is our opinion that the risk of liquefaction at the site is low.

Lateral Spreading Potential

Lateral spreading related to seismic activity typically involves lateral displacement of large, surficial blocks of non-liquefied soil when a layer of underlying soil loses strength during seismic shaking. Lateral spreading usually develops in areas where sloping ground or large grade changes (including retaining walls) are present. Based on our understanding of the proposed improvements and current site topography, it is our opinion that the risk of lateral spreading is low.

Surface Rupture Potential

According to the Washington State Department of Natural Resources Interactive Natural Hazards Map (accessed November 7, 2016), no surface faults are mapped near the project site. Because no surface

faults are mapped in the project vicinity, it is our opinion that the risk for seismic surface rupture at the site is low.

Site Development and Earthwork

General

We anticipate that site development and earthwork will include clearing and stripping vegetated areas, demolition of existing hardscaping, site grading, establishing subgrades for roadways, parking areas, building foundations, and placing and compacting fill and backfill materials. We expect that the majority of site grading and earthwork can be accomplished with conventional earthmoving equipment.

The following sections provide recommendations for stripping, erosion and sedimentation control, excavation, temporary and permanent cut slopes, wet weather considerations, fill materials and fill placement and compaction requirements.

Clearing and Stripping

Based on conditions observed in out explorations minimum stripping depths at the site will likely be on the order of 2 to 4 inches. However, greater stripping depths could be required to remove localized zones of loose or organic-rich soil, especially in areas of the site currently planted with trees. During clearing and stripping, stumps and primary root systems of shrubs and trees should be completely removed. Voids caused by removal of stumps and/or root systems should be backfilled with compacted structural fill. Stripped material should be transported off site or processed and used as fill in landscaping areas.

Based on our explorations, we anticipate that soils exposed will have a high fines content and thus be susceptible to disturbance when wet. Care should be taken to avoid allowing these soils to become saturated and disturbed. We provide recommendations for subgrade protection in the "Subgrade Protection and Wet Weather Considerations" section below.

Cobbles and boulders were not encountered in our explorations, however, in our experience they can be present in the glacial deposits in the area. The contractor should be prepared for the presence of cobbles or boulders in areas to be excavated or re-graded. Additionally, the contractor should be prepared to separate cobbles and boulders from soils generated during excavation if excavated soils are to be reused as fill or backfill. Boulders may be removed from the site or used in landscape areas. Voids caused by boulder removal should be backfilled with structural fill.

Erosion and Sedimentation Control

Erosion and sedimentation rates and quantities can be influenced by construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing and weather. Implementing an erosion and sedimentation control plan will reduce the project impact on erosion-prone areas. The plan should be designed in accordance with applicable city, county and/or state standards. The plan should incorporate basic planning principles, including:

- Scheduling grading and construction to reduce soil exposure.
- Re-vegetating or mulching denuded areas.
- Directing runoff away from exposed soils.

- Reducing the length and steepness of slopes with exposed soils.
- Decreasing runoff velocities.
- Preparing drainage ways and outlets to handle concentrated or increased runoff.
- Confining sediment to the project site.
- Inspecting and maintaining control measures frequently.

Some sloughing and raveling of exposed or disturbed soil on slopes should be expected. We recommend that disturbed soil be restored promptly so that surface runoff does not become channeled.

Temporary erosion protection should be used and maintained in areas with exposed or disturbed soils to help reduce erosion and reduce transport of sediment to adjacent areas and receiving waters. Permanent erosion protection should be provided by paving, structure construction or landscape planting.

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

Temporary Excavations, Support and Dewatering

Excavations deeper than 4 feet should be shored or laid back at a stable slope if workers are required to enter. Shoring and temporary slope inclinations must conform to the provisions of Title 296 Washington Administrative Code (WAC), Part N, "Excavation, Trenching and Shoring." Regardless of the soil type encountered in the excavation, shoring, trench boxes or sloped sidewalls will be required under Washington Industrial Safety and Health Act (WISHA). The contract documents should specify that the contractor is responsible for selecting excavation and dewatering methods, monitoring the excavations for safety and providing shoring, as required, to protect personnel and structures.

In general, temporary cut slopes should be inclined no steeper than about 1-1/2H:1V (horizontal to vertical) in the fill, recessional outwash and weathered glacial till soils. For cuts in dense glacial till, temporary cut slopes as steep as of 3/4H:1V may be feasible. These conditions should be verified prior to planning for slopes cut this steep. These guidelines assume that all surface loads are kept at a minimum distance of at least one-half the depth of the cut away from the top of the slope and that seepage is not present on the slope face. Flatter cut slopes will be necessary where seepage occurs or if surcharge loads are anticipated. Temporary covering with heavy plastic sheeting should be used to protect these slopes during periods of wet weather.

Based on our explorations, we do not expect groundwater to be a significant factor during shallow excavations and earthwork. However, some perched groundwater could be present depending on the time of year of construction. Based on our interpretation of the soil conditions and our experience, the interface between the fill material and the native soils and contacts between weathered and unweathered glacial till are likely locations for accumulation of perched groundwater. Groundwater handling needs are typically lower during the late summer and early fall months. We anticipate that shallow perched groundwater can typically be handled adequately with sumps, pumps, and/or diversion ditches, as necessary. Ultimately, we recommend that the contractor performing the work be made responsible for controlling and collecting groundwater encountered.

Permanent Cut and Fill Slopes

If permanent slopes are necessary we recommend they be constructed at a maximum inclination of 2H:1V. Where 2H:1V permanent slopes are not feasible, protective facings and/or retaining structures should be considered.

To achieve uniform compaction, we recommend that fill slopes be overbuilt slightly and subsequently cut back to expose well-compacted fill. Fill placement on slopes steeper than 5H:1V should be benched into the slope face. The configuration of benches depends on the equipment being used. Bench excavations should be level and extend into the slope face.

Exposed areas should be re-vegetated as soon as practical to reduce the surface erosion and sloughing. Temporary protection should be used until permanent protection is established.

Subgrade Preparation and Evaluation

Subgrades that will support slabs-on-grade, parking areas and driveways should be thoroughly compacted to a uniformly firm and unyielding condition on completion of stripping and before placing structural fill. We recommend that subgrades be evaluated to identify areas of yielding or soft soil. Evaluation methods such as probing with a steel probe rod or proof-rolling with a heavy piece of wheeled construction equipment are appropriate methods of evaluation.

If soft or otherwise unsuitable subgrade areas are revealed during evaluation that cannot be compacted to a stable and uniformly firm condition, we recommend that: (1) the unsuitable soils be scarified (e.g., with a ripper or farmer's disc), aerated and recompacted, if practical; or (2) the unsuitable soils be removed and replaced with compacted structural fill, as needed.

Subgrade Protection and Wet Weather Considerations

The wet weather season generally begins in October and continues through May in western Washington; however, periods of wet weather can occur during any month of the year. The soils encountered in our explorations contain a significant amount of fines. Soil with high fines content is very sensitive to small changes in moisture and is susceptible to disturbance from construction traffic when wet or if earthwork is performed during wet weather. If wet weather earthwork is unavoidable, we recommend that the following steps be taken.

- The ground surface in and around the work area should be sloped so that surface water is directed away from the work area. The ground surface should be graded so that areas of ponded water do not develop. Measures should be taken by the contractor to prevent surface water from collecting in excavations and trenches. Measures should be implemented to remove surface water from the work area.
- Earthwork activities should not take place during periods of heavy precipitation.
- Slopes with exposed soils should be covered with plastic sheeting.
- The contractor should take necessary measures to prevent on-site soils and other soils to be used as fill from becoming wet or unstable. These measures may include the use of plastic sheeting, sumps with pumps and grading. The site soils should not be left uncompacted and exposed to moisture.

Sealing the exposed soils by rolling with a smooth-drum roller prior to periods of precipitation will help reduce the extent to which these soils become wet or unstable.

- Construction traffic should be restricted to specific areas of the site, preferably areas that are surfaced with working pad materials not susceptible to wet weather disturbance.
- Construction activities should be scheduled so that the length of time that soils are left exposed to moisture is reduced to the extent practical.
- Protective surfacing such as placing asphalt-treated base (ATB) or haul roads made of quarry spalls or a layer of free-draining material such as well-graded pit-run sand and gravel may be necessary to protect completed areas. Typically, minimum gravel thicknesses on the order of 24 inches are necessary to provide adequate subgrade protection.
- Foundation bearing surface preparation should also be considered. We provide additional recommendations in the "Shallow Foundations" section of this report.

Fill Materials

Structural Fill

Material used for structural fill should be free of debris, organic contaminants and rock fragments larger than 6 inches. We recommend that structural fill material consist of material similar to "Select Borrow" or "Gravel Borrow" as described in Section 9-03.14 of the Washington State Department of Transportation (WSDOT) Standard Specifications.

The workability of material for use as structural fill will depend on the gradation and moisture content of the soil. As the amount of fines increases, soil becomes increasingly sensitive to small changes in moisture content. We recommend that washed crushed rock or select granular fill, as described below, be used for structural fill during the rainy season. If prolonged dry weather prevails during the earthwork phase of construction, materials with a somewhat higher fines content may be acceptable.

Select Granular Fill

Select granular fill should consist of well-graded sand and gravel or crushed rock with a maximum particle size of 6 inches and less than 5 percent fines by weight based on the minus 3/4-inch fraction. Organic matter, debris or other deleterious material should not be present. In our opinion, material with gradation characteristics similar to WSDOT Specification 9-03.9 (Aggregates for Ballast and Crushed Surfacing), or 9-03.14 (Borrow) is suitable for use as select granular fill, provided that the fines content is less than 5 percent (based on the minus 3/4-inch fraction) and the maximum particle size is 6 inches.

Pipe Bedding

Trench backfill for the bedding and pipe zone should consist of well-graded granular material similar to "gravel backfill for pipe zone bedding" described in Section 9-03.12(3) of the WSDOT Standard Specifications. The material must be free of roots, debris, organic matter and other deleterious material. Other materials may be required depending on manufacturer specifications and/or jurisdictional requirements.

Trench Backfill

The use of on-site soil is discussed below. Imported trench backfill material may be required if material generated from the trench excavation is above optimum moisture content and cannot be dried out. We recommend that imported trench backfill material consist of material similar to "Select Borrow" or "Gravel Borrow" as described in Section 9-03.14 of the WSDOT Standard Specifications. During wet weather, select granular fill may be required as a trench backfill. Deeper excavations close to or below groundwater seepage may require other backfill materials and base stabilization materials such as a clean ballast and/or quarry spalls, which are relatively self compacting. Pipe manufactures and jurisdictional requirements should also be considered when choosing trench backfill materials.

Quarry Spalls

We recommend that quarry spalls consist of 2- to 4-inch washed, crushed stone similar to that described in Section 9-13 of the WSDOT Standard Specifications. Alternative stone size ranges may be considered, depending on the application.

On-Site Soil

Existing fill soils and native soil at the site may be considered for use as structural fill and trench backfill provided that the material:

- Is used during extended periods of dry weather,
- Can be adequately moisture conditioned and placed and compacted as recommended,
- Does not contain organic or other deleterious material, and
- Meets any special requirements related to its end use.

The fill, lacustrine and till-like soils encountered in our explorations are very moisture sensitive and will be very difficult or impossible to properly compact when wet. In addition, the soil could be at moisture content above optimum when excavated. If earthwork occurs during a typical wet season, or if the soils are persistently wet and cannot be dried back due to prevailing wet weather conditions we recommend the use of imported structural fill or select granular fill, as described above. Budgets should include provisions for import granular fill, especially if construction is planned during the wet weather season.

Fill Placement and Compaction

General

To obtain proper compaction, fill soil should be compacted near optimum moisture content and in uniform horizontal lifts. Lift thickness and compaction procedures will depend on the moisture content and gradation characteristics of the soil and the type of equipment used. The maximum allowable moisture content varies with the soil gradation and should be evaluated during construction. Generally, 12-inch loose lifts are appropriate for steel-drum vibratory roller compaction equipment. Compaction should be achieved by mechanical means. During fill and backfill placement, sufficient testing of in-place density should be conducted to check that adequate compaction is being achieved.

Area Fills and Pavement Bases

Fill placed to raise site grades and materials under pavements and structural areas should be placed on subgrades prepared as previously recommended. Fill material placed below structures and footings should be compacted to at least 95 percent of the theoretical maximum dry density (MDD) per ASTM International (ASTM) D 1557. Fill material placed less than 2 feet below pavement sections should be compacted to at least 95 percent of the MDD. Fill placed deeper than 2 feet below pavement sections should be compacted to at least 90 percent of the MDD. Fill material placed in landscaping areas should be compacted to a firm condition that will support construction equipment, as necessary, typically around 85 to 90 percent of the MDD.

Backfill Behind Retaining Walls

Backfill behind retaining walls should be compacted to between 90 and 92 percent of the MDD. Overcompaction of fill placed directly behind retaining walls should be avoided. We recommend use of hand-operated compaction equipment and maximum 6-inch loose lift thickness when compacting fill within about 5 feet behind retaining walls.

Trench Backfill

For utility excavations, we recommend that the initial lift of fill over the pipe be thick enough to reduce the potential for damage during compaction but generally should not be greater than about 18 inches. In addition, rock fragments greater than about 1 inch in maximum dimension should be excluded from this lift.

Trench backfill material placed below structures and footings should be compacted to at least 95 percent of the MDD. In paved areas, trench backfill should be uniformly compacted in horizontal lifts to at least 95 percent of the MDD in the upper 2 feet below subgrade. Fill placed below a depth of 2 feet from subgrade in paved areas must be compacted to at least 90 percent of the MDD. In non-structural areas, trench backfill should be compacted to a firm condition that will support construction equipment as necessary.

Shallow Foundations

General

Proposed structures can be founded on continuous wall and isolated column footings. Based on the materials observed in our borings, the site topography, and the conceptual site layout we anticipate that footings will likely be founded on one of three typical soils profiles: glacial till, structural fill extending to glacial till, and structural fill overlying existing fill or lacustrine soils. The existing fill and lacustrine deposits encountered in our explorations are typically loose or medium stiff and variable. Due to the potential for excessive differential settlement, we recommend that foundations not bear directly on existing fill or lacustrine soils. Overexcavation and replacement of existing fill or lacustrine soils below foundations will be required. Based on our explorations we estimate that modification to the bearing surfaces will be required over about half of the building footprint. Exterior footings should be established at least 18 inches below the lowest adjacent grade. Interior footings can be founded a minimum of 12 inches below the top of the floor slab. Isolated column and continuous wall footings should have minimum widths of 24 and 18 inches, respectively.

Footing Bearing Surface Preparation

Our specific bearing surface preparation recommendations for the three typical soils profile described above are as follows:

- Bearing surfaces for footings bearing directly on glacial till should be proof-compacted as necessary to a uniformly firm and unyielding condition.
- Structural fill overlying glacial till should extend laterally beyond the edge of the footings a distance equal to the thickness of the fill or 2 feet, whichever is less.
- Existing fill or lacustrine soils should be overexcavated at least 2 feet below footings and replaced with compacted structural fill if more than 2 feet of existing fill or lacustrine soils are present. Structural fill should extend 2 feet laterally beyond the edges of the footings.

The base of all footing excavations should be evaluated by a representative from our firm prior to placement of structural fill or formwork and reinforcement. Loose or disturbed materials present at the base of footing excavations should be removed or compacted. If soft or otherwise unsuitable areas are revealed during evaluation that cannot be compacted to a stable and uniformly firm condition the following options may be considered: (1) the exposed soils be moisture conditioned and recompacted; or (2) the unsuitable soils be overexcavated and replaced with compacted structural fill, as needed; or (3) it may be possible to push, seat, and compact quarry spalls into the soft soils to stabilize the surface.

During periods of wet weather, concrete should be placed as soon as practical after preparation of the footing excavations. Foundation bearing surfaces should not be exposed to standing water. If water pools in the base of the excavation, it should be removed before placing structural fill or reinforcing steel. If footing excavations are exposed to extended wet weather conditions a lean concrete mat can be considered for subgrade protection.

Allowable Soil Bearing Pressure

For footings prepared as described above bearing directly on firm, unyielding glacial till or structural fill extending to glacial till we recommend that shallow foundations be designed using an allowable downward soil bearing pressure of 5,000 pounds per square foot (psf).

We recommend an allowable soil bearing pressure of 3,500 psf for foundations bearing on 2 feet of compacted structural fill overlying existing fill material or lacustrine soils. An allowable soil bearing pressure of 5,000 psf can be used for structural fill overlying existing fill or lacustrine soils if the overexcavation depth is increased to 3 feet and imported select granular fill is used as the overexcavation backfill.

These bearing pressures apply to the total of dead and long-term live loads and may be increased by one-third when considering total loads, including earthquake or wind loads. These are net bearing pressures. The weight of the footing and overlying backfill can be ignored in calculating footing sizes.

Foundation Settlement

We estimate that settlement of footings designed and constructed as recommended will be less than 1 inch, with differential settlements of less than 1/2 inch between comparably loaded isolated column footings or along 50 feet of continuous footing. Settlement of footings founded on the very dense glacial

till will likely be negligible. Settlement is expected to occur rapidly as loads are applied. Settlements could be greater than estimated if loose or disturbed soil is present beneath footings.

Lateral Resistance

The ability of the soil to resist lateral loads is a function of frictional resistance, which can develop on the base of footings and slabs and the passive resistance, which can develop on the face of below-grade elements of the structure as these elements tend to move into the soil. For footings founded in accordance with the recommendations presented above, the allowable frictional resistance on the base of the footing may be computed using a coefficient of friction of 0.40 applied to the vertical dead-load forces. The allowable passive resistance on the face of the footing or other embedded foundation elements may be computed using an equivalent fluid density of 330 pounds per cubic foot (pcf) for undisturbed site soils or structural fill extending out from the face of the foundation element a distance at least equal to two and one-half times the depth of the element. These values include a factor of safety of about 1.5.

The passive earth pressure and friction components may be combined provided that the passive component does not exceed two-thirds of the total. The passive earth pressure value is based on the assumptions that the adjacent grade is level and that groundwater remains below the base of the footing throughout the year. The top foot of soil should be neglected when calculating passive lateral earth pressure unless the area adjacent to the foundation is covered with pavement or a slab-on-grade.

Foundation Drains

We recommend that perimeter foundation footing drains be installed at the base of exterior footings. The perimeter drains should be provided with cleanouts and should consist of at least 4-inch-diameter perforated pipe surrounded on all sides by 6 inches of drain material enclosed in a non-woven geotextile fabric for underground drainage to prevent fine soil from migrating into the drain material. We recommend that the drainpipe consist of either heavy-wall solid pipe or rigid corrugated smooth interior polyethylene pipe. We do not recommend using flexible tubing for footing drainpipes. The drain material should consist of pea gravel or material similar to “Gravel Backfill for Drains” per WSDOT Standard Specifications Section 9-03.12(4). The perimeter drains should be sloped to drain by gravity, if practical, to a suitable discharge point. Water collected in roof downspout lines must not be routed to the perimeter footing drains

Slab-on-Grade Floor

The exposed subgrade should be evaluated after site grading is complete. The slab subgrades could be variable and range from fill, lacustrine soil, weathered or unweathered glacial till. We recommend the slab subgrades be approved by a member of our firm during construction. Disturbed areas should be compacted, if possible, or removed and replaced with compacted structural fill. In all cases, the exposed soil should be firm and unyielding. It may be appropriate to compact the exposed subgrade with a smooth drum vibratory roller to a dense and unyielding condition. Ideally, the subgrade should be compacted to at least 95 percent of the MDD in accordance with ASTM D 1557, or as determined by the field geotechnical engineer.

We recommend the slab-on-grade floors be underlain by a minimum 8-inch-thick capillary break consisting of clean sand and gravel, crushed or washed rock with less than 3 percent fines. Provided that

loose soil is removed and the subgrade is prepared as recommended, we recommend slabs-on-grade be designed using a modulus of subgrade reaction of 300 pounds per cubic inch (pci).

We estimate that settlement for slabs-on-grade constructed as recommended will be less than 3/4 inch for a floor load of 500 psf.

For on-grade construction at or within 2 feet of existing grades it is our opinion that an underslab drain system is not necessary. Based on the conditions observed, isolated areas of perched groundwater could occur where slab subgrades transition from unweathered to weathered glacial till. Interceptor drains may be required and should be included as a contingency. We can provide additional recommendations for underslab drains as requested during design.

Conventional Retaining Walls

Drainage

Positive drainage is imperative behind retaining walls, unless they are designed to resist hydrostatic forces. We recommend a zone of free-draining material behind the retaining structure with perforated pipes to collect water. The drainage material should consist of material similar to "gravel backfill for drains" described in Section 9-03.12(4) of the WSDOT Standard Specifications. The drainage zone should extend horizontally at least 18 inches from the back of the retaining structure. Waffle boards or drainage mats may also be considered. We recommend we review drainage mat submittals and plan details if drainage mats are to be used.

A perforated, smooth-walled, rigid PVC pipe with a minimum diameter of 4 inches should be placed at the bottom of the drainage zone along the entire length of the retaining structure with the pipe invert at or below the elevation of the base of the footing. The drainpipes should collect water and direct it to a tightline leading to an appropriate disposal system. Cleanouts should be incorporated into the design of the drains in order to provide access for regular maintenance. Roof downspouts, perimeter drains or other types of drainage systems should not be connected to drain systems for retaining walls or below-grade structures.

Design Parameters

Footings for retaining structures should be designed in accordance with the "Shallow Foundations" recommendations above. We recommend retaining structures that are free to deflect at least 0.001H, where H is the height of the retaining structures, be designed for active earth pressures using an equivalent fluid unit weight of 35 pcf for the level backfill condition and 50 pcf for structures with backfill sloping upward behind the wall at 2H:1V. If the retaining structures are restrained against deflection, we recommend they be designed for an at-rest equivalent fluid unit weight of 55 pcf for the level backfill condition. These values do not include hydrostatic forces.

Surcharge loads applied closer than one-half of the retaining structure height may be considered as uniformly distributed horizontal pressures equal to one-third of the distributed vertical surcharge pressure.

A uniform seismic pressure of 10H psf, where H is the height of the retaining structure, should be included when designing permanent retaining structures for seismic loads.

Stormwater Infiltration

General

We understand that stormwater infiltration facilities may be incorporated into improvements at the project site. We understand that the City of Puyallup has recently adopted or will soon be adopting the 2014 Department of Ecology SWMMWW. Accordingly, our preliminary stormwater infiltration recommendations follow the guidance outlined 2014 SWMMWW.

The sections below provide our interpretation of the suitability of the site soil for infiltration, an estimate of soil infiltration rates that may be possible based on empirical correlations, and a discussion about further studies that may be needed to facilitate design of infiltration facilities.

Infiltration Suitability

It is our opinion that infiltration is feasible at the site, however, due to the relatively high fines content of the site soils encountered the infiltration capacity could be limited. The till-like soils encountered in some explorations are highly consolidated, which will limit their infiltration potential. Based on our explorations, it is our opinion that the glacial till soils at the site could be considered a low permeability layer when designing infiltration facilities. According to the 2014 SWMMWW, a minimum separation of 3 to 5 feet between the bottom of concentrated infiltration facilities, such as infiltration galleries or infiltration ponds, and low permeability layers must be maintained. Separation of 1 foot is acceptable for permeable pavements and roof downspout facilities. Once the team begins planning of stormwater facility depth and location, we can assist in determining if a low permeability layer provision should be considered. We did not encounter what we interpret to be the regional groundwater table in our explorations and, therefore, maintaining specified separation between facilities and the groundwater table is not anticipated to be a design constraint.

Preliminary Infiltration Rates

To provide an estimate of what range of infiltration values could be achieved for the different soil types at the site, we established a range of preliminary infiltration rates based on the Soil Grain Size Analysis Method presented in the 2014 SWMMWW. Table 2 below summarizes our results.

TABLE 2: SOIL INFILTRATION RATE ANALYSIS[1]

Boring	Soil Sample Depth (feet)	Soil Unit	Approximate Percent Fines[2]	USCS Soil Classification[3]	Preliminary Long-term Design Infiltration Rate[4] (Inches per Hour)
B-2	2.5	Weathered Glacial Till	38	SM	≤0.25
B-4	2.5	Lacustrine Soils	52	ML	≤0.75
B-5	5	Glacial Till	30	GM	≤0.25
B-8	2.5	Lacustrine Soils	84	ML	≤0.2

Notes:

[1] For selected soil samples.

[2] Fines = Silt and clay-sized particles passing U.S. No. 200 sieve.

[3] Unified Soil Classification System (USCS). See Figure A-1 for additional descriptions.

[4] Based on the procedures outlined in the 2012 SWMMWW and our experience.

Because the estimated infiltration rates are variable it may be appropriate to assume values on the lower end of the range presented for preliminary design. If more than one soil type is present below the base of an infiltration facility, the infiltration rate associated with the less permeable soil should be used. The values presented above are for the samples obtained in a particular area at a particular depth and represent an estimate of soil infiltration rates as indicated by gradation characteristics. These values should not be used for final design of infiltration facilities.

Recommendations for Additional Field Testing

If infiltration facilities are included at this site, additional testing, analysis, and reporting will be required to establish the design infiltration rate. The SWMMWW recommends that long-term design infiltration rates be determined via a pilot infiltration test (PIT). Based on our experience, PITs could provide a more accurate (and less conservative) estimate of soil infiltration rates than soil gradation-based infiltration rate estimates. Due to the variability of soil conditions and the limited infiltration potential of the site soils we recommend that at least two PITs be performed at the site if infiltration facilities are incorporated in the design. The locations of the PITs should be near (ideally within) the footprint of the proposed infiltration facilities. The PITs could be performed over the course of one to two days. We can assist with determining preliminary infiltration pond locations, performing PITs, and performing associated analysis and reporting, if requested.

Asphalt Concrete Pavement Recommendations

On Site Pavements

Pavements constructed on school grounds will likely include parking areas, access roads, and school bus and car drop off areas. Based on our experience, we provide recommended conventional ACP sections below. These pavement sections may not be adequate for heavy construction traffic loads such as those imposed by concrete transit mixers, dump trucks or cranes. Additional pavement thickness may be necessary to prevent pavement damage during construction. The recommended sections assume that final improvements surrounding the conventional ACP will be designed and constructed such that stormwater or excess irrigation water from landscape areas does not accumulate below the pavement section or pond on pavement surfaces.

Pavement subgrade should be prepared, placed and observed as previously described. Crushed surfacing base course and subbase should be moisture conditioned to near optimum moisture content and compacted to at least 95 percent of MDD (ASTM D 1577).

Crushed surfacing base course should conform to applicable sections of 4-04 and 9-03.9(3) of the WSDOT Standard Specifications. Hot mix asphalt should conform to applicable sections of 5-04, 9-02 and 9-03 of the WSDOT Standard Specifications.

Standard-Duty ACP – Automobile Driveways and Parking Areas

- 2 inches of hot mix asphalt, class ½ inch, PG 58-22
- 4 inches of crushed surfacing base course
- 6 inches of subbase consisting of select granular fill to provide uniform grading and pavement support, to maintain drainage, and to provide separation from fine-grained subgrade soil

- Native subgrade or structural fill prepared in accordance with the "Subgrade Preparation and Evaluation" section of this report

Heavy-Duty ACP – Areas Subject to Heavy-Duty Traffic

- 4 inches of hot mix asphalt, class ½ inch, PG 58-22
- 6 inches of crushed surfacing base course
- 6 inches of subbase consisting of select granular fill to provide a uniform grading surface and pavement support, to maintain drainage, and to provide separation from fine-grained subgrade soil
- Native soil or structural fill on subgrades prepared in accordance with the "Subgrade Preparation and Evaluation" section of this report

Pervious Pavements

General

Our recommendations for pervious pavement design sections are based on information provided in the technical guidance manual for LID (Puget Sound LID manual), completed by the Puget Sound Partnership (December 2012) and our experience designing permeable pavements in the region. The pavement sections presented below are suitable for use in driveway and parking areas and may not be suitable for use on surface streets or in areas with heavy traffic loads such as the bus travel and parking areas. The design of pervious pavements for stormwater management should consider storage capacity of the pervious pavement system and infiltration rate of the subgrade soils. Our general recommendations are provided in the following sections; however, we recommend that final pervious pavement design should be in accordance with the complete recommendations provided in the Puget Sound LID manual.

Sections for pervious concrete pavement and porous asphalt pavement are presented below followed by specific recommendations for each section.

Pervious Cement Concrete Section

- 6 inches of pervious cement concrete
- 6 inches (minimum) of permeable ballast, more permeable ballast may be required to provide adequate storage capacity for the section
- 6 inches treatment layer (if necessary)
- Geotextile separation liner (if necessary)
- Subgrade prepared as recommended below

Porous Asphalt Concrete Section

- 4 inches of porous hot mix asphalt concrete
- 6 inches (minimum) of permeable ballast, more permeable ballast may be required to provide adequate storage capacity for the section
- 6 inches treatment layer (if necessary)
- Geotextile separation liner (if necessary)
- Subgrade prepared as recommended below

Pavement

Permeable pavements should be open graded and should have a minimum infiltration rate of at least 8 inches per hour when newly installed. Field infiltration tests should be performed on newly placed permeable pavements to verify the infiltration rate.

Permeable Ballast

We recommend a minimum 6-inch thick permeable ballast layer that meets the specification for American Public Works Association (APWA) General Special Provision (GSP) 9-03.9(2) Option 1 (shown in table below). A thicker permeable ballast layer may be necessary to provided sufficient storage capacity for the design infiltration rate. In general, the permeable ballast can be considered to have a porosity of 30 percent.

TABLE 3: GRADATION SPECIFICATION FOR PERMEABLE BALLAST

Sieve Size	Percent Passing
2½-inch	99-100
2 inch	65-100
¾ inch	40-80
No. 4	0-5
No. 100	0-2
% Fracture	95

Permeable ballast layers between 6 and 12 inches thick should be placed as a single lift. The ballast should be lightly compacted to a firm unyielding condition. Overcompaction of the ballast can result in reduced permeability. The prepared ballast layer should be observed by an engineer to ensure that the ballast has been adequately compacted prior to placement of the permeable pavement. If the permeable ballast layer is thicker than 12 inches, it should be placed and compacted in multiple lifts not exceeding 12 inches in thickness.

Treatment Layer

If treatment of the collected stormwater is necessary before infiltration, a minimum 6-inch thick layer of sand or permeable treatment media could be included in the pavement section and located below the permeable ballast. A geotextile liner is required between the ballast layer and the treatment layer to prevent the treatment media from migrating into the ballast layer. The permeability of the treatment layer should match or exceed that of the permeability ballast layer. The treatment layer should be placed and compacted following the recommendations in the "Permeable Ballast" section above.

Subgrade Preparation and Geotextile Liner

Subgrades below permeable pavement sections should be lightly compacted to a firm and unyielding condition before constructing the permeable pavement section; however, overcompaction of the subgrade should be avoided. Prepared subgrades should be protected from construction traffic standing water or other disturbance. If portions of the subgrade become disturbed or are overcompacted, the subgrade should be scarified to a minimum depth of 8 inches and recompacted. The subgrade should be recompacted to between 90 and 92 percent of the MDD.

A layer of non-woven geotextile filter fabric should be placed between the prepared subgrade soils and permeable pavement section if the subgrade soils contain more than 7 percent fines by weight based on the minus 3/4-inch fraction. This is likely the case, based on conditions observed in our explorations. Filter fabric should meet the requirements of WSDOT Standard Specifications Section 9-33.1 for separation.

Protection, Maintenance and Safety

It is imperative that soils are not tracked onto pervious pavement surfaced areas during construction. Periodic visual inspections should be performed throughout the pavement life to determine if pervious pavement surfaces are clogged with fine soil or vegetation. Surfaces should be swept with a high-efficiency or vacuum sweeper regularly (typically at least 2 to 4 times per year) and washed with a high-pressure hose at least once per year.

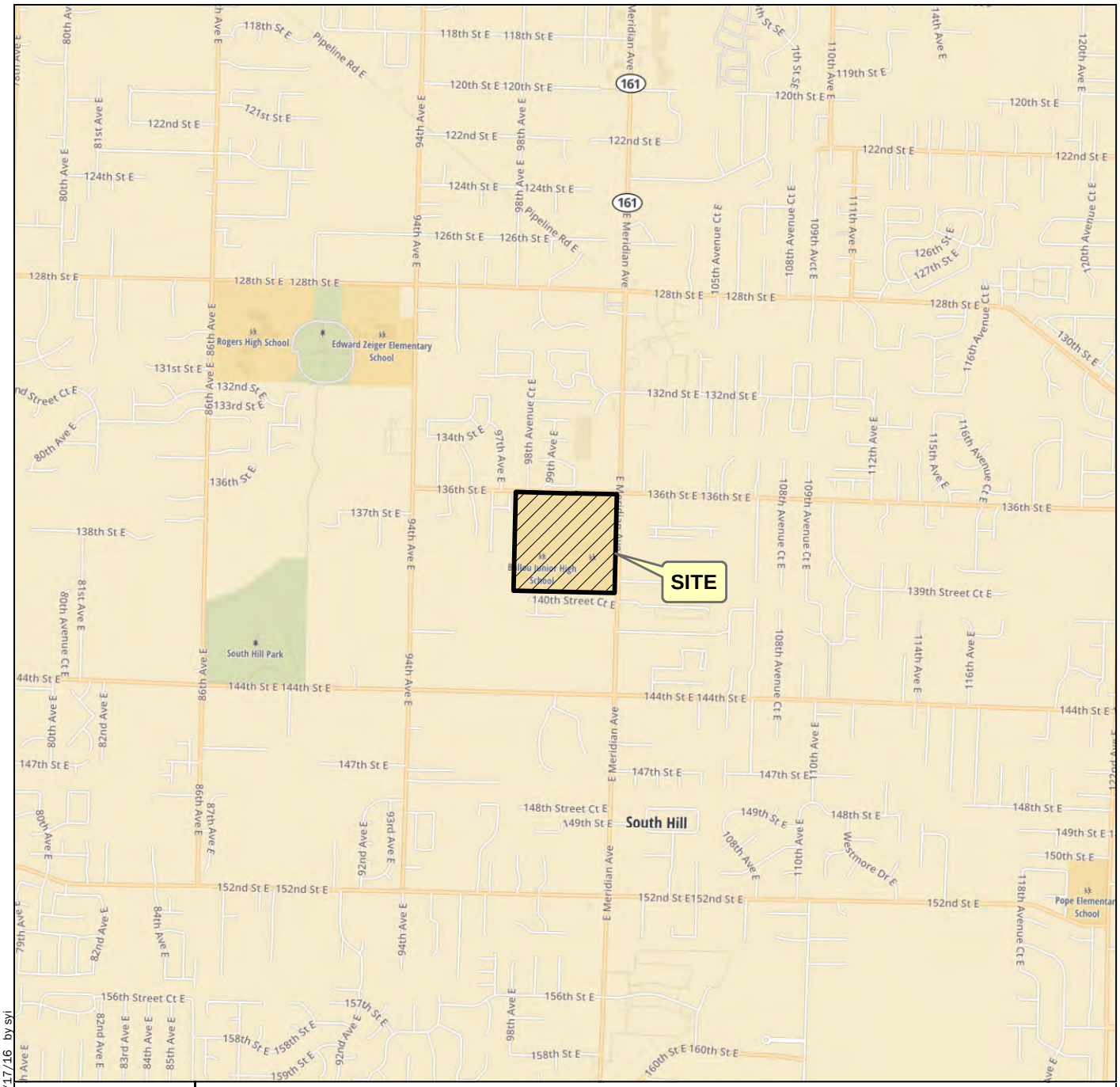
Because the relatively porous base and subbase layers allow some air movement below the pavement, pervious pavement surfaces may become icy more easily than surrounding conventional pavement surfaces. This problem is similar to differential icing of bridges and elevated road structures. Users should be made aware of the possibility of differential icing if pervious pavements are used.

LIMITATIONS

We have prepared this report for the Puyallup School District, for Firgrove Elementary School. Puyallup School District may distribute copies of this report to owner's authorized agents and regulatory agencies as may be required for the Project.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices for geotechnical engineering services in this area at the time this report was prepared. The conclusions, recommendations, and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty, express or implied, applies to the services or this report.

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



Notes:

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

Data Source: Mapbox Open Street Map, 2015

Projection: NAD 1983 StatePlane Washington South FIPS 4602 Feet

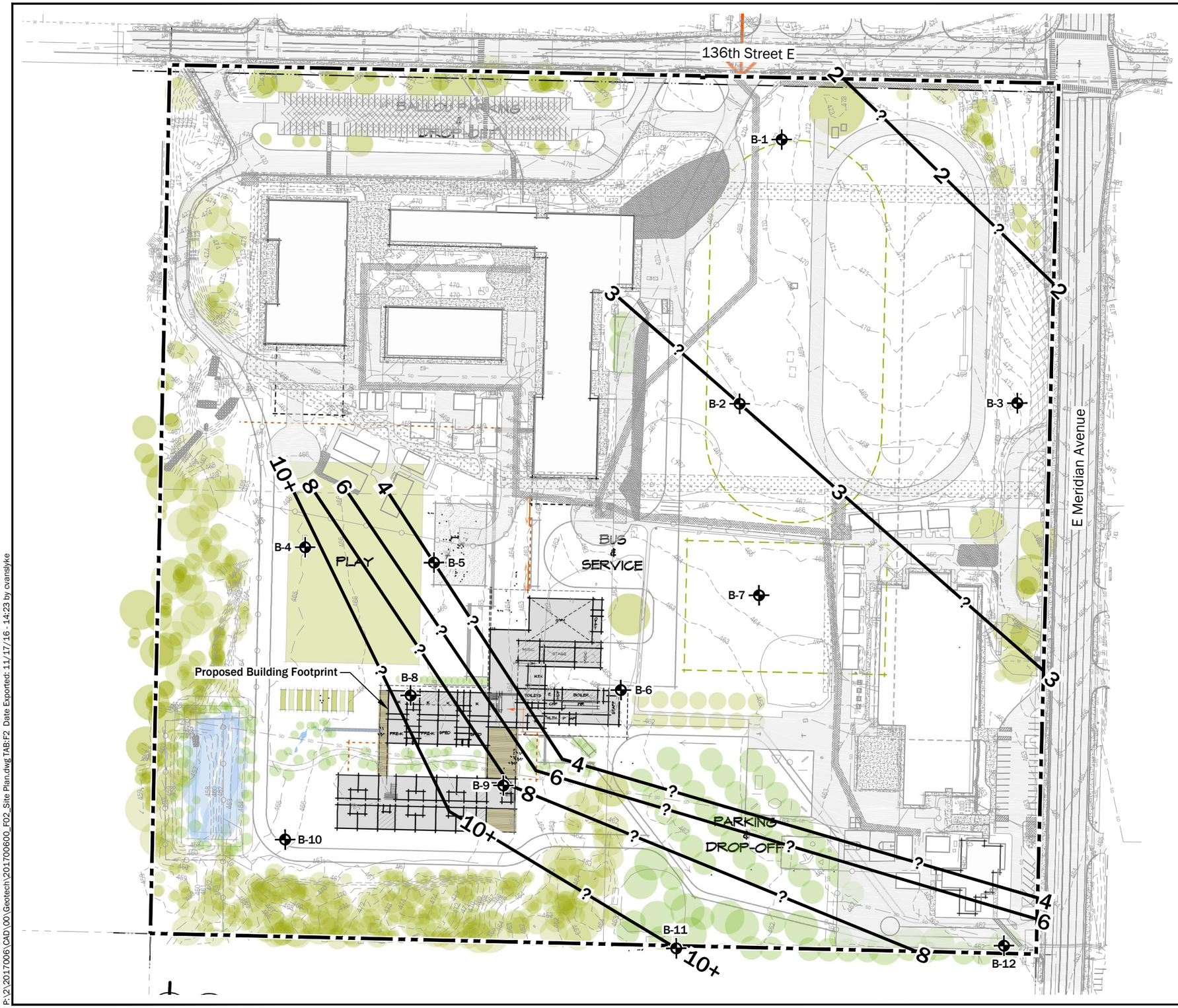
Vicinity Map

Firgrove Elementary School
Puyallup, Washington

GeoEngineers

Figure 1

P:\2_2017006\GIS\MXD\20170600_F01_Vicinity Map.mxd Date Exported: 11/17/16 by syi



Legend

- Site Boundary
- B-1 — Boring by GeoEngineers, 2016
- Existing Ground Surface Contour
- ?—4—? Approximate Depth to Dense Glacial Till-Like Soils

N W E S

150 0 150

Feet

Notes:

1. The locations of all features shown are approximate.
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Vertical Datum: NGVD 29.

Projection: NAD83 Washington State Planes, South Zone, US Foot.

Data Source:
Base drawing provided by Mahlum Architects, Inc. dated 11/16/16.

Site Plan

Firgrove Elementary School
Puyallup, Washington

GeoEngineers

Figure 2

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APPENDIX A
Subsurface Explorations

APPENDIX A
SUBSURFACE EXPLORATIONS

General

Soil conditions at the project site were explored on October 19 and 20, 2016 by advancing 12 borings at the approximate locations shown on the Site Plan (Figure 2). The explorations were located in the field using a GPS device. The locations of the explorations shown on the Site Plan should be considered approximate.

Soil Borings

Soil borings were advanced to between 8 feet and 20.5 feet below ground surface (bgs) using a track-mounted hollow-stem auger drill rig. The explorations were continuously monitored by a representative from our firm who examined and classified the soil encountered, obtained representative soil samples, and maintained a detailed log of the explorations. Soil encountered in the borings was classified in general accordance with ASTM International (ASTM) D 2488 and the classification chart listed in Key to Exploration Logs, Figure A-1. Logs of the borings are presented in Figures A-2 through A-13. The logs are based on interpretation of the field and laboratory data, and indicate the depth at which we interpret subsurface materials or their characteristics to change, although these changes might actually be gradual.

Soil samples were obtained from the borings at approximate 2.5 to 5-foot-depth intervals using either a 2-inch, outside-diameter, standard split-spoon sampler (Standard Penetration Test [SPT]) in general accordance with ASTM D 1586 or using a larger 3-inch diameter sampler. The samplers were driven into the soil using a 140-pound automatic hammer, free-falling 30 inches. The number of blows required to drive the samplers each of three, 6-inch increments of penetration were recorded in the field. The sum of the blow counts for the final 12 inches of penetration, unless otherwise noted, is reported on the boring logs.

Borings were drilled and backfilled by Holocene Drilling, Inc. subcontracted to GeoEngineers.

SOIL CLASSIFICATION CHART

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

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

ADDITIONAL MATERIAL SYMBOLS

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

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Continuous Coring

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

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

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

Laboratory / Field Tests

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

Sheen Classification

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

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

KEY TO EXPLORATION LOGS

GeoEngineers

FIGURE A-1

Rev. 02/16

Start / End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
Drilled 10/20/2016 / 10/20/2016	8	EAW / BEL	Holocene Drilling, Inc.	Hollow Stem Auger

Surface Elevation (ft) / Vertical Datum	470 NAVD88	Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50
Easting (X) / Northing (Y)	1193727 / 661240	System Datum	WA State Plane South NAD83 (feet)	Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft): Not Observed

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						TS	1 inch sod			
		8	7	1			SM	Dark brown silty fine to coarse sand with occasional gravel and organic matter (roots) (loose, moist) (fill)			
		18	39	2 %F			SM	Gray-brown with orange staining silty fine to medium sand with gravel (dense, moist) (weathered till)	16	40	Drill chatter from 3 to 7.5 feet
465	5			3							Drilling refusal at 6.5 feet, location adjusted ~3 feet north and boring redrilled
		2	50/2"	4			ML	Gray-brown sandy silt with gravel (hard, moist) (glacial till)			

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

Log of Boring B-1

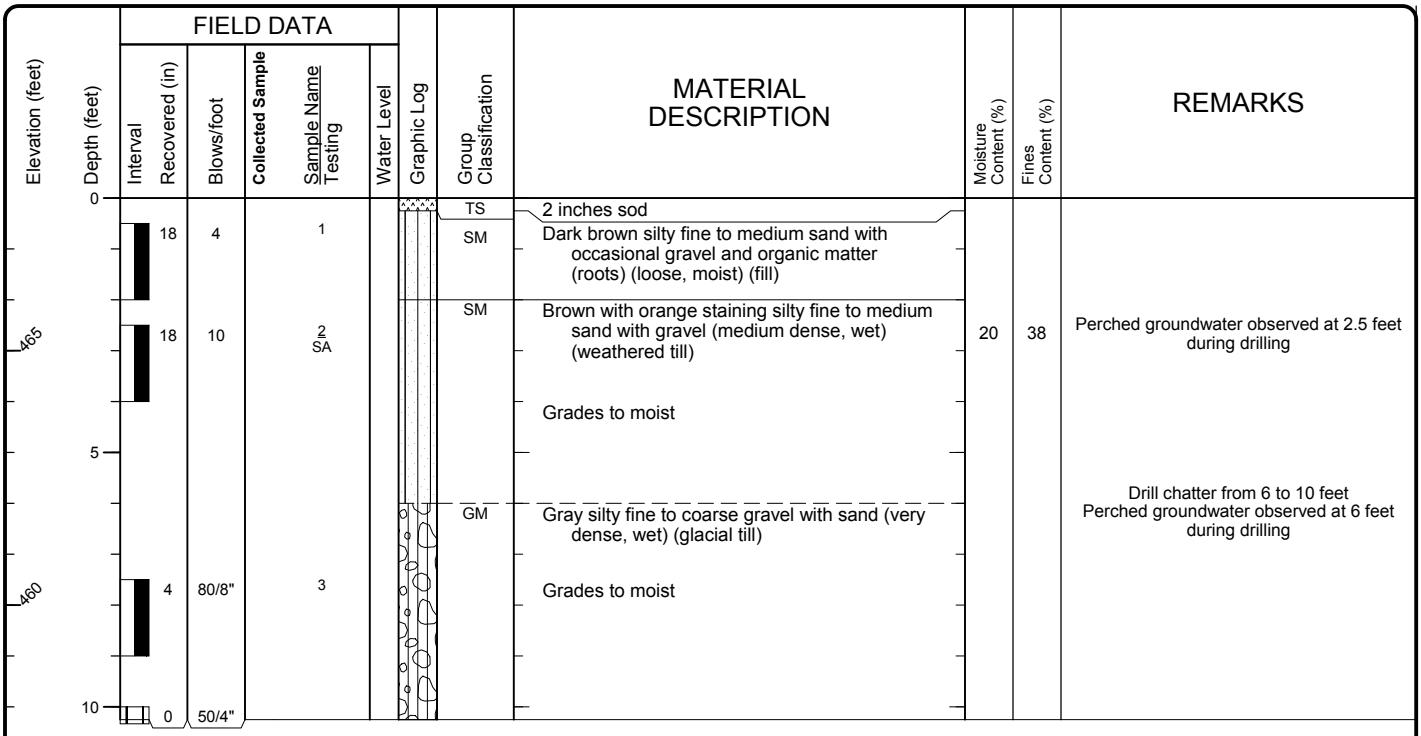
GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-2
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled Start 10/19/2016 End 10/19/2016	Total Depth (ft) 10.25	Logged By EAW Checked By BEL	Driller Holocene Drilling, Inc.	Drilling Method Hollow Stem Auger
Surface Elevation (ft) 468 Vertical Datum NAVD88		Hammer Data 140 (lbs) / 30 (in) Drop		Drilling Equipment Diedrich D-50
Easting (X) 1193664 Northing (Y) 660844		System Datum WA State Plane South NAD83 (feet)		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				



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

Log of Boring B-2

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-3
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
10/19/2016	10/19/2016	9	EAW / BEL	Holocene Drilling, Inc.	Hollow Stem Auger

Surface Elevation (ft) / Vertical Datum	471 NAVD88	Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50
Easting (X) / Northing (Y)	1194080 660845	System Datum	WA State Plane South NAD83 (feet)	Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft)

Notes:

Not Observed

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0								TS	2 inches sod			
470			18	10		1 MC			SM	Dark brown silty fine to coarse sand with occasional gravel and organic matter (roots) (medium dense, moist) (fill)	16		
			18	35		2 3			SM	Light brown to gray silty fine to coarse sand with gravel (dense, moist) (weathered till)			
									SM	Gray silty fine to coarse gravel with sand (very dense, moist) (glacial till)			Drill chatter 4 to 7.5 feet
465	5												
			16	50/4"		4							

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

Log of Boring B-3

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-4
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Start Drilled	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
10/20/2016	10/20/2016	11.5	EAW / BEL	Holocene Drilling, Inc.	Hollow Stem Auger

Surface Elevation (ft) / Vertical Datum	465 NAVD88	Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50
Easting (X) / Northing (Y)	1193013 / 660629	System Datum	WA State Plane South NAD83 (feet)	Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks

Notes:

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						TS	~2 inches sod			
							GP-GM	Brown fine gravel with silt and sand (medium dense, wet) (fill)			
								Grades to moist			
		1	19	1							Perched groundwater observed at 2.5 feet during drilling Driller indicated change in conditions at 3 feet
							ML	Brown to gray sandy silt (stiff, moist) (lacustrine soils)			
460	5	18	11	2 SA					21	52	
455	10	18	11	3							

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

Log of Boring B-4

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-5
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
10/20/2016	10/20/2016	11.5	EAW / BEL	Holocene Drilling, Inc.	Hollow Stem Auger

Surface Elevation (ft) / Vertical Datum	466 NAVD88	Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50
Easting (X) / Northing (Y)	1193206 / 660606	System Datum	WA State Plane South NAD83 (feet)	Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:					Not Observed

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						TS	~2 inches sod			
465		6	3	1			SM	Gray-brown silty fine to medium sand with occasional organic matter (roots) (very loose, moist) (fill)			
	5	12	54	2 SA			GM	Gray silty fine to coarse gravel with sand (very dense, moist) (glacial till)	7	30	Driller indicates change in conditions at 4 feet Samples 2 and 3 combined for lab testing Drill chatter from 7 to 10 feet
460											
	10	18	47	3							
455											

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

Log of Boring B-5

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-6
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled Start 10/20/2016 End 10/20/2016	Total Depth (ft) 16	Logged By EAW Checked By BEL	Driller Holocene Drilling, Inc.	Drilling Method Hollow Stem Auger
Surface Elevation (ft) 462 Vertical Datum NAVD88		Hammer Data 140 (lbs) / 30 (in) Drop		Drilling Equipment Diedrich D-50
Easting (X) 1193486 Northing (Y) 660415		System Datum WA State Plane South NAD83 (feet)		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not Observed
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						TS	~2 inches sod			
							SM	Brown silty fine to coarse sand with occasional gravel and organic matter (roots) (loose, moist) (fill)			
460		18	11	1 %F			ML	Brown and gray sandy silt (stiff, moist) (weathered till)	26	68	
	5	18	77	2 CA, ORG			SM	Gray silty fine to coarse sand with gravel (very dense, moist) (glacial till)			ORG=0.3% Drill chatter from 5.5 to 15 feet
455											
	10	12	69	3			GP-GM	Gray fine to coarse gravel with silt and sand (very dense, moist)			
450											
	15	8	50/6"	4							Drilling refusal at 16 feet

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

Log of Boring B-6

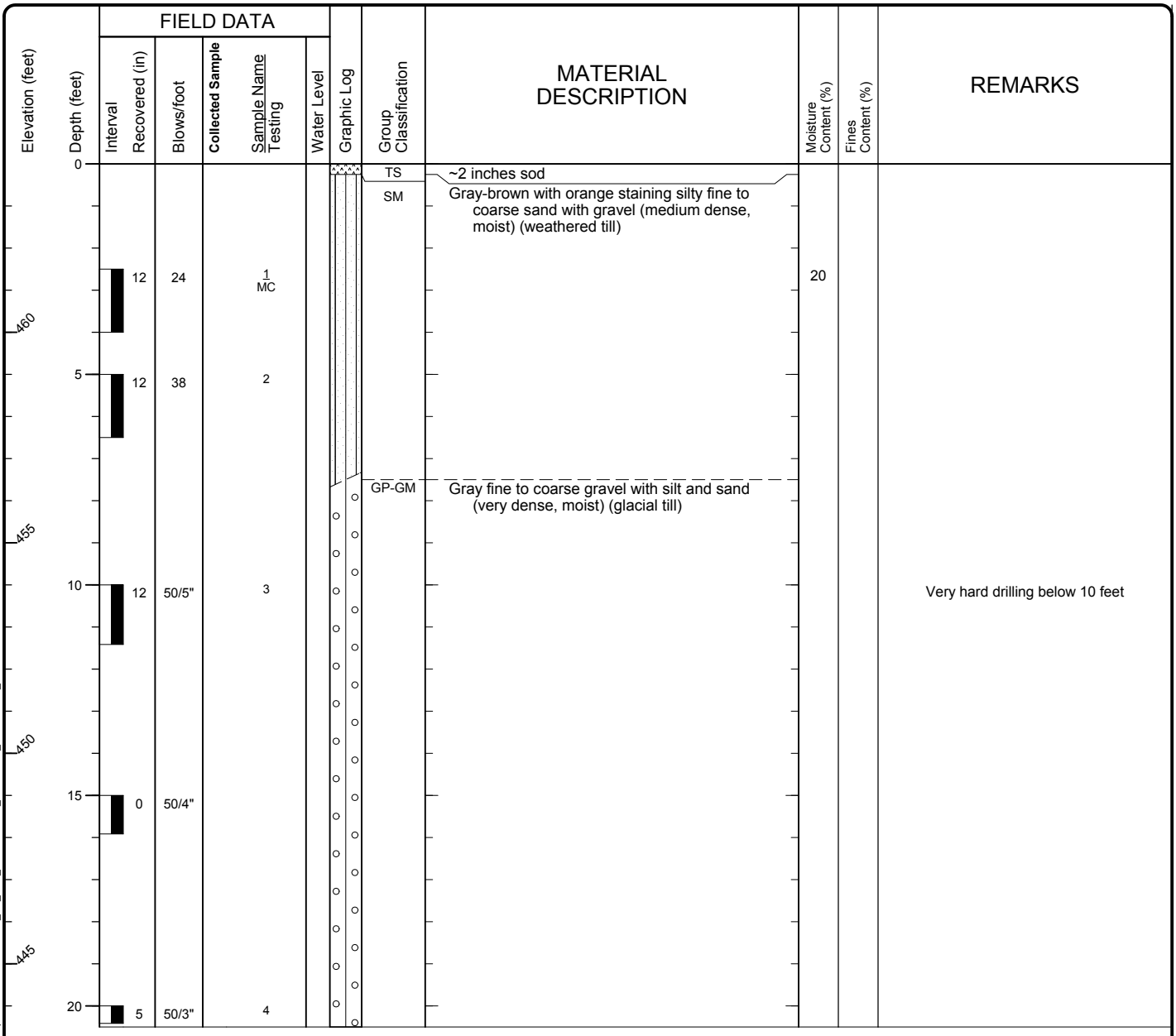
GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-7
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled Start 10/19/2016 End 10/19/2016	Total Depth (ft) 20.5	Logged By EAW Checked By BEL	Driller Holocene Drilling, Inc.	Drilling Method Hollow Stem Auger
Surface Elevation (ft) 464 Vertical Datum NAVD88		Hammer Data 140 (lbs) / 30 (in) Drop		Drilling Equipment Diedrich D-50
Easting (X) 1193693 Northing (Y) 660557		System Datum WA State Plane South NAD83 (feet)		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not Observed
Notes:				



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

Log of Boring B-7

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-8
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate\LibTemplate\GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled	Start 10/19/2016	End 10/19/2016	Total Depth (ft)	19	Logged By / Checked By	EAW / BEL	Driller	Holocene Drilling, Inc.	Drilling Method	Hollow Stem Auger
Surface Elevation (ft) / Vertical Datum	466 / NAVD88		Hammer Data	140 (lbs) / 30 (in) Drop			Drilling Equipment	Diedrich D-50		
Easting (X) / Northing (Y)	1193171 / 660407		System Datum	WA State Plane South NAD83 (feet)			Groundwater	Date Measured	Depth to Water (ft)	Elevation (ft)
Notes:									Not Observed	

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						TS	2 inches sod			
465		18	8	1			SM	Dark brown silty fine to medium sand with occasional organic matter (roots) (loose, moist) (fill)			
							ML	Light brown silt with sand (medium stiff, moist) (lacustrine soils)	24	84	
	5	18	6	2 SA							
460		18	13	3				Grades to stiff			
				4			SP	Gray fine to coarse sand, trace silt (medium dense, moist)			
							SM	Gray silty fine to coarse sand with gravel (dense, moist) (glacial till)			Drill chatter 9 to 19 feet
	10										
455		12	39	5							
	15										
450		3	54	6				Grades to very dense			

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

Log of Boring B-8

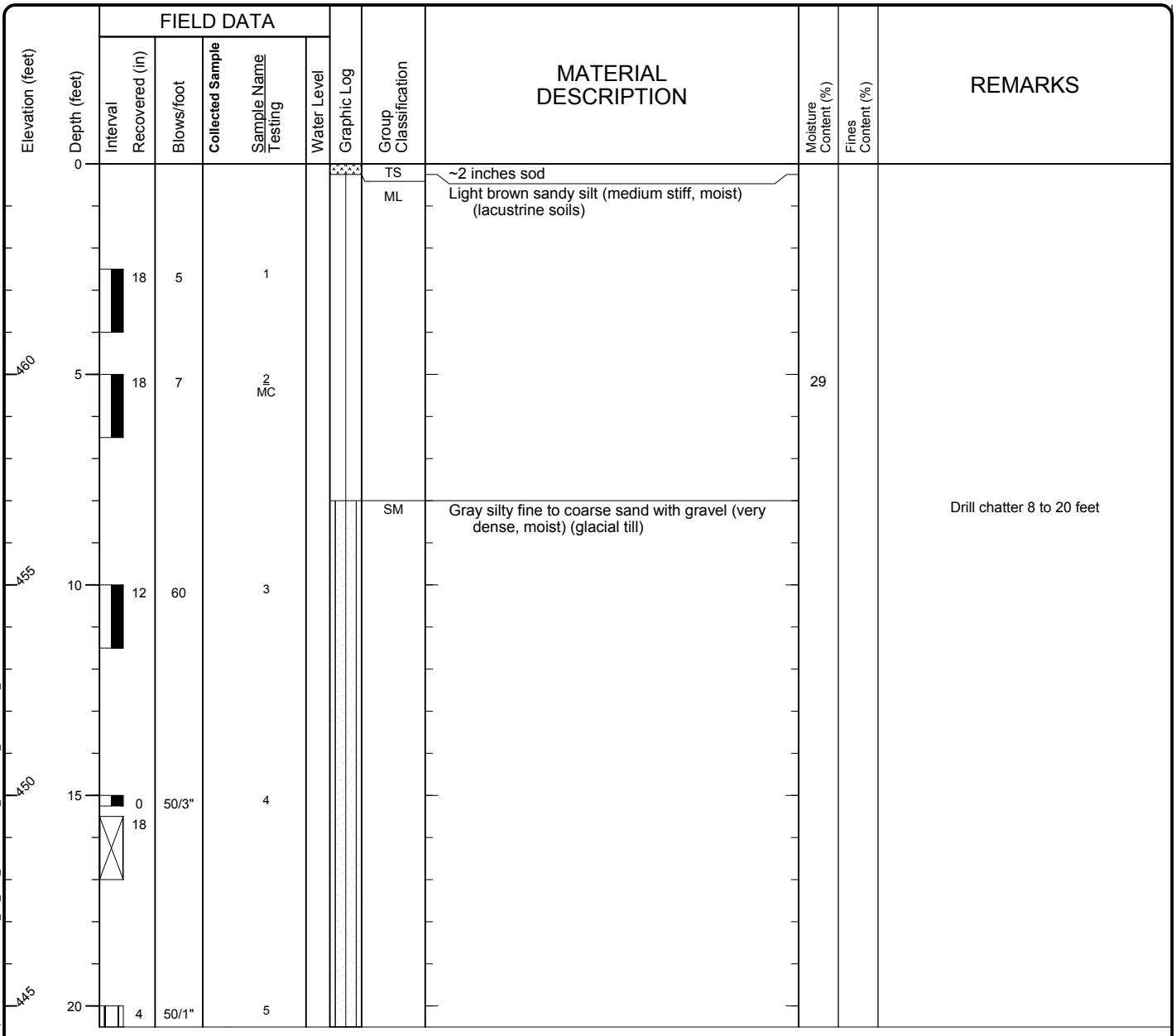
GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-9
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled Start 10/19/2016 End 10/19/2016	Total Depth (ft) 20.5	Logged By EAW Checked By BEL	Driller Holocene Drilling, Inc.	Drilling Method Hollow Stem Auger
Surface Elevation (ft) 465 Vertical Datum NAVD88		Hammer Data 140 (lbs) / 30 (in) Drop		Drilling Equipment Diedrich D-50
Easting (X) 1193310 Northing (Y) 660272		System Datum WA State Plane South NAD83 (feet)		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not Observed
Notes:				



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

Log of Boring B-9

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-10
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled Start 10/19/2016 End 10/19/2016	Total Depth (ft) 11.5	Logged By EAW Checked By BEL	Driller Holocene Drilling, Inc.	Drilling Method Hollow Stem Auger
Surface Elevation (ft) 466 Vertical Datum NAVD88		Hammer Data 140 (lbs) / 30 (in) Drop		Drilling Equipment Diedrich D-50
Easting (X) 1192983 Northing (Y) 660191		System Datum WA State Plane South NAD83 (feet)		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): Not Observed
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						TS	2 inches sod			
465		18	10	1 CA, ORG			SM	Gray-brown silty fine to medium sand (medium dense, moist) (lacustrine soils)			ORG=0.8%
		18	9	2 %F				Grades to loose	10	43	
	5	18	6	3							
460							ML	Brown-gray sandy silt (medium stiff, wet)			Perched groundwater observed at 7 feet during drilling
		18	4	4 MC					35		
								Grades to moist			
	10	18	4	5							
455											

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

Log of Boring B-10

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-11
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled Start 10/19/2016 End 10/19/2016	Total Depth (ft) 14	Logged By EAW Checked By BEL	Driller Holocene Drilling, Inc.	Drilling Method Hollow Stem Auger
Surface Elevation (ft) 463 Vertical Datum NAVD88		Hammer Data 140 (lbs) / 30 (in) Drop		Drilling Equipment Diedrich D-50
Easting (X) 1193569 Northing (Y) 660028		System Datum WA State Plane South NAD83 (feet)		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						TS	~2 inches sod			
							SM	Gray-brown silty fine to medium sand, occasional gravel (loose, moist) (lacustrine soils)			
460		6	7	1							
	5	18	5	2 MC					31		
								Grades to without gravel			
455											
	10	12	30	3			SM	Gray silty fine to medium sand with occasional gravel (dense, wet) (weathered till)			Perched groundwater observed at 10 feet during drilling
								Grades to moist			
450		18	63	4							
							SM	Gray silty fine to coarse sand with gravel (very dense, moist) (glacial till)			

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

Log of Boring B-11

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-13
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Start Drilled	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
10/19/2016	10/19/2016	9	EAW / BEL	Holocene Drilling, Inc.	Hollow Stem Auger

Surface Elevation (ft) / Vertical Datum	462 NAVD88	Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50
Easting (X) / Northing (Y)	1194060 660032	System Datum	WA State Plane South NAD83 (feet)	Groundwater	

Notes:

Groundwater: Date Measured | Depth to Water (ft) | Elevation (ft) — Not Observed

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0								AC	2.5 inches asphalt concrete			
									SM	Gray silty fine to medium sand (loose, moist) (lacustrine soils)			
460			12	4		1 MC					12		
			18	9		2							
	5												
455									SM	Gray silty fine to coarse sand with gravel (medium dense, moist) (weathered till)			
			18	19		3							

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

Log of Boring B-12

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-13
Sheet 1 of 1

Tacoma: Date:11/17/16 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

APPENDIX B
Laboratory Testing

APPENDIX B
LABORATORY TESTING

General

Soil samples obtained from the borings were returned to our laboratory for further examination and testing. Our laboratory testing program consisted of: six moisture content determinations, four grain-size distribution analyses, and three percent fines determinations. We also sent selected samples to an off-site laboratory for cation exchange capacity (CEC) and organic content (OC) tests. Details of the tests performed are provided in the sections below.

Moisture Content

The moisture content of selected samples was determined in general accordance with ASTM International (ASTM) D 2216. The test results are used to aid in determining the moisture content of the soil, soil classification and correlation with other pertinent engineering soil properties. The test results are presented on the exploration logs in Appendix A at the respective sample depths.

Grain-Size Analysis

Grain-size analyses were performed on selected soil samples in general accordance with ASTM Test Method D 442-63. This test provides a quantitative determination of the distribution of particle sizes in soils. Figures B-1 and B-2 present the results of the grain-size analyses.

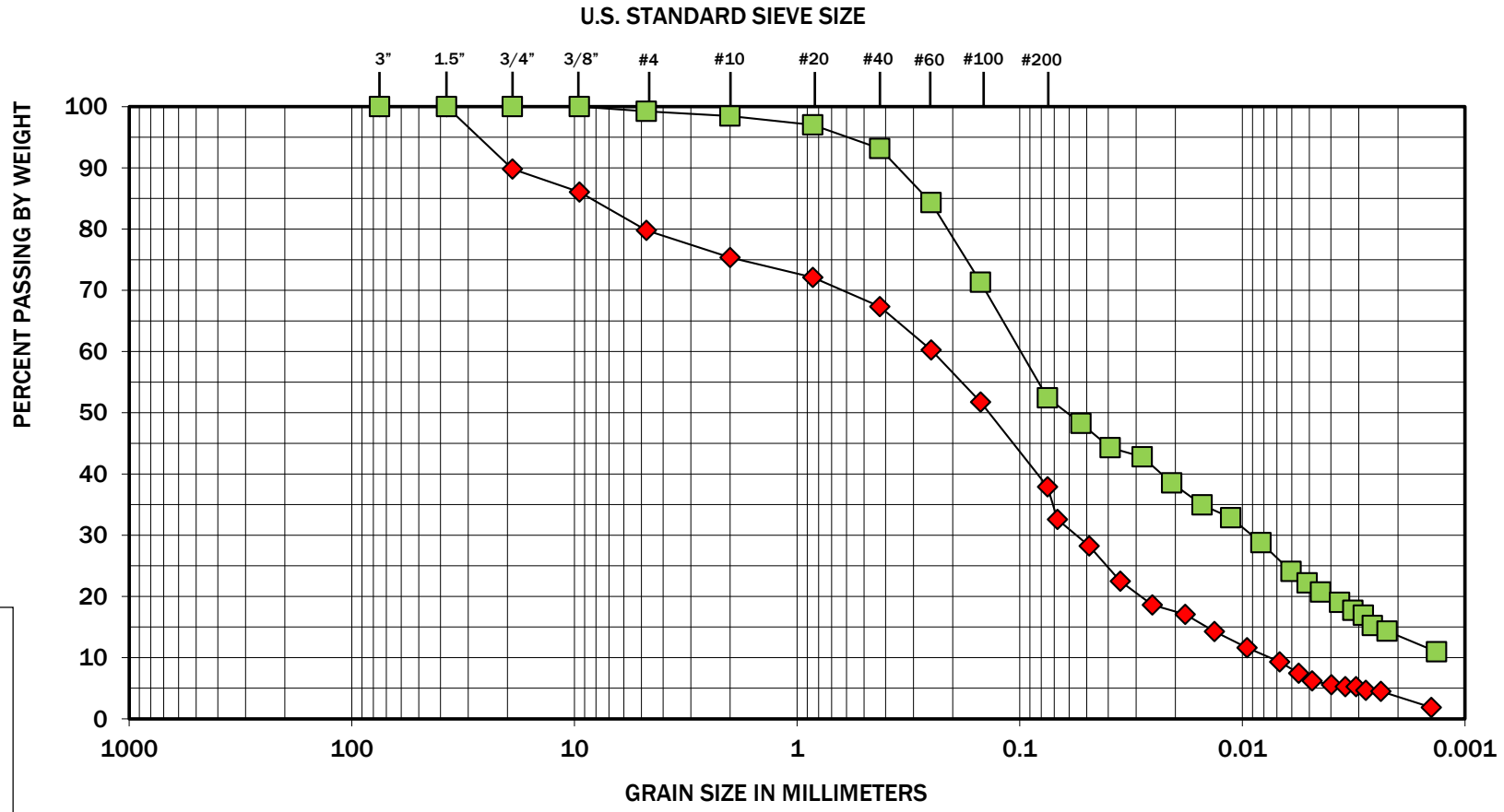
Percent Passing the U.S. No. 200 Sieve

Selected samples were "washed" through the U.S. No. 200 sieve to estimate the relative percentages of coarse- and fine-grained particles in the soil. The percent passing value represents the percentage by weight of the sample finer than the U.S. No. 200 sieve (fines). The tests were conducted in general accordance with ASTM D 1140. The test results are presented on the exploration logs in Appendix A at the respective sample depths.

Cation Exchange Capacity and Organic Content Tests

CEC and OC tests were performed on selected samples at a subcontracted laboratory (SoilTest Farm Consultants located in Moses Lake, Washington.) Test results are presented in the table below.

Exploration	Sample Depth (feet)	Soil Unit	Cation Exchange Capacity (meq/100g)	Organic Content (%)
B-6	5	Glacial Till	10.0	0.3
B-10	0.5	Lacustrine Soils	6.6	0.8



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Laboratory Soil Description
◆	B-2	2.5	20	Silty sand with gravel (SM)
■	B-4	5	21	Sandy silt (ML)

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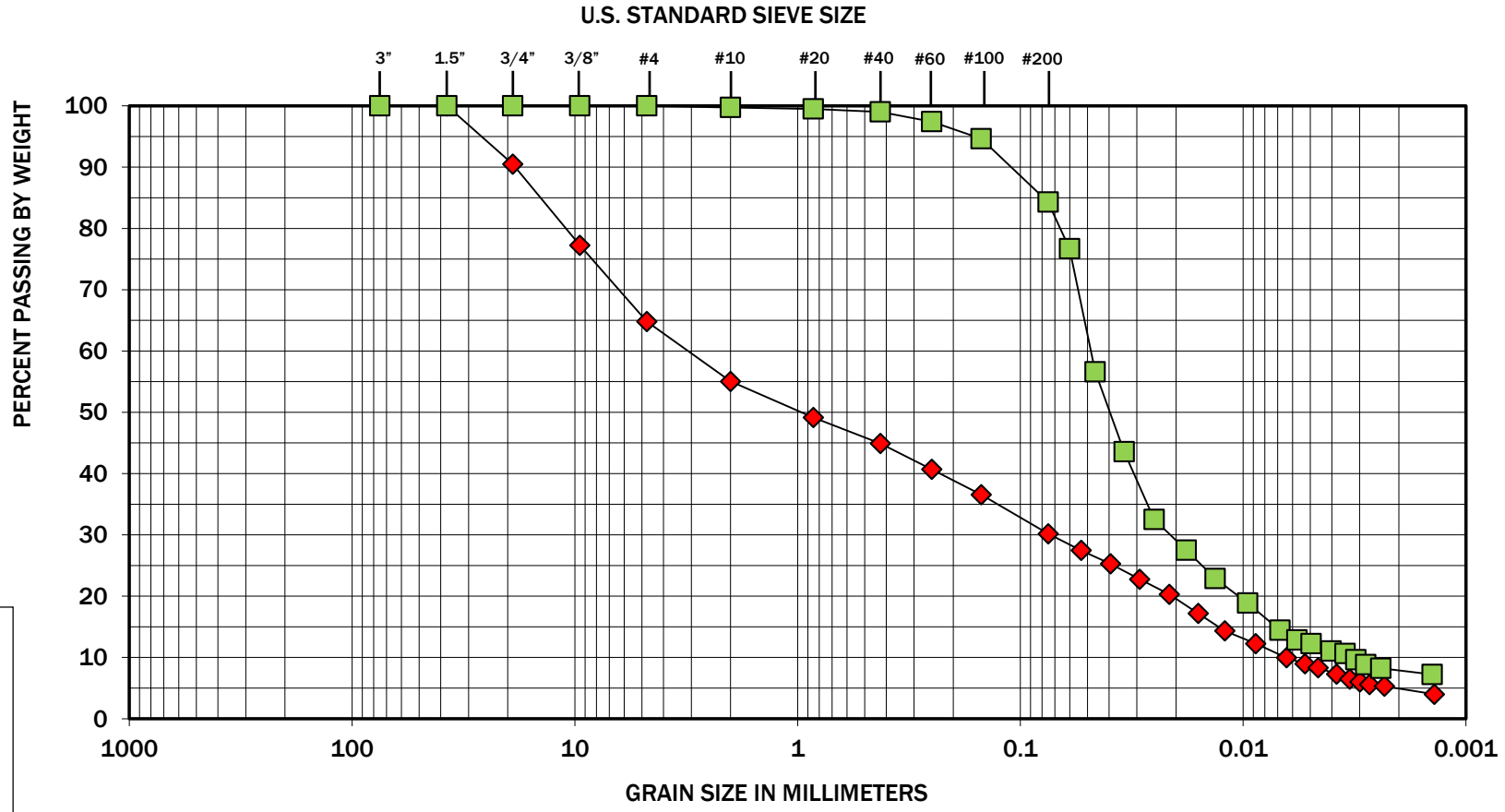
The grain size analysis results were obtained in general accordance with ASTM D 6913.

GeoEngineers

Sieve Analysis Results

Firgrove Elementary School
Puyallup, Washington

Figure B-1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Laboratory Soil Description
◆	B-5	5	7	Silty gravel with sand (GM)
■	B-8	2.5	24	Silt with sand (ML)

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

GeoEngineers

Figure B-2

Firgrove Elementary School
Puyallup, Washington

Sieve Analysis Results

APPENDIX C
Report Limitations and Guidelines for Use

APPENDIX C
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

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

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) rely on professional judgment and opinion to a greater extent than other engineering and natural science disciplines, where more precise and/or readily observable data may exist. To help clients better understand how this difference pertains to our services, GeoEngineers includes the following explanatory "limitations" provisions in its reports. Please confer with GeoEngineers if you need to know more how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the Puyallup School District and for the Project(s) specifically identified in the report. The information contained herein is not applicable to other sites or projects.

GeoEngineers structures its services to meet the specific needs of its clients. No party other than the party to whom this report is addressed may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed scope of services for the Project, and its schedule and budget, our services have been executed in accordance with our Agreement with the Puyallup School District dated October 7, 2016 and generally accepted geotechnical practices in this area at the time this report was prepared. We do not authorize, and will not be responsible for, the use of this report for any purposes or projects other than those identified in the report.

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

This report has been prepared for Firgrove Elementary School in Puyallup, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

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

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

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

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

- composition of the design team; or
- project ownership.

If changes occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

Environmental Concerns are Not Covered

Unless environmental services were specifically included in our scope of services, this report does not provide any environmental findings, conclusions, or recommendations, including but not limited to, the likelihood of encountering underground storage tanks or regulated contaminants.

Information Provided by Others

GeoEngineers has relied upon certain data or information provided or compiled by others in the performance of our services. Although we use sources that we reasonably believe to be trustworthy, GeoEngineers cannot warrant or guarantee the accuracy or completeness of information provided or compiled by others.

Subsurface Conditions Can Change

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the site, new information or technology that becomes available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our report or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this report for its intended purpose so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Geotechnical and Geologic Findings are Professional Opinions

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

Geotechnical Engineering Report Recommendations are Not Final

We have developed the following recommendations based on data gathered from subsurface investigation(s). These investigations sample just a small percentage of a site to create a snapshot of the subsurface conditions elsewhere on the site. Such sampling on its own cannot provide a complete and accurate view of subsurface conditions for the entire site. Therefore, the recommendations included in this report are preliminary and should not be considered final. GeoEngineers' recommendations can be

finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for the recommendations in this report if we do not perform construction observation.

We recommend that you allow sufficient monitoring, testing and consultation during construction by GeoEngineers to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes if the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective means of managing the risks associated with unanticipated conditions. If another party performs field observation and confirms our expectations, the other party must take full responsibility for both the observations and recommendations. Please note, however, that another party would lack our project-specific knowledge and resources.

A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation

Misinterpretation of this report by members of the design team or by contractors can result in costly problems. GeoEngineers can help reduce the risks of misinterpretation by conferring with appropriate members of the design team after submitting the report, reviewing pertinent elements of the design team's plans and specifications, participating in pre-bid and preconstruction conferences, and providing construction observation.

Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. The logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Photographic or electronic reproduction is acceptable, but separating logs from the report can create a risk of misinterpretation.

Give Contractors a Complete Report and Guidance

To help reduce the risk of problems associated with unanticipated subsurface conditions, GeoEngineers recommends giving contractors the complete geotechnical engineering or geologic report, including these "Report Limitations and Guidelines for Use." When providing the report, you should preface it with a clearly written letter of transmittal that:

- advises contractors that the report was not prepared for purposes of bid development and that its accuracy is limited; and
- encourages contractors to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer.

Contractors are Responsible for Site Safety on Their Own Construction Projects

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

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

Geotechnical Engineering Services Report Addendum

Firgrove Elementary School
Puyallup, Washington

for
Puyallup School District

May 5, 2017

GeoEngineers
Earth Science + Technology

Geotechnical Engineering Services Report Addendum

Firgrove Elementary School
Puyallup, Washington

for
Puyallup School District

May 5, 2017

GeoEngineers

1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Geotechnical Engineering Services
Report Addendum

Firgrove Elementary School
Puyallup, Washington

File No. 2017-006-00

May 5, 2017

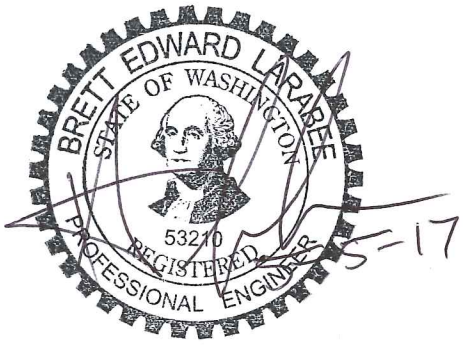
Prepared for:

Puyallup School District
323 12th Street NW
Puyallup, Washington

Attention: Mike Meadows

Prepared by:

GeoEngineers, Inc.
1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940



5-17

Brett E. Larabee, PE
Geotechnical Engineer

Dennis (DJ) Thompson, PE
Associate

BEL:DJT:tt

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INTRODUCTION AND SCOPE OF SERVICES

This report addendum presents the results of our supplemental stormwater infiltration evaluation for the Firgrove Elementary School Project. The project site is located at 13918 Meridian Avenue East in Puyallup, Washington, as shown on the Vicinity Map, Figure 1. Our services are provided in accordance with our original signed agreement dated October 6, 2016 and revised to include this scope of services on April 12, 2017. We previously prepared a geotechnical engineering report dated November 17, 2016 for this project, which included preliminary infiltration rates for the site soils based on sieve analysis of select samples.

We understand that the project plans will include stormwater infiltration facilities. As part of the facility design, a long-term infiltration rate is required. Stormwater design is being conducted in general accordance with the 2015 Pierce County Stormwater and Site Development Manual (2015 Stormwater Manual).

The purpose of our services was to perform small-scale pilot infiltration tests (PITs) to establish a long-term infiltration rate(s) for the site soils. Our specific scope of services included the following:

1. Coordinating with the project team to identify PIT locations and depths.
2. Visiting the project site to mark out locations for our PITs and contact the "One-Call" Utility Notification Center, as required by Washington State law.
3. Obtaining a permit to refill the water truck and trailer necessary for the PITs at a nearby water fill station.
4. Conducting eight small-scale PITs in general accordance with the 2015 Stormwater Manual.
5. Conducting geotechnical laboratory testing on selected soil samples collected in the PIT excavations. We budgeted for six sieve analysis tests. At the request of LPD Engineers (project Civil Engineer) we also submitted samples to an off-site laboratory for cation exchange capacity (CEC) and organic content (OC) testing.
6. Providing our recommendation for a long-term design infiltration rate(s) for site soils based on the results of our PITs and the guidelines presented in the 2015 Stormwater Manual.
7. Preparing this report addendum presenting our findings, test results, conclusions and recommendations.

PILOT INFILTRATION TEST BACKGROUND AND THEORY

General

Eight small scale PITs were conducted at the project site following GeoEngineers' standard methodology for stormwater facilities in Western Washington. Our methodology is a synthesis of the standard practices and current local jurisdictional procedures set forth by Pierce County and the Washington State Department of Ecology (Ecology).

The PIT consists of a relatively large-scale infiltration test to better measure infiltration rates for design of stormwater infiltration facilities. The PIT reduces some of the scale errors associated with relatively small-scale tests, such as the double ring infiltrometer, EPA Borehole Method, or "stove-pipe" infiltration tests. It

is not a standard test but rather a practical field procedure based on the methods recommended by Ecology's Technical Advisory Committee that are designed to achieve full saturation of the subgrade such that the infiltration rate measured approaches the saturated hydraulic conductivity of the subgrade material.

Infiltration into unsaturated soils initially occurs at a rate that can be much higher than the saturated hydraulic conductivity of the soil. As the saturation of the soil increases the hydraulic conductivity of the soil decreases. The intent of both GeoEngineers' method and the method described in the 2015 Stormwater Manual is to fully saturate the soils before measuring the hydraulic conductivity. The PIT procedure we follow has been developed to provide increased confidence that the infiltration rate calculated toward the end of the test is representative of the hydraulic conductivity under fully saturated conditions.

GeoEngineers' Test Procedure

Upon reaching the target depth for the PITs, graduated yard sticks are driven into the floor of the test pit as visual references for monitoring water levels during testing. Piezoelectric pressure transducers are secured to the bottoms of the yard sticks to provide accurate water level records at 30-second intervals throughout the duration of the tests.

Initial filling and maintaining of the water levels in the test pits is done by measuring inflow and water level in a series of stages. The PIT is filled to a predetermined water level and then allowed to drain to a lower pre-determined level, and then is refilled to the initial level again. This draining and refilling process is repeated as many times as practical during the test duration. During each refill/drain cycle (or stage), the infiltration rate is measured manually and using the pressure transducer. The decline of water level recorded for each stage is used to calculate the hydraulic conductivity throughout the test. Once saturation of the subgrade has been achieved (methodology described below) the PIT is allowed to drain and the saturated hydraulic conductivity is measured.

Justification for Modified PIT Methodology

In our opinion the significant difference between the GeoEngineers' PIT methodology and the Small-Scale PIT methodology described in the 2015 Stormwater Manual relates to how the subgrade soils are saturated and how the two methods attempt to verify that saturation has been achieved.

In the 2015 Stormwater Manual, saturation is accomplished by holding water at a constant depth in the test pit for the designated 6-hour pre-soak period. After the 6-hour pre-soak period the water inflow rate into the PIT is adjusted in order to maintain a specific depth. Once this balance is achieved over a period of 1 hour, the soil is assumed to be saturated and the data collected during the test can be used to calculate the short-term infiltration rate of the soil. In the 2015 Stormwater Manual test, only one measurement of infiltration rate is made at the end of the test duration.

In our methodology, we conduct a series of refill/drain cycles during the pre-soak period while holding the water level above a minimum depth. The refill and drain cycles allow us to monitor the saturation progress of the soil by measuring the decline in apparent infiltration rate progressively through each refill/drain cycle as saturation increases and the hydraulic gradient decreases. In ideal conditions the apparent infiltration rate asymptotically approaches a constant value through the pre-soak period as the refill/drain cycles occur. Our method allows us to increase the pre-soak period if a constant apparent infiltration rate(s) has

not been achieved in 6 hours. Once a near constant value is achieved we consider the soil saturated and proceed with a final measurement of the short-term infiltration rate.

The water depth in the PIT during the refill/drain cycles is selected based on the operational anticipated water depth in the proposed facility. If the operational water depth in the proposed facility is expected to be less than the minimum water depth maintained in the test, it may be necessary to factor down the short-term infiltration rate measured during the test before the correction factors are applied.

TEST PIT EXCAVATIONS

Eight test pits (PIT-1 through PIT-8) were excavated at the approximate locations shown on the Site Plan, Figure 2. Test pits were advanced using a backhoe to intermediate depths between 2 and 4.5 feet below ground surface (bgs) to perform the infiltration tests. After testing was complete, the test pit excavations were deepened to between about 7 and 9 feet bgs. The explorations were continuously monitored by an engineer or geologist from our firm who examined and classified the soil encountered, obtained representative soil samples, and maintained a detailed log of the explorations. Soil encountered was classified in general accordance with ASTM International (ASTM) D 2488 and the classification chart listed in the Key to Exploration Logs, Figure A-1 in Appendix A. Logs of the explorations are presented as Figures A-2 through A-9. Exploration logs for the borings shown on the Site Plan are provided in our November 17, 2016 Geotechnical Report.

Conditions encountered in our test pits were generally consistent with those encountered in our borings and described in the "Subsurface Conditions" section of our November 17, 2016 Geotechnical Report. This report should be reviewed for additional explanation of soil units described. PIT-1 was conducted within intact glacial till soil around 4.5 feet bgs. PIT-2, PIT-3, and PIT-5 though PIT-8 were conducted within weathered glacial till soils between 2 and 4.5 feet bgs. PIT-4 was conducted within what we interpret to be lacustrine ice-contact deposits (lacustrine soils) around 4 feet bgs.

We encountered intact glacial till soils in all our PIT explorations. The depth to intact glacial till ranged from 3 to 8.5 feet bgs. The depth to dense or stiff glacial till-like soils observed in our test pit explorations are generally consistent with what we observed in our borings and the approximate depth contour lines provided on Figure 2.

Groundwater or clear evidence of groundwater (such as mottling or water marks) were not observed in any of the test pits.

LABORATORY TESTING

Selected samples from our excavations were tested in order to evaluate engineering properties and to confirm or modify field classifications. Our testing program consisted of six grain-size distribution analysis and six cation exchange capacity (CEC) and organic content (OC) tests. Grain-size analyses were performed on selected soil samples in general accordance with ASTM Test Method D 6913. Figures A-10 and A-11 present the results of the grain-size analyses. CEC and OC tests were performed at a subcontracted laboratory. Results of the CEC and OC tests are presented on Figure A-12.

PIT RESULTS

Recorded water level data from the PITs and plots of the measured (unfactored) infiltration rates calculated during each stage of the PITs are presented in Figures 3 through 10. The short-term infiltration rate is determined by extrapolating the declining trend in apparent infiltration rate over successive stages of the test. The resulting asymptotic value provides the best estimate of short-term infiltration rate at each PIT location. In instances where two or fewer stages were completed during the test duration (PIT-1 and PIT-2), the lowest apparent infiltration rate was selected as the short-term infiltration rate.

DESIGN INFILTRATION RATE

The 2015 Stormwater Manual recommends that correction factors be applied to the PIT results to estimate long-term design infiltration rates. The correction factors account for uncertainties in testing procedures, the geometry of the proposed facilities and long-term reductions in permeability due to biological activity and accumulation of fines (siltation and biofouling). The table below provides a summary of the correction factors provided in the 2015 stormwater manual that are, in our opinion, appropriate for use in determining the long-term design infiltration rate.

TABLE 1. MEASURED HYDRAULIC SATURATED CONDUCTIVITY RATE REDUCTION FACTORS

Issue	Partial Correction Factor
Test Method	$F_{TESTING}$ = 0.50 (for small scale PITs)
Plugging	$F_{PLUGGING}$ = 0.7 (for loams and sandy loams)
Facility Geometry	0.25< $F_{GEOMETRY}$< 1.0 (depends on facility geometry and subsurface conditions) $F_{GEOMETRY}$ = 4 D/W +0.5 Where: D = depth from bottom of proposed facility to maximum wet season water level or nearest impervious layer W = width of facility

The total correction factor (CF) is based on these partial correction factors and equal to $F_{TESTING}$ x $F_{PLUGGING}$ x $F_{GEOMETRY}$. The total correction factor for this site ranges between 0.0875 to 0.35 depending on the geometry factor. We were not provided the geometry of the proposed facilities and, therefore, were not able to calculate the exact geometry reduction factor. When calculating the geometry factor for a specific location we recommend that intact glacial till be considered an impervious layer. The depth and elevation of the intact glacial till is presented on the PITs and boring logs at the exploration locations. When interpreting between exploration locations we recommend that the depth to dense glacial till-like contours presented on the Site Plan be used for guidance. Ultimately, we recommend that we be consulted as the facility geometries are developed to verify that the appropriate geometry factor applied.

The table below summarizes the soil conditions at each PIT location, the short-term infiltration rates measured in our PITs and the recommended design long-term infiltration rate for each test considering a correction factor, CF = 0.0875. This value is the lower value in the range indicated above.

TABLE 2. PIT RESULT SUMMARY

Test	Test Elevation (Feet NGVD 29)	Soil Unit at Test Depth	Elevation of Intact Glacial Till at PIT Location (Feet NGVD 29)	Short-Term Infiltration Rate (inch/hour)	Design Long-Term Infiltration Rate (inch/hour)
PIT-1	457.5	Intact Glacial Till	458.8	0.15	0.01
PIT-2	457.5	Weathered Glacial Till	457	0.20	0.01
PIT-3	464	Weathered Glacial Till	462	1.7	0.15
PIT-4	460	Lacustrine Soils	455.5	11.4	1.0
PIT-5	460	Weathered Glacial Till	455	3.5	0.3
PIT-6	460	Weathered Glacial Till	458	4.6	0.40
PIT-7	461	Weathered Glacial Till	456	5.0	0.43
PIT-8	462	Weathered Glacial Till	460	1.0	0.1

PIT CONCLUSIONS AND RECOMMENDATIONS

Based on our analysis of the PITs performed at the site, it is our opinion that stormwater infiltration is feasible in some soil types at the site. The most rapid infiltration rate at the site was observed in PIT-4, which was performed within lacustrine soils. Based on our understanding of the site geology, the lacustrine soils appear to be present only in the very southwest corner of the site near the location of PIT-4 and B-10. We do not recommend that facilities outside of this area be designed using the infiltration rate determined in PIT-4. Further, if a large footprint infiltration facility is planned for this area, additional subsurface explorations should be performed to identify the extent of the lacustrine soils.

Infiltration into the weathered glacial till soils appears to be feasible. The design infiltration rate of facilities located within the weathered glacial till should consider the distance between the base of the facility and the low permeability intact glacial till soils. If intact glacial till is located within a few feet of the bottom of the facility the infiltration rate of the soils could be reduced. For example, in our opinion the relatively low infiltration rate observed in PIT-2 is partially a result of the proximity of the test location to the intact glacial till. We should be consulted if the base of the infiltration facilities will be located within 2 feet of intact glacial till.

Based on the results of PIT-1 we do not recommend that infiltration facilities be located within intact glacial till.

We recommend that GeoEngineers review the proposed stormwater infiltration facilities designed for this site to confirm that the anticipated performance can be achieved based on the soil conditions encountered. We also recommend that we be retained during construction to observe soil conditions at the base of the

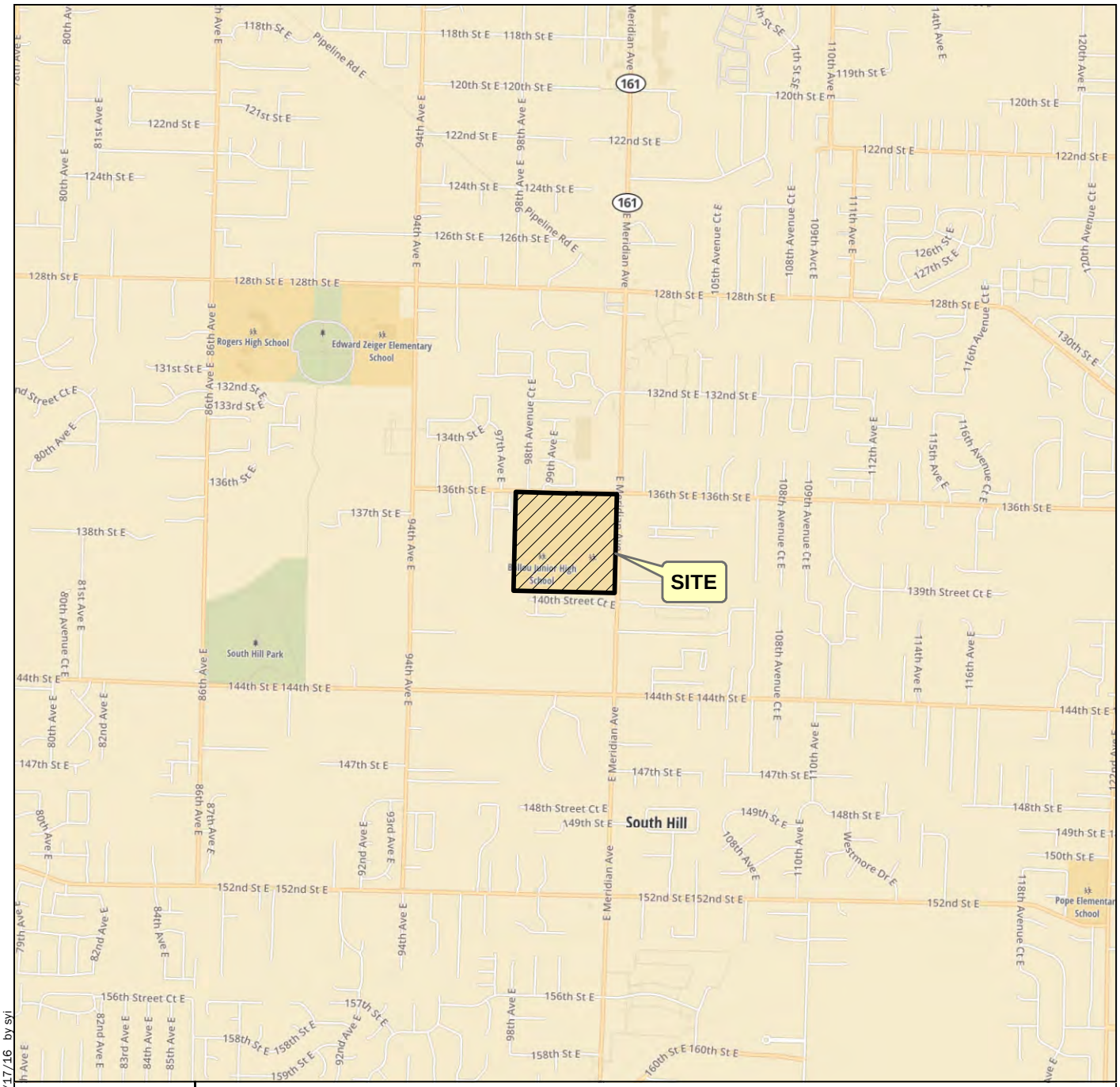
infiltration facilities and verify that soil conditions present are suitable for the proposed design. Additional recommendations for design and construction of infiltration facilities is provided in our November 17, 2016 Geotechnical Report.

LIMITATIONS

We have prepared this report addendum for the Puyallup School District, for Firgrove Elementary School. Puyallup School District may distribute copies of this report to owner's authorized agents and regulatory agencies as may be required for the Project.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices for geotechnical engineering services in this area at the time this report addendum was prepared. The conclusions, recommendations, and opinions presented in this report addendum are based on our professional knowledge, judgment and experience. No warranty, express or implied, applies to the services or this report addendum.

Except as modified herein, the conclusions, recommendations and limitations (Appendix C) presented in our previous report dated November 17, 2016 also apply to this report addendum.



Notes:

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

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Projection: NAD 1983 StatePlane Washington South FIPS 4602 Feet

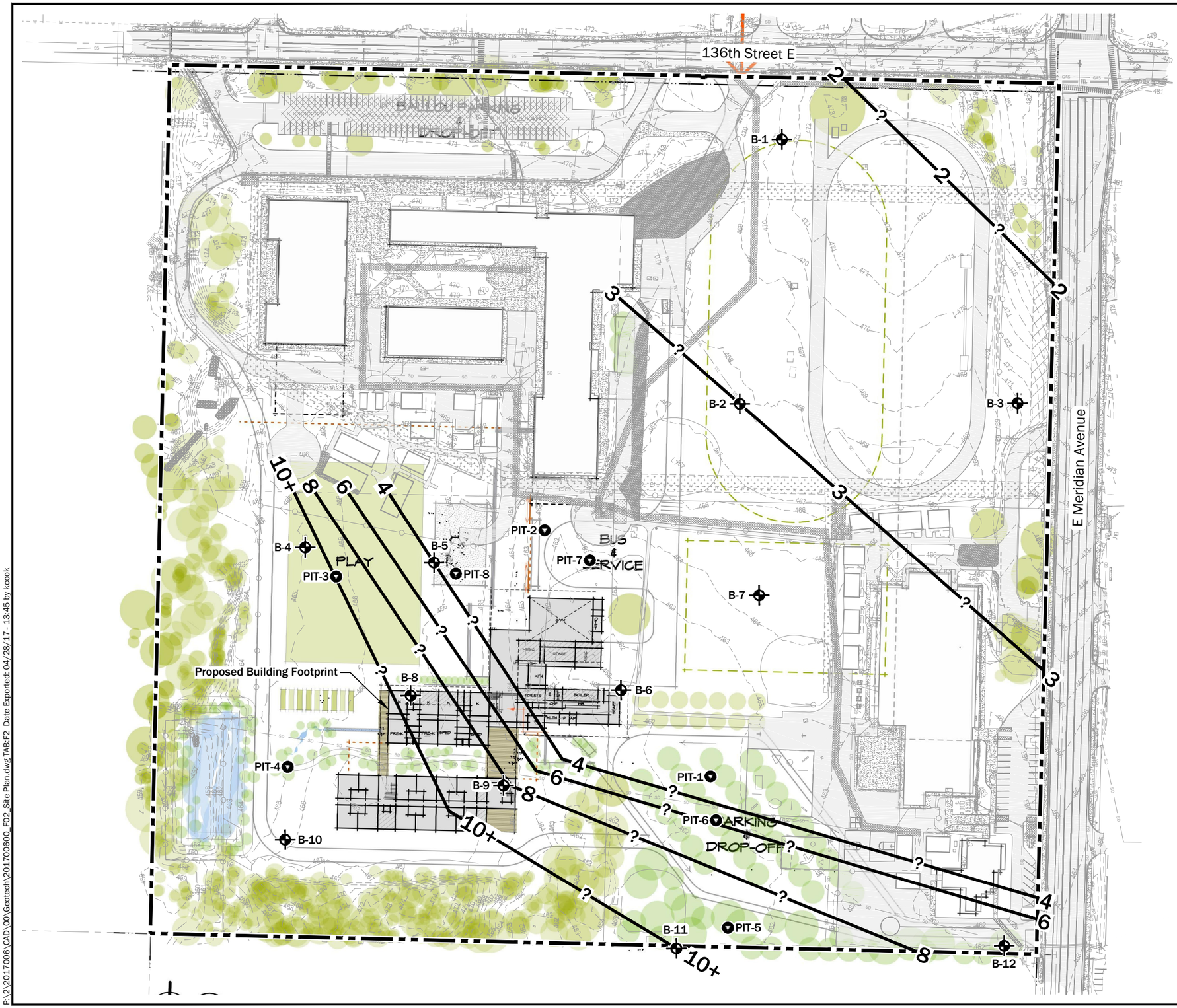
Vicinity Map

Firgrove Elementary School
Puyallup, Washington

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Figure 1

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Legend

- Site Boundary
- PIT-1 — Pilot Infiltration Test by GeoEngineers, 2017
- B-1 — Boring by GeoEngineers, 2016
- Existing Ground Surface Contour
- ?—4—? Approximate Depth to Dense Glacial Till-Like Soils

N W E S

150 0 150
Feet

Notes:

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

Vertical Datum: NGVD 29.

Projection: NAD83 Washington State Planes, South Zone, US Foot.

Data Source:
Base drawing provided by Mahlum Architects, Inc. dated 11/16/16.

Site Plan

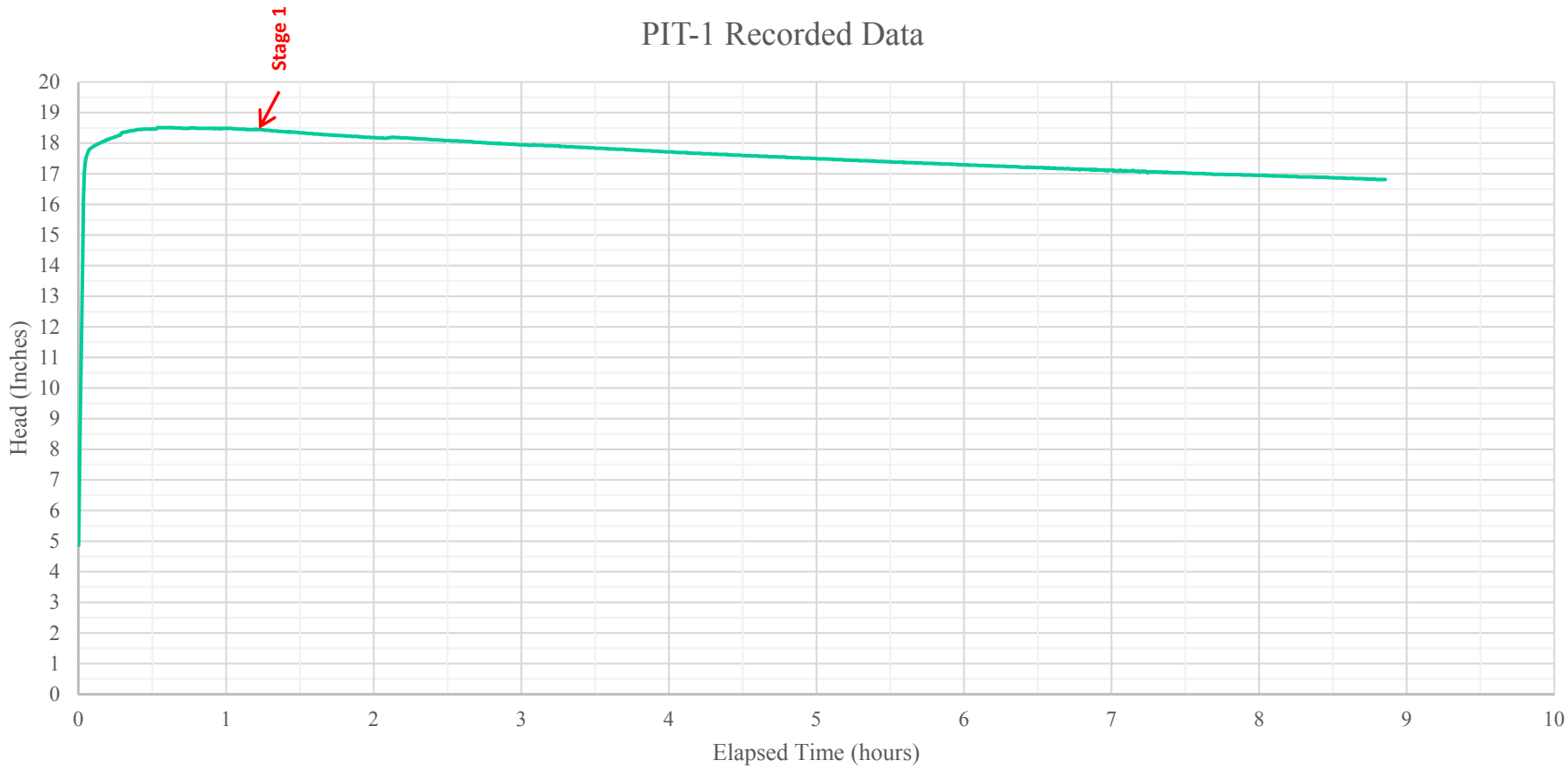
Firgrove Elementary School
Puyallup, Washington

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Figure 2

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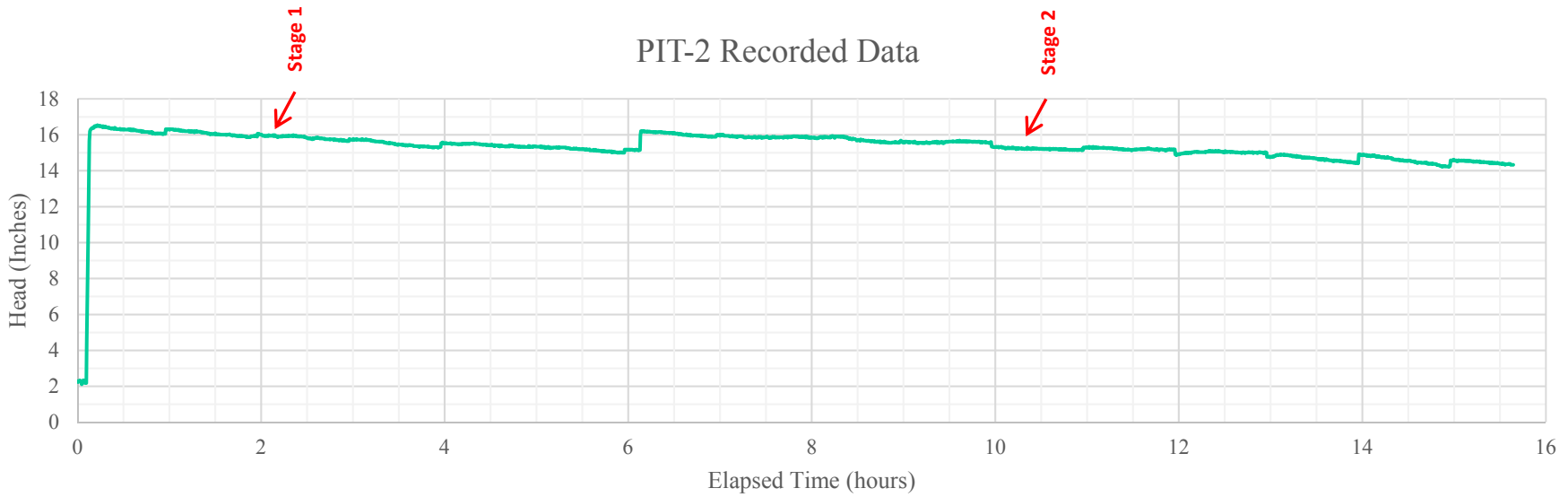
Pilot Infiltration Test Results – PIT-1

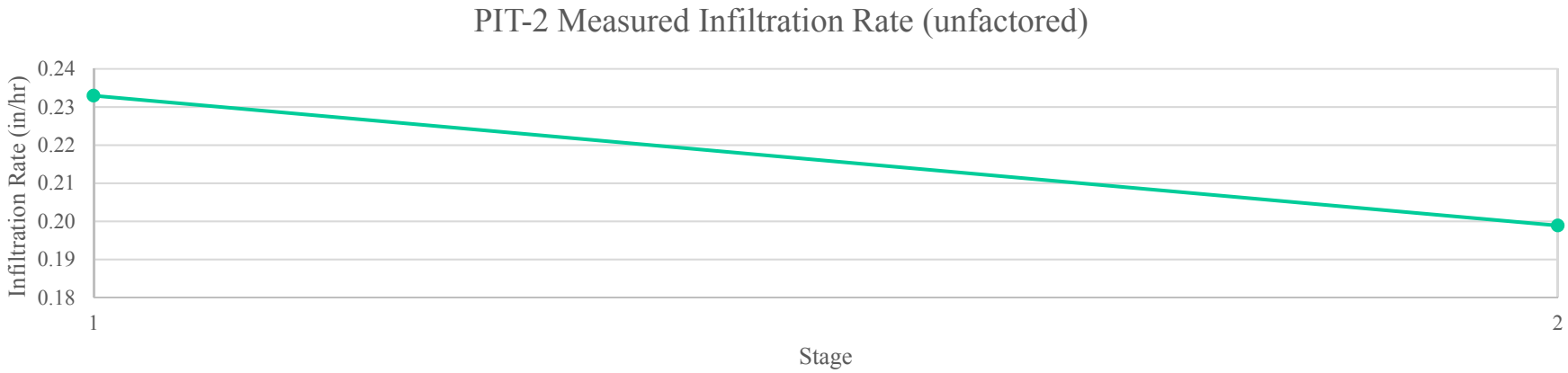
Firgrove Elementary School
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Figure 3

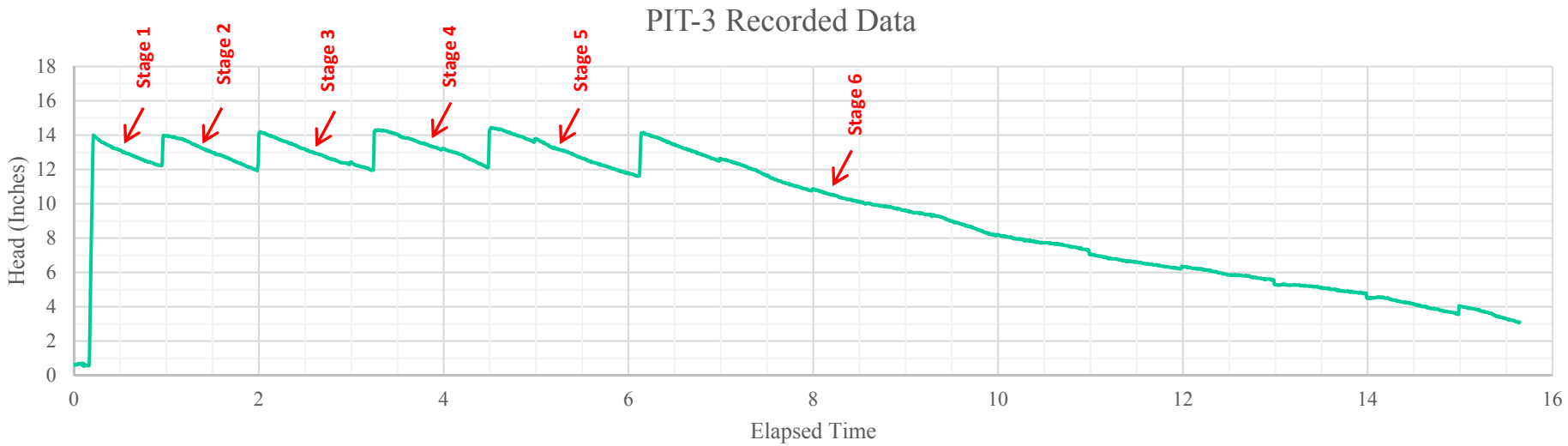
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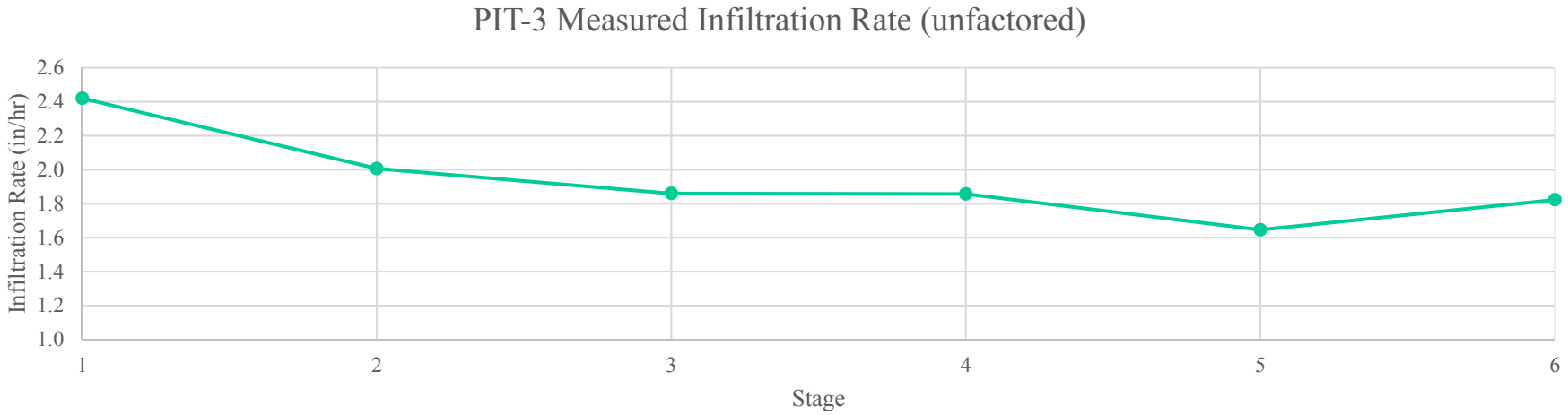




Pilot Infiltration Test Results – PIT-2	
Firgrove Elementary School Puyallup, Washington	
GeoEngineers	Figure 4

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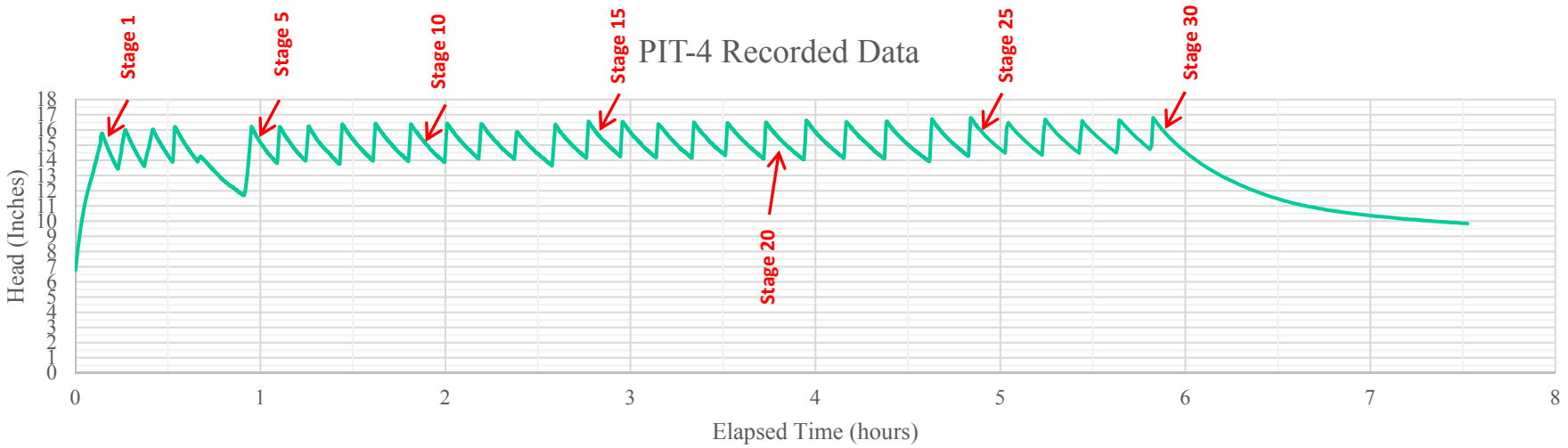
Pilot Infiltration Test Results – PIT-3

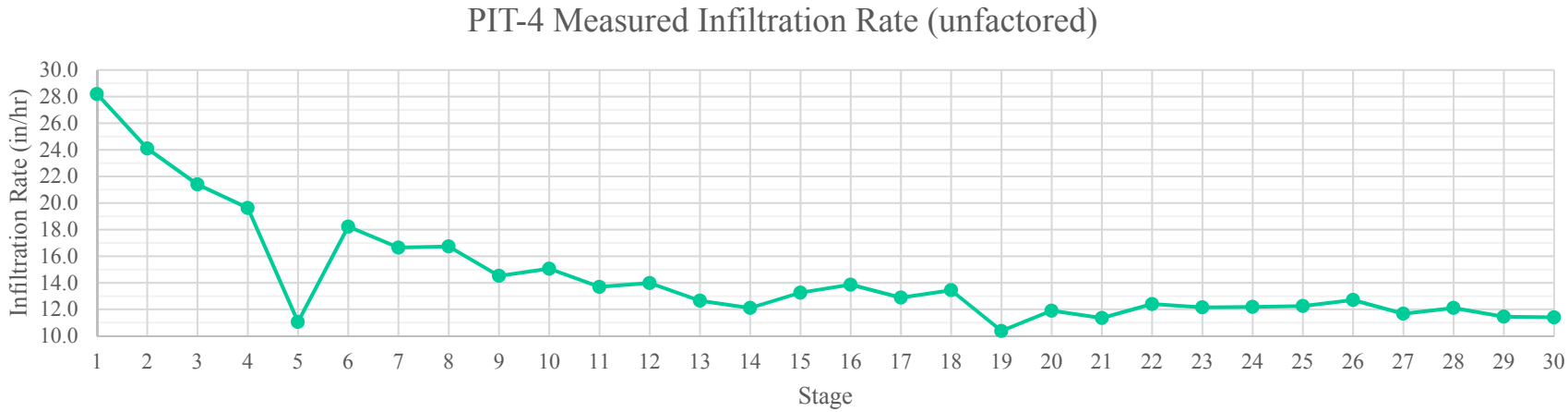
Firgrove Elementary School
Puyallup, Washington

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Figure 5

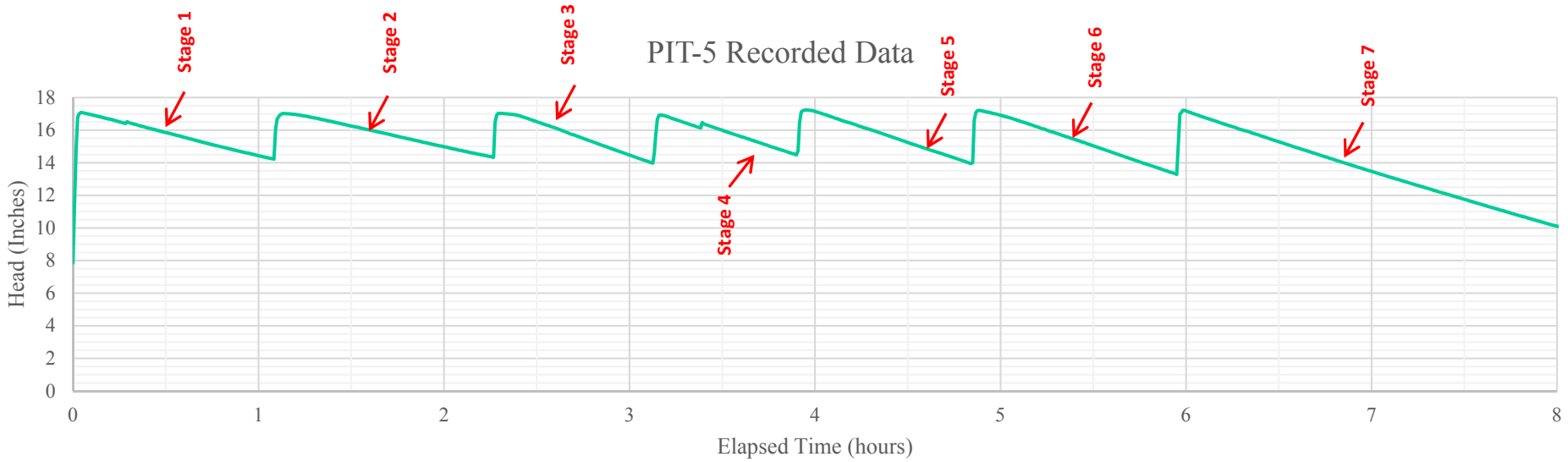
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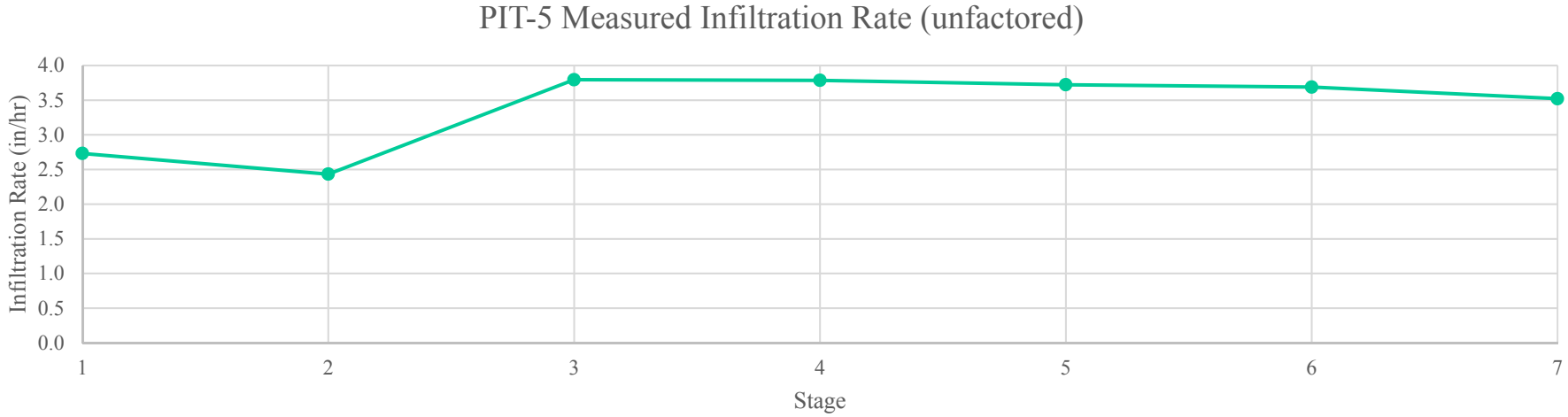




Pilot Infiltration Test Results – PIT-4	
Firgrove Elementary School Puyallup, Washington	
GeoEngineers	Figure 6

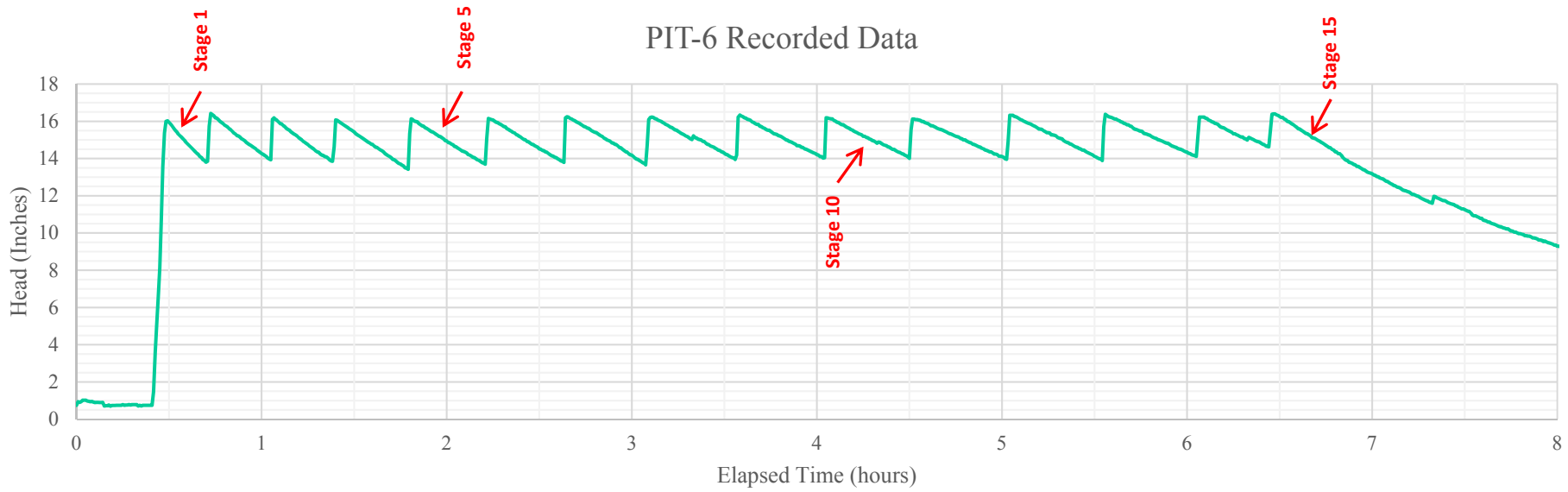
2017-006-00 date exported 4/26/17

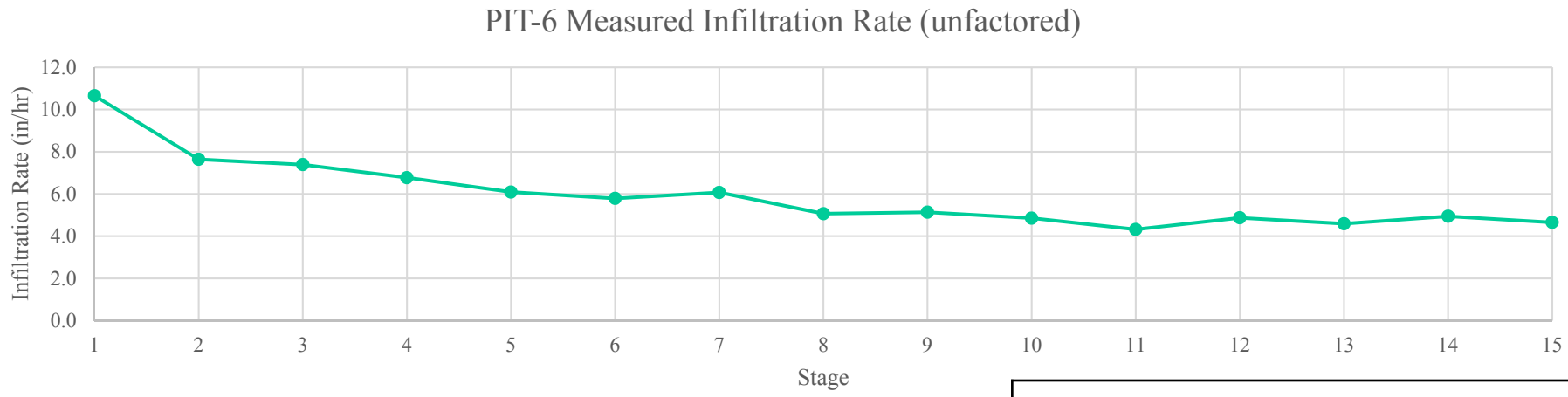




Pilot Infiltration Test Results – PIT-5	
Firgrove Elementary School Puyallup, Washington	
GeoEngineers	Figure 7

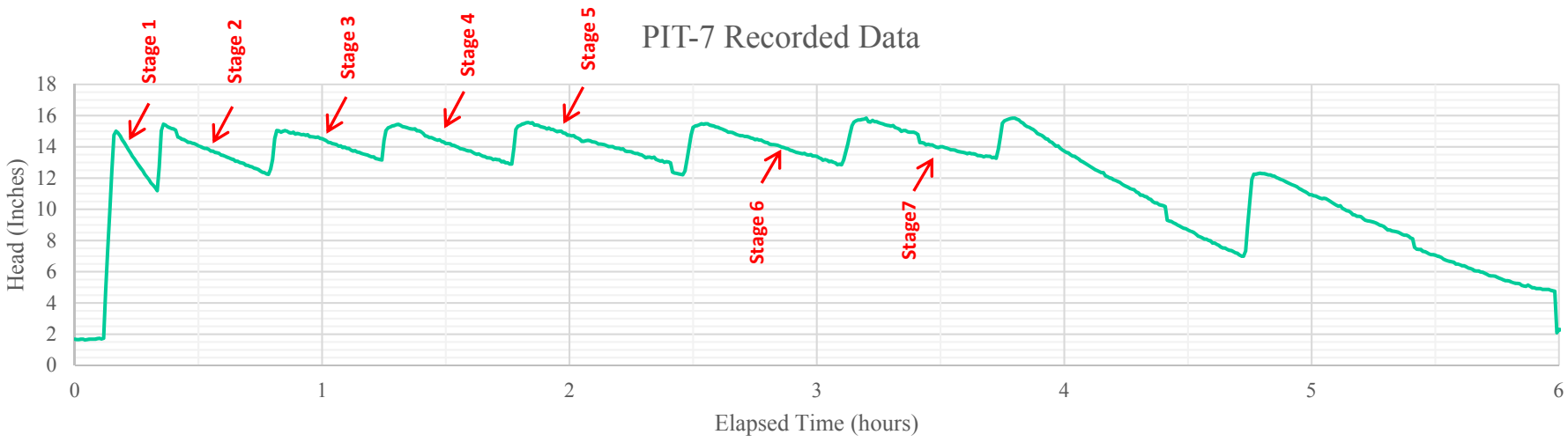
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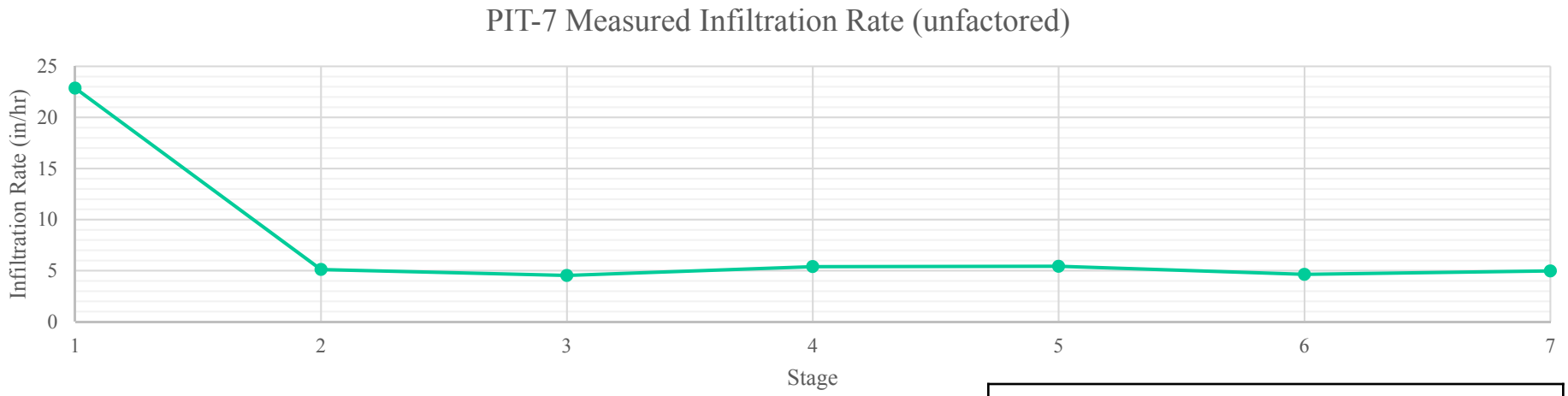




Pilot Infiltration Test Results – PIT-6	
Firgrove Elementary School Puyallup, Washington	
GeoEngineers	Figure 8

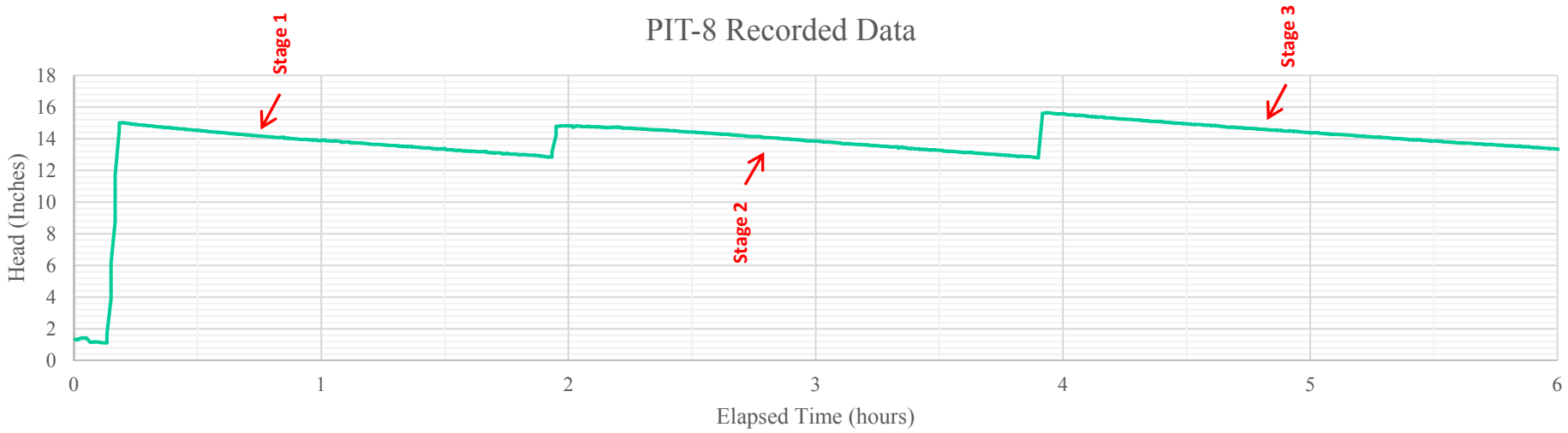
2017-006-00 date exported 4/26/17

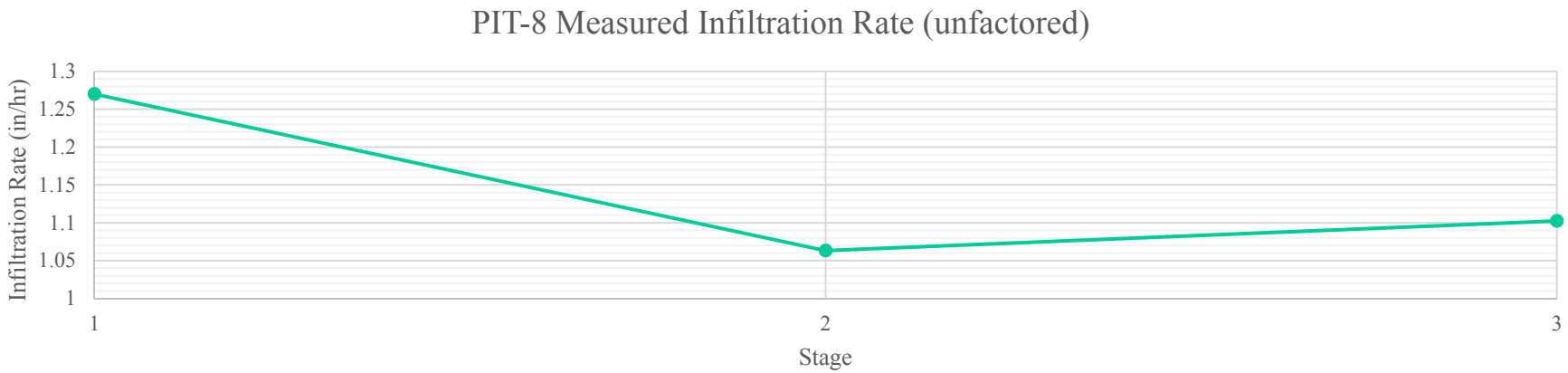




Pilot Infiltration Test Results – PIT-7	
Firgrove Elementary School Puyallup, Washington	
GeoEngineers	Figure 9

2017-006-00 date exported 4/26/17





Pilot Infiltration Test Results – PIT-8	
Firgrove Elementary School Puyallup, Washington	
GeoEngineers	Figure 10

APPENDIX A
PIT Explorations and Laboratory Testing

SOIL CLASSIFICATION CHART

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

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

ADDITIONAL MATERIAL SYMBOLS

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

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Continuous Coring

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

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

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

Laboratory / Field Tests

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

Sheen Classification

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

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

KEY TO EXPLORATION LOGS

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FIGURE A-1

Rev. 02/16

Date Excavated 4/5/2017	Total Depth (ft) 9.5	Logged By MWB Checked By BEL	Excavator Kellys Excavating	Excavation Equipment	Komatsu Tire Backhoe
Surface Elevation (ft) Vertical Datum	462 NAVD88	Easting (X) Northing (Y)	1193620 660286	Coordinate System Horizontal Datum	WA State Plane,South NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
					SOD	Grass field surface			
461	1	X	1		ML	Brown sandy silt with organic matter (roots) (medium stiff, moist) (fill)			
460	2	X	2			Grades to with gravel			
					SM	Gray-brown silty fine sand with gravel (medium dense, moist) (weathered till)			
459	3								
		X	3		SM	Gray fine to coarse silty sand with gravel and cobbles (very dense, moist) (glacial till)			
458	4								
		X	4			Grades to wet			PIT performed at 4.5 feet, soil wet to approximately 7 feet after completion of PIT
457	5								
456	6								
455	7					Grades to moist			
454	8								
453	9								

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.

Log of PIT 1

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-2
Sheet 1 of 1

Tacoma: Date:5/5/17 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate\LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	4/4/2017	Total Depth (ft)	7.5	Logged By MWB Checked By BEL	Excavator Kellys Excavating	Excavation Equipment	Komatsu Tire Backhoe
Surface Elevation (ft) Vertical Datum	462 NAVD88	Easting (X) Northing (Y)	1193372 660654	Coordinate System Horizontal Datum	WA State Plane,South NAD83 (feet)		

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
					SOD	Grass field surface			
461	1		1		SM	Brown silty fine sand, trace gravel and organic matter (roots) (loose, moist) (fill)			
460	2		2		ML	Light brown to gray sandy silt with occasional gravel (stiff, moist) (weathered till)			
459	3								
			3						
458	4					Grades to very stiff			
			4			Grades to wet			PIT performed at 4.5 feet, soil wet to approximately 7 feet after completion of PIT
457	5				SM	Gray silty fine sand with gravel and cobbles (very dense, wet) (glacial till)			
456	6								
455	7					Grades to moist			Practical refusal at 7.5 feet

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.

Log of PIT 2

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-3
Sheet 1 of 1

Tacoma: Date:5/5/17 Path:P:\2\2017006\GINT\2017006GPJ DBTemplate\LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	4/3/2017	Total Depth (ft)	7	Logged By MWB Checked By BEL	Excavator Kellys Excavating	Excavation Equipment	Komatsu Tire Backhoe
Surface Elevation (ft) Vertical Datum	466 NAVD88	Easting (X) Northing (Y)	1193059 660585	Coordinate System Horizontal Datum	WA State Plane,South NAD83 (feet)		

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
					SM	Black-dark brown silty fine sand with organic matter (roots) (loose, moist) (fill)			
			1		ML	Gray-tan with orange mottle silty sand with trace gravel (stiff, moist) (weathered till)			
465	1								
			2						
			3						
464	2		4 SA; CEC			Grades to wet	31	74	PIT performed at 2 feet, soil wet to 4 feet after PIT completed
463	3								
462	4				SM	Gray silty fine to coarse sand with gravel (very dense, moist) (glacial till)			
461	5								
460	6								
459	7								

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.

Log of PIT 3

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-4
Sheet 1 of 1

Tacoma: Date:5/5/17 Path:P:\2\2017006\GINT\2017006GPJ DBTemplate\LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	4/3/2017	Total Depth (ft)	9	Logged By / Checked By	MWB / BEL	Excavator	Kellys Excavating	Excavation Equipment	Komatsu Tire Backhoe
Surface Elevation (ft) / Vertical Datum	464 NAVD88	Easting (X) / Northing (Y)	1192987 660300	Coordinate System / Horizontal Datum	WA State Plane,South NAD83 (feet)				

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
463	1	X	1		SM	Dark brown silty fine sand with gravel and cobbles (loose, moist) (fill)			
462	2	X	2		SM	Gray to brown silty fine to coarse sand with gravel (medium dense, moist) (lacustrine soils)			
		X	3						
461	3	X	4						
460	4	X	5,6 SA; CEC		SM	Gray to brown silty fine sand (loose, wet)	18	44	PIT performed at 4 feet; soil wet to approximately 7.5 feet after PIT
						Grades to moist			
459	5								
458	6								
457	7								
		X	7						
456	8								
		X	8		SM	Gray to brown with orange mottle sandy silt (medium stiff, moist) (glacial till)			
455	9								

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.

Log of PIT 4

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-5
Sheet 1 of 1

Tacoma: Date:5/5/17 Path:P:\2\2017006\GINT\2017006GPJ DBTemplate\LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	4/6/2017	Total Depth (ft)	8	Logged By / Checked By	MWB / BEL	Excavator	Kellys Excavating	Excavation Equipment	Komatsu Tire Backhoe
Surface Elevation (ft) / Vertical Datum	462 NAVD88	Easting (X) / Northing (Y)	1193646 660059	Coordinate System / Horizontal Datum	WA State Plane,South NAD83 (feet)				

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
					SOD	Grass field surface			
461	1	X	1		SM	Light brown with orange mottle silty fine to medium sand (medium dense, moist) (weathered till)			
460	2	X	2 SA; CEC			Grades to wet	14	26	PIT performed at 2 feet bgs; soil wet to approximately 5 feet after PIT
459	3								
458	4	X	3						
457	5				ML	Light brown sandy silt (medium stiff, moist)			
456	6								
455	7				SM	Light gray to brown silty fine to coarse sand with gravel and occasional cobbles (very dense, moist) (glacial till)			
454	8								

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.

Log of PIT 5

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-6
Sheet 1 of 1

Tacoma: Date:5/5/17 Path:P:\2\2017006\GINT\2017006GPJ DBTemplate\LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated	4/6/2017	Total Depth (ft)	7	Logged By MWB Checked By BEL	Excavator Kellys Excavating	Excavation Equipment	Komatsu Tire Backhoe
Surface Elevation (ft) Vertical Datum	462 NAVD88	Easting (X) Northing (Y)	1193628 660220	Coordinate System Horizontal Datum	WA State Plane,South NAD83 (feet)		

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
					SOD	grass field surface			
461	1		1		SM	Light brown with orange staining silty fine to coarse sand, occasional gravel and cobbles (medium dense, moist) (weathered till)			
460	2		2 SA; CEC			Grades to wet	25	42	PIT performed at 2 feet; soil wet to approximately 6 feet after PIT
459	3								
458	4				SM	Light gray silty fine to coarse sand with gravel (dense, wet) (glacial till)			
457	5								
456	6					Grades to moist			
455	7								

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.

Log of PIT 6

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-7
Sheet 1 of 1

Tacoma: Date:5/5/17 Path:P:\2\2017006\GINT\201700600.GPJ DBTemplate\LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated 4/5/2017	Total Depth (ft) 8	Logged By MWB Checked By BEL	Excavator Kellys Excavating	Excavation Equipment	Komatsu Tire Backhoe
Surface Elevation (ft) 463 Vertical Datum NAVD88		Easting (X) 1193439 Northing (Y) 660610		Coordinate System WA State Plane,South Horizontal Datum NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
462	1				SM	Brown silty fine to medium sand with occasional gravel and organic matter (roots) (loose, moist) (fill)			
					SM	Brown silty fine to coarse sand with gravel (loose, moist)			
461	2	X	1 SA; CEC		SM	Light brown to tan silty fine to medium sand with gravel (loose, wet) (weathered till)	22	42	PIT performed at 2 feet; soil wet to approximately 4 feet after PIT
460	3								
459	4	X	2			Grades to medium dense			
458	5								
					SM	Light brown silty fine to medium sand (medium dense, wet)			
457	6	X	3						
456	7				SM	Gray silty fine to coarse sand with gravel and occasional cobbles (very dense, moist) (glacial till)			
455	8								

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.

Log of PIT 7

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-8
Sheet 1 of 1

Tacoma: Date:5/5/17 Path:P:\2\2017006\GINT\2017006600.GPJ DBTemplate\LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_TESTPIT_1P_GEOTEC_%F

Date Excavated 4/7/2017	Total Depth (ft) 7	Logged By MWB Checked By BEL	Excavator Kellys Excavating	Excavation Equipment	Komatsu Tire Backhoe
Surface Elevation (ft) 464 Vertical Datum NAVD88		Easting (X) 1193239 Northing (Y) 660589		Coordinate System WA State Plane,South Horizontal Datum NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
463	1				SM	Dark brown silty fine to medium sand with occasional gravel and organic matter (roots) (loose, wet) (fill) Grades to without organic matter			
462	2	X	1 SA; CEC		SM	Light brown-tan silty fine to medium sand with occasional gravel (stiff, wet) (weathered till)	19	30	PIT performed at 2 feet; soil wet to approximately 6 feet after PIT
461	3	X	2		SM	Light gray to brown silty fine to coarse sand with gravel and cobbles (dense, wet) (glacial till)			
460	4								
459	5								
458	6					Grades to moist			
457	7	X	3			Grades to very dense at 7 feet			

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.

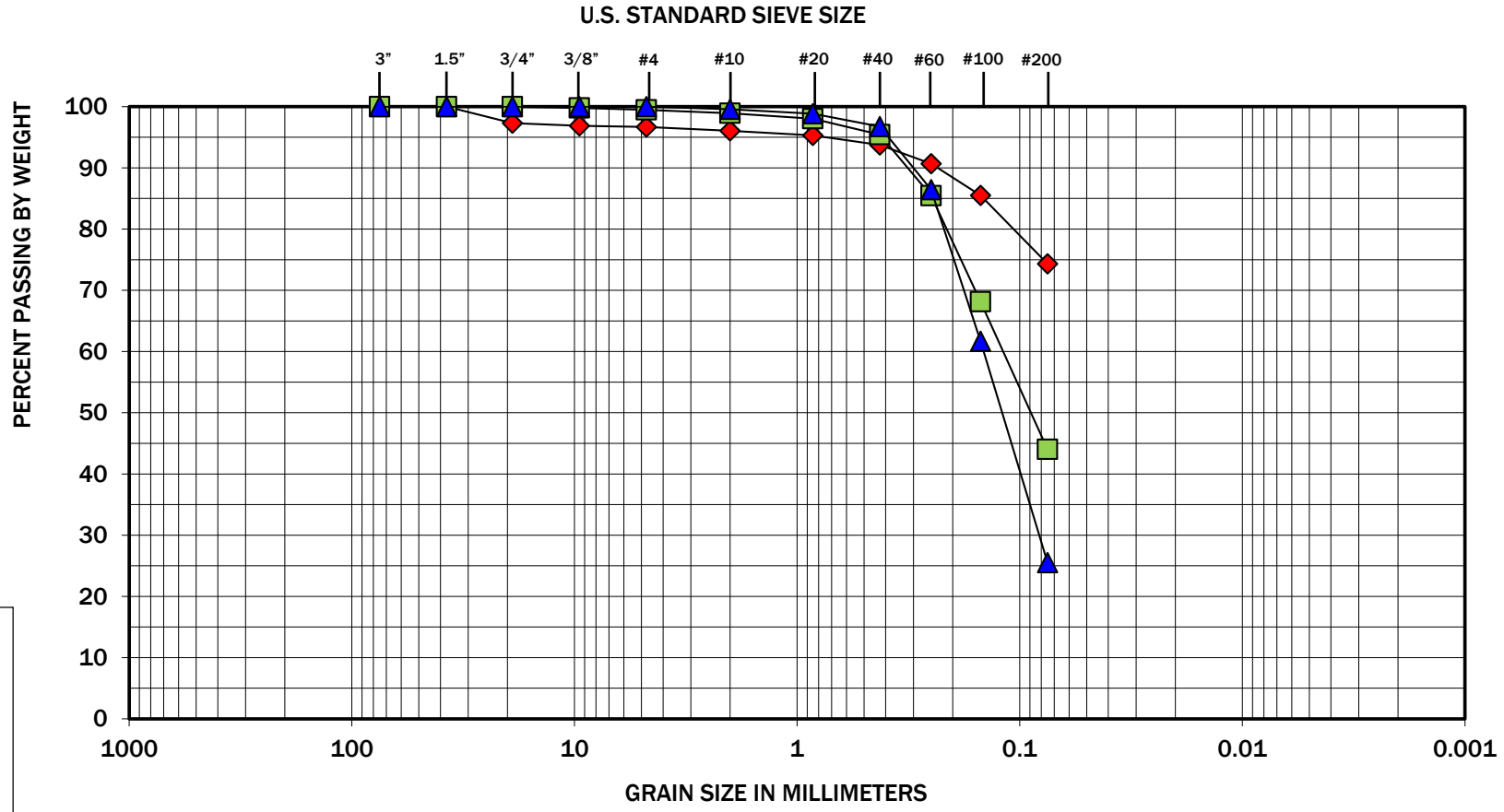
Log of PIT 8

GeoEngineers

Project: Firgrove Elementary School
Project Location: Puyallup, Washington
Project Number: 2017-006-00

Figure A-9
Sheet 1 of 1

Tacoma: Date:5/5/17 Path:P:\2\2017006\GINT\2017006GPJ DBTemplate\LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_TESTPIT_1P_GEOTEC_%F



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Exploration Number	Depth (feet)	Moisture (%)	Soil Description
◆	PIT-3	2	30.8	Silt with sand (ML)
■	PIT-4	4	18.2	Silty sand (SM)
▲	PIT-5	2	19.1	Silty sand (SM)

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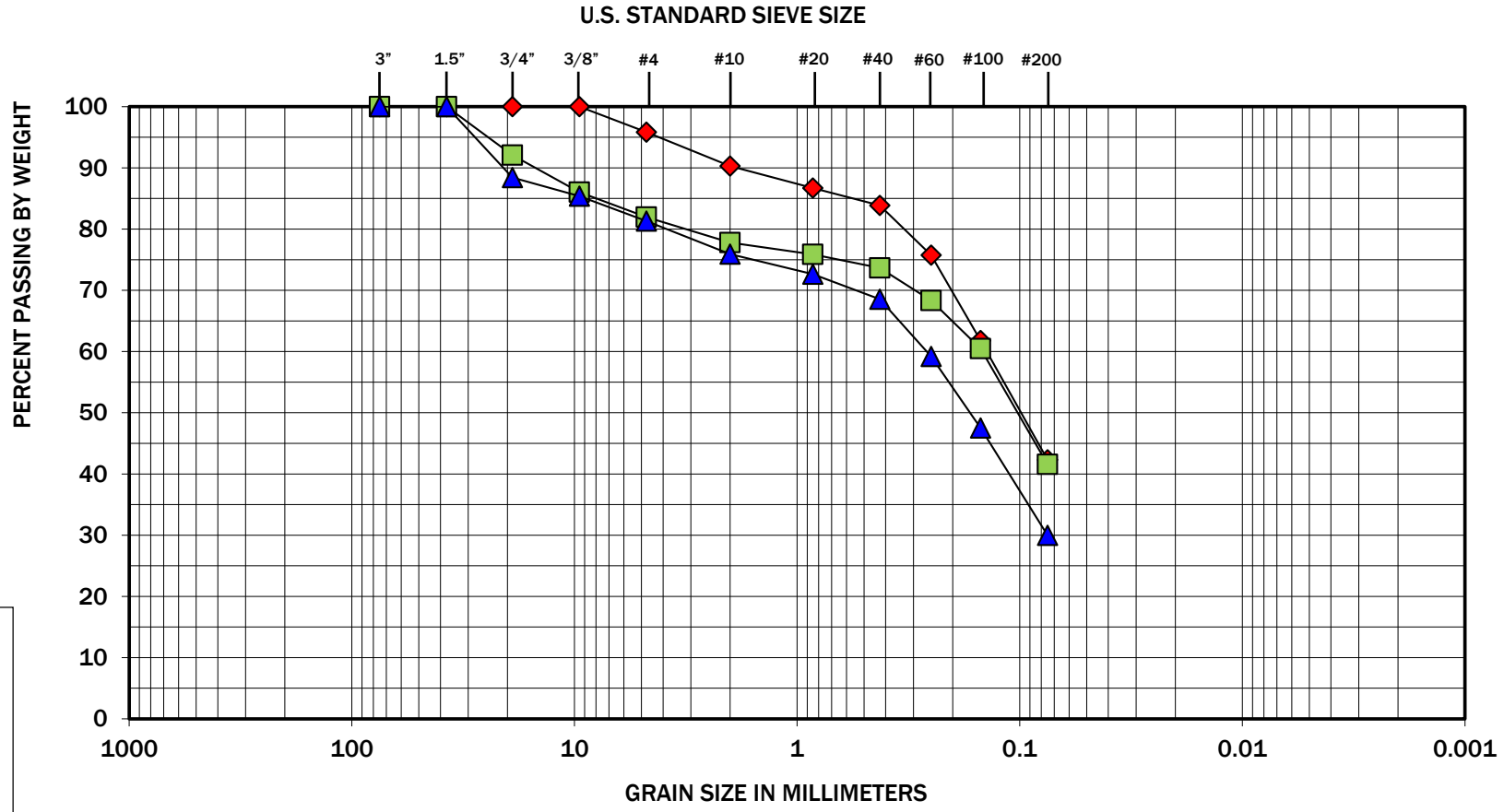
The grain size analysis results were obtained in general accordance with ASTM D 6913.

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Figure A-10

Firgrove Elementary School
Puyallup, Washington

Sieve Analysis Results



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Exploration Number	Depth (feet)	Moisture (%)	Soil Description
◆	PIT-6	2	25.2	Silty sand (SM)
■	PIT-7	2	22.3	Silty sand with gravel (SM)
▲	PIT-8	2	19.1	Silty sand with gravel (SM)

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

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Figure A-11

Firgrove Elementary School
Puyallup, Washington

Sieve Analysis Results

Exploration	Test Elevation (feet NGVD 29)	Soil Unit at Test Depth	Cation Exchange Capacity (meq/100g)	Organic Content (%)
PIT-3	463	Weathered Glacial Till	15.6	0.4
PIT-4	460	Lacustrine Soil	8.9	0.2
PIT-5	460	Weathered Glacial Till	5.7	0.3
PIT-6	460	Weathered Glacial Till	10.6	1.5
PIT-7	461	Weathered Glacial Till	12.3	3.4
PIT-8	462	Weathered Glacial Till	10.2	2.3

CEC and Organic Content Test Results

Firgrove Elementary School
Puyallup, Washington

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Figure A-12