BARGHAUSEN

STORMWATER REPORT

39th Street Office
1212 39th Avenue SW
Puyallup, WA

Prepared for:
Presidential Homes
1212 39th Avenue SW
Puyallup, WA 98373

03/09/22

September 21, 2021
Revised March 9, 2022
Our Job No. 21545

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Tab 1.0

1.0 PROJECT OVERVIEW

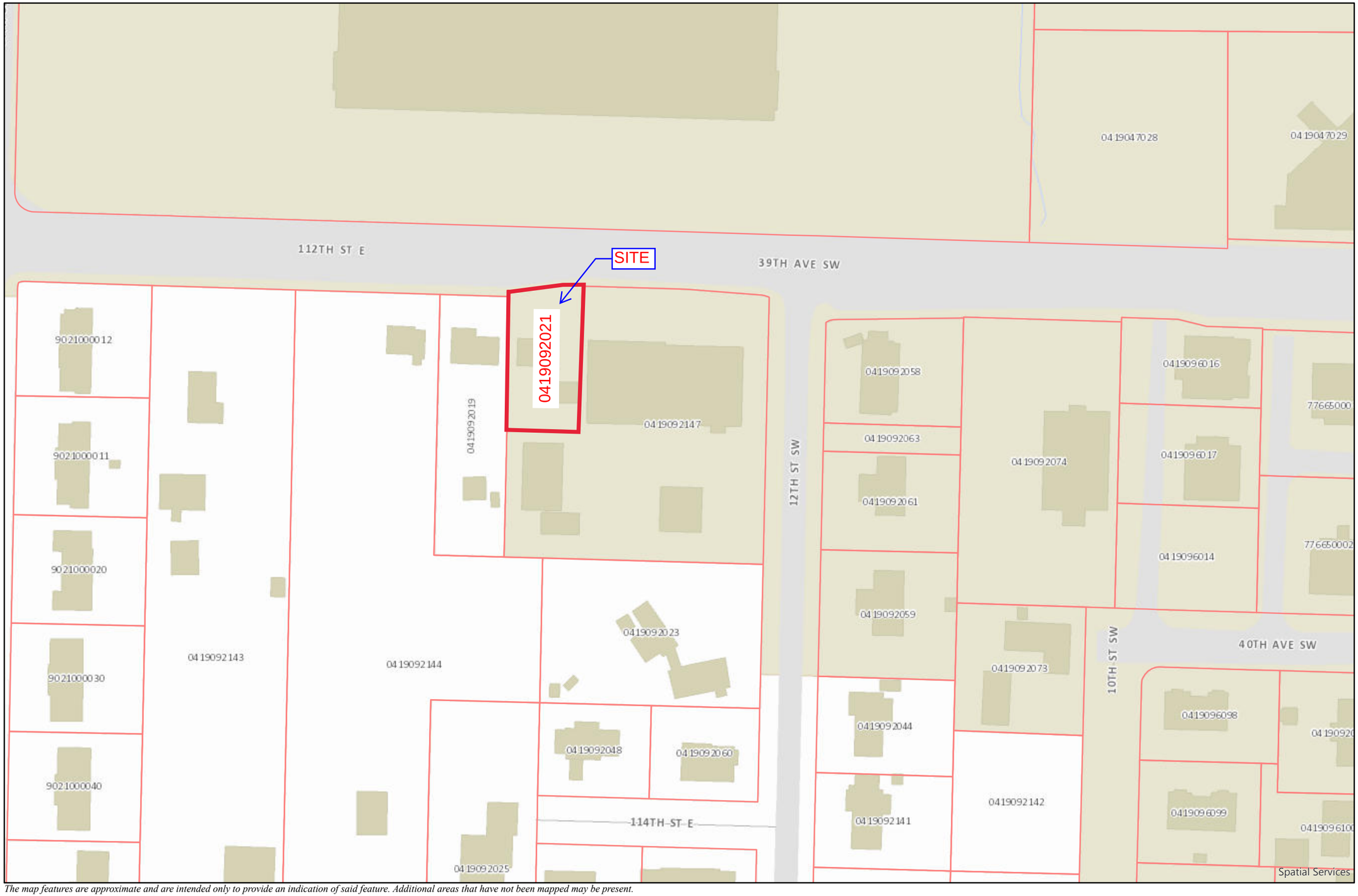
The Puyallup Office Building project is located on a single tax parcel (0419092021) with an area totaling approximately 0.25 acres. The site address is 1212 39th Ave SW, Puyallup, WA. Please refer to Figure 1 - Vicinity Map within this section.

The existing site is consists of an abandoned building, a gravel driveway and a grass lawn area. The site is bordered by 39th Avenue Southwest to the north, existing commercial buildings to the east and south, and by a single-family residence to the west. According to the SCS soils maps, soils consist of Indianola Loamy Sand. No sensitive areas have been identified onsite.

The project site will add 0.06-acre of roof area, 0.01-acre of permeable sidewalks, and 0.08-acre of permeable asphalt. A downspout infiltration trench, permeable paving, and soil amendments (BMP T5.13) are proposed to mitigate stormwater runoff in accordance with The Washington State Department of Ecology Stormwater Management Manual for Western Washington, 2012 (SMMWW), as amended in December 2014.

FIGURE 1
VICINITY MAP

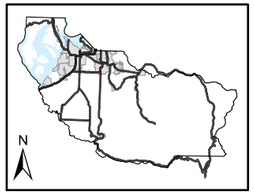
Vicinity Map



Legend

Tax Parcels

Base Parcel



The map features are approximate and are intended only to provide an indication of said feature. Additional areas that have not been mapped may be present.
This is not a survey. Orthophotos and other data may not align. The County assumes no liability for variations ascertained by actual survey.
ALL DATA IS EXPRESSLY PROVIDED 'AS IS' AND 'WITH ALL FAULTS'. The County makes no warranty of fitness for a particular purpose.

Date: 10/10/2019 10:37 AM

FIGURE 2
SOILS MAP

Map Scale: 1:295 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 4 8 16 24

Feet
0 10 20 40 60

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

Pierce County Area, Washington

18B—Indianola loamy sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t62k
Elevation: 0 to 980 feet
Mean annual precipitation: 30 to 81 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 170 to 210 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Indianola and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Indianola

Setting

Landform: Eskers, kames, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy glacial outwash

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 6 inches: loamy sand
Bw1 - 6 to 17 inches: loamy sand
Bw2 - 17 to 27 inches: sand
BC - 27 to 37 inches: sand
C - 37 to 60 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A

Forage suitability group: Droughty Soils (G002XV402WA), Droughty Soils (G002XF403WA), Droughty Soils (G002XS401WA), Droughty Soils (G002XN402WA)
Hydric soil rating: No

Minor Components

Alderwood
Percent of map unit: 8 percent
Landform: Ridges, hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest, talf
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Everett
Percent of map unit: 5 percent
Landform: Kames, eskers, moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest, interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Norma
Percent of map unit: 2 percent
Landform: Depressions, drainageways
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Pierce County Area, Washington
Survey Area Data: Version 15, Sep 16, 2019

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pierce County Area, Washington
Survey Area Data: Version 15, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 8, 2014—Jul 15, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
18B	Indianola loamy sand, 0 to 5 percent slopes	0.3	100.0%
Totals for Area of Interest		**0.3**	**100.0%**

FIGURE 3
FEMA MAP

National Flood Hazard Layer FIRMette

FEMA

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

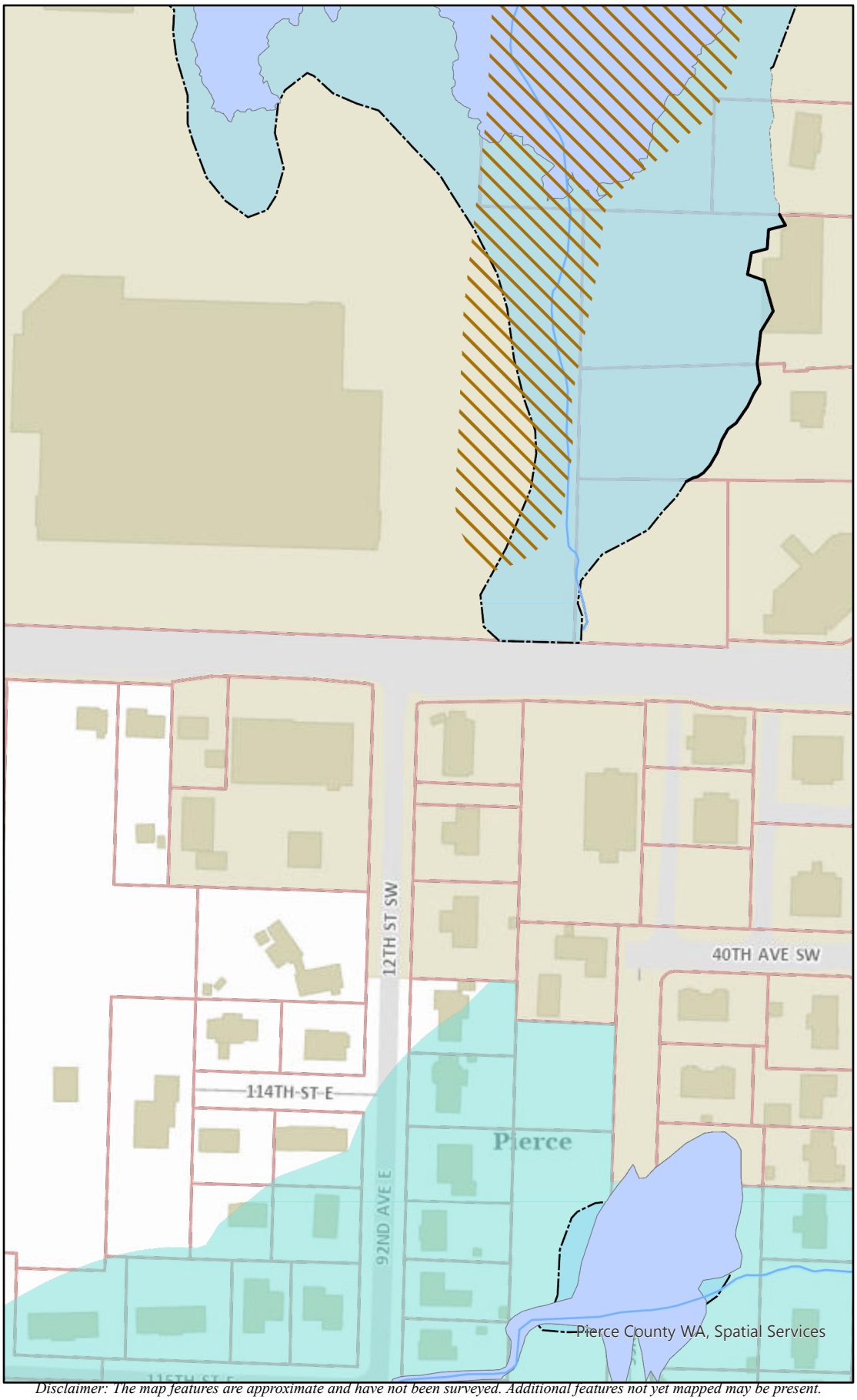
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/10/2019 at 1:33:35 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

FIGURE 4
SENSITIVE AREA MAP

SENSITIVE AREA MAP



Legend

- Hydric Soils
- Hydro Water Bodies

Regulated Floodplain 2017

- 1% Annual Chance Flood
- X BEHIND LEVEE
- 0.2 PCT
- X (SHADED)
- Coastal High Hazard Areas
- See King County FIRM
- Potential Wetland Review

Wetlands

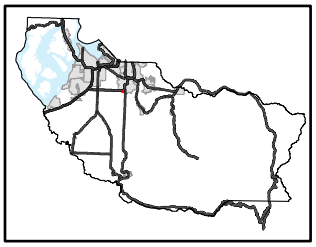
- Unconfirmed
- Yes
- No

Wetlands Delineation

- Delineated
- Verified
- Unverified

Hydro - Centerlines

- Hydro Centerline
- Pipe
- Floodways
- Tax Parcels



N

0 45 90 180 Feet

1:2,400

Date: 7/18/2021 05:21 PM

Disclaimer: The map features are approximate and have not been surveyed. Additional features not yet mapped may be present. Pierce County assumes no liability for variations ascertained by formal survey.

Tab 2.0

2.0 EXISTING CONDITIONS SUMMARY

The site is located to the south of the 39th Ave SW alignment. The existing site is generally rectangular in shape, measures approximately 75 feet wide (east to west) by about 140 to 150 feet deep (north to south) and encompasses approximately 0.25 acres. The site is bound by existing residential development to the west, by commercial development to the south and east, and by 39th Avenue Southwest to the north. The site generally slopes from south to north. The site's northern boundary is generally at grade with 39th Avenue SW and slopes up to the south at about 5 percent along the existing driveway. A short landscaping wall provides grade separation along the north property line adjacent west of the driveway. Vegetation across the site mostly consists of grass.

Soils at the site have been mainly identified as Indianola loamy sand (18B) as determined by the National Cooperative Soil Survey of Natural Resources Conservation Service (NRCS). Indianola soils are typically derived from sandy glacial outwash, form on slopes of 0 to 5 percent, have a "slight" erosion hazard when exposed, and are include in hydrologic soils group A.

A geotechnical report was prepared by GeoResources, LLC on June 12, 2019, and amended on June 22, 2020. The test pits generally encountered about 0.5-feet of topsoil over 3-feet of loose to medium stiff recessional lacustrine deposits over medium dense silty sand to a depth of 10-feet below existing ground. Test pits were excavated during the wet season and groundwater seepage was not observed in any of the test pits. The report confirmed that soils found at the site are suitable for infiltration. Long term design infiltration rates were determined to be 0.4 inches per hour for permeable paving and 2 inches per hour for the infiltration trench. Please refer to geotechnical report in Section 6.0 for more information.

The Federal Emergency Management Agency (FEMA) has prepared flood insurance maps identifying floodplains within the City of Puyallup. The parcel and all the proposed improvements are located within Zone X as shown on FIRM Panel #53053C0343E, which is considered out of the 100-year floodplain.

Tab 3.0

3.0 OFFSITE ANALYSIS

There is no upstream stormwater runoff from the adjacent properties flowing to the project site. The project site is within the Clarks Creek basin per the City of Puyallup Drainage Basin maps.

The runoff from the roof will be conveyed to an onsite infiltration trench, and runoff from the parking lot and sidewalk areas will infiltrate via onsite permeable concrete and/or permeable asphalt sections. Overflows from onsite will flow into the public right of way and infiltrate into new permeable pavement sections in 39th Avenue Southwest, and then into the nearest structure of the City of Puyallup public conveyance, located at the corner of 39th Avenue Southwest and 12th Street Southwest. There were no problems identified or observed during our site reconnaissance.

Tab 4.0

4.0 PERMANENT STORMWATER CONTROL PLAN

Existing Site Hydrology

The existing site is vacant and contains areas of grass and gravel. The parcel generally slopes from south to north. The runoff from the site is expected to infiltrate on site. Please refer to Figure 5 - Existing Basin Map within this section.

Developed Site Hydrology

The developed site will contain an office building, parking and walkways, utilities, permeable pavement sidewalk and parking lot utilities, and landscaping. Stormwater runoff from the access drive will be infiltrated within the permeable pavement. The runoff from the rooftop will be fully infiltrated in a downspout infiltration trench. The remainder of the site will contain amended soils and were modeled as outwash pasture. Please refer to Figure 6 - Developed Basin Map within this section.

The following is a summary of post-developed land-use of the site:

Land-use	WWHM Description	Area (acre)
Landscaping	Outwash	0.127
Driveway/Parking/Sidewalks	Roads Flat	0.070
Roof	Roof Tops Flat	0.053
Total		**0.25**

Table 4.1 – Post-developed Land-use

Flow Control

Retention facilities were sized using the most current version of Western Washington Hydrology Model (WWHM). Runoff from the roof area (0.053-acre) will be fully infiltrated in a downspout infiltration trench. Runoff from the proposed sidewalk (0.010-acre) will infiltrate within the permeable sidewalk. Runoff from the proposed parking area and drive aisle (0.062-acre) will infiltrate within the permeable asphalt. Onsite soils within the landscaping areas will be amended. Based on pre-developed and post-developed flows, the remainder of the site is exempt from providing additional flow control since there is no more than a 0.15 cfs increase in the 100-year developed storm event. A copy of the WWHM reports are provided in this section. The following is a summary of the pre and post development flows after impervious surfaces are infiltrated.

Storm Event (year)	Pre-Developed Flow rate (cfs)	Post Developed Flow Rate (cfs)	Increase in Flow (cfs) – Pre vs Post
100	0.000257	0.005968	0.005711 < 0.15

Table 4.2 – Flow Rate Comparison of Pre-developed and Mitigated Flow

Water Quality System

Since the project will result in approximately 2,697 square feet of pollution-generating hard surfaces (PGHS) which is less than the 5,000 square foot threshold, formal water quality treatment is not required.

Discussion of Minimum Requirements

The following is a summary of the minimum requirements as described in Chapter 2 of Volume I of the SMMWW. Each minimum requirement must be considered per Figure 2.4.1 flowchart.

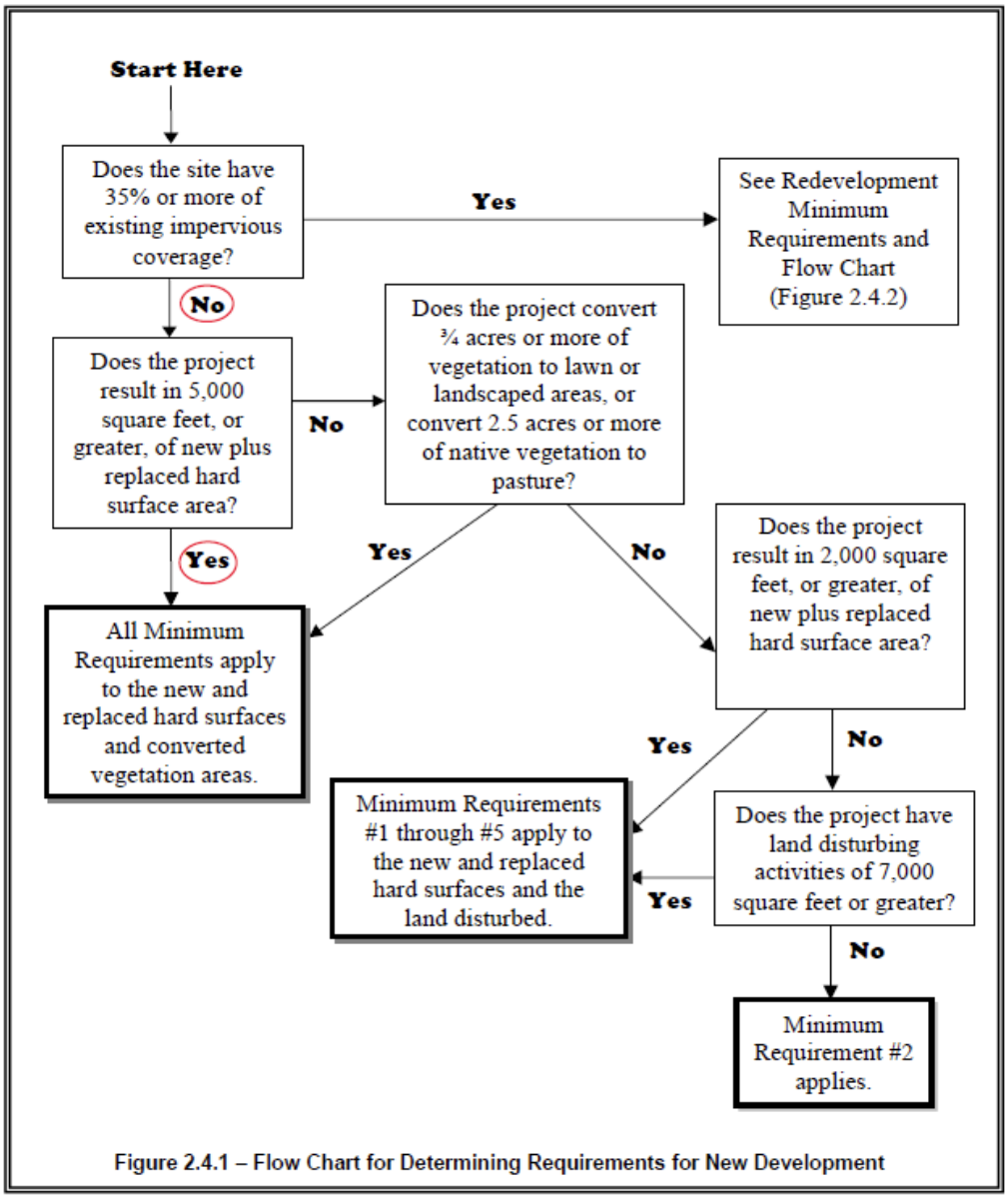


Figure 2.4.1 – Flow Chart for Determining Requirements for New Development

Minimum Requirement #1: Preparation of a Stormwater Site Plan

The Stormwater Site Plan is prepared per Chapter 3, Volume I of the SMMWW.

Minimum Requirement #2: Construction Stormwater Pollution Prevention (SWPP)

A temporary erosion control plan is prepared for this project and all thirteen (13) elements are addressed, please refer to Section 5.0 of this report.

Minimum Requirement #3: Source Control of Pollution

Permanent source control BMPs are required for the development's daily operations, and the stormwater facilities must be maintained as described in the Operations and Maintenance Manual, which is include at the end of this report.

Minimum Requirement #4: Preservation of Natural Drainage System and Outfalls

Stormwater from the proposed improvements will infiltrate as in the existing condition, either via the onsite infiltration trench or through the permeable sidewalk and permeable asphalt areas.

Minimum Requirement #5: Onsite Stormwater Management

The City requires projects to implement onsite stormwater management BMPs when feasible. This project must meet minimum requirements #1 to #11. Therefore, this project will evaluate List 2 of the Manual for onsite stormwater management compliance. These BMPs were evaluated and discussed as follows:

<u>Lawn and Landscape Areas</u>

Soil Preservation and Amendment (Ecology BMP T5.13)

All disturbed pervious areas that are not converted to impervious surfaces will apply soil amendment per Ecology BMP T5.13.

<u>Roof Areas</u>

Full dispersion was deemed infeasible since the developed site has much less than 65% of forested or native condition. In addition, the 100-foot flow path is not available.

Downspout full infiltration was deemed feasible. A roof infiltration trench is proposed for the disposal of roof stormwater.

Perforated Stub-out connections are not necessary since downspout infiltration is proposed and has higher priority.

<u>Other Hard Surface</u>

Full dispersion of BMP T5.30 was deemed infeasible since the developed site had much less than 65% of forested or native condition and the 100-foot flow path is not available.

Permeable Pavement BMP was deemed feasible and will be utilized for the onsite parking and sidewalk areas.

Minimum Requirement #6: Runoff Treatment

The project will result in 3,268 sq. ft. of PGHS, which is less than the threshold of 5,000 sq.ft. and the project does not propose three quarters (3/4) of an acre or more pollution-generating pervious surfaces (PGPS). Therefore, this project will not trigger runoff treatment requirement.

Minimum Requirement #7: Flow Control

The project is exempt from providing additional flow control since the developed 100-year flow is not increased by more than 0.15 cfs. Detailed calculations are provided within this section.

Minimum Requirement #8: Wetlands Protection

No wetlands have been identified onsite or immediately adjacent to the site.

Minimum Requirement #9: Basin/Watershed Planning

The project is located within the Clarks Creek basin per the City of Puyallup Drainage Basins Map. The project will not adversely affect any downstream properties since all stormwater runoff will be infiltrated.

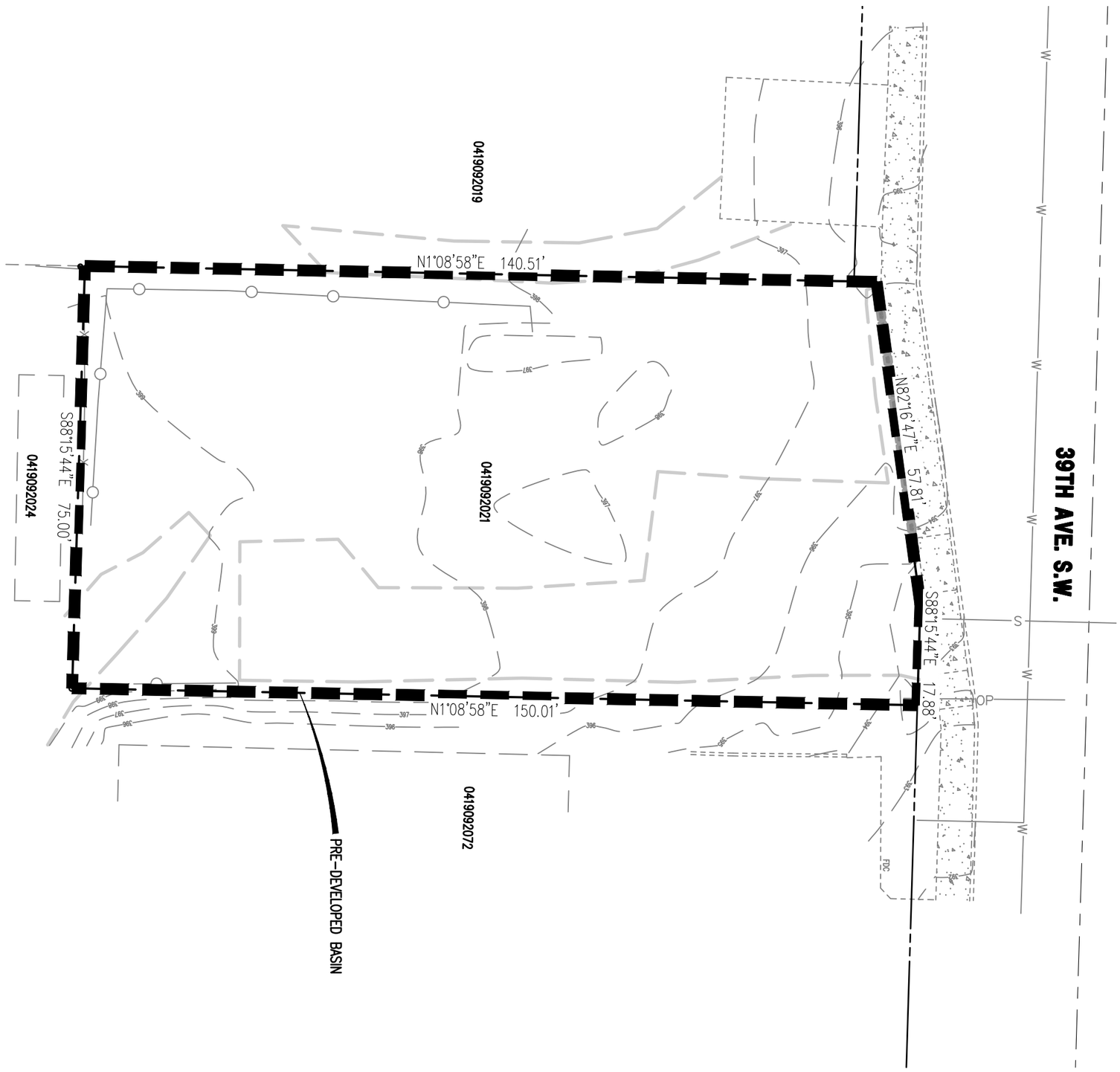
Minimum Requirement #10: Operation and Maintenance

A Maintenance Schedule can be found in Section 8.0.

Minimum Requirement #11: Off-Site Analysis and Mitigation

An offsite analysis is prepared within this document and can be found in Section 3.0 of this report.

FIGURE 5
EXISTING BASIN MAP



PRE-DEVELOPED BASIN:
FOREST: 0.25 ACRES

SCALE: 1"=20'

0 10' 20' 40'

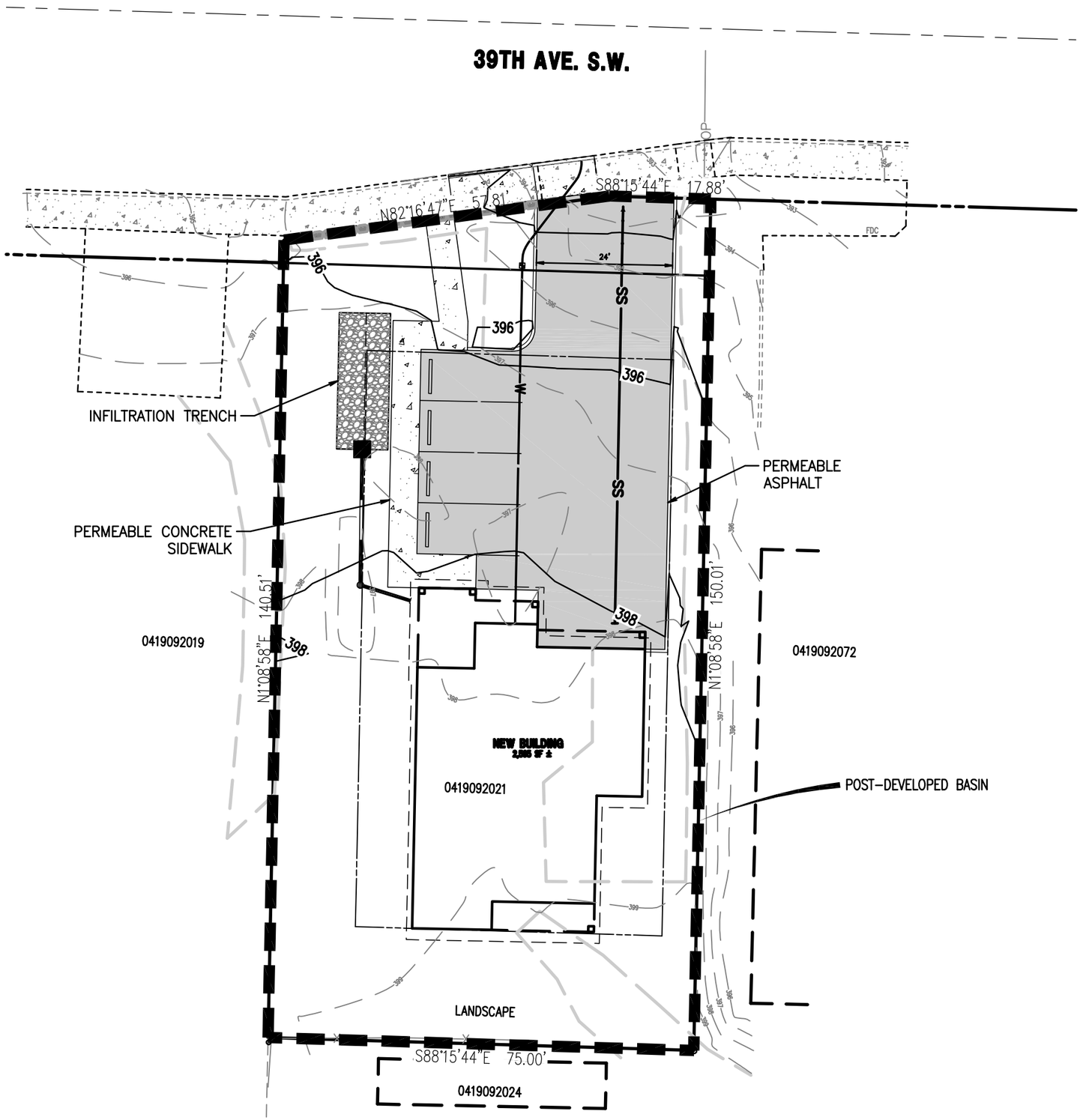
N

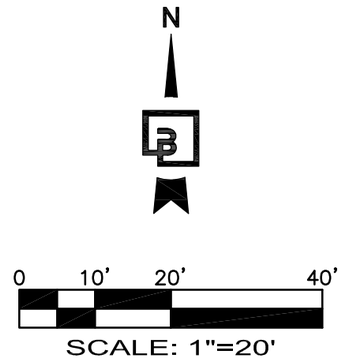
No.	Date	By	Ckd.	Appr.	Revision

Job Number 21545	Barghausen Consulting Engineers, Inc. 18215 72nd Avenue South Kent, WA 98032 425.251.6222 barghausen.com	Designed – Drawn – Checked – Approved – Date –	Scale: Horizontal AS SHOWN Vertical AS SHOWN	Title: 39TH AVE OFFICE BUILDING PRE-DEVELOPED BASIN MAP
Sheet 1 of 1				For: PRESIDENTIAL HOMES 1212 39TH AVENUE, PUYALLUP, WA, 98373

P:\21000s\21545\exhibit\Pre-developed Basin Map B1.dwg 5/25/2021 3:34 PM LPALMER

FIGURE 6
DEVELOPED BASIN MAP





POST–DEVELOPED BASIN:

ROOFTOP:	2294 SF (0.053 AC)
PARKING:	2697 SF (0.062 AC)
SIDEWALKS:	435 SF (0.010 AC)
PASTURE/LANDSCAPE:	5553 SF (0.120 AC)
TOTAL:	10979 SF (0.25 AC)

No.	Date	By	Ckd.	Appr.	Revision

Title: **39TH AVE OFFICE BUILDING**
POST-DEVELOPED BASIN MAP

For: PRESIDENTIAL HOMES
1212 39TH AVENUE, PUYALLUP, WA, 98373

Scale: Horizontal AS SHOWN Vertical AS SHOWN

Designed — Drawn — Checked — Approved — Date —

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222 **barghausen.com**

Job Number 21545

Sheet 1 of 1

P:\21000s\21545\exhibit\Post-developed basin Map B2.dwg

FIGURE 7
WWHM

WWHM - Roof Infiltration Trench

WWHM2012
PROJECT REPORT

Project Name: 21545-Infiltration Trench
Site Name: 39TH Office Bldg
Site Address: 1212 39th Ave SW
City : Puyallup
Report Date: 3/15/2022
Gage : 40 IN EAST
Data Start : 10/01/1901
Data End : 09/30/2059
Precip Scale: 1.00
Version Date: 2019/09/13
Version : 4.2.17

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Pre-developed Basin
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Forest, Mod	.053
Pervious Total	0.053

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.053

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Developed Basin
Bypass: No

GroundWater: No

Pervious Land Use	acre
Pervious Total	0

Impervious Land Use	acre
ROOF TOPS FLAT	0.053
Impervious Total	0.053
Basin Total	0.053

Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed 1	Gravel Trench Bed 1	

Name : Gravel Trench Bed 1
Bottom Length: 24.00 ft.
Bottom Width: 9.00 ft.
Trench bottom slope 1: 0 To 1
Trench Left side slope 0: 0 To 1
Trench right side slope 2: 0 To 1
Material thickness of first layer: 3
Pour Space of material for first layer: 0.35
Material thickness of second layer: 0
Pour Space of material for second layer: 0
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Infiltration On
Infiltration rate: 2
Infiltration safety factor: 1
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 22.49
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 22.49
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 3 ft.
Riser Diameter: 8 in.

Element Flows To:

Outlet 1	Outlet 2

Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.005	0.000	0.000	0.000
0.0444	0.005	0.000	0.000	0.010

0.0889	0.005	0.000	0.000	0.010
0.1333	0.005	0.000	0.000	0.010
0.1778	0.005	0.000	0.000	0.010
0.2222	0.005	0.000	0.000	0.010
0.2667	0.005	0.000	0.000	0.010
0.3111	0.005	0.000	0.000	0.010
0.3556	0.005	0.000	0.000	0.010
0.4000	0.005	0.000	0.000	0.010
0.4444	0.005	0.000	0.000	0.010
0.4889	0.005	0.000	0.000	0.010
0.5333	0.005	0.000	0.000	0.010
0.5778	0.005	0.001	0.000	0.010
0.6222	0.005	0.001	0.000	0.010
0.6667	0.005	0.001	0.000	0.010
0.7111	0.005	0.001	0.000	0.010
0.7556	0.005	0.001	0.000	0.010
0.8000	0.005	0.001	0.000	0.010
0.8444	0.005	0.001	0.000	0.010
0.8889	0.005	0.001	0.000	0.010
0.9333	0.005	0.001	0.000	0.010
0.9778	0.005	0.001	0.000	0.010
1.0222	0.005	0.001	0.000	0.010
1.0667	0.005	0.001	0.000	0.010
1.1111	0.005	0.001	0.000	0.010
1.1556	0.005	0.002	0.000	0.010
1.2000	0.005	0.002	0.000	0.010
1.2444	0.005	0.002	0.000	0.010
1.2889	0.005	0.002	0.000	0.010
1.3333	0.005	0.002	0.000	0.010
1.3778	0.005	0.002	0.000	0.010
1.4222	0.005	0.002	0.000	0.010
1.4667	0.005	0.002	0.000	0.010
1.5111	0.005	0.002	0.000	0.010
1.5556	0.005	0.002	0.000	0.010
1.6000	0.005	0.002	0.000	0.010
1.6444	0.005	0.002	0.000	0.010
1.6889	0.005	0.002	0.000	0.010
1.7333	0.005	0.003	0.000	0.010
1.7778	0.005	0.003	0.000	0.010
1.8222	0.005	0.003	0.000	0.010
1.8667	0.005	0.003	0.000	0.010
1.9111	0.005	0.003	0.000	0.010
1.9556	0.005	0.003	0.000	0.010
2.0000	0.005	0.003	0.000	0.010
2.0444	0.005	0.003	0.000	0.010
2.0889	0.005	0.003	0.000	0.010
2.1333	0.005	0.003	0.000	0.010
2.1778	0.005	0.003	0.000	0.010
2.2222	0.005	0.003	0.000	0.010
2.2667	0.005	0.003	0.000	0.010
2.3111	0.005	0.004	0.000	0.010
2.3556	0.005	0.004	0.000	0.010
2.4000	0.005	0.004	0.000	0.010
2.4444	0.005	0.004	0.000	0.010
2.4889	0.005	0.004	0.000	0.010
2.5333	0.005	0.004	0.000	0.010
2.5778	0.005	0.004	0.000	0.010

2.6222	0.005	0.004	0.000	0.010
2.6667	0.005	0.004	0.000	0.010
2.7111	0.005	0.004	0.000	0.010
2.7556	0.005	0.004	0.000	0.010
2.8000	0.005	0.004	0.000	0.010
2.8444	0.005	0.004	0.000	0.010
2.8889	0.005	0.005	0.000	0.010
2.9333	0.005	0.005	0.000	0.010
2.9778	0.005	0.005	0.000	0.010
3.0222	0.005	0.005	0.023	0.010
3.0667	0.005	0.005	0.121	0.010
3.1111	0.005	0.005	0.255	0.010
3.1556	0.005	0.006	0.404	0.010
3.2000	0.005	0.006	0.547	0.010
3.2444	0.005	0.006	0.665	0.010
3.2889	0.005	0.006	0.747	0.010
3.3333	0.005	0.006	0.799	0.010
3.3778	0.005	0.007	0.860	0.010
3.4222	0.005	0.007	0.909	0.010
3.4667	0.005	0.007	0.956	0.010
3.5111	0.005	0.007	1.000	0.010
3.5556	0.005	0.008	1.043	0.010
3.6000	0.005	0.008	1.084	0.010
3.6444	0.005	0.008	1.123	0.010
3.6889	0.005	0.008	1.161	0.010
3.7333	0.005	0.008	1.198	0.010
3.7778	0.005	0.009	1.234	0.010
3.8222	0.005	0.009	1.269	0.010
3.8667	0.005	0.009	1.303	0.010
3.9111	0.005	0.009	1.336	0.010
3.9556	0.005	0.010	1.368	0.010
4.0000	0.005	0.010	1.399	0.010

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.053
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:0.053

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.000036
5 year	0.000044
10 year	0.000047

25 year	0.000051
50 year	0.000053
100 year	0.000054

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Stream Protection Duration

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.000
1911	0.000	0.000
1912	0.000	0.000
1913	0.000	0.000
1914	0.000	0.000
1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.000
1923	0.000	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
1928	0.000	0.000
1929	0.000	0.000
1930	0.000	0.000
1931	0.000	0.000
1932	0.000	0.000
1933	0.000	0.000
1934	0.000	0.000
1935	0.000	0.000
1936	0.000	0.000
1937	0.000	0.000
1938	0.000	0.000
1939	0.000	0.000
1940	0.000	0.000
1941	0.000	0.000

1942	0.000	0.000
1943	0.000	0.000
1944	0.000	0.000
1945	0.000	0.000
1946	0.000	0.000
1947	0.000	0.000
1948	0.000	0.000
1949	0.000	0.000
1950	0.000	0.000
1951	0.000	0.000
1952	0.000	0.000
1953	0.000	0.000
1954	0.000	0.000
1955	0.000	0.000
1956	0.000	0.000
1957	0.000	0.000
1958	0.000	0.000
1959	0.000	0.000
1960	0.000	0.000
1961	0.000	0.000
1962	0.000	0.000
1963	0.000	0.000
1964	0.000	0.000
1965	0.000	0.000
1966	0.000	0.000
1967	0.000	0.000
1968	0.000	0.000
1969	0.000	0.000
1970	0.000	0.000
1971	0.000	0.000
1972	0.000	0.000
1973	0.000	0.000
1974	0.000	0.000
1975	0.000	0.000
1976	0.000	0.000
1977	0.000	0.000
1978	0.000	0.000
1979	0.000	0.000
1980	0.000	0.000
1981	0.000	0.000
1982	0.000	0.000
1983	0.000	0.000
1984	0.000	0.000
1985	0.000	0.000
1986	0.000	0.000
1987	0.000	0.000
1988	0.000	0.000
1989	0.000	0.000
1990	0.000	0.000
1991	0.000	0.000
1992	0.000	0.000
1993	0.000	0.000
1994	0.000	0.000
1995	0.000	0.000
1996	0.000	0.000
1997	0.000	0.000
1998	0.000	0.000

1999	0.000	0.000
2000	0.000	0.000
2001	0.000	0.000
2002	0.000	0.000
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000
2011	0.000	0.000
2012	0.000	0.000
2013	0.000	0.000
2014	0.000	0.000
2015	0.000	0.000
2016	0.000	0.000
2017	0.000	0.000
2018	0.000	0.000
2019	0.000	0.000
2020	0.000	0.000
2021	0.000	0.000
2022	0.000	0.000
2023	0.000	0.000
2024	0.000	0.000
2025	0.000	0.000
2026	0.000	0.000
2027	0.000	0.000
2028	0.000	0.000
2029	0.000	0.000
2030	0.000	0.000
2031	0.000	0.000
2032	0.000	0.000
2033	0.000	0.000
2034	0.000	0.000
2035	0.000	0.000
2036	0.000	0.000
2037	0.000	0.000
2038	0.000	0.000
2039	0.000	0.000
2040	0.000	0.000
2041	0.000	0.000
2042	0.000	0.000
2043	0.000	0.000
2044	0.000	0.000
2045	0.000	0.000
2046	0.000	0.000
2047	0.000	0.000
2048	0.000	0.000
2049	0.000	0.000
2050	0.000	0.000
2051	0.000	0.000
2052	0.000	0.000
2053	0.000	0.000
2054	0.000	0.000
2055	0.000	0.000

2056	0.000	0.000
2057	0.000	0.000
2058	0.000	0.000
2059	0.000	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0001	0.0000
2	0.0001	0.0000
3	0.0001	0.0000
4	0.0000	0.0000
5	0.0000	0.0000
6	0.0000	0.0000
7	0.0000	0.0000
8	0.0000	0.0000
9	0.0000	0.0000
10	0.0000	0.0000
11	0.0000	0.0000
12	0.0000	0.0000
13	0.0000	0.0000
14	0.0000	0.0000
15	0.0000	0.0000
16	0.0000	0.0000
17	0.0000	0.0000
18	0.0000	0.0000
19	0.0000	0.0000
20	0.0000	0.0000
21	0.0000	0.0000
22	0.0000	0.0000
23	0.0000	0.0000
24	0.0000	0.0000
25	0.0000	0.0000
26	0.0000	0.0000
27	0.0000	0.0000
28	0.0000	0.0000
29	0.0000	0.0000
30	0.0000	0.0000
31	0.0000	0.0000
32	0.0000	0.0000
33	0.0000	0.0000
34	0.0000	0.0000
35	0.0000	0.0000
36	0.0000	0.0000
37	0.0000	0.0000
38	0.0000	0.0000
39	0.0000	0.0000
40	0.0000	0.0000
41	0.0000	0.0000
42	0.0000	0.0000
43	0.0000	0.0000
44	0.0000	0.0000
45	0.0000	0.0000
46	0.0000	0.0000
47	0.0000	0.0000
48	0.0000	0.0000

49	0.0000	0.0000
50	0.0000	0.0000
51	0.0000	0.0000
52	0.0000	0.0000
53	0.0000	0.0000
54	0.0000	0.0000
55	0.0000	0.0000
56	0.0000	0.0000
57	0.0000	0.0000
58	0.0000	0.0000
59	0.0000	0.0000
60	0.0000	0.0000
61	0.0000	0.0000
62	0.0000	0.0000
63	0.0000	0.0000
64	0.0000	0.0000
65	0.0000	0.0000
66	0.0000	0.0000
67	0.0000	0.0000
68	0.0000	0.0000
69	0.0000	0.0000
70	0.0000	0.0000
71	0.0000	0.0000
72	0.0000	0.0000
73	0.0000	0.0000
74	0.0000	0.0000
75	0.0000	0.0000
76	0.0000	0.0000
77	0.0000	0.0000
78	0.0000	0.0000
79	0.0000	0.0000
80	0.0000	0.0000
81	0.0000	0.0000
82	0.0000	0.0000
83	0.0000	0.0000
84	0.0000	0.0000
85	0.0000	0.0000
86	0.0000	0.0000
87	0.0000	0.0000
88	0.0000	0.0000
89	0.0000	0.0000
90	0.0000	0.0000
91	0.0000	0.0000
92	0.0000	0.0000
93	0.0000	0.0000
94	0.0000	0.0000
95	0.0000	0.0000
96	0.0000	0.0000
97	0.0000	0.0000
98	0.0000	0.0000
99	0.0000	0.0000
100	0.0000	0.0000
101	0.0000	0.0000
102	0.0000	0.0000
103	0.0000	0.0000
104	0.0000	0.0000
105	0.0000	0.0000

106	0.0000	0.0000
107	0.0000	0.0000
108	0.0000	0.0000
109	0.0000	0.0000
110	0.0000	0.0000
111	0.0000	0.0000
112	0.0000	0.0000
113	0.0000	0.0000
114	0.0000	0.0000
115	0.0000	0.0000
116	0.0000	0.0000
117	0.0000	0.0000
118	0.0000	0.0000
119	0.0000	0.0000
120	0.0000	0.0000
121	0.0000	0.0000
122	0.0000	0.0000
123	0.0000	0.0000
124	0.0000	0.0000
125	0.0000	0.0000
126	0.0000	0.0000
127	0.0000	0.0000
128	0.0000	0.0000
129	0.0000	0.0000
130	0.0000	0.0000
131	0.0000	0.0000
132	0.0000	0.0000
133	0.0000	0.0000
134	0.0000	0.0000
135	0.0000	0.0000
136	0.0000	0.0000
137	0.0000	0.0000
138	0.0000	0.0000
139	0.0000	0.0000
140	0.0000	0.0000
141	0.0000	0.0000
142	0.0000	0.0000
143	0.0000	0.0000
144	0.0000	0.0000
145	0.0000	0.0000
146	0.0000	0.0000
147	0.0000	0.0000
148	0.0000	0.0000
149	0.0000	0.0000
150	0.0000	0.0000
151	0.0000	0.0000
152	0.0000	0.0000
153	0.0000	0.0000
154	0.0000	0.0000
155	0.0000	0.0000
156	0.0000	0.0000
157	0.0000	0.0000
158	0.0000	0.0000

Stream Protection Duration
POC #1

The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0000	4563	0	0	Pass
0.0000	4412	0	0	Pass
0.0000	4206	0	0	Pass
0.0000	4063	0	0	Pass
0.0000	3891	0	0	Pass
0.0000	3739	0	0	Pass
0.0000	3581	0	0	Pass
0.0000	3469	0	0	Pass
0.0000	3353	0	0	Pass
0.0000	3235	0	0	Pass
0.0000	3081	0	0	Pass
0.0000	2955	0	0	Pass
0.0000	2860	0	0	Pass
0.0000	2769	0	0	Pass
0.0000	2657	0	0	Pass
0.0000	2556	0	0	Pass
0.0000	2477	0	0	Pass
0.0000	2382	0	0	Pass
0.0000	2326	0	0	Pass
0.0000	2246	0	0	Pass
0.0000	2183	0	0	Pass
0.0000	2101	0	0	Pass
0.0000	2030	0	0	Pass
0.0000	1945	0	0	Pass
0.0000	1892	0	0	Pass
0.0000	1819	0	0	Pass
0.0000	1772	0	0	Pass
0.0000	1702	0	0	Pass
0.0000	1659	0	0	Pass
0.0000	1587	0	0	Pass
0.0000	1522	0	0	Pass
0.0000	1487	0	0	Pass
0.0000	1420	0	0	Pass
0.0000	1362	0	0	Pass
0.0000	1257	0	0	Pass
0.0000	1196	0	0	Pass
0.0000	1112	0	0	Pass
0.0000	1067	0	0	Pass
0.0000	1020	0	0	Pass
0.0000	983	0	0	Pass
0.0000	961	0	0	Pass
0.0000	929	0	0	Pass
0.0000	870	0	0	Pass
0.0000	828	0	0	Pass
0.0000	784	0	0	Pass
0.0000	739	0	0	Pass
0.0000	702	0	0	Pass
0.0000	666	0	0	Pass
0.0000	632	0	0	Pass
0.0000	607	0	0	Pass
0.0000	564	0	0	Pass
0.0000	530	0	0	Pass

0.0000	481	0	0	Pass
0.0000	449	0	0	Pass
0.0000	426	0	0	Pass
0.0000	390	0	0	Pass
0.0000	359	0	0	Pass
0.0000	304	0	0	Pass
0.0000	266	0	0	Pass
0.0000	240	0	0	Pass
0.0000	211	0	0	Pass
0.0000	197	0	0	Pass
0.0000	160	0	0	Pass
0.0000	138	0	0	Pass
0.0000	122	0	0	Pass
0.0000	104	0	0	Pass
0.0000	77	0	0	Pass
0.0000	58	0	0	Pass
0.0000	36	0	0	Pass
0.0000	25	0	0	Pass
0.0000	6	0	0	Pass
0.0000	5	0	0	Pass
0.0000	5	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0000	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	3	0	0	Pass
0.0001	3	0	0	Pass
0.0001	3	0	0	Pass
0.0001	3	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for Water Quality Treatment?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft.)	Cumulative Volume Infiltration Credit	Percent Infiltrated	Comment
Gravel Trench Bed 1 POC	N	20.47			N	100.00	
Total Volume Infiltrated		20.47	0.00	0.00		100.00	0.00
	0%	No Treat. Credit					

Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

WWHM - Permeable Parking

WWHM2012
PROJECT REPORT

Project Name: 21545-Permeable Parking
Site Name: 39TH Office Bldg
Site Address: 1212 39th Ave SW
City : Puyallup
Report Date: 3/15/2022
Gage : 40 IN EAST
Data Start : 10/01/1901
Data End : 09/30/2059
Precip Scale: 1.00
Version Date: 2019/09/13
Version : 4.2.17

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Pre-developed Basin
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Forest, Mod	.062
Pervious Total	0.062

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.062

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Permeable Pavement 1
Pavement Area: 0.0624 ac.
Pavement Length: 80.00 ft.
Pavement Width: 34.00 ft.
Pavement slope 1: 0 To 1

Pavement thickness: 0.42
Pour Space of Pavement: 0.35
Material thickness of second layer: 1
Pour Space of material for second layer: 0.35
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Infiltration On
Infiltration rate: 0.4
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 24.86
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 24.86
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 1.802

Element Flows To:
Outlet 1 **Outlet 2**

Permeable Pavement Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.062	0.000	0.000	0.000
0.0269	0.062	0.000	0.000	0.025
0.0538	0.062	0.001	0.000	0.025
0.0807	0.062	0.001	0.000	0.025
0.1076	0.062	0.002	0.000	0.025
0.1344	0.062	0.002	0.000	0.025
0.1613	0.062	0.003	0.000	0.025
0.1882	0.062	0.004	0.000	0.025
0.2151	0.062	0.004	0.000	0.025
0.2420	0.062	0.005	0.000	0.025
0.2689	0.062	0.005	0.000	0.025
0.2958	0.062	0.006	0.000	0.025
0.3227	0.062	0.007	0.000	0.025
0.3496	0.062	0.007	0.000	0.025
0.3764	0.062	0.008	0.000	0.025
0.4033	0.062	0.008	0.000	0.025
0.4302	0.062	0.009	0.000	0.025
0.4571	0.062	0.010	0.000	0.025
0.4840	0.062	0.010	0.000	0.025
0.5109	0.062	0.011	0.000	0.025
0.5378	0.062	0.011	0.000	0.025
0.5647	0.062	0.012	0.000	0.025
0.5916	0.062	0.012	0.000	0.025
0.6184	0.062	0.013	0.000	0.025
0.6453	0.062	0.014	0.000	0.025
0.6722	0.062	0.014	0.000	0.025
0.6991	0.062	0.015	0.000	0.025
0.7260	0.062	0.015	0.000	0.025
0.7529	0.062	0.016	0.000	0.025
0.7798	0.062	0.017	0.000	0.025
0.8067	0.062	0.017	0.000	0.025
0.8336	0.062	0.018	0.000	0.025

0.8604	0.062	0.018	0.000	0.025
0.8873	0.062	0.019	0.000	0.025
0.9142	0.062	0.020	0.000	0.025
0.9411	0.062	0.020	0.000	0.025
0.9680	0.062	0.021	0.000	0.025
0.9949	0.062	0.021	0.000	0.025
1.0218	0.062	0.022	0.000	0.025
1.0487	0.062	0.022	0.000	0.025
1.0756	0.062	0.023	0.000	0.025
1.1024	0.062	0.024	0.000	0.025
1.1293	0.062	0.024	0.000	0.025
1.1562	0.062	0.025	0.000	0.025
1.1831	0.062	0.025	0.000	0.025
1.2100	0.062	0.026	0.000	0.025
1.2369	0.062	0.027	0.000	0.025
1.2638	0.062	0.027	0.000	0.025
1.2907	0.062	0.028	0.000	0.025
1.3176	0.062	0.028	0.000	0.025
1.3444	0.062	0.029	0.000	0.025
1.3713	0.062	0.030	0.000	0.025
1.3982	0.062	0.030	0.000	0.025
1.4251	0.062	0.032	0.006	0.025
1.4520	0.062	0.033	0.095	0.025
1.4789	0.062	0.035	0.237	0.025
1.5058	0.062	0.037	0.418	0.025
1.5327	0.062	0.039	0.629	0.025
1.5596	0.062	0.040	0.868	0.025
1.5864	0.062	0.042	1.130	0.025
1.6133	0.062	0.044	1.415	0.025
1.6402	0.062	0.045	1.720	0.025
1.6671	0.062	0.047	2.045	0.025
1.6940	0.062	0.049	2.388	0.025
1.7209	0.062	0.050	2.748	0.025
1.7478	0.062	0.052	3.124	0.025
1.7747	0.062	0.054	3.516	0.025
1.8016	0.062	0.055	3.924	0.025
1.8284	0.062	0.057	4.346	0.025
1.8553	0.062	0.059	4.782	0.025
1.8822	0.062	0.060	5.232	0.025
1.9091	0.062	0.062	5.695	0.025
1.9360	0.062	0.064	6.171	0.025
1.9629	0.062	0.065	6.660	0.025
1.9898	0.062	0.067	7.161	0.025
2.0167	0.062	0.069	7.673	0.025
2.0436	0.062	0.070	8.198	0.025
2.0704	0.062	0.072	8.734	0.025
2.0973	0.062	0.074	9.281	0.025
2.1242	0.062	0.075	9.839	0.025
2.1511	0.062	0.077	10.40	0.025
2.1780	0.062	0.079	10.98	0.025
2.2049	0.062	0.080	11.57	0.025
2.2318	0.062	0.082	12.17	0.025
2.2587	0.062	0.084	12.78	0.025
2.2856	0.062	0.086	13.40	0.025
2.3124	0.062	0.087	14.03	0.025
2.3393	0.062	0.089	14.67	0.025
2.3662	0.062	0.091	15.32	0.025

2.3931	0.062	0.092	15.98	0.025
2.4200	0.062	0.094	16.65	0.025

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.062
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:0.062443

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.00004
5 year	0.00005
10 year	0.000054
25 year	0.000058
50 year	0.00006
100 year	0.000062

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1902	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.000
1911	0.000	0.000
1912	0.000	0.000
1913	0.000	0.000
1914	0.000	0.000

1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.000
1923	0.000	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
1928	0.000	0.000
1929	0.000	0.000
1930	0.000	0.000
1931	0.000	0.000
1932	0.000	0.000
1933	0.000	0.000
1934	0.000	0.000
1935	0.000	0.000
1936	0.000	0.000
1937	0.000	0.000
1938	0.000	0.000
1939	0.000	0.000
1940	0.000	0.000
1941	0.000	0.000
1942	0.000	0.000
1943	0.000	0.000
1944	0.000	0.000
1945	0.000	0.000
1946	0.000	0.000
1947	0.000	0.000
1948	0.000	0.000
1949	0.000	0.000
1950	0.000	0.000
1951	0.000	0.000
1952	0.000	0.000
1953	0.000	0.000
1954	0.000	0.000
1955	0.000	0.000
1956	0.000	0.000
1957	0.000	0.000
1958	0.000	0.000
1959	0.000	0.000
1960	0.000	0.000
1961	0.000	0.000
1962	0.000	0.000
1963	0.000	0.000
1964	0.000	0.000
1965	0.000	0.000
1966	0.000	0.000
1967	0.000	0.000
1968	0.000	0.000
1969	0.000	0.000
1970	0.000	0.000
1971	0.000	0.000

1972	0.000	0.000
1973	0.000	0.000
1974	0.000	0.000
1975	0.000	0.000
1976	0.000	0.000
1977	0.000	0.000
1978	0.000	0.000
1979	0.000	0.000
1980	0.000	0.000
1981	0.000	0.000
1982	0.000	0.000
1983	0.000	0.000
1984	0.000	0.000
1985	0.000	0.000
1986	0.000	0.000
1987	0.000	0.000
1988	0.000	0.000
1989	0.000	0.000
1990	0.000	0.000
1991	0.000	0.000
1992	0.000	0.000
1993	0.000	0.000
1994	0.000	0.000
1995	0.000	0.000
1996	0.000	0.000
1997	0.000	0.000
1998	0.000	0.000
1999	0.000	0.000
2000	0.000	0.000
2001	0.000	0.000
2002	0.000	0.000
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000
2011	0.000	0.000
2012	0.000	0.000
2013	0.000	0.000
2014	0.000	0.000
2015	0.000	0.000
2016	0.000	0.000
2017	0.000	0.000
2018	0.000	0.000
2019	0.000	0.000
2020	0.000	0.000
2021	0.000	0.000
2022	0.000	0.000
2023	0.000	0.000
2024	0.000	0.000
2025	0.000	0.000
2026	0.000	0.000
2027	0.000	0.000
2028	0.000	0.000

2029	0.000	0.000
2030	0.000	0.000
2031	0.000	0.000
2032	0.000	0.000
2033	0.000	0.000
2034	0.000	0.000
2035	0.000	0.000
2036	0.000	0.000
2037	0.000	0.000
2038	0.000	0.000
2039	0.000	0.000
2040	0.000	0.000
2041	0.000	0.000
2042	0.000	0.000
2043	0.000	0.000
2044	0.000	0.000
2045	0.000	0.000
2046	0.000	0.000
2047	0.000	0.000
2048	0.000	0.000
2049	0.000	0.000
2050	0.000	0.000
2051	0.000	0.000
2052	0.000	0.000
2053	0.000	0.000
2054	0.000	0.000
2055	0.000	0.000
2056	0.000	0.000
2057	0.000	0.000
2058	0.000	0.000
2059	0.000	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0001	0.0000
2	0.0001	0.0000
3	0.0001	0.0000
4	0.0000	0.0000
5	0.0000	0.0000
6	0.0000	0.0000
7	0.0000	0.0000
8	0.0000	0.0000
9	0.0000	0.0000
10	0.0000	0.0000
11	0.0000	0.0000
12	0.0000	0.0000
13	0.0000	0.0000
14	0.0000	0.0000
15	0.0000	0.0000
16	0.0000	0.0000
17	0.0000	0.0000
18	0.0000	0.0000
19	0.0000	0.0000
20	0.0000	0.0000
21	0.0000	0.0000

22	0.0000	0.0000
23	0.0000	0.0000
24	0.0000	0.0000
25	0.0000	0.0000
26	0.0000	0.0000
27	0.0000	0.0000
28	0.0000	0.0000
29	0.0000	0.0000
30	0.0000	0.0000
31	0.0000	0.0000
32	0.0000	0.0000
33	0.0000	0.0000
34	0.0000	0.0000
35	0.0000	0.0000
36	0.0000	0.0000
37	0.0000	0.0000
38	0.0000	0.0000
39	0.0000	0.0000
40	0.0000	0.0000
41	0.0000	0.0000
42	0.0000	0.0000
43	0.0000	0.0000
44	0.0000	0.0000
45	0.0000	0.0000
46	0.0000	0.0000
47	0.0000	0.0000
48	0.0000	0.0000
49	0.0000	0.0000
50	0.0000	0.0000
51	0.0000	0.0000
52	0.0000	0.0000
53	0.0000	0.0000
54	0.0000	0.0000
55	0.0000	0.0000
56	0.0000	0.0000
57	0.0000	0.0000
58	0.0000	0.0000
59	0.0000	0.0000
60	0.0000	0.0000
61	0.0000	0.0000
62	0.0000	0.0000
63	0.0000	0.0000
64	0.0000	0.0000
65	0.0000	0.0000
66	0.0000	0.0000
67	0.0000	0.0000
68	0.0000	0.0000
69	0.0000	0.0000
70	0.0000	0.0000
71	0.0000	0.0000
72	0.0000	0.0000
73	0.0000	0.0000
74	0.0000	0.0000
75	0.0000	0.0000
76	0.0000	0.0000
77	0.0000	0.0000
78	0.0000	0.0000

79	0.0000	0.0000
80	0.0000	0.0000
81	0.0000	0.0000
82	0.0000	0.0000
83	0.0000	0.0000
84	0.0000	0.0000
85	0.0000	0.0000
86	0.0000	0.0000
87	0.0000	0.0000
88	0.0000	0.0000
89	0.0000	0.0000
90	0.0000	0.0000
91	0.0000	0.0000
92	0.0000	0.0000
93	0.0000	0.0000
94	0.0000	0.0000
95	0.0000	0.0000
96	0.0000	0.0000
97	0.0000	0.0000
98	0.0000	0.0000
99	0.0000	0.0000
100	0.0000	0.0000
101	0.0000	0.0000
102	0.0000	0.0000
103	0.0000	0.0000
104	0.0000	0.0000
105	0.0000	0.0000
106	0.0000	0.0000
107	0.0000	0.0000
108	0.0000	0.0000
109	0.0000	0.0000
110	0.0000	0.0000
111	0.0000	0.0000
112	0.0000	0.0000
113	0.0000	0.0000
114	0.0000	0.0000
115	0.0000	0.0000
116	0.0000	0.0000
117	0.0000	0.0000
118	0.0000	0.0000
119	0.0000	0.0000
120	0.0000	0.0000
121	0.0000	0.0000
122	0.0000	0.0000
123	0.0000	0.0000
124	0.0000	0.0000
125	0.0000	0.0000
126	0.0000	0.0000
127	0.0000	0.0000
128	0.0000	0.0000
129	0.0000	0.0000
130	0.0000	0.0000
131	0.0000	0.0000
132	0.0000	0.0000
133	0.0000	0.0000
134	0.0000	0.0000
135	0.0000	0.0000

136	0.0000	0.0000
137	0.0000	0.0000
138	0.0000	0.0000
139	0.0000	0.0000
140	0.0000	0.0000
141	0.0000	0.0000
142	0.0000	0.0000
143	0.0000	0.0000
144	0.0000	0.0000
145	0.0000	0.0000
146	0.0000	0.0000
147	0.0000	0.0000
148	0.0000	0.0000
149	0.0000	0.0000
150	0.0000	0.0000
151	0.0000	0.0000
152	0.0000	0.0000
153	0.0000	0.0000
154	0.0000	0.0000
155	0.0000	0.0000
156	0.0000	0.0000
157	0.0000	0.0000
158	0.0000	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0000	4721	0	0	Pass
0.0000	4554	0	0	Pass
0.0000	4384	0	0	Pass
0.0000	4195	0	0	Pass
0.0000	4017	0	0	Pass
0.0000	3874	0	0	Pass
0.0000	3713	0	0	Pass
0.0000	3572	0	0	Pass
0.0000	3450	0	0	Pass
0.0000	3337	0	0	Pass
0.0000	3196	0	0	Pass
0.0000	3054	0	0	Pass
0.0000	2927	0	0	Pass
0.0000	2845	0	0	Pass
0.0000	2731	0	0	Pass
0.0000	2644	0	0	Pass
0.0000	2551	0	0	Pass
0.0000	2458	0	0	Pass
0.0000	2377	0	0	Pass
0.0000	2297	0	0	Pass
0.0000	2233	0	0	Pass
0.0000	2162	0	0	Pass
0.0000	2094	0	0	Pass
0.0000	2020	0	0	Pass
0.0000	1936	0	0	Pass

0.0000	1853	0	0	Pass
0.0000	1802	0	0	Pass
0.0000	1744	0	0	Pass
0.0000	1685	0	0	Pass
0.0000	1609	0	0	Pass
0.0000	1552	0	0	Pass
0.0000	1509	0	0	Pass
0.0000	1470	0	0	Pass
0.0000	1406	0	0	Pass
0.0000	1307	0	0	Pass
0.0000	1232	0	0	Pass
0.0000	1155	0	0	Pass
0.0000	1097	0	0	Pass
0.0000	1039	0	0	Pass
0.0000	1011	0	0	Pass
0.0000	973	0	0	Pass
0.0000	945	0	0	Pass
0.0000	887	0	0	Pass
0.0000	855	0	0	Pass
0.0000	816	0	0	Pass
0.0000	760	0	0	Pass
0.0000	725	0	0	Pass
0.0000	693	0	0	Pass
0.0000	656	0	0	Pass
0.0000	615	0	0	Pass
0.0000	571	0	0	Pass
0.0000	537	0	0	Pass
0.0000	490	0	0	Pass
0.0000	462	0	0	Pass
0.0000	433	0	0	Pass
0.0000	405	0	0	Pass
0.0000	369	0	0	Pass
0.0000	313	0	0	Pass
0.0000	282	0	0	Pass
0.0000	249	0	0	Pass
0.0000	221	0	0	Pass
0.0000	198	0	0	Pass
0.0000	174	0	0	Pass
0.0000	143	0	0	Pass
0.0000	129	0	0	Pass
0.0000	112	0	0	Pass
0.0000	90	0	0	Pass
0.0000	60	0	0	Pass
0.0000	47	0	0	Pass
0.0000	27	0	0	Pass
0.0000	15	0	0	Pass
0.0000	5	0	0	Pass
0.0000	5	0	0	Pass
0.0000	5	0	0	Pass
0.0000	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass

0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	4	0	0	Pass
0.0001	3	0	0	Pass
0.0001	3	0	0	Pass
0.0001	3	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for	Total Volume	Volume	Infiltration	Cumulative	Percent	Water Quality	Percent	Comment
	Treatment?	Needs	Through	Volume	Volume	Volume	Infiltrated	Treated	
		Treatment (ac-ft)	Facility (ac-ft)	(ac-ft.)	Infiltration Credit				
Permeable Pavement 1 POC	N	22.62			N	100.00			
Total Volume Infiltrated		22.62	0.00	0.00		100.00	0.00	0%	No Treat. Credit

Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

WWHM - Permeable Sidewalk

WWHM2012
PROJECT REPORT

Project Name: 21545-Permeable Sidewalk
Site Name: 39TH Office Bldg
Site Address: 1212 39th Ave SW
City : Puyallup
Report Date: 3/09/2022
Gage : 40 IN EAST
Data Start : 10/01/1901
Data End : 09/30/2059
Precip Scale: 1.00
Version Date: 2019/09/13
Version : 4.2.17

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Pre-developed Basin
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Forest, Mod	.01
Pervious Total	0.01

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.01

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Permeable Pavement 1
Pavement Area: 0.0100 ac.
Pavement Length: 87.00 ft.
Pavement Width: 5.00 ft.
Pavement slope 1: 0 To 1

Pavement thickness: 0.33
Pour Space of Pavement: 0.35
Material thickness of second layer: 0.5
Pour Space of material for second layer: 0.35
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Infiltration On
Infiltration rate: 0.4
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 3.957
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 3.957
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 0.285

Element Flows To:
Outlet 1 **Outlet 2**

Permeable Pavement Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.010	0.000	0.000	0.000
0.0203	0.010	0.000	0.000	0.004
0.0407	0.010	0.000	0.000	0.004
0.0610	0.010	0.000	0.000	0.004
0.0813	0.010	0.000	0.000	0.004
0.1017	0.010	0.000	0.000	0.004
0.1220	0.010	0.000	0.000	0.004
0.1423	0.010	0.000	0.000	0.004
0.1627	0.010	0.000	0.000	0.004
0.1830	0.010	0.000	0.000	0.004
0.2033	0.010	0.000	0.000	0.004
0.2237	0.010	0.000	0.000	0.004
0.2440	0.010	0.000	0.000	0.004
0.2643	0.010	0.000	0.000	0.004
0.2847	0.010	0.001	0.000	0.004
0.3050	0.010	0.001	0.000	0.004
0.3253	0.010	0.001	0.000	0.004
0.3457	0.010	0.001	0.000	0.004
0.3660	0.010	0.001	0.000	0.004
0.3863	0.010	0.001	0.000	0.004
0.4067	0.010	0.001	0.000	0.004
0.4270	0.010	0.001	0.000	0.004
0.4473	0.010	0.001	0.000	0.004
0.4677	0.010	0.001	0.000	0.004
0.4880	0.010	0.001	0.000	0.004
0.5083	0.010	0.001	0.000	0.004
0.5287	0.010	0.001	0.000	0.004
0.5490	0.010	0.001	0.000	0.004
0.5693	0.010	0.002	0.000	0.004
0.5897	0.010	0.002	0.000	0.004
0.6100	0.010	0.002	0.000	0.004
0.6303	0.010	0.002	0.000	0.004

0.6507	0.010	0.002	0.000	0.004
0.6710	0.010	0.002	0.000	0.004
0.6913	0.010	0.002	0.000	0.004
0.7117	0.010	0.002	0.000	0.004
0.7320	0.010	0.002	0.000	0.004
0.7523	0.010	0.002	0.000	0.004
0.7727	0.010	0.002	0.000	0.004
0.7930	0.010	0.002	0.000	0.004
0.8133	0.010	0.002	0.000	0.004
0.8337	0.010	0.003	0.003	0.004
0.8540	0.010	0.003	0.061	0.004
0.8743	0.010	0.003	0.155	0.004
0.8947	0.010	0.003	0.273	0.004
0.9150	0.010	0.003	0.412	0.004
0.9353	0.010	0.004	0.569	0.004
0.9557	0.010	0.004	0.741	0.004
0.9760	0.010	0.004	0.928	0.004
0.9963	0.010	0.004	1.129	0.004
1.0167	0.010	0.004	1.342	0.004
1.0370	0.010	0.005	1.568	0.004
1.0573	0.010	0.005	1.804	0.004
1.0777	0.010	0.005	2.052	0.004
1.0980	0.010	0.005	2.310	0.004
1.1183	0.010	0.005	2.577	0.004
1.1387	0.010	0.006	2.855	0.004
1.1590	0.010	0.006	3.142	0.004
1.1793	0.010	0.006	3.437	0.004
1.1997	0.010	0.006	3.742	0.004
1.2200	0.010	0.006	4.055	0.004
1.2403	0.010	0.007	4.376	0.004
1.2607	0.010	0.007	4.705	0.004
1.2810	0.010	0.007	5.042	0.004
1.3013	0.010	0.007	5.387	0.004
1.3217	0.010	0.007	5.740	0.004
1.3420	0.010	0.008	6.099	0.004
1.3623	0.010	0.008	6.466	0.004
1.3827	0.010	0.008	6.840	0.004
1.4030	0.010	0.008	7.221	0.004
1.4233	0.010	0.008	7.609	0.004
1.4437	0.010	0.009	8.004	0.004
1.4640	0.010	0.009	8.405	0.004
1.4843	0.010	0.009	8.812	0.004
1.5047	0.010	0.009	9.226	0.004
1.5250	0.010	0.009	9.647	0.004
1.5453	0.010	0.010	10.07	0.004
1.5657	0.010	0.010	10.50	0.004
1.5860	0.010	0.010	10.94	0.004
1.6063	0.010	0.010	11.38	0.004
1.6267	0.010	0.011	11.83	0.004
1.6470	0.010	0.011	12.29	0.004
1.6673	0.010	0.011	12.75	0.004
1.6877	0.010	0.011	13.22	0.004
1.7080	0.010	0.011	13.69	0.004
1.7283	0.010	0.012	14.17	0.004
1.7487	0.010	0.012	14.66	0.004
1.7690	0.010	0.012	15.15	0.004
1.7893	0.010	0.012	15.64	0.004

1.8097	0.010	0.012	16.14	0.004
1.8300	0.010	0.013	16.65	0.004

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.01
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:0.009986

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.000007
5 year	0.000008
10 year	0.000009
25 year	0.00001
50 year	0.00001
100 year	0.00001

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1902	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.000
1911	0.000	0.000
1912	0.000	0.000
1913	0.000	0.000
1914	0.000	0.000

1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.000
1923	0.000	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
1928	0.000	0.000
1929	0.000	0.000
1930	0.000	0.000
1931	0.000	0.000
1932	0.000	0.000
1933	0.000	0.000
1934	0.000	0.000
1935	0.000	0.000
1936	0.000	0.000
1937	0.000	0.000
1938	0.000	0.000
1939	0.000	0.000
1940	0.000	0.000
1941	0.000	0.000
1942	0.000	0.000
1943	0.000	0.000
1944	0.000	0.000
1945	0.000	0.000
1946	0.000	0.000
1947	0.000	0.000
1948	0.000	0.000
1949	0.000	0.000
1950	0.000	0.000
1951	0.000	0.000
1952	0.000	0.000
1953	0.000	0.000
1954	0.000	0.000
1955	0.000	0.000
1956	0.000	0.000
1957	0.000	0.000
1958	0.000	0.000
1959	0.000	0.000
1960	0.000	0.000
1961	0.000	0.000
1962	0.000	0.000
1963	0.000	0.000
1964	0.000	0.000
1965	0.000	0.000
1966	0.000	0.000
1967	0.000	0.000
1968	0.000	0.000
1969	0.000	0.000
1970	0.000	0.000
1971	0.000	0.000

1972	0.000	0.000
1973	0.000	0.000
1974	0.000	0.000
1975	0.000	0.000
1976	0.000	0.000
1977	0.000	0.000
1978	0.000	0.000
1979	0.000	0.000
1980	0.000	0.000
1981	0.000	0.000
1982	0.000	0.000
1983	0.000	0.000
1984	0.000	0.000
1985	0.000	0.000
1986	0.000	0.000
1987	0.000	0.000
1988	0.000	0.000
1989	0.000	0.000
1990	0.000	0.000
1991	0.000	0.000
1992	0.000	0.000
1993	0.000	0.000
1994	0.000	0.000
1995	0.000	0.000
1996	0.000	0.000
1997	0.000	0.000
1998	0.000	0.000
1999	0.000	0.000
2000	0.000	0.000
2001	0.000	0.000
2002	0.000	0.000
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000
2011	0.000	0.000
2012	0.000	0.000
2013	0.000	0.000
2014	0.000	0.000
2015	0.000	0.000
2016	0.000	0.000
2017	0.000	0.000
2018	0.000	0.000
2019	0.000	0.000
2020	0.000	0.000
2021	0.000	0.000
2022	0.000	0.000
2023	0.000	0.000
2024	0.000	0.000
2025	0.000	0.000
2026	0.000	0.000
2027	0.000	0.000
2028	0.000	0.000

2029	0.000	0.000
2030	0.000	0.000
2031	0.000	0.000
2032	0.000	0.000
2033	0.000	0.000
2034	0.000	0.000
2035	0.000	0.000
2036	0.000	0.000
2037	0.000	0.000
2038	0.000	0.000
2039	0.000	0.000
2040	0.000	0.000
2041	0.000	0.000
2042	0.000	0.000
2043	0.000	0.000
2044	0.000	0.000
2045	0.000	0.000
2046	0.000	0.000
2047	0.000	0.000
2048	0.000	0.000
2049	0.000	0.000
2050	0.000	0.000
2051	0.000	0.000
2052	0.000	0.000
2053	0.000	0.000
2054	0.000	0.000
2055	0.000	0.000
2056	0.000	0.000
2057	0.000	0.000
2058	0.000	0.000
2059	0.000	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0000	0.0000
2	0.0000	0.0000
3	0.0000	0.0000
4	0.0000	0.0000
5	0.0000	0.0000
6	0.0000	0.0000
7	0.0000	0.0000
8	0.0000	0.0000
9	0.0000	0.0000
10	0.0000	0.0000
11	0.0000	0.0000
12	0.0000	0.0000
13	0.0000	0.0000
14	0.0000	0.0000
15	0.0000	0.0000
16	0.0000	0.0000
17	0.0000	0.0000
18	0.0000	0.0000
19	0.0000	0.0000
20	0.0000	0.0000
21	0.0000	0.0000

22	0.0000	0.0000
23	0.0000	0.0000
24	0.0000	0.0000
25	0.0000	0.0000
26	0.0000	0.0000
27	0.0000	0.0000
28	0.0000	0.0000
29	0.0000	0.0000
30	0.0000	0.0000
31	0.0000	0.0000
32	0.0000	0.0000
33	0.0000	0.0000
34	0.0000	0.0000
35	0.0000	0.0000
36	0.0000	0.0000
37	0.0000	0.0000
38	0.0000	0.0000
39	0.0000	0.0000
40	0.0000	0.0000
41	0.0000	0.0000
42	0.0000	0.0000
43	0.0000	0.0000
44	0.0000	0.0000
45	0.0000	0.0000
46	0.0000	0.0000
47	0.0000	0.0000
48	0.0000	0.0000
49	0.0000	0.0000
50	0.0000	0.0000
51	0.0000	0.0000
52	0.0000	0.0000
53	0.0000	0.0000
54	0.0000	0.0000
55	0.0000	0.0000
56	0.0000	0.0000
57	0.0000	0.0000
58	0.0000	0.0000
59	0.0000	0.0000
60	0.0000	0.0000
61	0.0000	0.0000
62	0.0000	0.0000
63	0.0000	0.0000
64	0.0000	0.0000
65	0.0000	0.0000
66	0.0000	0.0000
67	0.0000	0.0000
68	0.0000	0.0000
69	0.0000	0.0000
70	0.0000	0.0000
71	0.0000	0.0000
72	0.0000	0.0000
73	0.0000	0.0000
74	0.0000	0.0000
75	0.0000	0.0000
76	0.0000	0.0000
77	0.0000	0.0000
78	0.0000	0.0000

79	0.0000	0.0000
80	0.0000	0.0000
81	0.0000	0.0000
82	0.0000	0.0000
83	0.0000	0.0000
84	0.0000	0.0000
85	0.0000	0.0000
86	0.0000	0.0000
87	0.0000	0.0000
88	0.0000	0.0000
89	0.0000	0.0000
90	0.0000	0.0000
91	0.0000	0.0000
92	0.0000	0.0000
93	0.0000	0.0000
94	0.0000	0.0000
95	0.0000	0.0000
96	0.0000	0.0000
97	0.0000	0.0000
98	0.0000	0.0000
99	0.0000	0.0000
100	0.0000	0.0000
101	0.0000	0.0000
102	0.0000	0.0000
103	0.0000	0.0000
104	0.0000	0.0000
105	0.0000	0.0000
106	0.0000	0.0000
107	0.0000	0.0000
108	0.0000	0.0000
109	0.0000	0.0000
110	0.0000	0.0000
111	0.0000	0.0000
112	0.0000	0.0000
113	0.0000	0.0000
114	0.0000	0.0000
115	0.0000	0.0000
116	0.0000	0.0000
117	0.0000	0.0000
118	0.0000	0.0000
119	0.0000	0.0000
120	0.0000	0.0000
121	0.0000	0.0000
122	0.0000	0.0000
123	0.0000	0.0000
124	0.0000	0.0000
125	0.0000	0.0000
126	0.0000	0.0000
127	0.0000	0.0000
128	0.0000	0.0000
129	0.0000	0.0000
130	0.0000	0.0000
131	0.0000	0.0000
132	0.0000	0.0000
133	0.0000	0.0000
134	0.0000	0.0000
135	0.0000	0.0000

136	0.0000	0.0000
137	0.0000	0.0000
138	0.0000	0.0000
139	0.0000	0.0000
140	0.0000	0.0000
141	0.0000	0.0000
142	0.0000	0.0000
143	0.0000	0.0000
144	0.0000	0.0000
145	0.0000	0.0000
146	0.0000	0.0000
147	0.0000	0.0000
148	0.0000	0.0000
149	0.0000	0.0000
150	0.0000	0.0000
151	0.0000	0.0000
152	0.0000	0.0000
153	0.0000	0.0000
154	0.0000	0.0000
155	0.0000	0.0000
156	0.0000	0.0000
157	0.0000	0.0000
158	0.0000	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0000	612177	9	0	Pass
0.0000	592233	9	0	Pass
0.0000	573397	9	0	Pass
0.0000	551790	9	0	Pass
0.0000	534672	9	0	Pass
0.0000	518384	9	0	Pass
0.0000	502816	9	0	Pass
0.0000	488024	9	0	Pass
0.0000	473842	9	0	Pass
0.0000	460158	9	0	Pass
0.0000	444369	9	0	Pass
0.0000	431626	9	0	Pass
0.0000	419327	9	0	Pass
0.0000	407472	9	0	Pass
0.0000	396059	9	0	Pass
0.0000	385034	9	0	Pass
0.0000	374564	9	0	Pass
0.0000	364481	9	0	Pass
0.0000	352847	9	0	Pass
0.0000	343595	9	0	Pass
0.0000	334564	9	0	Pass
0.0000	325756	9	0	Pass
0.0000	317390	9	0	Pass
0.0000	309191	9	0	Pass
0.0000	301213	9	0	Pass

0.0000	293513	9	0	Pass
0.0000	284648	9	0	Pass
0.0000	277613	9	0	Pass
0.0000	270798	9	0	Pass
0.0000	264206	9	0	Pass
0.0000	257668	9	0	Pass
0.0000	251408	9	0	Pass
0.0000	245259	9	0	Pass
0.0000	239331	9	0	Pass
0.0000	232572	8	0	Pass
0.0000	226976	8	0	Pass
0.0000	221492	8	0	Pass
0.0000	216118	8	0	Pass
0.0000	210966	8	0	Pass
0.0000	205924	8	0	Pass
0.0000	201049	8	0	Pass
0.0000	195398	8	0	Pass
0.0000	190800	8	0	Pass
0.0000	186312	8	0	Pass
0.0000	182047	7	0	Pass
0.0000	177891	7	0	Pass
0.0000	173903	7	0	Pass
0.0000	170025	7	0	Pass
0.0000	166202	7	0	Pass
0.0000	161770	7	0	Pass
0.0000	158224	7	0	Pass
0.0000	154734	7	0	Pass
0.0000	151355	7	0	Pass
0.0000	148031	7	0	Pass
0.0000	144706	7	0	Pass
0.0000	141604	7	0	Pass
0.0000	138446	7	0	Pass
0.0000	134790	7	0	Pass
0.0000	131798	7	0	Pass
0.0000	128917	7	0	Pass
0.0000	126092	7	0	Pass
0.0000	123377	7	0	Pass
0.0000	120607	7	0	Pass
0.0000	117948	7	0	Pass
0.0000	115400	7	0	Pass
0.0000	112352	7	0	Pass
0.0000	109970	7	0	Pass
0.0000	107588	7	0	Pass
0.0000	105372	7	0	Pass
0.0000	103101	7	0	Pass
0.0000	100940	7	0	Pass
0.0000	98890	7	0	Pass
0.0000	96342	7	0	Pass
0.0000	94292	7	0	Pass
0.0000	92353	7	0	Pass
0.0000	90469	7	0	Pass
0.0000	88641	7	0	Pass
0.0000	86868	7	0	Pass
0.0000	85040	7	0	Pass
0.0000	83212	7	0	Pass
0.0000	81217	7	0	Pass
0.0000	79611	7	0	Pass

0.0000	78060	7	0	Pass
0.0000	76453	7	0	Pass
0.0000	74957	7	0	Pass
0.0000	73461	7	0	Pass
0.0000	72021	7	0	Pass
0.0000	70636	7	0	Pass
0.0000	68974	7	0	Pass
0.0000	67700	7	0	Pass
0.0000	66370	7	0	Pass
0.0000	65096	7	0	Pass
0.0000	63877	7	0	Pass
0.0000	62714	7	0	Pass
0.0000	61550	7	0	Pass
0.0000	60387	7	0	Pass
0.0000	59002	6	0	Pass
0.0000	57894	6	0	Pass
0.0000	56841	6	0	Pass
0.0000	55788	6	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for	Total Volume	Volume	Infiltration	Cumulative	Percent	Water Quality	Percent	Comment
	Treatment?	Needs	Through	Volume	Volume				
	Water Quality								
		Treatment	Facility	(ac-ft.)	Infiltration				
Infiltrated	Treated								
		(ac-ft)	(ac-ft)		Credit				
Permeable Pavement 1 POC	N	3.60			N				
100.00									
Total Volume Infiltrated		3.60	0.00	0.00					
100.00	0.00	0%	No Treat. Credit						

Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

WWHM - Pre and Post Developed Flow

Pre and Post Developed Flow Comparison

WWHM2012
PROJECT REPORT

Project Name: Flow Comparison
Site Name: 39TH Office Bldg
Site Address: 1212 39th Ave SW
City : Puyallup
Report Date: 3/16/2022
Gage : 40 IN EAST
Data Start : 10/01/1901
Data End : 09/30/2059
Precip Scale: 1.00
Version Date: 2019/09/13
Version : 4.2.17

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Pre-developed Basin
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Forest, Mod	.25
Pervious Total	0.25

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.25

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Pasture, Mod	.127
A B, Lawn, Flat	.072
Pervious Total	0.199

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.199

Element Flows To:

Surface	Interflow	Groundwater

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.25
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.199
Total Impervious Area:0

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.000168
5 year	0.000206
10 year	0.000224
25 year	0.00024
50 year	0.00025
100 year	0.000257

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.000157
5 year	0.00045
10 year	0.000876
25 year	0.001951
50 year	0.003449
100 year	0.005968

Tab 5.0

5.0 CONSTRUCTION STORMWATER POLLUTION PREVENTION

5.1 Mark Clearing Limits

The project proposes to clear areas onsite. Clearing limits are to be staked by a professional land surveyor as shown on the approved plans. Clearing shall remain within these limits.

5.2 Establish Construction Access

A construction entrance (BMP C105) is proposed to protect 39th Avenue SW from sediment. Adjacent paved surfaces must be cleaned daily, or if deemed necessary, more frequently.

5.3 Control Flow Rates

The project will clear approximately 0.25-acre to construct the site improvements. The project will mitigate runoff with cover measures (BMP C120 and C121), silt fences (BMP C233) interceptor swales (BMP C200), and a temporary sediment trap (BMP C240).

5.4 Install Sediment Controls

The project proposes silt fences (BMP C233) around the perimeter of the site and a temporary sediment trap to trap sediment onsite (BMP C240).

5.5 Stabilize Soils

The project will stabilize exposed soils with the use of cover measures. These cover measures are mulching, temporary seeding, and plastic sheeting (BMP C120, C121, C123).

5.6 Protect Slopes

Just like stabilizing the exposed soils the project's exposed slopes will be controlled with the same covering measures (BMP C120, C121, and BMP C123).

5.7 Protect Drain Inlets

Existing offsite drain inlets and proposed drain inlets will be protected from sediment with the use of bag filters (BMP C220).

5.8 Stabilize Channels and Outlets

There are no proposed or exiting channels and outlets that need protection onsite or offsite.

5.9 Control Pollutants

The project will require earth moving equipment. When vehicles are stored onsite care needs to be taken to make sure that any fluid leaks are contained with drip pans and the fluids are disposed of properly. All spills need to be cleaned up immediately as per the Department of Ecology (DOE) and City of Puyallup's Standards.

5.10 Control Dewatering

This project does not anticipate dewatering. If dewatering becomes necessary, groundwater seepage should be collected and conveyed to the temporary sediment trap for sediment removal. Water should be collected and conveyed with the use of interceptor swales (BMP C200) or by pumping directly to the temporary sediment trap (BMP C240).

5.11 Maintain BMPs

The proposed BMPs need to be maintained as per the approved plans notes and specifications. In general, when sediment accumulation has reached 1/3 of the treatment device or one (1) foot of depth it should be removed. Also, if there is a major storm event then the proposed BMPs should be checked and cleaned appropriately. If the sediment removed from these devices is approved by a geotechnical engineer, they can be stabilized onsite. If not, they must be removed as per the DOE and the City's requirements.

5.12 Manage the Project

A construction sequence is provided on the plans. This construction sequence needs to be followed to ensure that sediment is not deposited downstream. The City will inspect the erosion control BMPs after installation and during construction. The contractor is to employ a Certified Erosion and Sediment Control Lead (CESL, BMP C160) as described by the State to help manage and inspect the erosion control devices. Detailed descriptions of each BMP listed above can be found in Volume I of the SMMWW 2012.

5.13 Protect Low Impact Development BMPs

LID BMPs of permeable pavement for sidewalk and parking areas are proposed in this project, along with amended soil areas. These areas (including the future infiltration trench area) should not be over compacted during construction.

Tab 6.0

6.0 OTHER REPORTS AND STUDIES

The following special reports and studies have been prepared for the development and are included in this report.

6.1 Stormwater Feasibility Soils Report, GeoResources, dated June 12, 2019.

6.2 Soils Report Addendum, GeoResources, dated June 22, 2020.

6.1 Stormwater Feasibility Soils Report, GeoResources, dated June 12, 2019.

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June 12, 2019

Presidential Homes
1212 – 39th Avenue Southwest
Puyallup, WA 98373

Attn: Mr. Terry Folden
(253) 208-6030
Pres.homes@comcast.net

Stormwater Feasibility Soils Report
Proposed Office Building
1212 – 39th Avenue Southwest
Puyallup, Washington
PN: 0419092021
Doc ID: PresidentialHomes.39thAveSW.SR

INTRODUCTION

This soils report presents the results of our subsurface explorations and provides our opinion regarding the feasibility of onsite infiltration for the proposed commercial development at 1212 – 39th Avenue Southwest in Puyallup, Washington. The location of the project site is shown on the attached Site Location Map, Figure 1.

Our understanding of the project is based on our discussions with you, our review of the available geologic and soils data, our May 20, 2019 site visit, and our experience in the area. The site was previously developed with an office, driveway, and accompanying structure, but both structures have since been demolished. We understand the proposed site development will include a new office building with a parking lot area and associated utilities. We anticipate the new building will consist of a one or two-story, wood-framed structure supported by conventional shallow foundations.

We understand that the City of Puyallup requires that a soils report be prepared to evaluate the feasibility of onsite infiltration in accordance with the 2012 Stormwater Management Manual for Western Washington (SWMMWW) with the 2014 Amendments.

SCOPE

The purpose of our services was to evaluate the surface and subsurface conditions at the site as a basis for providing our opinion regarding the feasibility of onsite infiltration for the proposed development in order to satisfy the City of Puyallup requirements. Specifically, our scope of services for the project included the following:

1. Conducting a geologic reconnaissance of the site area;
2. Reviewing the available geotechnical, geologic and hydrogeologic data for the site area;
3. Observing the excavation of 3 test pit explorations, and sampling the observed soils for subsequent laboratory testing, as deemed necessary;

4. Perform up to 2 grain size analyses on representative select soil samples from the explorations;
5. Determining a preliminary infiltration rate based on the grain size analysis, if appropriate;
6. Submitting one sample to an independent laboratory for cation exchange capacity and organic content testing if necessary; and
7. Preparing a written soils report summarizing our site observations and conclusions, along with the supporting data.

The above scope of work was completed in accordance with our *Proposal for Services* dated May 20, 2019. We received written notice to proceed on the same day.

SITE CONDITIONS

Surface Conditions

The site consists of a single parcel located at 1212 – 39th Avenue Southwest in Puyallup, Washington, within an area of existing commercial and residential development. The site is generally rectangular in shape, measures approximately 75 feet wide (north to south) by about 140 to 150 feet deep (north to south) and encompasses approximately 0.30 acres. The parcel is bounded by existing residential development to the west, by commercial development to the south and east, and by 39th Avenue Southwest to the north.

According to the information obtained from the Pierce County Public GIS, the site generally slopes up from north to south. The site's northern boundary is generally at grade with 39th Avenue Southwest and slopes up to the south at about 5 percent along the driveway. A short landscaping wall provides grade separation along the northern property line adjacent west of the driveway. Steeper slopes are located on the southeastern portion of the site. These slopes slope down from west to east at about 80 to 100 percent to the adjacent development's parking area and are about 2 to 4 feet in height. The total topographic relief across the site is on the order of about 6 feet. The existing site configuration and topography is shown on the attached Site and Exploration Plan, Figure 2.

Vegetation across the site mostly consists of typical grass lawn with scattered mature coniferous and deciduous trees and various other native and invasive plants and shrubs within the lawn area.

Site Soils

The Natural Resources Conservation Survey (NRCS) Web Soil Survey maps the site as being underlain by Indianola loamy sand (18B). The Indianola soils are typically derived from sandy glacial outwash, form on slopes of 0 to 5 percent, have a "slight" erosion hazard when exposed, and are included in hydrologic soils group A. An NRCS soils map for the site area is included as Figure 3.

Site Geology

The draft the *Geologic Map of the Puyallup 7.5-Minute Quadrangle, Washington* (Troost et Al.) maps the site as being underlain by Steilacoom Gravel ($Qvsc_{c1}$), and adjacent to Vashon recessional outwash ($Qvsb_4$) to the west. These glacial soils were generally deposited during the Vashon stage of the Fraser Glaciation, some 12,000 to 15,000 years ago. The Steilacoom Gravel and recessional deposits typically consist of a poorly-sorted, lightly-stratified mixture of sand and gravel that may locally

contain silt and clay that were deposited by meltwater streams issuing from the retreating ice mass. The $Qvsb_4$ deposits are part of the Bradley Channel, a subunit of Steilacoom gravel, outwash flood channel deposits. The recessional outwash is considered to be normally consolidated and generally exhibits moderate strength and compressibility characteristics where undisturbed. An excerpt of the above referenced geologic map is included as Figure 4.

Subsurface Explorations

On May 20, 2019, a field representative from GeoResources, LLC (GeoResources) explored shallow subsurface conditions at the site by observing the excavation of three test pit explorations at the site to depths of 4.0 feet below the existing ground surface.

Our representative logged the subsurface conditions encountered in each test pit and obtained representative soil samples. The number and location of the test pits was selected in the field based on project information provided by you at the time of excavation, our understanding of the proposed development, consideration for underground utilities, existing site conditions, and current site usage. Each test pit was backfilled with the excavated soils and bucket tamped, but not otherwise compacted.

The subsurface explorations excavated as part of this evaluation indicate the subsurface conditions at specific locations only, as actual subsurface conditions can vary across the site. Furthermore, the nature and extent of such variation would not become evident until additional explorations are performed or until construction activities have begun. Based on our experience in the area and extent of prior explorations in the area, it is our opinion that the soils encountered in the explorations are generally representative of the soils at the site.

The approximate locations of our test pits are indicated on the attached Site and Exploration Plan, Figure 2. The soils encountered were visually classified in accordance with the Unified Soil Classification System (USCS) and ASTM D: 2488. The USCS is included in Appendix A as Figure A-1, while the descriptive logs of our test pits are included as Figures A-2.

Subsurface Conditions

Our explorations encountered subsurface conditions that generally disagreed with the mapped stratigraphy at the site. Our test pits generally encountered about 0.5 feet of topsoil mantling brown silty fine sand and light brown, orange iron oxide stained silt in a loose to medium dense, moist condition to the full depth explored. In test pit TP-2 we encountered gray silt with some sand in a medium dense, moist condition underlying the iron oxide stained soil and extending to the full depth explored. Test pit TP-3 in the existing gravel driveway encountered 0.2 feet of crushed rock fill in a dense, moist condition underlain by brown sand and gravel fill in a dense, moist condition. Beneath these full soils we encountered reddish brown, orange iron oxide stained silt in a loose, moist condition, which we interpret to be fill. We interpret the native soils to be consistent with recessional lacustrine deposits.

Laboratory Testing

Geotechnical laboratory tests were performed on a select sample retrieved from the explorations to determine soil index and engineering properties encountered. Laboratory testing included visual soil classification per ASTM D: 2488, moisture content determinations per ASTM D:

2216, and grain size analyses per ASTM D: 422 standard procedures. The results of our grain size analysis shows the shallow soils at the site have a fines content of 88.4 percent.

Groundwater Conditions

No groundwater was observed in any of our test pit explorations, however, orange iron oxide staining, a form of mottling, was observed at about 1.5 to 2 feet below the existing ground surface. Mottling is often indicative of the seasonal high perched groundwater table. Perched groundwater develops when the infiltration of water through a more permeable upper soil layer is slowed by a less permeable layer. We anticipate fluctuations in the local groundwater levels will occur in response to precipitation patterns, off-site construction activities, and site utilization.

CONCLUSIONS

Based on the results of our site reconnaissance, subsurface explorations and laboratory test results, the use of downspout infiltration and permeable pavement BMP's to address stormwater runoff and flow control generated by the proposed office building is not feasible.

Infiltration Recommendations

Based on our site observations and subsurface explorations, it is our opinion that stormwater infiltration via a trench or basin type system, as well as permeable pavement is not feasible within the project area. Mottling was encountered as shallow as 1.5 feet below ground surface across the site. Per Volume III, Section C, Site Suitability Criteria 5, *Depth to Bedrock, Water Table, or Impermeable Layer* of the 2012 SWMMWW, a minimum separation of 3 feet between the bottom of an infiltration basin or trench and the top of the seasonal high water mark is required. Given that a minimum infiltration facility depth is 3 feet below the existing ground surface, the minimum separation between the bottom of the infiltration facility and seasonal high groundwater cannot be met on the site; therefore, onsite infiltration of stormwater is not feasible on the site.

Per Volume V BMP T5.15, permeable pavement is not feasible if saturated conditions are encountered within 1-foot of the bottom of the storage course. Based on the evidence of a shallow perched groundwater table, and also the type of soil found at these depths, the use of permeable pavement is not feasible.

We recommend that alternative stormwater management Best Management Practices (BMPs) be implemented to manage the stormwater runoff generated by the proposed development per the 2012 SWMMWW. BMP's such as onsite dispersion per Volume III, Section 3.1.2, BMP T5.12 or connecting to the municipal storm drainage system using an onsite detention system should be utilized. All appropriate and pertinent setback criteria per the 2012 SWMMWW should be considered prior to the selection of a stormwater management BMP.

LIMITATIONS

We have prepared this report for use by Presidential Homes, Terry Folden, and other members of the design team, for use in the design of a portion of this project. The data used in preparing this report and this report should be provided to prospective contractors for their bidding or estimating purposes only. Our report, conclusions and interpretations are based on our subsurface

explorations, published geologic information, and limited site reconnaissance, and should not be construed as a warranty of the subsurface conditions.

Variations in subsurface conditions are possible between the explorations and may also occur with time. A contingency for unanticipated conditions should be included in the budget and schedule. Sufficient monitoring, testing and consultation should be provided by our firm during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities comply with contract plans and specifications.

The scope of our services does not include services related to environmental remediation and construction safety precautions. Our recommendations are not intended to direct the contractor's methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design.

If there are any changes in the loads, grades, locations, configurations or type of facilities to be constructed, the conclusions and recommendations presented in this report may not be fully applicable. If such changes are made, we should be given the opportunity to review our recommendations and provide written modifications or verifications, as appropriate.

◆ ◆ ◆

We have appreciated the opportunity to be of service to you on this project. If you have any questions or comments, please do not hesitate to call at your earliest convenience.

Respectfully submitted,
GeoResources, LLC

Andrew Schnitger, EIT
Engineer in Training

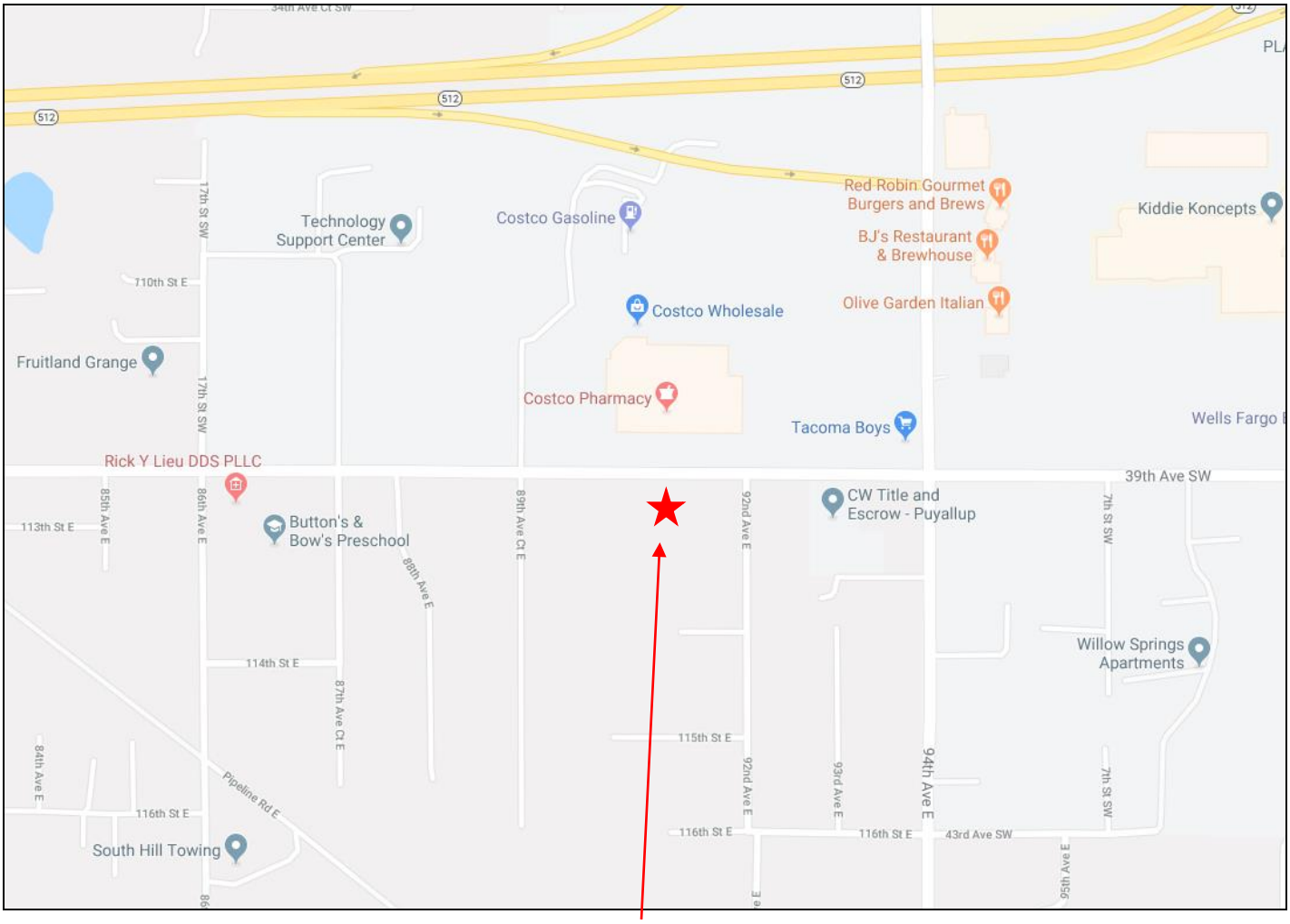
State of Washington
3237
Licensed Geologist
6/14/2019
Seth Mattos

Seth T. Mattos, LG
Associate

NEIL ANDREW FERGUSON
STATE OF WASHINGTON
56951
REGISTERED
PROFESSIONAL ENGINEER
6/14/2019

Neil A. Ferguson, PE
Project Engineer

AES:NAF:STM/aes
Doc ID: PresidentialHomes.39thAveSW.SR
Attachments: Figure 1: Site Location Map
Figure 2: Site and Exploration Plan
Figure 3: NRCS Soils Map
Figure 4: USGS Geologic Map
Appendix A – Subsurface Explorations
Appendix B – Laboratory Analysis



Approximate Site Location

Map created from Google Maps (https://maps.google.com/)

Not to Scale

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Site Location Map

Proposed Office
1212 – 39th Avenue Southwest
Puyallup, Washington
PN: 0419092021

DocID: PresidentialHomes.39thAveSW.F	June 2019	Figure 1

Approximate Site Location

Map created from Pierce County Public GIS (https://matterhornwab.co.pierce.wa.us/publicgis/)

Approximate location and number of test pit

Not to Scale

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Site & Exploration Plan

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Puyallup, Washington
PN: 0419092021

DocID: PresidentialHomes.39thAveSW.F	June 2019	Figure 2

Approximate Site Location

Map created from Web Soil Survey (http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx)

Soil Type	Soil Name	Parent Material	Slopes	Erosion Hazard	Hydrologic Soils Group
18B	Indianola loamy sand	Sandy glacial outwash	0 to 5	Slight	A

Not to Scale

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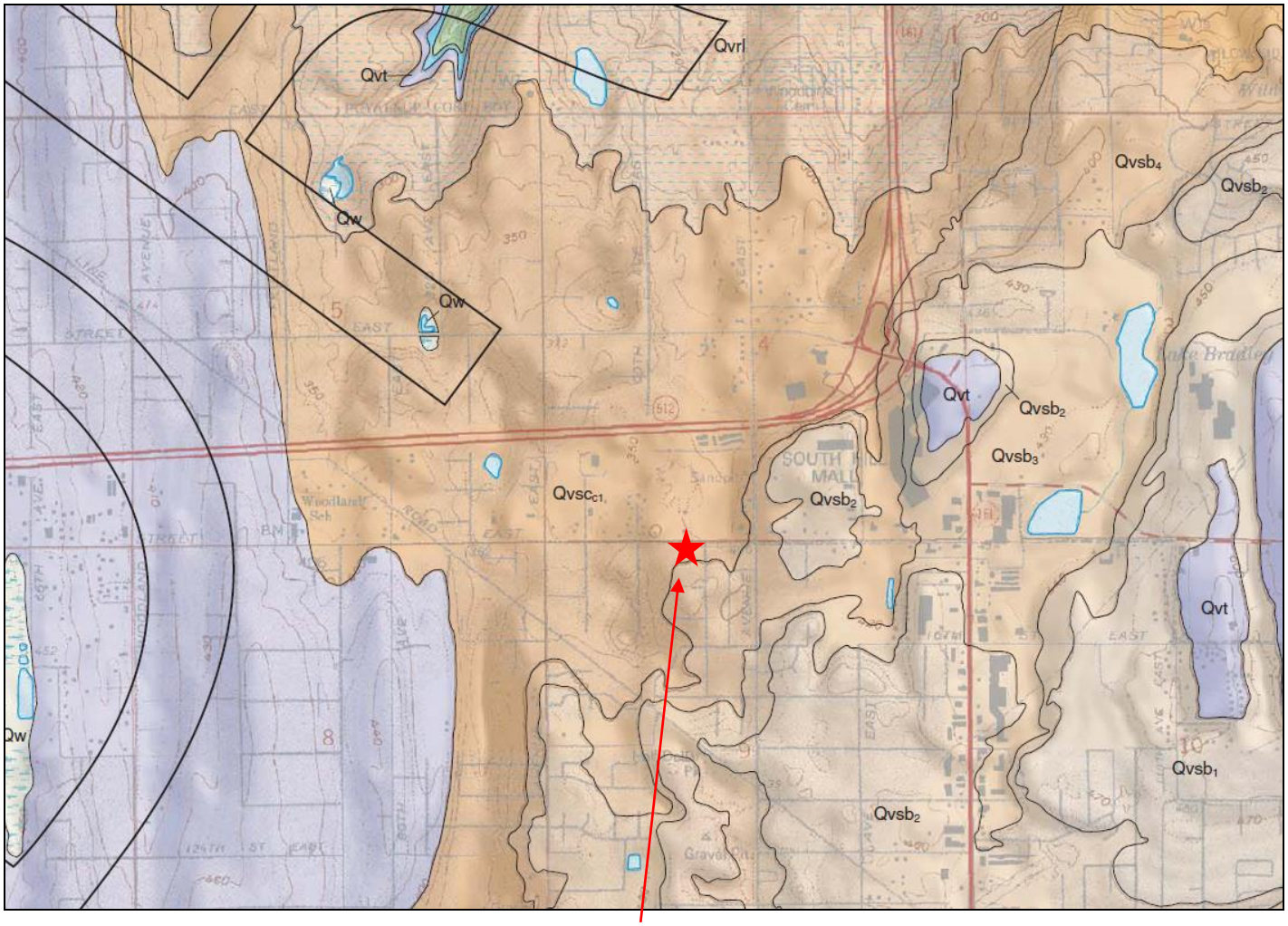
NRCS Soils Map

Proposed Office
1212 – 39th Avenue Southwest
Puyallup, Washington
PN: 0419092021

DocID: PresidentialHomes.39thAveSW.F	June 2019	Figure 3



Approximate Site Location

An excerpt from the draft *Geologic Map of the Puyallup 7.5-minute Quadrangle*, Washington, by K.G. Troost

$Qvsc_{c1}$	Steilacoom Gravel
$Qvsb_4$	Vashon recessional outwash

N W E S

Not to Scale

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USGS Geologic Map

Proposed Office
1212 – 39th Avenue Southwest
Puyallup, Washington
PN: 0419092021

DocID: PresidentialHomes.39thAveSW.F	June 2019	Figure 4

Appendix A

Subsurface Explorations

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS More than 50% Retained on No. 200 Sieve	GRAVEL More than 50% Of Coarse Fraction Retained on No. 4 Sieve	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND More than 50% Of Coarse Fraction Passes No. 4 Sieve	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% Passes No. 200 Sieve	SILT AND CLAY Liquid Limit Less than 50	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY Liquid Limit 50 or more	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1. Field classification is based on visual examination of soil in general accordance with ASTM D2488-90.
2. Soil classification using laboratory tests is based on ASTM D2487-90.
3. Description of soil density or consistency are based on interpretation of blow count data, visual appearance of soils, and or test data.

SOIL MOISTURE MODIFIERS:

Dry- Absence of moisture, dry to the touch

Moist- Damp, but no visible water

Wet- Visible free water or saturated, usually soil is obtained from below water table

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Unified Soils Classification System

Proposed Office
1212 – 39th Avenue Southwest
Puyallup, Washington
PN: 0419092021

Test Pit TP-1

Location: Southwestern portion of parcel
Approximate Elevation: 400'

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	1.5	SM	Brown silty fine SAND (loose, moist)
1.5	-	4.0	ML	Light brown SILT, orange iron oxide staining at contact (medium stiff, moist)

Terminated at 4 feet below ground surface.
No caving observed at the time of excavation.
No groundwater seepage observed.
Mottling observed at 1.5 feet below existing ground surface

Test Pit TP-2

Location: Northwestern portion of parcel
Approximate Elevation: 398'

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	3.5	ML	Light brown, orange iron oxide stained SILT (medium stiff, moist)
3.5	-	4.0	ML	Gray SILT with some sand (medium stiff to stiff, moist)

Terminated at 4 feet below ground surface.
No caving observed at the time of excavation.
No groundwater seepage observed.
Mottling observed at 2.0 feet below existing ground surface

Test Pit TP-3

Location: Central portion of site, within existing gravel driveway
Approximate Elevation: 400'

Depth (ft)			Soil Type	Soil Description
0	-	0.2	-	Crushed rock (dense, moist) (fill)
0.2	-	1.5	-	Brown sand and gravel (dense, moist) (fill)
1.5	-	2.0	ML	Reddish brown, orange iron oxide stained SILT (soft, moist)
2.0	-	4.0	ML	Light brown, orange iron oxide stained SILT (medium stiff, moist)

Terminated at 4 feet below ground surface.
No caving observed at the time of excavation.
No groundwater seepage observed.
Mottling observed at 1.5 feet below existing ground surface

Logged by: AES **Excavated on: May 20, 2019**

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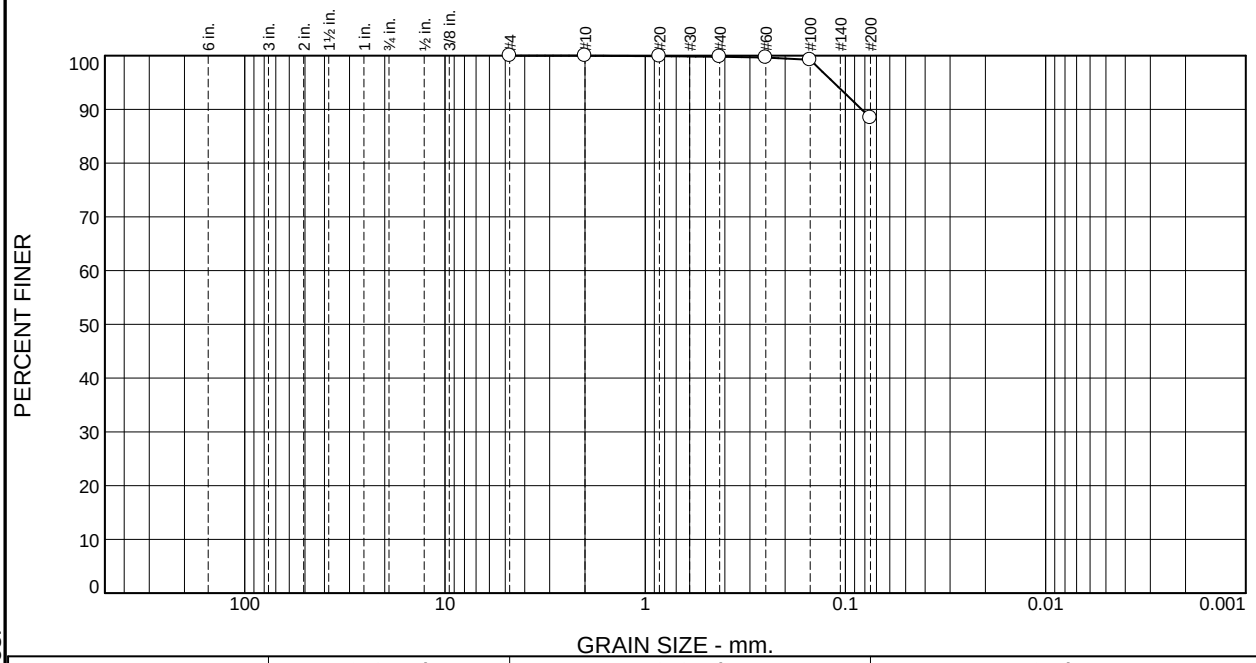
Test Pit Logs
Proposed Office
1212 – 39th Avenue Southwest
Puyallup, Washington
PN: 0419092021

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	11.4	88.4	

Test Results (ASTM D 422 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.8		
#60	99.6		
#100	99.2		
#200	88.4		

* (no specification provided)

Material Description

LIGHT BROWN silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NV

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.0829 D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 5/20/2019 **Date Tested:** 5/20/2019

Tested By: AES

Checked By: STM

Title: PM

Location: TP-1, S-2 **Date Sampled:** 5/20/2019
Sample Number: 097472 **Depth:** 1.5-4

GeoResources, LLC

Fife, WA

Client: Presidential Homes
Project: Proposed Office

Project No: PresHomes.39th **Figure**

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicitive of apparently identical samples.

Tested By: _____ **Checked By:** _____

6.2 Soils Report Addendum, GeoResources, dated June 22, 2020.

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June 22, 2020

Presidential Homes
1212 – 39th Avenue Southwest
Puyallup, WA 98373

Attn: Mr. Terry Folden
(253) 208-6030
Pres.homes@comcast.net

Soils Report Addendum
Proposed Office Building
1212 – 39th Avenue Southwest
Puyallup, Washington
PN: 0419092021
Doc ID: PresidentialHomes.39thAveSW.SRa

INTRODUCTION

This soils report addendum summarizes our site observations, subsurface explorations, laboratory testing, infiltration testing, and engineering analyses of the soils found at the site at the above referenced parcel. We previously prepared a *Soils Report* dated June 12, 2019 for the site that included three test pits.

Our understanding of this project is based on our discussions with Mr. Terry Folden, our *Soils Report* and our May 20, 2019 and recent February 5, 2020 test pit explorations and infiltration testing. We understand the City of Puyallup is requiring groundwater monitoring and infiltration testing for the proposed development. This addendum addresses comments from the City of Puyallup.

SCOPE

The purpose of our services is to evaluate the surface and subsurface conditions across the site as a basis for providing geotechnical recommendations and design criteria for the proposed development. Specifically, the scope of services for this project included the following:

1. Exploring the subsurface conditions by monitoring the excavation of a single test pit at a select location at the site, and installing a piezometer in the test pit;
2. Collecting select soil samples from the explorations and conducting a single grain size test, as appropriate;
3. Describing surface and subsurface conditions, including soil type, depth to groundwater, and an estimate of seasonal high groundwater levels;
4. Performing 1 small-scale Pilot Infiltration Test (PIT) in accordance with the 2014 SWMMWW;
5. Providing recommendations regarding the feasibility of the onsite infiltration in accordance with the 2014 SWMMWW including a preliminary design infiltration rate based on grain size data, as appropriate;

6. Preparing this *Soils Report Addendum* summarizing our site observations and conclusions, and our geotechnical recommendations and design criteria, along with the supporting data.

SITE CONDITIONS

Subsurface Explorations

On February 5, 2020, a representative from GeoResources LLC (GeoResources) visited the site and monitored the excavation of a single test pit to a depth of 10 feet below the existing ground surface at the site. The test pits were excavated by a small track-mounted excavator operated by a licensed earthwork contractor working for you. The approximate test pit locations are marked on the Site & Exploration Map, Figure 1.

The specific number, location, and depth of our explorations were selected based on conversations with you, and were adjusted in the field based on site access limitations. Our representative continuously monitored the explorations, maintained logs of the subsurface conditions encountered, obtained representative soil samples, and observed pertinent site features. Representative soil samples obtained from the explorations were placed in sealed plastic bags and taken to our laboratory for further examination and testing as deemed necessary. A 2-inch diameter piezometer was installed in the test pit to observe groundwater levels prior to being backfilled. The test pit was backfilled and tamped with the bucket, but otherwise not recompacted.

The subsurface explorations excavated as part of this evaluation indicate the subsurface conditions at specific locations only, as actual subsurface conditions can vary across the site. Furthermore, the nature and extent of such variation would not become evident until additional explorations are performed or until construction activities have begun.

The soils encountered were visually classified in accordance with the Unified Soil Classification System (USCS) and ASTM D: 2488. The USCS is included in Appendix A as Figure A-1, while the descriptive log of our test pit is included as Figures A-2.

Subsurface Conditions

Our test pit encountered similar soils to our previous test pit explorations that generally confirmed the mapped geology at the site. Our recent test pits encountered approximately 0.5 inches of topsoil mantling 3 feet of loose to medium stiff brown and light brown, orange iron oxide stained recessional lacustrine deposits in a moist condition. Beneath these surficial soils we encountered medium dense gray silty sand in a moist condition to the full depth explored that we interpret as recessional outwash.

Our PIT extended to 3 feet below the existing ground surface and was terminated in the light brown, orange iron oxide stained silt. We interpret the soils observed in our test pit and PIT to be consistent with recessional lacustrine deposits mantling recessional outwash silty sands.

Laboratory Testing

Geotechnical laboratory tests were performed on the deeper sandy soil samples retrieved from the test pits to determine soil index and engineering properties encountered. Laboratory testing included visual soil classification per ASTM D: 2488, moisture content determinations per ASTM D: 2216, and grain size analyses per ASTM D: 6913 standard procedures. The results of our laboratory tests are included in Appendix B, and summarized below in Table 1.

TABLE 1:
LABORATORY TEST RESULTS

Sample	Soil Type	Lab ID Number	Gravel Content (percent)	Sand Content (percent)	Fines Content (percent)	D10 Ratio (mm)
TP-101, 3'	Silty fine sand	099210	0	70.6	29.3	-

Groundwater Conditions

Our recent test pits were excavated during the wet season and groundwater seepage was not observed in any of our test pits explorations, however, orange iron oxide staining, a form of mottling, was observed in the shallow silty soils encountered at about 1.5 to 3.5 feet below the existing ground surface. We anticipate the site is not prone to a seasonal perched groundwater table, and the mottling observed in our explorations is because of poorly drained lacustrine soils.

We returned to the site on several occasions throughout the wet season to monitor the groundwater levels at the site via the recently installed piezometer to 10 feet below the existing ground surface. The elevation of the piezometer is approximately 398 to 388 feet (NAVD 88). We have not observed any groundwater in the piezometer during any of our groundwater monitoring site visits. It is our opinion seasonal high groundwater occurred below elevation 388 ft.

ENGINEERING CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our data review, site reconnaissance, subsurface explorations and our experience in the area, it is our opinion that the soils found in our recent test pit explorations are suitable for infiltration. Pertinent conclusions and geotechnical recommendations regarding the design and construction of the proposed development are presented below.

Infiltration Recommendations

For the purposes of this infiltration feasibility evaluation, we have a assumed that, at a minimum, the standard infiltration trench section (6 inches of topsoil over a 2 foot deep trench) and the standard permeable pavement section (6 inches of pavement over 6 inches of storage course) will be considered. Deeper trenches and thicker storage courses may be designed by a civil engineer where vertical separation requirements can be met.

Below we provide a summary of our opinions and recommendations regarding infiltration.

Permeable Pavement

We performed a single small-scale PIT at an elevation of approximately 3 feet below the existing ground surface to determine a Ksat (design infiltration rate) for the shallow lacustrine soils at the site. We recorded a Ksat of 1.6 inches per hour (in/hr). Based on the results of our infiltration testing, we recommend a long-term design rate of 0.4 inches per hour in the silt soils found in the upper 3 feet of the site for permeable pavement. We used the following correction factors: Site Variability (CF_v) of 0.33, and aggregate quality (CF_a) of 0.9. Low Impact Development (LID) techniques such as permeable pavement would require an appropriate overflow design because of the silty nature of the site soils.

We sent a representative sample of the soils at the proposed bottom elevation of the infiltration facility to a third party laboratory. The 2012 SWMMWW requires a Cation Exchange Capacity (CEC) of at least 5 mEq/100g and a minimum organic content of 1 percent in order for the native soils to be used as a treatment layer beneath water quality facilities, such as permeable pavement. The results of tests performed by Spectra Laboratories indicate that the CEC for the upper weathered outwash as the site is about 9.86 mEq/100g and that the organic content is about 5.3 percent, meeting the requirements of the 2012 SWMMWW

Downspout Infiltration Facilities

Downspout infiltration appears feasible in the deeper outwash sands. The bottom of the infiltration facilities should be located in the silty fine sand soils found at about 3.5 feet below the existing ground surface in the area of test pit TP-101. We performed a grainsize analysis in accordance with Volume III, Section 3.3.6 of the 2012 SWMWW to obtain a preliminary infiltration rate for infiltration facilities at the site. Based on our grainsize analysis, we recommend a design infiltration rate of 2 in/hr in the silty fine sand soils found at 3.5 feet below the existing ground surface in the area of test pit TP-101. We used the following correction factors: Site Variability (CF_v) of 0.3, test method (CF_t) of 0.5, and maintenance (CF_m) of 0.9.

Construction Considerations

We recommend that a representative from our firm be onsite at the time of excavation of the proposed infiltration facilities to verify that the soils encountered during construction are consistent with the soils observed in our subsurface explorations.

Appropriate design, construction and maintenance measures will be required to ensure the infiltration rate can be effectively maintained over time. Stormwater Best Management Practices (BMPs) in accordance with the 2014 SWMMWW should be included in the project plans and specifications to minimize the potential for fines contamination of Low Impact Development BMPs utilized at the site. This may be accomplished using a temporary stormwater management facility during construction. All contractors, builders, and subcontractors working on the site should be advised to avoid allowing "dirty" stormwater or excess sediment to enter the proposed pervious pavement area during construction and landscaping activities. No concrete trucks should be washed or cleaned onsite.

Suspended solids could clog the underlying soil and reduce the infiltration rate of the facilities. To reduce potential clogging of the infiltration systems, the infiltration system should not be connected to the stormwater runoff system until after construction is complete and the site area is landscaped, paved or otherwise protected. Additional measures may also be taken during construction to minimize the potential of fines contamination of the proposed infiltration system, such as utilizing an alternative storm water management location during construction or leaving the bottom of the permanent systems 1 to 2 feet high, and subsequently excavating to the finished grade once the site soils have been stabilized.

Prior to the placement of permeable pavement aggregate discharge subbase (ADS), topsoil and unsuitable soils should be removed to expose suitable subgrade. In general, the permeable pavement subgrade should be graded so that any overflow is directed to an appropriate discharge point. The native subgrade should be disturbed as little as possible and overcompaction should be avoided to maintain preconstruction infiltration rates. The subgrade should typically be no more than 90 to 92 percent of the maximum dry density (MDD) based on the modified Proctor procedure

(ASTM D: 1577) prior to placement of the ADS. A separation geotextile (filter fabric), such as Mirafi 140N or better, should be placed between the subgrade and ADS because of the silty subgrade soils. The subgrade should be scarified prior to placement of filter fabric to promote infiltration.

LIMITATIONS

We have prepared this report addendum for use by Presidential Homes, and other members of the design team, for use in the design of a portion of this project. The data used in preparing this report and this report should be provided to prospective contractors for their bidding or estimating purposes only. Our report, conclusions and interpretations are based on our subsurface explorations, data from others and limited site reconnaissance, and should not be construed as a warranty of the subsurface conditions.

Variations in subsurface conditions are possible between the explorations and may also occur with time. A contingency for unanticipated conditions should be included in the budget and schedule. Sufficient monitoring, testing and consultation should be provided by our firm during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities comply with contract plans and specifications.

The scope of our services does not include services related to environmental remediation and construction safety precautions. Our recommendations are not intended to direct the contractor's methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design.

If there are any changes in the loads, grades, locations, configurations or type of facilities to be constructed, the conclusions and recommendations presented in this report may not be fully applicable. If such changes are made, we should be given the opportunity to review our recommendations and provide written modifications or verifications, as appropriate.

◆ ◆ ◆

We have appreciated the opportunity to be of service to you on this project. If you have any questions or comments, please do not hesitate to call at your earliest convenience.

Respectfully submitted,
GeoResources, LLC

Andrew Schnitger, EIT
Engineer in Training

State of Washington
3237
Licensed Geologist
6/22/2020
Seth Mattos

Seth T. Mattos, LG
Associate

NEIL ANDREW FERGUSON
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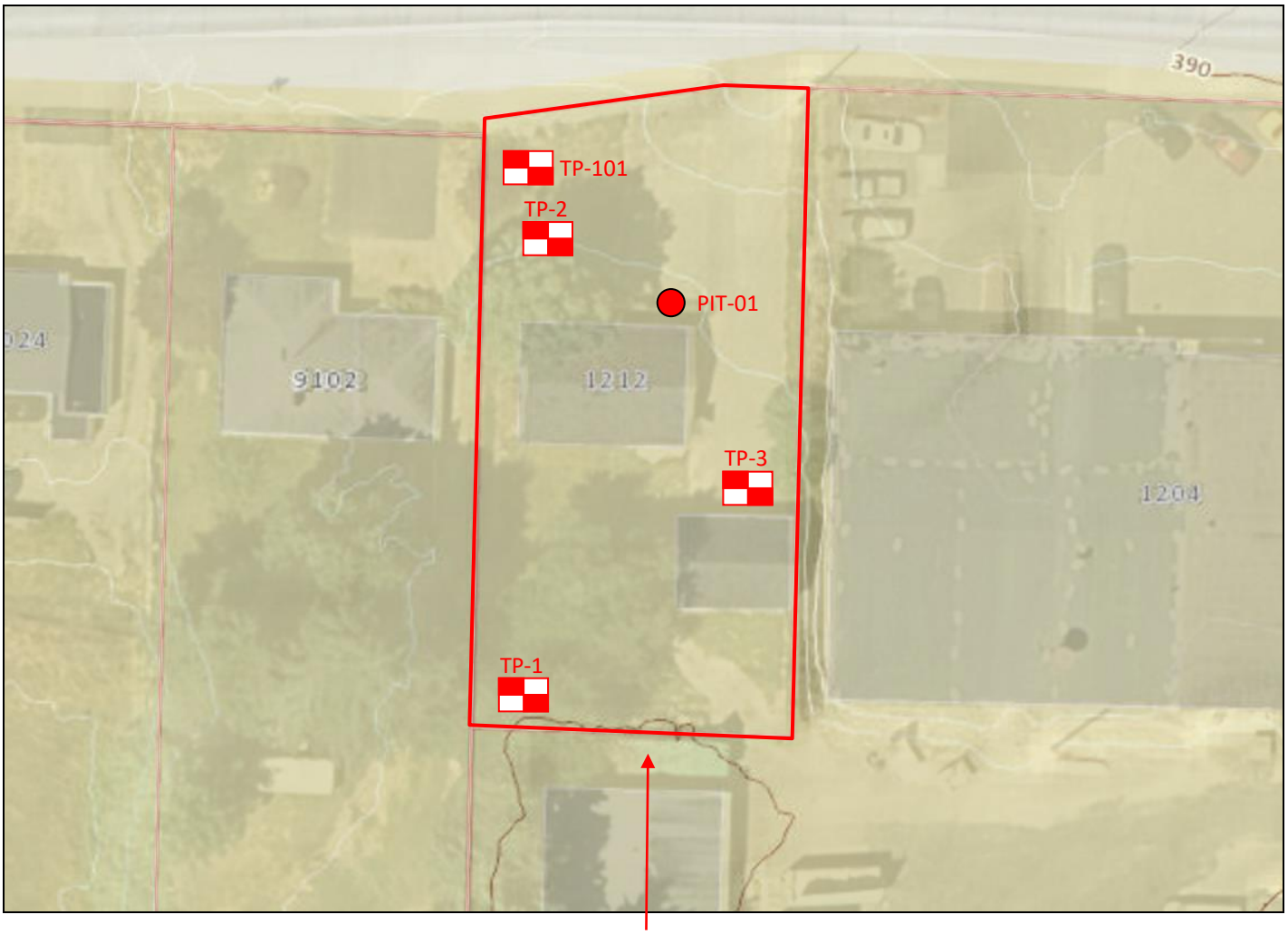
56951
REGISTERED
PROFESSIONAL ENGINEER
6/22/2020

Neil A. Ferguson, PE
Project Engineer

AES:STM:NAF/aes
Doc ID: PresidentialHomes.39thAveSW.SRa
Attachments: Figure 1: Site & Exploration Map
Appendix A - Subsurface Explorations
Appendix B - Laboratory Test Results



Approximate Site Location

Map created from Pierce County Public GIS (https://matterhornwab.co.pierce.wa.us/publicgis/)

Approximate location and number of test pit

Approximate location and number of PIT

Not to Scale

Site & Exploration Plan

Proposed Office
1212 – 39th Avenue Southwest
Puyallup, Washington
PN: 0419092021

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earth science & geotechnical engineering
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DocID: PresidentialHomes.39thAveSW.Fa	June 2020	Figure 1

Appendix A

Subsurface Explorations

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS More than 50% Retained on No. 200 Sieve	GRAVEL More than 50% Of Coarse Fraction Retained on No. 4 Sieve	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND More than 50% Of Coarse Fraction Passes No. 4 Sieve	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% Passes No. 200 Sieve	SILT AND CLAY Liquid Limit Less than 50	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY Liquid Limit 50 or more	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1. Field classification is based on visual examination of soil in general accordance with ASTM D2488-90.
2. Soil classification using laboratory tests is based on ASTM D2487-90.
3. Description of soil density or consistency are based on interpretation of blow count data, visual appearance of soils, and or test data.

SOIL MOISTURE MODIFIERS:

Dry- Absence of moisture, dry to the touch

Moist- Damp, but no visible water

Wet- Visible free water or saturated, usually soil is obtained from below water table

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Unified Soils Classification System

Proposed Office
1212 – 39th Avenue Southwest
Puyallup, Washington
PN: 0419092021

Test Pit TP-101

Location: Northwestern portion of parcel
Approximate Elevation: 398'

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	1.5	SM	Brown silty fine SAND (loose, moist) (weathered recessional lacustrine)
1.5	-	3.5	ML	Light brown SILT, orange iron oxide staining at contact (medium stiff, moist) (recessional lacustrine)
3.5	-	10	SM	Gray silty fine SAND (medium dense, moist) (recessional outwash)

Terminated at 10 feet below ground surface.
No caving observed at the time of excavation.
No groundwater seepage observed.
Mottling observed at 1.5 feet below existing ground surface

Pilot Infiltration Test PIT-01

Location: Northwestern portion of parcel, in proposed driveway
Approximate Elevation: 398'

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	1.5	SM	Brown silty fine SAND (loose, moist) (weathered recessional lacustrine)
1.5	-	3.0	ML	Light brown SILT, orange iron oxide staining at contact (medium stiff, moist) (recessional lacustrine)

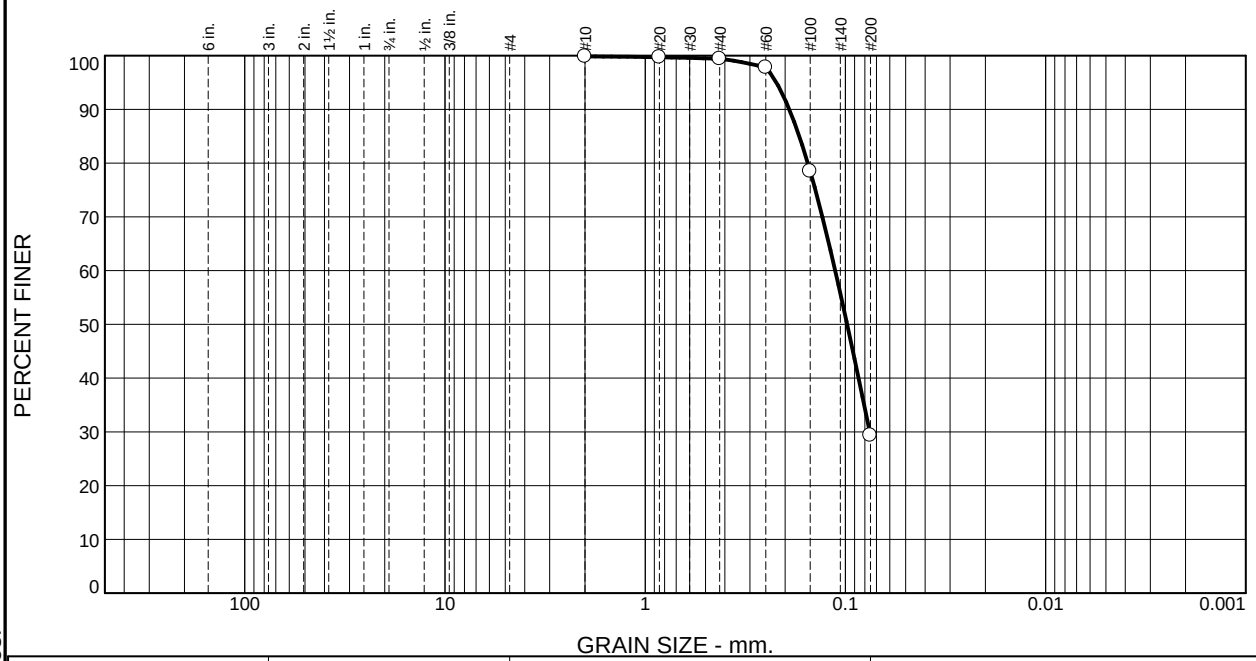
Terminated at 3.0 feet below ground surface.
No caving observed at the time of excavation.
No groundwater seepage observed.
Mottling observed at 1.5 feet below existing ground surface

Logged by: STM **Excavated on: February 5, 2020**

Appendix B

Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				0.5	70.1	29.3	

Test Results (ASTM D 6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#10	99.9		
#20	99.7		
#40	99.4		
#60	97.8		
#100	78.5		
#200	29.3		

* (no specification provided)

Material Description

gray silty fine SAND

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.1906 D_{85}= 0.1700 D_{60}= 0.1124
D_{50}= 0.0980 D_{30}= 0.0756 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 2/5/2020 **Date Tested:** 2/5/2020

Tested By: MM

Checked By: STM

Title: PM

Sample Number: 099210 **Date Sampled:** 2/5/2020

GeoResources, LLC

Fife, WA

Client: Presidential Homes
Project: Proposed Office

Project No: PresHomes.39th **Figure**

Tested By: _____ **Checked By:** _____

SPECTRA Laboratories ...Where experience matters
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06/19/2020

GeoResources, LLC
4809 Pacific Hwy E
Fife, WA 98424

Project:	PresHomes.37th
Client ID:	099997
Sample Matrix:	Soil
Date Sampled:	06/15/2020
Date Received:	06/15/2020
Spectra Project:	2020060487
Spectra Number:	1
	Rush

Analyte	Result	Units	Method	Analyst	Date Analyzed
Organic Matter	5.3	wt. % Dry	ASTM D-2974-13	KLH	06/16/2020
Cation Exchange Capacity	9.86	Na, mEq/ 100g	SW846 9081	SCJ	06/18/2020

SPECTRA LABORATORIES

Kristin Hintz

Authorized by: Kristin Hintz

a6/scj

Tab 7.0

7.0 OTHER PERMITS

The following is a list of permits that will need to be obtained prior or concurrent with construction:

- Building Permit
- Right of Way Permit

Tab 8.0

8.0 OPERATIONS AND MAINTENANCE

Table V-A.2: Maintenance Standards - Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Poisonous/Noxious Vegetation	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Contaminants and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Rodent Holes	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events.	Sediment is removed and/or facility is cleaned so that infiltration system works according to design.

Table V-A.2: Maintenance Standards - Infiltration (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
		(A percolation test pit or test of facility indicates facility is only working at 90% of its designed capabilities. Test every 2 to 5 years. If two inches or more sediment is present, remove).	
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than 1/2 full.	Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Gravel in rock filter is replaced.
Side Slopes of Pond	Erosion	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Emergency Overflow Spillway and Berms over 4 feet in height.	Tree Growth	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Piping	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Emergency Overflow Spillway	Rock Missing	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Erosion	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Pre-settling Ponds and Vaults	Facility or sump filled with Sediment and/or debris	6" or designed sediment trap depth of sediment.	Sediment is removed.

Table V-A.5: Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin). Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Top slab is free of holes and cracks. Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Cover/grate is in place, meets design standards, and is secured
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place, meets the design standards, and is installed and aligned with the flow path.

Table V-A.22: Maintenance Standards - Permeable Pavement

Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Surface/Wearing Course				
Permeable Pavements, all	A, S		Runoff from adjacent pervious areas deposits soil, mulch or sediment on paving	• Clean deposited soil or other materials from permeable pavement or other adjacent surfacing • Check if surface elevation of planted area is too high, or slopes towards pavement, and can be regraded (prior to regrading, protect permeable pavement by covering with temporary plastic and secure covering in place) • Mulch and/or plant all exposed soils that may erode to pavement surface
Porous asphalt or pervious concrete		A or B	None (routine maintenance)	Clean surface debris from pavement surface using one or a combination of the following methods: • Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Vacuum/sweep permeable paving installation using: ◦ Walk-behind vacuum (sidewalks) ◦ High efficiency regenerative air or vacuum sweeper (roadways, parking lots) ◦ ShopVac or brush brooms (small areas) • Hand held pressure washer or power washer with rotating brushes Follow equipment manufacturer guidelines for when equipment is most effective for cleaning permeable pavement. Dry weather is more effective for some equipment.
	A[b]		Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)	• Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility) • Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 square feet. Perform an additional test for each additional 2,500 square feet up to 15,000 square feet total. Above 15,000 square feet, add one test for every 10,000 square feet. • If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability. To clean clogged pavement surfaces, use one or combination of the following methods:

Table V-A.22: Maintenance Standards - Permeable Pavement (continued)

Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
				◦ Combined pressure wash and vacuum system calibrated to not dislodge wearing course aggregate. ◦ Hand held pressure washer or power washer with rotating brushes ◦ Pure vacuum sweepers Note: If the annual/biannual routine maintenance standard to clean the pavement surface is conducted using equipment from the list above, corrective maintenance may not be needed.
	A		Sediment present at the surface of the pavement	• Assess the overall performance of the pavement system during a rain event. If water runs off the pavement and/or there is ponding then see above. • Determine source of sediment loading and evaluate whether or not the source can be reduced/eliminated. If the source cannot be addressed, consider increasing frequency of routine cleaning (e.g., twice per year instead of once per year).
	Summer		Moss growth inhibits infiltration or poses slip safety hazard	• Sidewalks: Use a stiff broom to remove moss in the summer when it is dry • Parking lots and roadways: Pressure wash, vacuum sweep, or use a combination of the two for cleaning moss from pavement surface. May require stiff broom or power brush in areas of heavy moss.
	A		Major cracks or trip hazards and concrete spalling and raveling	• Fill potholes or small cracks with patching mixes • Large cracks and settlement may require cutting and replacing the pavement section. Replace in-kind where feasible. Replacing porous asphalt with conventional asphalt is acceptable if it is a small percentage of the total facility area and does not impact the overall facility function. • Take appropriate precautions during pavement repair and replacement efforts to prevent clogging of adjacent porous materials
Interlocking concrete paver blocks and aggregate pavers		A or B	None (routine maintenance)	Clean pavement surface using one or a combination of the following methods: • Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Vacuum/sweep permeable paving installation using: ◦ Walk-behind vacuum (sidewalks) ◦ High efficiency regenerative air or vacuum sweeper (roadways, parking lots) ◦ ShopVac or brush brooms (small areas) Note: Vacuum settings may have to be adjusted to prevent excess uptake of aggregate from paver openings or joints. Vacuum surface openings in dry weather to remove dry, encrusted sediment.
	A_b		Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)	• Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility) • Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 square feet. Perform an additional test for each additional 2,500 square feet up to 15,000 square feet total. Above 15,000 square feet, add one test for every 10,000 square feet. • If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability.

Table V-A.22: Maintenance Standards - Permeable Pavement (continued)

Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
				• Clogging is usually an issue in the upper 2 to 3 centimeters of aggregate. Remove the upper layer of encrusted sediment, and fines, and/or vegetation from openings and joints between the pavers by mechanical means and/or suction equipment (e.g., pure vacuum sweeper). • Replace aggregate in paver cells, joints, or openings per manufacturer's recommendations
	A		Sediment present at the surface of the pavement	• Assess the overall performance of the pavement system during a rain event. If water runs off the pavement and/or there is ponding, then see above. • Determine source of sediment loading and evaluate whether or not the source can be reduced/eliminated. If the source cannot be addressed, consider increasing frequency of routine cleaning (e.g., twice per year instead of once per year).
	Summer		Moss growth inhibits infiltration or poses slip safety hazard	• Sidewalks: Use a stiff broom to remove moss in the summer when it is dry • Parking lots and roadways: Vacuum sweep or stiff broom/power brush for cleaning moss from pavement surface
	A		Paver block missing or damaged	Remove individual damaged paver blocks by hand and replace or repair per manufacturer's recommendations
	A		Loss of aggregate material between paver blocks	Refill per manufacturer's recommendations for interlocking paver sections
	A		Settlement of surface	May require resetting
Open-celled paving grid with gravel		A or B	None (routine maintenance)	• Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Follow equipment manufacturer guidelines for cleaning surface.
	A_b		Aggregate is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)	• Use vacuum truck to remove and replace top course aggregate • Replace aggregate in paving grid per manufacturer's recommendations
	A		Paving grid missing or damaged	• Remove pins, pry up grid segments, and replace gravel • Replace grid segments where three or more adjacent rings are broken or damaged • Follow manufacturer guidelines for repairing surface.
	A		Settlement of surface	May require resetting
	A		Loss of aggregate material in paving grid	Replenish aggregate material by spreading gravel with a rake (gravel level should be maintained at the same level as the plastic rings or no more than 1/4 inch above the top of rings). See manufacturer's recommendations.
		A	Weeds present	• Manually remove weeds • Presence of weeds may indicate that too many fines are present (refer to Actions Needed under "Aggregate is clogged" to address this issue)
Open-celled paving grid with grass		A or B	None (routine maintenance)	• Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Follow equipment manufacturer guidelines for cleaning surface.

Table V-A.22: Maintenance Standards - Permeable Pavement (continued)

Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
	A_b		Aggregate is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)	Rehabilitate per manufacturer's recommendations.
	A		Paving grid missing or damaged	• Remove pins, pry up grid segments, and replace grass • Replace grid segments where three or more adjacent rings are broken or damaged • Follow manufacturer guidelines for repairing surface.
	A		Settlement of surface	May require resetting
	A		Poor grass coverage in paving grid	• Restore growing medium, reseed or plant, aerate, and/or amend vegetated area as needed • Traffic loading may be inhibiting grass growth; reconsider traffic loading if feasible
		As needed	None (routine maintenance)	Use a mulch mower to mow grass
		A	None (routine maintenance)	• Sprinkle a thin layer of compost on top of grass surface (1/2" top dressing) and sweep it in • Do not use fertilizer
		A	Weeds present	• Manually remove weeds • Mow, torch, or inoculate and replace with preferred vegetation
Inlets/Outlets/Pipes				
Inlet/outlet pipe	A		Pipe is damaged	Repair/replace
	A		Pipe is clogged	Remove roots or debris
Underdrain pipe	Clean pipe as needed	Clean orifice at least biannually (may need more frequent cleaning during wet season)	Plant roots, sediment or debris reducing capacity of underdrain (may cause prolonged drawdown period)	• Jet clean or rotary cut debris/roots from underdrain(s) • If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly
Raised subsurface overflow pipe	Clean pipe as needed	Clean orifice at least biannually (may need more frequent cleaning during wet season)	Plant roots, sediment or debris reducing capacity of underdrain	• Jet clean or rotary cut debris/roots from under-drain(s) • If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly
Outlet structure	A, S		Sediment, vegetation, or debris reducing capacity of outlet structure	• Clear the blockage • Identify the source of the blockage and take actions to prevent future blockages
Overflow	B		Native soil is exposed or other signs of erosion damage are present at discharge point	Repair erosion and stabilize surface
Aggregate Storage Reservoir				
Observation port	A, S		Water remains in the storage aggregate longer than anticipated by design after the end of a storm	If immediate cause of extended ponding is not identified, schedule investigation of subsurface materials or other potential causes of system failure.

Table V-A.22: Maintenance Standards - Permeable Pavement (continued)

Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Vegetation				
Adjacent large shrubs or trees		As needed	Vegetation related fallout clogs or will potentially clog voids	• Sweep leaf litter and sediment to prevent surface clogging and ponding • Prevent large root systems from damaging subsurface structural components
		Once in May and Once in September	Vegetation growing beyond facility edge onto sidewalks, paths, and street edge	Edging and trimming of planted areas to control groundcovers and shrubs from overreaching the sidewalks, paths and street edge improves appearance and reduces clogging of permeable pavements by leaf litter, mulch and soil.
Leaves, needles, and organic debris		In fall (October to December) after leaf drop (1-3 times, depending on canopy cover)	Accumulation of organic debris and leaf litter	Use leaf blower or vacuum to blow or remove leaves, evergreen needles, and debris (i.e., flowers, blossoms) off of and away from permeable pavement

Note that the inspection and routine maintenance frequencies listed above are recommended by Ecology. They do not supersede or replace the municipal stormwater permit requirements for inspection frequency required of municipal stormwater permittees for "stormwater treatment and flow control BMPs/facilities".

a Frequency: A= Annually; B= Biannually (twice per year); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).

b Inspection should occur during storm event.