C.E.S. NW Inc.
Civil Engineering & Surveying

STORM DRAINAGE REPORT FOR 2504 12TH AVE. NW SFR

REVISED OCTOBER, 2022
JULY, 2022

PREPARED FOR:

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STORM DRAINAGE REPORT

FOR

2504 12th Ave. NW SFR
Puyallup, Washington

Revised October 2022
July, 2022

Prepared for:
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Prepared by:
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Approved By:
Daniel Smith, P.E., Senior Project Manager

REPORT #22058

"I hereby state that this Preliminary Drainage and Erosion/Sediment Control Plan for the 2504 12th Ave. NW SFR project has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community of professional engineers. I understand that City of Puyallup does not and will not assume liability for the sufficiency, suitability or performance of drainage facilities prepared by me."

This analysis is based on data and records either supplied to, or obtained by, C.E.S. NW, Inc. These documents are referenced within the text of the analysis. The analysis has been prepared utilizing procedures and practices within the standard accepted practices of the industry.

TABLE OF CONTENTS

STORM DRAINAGE

1. Project Overview

This report accompanies the building permit prepared for the 2504 12th Ave. NW SFR project which is submitted to the City of Puyallup for review and approval. This document provides site information, and the analysis used to prepare the final storm drainage design. The *Washington State Department of Ecology Stormwater Management Manual for Western Washington, 2019 (Manual),* and the City of Puyallup's modifications to that document establishes the methodology and design criteria used for this project.

The 2504 12th Ave NW SFR project consists of a proposed single-family residence on parcel 6025480320 with an area totaling 0.20 acres. The site is accessible from 12th Ave. NW with a new driveway approach. A Vicinity Map has been included in Appendix A of this report. A project summary is as follows:

Permit Applied for – Building Permit
Address – 2504 12th Ave. NW, Puyallup, WA
Parcel Numbers – 6025480320
Legal description – Section 20 Township 20 Range 04

Lot 32 of the ASHLEY MEADOWS Phase 3 Recorded under Auditor's File Number 200612205022

Situated in the City of Puyallup, County of Pierce, Washington.

The project proposes 3,026 sq.ft. of roof area and 729 sq.ft. of driveway area and clears 9,620 sq.ft. of the site; therefore, the project must evaluate minimum requirements #1 through #5 in accordance with Figure I-3.1 of the Manual, see Section 5 of this report for detailed discussion of the minimum requirements. The project mitigates its runoff with a roof downspout infiltration trench (BMP T5.10B) and permeable interlocking concrete pavers (BMP T5.15).

2. Existing Conditions Summary

The site is bordered on the north by 12th Ave NW, to the south by a residential home and an automotive shop, to the west and east by both residential homes. The site is currently vacant with and old stockpile towards the back of the lot. The site is relatively flat and has little to no slope across the lot.

Onsite soils are identified as Sultan Silt Loam, (42A) as determined by the USDA SCS maps of Pierce County, Washington. Sultan Silty Loam is classified as a Type C soil. These soils are considered to have moderate runoff potential. A description of these soils and a copy of the soil map for this portion of the City is included in Appendix A of this report. According to the Geotechnical engineer's report, no ground water indicators are observed in the exploratory soil pits. Typical infiltration rates are between 2 to 4 in/hr. A Falling Head Percolation Test was performed in the vicinity of Test Pit 3 and an infiltration rate of 1.5-inches per hour was determined in the upper soils with a safety factor of 0.5. A copy of the geotechnical engineer's report is included in *Appendix "A"* of this report.

Federal Emergency Management Agency (FEMA) has prepared flood insurance maps identifying floodplains within Pierce County, Washington. The parcel and all the proposed improvements are located within Zone X, which is considered out of the 100-year floodplain, per FEMA FIRM community panel numbers 530530329E. A copy of the FIRM Panels can be found in *Appendix "B"* of this report.

3. Off-site Analysis Report

A quarter mile downstream analysis is required by the City of Puyallup. The project mitigates it proposed improvements with soil amendments (BMP T5.13), Permeable interlocking concrete pavers (BMP T5.15), and a roof downspout infiltration trench (BMP T5.10A). These BMPs rely on infiltration to eliminate additional runoff from the site due to proposed improvements.

No adverse impacts are anticipated to the downstream system as a result of the development due to the proposed site improvements.

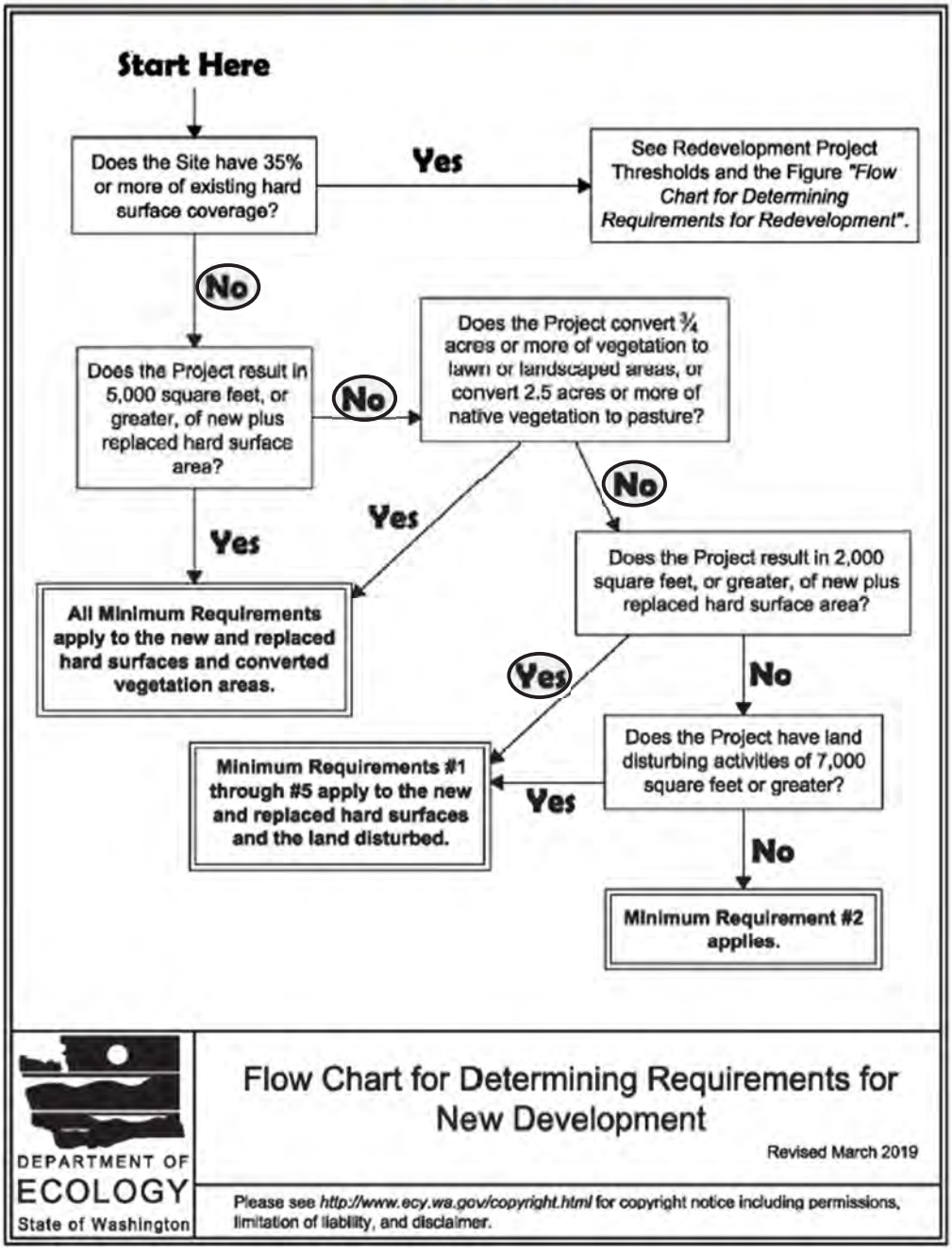
4. Permanent Stormwater Control Plan

This project proposes less than 5,000 sq.ft. of impervious surfaces so it does not have to meet flow control or runoff treatment standards from Minimum Requirements #6 and #7. The project must apply onsite stormwater management BMP from List #1 of Minimum Requirement #5 which includes a roof downspout infiltration trench (BMP T5.10A), Permeable interlocking concrete paver sections (BMP T5.15) and soil amendments (BMP T5.13). The infiltration trench is modeled with the WWHM computer program to demonstrate that runoff from the rooftop is fully infiltrated. The WWHM modeling report is included in *Appendix "C"* of this report.

5. Discussion of Minimum Requirements

The project proposes less than 5,000 sq.ft. of impervious surfaces but more than 2,000 sq.ft. of impervious surfaces. In accordance with Figure I-3.1 the project must meet Minimum Requirements #1-#5. The following is a summary of each these minimum requirements.

Figure I-3.1: Flow Chart for Determining Requirements for New Development



5.1 Minimum Requirement #1: Preparation of a Stormwater Site Plan

The Stormwater Site Plan is prepared and is provided as this document.

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

A SWPP Plan is prepared that discusses all thirteen (13) elements, which is provided as a separate document.

5.3 Minimum Requirement #3: Source Control of Pollution

A pollution source control manual is included as Attachment B of the Operation and Maintenance Manual which is included as a separate document.

Per Section III-1.1 in the ECY Manual, MR 3 is not applicable for SFRs. [Storm Report, Page 5]

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

Runoff from proposed improvement will infiltrate onsite. Any flows leaving the site will enter the City's existing closed storm drainage system in 12th Ave NW which is a historic discharge location of the property.

5.5 Minimum Requirement #5: Onsite Stormwater Management

This project must meet minimum requirements #1-#5; therefore, the project must implement BMPs from List #1. These projects propose soils amendments (BMP T5.13), a roof downspout infiltration trench (BMP T5.10A) and permeable interlocking concrete pavers (BMP T5.15). A discussion of each BMP from List #1 is as follows:

Lawn and Landscape Areas

- Soil Preservation and Amendment (Ecology BMP T5.13).

  All disturbed areas which are not converted to impervious areas shall apply soil amendment per Ecology BMP T5.13.

Roofs

- Full Dispersion in accordance with BMP T5.30 in Chapter 5 of Volume V, or Downspout Full Infiltration Systems in accordance with BMP T5.10A in Section 3.1.1 in Chapter 3 of Volume III

  Full Dispersion is deemed infeasible since there is not sufficient area onsite to meet the native vegetation retention requirements. Full infiltration is deemed feasible since there is proper separation from the groundwater table and the infiltration. No other BMPs are required for this surface.

Other Hard Surfaces

- Full Dispersion in accordance with BMP T5.30 in Chapter 5 of Volume V.

There is not sufficient native vegetation area available to set aside to meet the native vegetation requirement; therefore, this BMP is not feasible.

- Permeable pavement1 in accordance with BMP T5.15 in chapter 5 of Volume V or rain gardens in accordance with BMP T5.14 in Chapter 5 of Volume V or Bioretention in accordance with Chapter 7 of Volume V.

this BMP is deemed feasible for the proposed driveway. Permeable interlocking concrete pavers is proposed as shown on the approved plans.

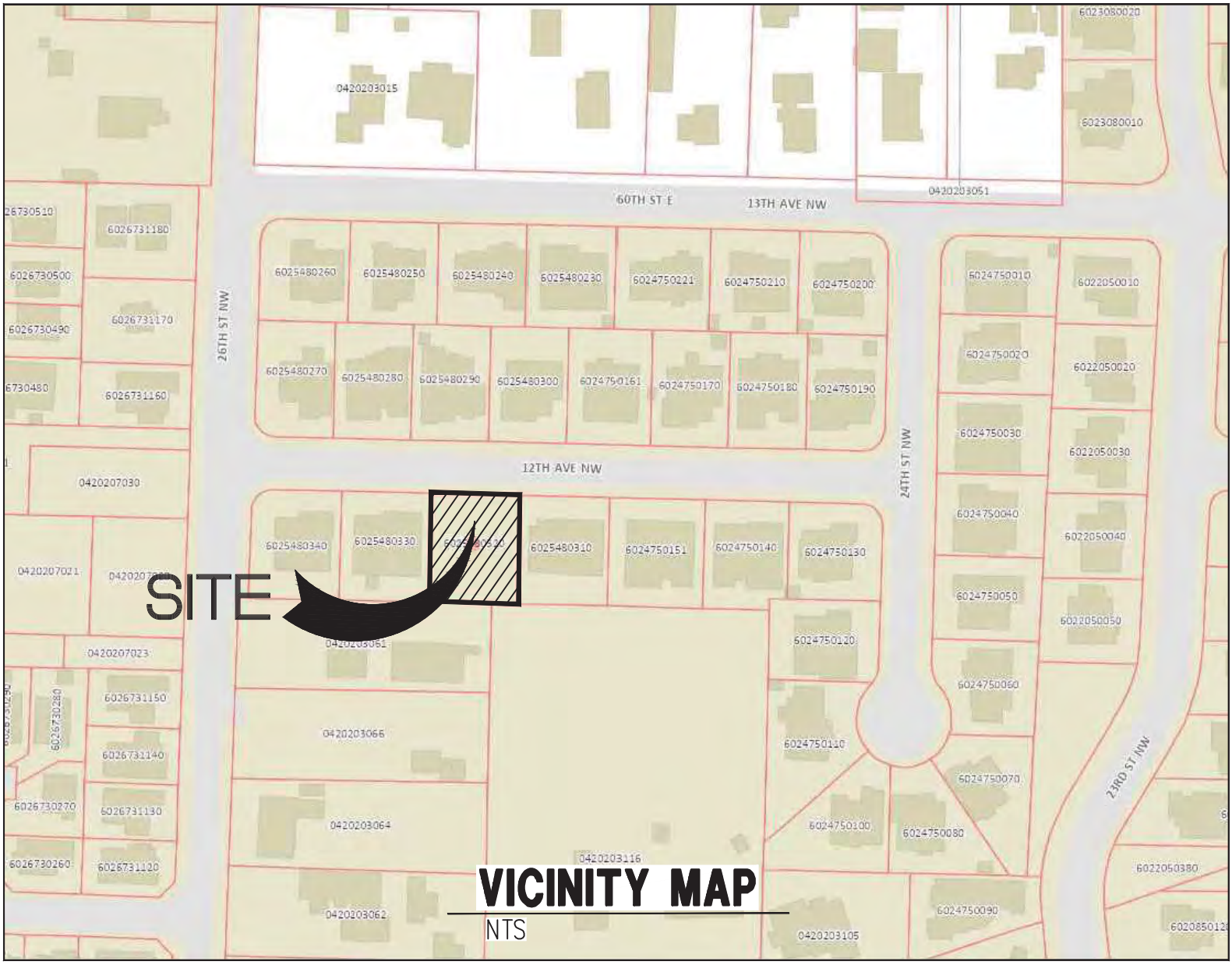
6. Other Permits

Other necessary permits and approvals include:

- ROW Permit

APPENDIX A

General Exhibits



VICINITY MAP

NTS

Map Scale: 1:227 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 3 6 12 18

Feet
0 10 20 40 60

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

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 17, Aug 31, 2021

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

Date(s) aerial images were photographed: Jul 18, 2020—Aug 2, 2020

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
42A	Sultan silt loam	0.3	100.0%
Totals for Area of Interest		**0.3**	**100.0%**

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253 279-8284

June 20, 2022

Residential Soil Evaluation

Site Address	**2504 12th AV NW, Puyallup**
Parcel No.	**025480320**
Site Observations:	**06/03/2022**
Revised	**09/22/2022**

Introduction

A geotechnical evaluation was requested for the single-family residential lot located at 2504 12th AV NW in Puyallup, WA. Through this evaluation, we made site observations and researched the surface and subsurface conditions through available published records; and reviewed aerial photography, topographical maps, and LiDAR terrain maps. These various references help gain an understanding of the regional morphology and establish an opinion on site development.

Based on our site observations, exploratory soil pits and research it is our opinion the 8,661 sf residential lot can be developed utilizing a conventional foundation system and private storm drainage detention system available

Information Sources

Soil identification and mapping for this assessment is supported by on-site soil exploration pits, information from the Natural Resource Conservation Service (NRCS) and slope observations. Geologic information is supported by information from the Department of Natural Resources (DNR) Geologic Map of the DRAFT Puyallup Geologic Map. Our understanding of site geology is supported by the review of geologic mapping, published topographic and relief map layers from the Pierce County Geographical Information System (GIS), and site observations. Our opinions are based on our interpretation of the cumulative information and the contemporary conditions of the geologic setting.

Published Information Accuracy

It should be noted that the NRCS, the Washington State geologic map, and the Pierce County GIS define general areas of soil deposits, geology, and landforms. Given the large areas to identify and limited sample points, the authors of the above sources infer boundaries, contacts, and other representations in some areas. Only through on-site reconnaissance can we further detail and adjust information from the maps as they relate to each site. Our experience often finds site discrepancies on a lot-by-lot basis. In this case, the NRCS, the DNR unit identification, and the in-situ conditions are consistent.

Site Description

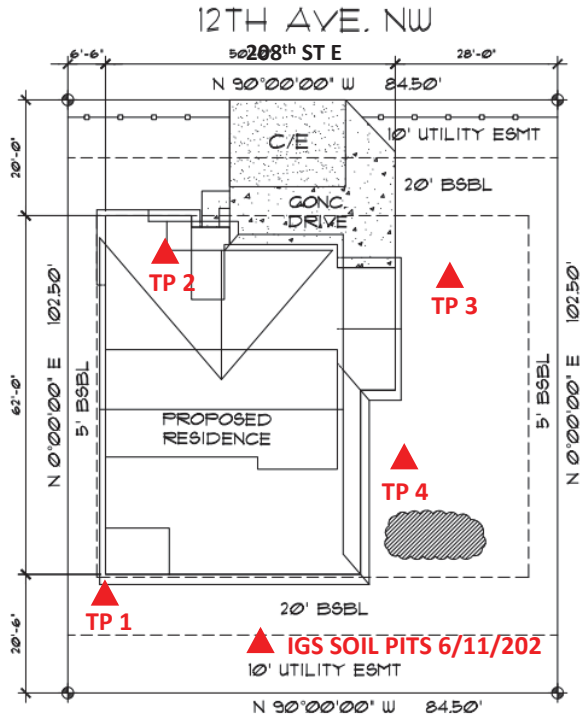
General

This 8,661-sf property (0.19 ac.) is located south of 12th AV NW in Puyallup, WA. The nearly rectangular property extends south from 12th AV NW 102 ft and is nearly 85 ft wide. Development plans call for the construction of a single-family residential structure 5 ft. east of the west property line and 20 ft. north of the south property line.

The nearly 0.19-acre parcel is currently a vacant lot surrounded by similar single-family structures on conventional foundation systems. The lot is nearly level with a large stockpile of soil in the southeast quarter of the lot.

The proposed new residential lots will be served by municipal water, sewer and a community storm water detention system with a stub out available at the lot.

12th AV NW PROPERTY
Mapping not to Scale



Site plan provided by Cheshire Homes and Ortho Photo obtained from Pierce County GIS

Soil

As discussed in the 'Published Information Accuracy' section above; on-site reconnaissance is necessary to verify soil conditions on specific properties. Both the Natural Resource Conservation Service, (NRCS) and the geologic map describe materials of similar characteristics and origin. Per the NRCS, the type of soil across the property consists of Sultan silt loam (42A) with nearly level grades.

NRCS SOIL MAPPING

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
31A	Puyallup fine sandy loam	2.8	11.3%
42A	Sultan silt loam	22.1	88.7%
Totals for Area of Interest		**24.9**	**100.0%**

NRCS Soil Classification

Sultan 42A – Sultan silt loam

This nearly level soil is moderately well drained. It formed in alluvium under deciduous and coniferous trees. This soil is on the bottom lands along the Puyallup and White Rivers at elevations ranging from near sea level to 100 feet. Slopes are less than two percent, and the surface is smooth. The annual precipitation is 35 to 50 inches, and the mean annual air temperature is about 50 degrees F. The average frost-free season is about 190 days. Areas range in size from five to more than 400 acres, but they average about 100 acres. This soil lies between areas of somewhat poorly drained Briscot soils and poorly drained Puget soils.

Included with this soil in mapping are as much as 12 percent Briscot and Puyallup soils on slightly convex slopes and as much as two percent Puget soils in troughs or depressions. In the area south of Alderton, small areas of soil underlain by gravelly coarse sandy clay loam at a depth of 18 inches are also included.

In a typical profile the surface layer is dark grayish brown silt loam about 14 inches thick. The underlying material to a depth of 34 inches is mottled, brown silt loam and dark yellowish brown very fine sandy loam. To a depth of more than 60 inches, it is mottled, dark gray fine sandy loam, gray silty clay loam, very dark grayish brown fine sand, and dark yellowish brown silt loam. Reaction is slightly acid to neutral.

Permeability is moderately slow. In undrained areas, few roots penetrate below a depth of 24 inches. The available water capacity is high. Surface runoff is slow, and there is a slight erosion hazard.

This soil is subject to residential and industrial development pressure. It is well suited to excavation for utility lines. It is protected from periodic flooding by dikes. Onsite sewage disposal systems function improperly or fail during the rainy season because of the high water table. The natural ability of this soil to support large loads is limited. Fill soil material is required for most types of construction. Adequate drainage to dispose of runoff from rooftops and pavement is necessary.

Geology

The regional geology indicates the property is situate near the center of a wide alluvial valley. The alluvial soils consist of sand, silt and gravel deposited by river migration through the valley and flood deposits. The NRCS reports the surface soils to consist of Sultan Silt Loam which is consistent with the geologic mapping as alluvium.

DRAFT Geologic Map of Puyallup (nts)

Qal Alluvium (Holocene and Pleistocene)—Sand, silt, gravel, and cobbles; clean to silty; peat and organic silt lenses common, shelly layers at depth associated with former marine embayments; very loose to dense; 275 ft to 300 ft thick from east to west. Includes lahars from Mt. Rainier and reworked lahar deposits, particularly the Osceola mudflow in the Puyallup and White River valleys (Zehfuss, 2005; Dragovich and others, 1994). Lahar deposits found at depth and consist of slightly clayey, gravelly, sandy silt diamict; often with wood and pumice. From Puyallup to Fife the post-Osceola alluvial fill thickens from 6 to 90 m (20-300 ft) thick and is within 20 to 50 ft of the floodplain surface at Puyallup and east of Puyallup. Deposited by lowland streams and rivers, may include late-stage recessional outwash of Fraser glaciation. Mapped in the Puyallup, White River, and Hylebos Creek valleys, although thinner deposits of alluvium are present in the bottoms of the smaller upland streams. Locally subdivided into: Qyal Younger Alluvium (Holocene)—Sand, silt, gravel, and cobbles; very loose to medium dense. Deposited in historical channels of the Puyallup River and Wapato Creek visible on 1940 aerial photographs and 1889 GLO Plat Maps. Commonly overlain by areas of modified land Qf Fan deposits (Holocene)—Sand, silt, gravel, and cobbles; very loose to dense. Forms lobate deposits where streams emerge from confining valleys and gradients are reduced. Gradational with units Qal and Qp.

Our soil exploration pits confirmed the geology as Alluvial sand and silt deposits across the lot. A large pile of clean soil was explored in the southeast corner of the site. The stockpile of soil consists of gravelly sand and silt which was dry to a depth of 6 ft.

GEOTECHNCAL RECOMMENDATIONS

Seismic Design Parameters

Based on our analysis of subsurface exploration logs and our review of published geologic maps, we interpret the on-site soil conditions to correspond with a seismic soil profile Type C as defined by the USGS. Current *National Seismic Hazard Maps (Provided)* prepared by the U.S. Geological Survey indicate that a peak bedrock site acceleration coefficient of about 0.051 is appropriate for an earthquake having a 10-percent probability of exceedance in 50 years, which corresponds to a return interval of 475 years.

Liquefaction

Liquefaction is a sudden increase in pore water pressure and a sudden loss of soil shear strength caused by shear strains, as could result from an earthquake. Research has shown that saturated, loose sands with a fines silt and clay content less than about 25 percent are most susceptible to liquefaction. Although other soil types are generally considered to have a low susceptibility, liquefaction may still occur during a strong earthquake.

Our subsurface exploration observed a stratified sequence of sand with small gravel, overlying a silt layer and medium dense sand below the silt. The site is underlain by alluvial deposits which in our opinion have a moderate potential for saturation and soil liquefaction. No ground water was observed in the 4 exploratory soil pits.

Building Foundation

In our opinion, conventional spread footings will provide adequate support for the residential structures if the subgrades are properly prepared.

Footing Depths and Widths: For frost and erosion protection, the bases of all exterior footings should bear at least 18 inches below adjacent outside grades, whereas the bases of interior footings need bear only 12 inches below the surrounding slab surface level. To reduce post-construction settlements, continuous (wall) and isolated (column) footings should be at least 18 and 24 inches wide, respectively.

Bearing Subgrades: Footings should bear on medium dense or denser, undisturbed native soils which have been stripped of surficial organic soils, or on properly compacted structural fill which bears on undisturbed native soils which have been stripped of surficial organic soils. In general, before footing concrete is placed, any localized zones of loose soils exposed across the footing subgrades should be compacted to a firm, unyielding condition, and any localized zones of soft, organic, or debris-laden soils should be over-excavated and replaced with suitable structural fill. Care should be taken in identifying pockets of loose fill, placed during prior grading activities, which may be scattered across the site.

Subgrade Observation: All footing subgrades should consist of firm, unyielding, native soils or structural fill materials compacted to a density of at least 95 percent (based on ASTM:D-1557). Footings should never be cast atop loose, soft, or frozen soil, slough, debris, existing uncontrolled fill, or surfaces covered by standing water.

Bearing Pressures: In our opinion, for static loading, footings that bear on properly prepared subgrades can be designed for a maximum allowable soil bearing pressure of 1,500 pounds per square foot (psf). A one-third increase in allowable soil bearing capacity may be used for short-term loads created by seismic or wind related activities.

Footing Settlements: Assuming that structural fill soils are compacted to a medium dense or denser state, we estimate that total post-construction settlements of properly designed footings bearing on properly prepared subgrades will not exceed 1 inch. Differential settlements for comparably loaded elements may approach one-half of the actual total settlement over horizontal distances of approximately 50 feet.

Footing Backfill: To provide erosion protection and lateral load resistance, we recommend that all footing excavations be backfilled on both sides of the footings and stem walls after the concrete has cured. Either imported structural fill or non-organic on-site soils can be used for this purpose, contingent on suitable moisture content at the time of placement. Regardless of soil type, all footing backfill soil should be compacted to a density of at least 90 percent (based on ASTM:D-1557).

LATERAL RESISTANCE

Footings which have been properly backfilled as recommended above will resist lateral movements by means of passive earth pressure and base friction. We recommend using an allowable passive earth pressure of 100 for the fine sand and silt deposits onsite. We recommend an allowable base friction coefficient of 0.30.

FOUNDATION DRAINS

In our opinion, the proposed structure should be provided with optional permanent drainage systems to reduce the risk of future moisture problems. We offer the following recommendations and comments for drainage design and construction purposes.

Perimeter Drains: We recommend that buildings be encircled with a perimeter drain system to collect seepage water. This drain should consist of a 4-inch-diameter perforated pipe within an envelope of pea gravel or washed rock, extending at least 6 inches on all sides of the pipe, and the gravel envelope should be wrapped with filter fabric to reduce the migration of fines from the surrounding soils. Ideally, the drain invert would be installed no more than 8 inches above the base of the perimeter footings.

Subfloor Drains: Based on the groundwater conditions observed in our site explorations, we do not infer a need for subfloor drains.

Discharge Considerations: If possible, all perimeter drains should discharge to the storm water detention system location by gravity flow. Check valves should be installed along any drainpipes that discharge to a sewer system, to prevent sewage backflow into the drain system.

Runoff Water: Roof-runoff and surface-runoff water should *not* discharge into the perimeter drain system. Instead, these sources should discharge into separate tightline pipes and be routed away from the building to a storm drain or other appropriate location.

Grading and Capping: Final site grades should slope downward away from the buildings so that runoff water will flow by gravity to suitable collection points, rather than ponding near the building. Ideally, the area surrounding the building would be capped with concrete, asphalt, or low-permeability (silty) soils to minimize or preclude surface-water infiltration.

SUBGRADE PREPARATION

Clearing and Stripping: After surface and near-surface water sources have been controlled, the construction areas should be cleared and stripped of all duff and topsoil. Also, it should be realized that if the stripping operation proceeds during wet weather, a generally greater stripping depth might be necessary to remove disturbed moisture-sensitive soils; therefore, stripping is best performed during a period of dry weather.

Site Excavations: Based on our explorations, we expect that site excavations on some of the site will encounter dense silty sand or hard silt. Special teeth on excavators or rippers on bulldozers may be needed to rapidly excavate these soils.

Dewatering: Our explorations encountered groundwater seepage at elevations where earth work activity will occur, we expect groundwater will be present in excavations for the planned development. If groundwater is encountered, we anticipate an internal system of ditches, sump holes, and pumps will be adequate to temporarily dewater excavations.

Site Filling: Our conclusions regarding the reuse of on-site soils and our comments regarding wet-weather filling are presented subsequently. Regardless of soil type, all fills should be placed and compacted according to our recommendations presented in the *Structural Fill* section of this report. Specifically, building pad fill soil should be compacted to a uniform density of at least 95 percent (based on ASTM:D-1557).

Slab on Grade Floors

In our opinion, soil-supported slab-on-grade floors can be used in the proposed structures if the subgrades are properly prepared. We offer the following comments and recommendations concerning slab-on-grade floors.

Floor Subbase: Structural fill subbases do not appear to be needed under soil-supported slab-on-grade floors at the site. However, the final decision regarding the need for subbases should be based on actual subgrade conditions observed at the time of construction. If a subbase is needed, all subbase fills should be compacted to a density of at least 95 percent (based on ASTM:D-1557).

Capillary Break and Vapor Barrier: To retard the upward wicking of groundwater beneath the floor slab, we recommend that a capillary break be placed over the subgrade. Ideally, this capillary break would consist of a 4-inch-thick layer of pea gravel or other clean, uniform, well-rounded gravel, such as "Gravel Backfill for Drains" per WSDOT Standard Specification 9-03.12(4), but clean angular gravel can be used if it adequately prevents capillary wicking. In addition, a layer of plastic sheeting (such as Crosstuff, Visqueen, or Moistop) should be placed over the capillary break to serve as a vapor barrier. During subsequent casting of the concrete slab, the contractor should exercise care to avoid puncturing this vapor barrier.

Temporary Excavations

Based on our site observations it appears a shallow foundation excavation will stand unsupported while a deep foundation (>4 ft.) will need to be back sloped or supported.

All temporary soil slopes associated with site cutting or excavations should be adequately inclined to prevent sloughing and collapse. Temporary cut slopes in glacial till, hard silt, or dense sand should be no steeper than 1¼ H:1V and should conform to WISHA regulations. Temporary cut slopes in loose to medium dense sand should be no steeper than 1½H:1V

Foundation and Retaining Walls

Retaining walls or deep foundation walls should be designed to resist lateral earth pressures imposed by the backfill soil. Soil parameters for wall designs retaining backfill soils are;

Active Earth Pressures (Level Backfill)	45 pcf
Active Earth Pressures (2:1 Backslope)	60 pcf
Passive Earth Pressures (Flat Slope)	100 pcf
Coefficient of Friction	30
Soil Unit Weight	120 pcf

The values provide are used to design permanent foundation and retaining walls. The passive pressure is appropriate for the depth of level structure fill placed in front of a retaining wall resting on or directly above slopes. The coefficient of friction and passive resistance are ultimate and do not include a factor of safety. A minimum safety factor of 1.5 should be assumed for overturning or sliding.

Construction equipment should be restricted from operations behind or near the top of foundation and/or retaining walls. Equipment operations should not operate within a distance equal to the height of the wall or foundation unless the wall is designed for the additional soil pressures.

INFILTRATION

On June 23rd, 2022 Innovative GEO-Services, LLC (IGS) visited the residential lot located at 2504 12th AV NW in Puyallup to conduct an *EPA Falling Head Perk Test* in accordance with the guidelines in Appendix III-A Methods for Determining Design Infiltration Rates in the *Pierce County Stormwater and Site Development Manual as modified for Pierce County.*

The property is an 8,661-sf residential lot on the south side of 12th AV NW. A geoEvaluation of the property was conducted on June 20th with three soil pits extending to a depth of 6 ft each. The underlying soil consists of alluvial, and flood plain deposits described as silty fine sand and silt with some small gravel. The soils were described as medium dense to dense. All soil pits were dry at the time of excavation and no groundwater or seepage was observed.

The field infiltration testing was conducted in the vicinity of Test Pit 3 near the northeast corner of the lot. A 6 in. diameter PVC Pipe was set at a depth of 36 in (near the bottom of the silt layer describe in Soil Pit Number TP 3). The pipe was filled with 12 inches of water and the depth was maintained for 4 hours and then allowed to soak overnight.

Field testing resumed the following morning by adding 6 inches of water over the gravel in the bottom of the pipe and the water level was measured every 30 min. as stipulated. The water level between measurements was returned to 6 in with a minimum of 3 tests were completed.

Field testing and calculations; (0.5 Safety Factor)

Test 1	0.20 in.	30 min / 0.20 in = 150 min / in	2.5 in/hr. (0.5) = **1.25 in/hr.**
Test 2	0.25 in.	30 min / 0.25 in = 120 min / in	2.0 in/hr. (0.5) = **1.00 in/hr.**
Test 3	0.15 in	30 min / 0.15 in = 200 min / in	3.3 in/hr. (0.5) = **1.65 in/hr.**

Based on our site observations and soil descriptions in three soil pits we recommend using a raw infiltration rate of **1.5 in/hr**. for storm water infiltration design based on the testing and calculations outlined in the Pierce County Storm Water Manual.

Material Reuse

Site Filling

Our conclusions regarding the reuse of on-site soils and our comments regarding wet-weather filling are presented subsequently. Regardless of soil type, all fills should be placed and compacted according to our recommendations presented in the *Structural Fill* section of this report. Specifically, building pad fill soil should be compacted to a uniform density of at least 95 percent (based on ASTM:D-1557).

On-Site Soils:

We offer the following evaluation of these on-site soils in relation to potential use as structural fill:

- *Surficial Organic Soils*: The duff and topsoil mantling the western half of the lot are *not* suitable for use as structural fill under any circumstances, due to their high organic content. Consequently, these materials can be used only for non-structural purposes, such as in landscaping areas.

- *Alluvial Deposits*: The near surface alluvial fine sand and silt observed throughout the lot is not considered suitable for use as structural fill

- *Soil Stockpile*: The soil stockpile located in the southeast quarter of the lot appears to consist of a gravelly sand which may be suitable for use as structural fill. Further evaluation of the stockpile soil will be necessary to confirm its usefulness on the site.

Structural Fill

The term "structural fill" refers to any placed under foundations, retaining walls, slab-on-grade floors, sidewalks, pavements, and other structures. Our comments, conclusions, and recommendations concerning structural fill are presented in the following paragraphs.

Materials: Typical structural fill materials include clean sand, gravel, pea gravel, washed rock, crushed rock, well-graded mixtures of sand and gravel (commonly called "gravel borrow" or "pit-run"), and miscellaneous mixtures of silt, sand, and gravel. Recycled asphalt, concrete, and glass, which are derived from pulverizing the parent materials, are also potentially useful as structural fill in certain applications. Soils used for structural fill should not contain any organic matter or debris, nor any individual particles greater than about 6 inches in diameter.

Fill Placement: Clean sand, gravel, crushed rock, soil mixtures, and recycled materials should be placed in horizontal lifts not exceeding 8 inches in loose thickness, and each lift should be thoroughly compacted with a mechanical compactor.

Compaction Criteria: Using the Modified Proctor test (ASTM:D-1557) as a standard, we recommend that structural fill used for various on-site applications be compacted to the following minimum densities:

Fill Application	Minimum Compaction
Footing subgrade and bearing pad	95 percent
Foundation backfills	90 percent
Slab-on-grade floor subgrade and subbase	95 percent

Subgrade Observation and Compaction Testing: Regardless of material or location, all structural fills should be placed over firm, unyielding subgrades prepared in accordance with the *Site Preparation* section of this report. The condition of all subgrades should be observed by geotechnical personnel before filling or construction begins. Also, fill soil compaction should be verified by means of in-place density tests performed during fill placement so that adequacy of soil compaction efforts may be evaluated as earthwork progresses.

Soil Moisture Considerations: The suitability of soils used for structural fill depends primarily on their grain-size distribution and moisture content when they are placed. As the "fines" content (that soil fraction passing the U.S. No. 200 Sieve) increases, soils become more sensitive to small changes in moisture content. Soils containing more than about 5 percent fines (by weight) cannot be consistently compacted to a firm, unyielding condition when the moisture content is more than 2 percentage points above or below optimum. For fill placement during wet-weather site work, we recommend using "clean" fill, which refers to soils that have a fines content of 5 percent or less (by weight) based on the soil fraction passing the U.S. No. 4 Sieve.

Exploration Test Pit Backfill
The soil exploratory test pits were backfilled with the excavated onsite soil. The soil pits contain disturbed native soil and the soil characteristics have been altered. If the backfill removal exceeds the excavation depth of the structure's foundation footings, the excavation should be backfilled with a compacted structural fill or CDF to the foundation design elevation.

Wet Weather Construction
Surface and near surface soil observed are considered to be moisture sensitive but may be erodible during heavy precipitation. Site development during the wet weather season or during heavy precipitation are not recommended. We recommend best management practices be used in wet weather conditions.

- Surface disturbance and earthwork should be conducted to minimize subgrade exposure to wet weather. Removal of the unsuitable fill material should be backfilled with structural fill or CDF as soon as practical.

- Construction equipment utilized should be consistent with the task and soil conditions to prevent excessive surface disturbance.

- Structural fill utilized should be consistent with the recommendations presented in this report. Fines should be non-plastic and moisture content should be maintained to prevent saturation and pumping in the soil.

- Surface area within the construction area should be graded to provide positive drainage away from excavations and to prevent ponding.

- Silt fencing should be installed down grade from all areas of possible surface disturbance.

- Soil stockpiles and excavations should be protected and/or covered with plastic sheeting.

Erosion Control Considerations

Preparation of the project site should involve erosion control, temporary drainage, clearing, stripping, cutting, filling, excavations, and subgrade compaction.

Erosion Control: Before new construction begins, an appropriate erosion control system should be installed. This system should collect and filter all surface run off through either silt fencing or a series of properly placed and secured straw bales. We anticipate a system of berms and drainage ditches around construction areas will provide an adequate collection system. If silt fencing is selected as a filter, this fencing fabric should meet the requirements of WSDOT Standard Specification 9-33.2 Table 3. In addition, silt fencing should embed a minimum of 6 inches below existing grade. If straw baling is used as a filter, bales should be secured to the ground so that they will not shift under the weight of retained water. Regardless of the silt filter selected, an erosion control system requires occasional observation and maintenance. Specifically, holes in the filter and areas where the filter has shifted above ground surface should be replaced or repaired as soon as they are identified.

Temporary Drainage: We recommend intercepting and diverting any potential sources of surface or near-surface water within the construction zones before stripping begins. Because the selection of an appropriate drainage system will depend on the water quantity, season, weather conditions, construction sequence, and contractor's methods, final decisions regarding drainage systems are best made in the field at the time of construction. Based on our current understanding of the construction plans, surface and subsurface conditions, we anticipate that curbs, berms, or ditches placed around the work areas will adequately intercept surface water runoff.

ADDITIONAL SERVICES

Because the future performance and integrity of the structural elements will depend largely on proper site preparation, drainage, fill placement, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. Consequently, we recommend that IGS be retained to provide the following post-report services:

- Review all construction plans and specifications to verify that our design criteria presented in this report have been properly integrated into the design;
- Prepare a letter summarizing all review comments (if required by City of Puyallup);
- Check all completed subgrades for footings and slab-on-grade floors before concrete is poured, in order to verify their bearing capacity; and
- Prepare a post-construction letter summarizing all field observations, inspections, and test results (if required by City of Puyallup).

CLOSURE

This evaluation has been prepared for CES NW and their project team. The conclusions and recommendations presented are based, in part, on the exploration and testing performed for this study; therefore, if variations in the subgrade conditions are observed at a later time, we may need to modify this report to reflect those changes. The evaluation was performed in general accordance with the agreed-upon scope of services. Also, because the future performance and integrity of the project elements depend largely on proper initial site preparation, drainage, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process.

The content of this evaluation may be used by the client for the purposed residential project, within a reasonable time from its completion. Land use, site conditions and other factors both on-site and off, including advances in our understanding of the applied science and construction technologies may change. These advances or changes may have an effect on out conclusions and recommendations. Therefore, the findings and recommendations presented in this evaluation should not be relied upon after 24 months or changes in the regulatory environment.

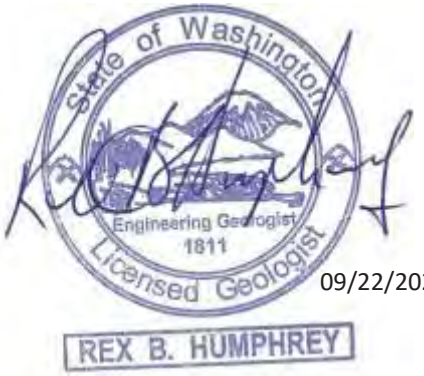
The client is responsible to advise the project team, designers, contractors, subcontractors and regulators of the content of this evaluation. Noncompliance with any of the recommendations presented will release The Concept Group from any liability resulting for the use of this evaluation.

This evaluation has been prepared for planning and design purposes, specific to the proposed residential project and has been prepared in accordance with generally accepted standards and practices at the time of the evaluation writing. No warranty expressed or implied is made.

We appreciate the opportunity to be of service on this project. If you have any questions regarding this letter or any aspects of our work, please contact our office.

Respectfully submitted,

Innovative GEO-Services, Inc.



09/22/2022

Rex Humphrey, L.E.G.
Principal Engineering Geologist

Attached: Soil Test Pits TP-1 through TP-4
Sultan Soil Infiltration Log
USGS Seismic Design Sheet

TERMS AND SYMBOLS

TEST PIT LOGS

RELATIVE DENSITY / CONSISTENCY

SAND / GRAVEL			SILT / CLAY		
Density	SPT N-values	Approx. Relative Density (%)	Consistency	SPT N-values	Approx. Undrained Shear Strength (psf)
Very Loose	<4	<15	Very Soft	<2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Med. Dense	10 to 30	35 - 65	Med. Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	>50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	>30	>4000

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		GROUP DESCRIPTIONS	
Gravel 50% or more of the coarse fraction retained on the #4 sieve. Use dual symbols (eg. GP-GM) for 5% to 12% fines.	GRAVEL (<5% fines)	GW	Well-graded GRAVEL
		GP	Poorly-graded GRAVEL
	GRAVEL (>12% fines)	GM	Silty GRAVEL
		GC	Clayey GRAVEL
Sand 50% or more of the coarse fraction passing the #4 sieve. Use dual symbols (eg. SP-SM) for 5% to 12% fines.	SAND (<5% fines)	SW	Well-graded SAND
		SP	Poorly-graded SAND
	SAND (>12% fines)	SM	Silty SAND
		SC	Clayey SAND
Silt and Clay 50%or more passing #200 sieve	Liquid Limit < 50	ML	SILT
		CL	Lean CLAY
		OL	Organic SILT or CLAY
	Liquid Limit > 50	MH	Elastic SILT
		CH	Fat CLAY
		OH	Organic SILT or CLAY
Highly Organic Soils		PT	PEAT

Notes: 1. Soil exploration logs contain material descriptions based on visual observation and field tests using a system modified from the Uniform Soil Classification System (USCS). Where necessary laboratory tests have been conducted (as noted in the "Other Tests" column), unit descriptions may include a classification. Please refer to the discussions in the report text for a more complete description of the subsurface conditions.

2. The graphic symbols given above are not inclusive of all symbols that may appear on the borehole logs. Other symbols may be used where field observations indicated mixed soil constituents or dual constituent materials.

DESCRIPTIONS OF SOIL STRUCTURES

Layered: Units of material distinguished by color and/or composition from material units above and below

Laminated: Layers of soil typically 0.05 to 1mm thick, max. 1 cm

Lens: Layer of soil that pinches out laterally

Interlayered: Alternating layers of differing soil material

Pocket: Erratic, discontinuous deposit of limited extent

Homogeneous: Soil with uniform color and composition throughout

Fissured: Breaks along defined planes

Slickensided: Fracture planes that are polished or glossy

Blocky: Angular soil lumps that resist breakdown

Disrupted: Soil that is broken and mixed

Scattered: Less than one per foot

Numerous: More than one per foot

BCN: Angle between bedding plane and a plane normal to core axis

COMPONENT DEFINITIONS

COMPONENT	SIZE / SIEVE RANGE	COMPONENT	SIZE / SIEVE RANGE
Boulder:	> 12 inches	Sand	
Cobbles:	3 to 12 inches	Coarse Sand:	#4 to #10 sieve (4.5 to 2.0 mm)
Gravel		Medium Sand:	#10 to #40 sieve (2.0 to 0.42 mm)
Coarse Gravel:	3 to 3/4 inches	Fine Sand:	#40 to #200 sieve (0.42 to 0.074 mm)
Fine Gravel:	3/4 inches to #4 sieve	Silt	0.074 to 0.002 mm
		Clay	<0.002 mm

TEST SYMBOLS

for In Situ and Laboratory Tests listed in "Other Tests" column.

ATT	Atterberg Limit Test
Comp	Compaction Tests
Con	Consolidation
DD	Dry Density
DS	Direct Shear
%F	Fines Content
GS	Grain Size
Perm	Permeability
PP	Pocket Penetrometer
R	R-value
SG	Specific Gravity
TV	Torvane
TXC	Triaxial Compression
UCC	Unconfined Compression

SYMBOLS

Sample/In Situ test types and intervals

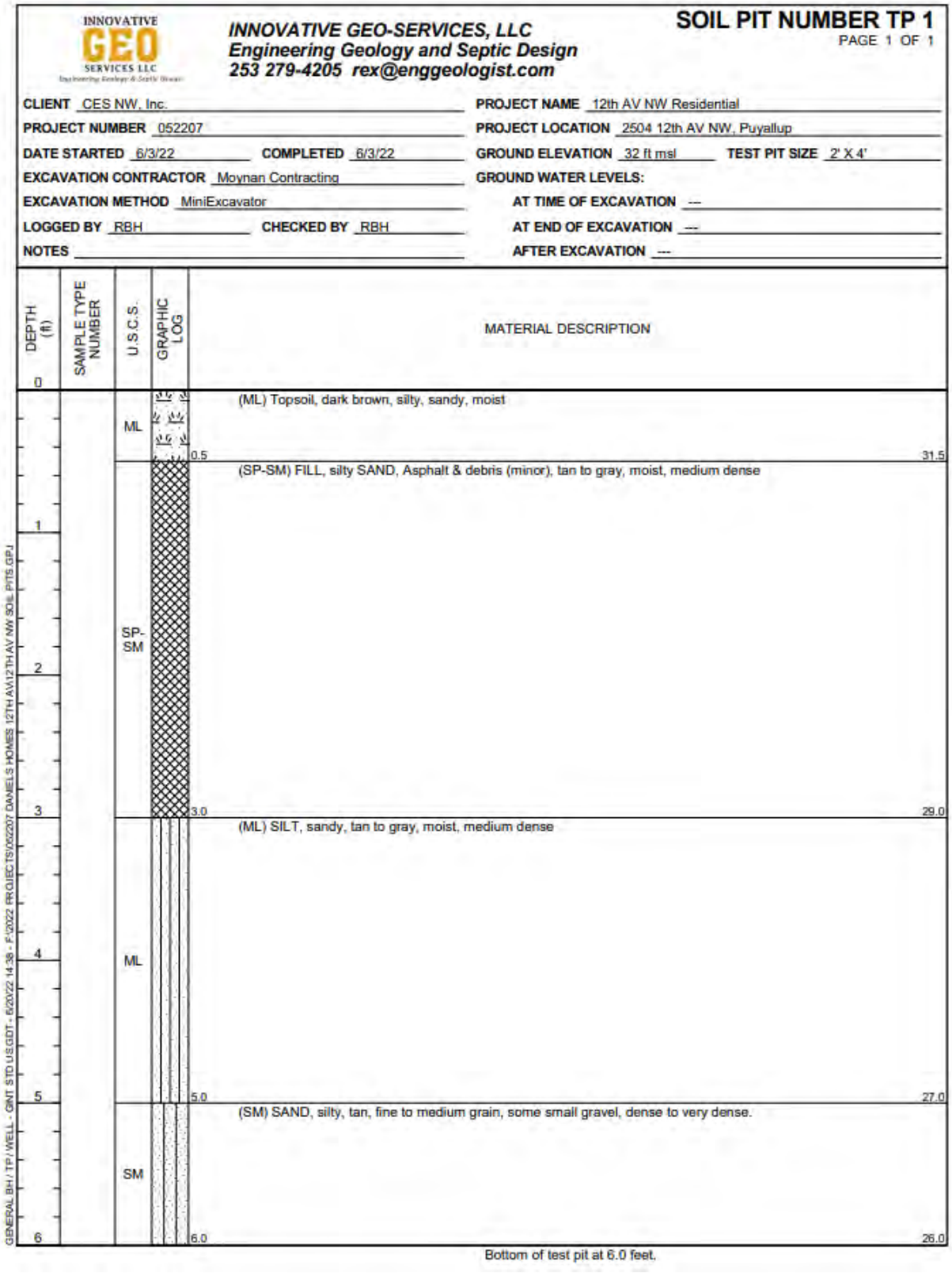
- 2-inch OD Split Spoon, SPT (140-lb. hammer, 30" drop)
- 3.25-inch OD Split Spoon (300-lb hammer, 30" drop)
- Non-standard penetration test (see boring log for details)
- Thin wall (Shelby) tube
- Grab
- Rock core
- Vane Shear

MONITORING WELL

- Groundwater Level at time of drilling (ATD)
- Static Groundwater Level
- Cement / Concrete Seal
- Bentonite grout / seal
- Silica sand backfill
- Slotted tip
- Slough
- Bottom of Boring

MOISTURE CONTENT

Dry	Dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water



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INNOVATIVE GEO-SERVICES, LLC
Engineering Geology and Septic Design
253 279-4205 rex@enggeologist.com

SOIL PIT NUMBER TP 1

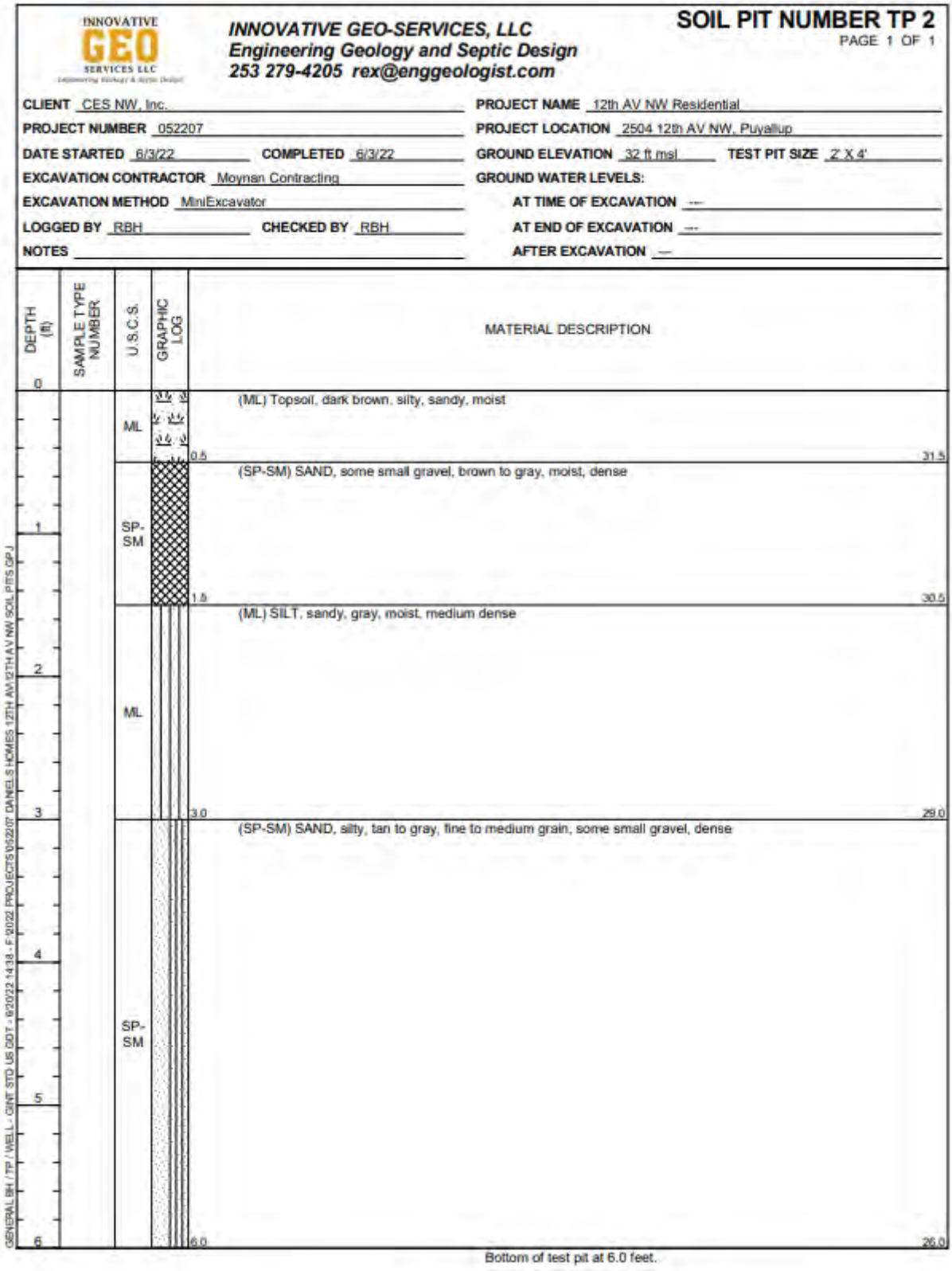
PAGE 1 OF 1

CLIENT CES NW, Inc.
PROJECT NAME 12th AV NW Residential
PROJECT NUMBER 052207
PROJECT LOCATION 2504 12th AV NW, Puyallup
DATE STARTED 6/3/22 **COMPLETED** 6/3/22
GROUND ELEVATION 32 ft msl **TEST PIT SIZE** 2' X 4'
EXCAVATION CONTRACTOR Moynan Contracting
GROUND WATER LEVELS:
EXCAVATION METHOD MiniExcavator
AT TIME OF EXCAVATION ---
LOGGED BY RBH **CHECKED BY** RBH
AT END OF EXCAVATION ---
NOTES
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					
		ML		(ML) Topsoil, dark brown, silty, sandy, moist	
0.5					31.5
		SP-SM		(SP-SM) FILL, silty SAND, Asphalt & debris (minor), tan to gray, moist, medium dense	
3.0					29.0
		ML		(ML) SILT, sandy, tan to gray, moist, medium dense	
5.0					27.0
		SM		(SM) SAND, silty, tan, fine to medium grain, some small gravel, dense to very dense.	
6.0					26.0

Bottom of test pit at 6.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 6/20/22 14:36 - F:\2022 PROJECTS\052207 DANIELS HOMES 12TH AV\12TH AV NW SOIL PITS.GPJ



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Engineering Geology and Septic Design
253 279-4205 rex@enggeologist.com

SOIL PIT NUMBER TP 2
PAGE 1 OF 1

CLIENT CES NW, Inc.
PROJECT NAME 12th AV NW Residential
PROJECT NUMBER 052207
PROJECT LOCATION 2504 12th AV NW, Puyallup
DATE STARTED 6/3/22 **COMPLETED** 6/3/22
GROUND ELEVATION 32 ft msl **TEST PIT SIZE** 2' X 4'
EXCAVATION CONTRACTOR Moynan Contracting
GROUND WATER LEVELS:
EXCAVATION METHOD MiniExcavator
AT TIME OF EXCAVATION ---
LOGGED BY RBH **CHECKED BY** RBH
AT END OF EXCAVATION ---
NOTES
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					
		ML		(ML) Topsoil, dark brown, silty, sandy, moist	
				0.5	31.5
1		SP-SM		(SP-SM) SAND, some small gravel, brown to gray, moist, dense	
				1.5	30.5
2		ML		(ML) SILT, sandy, gray, moist, medium dense	
3				3.0	29.0
4		SP-SM		(SP-SM) SAND, silty, tan to gray, fine to medium grain, some small gravel, dense	
5					
6				6.0	26.0

Bottom of test pit at 6.0 feet.

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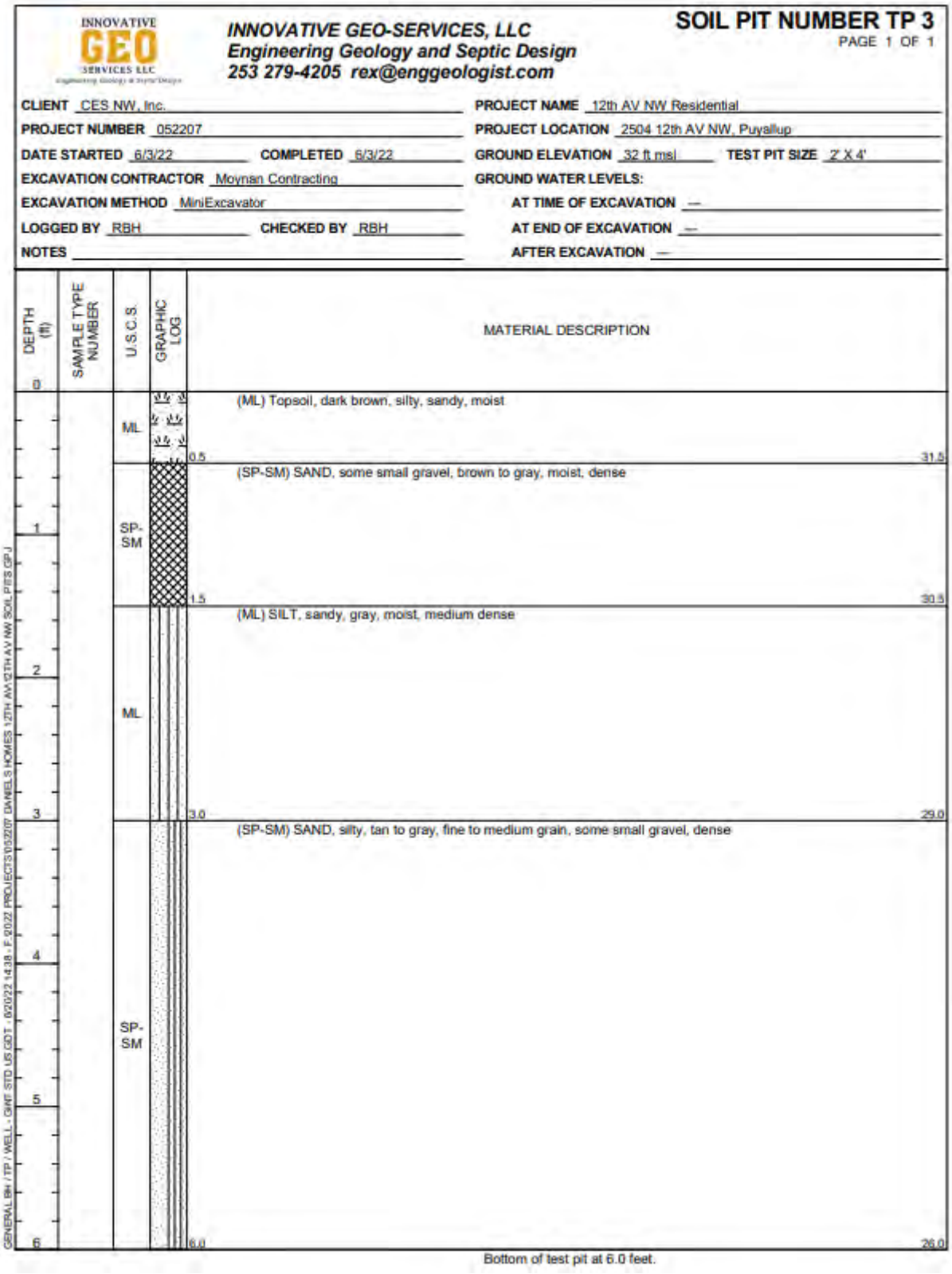

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253 279-4205 rex@enggeologist.com

SOIL PIT NUMBER TP 3
PAGE 1 OF 1

CLIENT CES NW, Inc.
PROJECT NAME 12th AV NW Residential
PROJECT NUMBER 052207
PROJECT LOCATION 2504 12th AV NW, Puyallup
DATE STARTED 6/3/22 **COMPLETED** 6/3/22
GROUND ELEVATION 32 ft msl **TEST PIT SIZE** 2' X 4'
EXCAVATION CONTRACTOR Moynan Contracting
GROUND WATER LEVELS:
EXCAVATION METHOD MiniExcavator
AT TIME OF EXCAVATION —
LOGGED BY RBH **CHECKED BY** RBH
AT END OF EXCAVATION —
NOTES
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					
		ML		(ML) Topsoil, dark brown, silty, sandy, moist	
				0.5	31.5
1		SP-SM		(SP-SM) SAND, some small gravel, brown to gray, moist, dense	
				1.5	30.5
2		ML		(ML) SILT, sandy, gray, moist, medium dense	
3				3.0	29.0
4		SP-SM		(SP-SM) SAND, silty, tan to gray, fine to medium grain, some small gravel, dense	
5					
6				6.0	26.0

Bottom of test pit at 6.0 feet.

GENERAL BH / TP / WELL - GINT STD US GDT - 6/20/22 14:38 - F:\2022 PROJECTS\052207 DANIELS HOMES 12TH AV\12TH AV NW SOIL PITS.GPJ

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Engineering Geology and Septic Design
253 279-4205 rex@enggeologist.com

SOIL PIT NUMBER TP 4

PAGE 1 OF 1

CLIENT CES NW, Inc.
PROJECT NAME 12th AV NW Residential
PROJECT NUMBER 052207
PROJECT LOCATION 2504 12th AV NW, Puyallup
DATE STARTED 6/3/22 **COMPLETED** 6/3/22
GROUND ELEVATION 32 ft msl **TEST PIT SIZE** 2' X 4'
EXCAVATION CONTRACTOR Moyman Contracting
GROUND WATER LEVELS:
EXCAVATION METHOD MiniExcavator
AT TIME OF EXCAVATION ---
LOGGED BY RBH **CHECKED BY** RBH
AT END OF EXCAVATION ---
NOTES
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				
		ML		(ML) Topsoil, dark brown, silty, sandy, moist
0.5				31.5
		SP-SM		(SP-SM) FILL, Sand with gravel, tan to gray, dry, medium dense
6.0				26.0

Bottom of test pit at 6.0 feet.

GENERAL BH / TP / WELL - GINT STD US GDT - 6/20/22 14:38 - F:\2022 PROJECTS\06\22\07 DANIELS HOMES 12TH AV\12TH AV NW SOIL PITS.GPJ

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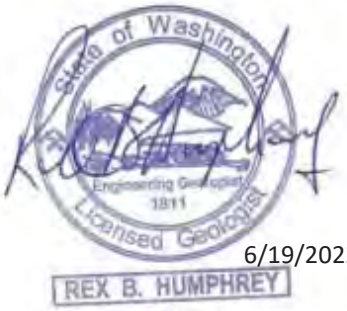
ENGINEERING GEOLOGY & SEPTIC DESIGN

Soil Log Number:	**2** **Sheet** 1 of 1
1. Site Address:	2504 12th AV NW
2. Parcel Number:	6025480320
3. Site Description:	Alluvium - Fluvial terrace
4. List methods used to expose, sample, & test soils:	Excavated Soil Pits and Field Perk Testing
5. Number of test holes logged:	4
6. Saturated Percolation Rate:	Infiltration < 2 to 4 in/hr – Recommend Dispersion
7. Has fill material been placed over the proposed infiltration area?	**YES – SW Quarter of Lot**
8. SCS Soil Series	Sultan silt loam
9. Hydrologic Soil Group	C-D
10. Depth to seasonal high water:	➢ 72 in.
11. Current water depth	> 72 in.
12. Depth to impermeable layer:	≥ 72 in.
13. Soil profile description:	1 – brown SILT with very fine sand 2 – gray/brown SILT, sl mottled, blocky 3 – tan/gray, mottled silt loam, mod dense, plastic

Horizon	Depth	Textural Class	Mottling	Induration
1	0 – 18 in.	IV	-	Weak
2	18 – 36 in.	IV-V	Distinct	Weak
3	36 – 72 in.	V	Distinct	Mod.

I hereby state that I prepared this report and conducted or supervised the performance of related work. I state that I am qualified to do this work. I represent my work to be complete and accurate within the bounds of uncertainty inherent to the practice of soil science, and to be suitable for its intended use.

Registration No.: 1811



6/19/2022

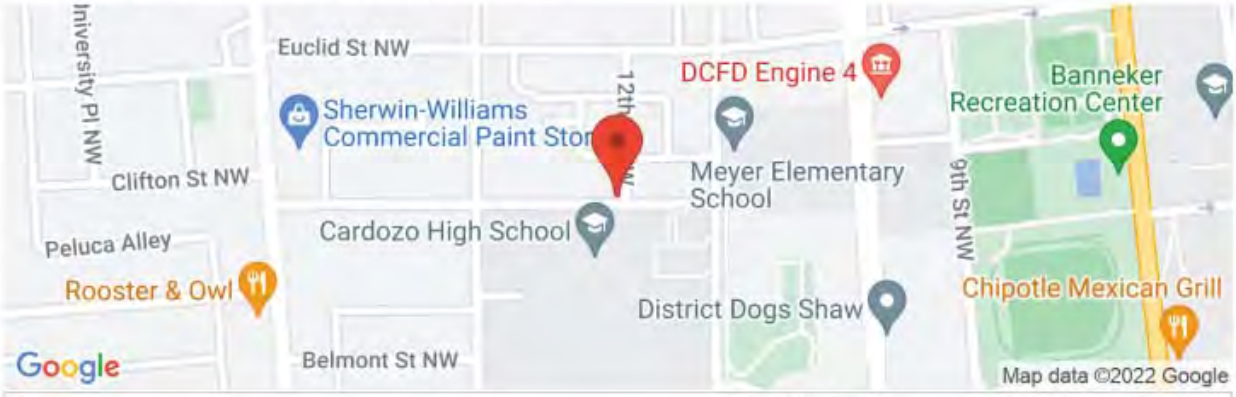
Stamp

OSHPD

12th AV NW Residential

2504 12th St NW, Washington, DC 20009, USA

Latitude, Longitude: 38.9224876, -77.02813569999999



Date	6/17/2022, 4:48:22 PM
Design Code Reference Document	IBC-2015
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	0.119	MCE_R ground motion. (for 0.2 second period)
S_1	0.051	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.19	Site-modified spectral acceleration value
S_{M1}	0.122	Site-modified spectral acceleration value
S_{DS}	0.126	Numeric seismic design value at 0.2 second SA
S_{D1}	0.082	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	B	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second
PGA	0.056	MCE_G peak ground acceleration
F_{PGA}	1.6	Site amplification factor at PGA
PGA_M	0.09	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	0.119	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.133	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.051	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.057	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.6	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.894	Mapped value of the risk coefficient at short periods
C_{R1}	0.9	Mapped value of the risk coefficient at a period of 1 s

APPENDIX B

Basin Exhibits

2504 12TH AVE. NW SFR

A PORTION OF SE 1/4 OF THE SE 1/4 OF SEC. 20, TWP. 20 N, RNG 4 E. WILLAMETTE MERIDIAN, PIERCE COUNTY, WASHINGTON

PARCEL NUMBER

6025480320

SITE ADDRESS

2504 12TH AVE. NW, PUYALLUP, WA 98371

ENGINEER/SURVEYOR:

C.E.S. NW INC
429 – 29TH STREET NE, SUITE D
PUYALLUP, WA 98372
(253) 848–4282

OWNER

3911 9TH ST SW
PUYALLUP, WA
98373

LOT STATISTICS:

LOT AREA:	8,676 SF (0.20 AC)
PROPOSED FOOTPRINT:	2,551 SF
COV'D PORCH/PATIO:	162 SF
LOT COVERAGE:	31%
DRIVEWAY/CONC.:	729 SF
SIDEWALK/DWY APRON:	598 SF
TOTAL ROOF AREA:	3,026 SF
TOTAL IMPERVIOUS AREA:	4,353 SF
CLEARED AREA:	9,620 SF

SETBACKS

FRONT YARD	20' MIN.
SIDE YARD	5' TOTAL
REAR YARD	20' MIN.
LOT WIDTH	40' MIN.
MAX LOT COVERAGE	50%

UTILITIES

CABLE T.V.:	COMCAST
GAS:	PUGET SOUND ENERGY
TELEPHONE:	LUMEN
POWER:	PUGET SOUND ENERGY
WATER:	CITY OF PUYALLUP
SEWER:	CITY OF PUYALLUP

LEGAL DESCRIPTION

SECTION 20 TOWNSHIP 20 RANGE 04
LOT 32 OF THE ASHLEY MEADOWS PHASE 3 RECORDED UNDER AUDITOR'S FILE NUMBER 200612205022
SITUATED IN THE CITY OF PUYALLUP, COUNTY OF PIERCE, WASHINGTON

UTILITY NOTE:

LOCATIONS OF SAID UTILITY AS SHOWN ON THESE PLANS ARE BASED ON UNVERIFIED PUBLIC INFORMATION AND A SURVEY BY OTHERS, THEY ARE SUBJECT TO VARIATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, DIMENSION, AND DEPTH OF EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT BY POTHOLING THE UTILITIES AND SURVEYING THE HORIZONTAL AND VERTICAL LOCATION PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE CALLING 811 AND THEN POTHOLING ALL OF THE EXISTING UTILITY LOCATIONS OF NEW UTILITY CROSSINGS TO PHYSICALLY VERIFY WHETHER OR NOT CONFLICTS EXIST. THE CONTRACTOR ACCEPTS FULL RESPONSIBILITY FOR ANY AND ALL DAMAGES THAT HAPPEN DUE TO THE CONTRACTORS FAILURE TO LOCATE EXACTLY AND PRESERVE ANY AND ALL UTILITIES. IF CONFLICT SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT CES NW INC., TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION. CES NW INC., ASSUMES NO LIABILITY FOR THE LOCATION OF UNDERGROUND UTILITIES.

VERTICAL DATUM:

NAVD88 (CONTOURS FROM THE PIERCE COUNTY GEOGRAPHIC INFORMATION SYSTEM).

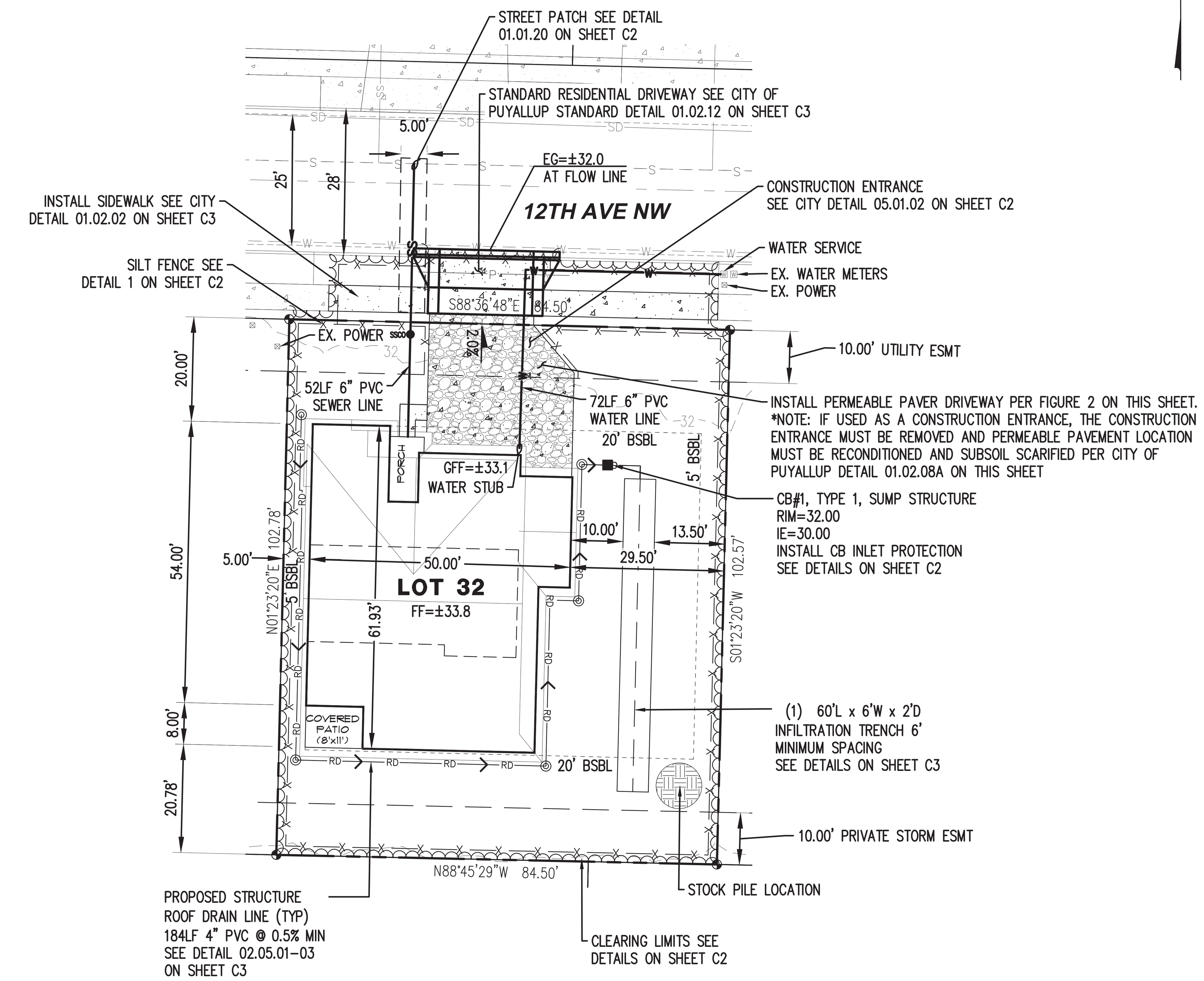
SOIL:

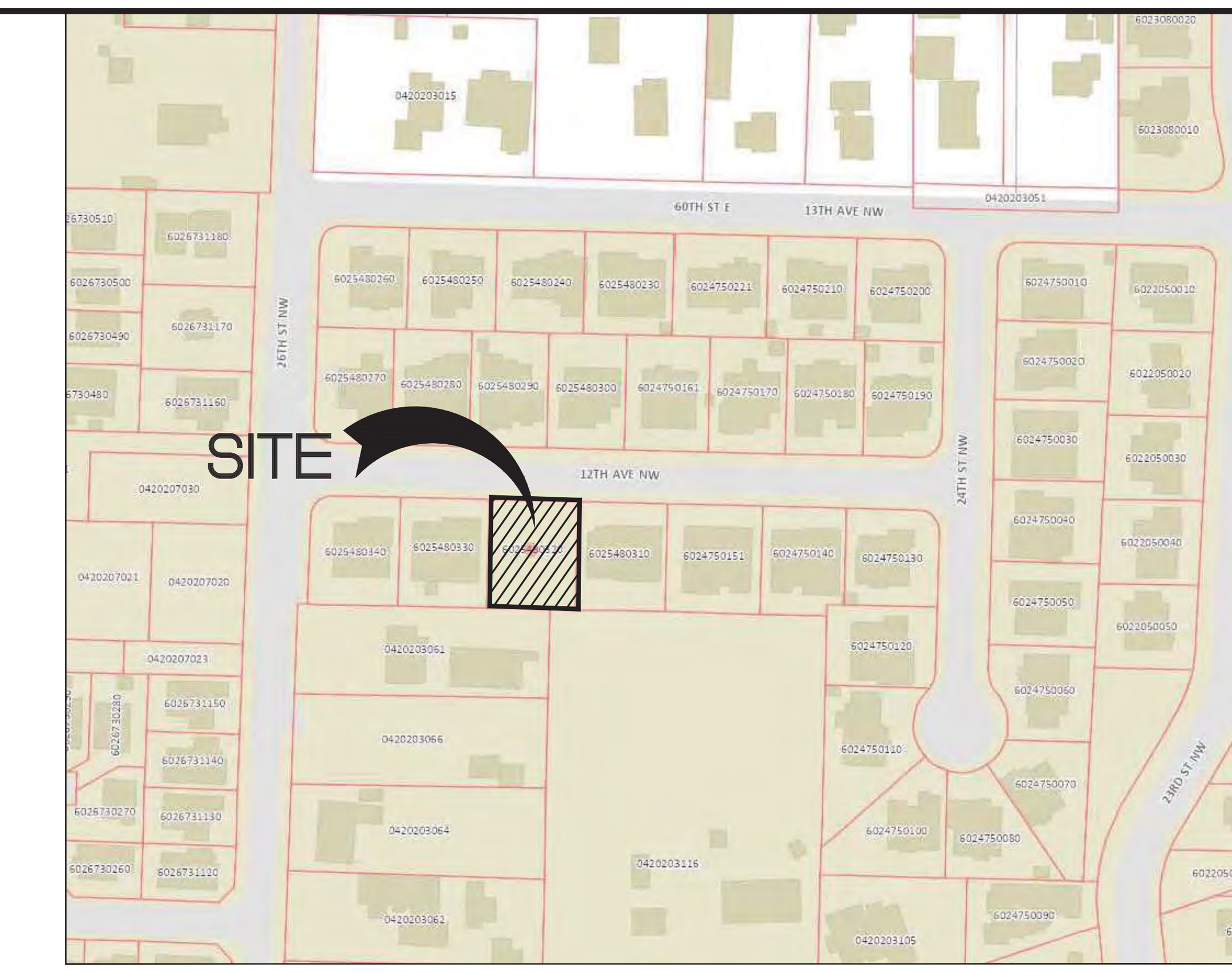
SULTAN SILT LOAM SLOPE
GRADIENT –LOW = 0; HIGH = 2
WATER TABLE DEPTH = 54

CONSTRUCTION SEQUENCE

1. HOLD A PRECONSTRUCTION MEETING WITH THE CITY OF PUYALLUP AND OBTAIN REQUIRED PERMITS
2. ESTABLISH CLEARING AND GRADING LIMITS.
3. CONSTRUCT PERIMETER DITCHES, SILT FENCES, AND OTHER EROSION CONTROL DEVICES AS SHOWN
4. CONSTRUCT PROTECTION DEVICES FOR CRITICAL AREAS AND SIGNIFICANT TREES PROPOSED FOR RETENTION
5. SCHEDULE AN EROSION CONTROL INSPECTION WITH THE CITY OF PUYALLUP.
6. CONSTRUCT STORM DRAINAGE RETENTION/DETENTION (CONTROL AND STORAGE) FACILITIES. PROVIDE EMERGENCY OVERFLOW AS APPLICABLE.
7. ALL DITCHES AND SWALES AS SHOWN SHALL BE PROVIDED TO DIRECT ALL SURFACE WATER TO THE RETENTION/DETENTION AND SEDIMENTATION POND AS CLEARING AND GRADING PROGRESSES. NO UNCONTROLLED SURFACE WATER SHALL BE ALLOWED TO LEAVE THE SITE OR BE DISCHARGED TO A CRITICAL AREA AT ANY TIME DURING THE GRADING OPERATIONS.
8. CLEARLY STATE AT WHAT POINT GRADING ACTIVITIES CAN BEGIN, USUALLY ONLY AFTER ALL DRAINAGE AND EROSION CONTROL MEASURES ARE IN PLACE.
9. IDENTIFY EROSION CONTROL MEASURES WHICH REQUIRE REGULAR MAINTENANCE.

1 inch = 20 feet.





VICINITY MAP

NTS

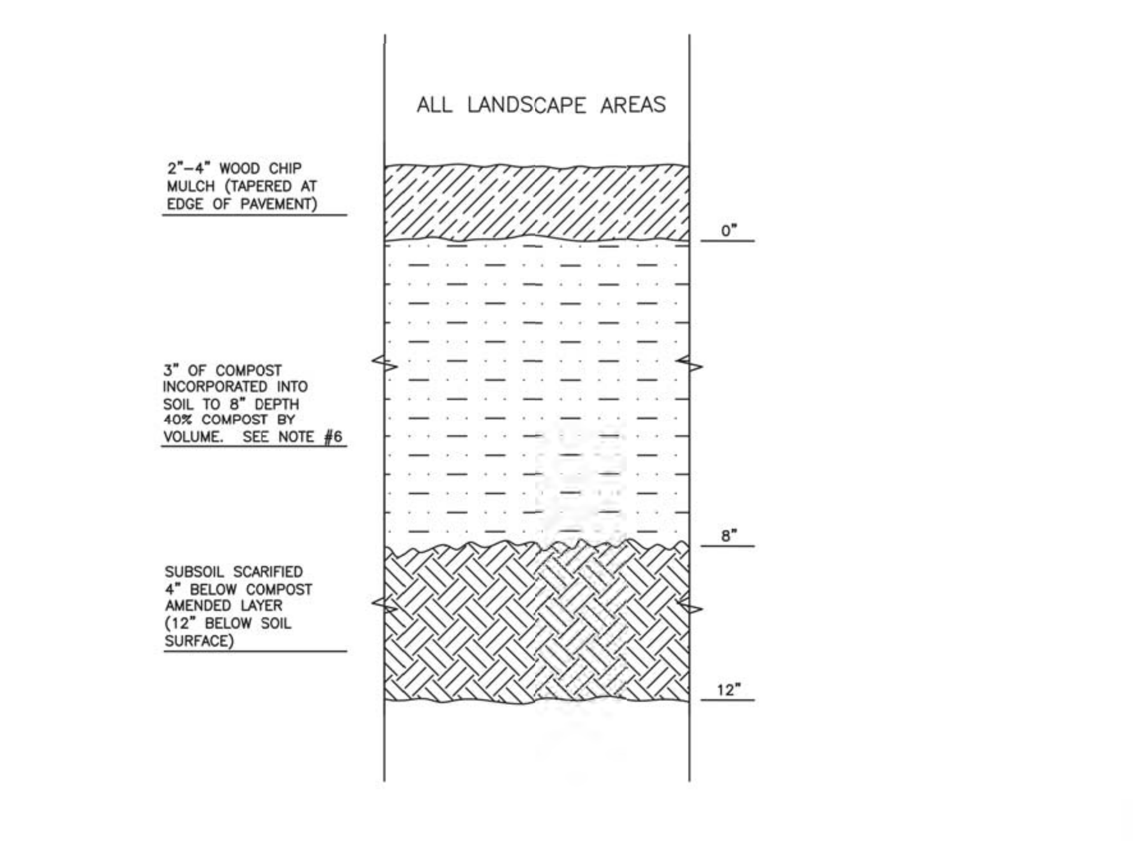
SHEET INDEX

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	MONUMENT	
	MONUMENT LINE	
	PROPERTY LINE	
	RIGHT OF WAY LINE	
	EASEMENT LINE	
	BUILDING SETBACK LINE	
	CHAIN LINK FENCE	
	WOOD FENCE	
	CURB & GUTTER	
	EDGE OF PAVEMENT	
300	CONTOURS	300
	STREET SIGN	
	STORM DRAIN CATCH BASIN	
	STORM DRAIN MANHOLE	
	STORM DRAIN CLEANOUT	
SD	STORM DRAIN LINE	SD
RD	ROOF DRAIN LINE	RD
S	SANITARY SEWER MANHOLE	
	SANITARY SEWER CLEANOUT	
S	SANITARY SEWER LINE	S
SS	SANITARY SEWER STUB	SS
	FIRE HYDRANT	
	WATER VALVE	
W	WATER METER	
	THRUST BLOCKING	
W	WATER MAIN	W
	LUMINAIRE	
	POWER/UTILITY POLE	
	GUY WIRE	
	ASPHALT CONCRETE	
	CEMENT CONCRETE	
	CLEARING LIMITS	
	INTERCEPTOR DITCH	
	SILT FENCE	X
	TOPSOIL STOCKPILE	
	CONSTRUCTION ENTRANCE	
	TELEPHONE SERVICE	
	POWER VAULT	
P	BURIED POWER	P

STORMWATER NOTES

1. ALL WORK IN CITY RIGHT–OF–WAY REQUIRES A PERMIT FROM THE CITY OF PUYALLUP. PRIOR TO ANY WORK COMMENCING, THE GENERAL CONTRACTOR SHALL ARRANGE FOR A PRECONSTRUCTION MEETING AT THE DEVELOPMENT SERVICES CENTER TO BE ATTENDED BY ALL CONTRACTORS THAT WILL PERFORM WORK SHOWN ON THE ENGINEERING PLANS, REPRESENTATIVES FROM ALL APPLICABLE UTILITY COMPANIES, THE PROJECT OWNER AND APPROPRIATE CITY STAFF. CONTACT ENGINEERING SERVICES TO SCHEDULE THE MEETING (253) 841–5568. THE CONTRACTOR IS RESPONSIBLE TO HAVE THEIR OWN APPROVED SET OF PLANS AT THE MEETING.
2. AFTER COMPLETION OF ALL ITEMS SHOWN ON THESE PLANS AND BEFORE ACCEPTANCE OF THE PROJECT, THE CONTRACTOR SHALL OBTAIN A "PUNCH LIST" PREPARED BY THE CITY'S INSPECTOR DETAILING REMAINING ITEMS OF WORK TO BE COMPLETED. ALL ITEMS OF WORK SHOWN ON THESE PLANS SHALL BE COMPLETED TO THE SATISFACTION OF THE CITY PRIOR TO ACCEPTANCE OF THE WATER SYSTEM AND PROVISION OF SANITARY SEWER SERVICE.
3. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (HEREINAFTER REFERRED TO AS THE "STANDARD SPECIFICATIONS"), WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND AMERICAN PUBLIC WORKS ASSOCIATION, WASHINGTON STATE CHAPTER, LATEST EDITION, UNLESS SUPERSEDED OR AMENDED BY THE CITY OF PUYALLUP CITY STANDARDS FOR PUBLIC WORKS ENGINEERING AND CONSTRUCTION (HEREINAFTER REFERRED TO AS THE "CITY STANDARDS").
4. A COPY OF THESE APPROVED PLANS AND APPLICABLE CITY DEVELOPER SPECIFICATIONS AND DETAILS SHALL BE ON SITE DURING CONSTRUCTION.
5. ANY REVISIONS MADE TO THESE PLANS MUST BE REVIEWED AND APPROVED BY THE DEVELOPER'S ENGINEER AND THE ENGINEERING SERVICES STAFF PRIOR TO ANY IMPLEMENTATION IN THE FIELD. THE CITY SHALL NOT BE RESPONSIBLE FOR ANY ERRORS AND/OR OMISSIONS ON THESE PLANS.
6. THE CONTRACTOR SHALL HAVE ALL UTILITIES VERIFIED ON THE GROUND PRIOR TO ANY CONSTRUCTION. CALL (811) AT LEAST TWO WORKING DAYS IN ADVANCE. THE OWNER AND HIS/HER ENGINEER SHALL BE CONTACTED IMMEDIATELY IF A CONFLICT EXISTS.
7. ANY STRUCTURE AND/OR OBSTRUCTION WHICH REQUIRE REMOVAL OR RELOCATION RELATING TO THIS PROJECT, SHALL BE DONE SO AT THE DEVELOPER'S EXPENSE.
8. DURING CONSTRUCTION, ALL EXISTING AND NEWLY INSTALLED DRAINAGE STRUCTURES SHALL BE PROTECTED FROM SEDIMENTS.
9. ALL STORM MANHOLES SHALL CONFORM TO CITY STANDARD DETAIL NO. 02.01.01. FLOW CONTROL MANHOLE/OIL WATER SEPARATOR SHALL CONFORM TO CITY STANDARD DETAIL NO. 02.01.06 AND 02.01.7.
10. MANHOLE RING AND COVER SHALL CONFORM TO CITY STANDARD DETAIL 06.01.02.
11. CATCH BASINS TYPE I SHALL CONFORM TO CITY STANDARD DETAIL NO.02.01.02 AND 02.01.03 AND SHALL BE USED ONLY FOR DEPTHS LESS THAN 5 FEET FROM TOP OF THE GRATE TO THE INVERT OF THE STORM PIPE.
12. CATCH BASINS TYPE II SHALL CONFORM TO CITY STANDARD DETAIL NO.02.01.04 AND SHALL BE USED FOR DEPTHS GREATER THAN 5 FEET FROM TOP OF THE GRATE TO THE INVERT OF THE STORM PIPE.
13. CAST IRON OR DUCTILE IRON FRAME AND GRATE SHALL CONFORM TO CITY STANDARD DETAIL NO.02.01.05. GRATE SHALL BE MARKED WITH "DRAINS TO STREAM". SOLID CATCH BASIN LIDS (SQUARE UNLESS NOTED AS ROUND) SHALL CONFORM TO WSDOT STANDARD PLAN B–30.20–04 (OLYMPIC FOUNDRY NO. SM60 OR EQUAL). VANED GRATES SHALL CONFORM TO WSDOT STANDARD PLAN B–30.30–03 (OLYMPIC FOUNDRY NO. SM60V OR EQUAL).
14. STORMWATER PIPE SHALL BE ONLY PVC, CONCRETE, DUCTILE IRON, OR DUAL WALLED POLYPROPYLENE PIPE.
   - 14.A. THE USE OF ANY OTHER TYPE SHALL BE REVIEWED AND APPROVED BY THE ENGINEERING SERVICES STAFF PRIOR TO INSTALLATION.
   - 14.B. PVC PIPE SHALL BE PER ASTM D3034, SDR 35 FOR PIPE SIZE 15–INCH AND SMALLER AND F679 FOR PIPE SIZES 18 TO 27 INCH. MINIMUM COVER ON PVC PIPE SHALL BE 3.0 FEET.
   - 14.C. CONCRETE PIPE SHALL CONFORM TO THE WSDOT STANDARD SPECIFICATIONS FOR CONCRETE UNDERDRAIN PIPE. MINIMUM COVER ON CONCRETE PIPE SHALL NOT LESS THAN 3.0 FEET.
   - 14.D. DUCTILE IRON PIPE SHALL BE CLASS 50, CONFORMING TO AWWA C151. MINIMUM COVER ON DUCTILE IRON PIPE SHALL BE 1.0 FOOT.
   - 14.E. POLYPROPYLENE PIPE (PP) SHALL BE DUAL WALLED, HAVE A SMOOTH INTERIOR AND EXTERIOR CORRUGATIONS AND MEET WSDOT 9–05.24(1). 12–INCH THROUGH 30–INCH PIPE SHALL MEET OR EXCEED ASTM F2736 AND AASHTO M330, TYPE S, OR TYPE D. 36–INCH THROUGH 60–INCH PIPE SHALL MEET OR EXCEED ASTM F2881 AND AASHTO M330, TYPE S, OR TYPE D. TESTING SHALL BE PER ASTM F1417. MINIMUM COVER OVER POLYPROPYLENE PIPE SHALL BE 3–FEET.
15. TRENCHING, BEDDING, AND BACKFILL FOR PIPE SHALL CONFORM TO CITY STANDARD DETAIL NO. 06.01.01.
16. STORM PIPE SHALL BE A MINIMUM OF 10 FEET AWAY FROM BUILDING FOUNDATIONS AND/OR ROOF LINES.
17. ALL STORM DRAIN MAINS SHALL BE TESTED AND INSPECTED FOR ACCEPTANCE AS OUTLINED IN SECTION 406 OF THE CITY OF PUYALLUP SANITARY SEWER SYSTEM STANDARDS.
18. ALL TEMPORARY SEDIMENTATION AND EROSION CONTROL MEASURES, AND PROTECTIVE MEASURES FOR CRITICAL AREAS AND SIGNIFICANT TREES SHALL BE INSTALLED PRIOR TO INITIATING ANY CONSTRUCTION ACTIVITIES.

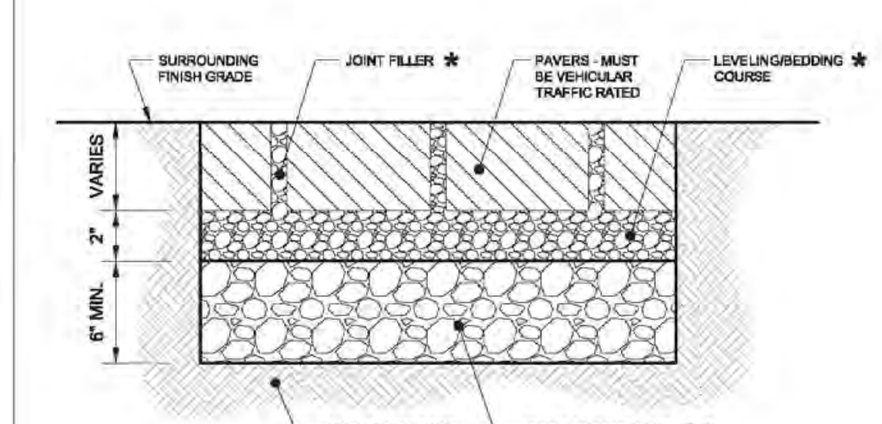


NOTES:
1. ALL SOIL AREAS DISTURBED OR COMPACTED DURING CONSTRUCTION, AND NOT COVERED BY BUILDINGS OR PAVEMENT, SHALL BE AMENDED WITH COMPOST AS DESCRIBED BELOW.
2. SUBSOIL SHOULD BE SCARIFIED (LOOSENED) 4 INCHES BELOW AMENDED LAYER, TO PRODUCE 12–INCH DEPTH OF UN–COMPACTED SOIL, EXCEPT WHERE SCARIFICATION WOULD DAMAGE TREE ROOTS OR AS DETERMINED BY THE ENGINEER. SEE NOTE BELOW REGARDING PLANTING STEPS FOR STREET TREES.
3. COMPOST SHALL BE TILLED IN TO 8 INCH DEPTH INTO EXISTING SOIL, OR PLACE 8 INCHES OF COMPOST–AMENDED SOIL, PER SOIL SPECIFICATION.
4. PLANTING BEDS SHALL RECEIVE 3 INCHES OF COMPOST TILLED IN TO 8–INCH DEPTH, OR MAY SUBSTITUTE 8" OF IMPORTED SOIL CONTAINING 35–40% COMPOST BY VOLUME. MULCH AFTER PLANTING, WITH 4 INCHES OF ARBORIST WOOD CHIP MULCH OR APPROVED EQUAL (6" OF LOOSE WOOD CHIPS AT THE TIME OF PLANTING TO ALLOW SETTLING TO 4").
5. SETBACKS: TO PREVENT UNEVEN SETTLING, DO NOT COMPOST–AMEND SOILS WITHIN 3 FEET OF UTILITY INFRASTRUCTURES (POLES, VAULTS, METERS ETC.). WITHIN ONE FOOT OF PAVEMENT EDGE, CURBS AND SIDEWALKS SOIL SHOULD BE COMPACTED TO APPROXIMATELY 95% PROCTOR TO ENSURE A FIRM SURFACE.
6. SEE SECTION 8.2(B) OF THE VMS FOR SOIL AMENDMENT AND INSTRUCTION PROCEDURES FOR STREET TREE PLANTER STRIPS. ALL STREET TREE PLANTER STRIPS SHALL RECEIVE 40% COMPOST AMENDED SOIL TO THE FULL DEPTH OF THE STREET TREE ROOTBALL.

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

SOIL AMENDMENT AND DEPTH

01.02.08A



PERMEABLE INTERLOCKING CONCRETE PAVER SECTION
NOT TO SCALE

★ LEVELING/BEDDING COURSE & JOINT FILLER
ASTM NO. 8 BEDDING STONE
GRADING REQUIREMENTS:

SIEVE SIZE	PERCENT PASSING
1/2 inch	100
3/8 inch	85-100
NO. 4	10-30
NO. 8	0-10
NO. 16	0-5
% FRACTURE	90

ALL PERCENTAGES ARE BY WEIGHT

★★ STORAGE RESERVOIR
GRADING REQUIREMENTS:

SIEVE SIZE	PERCENT PASSING
2-1/2 inch	100
2 inch	90-100
1-1/2 inch	35-70
1 inch	0-15
1/2 inch	0-5
100	0-3
% FRACTURE	95

ALL PERCENTAGES ARE BY WEIGHT

SINGLE FAMILY RESIDENTIAL PERMEABLE PAVEMENT DRIVEWAY DESIGN GUIDE

2015 Pierce County Stormwater Management and Site Development Manual

FIGURE 2

CALL 48 HOURS BEFORE YOU DIG DIAL 811

FEATURES CONTAINED IN THIS DRAWING, INCLUDING BUT NOT LIMITED TO, BOUNDARY, RIGHT-OF-WAY, EASEMENT, PARCEL LINES, BEARINGS, DISTANCES, WETLANDS AND BUFFERS, WERE DERIVED FROM PUBLIC RECORDS OR ACQUIRED FROM AUTOCAD DRAWINGS SUPPLIED BY OTHERS.

No.	Revision:	Int.	Date:

C.E.S. NW INC.
CIVIL ENGINEERING & SURVEYING
429 – 29TH ST. NE, SUITE D
PUYALLUP, WA 98372
Bus: (253) 848–4282
ceservices@cesnwinc.com

Project: 2504 12TH AVE. NW SFR
COVER/SITE PLAN

Client: TONY DANIELS
tony.builders16@gmail.com

Designed:	MAS
Drawn:	NDA
Checked:	DPS
Scale:	1"=20'
Date:	10/28/22
Job No.:	22058

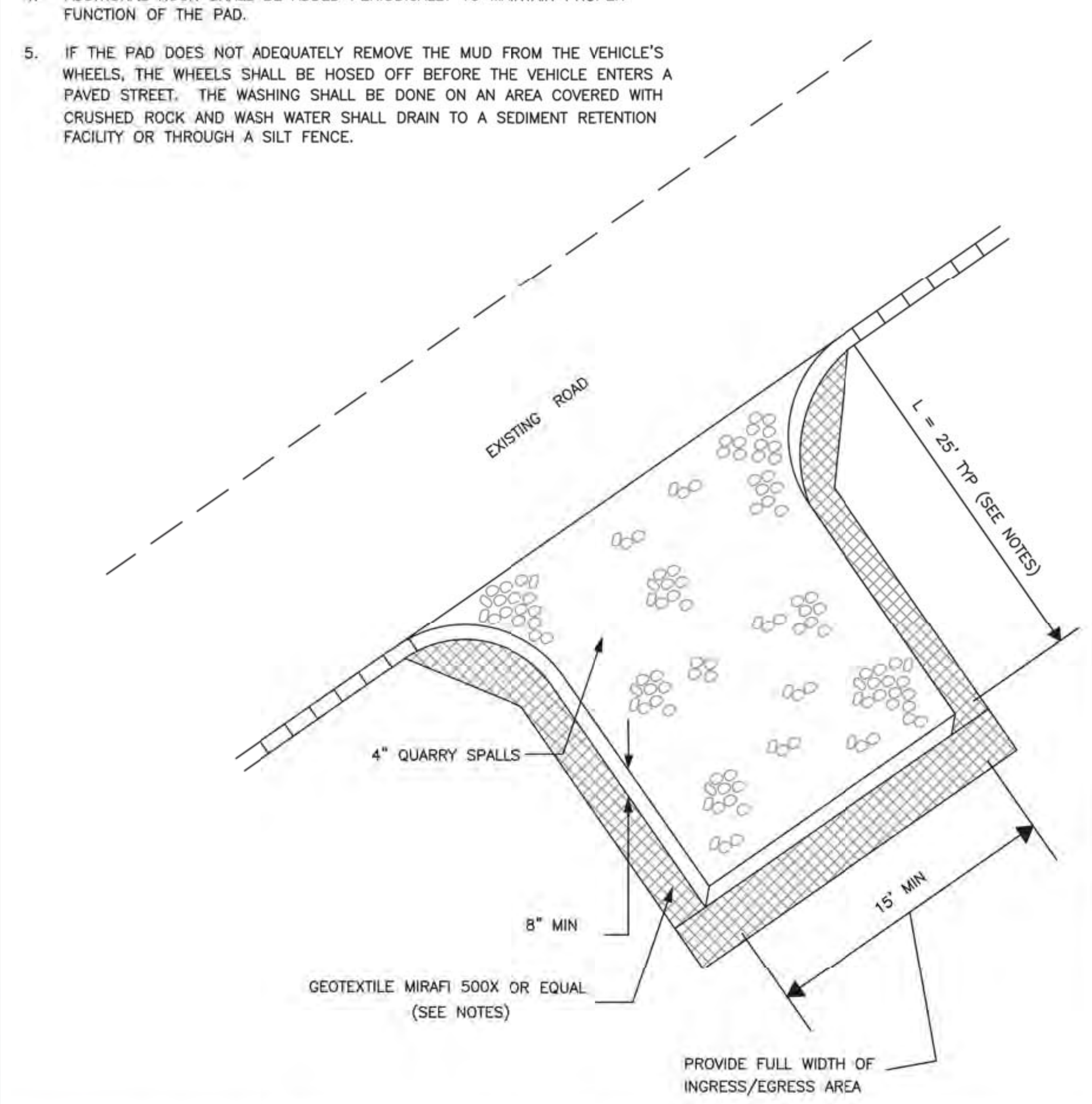
Sheet No.: C1
1 of 3 Sheets

2504 12TH AVE. NW SFR

A PORTION OF SE 1/4 OF THE SE 1/4 OF SEC. 27, TWP. 20 N, RNG 4 E.
WILLAMETTE MERIDIAN, PIERCE COUNTY, WASHINGTON

NOTES:

1. ENTRANCE LENGTH AND WIDTH MAY VARY DEPENDING ON THE SITE.
2. CONTRACTOR SHALL PROVIDE SUFFICIENT ENTRANCE AREA FOR A MINIMUM OF TWO VEHICLES.
3. GEOTEXTILE MIRAFI 500 X OR APPROVED EQUAL SHALL BE PLACED UNDER THE ENTIRETY OF THE TEMPORARY ENTRANCE.
4. ADDITIONAL ROCK SHALL BE ADDED PERIODICALLY TO MAINTAIN PROPER FUNCTION OF THE PAD.
5. IF THE PAD DOES NOT ADEQUATELY REMOVE THE MUD FROM THE VEHICLE'S WHEELS, THE WHEELS SHALL BE HOSED OFF BEFORE THE VEHICLE ENTERS A PAVED STREET. THE WASHING SHALL BE DONE ON AN AREA COVERED WITH CRUSHED ROCK AND WASH WATER SHALL DRAIN TO A SEDIMENT RETENTION FACILITY OR THROUGH A SILT FENCE.



CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

TEMPORARY CONSTRUCTION ENTRANCE (RESIDENTIAL ONLY)

CITY STANDARD 05.01.02

1. ALL LIMITS OF CLEARING AND AREAS OF VEGETATION PRESERVATION AS PRESCRIBED ON THE PLANS SHALL BE CLEARLY FLAGGED IN THE FIELD AND OBSERVED DURING CONSTRUCTION.

2. ALL REQUIRED SEDIMENTATION AND EROSION CONTROL FACILITIES MUST BE CONSTRUCTED AND IN OPERATION PRIOR TO ANY LAND CLEARING AND/OR OTHER CONSTRUCTION TO ENSURE THAT SEDIMENT LADEN WATER DOES NOT ENTER THE NATURAL DRAINAGE SYSTEM. THE CONTRACTOR SHALL SCHEDULE AN INSPECTION OF THE EROSION CONTROL FACILITIES PRIOR TO ANY LAND CLEARING AND/OR CONSTRUCTION. ALL EROSION AND SEDIMENT FACILITIES SHALL BE MAINTAINED IN A SATISFACTORY CONDITION AS DETERMINED BY THE CITY, UNTIL SUCH TIME THAT CLEARING AND/OR CONSTRUCTION IS COMPLETED AND THE POTENTIAL FOR ON-SITE EROSION HAS PASSED. THE IMPLEMENTATION, MAINTENANCE, REPLACEMENT, AND ADDITIONS TO THE EROSION AND SEDIMENTATION CONTROL SYSTEMS SHALL BE THE RESPONSIBILITY OF THE PERMITEE.

3. THE EROSION AND SEDIMENTATION CONTROL SYSTEM FACILITIES DEPICTED ON THESE PLANS ARE INTENDED TO BE MINIMUM REQUIREMENTS TO MEET ANTICIPATED SITE CONDITIONS. AS CONSTRUCTION PROGRESSES AND UNEXPECTED OR SEASONAL CONDITIONS DICTATE, FACILITIES WILL BE NECESSARY TO ENSURE COMPLETE SILTATION CONTROL ON THE SITE. DURING THE COURSE OF CONSTRUCTION, IT SHALL BE THE OBLIGATION AND RESPONSIBILITY OF THE PERMITEE TO ADDRESS ANY NEW CONDITIONS THAT MAY BE CREATED BY HIS ACTIVITIES AND TO PROVIDE ADDITIONAL FACILITIES, OVER AND ABOVE THE MINIMUM REQUIREMENTS, AS MAY BE NEEDED TO PROTECT ADJACENT PROPERTIES, SENSITIVE AREAS, NATURAL WATER COURSES, AND/OR STORM DRAINAGE SYSTEMS.

4. APPROVAL OF THESE PLANS IS FOR GRADING, TEMPORARY DRAINAGE, EROSION AND SEDIMENTATION CONTROL ONLY. IT DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT STORM DRAINAGE DESIGN, SIZE OR LOCATION OF PIPES, RESTRICTORS, CHANNELS, OR RETENTION FACILITIES.

5. ANY DISTURBED AREA WHICH HAS BEEN STRIPPED OF VEGETATION AND WHERE NO FURTHER WORK IS ANTICIPATED FOR A PERIOD OF 30 DAYS OR MORE, MUST BE IMMEDIATELY STABILIZED WITH MULCHING, GRASS PLANTING, OR OTHER APPROVED EROSION CONTROL TREATMENT APPLICABLE TO THE TIME OF YEAR IN QUESTION. GRASS SEEDING ALONE WILL BE ACCEPTABLE ONLY DURING THE MONTHS OF APRIL THROUGH SEPTEMBER INCLUSVE. SEEDING MAY PROCEED OUTSIDE THE SPECIFIED TIME PERIOD WHENEVER IT IS IN THE INTEREST OF THE PERMITEE BUT MUST BE AUGMENTED WITH MULCHING, NETTING, OR OTHER TREATMENT APPROVED BY THE CITY.

6. IN CASE EROSION OR SEDIMENTATION OCCURS TO ADJACENT PROPERTIES, ALL CONSTRUCTION WORK WITHIN THE DEVELOPMENT THAT WILL FURTHER AGGRAVATE THE SITUATION MUST CEASE, AND THE OWNER/CONTRACTOR WILL IMMEDIATELY COMMENCE RESTORATION METHODS. RESTORATION ACTIVITY WILL CONTINUE UNTIL SUCH TIME AS THE AFFECTED PROPERTY OWNER IS SATISFIED.

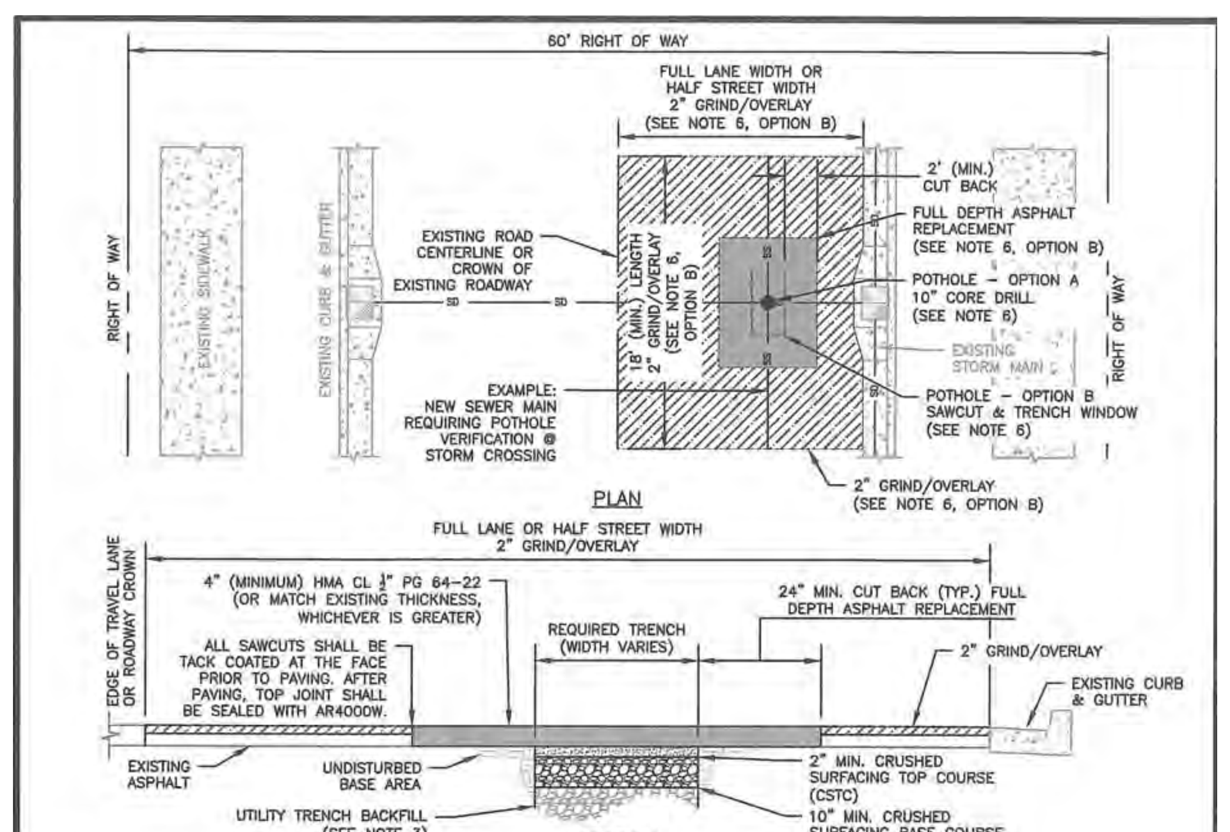
7. NO TEMPORARY OR PERMANENT STOCKPILING OF MATERIALS OR EQUIPMENT SHALL OCCUR WITHIN CRITICAL AREAS OR ASSOCIATED BUFFERS, OR THE CRITICAL ROOT ZONE FOR VEGETATION PROPOSED FOR RETENTION.

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

GRADING, EROSION, AND SEDIMENTATION CONTROL NOTES

DRAWN BY: JIM ERWIN-SVOBODA | CHECKED BY: LINDA LIAN | APPROVED BY: COLLEEN HARRIS | REVISED BY: LINDA LIAN | DATE APPROVED: 07/01/2009 | DATE REVISED: 11/18/2014 | SCALE: 1:1

CITY STANDARD 05.02.01



NOTES:

1. BASE AND SUBBASE MATERIAL SHALL BE COMPACTED TO 95% OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY.
2. ALL DEPTHS INDICATED ARE A MINIMUM COMPACTED DEPTH.
3. INITIAL BACKFILLING SHALL BE PERFORMED ONLY AFTER INSPECTION AND APPROVAL OF THE INSTALLED PIPE OR STRUCTURE. THE TRENCH BACKFILL MATERIAL SHALL BE IN ACCORDANCE WITH CITY STANDARD DETAIL NO. 06.01.01.
4. ALL BACKFILL FOR PIPE TRENCHES SHALL BE MECHANICALLY COMPACTED BY A POWER-OPERATED MECHANICAL TAMPER(S) AS SPECIFIED IN WSDOT STANDARD SPEC. 2-03.3 (14)C, COMPACTING EARTH EMBANKMENTS, METHOD C OF THE WSDOT STANDARD SPECIFICATIONS.
5. IF PAVING SURFACES ADJACENT TO THE TRENCH OPENING MAY BE DAMAGED WHERE TRENCHES ARE MADE PARALLEL TO THE STREET, OR WHERE A NUMBER OF CROSS TRENCHES ARE LAID IN CLOSE PROXIMITY TO ONE ANOTHER OR WHERE THE EQUIPMENT USED MAY CAUSE SUCH DAMAGE, THE CITY ENGINEER MAY REQUIRE A NEGOTIATED CONTRIBUTION FROM THE PERMITTEE FOR RESURFACING IN LIEU OF PATCHING.

   IF THE TOTAL AREA OF THE PROPOSED PATCH OR PROBABLE DAMAGED AREA EXCEEDS 25 PERCENT OF THE TOTAL PAVEMENT SURFACING BETWEEN CURB FACES OR BETWEEN CONCRETE GUTTER EDGES IN ANY BLOCK, SUCH NEGOTIATIONS SHALL BE CARRIED ON AND CONTRIBUTIONS AGREED UPON PRIOR TO ISSUANCE OF A PERMIT. SUCH CONTRIBUTIONS SHALL BE IN ADDITION TO THE STANDARD PERMIT FEE.
6. POTHOLING FOR UTILITIES:

   OPTION A – UP TO A 10" DIAMETER CORE DRILL IS ALLOWED. CORE HOLES MADE DURING UTILITY POTHOLES SHALL BE BACKFILLED WITH CDF TO WITHIN 4" OF FINISHED GRADE. 4" OF HMA SHALL THEN BE PLACED AND COMPACTED, FLUSH WITH EXISTING GRADE.

   OPTION B – FOR POTHOLE WINDOWS LARGER THAN 10" IN DIAMETER OR TRENCHING COMPLETED IN EXISTING ROADWAY, THE CONTRACTOR SHALL MEET CITY STANDARD 06.01.01 FOR PIPE BEDDING AND BACKFILL REQUIREMENTS. PAVEMENT RESTORATION SHALL BE ACCOMPLISHED BY INSTALLING THE TRENCH PATCH, AS SHOWN HEREIN, AND THEN GRINDING/OVERLAYING TO A MINIMUM DEPTH OF 2". THE LIMITS OF THE REQUIRED GRIND/OVERLAY SHALL BE TO THE NEAREST LANE LINE, OR HALF STREET, AND SHALL BE A MINIMUM OF 18 FEET LONG (LONGITUDINALLY ALONG ROADWAY) CENTERED AT LOCATION OF PATCH. NOTE: IF EXISTING ASPHALT THICKNESS IS LESS THAN 3", FULL DEPTH PAVEMENT REPLACEMENT, IN LIEU OF GRIND/OVERLAY, TO MEET A MINIMUM ASPHALT THICKNESS OF 4" WILL BE REQUIRED.

   WHERE LOCATION OF TRENCH OR POTHOLE WINDOW INTERSECTS ROAD CENTERLINE, A MINIMUM GRIND AND OVERLAY OF ONE FULL LANE WIDTH (12') IS REQUIRED CENTERED ON ROADWAY. NO LONGITUDINAL JOINTS WILL BE ALLOWED IN THE WHEEL PATH.
7. ALL MANHOLE FRAMES, VALVE FRAMES AND MONUMENT COVERS SHALL BE INSTALLED AFTER PLACEMENT OF ASPHALT. IF MORE THAN ONE LIFT IS NECESSARY, FRAMES AND LIDS WILL BE ADJUSTED TO FINISH GRADE AT FIRST LIFT AS DIRECTED BY THE CITY.

CITY OF PUYALLUP
OFFICE of THE CITY ENGINEER

APPROVED FOR PUBLICATION

STREET PATCH

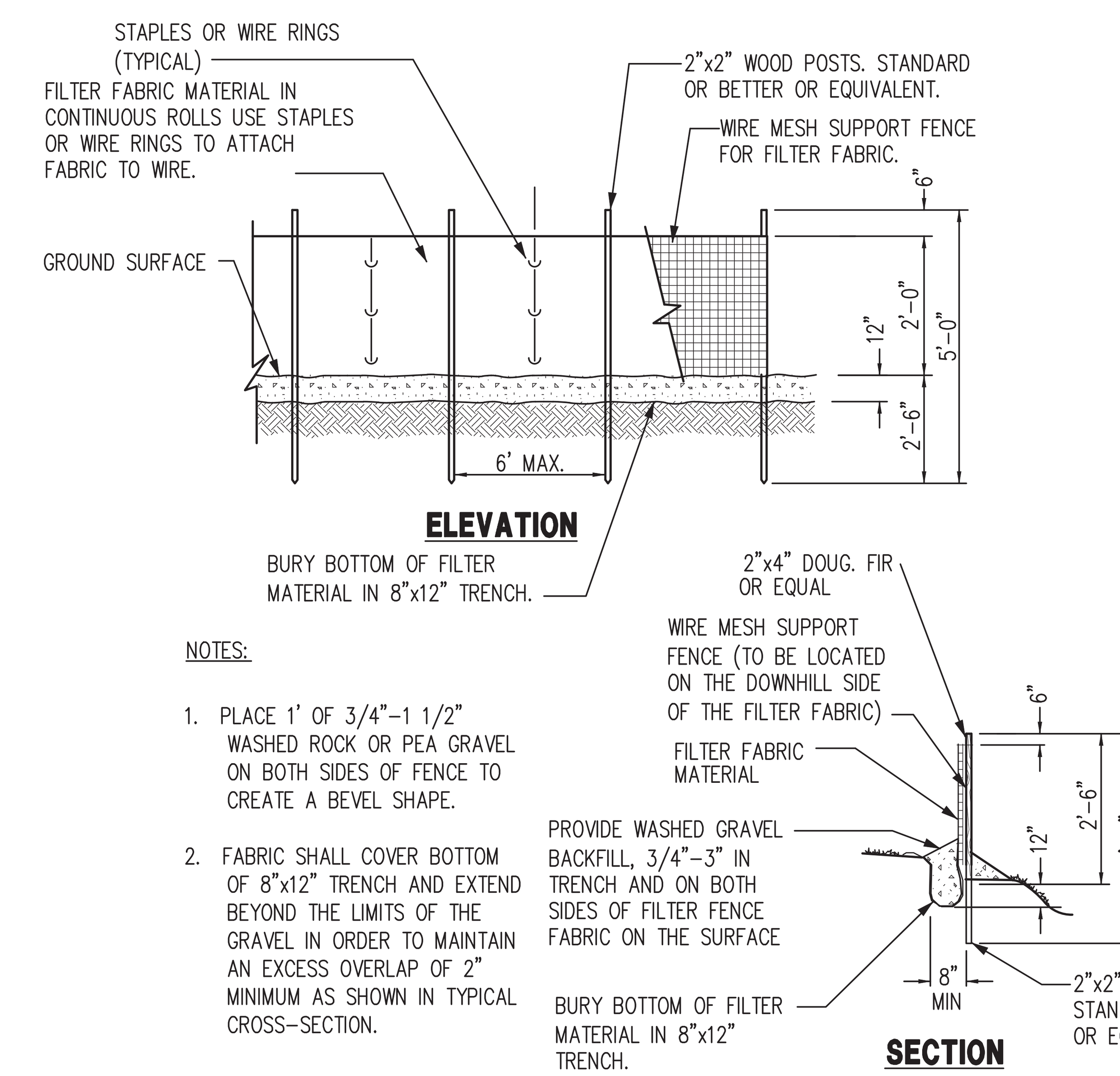
(NOT TO SCALE)

CITY STANDARD 01.01.20

Table 4.7
Mulch Standards and Guidelines

Mulch Material	Quality Standards	Application Rates	Remarks
Straw	Air-dried; free from undesirable seed and coarse material.	2"-3" thick; 5 bales per 1000 sf or 2-3 tons per acre	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier as even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species and it has no significant long-term benefits. Straw should be used only if mulches with long-term benefits are unavailable locally. It should also not be used within the ordinary high-water elevation of surface waters (due to flotation).
Hydromulch	No growth inhibiting factors.	Approx. 25-30 lbs per 1000 sf or 1500 - 2000 lbs per acre	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about ¾-1 inch clog hydromulch equipment. Fibers should be kept to less than ¾ inch.
Composted Mulch and Compost	No visible water or dust during handling. Must be purchased from supplier with Solid Waste Handling Permit (unless exempt).	2" thick min.; approx. 100 tons per acre (approx. 800 lbs per yard)	More effective control can be obtained by increasing thickness to 3". Excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Composted mulch has a coarser size gradation than compost. It is more stable and practical to use in wet areas and during rainy weather conditions.
Chipped Site Vegetation	Average size shall be several inches. Gradations from fines to 6 inches in length for texture, variation, and interlocking properties.	2" minimum thickness	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approx. 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If seeding is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment.
Wood-based Mulch	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.	2" thick; approx. 100 tons per acre (approx. 800 lbs. per cubic yard)	This material is often called "hog or hogged fuel." It is usable as a material for Stabilized Construction Entrances (BMP C105) and as a mulch. The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).

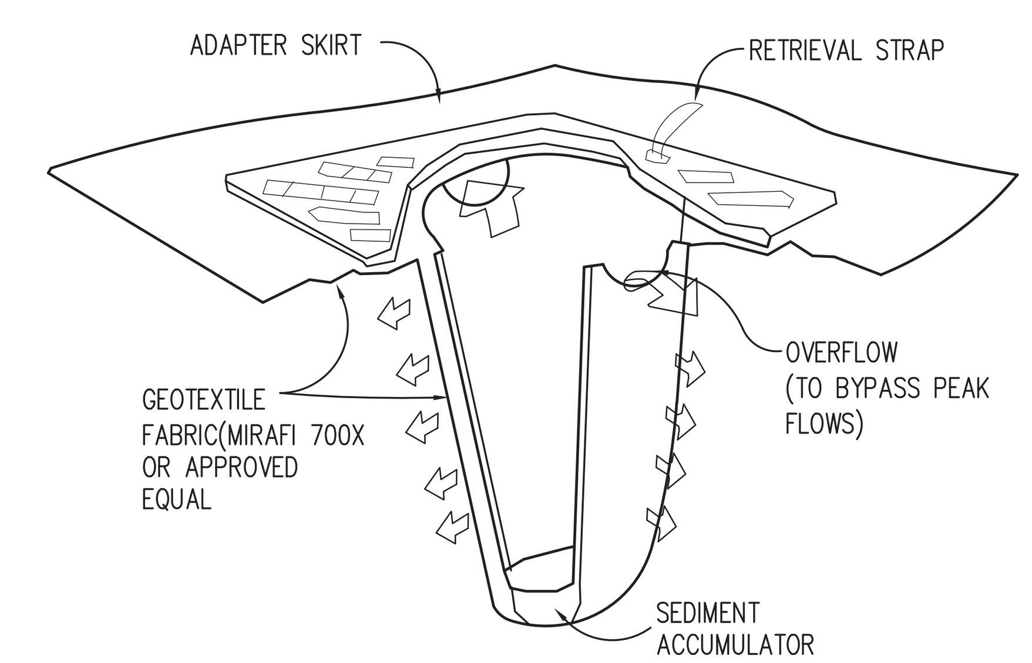
February 2005 Volume II - Construction Stormwater Pollution Prevention 4-21



1 **SILT FENCE DETAIL**
NTS

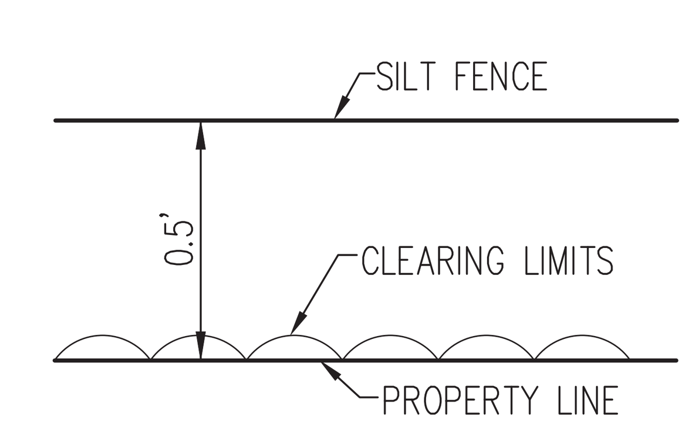
SILT FENCE NOTES

1. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL AND CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY FASTENED AT BOTH ENDS TO POSTS.
2. POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 30 INCHES).
3. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 8 INCHES WIDE AND 12 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER. THIS TRENCH SHALL BE BACKFILLED WITH WASHED GRAVEL.
4. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES AND SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
5. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 20 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. WHEN EXTRA-STRENGTH FILTER FABRIC AND CLOSER POST SPACING IS USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS WITH ALL OTHER PROVISIONS OF ABOVE NOTES APPLYING.
7. FILTER FABRIC FENCES SHALL NOT BE REMOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
8. FILTER FABRIC FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
9. SILT FENCES WILL BE INSTALLED PARALLEL TO ANY SLOPE CONTOURS.
10. CONTRIBUTING LENGTH TO FENCE WILL NOT BE GREATER THAN 100 FEET.
11. DO NOT INSTALL BELOW AN OUTLET PIPE OR WEIR.
12. INSTALL DOWN SLOPE OF EXPOSED AREAS.
13. DO NOT DRIVE OVER OR FILL OVER SILT FENCES.



PROVIDE CB INSERT "STREAMGUARD FOR SEDIMENT" OR APPROVED EQUAL
MANUFACTURER'S NAME: FOSS ENVIRONMENTAL
ADDRESS: 200 SW MICHIGAN STREET SEATTLE, WA 98106
TELEPHONE: FOR INFORMATION: (800) 909-3677

2 **CB SEDIMENT PROTECTION**
NTS



3 **CLEARING LIMITS/SILT FENCE LOCATION**
NTS

CALL 48 HOURS BEFORE YOU DIG DIAL 811

No. | Revision: | Int. | Date:

DANIEL PAUL SMITH, STATE OF WASHINGTON, 47023, REGISTERED PROFESSIONAL ENGINEER

C.E.S. NW INC.
CIVIL ENGINEERING & SURVEYING
429 – 29TH ST. NE, SUITE D
PUYALLUP, WA 98372
Bus: (253) 848-4282
ceservices@cesnwinc.com

Project: **2504 12TH AVE. NW SFR**
EROSION CONTROL NOTES AND DETAILS

Client: **TONY DANIELS**
tony.builders16@gmail.com

Designed: MAS
Drawn: NDA
Checked: DPS

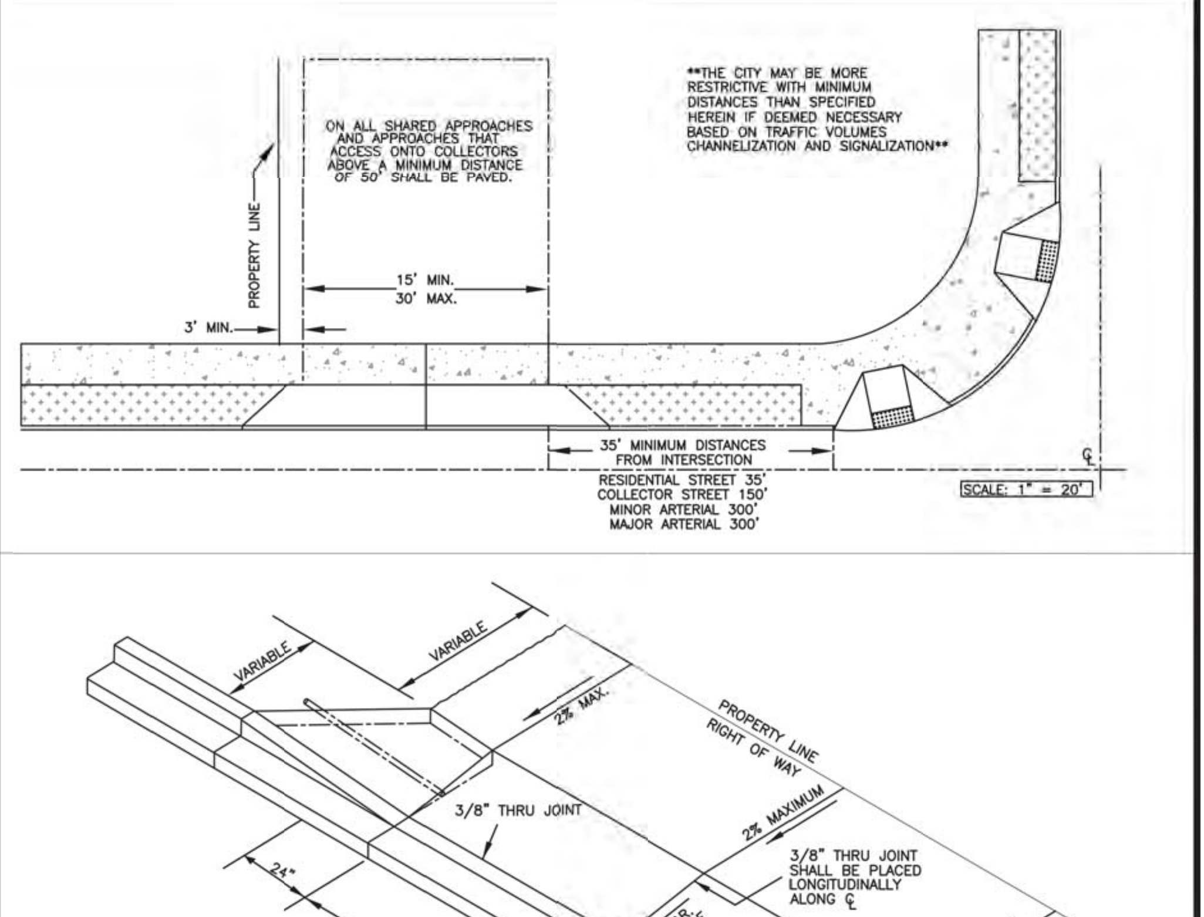
Scale: NTS
Date: 09/21/22
Job No.: 22058

Sheet No.: **C2**

2 of 3 Sheets

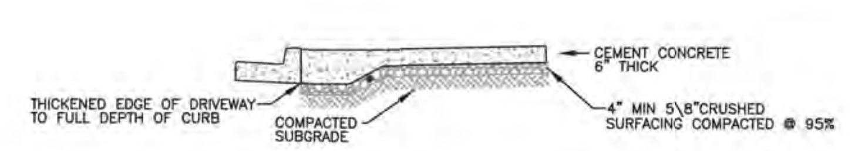
2504 12TH AVE. NW SFR

A PORTION OF SE 1/4 OF THE SE 1/4 OF SEC. 27, TWP. 20 N, RNG 4 E.
WILLAMETTE MERIDIAN, PIERCE COUNTY, WASHINGTON



NOTES:

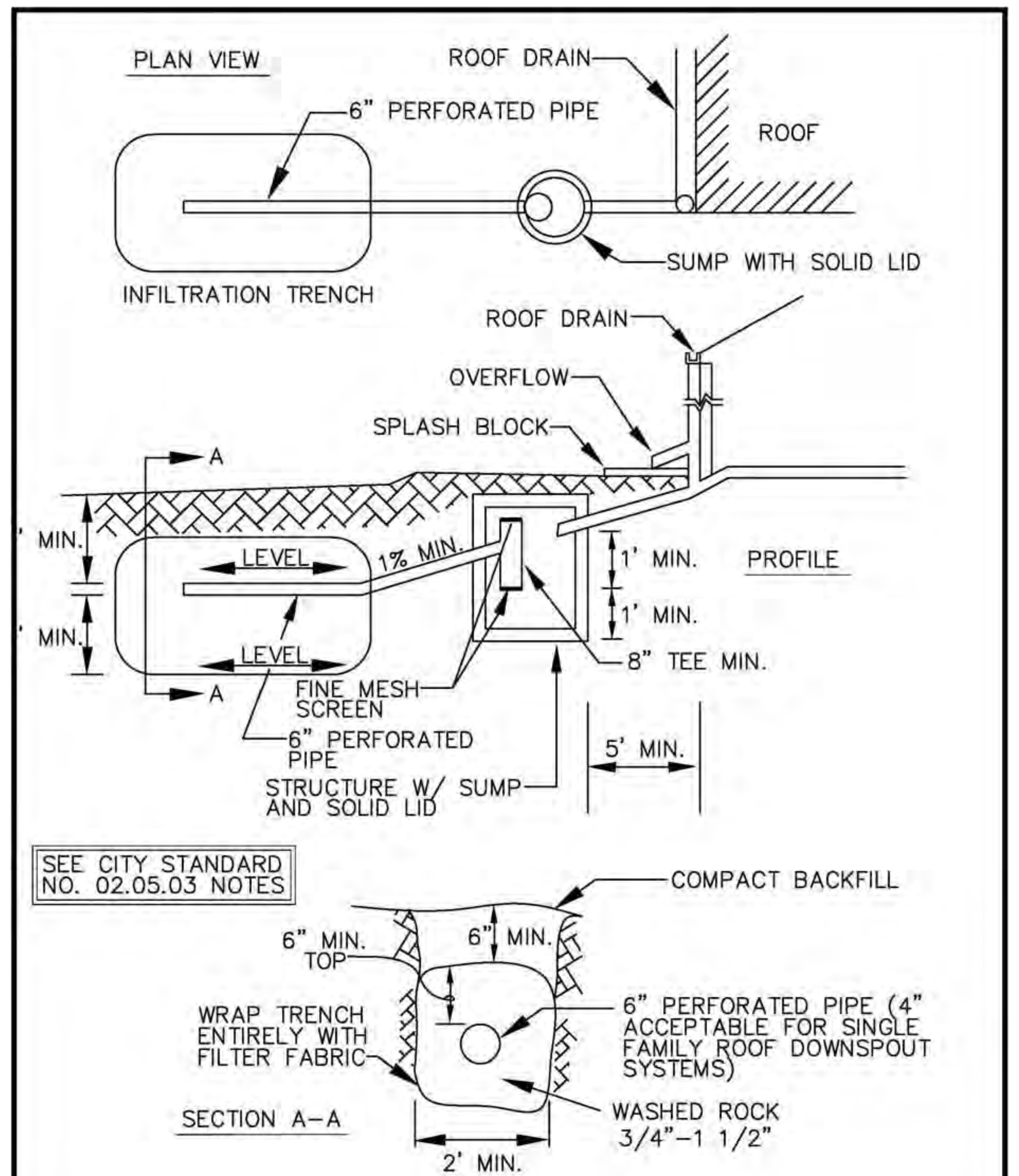
1. JOINTS IN PAVING SLAB SHALL NOT EXTEND INTO DRIVEWAY. ALL JOINTS SHALL BE CLEAN AND EDGED.
2. CONCRETE SHALL BE COMMERCIAL CONCRETE, 5.5 SACK MINIMUM, AASHTO GRADING 467 COARSE AGGREGATE, NO FLY ASH.
3. THE TOTAL WIDTH OF ALL DRIVEWAYS ON ONE PROPERTY/OWNERSHIP AND ON ANY ONE STREET SHALL NOT EXCEED 50% OF THAT PROPERTY/OWNERSHIP WIDTH.
4. A DRIVEWAY MAY NOT EXCEED A 10% GRADE AT ANY POINT AS DIRECTED BY THE CITY OF PUYALLUP FIRE CODE OFFICIAL.
5. ON ALL SHARED APPROACHES AND APPROACHES THAT ACCESS ONTO COLLECTORS AND ABOVE A MINIMUM DISTANCE OF 50 FEET SHALL BE PAVED.
6. ENTERING SIGHT DISTANCE SHALL MEET AASHTO STANDARDS.
7. WHEN NO CONCRETE CURB IS PRESENT NOR IS NEW CURB REQUIRED A NEW DRIVEWAY MAY BE CONSTRUCTED USING 2" OF ASPHALT OVER 2" OF CRUSHED SURFACING TOP COURSE.



SCALE: 1:5

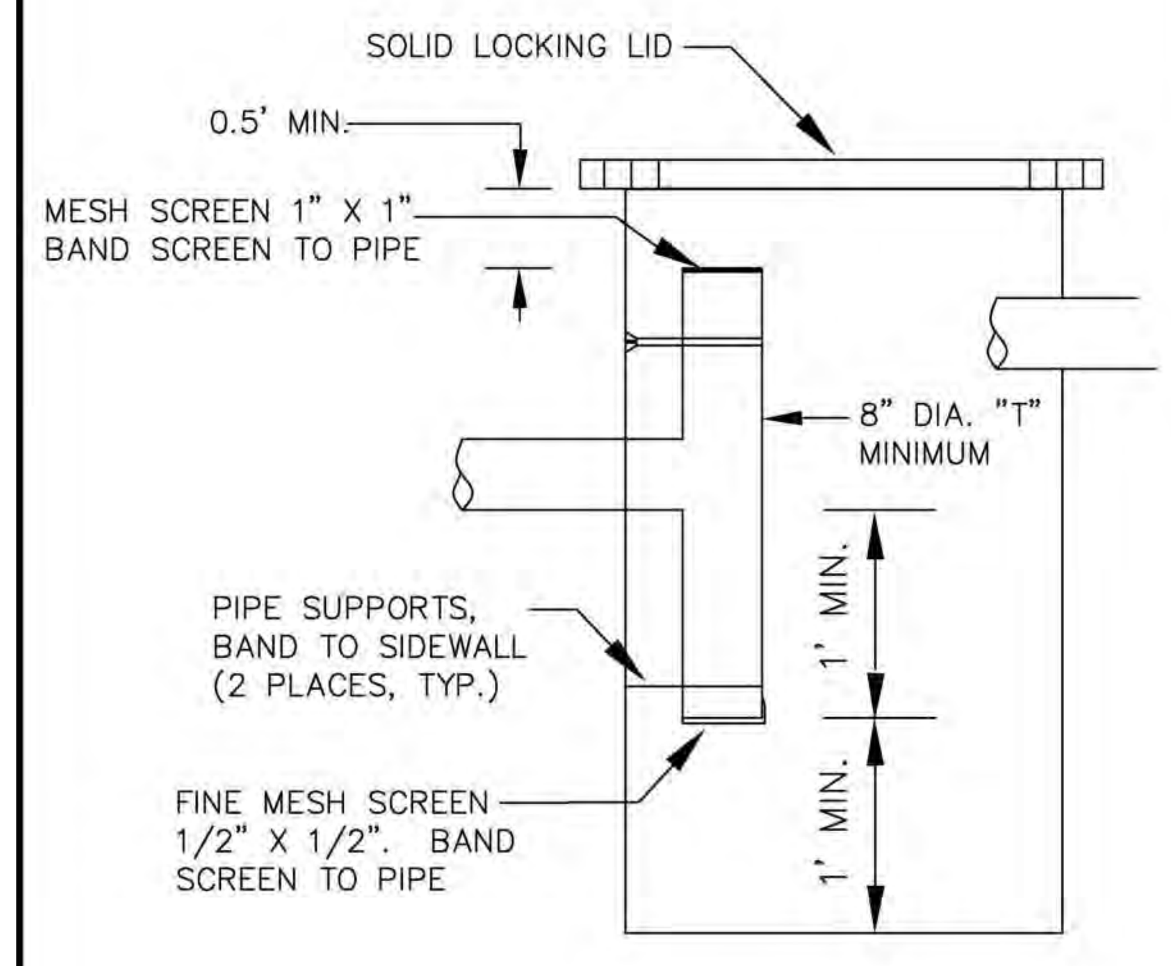
CITY OF PUYALLUP — DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

STANDARD RESIDENTIAL DRIVEWAY — CITY STANDARD 01.02.12



CITY OF PUYALLUP — DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

INDIVIDUAL ROOF DOWNSPOUT SYSTEM — CITY STANDARD 02.05.01



CITY OF PUYALLUP — DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

RESIDENTIAL INFILTRATION TRENCH SUMP STRUCTURE

DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
LINDA LANSING	LINDA LIAN	COLLEEN HARRIS	XXXX	02.05.02
FILE NAME: F:\DWG\COMMON\STDS\CITY\2009\02_SD\02.05.02	DATE APPROVED: 09/01/1992	DATE REVISED: 06/01/2003	SCALE: NTS	

NOTE:

SOIL CONDITIONS, INFILTRATION RATES, AND TRENCH SIZING SHALL BE PERFORMED BY A LICENSED PROFESSIONAL ENGINEER.

GENERAL NOTES:

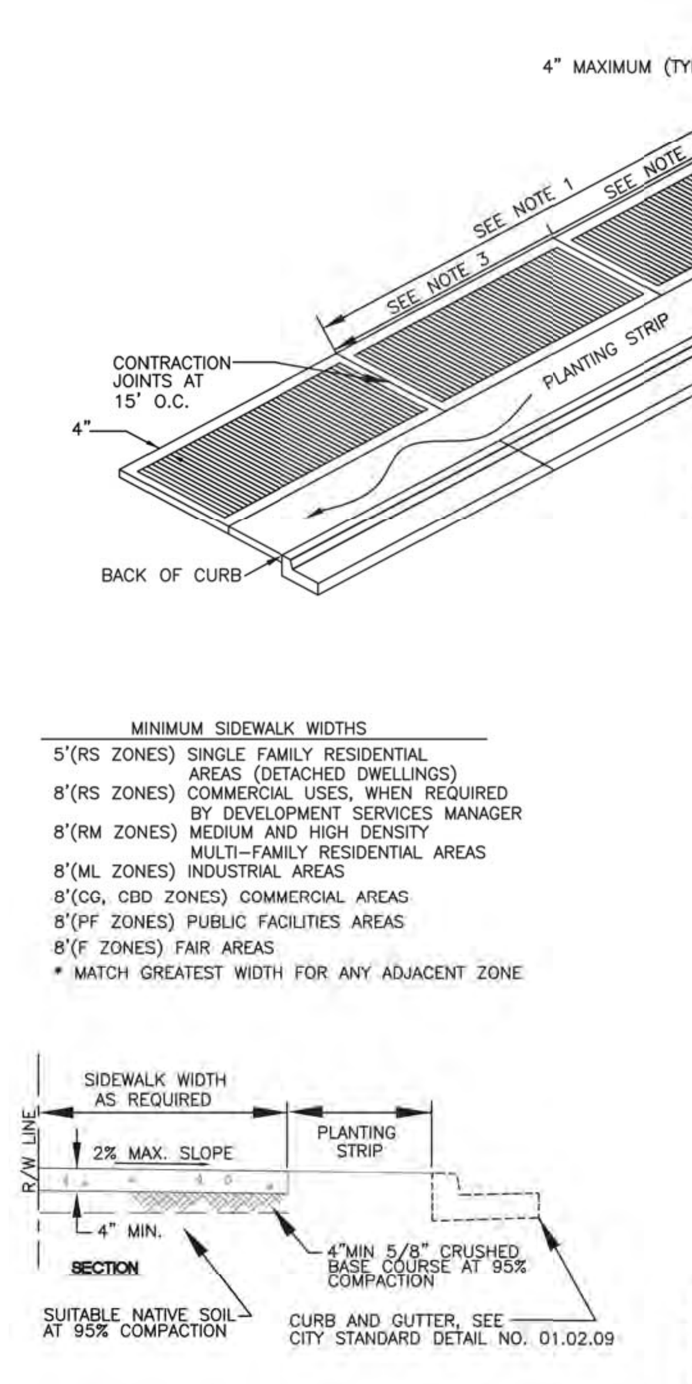
1. THE FOLLOWING MINIMUM LENGTHS (LINEAR FEET) PER 1,000 SQUARE FEET OF ROOF AREA BASED ON SOIL TYPE MAY BE USED FOR SIZING DOWNSPOUTS INFILTRATION TRENCHES.

COARSE SANDS AND COBBLES	20 LF
MEDIUM SAND	30 LF
FINE SAND, LOAMY SAND	75 LF
SANDY LOAM	125 LF
LOAM	190 LF

2. MAXIMUM LENGTH OF TRENCH SHALL NOT EXCEED 100 FEET FROM THE INLET SUMP.
3. MINIMUM SPACING BETWEEN TRENCH CENTER LINES SHALL BE 6 (SIX) FEET.

CITY OF PUYALLUP — DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

INDIVIDUAL ROOF DOWNSPOUT SYSTEM NOTES — CITY STANDARD 02.05.03

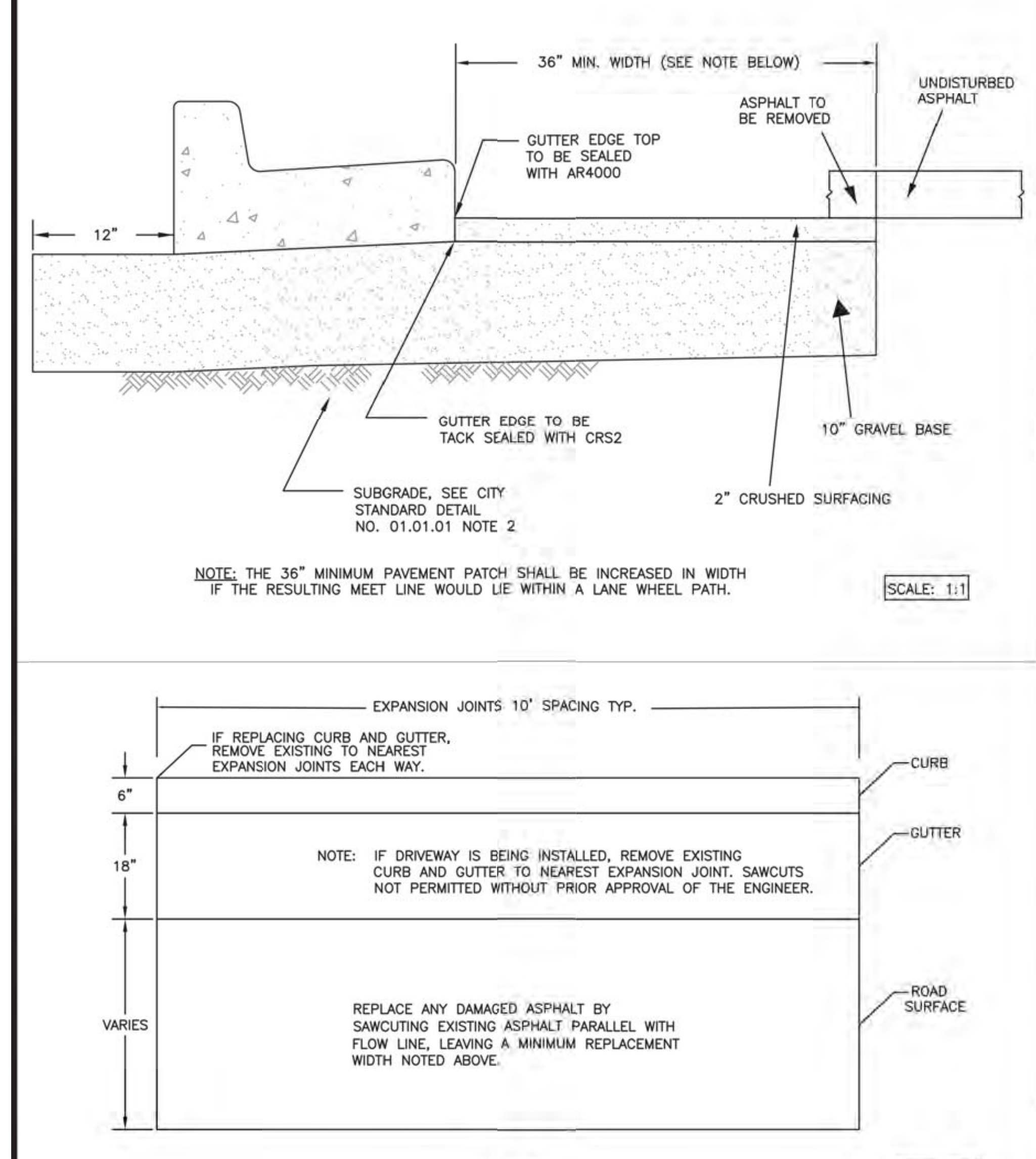


NOTES:

1. CONTRACTION JOINTS SHALL BE 3/8" x 1 1/2" ASPHALT SATURATED FELT PLACED AT 15' O.C.
2. THRU JOINTS SHALL BE 3/8" x 4" ASPHALT SATURATED FELT PLACED AT DRIVEWAYS, ALLEY RETURNS AND WHEELCHAIR RAMPS AND RADII.
3. V-GROOVEMARKS SHALL BE 1/8" DEEP AND 1/4" WIDE PLACED AT 5' O.C. FOR 5' SIDEWALKS AND 7.5' O.C. FOR 8' SIDEWALKS.
4. ALL JOINTS SHALL BE CLEAN AND EDGED TO A 1/4" RADIUS. JOINTS SHALL BE FLUSH WITH THE FINISHED SURFACE.
5. ALL UTILITY POLES AND STREET SIGN POSTS IN SIDEWALK AREA NOT REQUIRED TO BE RELOCATED SHALL HAVE A SQUARE SECTION OF CONCRETE SURROUNDED BY 3/8" EXPANSION JOINT MATERIAL AROUND THE POLE. THE JOINT SHALL BE NO CLOSER THAN 6" TO ANY SIDE OF THE POLE SIDE OF THE POLE.
6. FORMS SHALL BE EITHER WOOD OR STEEL AND SHALL MEET ALL REQUIREMENTS OF THESE SPECIFICATIONS.
7. CONCRETE SHALL BE CLASS 3000 COMMERCIAL CONCRETE, 5.5 SACK MINIMUM, AASHTO GRADING 467 COARSE AGGREGATE, NO FLY ASH.
8. SIDEWALK MINIMUM UNOBSTRUCTED CLEAR WIDTH SHALL BE 4', EXCLUSIVE OF THE WIDTH OF THE CURB.
9. GRATINGS, ACCESS COVERS, JUNCTION BOXES, CABLE VAULTS, PULL BOXES AND OTHER APPURTENANCES WITHIN THE SIDEWALK (RIGHT OF WAY) MUST HAVE SLIP RESISTANT SURFACES AND MATCH THE GRADE OF THE SIDEWALK.
10. CURB RAMPS SHALL BE CONSTRUCTED AT INTERSECTIONS USING A DESIGN PREPARED BY A LICENSED PROFESSIONAL ENGINEER. WHEN A RAMP DESIGN FAILS TO MEET ALL APPLICABLE DESIGN STANDARDS, THE ENGINEER SHALL DOCUMENT WHY THE PROPOSED RAMP ACHIEVES DESIGN STANDARDS TO THE MAXIMUM EXTENT FEASIBLE.

CITY OF PUYALLUP — DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

SIDEWALK WITH PLANTING STRIP — CITY STANDARD 01.02.02

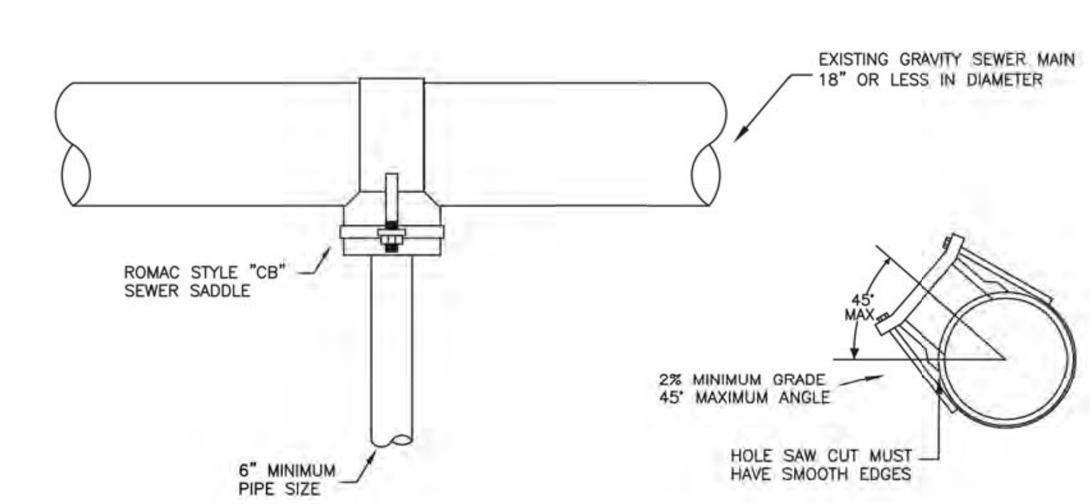


CITY OF PUYALLUP — DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

CURB CUT — CITY STANDARD 01.02.10

NOTES FOR CONNECTING TAPS ON EXISTING SEWER MAINS

1. THE TEE FITTING SHALL BE A ROMAC INDUSTRIES STYLE "CB" SEWER SADDLE (OR APPROVED EQUAL). ONLY NEW SADDLE AND PARTS SHALL BE INSTALLED. DUE TO PIPE SIZE MATERIALS OR PIPE CONDITION, THE CITY ENGINEER MAY REQUIRE AN ALTERNATE METHOD/MATERIAL BE USED.
2. THE SEWER MAIN TAP SHALL BE CUT WITH A SEWER PIPE TAPPING MACHINE (HOLE SAW) CAPABLE OF RETAINING THE COUPON.
3. THE ROUND HOLE CUT INTO THE SEWER MAIN SHALL BE NO LARGER THAN THE INSIDE DIAMETER OF THE SADDLE GASKET. THE HOLE SAW CUT EDGES SHALL BE SMOOTH.
4. THE COUPON SHALL BE RETAINED AND SURRENDERED TO THE INSPECTOR. THE PERMIT HOLDER WILL PAY ALL COSTS ASSOCIATED WITH THE LOCATION AND RETRIEVAL OF A LOST COUPON. ADDITIONALLY THE PERMIT HOLDER WILL BE HELD LIABLE FOR ANY SUBSEQUENT DAMAGES CAUSED BY A LOST COUPON.
5. BOLTS SHALL BE TORQUED TO MANUFACTURE SPECIFICATIONS, THEN RETORQUED AFTER 10 MINUTES.
6. NO TAPS SHALL BE ALLOWED ON EXISTING SEWER MAINS OVER 18" IN DIAMETER. CONNECTIONS INTO SEWER MAINS OVER 18" IN DIAMETER SHALL INTERSECT THE SEWER MAIN IN A MANHOLE. IN SOME CASES THE CITY ENGINEER MAY ALLOW A VARIANCE TO THIS REQUIREMENT.
7. ALL TRENCHING, BEDDING, AND BACKFILL SHALL BE IN ACCORDANCE WITH CITY STANDARD DETAIL NO. 06.01.01. ALL ASPHALT REPAIR SHALL BE IN ACCORDANCE WITH CITY STANDARD NO. 01.01.20. ALL ADDITIONAL UTILITY AND RIGHT OF WAY REPAIRS SHALL BE INACCORDANCE WITH THE "CITY STANDARDS" MANUAL.
8. THE CITY OF PUYALLUP WILL CONDUCT A "SEWER MAIN VIDEO INSPECTION" OF THE SEWER TAP. THE PERMIT HOLDER WILL BE REQUIRED TO REPAIR ANY SEWER TAP CONSTRUCTION DEFECTS FOUND BY THE CITY INSPECTORS. THE COST OF ALL REPAIRS AND SUBSEQUENT "SEWER MAIN VIDEO INSPECTIONS" WILL BE THE RESPONSIBILITY OF THE PERMIT HOLDER. THE DAMAGE DEPOSIT POSTED BY THE BUILDER WILL BE HELD UNTIL PROBLEMS ARE CORRECTED. DUE TO PUBLIC HEALTH AND SAFETY, BUILDING OCCUPANCY WILL NOT BE ALLOWED UNTIL REPAIRS ARE COMPLETED AND ACCEPTED BY THE CITY ENGINEER.

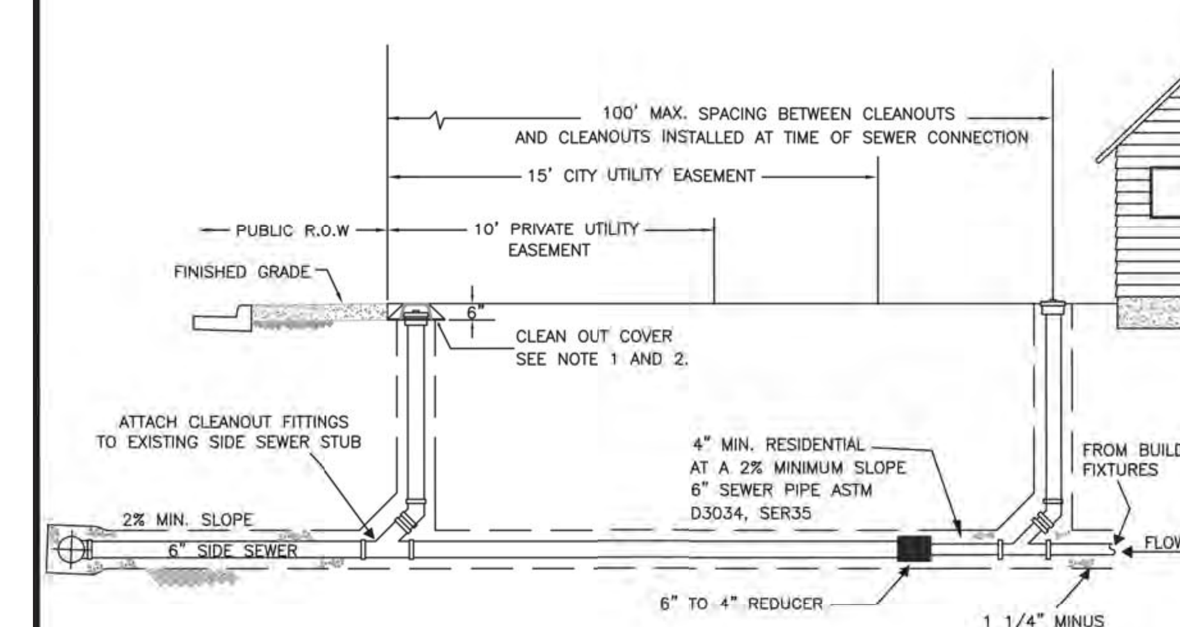


CITY OF PUYALLUP — DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

SEWER MAIN TAP — CITY STANDARD 04.02.01

RESIDENTIAL SIDE SEWER CONNECTION

1. PRIOR TO CONNECTING A NEW LATERAL TO AN EXISTING SEWER STUB, THE STUB MUST BE INSPECTED AND APPROVED BY THE CITY ENGINEER
2. WHEN THE SEWER MAIN IS IN A RIGHT-OF-WAY, A 6" CLEAN OUT IS REQUIRED AT THE EDGE OF THE RIGHT-OF-WAY.
3. WHEN THE SEWER MAIN IS IN AN EASEMENT, A 6" CLEAN OUT IS REQUIRED AT THE EDGE OF THE EASEMENT.
4. EACH CLEAN OUT ASSEMBLY SHALL CONSIST OF: ONE CLEAN OUT ADAPTOR, (HUB x FEMALE INSIDE PIPE THREAD, P.V.C. SLIP IN), AND ONE CLEAN OUT PLUG (MALE OUTSIDE THREAD WITH RAISED NUT, P.V.C. SDR 35).
5. FOR NON-VEHICULAR TRAFFIC INSTALLATIONS USE "CARSON" MODEL 910 GREEN YARD BOX WITH BOLT DOWN LID MARKED SEWER OR APPROVED EQUAL.
6. FOR ASPHALT, GRAVEL, OR TRAFFIC INSTALLATIONS SEE CITY STANDARD DETAIL NO. 04.03.05 FRAME AND COVER SECTION
7. SEWER PIPE, TRENCHING, BEDDING AND BACKFILL SHALL CONFORM TO CITY STANDARD NO. 06.01.01



CITY OF PUYALLUP — DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

SIDE SEWER RESIDENTIAL CONNECTION — CITY STANDARD 04.03.03

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Revision:	Int.	Date:

C.E.S. NW INC.
CIVIL ENGINEERING & SURVEYING
429 – 29TH ST. NE, SUITE D
PUYALLUP, WA 98372
Bus: (253) 848-4282
ceservices@cesnwinc.com

Project: 2504 12TH AVE. NW SFR — NOTES AND DETAILS

Client: TONY DANIELS — tony.builders16@gmail.com

Designed:	MAS
Drawn:	NDA
Checked:	DPS
Scale:	NTS
Date:	09/21/22
Job No.:	22058

Sheet No.: C3

3 of 3 Sheets

National Flood Hazard Layer FIRMette

FEMA

122°19'59"W 47°12'18"N

122°19'22"W 47°11'54"N

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

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

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 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 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 4/28/2022 at 11:43 AM 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.

APPENDIX C

WWHM Modeling Report

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	22058
Site Name:	2504 12th Ave NW SFR
Site Address:	2504 12th Ave NW
City:	Puyallup, WA
Report Date:	10/28/2022
Gage:	40 IN EAST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2021/08/18
Version:	4.2.18

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Pre Dev

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Forest, Flat	0.069
Pervious Total	0.069

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.069

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Roof

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.069
Impervious Total	0.069
Basin Total	0.069

Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed 1	Gravel Trench Bed 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Gravel Trench Bed 1

Bottom Length: 60.00 ft.
Bottom Width: 6.00 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: 0.33
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: 1.5
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 29.316
Total Volume Through Riser (ac-ft.): 0.001
Total Volume Through Facility (ac-ft.): 29.316
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 2 ft.
Riser Diameter: 12 in.
Element Flows To:
Outlet 1 Outlet 2

Gravel Trench Bed Hydraulic Table

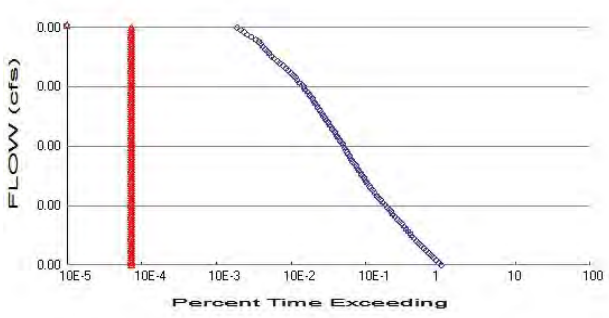
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.008	0.000	0.000	0.000
0.0333	0.008	0.000	0.000	0.012
0.0667	0.008	0.000	0.000	0.012
0.1000	0.008	0.000	0.000	0.012
0.1333	0.008	0.000	0.000	0.012
0.1667	0.008	0.000	0.000	0.012
0.2000	0.008	0.000	0.000	0.012
0.2333	0.008	0.000	0.000	0.012
0.2667	0.008	0.000	0.000	0.012
0.3000	0.008	0.000	0.000	0.012
0.3333	0.008	0.000	0.000	0.012
0.3667	0.008	0.001	0.000	0.012
0.4000	0.008	0.001	0.000	0.012
0.4333	0.008	0.001	0.000	0.012
0.4667	0.008	0.001	0.000	0.012
0.5000	0.008	0.001	0.000	0.012
0.5333	0.008	0.001	0.000	0.012
0.5667	0.008	0.001	0.000	0.012
0.6000	0.008	0.001	0.000	0.012
0.6333	0.008	0.001	0.000	0.012
0.6667	0.008	0.001	0.000	0.012
0.7000	0.008	0.001	0.000	0.012
0.7333	0.008	0.002	0.000	0.012
0.7667	0.008	0.002	0.000	0.012

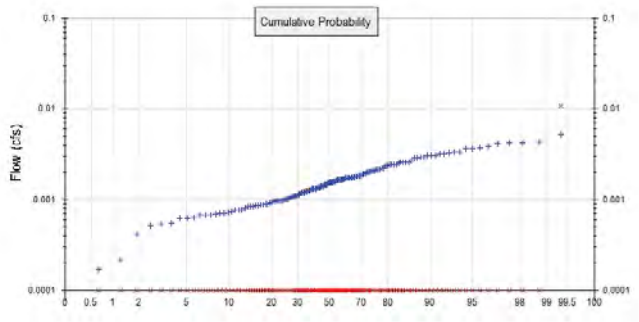
0.8000	0.008	0.002	0.000	0.012
0.8333	0.008	0.002	0.000	0.012
0.8667	0.008	0.002	0.000	0.012
0.9000	0.008	0.002	0.000	0.012
0.9333	0.008	0.002	0.000	0.012
0.9667	0.008	0.002	0.000	0.012
1.0000	0.008	0.002	0.000	0.012
1.0333	0.008	0.002	0.000	0.012
1.0667	0.008	0.002	0.000	0.012
1.1000	0.008	0.003	0.000	0.012
1.1333	0.008	0.003	0.000	0.012
1.1667	0.008	0.003	0.000	0.012
1.2000	0.008	0.003	0.000	0.012
1.2333	0.008	0.003	0.000	0.012
1.2667	0.008	0.003	0.000	0.012
1.3000	0.008	0.003	0.000	0.012
1.3333	0.008	0.003	0.000	0.012
1.3667	0.008	0.003	0.000	0.012
1.4000	0.008	0.003	0.000	0.012
1.4333	0.008	0.003	0.000	0.012
1.4667	0.008	0.004	0.000	0.012
1.5000	0.008	0.004	0.000	0.012
1.5333	0.008	0.004	0.000	0.012
1.5667	0.008	0.004	0.000	0.012
1.6000	0.008	0.004	0.000	0.012
1.6333	0.008	0.004	0.000	0.012
1.6667	0.008	0.004	0.000	0.012
1.7000	0.008	0.004	0.000	0.012
1.7333	0.008	0.004	0.000	0.012
1.7667	0.008	0.004	0.000	0.012
1.8000	0.008	0.004	0.000	0.012
1.8333	0.008	0.005	0.000	0.012
1.8667	0.008	0.005	0.000	0.012
1.9000	0.008	0.005	0.000	0.012
1.9333	0.008	0.005	0.000	0.012
1.9667	0.008	0.005	0.000	0.012
2.0000	0.008	0.005	0.000	0.012
2.0333	0.008	0.005	0.064	0.012
2.0667	0.008	0.005	0.182	0.012
2.1000	0.008	0.005	0.333	0.012
2.1333	0.008	0.005	0.509	0.012
2.1667	0.008	0.005	0.703	0.012
2.2000	0.008	0.006	0.907	0.012
2.2333	0.008	0.006	1.115	0.012
2.2667	0.008	0.006	1.318	0.012
2.3000	0.008	0.006	1.509	0.012
2.3333	0.008	0.006	1.683	0.012
2.3667	0.008	0.006	1.834	0.012
2.4000	0.008	0.006	1.960	0.012
2.4333	0.008	0.006	2.060	0.012
2.4667	0.008	0.006	2.138	0.012
2.5000	0.008	0.006	2.227	0.012
2.5333	0.008	0.006	2.300	0.012
2.5667	0.008	0.007	2.371	0.012
2.6000	0.008	0.007	2.439	0.012
2.6333	0.008	0.007	2.506	0.012
2.6667	0.008	0.007	2.571	0.012
2.7000	0.008	0.007	2.635	0.012

2.7333	0.008	0.007	2.697	0.012
2.7667	0.008	0.007	2.757	0.012
2.8000	0.008	0.007	2.817	0.012
2.8333	0.008	0.007	2.875	0.012
2.8667	0.008	0.007	2.932	0.012
2.9000	0.008	0.007	2.988	0.012
2.9333	0.008	0.008	3.042	0.012
2.9667	0.008	0.008	3.096	0.012
3.0000	0.008	0.008	3.149	0.012

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.069
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.069

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.001559
5 year	0.002399
10 year	0.002884
25 year	0.00341
50 year	0.003748
100 year	0.004041

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

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1902	0.001	0.000
1903	0.001	0.000
1904	0.002	0.000
1905	0.001	0.000
1906	0.000	0.000
1907	0.002	0.000
1908	0.002	0.000
1909	0.002	0.000
1910	0.002	0.000
1911	0.002	0.000

1912	0.005	0.000
1913	0.002	0.000
1914	0.001	0.000
1915	0.001	0.000
1916	0.002	0.000
1917	0.001	0.000
1918	0.002	0.000
1919	0.001	0.000
1920	0.002	0.000
1921	0.002	0.000
1922	0.002	0.000
1923	0.001	0.000
1924	0.001	0.000
1925	0.001	0.000
1926	0.002	0.000
1927	0.001	0.000
1928	0.001	0.000
1929	0.002	0.000
1930	0.002	0.000
1931	0.001	0.000
1932	0.001	0.000
1933	0.001	0.000
1934	0.003	0.000
1935	0.001	0.000
1936	0.001	0.000
1937	0.002	0.000
1938	0.001	0.000
1939	0.000	0.000
1940	0.001	0.000
1941	0.001	0.000
1942	0.002	0.000
1943	0.001	0.000
1944	0.002	0.000
1945	0.002	0.000
1946	0.001	0.000
1947	0.001	0.000
1948	0.003	0.000
1949	0.003	0.000
1950	0.001	0.000
1951	0.001	0.000
1952	0.004	0.011
1953	0.004	0.000
1954	0.001	0.000
1955	0.001	0.000
1956	0.001	0.000
1957	0.002	0.000
1958	0.004	0.000
1959	0.003	0.000
1960	0.001	0.000
1961	0.003	0.000
1962	0.001	0.000
1963	0.001	0.000
1964	0.001	0.000
1965	0.003	0.000
1966	0.001	0.000
1967	0.001	0.000
1968	0.001	0.000
1969	0.001	0.000

1970	0.002	0.000
1971	0.003	0.000
1972	0.002	0.000
1973	0.003	0.000
1974	0.001	0.000
1975	0.003	0.000
1976	0.002	0.000
1977	0.001	0.000
1978	0.003	0.000
1979	0.001	0.000
1980	0.002	0.000
1981	0.002	0.000
1982	0.001	0.000
1983	0.003	0.000
1984	0.001	0.000
1985	0.002	0.000
1986	0.002	0.000
1987	0.003	0.000
1988	0.002	0.000
1989	0.002	0.000
1990	0.002	0.000
1991	0.002	0.000
1992	0.002	0.000
1993	0.002	0.000
1994	0.003	0.000
1995	0.001	0.000
1996	0.003	0.000
1997	0.001	0.000
1998	0.002	0.000
1999	0.000	0.000
2000	0.001	0.000
2001	0.001	0.000
2002	0.002	0.000
2003	0.002	0.000
2004	0.002	0.000
2005	0.003	0.000
2006	0.001	0.000
2007	0.001	0.000
2008	0.002	0.000
2009	0.001	0.000
2010	0.001	0.000
2011	0.001	0.000
2012	0.001	0.000
2013	0.001	0.000
2014	0.001	0.000
2015	0.001	0.000
2016	0.001	0.000
2017	0.002	0.000
2018	0.004	0.000
2019	0.004	0.000
2020	0.001	0.000
2021	0.002	0.000
2022	0.001	0.000
2023	0.002	0.000
2024	0.004	0.000
2025	0.002	0.000
2026	0.003	0.000
2027	0.001	0.000

2028	0.001	0.000
2029	0.002	0.000
2030	0.003	0.000
2031	0.001	0.000
2032	0.001	0.000
2033	0.001	0.000
2034	0.001	0.000
2035	0.004	0.000
2036	0.002	0.000
2037	0.001	0.000
2038	0.002	0.000
2039	0.000	0.000
2040	0.001	0.000
2041	0.001	0.000
2042	0.004	0.000
2043	0.002	0.000
2044	0.002	0.000
2045	0.002	0.000
2046	0.002	0.000
2047	0.001	0.000
2048	0.002	0.000
2049	0.002	0.000
2050	0.001	0.000
2051	0.002	0.000
2052	0.001	0.000
2053	0.002	0.000
2054	0.002	0.000
2055	0.001	0.000
2056	0.001	0.000
2057	0.001	0.000
2058	0.001	0.000
2059	0.003	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0052	0.0108
2	0.0043	0.0000
3	0.0042	0.0000
4	0.0042	0.0000
5	0.0041	0.0000
6	0.0039	0.0000
7	0.0037	0.0000
8	0.0036	0.0000
9	0.0036	0.0000
10	0.0034	0.0000
11	0.0033	0.0000
12	0.0033	0.0000
13	0.0032	0.0000
14	0.0032	0.0000
15	0.0031	0.0000
16	0.0031	0.0000
17	0.0031	0.0000
18	0.0030	0.0000
19	0.0029	0.0000
20	0.0029	0.0000
21	0.0029	0.0000
22	0.0026	0.0000

23	0.0026	0.0000
24	0.0026	0.0000
25	0.0026	0.0000
26	0.0026	0.0000
27	0.0025	0.0000
28	0.0024	0.0000
29	0.0024	0.0000
30	0.0024	0.0000
31	0.0024	0.0000
32	0.0024	0.0000
33	0.0023	0.0000
34	0.0022	0.0000
35	0.0022	0.0000
36	0.0022	0.0000
37	0.0021	0.0000
38	0.0021	0.0000
39	0.0021	0.0000
40	0.0021	0.0000
41	0.0021	0.0000
42	0.0020	0.0000
43	0.0020	0.0000
44	0.0020	0.0000
45	0.0019	0.0000
46	0.0019	0.0000
47	0.0019	0.0000
48	0.0019	0.0000
49	0.0019	0.0000
50	0.0018	0.0000
51	0.0018	0.0000
52	0.0018	0.0000
53	0.0018	0.0000
54	0.0017	0.0000
55	0.0017	0.0000
56	0.0017	0.0000
57	0.0017	0.0000
58	0.0017	0.0000
59	0.0017	0.0000
60	0.0017	0.0000
61	0.0017	0.0000
62	0.0017	0.0000
63	0.0017	0.0000
64	0.0017	0.0000
65	0.0017	0.0000
66	0.0017	0.0000
67	0.0017	0.0000
68	0.0016	0.0000
69	0.0016	0.0000
70	0.0016	0.0000
71	0.0016	0.0000
72	0.0016	0.0000
73	0.0016	0.0000
74	0.0016	0.0000
75	0.0016	0.0000
76	0.0016	0.0000
77	0.0016	0.0000
78	0.0015	0.0000
79	0.0015	0.0000
80	0.0015	0.0000

81	0.0015	0.0000
82	0.0015	0.0000
83	0.0015	0.0000
84	0.0014	0.0000
85	0.0014	0.0000
86	0.0014	0.0000
87	0.0014	0.0000
88	0.0014	0.0000
89	0.0014	0.0000
90	0.0014	0.0000
91	0.0014	0.0000
92	0.0014	0.0000
93	0.0013	0.0000
94	0.0013	0.0000
95	0.0013	0.0000
96	0.0013	0.0000
97	0.0013	0.0000
98	0.0013	0.0000
99	0.0013	0.0000
100	0.0013	0.0000
101	0.0013	0.0000
102	0.0012	0.0000
103	0.0012	0.0000
104	0.0012	0.0000
105	0.0012	0.0000
106	0.0012	0.0000
107	0.0012	0.0000
108	0.0012	0.0000
109	0.0012	0.0000
110	0.0011	0.0000
111	0.0011	0.0000
112	0.0011	0.0000
113	0.0011	0.0000
114	0.0011	0.0000
115	0.0011	0.0000
116	0.0010	0.0000
117	0.0010	0.0000
118	0.0010	0.0000
119	0.0010	0.0000
120	0.0010	0.0000
121	0.0010	0.0000
122	0.0010	0.0000
123	0.0010	0.0000
124	0.0010	0.0000
125	0.0010	0.0000
126	0.0009	0.0000
127	0.0009	0.0000
128	0.0009	0.0000
129	0.0009	0.0000
130	0.0009	0.0000
131	0.0009	0.0000
132	0.0009	0.0000
133	0.0009	0.0000
134	0.0008	0.0000
135	0.0008	0.0000
136	0.0008	0.0000
137	0.0008	0.0000
138	0.0008	0.0000

139	0.0008	0.0000
140	0.0008	0.0000
141	0.0007	0.0000
142	0.0007	0.0000
143	0.0007	0.0000
144	0.0007	0.0000
145	0.0007	0.0000
146	0.0007	0.0000
147	0.0007	0.0000
148	0.0007	0.0000
149	0.0006	0.0000
150	0.0006	0.0000
151	0.0006	0.0000
152	0.0005	0.0000
153	0.0005	0.0000
154	0.0005	0.0000
155	0.0004	0.0000
156	0.0002	0.0000
157	0.0002	0.0000
158	0.0001	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0008	56896	4	0	Pass
0.0008	52470	4	0	Pass
0.0008	48415	4	0	Pass
0.0009	44658	4	0	Pass
0.0009	41268	4	0	Pass
0.0009	38271	4	0	Pass
0.0010	35506	4	0	Pass
0.0010	32980	4	0	Pass
0.0010	30542	4	0	Pass
0.0010	28448	4	0	Pass
0.0011	26509	4	0	Pass
0.0011	24759	4	0	Pass
0.0011	23141	4	0	Pass
0.0012	21684	4	0	Pass
0.0012	20332	4	0	Pass
0.0012	19074	4	0	Pass
0.0013	17856	4	0	Pass
0.0013	16720	4	0	Pass
0.0013	15612	4	0	Pass
0.0013	14626	4	0	Pass
0.0014	13723	4	0	Pass
0.0014	12881	4	0	Pass
0.0014	12099	4	0	Pass
0.0015	11385	4	0	Pass
0.0015	10654	4	0	Pass
0.0015	9989	4	0	Pass
0.0016	9357	4	0	Pass
0.0016	8753	4	0	Pass
0.0016	8199	4	0	Pass
0.0016	7723	4	0	Pass
0.0017	7241	4	0	Pass
0.0017	6787	4	0	Pass
0.0017	6415	4	0	Pass
0.0018	6111	4	0	Pass
0.0018	5834	4	0	Pass
0.0018	5557	4	0	Pass
0.0019	5276	4	0	Pass
0.0019	5011	4	0	Pass
0.0019	4790	4	0	Pass
0.0019	4536	4	0	Pass
0.0020	4343	4	0	Pass
0.0020	4163	4	0	Pass
0.0020	3942	4	0	Pass
0.0021	3714	4	0	Pass
0.0021	3537	4	0	Pass
0.0021	3367	4	0	Pass
0.0022	3231	4	0	Pass
0.0022	3091	4	0	Pass
0.0022	2967	4	0	Pass
0.0022	2851	4	0	Pass
0.0023	2740	4	0	Pass
0.0023	2605	4	0	Pass
0.0023	2477	4	0	Pass

0.0024	2359	4	0	Pass
0.0024	2267	4	0	Pass
0.0024	2159	4	0	Pass
0.0025	2057	4	0	Pass
0.0025	1949	4	0	Pass
0.0025	1837	4	0	Pass
0.0025	1749	4	0	Pass
0.0026	1659	4	0	Pass
0.0026	1579	4	0	Pass
0.0026	1510	4	0	Pass
0.0027	1445	4	0	Pass
0.0027	1367	4	0	Pass
0.0027	1297	4	0	Pass
0.0028	1241	4	0	Pass
0.0028	1182	4	0	Pass
0.0028	1129	4	0	Pass
0.0028	1080	4	0	Pass
0.0029	1026	4	0	Pass
0.0029	979	4	0	Pass
0.0029	922	4	0	Pass
0.0030	871	4	0	Pass
0.0030	819	4	0	Pass
0.0030	771	4	0	Pass
0.0031	717	4	0	Pass
0.0031	668	4	0	Pass
0.0031	629	4	0	Pass
0.0031	588	4	0	Pass
0.0032	549	4	0	Pass
0.0032	507	4	0	Pass
0.0032	472	4	0	Pass
0.0033	428	4	0	Pass
0.0033	392	4	1	Pass
0.0033	363	4	1	Pass
0.0034	329	4	1	Pass
0.0034	300	4	1	Pass
0.0034	281	4	1	Pass
0.0034	264	4	1	Pass
0.0035	248	4	1	Pass
0.0035	233	4	1	Pass
0.0035	218	4	1	Pass
0.0036	205	4	1	Pass
0.0036	186	4	2	Pass
0.0036	162	4	2	Pass
0.0037	142	4	2	Pass
0.0037	129	4	3	Pass
0.0037	117	4	3	Pass
0.0037	105	4	3	Pass

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Gravel Trench Bed 1 POC	☐	26.68			☐	100.00			
Total Volume Infiltrated		26.68	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

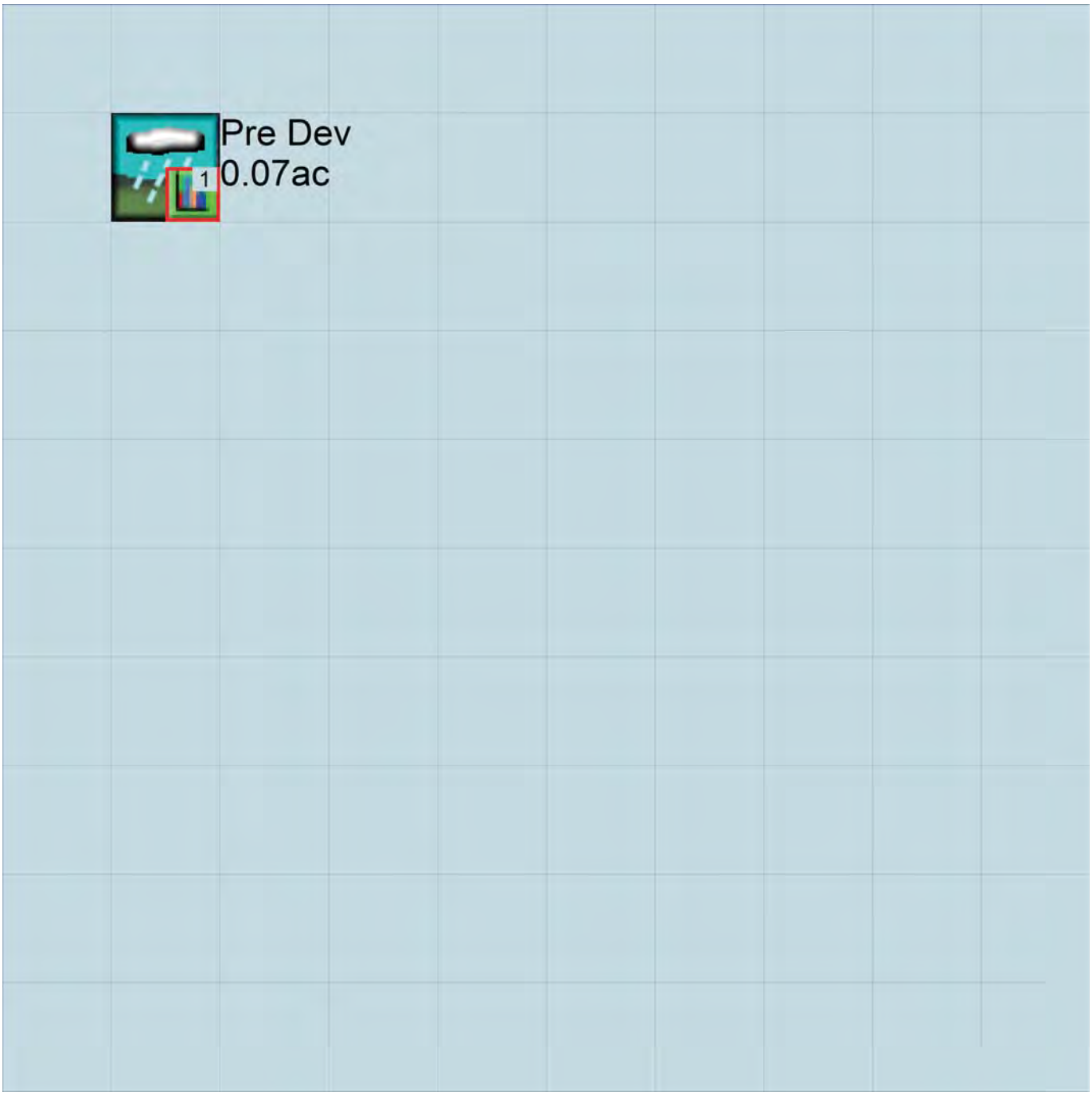
PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   22058.wdm
MESSU       25   Pre22058.MES
            27   Pre22058.L61
            28   Pre22058.L62
            30   POC220581.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      10
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Pre Dev                    MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                       in  out           ***
   10     C, Forest, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   10         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   10             0       4.5      0.08       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   10             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   10           0.2       0.5      0.35         6       0.5       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   10             0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Pre Dev***
PERLND  10                       0.069     COPY   501     12
PERLND  10                       0.069     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                          in  out                            ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *        *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM      1 EVAP     ENGL    1             PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1             IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   22058.wdm
MESSU       25   Mit22058.MES
            27   Mit22058.L61
            28   Mit22058.L62
            30   POC220581.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND       4
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Gravel Trench Bed 1         MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                         User  t-series Engl Metr ***
                                          in  out           ***
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
  END PRINT-INFO

  PWAT-PARM1
```

```
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                            ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS       AGWS      GWVS
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Roof ***
IMPLND   4                       0.069     RCHRES   1      5

******Routing******
IMPLND   4                       0.069     COPY     1     15
RCHRES   1                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                      in  out                               ***
    1     Gravel Trench Be-007    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                   ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1             1      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                      ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
```

FTABLES
FTABLE 1
92 5

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.008264	0.000000	0.000000	0.000000		
0.033333	0.008264	0.000091	0.000000	0.012500		
0.066667	0.008264	0.000182	0.000000	0.012500		
0.100000	0.008264	0.000273	0.000000	0.012500		
0.133333	0.008264	0.000364	0.000000	0.012500		
0.166667	0.008264	0.000455	0.000000	0.012500		
0.200000	0.008264	0.000545	0.000000	0.012500		
0.233333	0.008264	0.000636	0.000000	0.012500		
0.266667	0.008264	0.000727	0.000000	0.012500		
0.300000	0.008264	0.000818	0.000000	0.012500		
0.333333	0.008264	0.000909	0.000000	0.012500		
0.366667	0.008264	0.001000	0.000000	0.012500		
0.400000	0.008264	0.001091	0.000000	0.012500		
0.433333	0.008264	0.001182	0.000000	0.012500		
0.466667	0.008264	0.001273	0.000000	0.012500		
0.500000	0.008264	0.001364	0.000000	0.012500		
0.533333	0.008264	0.001455	0.000000	0.012500		
0.566667	0.008264	0.001545	0.000000	0.012500		
0.600000	0.008264	0.001636	0.000000	0.012500		
0.633333	0.008264	0.001727	0.000000	0.012500		
0.666667	0.008264	0.001818	0.000000	0.012500		
0.700000	0.008264	0.001909	0.000000	0.012500		
0.733333	0.008264	0.002000	0.000000	0.012500		
0.766667	0.008264	0.002091	0.000000	0.012500		
0.800000	0.008264	0.002182	0.000000	0.012500		
0.833333	0.008264	0.002273	0.000000	0.012500		
0.866667	0.008264	0.002364	0.000000	0.012500		
0.900000	0.008264	0.002455	0.000000	0.012500		
0.933333	0.008264	0.002545	0.000000	0.012500		
0.966667	0.008264	0.002636	0.000000	0.012500		
1.000000	0.008264	0.002727	0.000000	0.012500		
1.033333	0.008264	0.002818	0.000000	0.012500		
1.066667	0.008264	0.002909	0.000000	0.012500		
1.100000	0.008264	0.003000	0.000000	0.012500		
1.133333	0.008264	0.003091	0.000000	0.012500		
1.166667	0.008264	0.003182	0.000000	0.012500		
1.200000	0.008264	0.003273	0.000000	0.012500		
1.233333	0.008264	0.003364	0.000000	0.012500		
1.266667	0.008264	0.003455	0.000000	0.012500		
1.300000	0.008264	0.003545	0.000000	0.012500		
1.333333	0.008264	0.003636	0.000000	0.012500		
1.366667	0.008264	0.003727	0.000000	0.012500		
1.400000	0.008264	0.003818	0.000000	0.012500		
1.433333	0.008264	0.003909	0.000000	0.012500		
1.466667	0.008264	0.004000	0.000000	0.012500		
1.500000	0.008264	0.004091	0.000000	0.012500		
1.533333	0.008264	0.004182	0.000000	0.012500		
1.566667	0.008264	0.004273	0.000000	0.012500		
1.600000	0.008264	0.004364	0.000000	0.012500		
1.633333	0.008264	0.004455	0.000000	0.012500		
1.666667	0.008264	0.004545	0.000000	0.012500		
1.700000	0.008264	0.004636	0.000000	0.012500		
1.733333	0.008264	0.004727	0.000000	0.012500		
1.766667	0.008264	0.004818	0.000000	0.012500		
1.800000	0.008264	0.004909	0.000000	0.012500		
1.833333	0.008264	0.005000	0.000000	0.012500		
1.866667	0.008264	0.005091	0.000000	0.012500		
1.900000	0.008264	0.005182	0.000000	0.012500		
1.933333	0.008264	0.005273	0.000000	0.012500		
1.966667	0.008264	0.005364	0.000000	0.012500		
2.000000	0.008264	0.005455	0.000000	0.012500		
2.033333	0.008264	0.005545	0.064540	0.012500		
2.066667	0.008264	0.005636	0.182234	0.012500		
2.100000	0.008264	0.005727	0.333520	0.012500		
2.133333	0.008264	0.005818	0.509662	0.012500		

```
  2.166667  0.008264  0.005909  0.703432  0.012500
  2.200000  0.008264  0.006000  0.907676  0.012500
  2.233333  0.008264  0.006091  1.115035  0.012500
  2.266667  0.008264  0.006182  1.318080  0.012500
  2.300000  0.008264  0.006273  1.509672  0.012500
  2.333333  0.008264  0.006364  1.683468  0.012500
  2.366667  0.008264  0.006455  1.834531  0.012500
  2.400000  0.008264  0.006545  1.960035  0.012500
  2.433333  0.008264  0.006636  2.060036  0.012500
  2.466667  0.008264  0.006727  2.138326  0.012500
  2.500000  0.008264  0.006818  2.227125  0.012500
  2.533333  0.008264  0.006909  2.300165  0.012500
  2.566667  0.008264  0.007000  2.370955  0.012500
  2.600000  0.008264  0.007091  2.439693  0.012500
  2.633333  0.008264  0.007182  2.506546  0.012500
  2.666667  0.008264  0.007273  2.571662  0.012500
  2.700000  0.008264  0.007364  2.635170  0.012500
  2.733333  0.008264  0.007455  2.697182  0.012500
  2.766667  0.008264  0.007545  2.757800  0.012500
  2.800000  0.008264  0.007636  2.817115  0.012500
  2.833333  0.008264  0.007727  2.875206  0.012500
  2.866667  0.008264  0.007818  2.932146  0.012500
  2.900000  0.008264  0.007909  2.988001  0.012500
  2.933333  0.008264  0.008000  3.042832  0.012500
  2.966667  0.008264  0.008091  3.096691  0.012500
  3.000000  0.008264  0.008182  3.149630  0.012500
  3.033333  0.008264  0.008457  3.201694  0.012500
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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APPENDIX D

Operation and Maintenance Manual

ATTACHMENT "A"

OPERATIONS AND MAINTENACE MANUAL FOR DRAINAGE FACILITIES

for

2504 12th Ave. NW SFR
Puyallup, Washington

July, 2022

Prepared for:
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Approved By:
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Project#22058

Section 1 – Project Description

Site Address:	2504 12th Ave NW Puyallup, WA
Developer Address:	3911 9th St SW Puyallup, WA 98373
Tax Parcel Numbers:	6025480320
Ownership/Maintenance:	Homeowner

The 2504 12th Ave NW SFR project consists of a proposed single-family residence on parcel 6025480320 with an area totaling 0.20 acres. The site is accessible from 12th Ave. NW with a new driveway approach. The project proposes 3,026 sq.ft. of roof area and 729 sq.ft. of driveway area and clears 9,620 sq.ft. of the site; therefore, the project must evaluate minimum requirements #1 through #5 in according with Figure I-3.1 of the Manual, see Section 5 of this report for detailed discussion of the minimum requirements. The project mitigates its runoff with a roof downspout infiltration trench (BMP T5.10B) and permeable interlocking concrete pavers (BMP T5.15). The average annual cost for maintenance is approximated to be $500.00.

Section 2 – Maintenance Importance and Intent

"The importance of maintenance for the proper functioning of stormwater control facilities cannot be over-emphasized. A substantial portion of failures (clogging of filters, resuspension of sediments, loss of storage capacity, etc.) are due to inadequate maintenance. Stormwater BMP maintenance is essential to ensure that BMPs function as intended throughout their full life cycle.

The fundamental goals of maintenance activities are to ensure the entire flow regime and treatment train designed for this site continue to fully function. For this site these include:

- Maintain the ability of storm facility to attenuate flows.
- Maintain ability to safely convey design stormwater flows.
- Preserve soil and plant health, as well as stormwater flow contact with plant and soil systems.

- Clearly identify systems so they can be protected
- Keep maintenance costs low
- Prevent large-scale or expensive stormwater system failures
- Prevent water quality violations or damage to downstream properties.

Section 3 – Responsible Parties

Stormwater drainage facilities will be installed, constructed, and maintained with documentation of maintenance by the homeowner. This maintenance plan shall be kept onsite and must be made available for inspection by the City of Puyallup upon request.

Section 4 – Facilities Requiring Maintenance

The following stormwater facilities/Best Management Practices require maintenance:

- Roof Downspout Infiltration Trench
- Permeable Driveway
- Amended Soils

Section 5 – Maintenance Instructions

"The parties responsible for maintenance must review and apply the maintenance requirements contained herein. These maintenance instructions outline conditions for determining if maintenance actions are required, as identified through inspection. However, they are not intended to be measures of the facility's required condition at all times between inspections. Exceedance of these conditions at any time between inspections or maintenance activity does not automatically constitute a violation of these standards. However, based upon inspection

observations, the inspection and maintenance presented in these checklists shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance action. For facilities not owned and maintained by the City, a log of maintenance activity that indicates what actions were taken must be kept on site and be available for inspection by the City."

The following pages contain maintenance needs for most of the components that are part of your drainage system, as well as for some components that you may not have. Let the City know if there are any components that are missing from these pages. Ignore the requirements that do not apply to your system. You should plan to complete a checklist for all system components on the following schedule:

1. Monthly from November through April.
2. Once in late summer (preferably in September).
3. After any major storm (use 1-inch in 24-hours as a guideline).

Using photocopies of the checklist pages check off the problems that you looked for each time you did an inspection. Add comments on problems found and actions taken. Keep these "checked" sheets in your files, as they will be used to write your annual report. Some items do not need to be looked at every time an inspection is done. Use the suggested frequency at the left of each item as a guideline for your inspection.

Section 6 – Vegetation Maintenance

Plant material affecting the storm water system consists of grass, leaves, and yard debris. Maintenance checklists on the following pages and instructions listed above address appropriate maintenance requirements.

REQUIRED ACTIONS: The following actions shall be taken to ensure that pollution generated on site shall be minimized:

1. Warning signs (e.g., "Dump No Waste-Drains to Stream") shall be painted or embossed on or adjacent to all storm drain inlets. They shall be repainted as needed.

2. Sediment removed from the catch basins and storm system shall be disposed of in a proper manner. Contact the City of Puyallup for instruction prior to completing this task.

ATTACHMENT "A"

MAINTAINANCE PROGRAM
COVER SHEET

Inspection Period: _____

Number of Sheets Attached: _____

Date Inspected: _____

Name of Inspector: _____

Inspector's Signature: _____

#2 – Maintenance Checklist for Infiltration Basins and Trenches:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than one-half full.	Filter bag less than one-half 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.	Water flows through filter. Replace gravel in rock filter if needed.
Trenches	Observation Well (Use Surface of Trench if Well is Not Present)	Water ponds at surface during storm events. Less than 90 percent of design infiltration rate.	Remove and replace/clean rock and geomembrane.
Ponds	Vegetation	Exceeds 18 inches.	Grass or groundcover mowed to a height no greater than 6 inches.
Ponds	Vegetation	Bare spots.	No bare spots. Revegetate and stabilize immediately.
Side Slopes of Pond	Erosion	Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.	Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. *If erosion is occurring on compacted slope, a professional engineer should be consulted to resolve source of erosion.*
Pond Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works.	Dike is built back to the design elevation. *If settlement is significant, a professional engineer should be consulted to determine the cause of the settlement.*
Pond Berms (Dikes)	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.	No water flow through pond berm. Piping eliminated. Erosion potential eliminated. *Recommend a geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.*
General	Hazard Trees	If dead, diseased, or dying trees are identified.	Hazard trees removed. (*Use a certified Arborist to determine health of tree or removal requirements).*
General	Tree Growth and Dense Vegetation	Tree growth and dense vegetation which impedes inspection, maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements).	Trees and vegetation do not hinder inspection or maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood).

No. 5 – 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%.	No Trash or debris located immediately in front of catch basin or on grate opening.
		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.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	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).	Top slab is free of holes and cracks.
		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	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.	Basin replaced or repaired to design standards.
		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.	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.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.

No. 5 – Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	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 and meets design standards.

BMP T5.13: Post-Construction Soil Quality and Depth

Purpose and Definition

Naturally occurring (undisturbed) soil and vegetation provide important stormwater functions including: water infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition. These functions are largely lost when development strips away native soil and vegetation and replaces it with minimal topsoil and sod. Not only are these important stormwater functions lost, but such landscapes themselves become pollution generating pervious surfaces due to increased use of pesticides, fertilizers and other landscaping and household/industrial chemicals, the concentration of pet wastes, and pollutants that accompany roadside litter.

Establishing soil quality and depth regains greater stormwater functions in the post development landscape, provides increased treatment of pollutants and sediments that result from development and habitation, and minimizes the need for some landscaping chemicals, thus reducing pollution through prevention.

Applications and Limitations

Establishing a minimum soil quality and depth is not the same as preservation of naturally occurring soil and vegetation. However, establishing a minimum soil quality and depth will provide improved on-site management of stormwater flow and water quality.

Soil organic matter can be attained through numerous materials such as compost, composted woody material, biosolids, and forest product residuals. It is important that the materials used to meet the soil quality and depth BMP be appropriate and beneficial to the plant cover to be established. Likewise, it is important that imported topsoils improve soil conditions and do not have an excessive percent of clay fines.

This BMP can be considered infeasible on till soil slopes greater than 33 percent.

Design Guidelines

- Soil retention. Retain, in an undisturbed state, the duff layer and native topsoil to the maximum extent practicable. In any areas requiring grading remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas, to be reapplied to other portions of the site where feasible.
- Soil quality. All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structural fill or slope shall, at project completion, demonstrate the following:
    1. A topsoil layer with a minimum organic matter content of 10% dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the undisturbed soil. The topsoil layer shall have a minimum depth of

eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.

2. Mulch planting beds with 2 inches of organic material
3. Use compost and other materials that meet these organic content requirements:

    a. The organic content for "pre-approved" amendment rates can be met only using compost meeting the compost specification for Bioretention (BMP T7.30), with the exception that the compost may have up to 35% biosolids or manure.

    The compost must also have an organic matter content of 40% to 65%, and a carbon to nitrogen ratio below 25:1.

    The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region.

    b. Calculated amendment rates may be met through use of composted material meeting (a.) above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and not exceeding the contaminant limits identified in Table 220-B, Testing Parameters, in WAC 173-350-220.

The resulting soil should be conducive to the type of vegetation to be established.

- Implementation Options: The soil quality design guidelines listed above can be met by using one of the methods listed below:

    1. Leave undisturbed native vegetation and soil, and protect from compaction during construction.
    2. Amend existing site topsoil or subsoil either at default "pre-approved" rates, or at custom calculated rates based on tests of the soil and amendment.
    3. Stockpile existing topsoil during grading, and replace it prior to planting. Stockpiled topsoil must also be amended if needed to meet the organic matter or depth requirements, either at a default "pre-approved" rate or at a custom calculated rate.
    4. Import topsoil mix of sufficient organic content and depth to meet the requirements.

    More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

Planning/Permitting/Inspection/Verification Guidelines & Procedures	• Local governments are encouraged to adopt guidelines and procedures similar to those recommended in *Guidelines and Resources For Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington*. This document is available at: http://www.soilsforsalmon.org/pdf/Soil_BMP_Manual.pdf
Maintenance	• Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion. • Plant vegetation and mulch the amended soil area after installation. • Leave plant debris or its equivalent on the soil surface to replenish organic matter. • Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.
Runoff Model Representation	Areas meeting the design guidelines may be entered into approved runoff models as "Pasture" rather than "Lawn." Flow reduction credits can be taken in runoff modeling when BMP T5.13 is used as part of a dispersion design under the conditions described in: BMP T5.10B Downspout Dispersion BMP T5.11 Concentrated Flow Dispersion BMP T5.12 Sheet Flow Dispersion BMP T5.18 Reverse Slope Sidewalks BMP T5.30 Full Dispersion (for public road projects)

ATTACHMENT "B"

POLLUTION SOURCE CONTROL MANUAL FOR SINGLE-FAMILY RESIDENCES

For

2504 12th Ave. NW SFR
Puyallup, Washington

July, 2022

Prepared for:
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(253) 848-4278

Project#22058

Pollution Source Control Program for Single-Family Residences

The actions we take each day in and around our homes have a profound effect on stormwater quality in this region. Small amounts of pollution from many different sources can significantly affect our waterways. Yard maintenance, waste storage, car washing and maintenance, and pool cleaning are some of the activities that can adversely impact water quality. The best management practices (BMPs) discussed in this section are practical ways to keep stormwater from becoming polluted in the first place. It is recommended that all residences in the City of Puyallup use these BMPs. **Please note that some of these procedures are required by various state, federal, or county laws, and are noted as required BMPs.**

1.0 Automobile Washing

Most residents wash their vehicles in the driveway or on the street. Wash waters typically flow to a storm drain or ditch, which discharges stormwater directly to the nearest stream, lake or to the Puget Sound. Soaps and detergents, even the biodegradable ones, can have immediate and long-term effects on plants and animals living in water bodies. The pollutants washed off vehicles also contain a variety of pollutants that can harm fish and wildlife.

<u>Suggested BMPs</u>

- Wash your vehicle directly over your lawn or make sure the wash water drains to a vegetated area. This allows the water and soap to soak into the ground instead of running off into a local waterbody.
- Ideally, no soaps or detergents should be used, but if you do use one, select one without phosphates.
- Sweep driveways and street gutters **before** washing vehicle to clean up dirt, leaves, trash and other materials that may flow to the storm drain along with your wash water. This helps reduce storm drain maintenance costs as well as protect water quality.

- Commercial products are available that allow you to clean a vehicle without water. These were developed for areas where water is scarce, so a water saving benefit is realized as well as reduced pollution.

- Use a nozzle on your hose to save water.

- Do not wash your vehicle if rain is expected.

- Consider not washing your vehicle at home. Take it to a commercial car wash that has a recycle system and discharges wastewater to the sanitary sewer for treatment.

1.1 Automobile Maintenance

Many of us are "weekend mechanics." We enjoy the cost savings of changing our own oil and antifreeze, topping off the battery with water, and generally making our car performs its best. There is much potential for stormwater pollution associated with these activities; however, the following BMPs will help you minimize pollution while servicing your car.

Suggested BMPs

- Recycle all oils, antifreeze, solvents and batteries. Many local car parts dealers and gas stations accept used oil. The Household Hazardous Waste facility at the Tacoma Landfill accepts oil, oil filters, antifreeze and solvents from both City of Tacoma and non-city residents. Pierce County and Tacoma also hold Household Hazardous Waste Turn-In days, which will accept car wastes including old batteries. Old batteries can actually be worth money. Call shops listed under Batteries in the Yellow Pages of the phone book to find out if they are paying for used batteries.

- **Never** dump new or used automotive fluids or solvents on the ground, in a storm drain or street gutter, or in a waterbody. Eventually, it will make its way to local surface waters or groundwater, including the water we drink.

- Do not mix wastes. The chlorinated solvents in some carburetor cleaners can contaminate a huge tank of used oil, rendering it unsuitable for recycling. Always keep your wastes in separate containers that are properly labeled and store them out of the weather.

Suggested BMPs

- To dispose of oil filters, punch a hole in the top and let drain for 24 hours. This is where a large funnel in the top of your oil storage container will come in handy. After draining, wrap in 2 layers of plastic and dispose of in your regular garbage or recycle by taking it to the Tacoma Landfill Household Hazardous Waste facility even for non-city residences. Pending State law may make disposal in your home garbage illegal, so please call the Hazardous Waste line at 1-800-287-6429 for up-to-date information.

- Use care in draining and collecting antifreeze to prevent accidental spills. Spilled antifreeze can be deadly to cats and dogs that ingest it.

- Perform your service activities on concrete or asphalt or over a plastic tarp to make spill clean up easier. Keep a bag of kitty litter on hand to absorb spills. Sprinkle a good layer on the spill, let it absorb for a little while and then sweep it up. Place the contaminated litter in a plastic bag, tie it up and dispose of it in your regular garbage. Take care not to leave kitty litter out in the rain; it will form sticky goo that is hard to clean up.

- If you are doing bodywork outside, be sure to use a tarp to catch material resulting from grinding, sanding and painting. Dispose of this waste by double bagging in plastic and placing in your garbage.

1.2 Storage of Solid Wastes and Food Wastes

Improper storage of food and solid waste at residences can lead not only to water pollution problems, but problems with neighborhood pets and vermin as well. Following the BMPs listed below can help keep your property a clean and healthy place to live.

Suggested BMPs

- All waste containers kept outside should have lids.

- Leaking waste containers should be replaced.

- Store waste containers under cover if possible, or on grassy areas.

- Inspect the storage area regularly to pick up loose scraps of material and dispose of them properly.

- Recycle as much as you can. The City of Puyallup offers curbside recycling, through LeMay Inc., to a majority of residents. Also, look under "Recycling" in the phone book for firms that take other recyclable materials.

- Purchase products that have the least amount of packaging materials.

- Compost biodegradable materials such as grass clippings and vegetable scraps instead of throwing them away. Your flowerbeds will love the finished compost, and we will not fill our landfills so quickly. Call LeMay Inc. at (253) 875-5053 for more information on composting.

- A fun alternative to traditional composting is worm composting. You can let worms do all the work for you by keeping a small vermiculture box just outside your kitchen. For more information on getting started with worms, call the numbers listed above.

1.3 Composting

Composting is an earth-friendly activity as long as some common sense rules outlined below are followed. If you choose to compost, the following BMPs should be utilized.

Suggested BMPs

- Compost piles must be located on an unpaved area where runoff can soak into the ground or be filtered by grass and other vegetation. Compost piles should be located in an area of your yard not prone to water ponding during storms, and should be kept well away from wetlands, streams, lakes and other drainage paths.

- Avoid putting hazardous or non-decomposable waste in the pile.

- Cover the compost pile for two reasons:

- To keep stormwater from washing nutrients into waterways.

- To keep excess water from cooling down the pile, which will slow down the rate of decomposition.

- Build bins of wood, chicken wire or fencing material to contain compost so it cannot be washed away. Call LeMay Inc. at (253) 875-5053to get free composter designs and materials lists.

- Building a small earthen dike around your compost pile is an effective means of preventing nutrient-rich compost drainage from reaching stormwater paths.

1.4 Yard Maintenance and Gardening

This section deals with the normal yard maintenance activities we all perform at our homes. Overwatering, overfertilizing, improper herbicide application and improper disposal of trimmings and clippings can all contribute to serious water pollution problems. Following the BMPs listed below will help alleviate pollutant runoff.

Required BMPs

- Follow the manufacturer's directions exactly for mixing and applying herbicides, fungicides and insecticides, and use them sparingly. Never apply when it is windy or when rain is expected. Never apply over water, within 100 feet of a wellhead, or adjacent to streams or other waterbodies. Triple-rinse empty containers, using the rinsate for mixing your next batch of spray, and then double-bag and dispose of the empty container in your regular garbage.

- **Never** dispose of grass clippings or other vegetation in or near storm drains, streams, lakes or Puget Sound.

- Follow manufacturer's directions when applying fertilizers. More is not better, either for your lawn or for local waterbodies. Never apply fertilizers over water or adjacent to ditches, streams or other water bodies. Remember that organic fertilizers have a slow release of nitrogen, and less potential to pollute than synthetic fertilizers.

- Save water and prevent pollution problems by watering your lawn sensibly. Lawns and gardens typically need the equivalent of 1" of rainfall per week. You can check on how you are doing by putting a wide mouth jar out where you are sprinkling, and measure the water with a small plastic ruler. Overwatering to the point of runoff can carry polluting nutrients to the nearest waterbody.

- Consider planting a vegetated buffer zone adjacent to streams or other water bodies on your property. Call the Pierce County Conservation District for advice and assistance in developing a planting plan. The Stream Team at the Conservation District may even be able to help you plant it!

- Make sure all fertilizers and pesticides are stored in a covered location. Rain can wash the labels off bottles and convert 50 lbs. of fertilizer into either a solid lump or a river of nutrients.

- Compost all yard clippings, or use them as mulch to save water and keep down weeds in your garden.

- Practice organic gardening and virtually eliminate the need to use pesticides and fertilizers. Contact Pierce County Cooperative Extension at 798-7180 or the Ask-A-Master Gardener program at 798-7170 for information and classes on earth friendly gardening.

- Pull weeds instead of spraying and get some healthy exercise, too. If you must spray, use the least toxic formulations that will get the job done. The Master Gardener program listed above can help advise you on which spray to use.

- Work fertilizers into the soil instead of letting them lie on the ground surface exposed to the next rainstorm.

- Contact your local garbage hauler for curbside pickup and recycling of yard waste.

1.5 Swimming Pool and Spa Cleaning and Maintenance

Despite the fact that we immerse ourselves in it, the water from pools and spas is far from chemically clean. Nutrients, pH and chlorine can adversely affect fish and wildlife in

waterbodies. Following these BMPs will ensure the cleanliness of your pool and the environment.

Required BMPs

- Pool and spa water must be dechlorinated if it is to be emptied into a ditch, on the ground, or a lawn or to the storm drainage system. Contact your pool chemical supplier to obtain the neutralizing chemicals you will need. The rate of flow into the ditch or drainage system must be regulated so that it does not cause problems such as erosion, surcharging or flooding. Water discharged to the ground or a lawn must not cross property lines and must not produce runoff. If you live in a sewered area, you must discharge pool water to the sanitary sewer. Contact the pre-treatment unit at 798-3013 for permission prior to discharge.

- If pool and spa water cannot be dechlorinated, it must be discharged to the sanitary sewer. Prior to draining, your local wastewater treatment plant must be notified to ensure they are aware of the volume of discharge and the potential effects of chlorine levels. A pool service company can help you determine the frequency of cleaning and backwash of filters.

- Diatomaceous earth used in pool filters cannot be disposed of in surface waters, on the ground, into storm drainage systems or septic systems. Dry it out as much as possible; bag it in plastic, and dispose of at the landfill.

Suggested BMPs

- Hire a professional pool service company to collect all pool water for proper disposal. Make sure to ask them where they will dispose of it and the kind of permits they hold to do so.

1.6 Household Hazardous Material Use, Storage, and Disposal

Once we really start looking around our houses, the amount of hazardous materials we have on site is a real revelation. Oil-based paints and stains, paint thinner, gasoline, charcoal starter fluid, cleaners, waxes, pesticides, fingernail polish remover, and wood preservatives are just a few that most of us have around the house.

When products such as these are dumped on the ground or in a storm drain, they can be washed directly to receiving waters where they can harm fish and wildlife. They can also infiltrate into the ground and contaminate drinking water supplies. The same problem can occur if they are disposed of with your regular garbage; the containers can leak at the landfill and contaminate groundwater. The same type of contamination can occur if hazardous products are poured down a sink or toilet into a septic system. Do not pour them down the drain if you are on municipal sewers, either. Many compounds will "pass through" the wastewater treatment plant without treatment and contaminate receiving waters, or they can harm the biological process used at the treatment plant, reducing overall treatment efficiency.

With such a diversity of hazardous products present in all homes in City of Puyallup, a large potential for serious environmental harm exists if improper methods of storage, usage and disposal are employed. Using the following, BMPs will help keep these materials out of our soils, sediments and waters.

Required BMPs

- Dispose of hazardous materials and their containers properly. Never dump products labeled as *poisonous, corrosive, caustic, flammable, inflammable, volatile, explosive danger, warning, caution or dangerous* outdoors, in a storm drain, or into sinks, toilets or drains. Call LeMay Inc. at (253) 875-5053 or the Hazardous Waste Line at 1-800- 287-6429 for information on disposal methods, collection events, and alternative products. Household hazardous wastes from City of Tacoma residents and non- residents are accepted at the Tacoma Landfill.

Suggested BMPs

- Check containers containing hazardous materials frequently for signs of leakage. If a container is rusty and has the potential of leaking soon, place it in a secondary container before the leak occurs and prevent a clean-up problem.

- Store hazardous materials containers under cover and off the ground. Keep them out of the weather to avoid rusting, freezing, cracking, labels being washed off, etc.

- Hazardous materials should be stored out of the reach of children. Never transfer to or store these materials in food or beverage containers that could be misinterpreted by a child as something to eat or drink.

- Keep appropriate spill cleanup materials on hand. Kitty litter is good for many oil-based spills.

- Ground cloths and drip pans must be used under any work outdoors that involves hazardous materials such as oil-based paints, stains, rust removers, masonry cleaners and others bearing label warnings as outlined above.

- Latex paints are not a hazardous waste, but are not accepted in liquid form at the landfill. To dispose, leave uncovered in a protected place until dry, then place in the garbage. If you wish to dry waste paint quickly, just pour kitty litter in the can to absorb the paint. Once paint is dry, leave the lid off when you place it in the garbage so your garbage collector can see that it is no longer liquid.

- Use less toxic products whenever possible. The Hazardous Waste Line at 1-800-287-6429 and the Washington Toxics Coalition at (206) 632-1545 have information detailing alternatives to toxic products.

- If an activity involving the use of a hazardous material can be moved indoors out of the weather, then do so. Make sure you can provide proper ventilation, however.

- Follow manufacturers' directions in the use of all materials. Over-application of yard chemicals, for instance, can result in the washing of these compounds into receiving waterbodies. Never apply pesticides when rain is expected.

- When hazardous materials are in use, place the container inside a tub or bucket to minimize spills.