CIVIL ENGINEERING ◊ SURVEYING ◊ LAND PLANNING
Phone: (253) 857-5454 ~ Fax: (253) 509-0044 ~ Email: info@contourpllc.com
Mailing Address: PO Box 949, Gig Harbor, WA 98335
Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

STORMWATER SITE PLAN

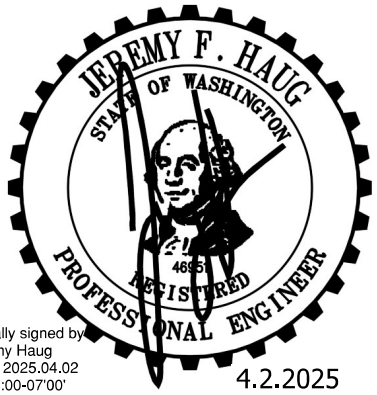
FOR

BRADBURY PLACE TOWNHOMES

CITY OF PUYALLUP, WASHINGTON

APRIL 2025

Prepared For:
Bradbury Place LLC
7809 Pacific Ave
Tacoma, WA 98408
(253) 318-5711



Digitally signed by Jeremy Haug
Date: 2025.04.02 13:37:00-07'00'

4.2.2025

Prepared By:
Rex Henretta, E.I.T., Design Engineer

Approved By:
Jeremy Haug, P.E., Project Engineer

Project # 20-223

*I hereby state that this Stormwater Site Plan for **Bradbury Place Apartments** has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that City of Puyallup does not and will not assume liability for the sufficiency, suitability or performance of drainage facilities prepared by Contour Engineering LLC. This analysis is based on data and records either supplied to, or obtained by, Contour Engineering, LLC. 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

1.0 PROJECT OVERVIEW

A construction stormwater general permit will be required as this project disturbs more than an acre of land. [Storm Report, pg. 3]

Purpose and Scope

This Stormwater Site Plan accompanies the on-site storm drainage plans for the proposed construction of 42 multi-family residences. See Appendix A for a Vicinity Map.

The *2019 Stormwater Management Manual for Western Washington* and the requirements of the City of Puyallup will establish the methodology and design criteria used for this project.

Project Description

The site consists of two parcels to be combined into one parcel totaling 2.65 acres, which will consist of 42 multi-family residences. On-site impervious surface area will be infiltrated through the use of an infiltration pond. Access will be provided by extending the existing right-of-way (ROW) of 5th Street SE to the end of the property line. Utilities including sewer, water, storm, and dry utilities will be extended along the proposed aisles. Sewer will service all proposed buildings and extend down 5th Street SE and connect to the existing sewer system located in 27th Ave SE. Additionally, the proposed sewer improvements will require to remove existing sewer pipe located in 27th Ave SE and be replaced. Water will service all buildings on the site and connect to the existing water line located in 5th Street SE. Storm will collect and convey stormwater throughout the site and be routed to a StreamFilter catch basin with BayFilter cartridges for treatment, then discharge to the proposed infiltration pond.

Parcel #: 0419036002
0419036003
Address: 2525 5th Street SE, Puyallup, WA 98374
Owner: Bradbury Place LLC

2.0 EXISTING CONDITIONS

Topography, Ground Cover, and Native Soils

The project site has moderate slopes from the southeast to northwest portions of the site. The site is forested with overgrown grass and bushes, additionally the site is undeveloped with no existing buildings or structures.

The USDA Natural Resource Conservation Service (NRCS) Web Soil Survey maps the project site and surrounding area as being underlain with Everett very gravelly sandy loam. (13B). A geotechnical assessment was prepared for this project by Georesorces dated May 24, 2019, followed by a Groundwater Monitoring addendum on August 18, 2022 and a Mounding Analysis addendum on February 9, 2023 and can be found in Appendix C. Per the geotechnical report, the existing soils are suitable for infiltration. Based on tests and analysis, an infiltration rate of 6.6 inches per hour is recommended by the Geotechnical Engineer for designing infiltration facilities in the upper gravelly soils. Below is the test pit information, conducted by Georesorces, of the area where the proposed infiltration pond is located.

Test Pit #1:

0′ – 0.3′	-> Topsoil
0.3′ – 2.0′	->Reddish brown sandy SILT with gravel (loose, moist)
2.0′ – 3.5′	-> Reddish brown poorly graded GRAVEL with sand and silt
3.5′ – 5.0′	-> Grey silty SAND with gravel and cobbles (very dense, moist)
5.0′+	-> Glacial till Layer

Predeveloped Areas

Onsite:

Pervious area:	115,560 SF	(2.82 AC)
Impervious area:	315 SF	(0.01 AC)

Adjacent Land Uses

North:	Office Building – Commercial Use
South:	Existing Single-Family Residence – Zoned Single-Family Dwelling
East:	Office Building – Commercial Use
West:	5th Street SE ROW

Drainage Patterns

Drainage from the site currently follows the site topography from southeast to northwest. Approximately 7,300 SF of offsite inflow enters the site from the north property. Due to the infiltration rates for the site (measured between 7 and 27 inches per hour) we can assume that any stormwater that enters the site will be infiltrated. Any stormwater that does leave the site will follow the natural topography to the ROW

of 5th Street SE and enter a private stormwater system. For further discussion of the drainage patterns of the site see Section 3.0.

Critical and Sensitive Areas

There are no known critical or sensitive areas, or associated buffers, on or adjacent to the site, per Pierce County GIS.

Other Existing Site Information

There are no known underground tanks or septic systems on or adjacent to the site.

3.0 OFFSITE ANALYSIS

Qualitative Analysis

The project site has moderate slopes from the southeast to northwest portions of the site.

There were no problems observed on the site. This includes no potential constrictions or capacity deficiencies in the drainage system, no existing or potential flooding problems and no existing or potential overtopping, scouring, bank sloughing or sedimentation. The area is relatively flat therefore there is no known risk of upland erosion impact or landslide hazards. There was no known destruction of aquatic habitat on or downstream of the existing site.

There are no known streams in the immediate vicinity of the site, the closest body of water is Bradley Lake that is over a quarter mile to the south. 5th Street SE is half developed and the proposed improvements will dedicate 30' to the ROW to build out the other half of the street. This proposed street will capture any runoff leaving the project site. Based on the design infiltration rate (between 7 and 27 in/hr) all stormwater on site will be infiltrated, any stormwater overflow leaving the site will enter the ROW of 5th Street SE and enter a downstream private stormwater system. Stormwater is ultimately infiltrated into the natural soils onsite. See Appendix A – General Exhibits for Basin Map and Downstream Flow Maps.

There are no known existing or predicted problems with the drainage system from the project site.

Quantitative Analysis

This project proposes 82,885 square feet of new or replaced impervious surfaces.

All runoff from the roofs will be collected and conveyed to the infiltration pond. Roof drains have been sized according to each roof system the drain is servicing. All

stormwater will be contained onsite from roof drains, therefore no further analysis is required. See Exhibit #6 – Roof Drain Analysis for roof area details.

To service the site a grade break was inserted that splits some of the stormwater flows from onsite to offsite. All onsite flows shall be contained onsite and infiltrated into the natural soils. Offsite flows that are produced will flow to the flow line of 5th street SE and enter a Contech Steel catch basin for treatment. Once the stormwater is treated the stormwater will enter an infiltration trench that will infiltrate the stormwater into the natural soils. As the infiltration trench was sized to infiltrate 100% of the stormwater runoff for Basin #3 (see Appendix B for basin maps), no further analysis is required. Overflow, if any, will be conveyed to the downstream private storm system west of 5th St SE. See Appendix D for WWHM calculation and Appendix E for Design calculations.

4.0 HYDROLOGIC & HYDRAULIC ANALYSIS

Developed Areas

<u>Onsite:</u>		
Pervious area:	45,611 SF	1.05 AC
Impervious area:		
Roof Area:	26,553 SF	0.61 AC
PGHS Area:	36,498 SF	0.77 AC
Pond Area:	2,898 SF	0.07 AC
<u>Offsite:</u>		
Pervious Area:	1,418 SF	0.03 AC
Impervious Area:	9,419 SF	0.21 AC
Replaced PGHS (Grind & Overlay):	7,517 SF	0.17 AC

Pre-Developed Site Hydrology

The total existing basin area contributing to the site is 2.80 acres. All the existing basin is covered with trees and overgrown shrubs and grass. Pre-Developed flows have been calculated using WWHM, this analysis report can be referenced in Appendix D of this report. The soil type is part of hydraulic soils group A per the georeport in Appendix E.

Drainage from the site currently follows the site topography flowing from southeast to the northwest corner of the site. The northwest corner is where stormwater exits the site, as it is the lowest elevation. It then enters the ROW of 5th Street SE and flows to a catch basin located in the ROW where it is routed to a private downstream stormwater system. Any flows that do not exit the site will be naturally infiltrated as the infiltration rate is 6.6 in/hr.

Developed Site Hydrology

The developed site will match the existing site hydrology by infiltrating all stormwater runoff and runon on-site through the use of an infiltration pond.

The proposed site developments consist of developing 42 multifamily units accessed by three proposed aisles. The lot will be graded such that all stormwater drains to the proposed private aisles to the maximum extent feasible. These aisles will be graded to a stormwater filter catch basin that will treat stormwater prior to it being discharged to the proposed infiltration pond. The offsite inflow to the north and east of the property will be captured by yard drains and conveyed directly to the infiltration pond.

Onsite stormwater that cannot be conveyed to the infiltration pond due to grading restrictions will enter an infiltration trench located at the west end of the property along 5th St SE and from there be conveyed to the storm main system on 5th St SE. The pond has been sized to be able to receive all onsite runoff, including the area between the ROW and grade break that will be routed to the infiltration trench.

Developed flows have been calculated using WWHM, this analysis report can be referenced in Appendix D of this report.

The onsite soils will be maintained as hydraulic soils group A as discussed in the Georeport found in Appendix E.

Performance Goals and Standards

See Appendix A for applicable threshold flowcharts.

As per the flow charts mentioned above, the site will be required to adhere to Minimum Requirements #1-9.

Basin-specific requirements include compliance with Minimum Requirement #5 Onsite Stormwater Management, Minimum Requirement #6, Water Quality, and Minimum Requirement #7 Flow Control with Standard Requirement.

On site Stormwater Management

Per Project threshold flowcharts this project requires compliance with Minimum Requirements #1-#9; therefore, onsite stormwater management BMPs from List #2 per Volume 1, §3.4.5 apply for all surfaces within each type of surface in List #2; or demonstrate compliance with the LID Performance Standard per Volume 1, §3.4.5. This project will comply with the LID Performance Standard.

Per the SWMM: Using an Ecology approved continuous simulation model (assuming a 15-minute timestep) for design, stormwater discharges shall match developed discharge durations to predeveloped discharge durations for the range of predeveloped discharge

rates from 8% of the 2-year return period flowrate to 50% of the 2-year return period flowrate. Projects required to comply with Minimum Requirement #7 must match developed discharge durations to predeveloped discharge durations for the range of predeveloped discharge rates from 8% of the 2-year return period flowrate up to the full 50-year return period flowrate.

Since all stormwater will be infiltrated onsite, this project meets the LID Performance standard. See WWHM calculations in Appendix D for more information.

BMP T.513 Post Construction Soil Quality and Depth will be utilized for all lawn and landscaping surfaces.

Flow Control

The site has been graded such that there is a grade break approximately 60' from the center of 5th Street SE. At this grade break is where the portion of the site splits flows from onsite and offsite. Below the first paragraph will describe how Flow Control is met for all onsite flows and the second paragraph will be for all offsite flows.

Onsite:
Since the total new and/or replaced impervious surface areas is greater than 10,000 square feet, Flow Control is required. The project will infiltrate 100% of the generated runoff through the implementation of an infiltration pond, meeting the requirements of Flow Control. WWHM was used to ensure that the proposed pond can infiltrate 100% of the onsite stormwater, including the portion that will be routed to the offsite infiltration trench. Since 100% of the stormwater is infiltrated, flow control requirements are achieved. See Appendix D for WWHM calculations and report.

Offsite:
Since the total new and/or replaced impervious surface areas is greater than 10,000 square feet, Flow Control is required. The project will infiltrate 100% of the generated runoff through the implementation of an infiltration trench, meeting the requirements of Flow control. WWHM was used to ensure that the proposed infiltration trench could infiltrate 100% of the stormwater. A bypass pipe will connect to an existing storm catch basin within 5th St SE in the event of overflow. Since the infiltration trench infiltrated 100% of the stormwater, Flow Control is achieved.

Due to both systems passing with 100% infiltration, Flow Control is achieved.

Water Quality

Since this project will add more than 5,000 square feet of pollution-generating hard surface (PGHS), water quality treatment is required. The proposed improvements include extending the existing road of 5th Street SE by dedicating 30' to the ROW. Three aisles will be extended off 5th street that will provide access to all the proposed buildings.

The site has been graded such that all onsite flows from driveways, roads, sidewalks, and lawn areas flow into one of two proposed water quality treatment devices. Within the site there is a grade break in which a portion of the site flows offsite to 5th Street SE. Below will be two separate paragraphs describing each case for the onsite and offsite basins.

Onsite:
Water quality will be achieved by having all onsite stormwater, except for roof stormwater, flow to an ADS 2-cartridge StreamFilter catchbasin. The manhole has been placed is such that all driveway, sidewalk, lawn, and road stormwater will flow to it for treatment. While onsite Basin #2 stormwater will flow to the offsite infiltration trench, it is included in the WWHM calculations for the onsite StormFilter manhole. See Appendix A for Basin map areas. Below is a description of each basin.

Basin #1 & Basin #2

Pervious Area:	0.42 AC
Impervious Area:	0.84 AC
100-year Flow Rate:	0.75 CFS
Offline Flow Rate:	0.074 CFS (33.2 GPM)
ADS capacity:	0.10 CFS (45 GPM)

Offsite:
The offsite basin will flow to the proposed ADS StreamFilter 1-cartridge catch basin within the ROW of 5th Street SE and route the stormwater to an infiltration trench. This trench will also receive and treat flows from onsite Basin #2 and has been sized accordingly and placed under the north driveway entrance. See Appendix D for the calculations on the sizing of the infiltration trench and sizing of the Catch basin. See Appendix A for Basin Map areas.

Basin #3 & Basin #2

Pervious Area:	0.20 AC
Impervious Area:	0.28 AC
100-year Flow Rate:	0.25 CFS
Offline Flow Rate:	0.0247 CFS (11.09 GPM)
Streamfilter Capacity:	0.05 CFS (22.5 GPM)

Conveyance Capacity

The stormwater infrastructure within Aisles A and B were analyzed for the collection and conveyance of runoff from the road, sidewalks, driveways, and landscaped areas onsite. Roof runoff is proposed to be routed separately and directly discharged into the infiltration pond. The stormwater mains consist of 8-inch and 12-inch pipes using either PVC SDR 35 (Manning Coefficient n=0.010) or Ductile Iron (DI) pipes (n=0.012).

The onsite basin was analyzed through the SBUH method to determine demand for the most constrained pipe. The most constrained pipe is identified as the 179 linear-foot, 8-inch DI pipe sloped at 1 percent in Aisle A which discharges into SDMH#25 at the east invert elevation. The results of these calculations are summarized below:

Onsite basin: 1.05 acres pervious (all landscaped areas)
0.91 acres impervious (all onsite non-roof hard surfaces)
1.10 cfs (peak runoff for 100-year storm)
1.31 cfs (capacity of 8-inch DI pipe at 1% slope)

As capacity exceeds demand, the proposed stormwater system is considered to have sufficient conveyance capacity. Please note that the pipe capacity is compared against all onsite pervious areas and non-roof impervious areas. The actual areas tributary to this pipe are likely to be much less than those shown above.

The roof drain system was sized using StormShed and FlowMaster. Discharge capacity was determined for 4-inch and 6-inch roof drain pipes along with the maximum roof areas that each pipe can receive based on the 100-year peak flow generated by those areas.

See Appendix E for conveyance calculations and Appendix A for the developed basin map.

5.0 DISCUSSION OF MINIMUM REQUIREMENTS

This project must meet Minimum Requirements #1 through #9, as set forth by the *2019 Stormwater Management Manual for Western Washington.* They are discussed below:

#1 - Preparation of Stormwater Site Plans
This storm water site plan satisfies this requirement.

#2 - Construction Stormwater Pollution Prevention Plan (SWPPP)
A Construction Stormwater Pollution Prevention Plan is included with this submittal.

#3 - Source Control of Pollution
Applicable Source Control BMPs will be employed as needed. Source Control BMPs that could be needed for this project can be found in Volume 4 of the 2019 Stormwater Management Manual for Western Washington. Construction BMPs will be employed as needed and are located within the Construction SWPPP for the project.

#4 - Preservation of Natural Drainage Systems and Outfalls
Natural drainage systems and outfalls are being maintained to the maximum extent possible. In the existing state, stormwater will follow the natural topography and flow from the southeast corner to the northwest corner of the site. All stormwater will be

infiltrated to the natural soils, any stormwater leaving the site is small and negligible. The proposed storm drainage system will collect surface stormwater through site grading and steel storm drain catch basins. The stormwater will be routed to water quality catch basins before it is discharged into the proposed infiltration pond.

#5 - On-site Stormwater Management
The storm system is outlined in the section DEVELOPED SITE HYDROLOGY. See Section 4.0 within this report.

#6 – Runoff Treatment
Water quality will be achieved through two StreamFilter catch basin with BayFilter cartridges for the onsite and offsite areas. See SECTION 4.0 – Water Quality for details.

#7 – Flow Control
Flow Control will be met through infiltration. See SECTION 4.0 – Flow Control for details.

#8 – Wetlands Protection
No wetlands or other critical areas were identified within the project area.

#9 – Operation and Maintenance
An operations and Maintenance Manual is included with this submittal.

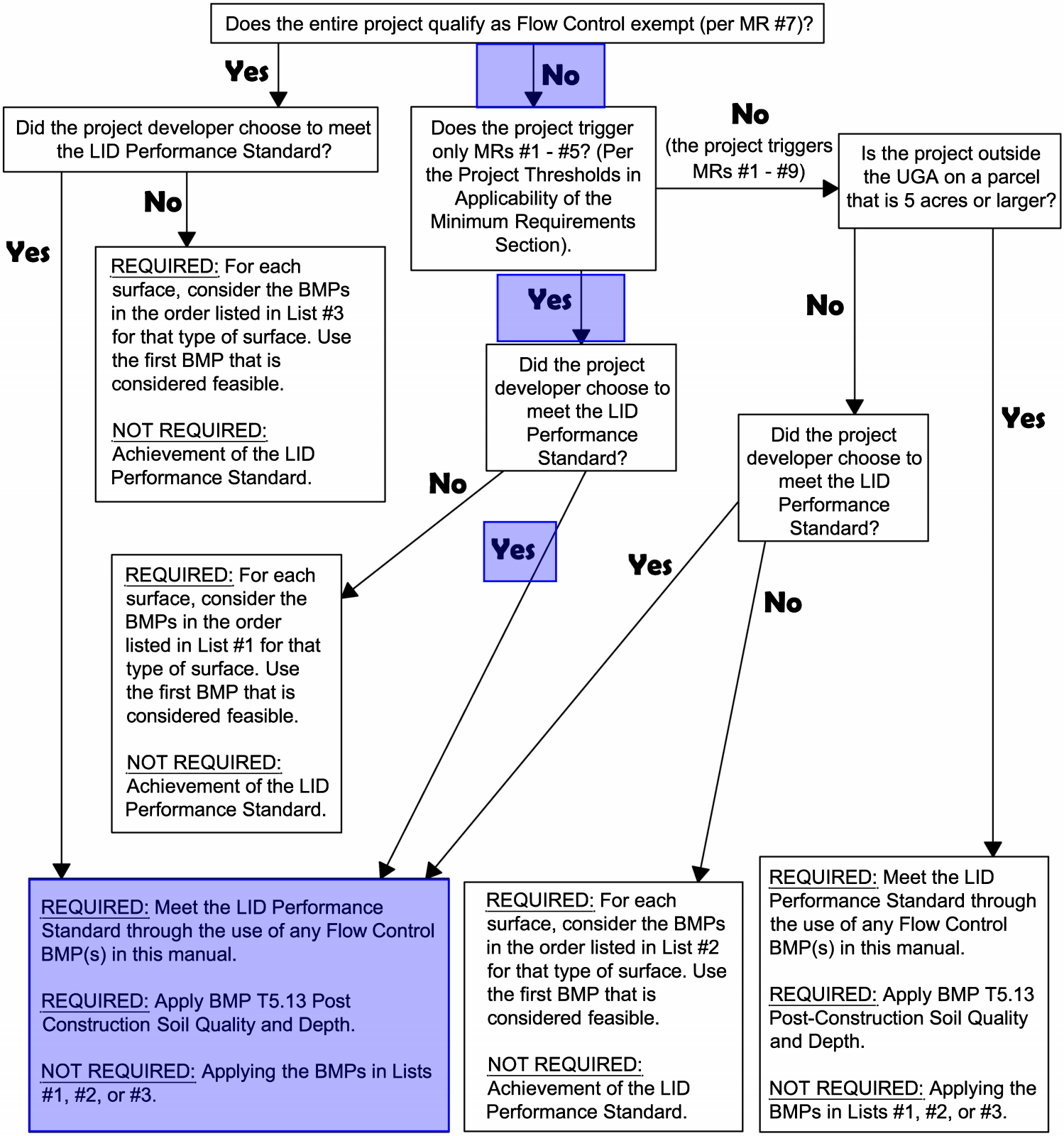
Provide more information about the selected runoff treatment devices. Provide manufacturer sheets, GULD approval sheets, confirmation from the manufacturer that the selected system is sized for the area draining to it. [Storm Report, pg. 11]

APPENDIX A

General Exhibits

VICINITY MAP

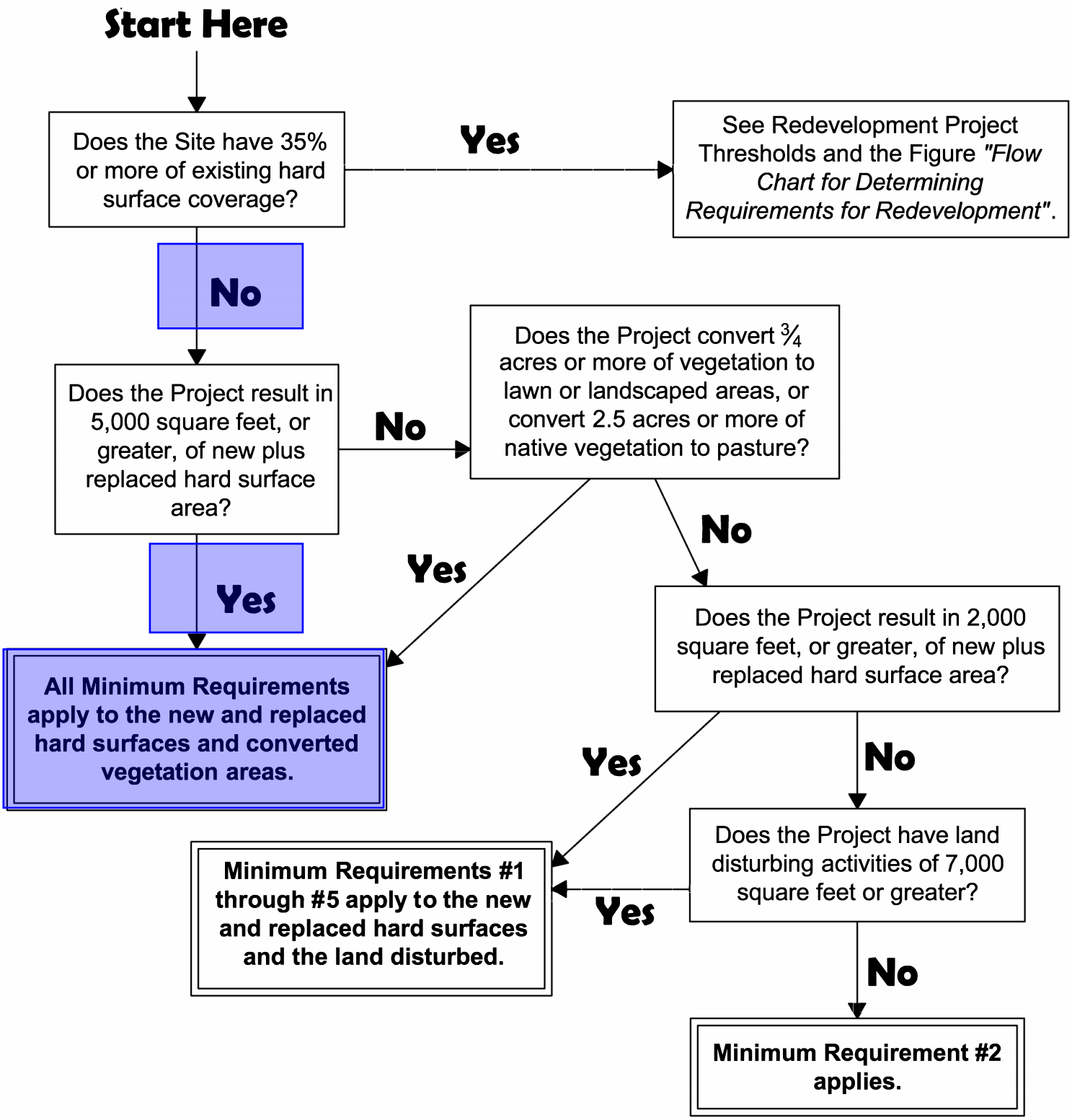
NOT TO SCALE



DEPARTMENT OF ECOLOGY
State of Washington

1. Flow Chart for Determining MR #5 Requirements

Revised March 2019

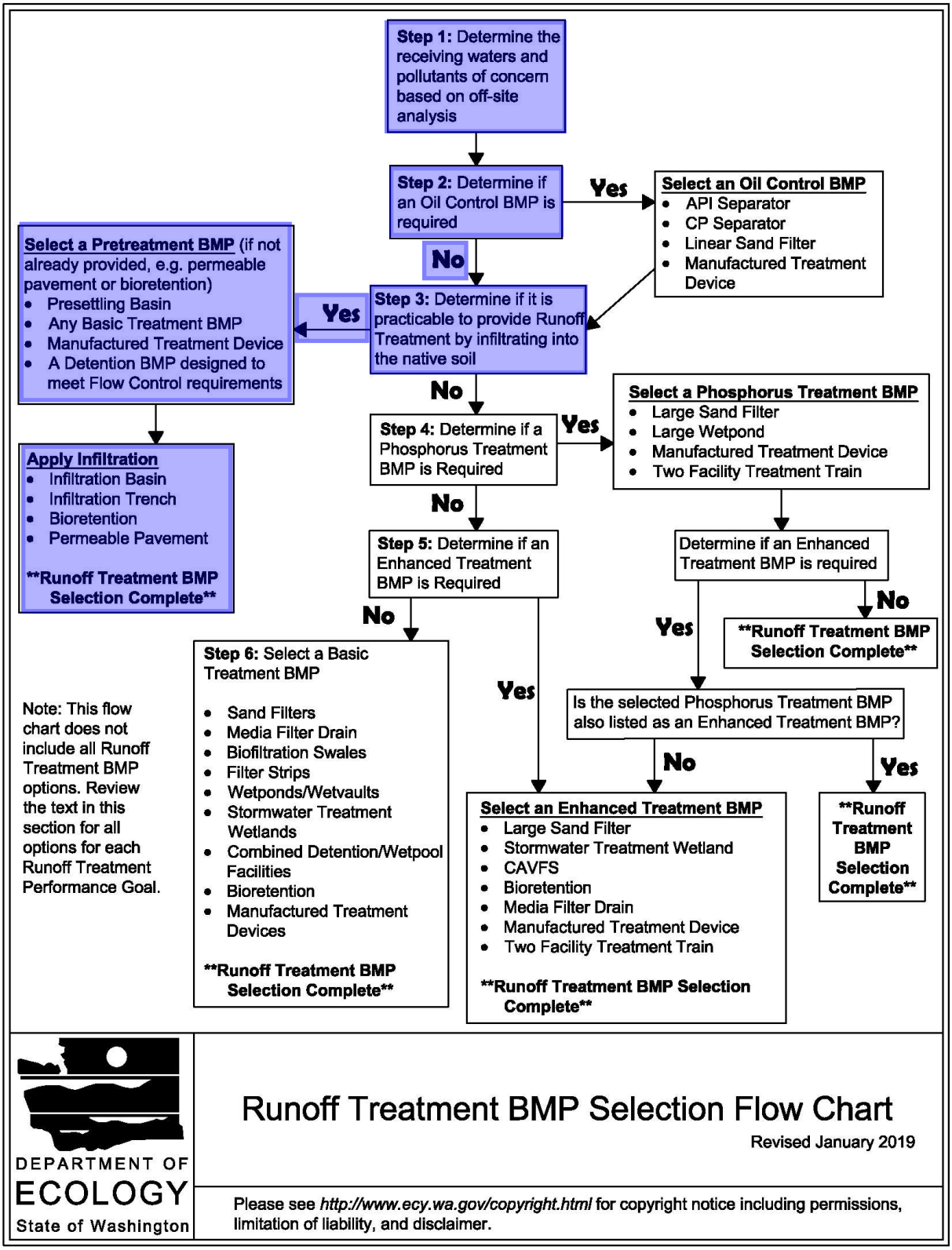


DEPARTMENT OF ECOLOGY
State of Washington

2. Flow Chart for Determining Requirements for New Development

Revised March 2019

Figure III-1.1: Runoff Treatment BMP Selection Flow Chart



NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 10. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by Pierce County GIS, WA DNR, WSDOT, USFWS, Washington State Department of Ecology, and Puget Sound Regional Council. This information was compiled at scales of 1:1,200 to 1:24,000 during the time period 1996-2012.

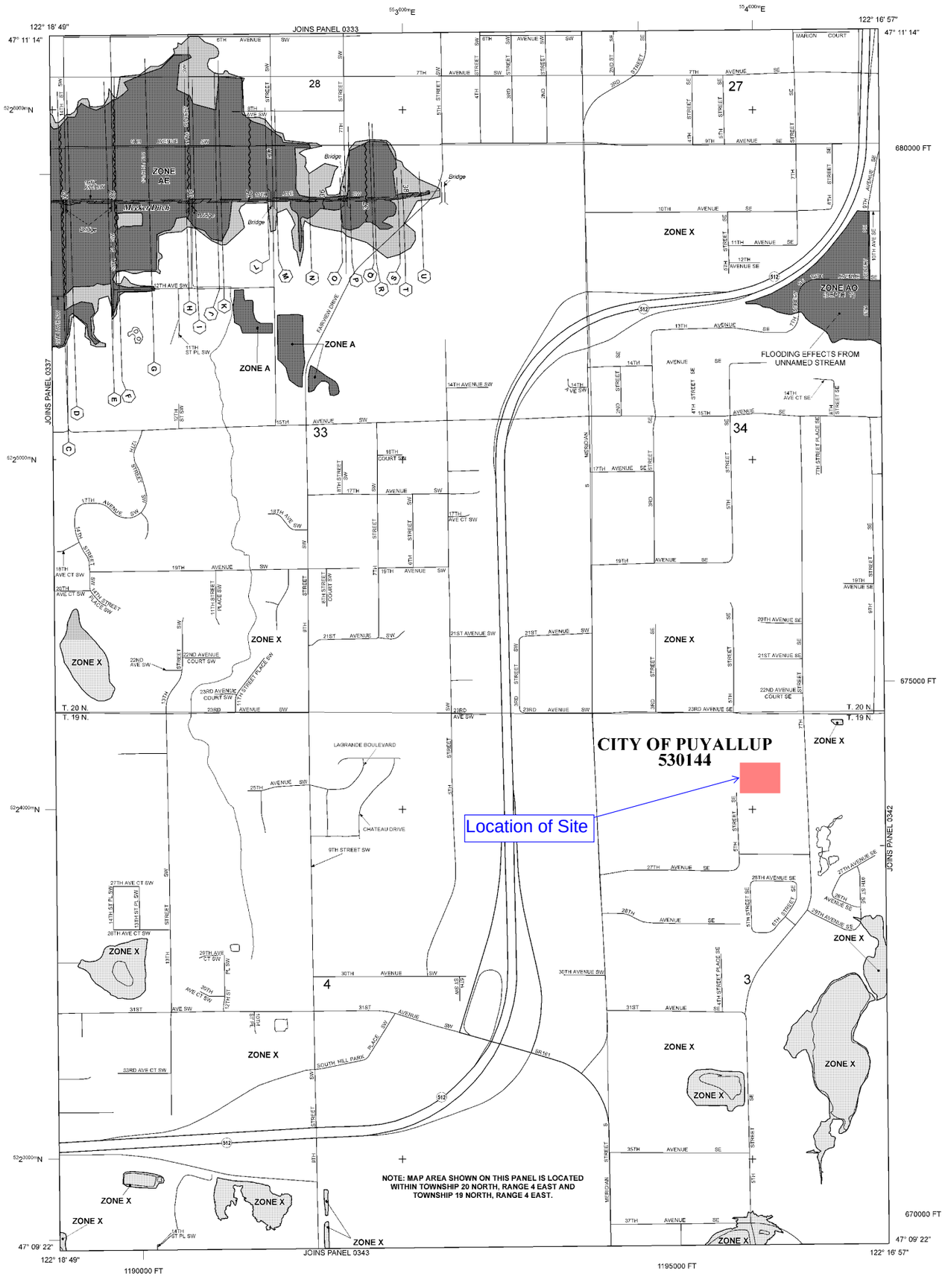
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- Culvert
- Bridge
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 5539000mN — 1000-meter Universal Transverse Mercator grid values, zone 10
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
March 7, 2017

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0341E

FIRM

FLOOD INSURANCE RATE MAP

PIERCE COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 341 OF 1375
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
PUYALLUP, CITY OF	530144	0341	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
53053C0341E
EFFECTIVE DATE
MARCH 7, 2017

Federal Emergency Management Agency

GRAPHIC SCALE

0 40 80

1 INCH = 40 FEET (11"x17")

Per preliminary site plan comments, break out the offsite "Area Inflow" acreage for clarity. [Storm Report, pg. 18]

LEGEND

ONSITE:			
PERVIOUS AREA	111,560 SF	2.80 AC	
IMPERVIOUS AREA	0 SF	0 AC	
OFFSITE:			
PERVIOUS AREA	10,479 SF	0.24 AC	
IMPERVIOUS AREA	358 SF	0.01 AC	

CONTOUR ENGINEERING • LLC
CIVIL ENGINEERS~SURVEYORS~LAND PLANNERS
P.O. Box 949, Gig Harbor, WA 98335
Phone: 253-857-5454 ~ Fax: 253-509-0044 ~ info@contourpllc.com

PRE-DEVELOPED BASIN MAP

BRADBURY PLACE APARTMENTS
PUYALLUP, WA

BY:	R. HENRETTA
PROJECT:	20-223
DATE:	2025.01.02
EXHIBIT NO.	1

GRAPHIC SCALE

0 40 80

1 INCH = 40 FEET (11"x17")

LEGEND

ONSITE TRIBUTARY TO POND:			
PERVIOUS AREA	38,593 SF	0.89 AC	
IMPERVIOUS AREA			
ROOF AREA	26,553 SF	0.61 AC	
PGHS AREA	33,458 SF	0.77 AC	
POND AREA	2,898 SF	0.07 AC	
ONSITE TRIBUTARY TO TRENCH:			
PERVIOUS AREA	7,018 SF	0.16 AC	
IMPERVIOUS AREA (PGHS)	3,040 SF	0.07 AC	
OFFSITE:			
PERVIOUS AREA	1,418 SF	0.03 AC	
IMPERVIOUS AREA (PGHS)	9,419 SF	0.21 AC	
REPLACED PGHS	7,517 SF	0.17 AC	SAWCUT

The total area called out in the predeveloped map is 3.05 AC.The total area called out here is 2.98 AC. These values should total to be the same, and should also match the modeling from WWHM. [Storm Report, pg. 19]

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DEVELOPED BASIN MAP

BRADBURY PLACE APARTMENTS
PUYALLUP, WA

BY: R. HENRETTA
PROJECT: 20-223
DATE: 2025.01.02
EXHIBIT NO. 2

GRAPHIC SCALE

0 40 80

1 INCH = 40 FEET (11"x17")

INFILTRATION POND

SFCB#40
STORMFILTER

SDMH#25
BAYFILTER 522

BASIN #1

BASIN #2 CONTAINS ONSITE AREAS TO BE INCLUDED IN BASIN #1 WQ CALCULATIONS, BUT TO BE ROUTED TO SDCB#40 AND INCLUDED IN BASIN #3 CALCULATIONS ALSO

BASIN #3

BASIN #2

ROOF AND YARD RUNOFF ROUTED DIRECTLY TO INFIL POND (TYP)

SDCB#10
BAYFILTER 522

LEGEND

BASIN #1:			
PERVIOUS AREA	10,877 SF	0.25 AC	
IMPERVIOUS AREA	33,492 SF	0.77 AC	
BASIN #2:			
PERVIOUS AREA	7,301 SF	0.17 AC	
IMPERVIOUS AREA	3,040 SF	0.07 AC	
BASIN #3:			
PERVIOUS AREA	1,380 SF	0.03 AC	
IMPERVIOUS AREA	9,374 SF	0.21 AC	
FOR WWHM CALCS :			
POC 1	BASIN 1+2	0.0414 CFS	
POC 2	BASIN 3+2	0.0247 CFS	

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WATER QUALITY BASIN MAP

BRADBURY PLACE APARTMENTS
PUYALLUP, WA

BY: R. HENRETTA
PROJECT: 20-223
DATE: 2025.01.02
EXHIBIT NO. 3

APPENDIX B

Plans Exhibits

BRADBURY PLACE APARTMENTS

A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

Update to be the current planset. [Storm Report, pg. 22]

GRAPHIC SCALE
0 50 100
1 INCH = 50 FEET (22"x34")
1 INCH = 100 FEET (11"x17")

SURVEYOR
STEVE WOODS, PLS
CONTOUR ENGINEERING LLC
4706 97TH STREET NW, BUILDING #2
P.O. BOX 949
GIG HARBOR, WA 98335
PHONE: (253) 857-5454

ARCHITECT
SYNTHESIS 9
523 N. D ST
TACOMA, WA 98403
(253) 468-4117

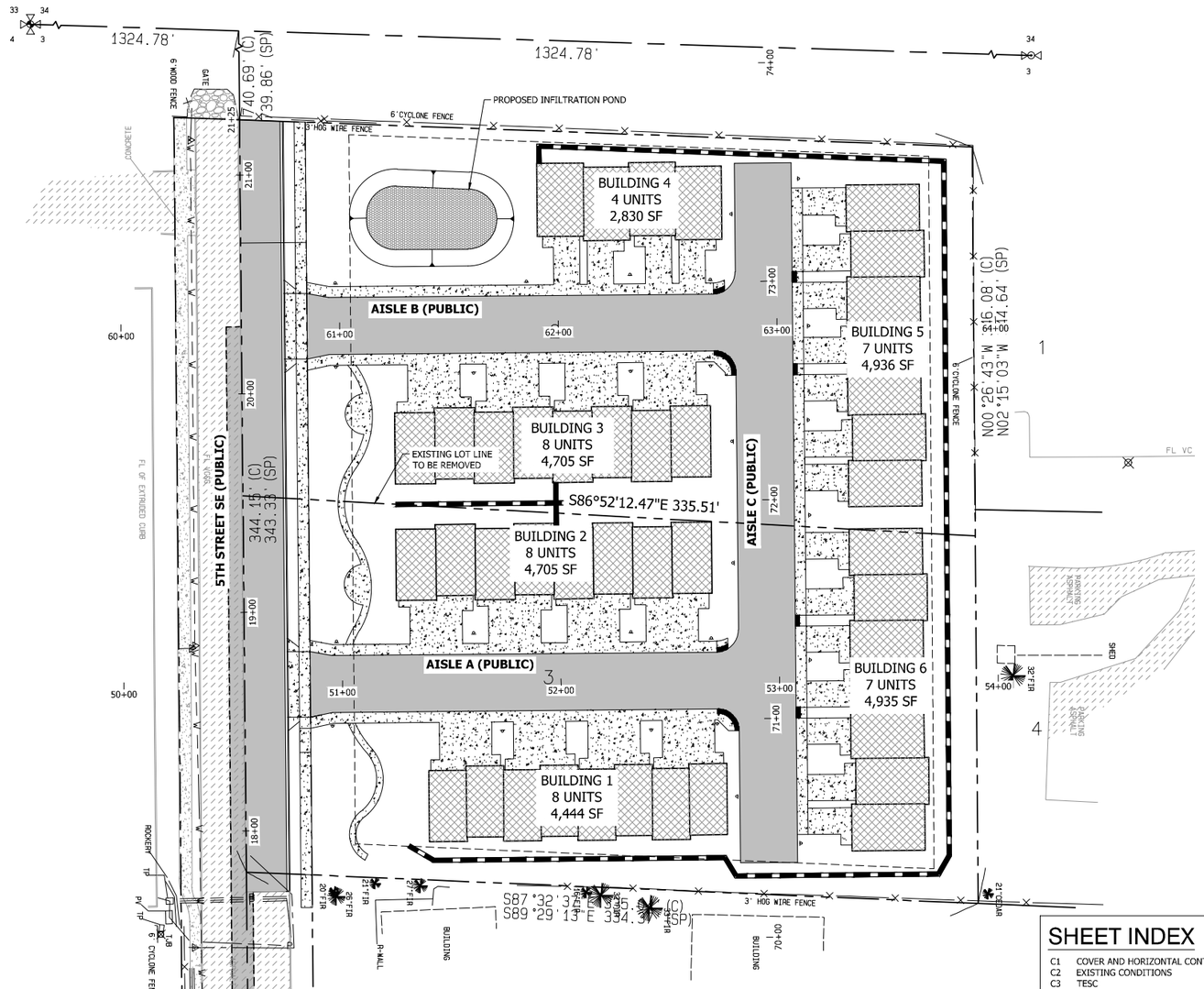
GEOTECHNICAL
GEORESOURCES, LLC
4809 PACIFIC HWY E.
FIF, WA 98424
(253) 896-1011

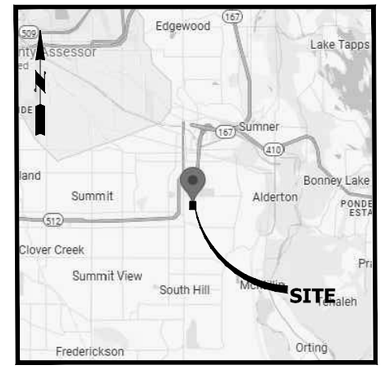
OWNER
BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98480
PHONE: (253) 318-5711

SITE INFORMATION

SITE ADDRESS:	2525 5TH ST SE PUYALLUP, WA 98374
PARCEL NUMBERS:	0419036002 & 0419036003
ZONING DISTRICT:	RM-20
TOTAL PARCEL AREA:	2.68 AC

ENVIRONMENTAL CONSULTANT
SOUNDVIEW CONSULTANTS LLC
2907 HARBORVIEW DR., SUITE D, GIG HARBOR, WA 98335
(253)-514-8952





VICINITY MAP
NOT TO SCALE

LEGEND

SURVEY		PROPOSED
100	CONTOURS	100
	PROPERTY LINE/RIGHT-OF-WAY	
	RIGHT-OF-WAY DEDICATION	
	RIGHT-OF-WAY CENTERLINE	
	BUILDING SETBACK	
SD	STORM DRAIN LINE	SD
SS	SANITARY SEWER LINE	SS
P	UNDERGROUND POWER LINE	
W	WATER LINE	W
	TYPE 2 CATCHBASIN	
	TYPE 1/TYPE 1L CATCHBASIN	
	STORM DRAIN CLEANOUT (SDCO)	
	SANITARY SEWER MANHOLE	
	SANITARY SEWER CLEANOUT (SSCO)	
	MONUMENT	
	POWER POLE (PP)	
	TELEPHONE JUNCTION BOX	
	SIGN	
	ASPHALT	
	CONCRETE	
	GRAVEL	

CONSTRUCTION SEQUENCE

1. OBTAIN REQUIRED PERMITS AND HOLD A PRE-CONSTRUCTION MEETING WITH CITY.
2. FIELD LOCATE AND VERIFY ALL EXISTING SERVICES AND UTILITIES WITHIN PROJECT AREA.
3. ESTABLISH CLEARING AND GRADING LIMITS.
4. CONSTRUCT TEMPORARY CONSTRUCTION ENTRANCE, INLET PROTECTION, FILTER FABRIC FENCES, AND OTHER EROSION CONTROL DEVICES AS SHOWN OR AS NEEDED PER FIELD CONDITIONS. PERMANENT STORM SYSTEM TO BE INSTALLED PRIOR TO GRADING.
5. CALL FOR TESC INSPECTION IF NEEDED BY CITY.
6. CONSTRUCT IMPROVEMENTS PER PLAN. **PRIOR TO INFILTRATION SYSTEM CONSTRUCTION, INFILTRATION TESTING SHALL BE PERFORMED. PROVIDE RESULTS TO THE PROJECT ENGINEER.**
7. NO UNCONTROLLED SURFACE WATER SHALL BE ALLOWED TO LEAVE THE SITE AT ANY TIME DURING THE CONSTRUCTION OPERATIONS.
8. ALL TESC MEASURES TO REMAIN IN PLACE AND MAINTAINED DURING CONSTRUCTION OF ONSITE IMPROVEMENTS.
9. ARRANGE FINAL INSPECTION WITH THE CITY.
10. REMOVE TESC MEASURES WHEN ALLOWED BY THE CITY.

UTILITY NOTES

EXISTING UTILITY INFORMATION DEPICTED ON THESE PLANS WAS OBTAINED FROM BEST AVAILABLE SOURCES AT THE TIME OF DESIGN. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE RELOCATION OF EXISTING UNDERGROUND CONFLICTING UTILITIES DEPICTED OR NOT DEPICTED ON THESE PLANS.

FILL SPECIFICATION

FILL MATERIAL SHALL NOT CONTAIN PETROLEUM PRODUCTS, OR SUBSTANCES WHICH ARE HAZARDOUS, DANGEROUS, TOXIC, OR WHICH OTHERWISE VIOLATE ANY STATE, FEDERAL, OR LOCAL LAW ORDINANCE, CODE, REGULATION, RULE, ORDER, OR STANDARD. ONLY EARTH MATERIAL SHALL BE PLACED IN FILLS.

FLOODPLAIN NOTE

PROJECT IS NOT LOCATED WITHIN A 100-YEAR FLOOD PLAIN.

SHEET INDEX

VERIFICATION NOTE

ALL EXISTING UTILITIES IN THE CONSTRUCTION AREA SHALL BE IDENTIFIED AND VERIFIED FOR DEPTH AND LOCATION PRIOR TO ANY CONSTRUCTION ACTIVITIES SO TO IDENTIFY ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION. CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

PRIOR TO ANY CONSTRUCTION ACTIVITIES, VERIFY EXISTING TOPOGRAPHY IS CONSISTENT WITH WHAT IS SHOWN ON PLANS AND IF THERE ARE ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION ACTIVITIES. CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG

REVISION	DESCRIPTION	DATE	BY

CONTOUR ENGINEERING • LLC
CIVIL ENGINEERS ~ SURVEYORS ~ LAND PLANNERS
Phone: 253-857-5454 ~ Fax: 253-509-0044 ~ info@contourplk.com
Mailing Address: P.O. Box 949, Gig Harbor, WA 98335
Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

JEREMY F. HAUG — STATE OF WASHINGTON — 22407 — REGISTERED PROFESSIONAL ENGINEER
1.2.2025

SHEET TITLE: COVER SHEET AND HORIZONTAL CONTROL

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98408
PHONE: (253) 318-5711
CONTACT: KEN RODY

DESIGNER: M. GOULARTE
ENGINEER: J. HAUG
DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 1.2.2025
REVISED:

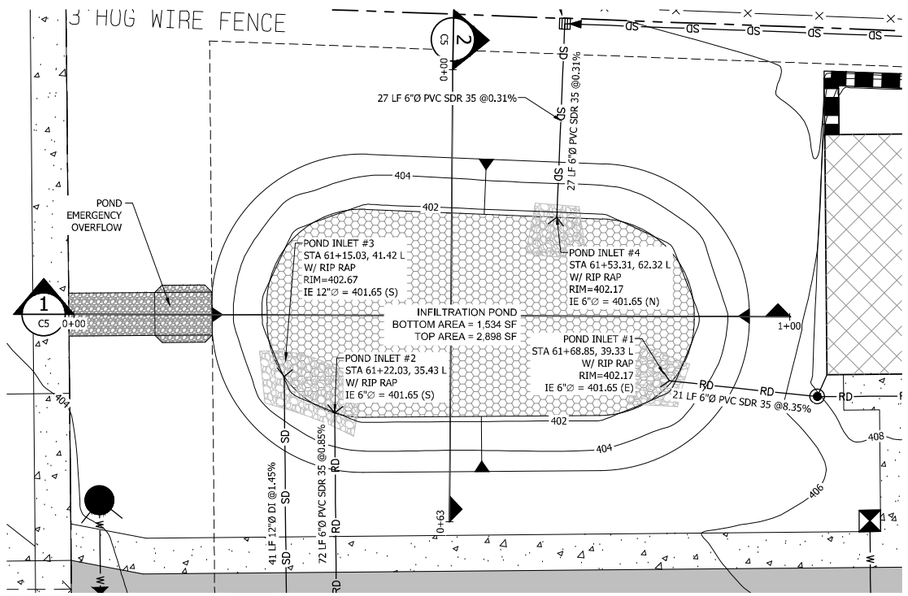
PROJECT: 20-223
DWG NAME: 20-223 C

SHEET	REV.
C1	0
1 OF 22	

BRADBURY PLACE APARTMENTS

A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

GRAPHIC SCALE
0 10 20
1 INCH = 10 FEET (22"x34")
1 INCH = 20 FEET (11"x17")



AS-BUILT POND NOTE

1. A DECLARATION FROM THE PROJECTS GEOTECHNICAL ENGINEER STATING THAT THE PROJECT'S POND WAS CONSTRUCTED IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS, AND CONSTRUCTION CHANGE ORDERS (IF ANY). THIS SUBMITTAL SHALL TAKE PLACE WITHIN 30 DAYS FOLLOWING SUBSTANTIAL COMPLETION OF CONSTRUCTION OF THE POND. A DECLARATION OF DAM CONSTRUCTION COMPLETION FORM IS INCLUDED IN THE DAM SAFETY GUIDELINES PART II.

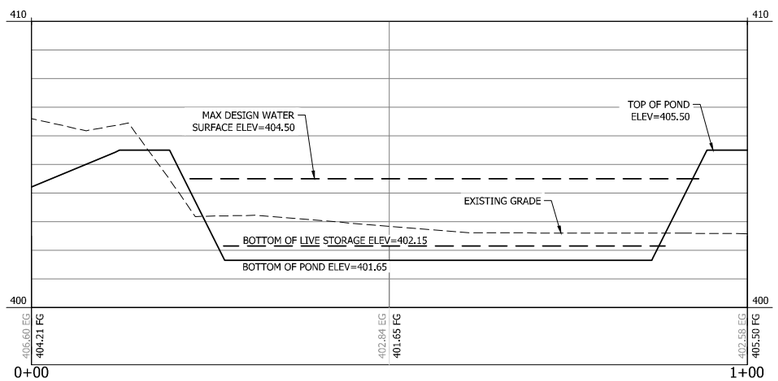
2.A CONSTRUCTION REPORT SHALL BE SUBMITTED TO THE ECOLOGY DAM SAFETY OFFICE WITHIN 120 DAYS FOLLOWING COMPLETION OF CONSTRUCTION ACTIVITIES. THIS REPORT SUMMARIZES THE RESULTS OF FIELD TESTING (I.E., COMPACTION RESULTS, GEOMEMBRANE TESTING, ETC.), DISCUSSES ANY SIGNIFICANT ACTIVITIES OF THE CONSTRUCTION WORK, AND INCLUDES A COPY OF THE AS-BUILT PLANS.

INFILTRATION VERIFICATION NOTE

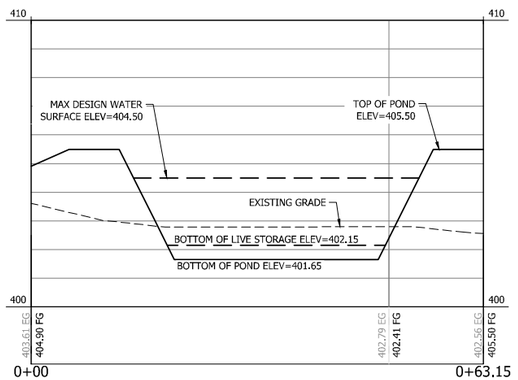
CONTRACTOR SHALL COORDINATE WITH GEOTECHNICAL ENGINEER FOR INSPECTION OF NATIVE SOILS AT POND BOTTOM ONCE FULLY EXCAVATED.

GEOTECHNICAL ENGINEER SHALL VERIFY THAT SOILS AT BOTTOM OF POND MEET OR EXCEED THE RECOMMENDED DESIGN INFILTRATION RATE PROVIDED. ADDITIONAL INFILTRATION TESTING OR DEEPER EXPORATIONS SHOULD BE DONE IF DETERMINED TO BE REQUIRED BY GEOTECHNICAL ENGINEER TO MEET REQUIREMENTS OF THE CURRENT STORMWATER MANUAL.

IF SOILS AT BOTTOM OF POND DO NOT MEET RECOMMENDED DESIGN INFILTRATION RATE, CONTACT PROJECT ENGINEER FOR POSSIBLE DESIGN CHANGES.



1 POND X-SECTION EAST/WEST



2 POND X-SECTION NORTH/SOUTH

VERIFICATION NOTE

ALL EXISTING UTILITIES IN THE CONSTRUCTION AREA SHALL BE IDENTIFIED AND VERIFIED FOR DEPTH AND LOCATION PRIOR TO ANY CONSTRUCTION ACTIVITIES SO TO IDENTIFY ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION. CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

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CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG

REVISION	DESCRIPTION	DATE	BY

CONTOUR ENGINEERING, LLC
CIVIL ENGINEERS ~ SURVEYORS ~ LAND PLANNERS
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Mailing Address: P.O. Box 949, Gig Harbor, WA 98335
Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

JEREMY F. HAUG — STATE OF WASHINGTON — 21611 — REGISTERED PROFESSIONAL ENGINEER
1.2.2025

SHEET TITLE: POND PLAN AND PROFILE

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98408
CONTACT: KEN RODY
PHONE: (253) 318-5711

DESIGNER: M. GOULARTE
ENGINEER: J. HAUG
DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 1.2.2025
REVISED:

PROJECT: 20-223
DWG NAME: 20-223 C

SHEET	REV.
C8	0
8 OF 22	

BRADBURY PLACE APARTMENTS

A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

GRAPHIC SCALE
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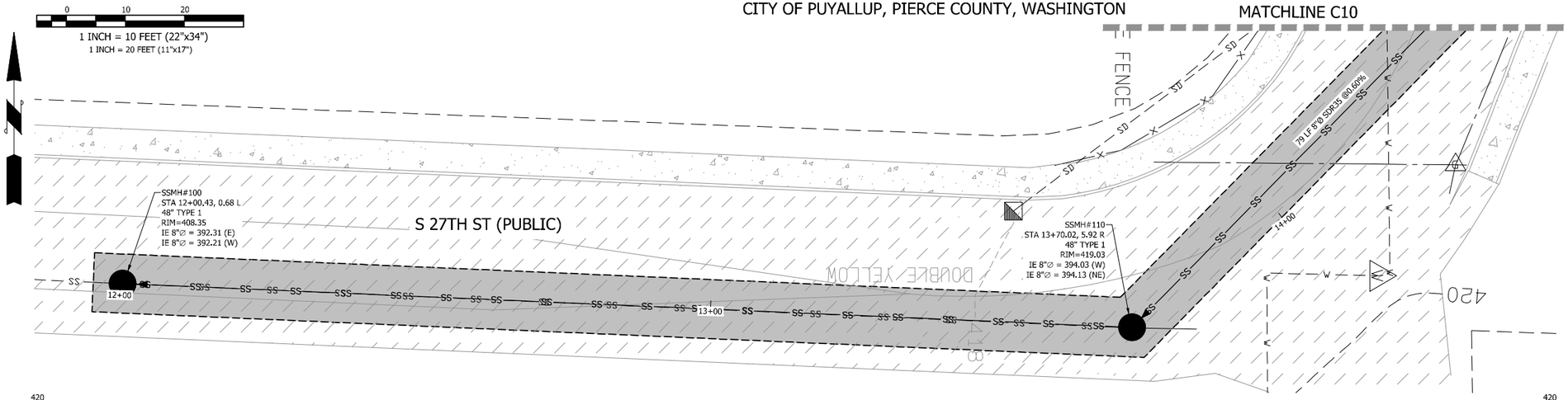

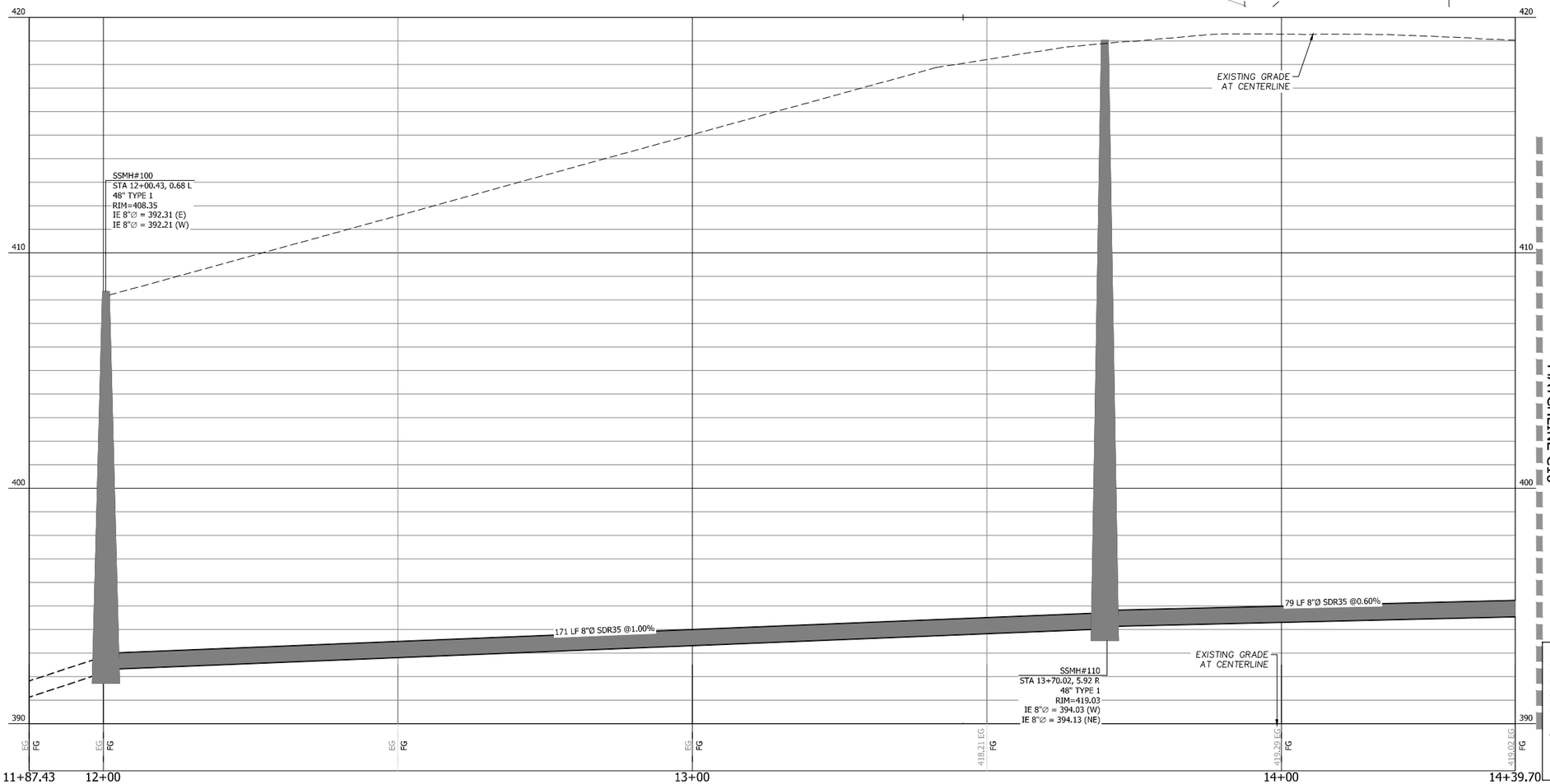

27TH AVE SE - STA: 11+87.43 TO 14+39.70
HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2.5'

UTILITY PLAN NOTE

WATER AND SEWER SHOWN FOR REFERENCE ONLY. SEWER TO BE PERMITTED SEPARATELY THROUGH PIERCE COUNTY SEWER. WATER TO BE PERMITTED SEPARATELY THROUGH LAKEWOOD WATER DISTRICT.

GRADING NOTES

1. SPOT ELEVATIONS SHOWN ARE FOR FINISHED GRADE ELEVATIONS UNLESS OTHERWISE SPECIFIED.
2. CONTOUR LINES ARE FOR VISUAL REFERENCE. GRADING SHALL BE PER SPOT ELEVATIONS.

VERIFICATION NOTE

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Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

JEREMY F. HAUG — STATE OF WASHINGTON — 22819 — REGISTERED PROFESSIONAL ENGINEER
1.2.2025

SHEET TITLE: 27TH AVE SE PLAN AND PROFILE

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98408
CONTACT: KEN RODY
PHONE: (253) 318-5711

DESIGNER: M. GOULARTE
ENGINEER: J. HAUG
DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 1.2.2025
REVISED:

PROJECT: 20-223
DWG NAME: 20-223 C

SHEET	REV.
C9	0
9 OF 22	

BRADBURY PLACE APARTMENTS

A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

GRAPHIC SCALE
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1 INCH = 10 FEET (22"x34")
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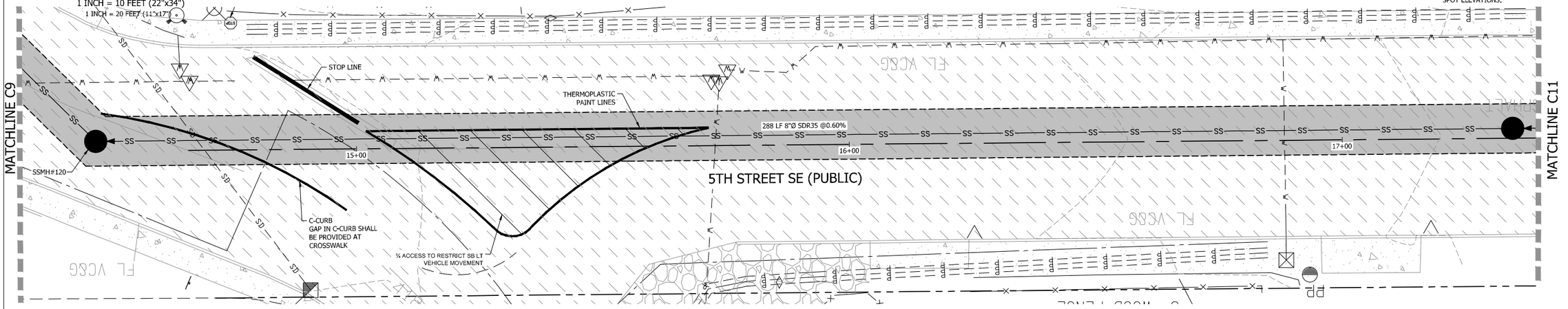

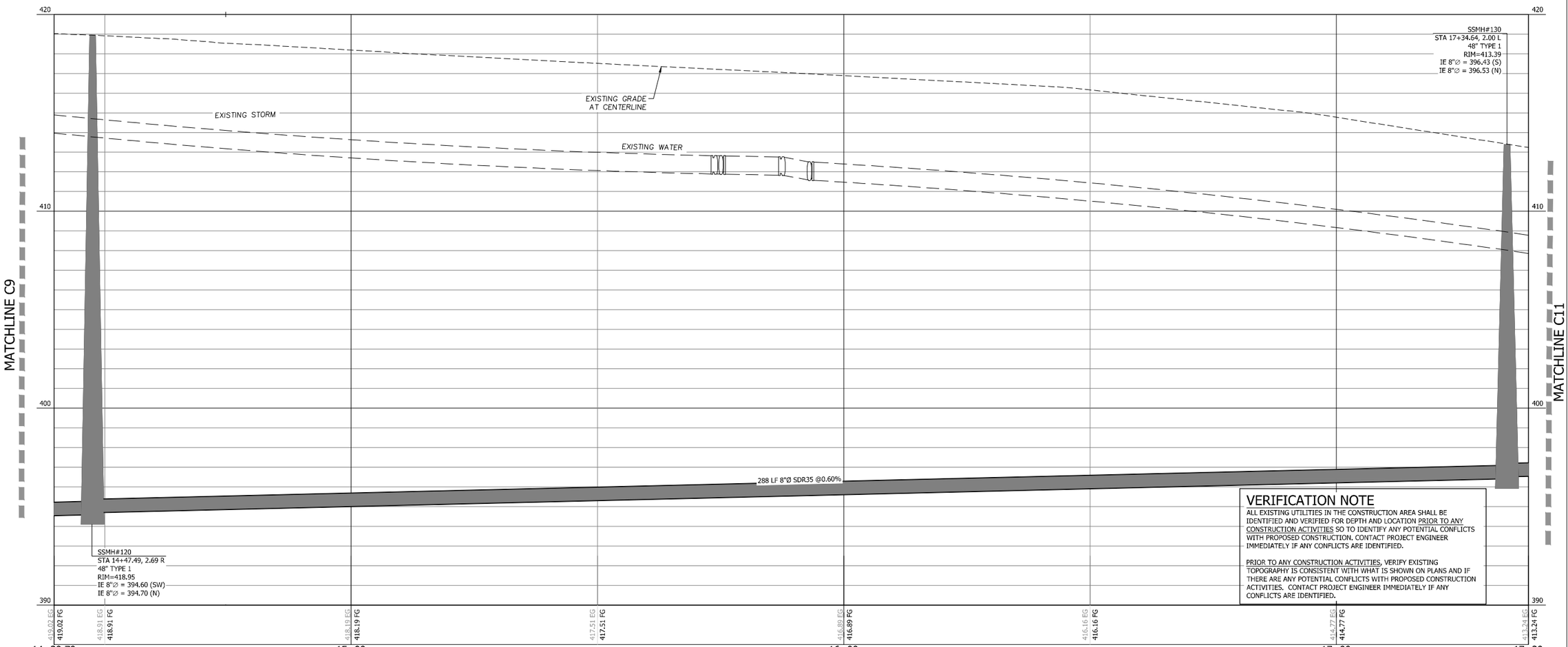

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5TH AVE SE - STA: 14+39.70 TO 17+39

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2.5'

CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG

NO.	DESCRIPTION	DATE	BY

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Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

JEREMY F. HAUG — STATE OF WASHINGTON — 21809 — REGISTERED PROFESSIONAL ENGINEER
1.2.2025

SHEET TITLE: 5TH ST SE PLAN AND PROFILE

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98408
CONTACT: KEN RODY
PHONE: (253) 318-5711

DESIGNER: M. GOULARTE
ENGINEER: J. HAUG
DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 1.2.2025
REVISED:

PROJECT: 20-223
DWG NAME: 20-223 C

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C10	0
10 OF 22	

BRADBURY PLACE APARTMENTS

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CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

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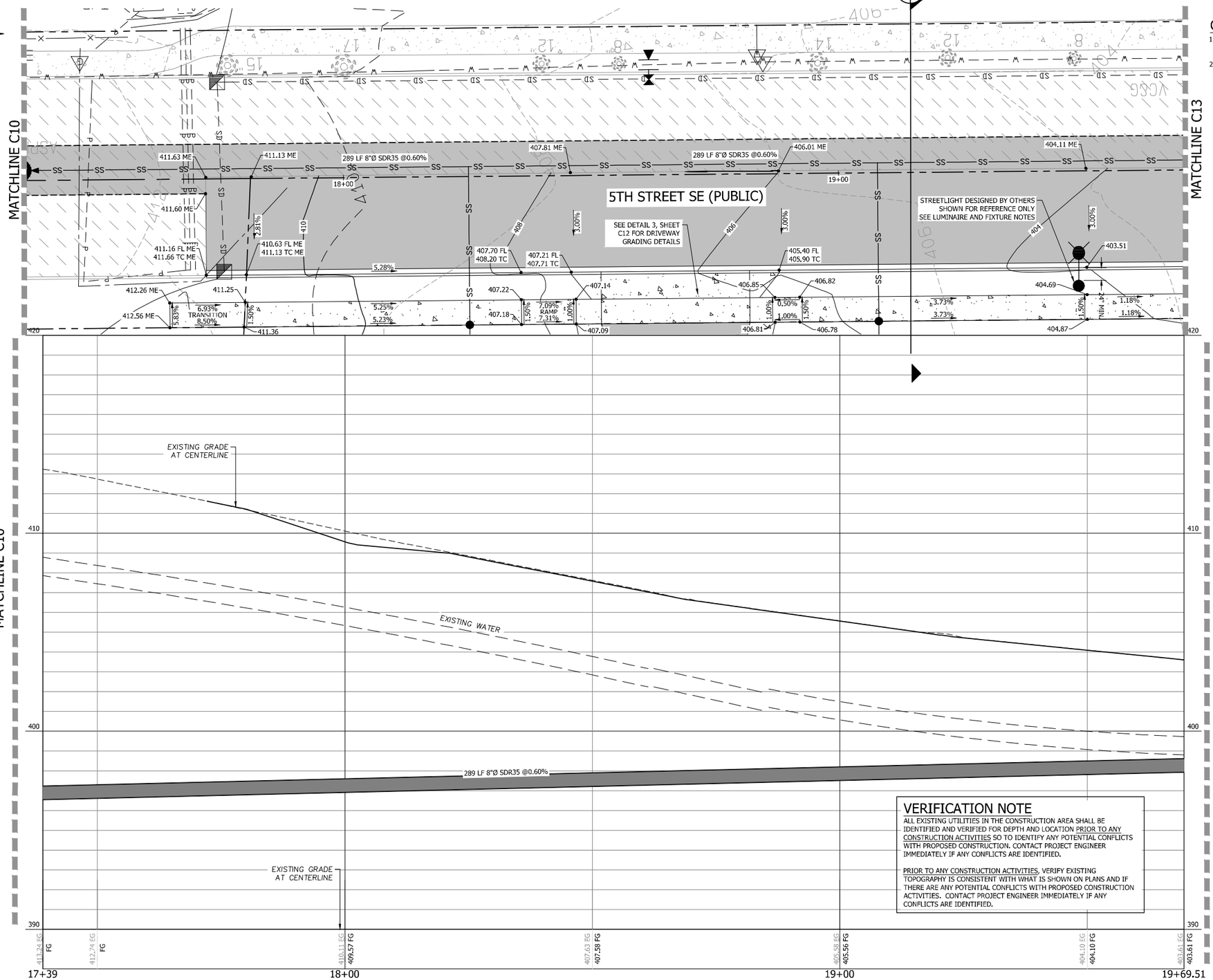

5TH AVE SE - STA: 17+39 TO 19+69.51

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2.5'

GRADING NOTES

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2. CONTOUR LINES ARE FOR VISUAL REFERENCE. GRADING SHALL BE PER SPOT ELEVATIONS.

LUMINAIRE NOTE

ALL LUMINAIRES ARE LEOTEK LED GC1-40E-MV-NW-2-530 UNLESS OTHERWISE NOTED.

FIXTURE NOTE

GENERAL ELECTRIC M2AC10S3M2GMC32 (100W, 240V) FLAT LENS COBRA HEAD TO BE USED FOR PROPOSED STREET LIGHT

LUMINARE SHALL OVERHANG FACE OF CURB 3 FT MINIMUM.

ALL POLES SHALL BE PER CITY STANDARD DETAIL 1.05.01 THROUGH 1.05.09

MINIMUM SPACING FOR RESIDENTIAL STREETLIGHTS IS 300 FT

VERIFICATION NOTE

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Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

JEREMY F. HAUG — STATE OF WASHINGTON — 24000 — REGISTERED PROFESSIONAL ENGINEER
1.2.2025

SHEET TITLE: 5TH ST SE PLAN AND PROFILE

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98408
PHONE: (253) 318-5711
CONTACT: KEN RODY

DESIGNER: M. GOULARTE
ENGINEER: J. HAUG
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DATE: 1.2.2025
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PROJECT: 20-223
DWG NAME: 20-223 C

SHEET	REV.
C11	0
11 OF 22	

BRADBURY PLACE APARTMENTS

A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
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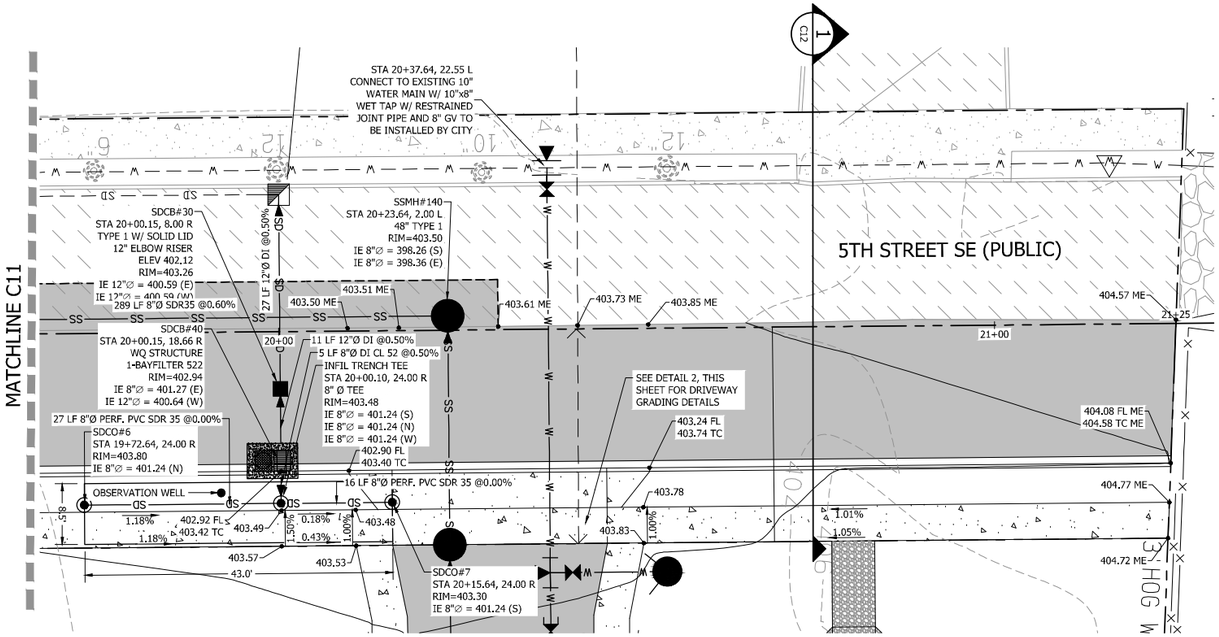

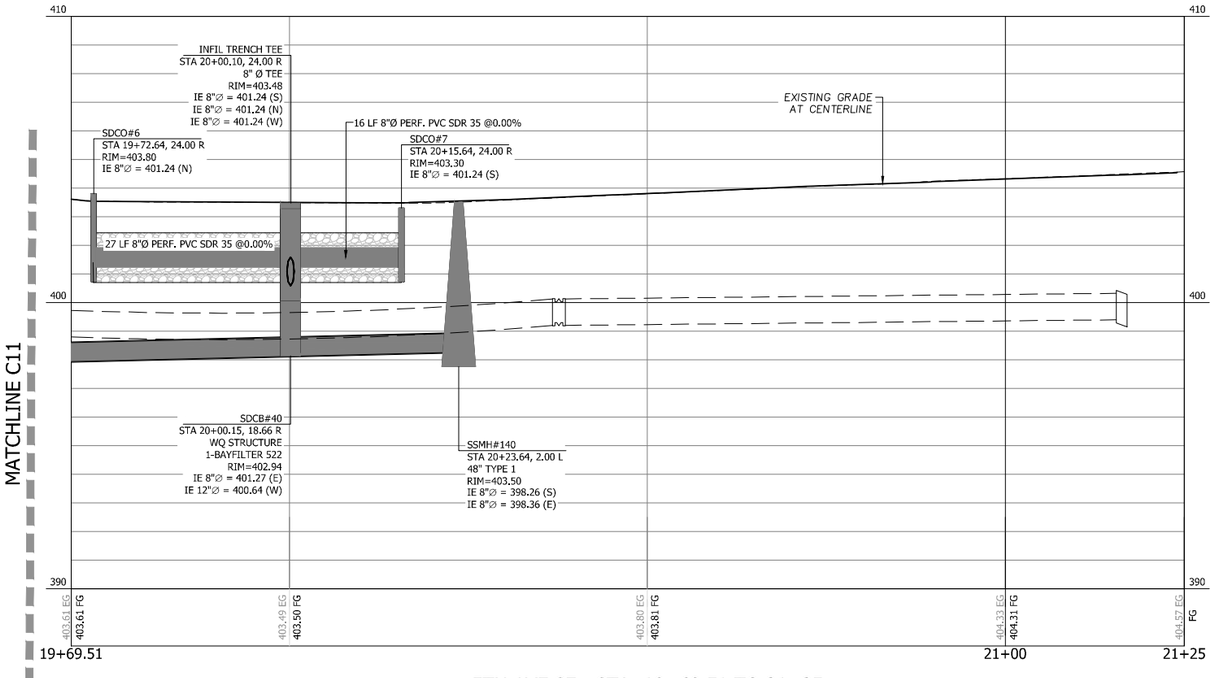

5TH AVE SE - STA: 19+69.51 TO 21+25
HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2.5'

INFILTRATION VERIFICATION NOTE

CONTRACTOR SHALL COORDINATE WITH GEOTECHNICAL ENGINEER FOR INSPECTION OF NATIVE SOILS AT TRENCH BOTTOM ONCE FULLY EXCAVATED.

GEOTECHNICAL ENGINEER SHALL VERIFY THAT SOILS AT BOTTOM OF TRENCH MEET OR EXCEED THE RECOMMENDED DESIGN INFILTRATION RATE PROVIDED. ADDITIONAL INFILTRATION TESTING OR DEEPER EXPORATIONS SHOULD BE DONE IF DETERMINED TO BE REQUIRED BY GEOTECHNICAL ENGINEER TO MEET REQUIREMENTS OF THE CURRENT STORMWATER MANUAL.

IF SOILS AT BOTTOM OF TRENCH DO NOT MEET RECOMMENDED DESIGN INFILTRATION RATE, CONTACT PROJECT ENGINEER FOR POSSIBLE DESIGN CHANGES.

VERIFICATION NOTE

ALL EXISTING UTILITIES IN THE CONSTRUCTION AREA SHALL BE IDENTIFIED AND VERIFIED FOR DEPTH AND LOCATION PRIOR TO ANY CONSTRUCTION ACTIVITIES SO TO IDENTIFY ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION. CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

PRIOR TO ANY CONSTRUCTION ACTIVITIES, VERIFY EXISTING TOPOGRAPHY IS CONSISTENT WITH WHAT IS SHOWN ON PLANS AND IF THERE ARE ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION ACTIVITIES. CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

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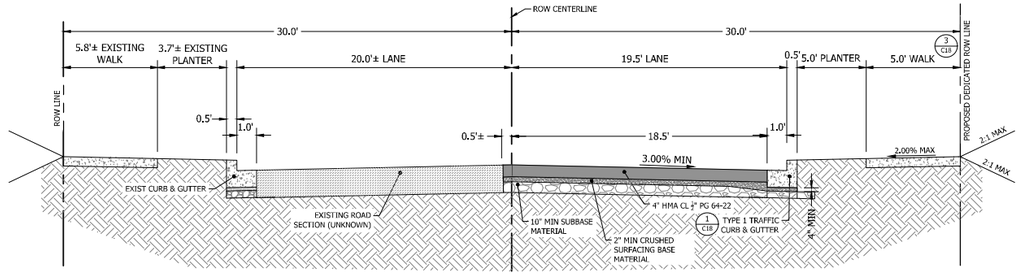
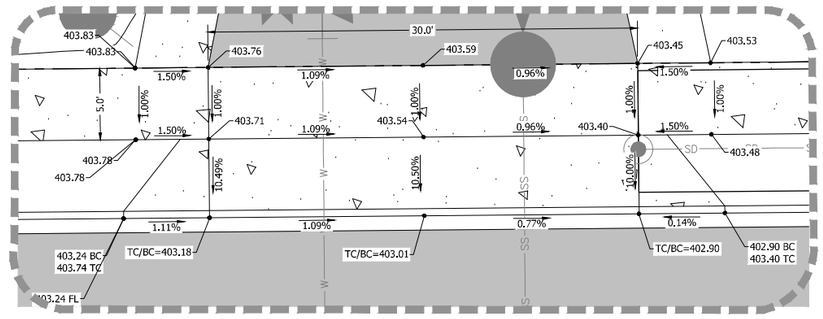
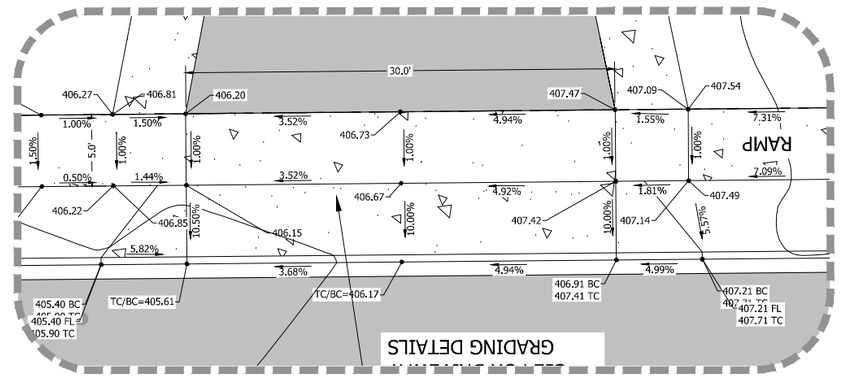


1 5TH ST SE ROW STANDARD SECTION
NOT TO SCALE



2 AISLE B DRIVEWAY DETAIL
NOT TO SCALE



3 AISLE A DRIVEWAY DETAIL
NOT TO SCALE

BY	DATE	DESCRIPTION	REVISION

CONTOUR ENGINEERING • LLC
CIVIL ENGINEERS ~ SURVEYORS ~ LAND PLANNERS
Phone: 253-857-5454 ~ Fax: 253-509-0044 ~ info@contourplk.com
Mailing Address: P.O. Box 949, Gig Harbor, WA 98335
Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

JEREMY F. HAUG — STATE OF WASHINGTON — 44837 — REGISTERED PROFESSIONAL ENGINEER
1.2.2025

SHEET TITLE: 5TH ST SE PLAN AND PROFILE

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98408
PHONE: (253) 318-5711
CONTACT: KEN RODY

DESIGNER: M. GOULARTE
ENGINEER: J. HAUG
DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 1.2.2025
REVISED:

PROJECT: 20-223
DWG NAME: 20-223 C

SHEET	REV.
C12	0
12 OF 22	

GRAPHIC SCALE

0 10 20

1 INCH = 10 FEET (22"x34")

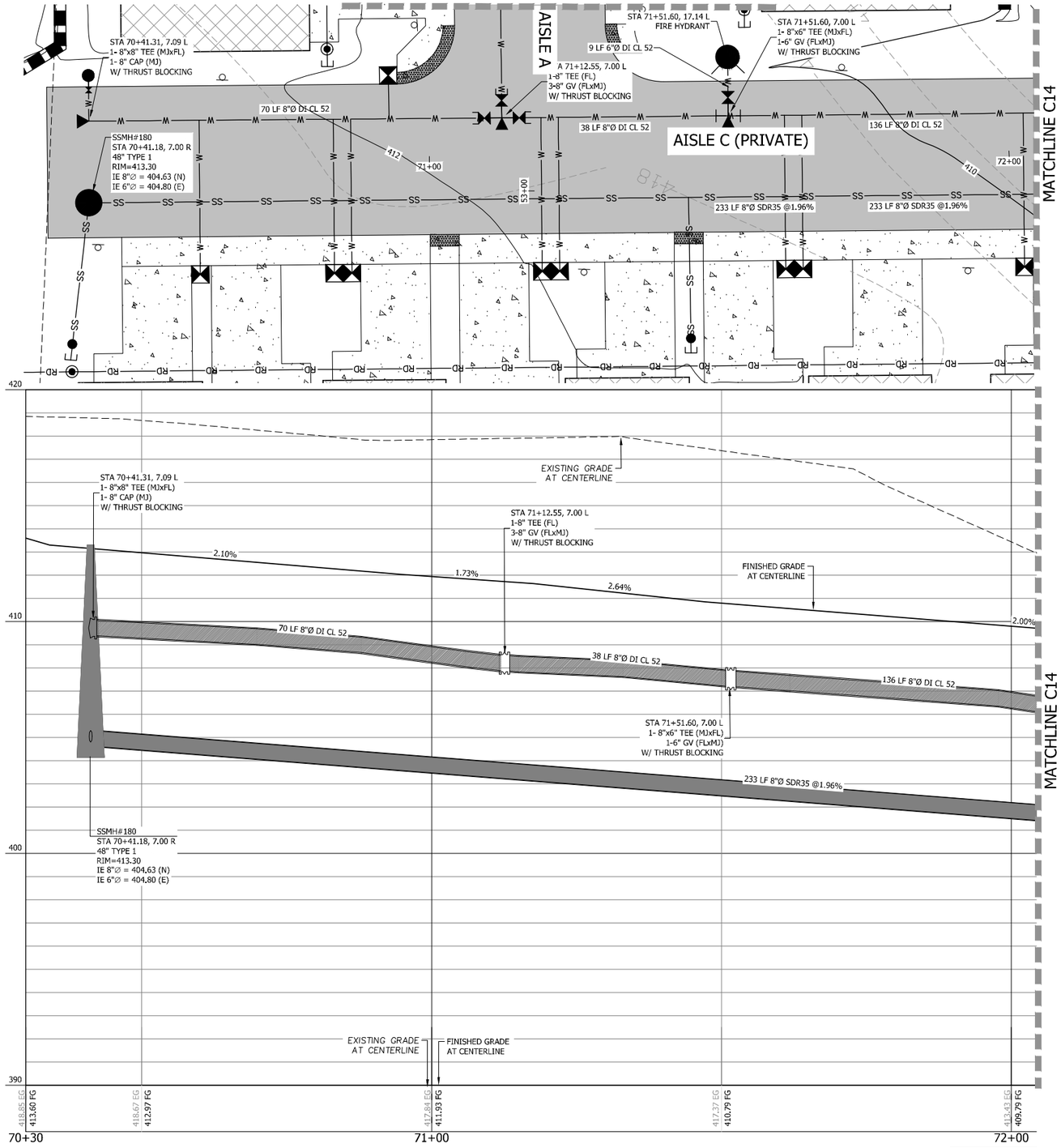
1 INCH = 20 FEET (11"x17")

BRADBURY PLACE APARTMENTS

A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.

CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

MATCHLINE C16



AISLE C - STA: 70+30 TO 72+00

HORIZONTAL SCALE: 1"=10'

VERTICAL SCALE: 1"=5'

VERIFICATION NOTE

ALL EXISTING UTILITIES IN THE CONSTRUCTION AREA SHALL BE IDENTIFIED AND VERIFIED FOR DEPTH AND LOCATION PRIOR TO ANY CONSTRUCTION ACTIVITIES SO TO IDENTIFY ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION. CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

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REVISION	DESCRIPTION	DATE	BY

CONTOUR ENGINEERING, LLC
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Mailing Address: P.O. Box 949, Gig Harbor, WA 98335
Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

JEREMY F. HAUG — STATE OF WASHINGTON — 21611 — REGISTERED PROFESSIONAL ENGINEER

1.2.2025

SHEET TITLE: AISLE C PLAN AND PROFILE

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98408

PHONE: (253) 318-5711

CONTACT: KEN RODY

DESIGNER: M. GOULARTE
ENGINEER: J. HAUG
DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 1.2.2025
REVISED:

PROJECT: 20-223
DWG NAME: 20-223 C

SHEET	REV.
C13	0
13 OF 22	

BRADBURY PLACE APARTMENTS

A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON
MATCHLINE C15

GRAPHIC SCALE
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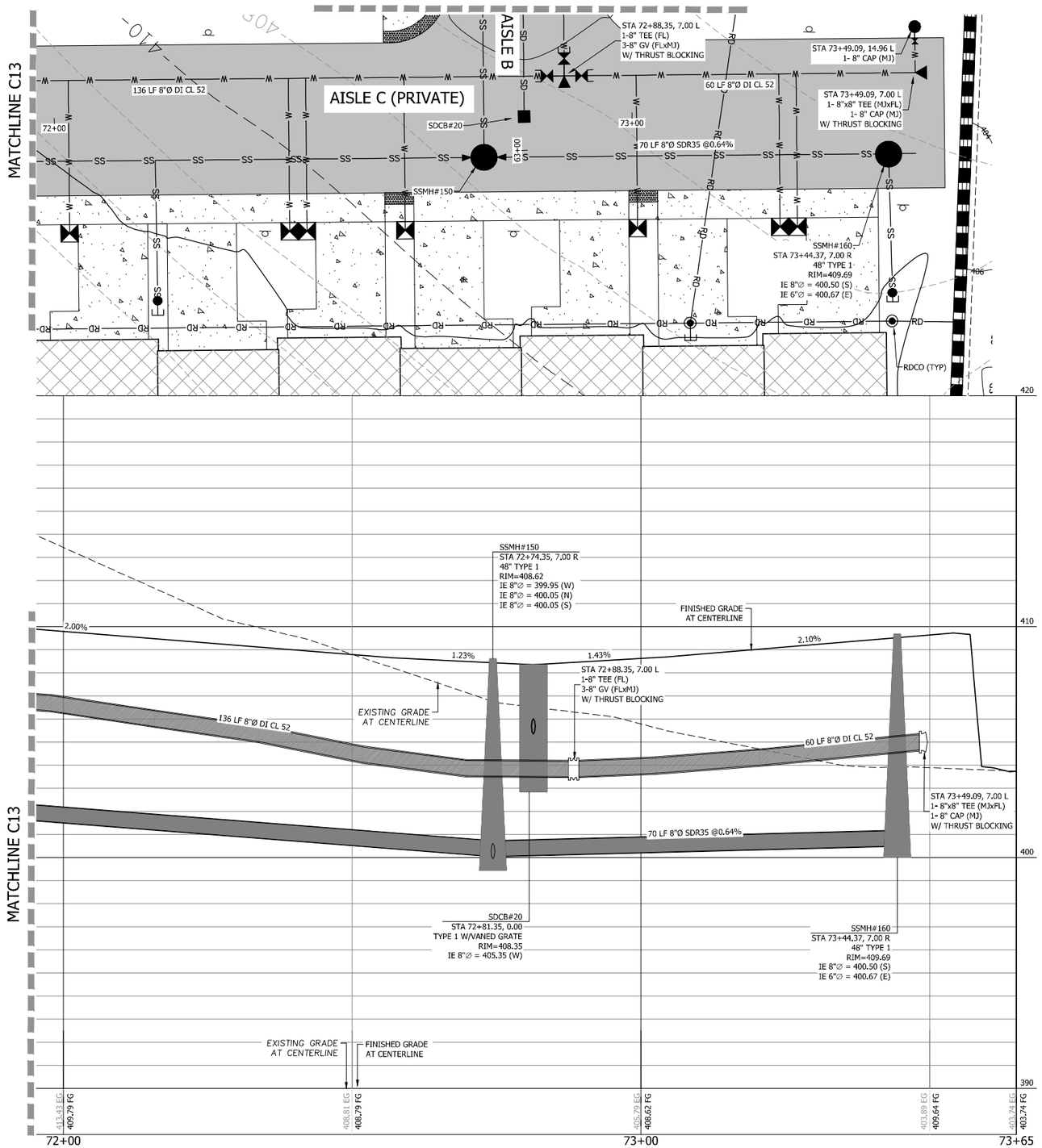
1 INCH = 10 FEET (22"x34")
1 INCH = 20 FEET (11"x17")



AISLE C - STA: 72+00 TO 73+65

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2.5'

VERIFICATION NOTE

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Mailing Address: P.O. Box 949, Gig Harbor, WA 98335
Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

JEREMY R. HAUG — STATE OF WASHINGTON — 24011 — REGISTERED PROFESSIONAL ENGINEER
1.2.2025

SHEET TITLE: AISLE C PLAN AND PROFILE

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98408
CONTACT: KEN RODY
PHONE: (253) 318-5711

DESIGNER: M. GOULARTE
ENGINEER: J. HAUG
DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 1.2.2025
REVISED:

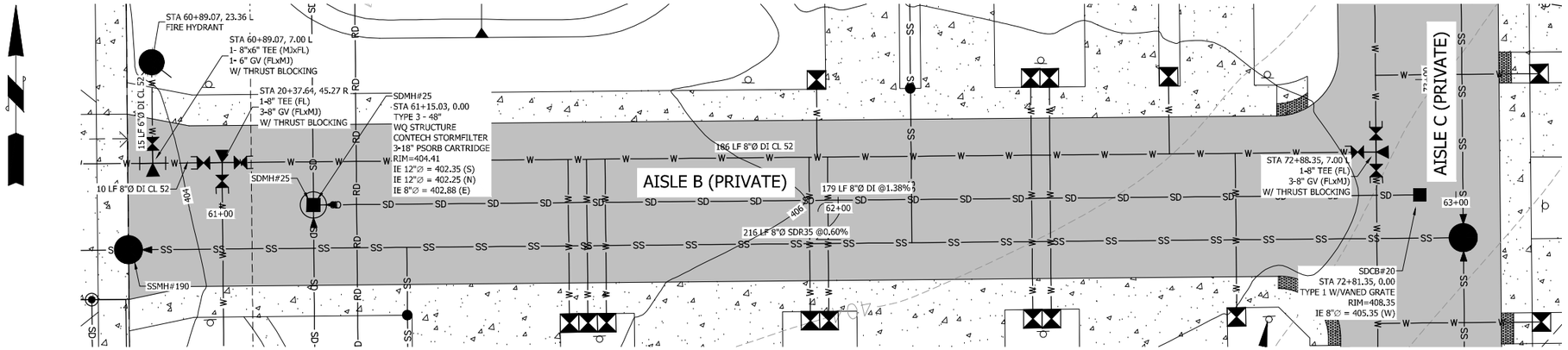
PROJECT: 20-223
DWG NAME: 20-223 C

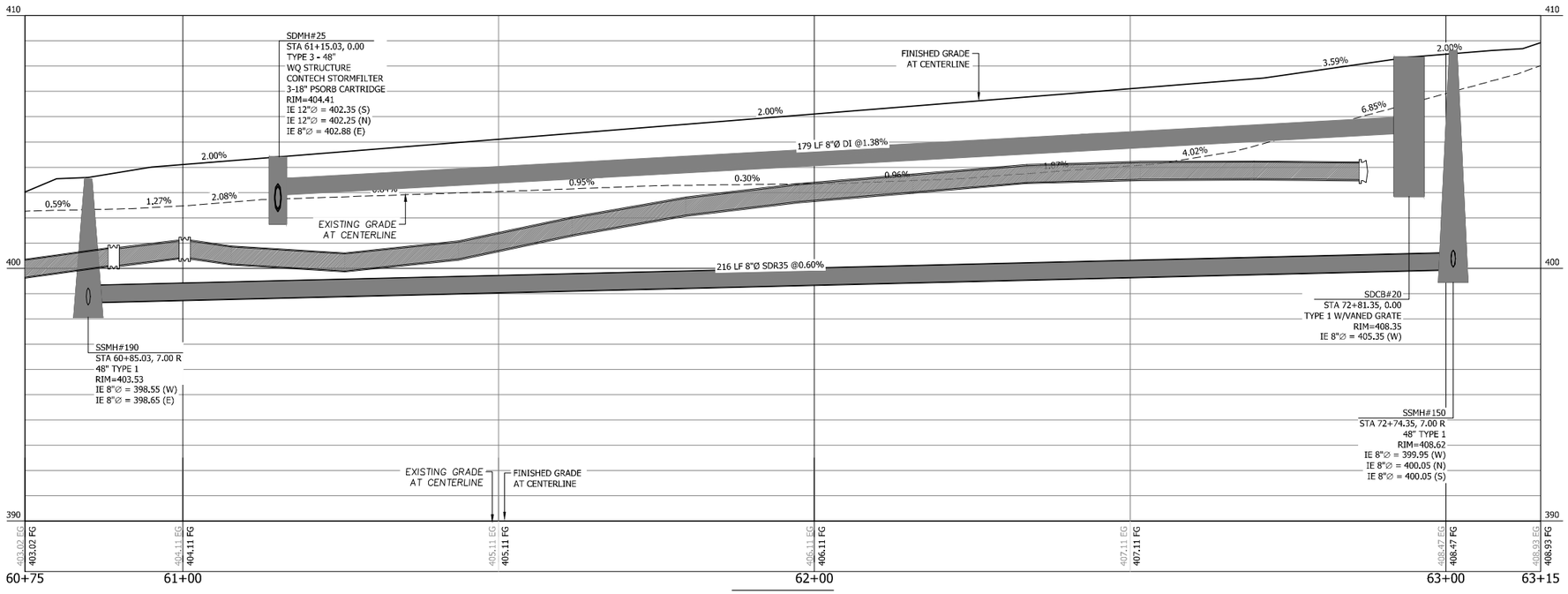
SHEET	REV.
C14	0
14 OF 22	

BRADBURY PLACE APARTMENTS

A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

GRAPHIC SCALE
0 10 20
1 INCH = 10 FEET (22"x34")
1 INCH = 20 FEET (11"x17")





AISLE B - STA: 60+75 TO 63+15

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2.5'

VERIFICATION NOTE

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Mailing Address: P.O. Box 949, Gig Harbor, WA 98335
Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

TIMOTHY R. HAUG — STATE OF WASHINGTON — 24837 — REGISTERED PROFESSIONAL ENGINEER
1.2.2025

SHEET TITLE: AISLE B PLAN AND PROFILE

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98408
PHONE: (253) 318-5711
CONTACT: KEN RODY

DESIGNER: M. GOULARTE
ENGINEER: J. HAUG
DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 1.2.2025
REVISED:

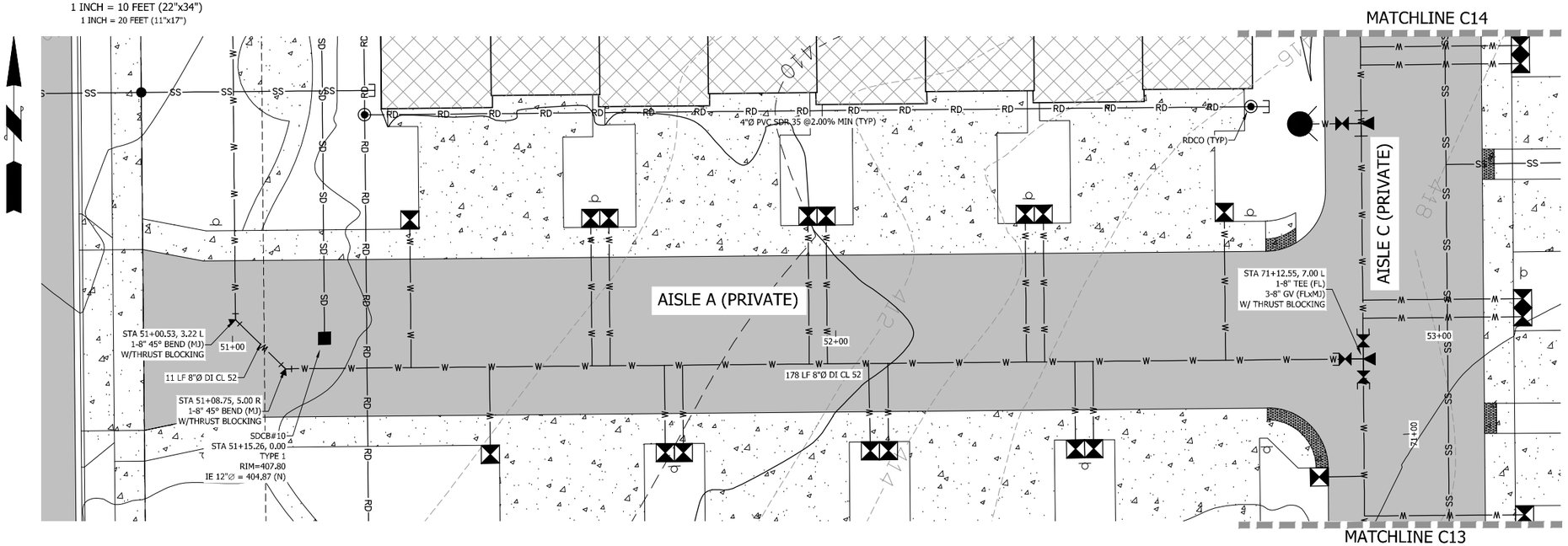
PROJECT: 20-223
DWG NAME: 20-223 C

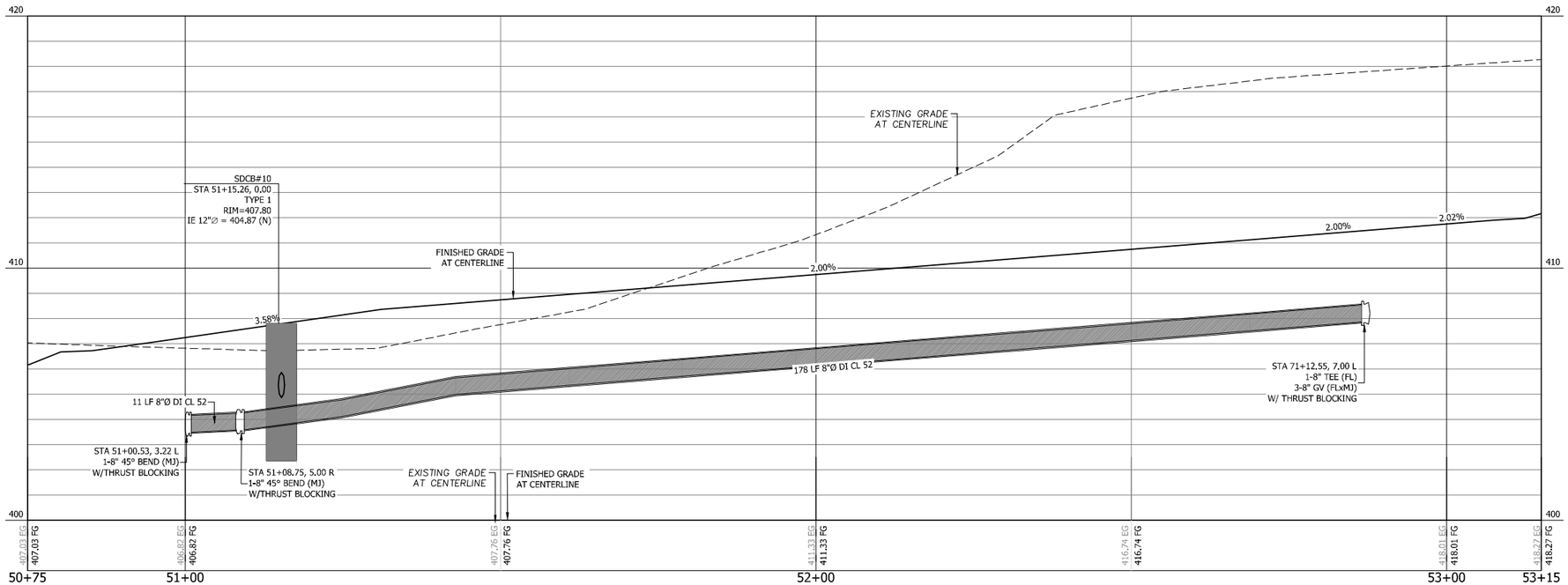
SHEET	REV.
C15	0
15 OF 22	

BRADBURY PLACE APARTMENTS

A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

GRAPHIC SCALE
0 10 20
1 INCH = 10 FEET (22"x34")
1 INCH = 20 FEET (11"x17")





AISLE A - STA: 50+75 TO 53+15

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2.5'

VERIFICATION NOTE

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CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG

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Mailing Address: P.O. Box 949, Gig Harbor, WA 98335
Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

JEREMY F. HAUG — STATE OF WASHINGTON — 21483 — REGISTERED PROFESSIONAL ENGINEER
1.2.2025

SHEET TITLE: AISLE A PLAN AND PROFILE

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98408
CONTACT: KEN RODY
PHONE: (253) 318-5711

DESIGNER: M. GOULARTE
ENGINEER: J. HAUG
DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 1.2.2025
REVISED:

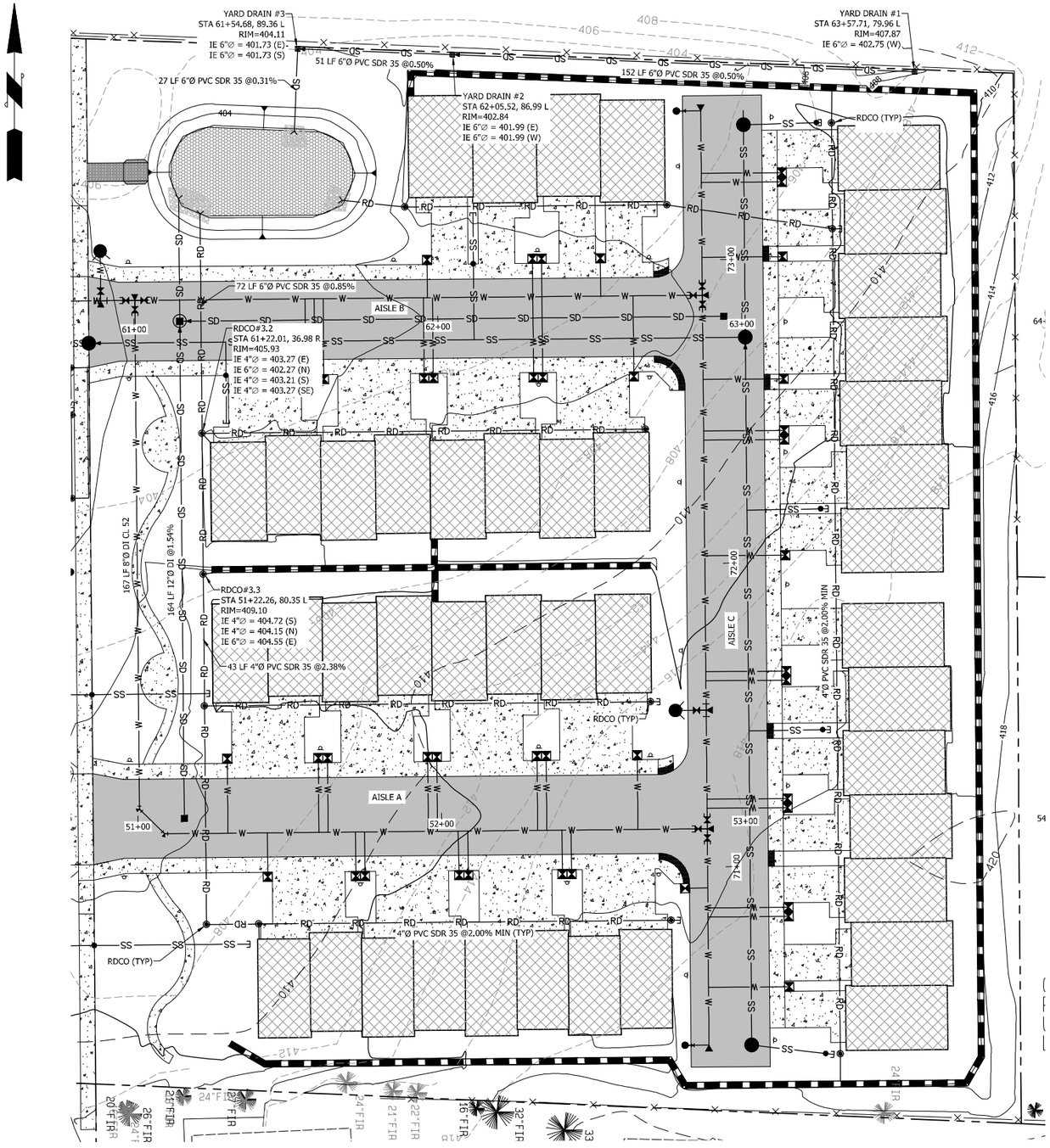
PROJECT: 20-223
DWG NAME: 20-223 C

SHEET	REV.
C16	0
16 OF 22	

BRADBURY PLACE APARTMENTS

A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

GRAPHIC SCALE
0 20 40
1 INCH = 20 FEET (22"x34")
1 INCH = 40 FEET (11"x17")



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REVISION	DESCRIPTION	DATE	BY

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Phone: 253-857-5454 ~ Fax: 253-509-0044 ~ info@contourplk.com
Mailing Address: P.O. Box 949, Gig Harbor, WA 98335
Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

JEREMY F. HAUG — STATE OF WASHINGTON — 22810 — REGISTERED PROFESSIONAL ENGINEER
1.2.2025

SHEET TITLE: ROOF AND YARD DRAIN PLAN

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
TACOMA, WA 98408
PHONE: (253) 318-5711
CONTACT: KEN RODY

DESIGNER: M. GOULARTE
ENGINEER: J. HAUG
DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 1.2.2025
REVISED:
PROJECT: 20-223
DWG NAME: 20-223 C

SHEET	REV.
C17	0
17 OF 22	

APPENDIX C

Geotechnical Report

GEORESOURCES
earth science & geotechnical engineering
5007 Pacific Hwy E., Suite 16 | Fife, WA 98424 | 253.896.1011 | www.georesources.rocks

May 24, 2019

Eagle Works LLC
2504 – 43rd Street East
Puyallup, WA 98374
rick@harvestrealtyinc.com

Soils Report: Infiltration Feasibility
Proposed Multi-Family Development
xxx – 5th Street Southeast
Puyallup, Washington
PN: 0419036002, -6003
Doc ID: EagleWorksLLC.5thStreetSE.SR

INTRODUCTION

This soils report addresses the feasibility of the site soils to support the infiltration of stormwater runoff generated by the proposed residential development to be constructed at xxx – 5th Street in the City of Puyallup located in Pierce County, Washington. The general site location is shown on the Site Location Map, Figure 1.

Our understanding of the project is based on our conversations with you, our review of available published geologic literature for the site area, our March 13, 2019 site visit and subsurface explorations, our understanding of City of Puyallup development requirements, and our experience in the area. We understand that the site is currently undeveloped and that you propose to construct a 46-unit multi-family apartment complex at the site that likely would include driveways, parking lots and associated utilities. A site plan was not provided to us at the time of this report.

Because of the proposed amount of new hard surface, the City of Puyallup is requiring that a site-specific soils report be prepared in accordance with the 2012 Stormwater Management Manual for Western Washington (SWMMWW) with the 2014 Amendments.

SCOPE

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

1. Conducting a geologic reconnaissance of the site area;
2. Reviewing the available geotechnical, geologic and hydrogeologic data for the site area;
3. Observing the excavation of 9 test pit explorations, and sampling the observed soils for subsequent laboratory testing, as deemed necessary;
4. Performing up to 2 grain size analysis on representative select soil samples from the explorations;
5. Determining a preliminary infiltration rate based on the grain size analysis, if appropriate;

6. Preparing this *Soils Report* summarizing our site observations and conclusions, along with the supporting data.

The above scope of work was completed in accordance with our *Proposal for Services* dated March 13, 2019. We received notice to proceed on the same day.

Site Conditions

As stated, the site is located at xxx – 5th Street Southeast in the City of Puyallup of Pierce County, Washington, within an area of existing residential and commercial development. The site consists of two parcels that when combined are generally rectangular in shape, measures about 340 feet deep (north to south) by 330 feet wide (east to west) and encompasses about 2.68 acres. The site is bounded by an office building to the north, a parking lot and office building to the east, an apartment complex to the west, and residential development to the south. As previously stated, the site is currently undeveloped.

The site is located on the north margin of the Puyallup-South Hill glacial upland area. Based on information obtained from Pierce County PublicGIS and our site observations, the site slopes up towards the southeast, generally getting steeper towards the southeast portion. The northwest to southwest portion of the site is flat to gently sloping up towards the southeast at less than 3 percent. The slopes in the southeastern portion slope up at a steeper inclination of 10 to 14 percent before transitioning to about 4 to 6 percent in the southeastern corner. The total topographic relief across the parcel is on the order of about 15 feet. The existing site configuration and topography is shown on the Site and Exploration Map, Figure 2.

Vegetation at the site consists of immature growth forestland, primarily maple to douglas fir trees with an understory of blackberries, ferns, and smaller saplings. No surface erosion, seeps, springs, or evidence of slope instability was observed at the time of our site visit.

Site Soils

The USDA Natural Resource Conservation Service (NRCS) Web Soil Survey maps the site and surrounding areas as being underlain by Everett very gravelly sandy loam (13B) soils. The Everett soils are derived from sandy and gravelly glacial outwash and are included in hydrologic soils group A. The 13B soil type forms on slopes of 0 to 8 percent and have a "slight" erosion hazard when exposed. Our subsurface explorations generally confirm the NRCS map for the site. A copy of the NRCS Soil Survey Map for the site and surrounding area is included as Figure 3.

Geologic Conditions

The draft *Geologic Map of the Puyallup 7.5-Minute Quadrangle, Washington* (Troost et Al.) maps the site as being underlain by recessional outwash ($Qvsb_4$). These glacial outwash soils were generally deposited during the Vashon stage of the Fraser Glaciation, some 12,000 to 15,000 years ago. The recessional deposits typically consist of a poorly-sorted, lightly-stratified mixture of sand and gravel that may locally contain silt and clay that were deposited by meltwater streams issuing from the retreating ice mass. The $Qvsb_4$ deposits are part of the Bradley Channel, a subunit of Steilacoom gravel, outwash flood channel deposits. The recessional outwash is considered to be normally consolidated and generally exhibits moderate strength and compressibility characteristics where undisturbed. An excerpt of the above referenced geologic map is included as Figure 4.

Subsurface Explorations

On March 13, 2019, a representative from GeoResources, LLC (GeoResources) visited the site and observed two groundwater monitoring ports and seven previously excavated test pits to depths of approximately 5 to 10 feet below the existing ground surface, logged the subsurface conditions encountered in each test pit, and obtained representative soil samples. The test pits and the groundwater monitoring ports were excavated by a licensed operator on a small track-mounted excavator working for you. Table 1, below, summarizes the approximate locations, surface elevations, and termination depths of the test pits and groundwater monitoring ports.

TABLE 1:
APPROXIMATE LOCATIONS, ELEVATIONS, AND DEPTHS OF EXPLORATIONS

Test Pit/ Monitoring Port Number	Functional Location	Surface Elevation[1] (feet)	Termination Depth (feet)	Termination Elevation (feet)
MP-1	Northwestern portion of site	410	10	400
MP-2	Northwestern portion of site	410	10	400
TP-1	Northeastern portion of site	410	5	405
TP-2	Middle of site	410	5	405
TP-3	Northwestern portion of site	410	5	405
TP-4	North central portion of site	410	5	410
TP-5	Northeast portion of site	415	5	410
TP-6	Northeast portion of site	415	5	410
TP-7	Southeast portion of site	418	5	413

Notes:
Elevation datum: Pierce County GIS (NAVD 88)

The specific number, locations, and depths of the explorations were selected by you. Representative soil samples obtained from the test pits and groundwater monitoring ports were placed in sealed plastic bags and then taken to a laboratory for further examination and testing as deemed necessary.

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

The approximate locations and numbers of our test pits are shown on the attached Site and Exploration Map, Figure 2. The soils encountered were visually classified in general accordance with the Unified Soil Classification System (USCS) and ASTM D: 2488. The USCS is included in Appendix A as Figure A-1, while the descriptive logs of our test pits are included as Figure A-2 through A-6.

Subsurface Conditions

Our test pits and the monitoring ports encountered relatively uniform subsurface conditions that generally confirmed the mapped stratigraphy at the site. Our test pit explorations encountered

0.3 to 2 feet of gravelly black topsoil over 0.8 to 4 feet of reddish-brown to gray, poorly to well-graded gravel with variable amounts of sand and cobbles, that appeared to be in a medium dense, moist condition. We interpret these surficial soils as recessional glacial outwash deposits. At depths of 2.5 to 5 feet in monitoring ports MP-1, MP-2, test pits TP-1, TP-5, TP-6, and TP-7, a dense to very grey silty sand with gravel and cobbles that appeared consistent with glacial till was encountered underlying the shallow recessional outwash. Although not encountered in all test pit explorations, we anticipate the glacial till underlies the outwash deposits across the site. It also appears that the glacial till is encountered at shallower depths towards the upslope, southeast direction.

Monitoring Port MP-1, test pit TP-1, and TP-2 encountered about 0.5 to 1.7 feet of reddish-brown sandy silt with gravel that we interpret to be undocumented fill. The fill was generally encountered in the central portion of the site. The soils appeared to be in a loose, moist condition. Table 2, below, summarizes the approximate thicknesses, depths, and elevations of selected soil layers.

TABLE 2:
APPROXIMATE THICKNESS, DEPTHS, AND ELEVATION OF SOIL TYPES ENCOUNTERED IN EXPLORATIONS

Exploration Number	Thickness of Topsoil (feet)	Thickness of Recessional Outwash (feet)	Thickness of Weathered Glacial Till (feet)	Depth to Undisturbed Glacial Till (feet)	Elevation of Undisturbed Glacial Till (feet)
MP-1	2	3	N/E	5	405
MP-2	½	3½	N/E	5	405
TP-1	¼	1½	N/E	3½	406½
TP-2	½	3½	N/E	N/E	N/E
TP-3	½	4½	N/E	N/E	N/E
TP-4	1	4	N/E	N/E	N/E
TP-5	1	1½	N/E	2½	412½
TP-6	½	¾	N/E	1¼	413¾
TP-7	½	1½	N/E	2	416

Groundwater Conditions

We observed mottling in the lower portion of the shallow recessional outwash deposits, and significant mottling of the upper portion of the glacial till deposits. Mottling is generally indicative of a seasonal or fluctuating high perched groundwater table that typically develops when the vertical infiltration of precipitation through a more permeable soil is slowed at depth by a deeper, denser, less permeable soil type, such as glacial till. We anticipate fluctuations in the local groundwater levels will occur in response to precipitation patterns, off-site construction activities, and site utilization. Table 3 summarizes the approximate depths and elevations of groundwater and mottling observed at the time of our explorations.

TABLE 3:
APPROXIMATE DEPTHS, AND ELEVATION OF GROUNDWATER ENCOUNTERED IN EXPLORATIONS

Exploration Number	Depth to Mottling (feet)	Depth to Groundwater (feet)	Elevation of Groundwater (feet)	Dated Encountered
MP-1	5	N/E	N/E	ATD (5/11/2019)
MP-2	5	N/E	N/E	ATD (5/11/2019)
TP-1	3½	N/E	N/E	ATD (5/11/2019)
TP-2	4	N/E	N/E	ATD (5/11/2019)
TP-3	N/E	N/E	N/E	ATD (5/11/2019)
TP-4	N/E	N/E	N/E	ATD (5/11/2019)
TP-5	1	N/E	N/E	ATD (5/11/2019)
TP-6	½	N/E	N/E	ATD (5/11/2019)
TP-7	½	N/E	N/E	ATD (5/11/2019)

Notes: Elevation datum: Pierce County GIS data N/E: Not encountered
ATD = At time of drilling/digging

Laboratory Testing

Geotechnical laboratory tests were performed on select samples retrieved from the test pits to determine soil index and engineering properties encountered. Laboratory testing included visual soil classification per ASTM D: 2488 and grain size analyses per ASTM D: 422 standard procedures. The results of the laboratory tests are included in Appendix B.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our site reconnaissance, subsurface explorations and laboratory test results, the use of downspout infiltration, bioretention, or permeable pavement BMP's to address stormwater runoff and flow control generated by the proposed development is feasible, provided adequate separation from the underlying glacial till and seasonal high groundwater can be maintained. The deeper glacial till (hardpan) underlying the site at depth will not support infiltration.

Downspout Infiltration

Based on our site observations and subsurface explorations, it is our opinion that stormwater infiltration via a trench type system is feasible within the northwestern and southwestern portions of the site. Per the Volume 3.1.1 of the 2012 SWMMWW, downspout infiltration is considered feasible on lots or sites if 3 feet or more of permeable soil from the proposed final grade to the seasonal high ground water table exists and at least 1 foot of clearance from the expected bottom elevation of the infiltration trench or dry well to the seasonal high ground water table can be met. Given that a typical downspout trench depth is 2 feet below the existing ground surface, the minimum separation between the bottom of the infiltration facility and seasonal high groundwater or impermeable layer can be met in the northwest to southwest portions; therefore, onsite infiltration of stormwater is feasible in the

northwest to southwest portions. A basin type system may be feasible within the northwestern to southwestern portions with a mounding analysis. Per Volume 3.3.7 of the 2012 SWMMWW, basins require 5 feet of separate, or 3 feet with a mounding analysis. As stated previously, glacial till was encountered at 5 feet below existing grade in the northwestern portion of the site. Based on the subsurface conditions encountered in the vicinity of the test pits TP-5, TP-6 and TP-7, the minimum separation requirements cannot be met. We recommend alternative stormwater management options such as dispersion be considered in the northeast to southeast portions.

All appropriate and pertinent setback criteria per the 2012 SWMMWW should be considered prior to the selection of a stormwater management BMP.

Permeable Pavement

Per Volume V BMP T5.15, permeable pavement is not feasible if seasonal high ground water or an underlying impermeable/low permeable layer would create saturated conditions within 1-foot of the bottom of the storage course. The granular nature of the upper surficial soils in the northwestern and southwestern portion allow for the support of permeable pavement.

Soil Grain Size Analysis Method

Since the soils are part of the Steilacoom Gravel, the use of the Grain Size method per the 2012 SWMMWW, Volume III 3.3.6 used by the City of Puyallup may be used to determine infiltration rates.

Based on our grain size analysis and in accordance with the 2012 SWMMWW, we recommend a long-term design infiltration rate of 7 inches per hour be used to design infiltration facilities in the upper gravelly soils where infiltration is feasible. Appropriate correction factors for test method and plugging have been applied to these values, but the project civil engineer should include a correction factor for geometry.

We recommend that a representative from our firm be onsite at the time of excavation of the proposed infiltration facilities to verify that the soils encountered during construction are consistent with the soils observed in our subsurface explorations, and if the vertical separation requirements could be met. In-situ infiltration testing should also be performed at the time of construction to verify the recommended infiltration rate per the 2012 SWMMWW.

Appropriate design, construction and maintenance measures will be required to ensure the infiltration rate can be effectively maintained over time. It should be noted that special care is required during the grading and construction periods to avoid fine sediment contamination of the infiltration system. This may be accomplished by using an alternative storm water management location during construction or leaving the bottom of the systems 1 to 2 feet high, and subsequently excavating to the finished grade once the driveways are paved and landscaping is installed. All contractors working on the site (builders and subcontractors) should be advised to avoid “dirty” stormwater flowing to the site’s stormwater system during construction and landscaping. No concrete trucks should be washed or cleaned on-site.

Suspended solids could clog the underlying soil and reduce the infiltration rate. To reduce potential clogging of the infiltration systems, the infiltration system should not be connected to the stormwater runoff system until after construction is complete and the site area is landscaped, paved or otherwise protected. Temporary systems may be utilized through construction. Periodic sweeping of the paved areas will help extend the life of the infiltration system.

All proposed infiltration facilities should be designed and constructed in accordance with the 2012 SWMMWW. All minimum separation, setback requirements and infeasibility criteria per 2012 SWMMWW should be considered prior to the selection, design and location of any stormwater facility for the proposed development.

LIMITATIONS

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

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

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

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

◆ ◆ ◆

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

Respectfully submitted,
GeoResources, LLC

Erik Fina, GIT
Staff Geologist in Training

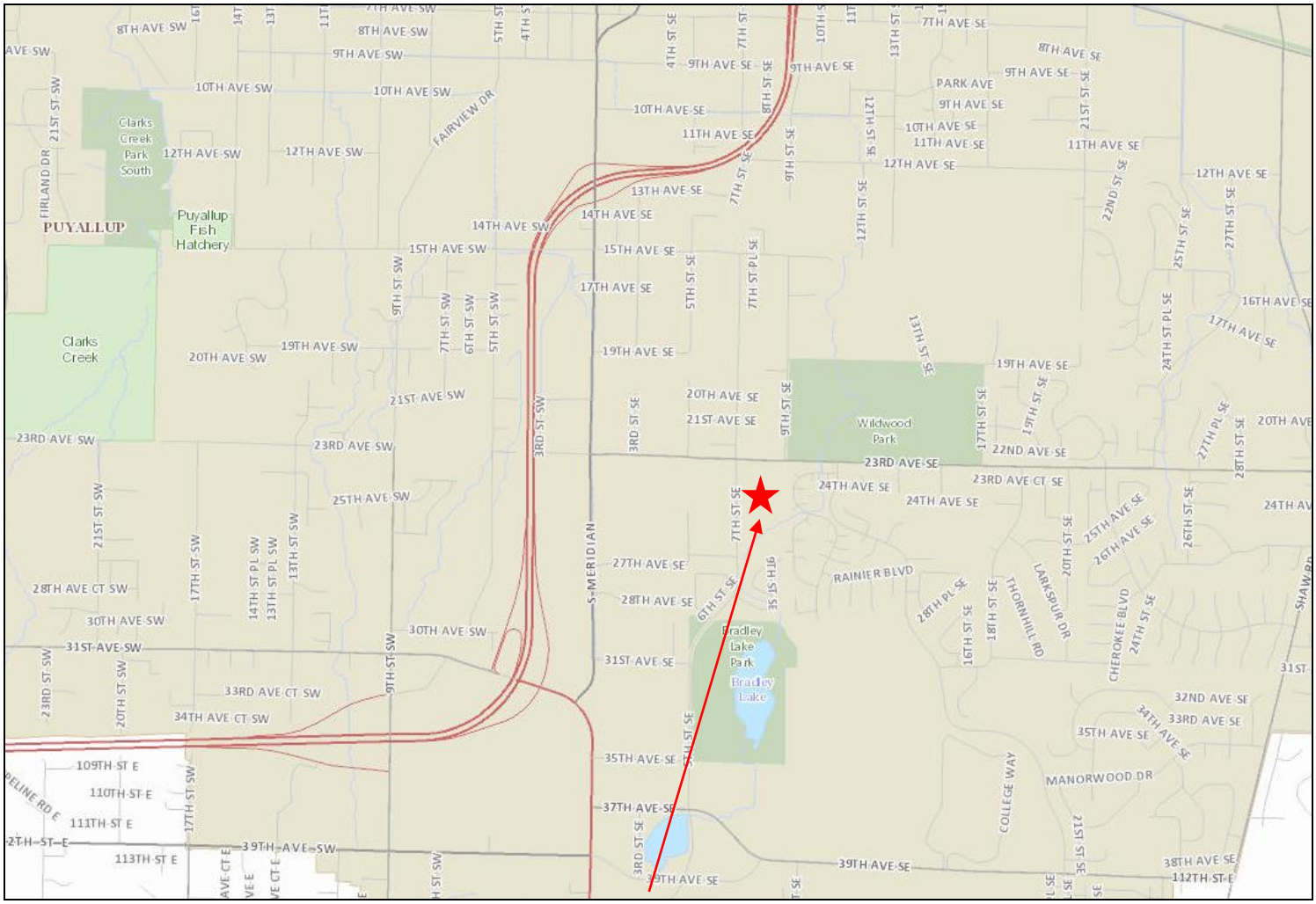
State of Washington
Engineering Geologist
925
Licensed Geologist
5/24/2019
KEITH SCOTT SCHEMBS

Keith S. Schembs, LEG
Principal

NEIL ANDREW FERGUSON
STATE OF WASHINGTON
56951
REGISTERED
PROFESSIONAL ENGINEER
5/24/2019

Neil A. Ferguson, PE
Project Engineer

EJF:KSS:NAF/ejf
Doc ID: EagleWorksLLC.5thStSE.SR
Attachments:
Figure 1: Site Location Map
Figure 2: Site and Exploration Map
Figure 3: NRCS Soils Map
Figure 4: USGS Geologic Map
Appendix A: Subsurface Explorations
Appendix B: Laboratory Results



Approximate Site Location

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

Not to Scale

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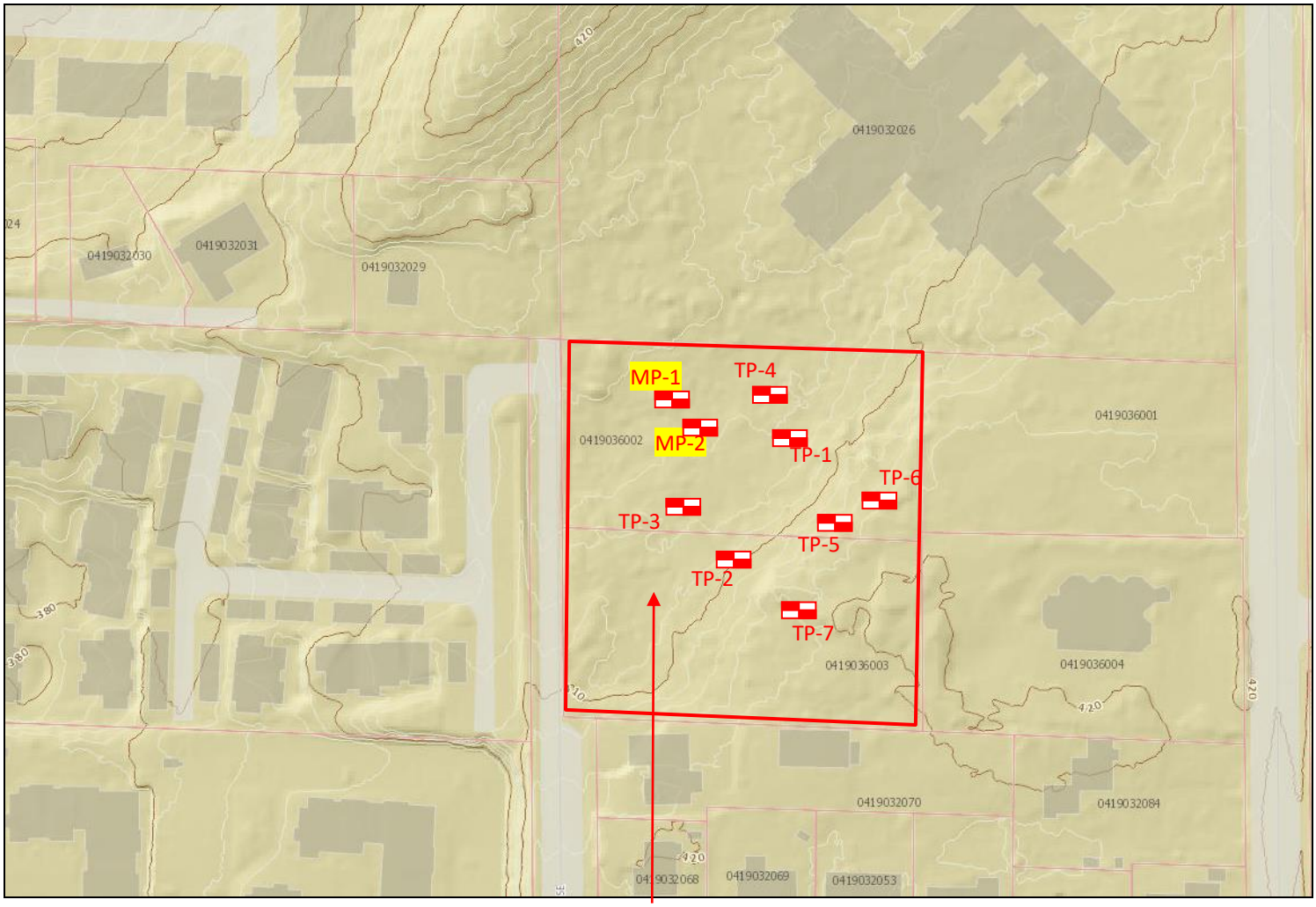
Site Location Map

Proposed Single Family Residence
xxx – 5th Street Southeast
Puyallup, WA
PN: 041903-6002, -6003

DocID: EagleWorksLLC.5thStSE	May 2019	Figure 1



Approximate Site Location

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

Approximate location and number of test pit

N W E S

Not to Scale

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Site & Exploration Map

Proposed Single Family Residence
xxx – 5th Street Southeast
Puyallup, WA
PN: 041903-6002, -6003

DocID: EagleWorksLLC.5thStSE	May 2019	Figure 2

Approximate Site Location

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

Soil Type	Soil Name	Parent Material	Slopes (%)	Erosion Hazard	Hydrologic Soils Group
13B	Everett very gravelly sandy loam	Sandy and gravelly glacial outwash	0 to 8	Slight	A
13C			8 to 15	Slight to Moderate	
20B	Kitsap silt loam	Glaciolacustrine deposits	2 to 8	Slight	C/D

N W E S

Not to Scale

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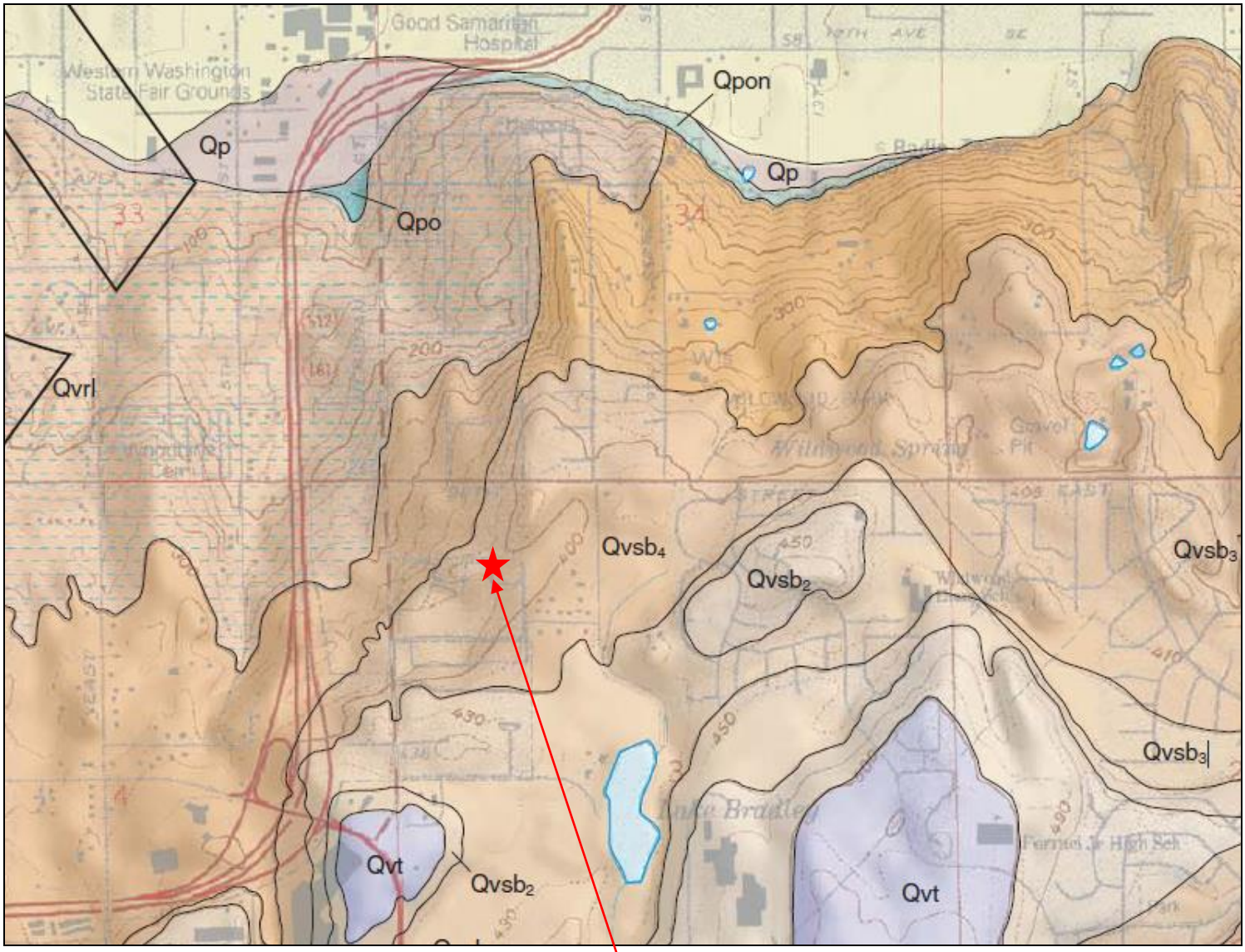
NRCS Soils Map

Proposed Single Family Residence
xxx – 5th Street Southeast
Puyallup, WA
PN: 041903-6002, -6003

DocID: EagleWorksLLC.5thStSE	May 2019	Figure 3



Approximate Site Location

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

$Qvsb_4$	Steilacoom Gravel – Bradley Channel
$Qvsb_3$	Steilacoom Gravel – Bradley Channel
$Qvsb_2$	Steilacoom Gravel – Bradley Channel
Qvt	Vashon glacial till

Not to Scale

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USGS Geologic Map

Proposed Single Family Residence
xxx – 5th Street Southeast
Puyallup, WA
PN: 041903-6002, -6003

DocID: EagleWorksLLC.5thStSE	May 2019	Figure 4

Appendix A

Subsurface Explorations

SOIL CLASSIFICATION SYSTEM

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

NOTES:

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

SOIL MOISTURE MODIFIERS:

Dry- Absence of moisture, dry to the touch

Moist- Damp, but no visible water

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

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Unified Soils Classification System

Proposed Single Family Residence
xxx – 5th Street Southeast
Puyallup, WA
PN: 041903-6002, -6003

GW Monitoring Port MP-1

Location: Northwestern portion
Approximate Elevation: 410'

Depth (ft)			Soil Type	Soil Description
0	-	2.0	-	Dark brown topsoil
2.0	-	5.0	GP-GM	Reddish brown poorly graded GRAVEL with sand and silt, roots, light iron-oxide staining/discoloration (loose to medium dense, moist) (Weathered Recessional Outwash - Steilacoom Gravel)
5.0	-	10.0	SM	Dark grey silty SAND with gravel and cobbles, iron-oxide staining/discoloration at contact (dense to very dense, moist) (Undisturbed Glacial Till)

Terminated at 10.0 feet below ground surface.
Mottling observed at 5.0 feet at time of excavation.
No caving observed at the time of excavation.
No groundwater seepage observed.

GW Monitoring Port MP-2

Location: Northwestern portion
Approximate Elevation: 410'

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Black topsoil
0.5	-	1.5	ML	Reddish brown sandy SILT with gravel (loose, moist) (Undocumented Fill?)
1.5	-	5.0	GP	Brown poorly graded GRAVEL with sand and cobbles (medium dense, moist) (Recessional Outwash - Steilacoom Gravel)
5.0	-	10.0	SM	Dark grey silty SAND with gravel and cobbles, iron-oxide staining/discoloration at contact (very dense, moist) (Undisturbed Glacial Till)

Terminated at 10.0 feet below ground surface.
Mottling observed at 5.0 feet at time of excavation.
No caving observed at the time of excavation.
No groundwater seepage observed.

Logged by: EJF **Excavated on: March 13, 2019**

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Groundwater Monitoring Port Logs
Proposed Single Family Residence
xxx – 5th Street Southeast
Puyallup, WA
PN: 041903-6002, -6003

Test Pit TP-1

Location: Northeastern portion
Approximate Elevation: 410'

Depth (ft)			Soil Type	Soil Description
0		0.3	-	Black topsoil, mantled by forest duff
0.3	-	2.0	ML	Reddish brown sandy SILT with gravel (loose, moist) (Undocumented Fill?)
2.0	-	3.5	GP-GM	Reddish brown poorly graded GRAVEL with sand and silt, roots, light iron oxide staining/discoloration (loose to medium dense, moist) (Weathered Recessional Outwash - Steilacoom Gravel)
3.5	-	5.0	SM	Grey silty SAND with gravel and cobbles (very dense, moist) (Undisturbed Glacial Till)

Terminated at 5.0 feet below ground surface.
Mottling observed from 3.5 to 5.0 feet at time of excavation.
No caving observed at the time of excavation.
No groundwater seepage observed.

Test Pit TP-2

Location: Southwestern portion
Approximate Elevation: 410'

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Black topsoil
0.5	-	1.0	ML	Reddish brown sandy SILT with gravel (loose, moist) (Undocumented Fill?)
1.5	-	5.0	GW	Reddish brown well graded GRAVEL with sand and cobbles, light iron oxide staining/discoloration (medium dense, moist) (Weathered Recessional Outwash - Steilacoom Gravel)

Terminated at 5.0 feet below ground surface.
Mottling observed from 4.0 to 5.0 feet at time of excavation.
No caving observed at the time of excavation.
Static groundwater levels observed at 2 feet below ground surface.

Logged by: EJF **Excavated on: March 13, 2019**

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Test Pit Logs
Proposed Single Family Residence
xxx – 5th Street Southeast
Puyallup, WA
PN: 041903-6002, -6003

Test Pit TP-3

Location: Northwestern portion
Approximate Elevation: 410'

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Dark brown topsoil
0.5	-	1.0	SP	Reddish brown poorly graded GRAVEL with sand and cobbles, roots, light iron-oxide staining/discoloration (loose to medium dense, moist) (Weathered Recessional Outwash - Steilacoom Gravel)
1.0	-	5.0	SM	Grey poorly graded GRAVEL with sand and cobbles (medium dense, moist) (Recessional Outwash - Steilacoom Gravel)

Terminated at 5.0 feet below ground surface.
No mottling observed at time of excavation.
No caving observed at the time of excavation.
No groundwater seepage observed.

Test Pit TP-4

Location: Northern portion
Approximate Elevation: 410'

Depth (ft)			Soil Type	Soil Description
0	-	1.0	-	Black topsoil
1.0	-	2.5	SP	Reddish brown poorly graded GRAVEL with sand, silt and cobbles, roots, light iron-oxide staining/discoloration (loose to medium dense, moist) (Weathered Recessional Outwash - Steilacoom Gravel)
2.5	-	5.0	SM	Grey poorly graded GRAVEL with sand and cobbles (medium dense, moist) (Recessional Outwash - Steilacoom Gravel)

Terminated at 5.0 feet below ground surface.
No mottling observed at time of excavation.
No caving observed at the time of excavation.
No groundwater seepage observed.

Logged by: EJF **Excavated on: March 13, 2019**

Test Pit TP-5

Location: Northeastern portion
Approximate Elevation: 415’

Depth (ft)			Soil Type	Soil Description
0	-	1.0	-	Black topsoil
1.0	-	2.5	GP	Reddish brown poorly graded GRAVEL with sand, silt and cobbles, roots, light iron-oxide staining/discoloration (medium dense, moist) (Weathered Recessional Outwash - Steilacoom Gravel)
2.5	-	5.0	SM	Grey silty SAND with gravel and cobbles, iron-oxide staining/discoloration (dense, moist) (Glacial Till)

Terminated at 5.0 feet below ground surface.
Mottling observed from 1.0 to 5.0 feet at time of excavation.
No caving observed at the time of excavation.
No groundwater seepage observed.

Test Pit TP-6

Location: Northeastern portion
Approximate Elevation: 415’

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Black topsoil
0.5	-	1.2	GP	Reddish brown poorly graded GRAVEL with sand, silt and cobbles, roots, light iron-oxide staining/discoloration (medium dense, moist) (Weathered Recessional Outwash - Steilacoom Gravel)
1.2	-	5.0	SM	Grey silty SAND with gravel and cobbles, iron-oxide staining/discoloration (dense, moist) (Glacial Till)

Terminated at 5.0 feet below ground surface.
Mottling observed from 0.5 to 5.0 feet at time of excavation.
No caving observed at the time of excavation.
No groundwater seepage observed.

Logged by: EJF **Excavated on: March 13, 2019**

Test Pit TP-7

Location: Southeastern portion
Approximate Elevation: 418'

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Black topsoil
0.5	-	2.0	GP	Reddish brown poorly graded GRAVEL with sand, silt and cobbles, roots, light iron-oxide staining/discoloration (medium dense, moist) (Weathered Recessional Outwash - Steilacoom Gravel)
2.0	-	5.0	SM	Grey silty SAND with gravel and cobbles, iron-oxide staining/discoloration (dense, moist) (Glacial Till)

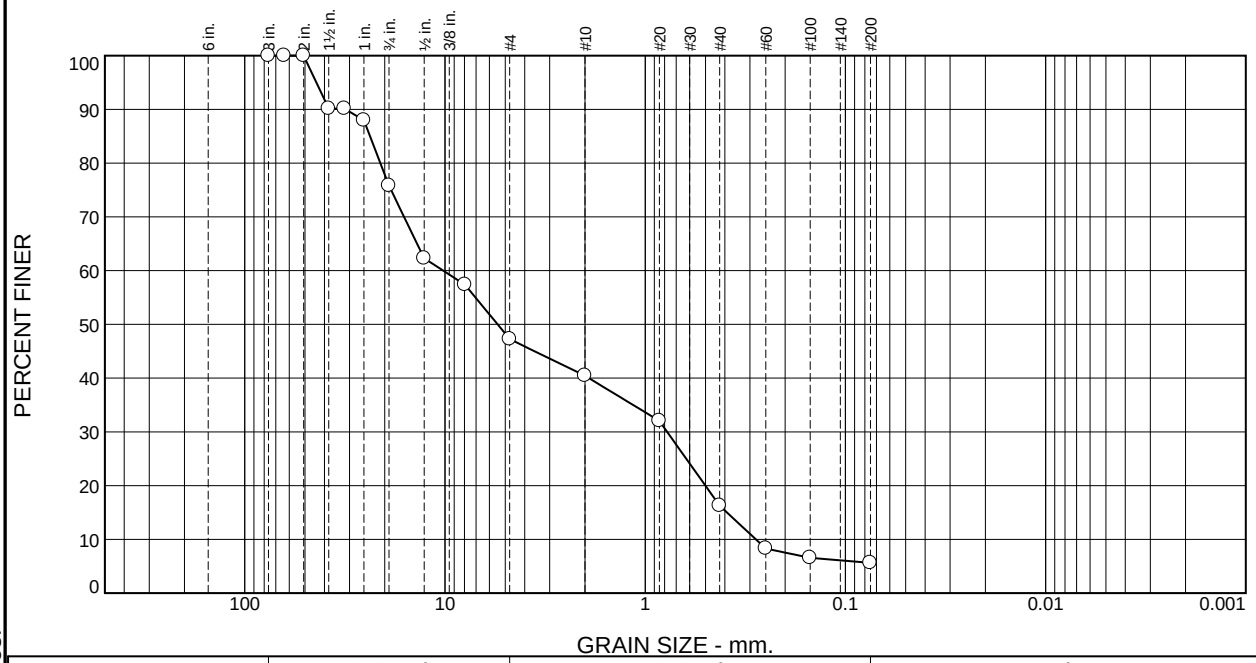
Terminated at 5.0 feet below ground surface.
Mottling observed from 0.5 to 5.0 feet at time of excavation.
No caving observed at the time of excavation.
No groundwater seepage observed.

Logged by: EJF **Excavated on: March 13, 2019**

Appendix B

Laboratory Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	24.2	28.5	6.9	24.1	10.7	5.6	

Test Results (ASTM D 422 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3.0	100.0		
2.5	100.0	100.0	
2.0	100.0	75.0 - 100.0	
1.5	90.1		
1.25	90.1		
1	88.0		
.75	75.8		
.5	62.3		
.3125	57.4		
#4	47.3	22.0 - 100.0	
#10	40.4		
#20	32.0		
#40	16.3		
#60	8.3		
#100	6.6		
#200	5.6	0.0 - 10.0	

* Pierce County Trench Backfill

Material Description

poorly graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)

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

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 31.2741 D_{85}= 23.6789 D_{60}= 10.2112
D_{50}= 5.4615 D_{30}= 0.7768 D_{15}= 0.3905
D_{10}= 0.2801 C_u= 36.46 C_c= 0.21

Remarks

Date Received: 03/13/2019 **Date Tested:** 03/28/2019

Tested By: EJF

Checked By:

Title:

Location: GW Monitoring Port MP-1/S-1 **Date Sampled:** 03/13/2019
Sample Number: 097147 **Depth:** 3'-4'

GeoResources, LLC

Fife, WA

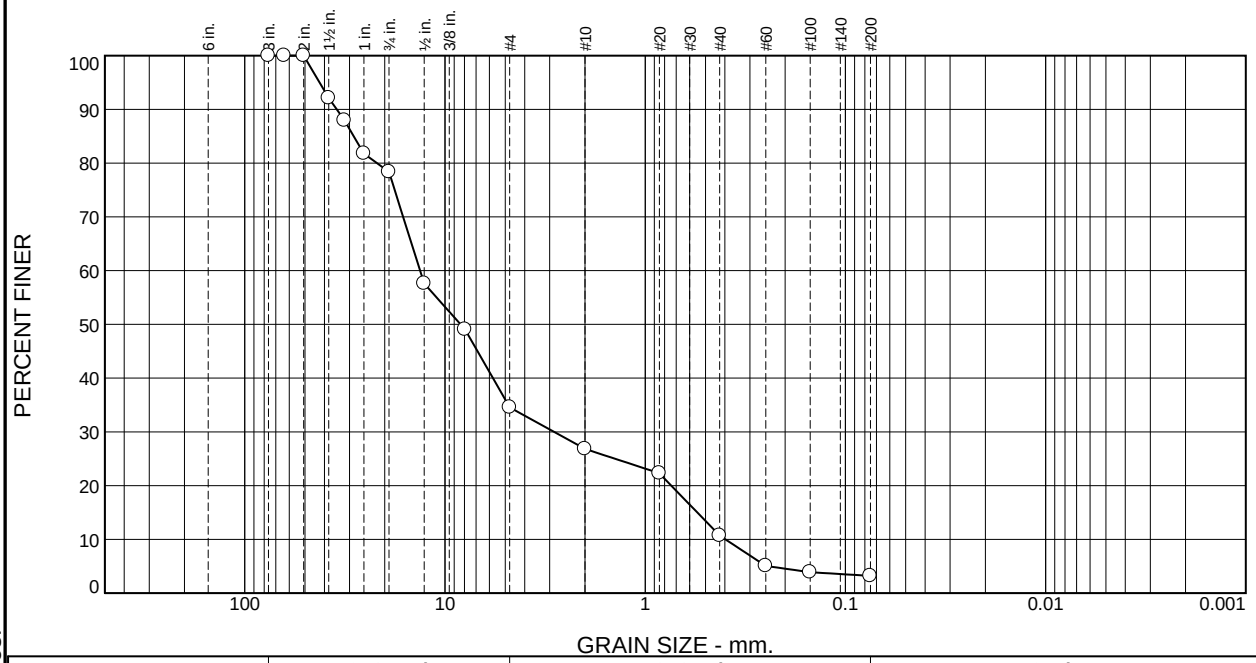
Client: Eagle Works LLC
Project: EagleworksLLC.5thStSE

Project No: **Figure** B-1

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

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

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	21.6	43.9	7.7	16.1	7.5	3.2	

Test Results (ASTM D 422 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3.0	100.0		
2.5	100.0	100.0	
2.0	100.0	75.0 - 100.0	
1.5	92.1		
1.25	87.9		
1	81.8		
.75	78.4		
.5	57.6		
.3125	49.1		
#4	34.5	22.0 - 100.0	
#10	26.8		
#20	22.3		
#40	10.7		
#60	5.1		
#100	3.9		
#200	3.2	0.0 - 10.0	

* Pierce County Trench Backfill

Material Description

well-graded gravel with sand

Atterberg Limits (ASTM D 4318)

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

Classification

USCS (D 2487)= GW **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 34.7418 D_{85}= 28.5504 D_{60}= 13.3087
D_{50}= 8.3629 D_{30}= 2.8524 D_{15}= 0.5493
D_{10}= 0.3977 C_u= 33.46 C_c= 1.54

Remarks

Date Received: 03/13/2019 **Date Tested:** 03/28/2019

Tested By: EJF

Checked By:

Title:

Location: Test Pit TP-2/S-1 **Date Sampled:** 03/13/2019
Sample Number: 097153 **Depth:** 3'-5'

GeoResources, LLC

Fife, WA

Client: Eagle Works LLC
Project: EagleworksLLC.5thStSE

Project No: **Figure** B-2

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

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

APPENDIX D

WWHM Reports

WWHM2012

PROJECT REPORT

Infiltration Sizing Calculations

General Model Information

WWHM2012 Project Name: Infiltration
Site Name:
Site Address:
City:

Report Date:	1/3/2025
Gage:	40 IN EAST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	0.000 (adjusted)
Version Date:	2023/01/27
Version:	4.2.19

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

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	2.56
Pervious Total	0
Impervious Land Use	acre
Impervious Total	0
Basin Total	0

The acreages shown in this section are inconsistent with the basin maps earlier in this report. Coordinate for consistency. [Storm Report, pg. 59]

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.46
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.01
Impervious Total	0
Basin Total	0

The acreages shown in this section are inconsistent with the basin maps earlier in this report. Coordinate for consistency. [Storm Report, pg. 60]

Ensure that these values are being calculated in the modeling. The total columns show as 0. [Storm Report, pg. 60]

Mitigated Land Use

Onsite

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Pasture, Flat	1.05
Pervious Total	1.05

Impervious Land Use	acre
ROADS FLAT	0.91
ROOF TOPS FLAT	0.61
POND	0.07
Impervious Total	1.59
Basin Total	2.64

The acreages shown in this section are inconsistent with the basin maps earlier in this report. Coordinate for consistency. [Storm Report, pg. 61]

Basin 2

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Pasture, Flat	0.19
Pervious Total	0.19

Impervious Land Use	acre
ROADS FLAT	0.28
Impervious Total	0.28
Basin Total	0.47

The acreages shown in this section are inconsistent with the basin maps earlier in this report. Coordinate for consistency. [Storm Report, pg. 62]

Mitigated Routing

Onsite Infiltration Pond

Infiltration Pond

Bottom Length:	43.00 ft.	
Bottom Width:	43.00 ft.	
Depth:	3.85 ft.	
Volume at riser head:	0.1217 acre-feet.	
Infiltration On		
Infiltration rate:	6.6	
Infiltration safety factor:	1	
Total Volume Infiltrated (ac-ft.):		679.999
Total Volume Through Riser (ac-ft.):		0.022
Total Volume Through Facility (ac-ft.):		680.02
Percent Infiltrated:		100
Total Precip Applied to Facility:		0
Total Evap From Facility:		0
Side slope 1:	0 To 1	
Side slope 2:	0 To 1	
Side slope 3:	0 To 1	
Side slope 4:	0 To 1	
Discharge Structure		
Riser Height:	2.85 ft.	
Riser Diameter:	12 in.	
Element Flows To:		
Outlet 1	Outlet 2	

43' x 43' = 1849 SF

The plans show a pond with a bottom area of 1,534 SF, which is less than the modeling. Update so that the modeling matches the plans. Ensure that full infiltration is still achieved. [Storm Report, pg. 64]

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
401.65	0.042	0.000	0.000	0.000
401.69	0.042	0.001	0.000	0.282
401.74	0.042	0.003	0.000	0.282
401.78	0.042	0.005	0.000	0.282
401.82	0.042	0.007	0.000	0.282
401.86	0.042	0.009	0.000	0.282
401.91	0.042	0.010	0.000	0.282
401.95	0.042	0.012	0.000	0.282
401.99	0.042	0.014	0.000	0.282
402.04	0.042	0.016	0.000	0.282
402.08	0.042	0.018	0.000	0.282
402.12	0.042	0.020	0.000	0.282
402.16	0.042	0.021	0.000	0.282
402.21	0.042	0.023	0.000	0.282
402.25	0.042	0.025	0.000	0.282
402.29	0.042	0.027	0.000	0.282
402.33	0.042	0.029	0.000	0.282
402.38	0.042	0.030	0.000	0.282
402.42	0.042	0.032	0.000	0.282
402.46	0.042	0.034	0.000	0.282
402.51	0.042	0.036	0.000	0.282
402.55	0.042	0.038	0.000	0.282
402.59	0.042	0.039	0.000	0.282
402.63	0.042	0.041	0.000	0.282
402.68	0.042	0.043	0.000	0.282
402.72	0.042	0.045	0.000	0.282
402.76	0.042	0.047	0.000	0.282

402.81	0.042	0.049	0.000	0.282
402.85	0.042	0.050	0.000	0.282
402.89	0.042	0.052	0.000	0.282
402.93	0.042	0.054	0.000	0.282
402.98	0.042	0.056	0.000	0.282
403.02	0.042	0.058	0.000	0.282
403.06	0.042	0.059	0.000	0.282
403.10	0.042	0.061	0.000	0.282
403.15	0.042	0.063	0.000	0.282
403.19	0.042	0.065	0.000	0.282
403.23	0.042	0.067	0.000	0.282
403.28	0.042	0.069	0.000	0.282
403.32	0.042	0.070	0.000	0.282
403.36	0.042	0.072	0.000	0.282
403.40	0.042	0.074	0.000	0.282
403.45	0.042	0.076	0.000	0.282
403.49	0.042	0.078	0.000	0.282
403.53	0.042	0.079	0.000	0.282
403.58	0.042	0.081	0.000	0.282
403.62	0.042	0.083	0.000	0.282
403.66	0.042	0.085	0.000	0.282
403.70	0.042	0.087	0.000	0.282
403.75	0.042	0.089	0.000	0.282
403.79	0.042	0.090	0.000	0.282
403.83	0.042	0.092	0.000	0.282
403.87	0.042	0.094	0.000	0.282
403.92	0.042	0.096	0.000	0.282
403.96	0.042	0.098	0.000	0.282
404.00	0.042	0.099	0.000	0.282
404.05	0.042	0.101	0.000	0.282
404.09	0.042	0.103	0.000	0.282
404.13	0.042	0.105	0.000	0.282
404.17	0.042	0.107	0.000	0.282
404.22	0.042	0.108	0.000	0.282
404.26	0.042	0.110	0.000	0.282
404.30	0.042	0.112	0.000	0.282
404.35	0.042	0.114	0.000	0.282
404.39	0.042	0.116	0.000	0.282
404.43	0.042	0.118	0.000	0.282
404.47	0.042	0.119	0.000	0.282
404.52	0.042	0.121	0.021	0.282
404.56	0.042	0.123	0.151	0.282
404.60	0.042	0.125	0.341	0.282
404.64	0.042	0.127	0.572	0.282
404.69	0.042	0.128	0.828	0.282
404.73	0.042	0.130	1.094	0.282
404.77	0.042	0.132	1.354	0.282
404.82	0.042	0.134	1.593	0.282
404.86	0.042	0.136	1.799	0.282
404.90	0.042	0.138	1.963	0.282
404.94	0.042	0.139	2.086	0.282
404.99	0.042	0.141	2.178	0.282
405.03	0.042	0.143	2.291	0.282
405.07	0.042	0.145	2.382	0.282
405.12	0.042	0.147	2.470	0.282
405.16	0.042	0.148	2.554	0.282
405.20	0.042	0.150	2.636	0.282
405.24	0.042	0.152	2.715	0.282

405.29	0.042	0.154	2.792	0.282
405.33	0.042	0.156	2.867	0.282
405.37	0.042	0.158	2.940	0.282
405.41	0.042	0.159	3.011	0.282
405.46	0.042	0.161	3.081	0.282
405.50	0.042	0.163	3.149	0.282

Offsite Infiltration Trench

Gravel Trench Bed 1

Bottom Length:	42.00 ft.
Bottom Width:	8.50 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:	1.5
Pour Space of material for first layer:	0.4
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:	27
Infiltration safety factor:	1
Total Volume Infiltrated (ac-ft.):	116.096
Total Volume Through Riser (ac-ft.):	0.001
Total Volume Through Facility (ac-ft.):	116.097
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	1.5 ft.
Riser Diameter:	10 in.
Element Flows To:	
Outlet 1	Outlet 2

Gravel Trench Bed Hydraulic Table

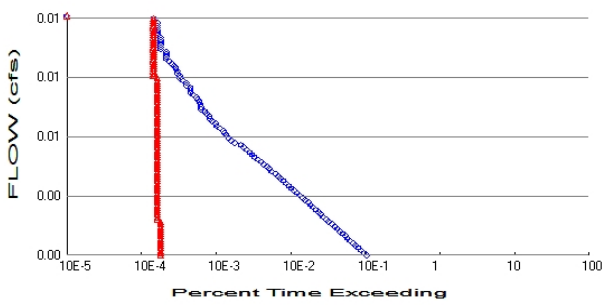
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.008	0.000	0.000	0.000
0.0167	0.008	0.000	0.000	0.223
0.0333	0.008	0.000	0.000	0.223
0.0500	0.008	0.000	0.000	0.223
0.0667	0.008	0.000	0.000	0.223
0.0833	0.008	0.000	0.000	0.223
0.1000	0.008	0.000	0.000	0.223
0.1167	0.008	0.000	0.000	0.223
0.1333	0.008	0.000	0.000	0.223
0.1500	0.008	0.000	0.000	0.223
0.1667	0.008	0.000	0.000	0.223
0.1833	0.008	0.000	0.000	0.223
0.2000	0.008	0.000	0.000	0.223
0.2167	0.008	0.000	0.000	0.223
0.2333	0.008	0.000	0.000	0.223
0.2500	0.008	0.000	0.000	0.223
0.2667	0.008	0.000	0.000	0.223
0.2833	0.008	0.000	0.000	0.223
0.3000	0.008	0.001	0.000	0.223
0.3167	0.008	0.001	0.000	0.223
0.3333	0.008	0.001	0.000	0.223
0.3500	0.008	0.001	0.000	0.223
0.3667	0.008	0.001	0.000	0.223
0.3833	0.008	0.001	0.000	0.223
0.4000	0.008	0.001	0.000	0.223
0.4167	0.008	0.001	0.000	0.223

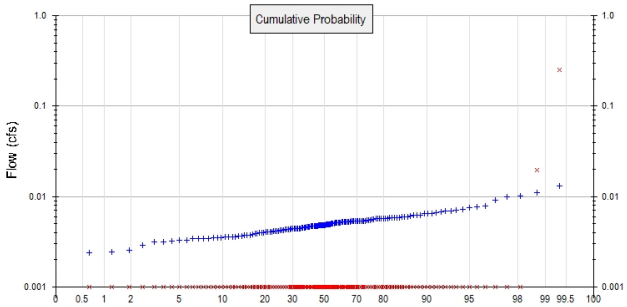
0.4333	0.008	0.001	0.000	0.223
0.4500	0.008	0.001	0.000	0.223
0.4667	0.008	0.001	0.000	0.223
0.4833	0.008	0.001	0.000	0.223
0.5000	0.008	0.001	0.000	0.223
0.5167	0.008	0.001	0.000	0.223
0.5333	0.008	0.001	0.000	0.223
0.5500	0.008	0.001	0.000	0.223
0.5667	0.008	0.001	0.000	0.223
0.5833	0.008	0.001	0.000	0.223
0.6000	0.008	0.002	0.000	0.223
0.6167	0.008	0.002	0.000	0.223
0.6333	0.008	0.002	0.000	0.223
0.6500	0.008	0.002	0.000	0.223
0.6667	0.008	0.002	0.000	0.223
0.6833	0.008	0.002	0.000	0.223
0.7000	0.008	0.002	0.000	0.223
0.7167	0.008	0.002	0.000	0.223
0.7333	0.008	0.002	0.000	0.223
0.7500	0.008	0.002	0.000	0.223
0.7667	0.008	0.002	0.000	0.223
0.7833	0.008	0.002	0.000	0.223
0.8000	0.008	0.002	0.000	0.223
0.8167	0.008	0.002	0.000	0.223
0.8333	0.008	0.002	0.000	0.223
0.8500	0.008	0.002	0.000	0.223
0.8667	0.008	0.002	0.000	0.223
0.8833	0.008	0.002	0.000	0.223
0.9000	0.008	0.003	0.000	0.223
0.9167	0.008	0.003	0.000	0.223
0.9333	0.008	0.003	0.000	0.223
0.9500	0.008	0.003	0.000	0.223
0.9667	0.008	0.003	0.000	0.223
0.9833	0.008	0.003	0.000	0.223
1.0000	0.008	0.003	0.000	0.223
1.0167	0.008	0.003	0.000	0.223
1.0333	0.008	0.003	0.000	0.223
1.0500	0.008	0.003	0.000	0.223
1.0667	0.008	0.003	0.000	0.223
1.0833	0.008	0.003	0.000	0.223
1.1000	0.008	0.003	0.000	0.223
1.1167	0.008	0.003	0.000	0.223
1.1333	0.008	0.003	0.000	0.223
1.1500	0.008	0.003	0.000	0.223
1.1667	0.008	0.003	0.000	0.223
1.1833	0.008	0.003	0.000	0.223
1.2000	0.008	0.003	0.000	0.223
1.2167	0.008	0.004	0.000	0.223
1.2333	0.008	0.004	0.000	0.223
1.2500	0.008	0.004	0.000	0.223
1.2667	0.008	0.004	0.000	0.223
1.2833	0.008	0.004	0.000	0.223
1.3000	0.008	0.004	0.000	0.223
1.3167	0.008	0.004	0.000	0.223
1.3333	0.008	0.004	0.000	0.223
1.3500	0.008	0.004	0.000	0.223
1.3667	0.008	0.004	0.000	0.223
1.3833	0.008	0.004	0.000	0.223

1.4000	0.008	0.004	0.000	0.223
1.4167	0.008	0.004	0.000	0.223
1.4333	0.008	0.004	0.000	0.223
1.4500	0.008	0.004	0.000	0.223
1.4667	0.008	0.004	0.000	0.223
1.4833	0.008	0.004	0.000	0.223
1.5000	0.008	0.004	0.000	0.223

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 3.02
Total Impervious Area: 0.01

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.24
Total Impervious Area: 1.87

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.004788
5 year	0.006037
10 year	0.00685
25 year	0.007869
50 year	0.008625
100 year	0.009381

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	0.005	0.000
1903	0.005	0.000
1904	0.006	0.000
1905	0.004	0.000
1906	0.003	0.000
1907	0.005	0.000
1908	0.005	0.000
1909	0.005	0.000
1910	0.005	0.000
1911	0.006	0.000

1912	0.009	0.000
1913	0.004	0.000
1914	0.013	0.019
1915	0.004	0.000
1916	0.005	0.000
1917	0.002	0.000
1918	0.004	0.000
1919	0.004	0.000
1920	0.004	0.000
1921	0.004	0.000
1922	0.004	0.000
1923	0.005	0.000
1924	0.005	0.000
1925	0.003	0.000
1926	0.005	0.000
1927	0.004	0.000
1928	0.004	0.000
1929	0.007	0.000
1930	0.006	0.000
1931	0.005	0.000
1932	0.004	0.000
1933	0.005	0.000
1934	0.005	0.000
1935	0.003	0.000
1936	0.005	0.000
1937	0.006	0.000
1938	0.004	0.000
1939	0.003	0.000
1940	0.007	0.000
1941	0.006	0.000
1942	0.005	0.000
1943	0.005	0.000
1944	0.008	0.000
1945	0.006	0.000
1946	0.005	0.000
1947	0.003	0.000
1948	0.005	0.000
1949	0.006	0.000
1950	0.004	0.000
1951	0.005	0.000
1952	0.005	0.254
1953	0.006	0.000
1954	0.005	0.000
1955	0.003	0.000
1956	0.003	0.000
1957	0.004	0.000
1958	0.005	0.000
1959	0.005	0.000
1960	0.005	0.000
1961	0.010	0.000
1962	0.005	0.000
1963	0.003	0.000
1964	0.008	0.000
1965	0.006	0.000
1966	0.004	0.000
1967	0.005	0.000
1968	0.005	0.000
1969	0.005	0.000

1970	0.005	0.000
1971	0.005	0.000
1972	0.011	0.000
1973	0.007	0.000
1974	0.007	0.000
1975	0.006	0.000
1976	0.005	0.000
1977	0.004	0.000
1978	0.005	0.000
1979	0.005	0.000
1980	0.005	0.000
1981	0.005	0.000
1982	0.004	0.000
1983	0.006	0.000
1984	0.006	0.000
1985	0.004	0.000
1986	0.004	0.000
1987	0.005	0.000
1988	0.004	0.000
1989	0.004	0.000
1990	0.004	0.000
1991	0.005	0.000
1992	0.005	0.000
1993	0.005	0.000
1994	0.005	0.000
1995	0.003	0.000
1996	0.006	0.000
1997	0.004	0.000
1998	0.006	0.000
1999	0.004	0.000
2000	0.005	0.000
2001	0.003	0.000
2002	0.005	0.000
2003	0.004	0.000
2004	0.006	0.000
2005	0.010	0.000
2006	0.004	0.000
2007	0.006	0.000
2008	0.006	0.000
2009	0.004	0.000
2010	0.005	0.000
2011	0.004	0.000
2012	0.005	0.000
2013	0.005	0.000
2014	0.004	0.000
2015	0.005	0.000
2016	0.004	0.000
2017	0.006	0.000
2018	0.005	0.000
2019	0.005	0.000
2020	0.004	0.000
2021	0.005	0.000
2022	0.005	0.000
2023	0.007	0.000
2024	0.007	0.000
2025	0.004	0.000
2026	0.005	0.000
2027	0.005	0.000

2028	0.002	0.000
2029	0.005	0.000
2030	0.006	0.000
2031	0.002	0.000
2032	0.004	0.000
2033	0.004	0.000
2034	0.005	0.000
2035	0.006	0.000
2036	0.004	0.000
2037	0.005	0.000
2038	0.005	0.000
2039	0.008	0.000
2040	0.004	0.000
2041	0.005	0.000
2042	0.006	0.000
2043	0.005	0.000
2044	0.005	0.000
2045	0.004	0.000
2046	0.004	0.000
2047	0.005	0.000
2048	0.004	0.000
2049	0.005	0.000
2050	0.005	0.000
2051	0.005	0.000
2052	0.004	0.000
2053	0.003	0.000
2054	0.006	0.000
2055	0.005	0.000
2056	0.006	0.000
2057	0.003	0.000
2058	0.004	0.000
2059	0.007	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0130	0.2535
2	0.0110	0.0194
3	0.0101	0.0000
4	0.0099	0.0000
5	0.0091	0.0000
6	0.0078	0.0000
7	0.0077	0.0000
8	0.0075	0.0000
9	0.0073	0.0000
10	0.0070	0.0000
11	0.0069	0.0000
12	0.0069	0.0000
13	0.0068	0.0000
14	0.0067	0.0000
15	0.0065	0.0000
16	0.0065	0.0000
17	0.0065	0.0000
18	0.0062	0.0000
19	0.0062	0.0000
20	0.0062	0.0000
21	0.0061	0.0000
22	0.0060	0.0000

23	0.0059	0.0000
24	0.0059	0.0000
25	0.0059	0.0000
26	0.0059	0.0000
27	0.0059	0.0000
28	0.0058	0.0000
29	0.0058	0.0000
30	0.0057	0.0000
31	0.0057	0.0000
32	0.0057	0.0000
33	0.0057	0.0000
34	0.0057	0.0000
35	0.0057	0.0000
36	0.0057	0.0000
37	0.0056	0.0000
38	0.0056	0.0000
39	0.0055	0.0000
40	0.0055	0.0000
41	0.0054	0.0000
42	0.0054	0.0000
43	0.0054	0.0000
44	0.0054	0.0000
45	0.0054	0.0000
46	0.0054	0.0000
47	0.0053	0.0000
48	0.0053	0.0000
49	0.0053	0.0000
50	0.0053	0.0000
51	0.0053	0.0000
52	0.0053	0.0000
53	0.0053	0.0000
54	0.0052	0.0000
55	0.0052	0.0000
56	0.0052	0.0000
57	0.0052	0.0000
58	0.0052	0.0000
59	0.0052	0.0000
60	0.0052	0.0000
61	0.0052	0.0000
62	0.0052	0.0000
63	0.0052	0.0000
64	0.0052	0.0000
65	0.0051	0.0000
66	0.0051	0.0000
67	0.0051	0.0000
68	0.0051	0.0000
69	0.0050	0.0000
70	0.0050	0.0000
71	0.0050	0.0000
72	0.0050	0.0000
73	0.0050	0.0000
74	0.0049	0.0000
75	0.0049	0.0000
76	0.0049	0.0000
77	0.0049	0.0000
78	0.0049	0.0000
79	0.0048	0.0000
80	0.0048	0.0000

81	0.0048	0.0000
82	0.0048	0.0000
83	0.0048	0.0000
84	0.0048	0.0000
85	0.0048	0.0000
86	0.0048	0.0000
87	0.0047	0.0000
88	0.0047	0.0000
89	0.0047	0.0000
90	0.0047	0.0000
91	0.0047	0.0000
92	0.0047	0.0000
93	0.0047	0.0000
94	0.0047	0.0000
95	0.0047	0.0000
96	0.0047	0.0000
97	0.0046	0.0000
98	0.0046	0.0000
99	0.0046	0.0000
100	0.0046	0.0000
101	0.0045	0.0000
102	0.0045	0.0000
103	0.0045	0.0000
104	0.0045	0.0000
105	0.0045	0.0000
106	0.0045	0.0000
107	0.0044	0.0000
108	0.0044	0.0000
109	0.0044	0.0000
110	0.0044	0.0000
111	0.0044	0.0000
112	0.0044	0.0000
113	0.0043	0.0000
114	0.0043	0.0000
115	0.0043	0.0000
116	0.0043	0.0000
117	0.0043	0.0000
118	0.0042	0.0000
119	0.0041	0.0000
120	0.0041	0.0000
121	0.0041	0.0000
122	0.0041	0.0000
123	0.0041	0.0000
124	0.0041	0.0000
125	0.0041	0.0000
126	0.0040	0.0000
127	0.0040	0.0000
128	0.0039	0.0000
129	0.0039	0.0000
130	0.0039	0.0000
131	0.0039	0.0000
132	0.0038	0.0000
133	0.0037	0.0000
134	0.0037	0.0000
135	0.0037	0.0000
136	0.0036	0.0000
137	0.0036	0.0000
138	0.0036	0.0000

139	0.0036	0.0000
140	0.0036	0.0000
141	0.0035	0.0000
142	0.0035	0.0000
143	0.0035	0.0000
144	0.0035	0.0000
145	0.0034	0.0000
146	0.0034	0.0000
147	0.0034	0.0000
148	0.0034	0.0000
149	0.0033	0.0000
150	0.0033	0.0000
151	0.0032	0.0000
152	0.0032	0.0000
153	0.0031	0.0000
154	0.0029	0.0000
155	0.0025	0.0000
156	0.0025	0.0000
157	0.0024	0.0000
158	0.0020	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0024	5767	10	0	Pass
0.0025	5266	10	0	Pass
0.0025	4860	10	0	Pass
0.0026	4477	10	0	Pass
0.0026	4109	10	0	Pass
0.0027	3788	10	0	Pass
0.0028	3467	10	0	Pass
0.0028	3220	10	0	Pass
0.0029	2967	10	0	Pass
0.0030	2730	10	0	Pass
0.0030	2519	10	0	Pass
0.0031	2335	10	0	Pass
0.0031	2153	10	0	Pass
0.0032	1970	10	0	Pass
0.0033	1803	10	0	Pass
0.0033	1659	9	0	Pass
0.0034	1515	9	0	Pass
0.0035	1403	9	0	Pass
0.0035	1292	9	0	Pass
0.0036	1201	9	0	Pass
0.0037	1110	9	0	Pass
0.0037	1020	9	0	Pass
0.0038	949	9	0	Pass
0.0038	869	9	1	Pass
0.0039	799	9	1	Pass
0.0040	734	9	1	Pass
0.0040	671	9	1	Pass
0.0041	617	9	1	Pass
0.0042	561	9	1	Pass
0.0042	523	9	1	Pass
0.0043	478	9	1	Pass
0.0043	442	9	2	Pass
0.0044	408	9	2	Pass
0.0045	375	9	2	Pass
0.0045	344	9	2	Pass
0.0046	309	9	2	Pass
0.0047	284	9	3	Pass
0.0047	269	9	3	Pass
0.0048	241	9	3	Pass
0.0048	222	9	4	Pass
0.0049	203	9	4	Pass
0.0050	180	9	5	Pass
0.0050	168	9	5	Pass
0.0051	157	9	5	Pass
0.0052	143	9	6	Pass
0.0052	130	9	6	Pass
0.0053	118	9	7	Pass
0.0054	99	9	9	Pass
0.0054	89	9	10	Pass
0.0055	81	9	11	Pass
0.0055	76	9	11	Pass
0.0056	71	9	12	Pass
0.0057	69	9	13	Pass

0.0057	62	9	14	Pass
0.0058	57	9	15	Pass
0.0059	54	9	16	Pass
0.0059	49	9	18	Pass
0.0060	46	9	19	Pass
0.0060	45	9	20	Pass
0.0061	41	9	21	Pass
0.0062	39	9	23	Pass
0.0062	35	9	25	Pass
0.0063	35	9	25	Pass
0.0064	34	9	26	Pass
0.0064	33	9	27	Pass
0.0065	31	9	29	Pass
0.0065	30	9	30	Pass
0.0066	27	9	33	Pass
0.0067	25	9	36	Pass
0.0067	25	9	36	Pass
0.0068	25	9	36	Pass
0.0069	22	9	40	Pass
0.0069	22	9	40	Pass
0.0070	20	9	45	Pass
0.0071	18	9	50	Pass
0.0071	18	8	44	Pass
0.0072	17	8	47	Pass
0.0072	17	8	47	Pass
0.0073	16	8	50	Pass
0.0074	15	8	53	Pass
0.0074	14	8	57	Pass
0.0075	13	8	61	Pass
0.0076	12	8	66	Pass
0.0076	12	8	66	Pass
0.0077	12	8	66	Pass
0.0077	12	8	66	Pass
0.0078	10	8	80	Pass
0.0079	10	8	80	Pass
0.0079	10	8	80	Pass
0.0080	10	8	80	Pass
0.0081	10	8	80	Pass
0.0081	10	8	80	Pass
0.0082	9	8	88	Pass
0.0082	9	8	88	Pass
0.0083	9	8	88	Pass
0.0084	9	8	88	Pass
0.0084	9	8	88	Pass
0.0085	9	8	88	Pass
0.0086	8	8	100	Pass
0.0086	8	8	100	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for 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
Infiltration Pond POC	☐	618.82			☐	100.00			
Gravel Trench Bed 1 POC	☐	105.65			☐	100.00			
Total Volume Infiltrated		724.47	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

POC 2

POC #2 was not reported because POC must exist in both scenarios and both scenarios must have been run.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

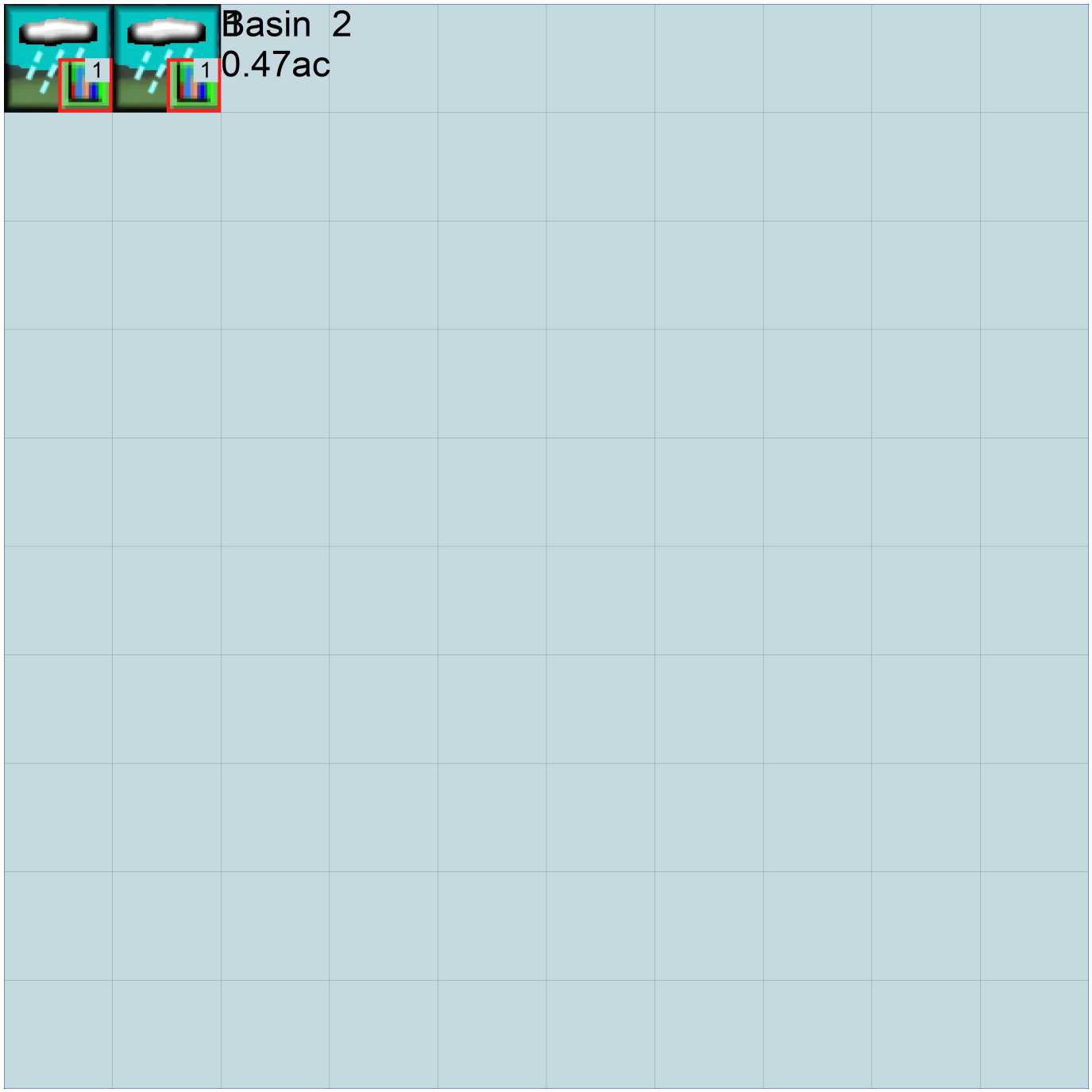
No PERLND changes have been made.

IMPLND Changes

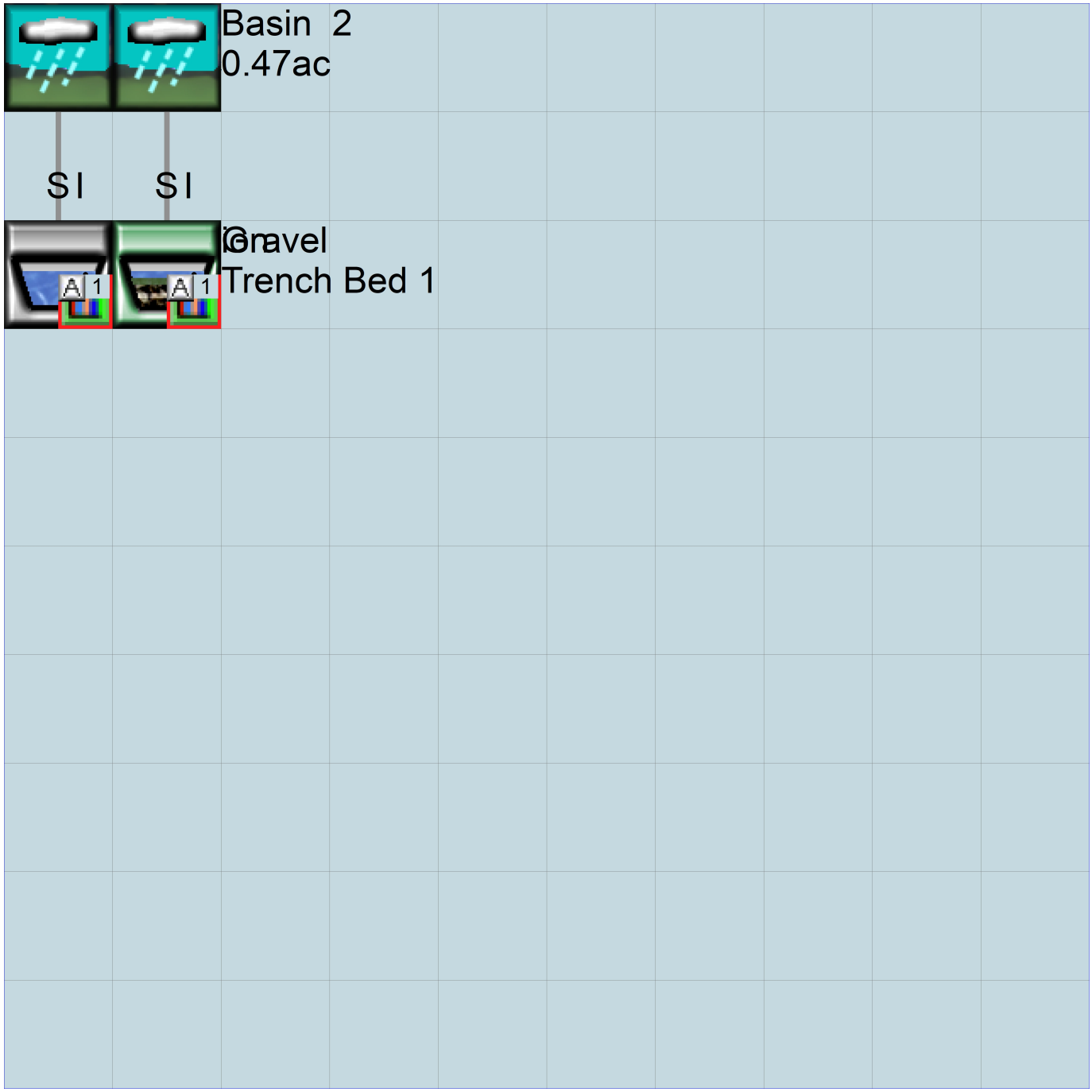
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

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   Infiltration.wdm
MESSU       25   MitInfiltration.MES
            27   MitInfiltration.L61
            28   MitInfiltration.L62
            30   POCInfiltration1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND       4
      IMPLND       1
      IMPLND       4
      IMPLND      14
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Infiltration Pond           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           ***
    4     A/B, Pasture, 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 ***
    4         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  *********
    4         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 ***
    4         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
    4              0         5       1.5       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    4              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    4          0.15       0.5       0.3         0       0.7       0.4
  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
    4              0         0         0         0         3          1         0
  END PWAT-STATE1

END PERLND

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

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
    4         0    0    1    0    0    0
   14         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    4    1    9
    4         0    0    4    0    0    0    1    9
   14         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     ***
    1         0    0    0    0    0
    4         0    0    0    0    0
```

```
   14         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
    4            400      0.01       0.1       0.1
   14            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
    4              0         0
   14              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
    4              0         0
   14              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Onsite***
PERLND   4                        1.05     RCHRES   1      2
PERLND   4                        1.05     RCHRES   1      3
IMPLND   1                        0.91     RCHRES   1      5
IMPLND   4                        0.61     RCHRES   1      5
IMPLND  14                        0.07     RCHRES   1      5
Basin  2***
PERLND   4                        0.19     RCHRES   2      2
PERLND   4                        0.19     RCHRES   2      3
IMPLND   1                        0.28     RCHRES   2      5

******Routing******
PERLND   4                        1.05     COPY     1     12
IMPLND   1                        0.91     COPY     1     15
IMPLND   4                        0.61     COPY     1     15
IMPLND  14                        0.07     COPY     1     15
PERLND   4                        1.05     COPY     1     13
PERLND   4                        0.19     COPY     1     12
IMPLND   1                        0.28     COPY     1     15
PERLND   4                        0.19     COPY     1     13
RCHRES   1                           1     COPY   501     17
RCHRES   2                           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     Infiltration Pon-011    2    1    1    1   28    0    1
    2     Gravel Trench Be-012    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
    2         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
    2         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
    2      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    401.65       0.5       0.0
    2              2      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
    2            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
   90    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.042447  0.000000  0.000000  0.000000
  0.042778  0.042447  0.001816  0.000000  0.282486
  0.085556  0.042447  0.003632  0.000000  0.282486
  0.128333  0.042447  0.005447  0.000000  0.282486
  0.171111  0.042447  0.007263  0.000000  0.282486
  0.213889  0.042447  0.009079  0.000000  0.282486
  0.256667  0.042447  0.010895  0.000000  0.282486
  0.299444  0.042447  0.012711  0.000000  0.282486
  0.342222  0.042447  0.014526  0.000000  0.282486
  0.385000  0.042447  0.016342  0.000000  0.282486
  0.427778  0.042447  0.018158  0.000000  0.282486
  0.470556  0.042447  0.019974  0.000000  0.282486
  0.513333  0.042447  0.021790  0.000000  0.282486
  0.556111  0.042447  0.023605  0.000000  0.282486
  0.598889  0.042447  0.025421  0.000000  0.282486
  0.641667  0.042447  0.027237  0.000000  0.282486
  0.684444  0.042447  0.029053  0.000000  0.282486
```

0.727222	0.042447	0.030869	0.000000	0.282486
0.770000	0.042447	0.032684	0.000000	0.282486
0.812778	0.042447	0.034500	0.000000	0.282486
0.855556	0.042447	0.036316	0.000000	0.282486
0.898333	0.042447	0.038132	0.000000	0.282486
0.941111	0.042447	0.039948	0.000000	0.282486
0.983889	0.042447	0.041763	0.000000	0.282486
1.026667	0.042447	0.043579	0.000000	0.282486
1.069444	0.042447	0.045395	0.000000	0.282486
1.112222	0.042447	0.047211	0.000000	0.282486
1.155000	0.042447	0.049027	0.000000	0.282486
1.197778	0.042447	0.050842	0.000000	0.282486
1.240556	0.042447	0.052658	0.000000	0.282486
1.283333	0.042447	0.054474	0.000000	0.282486
1.326111	0.042447	0.056290	0.000000	0.282486
1.368889	0.042447	0.058105	0.000000	0.282486
1.411667	0.042447	0.059921	0.000000	0.282486
1.454444	0.042447	0.061737	0.000000	0.282486
1.497222	0.042447	0.063553	0.000000	0.282486
1.540000	0.042447	0.065369	0.000000	0.282486
1.582778	0.042447	0.067184	0.000000	0.282486
1.625556	0.042447	0.069000	0.000000	0.282486
1.668333	0.042447	0.070816	0.000000	0.282486
1.711111	0.042447	0.072632	0.000000	0.282486
1.753889	0.042447	0.074448	0.000000	0.282486
1.796667	0.042447	0.076263	0.000000	0.282486
1.839444	0.042447	0.078079	0.000000	0.282486
1.882222	0.042447	0.079895	0.000000	0.282486
1.925000	0.042447	0.081711	0.000000	0.282486
1.967778	0.042447	0.083527	0.000000	0.282486
2.010556	0.042447	0.085342	0.000000	0.282486
2.053333	0.042447	0.087158	0.000000	0.282486
2.096111	0.042447	0.088974	0.000000	0.282486
2.138889	0.042447	0.090790	0.000000	0.282486
2.181667	0.042447	0.092606	0.000000	0.282486
2.224444	0.042447	0.094421	0.000000	0.282486
2.267222	0.042447	0.096237	0.000000	0.282486
2.310000	0.042447	0.098053	0.000000	0.282486
2.352778	0.042447	0.099869	0.000000	0.282486
2.395556	0.042447	0.101685	0.000000	0.282486
2.438333	0.042447	0.103500	0.000000	0.282486
2.481111	0.042447	0.105316	0.000000	0.282486
2.523889	0.042447	0.107132	0.000000	0.282486
2.566667	0.042447	0.108948	0.000000	0.282486
2.609444	0.042447	0.110764	0.000000	0.282486
2.652222	0.042447	0.112579	0.000000	0.282486
2.695000	0.042447	0.114395	0.000000	0.282486
2.737778	0.042447	0.116211	0.000000	0.282486
2.780556	0.042447	0.118027	0.000000	0.282486
2.823333	0.042447	0.119843	0.000000	0.282486
2.866111	0.042447	0.121658	0.021702	0.282486
2.908889	0.042447	0.123474	0.151371	0.282486
2.951667	0.042447	0.125290	0.341799	0.282486
2.994444	0.042447	0.127106	0.572643	0.282486
3.037222	0.042447	0.128922	0.828609	0.282486
3.080000	0.042447	0.130737	1.094372	0.282486
3.122778	0.042447	0.132553	1.354264	0.282486
3.165556	0.042447	0.134369	1.593332	0.282486
3.208333	0.042447	0.136185	1.799094	0.282486
3.251111	0.042447	0.138001	1.963769	0.282486
3.293889	0.042447	0.139816	2.086878	0.282486
3.336667	0.042447	0.141632	2.178164	0.282486
3.379444	0.042447	0.143448	2.291763	0.282486
3.422222	0.042447	0.145264	2.382549	0.282486
3.465000	0.042447	0.147080	2.470001	0.282486
3.507778	0.042447	0.148895	2.554460	0.282486
3.550556	0.042447	0.150711	2.636215	0.282486
3.593333	0.042447	0.152527	2.715510	0.282486
3.636111	0.042447	0.154343	2.792554	0.282486
3.678889	0.042447	0.156159	2.867528	0.282486

```
3.721667  0.042447  0.157974  2.940592  0.282486
3.764444  0.042447  0.159790  3.011884  0.282486
3.807222  0.042447  0.161606  3.081527  0.282486
END FTABLE  1
FTABLE      2
 92    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
0.000000  0.008196  0.000000  0.000000  0.000000
0.016667  0.008196  0.000055  0.000000  0.223125
0.033333  0.008196  0.000109  0.000000  0.223125
0.050000  0.008196  0.000164  0.000000  0.223125
0.066667  0.008196  0.000219  0.000000  0.223125
0.083333  0.008196  0.000273  0.000000  0.223125
0.100000  0.008196  0.000328  0.000000  0.223125
0.116667  0.008196  0.000382  0.000000  0.223125
0.133333  0.008196  0.000437  0.000000  0.223125
0.150000  0.008196  0.000492  0.000000  0.223125
0.166667  0.008196  0.000546  0.000000  0.223125
0.183333  0.008196  0.000601  0.000000  0.223125
0.200000  0.008196  0.000656  0.000000  0.223125
0.216667  0.008196  0.000710  0.000000  0.223125
0.233333  0.008196  0.000765  0.000000  0.223125
0.250000  0.008196  0.000820  0.000000  0.223125
0.266667  0.008196  0.000874  0.000000  0.223125
0.283333  0.008196  0.000929  0.000000  0.223125
0.300000  0.008196  0.000983  0.000000  0.223125
0.316667  0.008196  0.001038  0.000000  0.223125
0.333333  0.008196  0.001093  0.000000  0.223125
0.350000  0.008196  0.001147  0.000000  0.223125
0.366667  0.008196  0.001202  0.000000  0.223125
0.383333  0.008196  0.001257  0.000000  0.223125
0.400000  0.008196  0.001311  0.000000  0.223125
0.416667  0.008196  0.001366  0.000000  0.223125
0.433333  0.008196  0.001421  0.000000  0.223125
0.450000  0.008196  0.001475  0.000000  0.223125
0.466667  0.008196  0.001530  0.000000  0.223125
0.483333  0.008196  0.001584  0.000000  0.223125
0.500000  0.008196  0.001639  0.000000  0.223125
0.516667  0.008196  0.001694  0.000000  0.223125
0.533333  0.008196  0.001748  0.000000  0.223125
0.550000  0.008196  0.001803  0.000000  0.223125
0.566667  0.008196  0.001858  0.000000  0.223125
0.583333  0.008196  0.001912  0.000000  0.223125
0.600000  0.008196  0.001967  0.000000  0.223125
0.616667  0.008196  0.002022  0.000000  0.223125
0.633333  0.008196  0.002076  0.000000  0.223125
0.650000  0.008196  0.002131  0.000000  0.223125
0.666667  0.008196  0.002185  0.000000  0.223125
0.683333  0.008196  0.002240  0.000000  0.223125
0.700000  0.008196  0.002295  0.000000  0.223125
0.716667  0.008196  0.002349  0.000000  0.223125
0.733333  0.008196  0.002404  0.000000  0.223125
0.750000  0.008196  0.002459  0.000000  0.223125
0.766667  0.008196  0.002513  0.000000  0.223125
0.783333  0.008196  0.002568  0.000000  0.223125
0.800000  0.008196  0.002623  0.000000  0.223125
0.816667  0.008196  0.002677  0.000000  0.223125
0.833333  0.008196  0.002732  0.000000  0.223125
0.850000  0.008196  0.002787  0.000000  0.223125
0.866667  0.008196  0.002841  0.000000  0.223125
0.883333  0.008196  0.002896  0.000000  0.223125
0.900000  0.008196  0.002950  0.000000  0.223125
0.916667  0.008196  0.003005  0.000000  0.223125
0.933333  0.008196  0.003060  0.000000  0.223125
0.950000  0.008196  0.003114  0.000000  0.223125
0.966667  0.008196  0.003169  0.000000  0.223125
0.983333  0.008196  0.003224  0.000000  0.223125
1.000000  0.008196  0.003278  0.000000  0.223125
1.016667  0.008196  0.003333  0.000000  0.223125
```

```
  1.033333  0.008196  0.003388  0.000000  0.223125
  1.050000  0.008196  0.003442  0.000000  0.223125
  1.066667  0.008196  0.003497  0.000000  0.223125
  1.083333  0.008196  0.003551  0.000000  0.223125
  1.100000  0.008196  0.003606  0.000000  0.223125
  1.116667  0.008196  0.003661  0.000000  0.223125
  1.133333  0.008196  0.003715  0.000000  0.223125
  1.150000  0.008196  0.003770  0.000000  0.223125
  1.166667  0.008196  0.003825  0.000000  0.223125
  1.183333  0.008196  0.003879  0.000000  0.223125
  1.200000  0.008196  0.003934  0.000000  0.223125
  1.216667  0.008196  0.003989  0.000000  0.223125
  1.233333  0.008196  0.004043  0.000000  0.223125
  1.250000  0.008196  0.004098  0.000000  0.223125
  1.266667  0.008196  0.004152  0.000000  0.223125
  1.283333  0.008196  0.004207  0.000000  0.223125
  1.300000  0.008196  0.004262  0.000000  0.223125
  1.316667  0.008196  0.004316  0.000000  0.223125
  1.333333  0.008196  0.004371  0.000000  0.223125
  1.350000  0.008196  0.004426  0.000000  0.223125
  1.366667  0.008196  0.004480  0.000000  0.223125
  1.383333  0.008196  0.004535  0.000000  0.223125
  1.400000  0.008196  0.004590  0.000000  0.223125
  1.416667  0.008196  0.004644  0.000000  0.223125
  1.433333  0.008196  0.004699  0.000000  0.223125
  1.450000  0.008196  0.004753  0.000000  0.223125
  1.466667  0.008196  0.004808  0.000000  0.223125
  1.483333  0.008196  0.004863  0.000000  0.223125
  1.500000  0.008196  0.004917  0.000000  0.223125
  1.516667  0.008196  0.005054  0.019025  0.223125
  END FTABLE  2
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
RCHRES   2 HYDR   RO     1 1        1      WDM   1004 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1005 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1006 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1007 STAG     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
```

```
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  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

  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

```
ERROR/WARNING ID:   341   6

DATE/TIME: 1914/ 6/30 16:45

RCHRES:     2

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
92  214.18     220.15     226.37
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1914/ 6/30 16:45

RCHRES:     2

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
0.0000E+00  714.04    -1.458E+03    2.0420     2.0420       2
```

Disclaimer

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6200 Capitol Blvd. Ste F
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WWHM2012

PROJECT REPORT

WATER QUALITY TREATMENT

General Model Information

WWHM2012 Project Name: WQ
Site Name:
Site Address:
City:

Report Date:	1/3/2025
Gage:	40 IN EAST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	0.000 (adjusted)
Version Date:	2023/01/27
Version:	4.2.19

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year
Low Flow Threshold for POC3:	50 Percent of the 2 Year
High Flow Threshold for POC3:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	1.26
Pervious Total	1.26
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.26

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.48
Pervious Total	0.48
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.48

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Pasture, Flat	0.42
Pervious Total	0.42
Impervious Land Use	acre
ROADS FLAT	0.84
Impervious Total	0.84
Basin Total	1.26

Basin 3

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Pasture, Flat	0.2
Pervious Total	0.2

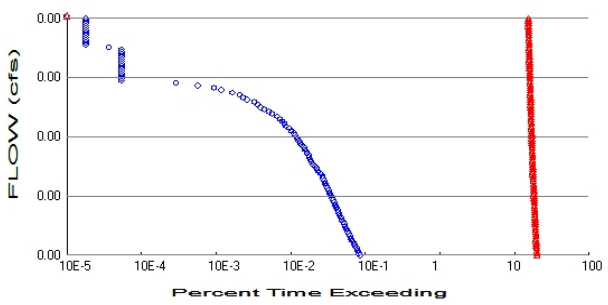
Impervious Land Use	acre
ROADS FLAT	0.28
Impervious Total	0.28
Basin Total	0.48

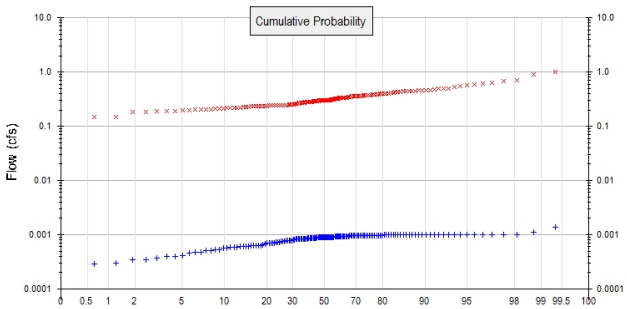
Routing Elements
Predeveloped Routing

Mitigated Routing

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 1.26
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.42
Total Impervious Area: 0.84

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000842
5 year	0.001025
10 year	0.001109
25 year	0.001188
50 year	0.001231
100 year	0.001266

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.301346
5 year	0.404214
10 year	0.478937
25 year	0.58116
50 year	0.663169
100 year	0.750359

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.001	0.357
1903	0.000	0.395
1904	0.001	0.446
1905	0.001	0.201
1906	0.001	0.228
1907	0.001	0.299
1908	0.001	0.247
1909	0.001	0.303
1910	0.001	0.290
1911	0.001	0.327

1912	0.001	0.543
1913	0.001	0.234
1914	0.000	1.003
1915	0.001	0.203
1916	0.001	0.378
1917	0.000	0.150
1918	0.001	0.301
1919	0.001	0.190
1920	0.001	0.248
1921	0.001	0.213
1922	0.001	0.333
1923	0.001	0.231
1924	0.001	0.438
1925	0.001	0.185
1926	0.001	0.356
1927	0.001	0.304
1928	0.001	0.216
1929	0.001	0.430
1930	0.001	0.455
1931	0.001	0.219
1932	0.001	0.235
1933	0.001	0.233
1934	0.001	0.377
1935	0.001	0.206
1936	0.001	0.279
1937	0.001	0.366
1938	0.001	0.206
1939	0.001	0.253
1940	0.001	0.455
1941	0.001	0.498
1942	0.001	0.336
1943	0.001	0.333
1944	0.001	0.480
1945	0.001	0.362
1946	0.001	0.283
1947	0.001	0.219
1948	0.001	0.301
1949	0.001	0.465
1950	0.001	0.257
1951	0.001	0.397
1952	0.001	0.446
1953	0.001	0.413
1954	0.001	0.243
1955	0.000	0.229
1956	0.000	0.212
1957	0.001	0.243
1958	0.001	0.302
1959	0.001	0.302
1960	0.001	0.246
1961	0.001	0.682
1962	0.001	0.293
1963	0.001	0.218
1964	0.001	0.628
1965	0.001	0.293
1966	0.001	0.237
1967	0.001	0.333
1968	0.001	0.281
1969	0.001	0.253

1970	0.001	0.284
1971	0.001	0.278
1972	0.001	0.919
1973	0.001	0.531
1974	0.001	0.389
1975	0.001	0.399
1976	0.001	0.425
1977	0.001	0.183
1978	0.001	0.308
1979	0.001	0.335
1980	0.001	0.320
1981	0.001	0.306
1982	0.001	0.246
1983	0.001	0.332
1984	0.001	0.330
1985	0.001	0.376
1986	0.001	0.190
1987	0.001	0.342
1988	0.001	0.200
1989	0.001	0.199
1990	0.001	0.243
1991	0.001	0.366
1992	0.001	0.352
1993	0.001	0.390
1994	0.001	0.269
1995	0.000	0.208
1996	0.001	0.279
1997	0.001	0.250
1998	0.001	0.298
1999	0.000	0.342
2000	0.001	0.283
2001	0.000	0.232
2002	0.001	0.414
2003	0.001	0.240
2004	0.001	0.363
2005	0.001	0.706
2006	0.001	0.326
2007	0.001	0.364
2008	0.001	0.300
2009	0.001	0.228
2010	0.001	0.293
2011	0.001	0.305
2012	0.001	0.287
2013	0.001	0.271
2014	0.001	0.265
2015	0.001	0.432
2016	0.001	0.286
2017	0.001	0.441
2018	0.001	0.263
2019	0.001	0.391
2020	0.001	0.321
2021	0.001	0.270
2022	0.001	0.449
2023	0.001	0.563
2024	0.001	0.589
2025	0.001	0.296
2026	0.001	0.334
2027	0.001	0.363

2028	0.000	0.141
2029	0.001	0.232
2030	0.001	0.493
2031	0.000	0.147
2032	0.001	0.246
2033	0.000	0.311
2034	0.001	0.236
2035	0.001	0.299
2036	0.001	0.244
2037	0.001	0.328
2038	0.001	0.309
2039	0.001	0.621
2040	0.001	0.244
2041	0.001	0.310
2042	0.001	0.362
2043	0.001	0.397
2044	0.001	0.272
2045	0.001	0.220
2046	0.001	0.244
2047	0.001	0.301
2048	0.001	0.248
2049	0.001	0.367
2050	0.001	0.275
2051	0.001	0.385
2052	0.001	0.298
2053	0.001	0.251
2054	0.001	0.493
2055	0.001	0.283
2056	0.000	0.396
2057	0.001	0.189
2058	0.001	0.371
2059	0.001	0.468

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.0014	1.0031
2	0.0011	0.9193
3	0.0010	0.7062
4	0.0010	0.6824
5	0.0010	0.6285
6	0.0010	0.6208
7	0.0010	0.5894
8	0.0010	0.5634
9	0.0010	0.5426
10	0.0010	0.5309
11	0.0010	0.4977
12	0.0010	0.4933
13	0.0010	0.4926
14	0.0010	0.4797
15	0.0010	0.4676
16	0.0010	0.4652
17	0.0010	0.4552
18	0.0010	0.4547
19	0.0010	0.4493
20	0.0010	0.4462
21	0.0010	0.4460
22	0.0010	0.4409

23	0.0010	0.4381
24	0.0010	0.4323
25	0.0010	0.4301
26	0.0010	0.4255
27	0.0010	0.4143
28	0.0010	0.4125
29	0.0010	0.3990
30	0.0010	0.3972
31	0.0010	0.3968
32	0.0010	0.3957
33	0.0010	0.3949
34	0.0010	0.3915
35	0.0010	0.3897
36	0.0010	0.3885
37	0.0010	0.3854
38	0.0010	0.3784
39	0.0010	0.3773
40	0.0010	0.3758
41	0.0010	0.3709
42	0.0010	0.3669
43	0.0010	0.3665
44	0.0010	0.3656
45	0.0010	0.3639
46	0.0010	0.3634
47	0.0010	0.3626
48	0.0010	0.3618
49	0.0010	0.3617
50	0.0009	0.3567
51	0.0009	0.3557
52	0.0009	0.3519
53	0.0009	0.3416
54	0.0009	0.3415
55	0.0009	0.3356
56	0.0009	0.3350
57	0.0009	0.3337
58	0.0009	0.3335
59	0.0009	0.3328
60	0.0009	0.3326
61	0.0009	0.3320
62	0.0009	0.3296
63	0.0009	0.3276
64	0.0009	0.3266
65	0.0009	0.3255
66	0.0009	0.3212
67	0.0009	0.3197
68	0.0009	0.3111
69	0.0009	0.3096
70	0.0009	0.3090
71	0.0009	0.3080
72	0.0009	0.3060
73	0.0009	0.3047
74	0.0009	0.3043
75	0.0009	0.3033
76	0.0009	0.3022
77	0.0009	0.3017
78	0.0009	0.3014
79	0.0009	0.3013
80	0.0009	0.3011

81	0.0009	0.2995
82	0.0009	0.2993
83	0.0009	0.2991
84	0.0009	0.2983
85	0.0009	0.2976
86	0.0009	0.2958
87	0.0009	0.2935
88	0.0009	0.2933
89	0.0009	0.2931
90	0.0009	0.2903
91	0.0009	0.2869
92	0.0009	0.2862
93	0.0009	0.2839
94	0.0009	0.2833
95	0.0009	0.2831
96	0.0009	0.2828
97	0.0009	0.2810
98	0.0009	0.2793
99	0.0008	0.2787
100	0.0008	0.2780
101	0.0008	0.2748
102	0.0008	0.2715
103	0.0008	0.2705
104	0.0008	0.2698
105	0.0008	0.2686
106	0.0008	0.2650
107	0.0008	0.2631
108	0.0008	0.2571
109	0.0008	0.2528
110	0.0008	0.2527
111	0.0008	0.2509
112	0.0008	0.2499
113	0.0008	0.2483
114	0.0008	0.2475
115	0.0008	0.2466
116	0.0007	0.2458
117	0.0007	0.2458
118	0.0007	0.2457
119	0.0007	0.2445
120	0.0007	0.2441
121	0.0007	0.2439
122	0.0007	0.2434
123	0.0007	0.2431
124	0.0007	0.2426
125	0.0007	0.2401
126	0.0007	0.2372
127	0.0007	0.2362
128	0.0007	0.2345
129	0.0006	0.2341
130	0.0006	0.2327
131	0.0006	0.2325
132	0.0006	0.2318
133	0.0006	0.2312
134	0.0006	0.2293
135	0.0006	0.2283
136	0.0006	0.2276
137	0.0006	0.2201
138	0.0006	0.2195

139	0.0006	0.2186
140	0.0006	0.2179
141	0.0006	0.2159
142	0.0006	0.2126
143	0.0005	0.2123
144	0.0005	0.2080
145	0.0005	0.2061
146	0.0005	0.2055
147	0.0005	0.2033
148	0.0005	0.2007
149	0.0005	0.2000
150	0.0004	0.1988
151	0.0004	0.1898
152	0.0004	0.1896
153	0.0004	0.1889
154	0.0003	0.1847
155	0.0003	0.1833
156	0.0003	0.1502
157	0.0003	0.1474
158	0.0003	0.1409

Duration Flows

The Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0004	4689	1104689	23559	Fail
0.0004	4530	1099703	24276	Fail
0.0004	4371	1095271	25057	Fail
0.0004	4191	1090839	26028	Fail
0.0005	4018	1086407	27038	Fail
0.0005	3890	1081974	27814	Fail
0.0005	3711	1077542	29036	Fail
0.0005	3574	1073110	30025	Fail
0.0005	3454	1069232	30956	Fail
0.0005	3355	1065354	31754	Fail
0.0005	3223	1061476	32934	Fail
0.0005	3075	1057044	34375	Fail
0.0005	2939	1053166	35834	Fail
0.0005	2860	1049288	36688	Fail
0.0005	2763	1045964	37856	Fail
0.0005	2662	1042086	39146	Fail
0.0006	2589	1038762	40122	Fail
0.0006	2475	1034884	41813	Fail
0.0006	2394	1031560	43089	Fail
0.0006	2340	1028236	43941	Fail
0.0006	2264	1024912	45269	Fail
0.0006	2199	1021588	46456	Fail
0.0006	2126	1017710	47869	Fail
0.0006	2049	1014940	49533	Fail
0.0006	1972	1011616	51298	Fail
0.0006	1902	1008846	53041	Fail
0.0006	1844	1005522	54529	Fail
0.0006	1794	1002752	55894	Fail
0.0007	1735	999428	57603	Fail
0.0007	1679	996104	59327	Fail
0.0007	1604	993333	61928	Fail
0.0007	1549	990563	63948	Fail
0.0007	1507	983915	65289	Fail
0.0007	1466	981145	66926	Fail
0.0007	1403	978375	69734	Fail
0.0007	1310	975605	74473	Fail
0.0007	1235	972835	78772	Fail
0.0007	1168	970065	83053	Fail
0.0007	1102	967849	87826	Fail
0.0007	1047	965079	92175	Fail
0.0007	1013	962309	94995	Fail
0.0008	973	959539	98616	Fail
0.0008	951	957323	100664	Fail
0.0008	912	955107	104726	Fail
0.0008	862	952337	110479	Fail
0.0008	826	950121	115026	Fail
0.0008	775	947351	122238	Fail
0.0008	741	945135	127548	Fail
0.0008	700	942919	134702	Fail
0.0008	670	940703	140403	Fail
0.0008	627	937933	149590	Fail
0.0008	607	935717	154154	Fail
0.0008	563	933501	165808	Fail
0.0009	534	931285	174397	Fail

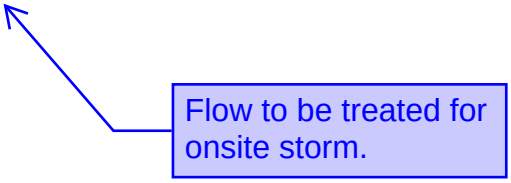
0.0009	482	929069	192752	Fail
0.0009	454	926853	204152	Fail
0.0009	427	924637	216542	Fail
0.0009	399	922975	231322	Fail
0.0009	364	920759	252955	Fail
0.0009	311	918543	295351	Fail
0.0009	280	916881	327457	Fail
0.0009	244	914665	374862	Fail
0.0009	219	912449	416643	Fail
0.0009	198	910233	459713	Fail
0.0009	179	908570	507581	Fail
0.0010	144	906354	629412	Fail
0.0010	127	904138	711919	Fail
0.0010	114	902476	791645	Fail
0.0010	91	900814	989905	Fail
0.0010	65	898598	1382458	Fail
0.0010	52	896936	1724876	Fail
0.0010	31	894720	2886193	Fail
0.0010	16	893058	5581612	Fail
0.0010	3	891396	29713200	Fail
0.0010	3	889180	29639333	Fail
0.0010	3	887518	29583933	Fail
0.0010	3	885856	29528533	Fail
0.0011	3	883640	29454666	Fail
0.0011	3	881978	29399266	Fail
0.0011	3	880316	29343866	Fail
0.0011	3	878654	29288466	Fail
0.0011	3	876992	29233066	Fail
0.0011	3	875330	29177666	Fail
0.0011	3	873668	29122266	Fail
0.0011	3	872006	29066866	Fail
0.0011	3	870344	29011466	Fail
0.0011	3	868682	28956066	Fail
0.0011	2	867020	43351000	Fail
0.0011	1	865358	86535800	Fail
0.0011	1	863696	86369600	Fail
0.0012	1	862034	86203400	Fail
0.0012	1	860372	86037200	Fail
0.0012	1	858710	85871000	Fail
0.0012	1	857602	85760200	Fail
0.0012	1	855940	85594000	Fail
0.0012	1	854278	85427800	Fail
0.0012	1	852616	85261600	Fail
0.0012	1	850954	85095400	Fail
0.0012	1	849846	84984600	Fail
0.0012	1	848184	84818400	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.0919 acre-feet
On-line facility target flow:	0.1276 cfs.
Adjusted for 15 min:	0.1276 cfs.
Off-line facility target flow:	0.074 cfs.
Adjusted for 15 min:	0.074 cfs.

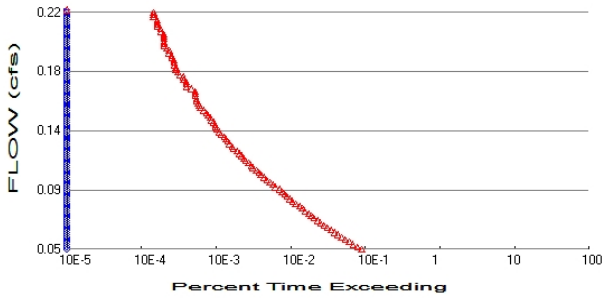


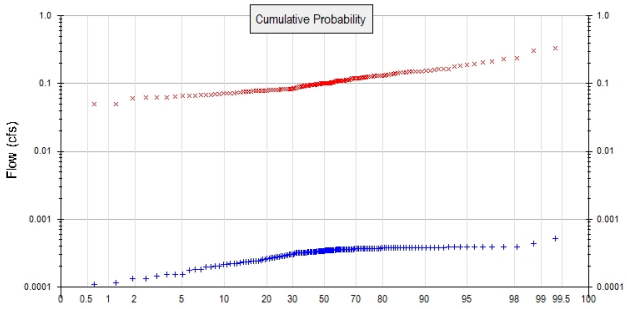
LID Report

POC 2

POC #2 was not reported because POC must exist in both scenarios and both scenarios must have been run.

POC 3





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #3
Total Pervious Area: 0.48
Total Impervious Area: 0

Mitigated Landuse Totals for POC #3
Total Pervious Area: 0.2
Total Impervious Area: 0.28

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	**Flow(cfs)**
2 year	0.000321
5 year	0.000391
10 year	0.000423
25 year	0.000452
50 year	0.000469
100 year	0.000482

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	0.100465
5 year	0.134756
10 year	0.159664
25 year	0.193738
50 year	0.221073
100 year	0.250135

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #3

Year	**Predeveloped**	**Mitigated**
1902	0.000	0.119
1903	0.000	0.132
1904	0.000	0.149
1905	0.000	0.067
1906	0.000	0.076
1907	0.000	0.100
1908	0.000	0.082
1909	0.000	0.101
1910	0.000	0.097
1911	0.000	0.109
1912	0.000	0.181

1913	0.000	0.078
1914	0.000	0.334
1915	0.000	0.068
1916	0.000	0.126
1917	0.000	0.050
1918	0.000	0.100
1919	0.000	0.063
1920	0.000	0.083
1921	0.000	0.071
1922	0.000	0.111
1923	0.000	0.077
1924	0.000	0.146
1925	0.000	0.062
1926	0.000	0.119
1927	0.000	0.101
1928	0.000	0.072
1929	0.000	0.143
1930	0.000	0.152
1931	0.000	0.073
1932	0.000	0.078
1933	0.000	0.078
1934	0.000	0.126
1935	0.000	0.069
1936	0.000	0.093
1937	0.000	0.122
1938	0.000	0.069
1939	0.000	0.084
1940	0.000	0.152
1941	0.000	0.166
1942	0.000	0.112
1943	0.000	0.111
1944	0.000	0.160
1945	0.000	0.121
1946	0.000	0.094
1947	0.000	0.073
1948	0.000	0.100
1949	0.000	0.155
1950	0.000	0.086
1951	0.000	0.132
1952	0.000	0.149
1953	0.000	0.138
1954	0.000	0.081
1955	0.000	0.076
1956	0.000	0.071
1957	0.000	0.081
1958	0.000	0.101
1959	0.000	0.101
1960	0.000	0.082
1961	0.000	0.227
1962	0.000	0.098
1963	0.000	0.073
1964	0.000	0.209
1965	0.000	0.098
1966	0.000	0.079
1967	0.000	0.111
1968	0.000	0.094
1969	0.000	0.084
1970	0.000	0.095

1971	0.000	0.093
1972	0.000	0.306
1973	0.000	0.177
1974	0.000	0.130
1975	0.000	0.133
1976	0.000	0.142
1977	0.000	0.061
1978	0.000	0.103
1979	0.000	0.112
1980	0.000	0.107
1981	0.000	0.102
1982	0.000	0.082
1983	0.000	0.111
1984	0.000	0.110
1985	0.000	0.125
1986	0.000	0.063
1987	0.000	0.114
1988	0.000	0.067
1989	0.000	0.066
1990	0.000	0.081
1991	0.000	0.122
1992	0.000	0.117
1993	0.000	0.130
1994	0.000	0.090
1995	0.000	0.069
1996	0.000	0.093
1997	0.000	0.083
1998	0.000	0.099
1999	0.000	0.114
2000	0.000	0.094
2001	0.000	0.078
2002	0.000	0.138
2003	0.000	0.080
2004	0.000	0.121
2005	0.000	0.235
2006	0.000	0.109
2007	0.000	0.121
2008	0.000	0.100
2009	0.000	0.076
2010	0.000	0.098
2011	0.000	0.102
2012	0.000	0.096
2013	0.000	0.090
2014	0.000	0.088
2015	0.000	0.144
2016	0.000	0.095
2017	0.000	0.147
2018	0.000	0.088
2019	0.000	0.130
2020	0.000	0.107
2021	0.000	0.090
2022	0.000	0.150
2023	0.000	0.188
2024	0.000	0.196
2025	0.000	0.099
2026	0.000	0.111
2027	0.000	0.121
2028	0.000	0.047

2029	0.000	0.077
2030	0.000	0.164
2031	0.000	0.049
2032	0.000	0.082
2033	0.000	0.104
2034	0.000	0.079
2035	0.000	0.100
2036	0.000	0.081
2037	0.000	0.109
2038	0.000	0.103
2039	0.000	0.207
2040	0.000	0.081
2041	0.000	0.103
2042	0.000	0.121
2043	0.000	0.132
2044	0.000	0.091
2045	0.000	0.073
2046	0.000	0.081
2047	0.000	0.100
2048	0.000	0.083
2049	0.000	0.122
2050	0.000	0.092
2051	0.000	0.128
2052	0.000	0.099
2053	0.000	0.084
2054	0.000	0.164
2055	0.000	0.094
2056	0.000	0.132
2057	0.000	0.063
2058	0.000	0.124
2059	0.001	0.156

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	Predeveloped	Mitigated
1	0.0005	0.3344
2	0.0004	0.3064
3	0.0004	0.2354
4	0.0004	0.2275
5	0.0004	0.2095
6	0.0004	0.2069
7	0.0004	0.1965
8	0.0004	0.1878
9	0.0004	0.1814
10	0.0004	0.1770
11	0.0004	0.1659
12	0.0004	0.1644
13	0.0004	0.1642
14	0.0004	0.1599
15	0.0004	0.1559
16	0.0004	0.1551
17	0.0004	0.1518
18	0.0004	0.1516
19	0.0004	0.1498
20	0.0004	0.1487
21	0.0004	0.1487
22	0.0004	0.1470
23	0.0004	0.1461

24	0.0004	0.1441
25	0.0004	0.1434
26	0.0004	0.1418
27	0.0004	0.1381
28	0.0004	0.1375
29	0.0004	0.1330
30	0.0004	0.1324
31	0.0004	0.1323
32	0.0004	0.1319
33	0.0004	0.1316
34	0.0004	0.1305
35	0.0004	0.1299
36	0.0004	0.1295
37	0.0004	0.1285
38	0.0004	0.1261
39	0.0004	0.1258
40	0.0004	0.1253
41	0.0004	0.1237
42	0.0004	0.1223
43	0.0004	0.1222
44	0.0004	0.1219
45	0.0004	0.1213
46	0.0004	0.1212
47	0.0004	0.1209
48	0.0004	0.1206
49	0.0004	0.1206
50	0.0004	0.1189
51	0.0004	0.1186
52	0.0004	0.1173
53	0.0004	0.1139
54	0.0004	0.1139
55	0.0004	0.1119
56	0.0004	0.1117
57	0.0004	0.1112
58	0.0004	0.1112
59	0.0004	0.1110
60	0.0004	0.1109
61	0.0004	0.1107
62	0.0004	0.1099
63	0.0004	0.1092
64	0.0004	0.1089
65	0.0004	0.1085
66	0.0004	0.1071
67	0.0004	0.1066
68	0.0003	0.1037
69	0.0003	0.1033
70	0.0003	0.1030
71	0.0003	0.1027
72	0.0003	0.1020
73	0.0003	0.1016
74	0.0003	0.1014
75	0.0003	0.1011
76	0.0003	0.1007
77	0.0003	0.1006
78	0.0003	0.1005
79	0.0003	0.1004
80	0.0003	0.1004
81	0.0003	0.0998

82	0.0003	0.0998
83	0.0003	0.0997
84	0.0003	0.0994
85	0.0003	0.0992
86	0.0003	0.0986
87	0.0003	0.0979
88	0.0003	0.0978
89	0.0003	0.0977
90	0.0003	0.0968
91	0.0003	0.0957
92	0.0003	0.0954
93	0.0003	0.0946
94	0.0003	0.0944
95	0.0003	0.0944
96	0.0003	0.0943
97	0.0003	0.0937
98	0.0003	0.0931
99	0.0003	0.0929
100	0.0003	0.0927
101	0.0003	0.0916
102	0.0003	0.0905
103	0.0003	0.0902
104	0.0003	0.0900
105	0.0003	0.0895
106	0.0003	0.0884
107	0.0003	0.0877
108	0.0003	0.0858
109	0.0003	0.0843
110	0.0003	0.0842
111	0.0003	0.0837
112	0.0003	0.0833
113	0.0003	0.0828
114	0.0003	0.0825
115	0.0003	0.0822
116	0.0003	0.0820
117	0.0003	0.0820
118	0.0003	0.0819
119	0.0003	0.0815
120	0.0003	0.0814
121	0.0003	0.0813
122	0.0003	0.0811
123	0.0003	0.0810
124	0.0003	0.0809
125	0.0003	0.0801
126	0.0003	0.0791
127	0.0003	0.0787
128	0.0003	0.0782
129	0.0002	0.0780
130	0.0002	0.0776
131	0.0002	0.0775
132	0.0002	0.0773
133	0.0002	0.0771
134	0.0002	0.0764
135	0.0002	0.0761
136	0.0002	0.0759
137	0.0002	0.0734
138	0.0002	0.0732
139	0.0002	0.0729

140	0.0002	0.0726
141	0.0002	0.0720
142	0.0002	0.0709
143	0.0002	0.0708
144	0.0002	0.0694
145	0.0002	0.0687
146	0.0002	0.0685
147	0.0002	0.0678
148	0.0002	0.0669
149	0.0002	0.0667
150	0.0002	0.0663
151	0.0002	0.0633
152	0.0002	0.0632
153	0.0001	0.0630
154	0.0001	0.0616
155	0.0001	0.0611
156	0.0001	0.0501
157	0.0001	0.0491
158	0.0001	0.0470

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0002	0	4937	n/a	Fail
0.0002	0	4350	n/a	Fail
0.0002	0	3807	n/a	Fail
0.0002	0	3365	n/a	Fail
0.0002	0	2985	n/a	Fail
0.0002	0	2659	n/a	Fail
0.0002	0	2370	n/a	Fail
0.0002	0	2124	n/a	Fail
0.0002	0	1929	n/a	Fail
0.0002	0	1721	n/a	Fail
0.0002	0	1536	n/a	Fail
0.0002	0	1394	n/a	Fail
0.0002	0	1264	n/a	Fail
0.0002	0	1137	n/a	Fail
0.0002	0	1045	n/a	Fail
0.0002	0	964	n/a	Fail
0.0002	0	860	n/a	Fail
0.0002	0	790	n/a	Fail
0.0002	0	731	n/a	Fail
0.0002	0	641	n/a	Fail
0.0002	0	590	n/a	Fail
0.0002	0	539	n/a	Fail
0.0002	0	495	n/a	Fail
0.0002	0	463	n/a	Fail
0.0002	0	425	n/a	Fail
0.0002	0	391	n/a	Fail
0.0002	0	346	n/a	Fail
0.0002	0	317	n/a	Fail
0.0002	0	291	n/a	Fail
0.0003	0	266	n/a	Fail
0.0003	0	242	n/a	Fail
0.0003	0	220	n/a	Fail
0.0003	0	208	n/a	Fail
0.0003	0	192	n/a	Fail
0.0003	0	174	n/a	Fail
0.0003	0	163	n/a	Fail
0.0003	0	150	n/a	Fail
0.0003	0	138	n/a	Fail
0.0003	0	130	n/a	Fail
0.0003	0	123	n/a	Fail
0.0003	0	115	n/a	Fail
0.0003	0	105	n/a	Fail
0.0003	0	94	n/a	Fail
0.0003	0	91	n/a	Fail
0.0003	0	84	n/a	Fail
0.0003	0	79	n/a	Fail
0.0003	0	75	n/a	Fail
0.0003	0	71	n/a	Fail
0.0003	0	64	n/a	Fail
0.0003	0	61	n/a	Fail
0.0003	0	56	n/a	Fail
0.0003	0	54	n/a	Fail
0.0003	0	54	n/a	Fail

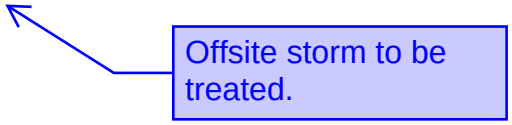
0.0003	0	52	n/a	Fail
0.0003	0	48	n/a	Fail
0.0003	0	46	n/a	Fail
0.0003	0	43	n/a	Fail
0.0003	0	41	n/a	Fail
0.0003	0	38	n/a	Fail
0.0003	0	34	n/a	Fail
0.0003	0	33	n/a	Fail
0.0004	0	32	n/a	Fail
0.0004	0	30	n/a	Fail
0.0004	0	30	n/a	Fail
0.0004	0	29	n/a	Fail
0.0004	0	29	n/a	Fail
0.0004	0	29	n/a	Fail
0.0004	0	26	n/a	Fail
0.0004	0	22	n/a	Fail
0.0004	0	22	n/a	Fail
0.0004	0	22	n/a	Fail
0.0004	0	20	n/a	Fail
0.0004	0	20	n/a	Fail
0.0004	0	18	n/a	Fail
0.0004	0	17	n/a	Fail
0.0004	0	16	n/a	Fail
0.0004	0	16	n/a	Fail
0.0004	0	15	n/a	Fail
0.0004	0	15	n/a	Fail
0.0004	0	15	n/a	Fail
0.0004	0	14	n/a	Fail
0.0004	0	14	n/a	Fail
0.0004	0	13	n/a	Fail
0.0004	0	13	n/a	Fail
0.0004	0	12	n/a	Fail
0.0004	0	11	n/a	Fail
0.0004	0	11	n/a	Fail
0.0004	0	11	n/a	Fail
0.0004	0	11	n/a	Fail
0.0004	0	11	n/a	Fail
0.0004	0	11	n/a	Fail
0.0004	0	10	n/a	Fail
0.0004	0	10	n/a	Fail
0.0005	0	9	n/a	Fail
0.0005	0	9	n/a	Fail
0.0005	0	9	n/a	Fail
0.0005	0	9	n/a	Fail
0.0005	0	8	n/a	Fail
0.0005	0	8	n/a	Fail
0.0005	0	8	n/a	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #3

On-line facility volume:	0.0306 acre-feet
On-line facility target flow:	0.0425 cfs.
Adjusted for 15 min:	0.0425 cfs.
Off-line facility target flow:	0.0247 cfs.
Adjusted for 15 min:	0.0247 cfs.



LID Report

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

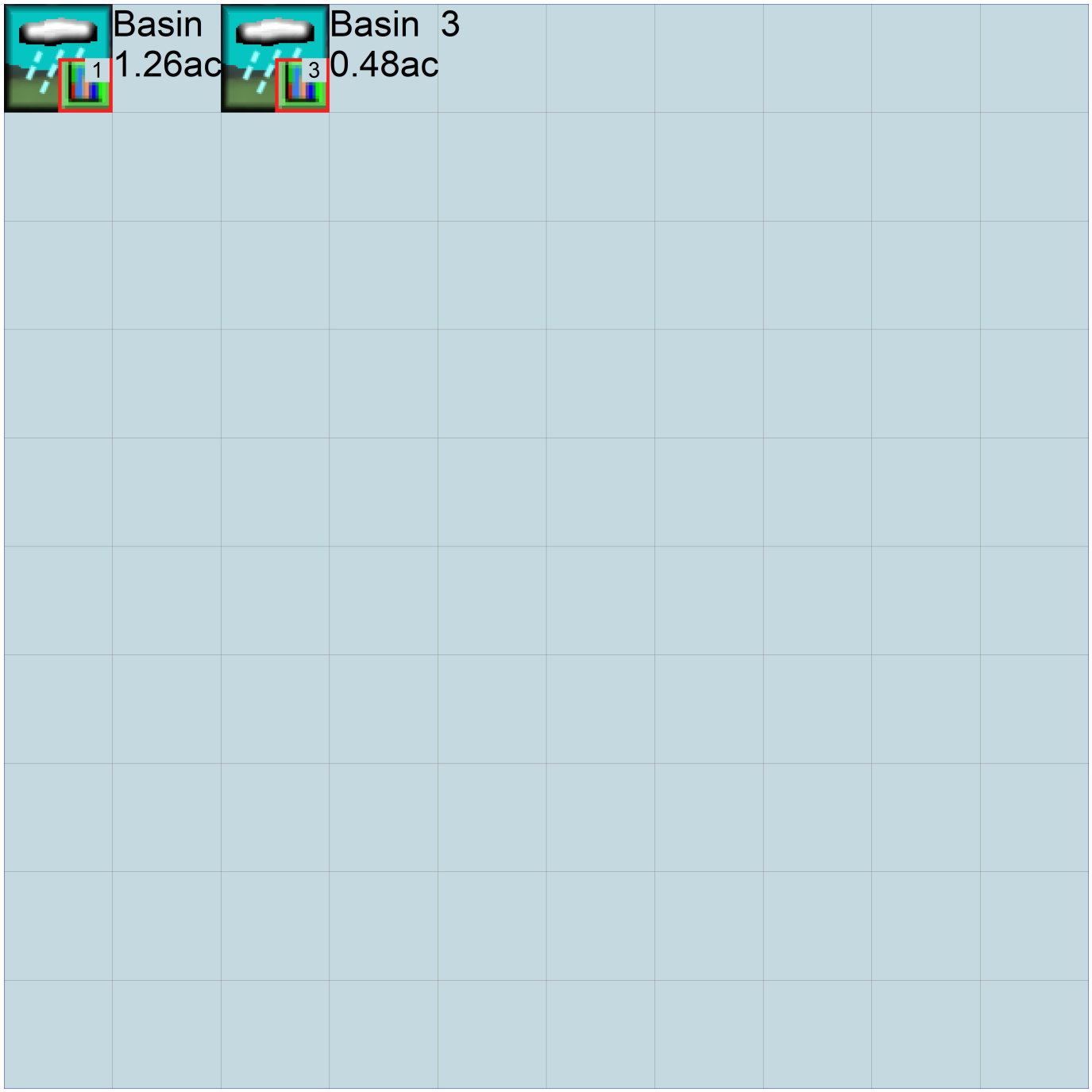
No PERLND changes have been made.

IMPLND Changes

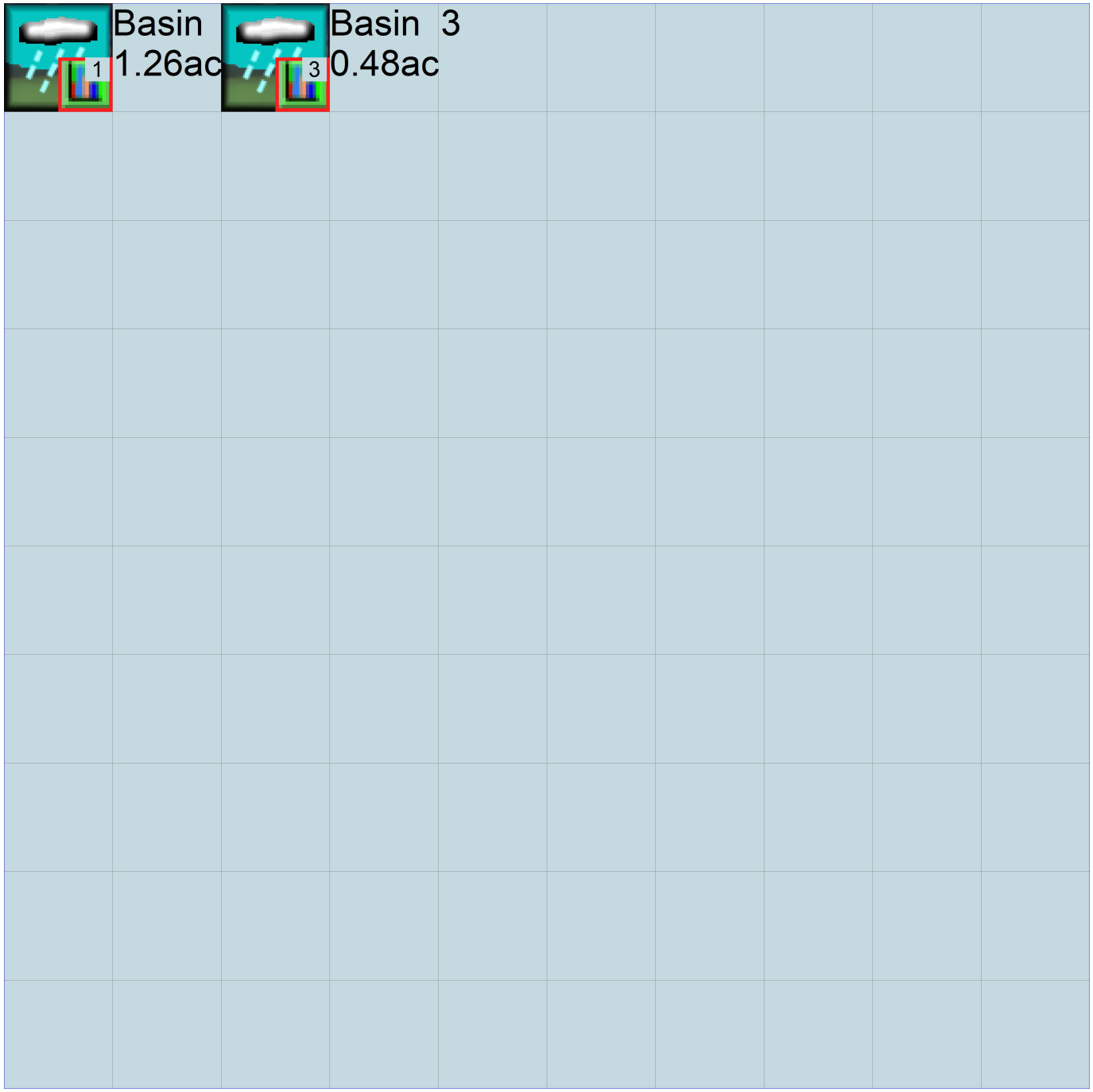
No IMPLND changes have been made.

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   WQ.wdm
MESSU       25   PreWQ.MES
            27   PreWQ.L61
            28   PreWQ.L62
            30   POCWQ1.dat
            32   POCWQ3.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND       1
      COPY       501
      COPY       503
      DISPLY       1
      DISPLY       3
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
    3        Basin  3                   MAX                    1    2   32    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  503         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           ***
    1     A/B, 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 ***
    1         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  *********
    1         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 ***
    1         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
    1              0         5         2       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    1              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    1          0.2       0.5      0.35         0       0.7       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
    1              0         0         0         0         3         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#   ***
Basin  1***
PERLND   1                        1.26     COPY   501     12
PERLND   1                        1.26     COPY   501     13
Basin  3***
PERLND   1                        0.48     COPY   503     12
PERLND   1                        0.48     COPY   503     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
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     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
COPY   503 OUTPUT MEAN   1 1     48.4      WDM    503 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   WQ.wdm
MESSU       25   MitWQ.MES
            27   MitWQ.L61
            28   MitWQ.L62
            30   POCWQ1.dat
            32   POCWQ3.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND       4
      IMPLND       1
      COPY       501
      COPY       503
      DISPLY       1
      DISPLY       3
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
    3        Basin  3                   MAX                    1    2   32    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  503         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           ***
    4     A/B, Pasture, 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 ***
    4         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  *********
    4         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 ***
    4         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
    4              0         5       1.5       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    4              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    4          0.15       0.5       0.3         0       0.7       0.4
  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
    4              0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

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

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

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

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   4                       0.42     COPY   501     12
PERLND   4                       0.42     COPY   501     13
IMPLND   1                       0.84     COPY   501     15
Basin  3***
PERLND   4                        0.2     COPY   503     12
PERLND   4                        0.2     COPY   503     13
IMPLND   1                       0.28     COPY   503     15

******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
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     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     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
COPY     3 OUTPUT MEAN   1 1     48.4      WDM    703 FLOW     ENGL      REPL
COPY   503 OUTPUT MEAN   1 1     48.4      WDM    803 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

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


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

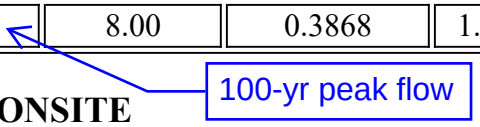
APPENDIX E

Design Calculations

Appended on: 11:22:59 Friday, January 03, 2025

ALL ONSITE Event Summary

Event	Peak Q (cfs)	Peak T (hrs)	Hyd Vol (acft)	Area (ac)	Method	Raintype
2 year	0.4607	8.00	0.1819	1.9600	SBUH	TYPE1A
10 year	0.6634	8.00	0.2472	1.9600	SBUH	TYPE1A
25 year	0.8780	8.00	0.3158	1.9600	SBUH	TYPE1A
100 year	1.1008	8.00	0.3868	1.9600	SBUH	TYPE1A



Record Id: ALL ONSITE

Design Method	SBUH	**Rainfall type**	TYPE1A
Hyd Intv	10.00 min	**Peaking Factor**	484.00
		Abstraction Coeff	0.20
Pervious Area (AMC 2)	1.96 ac	**DCIA**	0.00 ac
Pervious CN	83.96	**DC CN**	0.00
Pervious TC	6.30 min	**DC TC**	0.00 min

Pervious CN Calc

Description	SubArea	Sub cn
Roads (hard surface - includes right of way)	0.91 ac	92.00
Open spaces, lawns, parks (50-75% grass)	1.05 ac	77.00
Pervious Composited CN (AMC 2)		83.96

Pervious TC Calc

Type	Description	Length	Slope	Coeff	Misc	TT
Fixed	Basins 1, 2, and 3 per Exhibit 3					6.30 min
Pervious TC						6.30 min

8 Inch Pipe

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	1.00000	%
Normal Depth	8.00	in
Diameter	8.00	in

Results

Discharge	1.31	ft³/s
Flow Area	0.35	ft²
Wetted Perimeter	2.09	ft
Hydraulic Radius	2.00	in
Top Width	0.00	ft
Critical Depth	0.54	ft
Percent Full	100.0	%
Critical Slope	0.01021	ft/ft
Velocity	3.75	ft/s
Velocity Head	0.22	ft
Specific Energy	0.89	ft
Froude Number	0.00	
Maximum Discharge	1.41	ft³/s
Discharge Full	1.31	ft³/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

Discharge capacity of pipe

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

8 Inch Pipe

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	8.00	in
Critical Depth	0.54	ft
Channel Slope	1.00000	%
Critical Slope	0.01021	ft/ft

20-223 - 4" Pipe Analysis

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	1.00000	%
Normal Depth	4.00	in
Diameter	4.00	in

See Plans for Roof Drain pipe details. Analysis was used for 4" pipe at 1.00% min. slope.

Results

Discharge	0.21	ft³/s
Flow Area	0.09	ft²
Wetted Perimeter	1.05	ft
Hydraulic Radius	1.00	in
Top Width	0.00	ft
Critical Depth	0.26	ft
Percent Full	100.0	%
Critical Slope	0.01140	ft/ft
Velocity	2.36	ft/s
Velocity Head	0.09	ft
Specific Energy	0.42	ft
Froude Number	0.00	
Maximum Discharge	0.22	ft³/s
Discharge Full	0.21	ft³/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

Max Flow rate of a 4" Roof Drain pipe @ 1.00% min. slope.

GVF Input Data

Downstream Depth	0.00 in
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

20-223 - 4" Pipe Analysis

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.00	in
Critical Depth	0.26	ft
Channel Slope	1.00000	%
Critical Slope	0.01140	ft/ft

Appended on: 07:55:58 Friday, August 26, 2022

4" PIPE Event Summary

Event	Peak Q (cfs)	Peak T (hrs)	Hyd Vol (acft)	Area (ac)	Method	Raintype
2 year	0.1458	8.00	0.0492	0.2600	SBUH	TYPE1A
10 year	0.1766	8.00	0.0600	0.2600	SBUH	TYPE1A
25 year	0.2072	8.00	0.0708	0.2600	SBUH	TYPE1A
100 year	0.2682	8.00	0.0924	0.2600	SBUH	TYPE1A

Peak Flow Rate of 4" Roof Drain pipe

Max amount of Impervious area a 4" roof drain pipe can withstand.

Record Id: 4" PIPE

Design Method	SBUH	**Rainfall type**	TYPE1A
Hyd Intv	10.00 min	**Peaking Factor**	484.00
		Abstraction Coeff	0.20
Pervious Area (AMC 2)	0.26 ac	**DCIA**	0.00 ac
Pervious CN	98.00	**DC CN**	0.00
Pervious TC	5.00 min	**DC TC**	0.00 min

Pervious CN Calc

Description	SubArea	Sub cn
Impervious surfaces (pavements, roofs, etc)	0.26 ac	98.00
Pervious Composited CN (AMC 2)		98.00

Pervious TC Calc

Type	Description	Length	Slope	Coeff	Misc	TT
Fixed						5.00 min
Pervious TC						5.00 min

20-223 - 6" Pipe Analysis

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	1.00000	%
Normal Depth	6.00	in
Diameter	6.00	in

See Plans for Roof Drain pipe details. Analysis was used for 6" pipe at 1.00% min. slope.

Results

Discharge	0.61	ft³/s
Flow Area	0.20	ft²
Wetted Perimeter	1.57	ft
Hydraulic Radius	1.50	in
Top Width	0.00	ft
Critical Depth	0.40	ft
Percent Full	100.0	%
Critical Slope	0.01066	ft/ft
Velocity	3.10	ft/s
Velocity Head	0.15	ft
Specific Energy	0.65	ft
Froude Number	0.00	
Maximum Discharge	0.65	ft³/s
Discharge Full	0.61	ft³/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

Max Flow rate of a 6" Roof Drain pipe @ 1.00% min. slope.

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

20-223 - 6" Pipe Analysis

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	6.00	in
Critical Depth	0.40	ft
Channel Slope	1.00000	%
Critical Slope	0.01066	ft/ft

Appended on: 08:15:22 Friday, August 26, 2022

6" PIPE Event Summary

Event	Peak Q (cfs)	Peak T (hrs)	Hyd Vol (acft)	Area (ac)	Method	Raintype
2 year	0.4262	8.00	0.1438	0.7600	SBUH	TYPE1A
10 year	0.5161	8.00	0.1753	0.7600	SBUH	TYPE1A
25 year	0.6056	8.00	0.2069	0.7600	SBUH	TYPE1A
100 year	0.7840	8.00	0.2700	0.7600	SBUH	TYPE1A

Peak Flow rate of 6" Roof drain pipe

Max amount of impervious area a 6" Roof Drain pipe can withstand.

Record Id: 6" PIPE

Design Method	SBUH	**Rainfall type**	TYPE1A
Hyd Intv	10.00 min	**Peaking Factor**	484.00
		Abstraction Coeff	0.20
Pervious Area (AMC 2)	0.76 ac	**DCIA**	0.00 ac
Pervious CN	98.00	**DC CN**	0.00
Pervious TC	5.00 min	**DC TC**	0.00 min

Pervious CN Calc

Description	SubArea	Sub cn
Impervious surfaces (pavements, roofs, etc)	0.76 ac	98.00
Pervious Composited CN (AMC 2)		98.00

Pervious TC Calc

Type	Description	Length	Slope	Coeff	Misc	TT
Fixed						5.00 min
Pervious TC						5.00 min