CONTOUR
ENGINEERING • LLC

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

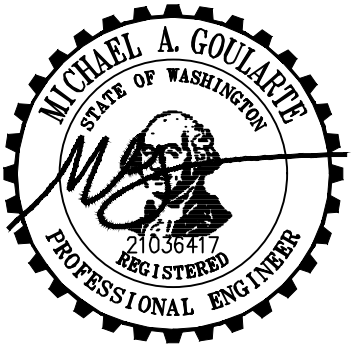
STORMWATER SITE PLAN

FOR

BRADBURY PLACE TOWNHOMES

CITY OF PUYALLUP, WASHINGTON

MARCH 2026



26th March 2026

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

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 Townhomes** 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.*

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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

See Predeveloped Basin Map in Appendix A for predeveloped areas.

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

See Developed Basin Map in Appendix A for developed areas.

Pre-Developed Site Hydrology

The total existing basin area contributing to the site is 2.85 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 catch basin. The catch basin 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 StreamFilter catch basin. See Appendix A for Basin map areas. Below is a description of each basin.

Basin #1 & Basin #2

Pervious Area:	0.37 AC
Impervious Area:	0.85 AC
100-year Flow Rate:	0.76 CFS
Offline Flow Rate:	0.0749 CFS (33.6 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 offline flow rate used to size the catch basin. See Appendix A for Basin Map areas.

Basin #3 & Basin #2

Pervious Area:	0.16 AC
Impervious Area:	0.28 AC
100-year Flow Rate:	0.25 CFS
Offline Flow Rate:	0.0246 CFS (11.05 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 or SDR 18 (Manning Coefficient n=0.010).

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 8-inch SDR 35 pipes sloped at 1.00 percent in Aisle C which discharge into SDCB#20. The results of these calculations are summarized below:

Onsite basin: 1.00 acres pervious (all landscaped areas)
0.95 acres impervious (all onsite non-roof hard surfaces)
1.14 cfs (peak runoff for 100-year storm)
1.57 cfs (capacity of 8-inch SDR 18 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.

A letter and technical documents have been provided by ADS ensuring that ADS N-12 and HP Storm pipes are rated for minimum 1' of cover. See documents in appendix E.

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

ADS N-12 is not an approved pipe material per City of Puyallup standards. Refer to section 204.3 of the city's standards for allowable pipe materials. HP is a type of polypropylene pipe. Polypropylene is an allowable pipe material however, it's required to have a minimum 3-feet of cover. [Storm Report, pg. 10]

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. See Appendix F for manufacturer information and DOE GULD for the proposed StreamFilter catch basins and BayFilter Media cartridges.

#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.

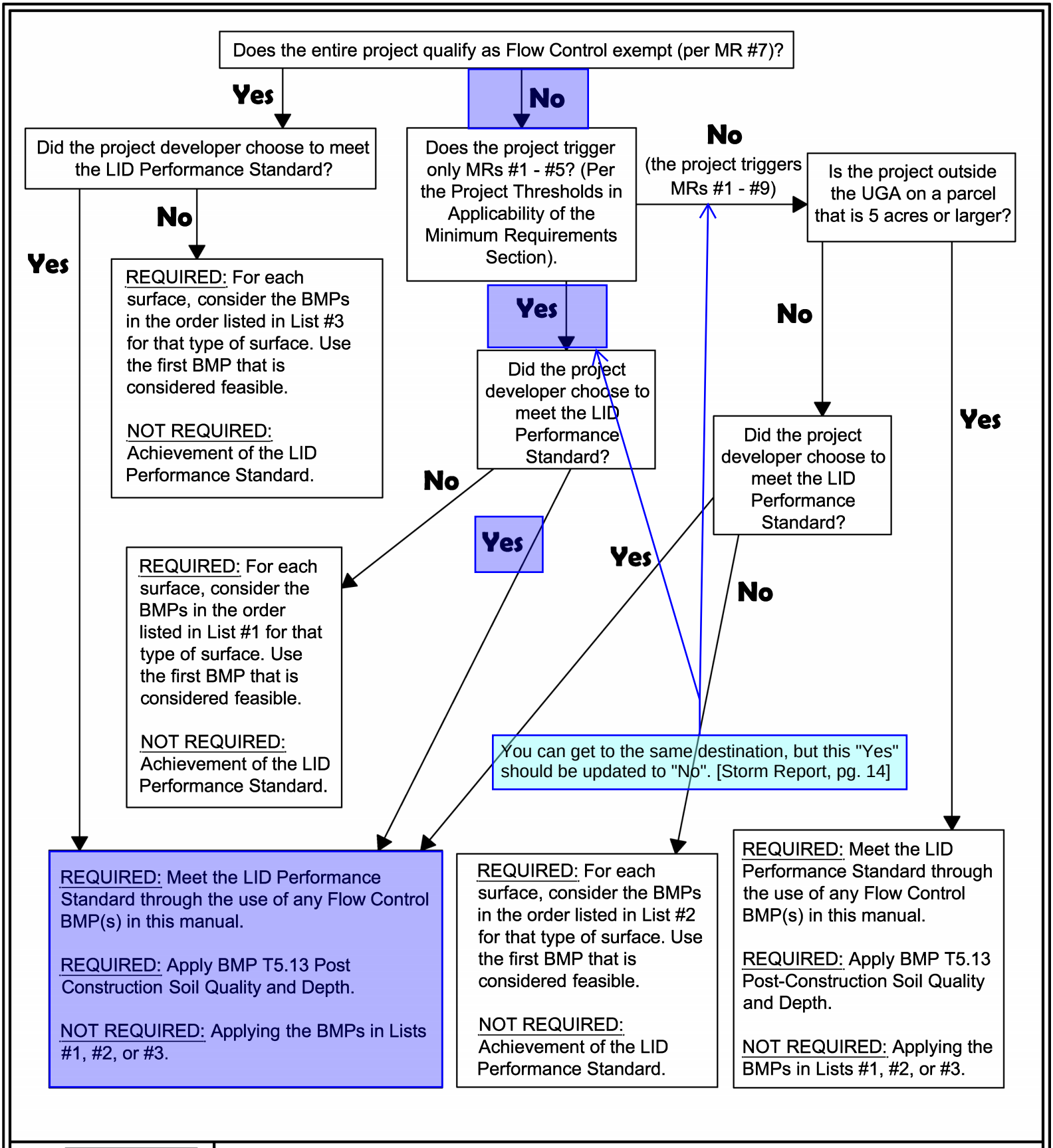
#9 – Operation and Maintenance
An operations and Maintenance Manual is included with this submittal.

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

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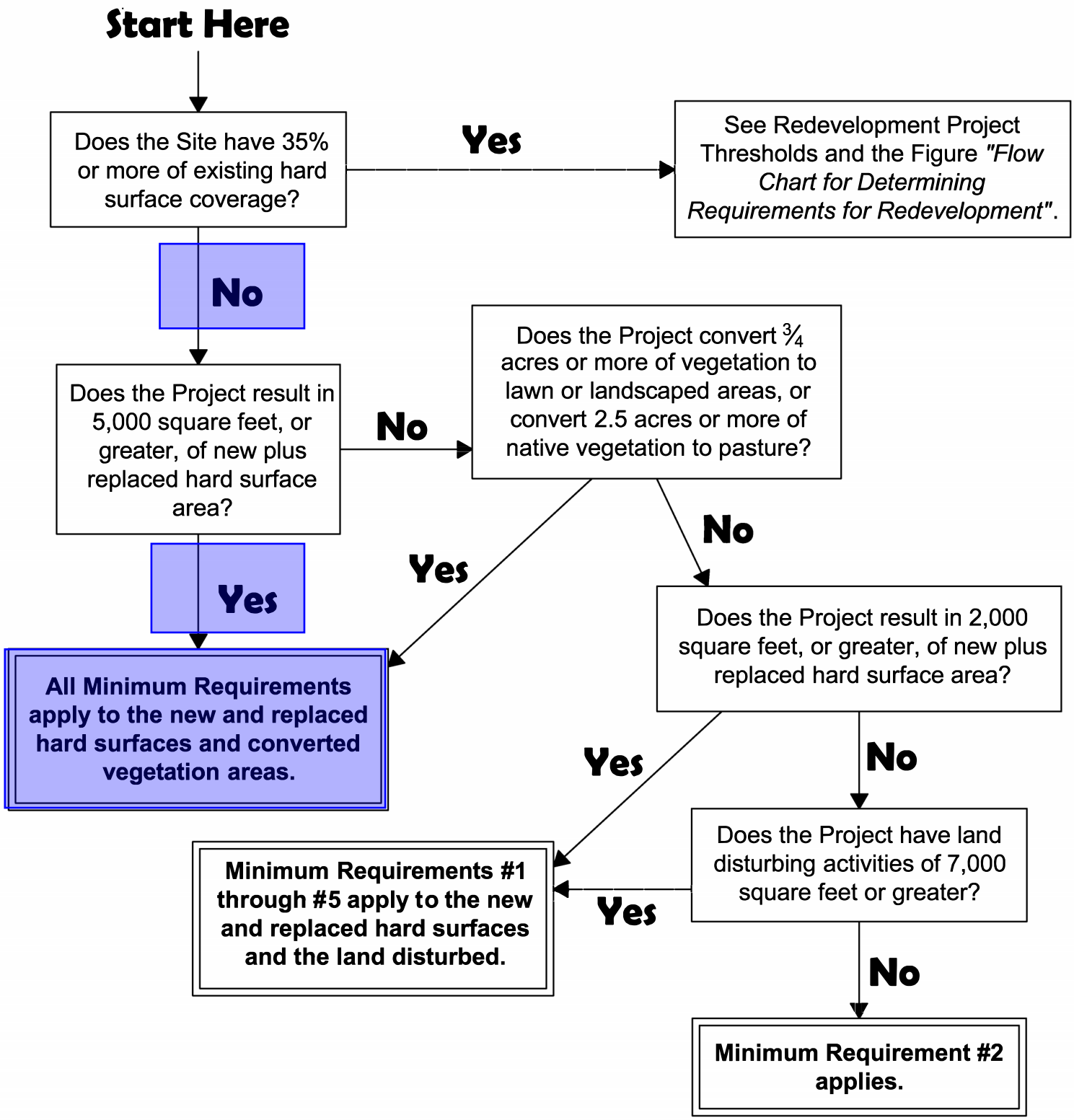

DEPARTMENT OF ECOLOGY
State of Washington

2. Flow Chart for Determining Requirements for New Development

Revised March 2019

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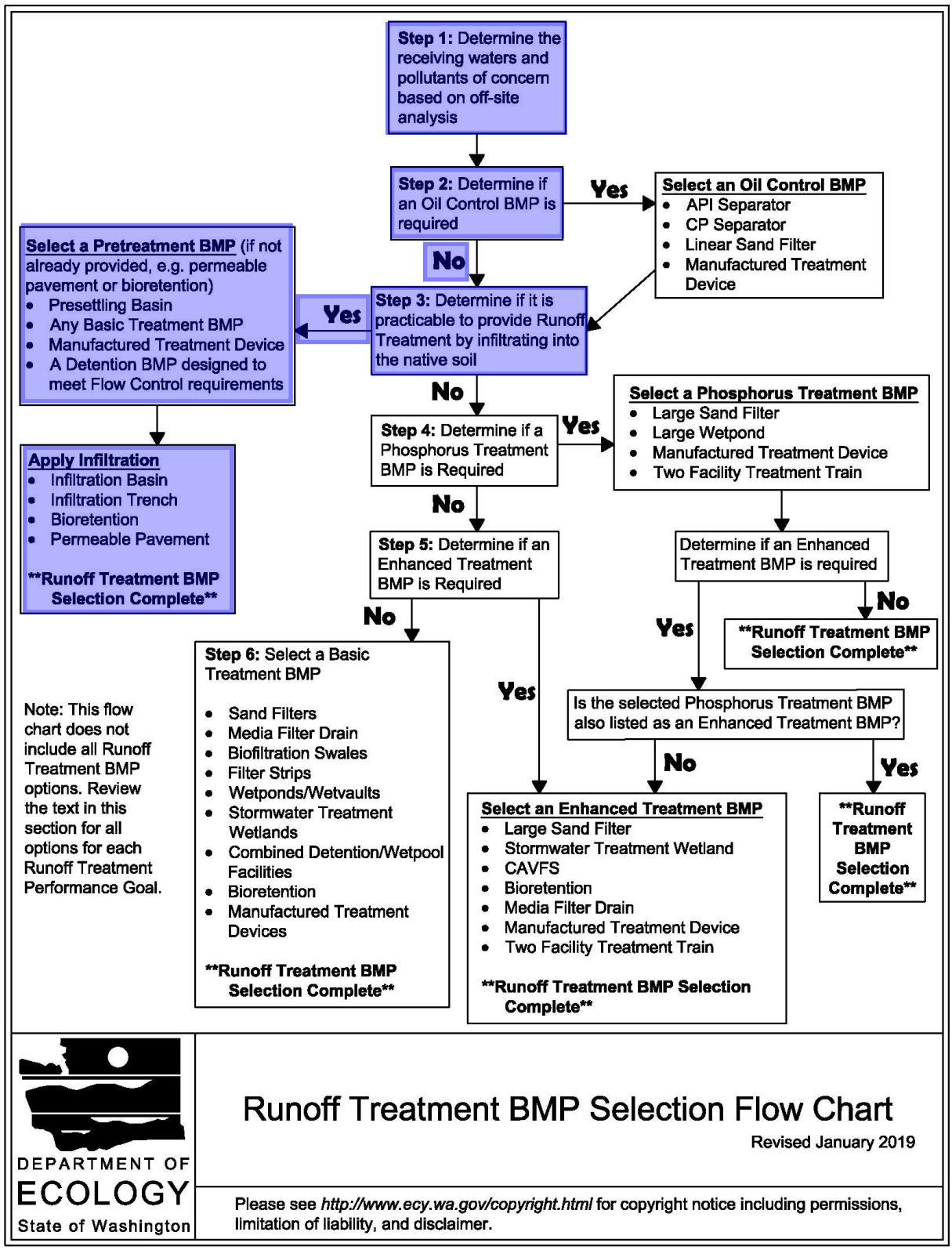
Figure III-1.1: Runoff Treatment BMP Selection Flow Chart



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.

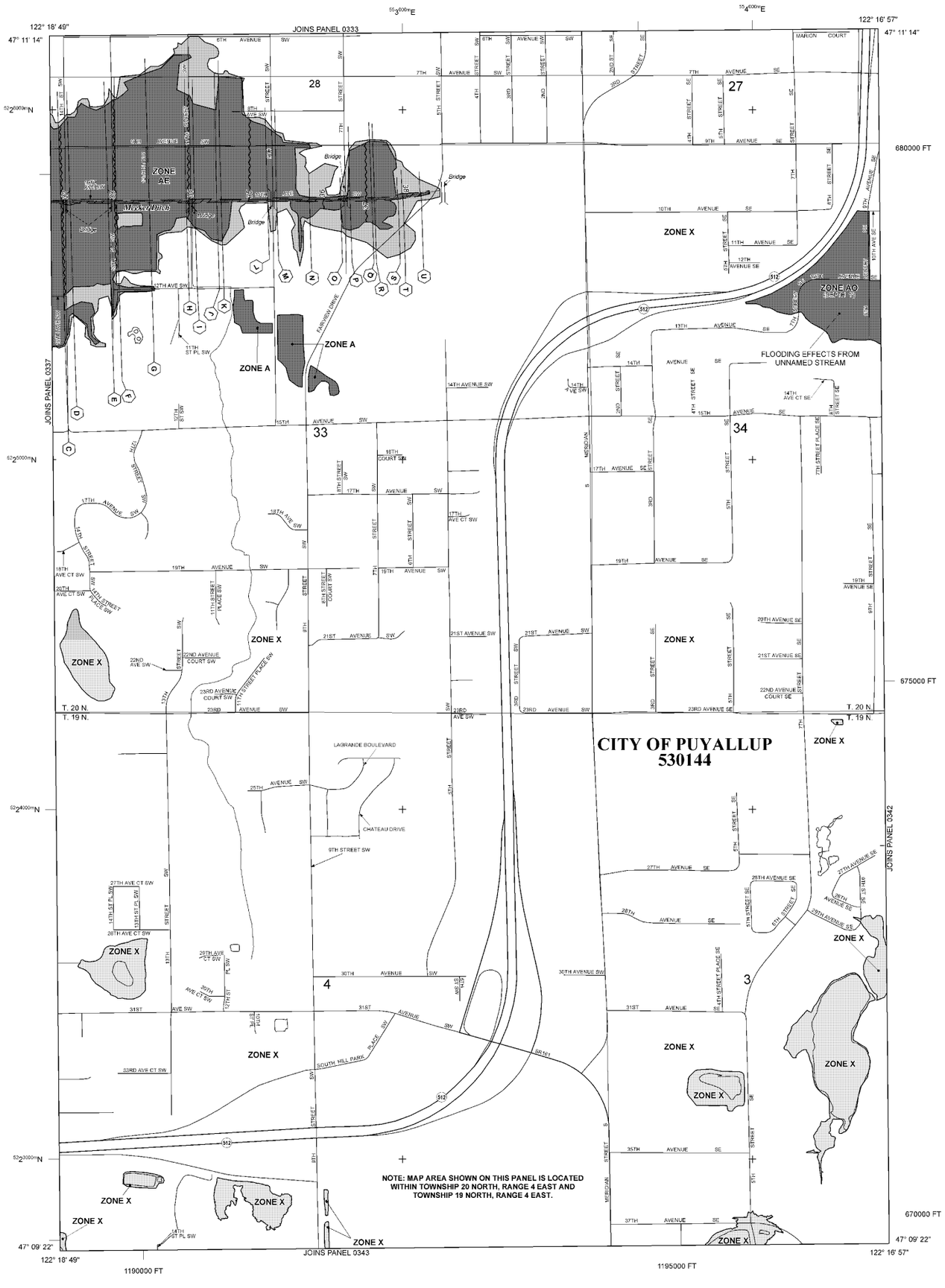
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

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.

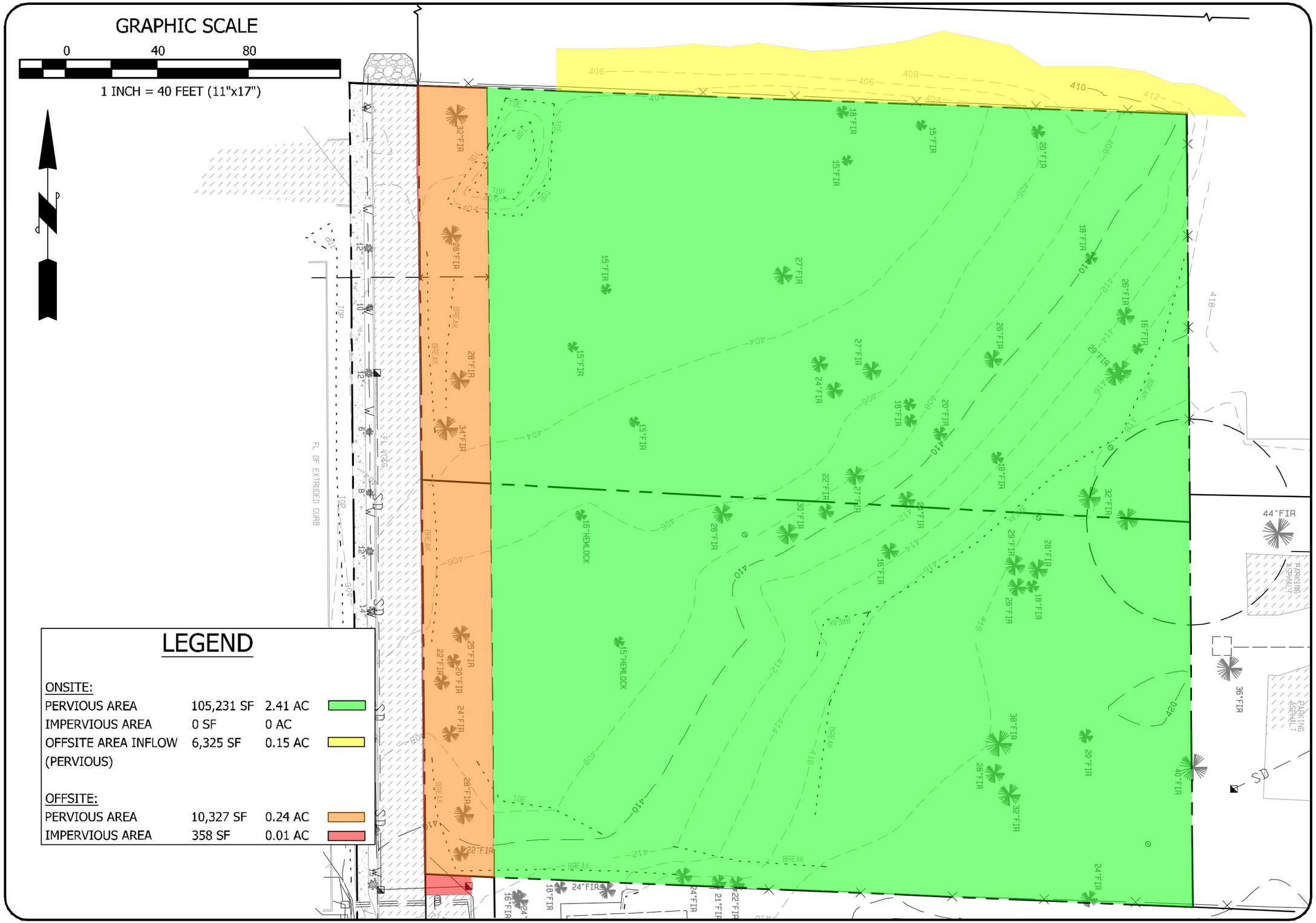
MAP NUMBER
53053C0341E
EFFECTIVE DATE
MARCH 7, 2017

Federal Emergency Management Agency

GRAPHIC SCALE

0 40 80

1 INCH = 40 FEET (11"x17")



LEGEND

ONSITE:			
PERVIOUS AREA	105,231 SF	2.41 AC	
IMPERVIOUS AREA	0 SF	0 AC	
OFFSITE AREA INFLOW (PERVIOUS)	6,325 SF	0.15 AC	
OFFSITE:			
PERVIOUS AREA	10,327 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:	2026.02.09
EXHIBIT NO.	1

GRAPHIC SCALE

0 40 80

1 INCH = 40 FEET (11"x17")

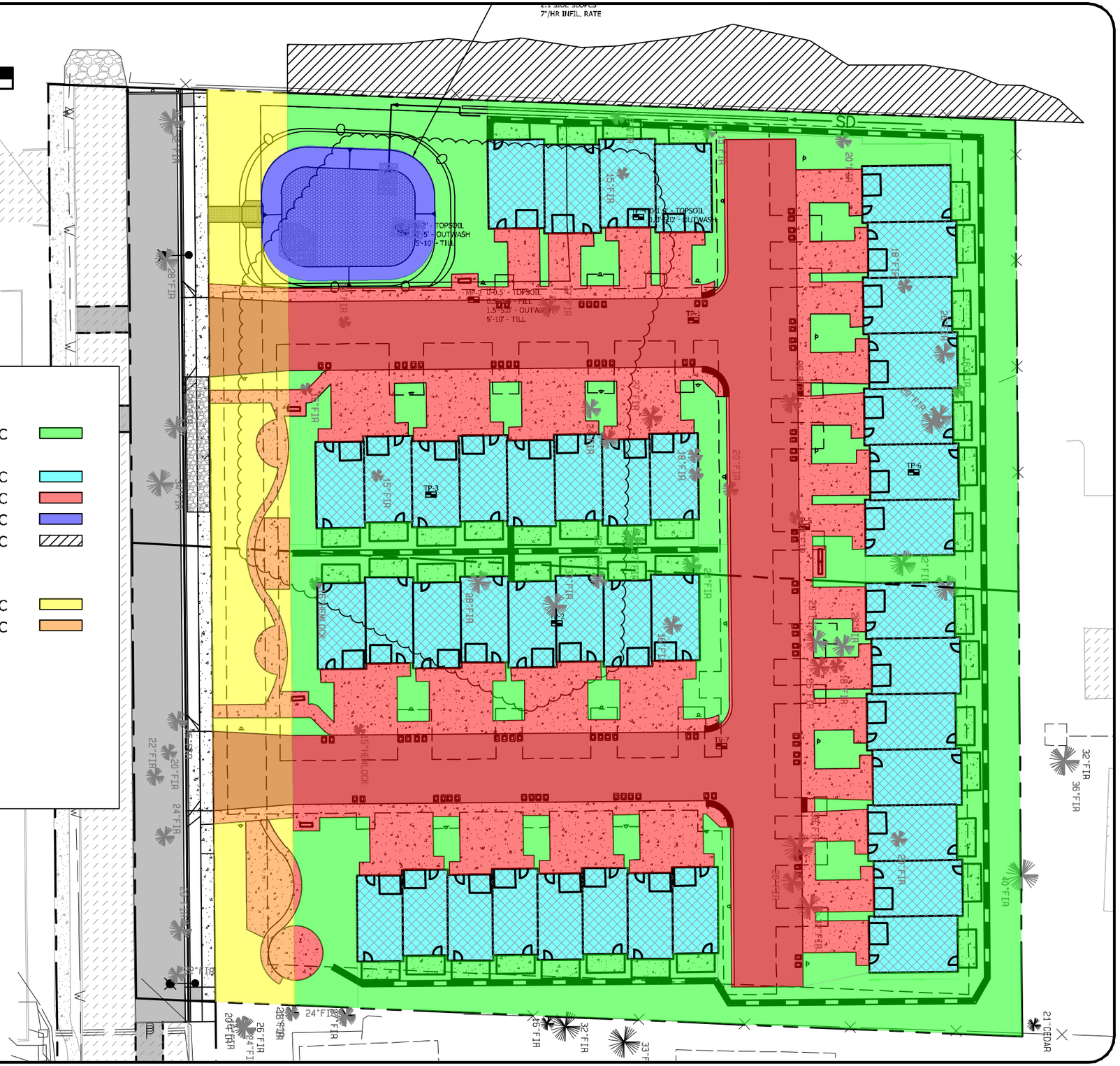
Paved patios shown on the back side of the buildings are shown as pervious, when they should be shown as impervious. Update accordingly, and update in modeling. [Storm Report, pg. 19]

LEGEND

ONSITE TRIBUTARY TO POND:			
PERVIOUS AREA	31,583 SF	0.72 AC	
IMPERVIOUS AREA			
ROOF AREA	26,553 SF	0.61 AC	
PGHS AREA	34,126 SF	0.78 AC	
POND AREA	3,018 SF	0.07 AC	
OFFSITE AREA INFLOW (PERVIOUS)	6,325 SF	0.15 AC	
ONSITE TRIBUTARY TO TRENCH:			
PERVIOUS AREA	5,793 SF	0.13 AC	
IMPERVIOUS AREA (PGHS)	4,162 SF	0.10 AC	

TOTAL PERVIOUS AREA USED IN POND WWHM CALCS
=0.72 AC+0.13 AC+0.15 AC
=1.00 AC

TOTAL PGHS AREA USED IN POND WWHM CALCS
=0.78 AC+0.10 AC
=0.88 AC



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Phone: 253-857-5454 ~ Fax: 253-509-0044 ~ info@contourpllc.com

ONSITE DEVELOPED BASIN MAP

BRADBURY PLACE APARTMENTS
PUYALLUP, WA

BY:	R. HENRETTA
PROJECT:	20-223
DATE:	2026.02.09
EXHIBIT NO.	2

GRAPHIC SCALE

0 40 80

1 INCH = 40 FEET (11"x17")

LEGEND

ONSITE TRIBUTARY TO TRENCH:

PERVIOUS AREA	5,793 SF	0.13 AC	
IMPERVIOUS AREA (PGHS)	4,162 SF	0.10 AC	

OFFSITE:

PERVIOUS AREA	1,300 SF	0.03 AC	
IMPERVIOUS AREA (PGHS)	9,385 SF	0.22 AC	

TOTAL PERVIOUS AREA USED IN TRENCH WWHM CALCS
=0.13 AC+0.03 AC
=0.16 AC

TOTAL PGHS AREA USED IN TRENCH WWHM CALCS
=0.10 AC+0.22 AC
=0.32 AC

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Phone: 253-857-5454 ~ Fax: 253-509-0044 ~ info@contourpllc.com

OFFSITE DEVELOPED BASIN MAP

BRADBURY PLACE APARTMENTS
PUYALLUP, WA

BY:	R. HENRETTA
PROJECT:	20-223
DATE:	2026.02.09
EXHIBIT NO.	3

GRAPHIC SCALE

0 40 80

1 INCH = 40 FEET (11"x17")

7"/HR INFIL. RATE

INFILTRATION POND

SFCB#40
STREAMFILTER

SDMH#25
BAYFILTER 522

SDCB#10
BAYFILTER 522

BASIN #1

BASIN #2

BASIN #3

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

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

LEGEND

BASIN #1:		
PERVIOUS AREA	10,421 SF	0.24 AC
IMPERVIOUS AREA	34,000 SF	0.78 AC
BASIN #2:		
PERVIOUS AREA	5,806 SF	0.13 AC
IMPERVIOUS AREA	4,162 SF	0.07 AC
BASIN #3:		
PERVIOUS AREA	1,300 SF	0.03 AC
IMPERVIOUS AREA	9,340 SF	0.21 AC

FOR WWHM CALCS :

POC 1	BASIN 1+2	0.0750 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:	2026.02.09
EXHIBIT NO.	4

APPENDIX B

Plans Exhibits

BRADBURY PLACE TOWNHOMES

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

GRAPHIC SCALE

0 50 100

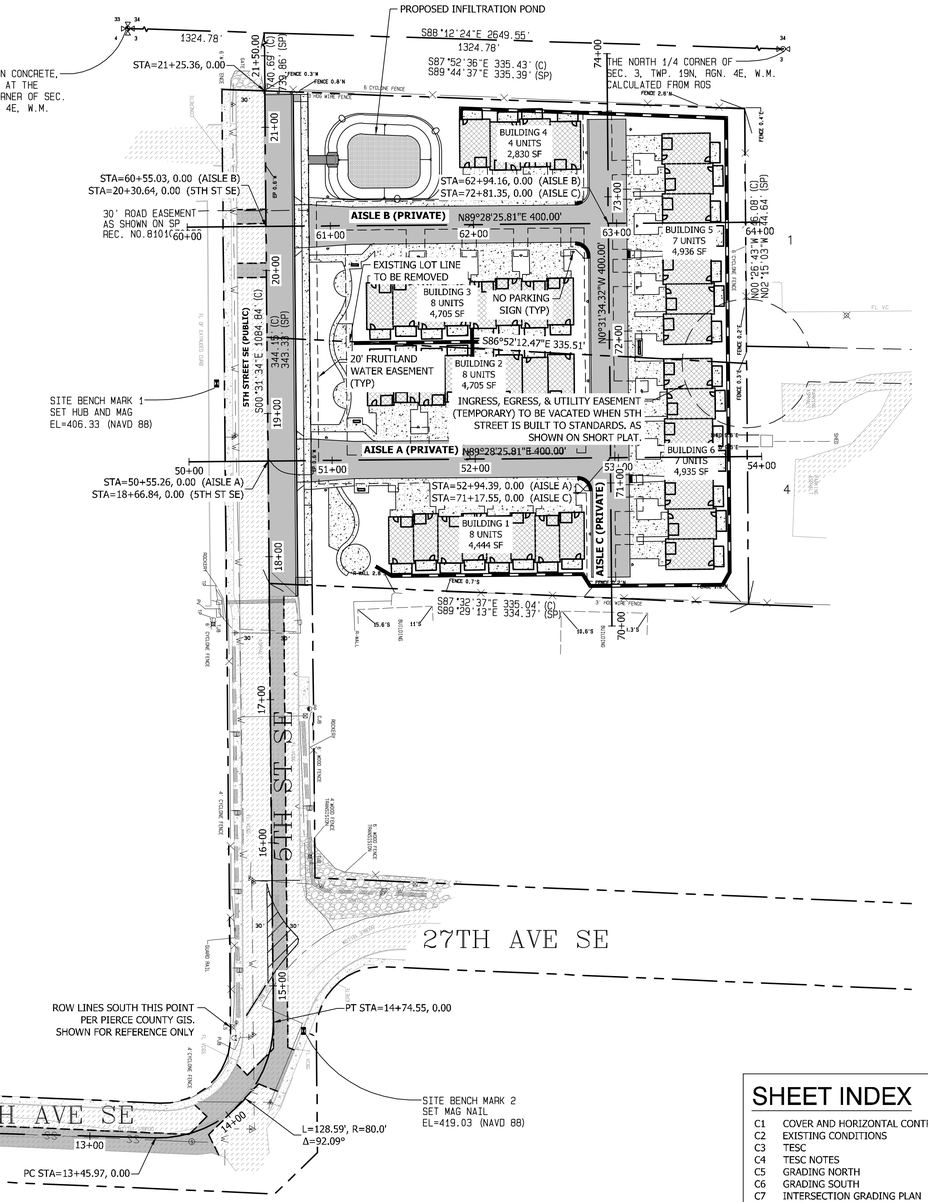
1 INCH = 50 FEET (24"x36")

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
THE CITY WILL NOT BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS.
FIELD CONDITIONS MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE DEVELOPMENT ENGINEERING MANAGER.



VICINITY MAP

NOT TO SCALE

LEGEND

SURVEY		PROPOSED
100	CONTOURS	100
	PROPERTY LINE/RIGHT-OF-WAY	
	RIGHT-OF-WAY DEDICATION	
	RIGHT-OF-WAY CENTERLINE	
	EASEMENT	
	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	

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
EMAIL: KGRODY54@GMAIL.COM

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

GENERAL NOTES
1. 1. ALL WORK IN CITY RIGHT-OF-WAY REQUIRES A PERMIT FROM THE CITY OF PUYALLUP. PRIOR TO ANY WORK COMMENCING, THE GENERAL CONTRACTOR SHALL ARRANGE FOR A PRECONSTRUCTION MEETING AT THE DEVELOPMENT SERVICES CENTER TO BE ATTENDED BY ALL CONTRACTORS THAT WILL PERFORM WORK SHOWN ON THE APPROVED ENGINEERING PLANS, REPRESENTATIVES FROM ALL APPLICABLE UTILITY COMPANIES, THE PROJECT OWNER AND APPROPRIATE CITY STAFF. CONTACT ENGINEERING SERVICES AT (253-841-5568) TO SCHEDULE THE MEETING. THE CONTRACTOR IS RESPONSIBLE TO HAVE THEIR OWN SET OF APPROVED PLANS AT THE MEETING.
2. AFTER COMPLETION OF ALL ITEMS SHOWN ON THESE PLANS AND BEFORE ACCEPTANCE OF THE PROJECT THE CONTRACTOR SHALL OBTAIN A "PUNCH LIST" PREPARED BY THE CITY'S INSPECTOR DETAILING REMAINING ITEMS OF WORK TO BE COMPLETED. ALL ITEMS OF WORK SHOWN ON THESE PLANS SHALL BE COMPLETED TO THE SATISFACTION OF THE CITY PRIOR TO ACCEPTANCE OF THE WATER SYSTEM AND PROVISION OF SANITARY SEWER SERVICE.
3. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (HEREINAFTER REFERRED TO AS THE "STANDARD SPECIFICATIONS"), WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND AMERICAN PUBLIC WORKS ASSOCIATION, WASHINGTON STATE CHAPTER, LATEST EDITION, UNLESS SUPERSEDED OR AMENDED BY THE CITY OF PUYALLUP CITY STANDARDS FOR PUBLIC WORKS ENGINEERING AND CONSTRUCTION (HEREINAFTER REFERRED TO AS THE "CITY STANDARDS").
4. A COPY OF THESE APPROVED PLANS AND APPLICABLE CITY DEVELOPER SPECIFICATIONS AND DETAILS SHALL BE ON SITE DURING CONSTRUCTION.
5. ANY REVISIONS MADE TO THESE PLANS MUST BE REVIEWED AND APPROVED BY THE DEVELOPER'S ENGINEER AND THE CITY PRIOR TO ANY IMPLEMENTATION IN THE FIELD. THE CITY SHALL NOT BE RESPONSIBLE FOR ANY ERRORS AND/OR OMISSIONS ON THESE PLANS.
6. THE CONTRACTOR SHALL HAVE ALL UTILITIES VERIFIED ON THE GROUND PRIOR TO ANY CONSTRUCTION. CALL (811) AT LEAST TWO WORKING DAYS IN ADVANCE. THE OWNER AND HIS/HER ENGINEER SHALL BE CONTACTED IMMEDIATELY IF A CONFLICT EXISTS.
7. ANY STRUCTURE AND/OR OBSTRUCTION THAT REQUIRES REMOVAL OR RELOCATION RELATING TO THIS PROJECT SHALL BE DONE SO AT THE DEVELOPER'S EXPENSE.
8. LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE TRUE ELEVATIONS AND LOCATIONS OF HIDDEN UTILITIES. ALL VISIBLE ITEMS SHALL BE THE ENGINEER'S RESPONSIBILITY.
9. THE CONTRACTOR SHALL INSTALL, REPLACE, OR RELOCATE ALL SIGNS, AS SHOWN ON THE PLANS OR AS AFFECTED BY CONSTRUCTION, PER CITY STANDARDS.
10. POWER, STREET LIGHT, CABLE, AND TELEPHONE LINES SHALL BE IN A TRENCH LOCATED WITHIN A 10-FOOT UTILITY EASEMENT ADJACENT TO PUBLIC RIGHT-OF-WAY. RIGHT-OF-WAY CROSSINGS SHALL HAVE A MINIMUM HORIZONTAL SEPARATION FROM OTHER UTILITIES (SEWER, WATER, AND STORM) OF 5 FEET.
11. ALL CONSTRUCTION SURVEYING FOR EXTENSIONS OF PUBLIC FACILITIES SHALL BE DONE UNDER THE DIRECTION OF A WASHINGTON STATE LICENSED LAND SURVEYOR OR A WASHINGTON STATE LICENSED PROFESSIONAL CIVIL ENGINEER.
12. DURING CONSTRUCTION, ALL PUBLIC STREETS ADJACENT TO THIS PROJECT SHALL BE KEPT CLEAN OF ALL MATERIAL DEPOSITS RESULTING FROM ON-SITE CONSTRUCTION, AND EXISTING STRUCTURES SHALL BE PROTECTED AS DIRECTED BY THE CITY.
13. CERTIFIED RECORD DRAWINGS ARE REQUIRED PRIOR TO PROJECT ACCEPTANCE.
14. A NPDES STORMWATER GENERAL PERMIT MAY BE REQUIRED BY THE DEPARTMENT OF ECOLOGY FOR THIS PROJECT. FOR INFORMATION CONTACT THE DEPARTMENT OF ECOLOGY, SOUTHWEST REGION OFFICE AT (360)407-6300.
15. ANY DISTURBANCE OR DAMAGE TO CRITICAL AREAS AND ASSOCIATED BUFFERS, OR SIGNIFICANT TREES DESIGNATED FOR PRESERVATION AND PROTECTION SHALL BE MITIGATED IN ACCORDANCE WITH A MITIGATION PLAN REVIEWED AND APPROVED BY THE CITY'S PLANNING DIVISION. PREPARATION AND IMPLEMENTATION OF THE MITIGATION PLAN SHALL BE AT THE DEVELOPER'S EXPENSE.

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

C1 COVER AND HORIZONTAL CONTROL
C2 EXISTING CONDITIONS
C3 TESC
C4 TESC NOTES
C5 GRADING NORTH
C6 GRADING SOUTH
C7 INTERSECTION GRADING PLAN
C8 POND PLAN
C9 27 AVE SE PLAN AND PROFILE
C10 5TH ST SE PLAN AND PROFILE
C11 5TH ST SE PLAN AND PROFILE
C12 5TH ST SE PLAN AND PROFILE
C13 AISLE C PLAN AND PROFILE
C14 AISLE C PLAN AND PROFILE
C15 AISLE B PLAN AND PROFILE
C16 AISLE A PLAN AND PROFILE
C17 WEST ONSITE UTILITY PLAN
C18 ROOF AND YARD DRAIN PLAN
C19 ENTERING SIGHT DISTANCE - AISLE A
C20 ENTERING SIGHT DISTANCE - AISLE B
C21 SIGNAGE AND STRIPING - OFFSITE
C22 SIGNAGE AND STRIPING - ONSITE
C23 NOTES AND DETAILS
C24 NOTES AND DETAILS
C25 NOTES AND DETAILS
C26 NOTES AND DETAILS
C27 NOTES AND DETAILS
C28 NOTES AND DETAILS

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 53687 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: COVER SHEET AND HORIZONTAL CONTROL

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: 3.17.2026
REVISED:

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

SHEET	REV.
C1	0
1 OF 28	

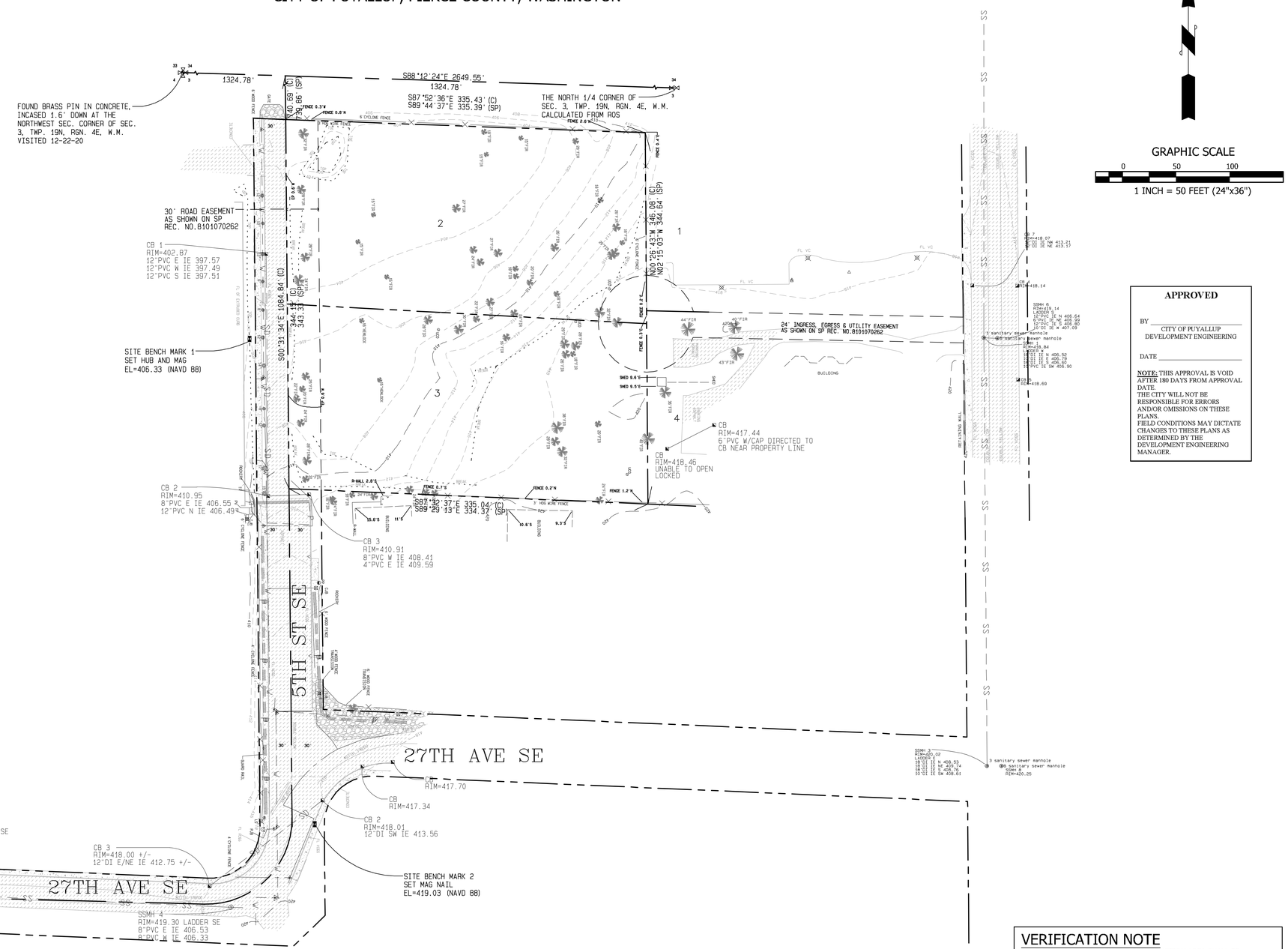
BRADBURY PLACE TOWNHOMES

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

GRAPHIC SCALE

0 50 100

1 INCH = 50 FEET (24"x36")



GRAPHIC SCALE

0 50 100

1 INCH = 50 FEET (24"x36")

LEGAL DESCRIPTION

PARCELS A AND B, PIERCE COUNTY LOT COMBINATION RECORDED UNDER RECORDING NO. 200104110218, RECORDS OF PIERCE COUNTY, WASHINGTON. SITUATE IN THE COUNTY OF PIERCE, STATE OF WASHINGTON.

BASIS OF BEARING

HELD BEARING OF SOUTH 87°44'39" EAST ALONG THE CENTER LINE OF SOUTH 96TH STREET, BETWEEN CITY OF TACOMA POINT NUMBERS 910 AND 720.
WASHINGTON STATE PLANE, NAD83/91, SOUTH ZONE

SURVEYOR'S NOTES

1) THE MONUMENT CONTROL SHOWN FOR THIS SITE WAS ACCOMPLISHED BY FIELD TRAVERSE UTILIZING A THREE (3) SECOND THEODOLITE WITH INTEGRAL ELECTRONIC DISTANCE MEASURING METER (TRIMBLE S6) AND REAL TIME KINEMATIC (RTK) GLOBAL POSITIONING SYSTEM (TRIMBLE R8). LINEAR AND ANGULAR CLOSURE OF THE TRAVERSES MEET THE STANDARDS OF WAC 332-130-090.
2) UTILITIES OTHER THAN THOSE SHOWN MAY EXIST ON THIS SITE. ONLY THOSE WHICH ARE VISIBLE OR HAVING VISIBLE EVIDENCE OF THEIR INSTALLATION ARE SHOWN HEREON.
3) THIS SURVEY REPRESENTS PHYSICAL IMPROVEMENT CONDITIONS AS THEY EXISTED MARCH 11, 2020, THE DATE OF THIS FIELD SURVEY.
4) FULL RELIANCE FOR LEGAL DESCRIPTIONS AND RECORDED EASEMENTS HAVE BEEN PLACED ON THE TITLE REPORT FROM CHICAGO TITLE INSURANCE COMPANY ORDER NUMBER 0198200-16, DATED DECEMBER 8, 2020. NO ADDITIONAL RESEARCH HAS BEEN ATTEMPTED.
5) OFFSET DIMENSIONS SHOWN HEREON ARE MEASURED PERPENDICULAR TO PROPERTY LINES.

VERTICAL DATUM

BASE:
COT 1468: 2" SURFACE BRASS DISK WITH "X" AT THE STREET INTERSECTION OF SOUTH 92ND STREET AND EAST SOUTH PARK AVENUE. ELEVATION 372.35' (NGVD 29)
SITE:
CONTROL #501, SET MAG NAIL IN SIDEWALK ON THE EAST SIDE OF SITE, +/- 53' SOUTH OF THE NE CORNER OF SITE, ~~3.5' E OF BACK OF WALK~~. ELEVATION 333.56' (NGVD 29)

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
THE CITY WILL NOT BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS.
FIELD CONDITIONS MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE DEVELOPMENT ENGINEERING MANAGER.

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

BY	DATE	DESCRIPTION	REVISION

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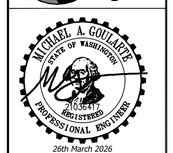

26th March 2026

SHEET TITLE: EXISTING CONDITIONS

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: 3.17.2026
REVISED:

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

SHEET	REV.
C2	0
2 OF 28	

BRADBURY PLACE TOWNHOMES

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

GRAPHIC SCALE
0 40 80
1 INCH = 40 FEET (24"x36")

APPROVED

BY _____
CITY OF PUYALLUP
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DATE _____

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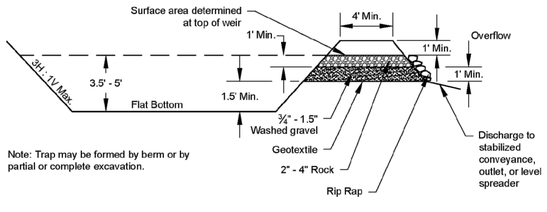
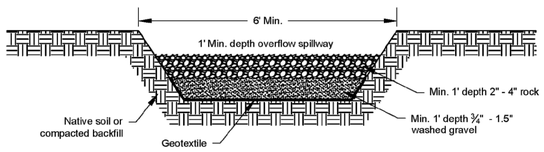
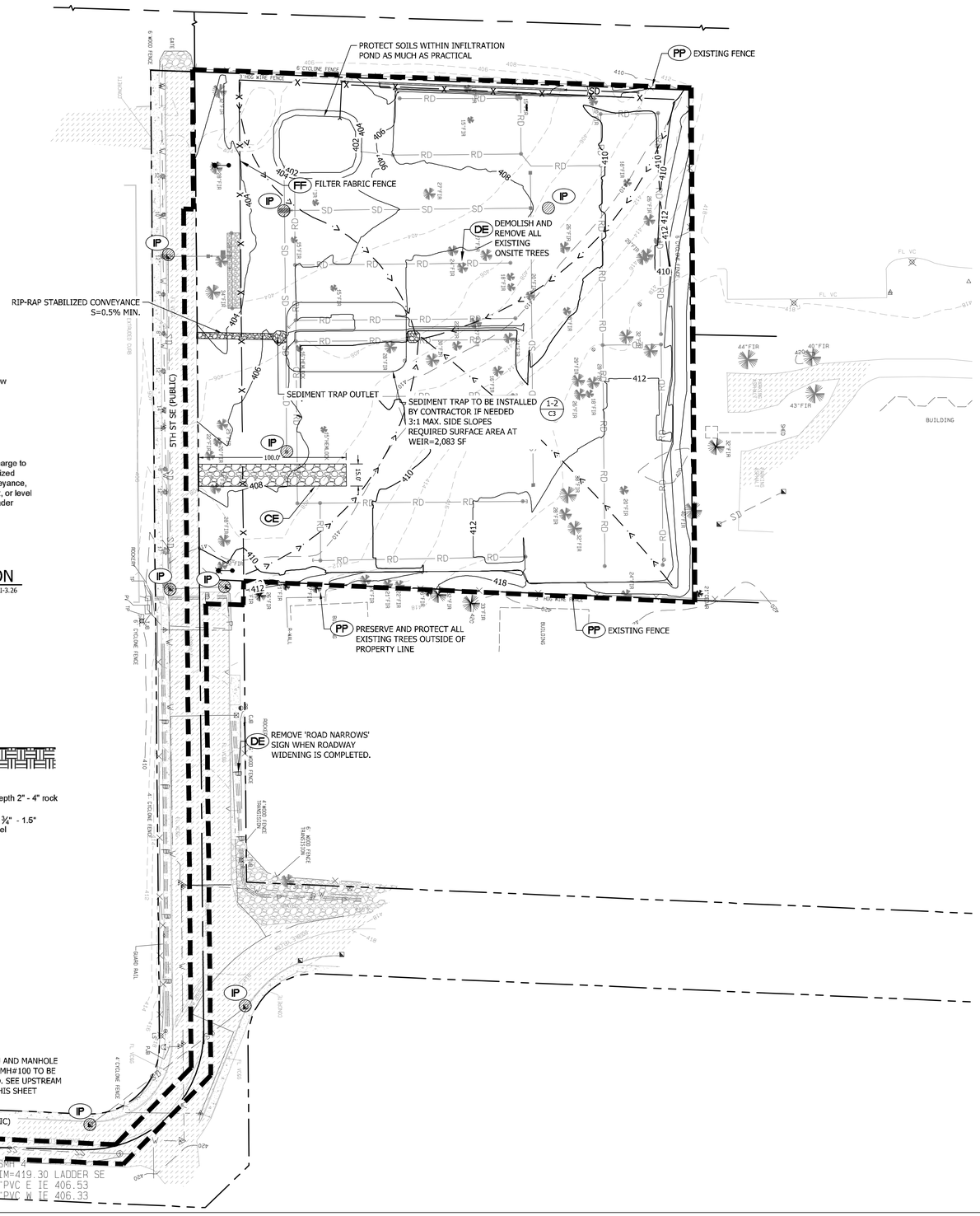


Note: Trap may be formed by berm or by partial or complete excavation.

1 SEDIMENT TRAP CROSS SECTION
NOT TO SCALE — DOE SWMMWW FIG. II-3.26



2 SEDIMENT TRAP OUTLET
NOT TO SCALE — DOE SWMMWW FIG. II-3.27



TESC LEGEND

PP	PRESERVE AND PROTECT AS NOTED	
IP	INLET PROTECTION	1 / C3
FF	FILTER FABRIC FENCE	2 / C3
CL	CLEARING LIMITS (2.92 AC)	
DE	DEMOLISH AND REMOVE AS NOTED	
CE	CONSTRUCTION ENTRANCE	3 / C3

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.

TREE CLEARING NOTE

ALL TREES ONSITE SHALL BE REMOVED UNLESS NOTED OTHERWISE.
CONSULT WITH PROJECT ENGINEER PRIOR TO CLEARING WORK.

SOIL AMENDMENT NOTE

SOIL AMENDMENTS ARE REQUIRED FOR ALL DISTURBED AREAS IN ACCORDANCE WITH COP STD DETAIL 01.02.08a (SHEET C4, DETAIL 4)

CALL IN INSPECTION LINE

TO SCHEDULE INSPECTIONS, CHECK THE DATE OF AN INSPECTION, CHECK THE STATUS OR RESULTS OF INSPECTION, CANCEL INSPECTIONS OR RESCHEDULE INSPECTIONS PLEASE CALL THE INSPECTIONS SCHEDULING LINE AT (253) 573-2587.

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 21008172 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: TESC PLAN

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: 3.17.2026
REVISED:

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

SHEET	REV.
C3	0
3 OF 28	

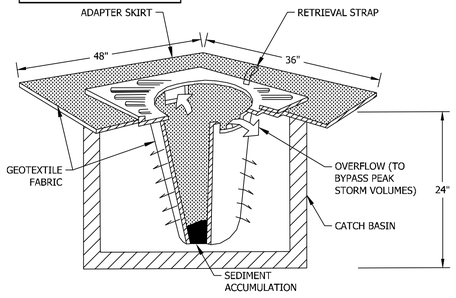
BRADBURY PLACE TOWNHOMES
A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

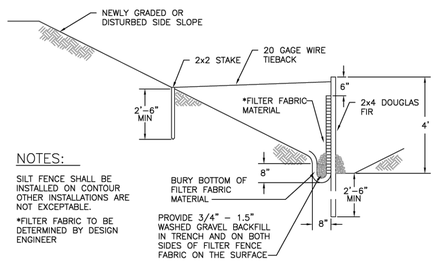
DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
THE CITY WILL NOT BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS.
FIELD CONDITIONS MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE DEVELOPMENT ENGINEERING MANAGER.



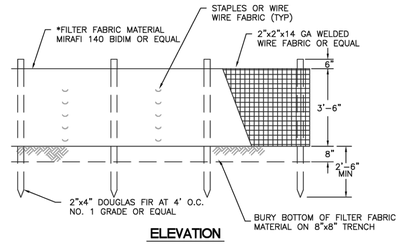
INLET PROTECTION NOTES:
1. FILTERS SHALL BE INSPECTED AFTER EACH STORM EVENT AND CLEANED OR REPLACED WHEN 1/3 FULL.
2. ALL CATCH BASINS WITHIN 500' DOWNSLOPE OF PROJECT SITE SHALL AS WELL AS ANY OTHER CATCH BASINS THAT COULD POSSIBLE RECEIVE RUNOFF FROM THE CONSTRUCTION SITE SHALL HAVE INLET PROTECTION INSTALLED AND MAINTAINED

1 INLET PROTECTION
NOT TO SCALE



NOTES:
SILT FENCE SHALL BE INSTALLED ON CONTOUR OTHER INSTALLATIONS ARE NOT EXCEPTABLE.
*FILTER FABRIC TO BE DETERMINED BY DESIGN ENGINEER

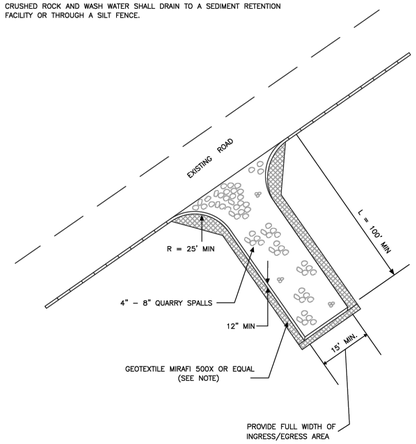
TYPICAL CROSS SECTION



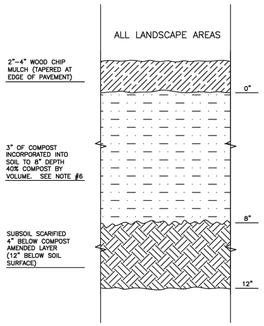
ELEVATION

2 FILTER FABRIC FENCE DETAIL
NOT TO SCALE COP STD. 02.03.02

NOTE:
1. GEOTEXTILE MIRAFI 500 X OR APPROVED EQUAL SHALL BE PLACED UNDER THE ENTIRETY OF THE TEMPORARY ENTRANCE.
2. ADDITIONAL ROCK SHALL BE ADDED PERIODICALLY TO MAINTAIN PROPER FUNCTION OF THE PAD.
3. IF THE PAD DOES NOT ADEQUATELY REMOVE THE MUD FROM THE VEHICLE'S WHEELS, THE WHEELS SHALL BE HOSED OFF BEFORE THE VEHICLE ENTERS A PAVED STREET. THE WASHING SHALL BE DONE ON AN AREA COVERED WITH CRUSHED ROCK AND WASH WATER SHALL DRAIN TO A SEDIMENT RETENTION FACILITY OR THROUGH A SILT FENCE.



3 CONSTRUCTION ENTRANCE
NOTE TO SCALE COP STD. 05.01.01



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

4 SOIL AMENDMENT AND DEPTH
NOT TO SCALE COP STD. 01.02.08a

GRADING, EROSION AND SEDIMENTATION CONTROL NOTES

1. ALL WORK IN CITY RIGHT-OF-WAY REQUIRES A PERMIT FROM THE CITY OF PUYALLUP. PRIOR TO ANY WORK COMMENCING, THE GENERAL CONTRACTOR SHALL ARRANGE FOR A PRECONSTRUCTION MEETING AT THE DEVELOPMENT SERVICES CENTER TO BE ATTENDED BY ALL CONTRACTORS THAT WILL PERFORM WORK SHOWN ON THE ENGINEERING PLANS, REPRESENTATIVES FROM ALL APPLICABLE UTILITY COMPANIES, THE PROJECT OWNER AND APPROPRIATE CITY STAFF. CONTACT ENGINEERING SERVICES TO SCHEDULE THE MEETING (253) 841-5568. THE CONTRACTOR IS RESPONSIBLE TO HAVE THEIR OWN APPROVED SET OF PLANS AT THE MEETING.
2. AFTER COMPLETION OF ALL ITEMS SHOWN ON THESE PLANS AND BEFORE ACCEPTANCE OF THE PROJECT, THE CONTRACTOR SHALL OBTAIN A "PUNCH LIST" PREPARED BY THE CITY'S INSPECTOR DETAILING REMAINING ITEMS OF WORK TO BE COMPLETED. ALL ITEMS OF WORK SHOWN ON THESE PLANS SHALL BE COMPLETED TO THE SATISFACTION OF THE CITY PRIOR TO ACCEPTANCE OF THE WATER SYSTEM AND PROVISION OF SANITARY SEWER SERVICE.
3. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (HEREINAFTER REFERRED TO AS THE "STANDARD SPECIFICATIONS"), WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND AMERICAN PUBLIC WORKS ASSOCIATION, WASHINGTON STATE CHAPTER, LATEST EDITION, UNLESS SUPERSEDED OR AMENDED BY THE CITY OF PUYALLUP CITY STANDARDS FOR PUBLIC WORKS ENGINEERING AND CONSTRUCTION (HERINAFTER REFERRED TO AS THE "CITY STANDARDS").
4. A COPY OF THESE APPROVED PLANS AND APPLICABLE CITY DEVELOPER SPECIFICATIONS AND DETAILS SHALL BE ON SITE DURING CONSTRUCTION.
5. ANY REVISIONS MADE TO THESE PLANS MUST BE REVIEWED AND APPROVED BY THE DEVELOPER'S ENGINEER AND THE CITY ENGINEER PRIOR TO ANY IMPLEMENTATION IN THE FIELD. THE CITY SHALL NOT BE RESPONSIBLE FOR ANY ERRORS AND/OR OMISSIONS ON THESE PLANS.
6. THE CONTRACTOR SHALL HAVE ALL UTILITIES VERIFIED ON THE GROUND PRIOR TO ANY CONSTRUCTION. CALL (811) AT LEAST TWO WORKING DAYS HOURS IN ADVANCE. THE OWNER AND HIS/HER ENGINEER SHALL BE CONTACTED IMMEDIATELY IF A CONFLICT EXISTS.
7. ALL LIMITS OF CLEARING AND AREAS OF VEGETATION PRESERVATION AS PRESCRIBED ON THE PLANS SHALL BE CLEARLY FLAGGED IN THE FIELD AND OBSERVED DURING CONSTRUCTION.
8. ALL REQUIRED SEDIMENTATION AND EROSION CONTROL FACILITIES MUST BE CONSTRUCTED AND IN OPERATION PRIOR TO ANY LAND CLEARING AND/OR OTHER CONSTRUCTION TO ENSURE THAT SEDIMENT LADEN WATER DOES NOT ENTER THE NATURAL DRAINAGE SYSTEM. THE CONTRACTOR SHALL SCHEDULE AN INSPECTION OF THE EROSION CONTROL FACILITIES PRIOR TO ANY LAND CLEARING AND/OR OTHER CONSTRUCTION. ALL EROSION AND SEDIMENT FACILITIES SHALL BE MAINTAINED IN A SATISFACTORY CONDITION AS DETERMINED BY THE CITY, UNTIL SUCH TIME THAT CLEARING AND/OR CONSTRUCTION IS COMPLETED AND THE POTENTIAL FOR ON-SITE EROSION HAS PASSED. THE IMPLEMENTATION, MAINTENANCE, REPLACEMENT, AND ADDITIONS TO THE EROSION AND SEDIMENTATION CONTROL SYSTEMS SHALL BE THE RESPONSIBILITY OF THE PERMITTEE.
9. THE EROSION AND SEDIMENTATION CONTROL SYSTEM FACILITIES DEPICTED ON THESE PLANS ARE INTENDED TO BE MINIMUM REQUIREMENTS TO MEET ANTICIPATED SITE CONDITIONS. AS CONSTRUCTION PROGRESSES AND UNEXPECTED OR SEASONAL CONDITIONS DICTATE, FACILITIES WILL BE NECESSARY TO ENSURE COMPLETE SILTATION CONTROL ON THE SITE. DURING THE COURSE OF CONSTRUCTION, IT SHALL BE THE OBLIGATION AND RESPONSIBILITY OF THE PERMITTEE TO ADDRESS ANY NEW CONDITIONS THAT MAY BE CREATED BY HIS ACTIVITIES AND TO PROVIDE ADDITIONAL FACILITIES, OVER AND ABOVE THE MINIMUM REQUIREMENTS, AS MAY BE NEEDED TO PROTECT ADJACENT PROPERTIES, SENSITIVE AREAS, NATURAL WATER COURSES, AND/OR STORM DRAINAGE SYSTEMS.
10. APPROVAL OF THESE PLANS IS FOR GRADING, TEMPORARY DRAINAGE, EROSION AND SEDIMENTATION CONTROL ONLY. IT DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT STORM DRAINAGE DESIGN, SIZE OR LOCATION OF PIPES, RESTRICTORS, CHANNELS, OR RETENTION FACILITIES.
11. ANY DISTURBED AREA WHICH HAS BEEN STRIPPED OF VEGETATION AND WHERE NO FURTHER WORK IS ANTICIPATED FOR A PERIOD OF 30 DAYS OR MORE, MUST BE IMMEDIATELY STABILIZED WITH MULCHING, GRASS PLANTING, OR OTHER APPROVED EROSION CONTROL TREATMENT APPLICABLE TO THE TIME OF YEAR IN QUESTION. GRASS SEEDING ALONE WILL BE ACCEPTABLE ONLY DURING THE MONTHS OF APRIL THROUGH SEPTEMBER INCLUSIVE. SEEDING MAY PROCEED OUTSIDE THE SPECIFIED TIME PERIOD WHENEVER IT IS IN THE INTEREST OF THE PERMITTEE BUT MUST BE AUGMENTED WITH MULCHING, NETTING, OR OTHER TREATMENT APPROVED BY THE CITY.
12. IN CASE EROSION OR SEDIMENTATION OCCURS TO ADJACENT PROPERTIES, ALL CONSTRUCTION WORK WITHIN THE DEVELOPMENT THAT WILL FURTHER AGGRAVATE THE SITUATION MUST CEASE, AND THE OWNER/CONTRACTOR WILL IMMEDIATELY COMMENCE RESTORATION METHODS. RESTORATION ACTIVITY WILL CONTINUE UNTIL SUCH TIME AS THE AFFECTED PROPERTY OWNER IS SATISFIED.
13. NO TEMPORARY OR PERMANENT STOCKPILING OF MATERIALS OR EQUIPMENT SHALL OCCUR WITHIN CRITICAL AREAS OR ASSOCIATED BUFFERS, OR THE CRITICAL ROOT ZONE FOR VEGETATION PROPOSED FOR RETENTION.

SEDIMENT FENCES

1. THE FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE NECESSARY, THE FILTER FABRIC SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM SIX-INCH (6") OVERLAP, AND BOTH ENDS SECURELY FASTENED TO THE POST.
2. THE FILTER FABRIC FENCE SHALL BE INSTALLED TO FOLLOW THE GROUND CONTOURS (WHERE FEASIBLE).
3. WHEN STANDARD LENGTH FILTER FABRIC IS USED, A WIRE SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UP-SLOPE SIDE OF THE POSTS USING HEAVY DUTY WIRE STAPLES AT LEAST ONE INCH (1") LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF FOUR INCHES. AT LEAST TWENTY-FOUR (24) INCHES OR MORE OF THE FENCE SHALL BE ABOVE THE GROUND.
4. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
5. THE TRENCH SHALL BE BACKFILLED WITH 3/4-INCH MINIMUM DIAMETER WASHED GRAVEL.
6. FILTER FABRIC FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
7. THE FILTER FABRIC FENCE SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UP-SLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
8. THE FILTER FABRIC SHALL HAVE A MINIMUM VERTICAL BURIAL OF TWELVE INCHES (12"). ALL EXCAVATED MATERIAL FROM THE FILTER FABRIC FENCE INSTALLATION SHALL BE INSTALLED AS BACKFILL AND COMPACTED ALONG THE ENTIRE DISTURBED AREA.
9. THE CONTRACTOR SHALL IMMEDIATELY MAKE ANY REPAIRS TO THE FILTER FABRIC.

MAINTENANCE OF FILTER FENCES

1. FILTER FABRIC FENCE SHALL BE INSPECTED IMMEDIATELY AFTER EACH RUNOFF-PRODUCING RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
2. SEDIMENT SHALL BE REMOVED WHEN IT REACHES APPROXIMATELY ONE-THIRD THE HEIGHT OF THE FENCE (EIGHT INCH MAXIMUM), ESPECIALLY IF HEAVY RAINS ARE EXPECTED.
3. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE FILTER FENCE IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDED.

SEQUENCE OF CONTROL MEASURES

1. FILTER FENCE BARRIERS, STAKED STRAW BALES, GRAVEL FILTERS, AND CONSTRUCTION ENTRANCES SHALL BE CONSTRUCTED IN THE LOCATIONS SHOWN ON THE PLANS.
2. SILTATION BASINS SHALL BE CONSTRUCTED TO THE SIZE INDICATED ON THE PLANS.
3. SITE CLEARING AND GRADING MAY PROCEED FOLLOWING THE INSTALLATION OF THE ABOVE ITEMS.
4. ALL SILTATION BARRIERS AND BASINS SHALL BE MAINTAINED TO PROVIDE THE REQUIRED PROTECTION.
5. BARRIERS MAY NOT BE REMOVED UNTIL CONSTRUCTION IS COMPLETED AND FINAL SITE STABILIZATION IS IN PLACE AND FUNCTIONAL.

REQUIRED INSPECTIONS FOR TESC FACILITIES

AFTER EVERY RAINFALL OR ONCE A WEEK, THE TESC LEAD SHALL INSPECT ALL OF THE FOLLOWING AND KEEP A RECORD/LOG:

1. INSPECT ALL INSTALLED CATCH BASINS FOR ACCUMULATION OF SEDIMENT/DEBRIS.
2. FILTER FENCE SHALL BE INSPECTED FOR SEDIMENT ACCUMULATION AND TEARS IN FABRIC.
3. INLET PROTECTION ON CATCH BASINS SHOULD BE CLEANED/REPLACED IF FULL OF SEDIMENT.
4. INTERCEPTOR DITCHES SHALL BE INSPECTED FOR EROSION. IF EROSION IS OCCURRING CONTRACTOR SHALL INSTALL ROCK CHECK DAMS AS NEEDED TO PREVENT EROSION.
5. FILL/CUT SLOPES SHALL BE INSPECTED FOR EROSION.
6. TESC LEAD RESPONSIBLE FOR NOTIFYING ENGINEER IF ADDITIONAL MEASURES ARE WARRANTED.

SEEDING NOTES

1. SEED MIXTURE SHALL BE AS BELOW OR AS APPROVED BY THE CITY OF POULSBO AND SHALL BE APPLIED AT THE RATE RECOMMENDED BY THE SUPPLIER

GERMINATION REDTOP	(AGROSTIS ALBA)	5%
PERENNIAL RYE	(LOLIUM PERENNE)	50%
CHEWING FESCUE	(FESTUCA RUBRA COMMUTATA)	40%
WHITE DUTCH CLOVER	(TRIFOLIUM REPENS)	5%

SEED BEDS PLANTED BETWEEN MAY 1 AND OCTOBER 31 WILL REQUIRE IRRIGATION AND OTHER MAINTENANCE AS NECESSARY TO FOSTER AND PROTECT THE ROOT STRUCTURE.
2. FOR SEED BEDS PLANTED BETWEEN OCTOBER 31 AND APRIL 30, ARMORING OF THE SEED BED WILL BE NECESSARY. (E.G., GEOTEXTILES, JUTE MAT, CLEAR PLASTIC COVERING).
3. BEFORE SEEDING, INSTALL NEEDED SURFACE RUNOFF CONTROL MEASURES SUCH AS GRADIENT TERRACES, INTERCEPTOR DIKES, SWALES, LEVEL SPREADERS AND SEDIMENT BASINS.
4. THE SEEDBED SHALL BE FIRM WITH A FAIRLY FINE SURFACE, FOLLOWING SURFACE ROUGHENING. PERFORM ALL OPERATIONS ACROSS OR AT RIGHT ANGLES TO THE SLOPE.
5. FERTILIZERS ARE TO BE USED ACCORDING TO SUPPLIER'S RECOMMENDATIONS. AMOUNTS USED SHOULD BE MINIMIZED, ESPECIALLY ADJACENT TO WATER BODIES AND WETLANDS.

TEMPORARY AND PERMANENT HYDROSEEDING

1. ALL AREAS DISTURBED DURING CONSTRUCTION WHERE PERMANENT LANDSCAPING WILL NOT BE PROVIDED WITHIN 60 DAYS SHALL BE HYDROSEEDED, OR OTHERWISE STABILIZED, AS REQUIRED. STRAW MULCHING OR PLASTIC SHEETING ARE ACCEPTABLE ALTERNATIVES TO TEMPORARY HYDROSEEDING DURING PERIODS OF LOW GROWTH.
2. PERMANENT SEEDING IN ALL DISTURBED AREAS WITHIN THE PROJECT BOUNDARY SHALL ADHERE TO THE FOLLOWING SPECIFICATIONS: MINIMUM 80 LBS./ACRE MIXTURE OF:
   20% ANNUAL, PERENNIAL RYEGRASS FERTILIZER-400 LBS./ACRE OF 10-20-20
   40% CREEPING RED FESCUE MULCH-2000 LBS./ACRE
   40% WHITE CLOVER

PLASTIC COVERING NOTES

1. PLASTIC SHEETING SHALL HAVE A MINIMUM THICKNESS OF 6 MILS AND SHALL MEET THE REQUIREMENTS OF THE STATE STANDARD SPECIFICATIONS SECTION 9-14.5.
2. COVERING SHALL BE INSTALLED AND MAINTAINED TIGHTLY IN PLACE BY USING SANDBAGS OR TIRES ON ROPES WITH A MAXIMUM 10-FOOT GRID SPACING IN ALL DIRECTIONS. ALL SEAMS SHALL BE TAPED OR WEIGHTED DOWN FULL LENGTH AND THERE SHALL BE A LEAST A 12 INCH OVERLAP OF ALL SEAMS.
3. CLEAR PLASTIC COVERING SHALL BE INSTALLED IMMEDIATELY ON AREAS SEEDED BETWEEN NOVEMBER 1 AND MARCH 31 AND REMAIN UNTIL VEGETATION IS FIRMLY ESTABLISHED.
4. WHEN THE COVERING IS USED ON UN-SEEDED SLOPES, IT SHALL BE KEPT IN PLACE UNTIL THE NEXT SEEDING PERIOD.
5. PLASTIC COVERING SHEETS SHALL BE BURIED TWO FEET AT THE TOP OF SLOPES IN ORDER TO PREVENT SURFACE WATER FLOW BENEATH SHEETS
6. PROPER MAINTENANCE INCLUDES REGULAR CHECKS FOR RIPS AND DISLODGED ENDS.

CONTRACTOR'S NOTES

1. CONTRACTOR SHALL VERIFY EXACT VERTICAL AND HORIZONTAL LOCATIONS OF ALL EXISTING UTILITIES AND STUBS AT ALL PROPOSED CONNECTION POINTS PRIOR TO THE BEGINNING OF ANY CONSTRUCTION ACTIVITIES. IF VERTICAL AND/OR HORIZONTAL LOCATIONS DIFFER FROM WHAT IS SHOWN ON PLANS, CONTACT PROJECT ENGINEER IMMEDIATELY FOR POSSIBLE DESIGN CHANGES.
2. A MINIMUM OF 10' HORIZONTAL SEPARATION AND 18" VERTICAL SEPARATION SHALL BE MAINTAINED BETWEEN ALL WATER AND SEWER MAINS. MINIMUM VERTICAL SEPARATION CAN BE REDUCED TO 1.5' BY MEANS OF CONCRETE ENCASEMENT OF SEWER OR THE USE OF DUCTILE IRON PIPE PER CITY STANDARDS.

   A MINIMUM OF 5' HORIZONTAL AND 1.0' VERTICAL SEPARATION SHALL BE MAINTAINED BETWEEN STORM AND WATER, AND STORM AND SEWER.
3. THE FINISH GRADE RIM ELEVATION MAY NEED TO BE ADJUSTED FROM WHAT IS SHOWN ON PLANS DUE TO SUCH THINGS AS FIELD CONDITIONS, VARIATIONS IN PAVING SURFACE, ETC. FINAL RIM ELEVATION SHALL MATCH FINISH GRADE ELEVATIONS.
4. ALL SANITARY SEWER PIPE SHALL BE POLYVINYL CHLORIDE (PVC) PER CITY OF POULSBO STANDARDS. DUCTILE IRON PIPE SHALL BE USED IF ADEQUATE COVER CAN NOT BE PROVIDED.
5. ALL SANITARY SEWER LATERALS SHALL BE 6"Ø AT A MINIMUM SLOPE OF 2.0%. CLEANOUTS SHALL BE PLACED PER THE STANDARDS SET FORTH BY THE CITY OF POULSBO. CLEANOUTS IN AREAS SUBJECT TO ANY VEHICULAR TRAFFIC SHALL HAVE TRAFFIC BEARING LIDS AND FRAMES.
6. THE CONTRACTOR SHALL REPAIR AND/OR REPLACE ALL DISTURBED AREAS AS NEEDED SO TO RESTORE TO PRE-CONSTRUCTION CONDITION.
7. BARE GALVANIZED METAL SHALL NOT BE USED FOR MATERIALS THAT CONVEY STORMWATER, SUCH AS SEDIMENT RISERS, ROOFS, CANOPIES, SIDING, GUTTERS, DOWNSPOUTS, ROOF DRAINS, AND PIPES. ANY GALVANIZED MATERIALS SHALL HAVE AN INERT, NON-LEACHABLE FINISH, SUCH AS A BAKED ENAMEL, FLUOROCARBON PAINT (SUCH AS KYNAR OR HYLAR), FACTORY-APPLIED EPOXY, PURE ALUMINUM, OR ASPHALT COATING. ACRYLIC PAINT, POLYESTER PAINT, FIELD-APPLIED, AND ZINC-ALUMINUM ALLOY (SUCH AS GALVALUME OR ZINCALUME) COATINGS ARE NOT ACCEPTABLE. HIGH CONCENTRATIONS OF ZINC CAN BE TOXIC TO AQUATIC LIFE. (ADDITIONAL BACKGROUND INFORMATION ABOUT ISSUES REGARDING UNCOATED GALVANIZED METAL ROOFS IS AVAILABLE AT http://www.sitesolutionsmag.com/pdf/v2i2/focusonbmp.pdf)

REVISION	DESCRIPTION	DATE	BY

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 23360 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: TESC NOTES AND DETAILS

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: 3.17.2026
REVISED:

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

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C4	0
4 OF 28	

BRADBURY PLACE TOWNHOMES

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 (24"x36")

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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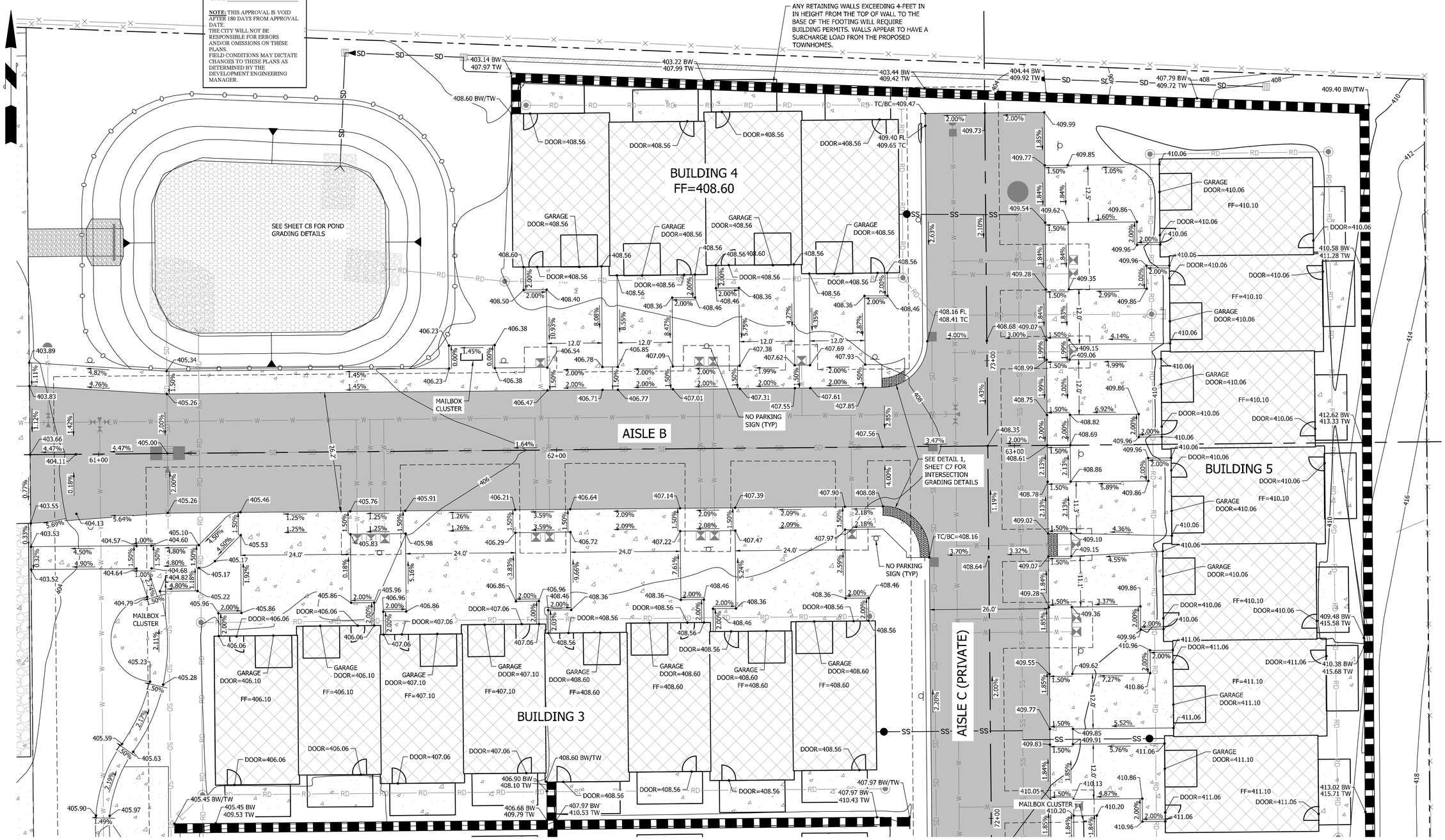

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CONTOUR ENGINEERING • LLC
CIVIL ENGINEERS ~ SURVEYORS ~ LAND PLANNERS
Phone: 253-857-5454 ~ Fax: 253-509-0044 ~ info@contourpllc.com
Mailing Address: P.O. Box 949, Gig Harbor, WA 98335
Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 53364 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: ONSITE GRADING NORTH

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: 3.17.2026
REVISED:

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

SHEET	REV.
C5	0
5 OF 28	

GRAPHIC SCALE

0 10 20

1 INCH = 10 FEET (24"x36")

GRADING QUANTITIES

CUT = 7,600 C.Y.
FILL = 4,800 C.Y.
NET = 2,800 C.Y. CUT (EXPORT)

THIS CALCULATION IS FOR REVIEW AND PERMITTING PURPOSES ONLY. THE NUMBERS SHOWN ARE GENERATED FROM THE FINISHED GROUND SURFACE TO THE EXISTING GROUND PROVIDED BY THE SURVEY. CONTRACTOR SHALL DO THEIR OWN CALCULATION BASED ON THE INFORMATION PROVIDED WITHIN THESE PLANS.

THE QUANTITIES WILL VARY BASED ON THE FOLLOWING FACTORS:

1. SHRINK/SWELL OF EXISTING SOILS
2. VARIANCE OF VEGETATION THICKNESS AND UNSUITABLE TOPSOIL
3. SUBBASE REQUIREMENTS FOR BUILDING FOUNDATION BASED ON THE FINAL STRUCTURAL DESIGN
4. PAVEMENT SECTIONS
5. TRENCHING EXCAVATION FOR UTILITIES
6. INFILTRATION TRENCHES

BRADBURY PLACE TOWNHOMES

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

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

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
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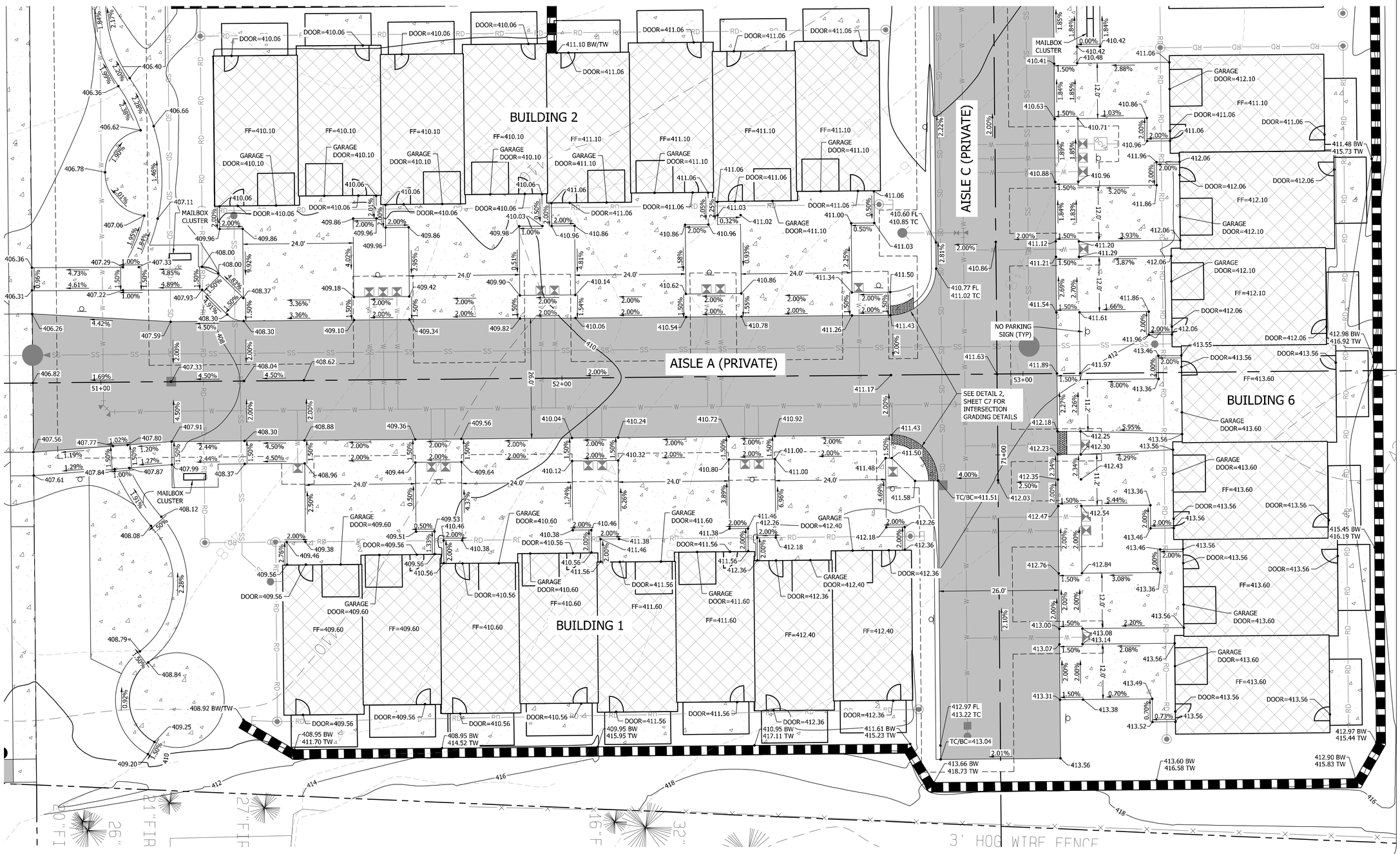


REVISION	DESCRIPTION	DATE	BY

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 20536 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: ONSITE GRADING SOUTH

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: 3.17.2026
REVISED:

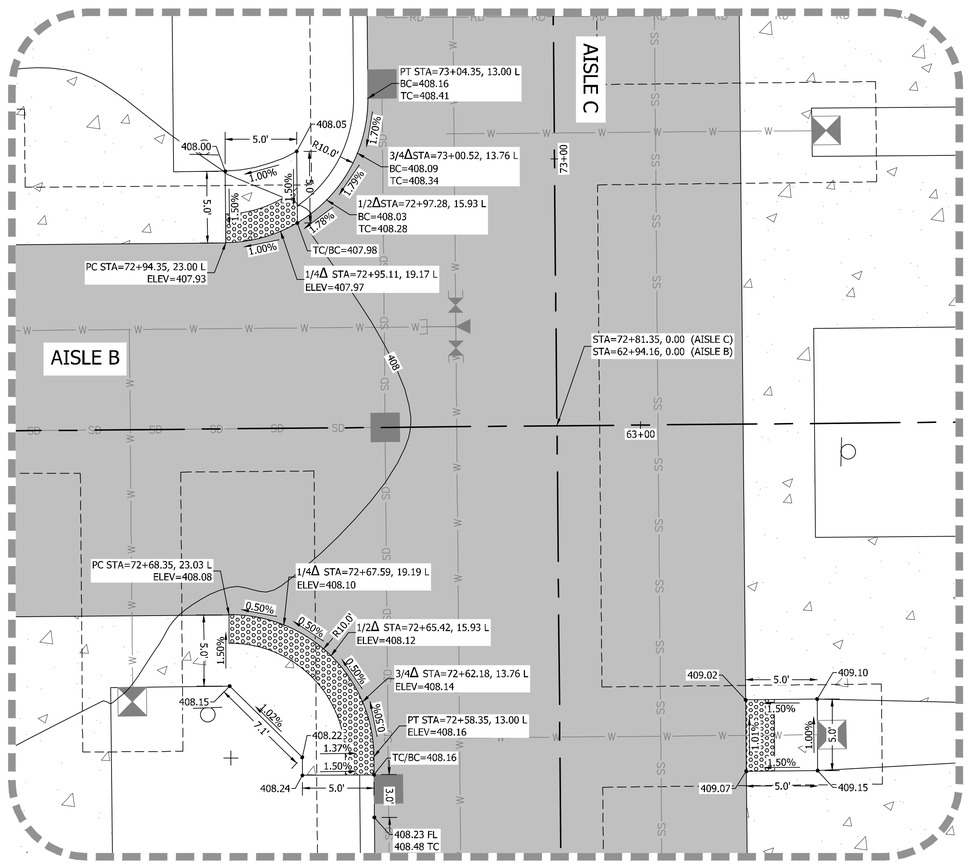
PROJECT: 20-223
DWG NAME: 20-223 C

SHEET	REV.
C6	0
6 OF 28	

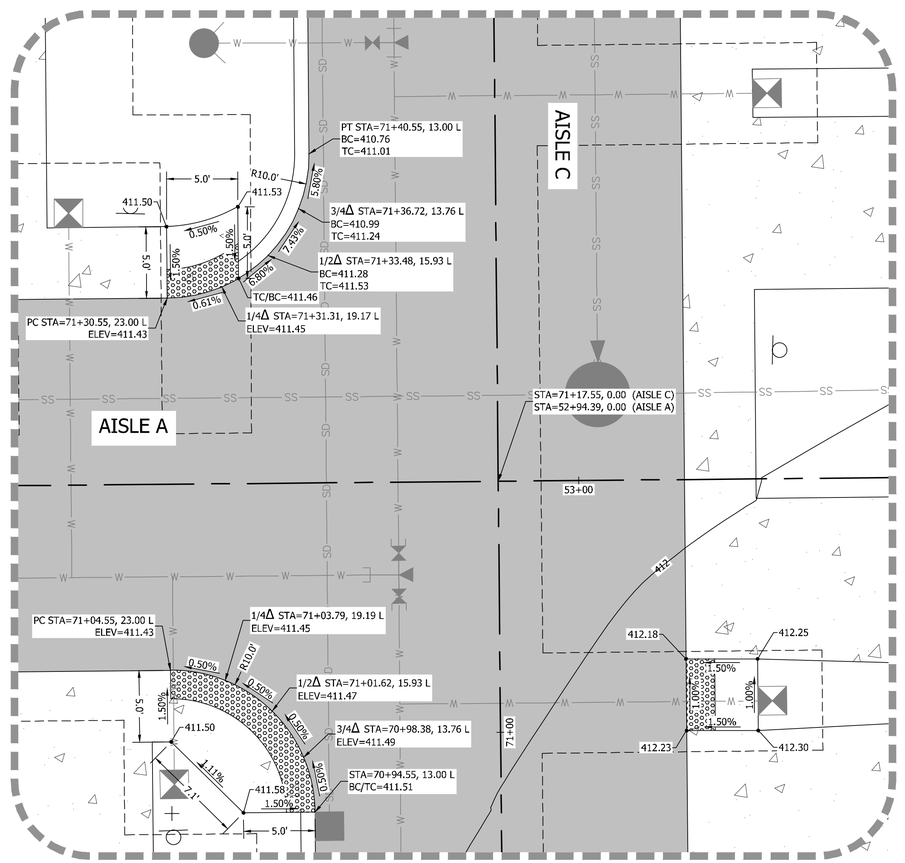
BRADBURY PLACE TOWNHOMES

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

GRAPHIC SCALE
0 5 10
1 INCH = 5 FEET (24"x36")



1 AISLE B & AISLE C INTERSECTION
NOT TO SCALE



2 AISLE A & AISLE C INTERSECTION
NOT TO SCALE

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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

MICHAEL A. GOULARTE
STATE OF WASHINGTON
10364
REGISTERED
PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: INTERSECTION GRADING PLAN

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: 3.17.2026
REVISED:

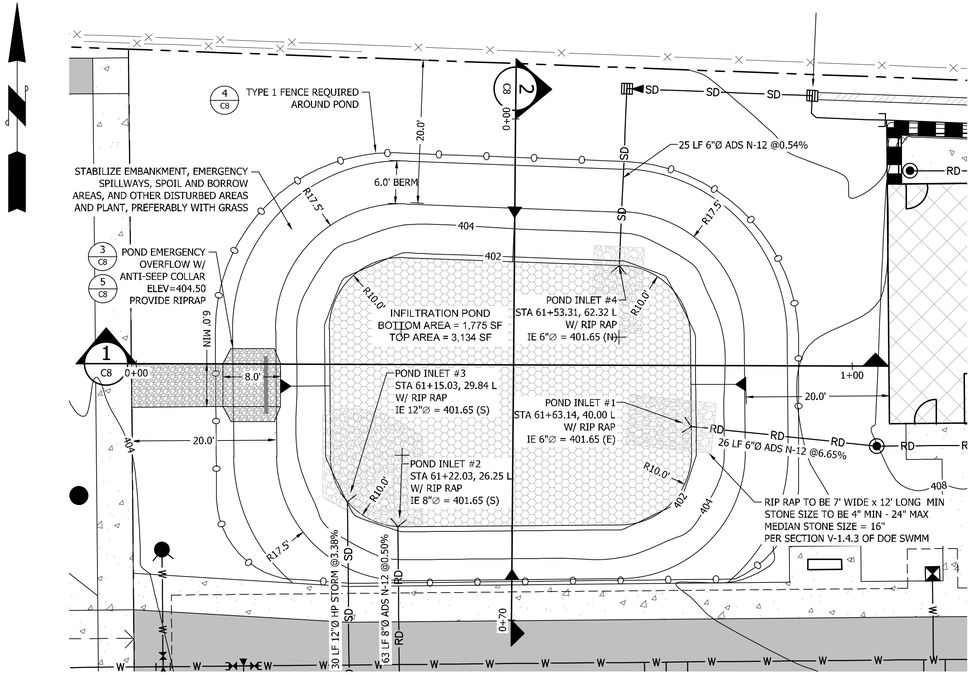
PROJECT: 20-223
DWG NAME: 20-223 C

SHEET	REV.
C7	0
7 OF 28	

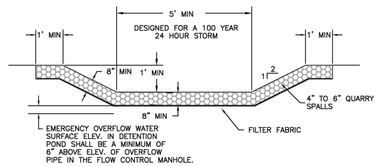
BRADBURY PLACE TOWNHOMES

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

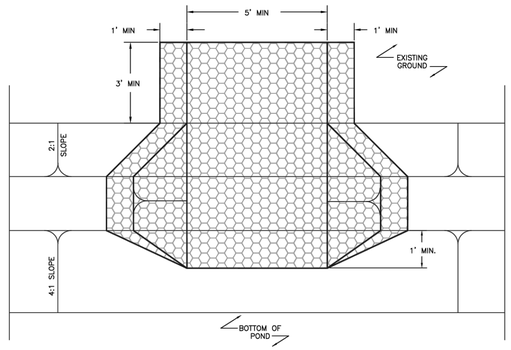
GRAPHIC SCALE
0 10 20
1 INCH = 10 FEET (24"x36")



SECTION

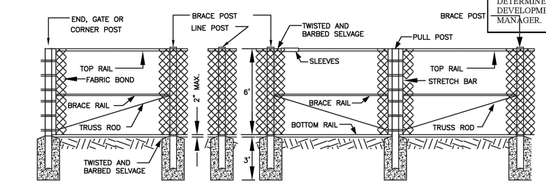


PLAN

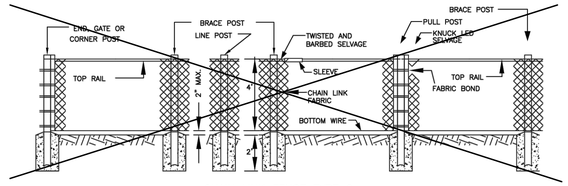


3 EMERGENCY OVERFLOW SPILLWAY
NOT TO SCALE COP STD 02.03.01

STANDARD BLACK VINYL CHAIN LINK FENCING TO BE USED FOR PUBLIC RIGHT OF WAY WHEN NECESSARY.



CHAIN LINK FENCE TYPE I
SCALE: 1:5



CHAIN LINK FENCE TYPE 6

NOTES:

1. ALL CHAIN LINK FENCE SHALL BE TYPE 6 FORTY-EIGHT (48") AS PER WSDOT STANDARD PLAN L-2, BOTTOM AND TOP, BRACE POST AND CHAIN LINK. BOTTOM AND TOP SHALL HAVE A BLACK VINYL COATING. SPECIFICATIONS – NOTE 3.
2. CHAIN LINK GATE SHALL BE AS SHOWN IN WSDOT STANDARD PLAN L-3. PER SECTION 9-16.1(1) AND AS AMENDED BY NOTE #3.
3. SECTION 9-16.1(1) SHALL BE SUPPLEMENTED WITH THE FOLLOWING: IN ADDITION TO MEETING THE COATING AND MATERIAL REQUIREMENTS OF SECTION 9-16 OF THE STANDARD SPECIFICATIONS, ALL FENCE AND GATE PARTS OF FENCE NOTED AS VINYL COATED SHALL HAVE A BLACK VINYL CLAD COATING AND ALL PARTS MATCH IN COLOR. COATING OF FABRIC SHALL BE EXTRUDED/BONDED OF 0.015 INCH THICKNESS. COATING FOR POSTS AND RAILS SHALL BE 3 MIL POWDER COAT. ALL BOLTS NUTS, AND WIRE TIES SHALL BE POWDER COATED TO MATCH THE COLOR OF THE FENCE FABRIC.
4. FENCE PLACEMENT AND LOCATION REQUIRES CITY ENGINEER APPROVAL. PLACEMENT IS INTENDED FOR AREAS THAT HAVE VERTICAL DROPS GREATER THAN THREE FEET AND TO DIVIDE PUBLIC AND PRIVATE PROPERTY AT RIGHT OF WAY LINE

SCALE: 1:4

4 CHAIN LINK FENCE TYPE 1
NOT TO SCALE COP STD 06.01.08

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CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

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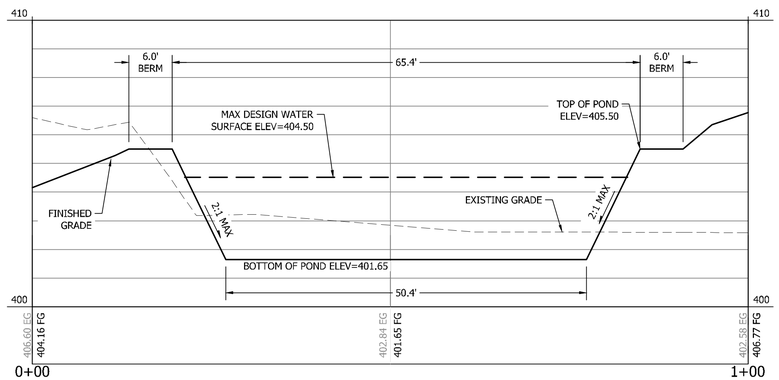
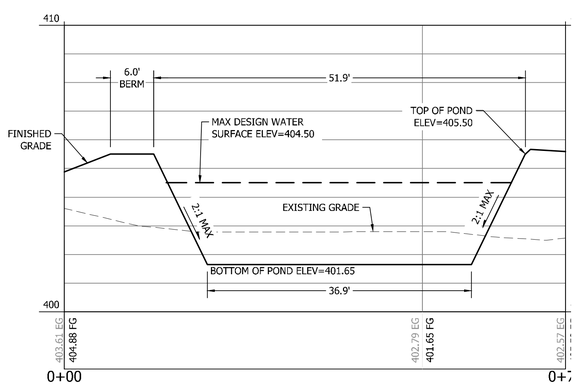


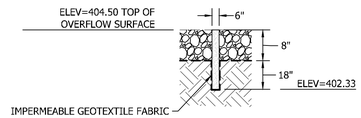
EW POND
Horizontal Scale 1"=10'
Vertical Scale 1"=2'

1 POND X-SECTION EAST/WEST



NS POND
Horizontal Scale 1"=10'
Vertical Scale 1"=2'

2 POND X-SECTION NORTH/SOUTH



NOTE:
CONTRACTOR SHALL INSTALL ANTI-SEEP COLLAR OR APPROVED EQUIVALENT IMPERMEABLE DEVICE.

5 CONCRETE ANTI-SEEP COLLAR
NOT TO SCALE

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 EXPORATTIONS 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.

VERIFICATION NOTE

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MICHAEL A. GOULARTE — STATE OF WASHINGTON — 21053417 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

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: 3.17.2026
REVISED:

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

SHEET	REV.
C8	0
8 OF 28	

BRADBURY PLACE TOWNHOMES

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

GRAPHIC SCALE
0 10 20
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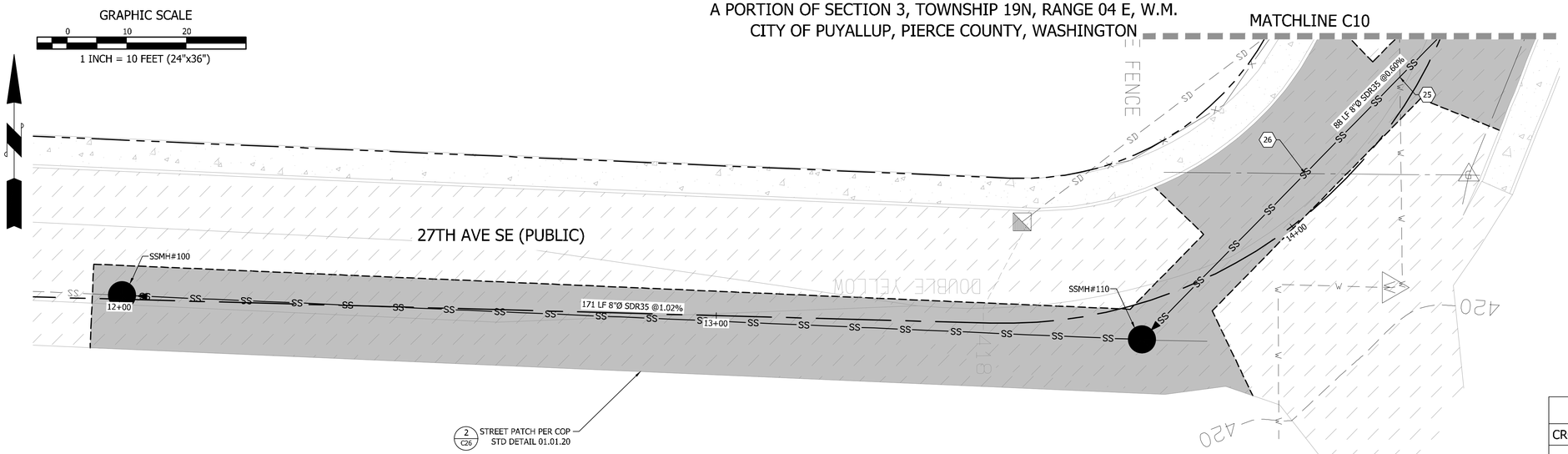

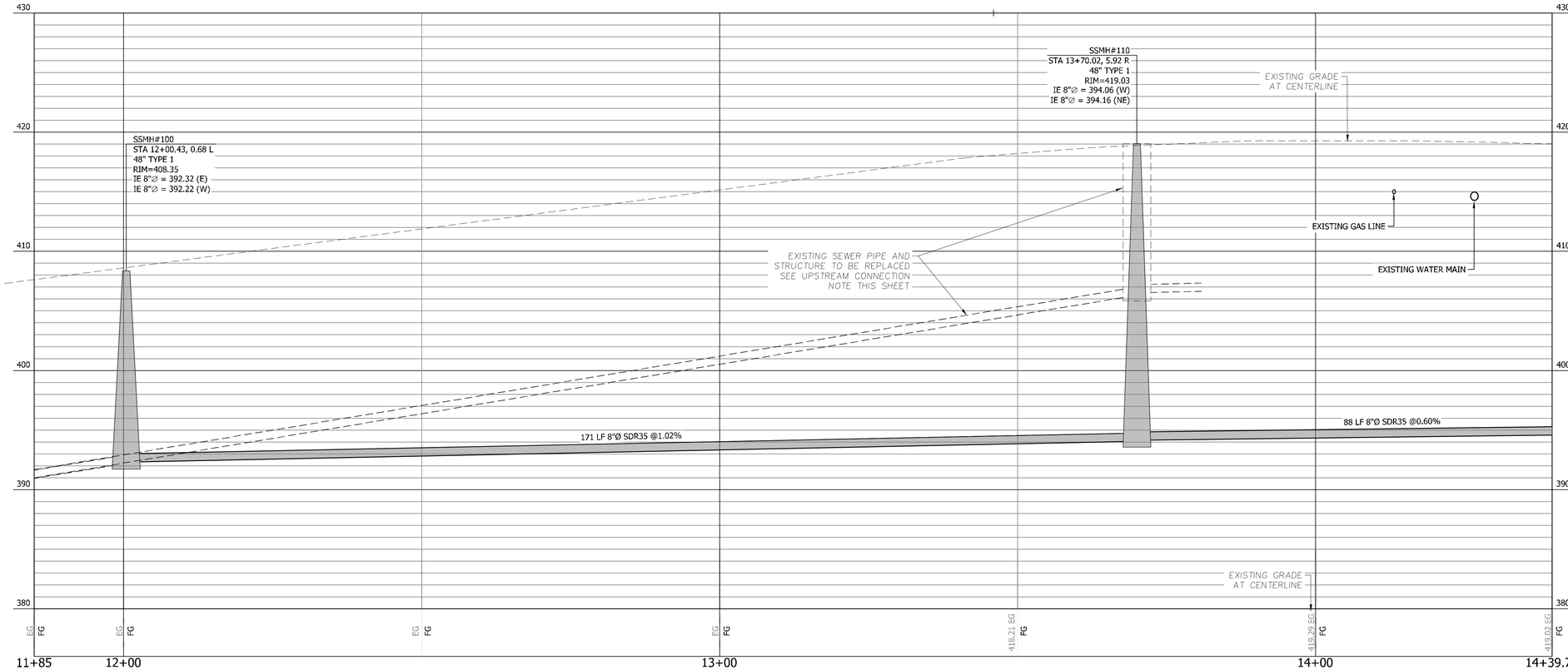

27TH AVE SE PROFILE

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

ROADWAY NOTES:

1. MONUMENTS SHALL BE INSTALLED AT ALL STREET INTERSECTIONS, AT ANGLE POINTS, AND POINTS OF CURVATURE IN EACH STREET. ALL BOUNDARY MONUMENTS MUST BE INSTALLED ACCORDING TO THE WASHINGTON STATE SUBDIVISION LAWS.
2. CURB AND GUTTER INSTALLATION SHALL CONFORM TO CITY STANDARD DETAIL 01.02.09.
3. SIDEWALKS AND DRIVEWAYS SHALL BE INSTALLED AS LOTS ARE BUILT ON. SIDEWALKS AND DRIVEWAYS SHALL CONFORM TO CITY STANDARD DETAIL 01.02.01, 01.02.02 AND 01.02.12. IF ASPHALT IS DAMAGED DURING REPLACEMENT OF CURB AND GUTTER, THE REPAIR SHALL CONFORM TO CITY STANDARD DETAIL 01.02.10.
4. THE SURROUNDING GROUND (5 FEET BEYOND THE BASE) FOR ALL POWER TRANSFORMERS, TELEPHONE/TV PEDESTALS, AND STREET LIGHT MAIN DISCONNECTS SHALL BE GRADED TO A POSITIVE 2 PERCENT SLOPE FROM TOP OF CURB.
5. SIGNAGE AND TRAFFIC CONTROL DEVICES ARE SAFETY ITEMS AND SHALL BE INSTALLED PRIOR TO ISSUANCE OF ANY CERTIFICATE OF OCCUPANCY OR PLAT APPROVAL. HOWEVER, IN LARGER DEVELOPMENTS, EXACT LOCATIONS OF STOP AND YIELD SIGNS MAY NEED TO BE DETERMINED AFTER FULL BUILDOUT WHEN TRAFFIC PATTERNS HAVE BEEN ESTABLISHED. IN THIS CASE, CONTRACTOR SHALL PROVIDE INDICATED "CITY-PLACED" SIGNS, SIGNPOSTS, AND BRACKETS TO THE CITY SIGN SPECIALIST (253) 841-5471 FOR LATER INSTALLATION BY THE CITY. ALL SIGNAGE SHALL BE IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
6. PRIOR TO ANY SIGN OR STRIPING INSTALLATION OR REMOVAL THE CONTRACTOR SHALL CONTACT THE CITY SIGN SPECIALIST (253) 841-5471 TO ARRANGE FOR AN ON-SITE MEETING TO DISCUSS PLACEMENT AND UNIFORMITY.
7. NEW OR REVISED STOP SIGNS OR YIELD SIGNS SHALL BE ADVANCE WARNED USING THE PROCEDURE OUTLINED IN THE MUTCD. ADVANCE WARNING SIGNS AND FLAGS SHALL BE MAINTAINED BY INSTALLER FOR 30 DAYS AND THEN REMOVED.

CROSSING TABLE

CROSSING #	STORM	SANITARY	WATER	SEPARATION
25	---	CR=395.19	IE=415.22	20.03'

CROSSING TABLE

CROSSING #	SANITARY	POWER	GAS	SEPARATION
26	CR=395.08	---	IE=414.84	19.76'

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.

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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UPSTREAM CONNECTION NOTE

CONTRACTOR SHALL ENSURE EXISTING CONNECTIONS ARE PRESENT WITHIN THE VICINITY OF THE SEWER MAIN TO BE REMOVED/ABANDONED AND THAT NO UPSTREAM CONNECTIONS EXIST EAST OF EX SSMH#4.

IF EXISTING CONNECTIONS ARE FOUND THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER IMMEDIATELY FOR FURTHER INSTRUCTIONS.

ALL EXISTING SERVICES MUST BE MAINTAINED THROUGHOUT ALL PHASES OF CONSTRUCTION. AT NO TIME SHALL AN EXISTING SERVICE CONNECTION BE BLOCKED OR REMOVED WITHOUT PROVIDING AN ALTERNATIVE OR TEMPORARY MEANS OF SERVICE. ANY REVISIONS TO EXISTING SERVICES SHALL BE COORDINATED WITH THE PROJECT ENGINEER AND CITY PRIOR TO REMOVAL AND/OR MODIFICATION.

VERIFICATION NOTE

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

MICHAEL A. GOULARTE
STATE OF WASHINGTON
23,847
REGISTERED
PROFESSIONAL ENGINEER
26th March 2026

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
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S 03 T 19 N R 04 E WM
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BRADBURY PLACE TOWNHOMES

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 (24"x36")

GRADING NOTES

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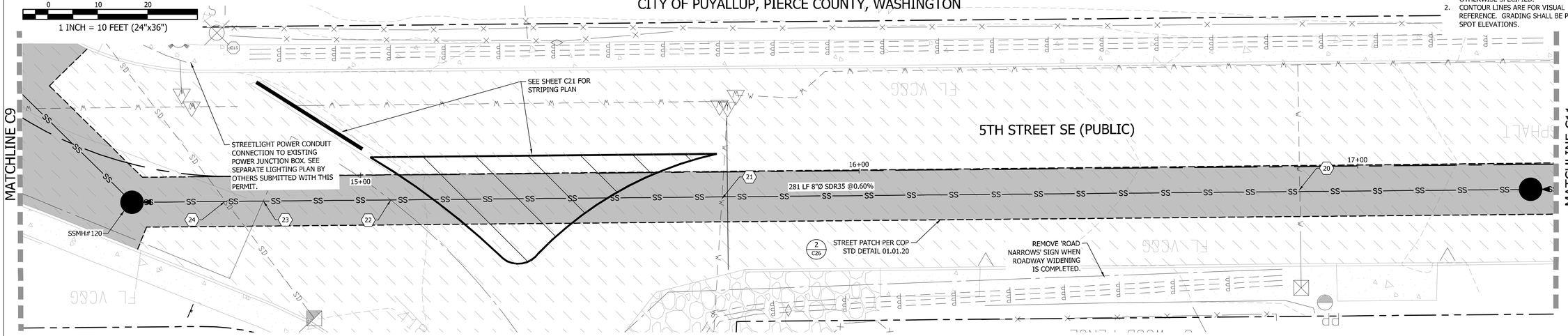

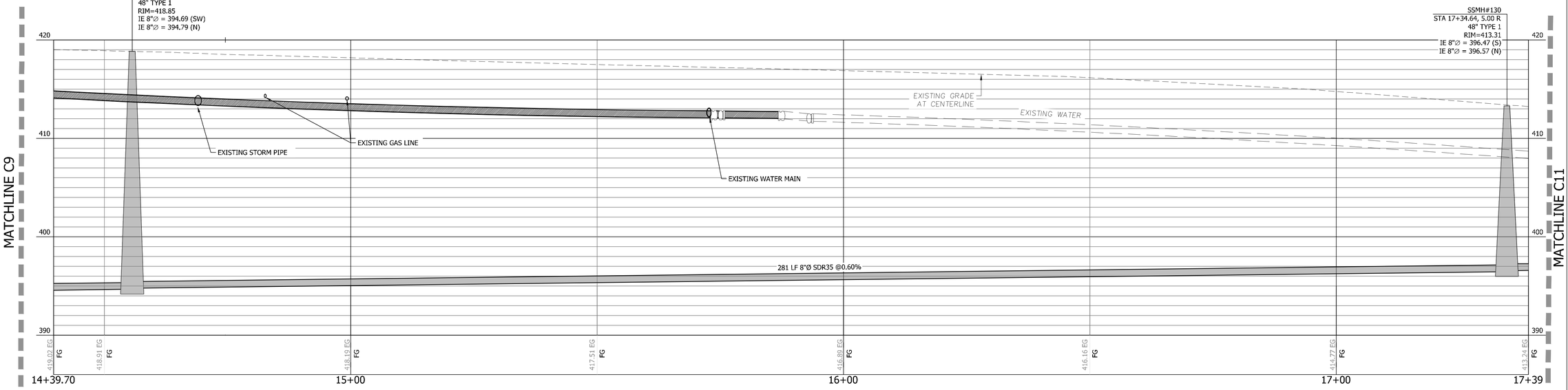

5TH ST SE PROFILE

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

CROSSING TABLE				
CROSSING #	STORM	SANITARY	WATER	SEPARATION
20	---	CR=396.88	IE=410.02	13.14'
21	---	CR=396.17	IE=412.19	16.02'
24	IE=413.31	CR=395.51	---	17.80'

CROSSING TABLE				
CROSSING #	SANITARY	POWER	GAS	SEPARATION
22	CR=395.68	---	IE=413.89	18.21'
23	CR=395.63	---	IE=414.13	18.50'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 21809 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

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: 3.17.2026
REVISED:

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

SHEET	REV.
C10	0
10 OF 28	

BRADBURY PLACE TOWNHOMES

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

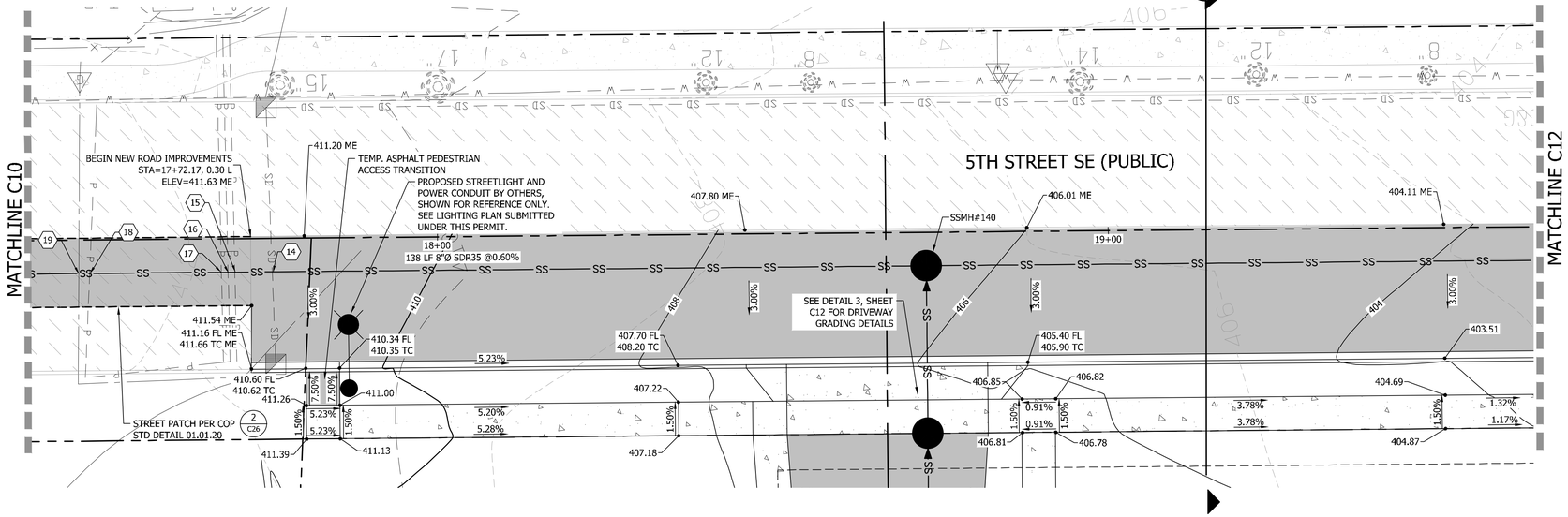
GRAPHIC SCALE
0 10 20
1 INCH = 10 FEET (24"x36")

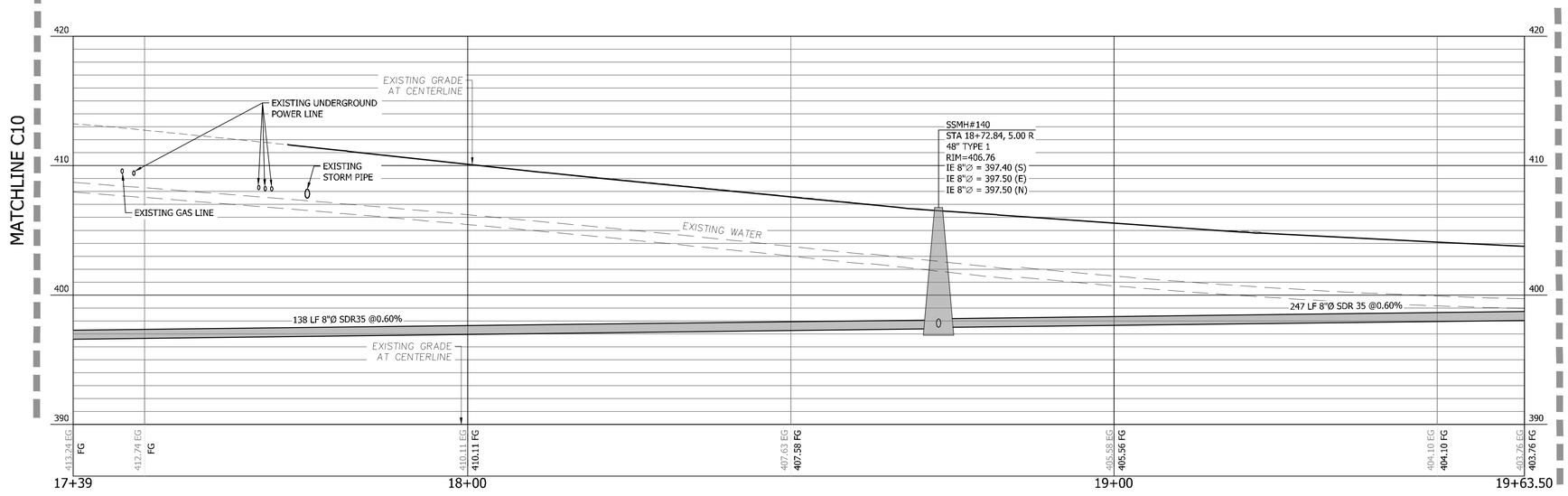
APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
THE CITY WILL NOT BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS.
FIELD CONDITIONS MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE DEVELOPMENT ENGINEERING MANAGER.





5TH ST SE PROFILE

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

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.

ILLUMINATION NOTES:

1. ALL WORK SHALL BE IN ACCORDANCE WITH CITY OF PUYALLUP PUBLIC WORKS STANDARDS AND WSDOT STANDARDS AND SPECIFICATIONS.
2. THE LOCATIONS OF FEATURES SHOWN ARE APPROXIMATE AND SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION START.
3. UTILITY LOCATIONS ARE APPROXIMATE AND SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY ILLUMINATION WORK.
4. ALL WORK SHALL BE CONSISTENT WITH UTILITY AGENCY REQUIREMENTS. THE CONTRACTOR SHALL COORDINATE WITH AFFECTED UTILITY AGENCIES THROUGHOUT THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO UTILITIES.
5. CONDUIT LOCATIONS ARE SHOWN FOR ILLUSTRATIVE PURPOSES. ACTUAL LOCATIONS SHALL BE DETERMINED BY THE CONTRACTOR IN THE FIELD.
6. CONTRACTOR SHALL COORDINATE WITH THE CITY SIGNAL/ILLUMINATION TECHNICIAN AT 253.405.4390 PRIOR TO CONSTRUCTION.
7. THE LOCATION OF ALL CONDUITS, JUNCTION BOXES, POLES, AND CABINETS SHOWN ON THIS PLAN MAY BE ADJUSTED IN THE FIELD TO AVOID CONFLICTS AND MEET ADA REQUIREMENTS. ALL FINAL LOCATIONS SHALL BE APPROVED BY THE CITY TRAFFIC ENGINEER PRIOR TO CONSTRUCTION.
8. JUNCTION BOX LOCATIONS SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. JUNCTION BOXES SHALL BE FIELD LOCATED BY THE CONTRACTOR WITH DIRECTION FROM THE CITY.
9. CONTRACTOR SHALL ADJUST JUNCTION BOX LIDS TO BE FLUSH WITH TOP OF SIDEWALK.
10. ANY NEW JUNCTION BOX WHICH WILL BE LOCATED WITHIN OR PARTIALLY WITHIN SIDEWALK SHALL HAVE LIDS AND FRAMES WITH A NON-SLIP COATING ON THE TOP SURFACE EQUAL TO MEBAC1 OR SLIPNOT#3.

CROSSING TABLE

CROSSING #	SANITARY	POWER	GAS	SEPARATION
15	CR=397.43	IE=408.04	---	10.61'
16	CR=397.42	IE=408.06	---	10.64'
17	CR=397.46	IE=408.14	---	10.68'
18	CR=397.34	IE=409.25	---	11.91'
19	CR=397.33	---	IE=409.41	12.08'

CROSSING TABLE

CROSSING #	STORM	SANITARY	WATER	SEPARATION
14	IE=407.72	CR=397.50	---	10.22'

*EXISTING UTILITY ELEVATION ASSUMED; CONTRACTOR TO POTHOLE AND VERIFY ELEVATIONS

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

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MICHAEL A. GOULARTE — STATE OF WASHINGTON — 23364 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: 5TH ST SE PLAN AND PROFILE

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7809 PACIFIC AVE
TACOMA, WA 98408
CONTACT: KEN RODY
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DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 3.17.2026
REVISED:

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

SHEET: C11
11 OF 28
REV.: 0

BRADBURY PLACE TOWNHOMES

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 (24"x36")

CROSSING TABLE				
CROSSING #	STORM	SANITARY	WATER	SEPARATION
(9)	IE=400.55	CR=398.95	---	1.60'
(10)	---	CR=396.96	IE=398.46	1.50'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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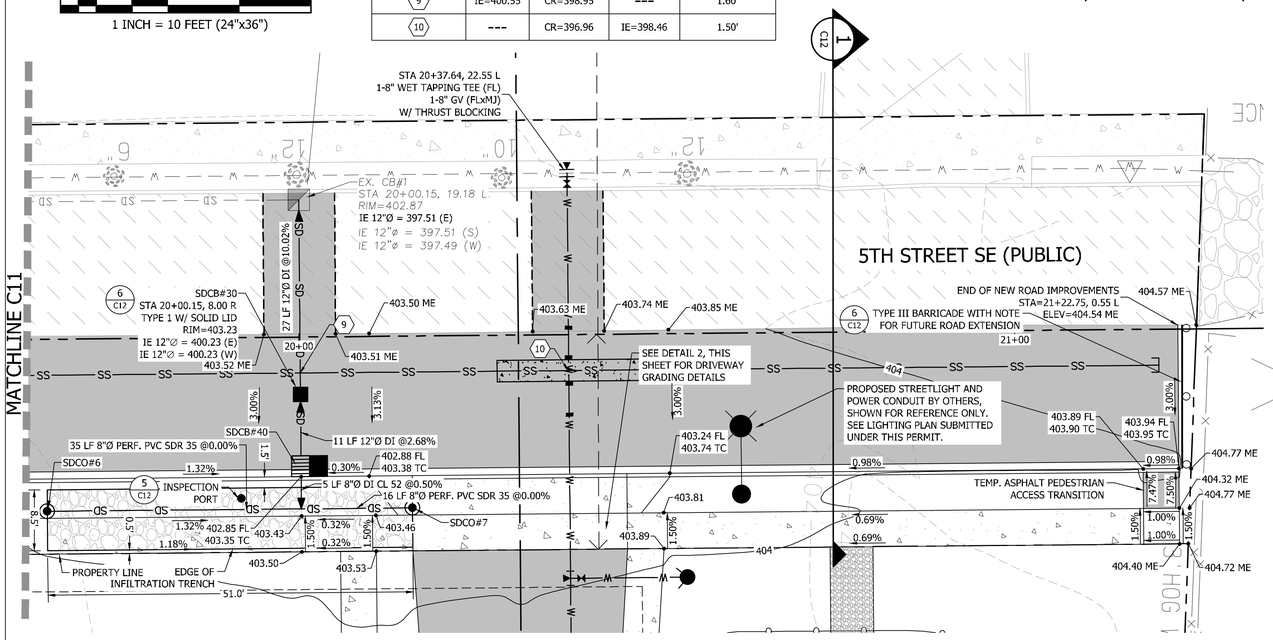
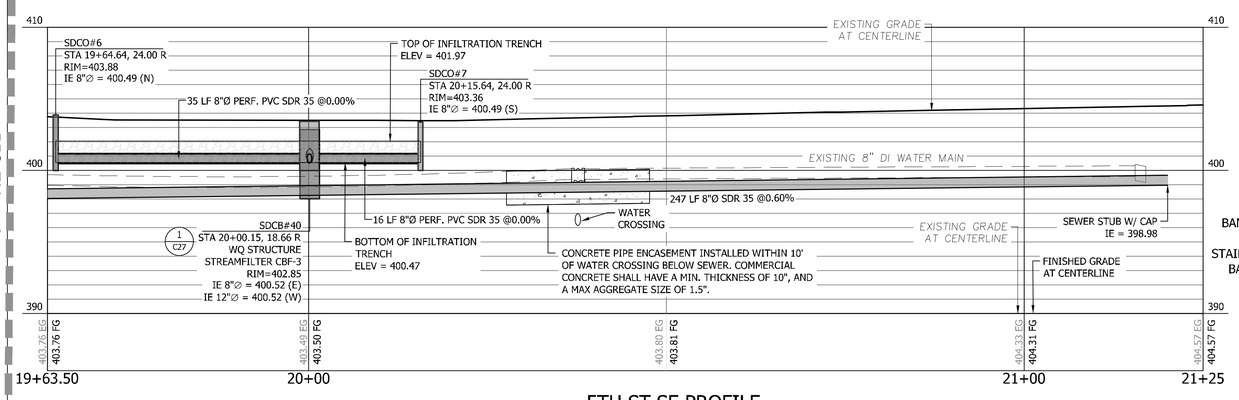
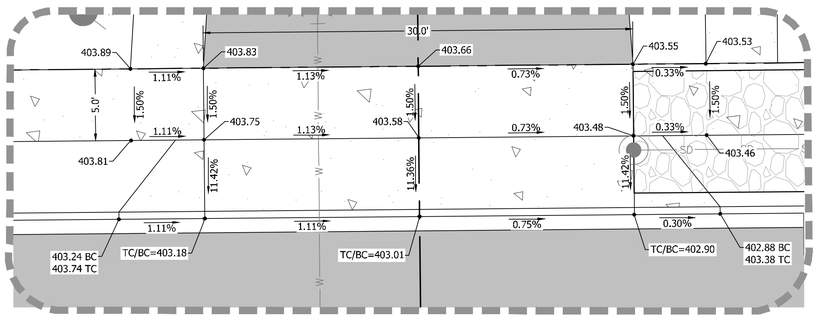




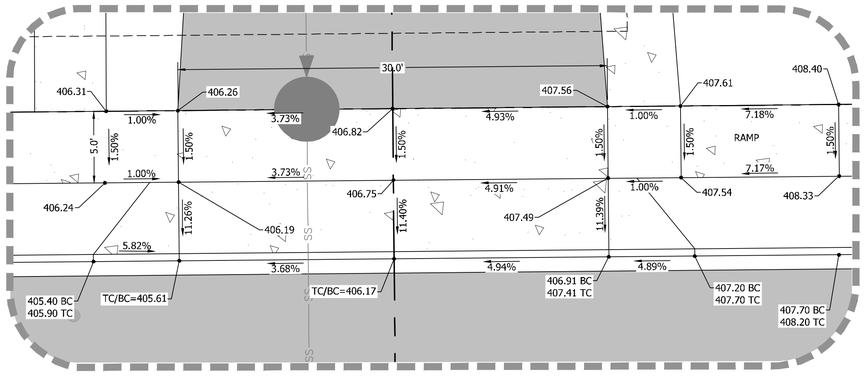
5TH ST SE PROFILE

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'



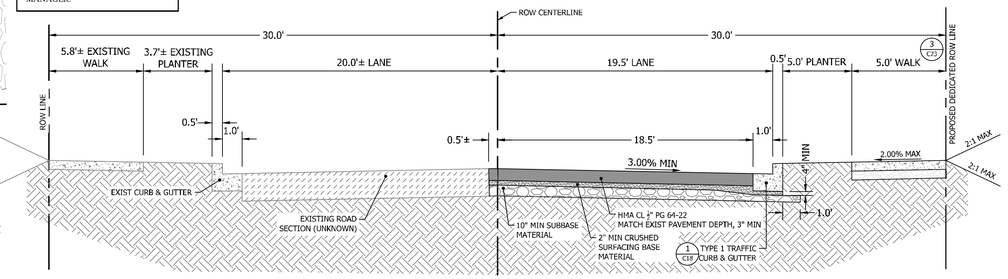
2 AISLE B DRIVEWAY DETAIL

NOT TO SCALE



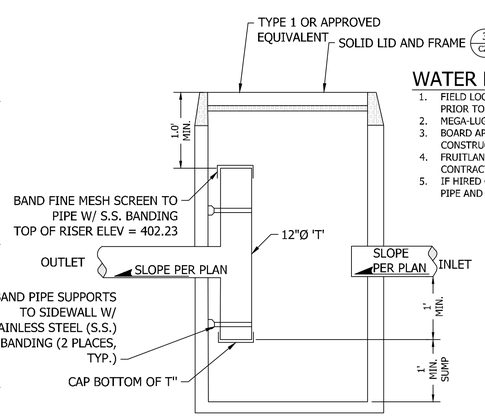
3 AISLE A DRIVEWAY DETAIL

NOT TO SCALE



1 5TH ST SE ROW STANDARD SECTION

NOT TO SCALE

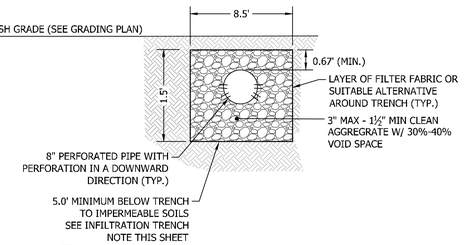


6 TYPE 1 CB W/ 12" ELBOW RISER

NOT TO SCALE

WATER NOTES

1. FIELD LOCK GASKETS WITH MIN. 2 JOINTS REQUIRED PRIOR TO CHANGE IN DIRECTION OR CAP.
2. MEGA-LUG RESTRAINT REQUIRED AT ALL MJ FITTINGS.
3. BOARD APPROVAL AND FEES PAID REQUIRED PRIOR TO CONSTRUCTION START ON WATER.
4. FRUITLAND MUTUAL WATER TO INSTALL OR HIRE CONTRACTOR.
5. IF HIRED OUT, FRUITLAND MUTUAL WATER WILL SUPPLY PIPE AND PARTS.



4 INFILTRATION TRENCH DETAIL

NOT TO SCALE

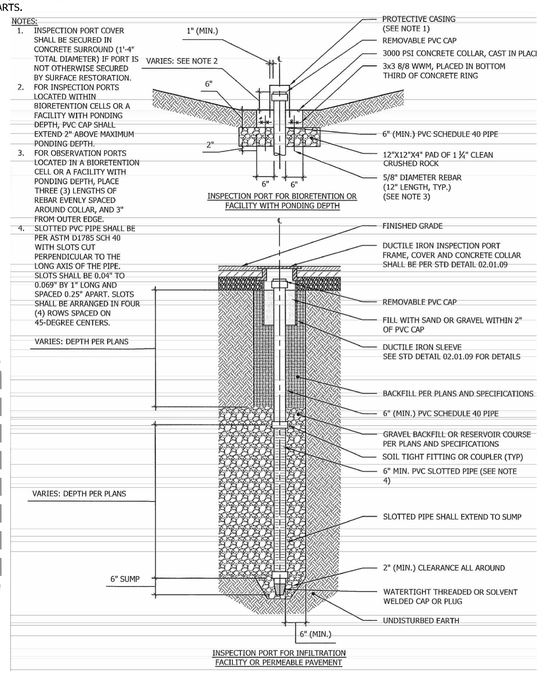
INFILTRATION VERIFICATION NOTE

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.

NOTES:
1. INSPECTION PORT COVER SHALL BE SECURED IN CONCRETE SURROUND (1'-4" TOTAL DIAMETER) IF PORT IS NOT OTHERWISE SECURED BY SURFACE RESTORATION.
2. FOR INSPECTION PORTS LOCATED WITHIN BIORETENTION CELLS OR A FACILITY WITH PONDING DEPTH, PVC CAP SHALL EXTEND 2" ABOVE MAXIMUM PONDING DEPTH.
3. FOR OBSERVATION PORTS LOCATED IN A BIORETENTION CELL OR A FACILITY WITH PONDING DEPTH, PLACE THREE (3) LENGTHS OF REBAR EVENLY SPACED AROUND COLLAR, AND 3" FROM OUTER EDGE.
4. SLOTTED PVC PIPE SHALL BE PER ASTM D1785 SCH 40 WITH SLOTS CUT PERPENDICULAR TO THE LONG AXIS OF THE PIPE. SLOTS SHALL BE 0.04" TO 0.069" BY 1" LONG AND SPACED 0.25" APART. SLOTS SHALL BE ARRANGED IN FOUR (4) ROWS SPACED ON 45-DEGREE CENTERS.



5 INSPECTION PORT DETAIL

NOT TO SCALE — COP STD. 02.01.10

REVISION	DATE	BY	DESCRIPTION

CONTOUR ENGINEERING, LLC
CIVIL ENGINEERS ~ SURVEYORS ~ LAND PLANNERS
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MICHAEL A. GOULARTE — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: 5TH ST SE PLAN AND PROFILE

CLIENT: BRADBURY PLACE LLC
7809 PACIFIC AVE
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CONTACT: KEN RODY
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DESIGNER: M. GOULARTE
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DRAWN: R. HENRETTA
S 03 T 19 N R 04 E WM
DATE: 3.17.2026
REVISED:

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

SHEET	REV.
C12	0
12 OF 28	

GRAPHIC SCALE

0 10 20

1 INCH = 10 FEET (24"x36")

BRADBURY PLACE TOWNHOMES

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

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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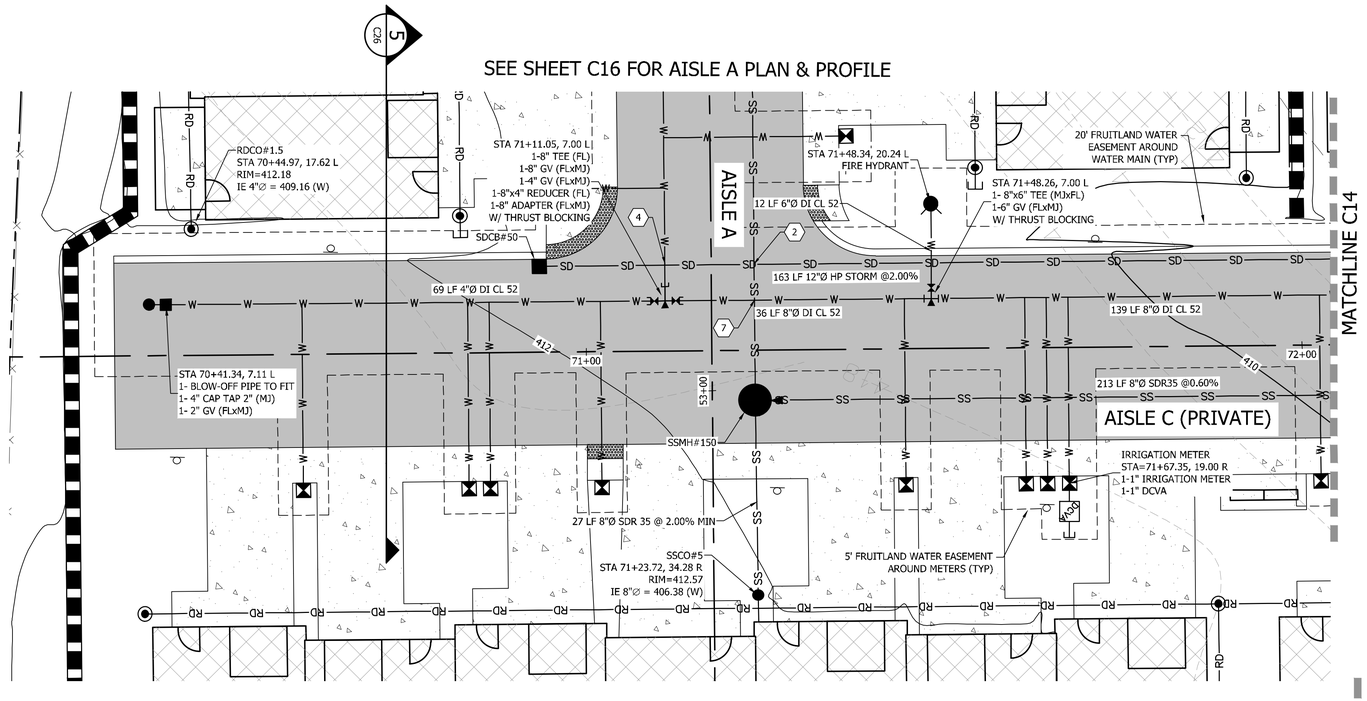
SEE SHEET C16 FOR AISLE A PLAN & PROFILE

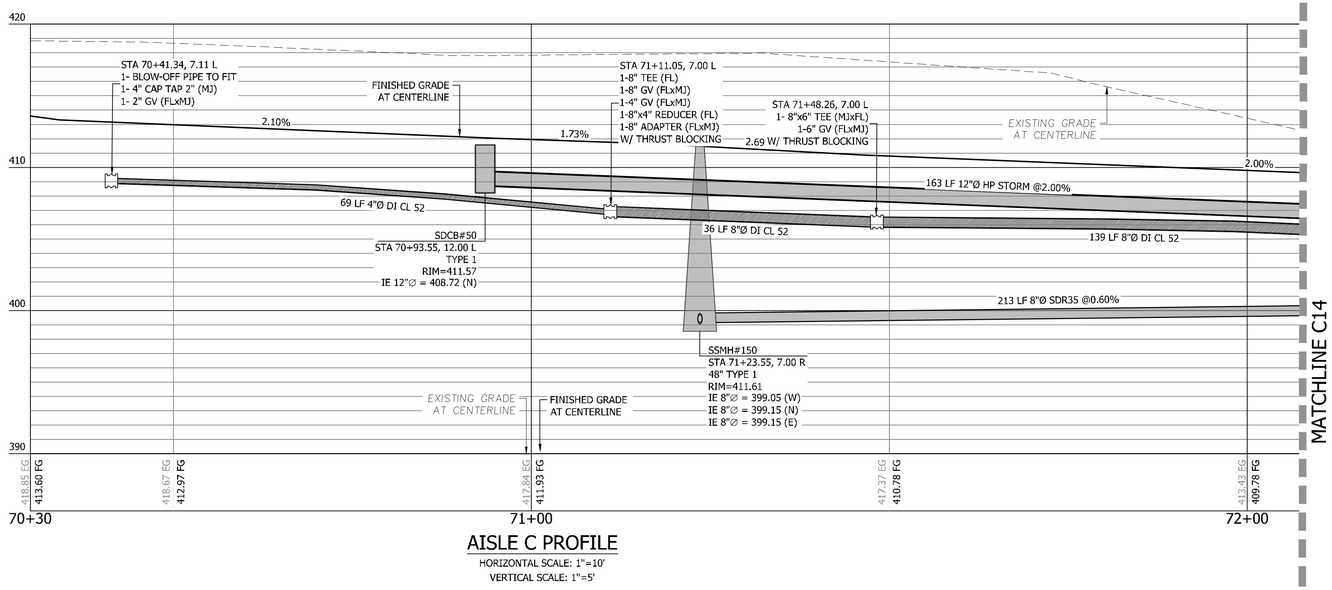


WATER NOTES

1. FIELD LOCK GASKETS WITH MIN. 2 JOINTS REQUIRED PRIOR TO CHANGE IN DIRECTION OR CAP.
2. MEGA-LUG RESTRAINT REQUIRED AT ALL MJ FITTINGS.
3. BOARD APPROVAL AND FEES PAID REQUIRED PRIOR TO CONSTRUCTION START ON WATER.
4. FRUITLAND MUTUAL WATER TO INSTALL OR HIRE CONTRACTOR.
5. IF HIRED OUT, FRUITLAND MUTUAL WATER WILL SUPPLY PIPE AND PARTS.

CROSSING TABLE

CROSSING #	STORM	SANITARY	WATER	SEPARATION
2	IE=408.10	---	CR=399.62	8.48'
4	IE=408.35	---	CR=407.28	1.07'
7	---	CR=399.65	IE=406.29	6.64'



AISLE C PROFILE

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

VERIFICATION NOTE

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MICHAEL A. GOULARTE — STATE OF WASHINGTON — 21053412 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

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: 3.17.2026
REVISED:

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

SHEET	REV.
C13	0
13 OF 28	

BRADBURY PLACE TOWNHOMES

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

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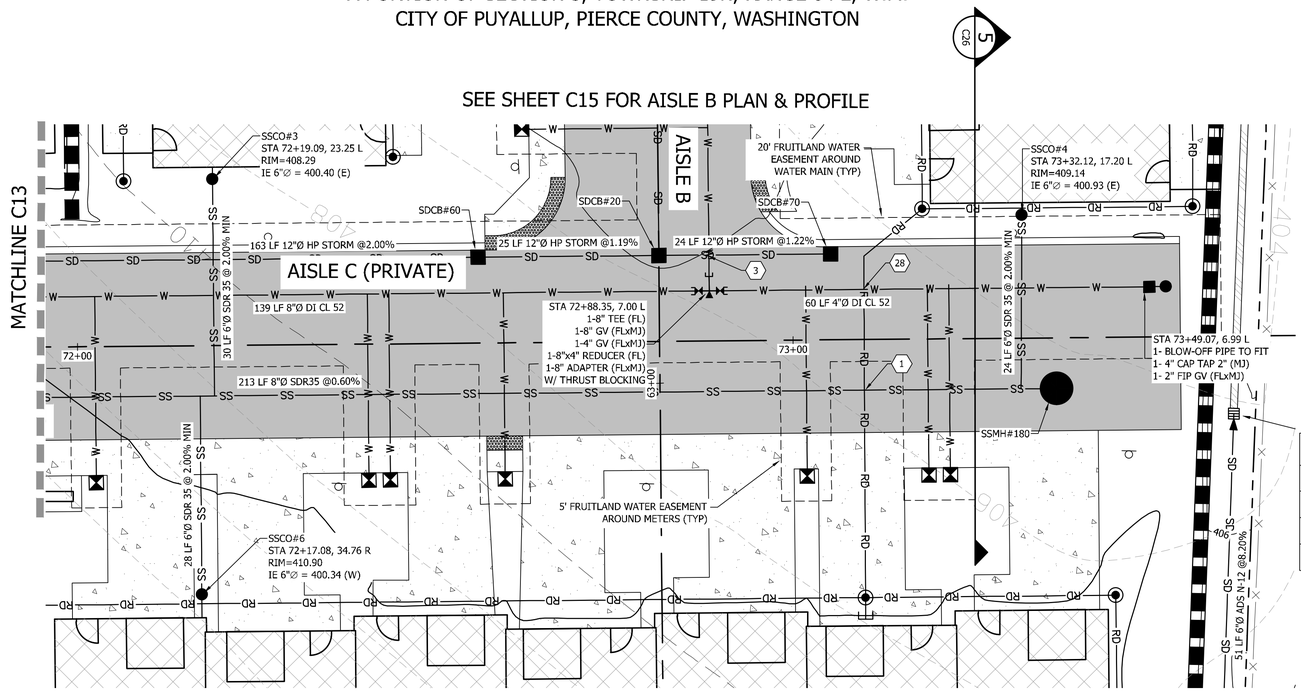
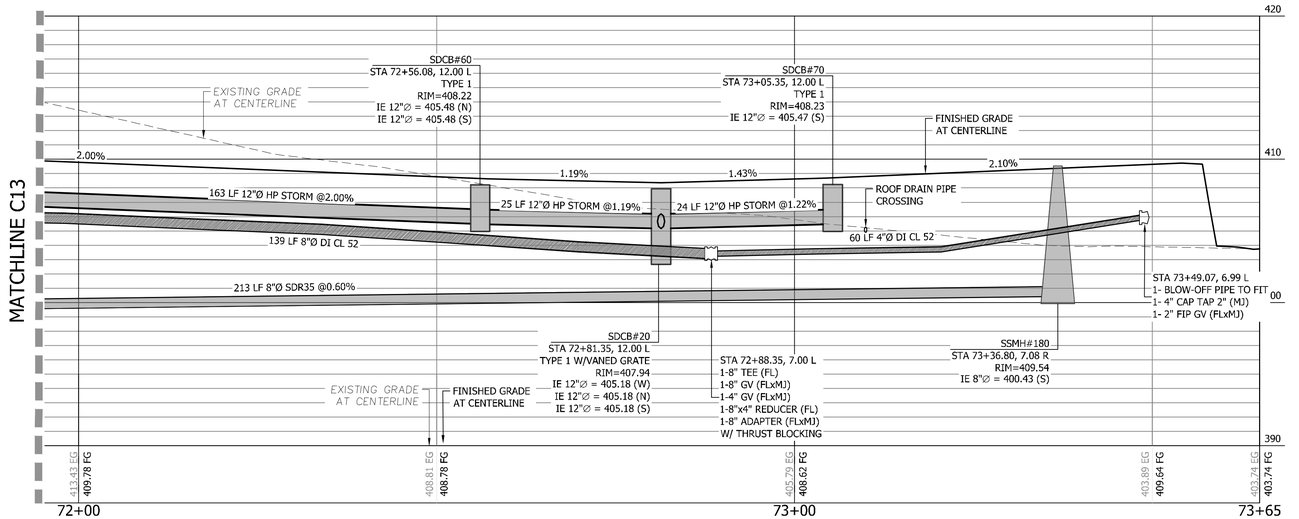
SEE SHEET C15 FOR AISLE B PLAN & PROFILE



CROSSING TABLE

CROSSING #	STORM	SANITARY	WATER	SEPARATION
1	IE=404.96	CR=400.96	---	4.01'
3	IE=405.28	---	CR=403.78	1.50'
28	IE=405.76	---	CR=404.63	1.13'



AISLE C PROFILE

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

WATER NOTES

1. FIELD LOCK GASKETS WITH MIN. 2 JOINTS REQUIRED PRIOR TO CHANGE IN DIRECTION OR CAP.
2. MEGA-LUG RESTRAINT REQUIRED AT ALL MJ FITTINGS.
3. BOARD APPROVAL AND FEES PAID REQUIRED PRIOR TO CONSTRUCTION START ON WATER.
4. FRUITLAND MUTUAL WATER TO INSTALL OR HIRE CONTRACTOR.
5. IF HIRED OUT, FRUITLAND MUTUAL WATER WILL SUPPLY PIPE AND PARTS.

APPROVED

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DEVELOPMENT ENGINEERING

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MICHAEL A. GOULARTE — STATE OF WASHINGTON — 21636 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

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7809 PACIFIC AVE
TACOMA, WA 98408
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C14	0
14 OF 28	

BRADBURY PLACE TOWNHOMES

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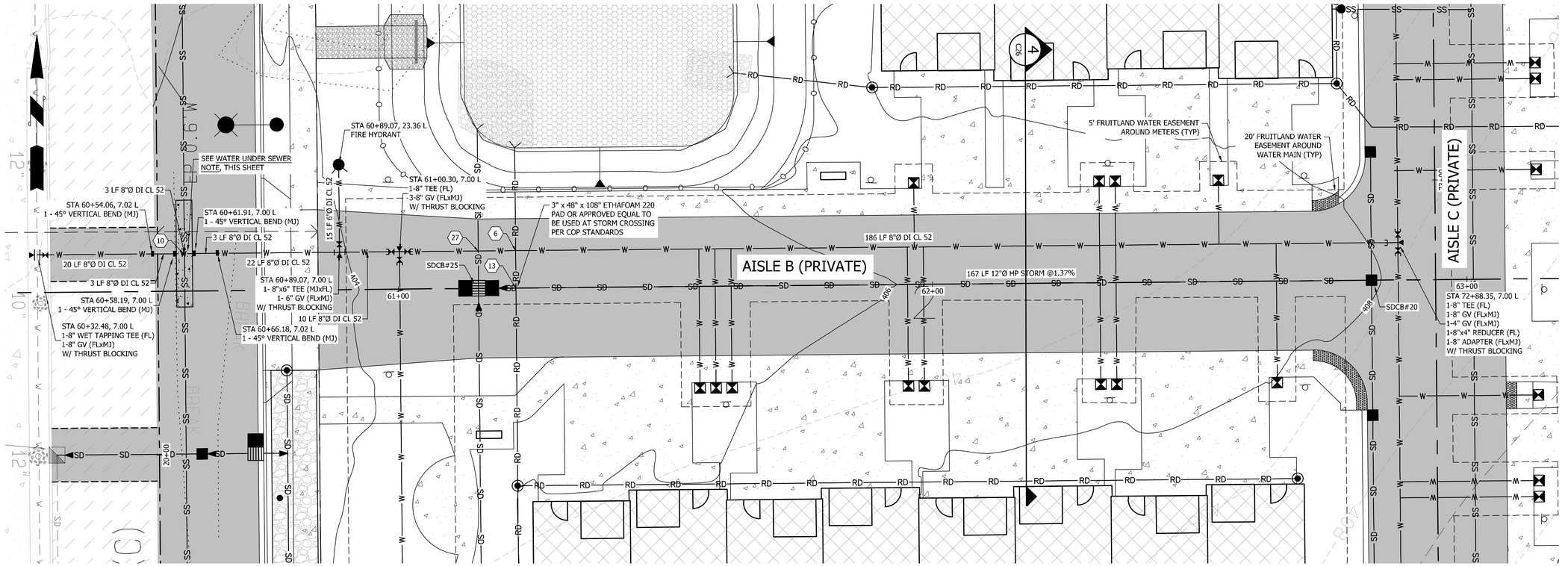
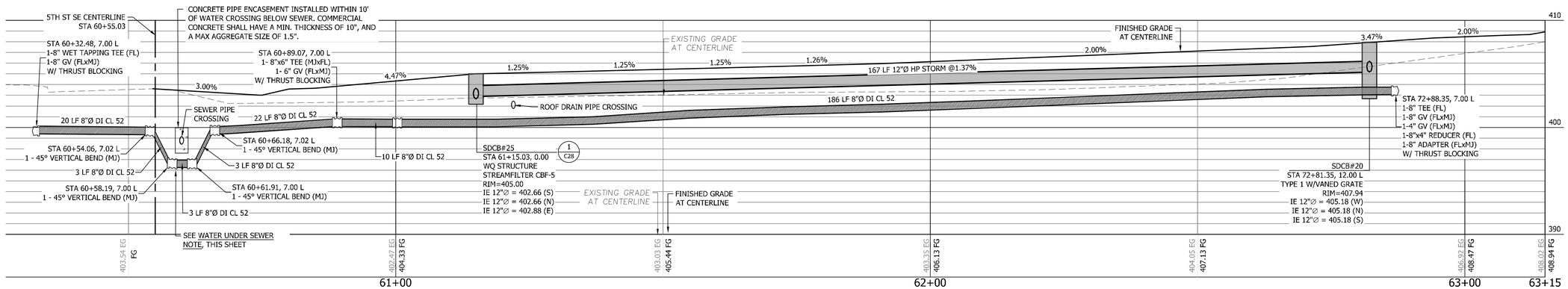


SEE SHEET C13 FOR AISLE A PLAN & PROFILE



AISLE B PROFILE

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

CROSSING TABLE				
CROSSING #	STORM	SANITARY	WATER	SEPARATION
6	IE=401.88	---	CR=400.86	1.01'
10	---	CR=396.96	IE=398.46	1.50'
27	IE=402.47	---	CR=400.77	1.70'

CROSSING TABLE			
CROSSING #	STORM	STORM	SEPARATION
13	IE=402.99	CR=402.47	0.52'

WATER UNDER SEWER NOTE

PER DOE *CRITERIA FOR SEWAGE WORKS DESIGN MANUAL* (ORANGE BOOK), WATER PIPE PASSING UNDER SEWER PIPE SHALL BE ENCASED IN CONCRETE OR IN A ONE QUARTER-INCH THICK CONTINUOUS STEEL, DUCTILE IRON, OR PRESSURE RATED PVC PIPE WITH A DIMENSION RATIO (DR) (THE RATIO OF THE OUTSIDE DIAMETER TO THE PIPE WALL THICKNESS) OF 18 OR LESS, WITH ALL VOIDS PRESSURE-GROUTED WITH SAND-CEMENT GROUT OR BENTONITE. COMMERCIALLY AVAILABLE PIPE SKIDS AND END SEALS ARE ACCEPTABLE.
WHEN USING STEEL OR DUCTILE IRON CASING, DESIGN CONSIDERATION FOR CORROSION PROTECTION SHOULD BE CONSIDERED.

WATER NOTES

1. FIELD LOCK GASKETS WITH MIN. 2 JOINTS REQUIRED PRIOR TO CHANGE IN DIRECTION OR CAP.
2. MEGA-LUG RESTRAINT REQUIRED AT ALL MJ FITTINGS.
3. BOARD APPROVAL AND FEES PAID REQUIRED PRIOR TO CONSTRUCTION START ON WATER.
4. FRUITLAND MUTUAL WATER TO INSTALL OR HIRE CONTRACTOR.
5. IF HIRED OUT, FRUITLAND MUTUAL WATER WILL SUPPLY PIPE AND PARTS.

VERIFICATION NOTE

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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

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
THE CITY WILL NOT BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS.
FIELD CONDITIONS MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE DEVELOPMENT ENGINEERING MANAGER.

REVISION	DESCRIPTION	DATE	BY

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

MICHAEL A. GOULARTE
STATE OF WASHINGTON
21035417
REGISTERED
PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: AISLE B 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: 3.17.2026
REVISED:

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

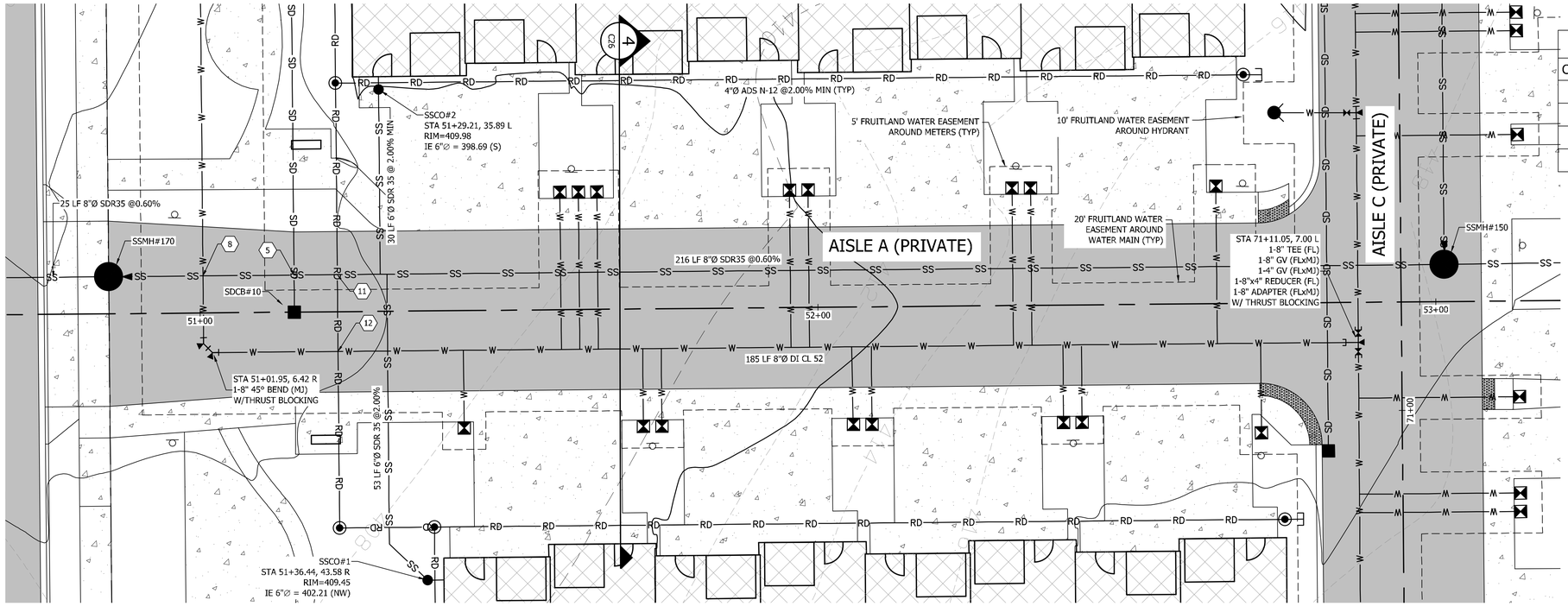
SHEET	REV.
C15	0
15 OF 28	

BRADBURY PLACE TOWNHOMES

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 (24"x36")

SEE SHEET C13-C14 FOR AISLE C PLAN & PROFILE



SEE SHEET C13 FOR AISLE C PLAN & PROFILE

CROSSING TABLE

CROSSING #	STORM	SANITARY	WATER	SEPARATION
5	IE=404.06	CR=398.53	---	5.44'
8	---	CR=398.53	IE=403.05	4.52'
11	IE=406.08	CR=398.66	---	7.42'
12	IE=406.21	---	CR=404.74	1.47'

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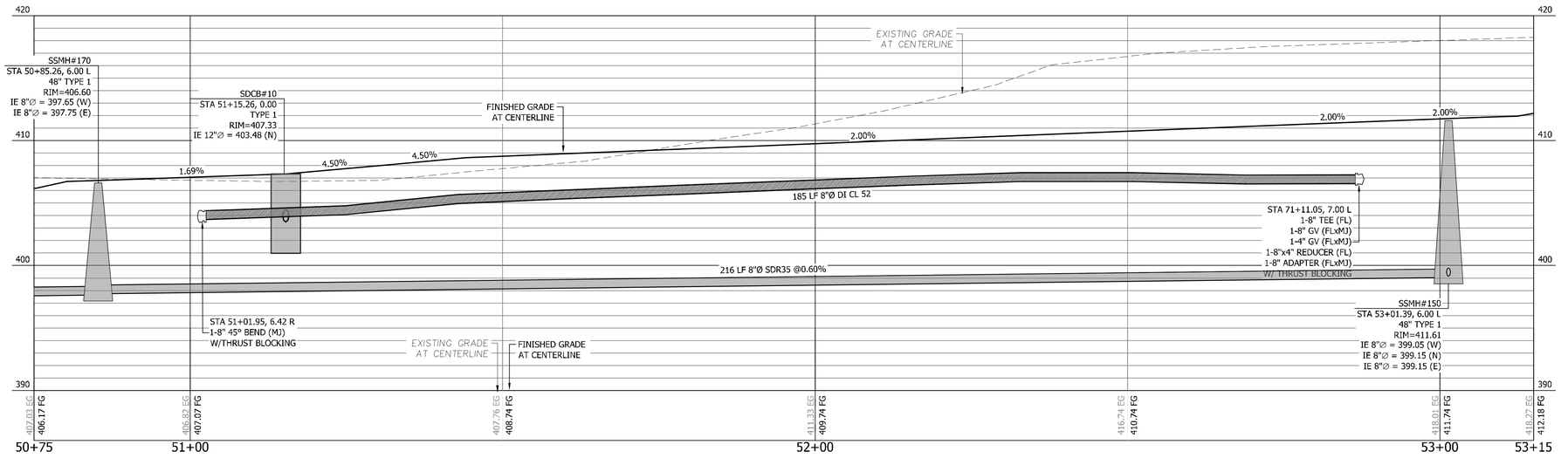

AISLE C PROFILE

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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BY	DATE	DESCRIPTION	REVISION

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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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 21636 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

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: 3.17.2026
REVISED:

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

SHEET	REV.
C16	0
16 OF 28	

BRADBURY PLACE TOWNHOMES

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

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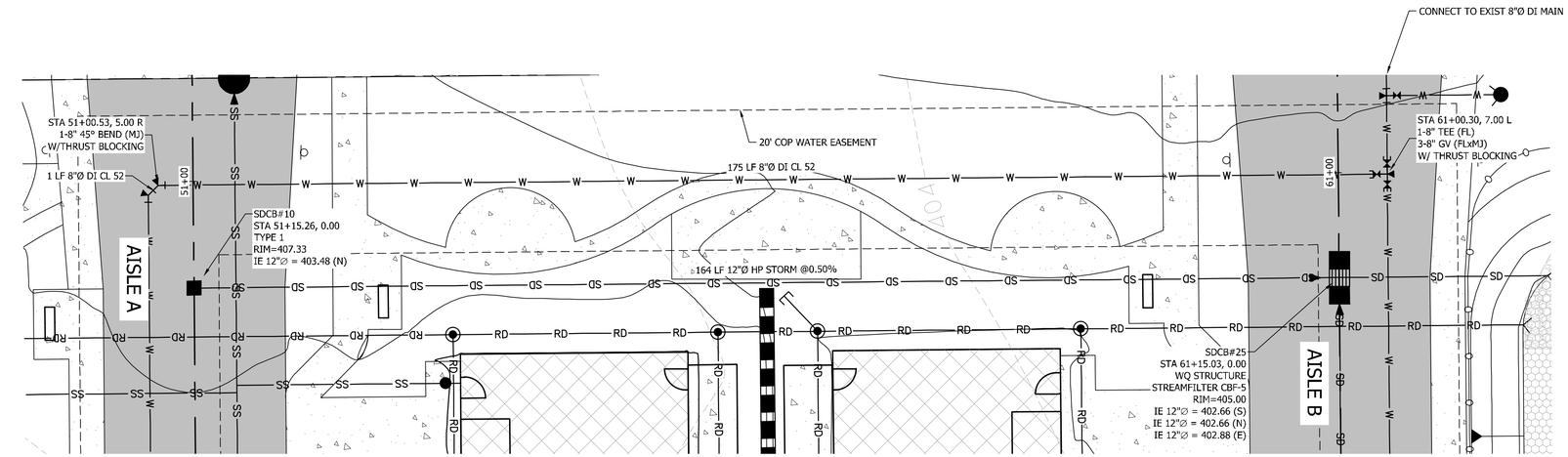

SEE SHEET C16 FOR AISLE A PLAN & PROFILE

SEE SHEET C15 FOR AISLE B PLAN & PROFILE

WATER NOTES

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STORMWATER NOTES

1. ANY STRUCTURE AND/OR OBSTRUCTION WHICH REQUIRE REMOVAL OR RELOCATION RELATING TO THIS PROJECT, SHALL BE DONE SO AT THE DEVELOPER'S EXPENSE.
2. DURING CONSTRUCTION, ALL EXISTING AND NEWLY INSTALLED DRAINAGE STRUCTURES SHALL BE PROTECTED FROM SEDIMENTS.
3. ALL STORM MANHOLES SHALL CONFORM TO CITY STANDARD DETAIL NO. 02.01.01. FLOW CONTROL MANHOLE/OIL WATER SEPARATOR SHALL CONFORM TO CITY STANDARD DETAIL NO. 02.01.06 AND 02.01.07.
4. MANHOLE RING AND COVER SHALL CONFORM TO CITY STANDARD DETAIL 06.01.02.
5. CATCH BASINS TYPE I SHALL CONFORM TO CITY STANDARD DETAIL NO.02.01.02 AND 02.01.03 AND SHALL BE USED ONLY FOR DEPTHS LESS THAN 5 FEET FROM TOP OF THE GRATE TO THE INVERT OF THE STORM PIPE.
6. CATCH BASINS TYPE II SHALL CONFORM TO CITY STANDARD DETAIL NO.02.01.04 AND SHALL BE USED FOR DEPTHS GREATER THAN 5 FEET FROM TOP OF THE GRATE TO THE INVERT OF THE STORM PIPE.
7. CAST IRON OR DUCTILE IRON FRAME AND GRATE SHALL CONFORM TO CITY STANDARD DETAIL NO.02.01.05. GRATE SHALL BE MARKED WITH "DRAINS TO STREAM". SOLID CATCH BASIN LIDS (SQUARE UNLESS NOTED AS ROUND) SHALL CONFORM TO WSDOT STANDARD PLAN B-30.20-04 (OLYMPIC FOUNDRY NO. SM60 OR EQUAL). VANED GRATES SHALL CONFORM TO WSDOT STANDARD PLAN B-30.30-03 (OLYMPIC FOUNDRY NO. SM60V OR EQUAL).
8. STORMWATER PIPE SHALL BE ONLY PVC, CONCRETE, DUCTILE IRON, OR DUAL WALLED POLYPROPYLENE PIPE.
   a. THE USE OF ANY OTHER TYPE SHALL BE REVIEWED AND APPROVED BY THE ENGINEERING SERVICES STAFF PRIOR TO INSTALLATION.
   b. PVC PIPE SHALL BE PER ASTM D3034, SDR 35 FOR PIPE SIZE 15-INCH AND SMALLER AND F679 FOR PIPE SIZES 18 TO 27 INCH. MINIMUM COVER ON PVC PIPE SHALL BE 3.0 FEET.
   c. CONCRETE PIPE SHALL CONFORM TO THE WSDOT STANDARD SPECIFICATIONS FOR CONCRETE UNDERDRAIN PIPE. MINIMUM COVER ON CONCRETE PIPE SHALL NOT LESS THAN 3.0 FEET.
   d. DUCTILE IRON PIPE SHALL BE CLASS 50, CONFORMING TO AWWA C151. MINIMUM COVER ON DUCTILE IRON PIPE SHALL BE 1.0 FOOT.
   e. POLYPROPYLENE PIPE (PP) SHALL BE DUAL WALLED, HAVE A SMOOTH INTERIOR AND EXTERIOR CORRUGATIONS AND MEET WSDOT 9-05.24(1). 12-INCH THROUGH 30-INCH PIPE SHALL MEET OR EXCEED ASTM F2736 AND AASHTO M330, TYPE S, OR TYPE D. 36-INCH THROUGH 60-INCH PIPE SHALL MEET OR EXCEED ASTM F2881 AND AASHTO M330, TYPE S, OR TYPE D. TESTING SHALL BE PER ASTM F1417. MINIMUM COVER OVER POLYPROPYLENE PIPE SHALL BE 3-FEET.
9. TRENCHING, BEDDING, AND BACKFILL FOR PIPE SHALL CONFORM TO CITY STANDARD DETAIL NO. 06.01.01.
10. STORM PIPE SHALL BE A MINIMUM OF 10 FEET AWAY FROM BUILDING FOUNDATIONS AND/OR ROOF LINES.
11. ALL STORM PIPE SHALL BE TESTED AND INSPECTED FOR ACCEPTANCE AS OUTLINED IN SECTION 209 OF THE CITY OF PUYALLUP STORMWATER MANAGEMENT STANDARDS.
12. ALL TEMPORARY SEDIMENTATION AND EROSION CONTROL MEASURES, AND PROTECTIVE MEASURES FOR CRITICAL AREAS AND SIGNIFICANT TREES SHALL BE INSTALLED PRIOR TO INITIATING ANY CONSTRUCTION ACTIVITIES.
14. REGISTRATION IS REQUIRED FOR ALL CLASS V UIC WELLS WITHIN PUBLIC DRAINAGE TRACTS OR PUBLIC RIGHTOF-WAY AND MUST BE SUBMITTED SIXTY (60) DAYS PRIOR TO WELL CONSTRUCTION. A COPY OF THE ONLINE REGISTRATION SHALL BE SUBMITTED TO THE CITY PRIOR TO CONSTRUCTION.

SANITARY SEWER NOTES

1. MINIMUM GRADE ON ALL 4 INCH RESIDENTIAL SIDE SEWERS SHALL BE 2 PERCENT AND 6 INCH COMMERCIAL SIDE SEWERS SHALL BE 1 PERCENT; MAXIMUM SHALL BE 8 PERCENT. ALL SIDE SEWERS SHALL BE 6 INCHES WITHIN CITY RIGHT-OF-WAY.
2. SIDE SEWERS SHALL BE INSTALLED IN ACCORDANCE WITH CITY STANDARD NOS. 04.03.01, 04.03.02, 04.03.03 AND 04.03.04. SIDE SEWER INSTALLATION WORK SHALL BE DONE IN ACCORDANCE WITH THE WASHINGTON INDUSTRIAL SAFETY AND HEALTH ACT (WISHA).
   ALL SEWER PIPE SHALL BE PVC, POLYPROPYLENE, OR DUCTILE IRON. PVC SEWER PIPE SHALL CONFORM TO ASTM D-3034, SDR35 FOR PIPE SIZES 15-INCH AND SMALLER AND ASTM F679 FOR PIPE SIZES 18- TO 27-INCH, DUCTILE IRON PIPE SHALL BE CLASS 51 OR GREATER, LINED WITH PROTECTO 401TM EPOXY LINING OR EQUIVALENT, UNLESS OTHERWISE NOTED. 12-INCH THROUGH 30-INCH POLYPROPYLENE PIPE (PP) SHALL BE DUAL WALLED, HAVE A SMOOTH INTERIOR AND EXTERIOR CORRUGATIONS AND MEET WSDOT 9-05.24(2). IT SHALL MEET OR EXCEED ASTM F2764. 36-INCH THROUGH 60-INCH PP PIPE SHALL BE TRIPLE WALLED AND MEET WSDOT 9-05.24(2). IT SHALL MEET OR EXCEED ASTM F2764. PP SHALL HAVE A MINIMUM PIPE STIFFNESS OF 46 PII WHEN TESTED IN ACCORDANCE WITH ASTM D2412. TESTING SHALL BE PER ASTM F1417. TRENCHING, BEDDING, AND BACKFILL SHALL BE IN ACCORDANCE WITH CITY STANDARD NO. 06.01.01. MINIMUM COVER ON PVC AND PP PIPE SHALL BE 3.0 FEET. MINIMUM COVER ON DUCTILE IRON PIPE SHALL BE 1.0 FOOT.
3. SANITARY SEWER MANHOLE FRAMES AND COVERS SHALL CONFORM TO CITY STANDARD NO. 06.01.02.
4. SANITARY SEWER MANHOLES SHALL CONFORM TO CITY STANDARD NOS. 04.01.01, 04.01.02, 04.01.03 AND 04.01.04. ALL MANHOLES SHALL BE CHANNELED FOR FUTURE LINES AS SPECIFIED ON THESE PLANS. MANHOLE STEPS AND LADDER SHALL CONFORM TO STANDARD NO. 06.01.03.
5. SANITARY SEWER PIPE AND SIDE SEWERS SHALL BE 10 FEET AWAY FROM BUILDING FOUNDATIONS AND/OR ROOF LINES WITH THE EXCEPTION OF SIDE SEWERS THAT PROVIDE SERVICE TO A SINGLE-FAMILY RESIDENCE. AT THE DISCRETION OF THE REVIEW ENGINEER, A LICENSED PROFESSIONAL ENGINEER WILL BE REQUIRED TO STAMP THE DESIGN TO ACCOUNT FOR DEPTH OR PROXIMITY TO FOUNDATION, STEEP SLOPES, OR OTHER FACTORS.
6. NO SIDE SEWERS SHALL BE CONNECTED TO ANY HOUSE OR BUILDING UNTIL ALL MANHOLES ARE ADJUSTED TO THE FINISHED GRADE OF THE COMPLETED ASPHALT ROADWAY AND THE ASPHALT PATCH AND SEAL AROUND THE RING ARE ACCEPTED.
7. FOR COMMERCIAL DEVELOPMENTS IN WHICH SOURCES OF GREASE AND/OR OILS MAY BE INTRODUCED TO THE CITY SANITARY SEWER SYSTEM, A CITY APPROVED GREASE INTERCEPTOR SHALL BE INSTALLED DOWNSTREAM FROM THE SOURCE.
8. ONCE SEWER AND ALL OTHER UTILITY CONSTRUCTION IS COMPLETED, ALL SANITARY SEWER MAINS AND SIDE SEWERS SHALL BE TESTED PER SECTION 406 OF THE CITY STANDARDS.

WATER SYSTEM NOTES

1. BACTERIOLOGICAL (COLIFORM AND IRON BACTERIA) TEST SAMPLES WILL BE TAKEN BY THE CITY (OR FMWC, VW OR TCW WHEN SERVED BY THAT PURVEYOR) AND PAID FOR BY THE CONTRACTOR, EXCEPT FOR CAPITAL IMPROVEMENT PROJECTS (CIP) WHICH SHALL BE PAID FOR BY THE CITY.
2. WATER MAINS SHALL HAVE A MINIMUM COVER OF 36 INCHES FROM PAVED FINAL GRADE IN IMPROVED RIGHT-OF-WAY AND IMPROVED EASEMENTS, AND A MINIMUM OF 48 INCHES IN UNIMPROVED RIGHT-OFWAY AND UNIMPROVED EASEMENTS.
3. PIPE FOR WATER MAINS SHALL BE DUCTILE IRON CONFORMING TO SECTION 7-09 OF THE STANDARD SPECIFICATIONS, CLASS 52 WITH TYTON OR APPROVED EQUAL JOINTS. PIPE SHALL BE CEMENT LINED IN ACCORDANCE WITH A.S.A. SPECIFICATION A 21.4-1964.
4. CONNECTIONS TO EXISTING WATER MAINS TYPICALLY SHALL BE WET TAPS THROUGH A TAPPING TEE AND TAPPING VALVE AND SHALL BE MADE BY A CITY APPROVED CONTRACTOR. THE TAPPING SLEEVE SHALL BE ROMAC SST ALL STAINLESS STEEL TAPPING SLEEVE OR APPROVED EQUAL. A TWO-PIECE EPOXY COATED OR DUCTILE IRON TAPPING SLEEVE MAY BE USED ON DUCTILE IRON PIPE, WHEN THE TAP IS SMALLER THAN THE WATER MAIN SIZE I.E. 6-INCH TAP ON 8-INCH PIPE. THE CITY (OR FMWC, VW OR TCW WHEN SERVED BY THAT PURVEYOR) SHALL APPROVE THE TIME AND LOCATION FOR THESE CONNECTIONS.
5. ALL WATER MAINS AND APPURTENANCES SHALL BE HYDROSTATICALLY TESTED AT 200 PSI IN ACCORDANCE WITH STANDARD SPECIFICATION 7-09.3(23). PRESSURE TESTING SHAL NOT BE PERFORMED UNTIL SATISFACTORY PURITY SAMPLES HAVE BEEN RECEIVED, EXCEPT WHEN NEW WATER MAINS ARE INSTALLED INDEPENDENTLY FROM THE WATER SYSTEM PIPING.
6. FIRE HYDRANTS SHALL BE INSTALLED IN ACCORDANCE WITH CITY STANDARD DETAIL 03.05.01 AND AS DIRECTED BY THE CITY OF PUYALLUP FIRE CODE OFFICIAL.
7. VALVE MARKER POSTS SHALL BE INSTALLED WHERE VALVE BOXES ARE HIDDEN FROM VIEW OR IN UNPAVED AREAS. THE INSTALLATION SHALL BE IN ACCORDANCE WITH CITY STANDARD DETAIL 03.01.02.
8. RESILIENT SEATED WEDGE GATE VALVES SHALL BE USED FOR 10-INCH MAINS AND SMALLER. BUTTERFLY VALVES SHALL BE USED FOR MAINS GREATER THAN 10 INCHES.
9. PIPE FITTING FOR WATER MAINS SHALL BE DUCTILE IRON AND SHALL BE MECHANICAL JOINT CONFORMING TO AWWA SPECIFICATION C111-72.
10. WATER MAIN PIPE AND SERVICE CONNECTIONS SHALL BE A MINIMUM OF 10 FEET AWAY FROM BUILDING FOUNDATIONS AND/OR ROOF LINES.
11. WHERE A WATER MAIN CROSSES THE NORTHWEST GAS PIPELINE, THE WATER LINE SHALL BE CASED WITH PVC PIPE A MINIMUM OF 10 FEET BEYOND EACH SIDE OF THE GAS LINE EASEMENT. CONTACT WILLIAMS NORTHWEST PIPELINE BEFORE THE CROSSING IS MADE.
12. TRENCHING, BEDDING, AND BACKFILL FOR WATER MAINS SHALL BE INSTALLED IN ACCORDANCE WITH CITY STANDARD DETAIL 06.01.01.
13. ALL COMMERCIAL AND INDUSTRIAL DEVELOPMENTS, IRRIGATION SYSTEMS, AND MULTI-FAMILY WATER SERVICE CONNECTIONS SHALL BE PROTECTED BY A DOUBLE CHECK VALVE ASSEMBLY OR A REDUCED PRESSURE BACKFLOW ASSEMBLY AS DIRECTED BY THE CITY (OR FMWC, VW OR TCW WHEN SERVED BY THAT PURVEYOR) CONFORMING TO CITY STANDARD DETAILS 03.04.01, 03.04.02, AND 03.04.03.
14. ANY LEAD JOINT FITTING DISTURBED DURING CONSTRUCTION SHALL BE REPLACED WITH A MECHANICAL JOINT FITTING AT THE CONTRACTOR'S EXPENSE.
15. HYDRAULIC FIRE FLOW MODELING SHALL BE REQUIRED FOR FORMAL PLATS WITHIN OR TO BE ANNEXED INTO THE CITY OF PUYALLUP'S WATER SERVICE AREA. THE DEVELOPER SHALL BE RESPONSIBLE TO APPLY FOR A HYDRAULIC MODEL PERMIT PRIOR TO PLAT REVIEW. THE HYDRAULIC MODELING CRITERIA IS BASED ON THE PROJECTED WATER DEMAND WHILE MAINTAINING A MINIMUM SYSTEM PRESSURE OF 20 POUNDS PER SQUARE INCH (PSI) AND A MAXIMUM VELOCITY OF 10 FEET PER SECOND.
16. WHEN USING A FIRE HYDRANT FOR NON-FIREFIGHTING PURPOSES, A CITY HYDRANT METER MUST BE USED. COORDINATE THE ACQUISITION OF THE HYDRANT METER WITH THE CITY'S UTILITY BILLING DIVISION AT PUYALLUP CITY HALL. A CITY APPROVED BACKFLOW PROTECTION ASSEMBLY SHALL BE INSTALLED BY THE PERSON REQUESTING USE OF A FIRE HYDRANT. THE ASSEMBLY SHALL BE ACCOMPANIED BY A CURRENT BACKFLOW ASSEMBLY TEST REPORT. THE TEST REPORT SHALL BE AVAILABLE AT THE SITE FOR THE DURATION OF THE HYDRANT USE.
17. SHOULD A BREAK OCCUR ON ANY CITY WATER MAIN, THE CONTRACTOR SHALL FOLLOW THE CITY'S ADOPTED "WATER MAIN BREAK PROCEDURE" ISSUED TO THEM AT THE PRE-CONSTRUCTION MEETING AND NOTIFY THOSE CONNECTED TO THE SYSTEM IN THE IMPACTED AREA AS OUTLINED IN THE PROCEDURE.
18. WATER MAIN REPAIRS (REFERENCES: AWWA C651-14 AND WSDOT STANDARD SPECIFICATION SECTION 7-09)
    (NOTE: A PLANNED WATER MAIN REPAIR SHALL BE APPROVED BY THE CITY INSPECTOR AND/OR WATER DIVISION SUPERVISOR PRIOR TO COMMENCING WORK.)
    a. REPAIR WITHOUT DEPRESSURIZATION – SMALL LEAKS SHALL BE REPAIRED USING REPAIR BANDS WHILE MAINTAINING POSITIVE PRESSURE IN THE WATER MAIN. VALVES SURROUNDING THE LEAK WILL BE PARTIALLY SHUT BY THE CITY WATER DEPARTMENT TO REDUCE THE FLOW AND PRESSURE TO THE AREA. BLOWOFFS AND HYDRANTS IN THE REDUCED PRESSURE AREA MAY BE OPENED AS NEEDED TO FURTHER REDUCE THE PRESSURE. THE WATER MAIN TRENCH SHALL BE OVER-EXCAVATED TO ALLOW WATER IN THE BENCH TO BE PUMPED OUT AND MAINTAINED BELOW THE LEVEL OF THE WATER MAIN. THE REPAIR SHALL BE COMPLETED WITH THE WATER MAIN PRESSURE REMAINING POSITIVE. AFTER THE REPAIR IS MADE, THE SYSTEM SHALL BE FULLY PRESSURIZED AND A VISUAL LEAK INSPECTION WILL BE COMPLETED. THE WATER MAIN IN THE AFFECTED AREA SHALL BE FLUSHED TO ACHIEVE THREE PIPE VOLUMES PULLED FROM THE PIPE (DISTANCE MEASURED FROM VALVE OPENED FOR FLUSHING TO THE EXIT HYDRANT OR BLOWOFF).
    b. REPAIR/CUT-IN WITH DEPRESSURIZATION – TRENCH SHALL BE OVER EXCAVATED AND DEWATERED BELOW THE WATER MAIN. FLUSH WATER FROM PIPE FROM EACH DIRECTION UNTIL IT RUNS CLEAR. IMMEDIATELY PRIOR TO INSTALLATION OF A NEW PIPE SECTION FOR REPAIR OR CUT IN TEE, ALL NEW FITTINGS AND PIPE SPOOLS SHALL BE SWABBED WITH A FIVE PERCENT (5%) CHLORINE SOLUTION (MINIMUM). THE INTERIOR OF THE EXISTING PIPE SHALL BE SWABBED WITH A FIVE PERCENT (5%) CHLORINE SOLUTION AT LEAST 6 FEET IN EACH DIRECTION FROM EXPOSED CUT ENDS. THE WATER MAIN IN THE AFFECTED AREA SHALL BE FLUSHED TO ACHIEVE THREE PIPE VOLUMES PULLED FROM THE PIPE (DISTANCE MEASURED FROM THE VALVE OPENED FOR FLUSHING TO THE EXIT HYDRANT OR BLOWOFF). CUSTOMERS SHALL BE NOTIFIED AFTER THE WATER MAIN IS FLUSHED AND REPAIRS HAVE BEEN COMPLETED, AS OUTLINED IN THE "WATER MAIN BREAK PROCEDURE."
26. NEW WATER MAIN INSTALLATION:
    a. EACH NEW WATER MAIN SECTION SHALL BE DELIVERED, STACKED AND STORED ONSITE WITH ENDS PLUGGED. THE PLUGS SHALL REMAIN IN THE PIPE UNTIL EACH PARTICULAR SECTION IS INSTALLED. NATIONAL SANITATION FOUNDATION (NSF) APPROVED SIXTY-FIVE PERCENT (65%) CALCIUM HYPOCHLORITE SHALL BE ADDED TO THE UPSTREAM END OF EACH PIPE SECTION, AND AT EACH HYDRANT TEE IN THE AMOUNT GIVEN IN THE TABLE BELOW (OR PER APPROVED MANUFACTURER SPECIFICATIONS). THE MINIMUM AMOUNT OF CALCIUM HYPOCHLORITE ADDED SHOULD BE SUFFICIENT TO ACHIEVE A 50 MG/L CONCENTRATION WITHIN THE IMPACTED AREA.

65% Calcium Hypochlorite Addition per Pipe Section

Pipe Diameter (Inches)	Pipe Volume per 18 feet (gal)	5-gram tablets per pipe section	Hypochlorite Granules		Maximum Fill Rate (gpm)
			Ounces per 500 feet	Teaspoons per 18 feet	
4	35	1	1.7	0.2	40
6	53	1	3.8	0.4	90
8	70	2	6.7	0.7	150
12	106	4	15.1	1.4	350
16	141	6	27	2.5	600

    b. NEW WATER MAINS SHALL BE FILLED USING AN APPROVED BACKFLOW PREVENTION ASSEMBLY. THE WATER MAIN SHALL BE FILLED FROM THE LOWER ELEVATION END SO THAT AS THE WATER MAIN IS FILLED, THE CHORINE IS CONTACTED, DISSOLVED AND SPREAD RELATIVELY UNIFORM THROUGH THE LENGTH OF THE NEW WATER MAIN. THE FILL RATE SHALL BE MINIMIZED SO THAT THE VELOCITY OF THE WATER IS LESS THAN 1 FT/SEC (SEE TABLE ABOVE). SUCCESSFUL PRESSURE TEST AND BACTERIOLOGICAL TESTS SHALL BE COMPLETED AND PROVIDED TO THE CITY PRIOR TO ANY NEW MATER MAIN CONNECTION TO THE EXISTING WATER SYSTEM.
    c. THE CHLORINATED WATER WILL BE ALLOWED TO REMAIN IN CONTACT WITH THE NEW WATER MAIN SYSTEM FOR 24 TO 72 HOURS. AFTER 24 HOURS, WATER MAY BE ADDED TO THE WATER MAIN FOR THE PURPOSES OF PRESSURE TESTING. THE WATER IN THE MAIN USED FOR PRESSURE TESTING MUST REMAIN IN THE WATER MAIN UNTIL PRESSURE TEST IS COMPLETED. IF NECESSARY, LIQUID CHLORINE SHALL BE INJECTED INTO THE WATER MAIN WITH FILL WATER TO MAINTAIN CONCENTRATION IN THE WATER MAIN ABOVE 50 MG/L. UNDER NO CIRCUMSTANCE SHALL "SUPER" CHLORINATED WATER BE ALLOWED TO SIT WITHIN A NEW WATER MAIN FOR MORE THAN 5 DAYS.
    d. PRESSURE TESTING INCLUDES TESTING AGAINST NEW VALVES AND HYDRANTS. EACH VALVE SHALL BE TESTED BY CLOSING EACH IN TURN AND REDUCING THE PRESSURE BEYOND THE VALVE. THE PRESSURE ON THE BACK SIDE OF THE VALVE SHOULD NOT BE ELIMINATED. CARE MUST BE TAKEN THAT, DURING THIS PROCESS, POSITIVE PRESSURE REMAINS THROUGHOUT THE SYSTEM BEING TESTED AT ALL TIMES. ALL HYDRANT AND VALVES SHALL BE OPEN DURING PRESSURE TESTING SO THAT THE PRESSURE TEST IS AGAINST THE HYDRANT VALVE. PRESSURE TESTING WILL NOT BE ALLOWED AGAINST ANY EXISTING VALVES.
    e. AFTER SUCCESSFUL PRESSURE TESTING, THE WATER MAIN SHALL BE THOROUGHLY FLUSHED TO REMOVE ALL "SUPER" CHLORINATED WATER FROM THE NEW WATER MAIN. FLUSHING OF NEW OR EXTENDED WATER MAINS SHALL BE CONDUCTED PER WSDOT SPECIFICATION 7-09.3(24)A WITH A MINIMUM VELOCITY DEVELOPED WITHIN THE PIPE WHILE FLUSHING OF 2.5 FEET PER SECOND (FPS). ALL FLUSHED WATER SHALL BE DECHLORINATED PRIOR TO DISPOSAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF ALL CHLORINATED WATER FLUSHED FROM MAINS. THE CITY SHALL APPROVE THE DISPOSAL METHOD PRIOR TO IMPLEMENTATION IN THE FIELD. THE CONTRACTOR SHALL UTILIZE ONSITE DISPOSAL METHODS, IF AVAILABLE. DISPOSAL OF FLUSH WATER TO THE SANITARY SEWER SYSTEM SHALL NOT BE ALLOWED WITHOUT WRITTEN PERMISSION FROM THE WATER POLLUTION CONTROL PLANT (WPCP) SUPERVISOR. ANY PLANNED DISCHARGE TO A STORMWATER SYSTEM SHALL BE DECHLORINATED TO A CONCENTRATION OF 0.1 PPM OR LESS, PH ADJUSTED (IF NECESSARY) TO BE BETWEEN 6.5 AND 8.5, AND VOLUMETRICALLY AND VELOCITY CONTROLLED TO PREVENT ANY RESUSPENSION OF SEDIMENTS. THE CITY WILL REQUIRE INDEPENDENT TESTING THROUGHOUT THE WATER DISCHARGE PROCESS TO ENSURE COMPLIANCE OF THESE STANDARDS ARE MET.
    f. SAMPLES FOR BACTERIOLOGICAL ANALYSIS SHALL BE COLLECTED AFTER FLUSHING AND AGAIN 24 HOURS AFTER THE FIRST SET OF SAMPLES.
    g. ALL CLOSURE/FINAL CONNECTION FITTINGS SHALL BE SPRAYED CLEAN AND THEN SWABBED WITH A FIVE PERCENT (5%) CHLORINE SOLUTION IMMEDIATELY PRIOR TO INSTALLATION PER AWWA STANDARD C651. ADDITIONAL SAMPLES FOR BACTERIOLOGICAL ANALYSIS SHALL BE COLLECTED FROM THE IMMEDIATE VICINITY OF THE NEW OR REPLACED WATER MAIN AND ANALYZED AFTER THE FINAL CONNECTIONS ARE MADE. IF NECESSARY, ADDITIONAL FLUSHING SHALL BE CONDUCTED AND ADDITIONAL SAMPLES SHALL BE COLLECTED UNTIL SATISFACTORY RESULTS ARE OBTAINED.

REVISION	DESCRIPTION	DATE	BY

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 53364 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: WEST ONSITE UTILITY PLAN

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: 3.17.2026
REVISED:

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

SHEET: C17 — 17 OF 28
REV.: 0

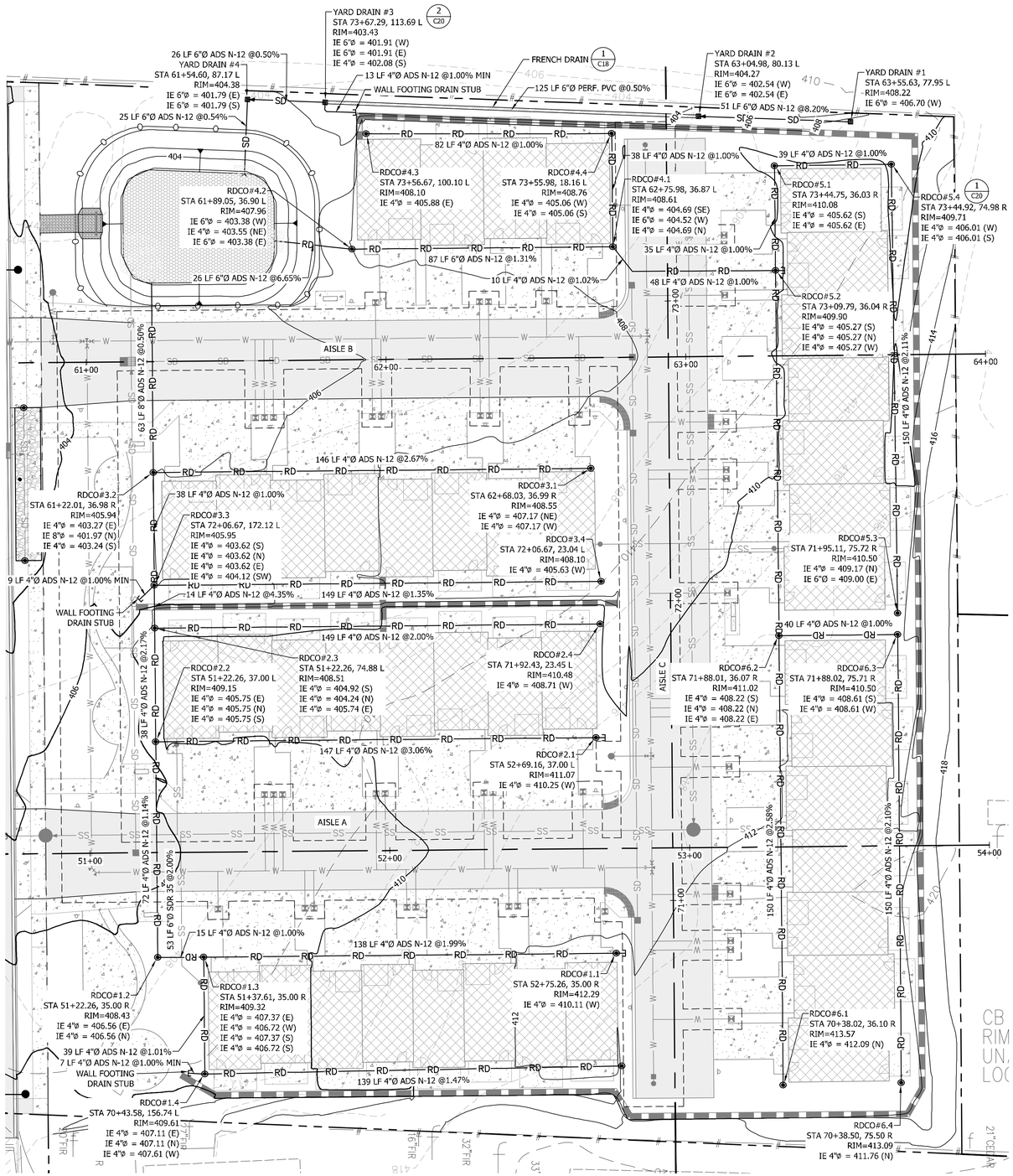
BRADBURY PLACE TOWNHOMES

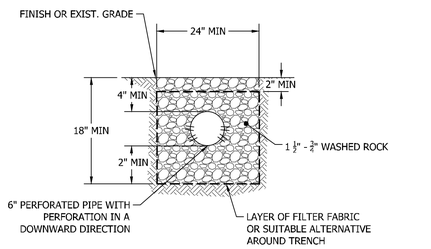
A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

GRAPHIC SCALE

0 20 40

1 INCH = 20 FEET (24"x36")





1 FRENCH DRAIN DETAIL (TYP.)
NOT TO SCALE

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
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FIELD CONDITIONS MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE DEVELOPMENT ENGINEERING MANAGER.

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 36951 — REGISTERED PROFESSIONAL ENGINEER

26th March 2026

SHEET TITLE: ROOF AND YARD DRAIN PLAN

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: 3.17.2026
REVISED:

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

SHEET	REV.
C18	0
18 OF 28	

BRADBURY PLACE TOWNHOMES

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 (24"x36")

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VERIFICATION NOTE

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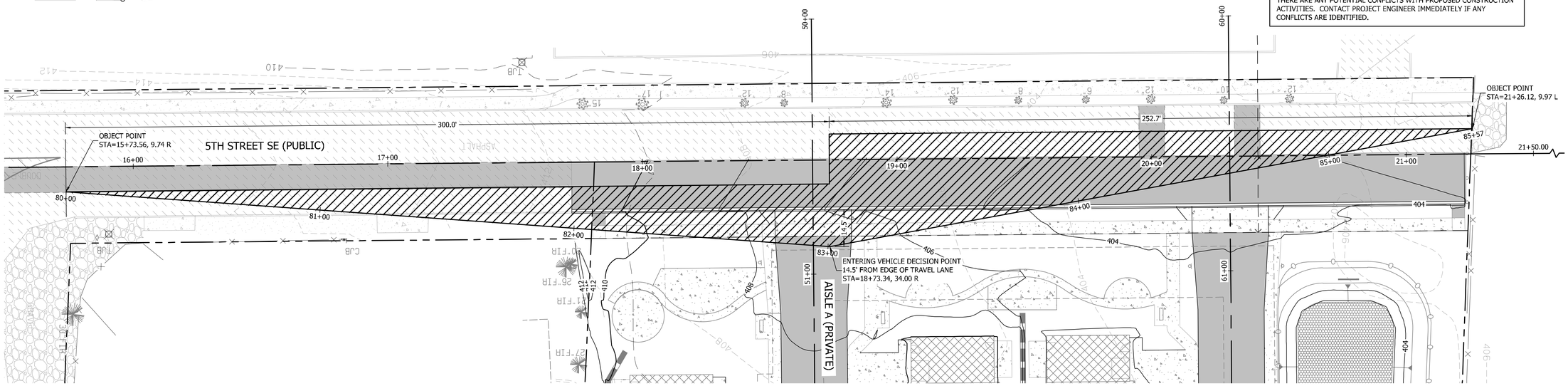

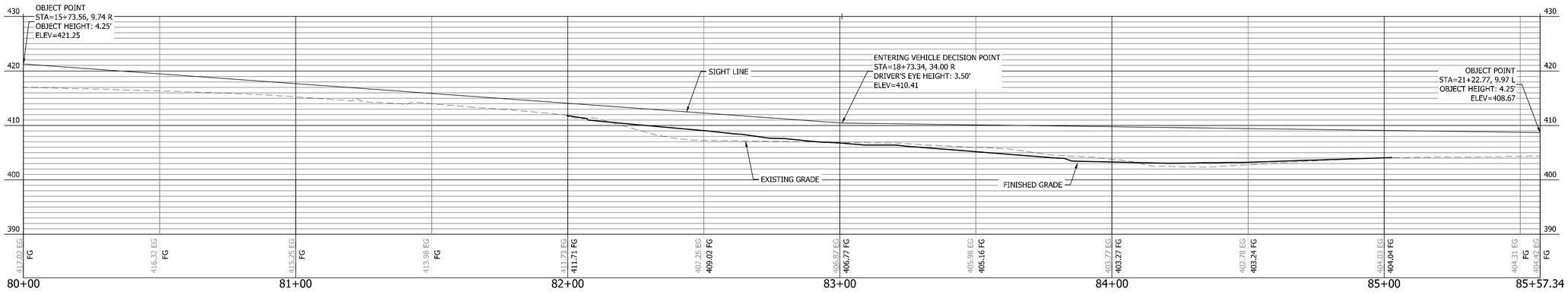

INTERSECTION SIGHT DISTANCE NOTE

THE SIGHT DISTANCE TRIANGLES FOR A VEHICLE TURNING ONTO 5TH ST SE FROM ROAD A AND ROAD B WERE CALCULATED AND DEPICTED BASED UPON THE REQUIREMENTS OF SECTION 9.5 OF AASHTO'S POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND ROADWAYS AS REQUIRED BY SECTION 100 AND TABLE 100-2 OF THE CITY OF PUYALLUP CITY STANDARDS.

S 5TH ST SE POSTED SPEED = 25 MPH
DRIVER'S EYE = 14.5' FROM THE EDGE OF THE MAJOR ROAD TRAVELED WAY

LEFT TURN ONTO S 5TH ST SE
TYPE: CASE B1 - LEFT TURN FROM ROAD A
ISD = 300 FEET FOR RESIDENTIAL PER CITY OF PUYALLUP DESIGN STANDARDS

RIGHT TURN ONTO S 5TH ST SE
TYPE: CASE B2 - RIGHT TURN FROM ROAD A
ISD = 300 FEET FOR RESIDENTIAL PER CITY OF PUYALLUP DESIGN STANDARDS
(252.7 FEET AVAILABLE)

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
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REVISION	DESCRIPTION	DATE	BY

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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

MICHAEL A. GOULARTE
STATE OF WASHINGTON
23364
REGISTERED
PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: ENTERING SIGHT DISTANCE - AISLE A

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: 3.17.2026
REVISED:

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

SHEET	REV.
C19	0
19 OF 28	

BRADBURY PLACE TOWNHOMES

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 (24"x36")

CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG

VERIFICATION NOTE

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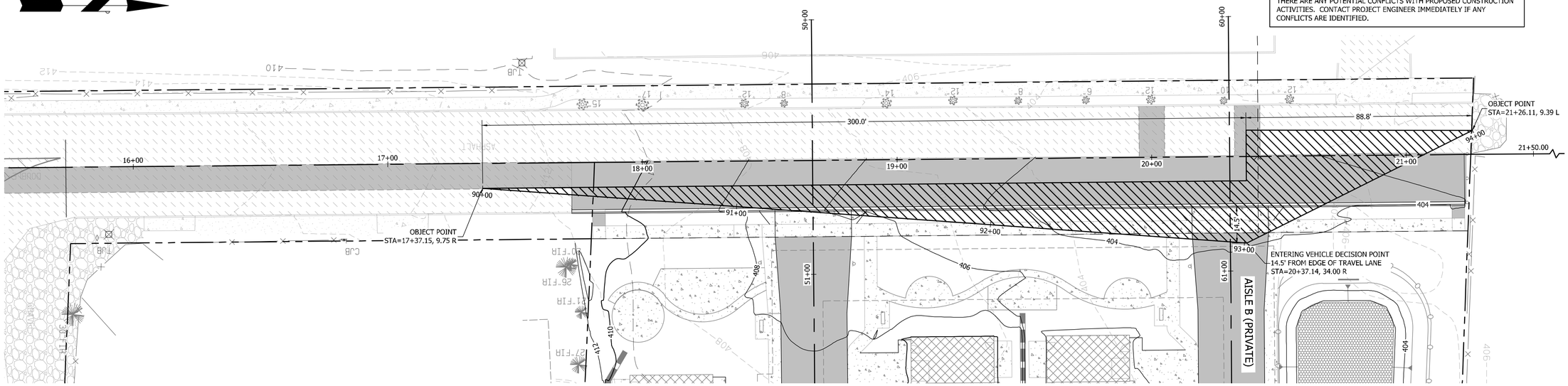

INTERSECTION SIGHT DISTANCE NOTE

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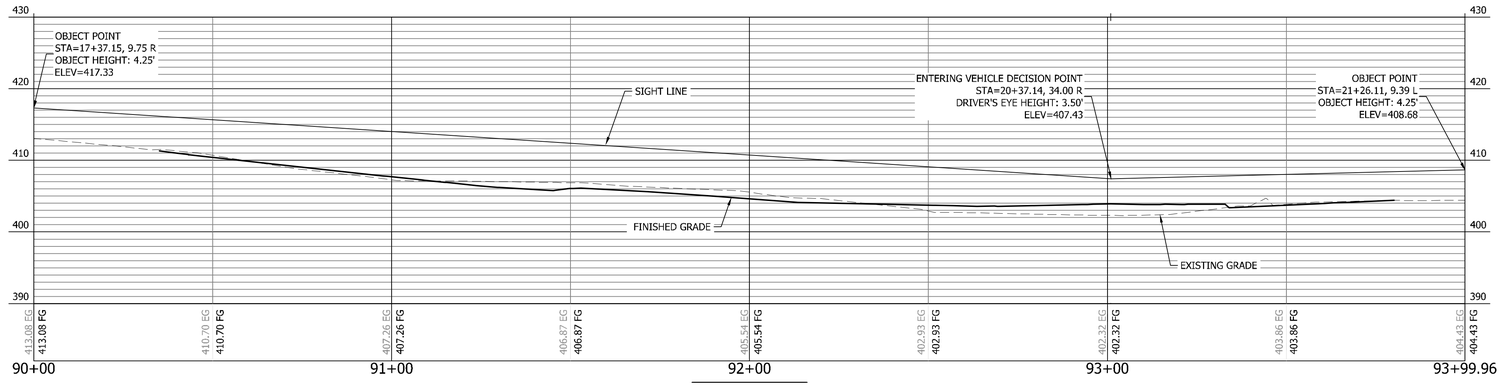
DRIVER'S EYE = 14.5' FROM THE EDGE OF THE MAJOR ROAD TRAVELED WAY

LEFT TURN ONTO S 5TH ST SE
TYPE: CASE B1 - LEFT TURN FROM ROAD B
ISD = 300 FEET FOR RESIDENTIAL PER CITY OF PUYALLUP DESIGN STANDARDS

RIGHT TURN ONTO S 5TH ST SE
TYPE: CASE B2 - RIGHT TURN FROM ROAD B
ISD = 300 FEET FOR RESIDENTIAL PER CITY OF PUYALLUP DESIGN STANDARDS
(88.8 FEET AVAILABLE)



APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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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

MICHAEL A. GOULARTE
STATE OF WASHINGTON
23364
REGISTERED
PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: ENTERING SIGHT DISTANCE - AISLE B

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: 3.17.2026
REVISED:

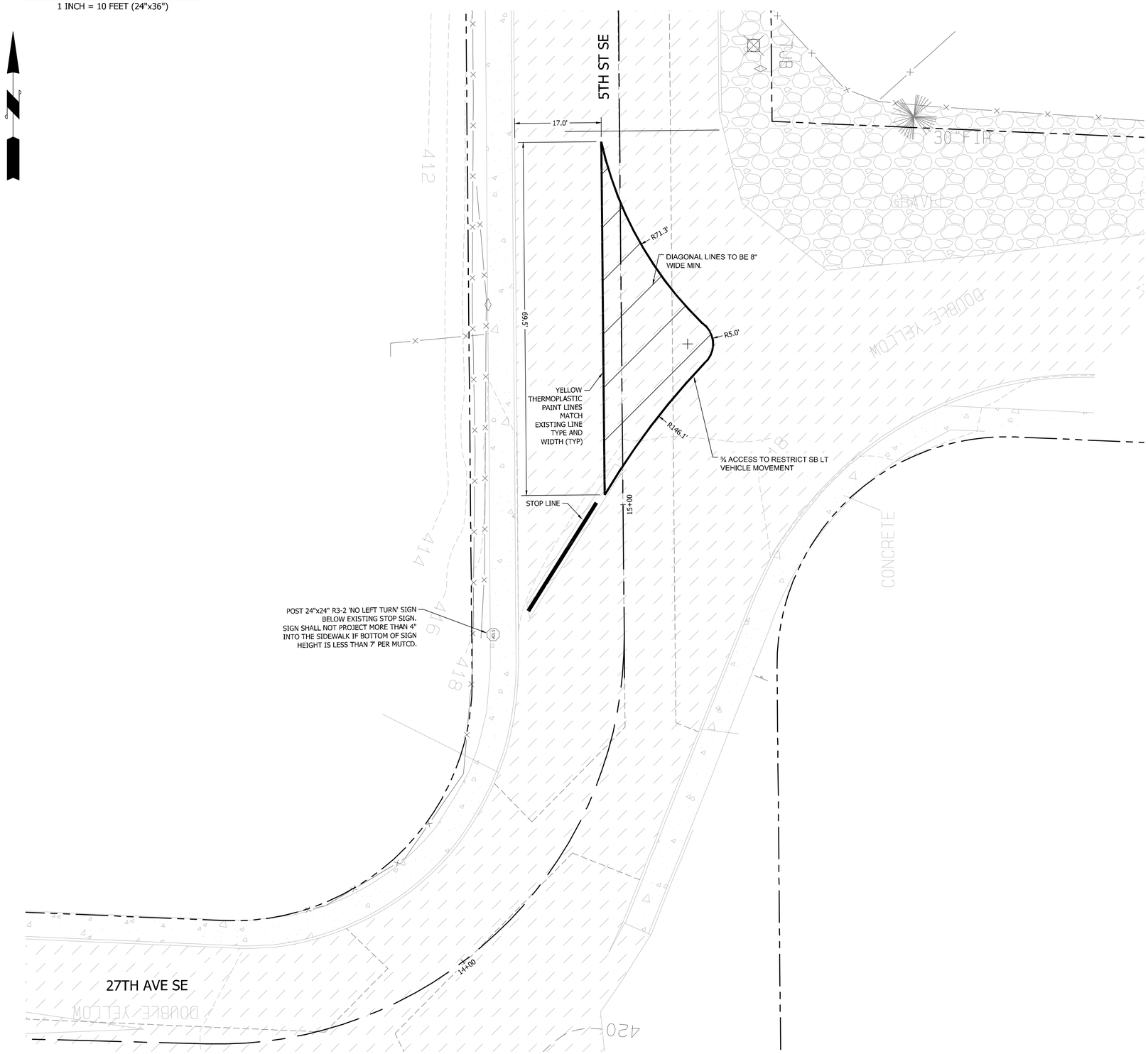
PROJECT: 20-223
DWG NAME: 20-223 C

SHEET	REV.
C20	0
20 OF 28	

BRADBURY PLACE TOWNHOMES

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 (24"x36")



APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG

VERIFICATION NOTE

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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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 21605417 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: SIGNAGE AND STRIPING - OFFSITE

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: 3.17.2026
REVISED:

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

SHEET	REV.
C21	0
21 OF 28	

BRADBURY PLACE TOWNHOMES

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

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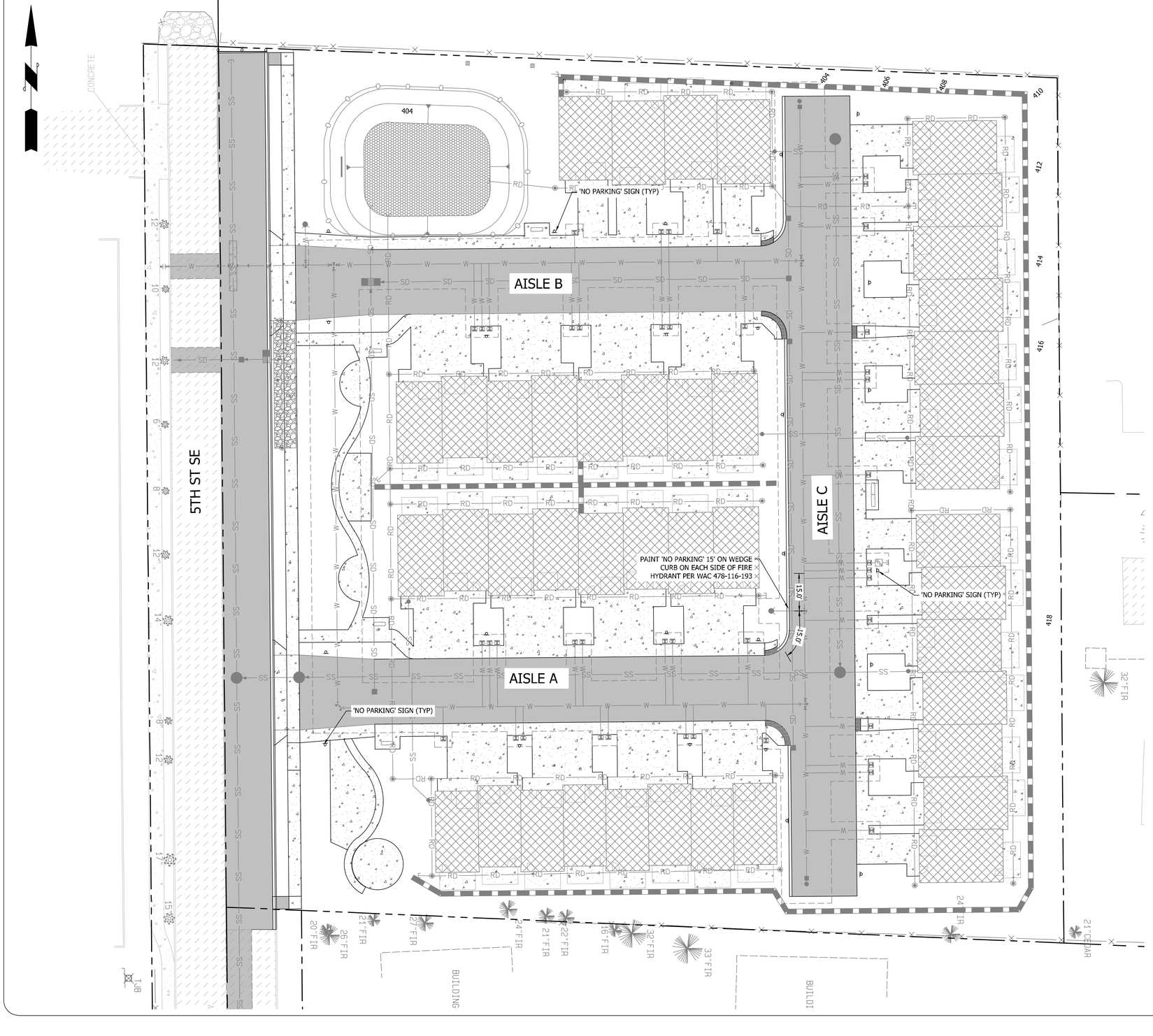

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 21057 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: SIGNAGE AND STRIPING - ONSITE

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: 3.17.2026
REVISED:

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

SHEET	REV.
C22	0
22 OF 28	

BRADBURY PLACE TOWNHOMES

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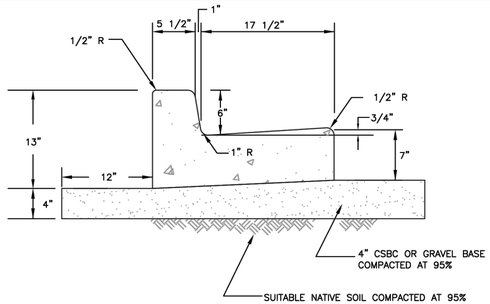

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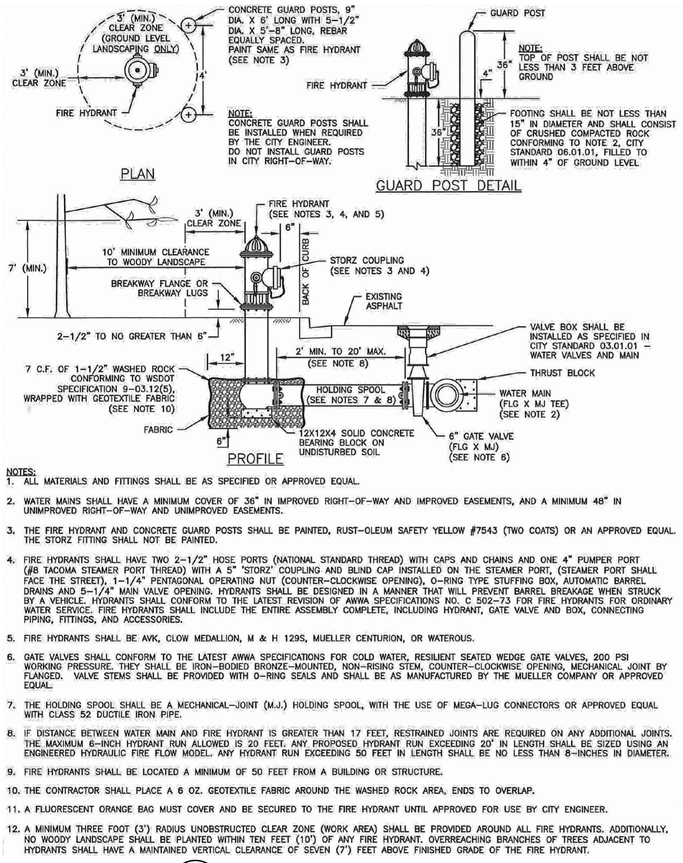
NOTES:

1. CONTRACTION JOINTS SHALL BE 3/8" x 2 1/4" ASPHALT SATURATED FELT PLACED IN ALL EXPOSED SURFACES OF CURB AND GUTTER AND SPACED AT 15' MAX. 10' MIN. O.C.
2. THRU JOINTS SHALL BE 3/8" ASPHALT SATURATED FELT PLACED AT POINTS OF TANGENCY ON CURVES, AT CATCH BASINS, AND AT EDGES OF ALLEY AND DRIVEWAYS. THE MAXIMUM DISTANCE BETWEEN THRU JOINTS SHALL BE 100'.
3. CONCRETE SHALL BE CLASS 3000 COMMERCIAL CONCRETE, 5.5 SACK MINIMUM, AASHTO GRADING 467 COARSE AGGREGATE, NO FLY ASH.
4. FORMS SHALL BE STEEL UNLESS PRIOR APPROVAL IS GIVEN BY THE CITY ENGINEER. FORMS SHALL BE SET TRUE TO LINE AND GRADE AND SECURELY STAKED PRIOR TO CONCRETE PLACEMENT. FULL DEPTH DIVISION PLATES ARE ONLY TO BE USED WHERE THRU JOINTS ARE TO BE PLACED.
5. THE 1" RADIUS ON THE UPPER FACE OF THE CURB MAY BE FORMED BY AN EDGER TOOL OR BUILT INTO THE FACE FORM. THE 1" RADIUS AT THE BOTTOM FACE OF THE CURB SHALL BE FORMED BY THE FACE FORM.

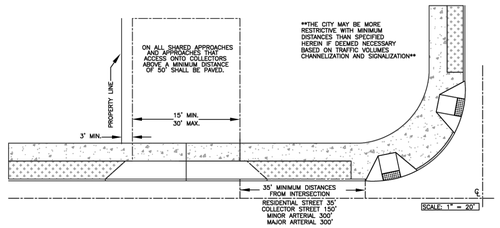
1 CURB AND GUTTER
NOT TO SCALE — COP STD. 01.02.09

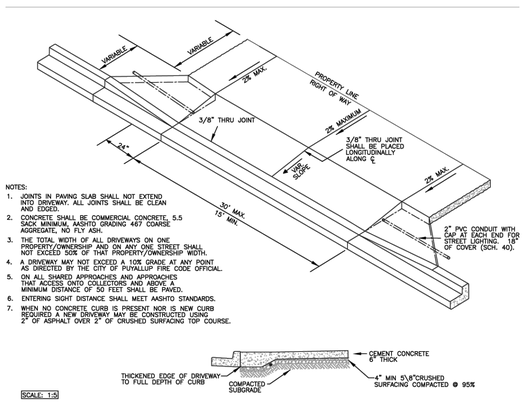


NOTES:

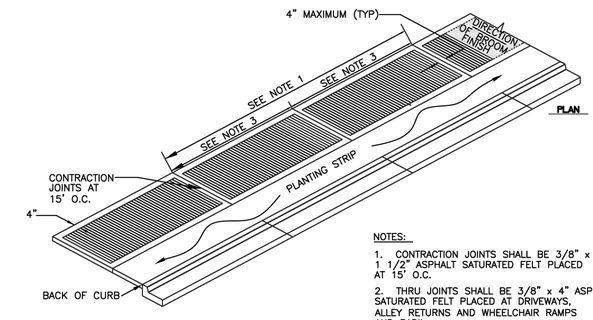
1. ALL MATERIALS AND FITTINGS SHALL BE AS SPECIFIED OR APPROVED EQUAL.
2. WATER MAINS SHALL HAVE A MINIMUM COVER OF 36" IN IMPROVED RIGHT-OF-WAY AND IMPROVED EASEMENTS, AND A MINIMUM 48" IN UNIMPROVED RIGHT-OF-WAY AND UNIMPROVED EASEMENTS.
3. THE FIRE HYDRANT AND CONCRETE GUARD POSTS SHALL BE PAINTED, RUST-OLEUM SAFETY YELLOW #7543 (TWO COATS) OR AN APPROVED EQUAL. THE STORZ FITTING SHALL NOT BE PAINTED.
4. FIRE HYDRANTS SHALL HAVE TWO 2-1/2" HOSE PORTS (NATIONAL STANDARD THREAD) WITH CAPS AND CHAINS AND ONE 4" PUMPER PORT (#8 TACOMA STEAMER PORT THREAD) WITH A 5" 'STORZ' COUPLING AND BLIND CAP INSTALLED ON THE STEAMER PORT, (STEAMER PORT SHALL FACE THE STREET), 1-1/4" PENTAGONAL OPERATING NUT (COUNTER-CLOCKWISE OPENING), O-RING TYPE STUFFING BOX, AUTOMATIC BARREL DRAINS AND 6-1/4" MAIN VALVE OPENING. HYDRANTS SHALL BE DESIGNED IN A MANNER THAT WILL PREVENT BARREL BREAKAGE WHEN STRUCK BY A VEHICLE. HYDRANTS SHALL CONFORM TO THE LATEST REVISION OF AWWA SPECIFICATIONS NO. C 502-73 FOR FIRE HYDRANTS FOR ORDINARY WATER SERVICE. FIRE HYDRANTS SHALL INCLUDE THE ENTIRE ASSEMBLY COMPLETE, INCLUDING HYDRANT, GATE VALVE AND BOX, CONNECTING PIPING, FITTINGS, AND ACCESSORIES.
5. FIRE HYDRANTS SHALL BE AVK, CLOW MEDALLION, M & H 129S, MUELLER CENTURION, OR WATEROUS.
6. GATE VALVES SHALL CONFORM TO THE LATEST AWWA SPECIFICATIONS FOR COLD WATER, RESILIENT SEATED WEDGE GATE VALVES, 200 PSI WORKING PRESSURE. THEY SHALL BE IRON-BODIED BRONZE-MOUNTED, NON-RISING STEM, COUNTER-CLOCKWISE OPENING, MECHANICAL JOINT BY FLANGED. VALVE STEMS SHALL BE PROVIDED WITH O-RING SEALS AND SHALL BE AS MANUFACTURED BY THE MUELLER COMPANY OR APPROVED EQUAL.
7. THE HOLDING SPOOL SHALL BE A MECHANICAL-JOINT (M.J.) HOLDING SPOOL, WITH THE USE OF MEGA-LUG CONNECTORS OR APPROVED EQUAL WITH CLASS 52 DUCTILE IRON PIPE.
8. IF DISTANCE BETWEEN WATER MAIN AND FIRE HYDRANT IS GREATER THAN 17 FEET, RESTRAINED JOINTS ARE REQUIRED ON ANY ADDITIONAL JOINTS. THE MAXIMUM 6-INCH HYDRANT RUN ALLOWED IS 20 FEET. ANY PROPOSED HYDRANT RUN EXCEEDING 20' IN LENGTH SHALL BE SIZED USING AN ENGINEERED HYDRAULIC FIRE FLOW MODEL. ANY HYDRANT RUN EXCEEDING 50 FEET IN LENGTH SHALL BE NO LESS THAN 8-INCHES IN DIAMETER.
9. FIRE HYDRANTS SHALL BE LOCATED A MINIMUM OF 50 FEET FROM A BUILDING OR STRUCTURE.
10. THE CONTRACTOR SHALL PLACE A 6 OZ. GEOTEXTILE FABRIC AROUND THE WASHED ROCK AREA, ENDS TO OVERLAP.
11. A FLUORESCENT ORANGE BAG MUST COVER AND BE SECURED TO THE FIRE HYDRANT UNTIL APPROVED FOR USE BY CITY ENGINEER.
12. A MINIMUM THREE FOOT (3') RADIUS UNOBSTRUCTED CLEAR ZONE (WORK AREA) SHALL BE PROVIDED AROUND ALL FIRE HYDRANTS. ADDITIONALLY, NO WOODY LANDSCAPE SHALL BE PLANTED WITHIN TEN FEET (10') OF ANY FIRE HYDRANT. OVERREACHING BRANCHES OF TREES ADJACENT TO HYDRANTS SHALL HAVE A MAINTAINED VERTICAL CLEARANCE OF SEVEN (7') FEET ABOVE FINISHED GRADE OF THE FIRE HYDRANT.

4 FIRE HYDRANT ASSEMBLY
NOT TO SCALE — COP STD. 03.05.01





2 STANDARD DRIVEWAY
NOT TO SCALE — COP STD. 01.02.12

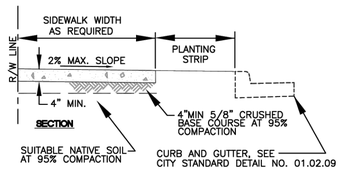


NOTES:

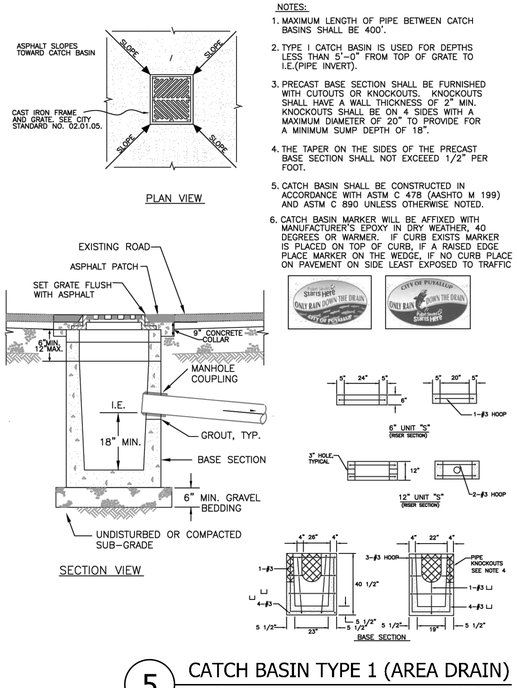
1. CONTRACTION JOINTS SHALL BE 3/8" x 1 1/2" ASPHALT SATURATED FELT PLACED AT 15' O.C.
2. THRU JOINTS SHALL BE 3/8" x 4" ASPHALT SATURATED FELT PLACED AT DRIVEWAYS, ALLEY RETURNS AND WHEELCHAIR RAMPS AND RADII.
3. V-GROOVEMARKS SHALL BE 1/8" DEEP AND 1/4" WIDE PLACED AT 5' O.C. FOR 5' SIDEWALKS AND 7.5'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

MINIMUM SIDEWALK WIDTHS

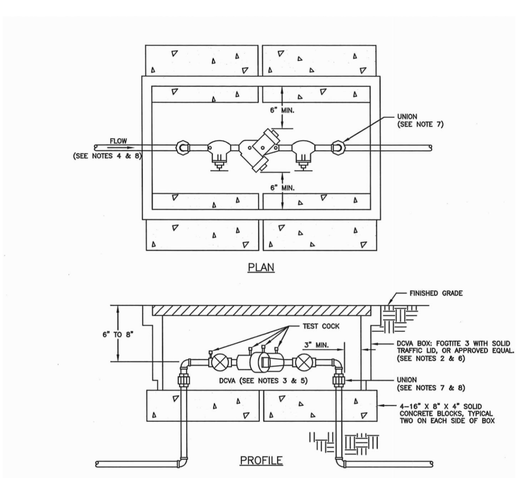
5'(RS ZONES) SINGLE FAMILY RESIDENTIAL AREAS (DETACHED DWELLINGS)
8'(RS ZONES) COMMERCIAL USES, WHEN REQUIRED BY DEVELOPMENT SERVICES MANAGER
8'(RM ZONES) MEDIUM AND HIGH DENSITY MULTI-FAMILY RESIDENTIAL AREAS
8'(ML ZONES) INDUSTRIAL AREAS
8'(CG, CBD ZONES) COMMERCIAL AREAS
8'(PF ZONES) PUBLIC FACILITIES AREAS
8'(F ZONES) FAIR AREAS
* MATCH GREATEST WIDTH FOR ANY ADJACENT ZONE



3 SIDEWALK WITH PLANTING STRIP
NOT TO SCALE — COP STD. 01.02.02



5 CATCH BASIN TYPE 1 (AREA DRAIN)
NOT TO SCALE — COP STD. 02.01.02



NOTES:

1. BACKFLOW ASSEMBLY MUST BE SELECTED FROM WASHINGTON STATE DEPARTMENT OF HEALTH'S LIST OF BACKFLOW PREVENTION ASSEMBLIES APPROVED FOR INSTALLATION IN WASHINGTON STATE, LATEST EDITION.
2. THE DCVA SHALL BE INSTALLED WITH ADEQUATE SPACE TO FACILITATE MAINTENANCE AND TESTING. IT SHALL BE TESTED AFTER INSTALLATION, BY A WASHINGTON STATE CERTIFIED BACK-FLOW ASSEMBLY TESTER, TO INSURE ITS SATISFACTORY OPERATION BEFORE OCCUPANCY, AND ANNUALLY THEREAFTER. SEND TEST RESULTS TO: CITY OF PUYALLUP, WATER QUALITY OPERATIONS, 1100 39TH AVE SE, PUYALLUP, WA 98374.
3. DCVA MUST BE PURCHASED AS A UNIT. NO MODIFICATIONS TO THE ASSEMBLY ARE ALLOWED.
4. DCVA SHALL BE PLACED IMMEDIATELY DOWNSTREAM OF WATER METER. WHEN IRRIGATION OR A NON FLOW-THROUGH FIRE SPRINKLER SYSTEM IS CONNECTED OFF THE DOMESTIC WATER LINE, DCVA SHALL BE PLACED IMMEDIATELY DOWNSTREAM OF THE BRANCH CONNECTION.
5. DCVA SHALL BE SIZED EQUAL OR COMPARABLE TO METER SIZE.
6. METER BOX SHALL BE LARGE ENOUGH TO ALLOW THE MINIMUM SETBACKS ILLUSTRATED ABOVE. METER BOX LID SHALL BE A TRAFFIC LID WITH A H-20 LOADING.
7. DIELECTRIC UNIONS MUST BE USED TO SEPARATE DISSIMILAR MATERIALS.
8. USE ONLY BRASS OR COPPER BETWEEN THE METER AND THE UNION ON THE CUSTOMER'S SIDE OF THE DCVA.

6 2" AND SMALLER DCVA INSTALLATION
NOT TO SCALE — COP STD. 03.04.01

REVISION	DESCRIPTION	DATE	BY

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 13367 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: NOTES AND DETAILS

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: 3.17.2026
REVISED:

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

SHEET	REV.
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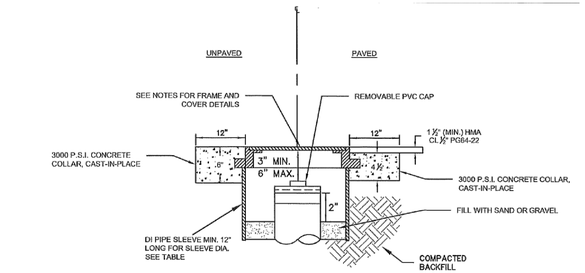
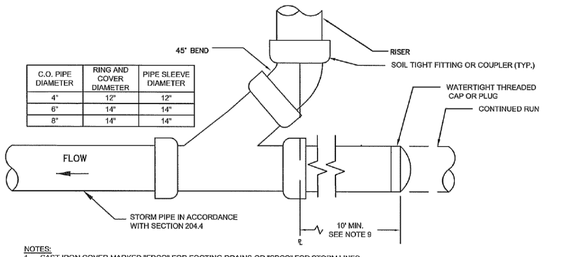
23 OF 28	

BRADBURY PLACE TOWNHOMES

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

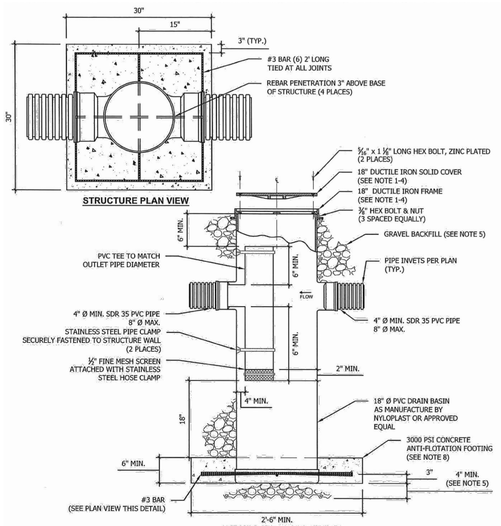




C.O. PIPE DIAMETER	RING AND COVER DIAMETER	PIPE SLEEVE DIAMETER
4"	12"	12"
6"	14"	14"
8"	14"	14"

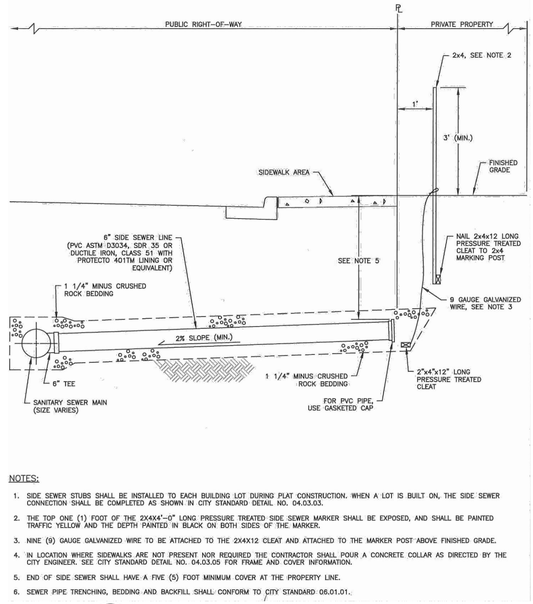
NOTES:
1. CAST IRON COVER MARKED "FDCO" FOR FOOTING DRAINS OR "SDCO" FOR STORM LINES.
2. CAST IRON FRAME AND COVER SHALL BE DRILLED AND TAPPED WITH ⅝"-11 NC STAINLESS STEEL TYPE 304 ALLEN HEAD BOLTS, 2" LONG.
3. BOLT-LOCKING CAST IRON FRAME AND COVER SHALL BE HS-20 RATED IF USED IN RIGHT-OF-WAY OR EASEMENTS.
4. 14" BOLT-LOCKING CAST IRON FRAME AND COVER SHALL BE EQUAL TO OLYMPIC FOUNDRY PART # M1060.
5. CAST IRON FRAME AND COVER SHALL BE FLUSH WITH FINISHED GRADE.
6. CLEANOUTS REQUIRED FOR EACH PIPE LENGTH GREATER THAN 100' AND FOR EACH 90 DEGREE BEND.
7. STORM PIPE BEDDING AND BACKFILL SHALL CONFORM TO STD DETAIL 06.01.01.
8. FINAL JOINTS SHALL BE SAW CUT, FACE OF CUT TACKED AND ALL JOINTS SEALED WITH SEALANT (AR4000W).
9. STORM DRAIN STUB SHALL EXTEND 10' BEYOND THE PROPERTY LINE OR EASEMENT LINE TO PREVENT DAMAGE AND MINIMIZE CONFLICT WITH FUTURE UTILITIES.
10. EACH CLEANOUT ASSEMBLY SHALL CONSIST OF: ONE CLEANOUT ADAPTOR, (HUB x FEMALE INSIDE PIPE THREAD, PVC SLIP IN), AND ONE CLEANOUT PLUG (MALE OUTSIDE THREAD WITH RAISED NUT, PVC).
11. FOR LANDSCAPED AREAS (OUTSIDE OF CITY ROW, EASEMENTS AND FACILITIES) A GREEN "CARSON" MODEL 910 YARD BOX MAY BE USED FOR C.O. PIPE DIA. LESS THAN OR EQUAL TO 6". YARD BOX SHALL BE FASTENED WITH ⅜" HEX BOLTS, THE COVER MARKED "STORM" AND FLUSH WITH FINISHED GRADE.

1 STORM DRAIN CLEANOUT
NOT TO SCALE — COP STD. 02.01.09



NOTES:
1. TRAFFIC APPLICATIONS SHALL BE HS-20 RATED, NOT FOR USE IN PUBLIC RIGHT-OF-WAY, PUBLIC EASEMENTS, OR TRACTS.
2. 18" SOLID LOCKING DUCTILE IRON FRAME AND COVER BY NYLOPLAST - TYPE C OR APPROVED EQUAL.
3. DUCTILE IRON FRAME AND COVER SHALL BE DRILLED AND TAPPED WITH ⅝"- 8 ZINC-PLATED HEX BOLT 1 ½" LONG.
4. DUCTILE IRON FRAME AND COVER SHALL BE FLUSH WITH FINISHED GRADE.
5. STORM PIPE AND STRUCTURE BEDDING AND BACKFILL SHALL CONFORM TO STD DETAIL 06.01.01.
6. ALL BOLT HOLES DRILLED IN THE STRUCTURE SHALL BE WATERTIGHT WITH RUBBER SEALING WASHERS OR APPROVED EQUAL.
7. ALL PIPE JOINTS SHALL BE WATERTIGHT.
8. A CONCRETE FOOTING SHALL BE PROVIDED AT THE BASE OF THE STRUCTURE WHEN THE BOTTOM ELEVATION OF THE STRUCTURE IS WITHIN 6" OF HIGH GROUNDWATER.
9. THE MAXIMUM DEPTH FROM FINISHED GRADE TO THE PIPE INVERT IS 5'-0".

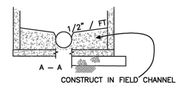
2 YARD DRAIN
NOT TO SCALE — COP STD. 02.05.02

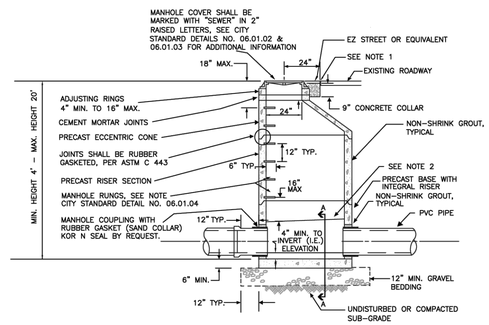


NOTES:
1. SIDE SEWER STUBS SHALL BE INSTALLED TO EACH BUILDING LOT DURING PLAT CONSTRUCTION. WHEN A LOT IS BUILT ON, THE SIDE SEWER CONNECTION SHALL BE COMPLETED AS SHOWN IN CITY STANDARD DETAIL NO. 04.03.03.
2. THE TOP ONE (1) FOOT OF THE 2X4X4'-0" LONG PRESSURE TREATED SIDE SEWER MARKER SHALL BE EXPOSED, AND SHALL BE PAINTED TRAFFIC YELLOW AND THE DEPTH PAINTED IN BLACK ON BOTH SIDES OF THE MARKER.
3. NINE (9) GAUGE GALVANIZED WIRE TO BE ATTACHED TO THE 2X4X12 CLEAT AND ATTACHED TO THE MARKER POST ABOVE FINISHED GRADE.
4. IN LOCATION WHERE SIDEWALKS ARE NOT PRESENT NOR REQUIRED THE CONTRACTOR SHALL POUR A CONCRETE COLLAR AS DIRECTED BY THE CITY ENGINEER. SEE CITY STANDARD DETAIL NO. 04.03.05 FOR FRAME AND COVER INFORMATION.
5. END OF SIDE SEWER SHALL HAVE A FIVE (5) FOOT MINIMUM COVER AT THE PROPERTY LINE.
6. SEWER PIPE TRENCHING, BEDDING AND BACKFILL SHALL CONFORM TO CITY STANDARD 06.01.01.

3 SIDE SEWER STUB - NO EASEMENT
NOT TO SCALE — COP STD. 04.03.02

NOTES:
1. NEAT LINE CUTS SHALL BE SEALED AT TOP WITH A HOT PAVING GRADE AND FACE OF CUT TACKED.
2. TOP OF SHELF, SLOPE 1/2" PER FOOT, CONSTRUCT IN FIELD CHANNEL AND SHELF TO THE CROWN OF PIPE.

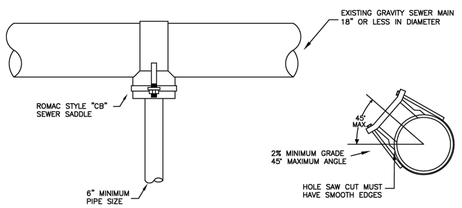




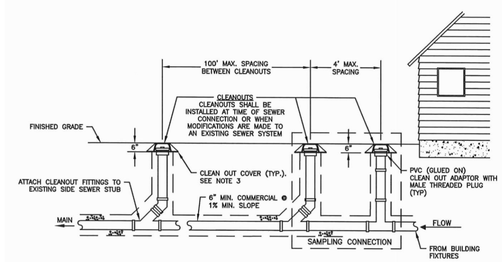
4 SANITARY SEWER MANHOLE
NOT TO SCALE — COP STD. 04.01.01

NOTES FOR CONNECTING TAPS ON EXISTING SEWER MAINS

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



5 SANITARY MAIN TAP
NOT TO SCALE — COP STD. 04.02.01

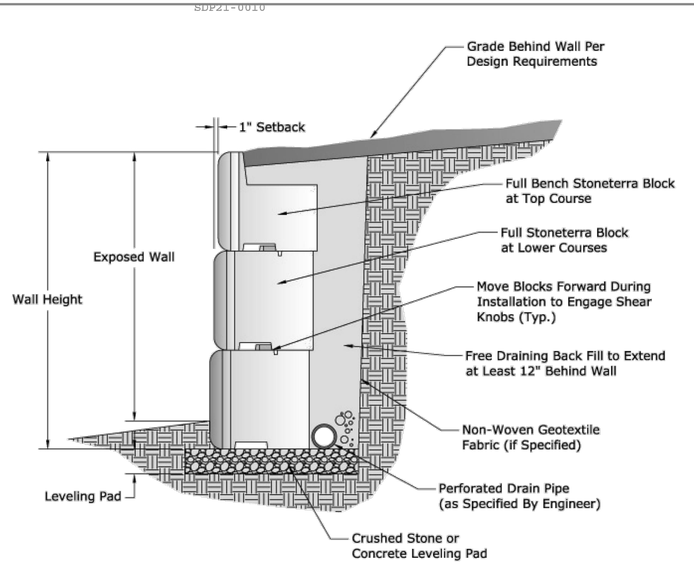


NOTES:
1. SAMPLING CONNECTION SHALL BE INSTALLED OUTSIDE WITH UNOBSTRUCTED ACCESS AT ALL TIMES.
2. SAMPLING CONNECTION SHALL BE INSTALLED FOR EACH COMMERCIAL / RETAIL UNIT OR SPACE.
3. CLEAN OUT AND SAMPLING CONNECTION COVERS:
   A) FOR NON-VEHICULAR TRAFFIC INSTALLATIONS USE "CARSON" MODEL 910 GREEN YARD BOX WITH BOLT DOWN LID MARKED SEWER OR APPROVED EQUAL.
   B) FOR ASPHALT, GRAVEL, OR TRAFFIC INSTALLATIONS, SEE CITY STANDARD DETAIL NO. 04.03.05 FOR FRAME AND COVER SECTION.
4. EACH CLEANOUT ASSEMBLY SHALL CONSIST OF: ONE CLEANOUT ADAPTER, HUB x FEMALE, FIPT, PVC SI AND ONE CLEANOUT PLUG, MOPT WITH RAISED NUT, PVC SDR35.

6 RESIDENTIAL SIDE SEWER CONNECTION
NOT TO SCALE — COP STD. 04.03.04

RECEIVED
10/24/2021
DEVELOPMENT SERVICES
CITY OF UNIVERSITY PLACE
REVISION

SDP21-0010



APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
THE CITY WILL NOT BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS.
FIELD CONDITIONS MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE DEVELOPMENT ENGINEERING MANAGER.

NOTE: WALL DETAIL IS PRELIMINARY AND REQUIRES SEPARATE PERMIT BY OTHERS

** PRELIMINARY -BLOCK LAYOUTS TO BE APPROVED BY ENGINEER**

STONETERRA™ WALL SYSTEM
815 N.E. 172nd Ave.
VANCOUVER, WA 98684
800-377-3877 PH
360-694-0281 FAX

TITLE: Stoneterra - Gravity Wall | DRAWN BY: MLN | DATE: 11/16/2011 | SCALE: NTS | SHEET #: ST-01

7 WALL DETAIL
NOT TO SCALE

NO.	DESCRIPTION	DATE	BY
	REVISION		

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 21053417 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: NOTES AND DETAILS

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: 3.17.2026
REVISED:

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

SHEET	REV.
C24	0
24 OF 28	

BRADBURY PLACE TOWNHOMES

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

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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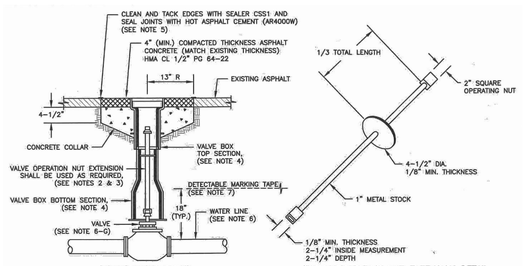
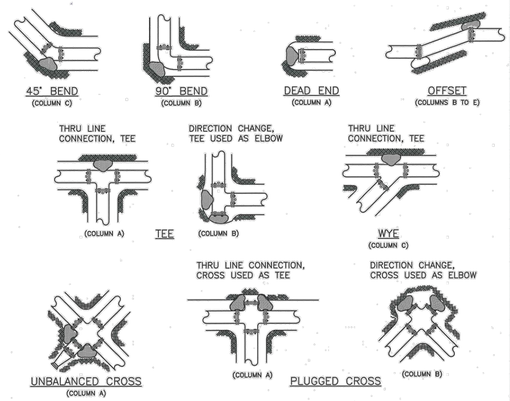


NOTES:

1. WATER MAINS SHALL HAVE A MINIMUM COVER OF 36" FROM PAVED FINAL GRADE IN IMPROVED RIGHT-OF-WAY AND IMPROVED EASEMENTS, AND A MINIMUM OF 48" IN UNIMPROVED RIGHT-OF-WAY AND UNIMPROVED EASEMENTS.
2. VALVE OPERATING NUT EXTENSIONS ARE REQUIRED WHEN THE VALVE NUT IS MORE THAN FIVE (5) FEET BELOW FINISHED GRADE. EXTENSIONS ARE TO BE A MINIMUM OF TWO (2) FEET LONG, ONLY ONE EXTENSION TO BE USED PER VALVE. TOP OF EXTENSION SHALL BE 2 FEET 6 INCHES TO 3 FEET BELOW FINISHED GRADE.
3. ALL VALVE OPERATING NUT EXTENSIONS ARE TO BE MADE OF STEEL, SIZED AS NOTED, AND PAINTED WITH TWO COATS OF METAL PAINT.
4. VALVE BOXES SHALL BE TWO-PIECE, ADJUSTABLE, CAST IRON WITH EXTENSION PIECES (IF NECESSARY), AS MANUFACTURED BY THE VANRICH #940 SEATTLE OR APPROVED EQUAL. THE WORD "WATER" SHALL BE CAST IN RELIEF ON THE VALVE BOX COVER. VALVE BOX TOPS INSTALLED IN ARTERIAL ROADWAYS SHALL BE MANUFACTURED BY EAST JORDAN (EJ) IRONWORKS MODEL 8555 WITH LOCKING VALVE BOX COVER MODEL 6800 (PART# 06800025U) OR APPROVED EQUAL.
5. NEAT LINE CUTS SHALL BE SEALED WITH A HOT PAVING GRADE ASPHALT AND FACE OF CUT TACKED.
6. WATER MAINS SHALL BE CONSTRUCTED AND TESTED IN ACCORDANCE WITH DIVISION 7 OF THE WSDOT STANDARD SPECIFICATIONS SUPPLEMENTED WITH THE FOLLOWING:
   A. DUCTILE IRON PIPE SHALL CONFORM TO AWWA C 151, THICKNESS CLASS 52, AND THE EXTERIOR SHALL BE COATED WITH COAL TAR VARNISH. PIPE AND FITTINGS SHALL BE MORTOR LINED AND SHALL CONFORM TO AWWA C 104. THE THICKNESS OF THE LINING SHALL BE NOT LESS THAN 1/16" THICK FOR 3" TO 12" PIPE, 3/32" THICK FOR 14" TO 24" PIPE, AND 1/8" THICK FOR 30" TO 54" PIPE. THE CEMENT LINING SHALL CONFORM TO THE REQUIREMENTS OF ASTM C 150.
   B. JOINTS SHALL BE TYTON PUSH-ON JOINTS, OR APPROVED EQUAL, OR MECHANICAL JOINT TYPE PER AWWA C 111 EXCEPT WHERE FLANGED JOINTS ARE REQUIRED TO CONNECT TO VALVES OR OTHER EQUIPMENT.
   C. BOLTS AND NUTS FOR BURIED FLANGES LOCATED OUTDOORS, ABOVE GROUND, OR IN OPEN VAULTS IN STRUCTURES SHALL BE TYPE 316 STAINLESS STEEL CONFORMING TO ASTM A 193, GRADE B8M FOR BOLTS, AND ASTM A 194, GRADE 8M FOR NUTS. BOLTS AND NUTS LARGER THAN ONE AND ONE-QUARTER (1-1/4) INCHES SHALL BE STEEL, ASTM A 307, GRADE B, WITH CADMIUM PLATING, ASTM A 165, TYPE NS.
   D. BOLTS USED IN FLANGE INSTALLATION SETS SHALL CONFORM TO ASTM B 193, GRADE B7. NUTS SHALL COMPLY WITH ASTM A 194, GRADE 2H.
   E. PROVIDE A WASHER FOR EACH NUT, WHERE NEEDED. WASHERS SHALL BE OF THE SAME MATERIAL AS THE NUTS.
   F. ALL FITTINGS SHALL CONFORM TO THE REQUIREMENTS OF AWWA C 110 AND AWWA C 111.
   G. RESILIENT SEATED WEDGE GATE VALVES SHALL BE USED FOR TEN (10) INCH MAINS AND SMALLER. BUTTERFLY VALVES SHALL BE USED FOR MAINS GREATER THAN TEN (10) INCHES.
      1) RESILIENT SEATED WEDGE GATE VALVE: GATE VALVES SHALL CONFORM TO THE LATEST AWWA SPECIFICATIONS FOR COLD WATER, DOUBLE-DISK GATE VALVES, 200 PSI WORKING PRESSURE. THEY SHALL BE IRON-BODIED, BRONZE MOUNTED, NON-RISING STEM, WITH TWO (2) INCH SQUARE NUT. COUNTER-CLOCKWISE OPENING, MECHANICAL JOINT AND / OR FLANGED ENDS (6" VALVES ON FIRE HYDRANT LINES WHICH SHALL BE MECHANICAL JOINTS BY FLANGED). VALVE STEMS SHALL BE PROVIDED WITH O-RING SEALS AND SHALL BE AS MANUFACTURED BY THE MUELLER COMPANY OR APPROVED EQUAL.
      2) BUTTERFLY VALVES: BUTTERFLY VALVES CONFORMING WITH AWWA C 504, CLASS 150 AND SHALL HAVE STANDARD AWWA TWO (2) INCH SQUARE NUT.
7. DETECTABLE MARKING TAPE SHALL BE INSTALLED 18" ABOVE PIPE, BE BLUE IN COLOR, AND READ "CAUTION WATER LINE BELOW" MEETING WSDOT SPEC. 9-15.18.

1 WATER VALVES AND MAINS
NOT TO SCALE — COP STD. 03.01.01

NOTE: DRAWINGS DEPICT BLOCK LOCATION, NOT SIZE.
FOR SIZE SEE NOTES 3, 4, 5, AND CITY STD. 03.02.01-3



NOTES:

1. THE FOLLOWING PRECAUTIONS MUST BE OBSERVED WHEN CONSTRUCTING THRUST BLOCKS:
   A. BLOCKS MUST BE POURED OR PLACED AGAINST UNDISTURBED SOIL.
   B. THE PIPE FITTING(S) AND BOLTS MUST BE ACCESSIBLE. WRAP IN PLASTIC BEFORE POURING CONCRETE BLOCKING.
   C. CONCRETE SHOULD BE CURED FOR AT LEAST 5 DAYS AND SHOULD HAVE A MINIMUM COMPRESSION STRENGTH OF 3,000 PSI AT 28 DAYS.
   D. RESTRAINED JOINTS SHALL BE INSTALLED, IN ADDITION TO CONCRETE THRUST BLOCKING.
   E. BLOCKS MUST BE POSITIONED TO COUNTERACT THE DIRECTION OF THE RESULTANT THRUST FORCE.
2. ALL PIPE SHALL BE PROPERLY BEDDED, SEE CITY OF PUYALLUP STANDARD BEDDING DETAIL NO. 06.01.01.
3. CONTRACTOR TO PROVIDE BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE.
4. DIVIDE THRUST BY SAFE BEARING LOAD TO DETERMINE REQUIRED AREA (IN SQUARE FEET) OF CONCRETE TO DISTRIBUTE LOAD.
5. BEARING SURFACE AREAS TO BE ADJUSTED BY THE ENGINEER FOR OTHER PRESSURE AND/OR SOIL CONDITIONS.

2 HORIZONTAL THRUST BLOCKING
NOT TO SCALE — COP STD. 03.02.01-1

TABLE 2: THRUST AT FITTINGS AT 200 PSI

SIZE	TEST PRESSURE (PSI)	THRUST FITTINGS AT 200 PSI A: TEE AND DEAD ENDS	B: 90° BEND	C: 45° BEND	D: 22.5° BEND	E: 11.25° BEND
4"	200	3,140	4,440	2,405	1,225	615
6"	200	7,070	9,995	5,410	2,760	1,385
8"	200	12,565	17,770	9,620	4,905	2,465
10"	200	19,635	27,770	15,030	7,660	3,850
12"	200	28,275	39,985	21,640	11,030	5,545
14"	200	38,485	54,425	29,455	15,015	7,545
16"	200	50,265	71,085	38,470	19,615	9,855

TABLE 3: BEARING VALUE OF SOIL

SOIL TYPE	SAFE BEARING LOAD LBS/SF
MUCK, PEAT, ETC.	0
SOFT CLAY/ALLUVIAL SOIL	1,000
SAND	2,000
SAND AND GRAVEL	3,000
SAND AND GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000

SEE CITY STANDARDS 03.02.01-1 AND 03.02.01-2 FOR ADDITIONAL INFORMATION.

NOTES:

① TO DETERMINE THRUST AT PRESSURES OTHER THAN PSI SHOWN, MULTIPLY THE THRUST OBTAINED IN TABLE 2 BY THE RATIO OF THE PRESSURE TO 200 PSI.
EXAMPLE:
THE THRUST ON A 12 INCH, 90° BEND AT 300 PSI.
$39{,}985 \times \frac{300\ PSI}{200\ PSI} = 59{,}978$ LBS

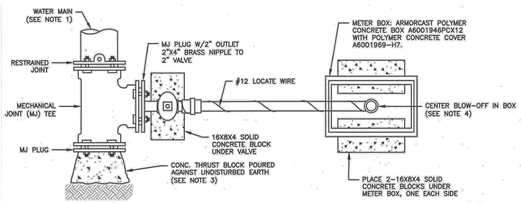
② TO DETERMINE THE BEARING AREA OF THE THRUST BLOCK IN SQUARE FEET (SF):
SEE TABLE 3, BEARING VALUE OF SOIL.
EXAMPLE:
FOR SAND AND GRAVEL BEARING VALUE FROM TABLE 3 IS 3,000 LBS/SF
59,978 LBS ÷ 3000 LB/SF = 20 SF OF AREA

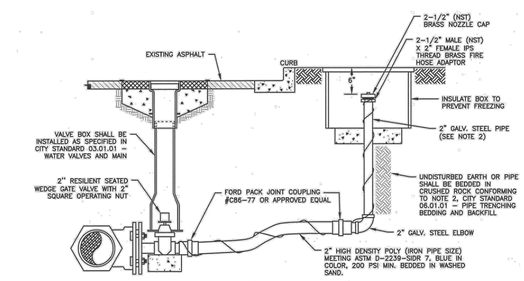
③ CONTRACTOR TO PROVIDE BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE

④ AREAS SHALL BE ADJUSTED FOR OTHER PRESSURE CONDITIONS.

⑤ NO WATER MAIN SHALL DEAD END AGAINST A MAIN LINE VALVE. DEAD END WATER MAINS SHALL BE BLOCKED AGAINST A RESTRAINED MECHANICAL JOINT (M.J.) PLUG OR CAP.

3 THRUST BLOCKING TABLE
NOT TO SCALE — COP STD. 03.02.01-3

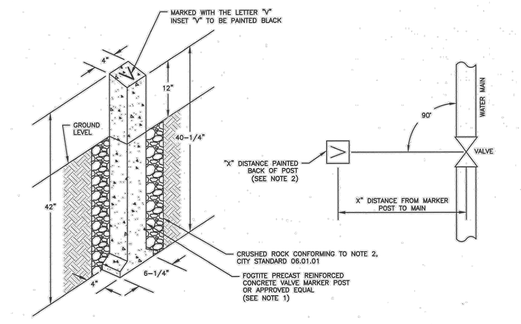




NOTES:

1. WATER MAINS SHALL HAVE A MINIMUM COVER OF 36" IN IMPROVED RIGHT-OF-WAY AND IMPROVED EASEMENTS, AND A MINIMUM OF 48" IN UNIMPROVED RIGHT-OF-WAY AND UNIMPROVED EASEMENTS.
2. OVERALL LENGTH OF RISER IS 6" SHORTER THAN NORMAL DEPTH OF BURY.
3. THE PIPE JOINT AND BOLTS MUST BE ACCESSIBLE. WRAP IN PLASTIC BEFORE POURING CONCRETE BLOCKING.
4. PLACE BLOW-OFF ASSEMBLY IN CENTER OF UTILITY STRIP. IF NO UTILITY STRIP, PLACE BLOW-OFF ASSEMBLY 2' OFF EDGE OF ROAD. THE BLOW-OFF BOX SHALL NOT BE LOCATED IN HARD SURFACES.

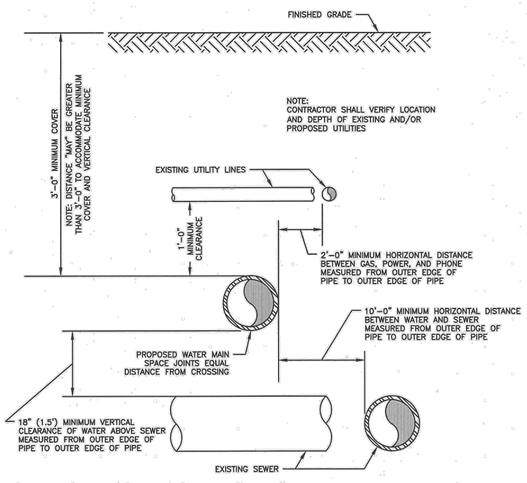
4 2" BLOW-OFF ASSEMBLY
NOT TO SCALE — COP STD. 03.06.01



NOTES:

1. PAINT MARKER POST WITH RUST-OLEUM SAFETY YELLOW #7543 OR APPROVED EQUAL.
2. THE DISTANCE FROM THE MARKER POST TO THE WATER MAIN SHALL BE PAINTED ON THE BACKSIDE OF THE MARKER POST, IN BLACK WITH A 2" HIGH NUMBER.
3. VALVE MARKER POST SHALL BE REQUIRED WHEN EVER THE WATER VALVE IS LOCATED IN AN UNPAVED AREA.
4. THE POST WILL ALSO BE REQUIRED FOR BLOW-OFF ASSEMBLIES IN THE SAME CONDITION AS WATER VALVES.
5. LOCATION OF VALVE MARKER POSTS SHALL BE OFFSET AT RIGHT ANGLES TO EACH LINE VALVE.

5 VALVE MARKER POST
NOT TO SCALE — COP STD. 03.01.02



SEE CITY STANDARD 03.01.03-2 FOR ADDITIONAL NOTES FOR THIS DETAIL

6 WATER CROSSING OTHER UTILITIES
NOT TO SCALE — COP STD. 03.01.03-1

NOTES FOR WATER MAIN CROSSING OTHER UTILITIES
CITY STANDARD 03.01.03-1

WHEN LOCAL CONDITIONS PREVENT THE SEPARATIONS DESCRIBED ON CITY STANDARD 03.01.03-1, A SEWER MAY BE LAID CLOSER THAN 10-FEET HORIZONTALLY OR 18-INCHES VERTICALLY TO A WATER LINE, PROVIDED THE GUIDELINES BELOW ARE FOLLOWED:

UNUSUAL CONDITIONS (PARALLEL SYSTEMS)

1. SEWER LINE IS LAID IN A SEPARATE TRENCH FROM THE WATER LINE.
2. WHEN 18-INCHES VERTICAL SEPARATION CANNOT BE OBTAINED, THE SEWER SHALL BE CONSTRUCTED OF MATERIALS AND JOINTS THAT ARE EQUIVALENT TO WATER MAIN STANDARDS OF CONSTRUCTION AND SHALL BE PRESSURE TESTED TO ENSURE WATER TIGHTNESS PRIOR TO BACKFILLING.
3. THE WATER LINE SHALL BE PLACED ON A BENCH OF UNDISTURBED EARTH WITH THE BOTTOM OF THE WATER PIPE AT LEAST 18-INCHES ABOVE THE CROWN OF THE SEWER, AND SHALL HAVE AT LEAST 5-FEET OF HORIZONTAL SEPARATION AT ALL TIMES. THE CITY RESERVES THE RIGHT TO REQUIRE SUPPLEMENTAL MITIGATION EFFORTS, SUCH AS IMPERMEABLE BARRIERS OR OTHER MEANS, FOR ADDITIONAL PROTECTION.
4. THE SEWER SHALL NOT BE INSTALLED IN THE SAME DITCH AS A POTABLE WATER LINE WITHOUT PRIOR WRITTEN APPROVAL BY THE CITY OF PUYALLUP.

UNUSUAL CONDITIONS (PERPENDICULAR SYSTEMS)

CONDITION A – GRAVITY SEWERS PASSING UNDER WATER LINES (ALL OF THE FOLLOWING APPLY)

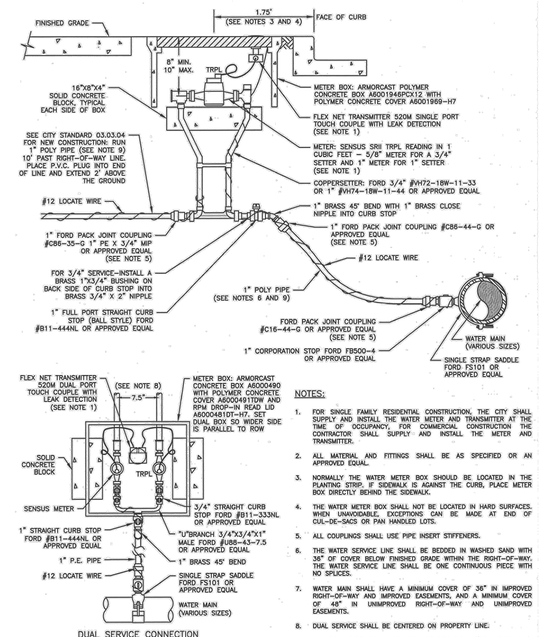
1. ONE FULL SEGMENT (NOT LESS THAN 18-FEET LONG) OF DUCTILE IRON CLASS 52 WATER PIPE, AND THE LONGEST STANDARD SEWER PIPE LENGTH AVAILABLE FROM THE MANUFACTURER SHALL BE USED WITH THE PIPES CENTERED TO MAXIMIZE JOINT SEPARATION.
2. STANDARD GRAVITY-SEWER MATERIAL ENCASED IN CONCRETE OR IN A ONE-QUARTER-INCH THICK CONTINUOUS STEEL, DUCTILE IRON, OR PRESSURE RATED PVC PIPE WITH A DIMENSION RATIO (THE RATIO OF THE OUTSIDE DIAMETER TO THE PIPE WALL THICKNESS) OF 18 OR LESS, WITH ALL VOIDS PRESSURE-GROUTED WITH SAND-CEMENT GROUT OR BENTONITE.
   EXAMPLE OF DIMENSION RATIO (DR): OUTSIDE PIPE DIAMETER DIVIDED BY THE WALL THICKNESS OR OD/T.
   FOR 8-INCH SCH. 80 PVC PIPE (T=0.5 INCHES), THE DR IS 8.625/0.5=17.25

CONDITION B – GRAVITY SEWER PASSING OVER WATER LINES

WATER LINES SHALL BE PROTECTED BY PROVIDING:

1. A VERTICAL SEPARATION OF AT LEAST 18-INCHES BETWEEN THE INVERT OF THE SEWER AND THE CROWN OF THE WATER LINE.
2. ADEQUATE STRUCTURAL SUPPORT FOR THE SEWER LINE TO PREVENT EXCESSIVE DEFLECTION OF JOINTS AND SETTLING ON AND BREAKING OF THE WATER LINE.
3. THE SEWER PIPE SHALL BE THE LONGEST STANDARD SEWER PIPE LENGTH AVAILABLE FROM THE MANUFACTURER WITH THE WATER AND SEWER PIPES CENTERED TO MAXIMIZE JOINT SEPARATION.
4. THE SEWER LINE CASING EQUIVALENT TO THAT SPECIFIED IN A(2) ABOVE.

7 WATER CROSSING OTHER UTILITIES NOTES
NOT TO SCALE — COP STD. 03.01.03-2



NOTES:

1. FOR SINGLE FAMILY RESIDENTIAL CONSTRUCTION, THE CITY SHALL SUPPLY AND INSTALL THE METER AND TRANSMITTER AT THE TIME OF OCCUPANCY. FOR COMMERCIAL CONSTRUCTION THE CONTRACTOR SHALL SUPPLY AND INSTALL THE METER AND TRANSMITTER.
2. ALL MATERIAL AND FITTINGS SHALL BE AS SPECIFIED OR AN APPROVED EQUAL.
3. NORMALLY THE WATER METER BOX SHOULD BE LOCATED IN THE PLANTING STRIP. IF SIDEWALK IS AGAINST THE CURB, PLACE METER BOX DIRECTLY BEHIND THE SIDEWALK.
4. THE WATER METER BOX SHALL NOT BE LOCATED IN HARD SURFACES. WHEN UNAVOIDABLE, EXCEPTIONS CAN BE MADE AT END OF CUL-DE-SACS OR PAN HANDLED LOTS.
5. ALL COUPLINGS SHALL USE PIPE INSERT STIFFENERS.
6. THE WATER SERVICE LINE SHALL BE BEDDED IN WASHED SAND WITH 36" OF COVER BELOW FINISHED GRADE WITHIN THE RIGHT-OF-WAY. THE WATER SERVICE LINE SHALL BE ONE CONTINUOUS PIECE WITH NO SPLICES.
7. WATER MAIN SHALL HAVE A MINIMUM COVER OF 36" IN IMPROVED RIGHT-OF-WAY AND IMPROVED EASEMENTS, AND A MINIMUM COVER OF 48" IN UNIMPROVED RIGHT-OF-WAY AND UNIMPROVED EASEMENTS.
8. DUAL SERVICE SHALL BE CENTERED ON PROPERTY LINE.
9. ALL POLY PIPE SHALL BE HIGH DENSITY POLY (IRON PIPE SIZE) MEETING ASTM D-2239-SIDR 7, BLUE IN COLOR, 200 PSI MINIMUM.

8 3/4" WATER SERVICE CONNECTION
NOT TO SCALE — COP STD. 03.03.01-1

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 53504 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: NOTES AND DETAILS

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: 3.17.2026
REVISED:

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

SHEET	REV.
C25	0
25 OF 28	

BRADBURY PLACE TOWNHOMES

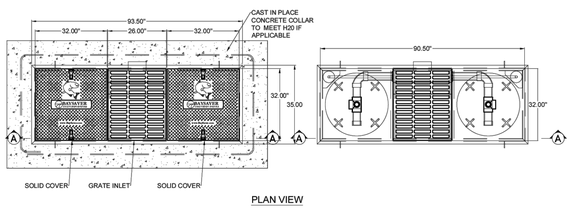
A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON

APPROVED

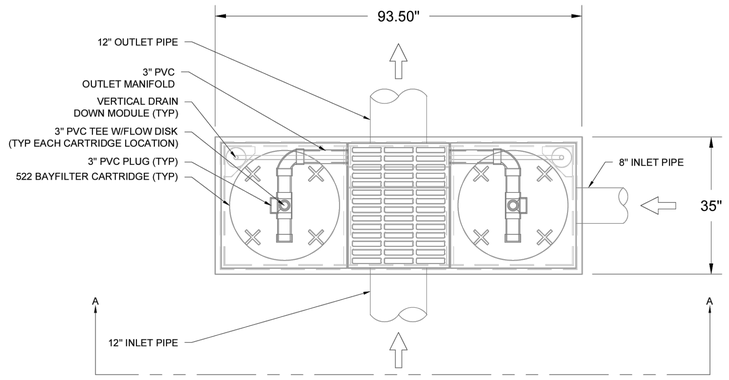
BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
THE CITY WILL NOT BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS.
FIELD CONDITIONS MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE DEVELOPMENT ENGINEERING MANAGER.



PLAN VIEW



PLAN VIEW
SCALE: 1/2" = 1'

BRADBURY PLACE TOWNHOMES			
PUYALLUP, WA		DRAWN:	TSG
DATE:	02-05-25	CHECKED:	CJF
PROJECT #:	S452666		

DATE	DESCRIPTION	DRWN	CHKD

THIS DRAWING IS NOT INTENDED FOR USE IN BIDDING OR CONSTRUCTION WITHOUT THE ENGR'S PRIOR APPROVAL. EOR SHALL REVIEW THIS DRAWING PRIOR TO BIDDING AND/OR CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE EOR TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS/CONTECH UNDER THE DIRECTION OF THE PROJECT'S ENGINEER OF RECORD ('EOR') OR OTHER PROJECT REPRESENTATIVE. THIS DRAWING IS NOT INTENDED FOR USE IN BIDDING OR CONSTRUCTION WITHOUT THE EOR'S

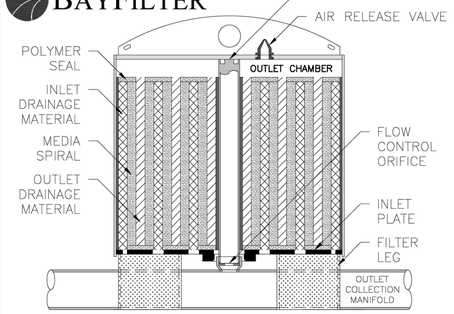
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026

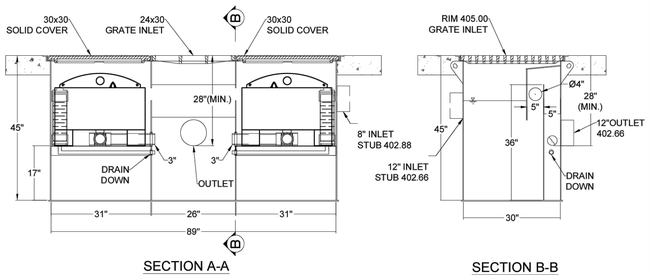
AS NOTED

SHEET 2 OF 2

STREAMFILTER™ CBF-5	SDCB#25
PROJECT	BRADBURY TOWNHOMES
LOCATION	PUYALLUP, WA
WATER QUALITY FLOW	0.074 CFS
DRAINAGE AREA	
CARTRIDGE DESIGN FLOW RATE	22.5 GPM
# BAYFILTER CARTRIDGES	2
TREATED SEDIMENT CAPACITY	350 LBS

THE BAYFILTER STORMWATER MANAGEMENT SYSTEM IS A STORMWATER FILTRATION DEVICE DESIGNED TO REMOVE FINE SEDIMENTS, HEAVY METALS, AND PHOSPORUS. THE BAYFILTER SYSTEM RELIES ON A SPIRAL WOUND MEDIA FILTER CARTRIDGE WITH APPROXIMATELY 45 SQUARE FEET OF FILTRATION AREA. THE FILTER CARTRIDGES REMOVE POLLUTANTS FROM RUNOFF BY FILTRATION (INTERCEPTION/ATTACHMENT) AND ADSORPTION.

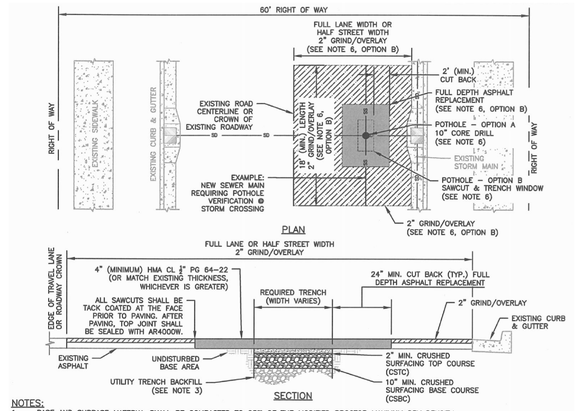




SECTION A-A

SECTION B-B

NOT TO SCALE



NOTES:

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

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

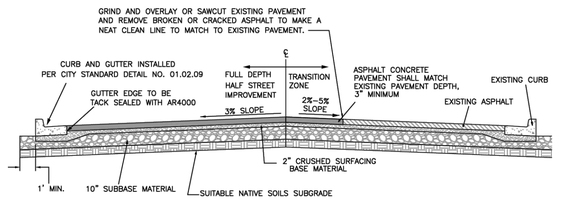
   OPTION A – UP TO A 10" DIAMETER CORE DRILL IS ALLOWED. CORE HOLES MADE DURING UTILITY POTHOLES SHALL BE BACKFILLED WITH CDF TO WITHIN 4" OF FINISHED GRADE. 4" OF HMA SHALL THEN BE PLACED AND COMPACTED, FLUSH WITH EXISTING GRADE.

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

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

2 STREET PATCH

NOT TO SCALE — COP STD DETAIL 01.01.20



NOTES:

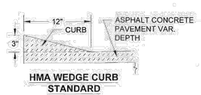
1. ALL DEPTHS ARE MINIMUM COMPACTED DEPTHS.
2. SUBGRADE PREPARATION SHALL MEET THE REQUIREMENTS OF WSDOT STANDARD SPEC. 2–06.3(1). IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MEET THE COMPACTION REQUIREMENTS AND CONTROL ALL WORK. THE CITY OF PUYALLUP RESERVES THE RIGHT TO REQUIRE TESTS AT THE CONTRACTOR'S EXPENSE.
3. SUBBASE MATERIAL SHALL BE GRAVEL BORROW MEETING THE REQUIREMENTS OF WSDOT STANDARD SPEC. 9–03.14(1) OR CRUSHED BALLAST MEETING THE REQUIREMENTS OF WSDOT STANDARD SPEC. 9–03.9(1). CRUSHED SURFACING SHALL MEET THE GRADATION REQUIREMENTS OF WSDOT STANDARD SPEC. 9–03.9(3). THE SUBBASE AND BASE MATERIAL SHALL BE INSTALLED IN ACCORDANCE WITH WSDOT STANDARD SPEC. 4–04.
4. SOIL STABILIZATION FABRIC MAY BE REQUIRED BY THE DEVELOPMENT REVIEW ENGINEER TO BE INSTALLED PRIOR TO THE INSTALLATION OF THE BASE MATERIAL WHEN REQUIRED, THE CONTRACTOR SHALL PLACE A GEOTEXTILE FABRIC OVER THE PREPARED SUBGRADE WITH A TWO FOOT MINIMUM OVERLAP. THE FABRIC SHALL BE INSTALLED PER MANUFACTURER SPECIFICATIONS.
5. ASPHALT CONCRETE PAVEMENT SHALL BE INSTALLED IN ACCORDANCE WITH WSDOT STANDARD SPEC 5–04. DESIGN ENGINEER SHALL SUBMIT A STATE APPROVED HMA MIX FOR APPROVAL.
6. TEMPERATURE SHALL NOT EXCEED 325°F AT DISCHARGE OF THE PLANT NOR BE LESS THAN 185°F LEAVING THE SPREADER BOX.
7. THE MAXIMUM COMPACTED THICKNESS OF ANY SINGLE LIFT SHALL MEET WSDOT STANDARD SPEC. 5–04.3(9) TO A MINIMUM AVERAGE COMPACTED DRY DENSITY OF 91 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY WSDOT TEST METHOD SPECIFIED IN STANDARD SPEC. 5–04.3(10)B. PERIODIC COMPLIANCE TESTS SHALL BE MADE BY A CERTIFIED TESTING AGENCY AT THE EXPENSE OF THE CONTRACTOR.
8. THE FACE OF THE GUTTER LIP AND EDGES OF EXISTING ASPHALT MEET LINES SHALL BE TACK COATED PRIOR TO PAVEMENT PLACEMENT. WHEN SUCCESSIVE LIFTS OF ASPHALT ARE REQUIRED, A TACK COAT SHALL BE DISTRIBUTED UNIFORMLY OVER THE PREVIOUS LIFT AT A RATE OF 0.06–0.08 GALLONS PER SQUARE YARD AT A TEMPERATURE OF 100°F AND SHALL BE ALLOWED TO SET TO A TACKY STATE PRIOR TO THE PLACEMENT OF THE NEXT LIFT.
9. ALL MEET LINES BETWEEN LIFTS OF ASPHALT SHALL BE UNIFORM AND VERTICAL. THE MEET LINES SHALL BE CLEANED AND TACK COATED.
10. ANY CHANGES TO THE STANDARD PAVEMENT SECTION SHALL REQUIRE APPROVAL BY THE DEVELOPMENT REVIEW ENGINEER. A STRUCTURAL PAVEMENT CROSS SECTION DESIGN WITH CALCULATIONS SHALL BE REQUIRED.
11. ALL MANHOLE FRAMES, VALVE FRAMES AND MONUMENT COVERS SHALL BE INSTALLED AFTER PLACEMENT OF ASPHALT. IF MORE THAN ONE LIFT IS NECESSARY, FRAMES AND LIDS WILL BE ADJUSTED TO FINISH GRADE AT FIRST LIFT AS DIRECTED BY THE CITY.
12. ASPHALT SHALL BE HMA CL 1/2" PG 64–22

3 HALF STREET IMPROVEMENT

NOT TO SCALE — COP STD DETAIL 01.01.19

1 ONSITE STREAMFILTER CATCH BASIN

NOT TO SCALE



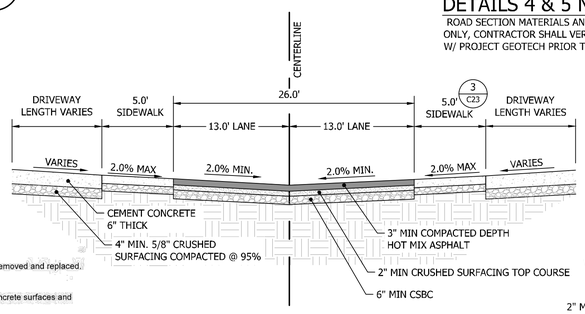
NOTES:
1. For trench crossings, curb and gutter shall be removed to a minimum 2' cut back over undisturbed soil.
2. In all projects, any remaining sections of curb and gutter less than 5' in length between the project area and the nearest control joint shall also be removed and replaced.
3. All joints shall be saw cut full depth prior to restoration and ½" expansion joint installed.
4. Concrete finish shall match existing.
5. Cutting wheel run-out beyond the limits of the opening shall be filled in accordance with WSDOT Standard Specification 5-05.3(8)B for cement concrete surfaces and 5-04.3(5)C for asphalt concrete surfaces.
6. Foundations shall be fully compacted prior to form placement.
7. Unsuitable foundation shall be replaced with ⅝" crushed surfacing top course.

3 ASPHALT WEDGE CURB

NOT TO SCALE — CITY OF TACOMA STD DWG SU-03A

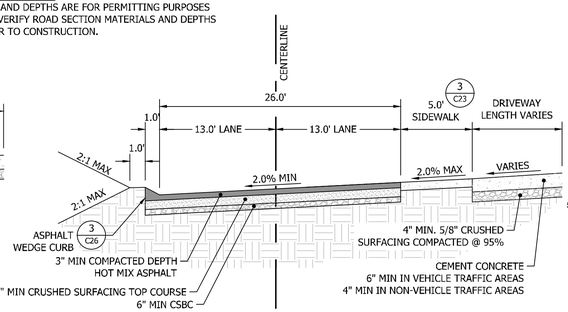
DETAILS 4 & 5 NOTE

ROAD SECTION MATERIALS AND DEPTHS ARE FOR PERMITTING PURPOSES ONLY, CONTRACTOR SHALL VERIFY ROAD SECTION MATERIALS AND DEPTHS W/ PROJECT GEOTECH PRIOR TO CONSTRUCTION.



4 AISLE A & B ROAD SECTION

NOT TO SCALE



5 AISLE C ROAD SECTION

NOT TO SCALE

REVISION	DESCRIPTION	DATE	BY

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 43051 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: NOTES AND DETAILS

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: 3.17.2026
REVISED:

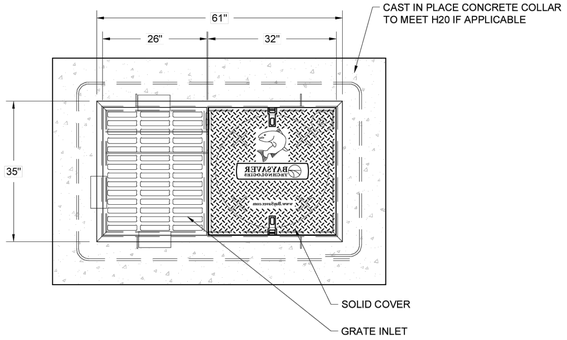
PROJECT: 20-223
DWG NAME: 20-223 C

SHEET C26
26 OF 28

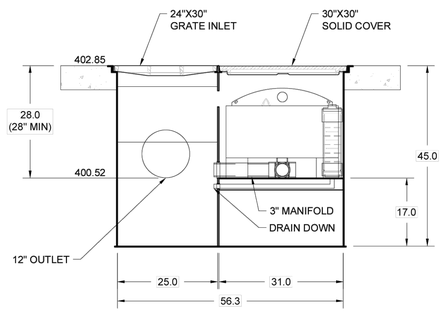
REV. 0

BRADBURY PLACE TOWNHOMES

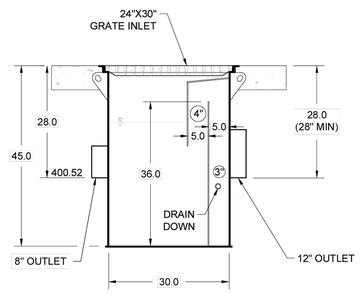
A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON



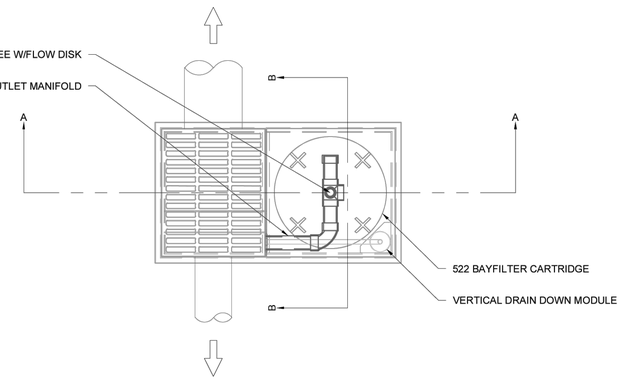
SURFACE DETAIL



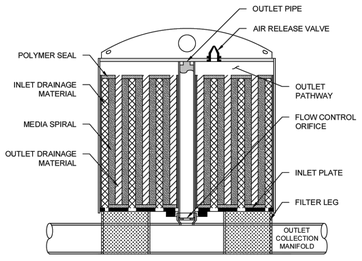
SECTION A-A
SCALE: 1/2" = 1'



SECTION B-B
SCALE: 1/2" = 1'



PLAN VIEW
SCALE: 1/2" = 1'



STREAMFILTER™ CBF-3	SDCB#40
WATER QUALITY FLOW	22.5
CARTRIDGE DESIGN FLOW RATE	22.5
# BAYFILTER CARTRIDGES	1
TREATED SEDIMENT CAPACITY	175

THE BAYFILTER STORMWATER MANAGEMENT SYSTEM IS A STORMWATER FILTRATION DEVICE DESIGNED TO REMOVE FINE SEDIMENTS, HEAVY METALS, AND PHOSPORUS. THE BAYFILTER SYSTEM RELIES ON A SPIRAL WOUND MEDIA FILTER CARTRIDGE WITH APPROXIMATELY 45 SQUARE FEET OF FILTRATION AREA. THE FILTER CARTRIDGES REMOVE POLLUTANTS FROM RUNOFF BY FILTRATION (INTERCEPTION/ATTACHMENT) AND ADSORPTION.

1 OFFSITE STREAMFILTER CATCH BASIN
NOT TO SCALE

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
THE CITY WILL NOT BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS.
FIELD CONDITIONS MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE DEVELOPMENT ENGINEERING MANAGER.

BRADBURY PLACE TOWNHOMES
PUYALLUP, WA
DATE: 02/05/25 DRAWN: TSG
PROJECT #: SI452666 CHECKED: CJF

DATE	DWN	CHK
2/16/2026	WCM	JPR
2/20/2026	PME	JPR

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Stormwater Media Filters

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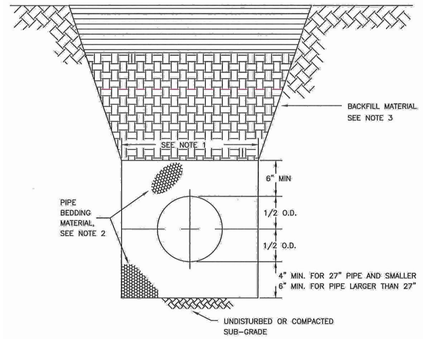
AS NOTED

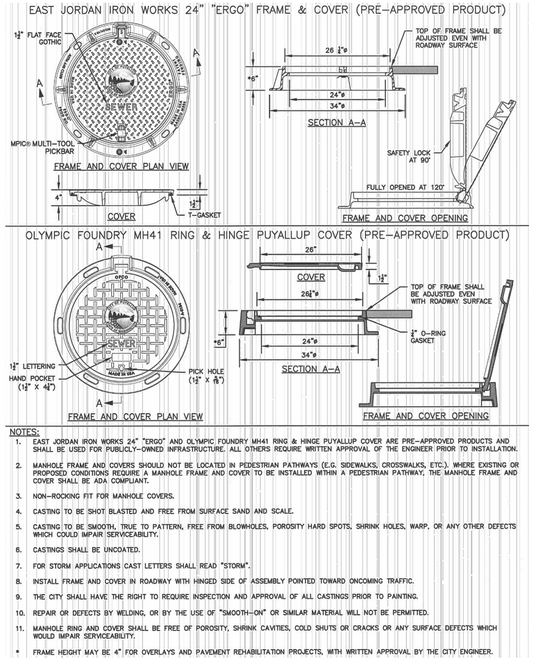
2 SHEET OF 3

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS/CONTECH UNDER THE DIRECTION OF THE PROJECT'S ENGINEER OF RECORD (EOR) FOR OTHER PROJECT REPRESENTATIVE. THIS DRAWING IS NOT INTENDED FOR USE IN BIDDING OR CONSTRUCTION WITHOUT THE EOR'S APPROVAL. EOR SHALL REVIEW THIS DRAWING PRIOR TO ORDERING AND/OR CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE EOR TO ENSURE THAT THE PRODUCT(S) SPECIFIED AND ALL ASSOCIATED SYSTEMS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.



1. TRENCHING SHALL MEET THE REQUIREMENTS OF SECTION 7-08.3(1)A AND 2-06.3(1) OF THE WSDOT SPECIFICATIONS.
2. BEDDING MATERIAL SHALL CONFORM TO 9-03.12(3) GRAVEL BACKFILL FOR PIPE ZONE BEDDING.
3. GRAVEL BACKFILL SHALL CONFORM TO 9-03.12(1)A GRAVEL BACKFILL FOR FOUNDATIONS, CLASS A.

2 PIPE TRENCH BEDDING & BACKFILL
NOT TO SCALE COP STD DETAIL 06.01.01



NOTES:
1. EAST JORDAN IRON WORKS 24" "ERGO" AND OLYMPIC FOUNDRY MH41 RING & HINGE PUYALLUP COVER ARE PRE-APPROVED PRODUCTS AND SHALL BE USED FOR PUBLICLY-OWNED INFRASTRUCTURE. ALL OTHERS REQUIRE WRITTEN APPROVAL OF THE ENGINEER PRIOR TO INSTALLATION.
2. MANHOLE FRAME AND COVERS SHOULD NOT BE LOCATED IN PEDESTRIAN PATHWAYS (E.G. SIDEWALKS, CROSSWALKS, ETC.). WHERE EXISTING OR PROPOSED CONDITIONS REQUIRE A MANHOLE FRAME AND COVER TO BE INSTALLED WITHIN A PEDESTRIAN PATHWAY, THE MANHOLE FRAME AND COVER SHALL BE ADA COMPLIANT.
3. NON-ROCKING FIT FOR MANHOLE COVERS.
4. CASTING TO BE SHOT BLASTED AND FREE FROM SURFACE SAND AND SCALE.
5. CASTING TO BE SMOOTH, TRUE TO PATTERN, FREE FROM BLOWHOLES, POROSITY HARD SPOTS, SHRINK HOLES, WARP, OR ANY OTHER DEFECTS WHICH COULD IMPAIR SERVICEABILITY.
6. CASTINGS SHALL BE UNCOATED.
7. FOR STORM APPLICATIONS CAST LETTERS SHALL READ "STORM".
8. INSTALL FRAME AND COVER IN ROADWAY WITH HINGED SIDE OF ASSEMBLY POINTED TOWARD ONCOMING TRAFFIC.
9. THE CITY SHALL HAVE THE RIGHT TO REQUIRE INSPECTION AND APPROVAL OF ALL CASTINGS PRIOR TO PAINTING.
10. REPAIR OR DEFECTS BY WELDING, OR BY THE USE OF "SMOOTH-ON" OR SIMILAR MATERIAL WILL NOT BE PERMITTED.
11. MANHOLE RING AND COVER SHALL BE FREE OF POROSITY, SHRINK CAVITIES, COLD SHUTS OR CRACKS OR ANY SURFACE DEFECTS WHICH WOULD IMPAIR SERVICEABILITY.

* FRAME HEIGHT MAY BE 4" FOR OVERLAYS AND PAVEMENT REHABILITATION PROJECTS, WITH WRITTEN APPROVAL BY THE CITY ENGINEER.

3 MANHOLE FRAME & COVER
NOT TO SCALE COP STD DETAIL 06.01.02

REVISION	DESCRIPTION	DATE	BY

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

MICHAEL A. GOULARTE
STATE OF WASHINGTON
21936
REGISTERED
PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: NOTES AND DETAILS

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

CONTACT: KEN RODY
PHONE: (253) 318-5711

DESIGNER: M. GOULARTE
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S 03 T 19 N R 04 E WM
DATE: 3.17.2026
REVISED:

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

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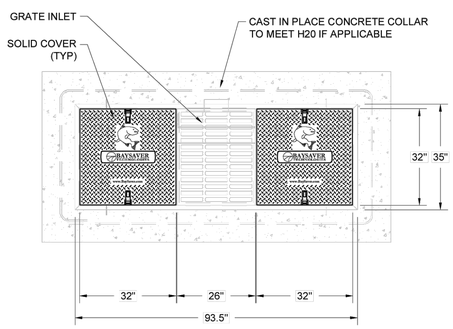
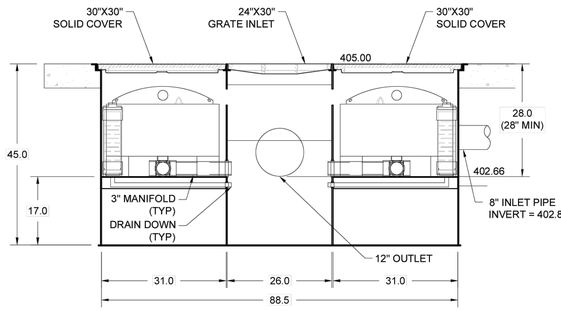
C27	0
27 OF 28	

BRADBURY PLACE TOWNHOMES

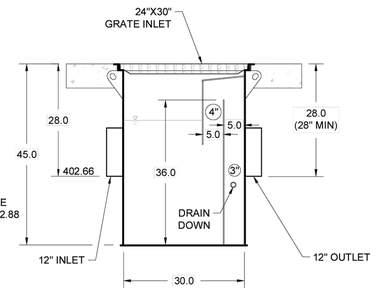
A PORTION OF SECTION 3, TOWNSHIP 19N, RANGE 04 E, W.M.
CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON



SURFACE DETAIL

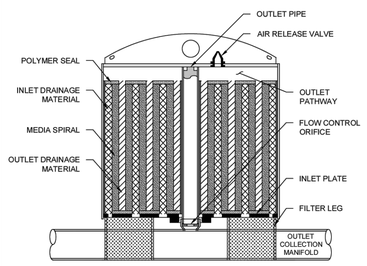


SECTION A-A
SCALE: 1/2" = 1'



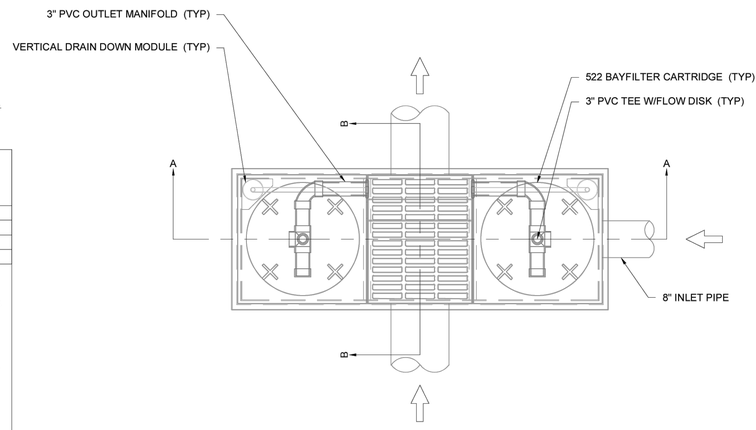
SECTION B-B
SCALE: 1/2" = 1'

THIS PLAN REFLECTS THE WATER QUALITY SYSTEM DESIGN BY THE DESIGN ENGINEER USING ADS WATER QUALITY COMPONENTS. THE SUITABILITY OF THE WQ SYSTEM TO MEET ANY FUNCTIONAL REQUIREMENTS ARE THE RESPONSIBILITY OF THE SITE DESIGN ENGINEER. ADS WQ SCOPE OF WORK IS LIMITED TO THE PRODUCT DIMENSIONS AND SPECIFICATIONS FOR INSTALLATION.



STREAMFILTER™ CBF-5	SDCB#25
WATER QUALITY FLOW	45
CARTRIDGE DESIGN FLOW RATE	22.5
# BAYFILTER CARTRIDGES	2
TREATED SEDIMENT CAPACITY	350

THE BAYFILTER STORMWATER MANAGEMENT SYSTEM IS A STORMWATER FILTRATION DEVICE DESIGNED TO REMOVE FINE SEDIMENTS, HEAVY METALS, AND PHOSPORUS. THE BAYFILTER SYSTEM RELIES ON A SPIRAL WOUND MEDIA FILTER CARTRIDGE WITH APPROXIMATELY 45 SQUARE FEET OF FILTRATION AREA. THE FILTER CARTRIDGES REMOVE POLLUTANTS FROM RUNOFF BY FILTRATION (INTERCEPTION/ATTACHMENT) AND ADSORPTION.



PLAN VIEW
SCALE: 1/2" = 1'

1 ONSITE STREAMFILTER CATCH BASIN
NOT TO SCALE

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
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BRADBURY PLACE TOWNHOMES
PUYALLUP, WA
DATE: 02/05/25 DRAWN: TSG
PROJECT #: S452666 CHECKED: CJF

DATE	DWN	CHK
2/16/2026	VCM	JPR
2/20/2026	PME	JPR

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3 SHEET OF 3

REVISION	DESCRIPTION	DATE	BY

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

MICHAEL A. GOULARTE — STATE OF WASHINGTON — 26007 — REGISTERED PROFESSIONAL ENGINEER
26th March 2026

SHEET TITLE: NOTES AND DETAILS

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: 3.17.2026
REVISED:

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

SHEET	REV.
C28	0
28 OF 28	

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

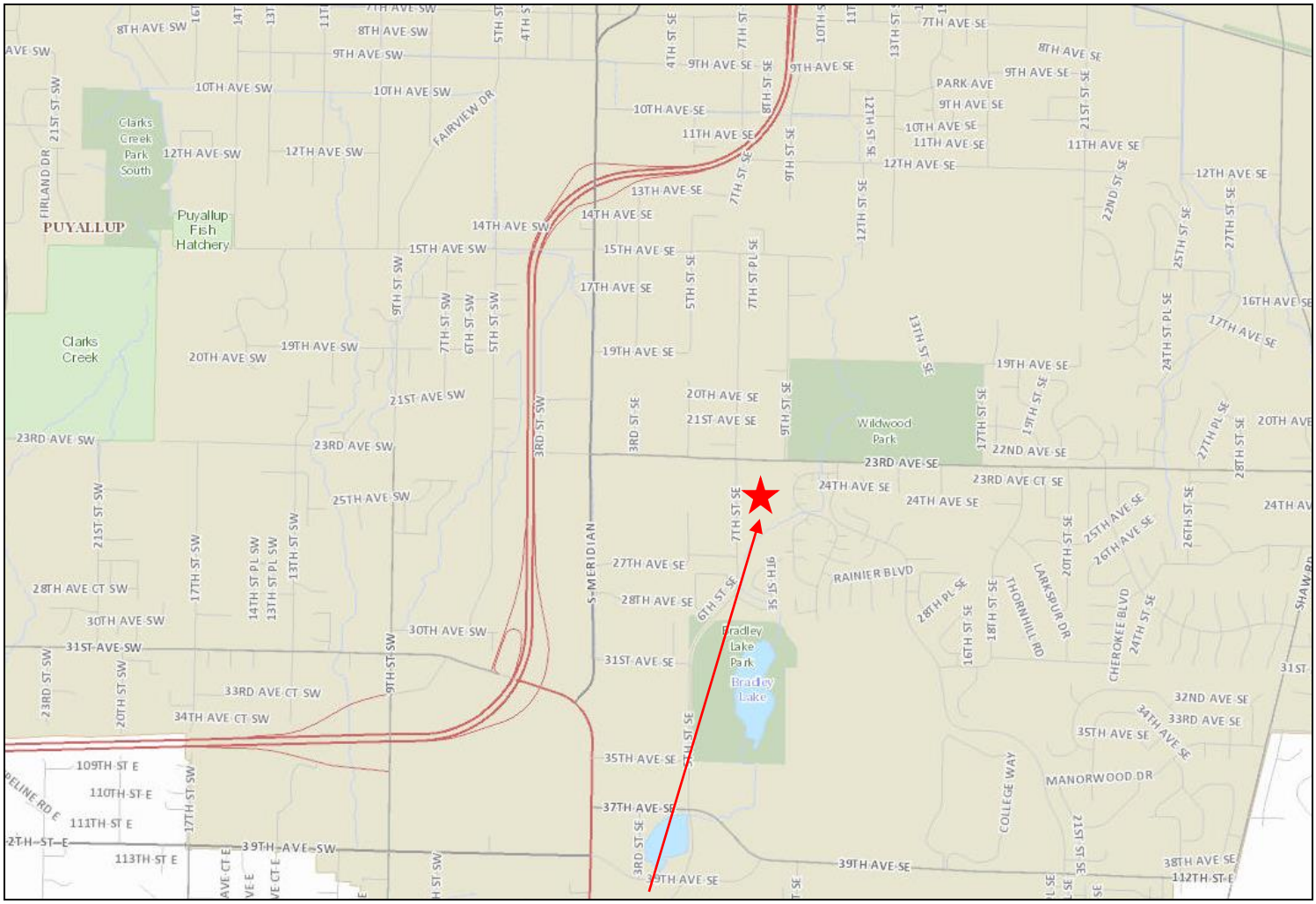
State of Washington
Engineering Geologist
925
Licensed Geologist
5/24/2019
KEITH SCOTT SCHEMBS

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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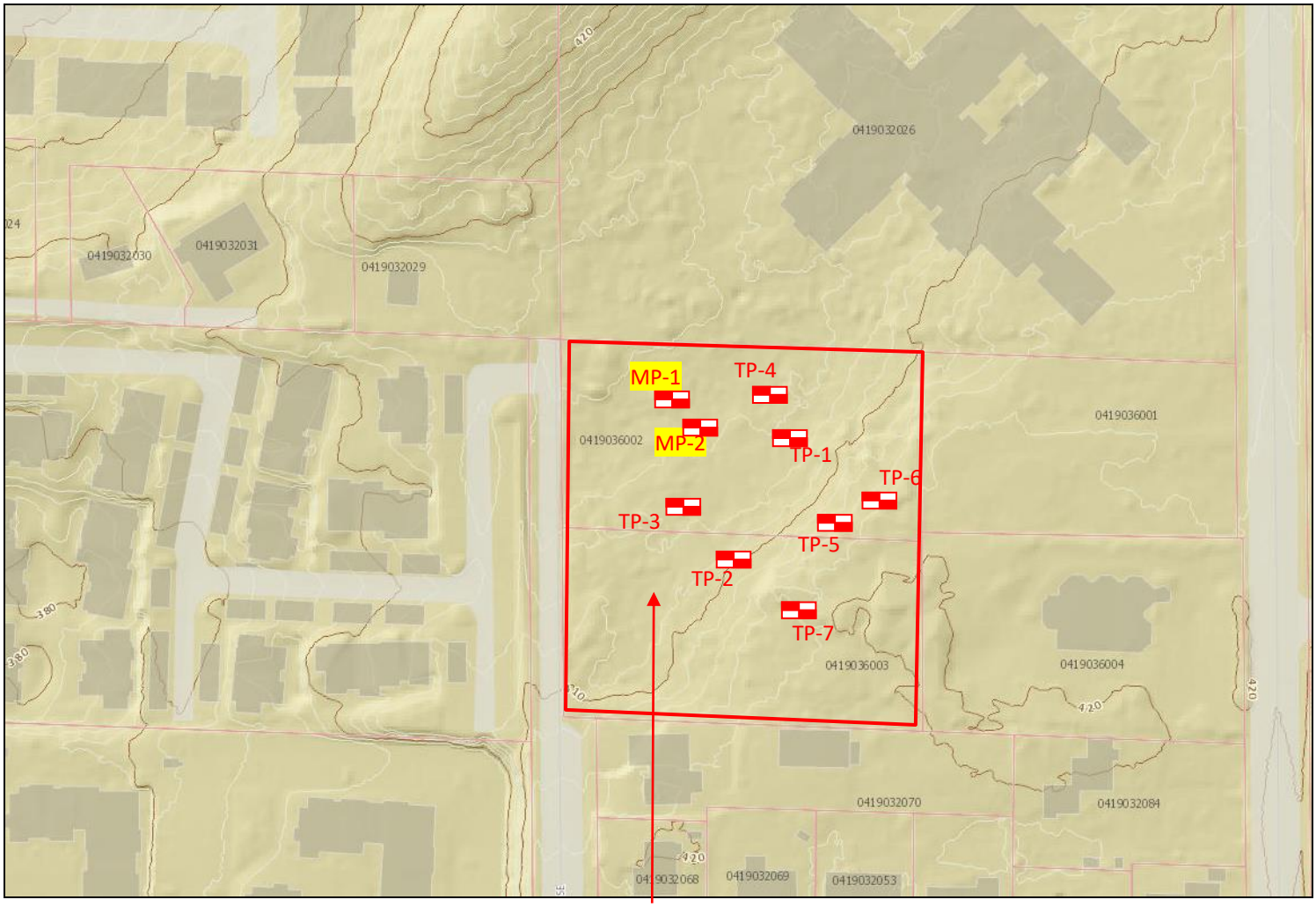
Site Location Map

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

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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

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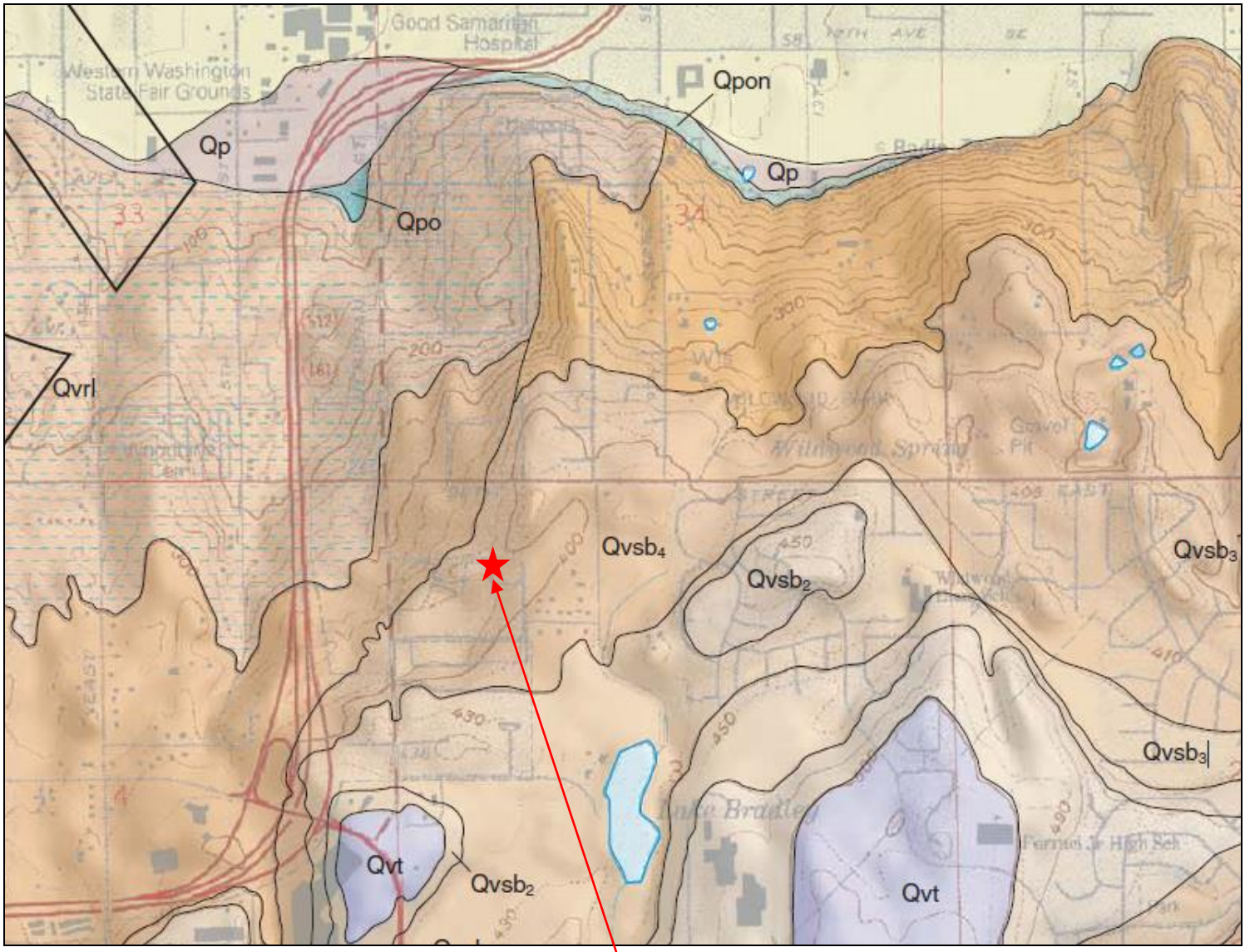
NRCS Soils Map

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



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
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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)

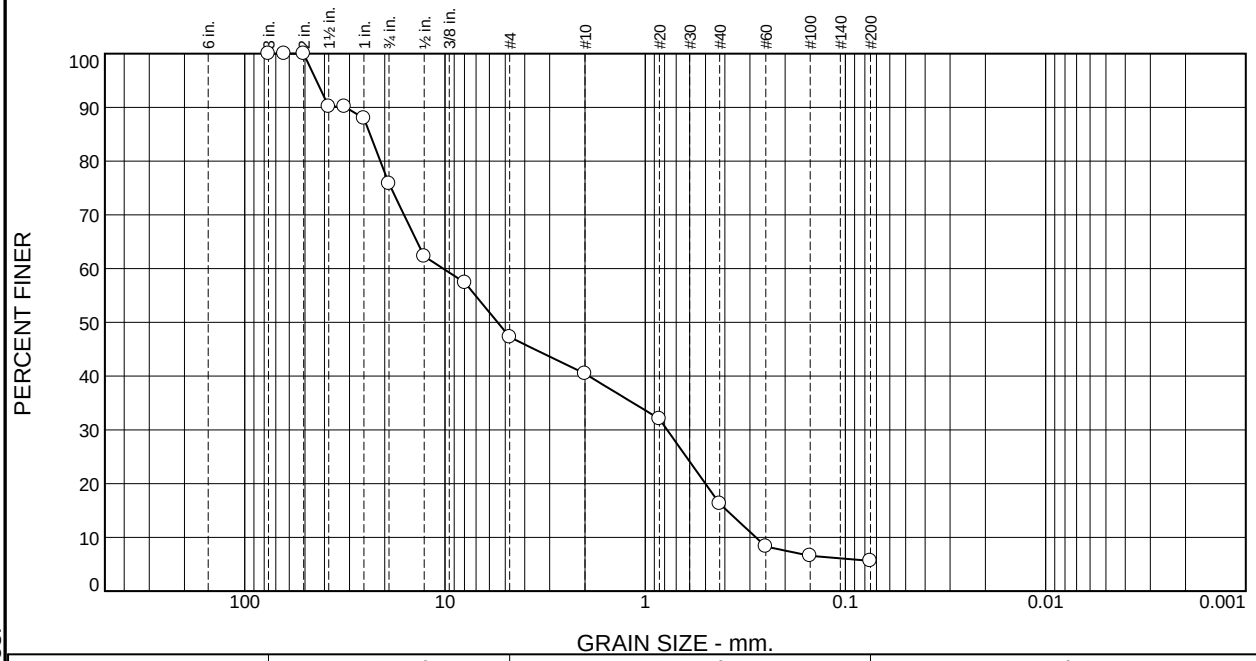
Terminated at 5.0 feet below ground surface.
Mottling observed from 0.5 to 5.0 feet at time of excavation.
No caving observed at the time of excavation.
No groundwater seepage observed.

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

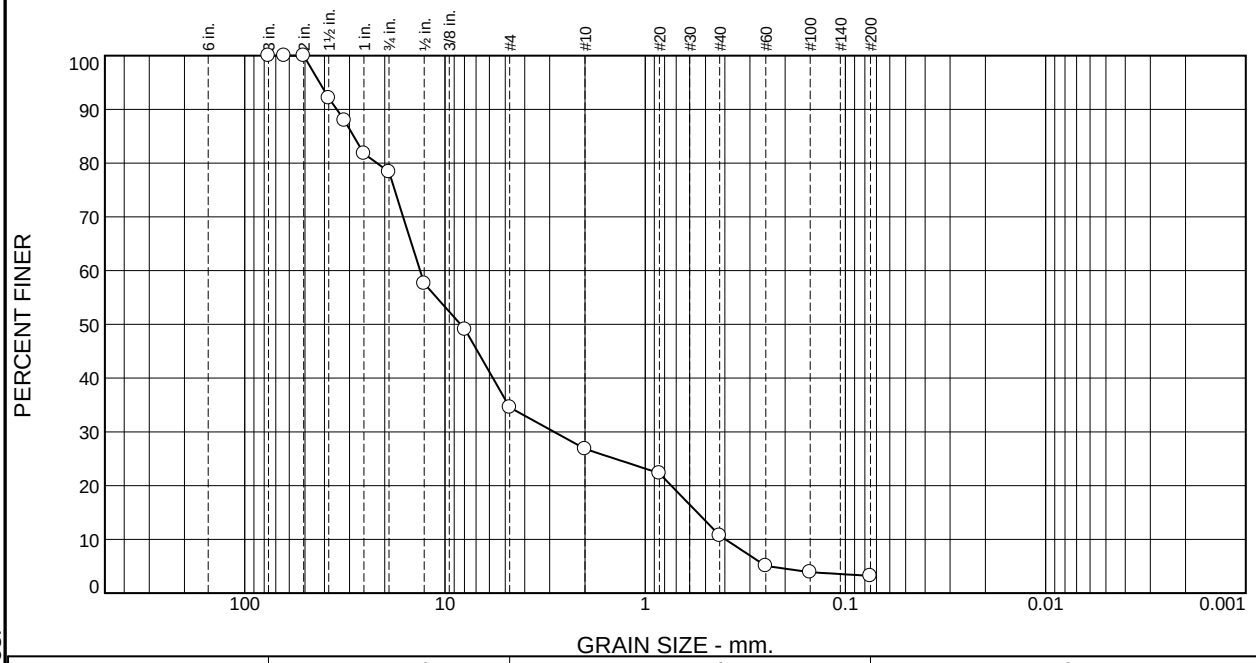
Client: Eagle Works LLC
Project: EagleworksLLC.5thStSE

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

ONSITE INFILTRATION POND

General Model Information

WWHM2012 Project Name: default[33]
Site Name:
Site Address:
City:

Report Date:	2/12/2026
Gage:	40 IN EAST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
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

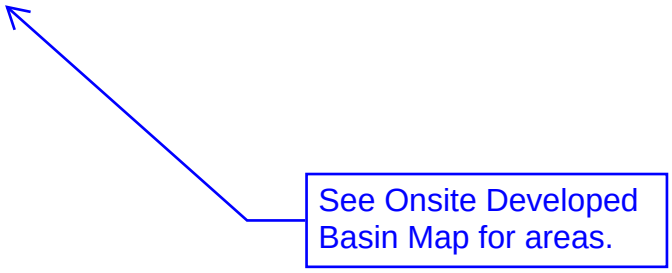
Basin 1

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

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Pasture, Flat	1
Pervious Total	1
Impervious Land Use	acre
ROADS FLAT	0.88
ROOF TOPS FLAT	0.61
POND	0.07
Impervious Total	1.56
Basin Total	2.56



Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	42.00 ft.	
Bottom Width:	42.00 ft.	
Depth:	3.85 ft.	
Volume at riser head:	0.1506 acre-feet.	
Infiltration On		
Infiltration rate:	6.6	
Infiltration safety factor:	1	
Total Volume Infiltrated (ac-ft.):		667.242
Total Volume Through Riser (ac-ft.):		0
Total Volume Through Facility (ac-ft.):		667.242
Percent Infiltrated:		100
Total Precip Applied to Facility:		0
Total Evap From Facility:		0
Side slope 1:	2 To 1	
Side slope 2:	2 To 1	
Side slope 3:	2 To 1	
Side slope 4:	2 To 1	
Discharge Structure		
Riser Height:	2.85 ft.	
Riser Diameter:	12 in.	
Element Flows To:		
Outlet 1	Outlet 2	

Pond Hydraulic Table

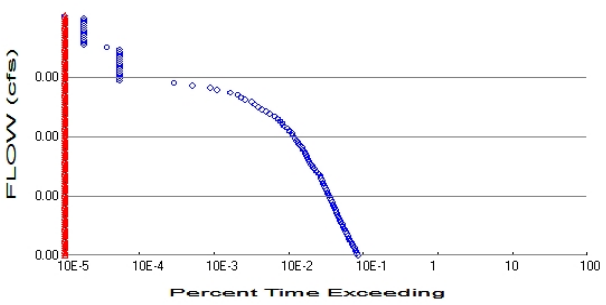
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.040	0.000	0.000	0.000
0.0428	0.040	0.001	0.000	0.269
0.0856	0.041	0.003	0.000	0.269
0.1283	0.041	0.005	0.000	0.269
0.1711	0.041	0.007	0.000	0.269
0.2139	0.042	0.008	0.000	0.269
0.2567	0.042	0.010	0.000	0.269
0.2994	0.042	0.012	0.000	0.269
0.3422	0.043	0.014	0.000	0.269
0.3850	0.043	0.016	0.000	0.269
0.4278	0.043	0.018	0.000	0.269
0.4706	0.044	0.019	0.000	0.269
0.5133	0.044	0.021	0.000	0.269
0.5561	0.044	0.023	0.000	0.269
0.5989	0.045	0.025	0.000	0.269
0.6417	0.045	0.027	0.000	0.269
0.6844	0.045	0.029	0.000	0.269
0.7272	0.046	0.031	0.000	0.269
0.7700	0.046	0.033	0.000	0.269
0.8128	0.047	0.035	0.000	0.269
0.8556	0.047	0.037	0.000	0.269
0.8983	0.047	0.039	0.000	0.269
0.9411	0.048	0.041	0.000	0.269
0.9839	0.048	0.043	0.000	0.269
1.0267	0.048	0.045	0.000	0.269
1.0694	0.049	0.047	0.000	0.269
1.1122	0.049	0.050	0.000	0.269

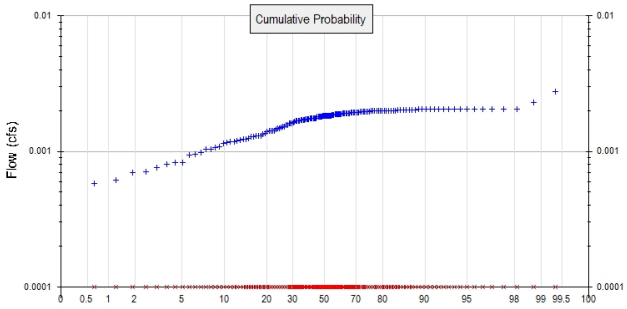
1.1550	0.049	0.052	0.000	0.269
1.1978	0.050	0.054	0.000	0.269
1.2406	0.050	0.056	0.000	0.269
1.2833	0.051	0.058	0.000	0.269
1.3261	0.051	0.060	0.000	0.269
1.3689	0.051	0.063	0.000	0.269
1.4117	0.052	0.065	0.000	0.269
1.4544	0.052	0.067	0.000	0.269
1.4972	0.052	0.069	0.000	0.269
1.5400	0.053	0.072	0.000	0.269
1.5828	0.053	0.074	0.000	0.269
1.6256	0.054	0.076	0.000	0.269
1.6683	0.054	0.078	0.000	0.269
1.7111	0.054	0.081	0.000	0.269
1.7539	0.055	0.083	0.000	0.269
1.7967	0.055	0.085	0.000	0.269
1.8394	0.055	0.088	0.000	0.269
1.8822	0.056	0.090	0.000	0.269
1.9250	0.056	0.093	0.000	0.269
1.9678	0.057	0.095	0.000	0.269
2.0106	0.057	0.098	0.000	0.269
2.0533	0.057	0.100	0.000	0.269
2.0961	0.058	0.103	0.000	0.269
2.1389	0.058	0.105	0.000	0.269
2.1817	0.059	0.108	0.000	0.269
2.2244	0.059	0.110	0.000	0.269
2.2672	0.059	0.113	0.000	0.269
2.3100	0.060	0.115	0.000	0.269
2.3528	0.060	0.118	0.000	0.269
2.3956	0.061	0.120	0.000	0.269
2.4383	0.061	0.123	0.000	0.269
2.4811	0.061	0.126	0.000	0.269
2.5239	0.062	0.128	0.000	0.269
2.5667	0.062	0.131	0.000	0.269
2.6094	0.063	0.134	0.000	0.269
2.6522	0.063	0.136	0.000	0.269
2.6950	0.064	0.139	0.000	0.269
2.7378	0.064	0.142	0.000	0.269
2.7806	0.064	0.145	0.000	0.269
2.8233	0.065	0.147	0.000	0.269
2.8661	0.065	0.150	0.021	0.269
2.9089	0.066	0.153	0.151	0.269
2.9517	0.066	0.156	0.341	0.269
2.9944	0.066	0.159	0.572	0.269
3.0372	0.067	0.162	0.828	0.269
3.0800	0.067	0.164	1.094	0.269
3.1228	0.068	0.167	1.354	0.269
3.1656	0.068	0.170	1.593	0.269
3.2083	0.069	0.173	1.799	0.269
3.2511	0.069	0.176	1.963	0.269
3.2939	0.069	0.179	2.086	0.269
3.3367	0.070	0.182	2.178	0.269
3.3794	0.070	0.185	2.291	0.269
3.4222	0.071	0.188	2.382	0.269
3.4650	0.071	0.191	2.470	0.269
3.5078	0.072	0.194	2.554	0.269
3.5506	0.072	0.197	2.636	0.269
3.5933	0.073	0.201	2.715	0.269

3.6361	0.073	0.204	2.792	0.269
3.6789	0.073	0.207	2.867	0.269
3.7217	0.074	0.210	2.940	0.269
3.7644	0.074	0.213	3.011	0.269
3.8072	0.075	0.216	3.081	0.269
3.8500	0.075	0.220	3.149	0.269

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 2.56
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1
Total Impervious Area: 1.56

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.001711
5 year	0.002083
10 year	0.002254
25 year	0.002413
50 year	0.002502
100 year	0.002572

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	0.002	0.000
1903	0.001	0.000
1904	0.002	0.000
1905	0.002	0.000
1906	0.001	0.000
1907	0.002	0.000
1908	0.002	0.000
1909	0.002	0.000
1910	0.002	0.000
1911	0.002	0.000

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

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

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

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0027	0.0000
2	0.0023	0.0000
3	0.0021	0.0000
4	0.0021	0.0000
5	0.0021	0.0000
6	0.0021	0.0000
7	0.0021	0.0000
8	0.0021	0.0000
9	0.0020	0.0000
10	0.0020	0.0000
11	0.0020	0.0000
12	0.0020	0.0000
13	0.0020	0.0000
14	0.0020	0.0000
15	0.0020	0.0000
16	0.0020	0.0000
17	0.0020	0.0000
18	0.0020	0.0000
19	0.0020	0.0000
20	0.0020	0.0000
21	0.0020	0.0000
22	0.0020	0.0000

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

81	0.0018	0.0000
82	0.0018	0.0000
83	0.0018	0.0000
84	0.0018	0.0000
85	0.0018	0.0000
86	0.0018	0.0000
87	0.0018	0.0000
88	0.0018	0.0000
89	0.0018	0.0000
90	0.0018	0.0000
91	0.0018	0.0000
92	0.0017	0.0000
93	0.0017	0.0000
94	0.0017	0.0000
95	0.0017	0.0000
96	0.0017	0.0000
97	0.0017	0.0000
98	0.0017	0.0000
99	0.0017	0.0000
100	0.0017	0.0000
101	0.0017	0.0000
102	0.0017	0.0000
103	0.0017	0.0000
104	0.0017	0.0000
105	0.0017	0.0000
106	0.0017	0.0000
107	0.0017	0.0000
108	0.0017	0.0000
109	0.0017	0.0000
110	0.0016	0.0000
111	0.0016	0.0000
112	0.0016	0.0000
113	0.0016	0.0000
114	0.0016	0.0000
115	0.0016	0.0000
116	0.0015	0.0000
117	0.0015	0.0000
118	0.0015	0.0000
119	0.0015	0.0000
120	0.0015	0.0000
121	0.0015	0.0000
122	0.0014	0.0000
123	0.0014	0.0000
124	0.0014	0.0000
125	0.0014	0.0000
126	0.0014	0.0000
127	0.0014	0.0000
128	0.0013	0.0000
129	0.0013	0.0000
130	0.0013	0.0000
131	0.0013	0.0000
132	0.0013	0.0000
133	0.0013	0.0000
134	0.0012	0.0000
135	0.0012	0.0000
136	0.0012	0.0000
137	0.0012	0.0000
138	0.0012	0.0000

139	0.0012	0.0000
140	0.0012	0.0000
141	0.0012	0.0000
142	0.0011	0.0000
143	0.0011	0.0000
144	0.0011	0.0000
145	0.0010	0.0000
146	0.0010	0.0000
147	0.0010	0.0000
148	0.0010	0.0000
149	0.0009	0.0000
150	0.0008	0.0000
151	0.0008	0.0000
152	0.0008	0.0000
153	0.0008	0.0000
154	0.0007	0.0000
155	0.0007	0.0000
156	0.0006	0.0000
157	0.0006	0.0000
158	0.0005	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0009	4693	0	0	Pass
0.0009	4525	0	0	Pass
0.0009	4371	0	0	Pass
0.0009	4181	0	0	Pass
0.0009	4009	0	0	Pass
0.0009	3873	0	0	Pass
0.0010	3710	0	0	Pass
0.0010	3575	0	0	Pass
0.0010	3453	0	0	Pass
0.0010	3345	0	0	Pass
0.0010	3212	0	0	Pass
0.0010	3076	0	0	Pass
0.0011	2935	0	0	Pass
0.0011	2859	0	0	Pass
0.0011	2753	0	0	Pass
0.0011	2660	0	0	Pass
0.0011	2576	0	0	Pass
0.0011	2474	0	0	Pass
0.0012	2394	0	0	Pass
0.0012	2336	0	0	Pass
0.0012	2261	0	0	Pass
0.0012	2193	0	0	Pass
0.0012	2126	0	0	Pass
0.0012	2045	0	0	Pass
0.0013	1968	0	0	Pass
0.0013	1896	0	0	Pass
0.0013	1844	0	0	Pass
0.0013	1789	0	0	Pass
0.0013	1732	0	0	Pass
0.0013	1679	0	0	Pass
0.0014	1603	0	0	Pass
0.0014	1548	0	0	Pass
0.0014	1505	0	0	Pass
0.0014	1466	0	0	Pass
0.0014	1403	0	0	Pass
0.0014	1307	0	0	Pass
0.0015	1230	0	0	Pass
0.0015	1163	0	0	Pass
0.0015	1098	0	0	Pass
0.0015	1045	0	0	Pass
0.0015	1012	0	0	Pass
0.0015	973	0	0	Pass
0.0016	946	0	0	Pass
0.0016	907	0	0	Pass
0.0016	862	0	0	Pass
0.0016	826	0	0	Pass
0.0016	771	0	0	Pass
0.0016	737	0	0	Pass
0.0017	700	0	0	Pass
0.0017	665	0	0	Pass
0.0017	623	0	0	Pass
0.0017	606	0	0	Pass
0.0017	560	0	0	Pass

0.0017	532	0	0	Pass
0.0018	480	0	0	Pass
0.0018	454	0	0	Pass
0.0018	426	0	0	Pass
0.0018	398	0	0	Pass
0.0018	359	0	0	Pass
0.0018	307	0	0	Pass
0.0019	279	0	0	Pass
0.0019	243	0	0	Pass
0.0019	219	0	0	Pass
0.0019	197	0	0	Pass
0.0019	175	0	0	Pass
0.0019	142	0	0	Pass
0.0020	127	0	0	Pass
0.0020	114	0	0	Pass
0.0020	91	0	0	Pass
0.0020	61	0	0	Pass
0.0020	49	0	0	Pass
0.0020	28	0	0	Pass
0.0021	16	0	0	Pass
0.0021	3	0	0	Pass
0.0021	3	0	0	Pass
0.0021	3	0	0	Pass
0.0021	3	0	0	Pass
0.0021	3	0	0	Pass
0.0022	3	0	0	Pass
0.0022	3	0	0	Pass
0.0022	3	0	0	Pass
0.0022	3	0	0	Pass
0.0022	3	0	0	Pass
0.0022	3	0	0	Pass
0.0023	3	0	0	Pass
0.0023	3	0	0	Pass
0.0023	3	0	0	Pass
0.0023	2	0	0	Pass
0.0023	1	0	0	Pass
0.0023	1	0	0	Pass
0.0024	1	0	0	Pass
0.0024	1	0	0	Pass
0.0024	1	0	0	Pass
0.0024	1	0	0	Pass
0.0024	1	0	0	Pass
0.0024	1	0	0	Pass
0.0025	1	0	0	Pass
0.0025	1	0	0	Pass
0.0025	1	0	0	Pass
0.0025	1	0	0	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
Trapezoidal Pond 1 POC	☐	607.19			☐	100.00			
Total Volume Infiltrated		607.19	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.

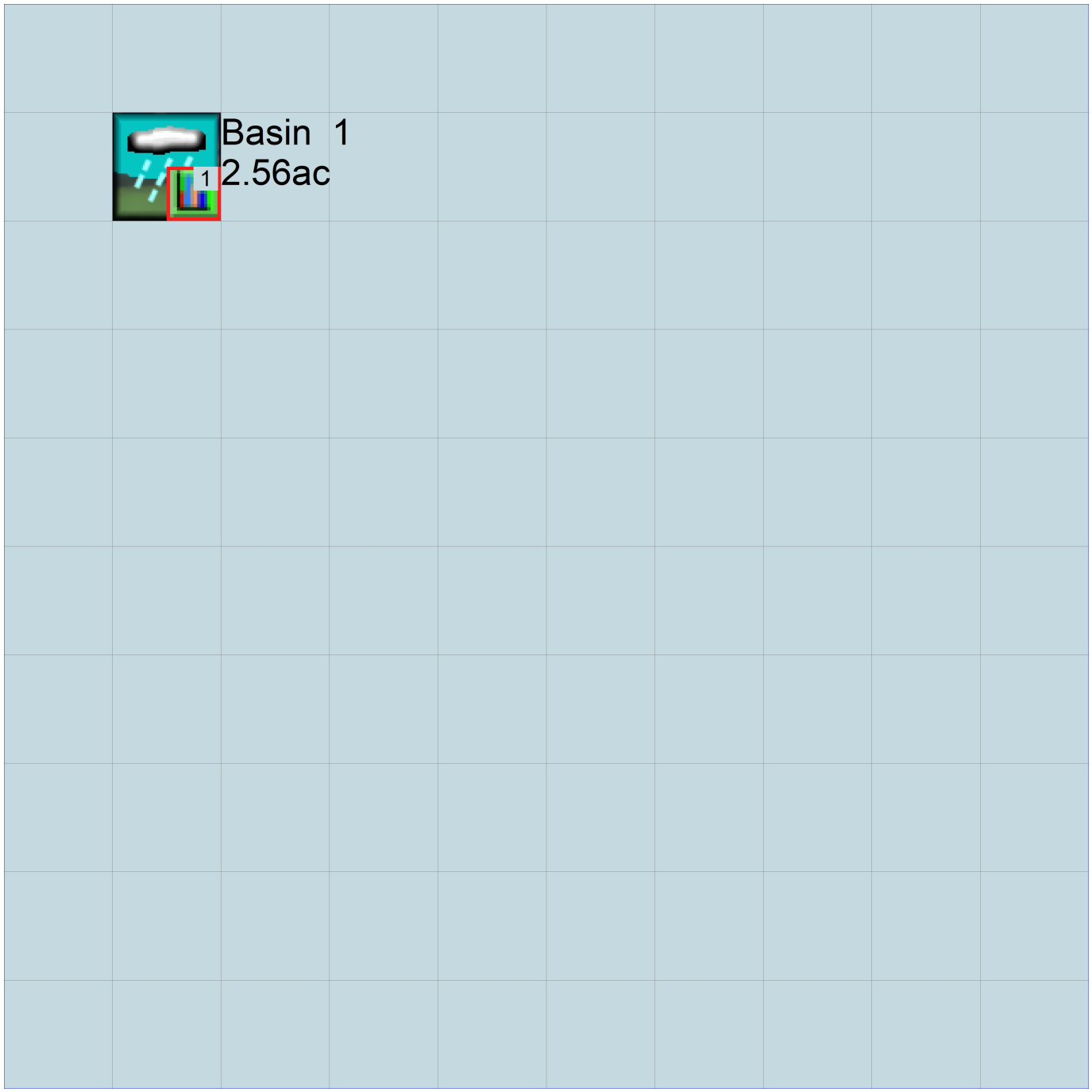
PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
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   default[33].wdm
MESSU       25   Predefault[33].MES
            27   Predefault[33].L61
            28   Predefault[33].L62
            30   POCdefault[33]1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       1
      COPY       501
      DISPLY       1
    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
  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           ***
    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                        2.56     COPY   501     12
PERLND   1                        2.56     COPY   501     13

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

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



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

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

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

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

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

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

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

END EXT SOURCES

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

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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default[33].wdm
MESSU       25   Mitdefault[33].MES
            27   Mitdefault[33].L61
            28   Mitdefault[33].L62
            30   POCdefault[33]1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       4
      IMPLND       1
      IMPLND       4
      IMPLND      14
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  1         MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    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#   ***
Basin  1***
PERLND   4                        1     RCHRES   1      2
PERLND   4                        1     RCHRES   1      3
IMPLND   1                     0.88     RCHRES   1      5
IMPLND   4                     0.61     RCHRES   1      5
IMPLND  14                     0.07     RCHRES   1      5

******Routing******
PERLND   4                        1     COPY     1     12
IMPLND   1                     0.88     COPY     1     15
IMPLND   4                     0.61     COPY     1     15
IMPLND  14                     0.07     COPY     1     15
PERLND   4                        1     COPY     1     13
RCHRES   1                        1     COPY   501     17
END SCHEMATIC

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



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG            ***
                                        in  out                             ***
    1     Trapezoidal Pond-006    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

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

```
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   90    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.040496  0.000000  0.000000  0.000000
  0.042778  0.040827  0.001739  0.000000  0.269500
  0.085556  0.041158  0.003493  0.000000  0.269500
  0.128333  0.041492  0.005261  0.000000  0.269500
  0.171111  0.041826  0.007043  0.000000  0.269500
  0.213889  0.042163  0.008839  0.000000  0.269500
  0.256667  0.042500  0.010650  0.000000  0.269500
  0.299444  0.042839  0.012475  0.000000  0.269500
  0.342222  0.043179  0.014315  0.000000  0.269500
  0.385000  0.043520  0.016170  0.000000  0.269500
  0.427778  0.043863  0.018039  0.000000  0.269500
  0.470556  0.044207  0.019922  0.000000  0.269500
  0.513333  0.044552  0.021821  0.000000  0.269500
  0.556111  0.044899  0.023734  0.000000  0.269500
  0.598889  0.045247  0.025662  0.000000  0.269500
  0.641667  0.045597  0.027605  0.000000  0.269500
  0.684444  0.045947  0.029563  0.000000  0.269500
  0.727222  0.046300  0.031536  0.000000  0.269500
  0.770000  0.046653  0.033524  0.000000  0.269500
  0.812778  0.047008  0.035528  0.000000  0.269500
  0.855556  0.047364  0.037546  0.000000  0.269500
  0.898333  0.047722  0.039580  0.000000  0.269500
  0.941111  0.048080  0.041629  0.000000  0.269500
  0.983889  0.048441  0.043694  0.000000  0.269500
  1.026667  0.048802  0.045774  0.000000  0.269500
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  1.240556  0.050630  0.056407  0.000000  0.269500
  1.283333  0.051000  0.058580  0.000000  0.269500
  1.326111  0.051371  0.060770  0.000000  0.269500
```

```
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  1.497222  0.052868  0.069688  0.000000  0.269500
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  1.582778  0.053625  0.074243  0.000000  0.269500
  1.625556  0.054005  0.076546  0.000000  0.269500
  1.668333  0.054387  0.078864  0.000000  0.269500
  1.711111  0.054770  0.081199  0.000000  0.269500
  1.753889  0.055154  0.083550  0.000000  0.269500
  1.796667  0.055540  0.085917  0.000000  0.269500
  1.839444  0.055927  0.088302  0.000000  0.269500
  1.882222  0.056316  0.090702  0.000000  0.269500
  1.925000  0.056705  0.093120  0.000000  0.269500
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  2.053333  0.057883  0.100472  0.000000  0.269500
  2.096111  0.058278  0.102957  0.000000  0.269500
  2.138889  0.058675  0.105458  0.000000  0.269500
  2.181667  0.059072  0.107977  0.000000  0.269500
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  2.481111  0.061895  0.126087  0.000000  0.269500
  2.523889  0.062304  0.128743  0.000000  0.269500
  2.566667  0.062714  0.131417  0.000000  0.269500
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  3.251111  0.069456  0.176629  1.963769  0.269500
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  3.336667  0.070323  0.182608  2.178164  0.269500
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  3.422222  0.071195  0.188662  2.382549  0.269500
  3.465000  0.071633  0.191717  2.470001  0.269500
  3.507778  0.072073  0.194791  2.554460  0.269500
  3.550556  0.072514  0.197883  2.636215  0.269500
  3.593333  0.072956  0.200995  2.715510  0.269500
  3.636111  0.073399  0.204125  2.792554  0.269500
  3.678889  0.073844  0.207275  2.867528  0.269500
  3.721667  0.074290  0.210443  2.940592  0.269500
  3.764444  0.074738  0.213631  3.011884  0.269500
  3.807222  0.075187  0.216837  3.081527  0.269500
  END FTABLE  1
END FTABLES

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

END EXT SOURCES
```

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

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        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
```

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

WWHM2012

PROJECT REPORT

OFFSITE INFILTRATION TRENCH

General Model Information

WWHM2012 Project Name: default[33]
Site Name:
Site Address:
City:

Report Date:	2/12/2026
Gage:	40 IN EAST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
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

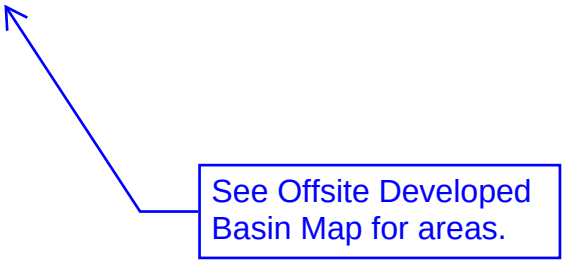
Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	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	0.16
Pervious Total	0.16
Impervious Land Use	acre
ROADS FLAT	0.32
Impervious Total	0.32
Basin Total	0.48



Mitigated Routing

Gravel Trench Bed 1

Bottom Length:	51.00 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.):	133.129
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	133.129
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

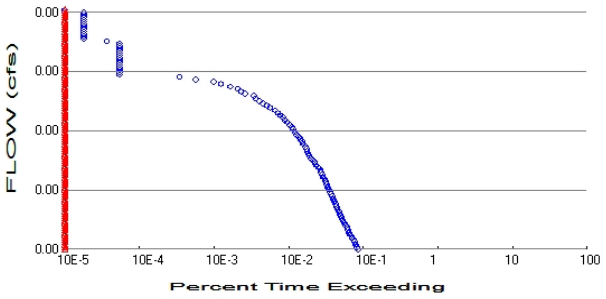
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.010	0.000	0.000	0.000
0.0167	0.010	0.000	0.000	0.270
0.0333	0.010	0.000	0.000	0.270
0.0500	0.010	0.000	0.000	0.270
0.0667	0.010	0.000	0.000	0.270
0.0833	0.010	0.000	0.000	0.270
0.1000	0.010	0.000	0.000	0.270
0.1167	0.010	0.000	0.000	0.270
0.1333	0.010	0.000	0.000	0.270
0.1500	0.010	0.000	0.000	0.270
0.1667	0.010	0.000	0.000	0.270
0.1833	0.010	0.000	0.000	0.270
0.2000	0.010	0.000	0.000	0.270
0.2167	0.010	0.000	0.000	0.270
0.2333	0.010	0.000	0.000	0.270
0.2500	0.010	0.001	0.000	0.270
0.2667	0.010	0.001	0.000	0.270
0.2833	0.010	0.001	0.000	0.270
0.3000	0.010	0.001	0.000	0.270
0.3167	0.010	0.001	0.000	0.270
0.3333	0.010	0.001	0.000	0.270
0.3500	0.010	0.001	0.000	0.270
0.3667	0.010	0.001	0.000	0.270
0.3833	0.010	0.001	0.000	0.270

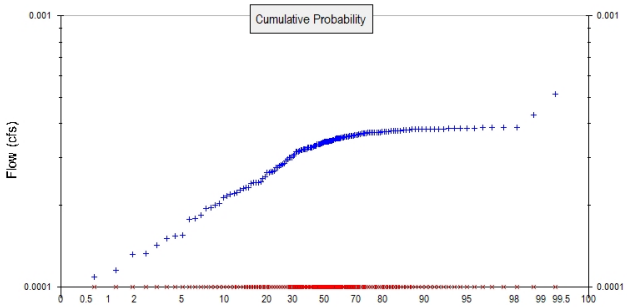
0.4000	0.010	0.001	0.000	0.270
0.4167	0.010	0.001	0.000	0.270
0.4333	0.010	0.001	0.000	0.270
0.4500	0.010	0.001	0.000	0.270
0.4667	0.010	0.001	0.000	0.270
0.4833	0.010	0.001	0.000	0.270
0.5000	0.010	0.002	0.000	0.270
0.5167	0.010	0.002	0.000	0.270
0.5333	0.010	0.002	0.000	0.270
0.5500	0.010	0.002	0.000	0.270
0.5667	0.010	0.002	0.000	0.270
0.5833	0.010	0.002	0.000	0.270
0.6000	0.010	0.002	0.000	0.270
0.6167	0.010	0.002	0.000	0.270
0.6333	0.010	0.002	0.000	0.270
0.6500	0.010	0.002	0.000	0.270
0.6667	0.010	0.002	0.000	0.270
0.6833	0.010	0.002	0.000	0.270
0.7000	0.010	0.002	0.000	0.270
0.7167	0.010	0.002	0.000	0.270
0.7333	0.010	0.002	0.000	0.270
0.7500	0.010	0.003	0.000	0.270
0.7667	0.010	0.003	0.000	0.270
0.7833	0.010	0.003	0.000	0.270
0.8000	0.010	0.003	0.000	0.270
0.8167	0.010	0.003	0.000	0.270
0.8333	0.010	0.003	0.000	0.270
0.8500	0.010	0.003	0.000	0.270
0.8667	0.010	0.003	0.000	0.270
0.8833	0.010	0.003	0.000	0.270
0.9000	0.010	0.003	0.000	0.270
0.9167	0.010	0.003	0.000	0.270
0.9333	0.010	0.003	0.000	0.270
0.9500	0.010	0.003	0.000	0.270
0.9667	0.010	0.003	0.000	0.270
0.9833	0.010	0.003	0.000	0.270
1.0000	0.010	0.004	0.000	0.270
1.0167	0.010	0.004	0.000	0.270
1.0333	0.010	0.004	0.000	0.270
1.0500	0.010	0.004	0.000	0.270
1.0667	0.010	0.004	0.000	0.270
1.0833	0.010	0.004	0.000	0.270
1.1000	0.010	0.004	0.000	0.270
1.1167	0.010	0.004	0.000	0.270
1.1333	0.010	0.004	0.000	0.270
1.1500	0.010	0.004	0.000	0.270
1.1667	0.010	0.004	0.000	0.270
1.1833	0.010	0.004	0.000	0.270
1.2000	0.010	0.004	0.000	0.270
1.2167	0.010	0.004	0.000	0.270
1.2333	0.010	0.004	0.000	0.270
1.2500	0.010	0.005	0.000	0.270
1.2667	0.010	0.005	0.000	0.270
1.2833	0.010	0.005	0.000	0.270
1.3000	0.010	0.005	0.000	0.270
1.3167	0.010	0.005	0.000	0.270
1.3333	0.010	0.005	0.000	0.270
1.3500	0.010	0.005	0.000	0.270

1.3667	0.010	0.005	0.000	0.270
1.3833	0.010	0.005	0.000	0.270
1.4000	0.010	0.005	0.000	0.270
1.4167	0.010	0.005	0.000	0.270
1.4333	0.010	0.005	0.000	0.270
1.4500	0.010	0.005	0.000	0.270
1.4667	0.010	0.005	0.000	0.270
1.4833	0.010	0.005	0.000	0.270
1.5000	0.010	0.006	0.000	0.270

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.48
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.16
Total Impervious Area: 0.32

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

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 #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	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.000
1911	0.000	0.000

1912	0.000	0.000
1913	0.000	0.000
1914	0.000	0.000
1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.000
1923	0.000	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
1928	0.000	0.000
1929	0.000	0.000
1930	0.000	0.000
1931	0.000	0.000
1932	0.000	0.000
1933	0.000	0.000
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1935	0.000	0.000
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1967	0.000	0.000
1968	0.000	0.000
1969	0.000	0.000

1970	0.000	0.000
1971	0.000	0.000
1972	0.000	0.000
1973	0.000	0.000
1974	0.000	0.000
1975	0.000	0.000
1976	0.000	0.000
1977	0.000	0.000
1978	0.000	0.000
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2021	0.000	0.000
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2025	0.000	0.000
2026	0.000	0.000
2027	0.000	0.000

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

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.0005	0.0000
2	0.0004	0.0000
3	0.0004	0.0000
4	0.0004	0.0000
5	0.0004	0.0000
6	0.0004	0.0000
7	0.0004	0.0000
8	0.0004	0.0000
9	0.0004	0.0000
10	0.0004	0.0000
11	0.0004	0.0000
12	0.0004	0.0000
13	0.0004	0.0000
14	0.0004	0.0000
15	0.0004	0.0000
16	0.0004	0.0000
17	0.0004	0.0000
18	0.0004	0.0000
19	0.0004	0.0000
20	0.0004	0.0000
21	0.0004	0.0000
22	0.0004	0.0000

23	0.0004	0.0000
24	0.0004	0.0000
25	0.0004	0.0000
26	0.0004	0.0000
27	0.0004	0.0000
28	0.0004	0.0000
29	0.0004	0.0000
30	0.0004	0.0000
31	0.0004	0.0000
32	0.0004	0.0000
33	0.0004	0.0000
34	0.0004	0.0000
35	0.0004	0.0000
36	0.0004	0.0000
37	0.0004	0.0000
38	0.0004	0.0000
39	0.0004	0.0000
40	0.0004	0.0000
41	0.0004	0.0000
42	0.0004	0.0000
43	0.0004	0.0000
44	0.0004	0.0000
45	0.0004	0.0000
46	0.0004	0.0000
47	0.0004	0.0000
48	0.0004	0.0000
49	0.0004	0.0000
50	0.0004	0.0000
51	0.0004	0.0000
52	0.0004	0.0000
53	0.0004	0.0000
54	0.0004	0.0000
55	0.0004	0.0000
56	0.0004	0.0000
57	0.0004	0.0000
58	0.0004	0.0000
59	0.0004	0.0000
60	0.0004	0.0000
61	0.0004	0.0000
62	0.0004	0.0000
63	0.0004	0.0000
64	0.0004	0.0000
65	0.0004	0.0000
66	0.0004	0.0000
67	0.0004	0.0000
68	0.0003	0.0000
69	0.0003	0.0000
70	0.0003	0.0000
71	0.0003	0.0000
72	0.0003	0.0000
73	0.0003	0.0000
74	0.0003	0.0000
75	0.0003	0.0000
76	0.0003	0.0000
77	0.0003	0.0000
78	0.0003	0.0000
79	0.0003	0.0000
80	0.0003	0.0000

81	0.0003	0.0000
82	0.0003	0.0000
83	0.0003	0.0000
84	0.0003	0.0000
85	0.0003	0.0000
86	0.0003	0.0000
87	0.0003	0.0000
88	0.0003	0.0000
89	0.0003	0.0000
90	0.0003	0.0000
91	0.0003	0.0000
92	0.0003	0.0000
93	0.0003	0.0000
94	0.0003	0.0000
95	0.0003	0.0000
96	0.0003	0.0000
97	0.0003	0.0000
98	0.0003	0.0000
99	0.0003	0.0000
100	0.0003	0.0000
101	0.0003	0.0000
102	0.0003	0.0000
103	0.0003	0.0000
104	0.0003	0.0000
105	0.0003	0.0000
106	0.0003	0.0000
107	0.0003	0.0000
108	0.0003	0.0000
109	0.0003	0.0000
110	0.0003	0.0000
111	0.0003	0.0000
112	0.0003	0.0000
113	0.0003	0.0000
114	0.0003	0.0000
115	0.0003	0.0000
116	0.0003	0.0000
117	0.0003	0.0000
118	0.0003	0.0000
119	0.0003	0.0000
120	0.0003	0.0000
121	0.0003	0.0000
122	0.0003	0.0000
123	0.0003	0.0000
124	0.0003	0.0000
125	0.0003	0.0000
126	0.0003	0.0000
127	0.0003	0.0000
128	0.0003	0.0000
129	0.0002	0.0000
130	0.0002	0.0000
131	0.0002	0.0000
132	0.0002	0.0000
133	0.0002	0.0000
134	0.0002	0.0000
135	0.0002	0.0000
136	0.0002	0.0000
137	0.0002	0.0000
138	0.0002	0.0000

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

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0002	4714	0	0	Pass
0.0002	4554	0	0	Pass
0.0002	4391	0	0	Pass
0.0002	4217	0	0	Pass
0.0002	4057	0	0	Pass
0.0002	3866	0	0	Pass
0.0002	3714	0	0	Pass
0.0002	3577	0	0	Pass
0.0002	3460	0	0	Pass
0.0002	3362	0	0	Pass
0.0002	3239	0	0	Pass
0.0002	3108	0	0	Pass
0.0002	2958	0	0	Pass
0.0002	2857	0	0	Pass
0.0002	2753	0	0	Pass
0.0002	2660	0	0	Pass
0.0002	2586	0	0	Pass
0.0002	2479	0	0	Pass
0.0002	2401	0	0	Pass
0.0002	2346	0	0	Pass
0.0002	2274	0	0	Pass
0.0002	2206	0	0	Pass
0.0002	2123	0	0	Pass
0.0002	2049	0	0	Pass
0.0002	1972	0	0	Pass
0.0002	1902	0	0	Pass
0.0002	1846	0	0	Pass
0.0002	1798	0	0	Pass
0.0002	1743	0	0	Pass
0.0003	1686	0	0	Pass
0.0003	1612	0	0	Pass
0.0003	1548	0	0	Pass
0.0003	1506	0	0	Pass
0.0003	1470	0	0	Pass
0.0003	1406	0	0	Pass
0.0003	1320	0	0	Pass
0.0003	1245	0	0	Pass
0.0003	1176	0	0	Pass
0.0003	1109	0	0	Pass
0.0003	1045	0	0	Pass
0.0003	1012	0	0	Pass
0.0003	973	0	0	Pass
0.0003	952	0	0	Pass
0.0003	915	0	0	Pass
0.0003	867	0	0	Pass
0.0003	831	0	0	Pass
0.0003	793	0	0	Pass
0.0003	749	0	0	Pass
0.0003	700	0	0	Pass
0.0003	668	0	0	Pass
0.0003	630	0	0	Pass
0.0003	608	0	0	Pass
0.0003	564	0	0	Pass

0.0003	535	0	0	Pass
0.0003	489	0	0	Pass
0.0003	461	0	0	Pass
0.0003	426	0	0	Pass
0.0003	398	0	0	Pass
0.0003	364	0	0	Pass
0.0003	311	0	0	Pass
0.0003	281	0	0	Pass
0.0004	251	0	0	Pass
0.0004	223	0	0	Pass
0.0004	198	0	0	Pass
0.0004	189	0	0	Pass
0.0004	142	0	0	Pass
0.0004	127	0	0	Pass
0.0004	115	0	0	Pass
0.0004	92	0	0	Pass
0.0004	68	0	0	Pass
0.0004	54	0	0	Pass
0.0004	31	0	0	Pass
0.0004	19	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	3	0	0	Pass
0.0004	2	0	0	Pass
0.0004	1	0	0	Pass
0.0004	1	0	0	Pass
0.0004	1	0	0	Pass
0.0004	1	0	0	Pass
0.0004	1	0	0	Pass
0.0005	1	0	0	Pass
0.0005	1	0	0	Pass
0.0005	1	0	0	Pass
0.0005	1	0	0	Pass
0.0005	1	0	0	Pass
0.0005	1	0	0	Pass
0.0005	1	0	0	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
Gravel Trench Bed 1 POC	☐	121.15			☐	100.00			
Total Volume Infiltrated		121.15	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

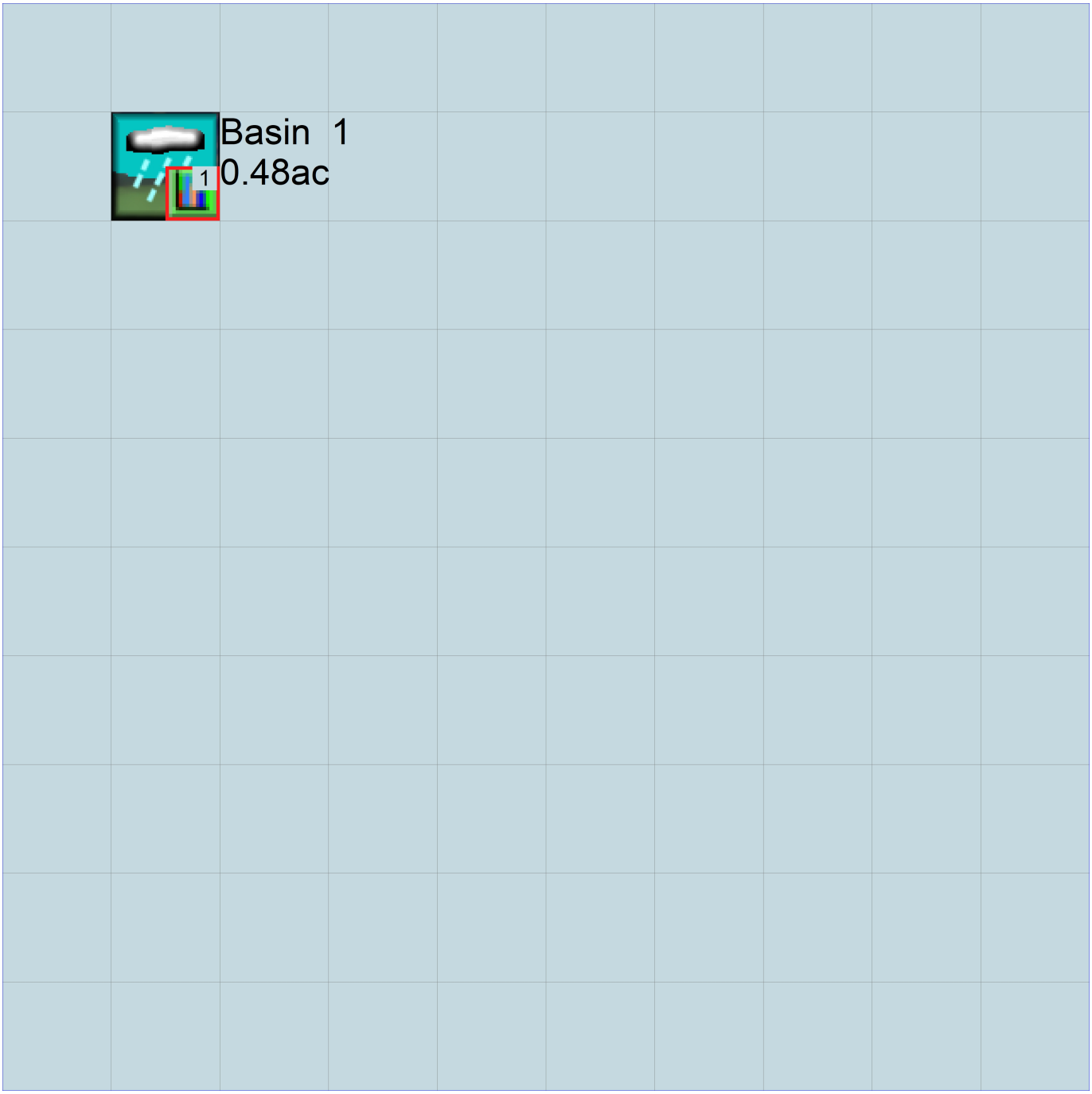
PERLND Changes

No PERLND changes have been made.

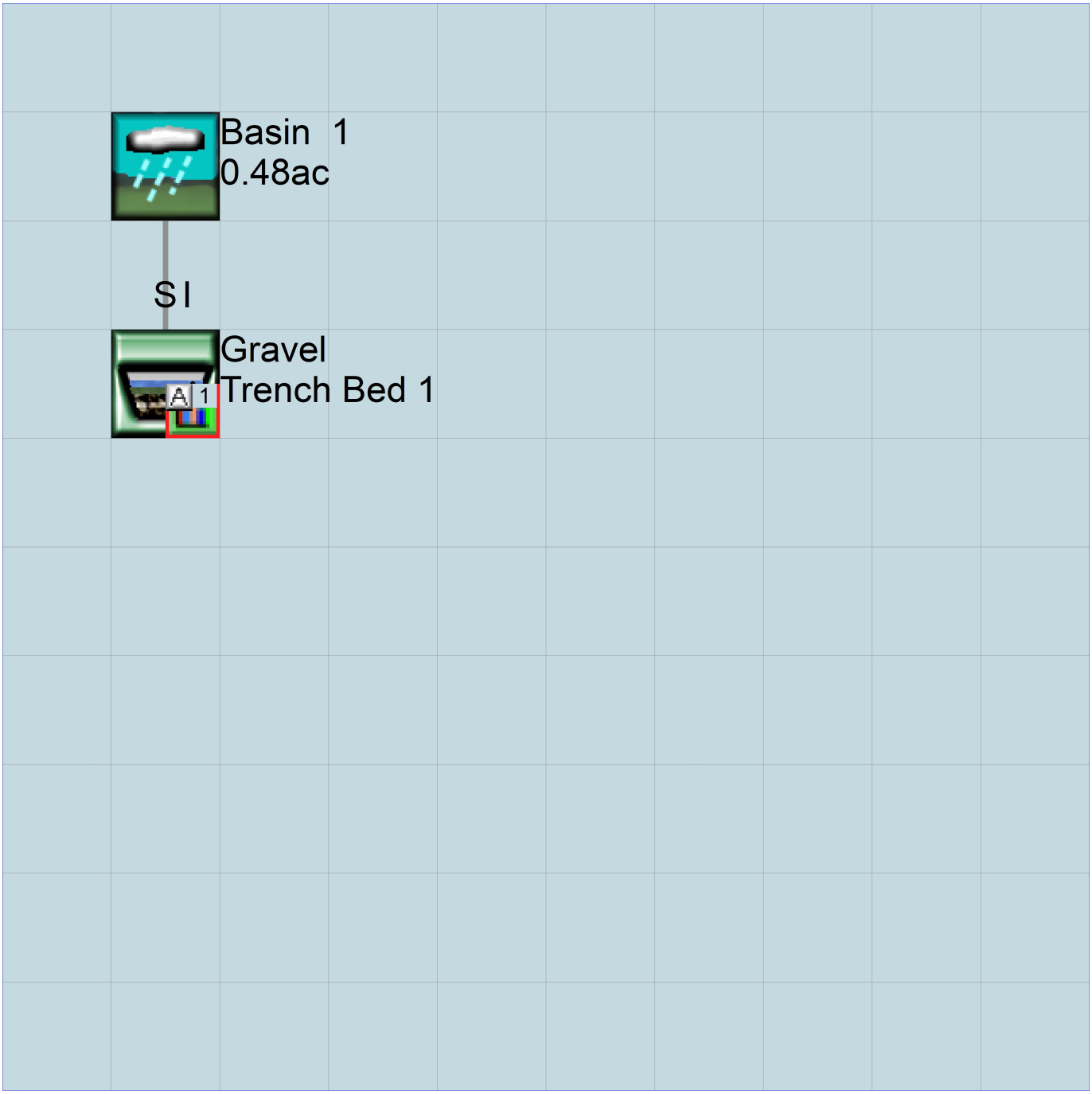
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default[33].wdm
MESSU       25   Predefault[33].MES
            27   Predefault[33].L61
            28   Predefault[33].L62
            30   POCdefault[33]1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       1
      COPY       501
      DISPLY       1
    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
  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           ***
    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                       0.48     COPY   501     12
PERLND   1                       0.48     COPY   501     13

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

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



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

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

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

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

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

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

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

END EXT SOURCES

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

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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   default[33].wdm
MESSU      25   Mitdefault[33].MES
           27   Mitdefault[33].L61
           28   Mitdefault[33].L62
           30   POCdefault[33]1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       4
      IMPLND       1
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Gravel Trench Bed 1         MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    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                        0.16     RCHRES   1      2
PERLND   4                        0.16     RCHRES   1      3
IMPLND   1                        0.32     RCHRES   1      5

******Routing******
PERLND   4                        0.16     COPY     1     12
IMPLND   1                        0.32     COPY     1     15
PERLND   4                        0.16     COPY     1     13
RCHRES   1                           1     COPY   501     17
END SCHEMATIC

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



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                      in  out                               ***
    1     Gravel Trench Be-005    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

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

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

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

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
```

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   92    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.009952  0.000000  0.000000  0.000000
  0.016667  0.009952  0.000066  0.000000  0.270938
  0.033333  0.009952  0.000133  0.000000  0.270938
  0.050000  0.009952  0.000199  0.000000  0.270938
  0.066667  0.009952  0.000265  0.000000  0.270938
  0.083333  0.009952  0.000332  0.000000  0.270938
  0.100000  0.009952  0.000398  0.000000  0.270938
  0.116667  0.009952  0.000464  0.000000  0.270938
  0.133333  0.009952  0.000531  0.000000  0.270938
  0.150000  0.009952  0.000597  0.000000  0.270938
  0.166667  0.009952  0.000663  0.000000  0.270938
  0.183333  0.009952  0.000730  0.000000  0.270938
  0.200000  0.009952  0.000796  0.000000  0.270938
  0.216667  0.009952  0.000862  0.000000  0.270938
  0.233333  0.009952  0.000929  0.000000  0.270938
  0.250000  0.009952  0.000995  0.000000  0.270938
  0.266667  0.009952  0.001062  0.000000  0.270938
  0.283333  0.009952  0.001128  0.000000  0.270938
  0.300000  0.009952  0.001194  0.000000  0.270938
  0.316667  0.009952  0.001261  0.000000  0.270938
  0.333333  0.009952  0.001327  0.000000  0.270938
  0.350000  0.009952  0.001393  0.000000  0.270938
  0.366667  0.009952  0.001460  0.000000  0.270938
  0.383333  0.009952  0.001526  0.000000  0.270938
  0.400000  0.009952  0.001592  0.000000  0.270938
  0.416667  0.009952  0.001659  0.000000  0.270938
  0.433333  0.009952  0.001725  0.000000  0.270938
  0.450000  0.009952  0.001791  0.000000  0.270938
  0.466667  0.009952  0.001858  0.000000  0.270938
  0.483333  0.009952  0.001924  0.000000  0.270938
  0.500000  0.009952  0.001990  0.000000  0.270938
  0.516667  0.009952  0.002057  0.000000  0.270938
  0.533333  0.009952  0.002123  0.000000  0.270938
  0.550000  0.009952  0.002189  0.000000  0.270938
  0.566667  0.009952  0.002256  0.000000  0.270938
  0.583333  0.009952  0.002322  0.000000  0.270938
  0.600000  0.009952  0.002388  0.000000  0.270938
  0.616667  0.009952  0.002455  0.000000  0.270938
  0.633333  0.009952  0.002521  0.000000  0.270938
  0.650000  0.009952  0.002587  0.000000  0.270938
  0.666667  0.009952  0.002654  0.000000  0.270938
  0.683333  0.009952  0.002720  0.000000  0.270938
  0.700000  0.009952  0.002787  0.000000  0.270938
  0.716667  0.009952  0.002853  0.000000  0.270938
  0.733333  0.009952  0.002919  0.000000  0.270938
  0.750000  0.009952  0.002986  0.000000  0.270938
  0.766667  0.009952  0.003052  0.000000  0.270938
  0.783333  0.009952  0.003118  0.000000  0.270938
  0.800000  0.009952  0.003185  0.000000  0.270938
  0.816667  0.009952  0.003251  0.000000  0.270938
  0.833333  0.009952  0.003317  0.000000  0.270938
  0.850000  0.009952  0.003384  0.000000  0.270938
```

```
  0.866667  0.009952  0.003450  0.000000  0.270938
  0.883333  0.009952  0.003516  0.000000  0.270938
  0.900000  0.009952  0.003583  0.000000  0.270938
  0.916667  0.009952  0.003649  0.000000  0.270938
  0.933333  0.009952  0.003715  0.000000  0.270938
  0.950000  0.009952  0.003782  0.000000  0.270938
  0.966667  0.009952  0.003848  0.000000  0.270938
  0.983333  0.009952  0.003914  0.000000  0.270938
  1.000000  0.009952  0.003981  0.000000  0.270938
  1.016667  0.009952  0.004047  0.000000  0.270938
  1.033333  0.009952  0.004113  0.000000  0.270938
  1.050000  0.009952  0.004180  0.000000  0.270938
  1.066667  0.009952  0.004246  0.000000  0.270938
  1.083333  0.009952  0.004312  0.000000  0.270938
  1.100000  0.009952  0.004379  0.000000  0.270938
  1.116667  0.009952  0.004445  0.000000  0.270938
  1.133333  0.009952  0.004511  0.000000  0.270938
  1.150000  0.009952  0.004578  0.000000  0.270938
  1.166667  0.009952  0.004644  0.000000  0.270938
  1.183333  0.009952  0.004711  0.000000  0.270938
  1.200000  0.009952  0.004777  0.000000  0.270938
  1.216667  0.009952  0.004843  0.000000  0.270938
  1.233333  0.009952  0.004910  0.000000  0.270938
  1.250000  0.009952  0.004976  0.000000  0.270938
  1.266667  0.009952  0.005042  0.000000  0.270938
  1.283333  0.009952  0.005109  0.000000  0.270938
  1.300000  0.009952  0.005175  0.000000  0.270938
  1.316667  0.009952  0.005241  0.000000  0.270938
  1.333333  0.009952  0.005308  0.000000  0.270938
  1.350000  0.009952  0.005374  0.000000  0.270938
  1.366667  0.009952  0.005440  0.000000  0.270938
  1.383333  0.009952  0.005507  0.000000  0.270938
  1.400000  0.009952  0.005573  0.000000  0.270938
  1.416667  0.009952  0.005639  0.000000  0.270938
  1.433333  0.009952  0.005706  0.000000  0.270938
  1.450000  0.009952  0.005772  0.000000  0.270938
  1.466667  0.009952  0.005838  0.000000  0.270938
  1.483333  0.009952  0.005905  0.000000  0.270938
  1.500000  0.009952  0.005971  0.000000  0.270938
  1.516667  0.009952  0.006137  0.019025  0.270938
  END FTABLE  1
END FTABLES

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

END EXT SOURCES

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

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>           <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        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
```

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

WWHM2012

PROJECT REPORT

WATER QUALITY TREATMENT

General Model Information

WWHM2012 Project Name: default[33]
Site Name:
Site Address:
City:

Report Date:	2/9/2026
Gage:	40 IN EAST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
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 POC2:	50 Percent of the 2 Year
High Flow Threshold for POC2:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	1.22
Pervious Total	1.22
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.22

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.44
Pervious Total	0.44
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.44

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Pasture, Flat	0.37
Pervious Total	0.37
Impervious Land Use	acre
ROADS FLAT	0.85
Impervious Total	0.85
Basin Total	1.22

Basin 2

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Pasture, Flat	0.16
Pervious Total	0.16

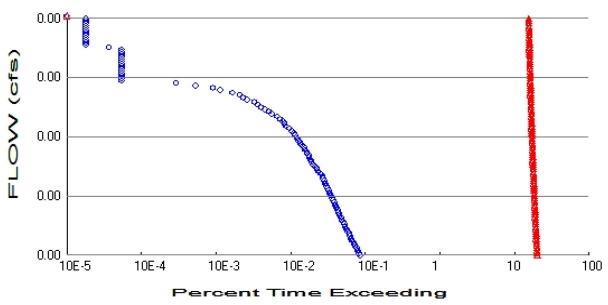
Impervious Land Use	acre
ROADS FLAT	0.28
Impervious Total	0.28
Basin Total	0.44

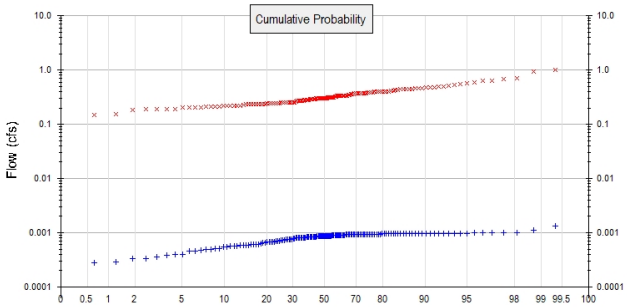
Routing Elements
Predeveloped Routing

Mitigated Routing

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 1.22
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.37
Total Impervious Area: 0.85

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000815
5 year	0.000993
10 year	0.001074
25 year	0.00115
50 year	0.001192
100 year	0.001226

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.304919
5 year	0.40901
10 year	0.484622
25 year	0.588063
50 year	0.671048
100 year	0.759277

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.001	0.361
1903	0.000	0.400
1904	0.001	0.452
1905	0.001	0.203
1906	0.001	0.230
1907	0.001	0.303
1908	0.001	0.250
1909	0.001	0.307
1910	0.001	0.294
1911	0.001	0.330

1912	0.001	0.549
1913	0.001	0.237
1914	0.000	1.015
1915	0.001	0.206
1916	0.001	0.383
1917	0.000	0.152
1918	0.001	0.305
1919	0.001	0.192
1920	0.001	0.251
1921	0.001	0.215
1922	0.001	0.337
1923	0.001	0.234
1924	0.001	0.443
1925	0.001	0.187
1926	0.001	0.360
1927	0.001	0.308
1928	0.001	0.218
1929	0.001	0.435
1930	0.001	0.460
1931	0.001	0.221
1932	0.001	0.237
1933	0.001	0.235
1934	0.001	0.382
1935	0.000	0.208
1936	0.001	0.282
1937	0.001	0.370
1938	0.001	0.209
1939	0.001	0.256
1940	0.001	0.461
1941	0.001	0.504
1942	0.001	0.340
1943	0.001	0.337
1944	0.001	0.485
1945	0.001	0.366
1946	0.001	0.287
1947	0.001	0.222
1948	0.001	0.305
1949	0.001	0.471
1950	0.001	0.260
1951	0.001	0.402
1952	0.001	0.451
1953	0.001	0.417
1954	0.001	0.246
1955	0.000	0.232
1956	0.000	0.215
1957	0.001	0.246
1958	0.001	0.306
1959	0.001	0.305
1960	0.001	0.249
1961	0.001	0.690
1962	0.001	0.297
1963	0.001	0.221
1964	0.001	0.636
1965	0.001	0.297
1966	0.001	0.240
1967	0.001	0.337
1968	0.001	0.284
1969	0.001	0.256

1970	0.001	0.287
1971	0.001	0.281
1972	0.001	0.930
1973	0.001	0.537
1974	0.001	0.393
1975	0.001	0.404
1976	0.001	0.431
1977	0.001	0.185
1978	0.001	0.312
1979	0.001	0.339
1980	0.001	0.324
1981	0.001	0.310
1982	0.001	0.249
1983	0.001	0.336
1984	0.001	0.334
1985	0.001	0.380
1986	0.001	0.192
1987	0.001	0.346
1988	0.001	0.202
1989	0.001	0.201
1990	0.001	0.246
1991	0.001	0.371
1992	0.001	0.356
1993	0.001	0.394
1994	0.001	0.272
1995	0.000	0.210
1996	0.001	0.283
1997	0.001	0.253
1998	0.001	0.302
1999	0.000	0.346
2000	0.001	0.286
2001	0.000	0.235
2002	0.001	0.419
2003	0.001	0.243
2004	0.001	0.367
2005	0.001	0.715
2006	0.001	0.329
2007	0.001	0.368
2008	0.001	0.303
2009	0.001	0.231
2010	0.001	0.297
2011	0.001	0.308
2012	0.001	0.290
2013	0.001	0.274
2014	0.001	0.268
2015	0.001	0.437
2016	0.001	0.290
2017	0.001	0.446
2018	0.001	0.266
2019	0.001	0.396
2020	0.001	0.325
2021	0.001	0.273
2022	0.000	0.455
2023	0.001	0.570
2024	0.001	0.596
2025	0.001	0.299
2026	0.001	0.338
2027	0.001	0.368

2028	0.000	0.143
2029	0.001	0.235
2030	0.001	0.499
2031	0.000	0.149
2032	0.001	0.249
2033	0.000	0.315
2034	0.001	0.239
2035	0.001	0.303
2036	0.001	0.247
2037	0.001	0.331
2038	0.001	0.313
2039	0.001	0.628
2040	0.001	0.247
2041	0.001	0.313
2042	0.001	0.366
2043	0.001	0.401
2044	0.001	0.275
2045	0.001	0.223
2046	0.001	0.247
2047	0.001	0.305
2048	0.001	0.250
2049	0.001	0.371
2050	0.001	0.278
2051	0.001	0.390
2052	0.001	0.301
2053	0.001	0.254
2054	0.001	0.499
2055	0.001	0.286
2056	0.000	0.400
2057	0.001	0.191
2058	0.001	0.375
2059	0.001	0.473

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0013	1.0150
2	0.0011	0.9302
3	0.0010	0.7146
4	0.0010	0.6905
5	0.0010	0.6359
6	0.0010	0.6282
7	0.0010	0.5964
8	0.0010	0.5701
9	0.0010	0.5485
10	0.0010	0.5372
11	0.0010	0.5036
12	0.0010	0.4992
13	0.0010	0.4985
14	0.0010	0.4854
15	0.0010	0.4732
16	0.0010	0.4707
17	0.0010	0.4606
18	0.0010	0.4601
19	0.0010	0.4547
20	0.0010	0.4515
21	0.0010	0.4513
22	0.0010	0.4461

23	0.0010	0.4433
24	0.0010	0.4375
25	0.0010	0.4352
26	0.0010	0.4305
27	0.0010	0.4192
28	0.0010	0.4174
29	0.0010	0.4038
30	0.0009	0.4019
31	0.0009	0.4015
32	0.0009	0.4004
33	0.0009	0.3995
34	0.0009	0.3961
35	0.0009	0.3943
36	0.0009	0.3932
37	0.0009	0.3900
38	0.0009	0.3829
39	0.0009	0.3818
40	0.0009	0.3803
41	0.0009	0.3753
42	0.0009	0.3713
43	0.0009	0.3708
44	0.0009	0.3699
45	0.0009	0.3682
46	0.0009	0.3677
47	0.0009	0.3669
48	0.0009	0.3661
49	0.0009	0.3660
50	0.0009	0.3609
51	0.0009	0.3599
52	0.0009	0.3561
53	0.0009	0.3457
54	0.0009	0.3455
55	0.0009	0.3396
56	0.0009	0.3390
57	0.0009	0.3377
58	0.0009	0.3374
59	0.0009	0.3367
60	0.0009	0.3365
61	0.0009	0.3359
62	0.0009	0.3335
63	0.0009	0.3314
64	0.0009	0.3305
65	0.0009	0.3294
66	0.0009	0.3250
67	0.0009	0.3235
68	0.0009	0.3148
69	0.0009	0.3133
70	0.0009	0.3127
71	0.0009	0.3116
72	0.0009	0.3096
73	0.0009	0.3084
74	0.0009	0.3079
75	0.0009	0.3069
76	0.0009	0.3058
77	0.0009	0.3053
78	0.0009	0.3050
79	0.0009	0.3049
80	0.0009	0.3046

81	0.0009	0.3031
82	0.0009	0.3029
83	0.0009	0.3027
84	0.0009	0.3018
85	0.0009	0.3012
86	0.0009	0.2993
87	0.0009	0.2969
88	0.0009	0.2968
89	0.0008	0.2966
90	0.0008	0.2937
91	0.0008	0.2903
92	0.0008	0.2896
93	0.0008	0.2873
94	0.0008	0.2866
95	0.0008	0.2864
96	0.0008	0.2862
97	0.0008	0.2843
98	0.0008	0.2826
99	0.0008	0.2819
100	0.0008	0.2813
101	0.0008	0.2780
102	0.0008	0.2747
103	0.0008	0.2737
104	0.0008	0.2730
105	0.0008	0.2718
106	0.0008	0.2682
107	0.0008	0.2662
108	0.0008	0.2602
109	0.0008	0.2558
110	0.0008	0.2557
111	0.0008	0.2539
112	0.0008	0.2528
113	0.0008	0.2513
114	0.0007	0.2505
115	0.0007	0.2495
116	0.0007	0.2487
117	0.0007	0.2487
118	0.0007	0.2486
119	0.0007	0.2474
120	0.0007	0.2470
121	0.0007	0.2468
122	0.0007	0.2463
123	0.0007	0.2460
124	0.0007	0.2455
125	0.0007	0.2430
126	0.0007	0.2400
127	0.0006	0.2390
128	0.0006	0.2373
129	0.0006	0.2369
130	0.0006	0.2355
131	0.0006	0.2352
132	0.0006	0.2345
133	0.0006	0.2339
134	0.0006	0.2320
135	0.0006	0.2310
136	0.0006	0.2303
137	0.0006	0.2227
138	0.0006	0.2221

139	0.0006	0.2212
140	0.0006	0.2205
141	0.0006	0.2184
142	0.0005	0.2151
143	0.0005	0.2148
144	0.0005	0.2104
145	0.0005	0.2085
146	0.0005	0.2079
147	0.0005	0.2057
148	0.0005	0.2031
149	0.0005	0.2023
150	0.0004	0.2011
151	0.0004	0.1920
152	0.0004	0.1918
153	0.0004	0.1911
154	0.0003	0.1869
155	0.0003	0.1854
156	0.0003	0.1519
157	0.0003	0.1491
158	0.0003	0.1425

Duration Flows

The Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0004	4705	1115769	23714	Fail
0.0004	4540	1110783	24466	Fail
0.0004	4373	1106351	25299	Fail
0.0004	4188	1101365	26298	Fail
0.0004	4011	1096933	27348	Fail
0.0004	3873	1092501	28208	Fail
0.0005	3713	1088069	29304	Fail
0.0005	3587	1084745	30241	Fail
0.0005	3462	1080312	31204	Fail
0.0005	3359	1076434	32046	Fail
0.0005	3224	1072002	33250	Fail
0.0005	3087	1068124	34600	Fail
0.0005	2947	1064246	36112	Fail
0.0005	2864	1060368	37024	Fail
0.0005	2763	1056490	38237	Fail
0.0005	2660	1052612	39571	Fail
0.0005	2582	1049288	40638	Fail
0.0005	2476	1045410	42221	Fail
0.0006	2393	1042086	43547	Fail
0.0006	2337	1038762	44448	Fail
0.0006	2270	1035438	45614	Fail
0.0006	2200	1032114	46914	Fail
0.0006	2133	1028790	48232	Fail
0.0006	2055	1025466	49901	Fail
0.0006	1975	1022142	51754	Fail
0.0006	1902	1019372	53594	Fail
0.0006	1844	1016048	55100	Fail
0.0006	1793	1012724	56482	Fail
0.0006	1738	1009954	58110	Fail
0.0006	1680	1006630	59918	Fail
0.0006	1604	1003860	62584	Fail
0.0007	1548	1001090	64669	Fail
0.0007	1505	998320	66333	Fail
0.0007	1466	994995	67871	Fail
0.0007	1406	992779	70610	Fail
0.0007	1316	987793	75060	Fail
0.0007	1241	983361	79239	Fail
0.0007	1168	980591	83954	Fail
0.0007	1101	977821	88812	Fail
0.0007	1049	975605	93003	Fail
0.0007	1014	972835	95940	Fail
0.0007	973	970065	99698	Fail
0.0007	950	967849	101878	Fail
0.0007	908	965079	106286	Fail
0.0008	864	962863	111442	Fail
0.0008	826	960093	116234	Fail
0.0008	773	957877	123916	Fail
0.0008	743	955661	128621	Fail
0.0008	700	953445	136206	Fail
0.0008	670	950675	141891	Fail
0.0008	631	948459	150310	Fail
0.0008	608	946243	155632	Fail
0.0008	564	944027	167380	Fail
0.0008	534	941811	176369	Fail

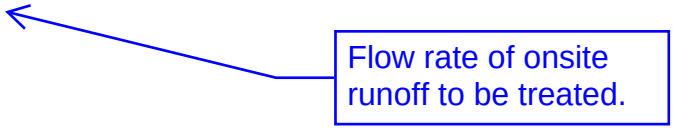
0.0008	480	939595	195748	Fail
0.0008	456	937379	205565	Fail
0.0009	428	935163	218496	Fail
0.0009	398	932947	234408	Fail
0.0009	361	930731	257820	Fail
0.0009	307	928515	302447	Fail
0.0009	280	926853	331018	Fail
0.0009	250	924637	369854	Fail
0.0009	220	922421	419282	Fail
0.0009	198	920759	465029	Fail
0.0009	179	918543	513152	Fail
0.0009	144	916327	636338	Fail
0.0009	127	914665	720208	Fail
0.0009	115	912449	793433	Fail
0.0009	91	910787	1000864	Fail
0.0010	62	908570	1465435	Fail
0.0010	50	906908	1813816	Fail
0.0010	29	904692	3119627	Fail
0.0010	16	903030	5643937	Fail
0.0010	3	901368	30045600	Fail
0.0010	3	899706	29990200	Fail
0.0010	3	897490	29916333	Fail
0.0010	3	895828	29860933	Fail
0.0010	3	894166	29805533	Fail
0.0010	3	892504	29750133	Fail
0.0010	3	890288	29676266	Fail
0.0010	3	888626	29620866	Fail
0.0010	3	886964	29565466	Fail
0.0011	3	885302	29510066	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	2	876992	43849600	Fail
0.0011	1	875330	87533000	Fail
0.0011	1	873668	87366800	Fail
0.0011	1	872006	87200600	Fail
0.0011	1	870344	87034400	Fail
0.0011	1	868682	86868200	Fail
0.0011	1	867020	86702000	Fail
0.0012	1	865912	86591200	Fail
0.0012	1	864250	86425000	Fail
0.0012	1	862588	86258800	Fail
0.0012	1	860926	86092600	Fail
0.0012	1	859264	85926400	Fail
0.0012	1	858156	85815600	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

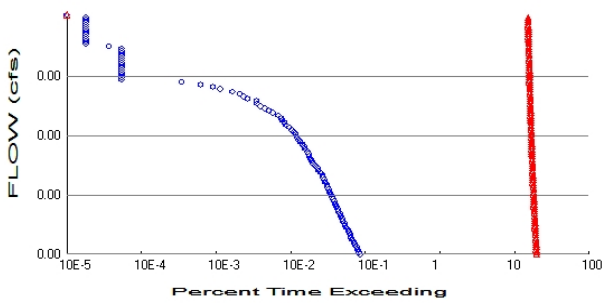
On-line facility volume:	0.093 acre-feet
On-line facility target flow:	0.129 cfs.
Adjusted for 15 min:	0.129 cfs.
Off-line facility target flow:	0.0749 cfs.
Adjusted for 15 min:	0.0749 cfs.

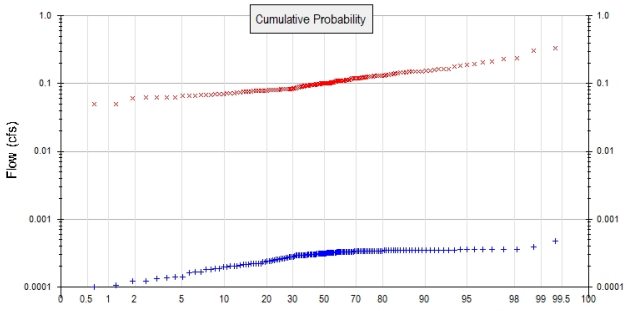


LID Report

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
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

POC 2





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 0.44
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2
Total Pervious Area: 0.16
Total Impervious Area: 0.28

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.000294
5 year	0.000358
10 year	0.000387
25 year	0.000415
50 year	0.00043
100 year	0.000442

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.100454
5 year	0.134744
10 year	0.159652
25 year	0.193726
50 year	0.221062
100 year	0.250125

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

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	0.077
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	0.000	0.156

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

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	0.1810
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	0.0003	0.1551
17	0.0003	0.1517
18	0.0003	0.1516
19	0.0003	0.1498
20	0.0003	0.1487
21	0.0003	0.1487
22	0.0003	0.1470
23	0.0003	0.1460

24	0.0003	0.1441
25	0.0003	0.1434
26	0.0003	0.1418
27	0.0003	0.1381
28	0.0003	0.1375
29	0.0003	0.1330
30	0.0003	0.1324
31	0.0003	0.1323
32	0.0003	0.1319
33	0.0003	0.1316
34	0.0003	0.1305
35	0.0003	0.1299
36	0.0003	0.1295
37	0.0003	0.1285
38	0.0003	0.1261
39	0.0003	0.1258
40	0.0003	0.1253
41	0.0003	0.1236
42	0.0003	0.1223
43	0.0003	0.1222
44	0.0003	0.1219
45	0.0003	0.1213
46	0.0003	0.1211
47	0.0003	0.1209
48	0.0003	0.1206
49	0.0003	0.1206
50	0.0003	0.1189
51	0.0003	0.1186
52	0.0003	0.1173
53	0.0003	0.1139
54	0.0003	0.1138
55	0.0003	0.1119
56	0.0003	0.1117
57	0.0003	0.1112
58	0.0003	0.1112
59	0.0003	0.1110
60	0.0003	0.1109
61	0.0003	0.1107
62	0.0003	0.1099
63	0.0003	0.1092
64	0.0003	0.1089
65	0.0003	0.1085
66	0.0003	0.1071
67	0.0003	0.1066
68	0.0003	0.1037
69	0.0003	0.1032
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	0.0978
88	0.0003	0.0978
89	0.0003	0.0977
90	0.0003	0.0968
91	0.0003	0.0956
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	0.0857
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	0.0819
117	0.0003	0.0819
118	0.0003	0.0819
119	0.0003	0.0815
120	0.0003	0.0814
121	0.0003	0.0813
122	0.0002	0.0811
123	0.0002	0.0810
124	0.0002	0.0809
125	0.0002	0.0801
126	0.0002	0.0791
127	0.0002	0.0787
128	0.0002	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	0.0693
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	0.0001	0.0663
151	0.0001	0.0633
152	0.0001	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 Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0001	4689	1093055	23311	Fail
0.0001	4577	1089731	23808	Fail
0.0002	4401	1084745	24647	Fail
0.0002	4210	1080312	25660	Fail
0.0002	4029	1075326	26689	Fail
0.0002	3887	1070894	27550	Fail
0.0002	3717	1066462	28691	Fail
0.0002	3571	1062030	29740	Fail
0.0002	3479	1058706	30431	Fail
0.0002	3372	1054828	31281	Fail
0.0002	3246	1050396	32359	Fail
0.0002	3103	1046518	33726	Fail
0.0002	2949	1042086	35336	Fail
0.0002	2860	1038208	36300	Fail
0.0002	2753	1034330	37571	Fail
0.0002	2680	1032114	38511	Fail
0.0002	2604	1028236	39486	Fail
0.0002	2491	1024358	41122	Fail
0.0002	2401	1020480	42502	Fail
0.0002	2342	1017156	43431	Fail
0.0002	2263	1013832	44800	Fail
0.0002	2191	1009954	46095	Fail
0.0002	2142	1007738	47046	Fail
0.0002	2069	1004414	48545	Fail
0.0002	1991	1001090	50280	Fail
0.0002	1904	997766	52403	Fail
0.0002	1845	994441	53899	Fail
0.0002	1791	991117	55338	Fail
0.0002	1733	984469	56807	Fail
0.0002	1688	982253	58190	Fail
0.0002	1612	979483	60761	Fail
0.0002	1555	976159	62775	Fail
0.0002	1509	973389	64505	Fail
0.0002	1472	970065	65901	Fail
0.0002	1403	967295	68944	Fail
0.0002	1307	964525	73796	Fail
0.0002	1252	962863	76905	Fail
0.0003	1182	960093	81226	Fail
0.0003	1106	957323	86557	Fail
0.0003	1052	954553	90736	Fail
0.0003	1015	951783	93771	Fail
0.0003	973	949013	97534	Fail
0.0003	948	946243	99814	Fail
0.0003	926	944581	102006	Fail
0.0003	870	941811	108254	Fail
0.0003	831	939595	113067	Fail
0.0003	788	936825	118886	Fail
0.0003	743	934609	125788	Fail
0.0003	700	931839	133119	Fail
0.0003	666	929623	139583	Fail
0.0003	645	927961	143869	Fail
0.0003	609	925745	152010	Fail
0.0003	565	922975	163358	Fail
0.0003	535	920759	172104	Fail

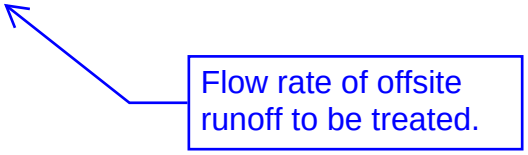
0.0003	482	918543	190569	Fail
0.0003	457	916327	200509	Fail
0.0003	426	914111	214580	Fail
0.0003	412	912449	221468	Fail
0.0003	373	910233	244030	Fail
0.0003	316	908016	287346	Fail
0.0003	282	905800	321205	Fail
0.0003	248	903584	364348	Fail
0.0003	219	901922	411836	Fail
0.0003	197	899706	456703	Fail
0.0003	191	898044	470180	Fail
0.0003	145	896382	618194	Fail
0.0003	130	894166	687820	Fail
0.0003	115	891950	775608	Fail
0.0003	92	890288	967704	Fail
0.0003	63	888072	1409638	Fail
0.0003	50	885856	1771711	Fail
0.0003	34	884748	2602200	Fail
0.0004	19	882532	4644905	Fail
0.0004	3	880870	29362333	Fail
0.0004	3	879208	29306933	Fail
0.0004	3	876992	29233066	Fail
0.0004	3	875330	29177666	Fail
0.0004	3	873114	29103800	Fail
0.0004	3	872006	29066866	Fail
0.0004	3	870344	29011466	Fail
0.0004	3	868682	28956066	Fail
0.0004	3	866466	28882200	Fail
0.0004	3	864804	28826800	Fail
0.0004	3	863142	28771400	Fail
0.0004	3	861480	28716000	Fail
0.0004	3	860372	28679066	Fail
0.0004	3	858156	28605200	Fail
0.0004	2	856494	42824700	Fail
0.0004	1	854832	85483200	Fail
0.0004	1	853170	85317000	Fail
0.0004	1	851508	85150800	Fail
0.0004	1	849846	84984600	Fail
0.0004	1	848738	84873800	Fail
0.0004	1	847076	84707600	Fail
0.0004	1	845414	84541400	Fail
0.0004	1	843752	84375200	Fail
0.0004	1	842090	84209000	Fail
0.0004	1	840428	84042800	Fail
0.0004	1	839320	83932000	Fail
0.0004	1	837658	83765800	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 #2

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:	0.0246 cfs.
Adjusted for 15 min:	0.0246 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
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

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   default[33].wdm
MESSU      25   Predefault[33].MES
           27   Predefault[33].L61
           28   Predefault[33].L62
           30   POCdefault[33]1.dat
           31   POCdefault[33]2.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       1
      COPY       501
      COPY       502
      DISPLY       1
      DISPLY       2
    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
    2        Basin  2                   MAX                    1    2   31    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         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                        1.22     COPY   501     12
PERLND   1                        1.22     COPY   501     13
Basin  2***
PERLND   1                        0.44     COPY   502     12
PERLND   1                        0.44     COPY   502     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   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     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 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   502 OUTPUT MEAN   1 1     48.4      WDM    502 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   default[33].wdm
MESSU       25   Mitdefault[33].MES
            27   Mitdefault[33].L61
            28   Mitdefault[33].L62
            30   POCdefault[33]1.dat
            31   POCdefault[33]2.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND       4
      IMPLND       1
      COPY       501
      COPY       502
      DISPLY       1
      DISPLY       2
    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
    2        Basin  2                   MAX                    1    2   31    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         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                        0.37     COPY   501     12
PERLND   4                        0.37     COPY   501     13
IMPLND   1                        0.85     COPY   501     15
Basin  2***
PERLND   4                        0.16     COPY   502     12
PERLND   4                        0.16     COPY   502     13
IMPLND   1                        0.28     COPY   502     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   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     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     2 OUTPUT MEAN   1 1     48.4      WDM    702 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     48.4      WDM    802 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
```

Mitigated HSPF Message File

Disclaimer

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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

Onsite Peak Flow Entering Storm Main

Project Description

File Name ..... Onsite Peak Flow.SPF

Project Options

Flow Units ..... CFS
Elevation Type ..... Elevation
Hydrology Method ..... Santa Barbara UH
Time of Concentration (TOC) Method ..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Enable Overflow Ponding at Nodes ..... YES
Skip Steady State Analysis Time Periods ..... NO

Analysis Options

Start Analysis On	00:00:00	0:00:00
End Analysis On	00:00:00	0:00:00
Start Reporting On	00:00:00	0:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

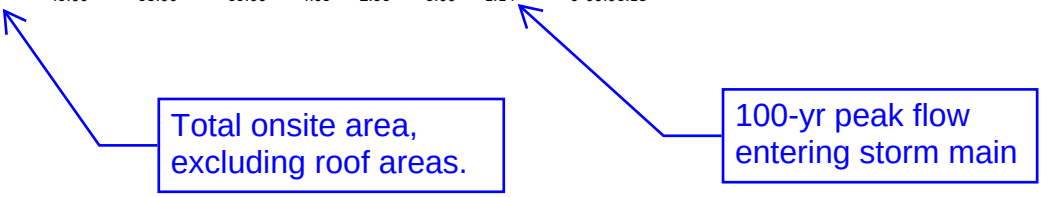
	Qty
Rain Gages	1
Subbasins	1
Nodes	1
Junctions	0
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-01	Cumulative	inches	Washington	Pierce	100.00	4.10	SCS Type IA 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	1.95	49.00	98.00	69.00	4.09	2.56	5.00	1.14	0 00:06:18



Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Out-01	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : Sub-01

Input Data

Area (ac)	1.95
Impervious Area (%)	49
Impervious Area Curve Number	98
Pervious Area Curve Number	69
Rain Gage ID	Rain Gage-01

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
Composite Area & Weighted CN	1.95		83.21

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

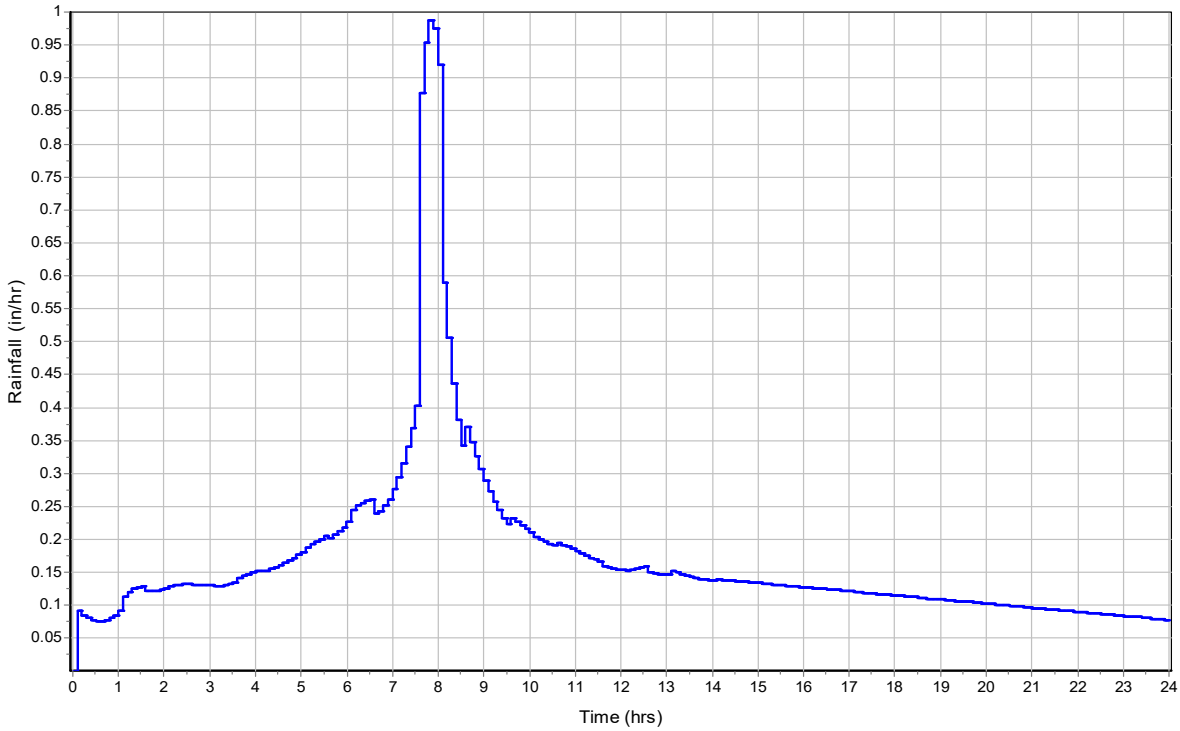
User-Defined TOC override (minutes): 6.3

Subbasin Runoff Results

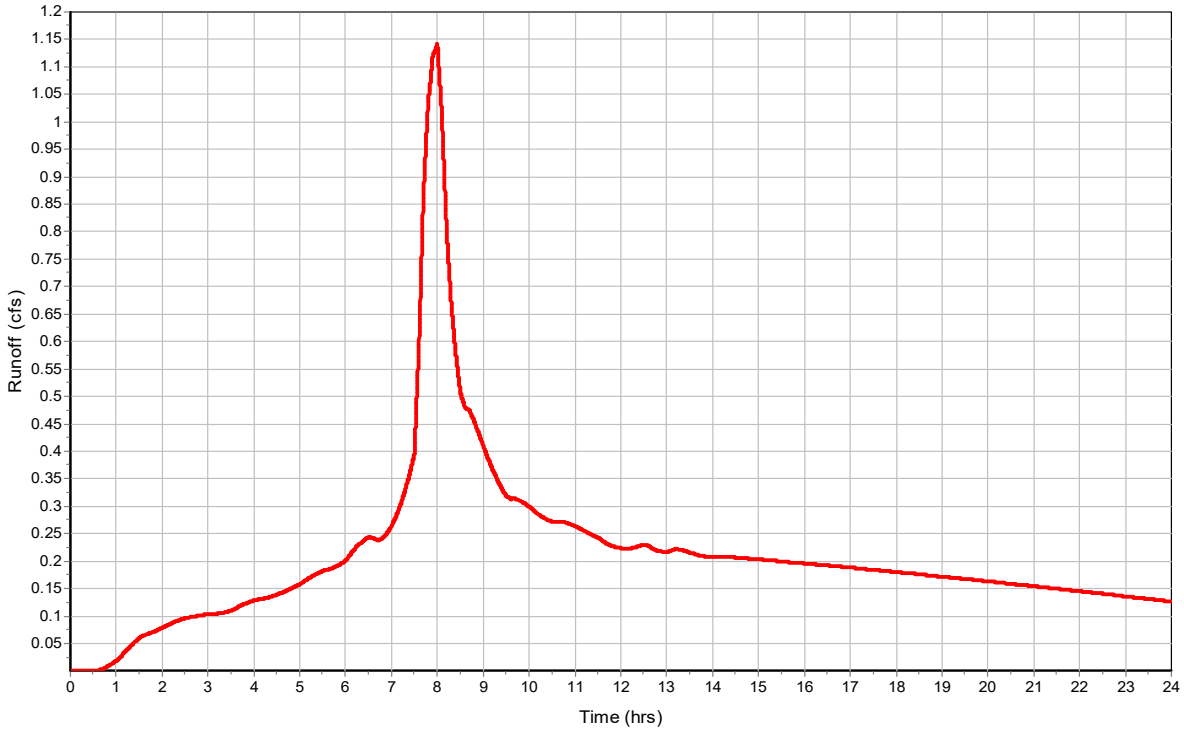
Total Rainfall (in)	4.09
Total Runoff (in)	2.56
Peak Runoff (cfs)	1.14
Weighted Curve Number	83.21
Time of Concentration (days hh:mm:ss)	0 00:06:18

Subbasin : Sub-01

Rainfall Intensity Graph



Runoff Hydrograph



8" SDR 18 Pipe @ 1.00%

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.010	
Channel Slope	1.00	%
Normal Depth	8.00	in
Diameter	8.00	in

Results

Discharge	1.57	ft³/s
Flow Area	0.35	ft²
Wetted Perimeter	2.09	ft
Hydraulic Radius	2.00	in
Top Width	0.00	ft
Critical Depth	0.58	ft
Percent Full	100.0	%
Critical Slope	0.00907	ft/ft
Velocity	4.50	ft/s
Velocity Head	0.31	ft
Specific Energy	0.98	ft
Froude Number	0.00	
Maximum Discharge	1.69	ft³/s
Discharge Full	1.57	ft³/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

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" SDR 18 Pipe @ 1.00%

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	8.00	in
Critical Depth	0.58	ft
Channel Slope	1.00	%
Critical Slope	0.00907	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

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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: 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

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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

March 2026

Subject: Bradbury Place Townhomes – N-12 & HP Storm Pipe Minimum Required Cover

This letter is to serve as support for the N-12 and HP Storm piping intended for use on the *Bradbury Place Townhomes* project.

Per Advanced Drainage Systems' internal standards, both N-12 dual wall corrugated HDPE pipe and HP Storm corrugated polypropylene pipe in diameters of 4" – 48" require a ***minimum cover of 1'***. Assuming the backfill envelope is constructed in accordance with the requirements of *ASTM D2321* and the ADS provided installation and compaction standards, 1' of cover over N-12 and HP Storm will support traffic loads (*AASHTO H-20, H-25, or HL-93 loads).*

If you have any questions, comments, or require additional information regarding this topic, you can reach me at dennis.hurt@adspipe.com or by phone at (206)-747-8301.

Regards,

Dennis Hurt
Regional Engineer
Advanced Drainage System, Inc.

Technical Note

TN 2.01 Minimum and Maximum Burial Depth for Corrugated HDPE Pipe (per AASHTO)

Introduction

The information in this document is designed to provide answers to general cover height questions; the data provided is not intended to be used for project design. The design procedure described in the Structures section (Section 2) of the Drainage Handbook provides detailed information for analyzing most common installation conditions. This procedure should be utilized for project specific designs.

The two common cover height concerns are minimum cover in areas exposed to vehicular traffic and maximum cover heights. Either may be considered "worst case" scenario from a loading perspective, depending on the project conditions.

The minimum and maximum cover heights in this technical note are not applicable to retention/ detention systems, where unique configurations of fittings may require different minimum and maximum cover height limits. Please reference ADS Standard Detail 702 "Retention-Detention System (Cross-Section)" for cover height recommendations.

Minimum Cover in Traffic Applications

Pipe diameters from 4" - 48" (100 - 1200 mm) installed in traffic areas (AASHTO H-20, H-25, or HL-93 loads) must have at least 1' (0.3 m) of cover over the pipe crown, while 54" - 60" (1350 - 1500 mm) pipes must have at least 24" (600 mm) of cover. The backfill envelope must be constructed in accordance with the Installation section (Section 5) of the Drainage Handbook and the requirements of ASTM D2321. The backfill envelope must be of the type and compaction listed in Appendix A-5, Table A-5-2 of the Drainage Handbook. In Table 1 below, this condition is represented by a Class III material compacted to 95% standard Proctor density or a Class II material compacted to 90% standard proctor density, although other material can provide similar strength at slightly lower levels of compaction. Structural backfill material should extend to the crown of the pipe; the remaining cover should be appropriate for the installation and as specified by the design engineer. If settlement or rutting is a concern, it may be appropriate to extend the structural backfill to grade. Where pavement is involved, sub-base material can be considered in the minimum burial depth. While rigid pavements can be included in the minimum cover, the thickness of flexible pavements should not be included in the minimum cover.

Additional information that may affect the cover requirements is included in the Installation section (Section 5) of the Drainage Handbook. Some examples of what may need to be considered are temporary heavy equipment, construction loading, paving equipment and similar loads that are less than the design load, the potential of pipe flotation, and the type of surface treatment which will be installed over the pipe zone.

Table 1 Minimum Cover Requirements for ADS N-12®, N-12 ST, and N-12 WT (per AASHTO) with AASHTO H-20, H-25, or HL-93 Load

Inside Diameter, ID, in (mm)	Minimum Cover ft (m)	Inside Diameter, ID, in (mm)	Minimum Cover ft (m)
4 (100)	1 (0.3)	24 (600)	1 (0.3)
6 (150)	1 (0.3)	30 (750)	1 (0.3)
8 (200)	1 (0.3)	36 (900)	1 (0.3)
10 (250)	1 (0.3)	42 (1050)	1 (0.3)
12 (300)	1 (0.3)	48 (1200)	1 (0.3)
15 (375)	1 (0.3)	54 (1350)	2 (0.6)
18 (450)	1 (0.3)	60 (1500)	2 (0.6)

Notes for Table 1:

1. *Minimum covers presented here were calculated assuming Class III backfill material to 95% standard Proctor density or Class II backfill material to 90% standard Proctor density around the pipe and structural backfill to the crown of the pipe, as recommended in Section 5 of the Drainage Handbook, with an additional layer of compacted traffic lane sub-base for a total cover as required. In shallow traffic installations, especially where pavement is involved, a good quality compacted material to grade is required to prevent surface rutting. Material must be adequately "knifed" into haunch and in between corrugations. Compaction and backfill material is assumed uniform throughout entire backfill zone.*
2. *The minimum covers specified do not include pavement thickness. A pavement section of 0.4' (0.1 m) is typical.*
3. *Backfill materials and compaction levels not shown in the table may also be acceptable. Contact ADS for further detail.*
4. *Calculations assume no hydrostatic pressure and native soils that are as strong as the specified minimum backfill recommendations.*

Maximum Cover

Wall thrust generally governs the maximum cover a pipe can withstand and conservative maximum cover heights will result when using the information presented in the *Structures* section (Section 2) of the Drainage Handbook.

The maximum burial depth is highly influenced by the type of backfill and level of compaction around the pipe. General maximum cover limits for ADS N-12, N-12 ST, N-12 WT pipe, (ASTM F2306 and AASTHO M252/M294 Type S pipes) are shown in Table 3 for a variety of backfill conditions.

Table 3 was developed assuming pipe is installed in accordance with ASTM D2321 and the *Installation* section (Section 5) of the Drainage Handbook. Additionally, the calculations assume zero hydrostatic load, incorporate the maximum safety factors represented in Structures section of the Drainage Handbook, use material properties consistent with the expected performance characteristics for N-12 (per ASTM F2306) materials as shown in Table 2 below, and assume the native soil is of adequate strength and is suitable for installation. For applications requiring fill heights greater than those shown in Table 3 or where hydrostatic pressure due to groundwater is present, contact an ADS engineering representative.

Figure 1 ADS N-12→, N-12 ST, and N-12 WT (per AASHTO) Trench Detail Under Pavement

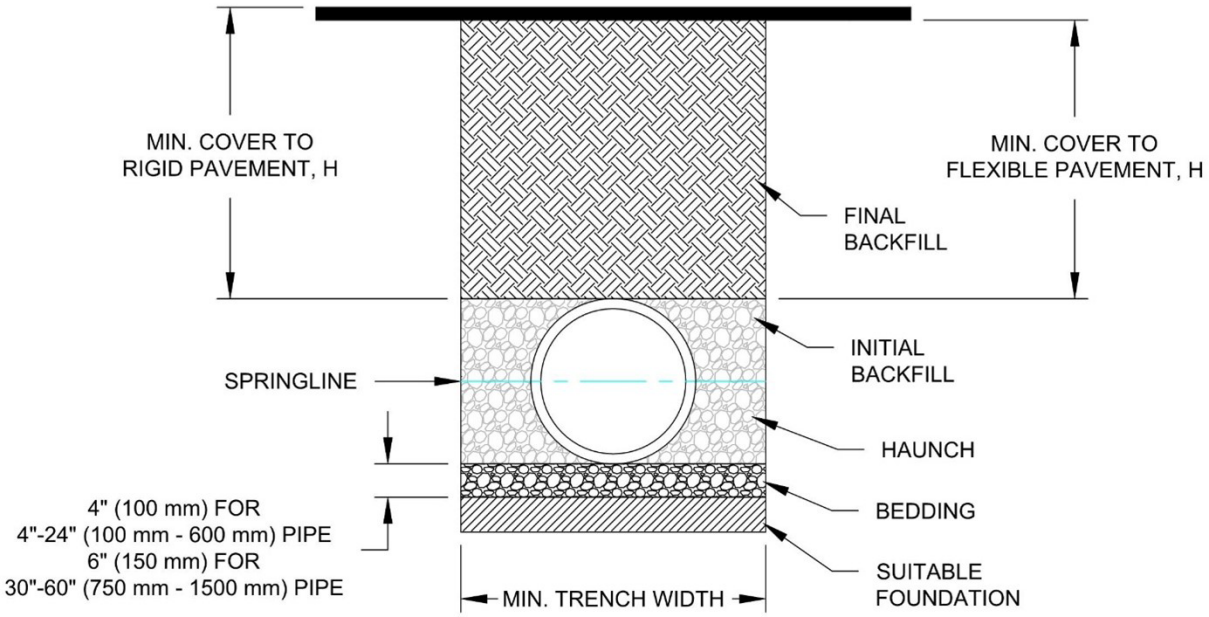

Table 2 ADS N-12 (per AASHTO) Mechanical Properties

Cell Class	Factored Compressive Strain (%)	Tension Strain (%)	Initial		75-Year	
			Fu (psi)	E (psi)	Fu (psi)	E (psi)
ASTM D3350 435400C	4.1	5.0	3,000	110,000	900	21,000

Table 3 Maximum Cover for ADS N-12, N-12 ST, and N-12 WT Pipe (per AASHTO)

Diameter in. (mm)	Class 1		Class 2			Class 3	
	Compacted ft (m)	Dumped ft (m)	95% ft (m)	90% ft (m)	85%[3] ft (m)	95% ft (m)	90%[3] ft (m)
4 (100)	37 (11.3)	18 (5.5)	25 (7.6)	18 (5.5)	12 (3.7)	18 (5.5)	13 (4.0)
6 (150)	44 (13.4)	20 (6.1)	29 (8.8)	20 (6.1)	14 (4.3)	21 (6.4)	15 (4.6)
8 (200)	32 (9.8)	15 (4.6)	22 (6.7)	15 (4.6)	10 (3.0)	16 (4.9)	11 (3.4)
10 (250)	38 (11.6)	18 (5.5)	26 (7.9)	18 (5.5)	12 (3.7)	18 (5.5)	13 (4.0)
12 (300)	35 (10.7)	17 (5.2)	24 (7.3)	17 (5.2)	8 (2.4)	17 (5.2)	11 (3.4)
15 (375)	38 (11.6)	17 (5.2)	25 (7.6)	17 (5.2)	8 (2.4)	18 (5.5)	11 (3.4)
18 (450)	36 (11.0)	17 (5.2)	24 (7.3)	17 (5.2)	8 (2.4)	17 (5.2)	11 (3.4)
24 (600)	28 (8.5)	13 (4.0)	20 (6.1)	13 (4.0)	7 (2.1)	14 (4.3)	10 (3.0)
30 (750)	28 (8.5)	13 (4.0)	20 (6.1)	13 (4.0)	7 (2.1)	14 (4.3)	9 (2.7)
36 (900)	26 (7.9)	12 (3.7)	18 (5.5)	12 (3.7)	7 (2.1)	13 (4.0)	9 (2.7)
42 (1050)	23 (7.0)	11 (3.4)	16 (4.9)	11 (3.4)	7 (2.1)	11 (3.4)	7 (2.1)
48 (1200)	25 (7.6)	11 (3.4)	17 (5.2)	11 (3.4)	7 (2.1)	12 (3.7)	7 (2.1)
54 (1350)	22 (6.7)	10 (3.0)	16 (4.9)	10 (3.0)	6 (1.8)	11 (3.4)	7 (2.1)
60 (1500)	25 (7.6)	11 (3.4)	17 (5.2)	11 (3.4)	6 (1.8)	12 (3.7)	7 (2.1)

Notes:

1. *Results based on calculations shown in the Structures section of the ADS Drainage Handbook (v20.7). Calculations assume no hydrostatic pressure and a density of 120 pcf (1926 kg/m^3) for overburden material.*
2. *Installation assumed to be in accordance with ASTM D2321 and the Installation section of the Drainage Handbook.*
3. *For installations using lower quality backfill materials or lower compaction efforts, pipe deflection may exceed the 5% design limit; however controlled deflection may not be a structurally limiting factor for the pipe. For installations where deflection is critical, pipe placement techniques or periodic deflection measurements may be required to ensure satisfactory pipe installation.*
4. *Backfill materials and compaction levels not shown in the table may also be acceptable. Contact ADS for further detail.*
5. *Material must be adequately "knifed" into haunch and in between corrugations. Compaction and backfill material is assumed uniform throughout entire backfill zone.*
6. *Compaction levels shown are for standard Proctor density.*
7. *For projects where cover exceeds the maximum values listed above, contact ADS for specific design considerations.*
8. *Calculations assume no hydrostatic pressure. Hydrostatic pressure will result in a reduction in allowable fill height. Reduction in allowable fill height must be assessed by the design engineer for the specific field conditions.*
9. *Fill height for dumped Class I material incorporate an additional degree of conservatism that is difficult to assess due to the large degree of variation in the consolidation of this material as it is dumped. There is limited analytical data on its performance. For this reason, values as shown are estimated to be conservatively equivalent to Class 2, 90% SPD.*

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Technical Note

TN 2.04 Minimum and Maximum Cover Heights for HP Storm Pipe for Storm Drainage

Introduction

The information in this document is designed to provide answers to general cover height questions; the data provided is not intended to be used for project design. The design procedure described in the *Structures* section (Section 2) of the Drainage Handbook provides detailed information for analyzing most common installation conditions. This procedure should be utilized for project specific designs.

The two common cover height concerns are minimum cover in areas exposed to vehicular traffic and maximum cover heights. Either may be considered "worst case" scenario from a loading perspective, depending on the project conditions.

Minimum Cover in Traffic Applications

Pipe diameters from 12" - 48" (300 - 1200 mm) installed in traffic areas (AASHTO H-20, H-25, or HL-93 loads) must have at least 1' (0.3 m) of cover over the pipe crown, while 60" (1500 mm) pipes must have at least 24" (600 mm) of cover. The backfill envelope must be constructed in accordance with the *Installation* section (Section 5) of the Drainage Handbook and the requirements of ASTM D2321. The backfill envelope must be of the type and compaction listed in Appendix A-5, Table A-5-2 of the Drainage Handbook. In Table 1 below, this condition is represented by a Class III material compacted to 95% standard Proctor density or a Class II material compacted to 90% standard proctor density, although other material can provide similar strength at slightly lower levels of compaction. Structural backfill material should extend to the crown of the pipe; the remaining cover should be appropriate for the installation and as specified by the design engineer. If settlement or rutting is a concern, it may be appropriate to extend the structural backfill to grade. Where pavement is involved, sub-base material can be considered in the minimum burial depth. While rigid pavements can be included in the minimum cover, the thickness of flexible pavements should not be included in the minimum cover.

Additional information that may affect the cover requirements is included in the *Installation* section (Section 5) of the Drainage Handbook. Some examples of what may need to be considered are temporary heavy equipment, construction loading , paving equipment and similar loads that are less than the design load, the potential of pipe flotation, and the type of surface treatment which will be installed over the pipe zone.

Table 1: Minimum Cover Requirements for ADS HP Storm with AASHTO H-25, H-20, or HL-93 Load

Inside Diameter, ID, in.(mm)	Minimum Cover ft. (m)
12 (300)	1 (0.3)
15 (375)	1 (0.3)
18 (450)	1 (0.3)
24 (600)	1 (0.3)
30 (750)	1 (0.3)

Inside Diameter, ID, in.(mm)	Minimum Cover ft. (m)
36 (900)	1 (0.3)
42 (1050)	1 (0.3)
48 (1200)	1 (0.3)
60 (1500)	2 (0.6)

Notes:

1. *Minimum covers presented here were calculated assuming Class III backfill material compacted to 95% standard Proctor density or Class II backfill material compacted to 90% standard Proctor density around the pipe, as recommended in Section 5 of the Drainage Handbook, with an additional layer of compacted traffic lane sub-base for a total cover as required. In shallow traffic installations, especially where pavement is involved, a good quality compacted material to grade is required to prevent surface settlement and rutting.*
2. *The minimum covers specified do not include pavement thickness. A pavement section of 0.4' is typical.*
3. *Backfill materials and compaction levels not shown in the table may also be acceptable. Contact ADS for further detail.*
4. *Calculations assume no hydrostatic pressure and native soils that are as strong as the specified minimum backfill recommendations.*

Maximum Cover

Wall thrust generally governs the maximum cover a pipe can withstand and conservative maximum cover heights will result when using the information presented in the *Structures* section (Section 2) of the Drainage Handbook. Table 2 below shows the material properties consistent with the expected performance characteristics for HP Storm materials for a 100-year design life.

The maximum burial depth is highly influenced by the type of backfill and level of compaction around the pipe. General maximum cover limits for ADS HP Storm use in storm drainage applications are shown in Tables 3 for a variety of backfill conditions.

Table 3 was developed assuming pipe is installed in accordance with ASTM D2321 and the *Installation* section (Section 5) of the Drainage handbook. Additionally, the calculations assume no hydrostatic load around the pipe, incorporate the maximum conservative AASHTO LRFD design factors represented in *Structures* section of the Drainage Handbook, use material properties consistent with the expected performance characteristics for HP Storm materials, as shown in Table 2, and assume the native (in-situ) soil is of adequate strength and suitable for installation. For applications requiring fill heights greater than those shown in Table 3 or where hydrostatic pressure due to groundwater is expected, contact an ADS Engineer.

Table 2: ADS HP Storm Mechanical Properties

Resin	ASTM Specification	Allowable Long Term Strain %	Initial		75-Year	
			Fu (psi)	E (psi)	Fu (psi)	E (psi)
Polypropylene, Impact-modified copolymer	ASTM F2881	3.7	3,500	175,000	1000	28,000

Figure 1: HP Storm Pipe Trench Detail with Uniform Backfill (Traffic and Non-Traffic Applications)

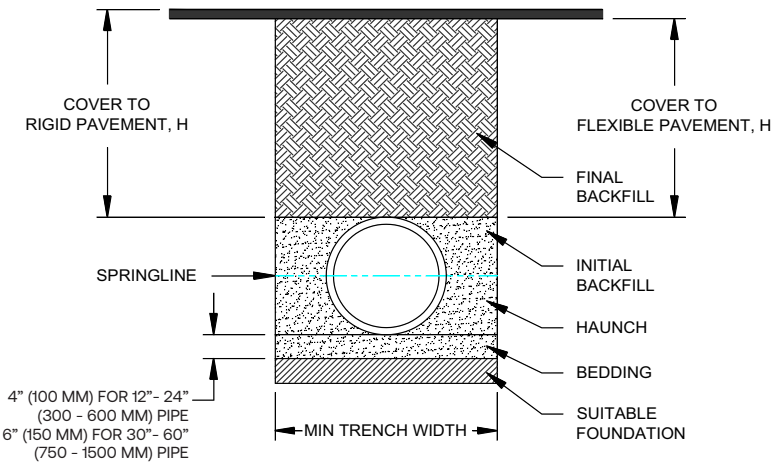

Table 3: Maximum Cover for ADS HP Storm Pipe with Uniform Backfill

Diameter	Class I		Class II			Class III		Class IV
in. (mm)	Compacted ft (m)	Dumped ft (m)	95% ft (m)	90% ft (m)	85% [3] ft (m)	95% ft (m)	90% [3] ft (m)	95% [3] ft (m)
12 (300)	41 (12.5)	21 (6.4)	28 (8.5)	21 (6.4)	16 (4.9)	20 (6.1)	16 (4.9)	16 (4.9)
15 (375)	42 (12.8)	21 (6.4)	29 (8.8)	21 (6.4)	16 (4.9)	21 (6.4)	16 (4.9)	16 (4.9)
18 (450)	44 (13.4)	21 (6.4)	30 (9.1)	21 (6.4)	16 (4.9)	22 (6.7)	17 (5.2)	16 (4.9)
24 (600)	30 (9.1)	15 (4.6)	21 (6.4)	15 (4.6)	11 (3.4)	16 (4.9)	11 (3.4)	11 (3.4)
30 (750)	39 (11.9)	19 (5.8)	27 (8.2)	19 (5.8)	14 (4.3)	19 (5.8)	15 (4.6)	14 (4.3)
36 (900)	28 (8.5)	14 (4.3)	20 (6.1)	14 (4.3)	10 (3.0)	14 (4.3)	11 (3.4)	10 (3.0)
42 (1050)	30 (9.1)	14 (4.3)	21 (6.4)	14 (4.3)	10 (3.0)	15 (4.6)	11 (3.4)	10 (3.0)
48 (1200)	29 (8.8)	14 (4.3)	20 (6.1)	14 (4.3)	9 (2.7)	14 (4.3)	10 (3.0)	10 (3.0)
60 (1500)	29 (8.8)	14 (4.3)	20 (6.1)	14 (4.3)	9 (2.7)	14 (4.3)	10 (3.0)	9 (2.7)

Notes:

1. *Results based on calculations shown in the Structures section of the ADS Drainage Handbook (v20.7). Calculations assume no hydrostatic pressure and a density of 120 pcf (1926 kg/m^3) for overburden material.*
2. *Installation assumed to be in accordance with ASTM D2321 and the Installation section of the Drainage Handbook.*
3. *For installations using lower quality backfill materials or lower compaction efforts, pipe deflection may exceed the 5% design limit; however controlled deflection may not be a structurally limiting factor for the pipe. For installation where deflection is critical, pipe placement techniques or periodic deflection measurements may be required to ensure satisfactory pipe installation.*
4. *Backfill materials and compaction levels not shown in the table may also be acceptable. Contact ADS for further detail.*
5. *Material must be adequately "knifed" into haunch and in between corrugations. Compaction and backfill material is assumed uniform throughout entire backfill zone.*
6. *Compaction levels shown are for standard Proctor density.*
7. *For projects where cover exceeds the maximum values listed above, contact ADS for specific design considerations.*
8. *See ADS Standard Detail STD-101D for additional details.*

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APPENDIX F

StreamFilter and BayFilter Information and GULD

February 2025

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS) AND PHOSPHORUS TREATMENT

For

Advanced Drainage Systems (ADS)
(BaySaver Technologies, LLC)
BayFilter™ System
Using Enhanced Media Cartridges (EMC)

Ecology's Decision

Based on BaySaver Technologies' application submissions for the BayFilter™ System using Enhanced Media Cartridges (BayFilter EMC), Ecology hereby issues the following use level designation:

1) General Use Level Designation (GULD) for Basic and Phosphorus Treatment:
   - Sized at a hydraulic loading rate of no greater than 0.50 gallons per minute (gpm) per square foot (sq ft) of filter area.
   - 45 gpm (0.10 cfs) per cartridge (example dimensions 28-inch diameter, 30-inches tall (90 sq ft filter area))
     - Canisters that provide 0.50 gpm per sq ft of filter area, regardless of dimensions meet this requirement
   - Using BaySaver's EMC Media Blend of Zeolite, Perlite, and Activated Alumina. Specifications of media shall match the specifications provided by the manufacturer and approved by Ecology

2) Maintenance data collected during the initial TAPE GULD testing and the post GULD maintenance assessment demonstrated the system was able to treat the following percentage of a water year before needing maintenance:

	Site Location	Land Use	Average TSS (mg/L)	D_{50} PSD (µm)	Maintenance Cycle[1] (% water year)
GULD Testing	Woodinville, WA	Commercial	63	52	100
Maintenance[2] Assessment					

[1] Ecology recommends considering maintenance cycle information when sizing the system. Sizing may need to be increased to meet the project, permit, or jurisdiction maintenance cycle.
[2] Maintenance assessment data are collected after issuing of the GULD. Maintenance assessment shall be completed by February 28, 2028.

3) Ecology approves the BayFilter EMC for treatment at the above flow rates per cartridge, and sized based on the water quality design flow rate for an off-line system. BaySaver designs their BayFilter systems to maintain the treatment of water quality design flow while routing excess flows around the filter vault during periods of peak bypass. The water quality design flow rates are calculated using the following procedures:

   - Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology- approved continuous runoff model and as described in section III-2.6 of the 2024 Stormwater Management Manual for Western Washington (SWMMWW).
   - Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 6.5.1 of the 2024 Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
   - Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

4) The GULD has no expiration date, but may be amended or revoked by Ecology, and is subject to the conditions specified below.

Ecology's Conditions of Use

BayFilter EMC units shall comply with these conditions:

1) Design, assemble, install, operate, and maintain the BayFilter EMC units in accordance with BaySaver Technologies' applicable manuals and documents and the Ecology Decision.
2) Maintenance: The required inspection/maintenance interval for stormwater treatment devices is often dependent on the efficiency of the device and the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.

- BaySaver recommends that the following be considered during the design application of the BayFilter Cartridge systems:
  - Water Quality Flow Rate
  - Anticipated Pollutant Load
  - Maintenance Frequency
- Ecology has found that a pre-treatment device prior to the BayFilter EMC system can provide a reduction in pollutant loads on these systems, thereby extending the maintenance interval.
- The BayFilter system contains filter fabric that is highly oleophilic (oil absorptive). When sufficient quantities of oils are present in the runoff, the oil and subsequent sediment particles may become attached to the fabric. As a result, it may compromise the maintenance interval of the BayFilter system. Oil control BMP's should be installed upstream of BayFilter installations if warranted, and/or the BayFilter system should be inspected after any known oil spill or release.
- Owners/operators must inspect BayFilter systems for a minimum of twelve months from the start of post-construction operation to determine site-specific inspection/maintenance schedules and requirements. Owners/operators must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30.) After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections or the manufacturer's anticipated maintenance interval, whichever is more frequent.
- Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flow rate and/or a decrease in pollutant removal ability.

3) When inspections are performed, the following findings typically serve as maintenance triggers:
   - Accumulated vault sediment depths exceed an average of 2 inches, or
   - Accumulated sediment depths on the tops of cartridges exceed an average of 0.5 inches, or
   - Standing water remains in the vault between rain events.
   - Bypass during storms smaller than the design storm.
   - Note: If excessive floatables (trash and debris) are present, perform minor maintenance consisting of gross solids removal, not cartridge replacement.
4) Discharges from the BayFilter EMC units shall not cause or contribute to water quality standard violations in receiving waters.

Approved Alternate Configurations

StreamFilter

1) The StreamFilter is a model of BayFilter used for small surface flow applications. The StreamFilter system utilizes a single or double BayFilter cartridge housed in a metal catch basin structure.
2) Ecology requires that StreamFilter cartridge media conform to the EMC media specifications approved by Ecology.
3) Ecology requires that StreamFilters that drain between events utilize the DDM technology approved by Ecology.
4) To select the size of a StreamFilter unit, the designer must determine the number of cartridges required using the sizing guidance described above.

Applicant:	Advanced Drainage Systems - BaySaver
Applicant's Address:	4640 Trueman Blvd Hilliard, Ohio 43065

Application Documents:

Engineered/CAD Drawings of Revised StreamFilter, Prepared by BaySaver Technologies, March 2022

Technical Evaluation Report BayFilter™ System Woodinville Sammamish River Outfall, Woodinville, Washington and Appendices A through M (March 2, 2017)

Washington State Department of Ecology Technology Assessment Protocol – Environmental BayFilter™ Conditional Use Designation Application (March 2007)

BaySaver Technologies, Inc. BayFilter™ System Washington State Technical and Design Manual, Version 1.1 (December 2006)

Efficiency Assessment of BaySeparator and Bay filter Systems in the Richard Montgomery High School January 6.2009

Evaluation of MASWRC Sample Collection, Sample Analysis, and Data Analysis, December 27, 2008

Letter from Mid-Atlantic Stormwater Research Center to BaySaver Technologies, In. dated October 22, 2009

Letter from Mid-Atlantic Stormwater Research Center to BaySaver Technologies, In. dated November 5, 2009

Maryland Department of the Environment letter to BaySaver Technologies dated Jan. 13, 2008 regarding approval of BayFilter as a standalone BMP for Stormwater treatment

NJCAT letter to BaySaver Technologies dated June 18, 2009 regarding Interim Certification

Applicant's Use Level Request:

- General Use Level Designation as a Basic and Phosphorus Treatment device in accordance with Ecology's *Stormwater Management Manual for Western Washington*

Applicant's Performance Claims:

- Removes and retains 80% of TSS based on laboratory testing using Sil-Co-Sil 106 as a laboratory stimulant.
- Removes 42% of dissolved Copper and 38% of dissolved Zinc.
- Expected to remove 50% of the influent phosphorus load.

Ecology's Recommendations:

Ecology finds that:

- BaySaver Technologies, Inc. has shown Ecology, through laboratory and field-testing, that the BayFilter™ System using Enhanced Media Cartridges (EMC) (as a single treatment facility) is capable of attaining Ecology's Basic and Phosphorus Treatment goals.
- Ecology should provide BaySaver Technologies, Inc. with the opportunity to demonstrate, through additional laboratory and field-testing, whether the BayFilter™ System using Enhanced Media Cartridges (EMC) (as a single treatment facility) can attain Ecology's Metals Treatment goals.

Findings of Fact:

- BaySaver conducted field monitoring of a BayFilter EMC at a site in Woodinville, WA between November 2013 and March 2015. BaySaver sized the system at a hydraulic loading rate of 0.50 gpm/sq. ft. The manufacturer collected flow-weighted influent and effluent composite samples during 12 storm events.
  - Influent TSS concentrations from sampled storm events ranged from 17 to 140 mg/L. For all samples, the upper 95 percent confidence limit (UCL) of the mean effluent concentration was less than 10 mg/L. For influent concentrations greater than 100 mg/L (n=2) the removal efficiency was greater than 80%.
  - Influent total phosphorus concentrations from sampled storm events ranged from 0.073 to 0.320 mg/L. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 64 percent.
  - BaySaver inspected the system regularly; however, they did not need maintenance during the 18-month evaluation period.

- Based on field testing in Vancouver, WA, at a flow rate less than or equal to 30 gpm per canister, the BayFilter system demonstrated a total suspended solids removal efficiency of greater than 80% for influent concentrations between 100 and 200 mg/L and an effluent concentration <20 mg/L for influent concentrations 100 mg/L.
- Based on laboratory testing, at a flowrate of 30 gpm per filter, the BayFilter system demonstrated a total suspended solids removal efficiency of 81.5% using Sil-C0-Sil 106 with an average influent concentration of 268 mg/L and zero initial sediment loading.
- Based on laboratory testing, at a flowrate of 30 gpm per filter, the BayFilter system demonstrated a dissolved phosphorus removal efficiency of 55% using data from the Richard Montgomery High School field-testing. The average influent concentration was 0.31 mg/L phosphorus and zero initial sediment loading.
- Based on data from field-testing at Richard Montgomery High School in Rockville, MD the BayFilter system demonstrated a copper removal efficiency of 51% and 41% for total and dissolved copper, respectively. Average influent concentrations were 41.5 µg/L total copper and 17.5 µg/L dissolved coper.
- Based on data from field-testing at Richard Montgomery High School in Rockville, MD the BayFilter system demonstrated a zinc removal efficiency of 45% and 38% for total and dissolved zinc, respectively. Average influent concentrations were 345 µg/L for total zinc and 251 µg/L for dissolved zinc.

Other BayFilter™ Related Issues to be addressed by the Company:

1. Conduct hydraulic testing at one site in the Pacific Northwest as outlined in the 2024 TAPE Guidance Document to obtain information about the maintenance longevity and requirements. Complete testing by February 28, 2028.

Technology Description: Download at www.BaySaver.com

Contact Information:

Applicant: Joseph Chylik
Advanced Drainage Systems – BaySaver
4640 Trueman Blvd
Hilliard, Ohio 43065 (866) 405-9495
joseph.chylik@adspipe.com

Applicant website: www.BaySaver.com

Ecology web link: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment- technologies

Ecology: Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 870-0983
douglas.howie@ecy.wa.gov

Revision History

Date	Revision
April 2008	Original use-level-designation document
February 2010	Revision
August 2011	GULD awarded for Basic Treatment
April 2012	Maintenance requirements updated.
August 2012	Revised design storm criteria
December 2012	Revised contact information and document formatting
December 2013	Revised expiration and submittal dates
December 2014	Revised Inspection/maintenance discussion, Updated cartridge descriptions
January 2015	Revised discussion for flow rate controls
December 2015	Revised Expiration date
January 2016	Revised Manufacturer Contact Information and expiration date
January 2017	Revised Expiration, QAPP and TER due dates
April 2017	Approved GULD designation for Basic and Phosphorus Treatment
December 2017	Removed CULD for Enhanced Treatment at request of Manufacturer
July 2019	Revised Applicant Contact Information
August 2021	Removed information and references that were related to a different cartridge media and did not pertain to the BayFilter System using Enhanced Media Cartridges
October 2021	Revised sizing language to note sizing based on off-line calculations
March 2022	Added the StreamFilter as an approved alternate configuration
June 2023	Revised the name of the ADS contact person
February 2025	Added requirement for maintenance assessment.

BayFilter® Design Manual

ADS™

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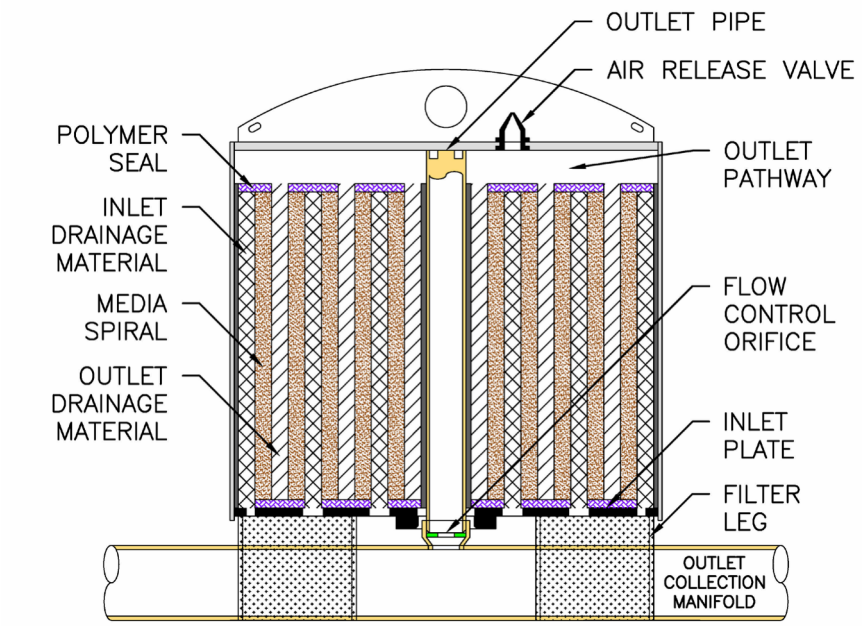
Introduction

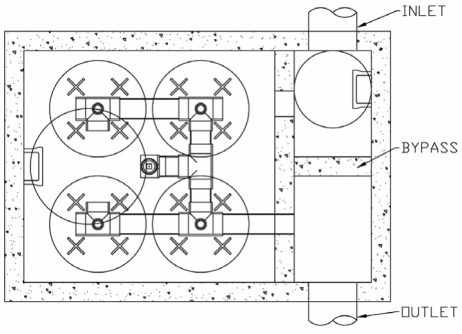
Clean water is essential to quality of life. Advanced Drainage Systems is 100% committed to minimizing pollution in stormwater which helps protect our water resources. By collaborating with the regulatory and engineering communities to develop products and processes, ADS continually develops state of the art stormwater filters that are proven to effectively remove pollutants such as sediments, phosphorous, metals, nitrogen, trash, and hydrocarbons.

BayFilter

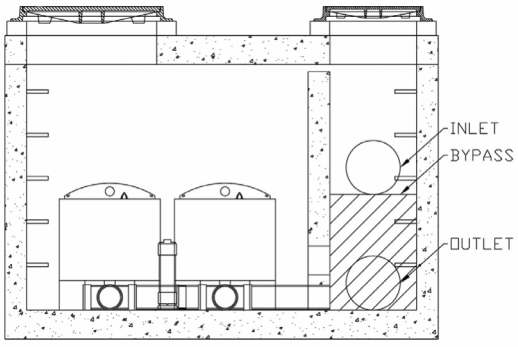
The BayFilter cartridge system is an ongoing commitment to state of the art stormwater treatment. The compound spiral media configuration allows for a large filter surface area in a compact footprint. This configuration results in the most efficient and effective stormwater filter available in the marketplace. The BayFilter is available in multiple sizes with multiple media configurations to meet any flow rate and design consideration while being able to target specific pollutants. A BayFilter System is typically a concrete structure (precast vault, manhole, or cast in place structure) with a single or multiple BayFilter cartridges. Inside the structure the BayFilters are connected to an outlet manifold through which the treated water exits the system.



BayFilter Cutaway



Plan View



Profile View

Basic Principles of Stormwater Filtration

Stormwater treatment has unique requirements, which often require the treatment of large volumes of water at relatively high flow rates to high levels of pollutant removal with long periods of time between maintenance intervals. At ADS we believe it is our responsibility to engineer a balance within these variables to provide effective stormwater treatment at an exceptional value to our clients.

What makes for an effective and efficient stormwater filter? A filter must be able to remove the pollutants of concern and function for a reasonable period of time as defined by industry and regulatory standards. A filter system should also be designed to limit re-suspension or release of pollutants that have been collected between maintenance periods.

The traditional pollutants of concern in stormwater is sediment. Phosphorous, metals, turbidity, nitrogen, fecal coliform, and bacteria are also pollutants of concern although they are not commonly regulated nationwide. ADS has completed both field and laboratory testing of the BayFilter. Testing demonstrates BayFilter's effectiveness and efficiency at capturing the pollutants listed above.

Settling and filtration are the two primary methods to remove pollutants from stormwater. Some settling of particles and pollutants occurs as the influent enters the filter vault. Settling typically removes the larger particles and debris, it does not remove the small particles or any dissolved materials. It is the filter which performs the work of removing the very small particles, and dissolved nutrients and metals. The media within a filter must be small enough to intercept the tiny sediment particles which won't settle (figure 1), and be capable of attracting and attaching charged and elemental particles through ion exchange.

The area of media provided by a stormwater filter is an important factor to consider when selecting and specifying a filter system. The more surface area provided by the media, the greater the potential flow through and across the media and the greater the pollutant removal potential of the filter. The vertically oriented and patented compound spiral media configuration of the BayFilter maximizes a media filter's area potential.

Figure 1: Coarse Industry Media

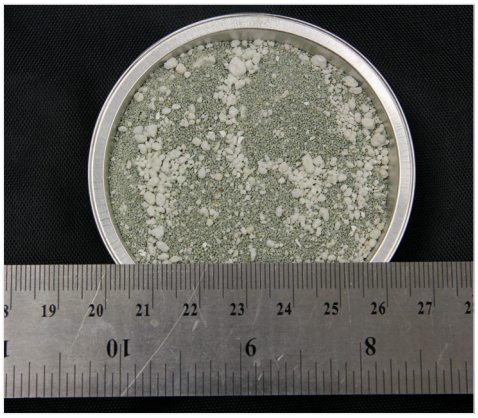


Figure 2: BayFilter Media

The particle size of the media is also important with respect to pollutant interception and adsorption. A tightly packed, fine media (figure 2) captures a greater percentage of fine and dissolved pollutants when compared to a loosely packed, coarse media or a membrane media. A fine and tightly packed media not only minimizes the interstitial spaces between the media particles to optimize interception of pollutants, it also maximizes the amount of surface area in a given volume provided by the media for ion exchange.

The quantity of sediment a filter is capable of capturing is a significant component to filter longevity. A filter must be able to treat large quantities of sediment while maintaining claimed flow rates and removal efficiencies. The sediment loading capacity of the BayFilter is 350 pounds (158.7 kg) for the 45 gpm (170.3 lpm) and 30 gpm (113.6 lpm) cartridges.

Surface area and loading rate contribute significantly to filter longevity. Greater filter surface area (sf) allows for a reduced loading rate (gpm/sf of filter media), which in turn increases the service life of the filter. For example, a 10 ft^2 (0.9 m^2) filter with a loading rate of 1 GPM (3.8 l/min) per square foot of filter area will pass 10 GPM (37.9 l/min). A 20 ft^2 (1.9 m^2) filter with a loading rate of 0.5 GPM (1.9 l/min) per square foot of filter area will also pass 10 GPM (37.9 l/min). If one gallon of treated water will occlude one square foot of filter area every 10 days, a 10 ft^2 (0.9 m^2) filter flowing at one GPM (3.8 l/min) will be expired in 100 days. A 20 ft^2 (1.9 m^2) filter flowing at 0.5 GPM (1.9 l/min) will be expired in 400 days. Increasing media area and reducing flow rate has a beneficial impact on pollutant removal and filter longevity and these are some of the core engineering principles on which the BayFilter design is based.

ADS is committed to the purpose of protecting public waterways. Permanently capturing pollutants, effectively backwashing media, allowing media to drain between storm events, and providing an economically reasonable maintenance interval are key design parameters for properly functioning stormwater filtration systems. The BayFilter cartridge system helps meet and exceed these key requirements needed to protect our water resources.

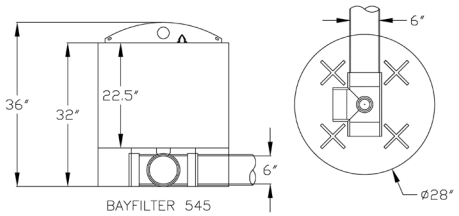
Figure 3: Top of Cartridge

Figure 4: Bottom of Cartridge

BayFilter Product Details

BayFilter 545

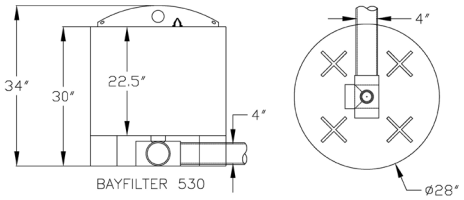
Size = 28” (711 mm) diameter
Weight = 250 lbs. (113 kg)
Media Area = 90 ft² (8.4 m²)
Flow Rate = 45 gpm (170 l/min)
Flow Rate per Square Foot = 0.50 gpm/ft² (20 l/min/m²)
Minimum Operational Head = 32” (813 mm)
Recommended Design Head = 34” (864 mm)
Sediment Capture Capacity = 350 lbs (159 kg)
Manifold Diameter = 6” (152 mm)



BayFilter 545

BayFilter 530*

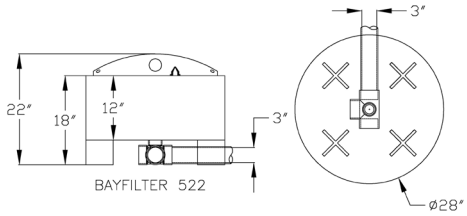
Size = 28” (711 mm) diameter
Weight = 250 lbs. (113 kg)
Media Area = 90 ft² (8.4 m²)
Flow Rate = 30 gpm (114 l/min)
Flow Rate per Square Foot = 0.33 gpm/ft² (13 l/min/m²)
Minimum Operational Head = 30” (762 mm)
Recommended Design Head = 32” (813 mm)
Sediment Capture Capacity = 350 lbs (159 kg)
Manifold Diameter = 4” (102 mm)



BayFilter 530

BayFilter 522**

Size = 28” (711 mm) diameter
Weight = 125 lbs. (57 kg)
Media Area = 45 ft² (4.2 m²)
Flow Rate = 22.5 gpm (85 l/min)
Flow Rate per Square Foot = 0.50 gpm/ft² (20 l/min/m²)
Minimum Operational Head = 18” (457 mm)
Recommended Design Head = 20” (508 mm)
Sediment Capture Capacity = 175 lbs (79 kg)
Manifold Diameter = 3” (76 mm)



BayFilter 522

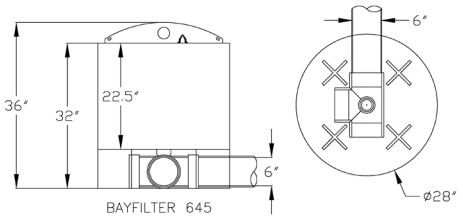
NOTES: The 500 series is for Total Suspended Solids (TSS) and Phosphorous and utilizes EMC media.

*BayFilter 530 replaces BFC cartridge.

** BayFilter 522 replaces 545L cartridge.

BayFilter 645

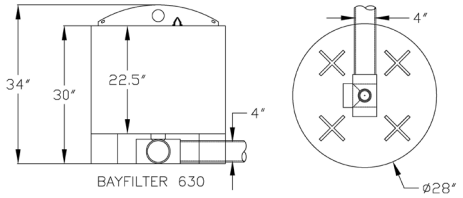
Size = 28” (711 mm) diameter
Weight = 250 lbs. (113 kg)
Media Area = 90 ft² (8.4 m²)
Flow Rate = 45 gpm (170 l/min)
Flow Rate per Square Foot = 0.50 gpm/ft² (20 l/min/m²)
Minimum Operational Head = 32” (813 mm)
Recommended Design Head = 34” (864 mm)
Sediment Capture Capacity = 350 lbs (159 kg)
Manifold Diameter = 6” (152 mm)



BayFilter 645

BayFilter 630

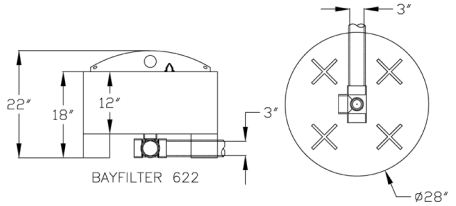
Size = 28” (711 mm) diameter
Weight = 250 lbs. (113 kg)
Media Area = 90 ft² (8.4 m²)
Flow Rate = 30 gpm (114 l/min)
Flow Rate per Square Foot = 0.33 gpm/ft² (13 l/min/m²)
Minimum Operational Head = 30” (762 mm)
Recommended Design Head = 32” (813 mm)
Sediment Capture Capacity = 350 lbs (159 kg)
Manifold Diameter = 4” (102 mm)



BayFilter 630

BayFilter 622

Size = 28” (711 mm) diameter
Weight = 125 lbs. (57 kg)
Media Area = 45 ft² (4.2 m²)
Flow Rate = 22.5 gpm (85 l/min)
Flow Rate per Square Foot = 0.50 gpm/ft² (20 l/min/m²)
Minimum Operational Head = 18” (457 mm)
Recommended Design Head = 20” (508 mm)
Sediment Capture Capacity = 175 lbs (79 kg)
Manifold Diameter = 3” (76 mm)



BayFilter 622

NOTES: The 600 series is for enhanced metals treatment.

BayFilter Operation

Stormwater runoff enters the manhole or concrete structure via an inlet pipe and begins to fill the structure. When the water surface elevation in the vault/manhole reaches the minimum operating level, water flows through the BayFilter driven by a hydrostatic head. Within the BayFilter, the water flows through a proprietary filter media and drains via a vertical pipe. The vertical pipe is connected to the under drain system, which conveys filtered water to the outfall.

During a typical storm event, the BayFilter system has four cycles:

A. BayFilter cartridge fills and releases air

B. Positive head filtration

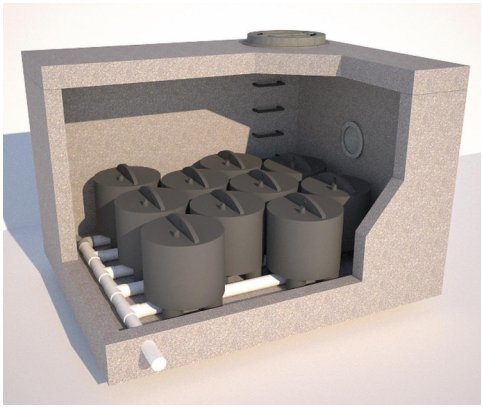
C. Siphon (negative head) filtration

D. Siphon break and hydrodynamic backwash

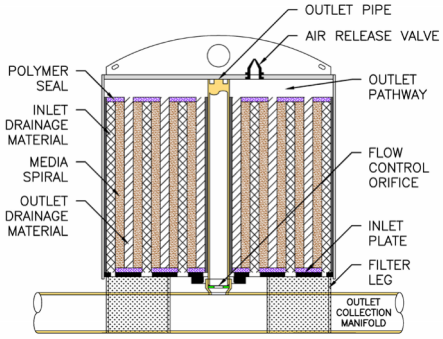
The cycle operation of a BayFilter is as follows:

A. BayFilter cartridge fill and air release: The BayFilter vault and BayFilter cartridges fill when stormwater flow enters the system. As the vault fills, water enters the BayFilter cartridge through the inlet plate on the bottom. Air is purged from the media spiral and filter housing during this process.

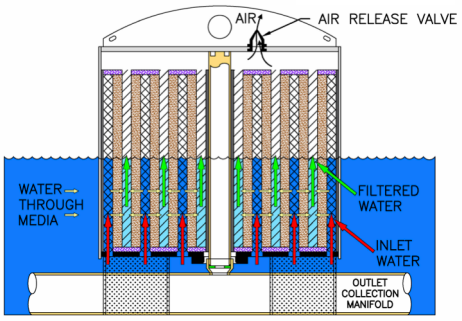
The air release is critical for the proper functioning of the siphon. The siphon draws flow through the BayFilter during periods of low water in the vault.



BayFilter Vault



BayFilter Cutaway



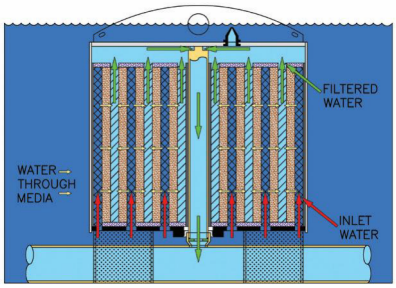
Cartridge Filling

B. Positive Head Filtration: Water enters the Filter from the bottom of the filter housing and travels upward through the inlet-flow conduit-spiral. From the inlet spiral, untreated water flows horizontally through the engineered media. Treated water exits the engineered media and flows into the outlet-flow conduit-spiral. Treated water flows vertically to the top of the cartridge where it can exit through the outlet pipe—please see product details (pg.6) for operating head levels. Finally, filtered water leaves the system via the outlet.

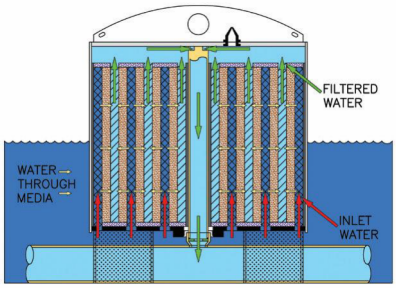
C. Siphon (Negative Head) Filtration: After the water level in the vault falls below the top of the filter cartridge-minimum operating head level, a siphon is established and water will continue to flow through the filter media until the siphon is broken. During siphon, the water level in the vault will decrease until it reaches the inlet plate of the BayFilter.

D. Siphon Break and Hydrodynamic Backwash: When the water level drops below the inlet plate, air enters the filter and the siphon breaks. Once the siphon breaks, a gravity-driven backwash occurs with all of the water flowing from the outlet pathway backwards through the filter media. This backwash has the effect of dislodging particles captured in the filtration layers and re-establishing porosity. Dislodged particles are transported back in to the filter vault and accumulate on the filter vault floor.

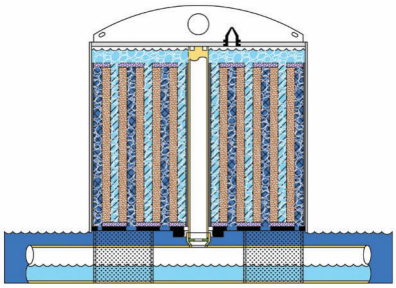
Each BayFilter has a maximum flow rating. At this flow, each cartridge can treat the specified total sediment load before requiring maintenance. BayFilter flow may also be custom regulated to meet specified design parameters by modifying the flow control orifice. Please contact ADS for custom design requirements.



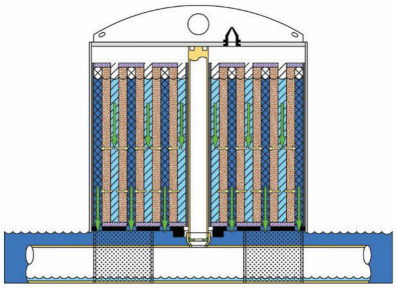
Positive Filtration



Siphon Filtration



Siphon Break



Backwash

BayFilter System Design & Sizing

The BayFilter cartridge system design is easily completed in four phases:

A. BayFilter System Configuration

B. BayFilter Site Plan Placement

C. BayFilter System Sizing

D. Final Check

The design process can be iterative until the determined design parameters are satisfied. Some of the items to consider when designing a stormwater filtration system:

- Site specific constraints and proposed BayFilter system location
- BayFilter system configuration—on-line or off-line
- Pretreatment requirements
- Operating head
- Treatment efficiency requirements and local regulations
- Pollutant loading (sediment load)
- Treatment flow rates and hydraulics
- Maintenance intervals

BayFilter System Configuration

BayFilter systems can accommodate any treatment flow requirement. The peak design flow through the storm drain system will be significantly greater than the treatment design flow through BayFilter. It is a best practice to only convey the required treatment flow through a stormwater filter and this will extend the filter's life cycle. Conveying the peak design flow around a stormwater filter is considered off-line treatment.

Off-Line Design

Schematics of off-line BayFilter systems are shown below. In Figure 5, the bypass structure diverts treatment flows to the BayFilter system and allows high flows to pass to a separate outfall. The bypass structure will feature flow controls designed by an engineer to ensure that the required treatment flows are sent to the BayFilter. In Figure 6, this same concept is accomplished within a 3-chamber vault.

In stormwater filter system installations, sediment will accumulate in the filter cartridge and on the vault floor. In off-line installations, high intensity flows are routed away from the vault minimizing the risk of resuspending the sediment accumulated on the vault floor. In online applications it is possible for high flows to mobilize and release this sediment.

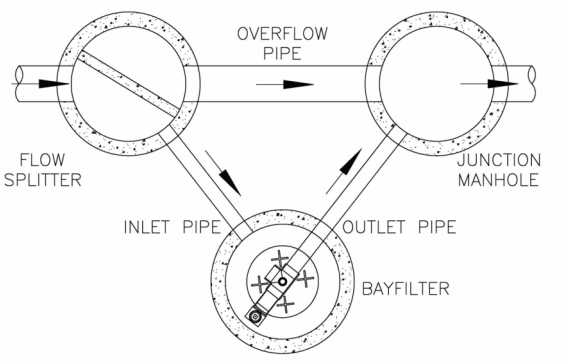


Figure 5: Offline Configuration
External Bypass

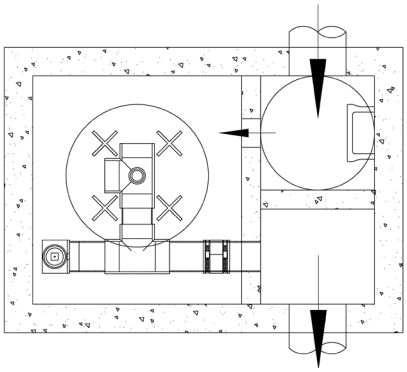


Figure 6: Inline Configuration
Internal Bypass

Operating Head

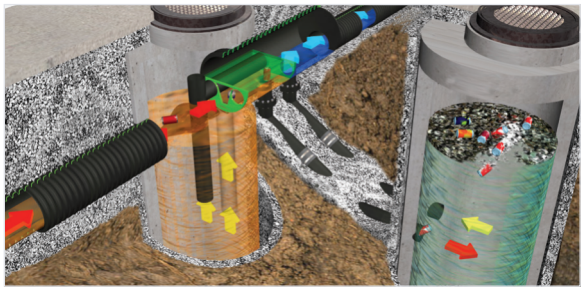
Head is required to activate BayFilter flow and establish siphon flow. The height of individual BayFilter cartridges will determine the operating head. Please consult product details for individual operating head levels. The drainage system and network does not need to provide the operating head. Filter systems can easily be designed on sites where the elevation drop of the hydraulic grade line is less than the required operating head of the filter. Consult ADS Engineering Department for verification based on your particular site conditions.

Pretreatment

Regional regulations may require pretreatment of stormwater flows prior to flow entering filters. Pretreatment will remove a portion of the influent pollutant load. This will lessen the pollutant load received by a filter and potentially increase the maintenance interval duration. The BaySeparator™ system (Figures 7 & 8) is an ideal hydrodynamic separator that removes sediments and floatables from stormwater runoff. Please contact your ADS representative for additional pretreatment options.

BayFilter Site Plan Placement

Locating a BayFilter system on your site will be determined by giving consideration to several factors including: maintenance access, the unit's footprint, available head, available depth, and the surface elevation of the receiving waters. A BayFilter system must be installed in an area that is accessible to maintenance equipment. The maintenance of a BayFilter system requires a vacuum truck as well as the removal and replacement of the filter cartridges. The manhole covers, and or access hatches of the BayFilter must be placed in locations that can be easily reached by such a vehicle. Consult the ADS Engineering Department for expert assistance.



Traditional BaySeparator

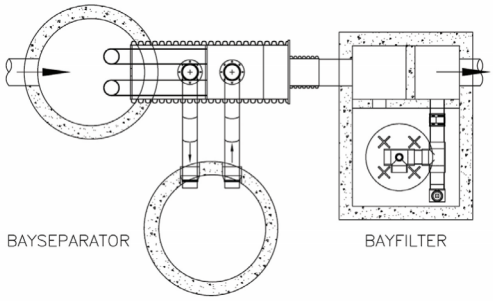


Figure 7: Traditional BaySeparator Pre-Treatment Configuration

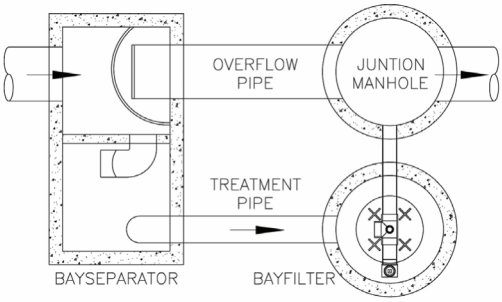


Figure 8: BaySeparator FS Unit Pre-Treatment Configuration

BayFilter System Sizing

Each BayFilter system relies on a collection of individual BayFilter cartridges to achieve the desired removal efficiency. Accurately determining the required number of filters is important to efficient operation. Undersizing a system may lead to shorten service life.

A valuable stormwater treatment system will be provided when the three design parameters listed below are given consideration.

- Jurisdiction – specific sizing requirements
- Flow capacity of the system
- Treated sediment load of the system

Each parameter results in a required number of BayFilter cartridges. After computing the number of filters for each parameter, determine which requires the most filters, and this is the limiting design parameter and the number of required BayFilter cartridges for your drainage area.

Jurisdiction

Local regulatory requirements play a significant role in any BayFilter design. Depending on the jurisdiction in which the project site is located, the engineer may have to meet minimum treatment flow rates, treatment volumes or some other criteria such as filter bed area. Some jurisdictions specify a methodology for calculating a minimum treatment flow rate for a given site.

Flow Capacity

Regulatory requirements will determine water quality treatment values. The BayFilter system is simply applied by the design professional to their computed values. Typically, the primary treatment value is treatment flow rate (Q_{TRT}). This value tells us the rate at which flow must pass through a filter system. Other common treatment values are water quality volume and phosphorous load reduction. Please contact ADS Engineering Department when designing to volume or phosphorous requirements.

The minimum number of BayFilter cartridges can be determined by dividing the treatment flow rate by flow rate of the BayFilter you have chosen. This calculation provides the minimum number of BayFilters that will be necessary to fully treat the water quality flow from the site. The step-by-step procedure is shown below.

Table 1: BayFilter Series 500 System Sizing

BayFilter Cartridge	Treatment Flow Rate gpm (l/min)	Treatment Volume f^3 (m^3)
522	22.5 (85.1)	1250 (35.4)
530	30.0 (113.6)	2500 (70.8)
545	45 (170.3)	2500 (70.8)

Table 2: BayFilter Series 600 System Sizing

BayFilter Cartridge	Treatment Flow Rate gpm (l/min)	Treatment Volume f^3 (m^3)
622	22.5 (85.1)	1250 (35.4)
630	30.0 (113.6)	2500 (70.8)
645	45.0 (170.3)	2500 (70.8)

1. Determine the required treatment flow rate (Q_{TRT}) based on locally approved methodologies for the project site. This may involve the use of the Rational Method, TR-55 or another locally specified hydrologic model. If a locally approved methodology is not specified, ADS recommends using one of these commonly accepted models.

2. Using the BayFilter cartridge treatment flow rate ($Q_{BayFilter}$), calculate the minimum numbers of BayFilter cartridges required to treat that flow using Equation 1. Refer to the product details for BayFilter flow rates.

The minimum number of BayFilter cartridges is equal to the maximum treatment flow rate divided by $Q_{BayFilter}$, rounded up to the next whole number.

$$\#\ Cartridges = \frac{Q_{TRT}\ (cfs)\ x\ 448.8\ \frac{gpm}{cfs}}{Q_{BayFilter}}$$

Equation 1

Sediment Load Capacity

BayFilter sediment load capacity allows the professional designer to establish the maintenance interval for the stormwater system. Establishing a sediment load is a straight forward computation which may be completed once the number of BayFilter cartridges required to treat the flow is known. With the known filter quantity, a designer will establish the sediment load capacity for the BayFilter system, and compare this value to the annual sediment load for the site. The following equations may be used to compute these values and help determine BayFilter suitability for a specific site design.

Sediment Load Capacity Calculations

1. Calculate the annual treated runoff volume according to Equation 2. $\mathbf{V_{TRT}}$ is the annual treated runoff volume, **P** is the average annual precipitation (in inches), **A** is the area of the site (in acres), c is the runoff coefficient of the site (c is dimensionless), and % **Capture** is the fraction of the total annual runoff that is treated by the stormwater quality system. If % **Capture** is not otherwise specified, a default value of 0.90 can be used. Please check local regulations.

2. Using the annual treated runoff volume, calculate the anticipated total system sediment load to BayFilter according to Equation 3. In Equation 3, **L** is the mass of sediment that BayFilter is exposed to annually (in pounds), $\mathbf{V_{TRT}}$ is the annual treated runoff volume as calculated in step 1 (in ft 3), and $\mathbf{TSS_{IN}}$ is the influent concentration of TSS in the runoff (in mg/L). The influent TSS concentration (TSS_{IN}) depends greatly on the site and the surrounding land use. In the absence of readily available data, ADS recommends using a minimum event mean concentration (EMC) TSS value of 60 mg/l.

$$V_{TRT}\ (ft^3) =\ P\ x\ A\ x\ c\ x\ \frac{ft}{12\ in}\ x\ \frac{43{,}560\ ft^2}{acre}\ x\ \%\ capture$$

Equation 2

$$L\ (lbs) =\ V_{TRT}\ x\ TSS_{in}\ x\ \frac{28.3\ lt}{ft^3}\ x\ \frac{kg}{10^6 mg}\ x\ \frac{2.2\ lbs}{kg}$$

Equation 3

The impact on the filter cartridge will also be less if the filtration system is preceded by pretreatment. In these cases, the influent TSS to the BayFilter system need to be reduced to reflect pretreatment sediment removal. The ADS Engineering Department can assist with these calculations.

3. Once the total annual system sediment load (L) is calculated, the engineer must ensure that the number of cartridges specified will be able to remove that sediment load at the specified design flow rate. Divide the total system sediment load L by the capacity of each BayFilter and note the associated BayFilter flow rate. Round up to the next whole number to get the minimum number of BayFilters required. This quantity of BayFilters will need to treat this sediment load at the required flow rate per BayFilter. The ADS Engineering Department is available to assist with the required calculations.

Final Check

It may be beneficial to perform a Final Check on the BayFilter design for your site. The ADS Engineering Department is available to assist you with this function.

Standard Details and Notes

Standard details are available on the Website at **adspipe.com** or by calling **800.229.7283**.

BayFilter Configurations

BayFilter Systems include the four typical concrete structures: manhole, precast vault, box culvert, and cast in place. ADS can also design BayFilter systems with Nyloplast structures, and HP Pipe manholes.

BayFilter systems in manholes have a small footprint and easily fit into site plans. Manhole BayFilter systems are ideal for applications downstream from water quality detention structures. Please consult with the ADS Engineering Services Department for more details.

When designing access for a BayFilter utilizing manhole frame and covers a minimum of 30” (762 mm) diameter should be used, however, it is recommended that a 36” (914 mm) diameter opening is used to provide ample access for filter replacement and maintenance. In each BayFilter system, the BayFilters are arranged so that a maintenance worker can stand on the floor of the manhole while installing or removing the cartridges.

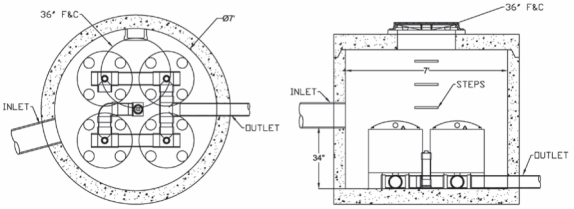


Figure 9: Example of a manhole BayFilter system

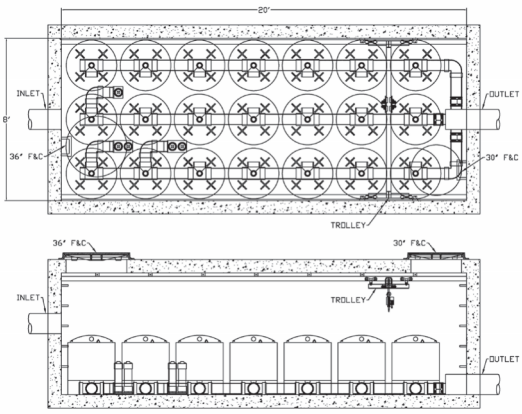


Figure 10: Example of a precast vault BayFilter system

Installation

Note: BayFilters are not recommended to be used as erosion control during site construction operations. BayFilters should remain offline or uninstalled until site stabilization has occurred. Please contact your local ADS representative if you should have any questions.

1. Contact utility locator to mark any nearby underground utilities and make sure it is safe to excavate.
2. Reference the site plan and stake out the location of the BayFilter manhole/vault.
3. Excavate the hole, providing any sheeting and shoring necessary to comply with all federal, state and local safety regulations.
4. Level the subgrade to the proper elevation. Verify the elevation against the manhole/vault dimensions, the invert elevations, and the site plans. Adjust the base aggregate, if necessary.
5. Have the soil bearing capacity verified by a licensed engineer for the required load bearing capacity. On solid subgrade, set the first section of the BayFilter manhole/vault.
6. Check the level and elevation of the first section to ensure it is correct before adding any riser sections.
7. If additional section(s) are required, add a watertight seal to the first section of the BayFilter manhole/vault. Set additional section(s) of the manhole/vault, adding a watertight seal to each joint.
8. Install the outlet pipe in BayFilter manhole/vault.
9. Install the inlet pipe to the BayFilter manhole/vault.
10. Install the trolley system (if applicable).
    a. Attach the mounting brackets to the track.
    b. Each track is split in sections. The length and number of sections vary depending on the vault. It is generally better to start installing longer track sections first. Hold a section in place and align the top of the brackets with the ceiling of the vault. Mark the center of the hole in each bracket and remove the track.
    c. Using a hammer drill and ¼" (6 mm) bit, drill a hole approximately 3" (76 mm) deep at each mark.
    d. Hold the track back in place and realign the brackets with the holes. Place a plastic spacer block behind each bracket and using the supplied ¼" (6 mm) x 3¼" (83 mm) anchor bolts mount the track in place. Only install one section of track at this stage.
    e. Repeat this procedure on the opposite wall of the vault directly across from the first section.

Modular Vault Assembly

Vault End Section

Trolley System

f. Bolt the 4 trolleys to the aluminum I-beam as shown in the attached diagram. Make sure that the wheels for each trolley are mounted an equal distance from the top of the I-beam.

g. Lift the I-beam in to place and insert the trolleys in to the track.

h. Using the supplied couplers, install the second sections of track via the same procedure. Continue until the track runs the length of the vault or as designed.

11. Install the PVC manifold. Glue all PVC joints with the exception of the BayFilter cartridge coupling. See Parts List drawing.
12. After the site has stabilized, remove any accumulated sediment or debris from the vault.
13. Install the Bayfilter Vertical Drain Down Modules (VDDM) to the manifold system (if applicable).
14. Install a row of BayFilter cartridges. Place each cartridge so the handle or "top eye hook" points across the vault. Make sure the air valve is on the side closer to the outlet.
15. Place one (1) full set of hold down bar and two retainer brackets across the top plate of a row of aligned BayFilters. Mark and drill (using a hammer drill and a 1/2" (13 mm) concrete bit) two 1/2" (13 mm) holes per retainer bracket approximately 1.5" (37 mm) into the wall. Each retainer bracket has 4 possible holes, use only two, and preferably in a diagonal position per retainer bracket. Insert the anchor bolts into the wall, slide the retainer bracket over the bolts and use either a ¾" (19 mm) wrench or deep ratchet socket to attach the anchor bolts and retainer bracket to the wall, creating a strong positive connection.
16. After fully anchoring the retainer brackets, place the left end of the hold down bar into position and lock into place using the quick release restraining pin attached to the retainer bracket. Do the same for the right end of the bar.
17. Repeat steps 14, 15 and 16 for each set (or row) of BayFilter Cartridges and hold down bar sets until the whole system is installed. See parts list drawing for the hold down bar placement.

Tool List

- PVC glue and primer
- Crane/lifting mechanism to lower the cartridges in the vault (each cartridge weighs 230-350 lbs (104-159 kg)
- Screwdriver or nut driver for Fernco® couplers
- Hammer and soft blow hammer
- Saw (in case PVC Sch 40 piping length needs to be adjusted)

Filter Tee

Drain Down Module

Filter Placement

Hold Down Bar Bracket

Hold Down Bar and Bracket

Chain Hoist System

BayFilter Vault Overview

Vault Internal Assembly

- Hammer drill
- ¼" (6 mm) concrete drill bit for the trolley
- 7/16" (11 mm) wrench or deep socket ratchet for the trolley rail anchors
- 1/2" (13 mm) concrete drill bit for hold down bars
- ¾" (19 mm) wrench or deep socket ratchet for the hold down bar anchors

Pre-Assembled Manifold

In some areas the vaults can be provided with pre-installed manifold systems. Please contact your local ADS representatives for additional details.

BayFilter System Cleanout

Inspection and Maintenance

The BayFilter system requires periodic maintenance to continue operating at the design efficiency. The maintenance process is comprised of the removal and replacement of each BayFilter cartridge, vertical drain down module; and the cleaning of the vault or manhole with a vacuum truck.

The maintenance cycle of the BayFilter system will be driven mostly by the actual solids load on the filter. The system should be periodically monitored to be certain it is operating correctly. Since stormwater solids loads can be variable, it is possible that the maintenance cycle could be more or less than the projected duration.

BayFilter systems in volume-based applications are designed to treat the WQv in 24 to 48 hours initially. Late in the operational cycle of the BayFilter, the flow rate will diminish as a result of occlusion. When the drain down exceeds the regulated standard, maintenance should be performed.

When a BayFilter system is first installed, it is recommended that it be inspected every six (6) months. When the filter system exhibits flows below design levels the system should be maintained. Filter cartridge replacement should also be considered when sediment levels are at or above the level of the manifold system. Please contact the ADS Engineering Department for maintenance cycle estimations or assistance at **800.229.7283**.

Vactor Truck Maintenance

Jet Vactoring Through Access Hatch

Maintenance Procedures

1. Contact ADS for replacement filter cartridge pricing and availability at 800-821-6710.
2. Remove the manhole covers and open all access hatches.

3. Before entering the system make sure the air is safe per OSHA Standards or use a breathing apparatus. Use low O_2, high CO, or other applicable warning devices per regulatory requirements.
4. Using a vacuum truck remove any liquid and sediments that can be removed prior to entry.
5. Using a small lift or the boom of the vacuum truck, remove the used cartridges by lifting them out.
6. Any cartridges that cannot be readily lifted can be easily slid along the floor to a location they can be lifted via a boom lift.
7. When all the cartridges have been removed, it is not practical to remove the balance of the solids and water. Loosen the stainless clamps on the Fernco couplings for the manifold and remove the drain pipes as well. Carefully cap the manifold and the Ferncos and rinse the floor, washing away the balance of any remaining collected solids.
8. Clean the manifold pipes, inspect, and reinstall.
9. Install the exchange cartridges and close all covers.
10. The used cartridges may be sent back to ADS for recycling.

Manifold Tee View of a Cleaned System

Cartridge Hoist Point

BayFilter Availability and Cost

BayFilter systems are available throughout the United States from ADS. Material, installation, and maintenance costs vary with location. For BayFilter pricing in your area, please contact ADS at 800-821-6710.

BayFilter cartridges and outlet components can be shipped anywhere in the world. Manholes and precast vaults are also supplied by ADS as part of a complete stormwater filtration system.

BayFilter Specifications

Products

A. Internal components: all components including concrete structure(s), PVC manifold piping and filter cartridges, shall be provided by ADS **800-821-6710**.
B. PVC manifold piping: all internal PVC pipe and fittings shall meet ASTM D1785. Manifold piping shall be provided to the contractor pre-cut and/or preassembled. Minor field modifications may be necessary.
C. Filter cartridges: external shell of the filter cartridges shall be substantially constructed of polyethylene or equivalent material acceptable to the manufacturer. Filtration media shall be arranged in a spiral layered fashion to maximize available filtration area.

An orifice flow control (i.e. flow disk) shall be supplied with each cartridge to restrict the flow rate to a maximum of 45 gpm (170 l/min).

D. Filter media: filter media shall be a proprietary mix produced by Advanced Drainage Systems and may consist of the following materials: zeolite, perlite, and activated alumina and/or other materials required to meet the project pollutant removal requirements.

E. Precast concrete vault: concrete structures shall be provided according to ASTM C478, C858, and C913. The materials and structural design of the devices shall be per ASTM C478 and ACI 318. Precast concrete shall be provided by Advanced Drainage Systems.

Performance

A. The stormwater filter system shall be capable of treating 100% of the required treatment flow at full sediment load conditions.

B. The stormwater filter system's cartridges shall have no moving parts.

C. The stormwater treatment unit shall be designed to remove a minimum of 80% of suspended solids, 60% of total phosphorus, 50% of turbidity, 40% of total copper, and 40% of total zinc. All filter designs shall comply with local regulations.

D. The stormwater filtration system shall not have any components that leach nitrates, phosphates or metals.

E. The stormwater filtration cartridge shall be equipped with a hydrodynamic backwash mechanism to extend the filter's life and optimize its performance.

F. The stormwater filtration system's cartridges shall have a treated sediment capacity for 80% TSS removal between 150-350 lbs (68-159 kg).

When BayFilter is initially installed, we recommend that an inspection be performed on the system in the first six (6) months. After that, the inspection cycle typically falls into an annual pattern given normal storm occurrence and actual solids loads.

When BayFilter exhibits flows below design levels, the system should be inspected and maintained as soon as practical. If flow monitoring is not available, BayFilter cartridges should be replaced when sediment levels are at or above the top of the manifold.

adspipe.com

800-821-6710

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StreamFilter® Catch Basin Media Filters

With over fifteen years in research and development, the BayFilter™ is the most efficient, effective, economical, and easy-to-use stormwater treatment filter cartridge on the market today. The StreamFilter Catch Basin utilizes a single or double BayFilter cartridge design to satisfy treatment flow requirements of up to 90 GPM (0.2 cfs) for a single location.

Utilizing steel catch basin structures, a proven mixed media filter, and a proprietary spiral wrapped layered construction; StreamFilter removes very fine sediment and nutrient pollutants. The vertically spiraled layered design maximizes flow rates and filter media area for the most effective stormwater treatment, while up-flow filtration allows for BayFilter's unique hydrodynamic backwash cleansing process. This process dislodges pollutants off the cartridge and onto the floor of the vault and restores the porosity of the mixed media filter. The draindown filter module assures there is no unwanted standing water in the catch basin between storm events. With its proven performance and cost effective design the StreamFilter system is the ideal solution for shallow sites and small to mid-sized drainage basins.

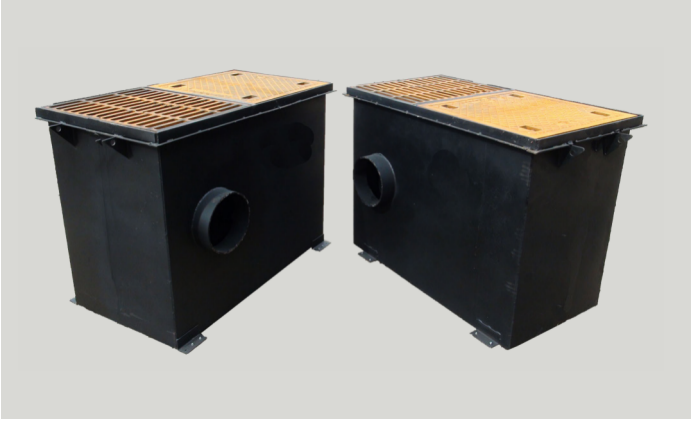
Features

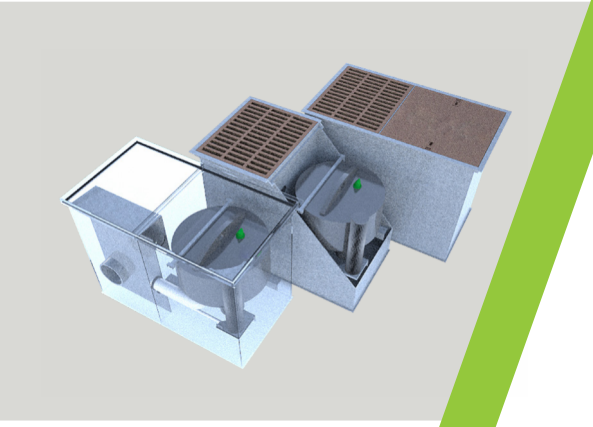
- Low drop filter cartridge system
- Peak flow bypass
- Grate, curb, and pipe inlet options
- Delivers fully assembled and installs like a standard catchbasin
- No confined space entry required for maintenance

StreamFilter Design Summary

StreamFilter Steel Catch Basin Size	Number of Cartridges	BF522 Cartridge 2.33' Drop Required	BF545 Cartridge 3.58' Drop Required	Approximate Pick Weight (lbs)
		Treatment Capacity	Treatment Capacity	
3' x 5'	1	22.5 gpm / 0.05 cfs	45 gpm / 0.10 cfs	2,000
3' x 8'	2	45 gpm / 0.10 cfs	90 gpm / 0.20 cfs	3,500

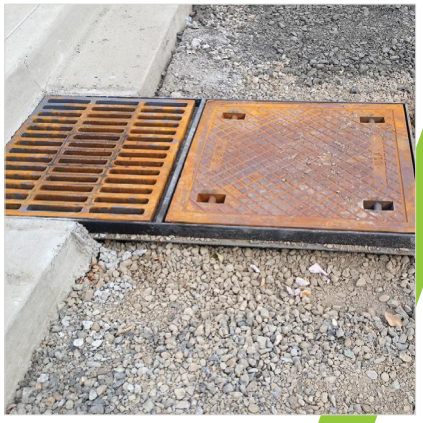
1. Drop Required value = Rim Elevation - Outlet IE.
2. All configurations can internally bypass up to 2.0 cfs.





ADS

StreamFilter Stormwater Filtration System Specifications



Products

- **Internal Components**: All components including steel structure(s), PVC manifold piping and filter cartridges, shall be provided by BaySaver Technologies LLC, 1030 Deer Hollow Drive, Mount Airy, MD (800.229.7283)
- **PVC Manifold Piping**: All internal PVC pipe and fittings shall meet ASTM D1785. Manifold piping shall be provided to the contractor precut and pre-assembled.
- **Filter Cartridges**: External shell of the filter cartridges shall be substantially constructed of polyethlene or equivalent material acceptable to the manufacturer. Filtration media shall be arranged in a spiral layered fashion to maximize available filtration area. An orifice plate shall be supplied with each cartridge to restrict the flow rate to a maximum of 45 GPM.
- **Filter Media**: Filter media shall be by BaySaver Technologies LLC and shall consist of the following mix: a blend of Zeolite, Perlite and Activated Alumina.
- **Steel Catch Basin**: Steel catch basin structures shall have a minimum ¼" wall thickness and painted or coated to protect from corrosion. Basin construction, dimensions, coatings, grates and covers shall comply with local building and plumbing codes. Steel Catch Basin structures shall be provided by BaySaver Technologies, LLC.

Performance

- The stormwater filter system is cabable of treating 100% of the required treatment flow at full sediment load conditions. The stormwater filter systems shall have no moving parts.
- The stormwater treatment unit shall be designed to remove at least 80% of total suspended solids, 50% of total copper and 45% of total zinc based on field data collected in compliance with the Technology Acceptance Reciprocity Partnership Tier II test protocol.
- The stormwater filtration system shall reduce incoming turbidity (measured as NTUs) by 65% or more and shall not have any components that leach nitrates or phosphates.
- The stormwater filtration cartridge shall be equipped with a hydrodynamic backwash mechanism to extend the filter's life and optimize its performance.
- The stormwater filtration system shall be designed to remove a minimum of 65% of the incoming Total Phosphorus (TP) load.
- The stormwater filtration system's cartridge units shall have a treated sediment capacity for 80% TSS removal of 175 lbs.

Installation

Installation of the StreamFilter System(s) shall be performed per manufacturer's Installation Instructions.

For more information on StreamFilter Stormwater Filtration System and other products, please contact our Customer Service representatives at 1-800-229-7283

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