Stormwater Plan

320 Todd Road Development

320 Todd Rd NE
Puyallup, WA 98371

Prepared by
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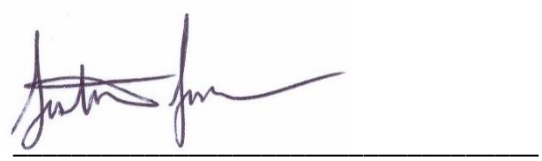
206.596.2020
Justin Jones, PE

June 2, 2025

PROJECT ENGINEER'S CERTIFICATION

I hereby certify that this Stormwater Plan for the 320 Todd Road Development in Puyallup has been prepared by me or under my supervision and meets minimum standards of Washington State Department of Ecology, The City of Puyallup, and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me.



Justin Jones, PE

06-02-25

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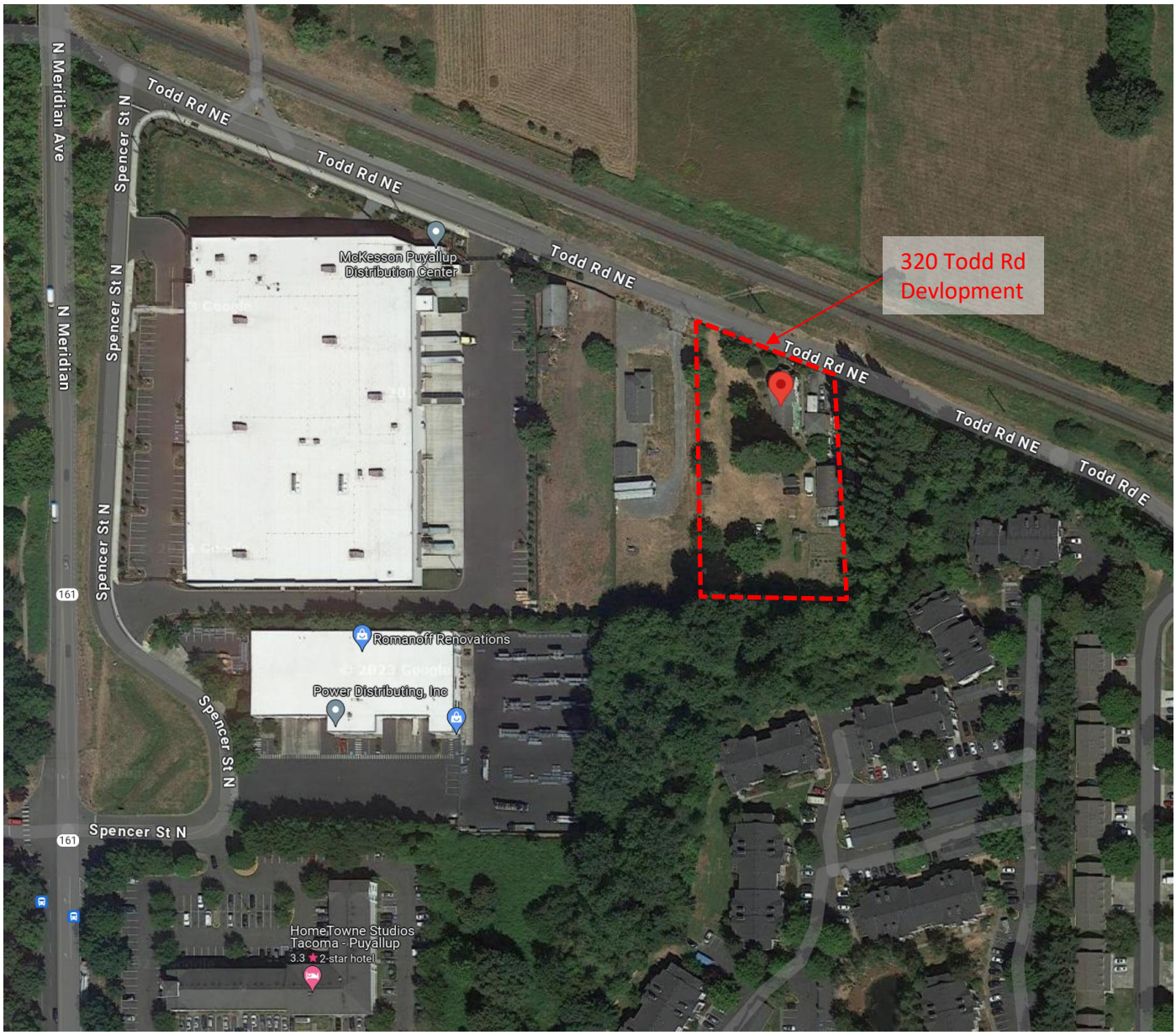
PROJECT OVERVIEW AND MAPS

The 320 Todd Road Development is located in Puyallup, WA along the southern side of Todd Rd NE. The proposed project is on a 65,123 SF residential multi-family lot, RM-20, with a proposed onsite project area of 33,174 SF and offsite project area of 7,997 SF. The surrounding area is comprised of residential and commercial buildings.

The project is a new development project and includes the renovation of an existing two-story residential building with a roof overhang/deck area of 2,745 SF, 168 SF of cement concrete pavement, 11,757 SF of asphalt pavement, and 18,157 SF of landscaping. Additionally, the development will include the construction of a driveway approach and garbage enclosure. The stormwater approach is to fully infiltrate all stormwater onsite using bioretention cells and an underground infiltration gallery.

Half street improvements will be installed, and a ROW dedication will be necessary. The half street improvements will consist of a new cement concrete sidewalk, curb & gutter, asphalt roadway, watermain extension, and stormwater improvements. Stormwater will be captured and conveyed to the existing stormwater system along Todd Rd NE.



EXISTING CONDITIONS SUMMARY

The Todd Rd Development is a 65,123 SF (1.50 acres) parcel, with a proposed project area of onsite project area of 33,174 SF. The site consists of an existing two-story residential 2,195 SF building, one-story garage, concrete, landscaping, septic drainfield, and wood fence along the perimeter of the property.

The project site is generally flat sloping from east to west; Stormwater that falls within the existing site infiltrates into native soils. There is no existing stormwater conveyance system to the site. The existing project site is approximately 14.3% impervious.

PROPOSED CONDITIONS SUMMARY

The Todd Rd Development proposes the conversion of an existing residential building to a 2,745 SF office building (including roof overhangs and decks) with site improvements and half street improvements.

Half street improvements will consist of an 1,879 SF ROW dedication, 212 LF of new curb & gutter, 1,695 SF of new cement concrete sidewalk, 6,140 SF of new asphalt roadway, and a 445 LF watermain extension.

The proposed development will result in 17,170 SF of impervious surface (15,031 SF of New/Replaced and 2,139 SF of Existing) and be 72.9% pervious.

Site improvements include the construction of new asphalt pavement, new cement concrete pavement, and new landscaping. The building will also have utility service connections for sewer, water, power, gas, and communications.

Stormwater from the Todd Rd building will be collected with roof downspouts and conveyed to a proposed infiltration gallery, which will infiltrate 100% of stormwater up to the 100-year storm. Infiltration testing was performed on site to obtain a design infiltration rate for on-site soils in the vicinity of stormwater infiltration systems, see Appendix A.

Runoff from the proposed cement concrete surfaces will sheet flow and infiltrate into native soils onsite.

Bioretention cells will collect and treat the asphalt stormwater runoff; subsequently the runoff in the bioretention cells will be conveyed to the same underground infiltration gallery.

The Todd Rd Development will have 15,031 SF of new and replaced hard surfaces upon project completion, and a total of 33,174 SF of land disturbing activity. The proposed development will result in 17,170 SF of impervious surface (15,031 SF of New/Replaced and 2,139 SF of Existing) and be 27.1% impervious. Since the project exceeds 5,000 SF of new plus replaced hard surfaces, the project is subject to all minimum requirements.

Offsite (Half Street Improvements) runoff is captured with new type 1 catch basins and conveyed to a new type 2 catch basin. The new type 2 catch basin intercepts an existing stormwater line under Todd Rd NE.

See table below for existing and proposed project areas.

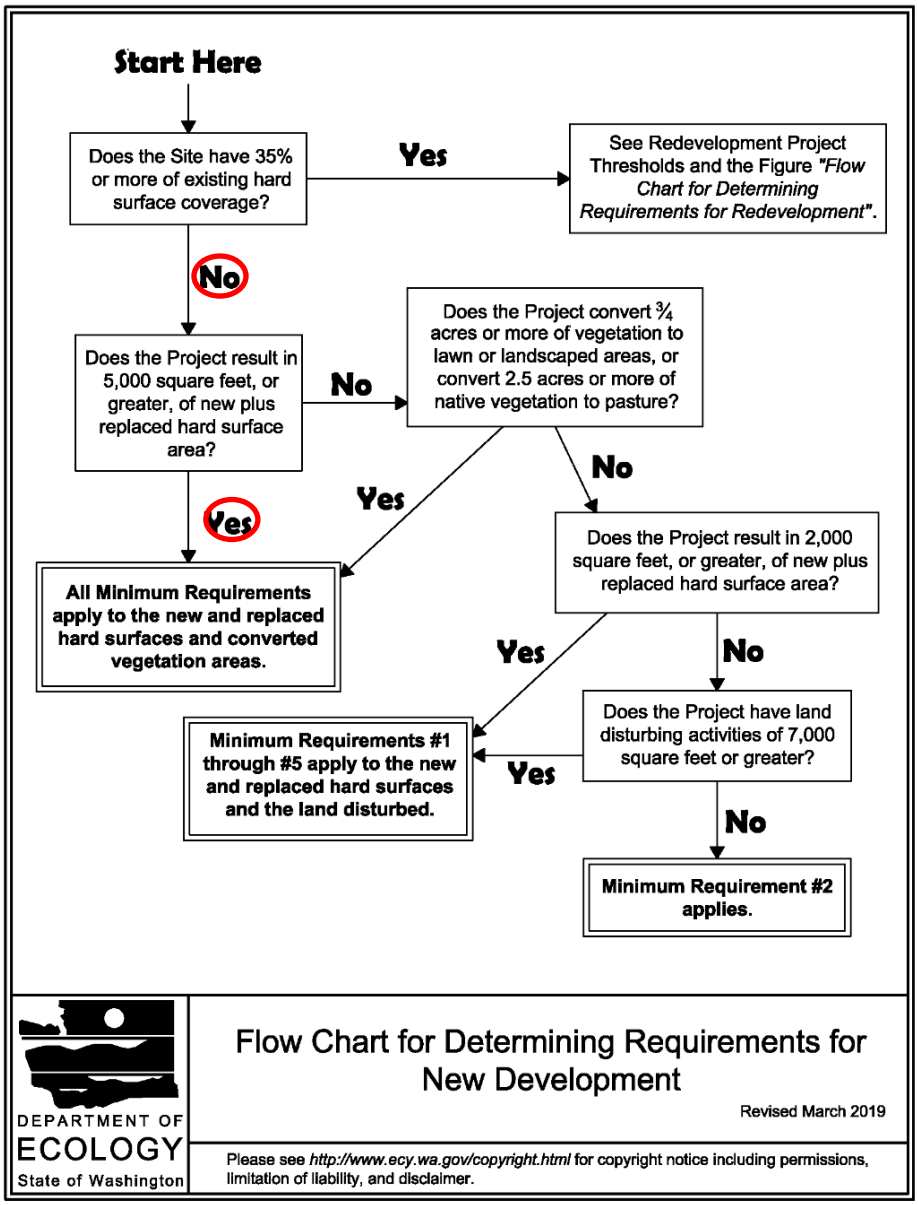
Description[a]	Onsite	Offsite	Total
Existing Conditions			
Total Project Area[b] (ft²)	33,174-0.762 ac	7,997-0.184 ac	41,171-0.946ac
Existing hard surface (ft²)	8,174-0.188 ac	4,678-0.108 ac	12,852-0.296ac
Existing vegetation area (ft²)	25,000- 0.574ac	3,319-0.076 ac	28,319-0.650ac
Proposed Conditions			
Total Project Area[b] (ft²)	33,174-0.762 ac	7,997-0.184 ac	41,171-0.946ac
Amount of new hard surface (ft²)	8,838-0.203 ac	3,304-0.076 ac	12,142-0.279ac
Amount of new pollution generating hard surface (PGHS)[c] (ft²)	8,386-0.193 ac	1,961-0.045 ac	10,347-0.238 ac
Amount of replaced hard surface (ft²)	6,193-0.142 ac	4,678-0.107 ac	10,871-0.249ac
Amount of replaced PGHS[d] (ft²)	3,721-0.085 ac	4,221-0.097 ac	7,942-0.182 ac
Amount of new plus replaced hard surface (ft²)	15,031-0.345ac	7,982-0.183 ac	23,013-0.528ac
Amount of new + replaced PGHS (ft²)	12,107-0.278ac	6,182-0.142 ac	18,289-0.420ac
Amount of existing hard surfaces converted to vegetation (ft²)	1,993-0.046 ac	15-0.001 ac	2,008-0.047 ac
Amount of Land Disturbed (ft²)	33,174-0.762 ac	7,997-0.184 ac	41,171-0.946ac
Vegetation to Lawn/Landscaped (acres)	0.371-16,150 sf	0-0 sf	0.371-16,150 sf
Native Vegetation to Pasture (acres)	0-0 sf	0-0 sf	0-0 sf
Existing hard surface to remain unaltered (ft²)	0-0 ac	0-0 ac	0-0 ac
Existing vegetation area to remain unaltered (ft²)	0-0 ac	0-0 ac	0-0 ac

a. All terms are defined in the 2019 Ecology Manual glossary.
b. The total project area in the existing condition should typically match the total project area in the proposed condition.
c. The "amount of new PGHS" should be part of or all of "amount of new hard surfaces"
d. The "amount of replaced PGHS" should be part of or all of the "amount of replaced hard surfaces".

SUMMARY OF MINIMUM REQUIREMENTS

The City of Puyallup utilizes the 2019 Department of Ecology Stormwater Manual for Western Washington (manual) for stormwater design. Volume 1 of this manual describes the Minimum Requirements for stormwater management for a New Development site. Using the flow chart below, all minimum requirements apply to the Todd Rd project onsite work.

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



MINIMUM REQUIREMENT 1: PREPARATION OF STORMWATER SITE PLANS

Stormwater Site Plan drawings have been prepared per the City of Puyallup development codes and the 2019 DOE Manual, see Appendix B.

MINIMUM REQUIREMENT 2: CONSTRUCTION STORMWATER POLLUTION PREVENTION

Temporary Erosion and Sediment Control Plans and a Construction Stormwater Pollution Prevention Plan have been prepared per the City of Puyallup development codes and the 2019 DOE Manual. Construction Stormwater Pollution Prevention measures may include: construction entrance; silt. See Appendix C for CSWPPP.

MINIMUM REQUIREMENT 3: SOURCE CONTROL OF POLLUTION

Source control BMPs will be implemented to minimize stormwater contamination and help comply with the Department of Ecology Stormwater Management Manual for Western Washington. BMP's for the project may include:

- *Inspect and clean treatment BMPs, conveyance systems, and catch basins as needed, and determine necessary O & M Improvements.*
- *Clean catch basins when the depth of deposits reaches 60-percent of the sump depth as measured from the bottom of basin to the invert of the lowest pipe into or out of the basin.*
- *Clean woody debris in a catch basin as frequently as needed to ensure proper operation of the catch basin.*

MINIMUM REQUIREMENT 4: PRESERVATION OF NATURAL DRAINAGE SYSTEMS AND OUTFALLS

The existing site is comprised of an existing two-story residential building, garage, landscaping, concrete, and a wood fence along the perimeter of the property and is 14.3% impervious. Stormwater currently infiltrates into native soils, and surface flows to the west side of the property. The proposed stormwater runoff will maintain existing drainage patterns and infiltrate onsite.

Offsite drainage consists of catch basins on either half of the road, that connect to an existing stormwater line under the north half of the road. The proposed stormwater runoff will maintain existing drainage patterns and be conveyed to the existing offsite stormwater system.

MINIMUM REQUIREMENT 5: ONSITE STORMWATER MANAGEMENT

Minimum Requirement #5 states projects shall utilize either On-Site Stormwater Management BMP's from List #2 or demonstrate compliance with the Low Impact Development (LID) Performance Standard. The LID performance standard requires the site to match predeveloped flows through flow control systems for 8% of the 2-year and 50-year storm events. The Todd Rd project is increasing the amount of impervious surface coverage on-site, and thus would be increasing stormwater flow frequency volumes. List #2 requires the evaluation of BMP's in the order listed to determine the most appropriate stormwater management system for landscaped areas, roofs, and hard surfaces. The stormwater approach is to infiltrate all stormwater runoff onsite, therefore the Todd Rd project is designed to ensure compliance with the LID Performance Standard.

Each BMP requires varying separation between the bottom of the BMP and the seasonal high groundwater level. Therefore, testing of the stormwater infiltration rate and seasonal high groundwater level was conducted. Excavation was conducted to a depth of 5.0-feet. No mottling or groundwater was observed in the test locations. A Pilot Infiltration Test (PIT) was conducted in the west and east sides of the site. The tests recorded infiltration rates

of 0.87 and 0.85 inches per hour, and after applying factors of safety design infiltration rates are 0.39 and 0.38 inches per hour, see Appendix A for Infiltration Report. Groundwater was not encountered during soil inspections.

Three drive-point piezometers (DPPs) were installed by GeoResources to conduct groundwater monitoring for the 320 Todd Rd project site during the wet season. Groundwater levels were manually measured bi-monthly from January 6, 2023 to March 31, 2023, see Appendix E in Appendix A for Soils Report.

The measured seasonal high groundwater level is at elevation 43.0', approximately 7 to 8 feet below existing grade. All BMP's will have sufficient separation between the bottom of the BMP and seasonal high groundwater level.

Downspout Infiltration and Bioretention Cells will be used to manage stormwater onsite to meet the LID Performance Standard. Runoff from building roof will be collected from the downspout locations and routed through stormwater pipes along the perimeter of the building and connect into the proposed infiltration gallery. Stormwater entering the infiltration gallery will infiltrate 100% up to the 100-year storm event. The infiltration gallery is sized per the design infiltration rate of 0.38 in/hr. Drain Rock with a porosity of 0.33 is the infiltration gallery material. Additionally, 1-foot of separation between the bottom of the infiltration gallery and the seasonal high groundwater level will be maintained.

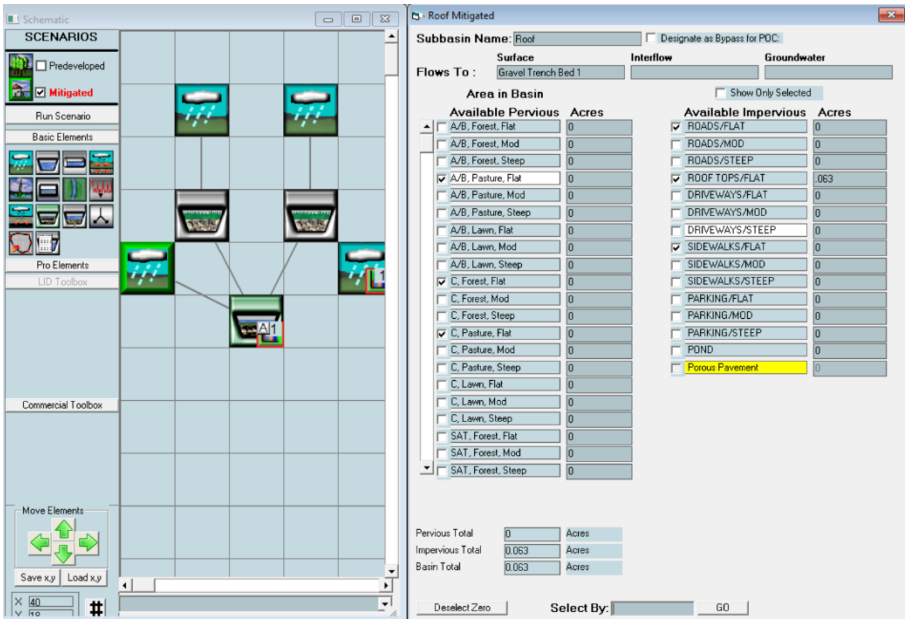
Proposed asphalt pavement runoff will sheetflow to one of two proposed Bioretention Cells to be treated and then conveyed to the same underground infiltration gallery as the roof runoff. Cement concrete walkway runoff will sheetflow onto native soils and infiltrate onsite.

Proposed landscaping will adhere to BMP T5.13 and infiltrate 100% of the stormwater runoff onsite into the native soils below.

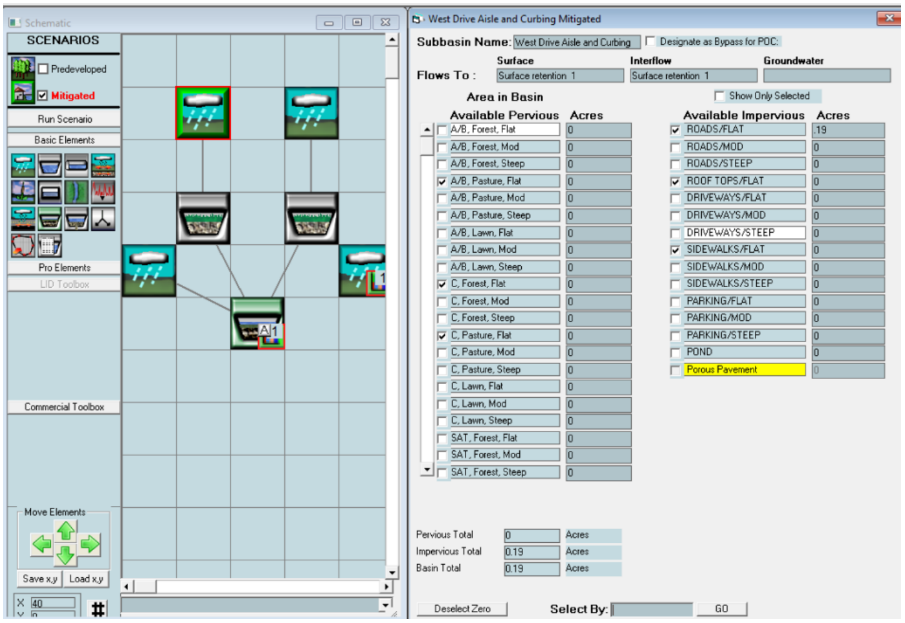
The half street improvements stormwater will be managed with multiple type 1 catch basins, a type 2 catch basins, and stormwater piping. Existing drainage patterns will be maintained.

See Appendix D for full WWHM Report. Results as follows

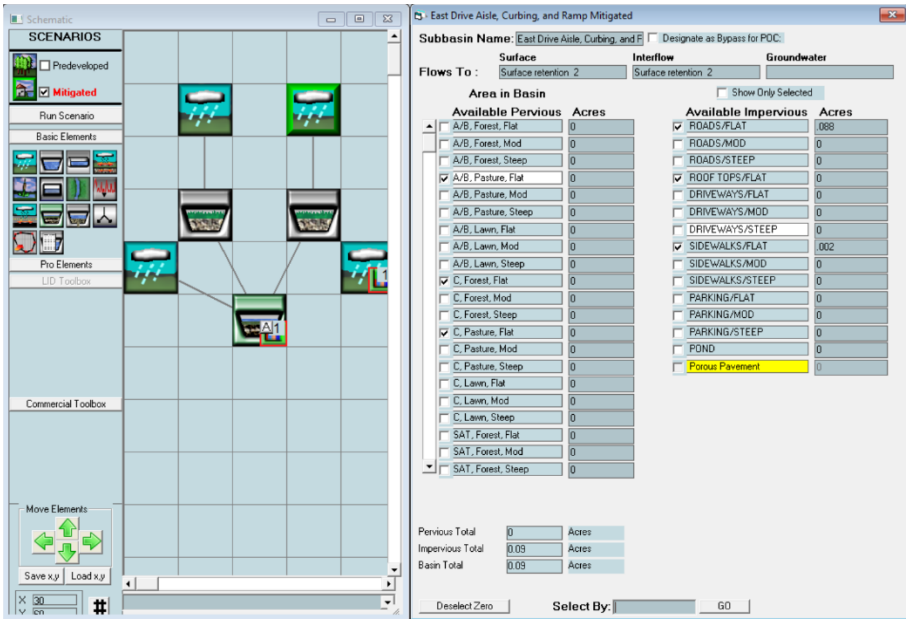
Roof Basin:



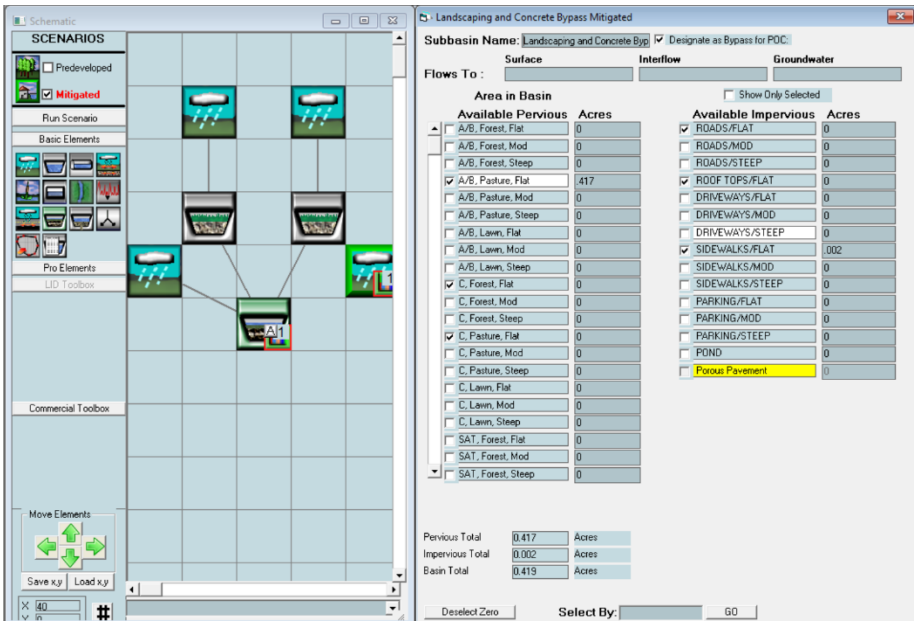
West Drive Aisle and Curbing Basin:



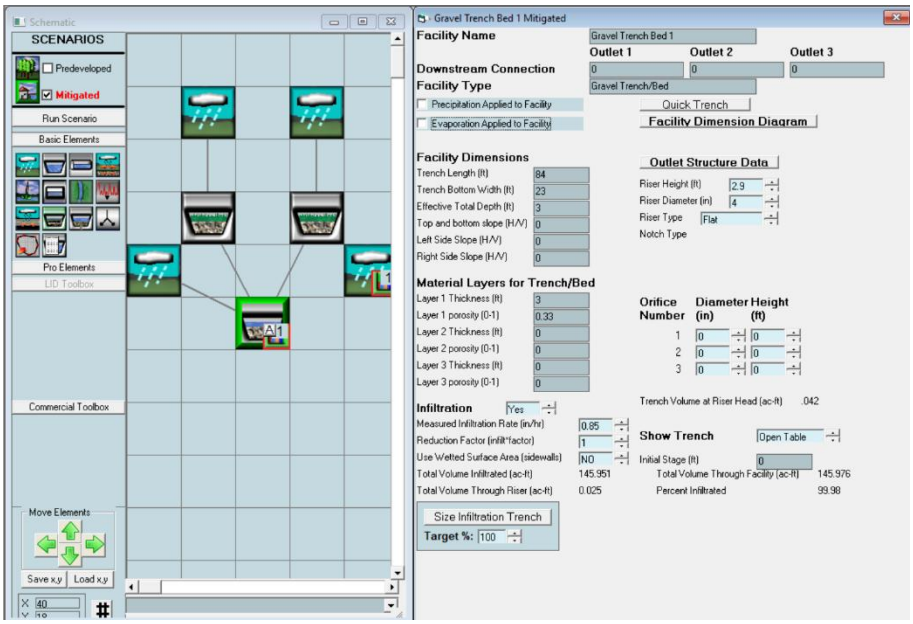
East Drive Aisle, Curbing, and Ramp Basin:



Landscaping and Concrete Bypass Basin:



Infiltration Trench:



MINIMUM REQUIREMENT 6: WATER QUALITY

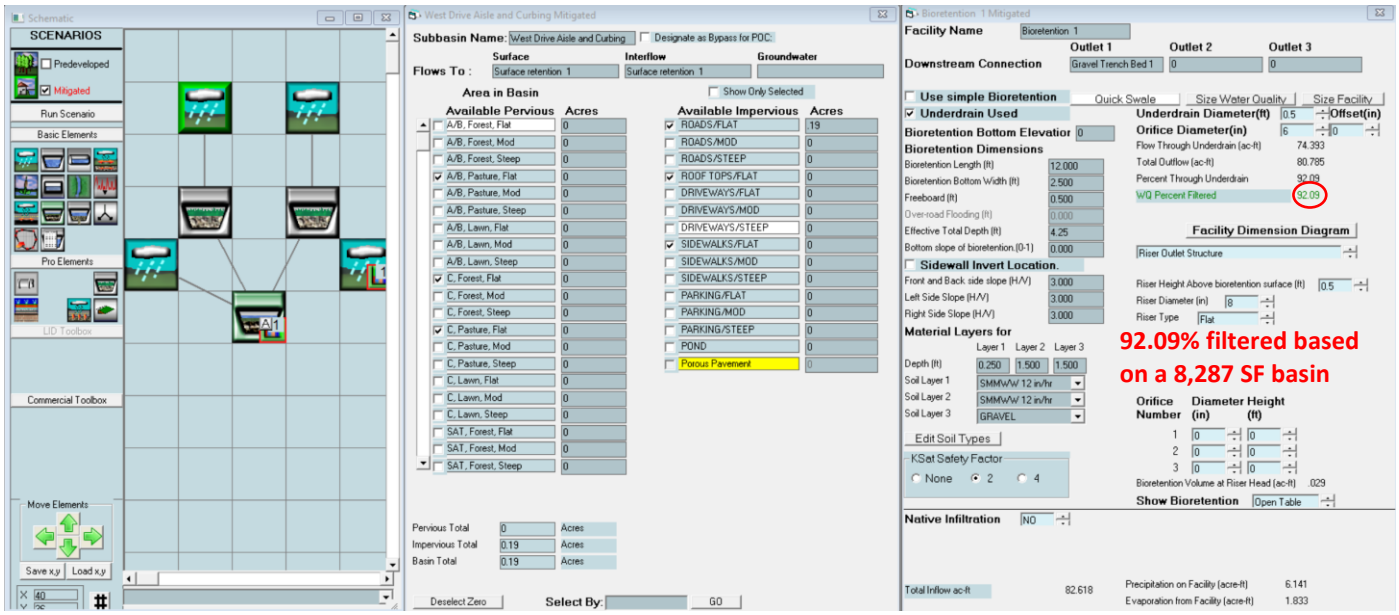
The Department of Ecology Stormwater Management Manual states that any project with a pollution generating threshold discharge area greater than 5,000 SF shall be required to utilize runoff treatment BMPs. The project proposes 11,757 SF of asphalt driveways and is therefore subject to runoff treatment for pollution generating areas. 72 SF of cement concrete walkways and 347 SF of cement concrete curbing will be managed as well.

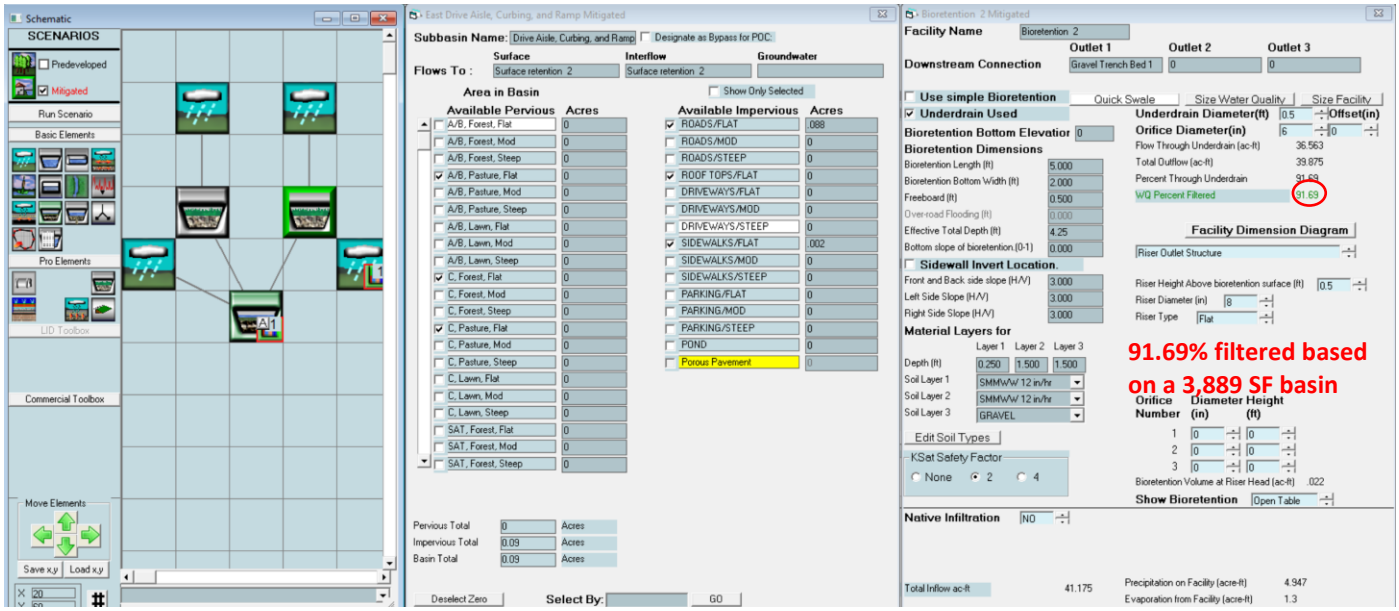
Half-street improvements are not subject to Minimum Requirement #6 since the improvements are road related and do not add more than 5,000 SF of new hard surfaces.

Stormwater runoff from the asphalt parking lot will sheet flow to one of two bioretention cells and be treated before entering the stormwater conveyance system to the underground infiltration gallery, see Appendix D for WWHM modeling.

The bioretention cells have been designed per the 2019 DOE manual and sized using WWHM and the following criteria:

- Treat 91% of runoff
- DOE bioretention soil mix (BSM)
- 3.0-inches per hour infiltration rate for basins less than 8,000 SF
    - Per 2019 DOE manual when using default soil media mix
- 0.5-foot of ponding with 24-hour drawdown
- 6-inches freeboard
- 1.5-foot depth BSM
- 2.0-feet x 5.0-feet and 2.0-feet x 12.0-feet bottom areas will be used for the two bioretention cells
- 3:1 side slopes





Bioretention soil mix to meet 2019 DOE manual “Default Soil Media (BSM)”, below:

Default Bioretention Soil Media (BSM)

Projects which use the following requirements for the bioretention soil media do not have to test the media for it saturated hydraulic conductivity (aka. Infiltration rate). They may assume the rates specified in the subsection titled “Determining Bioretention Soil Mix Infiltration Rate.”

Mineral Aggregate

Percent Fines: A range of 2 to 4 percent passing the #200 sieve is ideal and fines should not be above 5 percent for a proper functioning specification according to ASTM D422.

Aggregate Gradation

The aggregate portion of the BSM should be well-graded. According to ASTM D 2487-98 (Classification of Soils for Engineering Purposes (Unified Soil Classification System)), well-graded sand should have the following gradation coefficients:

- Coefficient of Uniformity (Cu = D60/D10) equal to or greater than 4, And
- Coefficient of Curve (Cc = (D30)2/D60 x D10) greater than or equal to 1 and less than or equal to 3.

Table 7.4.1 provides a gradation guideline for the aggregate component of a Bioretention Soil Mix specification in western Washington (Hinman, Robertson, 2007). The sand gradation below is often supplied as a well graded utility or screened. With compost this blend provides enough fines

for adequate water retention, hydraulic conductivity within recommended range (see below), pollutant removal capability, and plant growth characteristics for meeting design guidelines and objectives.

Table 7.4.1

General Guideline for Mineral Aggregate Gradation

Sieve Size	Percent Passing
3/8”	100
#4	95-100
#10	75-90
#40	25-40
#100	4-10
#200	2-5

Where existing soils meet the above aggregate gradation, those soils may be amended rather than importing mineral aggregate.

Compost to Aggregate Ratio, Organic Matter Content, Cation Exchange Capacity:

- Compost to aggregate ratio: 60-65 percent mineral aggregate, 35 – 40 percent compost by volume.
- Organic matter content: 5 – 8 percent by weight.
- Cation Exchange Capacity (CEC) must be > 5 milliequivalents/100 g dry soil Note: Soil mixes meeting the above specifications do not have to be tested for CEC. They will readily meet the minimum CEC.

Compost

To ensure that the BSM will support healthy plant growth and root development, contribute to biofiltration of pollutants, and not restrict infiltration when used in the proportions cited herein, the following compost standards are required.

- Meets the definition of “composted material” in WAC 173-350-100 and complies with testing parameters and other standards in WAC 173-350-220.
- Produced at a composting facility that is permitted by the jurisdictional health authority. Permitted compost facilities in Washington are included on a list available at http://www.ecy.wa.gov/programs/swfa/organics/soil.html The compost product must originate a minimum of 65 percent by volume from recycled plant waste comprised of ”yard debris,” “crop residues,” and “bulking agents” as those terms are defined in WAC 173-350-100. A maximum of 35 percent by volume of “postconsumer food waste” as defined in WAC 173-350-100 , but not

including biosolids, may be substituted for recycled plant waste.

- Stable (low oxygen use and CO2 generation) and mature (capable of supporting plant growth) by tests shown below. This is critical to plant success in a bioretention soil mixes.
- Moisture content range: no visible free water or dust produced when handling the material.
- Tested in accordance with the U.S. Composting Council “Test Method for the Examination of Compost and Composting” (TMECC), as established in the Composting Council’s “Seal of Testing Assurance”

(STA) program. Most Washington compost facilities now use these tests.

- Screened to the following size gradations for Fine Compost when tested in accordance with TMECC test method 02.02-B, Sample Sieving for Aggregate Size Classification.”

Fine Compost shall meet the following gradation by dry weight

Minimum percent passing 2” 100%

Minimum percent passing	1”	99%
Minimum percent passing	5/8”	90%
Minimum percent passing	¼”	75%

• pH between 6.0 and 8.5 (TMECC 04.11-A). “Physical contaminants” (as defined in WAC 173-350-100) content less that 1% by weight (TMECC 03.08-A) total, not to exceed 0.25 percent film plastic by dry

weight.

• Minimum organic matter content of 40% (TMECC 05.07-A “Loss on Ignition)

• Soluble salt content less than 4.0 dS/m (mmhos/cm) (TMECC 04.10-A “Electrical Conductivity, 1:5 Slurry Method, Mass Basis”)

• Maturity indicators from a cucumber bioassay (TMECC 05.05-A “Seedling Emergence and Relative Growth) must be greater than 80%for both emergence and vigor”)

• Stability of 7 mg CO2-C/g OM/day or below (TMECC 05.08-B “Carbon Dioxide Evolution Rate”)

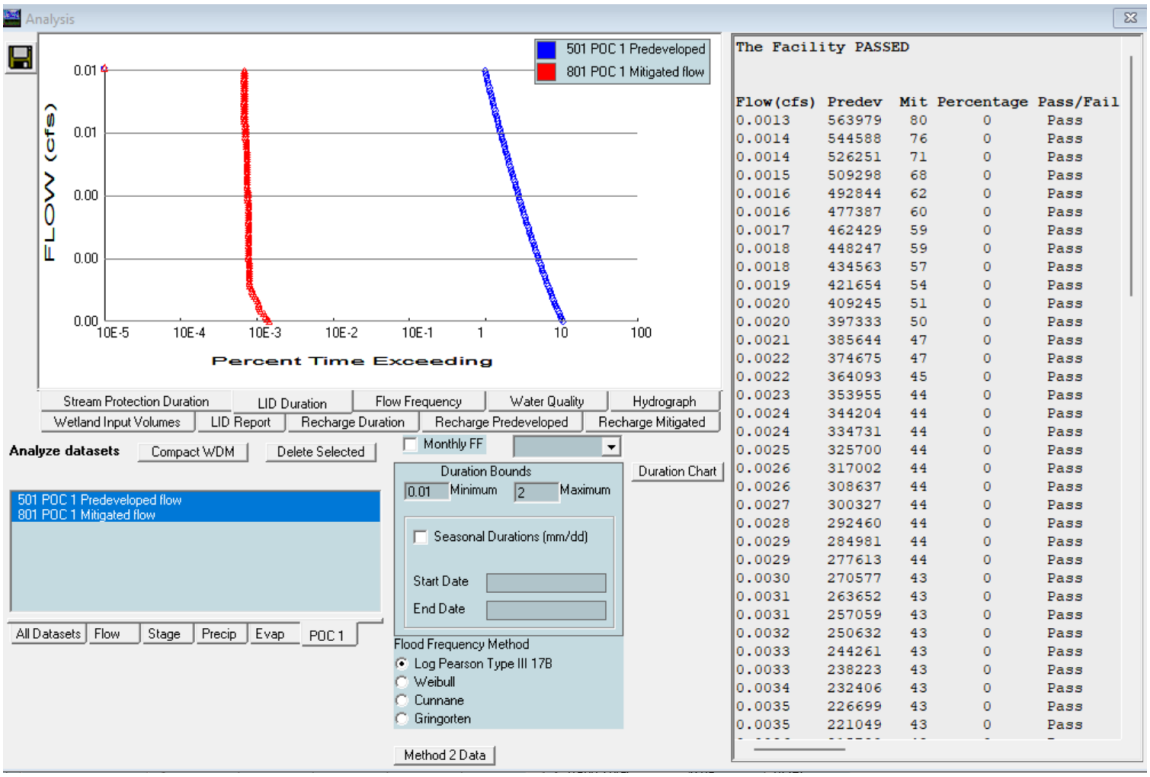
• Carbon to nitrogen ratio (TMECC 05.02A “ Carbon to Nitrogen Ratio” which uses 04.01 “Organic Carbon” and 04.02D “Total Nitrogen by Oxidation”) of less than 25:1. The C:N ratio may be up to 35:1 for plantings composed entirely of Puget Sound Lowland native species and up to 40:1 for coarse compost to be used as a surface mulch (not in a soil mix).

MINIMUM REQUIREMENT 7: FLOW CONTROL

The Todd Rd Development project site uses infiltration to meet the requirement of Minimum Requirement 7 Flow Control.

WWHM modeling was conducted to confirm that predeveloped flows are under the flow duration from 8% of the 2-year peak flow to the full 50-year peak flow. Based on the WWHM LID Duration check, the site meets the LID Performance Standard.

See Appendix D for full WWHM Report. Results are as follows:



Half-street improvements are not subject to Minimum Requirement #7 since the improvements are road related and do not add more than 5,000 SF of new hard surfaces.

MINIMUM REQUIREMENT 8: WETLANDS PROTECTION

Any threshold discharge area that discharges stormwater through a conveyance system into a wetland is required to meet the Ecology Manual standards for protecting the wetland. The Todd Rd Development project will not discharge stormwater into a wetland, and thus is not subject to the wetlands protection standards outlined in Minimum Requirement #8.

MINIMUM REQUIREMENT 9: OPERATION AND MAINTENANCE

See Appendix E for Operations & Maintenance Manual for all new stormwater BMP's installed with the project.

APPENDIX A

Infiltration Testing Report

320 Todd Rd NE

Puyallup, WA

Prepared for

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May 23, 2024

PROJECT ENGINEER'S CERTIFICATION

I hereby certify that this Infiltration Testing Report for Todd RD Development has been prepared by me or under my supervision and meets minimum standards of the Department of Ecology Stormwater Management Manual for Western Washington.

Justin Jones, PE

05-24-2024

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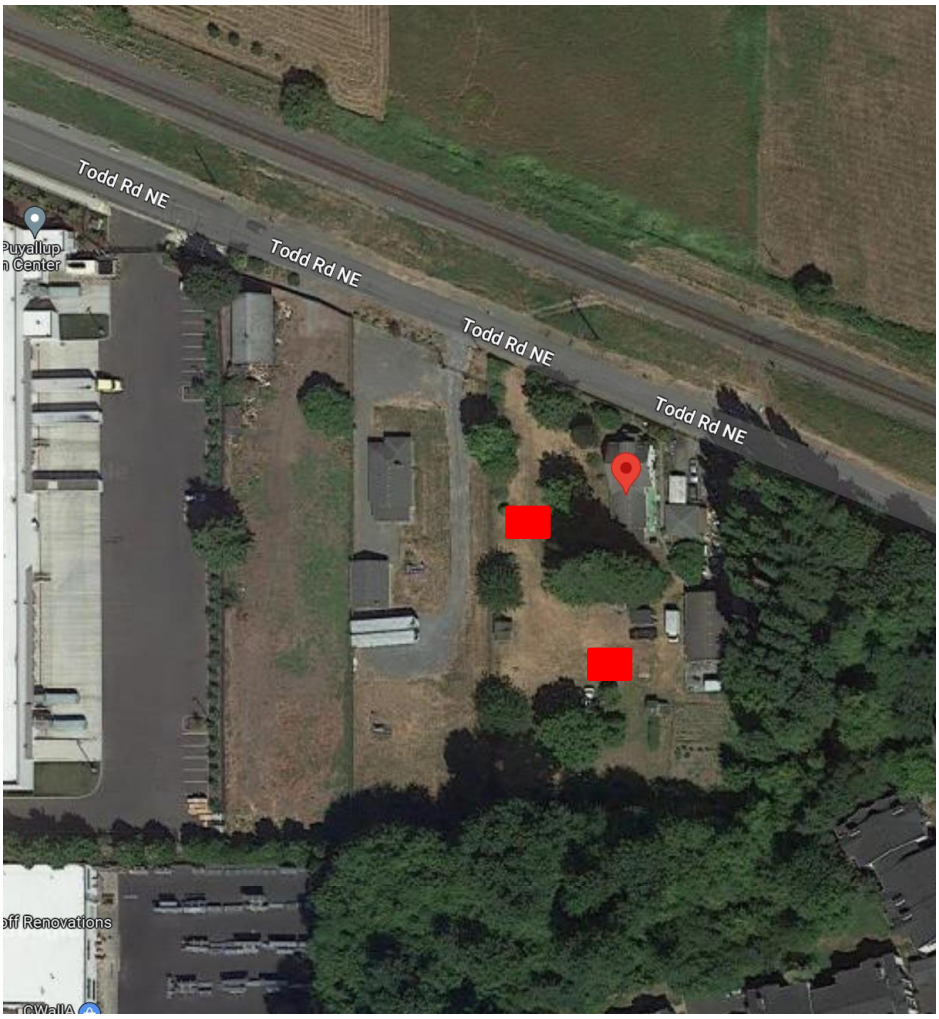
SUMMARY

This report details the results of infiltration testing for use in the stormwater system design of Todd Road Development located within Puyallup, WA. Two Pilot Infiltration Test (PIT) was conducted on site to determine the onsite stormwater infiltration rate. The test hole was excavated and backfilled by a licensed contractor and the PIT was completed in accordance with the Department of Ecology (ECY) Stormwater Management Manual for Western Washington (Stormwater Manual).

The PIT process evaluates the infiltration within a 12 SF area by first measuring the rate of water required to maintain a constant water elevation of approximately 12-inches in the test pit, and second by measuring the drawdown rate of the water within the test pit. The drawdown is done using a data logger. The test pit is excavated to a depth of 5.0-feet below existing grade and observed for groundwater.

The field data is then analyzed, and a factor of safety applied to determine the stormwater design infiltration rate. Below is a summary of the results.

Test Pit Location



Summary of Results

Per the PIT, the site soils are suitable for stormwater infiltration. A soil sample was taken from each PIT, the soil sample has been submitted and is pending results.

Testing	Test PIT	Results	ECY Threshold
Ground Water	Pit Depth	4.0-feet	N/A
	Test Hole 1 Groundwater Level	Ground Water not Observed	N/A
	Test Hole 2 Groundwater Level	Ground Water not Observed	N/A
Infiltration Rate	Infiltration Rate Factor of Safety	0.45	N/A
	Test Hole 1 Infiltration Rates	Uncorrected: 0.87 inches per hour	≥ 0.3 inches per hour
		Design: 0.39 Inches per hour	
	Test Hole 2 Infiltration Rates	Uncorrected: 0.85 inches per hour	≥ 0.3 inches per hour
		Design: 0.38 inches per hour	
Water Quality	Test Hole 1 Lab Analysis	Pending Results	≥ 5.0 milliequivalents CEC/100g
		Pending Results	≥ 1.0%
	Test Hole 2 Lab Analysis	Pending Results	≥ 5.0 milliequivalents CEC/100g
		Pending Results	≥ 1.0%

INFILTRATION TEST PROCEDURES

Below is the process taken for the PIT:

- □ Identify PIT locations based on the site survey of existing buildings and utilities as well as the potential locations of infiltration facilities based on the preliminary site plan.

- □ Obtain public and private utility locates. Prior to the PIT utility locates will be called to ensure there are no utilities present in the PIT locations.

- □ Excavation of PIT holes (approximately 3-feet x 4-feet 4-feet deep). A 3-feet x 4-feet x2-feet tall wood box is inserted into the test hole to ensures that the bottom surface area is exactly 12 SF. The box is backfilled to the top edge to ensure stability and infiltration only through the bottom of the test hole for the duration of the PIT.

- □ A soil sample is collected from the bottom of the hole to test treatment capability. A lab tests the cation exchange rate and organic matter content of soils. Lab results confirm if the soil is suitable for treatment based on Stormwater Manual criteria.

- □ A float system with a water hose connection is set into the center of the test hole. The float system is equipped with a leveling plate, a measuring ruler for visual inspection of water levels and a perforated pipe housing for the data collector.

- □ Using water transfer tanks or hose spigot as available, the test hole is filled to a 12-inch water depth that is maintained. The presoak period ensures that the soils have been fully saturated before conducting the PIT. A 1-hour stabilization test is performed after the presoak period to confirm soil stabilization. If the test yields 4 constant gallon per minute (GPM) readings that are conducted every 15-minutes, the stabilization of the soil is confirmed.

- □ A 1-hour GPM test is conducted per the Stormwater Manual. Using a water meter accurate to the nearest tenth of a gallon, a GPM flow rate is recorded every 15-minutes while the water level is maintained at a 12-inch depth. An infiltration rate (in/hr) can be determined using the GPM flow rate and the 12 SF bottom surface area of the hole.

- □ A drawdown test is performed per Stormwater Manual to determine the drawdown infiltration capability of the soil. A CRS451V (Pressure Transducer) is placed into the test hole and set to take pressure (PSI) readings every 10-minutes. The water source is shutoff, and the pressure transducer will measure water drawdown for a 2-hour period. At the end of the period the sensors are removed from the test hole, the data is collected using a PC interface module and the HydroSci program to communicate with the sensor to retrieve the data.

- □ The wood box and the float system are removed from the test hole.

- □ Over excavate test hole to confirm there is no ground water mounding.

- □ The test pit is then backfilled and restored to prior state of excavation.

FINDINGS AND RECOMMENDATIONS

Groundwater Conditions

The Stormwater Manual specifies minimum separations between the seasonal high groundwater elevation and the bottom of the infiltration facility based on different best management practices (BMP):

- **Downspout Infiltration:** 1-foot
- **Permeable Pavement:** 1-foot
- **Infiltration Facility:** 3-foot

With known groundwater conditions for each test hole, there is adequate spacing between groundwater and BMPs. An overflow should be installed with BMP in case of large storm events.

Three drive-point piezometers (DPPs) were installed by GeoResources to conduct groundwater monitoring for the 320 Todd Rd project site during the wet season. Groundwater levels were manually measured bi-monthly from January 6, 2023 to March 31, 2023, see Appendix E for Soils Report.

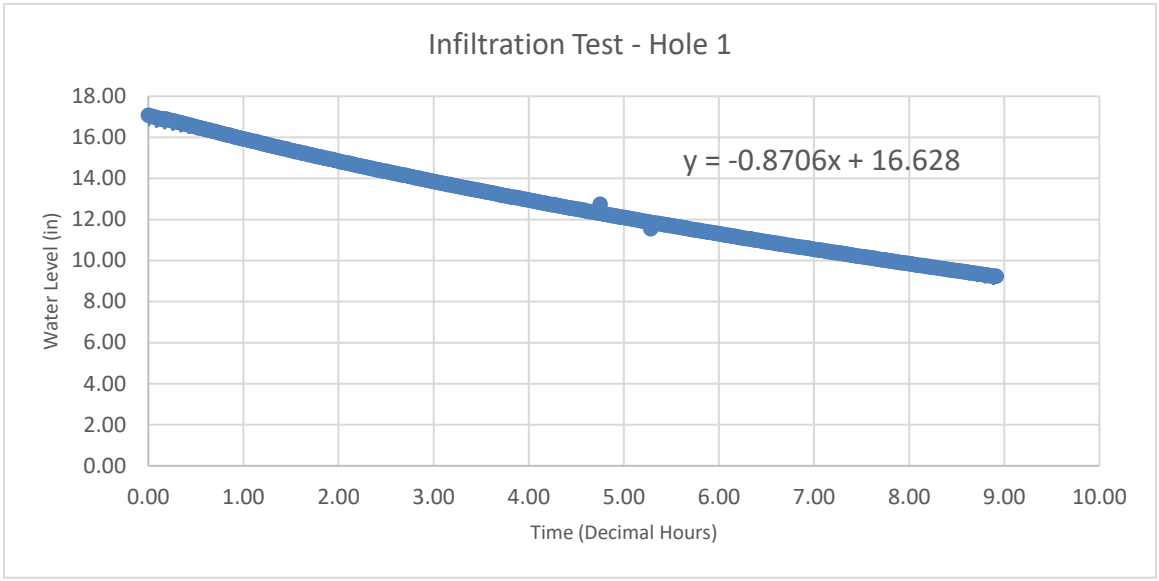
The measured seasonal high groundwater level is at elevation 43.0', approximately 7 to 8 feet below existing grade. All BMP's will have sufficient separation between the bottom of the BMP and seasonal high groundwater level.

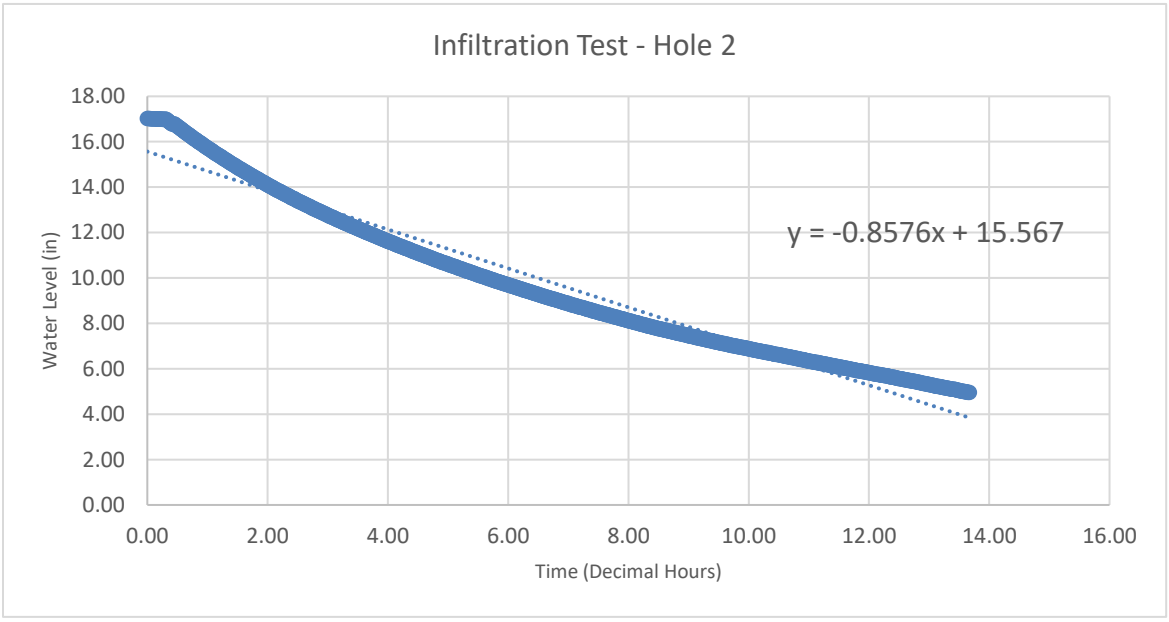
Field Measured Infiltration Rate

The infiltration rate was collected using two methods in during the PIT. The first method is to measure the gallons per minute flowrate required to maintain a constant water level in the test pit. The average of the flowrate measurements taken over an hour timeframe.

The second method is to measure the drawdown rate of the test pit. Measurements were taken both visually and with a data logger. The average of the drawdown measurements resulted in an infiltration rate of resulted in the following infiltration rates:

- Test Hole 1: 0.87 inches per hour
- Test Hole 2: 0.85 inches per hour


Infiltration Test - Hole 1
y = -0.8706x + 16.628
Water Level (in)
Time (Decimal Hours)
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00


Infiltration Test - Hole 2
y = -0.8576x + 15.567
Water Level (in)
Time (Decimal Hours)
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00

Design Infiltration Rate

Per the Stormwater Manual a minimum design infiltration rate of 0.3 inches per hour is required for onsite infiltration. The design infiltration rate takes the field measured infiltration rate and applies a factor of safety based on three correction factors. The three corrections are based on site variability, test method, and degree of influent control (See Appendix D).

Issue	Partial Correction Factor
Site variability and number of locations tested	CF_v = 0.33 to 1.0
Test Method	
• Large-scale PIT • Small-scale PIT • Other small-scale (e.g. Double ring, falling head) • Grain Size Method	CF_t = 0.75 = 0.50 = 0.40 = 0.40
Degree of influent control to prevent siltation and bio-buildup	CF_m = 0.9

Total Correction Factor, $CF_T = CF_v \times CF_t \times CF_m$

Based on multiple geotechnical reports from nearby projects, soils are known to be consistent in this area. Per the Stormwater Manual, a site variability correction of 1 is used. A correction of 0.5 for the small-scale PIT

and 0.9 for the degree of influent are also used. A total correction factor of 0.45 is applied to the measured infiltration rate yielding a recommended design infiltration rates as follows:

- Test Hole 1: 0.39 inches per hour
- Test Hole 2: 0.38 inches per hour

Treatment Suitability

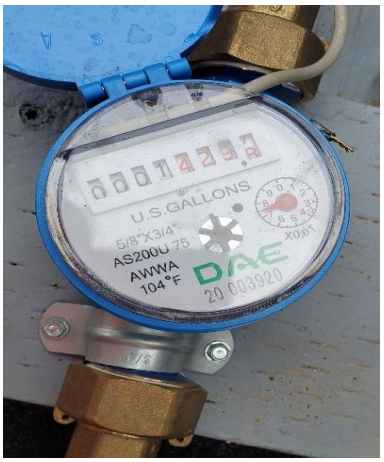
Per the Stormwater Manual the soils that stormwater is infiltrated into may be used for treatment of pollution generating surfaces if the soil meets specific requirements. Otherwise, a treatment layer is required to treat pollution generating surfaces. The treatment threshold of the infiltrated soil per the Stormwater Manual is a Cation Exchange Capacity greater than or equal to 5 milliequivalents CEC/100g and a minimum of 1.0% organic content.

A soil sample was taken from the PIT, soils samples are still in testing and are pending results.

TEST PIT PHOTO DOCUMENTATION – TEST HOLE 1

3-feet x 4-feet x 18-inches

Test Pit Pre-soak at 12-inches



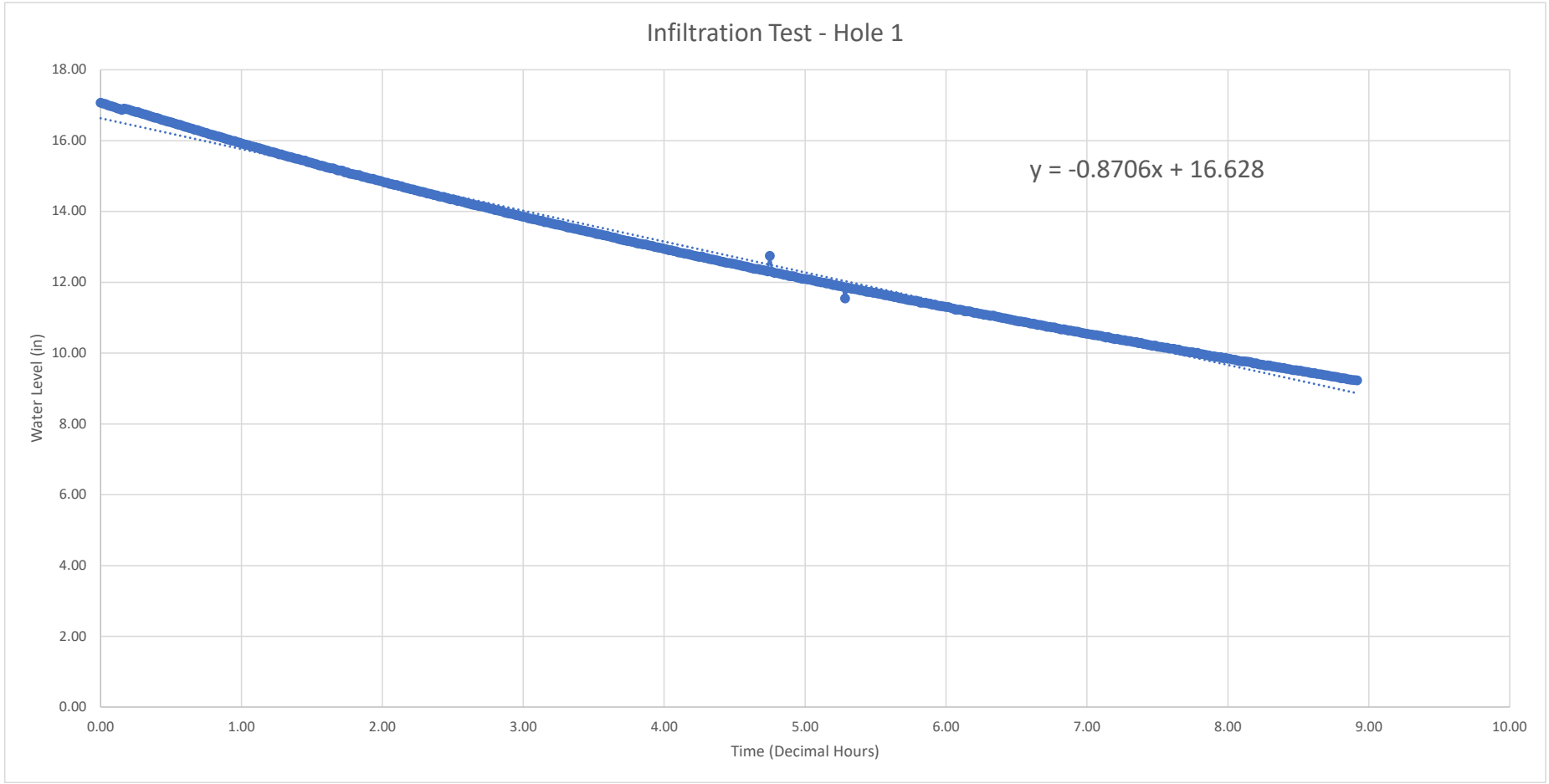
1-hour GPM Test

Pressure Transducer Drawdown Test

Over Excavation to observe if Groundwater is Mounding

Backfill Test Hole

APPENDIX A


Infiltration Test - Hole 1
y = -0.8706x + 16.628
Water Level (in)
Time (Decimal Hours)
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00

JMJ 02 03/15/23								
Project Location:		Todd Rd Development						
Date of Test:			3/15/2023					
Test Pit Dimensions:		Length (Feet)	4'	Width (Feet):	3'	Depth (feet):	4'	
Presoak:			9:55 - AM at 12-inch water column					
Infiltration Test:								
		Water Column Maintained (inches):		12				
		Gallons Per Inch:	7.48					
		Time(Minutes)	**Volume (gallons)**	**Flow Rate (GPM)**			**Flow (Gallons)**	**Infiltration Rate (in/hr)**
				Meter Start	Meter End	Flow (Gallons)		
		0						
		15						
		30						
		45						
		60						**0.0**
			Water Column Maintained (inches)		12			
Weather Condtions:			Cloudy					
Drawdown Test (Sensor):								
Sensor Name:			JMJ 02 (**CRS451V Sensors from Campbell Scientic**)					
Time (decimal Hours)		**Time Stamp**	**Record #**	**Reading (PSI)**	**Level (in)**			
0.00	0.0	3:05:00 PM	0	0.6156866	17.07			
0.02	1.0	3:06:00 PM	1	0.6148627	17.04			
0.03	2.0	3:07:00 PM	2	0.6143792	17.03			
0.05	3.0	3:08:00 PM	3	0.6133576	17.00			
0.07	4.0	3:09:00 PM	4	0.6126429	16.98			
0.08	5.0	3:10:00 PM	5	0.6119932	16.96			
0.10	6.0	3:11:00 PM	6	0.6110991	16.94			
0.12	7.0	3:12:00 PM	7	0.6101094	16.91			
0.13	8.0	3:13:00 PM	8	0.6094368	16.89			
0.15	9.0	3:14:00 PM	9	0.6084362	16.87			
0.17	10.0	3:15:00 PM	10	0.6098647	16.91			
0.18	11.0	3:16:00 PM	11	0.6093236	16.89			
0.20	12.0	3:17:00 PM	12	0.6087492	16.87			
0.22	13.0	3:18:00 PM	13	0.6077613	16.85			
0.23	14.0	3:19:00 PM	14	0.6070306	16.83			
0.25	15.0	3:20:00 PM	15	0.6062381	16.80			
0.27	16.0	3:21:00 PM	16	0.6060572	16.80			
0.28	17.0	3:22:00 PM	17	0.6051728	16.78			
0.30	18.0	3:23:00 PM	18	0.6042444	16.75			
0.32	19.0	3:24:00 PM	19	0.6038356	16.74			
0.33	20.0	3:25:00 PM	20	0.603064	16.72			
0.35	21.0	3:26:00 PM	21	0.602203	16.69			
0.37	22.0	3:27:00 PM	22	0.6014171	16.67			
0.38	23.0	3:28:00 PM	23	0.6006184	16.65			
0.40	24.0	3:29:00 PM	24	0.6002951	16.64			
0.42	25.0	3:30:00 PM	25	0.5992771	16.61			
0.43	26.0	3:31:00 PM	26	0.5982766	16.58			
0.45	27.0	3:32:00 PM	27	0.5977812	16.57			

0.47	28.0	3:33:00 PM	28	0.5970181	16.55			
0.48	29.0	3:34:00 PM	29	0.5963655	16.53			
0.50	30.0	3:35:00 PM	30	0.5959253	16.52			
0.52	31.0	3:36:00 PM	31	0.5948336	16.49			
0.53	32.0	3:37:00 PM	32	0.5941705	16.47			
0.55	33.0	3:38:00 PM	33	0.5933849	16.45			
0.57	34.0	3:39:00 PM	34	0.5930045	16.44			
0.58	35.0	3:40:00 PM	35	0.5921196	16.41			
0.60	36.0	3:41:00 PM	36	0.5912513	16.39			
0.62	37.0	3:42:00 PM	37	0.5906174	16.37			
0.63	38.0	3:43:00 PM	38	0.589988	16.35			
0.65	39.0	3:44:00 PM	39	0.5894052	16.34			
0.67	40.0	3:45:00 PM	40	0.588398	16.31			
0.68	41.0	3:46:00 PM	41	0.5878983	16.30			
0.70	42.0	3:47:00 PM	42	0.5870169	16.27			
0.72	43.0	3:48:00 PM	43	0.5864626	16.26			
0.73	44.0	3:49:00 PM	44	0.5854719	16.23			
0.75	45.0	3:50:00 PM	45	0.584968	16.22			
0.77	46.0	3:51:00 PM	46	0.5838918	16.19			
0.78	47.0	3:52:00 PM	47	0.5833375	16.17			
0.80	48.0	3:53:00 PM	48	0.5826278	16.15			
0.82	49.0	3:54:00 PM	49	0.5819051	16.13			
0.83	50.0	3:55:00 PM	50	0.5815238	16.12			
0.85	51.0	3:56:00 PM	51	0.5808325	16.10			
0.87	52.0	3:57:00 PM	52	0.5799282	16.08			
0.88	53.0	3:58:00 PM	53	0.5792771	16.06			
0.90	54.0	3:59:00 PM	54	0.578376	16.03			
0.92	55.0	4:00:00 PM	55	0.5778934	16.02			
0.93	56.0	4:01:00 PM	56	0.5769713	15.99			
0.95	57.0	4:02:00 PM	57	0.5766121	15.98			
0.97	58.0	4:03:00 PM	58	0.5757054	15.96			
0.98	59.0	4:04:00 PM	59	0.5750806	15.94			
1.00	60.0	4:05:00 PM	60	0.5741982	15.92			
1.02	61.0	4:06:00 PM	61	0.5735646	15.90			
1.03	62.0	4:07:00 PM	62	0.5729434	15.88			
1.05	63.0	4:08:00 PM	63	0.5726172	15.87			
1.07	64.0	4:09:00 PM	64	0.5713918	15.84			
1.08	65.0	4:10:00 PM	65	0.5710028	15.83			
1.10	66.0	4:11:00 PM	66	0.5705318	15.82			
1.12	67.0	4:12:00 PM	67	0.569611	15.79			
1.13	68.0	4:13:00 PM	68	0.5690674	15.77			
1.15	69.0	4:14:00 PM	69	0.5684627	15.76			
1.17	70.0	4:15:00 PM	70	0.5675685	15.73			
1.18	71.0	4:16:00 PM	71	0.5669469	15.72			
1.20	72.0	4:17:00 PM	72	0.5660034	15.69			
1.22	73.0	4:18:00 PM	73	0.5655891	15.68			
1.23	74.0	4:19:00 PM	74	0.5650941	15.66			
1.25	75.0	4:20:00 PM	75	0.564332	15.64			
1.27	76.0	4:21:00 PM	76	0.5630262	15.61			
1.28	77.0	4:22:00 PM	77	0.5631915	15.61			
1.30	78.0	4:23:00 PM	78	0.5621863	15.58			
1.32	79.0	4:24:00 PM	79	0.5614846	15.56			
1.33	80.0	4:25:00 PM	80	0.5608001	15.55			
1.35	81.0	4:26:00 PM	81	0.5605492	15.54			
1.37	82.0	4:27:00 PM	82	0.5595577	15.51			
1.38	83.0	4:28:00 PM	83	0.5588057	15.49			
1.40	84.0	4:29:00 PM	84	0.5584829	15.48			
1.42	85.0	4:30:00 PM	85	0.5576767	15.46			
1.43	86.0	4:31:00 PM	86	0.5570237	15.44			
1.45	87.0	4:32:00 PM	87	0.556747	15.43			
1.47	88.0	4:33:00 PM	88	0.5556393	15.40			
1.48	89.0	4:34:00 PM	89	0.5549214	15.38			
1.50	90.0	4:35:00 PM	90	0.5542242	15.36			
1.52	91.0	4:36:00 PM	91	0.5535494	15.34			
1.53	92.0	4:37:00 PM	92	0.552975	15.33			

1.55	93.0	4:38:00 PM	93	0.5517957	15.30			
1.57	94.0	4:39:00 PM	94	0.5515959	15.29			
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1.60	96.0	4:41:00 PM	96	0.5499135	15.24			
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1.63	98.0	4:43:00 PM	98	0.5490008	15.22			
1.65	99.0	4:44:00 PM	99	0.5488402	15.21			
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1.73	104.0	4:49:00 PM	104	0.5450302	15.11			
1.75	105.0	4:50:00 PM	105	0.5448695	15.10			
1.77	106.0	4:51:00 PM	106	0.5435811	15.07			
1.78	107.0	4:52:00 PM	107	0.543332	15.06			
1.80	108.0	4:53:00 PM	108	0.5427405	15.04			
1.82	109.0	4:54:00 PM	109	0.5420786	15.03			
1.83	110.0	4:55:00 PM	110	0.5419946	15.02			
1.85	111.0	4:56:00 PM	111	0.5407454	14.99			
1.87	112.0	4:57:00 PM	112	0.5401692	14.97			
1.88	113.0	4:58:00 PM	113	0.5397636	14.96			
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1.98	119.0	5:04:00 PM	119	0.5359896	14.86			
2.00	120.0	5:05:00 PM	120	0.53537	14.84			
2.02	121.0	5:06:00 PM	121	0.5344813	14.82			
2.03	122.0	5:07:00 PM	122	0.5341182	14.81			
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2.07	124.0	5:09:00 PM	124	0.5326889	14.77			
2.08	125.0	5:10:00 PM	125	0.5318959	14.74			
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2.13	128.0	5:13:00 PM	128	0.5306203	14.71			
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2.17	130.0	5:15:00 PM	130	0.5289809	14.66			
2.18	131.0	5:16:00 PM	131	0.5284132	14.65			
2.20	132.0	5:17:00 PM	132	0.527842	14.63			
2.22	133.0	5:18:00 PM	133	0.5273663	14.62			
2.23	134.0	5:19:00 PM	134	0.5265781	14.60			
2.25	135.0	5:20:00 PM	135	0.5261628	14.59			
2.27	136.0	5:21:00 PM	136	0.5253428	14.56			
2.28	137.0	5:22:00 PM	137	0.5248385	14.55			
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2.32	139.0	5:24:00 PM	139	0.5234047	14.51			
2.33	140.0	5:25:00 PM	140	0.5230739	14.50			
2.35	141.0	5:26:00 PM	141	0.5225979	14.49			
2.37	142.0	5:27:00 PM	142	0.5217437	14.46			
2.38	143.0	5:28:00 PM	143	0.5213159	14.45			
2.40	144.0	5:29:00 PM	144	0.5203963	14.43			
2.42	145.0	5:30:00 PM	145	0.5199574	14.41			
2.43	146.0	5:31:00 PM	146	0.5197419	14.41			
2.45	147.0	5:32:00 PM	147	0.5187908	14.38			
2.47	148.0	5:33:00 PM	148	0.5180068	14.36			
2.48	149.0	5:34:00 PM	149	0.5175015	14.35			
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2.55	153.0	5:38:00 PM	153	0.5155004	14.29			
2.57	154.0	5:39:00 PM	154	0.5146531	14.27			
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2.60	156.0	5:41:00 PM	156	0.5133805	14.23			
2.62	157.0	5:42:00 PM	157	0.5128037	14.21			

2.63	158.0	5:43:00 PM	158	0.5122814	14.20			
2.65	159.0	5:44:00 PM	159	0.5115144	14.18			
2.67	160.0	5:45:00 PM	160	0.5113738	14.18			
2.68	161.0	5:46:00 PM	161	0.5105324	14.15			
2.70	162.0	5:47:00 PM	162	0.5101804	14.14			
2.72	163.0	5:48:00 PM	163	0.5099925	14.14			
2.73	164.0	5:49:00 PM	164	0.5092018	14.12			
2.75	165.0	5:50:00 PM	165	0.5085192	14.10			
2.77	166.0	5:51:00 PM	166	0.5079156	14.08			
2.78	167.0	5:52:00 PM	167	0.5074483	14.07			
2.80	168.0	5:53:00 PM	168	0.5064862	14.04			
2.82	169.0	5:54:00 PM	169	0.5059146	14.02			
2.83	170.0	5:55:00 PM	170	0.5055254	14.01			
2.85	171.0	5:56:00 PM	171	0.5049577	14.00			
2.87	172.0	5:57:00 PM	172	0.5039244	13.97			
2.88	173.0	5:58:00 PM	173	0.5034221	13.95			
2.90	174.0	5:59:00 PM	174	0.502814	13.94			
2.92	175.0	6:00:00 PM	175	0.5027304	13.94			
2.93	176.0	6:01:00 PM	176	0.5020565	13.92			
2.95	177.0	6:02:00 PM	177	0.5013036	13.90			
2.97	178.0	6:03:00 PM	178	0.5007532	13.88			
2.98	179.0	6:04:00 PM	179	0.500052	13.86			
3.00	180.0	6:05:00 PM	180	0.4996347	13.85			
3.02	181.0	6:06:00 PM	181	0.499271	13.84			
3.03	182.0	6:07:00 PM	182	0.4984125	13.82			
3.05	183.0	6:08:00 PM	183	0.4976832	13.80			
3.07	184.0	6:09:00 PM	184	0.4970511	13.78			
3.08	185.0	6:10:00 PM	185	0.4967992	13.77			
3.10	186.0	6:11:00 PM	186	0.496339	13.76			
3.12	187.0	6:12:00 PM	187	0.4953722	13.73			
3.13	188.0	6:13:00 PM	188	0.4953351	13.73			
3.15	189.0	6:14:00 PM	189	0.494025	13.69			
3.17	190.0	6:15:00 PM	190	0.4942182	13.70			
3.18	191.0	6:16:00 PM	191	0.4934728	13.68			
3.20	192.0	6:17:00 PM	192	0.4927351	13.66			
3.22	193.0	6:18:00 PM	193	0.4921242	13.64			
3.23	194.0	6:19:00 PM	194	0.4917595	13.63			
3.25	195.0	6:20:00 PM	195	0.491395	13.62			
3.27	196.0	6:21:00 PM	196	0.4907802	13.60			
3.28	197.0	6:22:00 PM	197	0.4902606	13.59			
3.30	198.0	6:23:00 PM	198	0.4893938	13.57			
3.32	199.0	6:24:00 PM	199	0.4886401	13.55			
3.33	200.0	6:25:00 PM	200	0.4883151	13.54			
3.35	201.0	6:26:00 PM	201	0.4877641	13.52			
3.37	202.0	6:27:00 PM	202	0.4873322	13.51			
3.38	203.0	6:28:00 PM	203	0.486859	13.50			
3.40	204.0	6:29:00 PM	204	0.4862999	13.48			
3.42	205.0	6:30:00 PM	205	0.4857687	13.47			
3.43	206.0	6:31:00 PM	206	0.4852299	13.45			
3.45	207.0	6:32:00 PM	207	0.484644	13.43			
3.47	208.0	6:33:00 PM	208	0.4842926	13.42			
3.48	209.0	6:34:00 PM	209	0.483613	13.41			
3.50	210.0	6:35:00 PM	210	0.4831619	13.39			
3.52	211.0	6:36:00 PM	211	0.4821794	13.37			
3.53	212.0	6:37:00 PM	212	0.4819682	13.36			
3.55	213.0	6:38:00 PM	213	0.4814751	13.35			
3.57	214.0	6:39:00 PM	214	0.4806702	13.32			
3.58	215.0	6:40:00 PM	215	0.4804766	13.32			
3.60	216.0	6:41:00 PM	216	0.4799258	13.30			
3.62	217.0	6:42:00 PM	217	0.4792077	13.28			
3.63	218.0	6:43:00 PM	218	0.4785481	13.27			
3.65	219.0	6:44:00 PM	219	0.4782073	13.26			
3.67	220.0	6:45:00 PM	220	0.4774906	13.24			
3.68	221.0	6:46:00 PM	221	0.4766157	13.21			
3.70	222.0	6:47:00 PM	222	0.4762415	13.20			

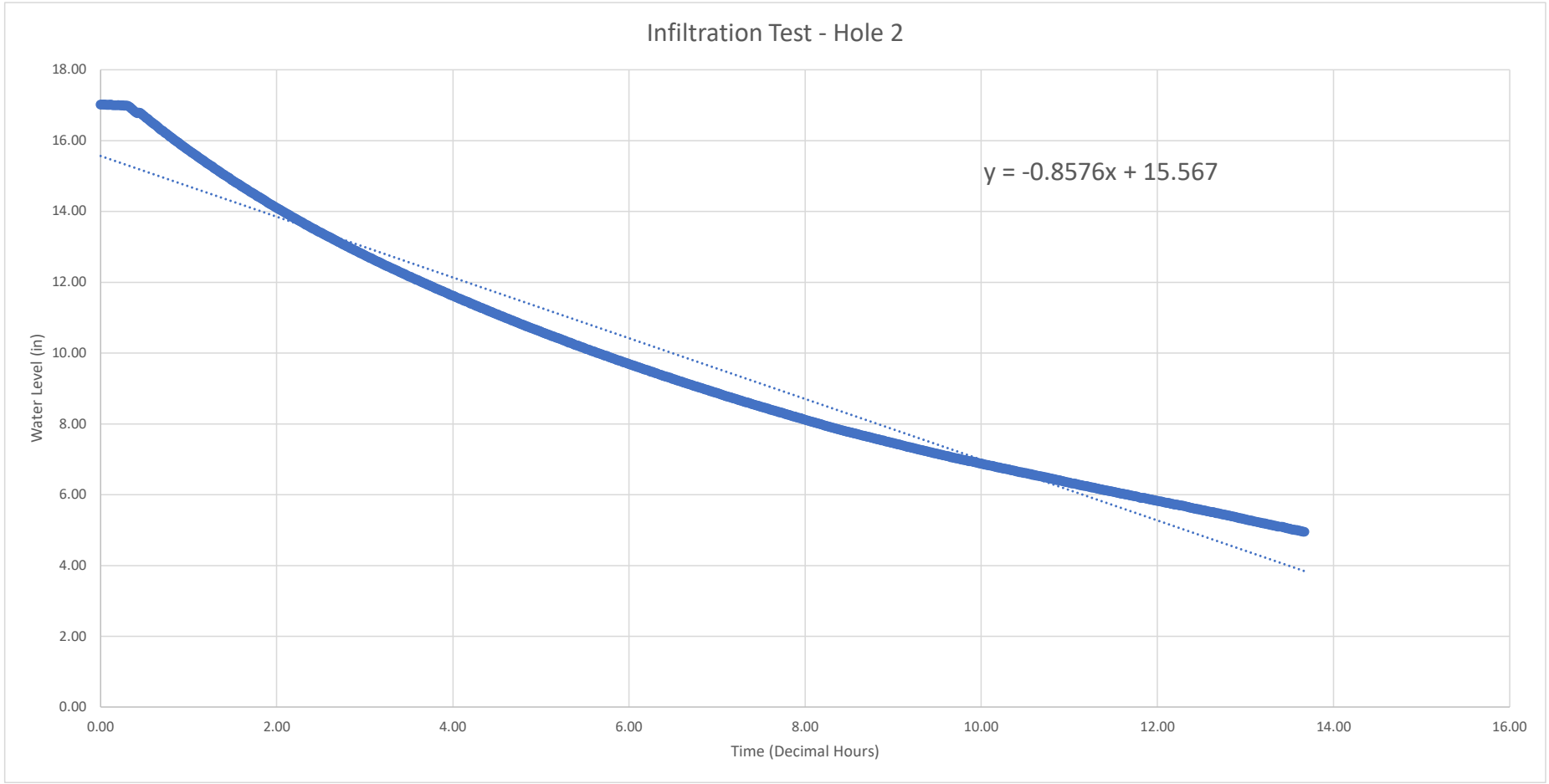
3.72	223.0	6:48:00 PM	223	0.4756183	13.18			
3.73	224.0	6:49:00 PM	224	0.4750919	13.17			
3.75	225.0	6:50:00 PM	225	0.474655	13.16			
3.77	226.0	6:51:00 PM	226	0.4740577	13.14			
3.78	227.0	6:52:00 PM	227	0.4739504	13.14			
3.80	228.0	6:53:00 PM	228	0.4729107	13.11			
3.82	229.0	6:54:00 PM	229	0.4721898	13.09			
3.83	230.0	6:55:00 PM	230	0.4720053	13.08			
3.85	231.0	6:56:00 PM	231	0.4713734	13.07			
3.87	232.0	6:57:00 PM	232	0.4713112	13.06			
3.88	233.0	6:58:00 PM	233	0.4707035	13.05			
3.90	234.0	6:59:00 PM	234	0.4702266	13.03			
3.92	235.0	7:00:00 PM	235	0.4697167	13.02			
3.93	236.0	7:01:00 PM	236	0.4687088	12.99			
3.95	237.0	7:02:00 PM	237	0.4685055	12.99			
3.97	238.0	7:03:00 PM	238	0.4678922	12.97			
3.98	239.0	7:04:00 PM	239	0.4676406	12.96			
4.00	240.0	7:05:00 PM	240	0.4667491	12.94			
4.02	241.0	7:06:00 PM	241	0.4661983	12.92			
4.03	242.0	7:07:00 PM	242	0.4655441	12.90			
4.05	243.0	7:08:00 PM	243	0.4653235	12.90			
4.07	244.0	7:09:00 PM	244	0.4645744	12.88			
4.08	245.0	7:10:00 PM	245	0.4644127	12.87			
4.10	246.0	7:11:00 PM	246	0.463375	12.84			
4.12	247.0	7:12:00 PM	247	0.4629279	12.83			
4.13	248.0	7:13:00 PM	248	0.4624807	12.82			
4.15	249.0	7:14:00 PM	249	0.4619249	12.80			
4.17	250.0	7:15:00 PM	250	0.4616999	12.80			
4.18	251.0	7:16:00 PM	251	0.4609861	12.78			
4.20	252.0	7:17:00 PM	252	0.4604497	12.76			
4.22	253.0	7:18:00 PM	253	0.4598548	12.75			
4.23	254.0	7:19:00 PM	254	0.459208	12.73			
4.25	255.0	7:20:00 PM	255	0.4587872	12.72			
4.27	256.0	7:21:00 PM	256	0.4590833	12.73			
4.28	257.0	7:22:00 PM	257	0.4579127	12.69			
4.30	258.0	7:23:00 PM	258	0.4574784	12.68			
4.32	259.0	7:24:00 PM	259	0.4568346	12.66			
4.33	260.0	7:25:00 PM	260	0.4562342	12.65			
4.35	261.0	7:26:00 PM	261	0.4558793	12.64			
4.37	262.0	7:27:00 PM	262	0.4553724	12.62			
4.38	263.0	7:28:00 PM	263	0.4548495	12.61			
4.40	264.0	7:29:00 PM	264	0.454033	12.59			
4.42	265.0	7:30:00 PM	265	0.4537116	12.58			
4.43	266.0	7:31:00 PM	266	0.4529433	12.56			
4.45	267.0	7:32:00 PM	267	0.4524295	12.54			
4.47	268.0	7:33:00 PM	268	0.4522238	12.54			
4.48	269.0	7:34:00 PM	269	0.4518773	12.53			
4.50	270.0	7:35:00 PM	270	0.4513924	12.51			
4.52	271.0	7:36:00 PM	271	0.4505684	12.49			
4.53	272.0	7:37:00 PM	272	0.4504066	12.49			
4.55	273.0	7:38:00 PM	273	0.4496302	12.46			
4.57	274.0	7:39:00 PM	274	0.4492884	12.45			
4.58	275.0	7:40:00 PM	275	0.4488221	12.44			
4.60	276.0	7:41:00 PM	276	0.4480051	12.42			
4.62	277.0	7:42:00 PM	277	0.4474825	12.40			
4.63	278.0	7:43:00 PM	278	0.4467733	12.38			
4.65	279.0	7:44:00 PM	279	0.4464708	12.38			
4.67	280.0	7:45:00 PM	280	0.4463106	12.37			
4.68	281.0	7:46:00 PM	281	0.4454604	12.35			
4.70	282.0	7:47:00 PM	282	0.4453031	12.34			
4.72	283.0	7:48:00 PM	283	0.4445886	12.32			
4.73	284.0	7:49:00 PM	284	0.4440461	12.31			
4.75	285.0	7:50:00 PM	285	0.4598133	12.75			
4.77	286.0	7:51:00 PM	286	0.4433854	12.29			
4.78	287.0	7:52:00 PM	287	0.4422977	12.26			

4.80	288.0	7:53:00 PM	288	0.4420955	12.25			
4.82	289.0	7:54:00 PM	289	0.4417258	12.24			
4.83	290.0	7:55:00 PM	290	0.4413367	12.23			
4.85	291.0	7:56:00 PM	291	0.4404738	12.21			
4.87	292.0	7:57:00 PM	292	0.4402833	12.20			
4.88	293.0	7:58:00 PM	293	0.4392645	12.18			
4.90	294.0	7:59:00 PM	294	0.4390843	12.17			
4.92	295.0	8:00:00 PM	295	0.4390247	12.17			
4.93	296.0	8:01:00 PM	296	0.4381262	12.14			
4.95	297.0	8:02:00 PM	297	0.4374221	12.13			
4.97	298.0	8:03:00 PM	298	0.4368554	12.11			
4.98	299.0	8:04:00 PM	299	0.4364111	12.10			
5.00	300.0	8:05:00 PM	300	0.4363991	12.10			
5.02	301.0	8:06:00 PM	301	0.4357242	12.08			
5.03	302.0	8:07:00 PM	302	0.4356918	12.08			
5.05	303.0	8:08:00 PM	303	0.4348011	12.05			
5.07	304.0	8:09:00 PM	304	0.4342441	12.04			
5.08	305.0	8:10:00 PM	305	0.4337437	12.02			
5.10	306.0	8:11:00 PM	306	0.4331467	12.01			
5.12	307.0	8:12:00 PM	307	0.4325188	11.99			
5.13	308.0	8:13:00 PM	308	0.4326446	11.99			
5.15	309.0	8:14:00 PM	309	0.4316702	11.97			
5.17	310.0	8:15:00 PM	310	0.4315181	11.96			
5.18	311.0	8:16:00 PM	311	0.4306561	11.94			
5.20	312.0	8:17:00 PM	312	0.4300736	11.92			
5.22	313.0	8:18:00 PM	313	0.4299336	11.92			
5.23	314.0	8:19:00 PM	314	0.4292848	11.90			
5.25	315.0	8:20:00 PM	315	0.4289575	11.89			
5.27	316.0	8:21:00 PM	316	0.4285058	11.88			
5.28	317.0	8:22:00 PM	317	0.4163842	11.54			
5.30	318.0	8:23:00 PM	318	0.4272409	11.84			
5.32	319.0	8:24:00 PM	319	0.4268593	11.83			
5.33	320.0	8:25:00 PM	320	0.4261787	11.81			
5.35	321.0	8:26:00 PM	321	0.4260441	11.81			
5.37	322.0	8:27:00 PM	322	0.4257566	11.80			
5.38	323.0	8:28:00 PM	323	0.4249824	11.78			
5.40	324.0	8:29:00 PM	324	0.4245381	11.77			
5.42	325.0	8:30:00 PM	325	0.4241344	11.76			
5.43	326.0	8:31:00 PM	326	0.4233149	11.73			
5.45	327.0	8:32:00 PM	327	0.4228588	11.72			
5.47	328.0	8:33:00 PM	328	0.4228771	11.72			
5.48	329.0	8:34:00 PM	329	0.4221428	11.70			
5.50	330.0	8:35:00 PM	330	0.4220134	11.70			
5.52	331.0	8:36:00 PM	331	0.4211294	11.67			
5.53	332.0	8:37:00 PM	332	0.4209543	11.67			
5.55	333.0	8:38:00 PM	333	0.4203614	11.65			
5.57	334.0	8:39:00 PM	334	0.4196712	11.63			
5.58	335.0	8:40:00 PM	335	0.4195567	11.63			
5.60	336.0	8:41:00 PM	336	0.4188875	11.61			
5.62	337.0	8:42:00 PM	337	0.4185083	11.60			
5.63	338.0	8:43:00 PM	338	0.4176286	11.58			
5.65	339.0	8:44:00 PM	339	0.4179963	11.59			
5.67	340.0	8:45:00 PM	340	0.4166287	11.55			
5.68	341.0	8:46:00 PM	341	0.4162635	11.54			
5.70	342.0	8:47:00 PM	342	0.4159639	11.53			
5.72	343.0	8:48:00 PM	343	0.4152418	11.51			
5.73	344.0	8:49:00 PM	344	0.4148639	11.50			
5.75	345.0	8:50:00 PM	345	0.4145225	11.49			
5.77	346.0	8:51:00 PM	346	0.4142239	11.48			
5.78	347.0	8:52:00 PM	347	0.4137594	11.47			
5.80	348.0	8:53:00 PM	348	0.4135064	11.46			
5.82	349.0	8:54:00 PM	349	0.4121646	11.43			
5.83	350.0	8:55:00 PM	350	0.4120906	11.42			
5.85	351.0	8:56:00 PM	351	0.4118601	11.42			
5.87	352.0	8:57:00 PM	352	0.4114033	11.40			

5.88	353.0	8:58:00 PM	353	0.4109527	11.39			
5.90	354.0	8:59:00 PM	354	0.4103119	11.37			
5.92	355.0	9:00:00 PM	355	0.4100701	11.37			
5.93	356.0	9:01:00 PM	356	0.4093683	11.35			
5.95	357.0	9:02:00 PM	357	0.4088797	11.33			
5.97	358.0	9:03:00 PM	358	0.4086282	11.33			
5.98	359.0	9:04:00 PM	359	0.4082363	11.32			
6.00	360.0	9:05:00 PM	360	0.4075574	11.30			
6.02	361.0	9:06:00 PM	361	0.4074436	11.29			
6.03	362.0	9:07:00 PM	362	0.4066026	11.27			
6.05	363.0	9:08:00 PM	363	0.4060326	11.26			
6.07	364.0	9:09:00 PM	364	0.4049584	11.23			
6.08	365.0	9:10:00 PM	365	0.4050892	11.23			
6.10	366.0	9:11:00 PM	366	0.4050245	11.23			
6.12	367.0	9:12:00 PM	367	0.4043415	11.21			
6.13	368.0	9:13:00 PM	368	0.4034517	11.18			
6.15	369.0	9:14:00 PM	369	0.4033616	11.18			
6.17	370.0	9:15:00 PM	370	0.403163	11.18			
6.18	371.0	9:16:00 PM	371	0.4025511	11.16			
6.20	372.0	9:17:00 PM	372	0.4015446	11.13			
6.22	373.0	9:18:00 PM	373	0.4017813	11.14			
6.23	374.0	9:19:00 PM	374	0.4008764	11.11			
6.25	375.0	9:20:00 PM	375	0.4007378	11.11			
6.27	376.0	9:21:00 PM	376	0.3997173	11.08			
6.28	377.0	9:22:00 PM	377	0.3996115	11.08			
6.30	378.0	9:23:00 PM	378	0.3991556	11.06			
6.32	379.0	9:24:00 PM	379	0.3986912	11.05			
6.33	380.0	9:25:00 PM	380	0.398762	11.05			
6.35	381.0	9:26:00 PM	381	0.3978955	11.03			
6.37	382.0	9:27:00 PM	382	0.3974971	11.02			
6.38	383.0	9:28:00 PM	383	0.396899	11.00			
6.40	384.0	9:29:00 PM	384	0.3963188	10.99			
6.42	385.0	9:30:00 PM	385	0.3961894	10.98			
6.43	386.0	9:31:00 PM	386	0.3957344	10.97			
6.45	387.0	9:32:00 PM	387	0.3950145	10.95			
6.47	388.0	9:33:00 PM	388	0.3946161	10.94			
6.48	389.0	9:34:00 PM	389	0.3940708	10.92			
6.50	390.0	9:35:00 PM	390	0.3934942	10.91			
6.52	391.0	9:36:00 PM	391	0.3931231	10.90			
6.53	392.0	9:37:00 PM	392	0.3928045	10.89			
6.55	393.0	9:38:00 PM	393	0.3923118	10.87			
6.57	394.0	9:39:00 PM	394	0.3922051	10.87			
6.58	395.0	9:40:00 PM	395	0.3915047	10.85			
6.60	396.0	9:41:00 PM	396	0.3907251	10.83			
6.62	397.0	9:42:00 PM	397	0.3908065	10.83			
6.63	398.0	9:43:00 PM	398	0.3900802	10.81			
6.65	399.0	9:44:00 PM	399	0.3891978	10.79			
6.67	400.0	9:45:00 PM	400	0.3894995	10.80			
6.68	401.0	9:46:00 PM	401	0.3887725	10.78			
6.70	402.0	9:47:00 PM	402	0.3882808	10.76			
6.72	403.0	9:48:00 PM	403	0.3875159	10.74			
6.73	404.0	9:49:00 PM	404	0.3873371	10.74			
6.75	405.0	9:50:00 PM	405	0.3869162	10.73			
6.77	406.0	9:51:00 PM	406	0.3867165	10.72			
6.78	407.0	9:52:00 PM	407	0.3861673	10.70			
6.80	408.0	9:53:00 PM	408	0.3855217	10.69			
6.82	409.0	9:54:00 PM	409	0.38482	10.67			
6.83	410.0	9:55:00 PM	410	0.3849325	10.67			
6.85	411.0	9:56:00 PM	411	0.3844962	10.66			
6.87	412.0	9:57:00 PM	412	0.3837038	10.64			
6.88	413.0	9:58:00 PM	413	0.3836343	10.63			
6.90	414.0	9:59:00 PM	414	0.3830293	10.62			
6.92	415.0	10:00:00 PM	415	0.3827337	10.61			
6.93	416.0	10:01:00 PM	416	0.3825421	10.60			
6.95	417.0	10:02:00 PM	417	0.3818117	10.58			

6.97	418.0	10:03:00 PM	418	0.3812735	10.57			
6.98	419.0	10:04:00 PM	419	0.3808888	10.56			
7.00	420.0	10:05:00 PM	420	0.3803261	10.54			
7.02	421.0	10:06:00 PM	421	0.37999	10.53			
7.03	422.0	10:07:00 PM	422	0.379525	10.52			
7.05	423.0	10:08:00 PM	423	0.3791612	10.51			
7.07	424.0	10:09:00 PM	424	0.3788717	10.50			
7.08	425.0	10:10:00 PM	425	0.3785872	10.49			
7.10	426.0	10:11:00 PM	426	0.3780693	10.48			
7.12	427.0	10:12:00 PM	427	0.3775157	10.46			
7.13	428.0	10:13:00 PM	428	0.3765889	10.44			
7.15	429.0	10:14:00 PM	429	0.3771551	10.45			
7.17	430.0	10:15:00 PM	430	0.3759286	10.42			
7.18	431.0	10:16:00 PM	431	0.3753921	10.41			
7.20	432.0	10:17:00 PM	432	0.3748997	10.39			
7.22	433.0	10:18:00 PM	433	0.3752069	10.40			
7.23	434.0	10:19:00 PM	434	0.3743168	10.38			
7.25	435.0	10:20:00 PM	435	0.3740495	10.37			
7.27	436.0	10:21:00 PM	436	0.3739115	10.36			
7.28	437.0	10:22:00 PM	437	0.3730409	10.34			
7.30	438.0	10:23:00 PM	438	0.3730856	10.34			
7.32	439.0	10:24:00 PM	439	0.3725324	10.33			
7.33	440.0	10:25:00 PM	440	0.3718792	10.31			
7.35	441.0	10:26:00 PM	441	0.3719645	10.31			
7.37	442.0	10:27:00 PM	442	0.3709205	10.28			
7.38	443.0	10:28:00 PM	443	0.3709977	10.28			
7.40	444.0	10:29:00 PM	444	0.3700362	10.26			
7.42	445.0	10:30:00 PM	445	0.3697953	10.25			
7.43	446.0	10:31:00 PM	446	0.3692849	10.24			
7.45	447.0	10:32:00 PM	447	0.3687208	10.22			
7.47	448.0	10:33:00 PM	448	0.3680923	10.20			
7.48	449.0	10:34:00 PM	449	0.3682602	10.21			
7.50	450.0	10:35:00 PM	450	0.3672431	10.18			
7.52	451.0	10:36:00 PM	451	0.3671553	10.18			
7.53	452.0	10:37:00 PM	452	0.3667587	10.17			
7.55	453.0	10:38:00 PM	453	0.3663796	10.16			
7.57	454.0	10:39:00 PM	454	0.3661635	10.15			
7.58	455.0	10:40:00 PM	455	0.3653865	10.13			
7.60	456.0	10:41:00 PM	456	0.3653121	10.13			
7.62	457.0	10:42:00 PM	457	0.3650196	10.12			
7.63	458.0	10:43:00 PM	458	0.3641022	10.09			
7.65	459.0	10:44:00 PM	459	0.364122	10.09			
7.67	460.0	10:45:00 PM	460	0.3630724	10.06			
7.68	461.0	10:46:00 PM	461	0.3626614	10.05			
7.70	462.0	10:47:00 PM	462	0.3623884	10.05			
7.72	463.0	10:48:00 PM	463	0.3618577	10.03			
7.73	464.0	10:49:00 PM	464	0.3616126	10.02			
7.75	465.0	10:50:00 PM	465	0.3615493	10.02			
7.77	466.0	10:51:00 PM	466	0.3606695	10.00			
7.78	467.0	10:52:00 PM	467	0.3609027	10.00			
7.80	468.0	10:53:00 PM	468	0.3596428	9.97			
7.82	469.0	10:54:00 PM	469	0.3597279	9.97			
7.83	470.0	10:55:00 PM	470	0.3592831	9.96			
7.85	471.0	10:56:00 PM	471	0.3586352	9.94			
7.87	472.0	10:57:00 PM	472	0.3583514	9.93			
7.88	473.0	10:58:00 PM	473	0.3576606	9.91			
7.90	474.0	10:59:00 PM	474	0.3573305	9.91			
7.92	475.0	11:00:00 PM	475	0.3569244	9.89			
7.93	476.0	11:01:00 PM	476	0.3567483	9.89			
7.95	477.0	11:02:00 PM	477	0.3565202	9.88			
7.97	478.0	11:03:00 PM	478	0.3554768	9.85			
7.98	479.0	11:04:00 PM	479	0.3556866	9.86			
8.00	480.0	11:05:00 PM	480	0.3551398	9.84			
8.02	481.0	11:06:00 PM	481	0.3547916	9.83			
8.03	482.0	11:07:00 PM	482	0.3541431	9.82			

8.05	483.0	11:08:00 PM	483	0.3541102	9.82			
8.07	484.0	11:09:00 PM	484	0.3532099	9.79			
8.08	485.0	11:10:00 PM	485	0.3525001	9.77			
8.10	486.0	11:11:00 PM	486	0.3524059	9.77			
8.12	487.0	11:12:00 PM	487	0.3522007	9.76			
8.13	488.0	11:13:00 PM	488	0.3519594	9.76			
8.15	489.0	11:14:00 PM	489	0.3517121	9.75			
8.17	490.0	11:15:00 PM	490	0.3511513	9.73			
8.18	491.0	11:16:00 PM	491	0.3500417	9.70			
8.20	492.0	11:17:00 PM	492	0.3502798	9.71			
8.22	493.0	11:18:00 PM	493	0.3493306	9.68			
8.23	494.0	11:19:00 PM	494	0.3490596	9.68			
8.25	495.0	11:20:00 PM	495	0.3489193	9.67			
8.27	496.0	11:21:00 PM	496	0.348048	9.65			
8.28	497.0	11:22:00 PM	497	0.3481885	9.65			
8.30	498.0	11:23:00 PM	498	0.3479398	9.64			
8.32	499.0	11:24:00 PM	499	0.3470287	9.62			
8.33	500.0	11:25:00 PM	500	0.346844	9.61			
8.35	501.0	11:26:00 PM	501	0.3463698	9.60			
8.37	502.0	11:27:00 PM	502	0.3459623	9.59			
8.38	503.0	11:28:00 PM	503	0.3456394	9.58			
8.40	504.0	11:29:00 PM	504	0.3453229	9.57			
8.42	505.0	11:30:00 PM	505	0.3444213	9.55			
8.43	506.0	11:31:00 PM	506	0.3445507	9.55			
8.45	507.0	11:32:00 PM	507	0.34374	9.53			
8.47	508.0	11:33:00 PM	508	0.3433304	9.52			
8.48	509.0	11:34:00 PM	509	0.3433363	9.52			
8.50	510.0	11:35:00 PM	510	0.3426367	9.50			
8.52	511.0	11:36:00 PM	511	0.3427011	9.50			
8.53	512.0	11:37:00 PM	512	0.3419479	9.48			
8.55	513.0	11:38:00 PM	513	0.3417095	9.47			
8.57	514.0	11:39:00 PM	514	0.3413677	9.46			
8.58	515.0	11:40:00 PM	515	0.3405904	9.44			
8.60	516.0	11:41:00 PM	516	0.3403109	9.43			
8.62	517.0	11:42:00 PM	517	0.3402545	9.43			
8.63	518.0	11:43:00 PM	518	0.3394211	9.41			
8.65	519.0	11:44:00 PM	519	0.3393098	9.41			
8.67	520.0	11:45:00 PM	520	0.3388627	9.39			
8.68	521.0	11:46:00 PM	521	0.3383609	9.38			
8.70	522.0	11:47:00 PM	522	0.3379867	9.37			
8.72	523.0	11:48:00 PM	523	0.3376943	9.36			
8.73	524.0	11:49:00 PM	524	0.3371136	9.34			
8.75	525.0	11:50:00 PM	525	0.3366016	9.33			
8.77	526.0	11:51:00 PM	526	0.336421	9.33			
8.78	527.0	11:52:00 PM	527	0.3361159	9.32			
8.80	528.0	11:53:00 PM	528	0.3350894	9.29			
8.82	529.0	11:54:00 PM	529	0.3352662	9.29			
8.83	530.0	11:55:00 PM	530	0.334726	9.28			
8.85	531.0	11:56:00 PM	531	0.3338711	9.25			
8.87	532.0	11:57:00 PM	532	0.3336633	9.25			
8.88	533.0	11:58:00 PM	533	0.333342	9.24			
8.90	534.0	11:59:00 PM	534	0.3331816	9.24			
8.92	535.0	12:00:00 AM	535	0.3328936	9.23			
				Average Infiltration Rate:	**0.87**			
				Factor of Safety:	**0.45**			
					Infiltration Rate of 0.39 in/hr Used for Sizing of System			


Infiltration Test - Hole 2
y = -0.8576x + 15.567
Water Level (in)
Time (Decimal Hours)
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00

JMJ 01 03/15/23								
Project Location:		Todd Rd Development						
Date of Test:			3/15/2023					
Test Pit Dimensions:		Length (Feet)	4'	Width (Feet):	3'	Depth (feet):	4'	
Presoak:			9:45 - AM at 12-inch water column					
Infiltration Test:								
		Water Column Maintained (inches):		12				
		Gallons Per Inch:	7.48					
		Time(Minutes)	**Volume (gallons)**	**Flow Rate (GPM)**			**Flow (Gallons)**	**Infiltration Rate (in/hr)**
				Meter Start	Meter End	Flow (Gallons)		
		0						
		15						
		30						
		45						
		60						**0.0**
			Water Column Maintained (inches)		12			
Weather Condtions:			Cloudy					
Drawdown Test (Sensor):								
Sensor Name:			JMJ 01 (**CRS451V Sensors from Campbell Scientic**)					
Time (decimal Hours)	**Readings (min)**	**Time Stamp**	**Record #**	**Reading (PSI)**	**Level (in)**			
0.00	0.0	2:47:00 PM	47	0.6138949	17.02			
0.02	1.0	2:48:00 PM	48	0.6139137	17.02			
0.03	2.0	2:49:00 PM	49	0.6138233	17.02			
0.05	3.0	2:50:00 PM	50	0.6137089	17.01			
0.07	4.0	2:51:00 PM	51	0.6136847	17.01			
0.08	5.0	2:52:00 PM	52	0.6136202	17.01			
0.10	6.0	2:53:00 PM	53	0.6136599	17.01			
0.12	7.0	2:54:00 PM	54	0.6137359	17.01			
0.13	8.0	2:55:00 PM	55	0.6134056	17.00			
0.15	9.0	2:56:00 PM	56	0.6132602	17.00			
0.17	10.0	2:57:00 PM	57	0.6132336	17.00			
0.18	11.0	2:58:00 PM	58	0.6132448	17.00			
0.20	12.0	2:59:00 PM	59	0.6132962	17.00			
0.22	13.0	3:00:00 PM	60	0.6131705	17.00			
0.23	14.0	3:01:00 PM	61	0.6130547	16.99			
0.25	15.0	3:02:00 PM	62	0.6129683	16.99			
0.27	16.0	3:03:00 PM	63	0.6127514	16.99			
0.28	17.0	3:04:00 PM	64	0.612825	16.99			
0.30	18.0	3:05:00 PM	65	0.6128131	16.99			
0.32	19.0	3:06:00 PM	66	0.6122638	16.97			
0.33	20.0	3:07:00 PM	67	0.6110082	16.94			
0.35	21.0	3:08:00 PM	68	0.6099396	16.91			
0.37	22.0	3:09:00 PM	69	0.6085999	16.87			
0.38	23.0	3:10:00 PM	70	0.6072317	16.83			
0.40	24.0	3:11:00 PM	71	0.6059656	16.80			
0.42	25.0	3:12:00 PM	72	0.6049975	16.77			
0.43	26.0	3:13:00 PM	73	0.6056166	16.79			
0.45	27.0	3:14:00 PM	74	0.6052875	16.78			
0.47	28.0	3:15:00 PM	75	0.6040337	16.74			

0.48	29.0	3:16:00 PM	76	0.6028686	16.71			
0.50	30.0	3:17:00 PM	77	0.6016765	16.68			
0.52	31.0	3:18:00 PM	78	0.6003692	16.64			
0.53	32.0	3:19:00 PM	79	0.5993606	16.61			
0.55	33.0	3:20:00 PM	80	0.5979576	16.58			
0.57	34.0	3:21:00 PM	81	0.5968477	16.54			
0.58	35.0	3:22:00 PM	82	0.5956032	16.51			
0.60	36.0	3:23:00 PM	83	0.5944473	16.48			
0.62	37.0	3:24:00 PM	84	0.5934092	16.45			
0.63	38.0	3:25:00 PM	85	0.5921558	16.41			
0.65	39.0	3:26:00 PM	86	0.5909004	16.38			
0.67	40.0	3:27:00 PM	87	0.5895347	16.34			
0.68	41.0	3:28:00 PM	88	0.5882849	16.31			
0.70	42.0	3:29:00 PM	89	0.587389	16.28			
0.72	43.0	3:30:00 PM	90	0.5861614	16.25			
0.73	44.0	3:31:00 PM	91	0.5849614	16.22			
0.75	45.0	3:32:00 PM	92	0.5840887	16.19			
0.77	46.0	3:33:00 PM	93	0.5826423	16.15			
0.78	47.0	3:34:00 PM	94	0.5815355	16.12			
0.80	48.0	3:35:00 PM	95	0.5805561	16.09			
0.82	49.0	3:36:00 PM	96	0.5794017	16.06			
0.83	50.0	3:37:00 PM	97	0.5781374	16.03			
0.85	51.0	3:38:00 PM	98	0.5771498	16.00			
0.87	52.0	3:39:00 PM	99	0.576111	15.97			
0.88	53.0	3:40:00 PM	100	0.5752172	15.95			
0.90	54.0	3:41:00 PM	101	0.5738214	15.91			
0.92	55.0	3:42:00 PM	102	0.5727864	15.88			
0.93	56.0	3:43:00 PM	103	0.5715603	15.84			
0.95	57.0	3:44:00 PM	104	0.5704766	15.81			
0.97	58.0	3:45:00 PM	105	0.5694889	15.79			
0.98	59.0	3:46:00 PM	106	0.5683067	15.75			
1.00	60.0	3:47:00 PM	107	0.567291	15.73			
1.02	61.0	3:48:00 PM	108	0.5661273	15.69			
1.03	62.0	3:49:00 PM	109	0.5651829	15.67			
1.05	63.0	3:50:00 PM	110	0.5641884	15.64			
1.07	64.0	3:51:00 PM	111	0.5629238	15.60			
1.08	65.0	3:52:00 PM	112	0.5619357	15.58			
1.10	66.0	3:53:00 PM	113	0.5608607	15.55			
1.12	67.0	3:54:00 PM	114	0.5598859	15.52			
1.13	68.0	3:55:00 PM	115	0.5587642	15.49			
1.15	69.0	3:56:00 PM	116	0.5578076	15.46			
1.17	70.0	3:57:00 PM	117	0.5567368	15.43			
1.18	71.0	3:58:00 PM	118	0.5557813	15.41			
1.20	72.0	3:59:00 PM	119	0.5545589	15.37			
1.22	73.0	4:00:00 PM	120	0.5537387	15.35			
1.23	74.0	4:01:00 PM	121	0.5527689	15.32			
1.25	75.0	4:02:00 PM	122	0.5515224	15.29			
1.27	76.0	4:03:00 PM	123	0.5506927	15.27			
1.28	77.0	4:04:00 PM	124	0.5495603	15.23			
1.30	78.0	4:05:00 PM	125	0.5484399	15.20			
1.32	79.0	4:06:00 PM	126	0.5475421	15.18			
1.33	80.0	4:07:00 PM	127	0.5464627	15.15			
1.35	81.0	4:08:00 PM	128	0.5453817	15.12			
1.37	82.0	4:09:00 PM	129	0.5445515	15.09			
1.38	83.0	4:10:00 PM	130	0.5433772	15.06			
1.40	84.0	4:11:00 PM	131	0.5425327	15.04			
1.42	85.0	4:12:00 PM	132	0.5415183	15.01			
1.43	86.0	4:13:00 PM	133	0.5405626	14.98			
1.45	87.0	4:14:00 PM	134	0.5395008	14.95			
1.47	88.0	4:15:00 PM	135	0.5386769	14.93			
1.48	89.0	4:16:00 PM	136	0.5373784	14.90			
1.50	90.0	4:17:00 PM	137	0.5364618	14.87			
1.52	91.0	4:18:00 PM	138	0.5354849	14.84			
1.53	92.0	4:19:00 PM	139	0.5344545	14.82			
1.55	93.0	4:20:00 PM	140	0.5336919	14.79			

1.57	94.0	4:21:00 PM	141	0.532706	14.77			
1.58	95.0	4:22:00 PM	142	0.5317665	14.74			
1.60	96.0	4:23:00 PM	143	0.5307212	14.71			
1.62	97.0	4:24:00 PM	144	0.5298718	14.69			
1.63	98.0	4:25:00 PM	145	0.528906	14.66			
1.65	99.0	4:26:00 PM	146	0.5279417	14.63			
1.67	100.0	4:27:00 PM	147	0.5270448	14.61			
1.68	101.0	4:28:00 PM	148	0.5259753	14.58			
1.70	102.0	4:29:00 PM	149	0.5248329	14.55			
1.72	103.0	4:30:00 PM	150	0.5242014	14.53			
1.73	104.0	4:31:00 PM	151	0.523153	14.50			
1.75	105.0	4:32:00 PM	152	0.5223269	14.48			
1.77	106.0	4:33:00 PM	153	0.5213259	14.45			
1.78	107.0	4:34:00 PM	154	0.5203286	14.42			
1.80	108.0	4:35:00 PM	155	0.5196723	14.41			
1.82	109.0	4:36:00 PM	156	0.5185503	14.37			
1.83	110.0	4:37:00 PM	157	0.5179019	14.36			
1.85	111.0	4:38:00 PM	158	0.5169567	14.33			
1.87	112.0	4:39:00 PM	159	0.5159566	14.30			
1.88	113.0	4:40:00 PM	160	0.5149618	14.27			
1.90	114.0	4:41:00 PM	161	0.5139663	14.25			
1.92	115.0	4:42:00 PM	162	0.5131132	14.22			
1.93	116.0	4:43:00 PM	163	0.5121055	14.20			
1.95	117.0	4:44:00 PM	164	0.5111621	14.17			
1.97	118.0	4:45:00 PM	165	0.5103054	14.15			
1.98	119.0	4:46:00 PM	166	0.509398	14.12			
2.00	120.0	4:47:00 PM	167	0.5086018	14.10			
2.02	121.0	4:48:00 PM	168	0.5076022	14.07			
2.03	122.0	4:49:00 PM	169	0.5069062	14.05			
2.05	123.0	4:50:00 PM	170	0.5059137	14.02			
2.07	124.0	4:51:00 PM	171	0.505071	14.00			
2.08	125.0	4:52:00 PM	172	0.5042806	13.98			
2.10	126.0	4:53:00 PM	173	0.5034274	13.96			
2.12	127.0	4:54:00 PM	174	0.5024111	13.93			
2.13	128.0	4:55:00 PM	175	0.5017368	13.91			
2.15	129.0	4:56:00 PM	176	0.5007994	13.88			
2.17	130.0	4:57:00 PM	177	0.4998519	13.86			
2.18	131.0	4:58:00 PM	178	0.4990126	13.83			
2.20	132.0	4:59:00 PM	179	0.4982367	13.81			
2.22	133.0	5:00:00 PM	180	0.4973976	13.79			
2.23	134.0	5:01:00 PM	181	0.4965979	13.77			
2.25	135.0	5:02:00 PM	182	0.4956314	13.74			
2.27	136.0	5:03:00 PM	183	0.49486	13.72			
2.28	137.0	5:04:00 PM	184	0.4941613	13.70			
2.30	138.0	5:05:00 PM	185	0.4932607	13.67			
2.32	139.0	5:06:00 PM	186	0.4924128	13.65			
2.33	140.0	5:07:00 PM	187	0.4913437	13.62			
2.35	141.0	5:08:00 PM	188	0.4908319	13.61			
2.37	142.0	5:09:00 PM	189	0.4898734	13.58			
2.38	143.0	5:10:00 PM	190	0.4890663	13.56			
2.40	144.0	5:11:00 PM	191	0.4880845	13.53			
2.42	145.0	5:12:00 PM	192	0.4873962	13.51			
2.43	146.0	5:13:00 PM	193	0.4867199	13.49			
2.45	147.0	5:14:00 PM	194	0.4856474	13.46			
2.47	148.0	5:15:00 PM	195	0.4848653	13.44			
2.48	149.0	5:16:00 PM	196	0.4840568	13.42			
2.50	150.0	5:17:00 PM	197	0.4834069	13.40			
2.52	151.0	5:18:00 PM	198	0.4825554	13.38			
2.53	152.0	5:19:00 PM	199	0.4816568	13.35			
2.55	153.0	5:20:00 PM	200	0.4809865	13.33			
2.57	154.0	5:21:00 PM	201	0.480343	13.32			
2.58	155.0	5:22:00 PM	202	0.4793691	13.29			
2.60	156.0	5:23:00 PM	203	0.4787618	13.27			
2.62	157.0	5:24:00 PM	204	0.4779957	13.25			
2.63	158.0	5:25:00 PM	205	0.4771469	13.23			

2.65	159.0	5:26:00 PM	206	0.476334	13.20			
2.67	160.0	5:27:00 PM	207	0.4755825	13.18			
2.68	161.0	5:28:00 PM	208	0.4746859	13.16			
2.70	162.0	5:29:00 PM	209	0.4739624	13.14			
2.72	163.0	5:30:00 PM	210	0.4732182	13.12			
2.73	164.0	5:31:00 PM	211	0.4723836	13.09			
2.75	165.0	5:32:00 PM	212	0.4713183	13.06			
2.77	166.0	5:33:00 PM	213	0.4709212	13.05			
2.78	167.0	5:34:00 PM	214	0.4701534	13.03			
2.80	168.0	5:35:00 PM	215	0.4692768	13.01			
2.82	169.0	5:36:00 PM	216	0.4686942	12.99			
2.83	170.0	5:37:00 PM	217	0.46774	12.97			
2.85	171.0	5:38:00 PM	218	0.4669708	12.94			
2.87	172.0	5:39:00 PM	219	0.4663706	12.93			
2.88	173.0	5:40:00 PM	220	0.4655534	12.91			
2.90	174.0	5:41:00 PM	221	0.4649832	12.89			
2.92	175.0	5:42:00 PM	222	0.4640834	12.86			
2.93	176.0	5:43:00 PM	223	0.4633295	12.84			
2.95	177.0	5:44:00 PM	224	0.4625263	12.82			
2.97	178.0	5:45:00 PM	225	0.462071	12.81			
2.98	179.0	5:46:00 PM	226	0.4611074	12.78			
3.00	180.0	5:47:00 PM	227	0.4603954	12.76			
3.02	181.0	5:48:00 PM	228	0.4596648	12.74			
3.03	182.0	5:49:00 PM	229	0.4590178	12.72			
3.05	183.0	5:50:00 PM	230	0.4579962	12.70			
3.07	184.0	5:51:00 PM	231	0.4574017	12.68			
3.08	185.0	5:52:00 PM	232	0.4567198	12.66			
3.10	186.0	5:53:00 PM	233	0.4559443	12.64			
3.12	187.0	5:54:00 PM	234	0.4552072	12.62			
3.13	188.0	5:55:00 PM	235	0.4543852	12.60			
3.15	189.0	5:56:00 PM	236	0.4536676	12.58			
3.17	190.0	5:57:00 PM	237	0.4530433	12.56			
3.18	191.0	5:58:00 PM	238	0.4523938	12.54			
3.20	192.0	5:59:00 PM	239	0.4516217	12.52			
3.22	193.0	6:00:00 PM	240	0.4509042	12.50			
3.23	194.0	6:01:00 PM	241	0.4501046	12.48			
3.25	195.0	6:02:00 PM	242	0.4493408	12.46			
3.27	196.0	6:03:00 PM	243	0.4487663	12.44			
3.28	197.0	6:04:00 PM	244	0.4481133	12.42			
3.30	198.0	6:05:00 PM	245	0.4472297	12.40			
3.32	199.0	6:06:00 PM	246	0.4466785	12.38			
3.33	200.0	6:07:00 PM	247	0.446042	12.36			
3.35	201.0	6:08:00 PM	248	0.4452429	12.34			
3.37	202.0	6:09:00 PM	249	0.4446959	12.33			
3.38	203.0	6:10:00 PM	250	0.4437504	12.30			
3.40	204.0	6:11:00 PM	251	0.4430337	12.28			
3.42	205.0	6:12:00 PM	252	0.4425249	12.27			
3.43	206.0	6:13:00 PM	253	0.4417984	12.25			
3.45	207.0	6:14:00 PM	254	0.4410664	12.23			
3.47	208.0	6:15:00 PM	255	0.4404542	12.21			
3.48	209.0	6:16:00 PM	256	0.4397186	12.19			
3.50	210.0	6:17:00 PM	257	0.4389174	12.17			
3.52	211.0	6:18:00 PM	258	0.4384156	12.15			
3.53	212.0	6:19:00 PM	259	0.4376729	12.13			
3.55	213.0	6:20:00 PM	260	0.4370528	12.12			
3.57	214.0	6:21:00 PM	261	0.4363786	12.10			
3.58	215.0	6:22:00 PM	262	0.435578	12.07			
3.60	216.0	6:23:00 PM	263	0.4350446	12.06			
3.62	217.0	6:24:00 PM	264	0.4341744	12.04			
3.63	218.0	6:25:00 PM	265	0.4336565	12.02			
3.65	219.0	6:26:00 PM	266	0.4329698	12.00			
3.67	220.0	6:27:00 PM	267	0.4322543	11.98			
3.68	221.0	6:28:00 PM	268	0.4315143	11.96			
3.70	222.0	6:29:00 PM	269	0.4309178	11.95			
3.72	223.0	6:30:00 PM	270	0.4303094	11.93			

3.73	224.0	6:31:00 PM	271	0.4296393	11.91			
3.75	225.0	6:32:00 PM	272	0.4289357	11.89			
3.77	226.0	6:33:00 PM	273	0.4281855	11.87			
3.78	227.0	6:34:00 PM	274	0.4277325	11.86			
3.80	228.0	6:35:00 PM	275	0.4268539	11.83			
3.82	229.0	6:36:00 PM	276	0.4262902	11.82			
3.83	230.0	6:37:00 PM	277	0.4256231	11.80			
3.85	231.0	6:38:00 PM	278	0.4249681	11.78			
3.87	232.0	6:39:00 PM	279	0.4243424	11.76			
3.88	233.0	6:40:00 PM	280	0.4237059	11.75			
3.90	234.0	6:41:00 PM	281	0.4230243	11.73			
3.92	235.0	6:42:00 PM	282	0.4222762	11.71			
3.93	236.0	6:43:00 PM	283	0.4217376	11.69			
3.95	237.0	6:44:00 PM	284	0.420995	11.67			
3.97	238.0	6:45:00 PM	285	0.4202533	11.65			
3.98	239.0	6:46:00 PM	286	0.4195064	11.63			
4.00	240.0	6:47:00 PM	287	0.4190864	11.62			
4.02	241.0	6:48:00 PM	288	0.41845	11.60			
4.03	242.0	6:49:00 PM	289	0.4177613	11.58			
4.05	243.0	6:50:00 PM	290	0.4170712	11.56			
4.07	244.0	6:51:00 PM	291	0.4164875	11.55			
4.08	245.0	6:52:00 PM	292	0.415774	11.53			
4.10	246.0	6:53:00 PM	293	0.4152345	11.51			
4.12	247.0	6:54:00 PM	294	0.4146182	11.49			
4.13	248.0	6:55:00 PM	295	0.4139433	11.47			
4.15	249.0	6:56:00 PM	296	0.4134012	11.46			
4.17	250.0	6:57:00 PM	297	0.4127483	11.44			
4.18	251.0	6:58:00 PM	298	0.412238	11.43			
4.20	252.0	6:59:00 PM	299	0.4113494	11.40			
4.22	253.0	7:00:00 PM	300	0.4107655	11.39			
4.23	254.0	7:01:00 PM	301	0.4100648	11.37			
4.25	255.0	7:02:00 PM	302	0.4095483	11.35			
4.27	256.0	7:03:00 PM	303	0.4088717	11.33			
4.28	257.0	7:04:00 PM	304	0.40831	11.32			
4.30	258.0	7:05:00 PM	305	0.4076103	11.30			
4.32	259.0	7:06:00 PM	306	0.4069979	11.28			
4.33	260.0	7:07:00 PM	307	0.4064675	11.27			
4.35	261.0	7:08:00 PM	308	0.4058159	11.25			
4.37	262.0	7:09:00 PM	309	0.4052145	11.23			
4.38	263.0	7:10:00 PM	310	0.4046304	11.22			
4.40	264.0	7:11:00 PM	311	0.4038675	11.20			
4.42	265.0	7:12:00 PM	312	0.4030887	11.17			
4.43	266.0	7:13:00 PM	313	0.4027538	11.16			
4.45	267.0	7:14:00 PM	314	0.4021398	11.15			
4.47	268.0	7:15:00 PM	315	0.4013925	11.13			
4.48	269.0	7:16:00 PM	316	0.4007931	11.11			
4.50	270.0	7:17:00 PM	317	0.4002134	11.09			
4.52	271.0	7:18:00 PM	318	0.3996933	11.08			
4.53	272.0	7:19:00 PM	319	0.3988602	11.06			
4.55	273.0	7:20:00 PM	320	0.39836	11.04			
4.57	274.0	7:21:00 PM	321	0.3977389	11.03			
4.58	275.0	7:22:00 PM	322	0.3972622	11.01			
4.60	276.0	7:23:00 PM	323	0.3965082	10.99			
4.62	277.0	7:24:00 PM	324	0.3958451	10.97			
4.63	278.0	7:25:00 PM	325	0.3954873	10.96			
4.65	279.0	7:26:00 PM	326	0.3948646	10.95			
4.67	280.0	7:27:00 PM	327	0.3941381	10.93			
4.68	281.0	7:28:00 PM	328	0.3936048	10.91			
4.70	282.0	7:29:00 PM	329	0.3930239	10.89			
4.72	283.0	7:30:00 PM	330	0.3924027	10.88			
4.73	284.0	7:31:00 PM	331	0.3917203	10.86			
4.75	285.0	7:32:00 PM	332	0.3911826	10.84			
4.77	286.0	7:33:00 PM	333	0.3904842	10.82			
4.78	287.0	7:34:00 PM	334	0.3899572	10.81			
4.80	288.0	7:35:00 PM	335	0.3893761	10.79			

4.82	289.0	7:36:00 PM	336	0.3888079	10.78			
4.83	290.0	7:37:00 PM	337	0.3880244	10.76			
4.85	291.0	7:38:00 PM	338	0.3876562	10.75			
4.87	292.0	7:39:00 PM	339	0.3869135	10.73			
4.88	293.0	7:40:00 PM	340	0.386407	10.71			
4.90	294.0	7:41:00 PM	341	0.385884	10.70			
4.92	295.0	7:42:00 PM	342	0.3853933	10.68			
4.93	296.0	7:43:00 PM	343	0.3847068	10.66			
4.95	297.0	7:44:00 PM	344	0.3841428	10.65			
4.97	298.0	7:45:00 PM	345	0.3836304	10.63			
4.98	299.0	7:46:00 PM	346	0.3830567	10.62			
5.00	300.0	7:47:00 PM	347	0.3823491	10.60			
5.02	301.0	7:48:00 PM	348	0.3819116	10.59			
5.03	302.0	7:49:00 PM	349	0.3812596	10.57			
5.05	303.0	7:50:00 PM	350	0.3806176	10.55			
5.07	304.0	7:51:00 PM	351	0.3800986	10.54			
5.08	305.0	7:52:00 PM	352	0.3794895	10.52			
5.10	306.0	7:53:00 PM	353	0.378943	10.50			
5.12	307.0	7:54:00 PM	354	0.3783875	10.49			
5.13	308.0	7:55:00 PM	355	0.3779738	10.48			
5.15	309.0	7:56:00 PM	356	0.3773686	10.46			
5.17	310.0	7:57:00 PM	357	0.3766908	10.44			
5.18	311.0	7:58:00 PM	358	0.3761404	10.43			
5.20	312.0	7:59:00 PM	359	0.3757232	10.42			
5.22	313.0	8:00:00 PM	360	0.3750913	10.40			
5.23	314.0	8:01:00 PM	361	0.3745391	10.38			
5.25	315.0	8:02:00 PM	362	0.3739198	10.37			
5.27	316.0	8:03:00 PM	363	0.3734775	10.35			
5.28	317.0	8:04:00 PM	364	0.3726285	10.33			
5.30	318.0	8:05:00 PM	365	0.3721547	10.32			
5.32	319.0	8:06:00 PM	366	0.3714828	10.30			
5.33	320.0	8:07:00 PM	367	0.3712516	10.29			
5.35	321.0	8:08:00 PM	368	0.3705567	10.27			
5.37	322.0	8:09:00 PM	369	0.3699436	10.25			
5.38	323.0	8:10:00 PM	370	0.3692336	10.24			
5.40	324.0	8:11:00 PM	371	0.3688316	10.22			
5.42	325.0	8:12:00 PM	372	0.3683915	10.21			
5.43	326.0	8:13:00 PM	373	0.3678633	10.20			
5.45	327.0	8:14:00 PM	374	0.3672081	10.18			
5.47	328.0	8:15:00 PM	375	0.3666074	10.16			
5.48	329.0	8:16:00 PM	376	0.3661046	10.15			
5.50	330.0	8:17:00 PM	377	0.3654379	10.13			
5.52	331.0	8:18:00 PM	378	0.3648874	10.11			
5.53	332.0	8:19:00 PM	379	0.3644522	10.10			
5.55	333.0	8:20:00 PM	380	0.3638973	10.09			
5.57	334.0	8:21:00 PM	381	0.3632666	10.07			
5.58	335.0	8:22:00 PM	382	0.3628179	10.06			
5.60	336.0	8:23:00 PM	383	0.3622772	10.04			
5.62	337.0	8:24:00 PM	384	0.3617661	10.03			
5.63	338.0	8:25:00 PM	385	0.3611802	10.01			
5.65	339.0	8:26:00 PM	386	0.3606049	10.00			
5.67	340.0	8:27:00 PM	387	0.3600149	9.98			
5.68	341.0	8:28:00 PM	388	0.359555	9.97			
5.70	342.0	8:29:00 PM	389	0.359046	9.95			
5.72	343.0	8:30:00 PM	390	0.3583884	9.93			
5.73	344.0	8:31:00 PM	391	0.3579948	9.92			
5.75	345.0	8:32:00 PM	392	0.357685	9.92			
5.77	346.0	8:33:00 PM	393	0.3569876	9.90			
5.78	347.0	8:34:00 PM	394	0.3563657	9.88			
5.80	348.0	8:35:00 PM	395	0.3557646	9.86			
5.82	349.0	8:36:00 PM	396	0.3553344	9.85			
5.83	350.0	8:37:00 PM	397	0.3548241	9.84			
5.85	351.0	8:38:00 PM	398	0.3542756	9.82			
5.87	352.0	8:39:00 PM	399	0.3536789	9.80			
5.88	353.0	8:40:00 PM	400	0.3529287	9.78			

5.90	354.0	8:41:00 PM	401	0.3527308	9.78			
5.92	355.0	8:42:00 PM	402	0.3522555	9.76			
5.93	356.0	8:43:00 PM	403	0.3515829	9.75			
5.95	357.0	8:44:00 PM	404	0.3511348	9.73			
5.97	358.0	8:45:00 PM	405	0.3505864	9.72			
5.98	359.0	8:46:00 PM	406	0.3501766	9.71			
6.00	360.0	8:47:00 PM	407	0.3495872	9.69			
6.02	361.0	8:48:00 PM	408	0.3489751	9.67			
6.03	362.0	8:49:00 PM	409	0.3485341	9.66			
6.05	363.0	8:50:00 PM	410	0.348086	9.65			
6.07	364.0	8:51:00 PM	411	0.3476068	9.64			
6.08	365.0	8:52:00 PM	412	0.3468601	9.61			
6.10	366.0	8:53:00 PM	413	0.346528	9.61			
6.12	367.0	8:54:00 PM	414	0.3459253	9.59			
6.13	368.0	8:55:00 PM	415	0.3455652	9.58			
6.15	369.0	8:56:00 PM	416	0.3450215	9.56			
6.17	370.0	8:57:00 PM	417	0.3444068	9.55			
6.18	371.0	8:58:00 PM	418	0.343888	9.53			
6.20	372.0	8:59:00 PM	419	0.3435142	9.52			
6.22	373.0	9:00:00 PM	420	0.3429617	9.51			
6.23	374.0	9:01:00 PM	421	0.3424506	9.49			
6.25	375.0	9:02:00 PM	422	0.3417067	9.47			
6.27	376.0	9:03:00 PM	423	0.3415975	9.47			
6.28	377.0	9:04:00 PM	424	0.3407967	9.45			
6.30	378.0	9:05:00 PM	425	0.3404202	9.44			
6.32	379.0	9:06:00 PM	426	0.3398587	9.42			
6.33	380.0	9:07:00 PM	427	0.3393693	9.41			
6.35	381.0	9:08:00 PM	428	0.3387113	9.39			
6.37	382.0	9:09:00 PM	429	0.3385239	9.38			
6.38	383.0	9:10:00 PM	430	0.3377045	9.36			
6.40	384.0	9:11:00 PM	431	0.337216	9.35			
6.42	385.0	9:12:00 PM	432	0.3368336	9.34			
6.43	386.0	9:13:00 PM	433	0.3365165	9.33			
6.45	387.0	9:14:00 PM	434	0.3357499	9.31			
6.47	388.0	9:15:00 PM	435	0.3355028	9.30			
6.48	389.0	9:16:00 PM	436	0.3347953	9.28			
6.50	390.0	9:17:00 PM	437	0.33433	9.27			
6.52	391.0	9:18:00 PM	438	0.3339249	9.26			
6.53	392.0	9:19:00 PM	439	0.3331754	9.24			
6.55	393.0	9:20:00 PM	440	0.3328319	9.23			
6.57	394.0	9:21:00 PM	441	0.3323514	9.21			
6.58	395.0	9:22:00 PM	442	0.331957	9.20			
6.60	396.0	9:23:00 PM	443	0.3313985	9.19			
6.62	397.0	9:24:00 PM	444	0.3308695	9.17			
6.63	398.0	9:25:00 PM	445	0.3304327	9.16			
6.65	399.0	9:26:00 PM	446	0.32994	9.15			
6.67	400.0	9:27:00 PM	447	0.3293374	9.13			
6.68	401.0	9:28:00 PM	448	0.3290542	9.12			
6.70	402.0	9:29:00 PM	449	0.3284717	9.11			
6.72	403.0	9:30:00 PM	450	0.3279082	9.09			
6.73	404.0	9:31:00 PM	451	0.3275704	9.08			
6.75	405.0	9:32:00 PM	452	0.3269824	9.06			
6.77	406.0	9:33:00 PM	453	0.3265906	9.05			
6.78	407.0	9:34:00 PM	454	0.3261551	9.04			
6.80	408.0	9:35:00 PM	455	0.325501	9.02			
6.82	409.0	9:36:00 PM	456	0.3251712	9.01			
6.83	410.0	9:37:00 PM	457	0.3246202	9.00			
6.85	411.0	9:38:00 PM	458	0.3241235	8.98			
6.87	412.0	9:39:00 PM	459	0.3236007	8.97			
6.88	413.0	9:40:00 PM	460	0.3233609	8.96			
6.90	414.0	9:41:00 PM	461	0.3226585	8.94			
6.92	415.0	9:42:00 PM	462	0.3220744	8.93			
6.93	416.0	9:43:00 PM	463	0.3218187	8.92			
6.95	417.0	9:44:00 PM	464	0.321153	8.90			
6.97	418.0	9:45:00 PM	465	0.3209304	8.90			

6.98	419.0	9:46:00 PM	466	0.3201574	8.87			
7.00	420.0	9:47:00 PM	467	0.3199719	8.87			
7.02	421.0	9:48:00 PM	468	0.3193471	8.85			
7.03	422.0	9:49:00 PM	469	0.3189234	8.84			
7.05	423.0	9:50:00 PM	470	0.3183325	8.82			
7.07	424.0	9:51:00 PM	471	0.3179225	8.81			
7.08	425.0	9:52:00 PM	472	0.3172668	8.79			
7.10	426.0	9:53:00 PM	473	0.3169887	8.79			
7.12	427.0	9:54:00 PM	474	0.3166049	8.78			
7.13	428.0	9:55:00 PM	475	0.3160063	8.76			
7.15	429.0	9:56:00 PM	476	0.3156134	8.75			
7.17	430.0	9:57:00 PM	477	0.3150926	8.73			
7.18	431.0	9:58:00 PM	478	0.3145929	8.72			
7.20	432.0	9:59:00 PM	479	0.3142574	8.71			
7.22	433.0	10:00:00 PM	480	0.3137705	8.70			
7.23	434.0	10:01:00 PM	481	0.3132855	8.68			
7.25	435.0	10:02:00 PM	482	0.3127896	8.67			
7.27	436.0	10:03:00 PM	483	0.3123173	8.66			
7.28	437.0	10:04:00 PM	484	0.3118723	8.65			
7.30	438.0	10:05:00 PM	485	0.3113218	8.63			
7.32	439.0	10:06:00 PM	486	0.3109029	8.62			
7.33	440.0	10:07:00 PM	487	0.310556	8.61			
7.35	441.0	10:08:00 PM	488	0.3102688	8.60			
7.37	442.0	10:09:00 PM	489	0.3097191	8.59			
7.38	443.0	10:10:00 PM	490	0.3091728	8.57			
7.40	444.0	10:11:00 PM	491	0.3086664	8.56			
7.42	445.0	10:12:00 PM	492	0.3082929	8.55			
7.43	446.0	10:13:00 PM	493	0.3078355	8.53			
7.45	447.0	10:14:00 PM	494	0.3072872	8.52			
7.47	448.0	10:15:00 PM	495	0.306905	8.51			
7.48	449.0	10:16:00 PM	496	0.306535	8.50			
7.50	450.0	10:17:00 PM	497	0.3059694	8.48			
7.52	451.0	10:18:00 PM	498	0.3055866	8.47			
7.53	452.0	10:19:00 PM	499	0.3050818	8.46			
7.55	453.0	10:20:00 PM	500	0.3047073	8.45			
7.57	454.0	10:21:00 PM	501	0.3043042	8.44			
7.58	455.0	10:22:00 PM	502	0.3038845	8.42			
7.60	456.0	10:23:00 PM	503	0.3033504	8.41			
7.62	457.0	10:24:00 PM	504	0.3028854	8.40			
7.63	458.0	10:25:00 PM	505	0.302429	8.38			
7.65	459.0	10:26:00 PM	506	0.3021383	8.38			
7.67	460.0	10:27:00 PM	507	0.3016852	8.36			
7.68	461.0	10:28:00 PM	508	0.3011046	8.35			
7.70	462.0	10:29:00 PM	509	0.3006677	8.33			
7.72	463.0	10:30:00 PM	510	0.3002995	8.32			
7.73	464.0	10:31:00 PM	511	0.2999159	8.31			
7.75	465.0	10:32:00 PM	512	0.2994536	8.30			
7.77	466.0	10:33:00 PM	513	0.2988558	8.28			
7.78	467.0	10:34:00 PM	514	0.2985285	8.28			
7.80	468.0	10:35:00 PM	515	0.2980798	8.26			
7.82	469.0	10:36:00 PM	516	0.2977571	8.25			
7.83	470.0	10:37:00 PM	517	0.2971527	8.24			
7.85	471.0	10:38:00 PM	518	0.2966553	8.22			
7.87	472.0	10:39:00 PM	519	0.2962384	8.21			
7.88	473.0	10:40:00 PM	520	0.295904	8.20			
7.90	474.0	10:41:00 PM	521	0.2954712	8.19			
7.92	475.0	10:42:00 PM	522	0.2949799	8.18			
7.93	476.0	10:43:00 PM	523	0.2945293	8.16			
7.95	477.0	10:44:00 PM	524	0.2942546	8.16			
7.97	478.0	10:45:00 PM	525	0.2936298	8.14			
7.98	479.0	10:46:00 PM	526	0.2932622	8.13			
8.00	480.0	10:47:00 PM	527	0.2927607	8.12			
8.02	481.0	10:48:00 PM	528	0.2923438	8.10			
8.03	482.0	10:49:00 PM	529	0.2919472	8.09			
8.05	483.0	10:50:00 PM	530	0.2914852	8.08			

8.07	484.0	10:51:00 PM	531	0.2910667	8.07			
8.08	485.0	10:52:00 PM	532	0.2905825	8.05			
8.10	486.0	10:53:00 PM	533	0.290187	8.04			
8.12	487.0	10:54:00 PM	534	0.2898004	8.03			
8.13	488.0	10:55:00 PM	535	0.2893795	8.02			
8.15	489.0	10:56:00 PM	536	0.288977	8.01			
8.17	490.0	10:57:00 PM	537	0.2884958	8.00			
8.18	491.0	10:58:00 PM	538	0.2880446	7.98			
8.20	492.0	10:59:00 PM	539	0.2876054	7.97			
8.22	493.0	11:00:00 PM	540	0.2871532	7.96			
8.23	494.0	11:01:00 PM	541	0.2865692	7.94			
8.25	495.0	11:02:00 PM	542	0.2863439	7.94			
8.27	496.0	11:03:00 PM	543	0.285934	7.93			
8.28	497.0	11:04:00 PM	544	0.2853926	7.91			
8.30	498.0	11:05:00 PM	545	0.2850575	7.90			
8.32	499.0	11:06:00 PM	546	0.2845982	7.89			
8.33	500.0	11:07:00 PM	547	0.2841134	7.88			
8.35	501.0	11:08:00 PM	548	0.2838154	7.87			
8.37	502.0	11:09:00 PM	549	0.2833345	7.85			
8.38	503.0	11:10:00 PM	550	0.2829339	7.84			
8.40	504.0	11:11:00 PM	551	0.2823529	7.83			
8.42	505.0	11:12:00 PM	552	0.2820951	7.82			
8.43	506.0	11:13:00 PM	553	0.2817876	7.81			
8.45	507.0	11:14:00 PM	554	0.2812302	7.80			
8.47	508.0	11:15:00 PM	555	0.2809139	7.79			
8.48	509.0	11:16:00 PM	556	0.2804275	7.77			
8.50	510.0	11:17:00 PM	557	0.2801899	7.77			
8.52	511.0	11:18:00 PM	558	0.2798247	7.76			
8.53	512.0	11:19:00 PM	559	0.2795561	7.75			
8.55	513.0	11:20:00 PM	560	0.2791081	7.74			
8.57	514.0	11:21:00 PM	561	0.2787391	7.73			
8.58	515.0	11:22:00 PM	562	0.2783832	7.72			
8.60	516.0	11:23:00 PM	563	0.2780272	7.71			
8.62	517.0	11:24:00 PM	564	0.2776232	7.70			
8.63	518.0	11:25:00 PM	565	0.2771862	7.68			
8.65	519.0	11:26:00 PM	566	0.2767598	7.67			
8.67	520.0	11:27:00 PM	567	0.2764525	7.66			
8.68	521.0	11:28:00 PM	568	0.2760223	7.65			
8.70	522.0	11:29:00 PM	569	0.2757339	7.64			
8.72	523.0	11:30:00 PM	570	0.2753151	7.63			
8.73	524.0	11:31:00 PM	571	0.2749712	7.62			
8.75	525.0	11:32:00 PM	572	0.2745787	7.61			
8.77	526.0	11:33:00 PM	573	0.2741412	7.60			
8.78	527.0	11:34:00 PM	574	0.2739182	7.59			
8.80	528.0	11:35:00 PM	575	0.2733957	7.58			
8.82	529.0	11:36:00 PM	576	0.273063	7.57			
8.83	530.0	11:37:00 PM	577	0.2727462	7.56			
8.85	531.0	11:38:00 PM	578	0.2724059	7.55			
8.87	532.0	11:39:00 PM	579	0.2718234	7.53			
8.88	533.0	11:40:00 PM	580	0.2716563	7.53			
8.90	534.0	11:41:00 PM	581	0.2713009	7.52			
8.92	535.0	11:42:00 PM	582	0.2707418	7.50			
8.93	536.0	11:43:00 PM	583	0.2705838	7.50			
8.95	537.0	11:44:00 PM	584	0.2701097	7.49			
8.97	538.0	11:45:00 PM	585	0.2696346	7.47			
8.98	539.0	11:46:00 PM	586	0.2694211	7.47			
9.00	540.0	11:47:00 PM	587	0.2689682	7.46			
9.02	541.0	11:48:00 PM	588	0.2684885	7.44			
9.03	542.0	11:49:00 PM	589	0.2682942	7.44			
9.05	543.0	11:50:00 PM	590	0.267786	7.42			
9.07	544.0	11:51:00 PM	591	0.2675043	7.42			
9.08	545.0	11:52:00 PM	592	0.2671519	7.41			
9.10	546.0	11:53:00 PM	593	0.266704	7.39			
9.12	547.0	11:54:00 PM	594	0.266351	7.38			
9.13	548.0	11:55:00 PM	595	0.2659157	7.37			

9.15	549.0	11:56:00 PM	596	0.2654819	7.36			
9.17	550.0	11:57:00 PM	597	0.2651992	7.35			
9.18	551.0	11:58:00 PM	598	0.2648574	7.34			
9.20	552.0	11:59:00 PM	599	0.2645844	7.33			
9.22	553.0	12:00:00 AM	600	0.2641949	7.32			
9.23	554.0	12:01:00 AM	601	0.2637908	7.31			
9.25	555.0	12:02:00 AM	602	0.2635445	7.31			
9.27	556.0	12:03:00 AM	603	0.2629656	7.29			
9.28	557.0	12:04:00 AM	604	0.2626902	7.28			
9.30	558.0	12:05:00 AM	605	0.2622282	7.27			
9.32	559.0	12:06:00 AM	606	0.2620318	7.26			
9.33	560.0	12:07:00 AM	607	0.2617341	7.26			
9.35	561.0	12:08:00 AM	608	0.2611405	7.24			
9.37	562.0	12:09:00 AM	609	0.2610267	7.24			
9.38	563.0	12:10:00 AM	610	0.2606808	7.23			
9.40	564.0	12:11:00 AM	611	0.260137	7.21			
9.42	565.0	12:12:00 AM	612	0.2597816	7.20			
9.43	566.0	12:13:00 AM	613	0.2594336	7.19			
9.45	567.0	12:14:00 AM	614	0.2591499	7.18			
9.47	568.0	12:15:00 AM	615	0.2587742	7.17			
9.48	569.0	12:16:00 AM	616	0.258481	7.17			
9.50	570.0	12:17:00 AM	617	0.2581647	7.16			
9.52	571.0	12:18:00 AM	618	0.2577306	7.14			
9.53	572.0	12:19:00 AM	619	0.2572978	7.13			
9.55	573.0	12:20:00 AM	620	0.2569368	7.12			
9.57	574.0	12:21:00 AM	621	0.2565182	7.11			
9.58	575.0	12:22:00 AM	622	0.2563441	7.11			
9.60	576.0	12:23:00 AM	623	0.2559004	7.09			
9.62	577.0	12:24:00 AM	624	0.255772	7.09			
9.63	578.0	12:25:00 AM	625	0.2553347	7.08			
9.65	579.0	12:26:00 AM	626	0.2548116	7.06			
9.67	580.0	12:27:00 AM	627	0.2545063	7.05			
9.68	581.0	12:28:00 AM	628	0.2541268	7.04			
9.70	582.0	12:29:00 AM	629	0.2538816	7.04			
9.72	583.0	12:30:00 AM	630	0.2534199	7.02			
9.73	584.0	12:31:00 AM	631	0.2532003	7.02			
9.75	585.0	12:32:00 AM	632	0.2530795	7.02			
9.77	586.0	12:33:00 AM	633	0.2525171	7.00			
9.78	587.0	12:34:00 AM	634	0.2522613	6.99			
9.80	588.0	12:35:00 AM	635	0.2519194	6.98			
9.82	589.0	12:36:00 AM	636	0.251673	6.98			
9.83	590.0	12:37:00 AM	637	0.2513539	6.97			
9.85	591.0	12:38:00 AM	638	0.2508717	6.95			
9.87	592.0	12:39:00 AM	639	0.2506553	6.95			
9.88	593.0	12:40:00 AM	640	0.2502955	6.94			
9.90	594.0	12:41:00 AM	641	0.2501408	6.93			
9.92	595.0	12:42:00 AM	642	0.249725	6.92			
9.93	596.0	12:43:00 AM	643	0.2493508	6.91			
9.95	597.0	12:44:00 AM	644	0.2491928	6.91			
9.97	598.0	12:45:00 AM	645	0.2488329	6.90			
9.98	599.0	12:46:00 AM	646	0.2483446	6.88			
10.00	600.0	12:47:00 AM	647	0.2481155	6.88			
10.02	601.0	12:48:00 AM	648	0.2477672	6.87			
10.03	602.0	12:49:00 AM	649	0.2473367	6.86			
10.05	603.0	12:50:00 AM	650	0.2469757	6.85			
10.07	604.0	12:51:00 AM	651	0.2466465	6.84			
10.08	605.0	12:52:00 AM	652	0.2464564	6.83			
10.10	606.0	12:53:00 AM	653	0.2460556	6.82			
10.12	607.0	12:54:00 AM	654	0.2457658	6.81			
10.13	608.0	12:55:00 AM	655	0.2455626	6.81			
10.15	609.0	12:56:00 AM	656	0.2450209	6.79			
10.17	610.0	12:57:00 AM	657	0.244832	6.79			
10.18	611.0	12:58:00 AM	658	0.2443352	6.77			
10.20	612.0	12:59:00 AM	659	0.2441674	6.77			
10.22	613.0	1:00:00 AM	660	0.2438309	6.76			

10.23	614.0	1:01:00 AM	661	0.2433557	6.75			
10.25	615.0	1:02:00 AM	662	0.2432244	6.74			
10.27	616.0	1:03:00 AM	663	0.2428895	6.73			
10.28	617.0	1:04:00 AM	664	0.2424634	6.72			
10.30	618.0	1:05:00 AM	665	0.242226	6.71			
10.32	619.0	1:06:00 AM	666	0.24213	6.71			
10.33	620.0	1:07:00 AM	667	0.2415085	6.69			
10.35	621.0	1:08:00 AM	668	0.2413204	6.69			
10.37	622.0	1:09:00 AM	669	0.2411366	6.68			
10.38	623.0	1:10:00 AM	670	0.2406868	6.67			
10.40	624.0	1:11:00 AM	671	0.2403203	6.66			
10.42	625.0	1:12:00 AM	672	0.2399281	6.65			
10.43	626.0	1:13:00 AM	673	0.2394554	6.64			
10.45	627.0	1:14:00 AM	674	0.2394218	6.64			
10.47	628.0	1:15:00 AM	675	0.2391005	6.63			
10.48	629.0	1:16:00 AM	676	0.2386801	6.62			
10.50	630.0	1:17:00 AM	677	0.2385307	6.61			
10.52	631.0	1:18:00 AM	678	0.238242	6.60			
10.53	632.0	1:19:00 AM	679	0.2378317	6.59			
10.55	633.0	1:20:00 AM	680	0.23752	6.58			
10.57	634.0	1:21:00 AM	681	0.2372568	6.58			
10.58	635.0	1:22:00 AM	682	0.2367324	6.56			
10.60	636.0	1:23:00 AM	683	0.2365582	6.56			
10.62	637.0	1:24:00 AM	684	0.2361709	6.55			
10.63	638.0	1:25:00 AM	685	0.2359665	6.54			
10.65	639.0	1:26:00 AM	686	0.2357119	6.53			
10.67	640.0	1:27:00 AM	687	0.2353159	6.52			
10.68	641.0	1:28:00 AM	688	0.2349618	6.51			
10.70	642.0	1:29:00 AM	689	0.2347174	6.51			
10.72	643.0	1:30:00 AM	690	0.2342418	6.49			
10.73	644.0	1:31:00 AM	691	0.2341276	6.49			
10.75	645.0	1:32:00 AM	692	0.233656	6.48			
10.77	646.0	1:33:00 AM	693	0.2334084	6.47			
10.78	647.0	1:34:00 AM	694	0.2330576	6.46			
10.80	648.0	1:35:00 AM	695	0.2327521	6.45			
10.82	649.0	1:36:00 AM	696	0.2322982	6.44			
10.83	650.0	1:37:00 AM	697	0.2321964	6.44			
10.85	651.0	1:38:00 AM	698	0.2315463	6.42			
10.87	652.0	1:39:00 AM	699	0.2312906	6.41			
10.88	653.0	1:40:00 AM	700	0.2311036	6.41			
10.90	654.0	1:41:00 AM	701	0.2308283	6.40			
10.92	655.0	1:42:00 AM	702	0.2303913	6.39			
10.93	656.0	1:43:00 AM	703	0.2300765	6.38			
10.95	657.0	1:44:00 AM	704	0.2296918	6.37			
10.97	658.0	1:45:00 AM	705	0.2291716	6.35			
10.98	659.0	1:46:00 AM	706	0.2291427	6.35			
11.00	660.0	1:47:00 AM	707	0.2287972	6.34			
11.02	661.0	1:48:00 AM	708	0.2283093	6.33			
11.03	662.0	1:49:00 AM	709	0.2281099	6.32			
11.05	663.0	1:50:00 AM	710	0.2277659	6.31			
11.07	664.0	1:51:00 AM	711	0.2275424	6.31			
11.08	665.0	1:52:00 AM	712	0.2271643	6.30			
11.10	666.0	1:53:00 AM	713	0.226747	6.29			
11.12	667.0	1:54:00 AM	714	0.2263805	6.28			
11.13	668.0	1:55:00 AM	715	0.2263152	6.27			
11.15	669.0	1:56:00 AM	716	0.2257873	6.26			
11.17	670.0	1:57:00 AM	717	0.225451	6.25			
11.18	671.0	1:58:00 AM	718	0.2253162	6.25			
11.20	672.0	1:59:00 AM	719	0.2250071	6.24			
11.22	673.0	2:00:00 AM	720	0.2245898	6.23			
11.23	674.0	2:01:00 AM	721	0.2243778	6.22			
11.25	675.0	2:02:00 AM	722	0.2239155	6.21			
11.27	676.0	2:03:00 AM	723	0.2238094	6.20			
11.28	677.0	2:04:00 AM	724	0.2233901	6.19			
11.30	678.0	2:05:00 AM	725	0.2231255	6.19			

11.32	679.0	2:06:00 AM	726	0.2228536	6.18			
11.33	680.0	2:07:00 AM	727	0.2224415	6.17			
11.35	681.0	2:08:00 AM	728	0.2218914	6.15			
11.37	682.0	2:09:00 AM	729	0.2218229	6.15			
11.38	683.0	2:10:00 AM	730	0.2212987	6.13			
11.40	684.0	2:11:00 AM	731	0.2211595	6.13			
11.42	685.0	2:12:00 AM	732	0.220771	6.12			
11.43	686.0	2:13:00 AM	733	0.2205335	6.11			
11.45	687.0	2:14:00 AM	734	0.2202411	6.11			
11.47	688.0	2:15:00 AM	735	0.2199863	6.10			
11.48	689.0	2:16:00 AM	736	0.2196768	6.09			
11.50	690.0	2:17:00 AM	737	0.2192997	6.08			
11.52	691.0	2:18:00 AM	738	0.2191253	6.07			
11.53	692.0	2:19:00 AM	739	0.21875	6.06			
11.55	693.0	2:20:00 AM	740	0.2184979	6.06			
11.57	694.0	2:21:00 AM	741	0.2181474	6.05			
11.58	695.0	2:22:00 AM	742	0.2177172	6.04			
11.60	696.0	2:23:00 AM	743	0.2175665	6.03			
11.62	697.0	2:24:00 AM	744	0.217322	6.02			
11.63	698.0	2:25:00 AM	745	0.2168784	6.01			
11.65	699.0	2:26:00 AM	746	0.2165503	6.00			
11.67	700.0	2:27:00 AM	747	0.2163334	6.00			
11.68	701.0	2:28:00 AM	748	0.2160437	5.99			
11.70	702.0	2:29:00 AM	749	0.2155117	5.97			
11.72	703.0	2:30:00 AM	750	0.2153101	5.97			
11.73	704.0	2:31:00 AM	751	0.2151149	5.96			
11.75	705.0	2:32:00 AM	752	0.2147408	5.95			
11.77	706.0	2:33:00 AM	753	0.2144705	5.95			
11.78	707.0	2:34:00 AM	754	0.2140915	5.93			
11.80	708.0	2:35:00 AM	755	0.213584	5.92			
11.82	709.0	2:36:00 AM	756	0.213325	5.91			
11.83	710.0	2:37:00 AM	757	0.2131992	5.91			
11.85	711.0	2:38:00 AM	758	0.2129974	5.90			
11.87	712.0	2:39:00 AM	759	0.2126255	5.89			
11.88	713.0	2:40:00 AM	760	0.2123617	5.89			
11.90	714.0	2:41:00 AM	761	0.2120121	5.88			
11.92	715.0	2:42:00 AM	762	0.2116331	5.87			
11.93	716.0	2:43:00 AM	763	0.211447	5.86			
11.95	717.0	2:44:00 AM	764	0.2110848	5.85			
11.97	718.0	2:45:00 AM	765	0.2107854	5.84			
11.98	719.0	2:46:00 AM	766	0.2104446	5.83			
12.00	720.0	2:47:00 AM	767	0.2101597	5.83			
12.02	721.0	2:48:00 AM	768	0.2097838	5.82			
12.03	722.0	2:49:00 AM	769	0.2094871	5.81			
12.05	723.0	2:50:00 AM	770	0.2093	5.80			
12.07	724.0	2:51:00 AM	771	0.2088682	5.79			
12.08	725.0	2:52:00 AM	772	0.2084447	5.78			
12.10	726.0	2:53:00 AM	773	0.2083865	5.78			
12.12	727.0	2:54:00 AM	774	0.2079379	5.76			
12.13	728.0	2:55:00 AM	775	0.2078394	5.76			
12.15	729.0	2:56:00 AM	776	0.2073376	5.75			
12.17	730.0	2:57:00 AM	777	0.2073809	5.75			
12.18	731.0	2:58:00 AM	778	0.2067196	5.73			
12.20	732.0	2:59:00 AM	779	0.2064185	5.72			
12.22	733.0	3:00:00 AM	780	0.2061854	5.72			
12.23	734.0	3:01:00 AM	781	0.2059976	5.71			
12.25	735.0	3:02:00 AM	782	0.205719	5.70			
12.27	736.0	3:03:00 AM	783	0.2053176	5.69			
12.28	737.0	3:04:00 AM	784	0.2051308	5.69			
12.30	738.0	3:05:00 AM	785	0.2049534	5.68			
12.32	739.0	3:06:00 AM	786	0.2045095	5.67			
12.33	740.0	3:07:00 AM	787	0.2042739	5.66			
12.35	741.0	3:08:00 AM	788	0.2038753	5.65			
12.37	742.0	3:09:00 AM	789	0.2034201	5.64			
12.38	743.0	3:10:00 AM	790	0.2031928	5.63			

12.40	744.0	3:11:00 AM	791	0.2029659	5.63			
12.42	745.0	3:12:00 AM	792	0.2024055	5.61			
12.43	746.0	3:13:00 AM	793	0.2023484	5.61			
12.45	747.0	3:14:00 AM	794	0.2017809	5.59			
12.47	748.0	3:15:00 AM	795	0.201733	5.59			
12.48	749.0	3:16:00 AM	796	0.2011694	5.58			
12.50	750.0	3:17:00 AM	797	0.2008379	5.57			
12.52	751.0	3:18:00 AM	798	0.2005912	5.56			
12.53	752.0	3:19:00 AM	799	0.2002134	5.55			
12.55	753.0	3:20:00 AM	800	0.199972	5.54			
12.57	754.0	3:21:00 AM	801	0.1996798	5.54			
12.58	755.0	3:22:00 AM	802	0.1993177	5.53			
12.60	756.0	3:23:00 AM	803	0.1990687	5.52			
12.62	757.0	3:24:00 AM	804	0.1987474	5.51			
12.63	758.0	3:25:00 AM	805	0.198751	5.51			
12.65	759.0	3:26:00 AM	806	0.1981454	5.49			
12.67	760.0	3:27:00 AM	807	0.1978096	5.48			
12.68	761.0	3:28:00 AM	808	0.1976218	5.48			
12.70	762.0	3:29:00 AM	809	0.1972546	5.47			
12.72	763.0	3:30:00 AM	810	0.1969735	5.46			
12.73	764.0	3:31:00 AM	811	0.1965597	5.45			
12.75	765.0	3:32:00 AM	812	0.1963765	5.44			
12.77	766.0	3:33:00 AM	813	0.1960853	5.44			
12.78	767.0	3:34:00 AM	814	0.1957227	5.43			
12.80	768.0	3:35:00 AM	815	0.195296	5.41			
12.82	769.0	3:36:00 AM	816	0.1952702	5.41			
12.83	770.0	3:37:00 AM	817	0.1946333	5.40			
12.85	771.0	3:38:00 AM	818	0.1944285	5.39			
12.87	772.0	3:39:00 AM	819	0.1939748	5.38			
12.88	773.0	3:40:00 AM	820	0.1937036	5.37			
12.90	774.0	3:41:00 AM	821	0.193235	5.36			
12.92	775.0	3:42:00 AM	822	0.193021	5.35			
12.93	776.0	3:43:00 AM	823	0.192614	5.34			
12.95	777.0	3:44:00 AM	824	0.1923282	5.33			
12.97	778.0	3:45:00 AM	825	0.1920118	5.32			
12.98	779.0	3:46:00 AM	826	0.1916044	5.31			
13.00	780.0	3:47:00 AM	827	0.1913645	5.30			
13.02	781.0	3:48:00 AM	828	0.1909942	5.29			
13.03	782.0	3:49:00 AM	829	0.1904634	5.28			
13.05	783.0	3:50:00 AM	830	0.1902112	5.27			
13.07	784.0	3:51:00 AM	831	0.1899803	5.27			
13.08	785.0	3:52:00 AM	832	0.1896005	5.26			
13.10	786.0	3:53:00 AM	833	0.1890518	5.24			
13.12	787.0	3:54:00 AM	834	0.1890419	5.24			
13.13	788.0	3:55:00 AM	835	0.1885242	5.23			
13.15	789.0	3:56:00 AM	836	0.1882483	5.22			
13.17	790.0	3:57:00 AM	837	0.1880348	5.21			
13.18	791.0	3:58:00 AM	838	0.1876725	5.20			
13.20	792.0	3:59:00 AM	839	0.1872986	5.19			
13.22	793.0	4:00:00 AM	840	0.1871082	5.19			
13.23	794.0	4:01:00 AM	841	0.1867086	5.18			
13.25	795.0	4:02:00 AM	842	0.1863241	5.16			
13.27	796.0	4:03:00 AM	843	0.1861088	5.16			
13.28	797.0	4:04:00 AM	844	0.1857601	5.15			
13.30	798.0	4:05:00 AM	845	0.185582	5.14			
13.32	799.0	4:06:00 AM	846	0.1851991	5.13			
13.33	800.0	4:07:00 AM	847	0.1848724	5.12			
13.35	801.0	4:08:00 AM	848	0.1845708	5.12			
13.37	802.0	4:09:00 AM	849	0.184144	5.10			
13.38	803.0	4:10:00 AM	850	0.1839373	5.10			
13.40	804.0	4:11:00 AM	851	0.1837896	5.09			
13.42	805.0	4:12:00 AM	852	0.1836488	5.09			
13.43	806.0	4:13:00 AM	853	0.1832347	5.08			
13.45	807.0	4:14:00 AM	854	0.1827551	5.07			
13.47	808.0	4:15:00 AM	855	0.1823733	5.06			

13.48	809.0	4:16:00 AM	856	0.1821455	5.05			
13.50	810.0	4:17:00 AM	857	0.1818089	5.04			
13.52	811.0	4:18:00 AM	858	0.1812184	5.02			
13.53	812.0	4:19:00 AM	859	0.180979	5.02			
13.55	813.0	4:20:00 AM	860	0.1807313	5.01			
13.57	814.0	4:21:00 AM	861	0.1804284	5.00			
13.58	815.0	4:22:00 AM	862	0.1803585	5.00			
13.60	816.0	4:23:00 AM	863	0.1799616	4.99			
13.62	817.0	4:24:00 AM	864	0.179759	4.98			
13.63	818.0	4:25:00 AM	865	0.179339	4.97			
13.65	819.0	4:26:00 AM	866	0.1789101	4.96			
13.67	820.0	4:27:00 AM	867	0.1786771	4.95			
				Average Infiltration Rate:	**0.85**			
				Factor of Safety:	**0.45**			
					Infiltration Rate of 0.38 in/hr Used for Sizing of System			

APPENDIX B

PRODUCT

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

CRS451V

Stainless-Steel Vented Stand-Alone Pressure Transducer

Pressure Transducer Combined with a Recorder

High resolution and accuracy

Overview

The CRS451V consists of a submersible water-level and water-temperature sensor with its own time clock and memory to store the collected data—in a compact stainless-steel case. This data logging capability frees users to place the sensor in remote sites and let it collect data for long periods. HydroSci software is included and elegantly supports test setup, data retrieval, and data display. Long battery life and rugged construction mean you can trust the CRS451V to collect important data. Low cost and ease of use make it a good choice in a variety of applications. The CRS456V is the same as this, but with a titanium case.

Benefits and Features

- Sensors and data-collection features in one instrument case
- Rugged stainless-steel case protects piezoresistive sensor
- Quality construction ensures product reliability
- Fully temperature-compensated
- Fast scan rate
- Large data-storage capacity
- Long battery life
- Easy-to-use software

Detailed Description

The CRS451V has several pressure range options.

HydroSci software is available for download. This software simplifies the process of configuring the CRS451V. Users can configure the CRS451V to monitor surface water, ground water, or a standard pump test.

HydroSci software will display the data in tabular or graphical formats.

Specifications

Venting	Vented	Measurement Time	< 1.0 s

APPENDIX C

INFILTRATION TEST

The Washington State Department of Ecology Stormwater Manual provides testing procedures and best practices, which are described below.

- Testing should occur between December 1 and April 1.
- The horizontal and vertical locations of the PIT shall be surveyed by a licensed land surveyor and accurately shown on the design drawings.
- Excavate the test pit to the estimated elevation of the proposed infiltration into the native soil. Note that for some proposed BMPs, such as and BMP T5.15: Per- meable Pavements, this will be below the proposed finished grade. If the native soils will have to meet a minimum subgrade compaction requirement (for example, the road subgrade if using BMP T5.15: Permeable Pavements), compact the native soil to that requirement prior to testing. Lay back the slopes sufficiently to avoid caving and erosion during the test. Altern- atively, consider shoring the sides of the test pit.
- The horizontal surface area of the bottom of the test pit should be approximately 100 square feet. Document the size and geometry of the test pit.
- Install a vertical measuring rod (long enough to measure the ponded water depth, minimum 5- ft. long) marked in half-inch increments in the center of the pit bottom.
- Use a rigid 6-inch diameter pipe with a splash plate on the bottom to convey water to the test pit and reduce side-wall erosion or excessive disturbance of the test pit bottom. Excessive erosion and bottom disturbance will result in clogging of the infiltration receptor and yield lower than actual infiltration rates.
- Add water to the pit at a rate that will maintain a water level between 6 and 12 inches above the bottom of the pit. A rotameter can be used to measure the flow rate into the pit.

The depth should not exceed the proposed maximum depth of water expected in the completed BMP. For infiltration BMPs serving large drainage areas, designs with multiple feet of standing water can have infiltration tests with greater than 1 foot of standing water.

- Every 15-30 min, record the cumulative volume and instantaneous flow rate in gallons per minute necessary to maintain the water level at the same point on the measuring rod.
- Keep adding water to the pit until one hour after the flow rate into the pit has stabilized (constant flow rate; a goal of 5% or less variation in the total flow) while maintaining the same pond water level. The total of the pre-soak time plus one hour after the flow rate has stabilized should be no less than 6 hours.
- After the flow rate has stabilized for at least one hour, turn off the water and record the rate of infiltration (the drop rate of the standing water) in inches per hour from the measuring rod data, until the pit is empty. Consider running this falling head phase of the test several times to estimate the

dependency of the infiltration rate with head.

- At the conclusion of testing, over-excavate the pit to see if the test water is mounded on shallow restrictive layers or if it has continued to flow deep into the subsurface. The depth of excavation varies depending on soil type and depth to the hydraulic restricting layer, and is determined by the engineer or certified soils professional. Mounding is an indication that a mounding analysis is necessary.

DATA ANALYSIS

Calculate and record the initial K_{sat} rate in inches per hour in 30 minutes or one-hour increments until one hour after the flow has stabilized.

Use statistical/trend analysis to obtain the hourly flow rate when the flow stabilizes. This would be the lowest hourly flow rate. *Example:*

The area of the bottom of the test pit is 8.5-ft. by 11.5-ft. (97.75 sq. ft.).

Water flow rate was measured and recorded at intervals ranging from 15 to 30 minutes throughout the test. Between 400 minutes and 1,000 minutes the flow rate stabilized between 10 and 12.5 gal- lons per minute or 600 to 750 gallons per hour, or 80.2 to 100 ft^3 per hour. Dividing this rate by the surface area gives an initial K_{sat} of 9.8 to 12.3 inches per hour.

K_{sat} Determination Option 2: Small Scale Pilot Infiltration Test (PIT)

A small-scale PIT can be substituted for Ksat Determination Option 1: Large Scale Pilot Infiltration Test (PIT) in any of the following instances:

- The drainage area to the infiltration BMP is less than 1 acre.
- The testing is for BMP T7.30: Bioretention or BMP T5.15: Permeable Pavements that either serve small drainage areas and/or are widely dispersed throughout a project site.
- The site has a high infiltration rate (>4 in/hr), making a large scale PIT difficult, and the site geo- technical investigation suggests uniform subsurface characteristics.

INFILTRATION TEST

Use the same procedures described above in Ksat Determination Option 1: Large Scale Pilot Infiltra-tion Test (PIT), with the following changes:

- The horizontal surface area of the bottom of the test pit should be 12 to 32 square feet. It may be circular or rectangular. Document the size and geometry of the test pit.
- The rigid pipe with a splash plate used to convey water to the pit may be a 3-inch diameter pipe for

pits on the smaller end of the recommended surface area, or a 4-inch pipe for pits on the larger end of the recommended surface area.

- Pre-soak period: Add water to the pit so that there is standing water for at least 6 hours. Maintain the pre-soak water level at least 12 inches above the bottom of the pit.
- At the end of the pre-soak period, add water to the pit at a rate that will maintain a 6-12 inch water level above the bottom of the pit over a full hour. The depth should not exceed the pro- posed maximum depth of water expected in the completed facility.
- Every 15 minutes, record the cumulative volume and instantaneous flow rate in gallons per minute necessary to maintain the water level at the same point (between 6 inches and 1 foot) on the measuring rod. The specific depth should be the same as the maximum designed pond- ing depth (usually 6 – 12 inches).

After one hour, turn off the water and record the rate of infiltration (the drop rate of the standing water) in inches per hour from the measuring rod data, until the pit is empty.

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APPENDIX D

CALCULATED DESIGN INFILTRATION RATE:

Site variability and number of locations tested (CF_v) - The number of locations tested must be capable of producing a picture of the subsurface conditions that fully rep- resents the conditions throughout the proposed location of the infiltration BMP. The partial correction factor used for this issue depends on the level of uncertainty that adverse subsurface conditions may occur. If the range of uncertainty is low - for example, conditions are known to be uniform through previous exploration and site geological factors

- one pilot infiltration test (or grain size analysis location) may be adequate to justify a partial correction factor at the high end of the range.

If the level of uncertainty is high, a partial correction factor near the low end of the range may be appropriate. This might be the case where the site conditions are highly variable due to conditions such as a deposit of ancient landslide debris, or buried stream channels. In these cases, even with many explorations and several pilot infiltration tests (or several grain size test locations), the level of uncertainty may still be high.

A partial correction factor near the low end of the range could be assigned where conditions have a more typical variability, but few explorations and only one pilot infiltration test (or one grain size analysis location) is conducted. That is, the number of explorations and tests conducted do not match the degree of site variability anticipated.

- **Uncertainty of test method (CF_t)** accounts for uncertainties in the testing methods. For the full scale PIT method, $CF_t = 0.75$; for the small-scale PIT method, $CF_t = 0.50$; for smaller-scale infiltration tests such as the double-ring infiltrometer test, $CF_t = 0.40$; for grain size analysis, $CF_t = 0.40$. These values are intended to represent the difference in each test's ability to estimate the actual saturated hydraulic conductivity. The assumption is the larger the scale of the test, the more reliable the result.
- **Degree of influent control to prevent siltation and bio-buildup (CF_m)** Even with a pre-settling basin or a basic treatment BMP for pre-treatment, the soil's initial infiltration rate will gradually decline as more and more stormwater, with some amount of suspended material, passes through the soil profile. The maintenance schedule calls for removing sediment when the BMP is infiltrating at only 90% of its design capacity. Therefore, a correction factor, CF_m, of 0.9 is called for.

Table V-5.1: Correction Factors to be Used With In-Situ Saturated Hydraulic Conductivity Measurements to Estimate Design Rates

Issue	Partial Correction Factor
Site variability and number of locations tested	CF_v = 0.33 to 1.0
Test Method	
• Large-scale PIT • Small-scale PIT • Other small-scale (e.g. Double ring, falling head) • Grain Size Method	CF_t = 0.75 = 0.50 = 0.40 = 0.40
Degree of influent control to prevent siltation and bio-buildup	CF_m = 0.9

Total Correction Factor, $CF_T = CF_v \times CF_t \times CF_m$

Total Correction Factor, $CF_T = 1.0 \times 0.5 \times 0.9$

$CF_T = 0.45$

APPENDIX B

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Pressure Transducer Combined with a Recorder

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The CRS451V consists of a submersible water-level and water-temperature sensor with its own time clock and memory to store the collected data—in a compact stainless-steel case. This data logging capability frees users to place the sensor in remote sites and let it collect data for long periods. HydroSci software is included and elegantly supports test setup, data retrieval, and data display. Long battery life and rugged construction mean you can trust the CRS451V to collect important data. Low cost and ease of use make it a good choice in a variety of applications. The CRS456V is the same as this, but with a titanium case.

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Degree of influent control to prevent siltation and bio-buildup	CF_m = 0.9

Total Correction Factor, $CF_T = CF_v \times CF_t \times CF_m$

Total Correction Factor, $CF_T = 1.0 \times 0.5 \times 0.9$

$CF_T = 0.45$

APPENDIX E

GEORESOURCES
earth science & geotechnical engineering
4809 Pacific Hwy. E. | Fife, Washington 98424 | 253.896.1011 | www. georesources.rocks

April 6, 2023

Advanced Underground Utilities
PO Box 309
Sumner, Washington 98390

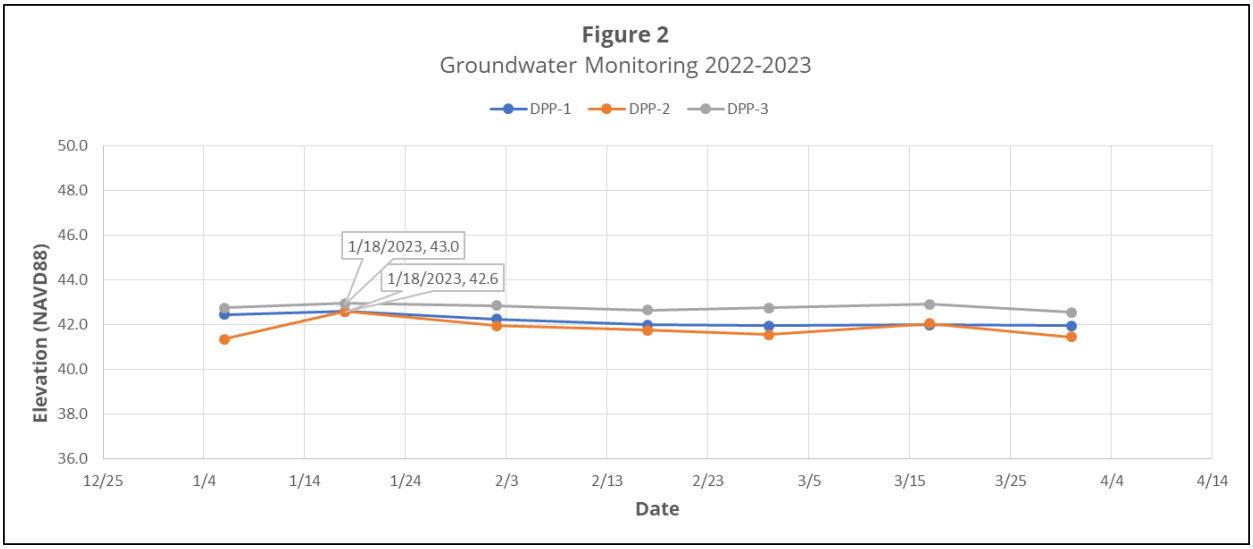
Attn: E.J. Fernandez
(253) 988-2449
ej@auuinc.com

Soils Report Addendum: Groundwater Monitoring
Proposed Contractor's Yard
320 Todd Road NE
Puyallup, Washington
PN: 0420222005
Doc ID: AdvancedUndergroundUtilities.ToddRdNE.SRa

This *Soils Report Addendum* summarizes our seasonal groundwater monitoring for the proposed contractor's yard to be constructed at 320 Todd Road NE in Puyallup, Washington. We prepared a *Soils Report* for the site dated January 4, 2023. To satisfy the groundwater monitoring requirements of the *2019 Stormwater Management Manual for Western Washington* (SWMMWW), we recorded groundwater levels periodically during the 2022-2023 winter wet season.

Three drive-point piezometers (DPPs) were installed by GeoResources at select locations across the site on December 13, 2022 to depths of approximately 10 feet below the existing ground surface. The locations of the DPPs are shown on the Site & Exploration Map, Figure 1. At the time of installation, no groundwater seepage was observed. Groundwater readings for the DPPs were manually measured on a bi-monthly basis from January 6, 2023 to March 31, 2023.

Based on our wet season monitoring, it appears that seasonal high groundwater occurs at about Elevation 42.6 to 43.0 feet (NAVD 88) at the locations monitored. These levels were recorded on January 18, 2023. Based on our measurements, it appears that seasonal high groundwater occurs within about 7 to 8 feet of the ground surface across the site. Figure 2, below, summarizes the groundwater levels recorded as part of our groundwater monitoring program during our monitoring period.



LIMITATIONS

We have prepared this report for use by Advanced Underground Utilities 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.

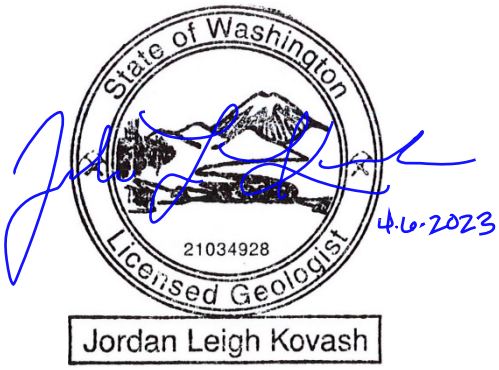
Variations in subsurface conditions are possible between the explorations and may also occur with time. A contingency for unanticipated conditions should be included in the budget and schedule. Sufficient monitoring, testing and consultation should be provided by our firm during construction to confirm 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.

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 working for you on this project. Please do not hesitate to call at your earliest convenience if you have any questions or comments.

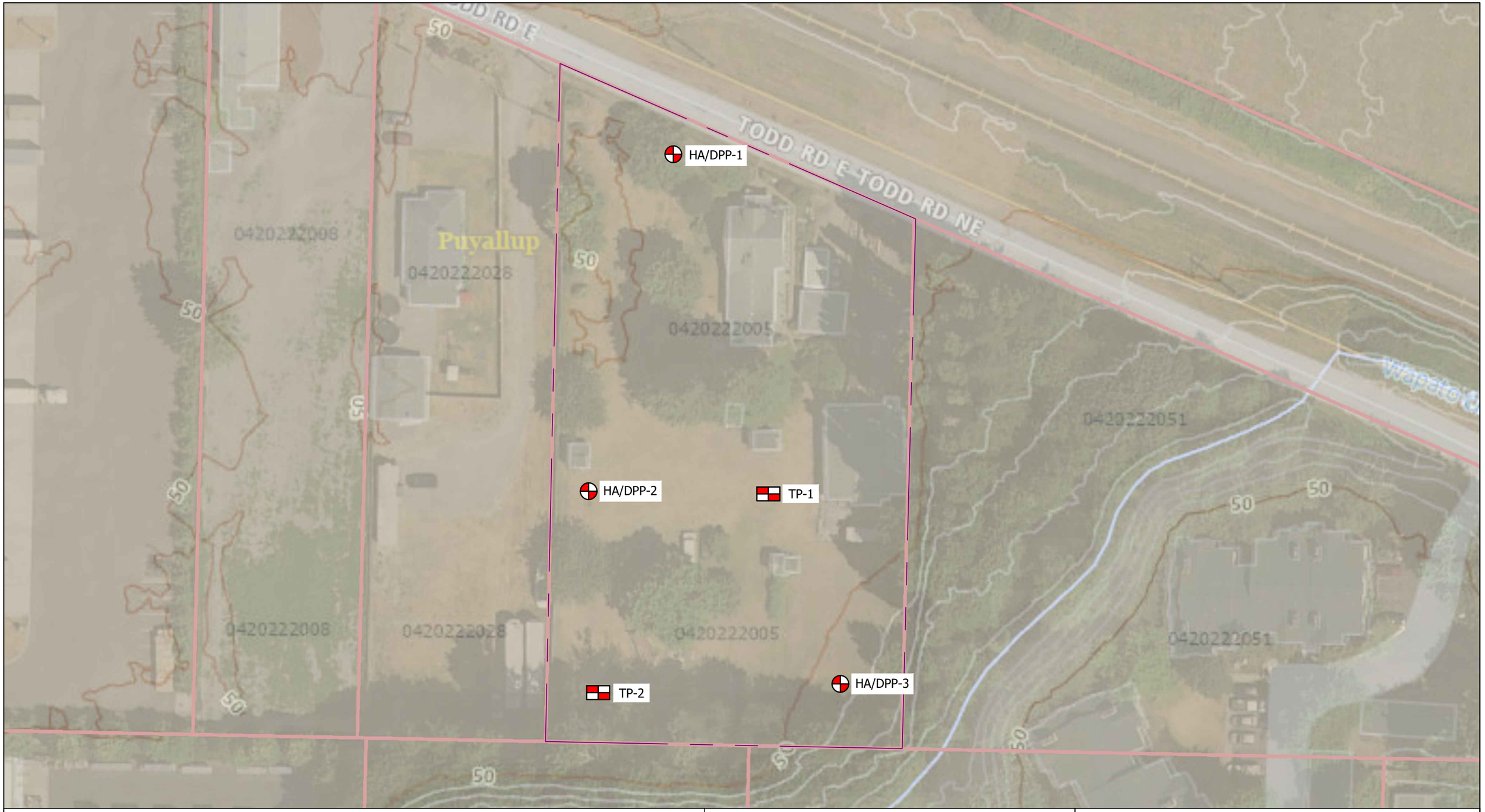
Respectfully submitted,
GeoResources, LLC



Jordan L. Kovash, LG
Project Geologist

Eric W. Heller, PE, LG
Senior Geotechnical Engineer

JLK:EWH/jlk
Doc ID: AdvancedUndergroundUtilities.ToddRdNE.SRa
Attachments: Figure 1 – Site & Exploration Plan



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

0 50 100
Scale:1" = 50'

HA/DPP Hand auger/Drive Point Piezometer number and approximate location

TP Test pit number and approximate location

This is not a survey.

GEORESOURCES
earth science & geotechnical engineering
4809 Pacific Hwy. E. | Fife, Washington 98424 | 253.896.1011 | www.georesources.rocks

Site & Exploration Map

Proposed Contractor's Yard
320 Todd Road NE
Puyallup, Washington
PN: 0420222005

DocID: AdvanceUndergroundUtilities.ToddRdNE	April 2023	Figure 1

APPENDIX B

SECTION 22, TOWNSHIP 20 N, RANGE 4 E, WM, PIERCE COUNTY, WA

320 TODD ROAD DEVELOPMENT

CIVIL CONSTRUCTION PERMIT

APPLICANT

EJ FERNANDAZ
PO BOX 309
SUMNER, WA 98390

ARCHITECT

MSGS ARCHITECTS
510 CAPITOL WAY SOUTH
OLYMPIA, WA 98501
(360) 943-6774, EXT. 112
CONTACT: GARNER MILLER

CIVIL ENGINEER

JMJ TEAM
905 MAIN STREET
SUITE 200
SUMNER, WA 98390
(206) 596-2020
CONTACT: JUSTIN JONES, PE

SURVEYOR

CONTOUR ENGINEERING LLC
4706 97TH STREET NW, SUITE 100
GIG HARBOR, WA 98335

(253) 857-5454
CONTACT: STEPHEN H. WOODS, PLS

SITE INFORMATION:

SITE ADDRESS	320 TODD RD NE, PUYALLUP, WA 98371
TAX PARCEL NUMBER:	0420222005
ZONING:	RM-20
TOTAL PROJECT AREA:	1.50 AC

VERTICAL DATUM:

BASE:
HELD STATION TACO AS PUBLISHED ON WASHINGTON STATE REFERENCE NETWORK WEBSITE (HTTP://WSRN3.ORG/) (2018)

ELEVATION: 341.348' (NAVD88)

SITE #1: CE 500, A SET HUB AND TACK ON THE NORTH SIDE OF TODD ROAD NORTHEAST, 8.8' EAST OF STORM DRAINAGE MANHOLE AS SHOWN HEREON.

ELEVATION: 50.2' (NAVD88)

SITE #2: CE 505, A SET HUB AND TACK IN THE BACK OF YARD OF THE SITE AS SHOWN HEREON.

ELEVATION: 51.35' (NAVD88)

SITE AREA: 65,123 SQ FT (1.495 ACRES)

HORIZONTAL DATUM:

THE NORTH AMERICAN DATUM OF 1983/2011 (NAD 83/2011 EPOCH 2010.00) GRID COORDINATES WERE FOUND TO BE 690850.70 / 1194622.67 AT AN "X" IN A 2.5" BRASS DISK.

SERVICE PROVIDERS:

WATER:	CITY OF PUYALLUP
SEWER:	ON-SITE SEPTIC
POWER:	PUGET SOUND ENERGY
GAS:	PUGET SOUND ENERGY

VICINITY MAP

320 Todd Rd NE, Puyallup, WA 98371

SHEET INDEX

PROJECT DISTURBED AREA

Description[a]	Onsite	Offsite	Total
Existing Conditions			
Total Project Area[b] (ft²)	33,174-0.762 ac	7,997-0.184 ac	41,171-0.946ac
Existing hard surface (ft²)	8,174-0.188 ac	4,678-0.108 ac	12,852-0.296ac
Existing vegetation area (ft²)	25,000- 0.574ac	3,319-0.076 ac	28,319-0.650ac
Proposed Conditions			
Total Project Area[b] (ft²)	33,174-0.762 ac	7,997-0.184 ac	41,171-0.946ac
Amount of new hard surface (ft²)	8,838-0.203 ac	3,304-0.076 ac	12,142-0.279ac
Amount of new pollution generating hard surface (PGHS)[c] (ft²)	8,386-0.193 ac	1,961-0.045 ac	10,347-0.238 ac
Amount of replaced hard surface (ft²)	6,193-0.142 ac	4,678-0.107 ac	10,871-0.249ac
Amount of replaced PGHS[d] (ft²)	3,721-0.085 ac	4,221-0.097 ac	7,942-0.182 ac
Amount of new plus replaced hard surface (ft²)	15,031-0.345ac	7,982-0.183 ac	23,013-0.528ac
Amount of new + replaced PGHS (ft²)	12,107-0.278ac	6,182-0.142 ac	18,289-0.420ac
Amount of existing hard surfaces converted to vegetation (ft²)	1,993-0.046 ac	15-0.001 ac	2,008-0.047 ac
Amount of Land Disturbed (ft²)	33,174-0.762 ac	7,997-0.184 ac	41,171-0.946ac
Vegetation to Lawn/Landscaped (acres)	0.371-16,150 sf	0-0 sf	0.371-16,150 sf
Native Vegetation to Pasture (acres)	0-0 sf	0-0 sf	0-0 sf
Existing hard surface to remain unaltered (ft²)	0-0 ac	0-0 ac	0-0 ac
Existing vegetation area to remain unaltered (ft²)	0-0 ac	0-0 ac	0-0 ac

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.

CALL TWO BUSINESS DAYS BEFORE YOU DIG
811
1-800-424-5555
UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:

EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:

Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:

Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:

320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES — STATE OF WASHINGTON — 41829 — REGISTERED PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Cover Sheet

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:

C1-001

DWG.

1 OF 31

GENERAL PLAN 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 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 revision 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 as (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.

STORMWATER NOTES

1. All work in City right–of–way requires a permit from the City of Puyallup. Prior to any work commencing, the general contractor shall arrange for a preconstruction meeting at the Development Services Center to be attended by all contractors that will perform work shown on the engineering plans, representatives from all applicable Utility Companies, the project owner and appropriate City staff. Contact Engineering Services to schedule the meeting (253) 841–5568. The contractor is responsible to have their own approved set of plans at the meeting.
2. After completion of all items shown on these plans and before acceptance of the project, the contractor shall obtain a "punch list" prepared by the City's inspector detailing remaining items of work to be completed. All items of work shown on these plans shall be completed to the satisfaction of the City prior to acceptance of the water system and provision of sanitary sewer service.
3. All materials and workmanship shall conform to the Standard Specifications for Road, Bridge, and Municipal Construction (hereinafter referred to as the "Standard Specifications"), Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition, unless superseded or amended by the City of Puyallup City Standards for Public Works Engineering and Construction (hereinafter referred to as the "City Standards").
4. A copy of these approved plans and applicable city developer specifications and details shall be on site during construction.
5. Any revisions made to these plans must be reviewed and approved by the developer's engineer and the Engineering Services Staff prior to any implementation in the field. The City shall not be responsible for any errors and/or omissions on these plans.
6. The contractor shall have all utilities verified on the ground prior to any construction. Call (811) at least two working days in advance. The owner and his/her engineer shall be contacted immediately if a conflict exists.
7. Any structure and/or obstruction which require removal or relocation relating to this project, shall be done so at the developer's expense.
8. During construction, all existing and newly installed drainage structures shall be protected from sediments.
9. All storm manholes shall conform to City Standard Detail No. 02.01.01. Flow control manhole/oil water separator shall conform to City Standard Detail No. 02.01.06 and 02.01.07.
10. Manhole ring and cover shall conform to City Standard Detail 06.01.02.
11. Catch basins Type I shall conform to City Standard Detail No.02.01.02 and 02.01.03 and shall be used only for depths less than 5 feet from top of the grate to the invert of the storm pipe.
12. Catch basins Type II shall conform to City Standard Detail No.02.01.04 and shall be used for depths greater than 5 feet from top of the grate to the invert of the storm pipe.
13. Cast iron or ductile iron frame and grate shall conform to City Standard Detail No.02.01.05. Grate shall be marked with "drains to stream". Solid catch basin lids (square unless noted as round) shall conform to WSDOT Standard Plan B–30.20–04 (Olympic Foundry No. SM60 or equal). Vaned grates shall conform to WSDOT Standard Plan B–30.30–03 (Olympic Foundry No. SM60V or equal).
14. Stormwater pipe shall be only PVC, concrete, ductile iron, or dual walled Polypropylene pipe.
    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.
15. Trenching, bedding, and backfill for pipe shall conform to City Standard Detail No. 06.01.01.
16. Storm pipe shall be a minimum of 10 feet away from building foundations and/or roof lines.
17. All storm drain mains shall be tested and inspected for acceptance as outlined in Section 406 of the City of Puyallup Sanitary Sewer System Standards.
18. All temporary sedimentation and erosion control measures, and protective measures for critical areas and significant trees shall be installed prior to initiating any construction activities.

SANITARY SEWER 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 sewer system and provision of sanitary sewer service.
3. All materials and workmanship shall conform to the Standard Specifications for Road, Bridge, and Municipal Construction (hereinafter referred to as the "Standard Specifications"), Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition, unless superseded or amended by the City of Puyallup City Standards for Public Works Engineering and Construction (hereinafter referred to as the "City Standards").
4. A copy of these approved plans and applicable city developer specifications and details shall be on site during construction.
5. Any revisions made to these plans must be reviewed and approved by the developer's engineer and the Engineering Services Staff prior to any implementation in the field. The City shall not be responsible for any errors and/or omissions on these plans.
6. The contractor shall have all utilities verified on the ground prior to any construction. Call (811) at least two working days in advance. The owner and his/her engineer shall be contacted immediately if a conflict exists.
7. Any structure and/or obstruction which require removal or relocation relating to this project shall be done so at the developer's expense.
8. 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.
9. 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).
10. 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.
11. Sanitary sewer manhole frames and covers shall conform to City Standard No. 06.01.02.
12. 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.
13. 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.
14. 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.
15. 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.
16. 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.

GRADING, EROSION, AND SEDIMENT CONTROL PLAN 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 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"), or as directed by Fruitland Mutual Water Company (FMWC), Valley Water (VW), or Tacoma City Water (TCW) is the purveyor.
4. A copy of these approved plans and applicable city developer specifications and details shall be on site during construction.
5. Any revision made to these plans must be reviewed and approved by the developer's engineer and the Engineering Services Staff, and the FMWC, VW, or TCW when served by that purveyor, 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. 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 situation 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.

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.

CALL TWO BUSINESS DAYS BEFORE YOU DIG
1–800–424–5555
UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:
EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:
Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:
JUTEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:
320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES — STATE OF WASHINGTON — 41829 — REGISTERED PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:
General Notes

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:
C1-002

DWG:
2 OF 31

WATER NOTES

1. All work in City right–of–way requires a permit from the City of Puyallup. Prior to any work commencing, the general contractor shall arrange for a preconstruction meeting at the Development Services Center to be attended by all contractors that will perform work shown on the engineering plans, representatives from all applicable Utility Companies, the project owner and appropriate City staff. Contact Engineering Services to schedule the meeting (253) 841–5568. The contractor is responsible to have their own approved set of plans at the meeting.

2. After completion of all items shown on these plans and before acceptance of the project, the contractor shall obtain a "punch list"prepared by the City's inspector detailing remaining items of work to be completed. All items of work shown on these plans shall be completed to the satisfaction of the City prior to acceptance of the water system and provision of sanitary sewer service.

3. All materials and workmanship shall conform to the Standard Specifications for Road, Bridge, and Municipal Construction (hereinafter referred to as the "Standard Specifications"), Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition, unless superseded or amended by the City of Puyallup City Standards for Public Works Engineering and Construction (hereinafter referred to as the "City Standards"), or as directed by Fruitland Mutual Water Company (FMWC), Valley Water (VW), or Tacoma City Water (TCW) is the purveyor.

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, the Engineering Services Staff, and the FMWC, VW or TCW when served by that purveyor, prior to any implementation in the field. The City shall not be responsible for any errors and/or omissions on these plans.

6. The contractor shall have all utilities verified on the ground prior to any construction. Call (811) at least two working days in advance. The owner and his/her engineer shall be contacted immediately if a conflict exists.

7. Any structure and/or obstruction which requires removal or relocation relating to this project shall be done so at the developer's expense.

8. 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.

9. 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–of– way and unimproved easements.

10. 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.

11. 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.

12. All water mains and appurtenances shall be hydrostatically tested at 200 psi in accordance with Standard Specification 7–09.3(23). Pressure testing shall not be performed until satisfactory purity samples have been received, except when new water mains are installed independently from the water system piping.

13. 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.

14. 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.

15. 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.

16. Pipe fitting for water mains shall be ductile iron and shall be mechanical joint conforming to AWWA Specification C111–72.

17. Water main pipe and service connections shall be a minimum of 10 feet away from building foundations and/or roof lines.

18. 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.

19. Trenching, bedding, and backfill for water mains shall be installed in accordance with City Standard Detail 06.01.01.

20. 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.

21. Any lead joint fitting disturbed during construction shall be replaced with a mechanical joint fitting at the contractor's expense.

22. When hydraulic fire flow modeling is required for a project, the City will issue a permit. The hydraulic modeling criteria is based on the projected 2030 water demand, while maintaining a minimum system pressure of 20 pounds per square inch and a maximum velocity of 10 feet per second.

23. 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.

24. 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.

25. 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 trench 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.

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 a 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 foot 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 on– site 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.

SANITARY SEWER TESTING REQUIREMENTS

1. Gravity sanitary sewer cleaning and testing requirements shall be as outlined in WSDOT Section 7–17.3(2). Sanitary sewer cleaning and testing shall be completed to the satisfaction of the Office of the City Engineer and/or Public Works Department prior to final acceptance. After completion of all project utility work (sewer, water, storm, etc.) and associated utility trench backfill and compaction, sewer lines shall be cleaned and tested by the Contractor prior to final project acceptance, as outlined in Section 406.1 through 406.4. At the end of the Maintenance and Warranty Period, the City will perform a final CCTV inspection per 406.4 to verify that the work performed conforms to City Standards prior to bond release.

1.1. Cleaning

Physical connection to the existing City sewer system shall not be allowed until all pipes have been thoroughly cleaned by jetting and/or pigging to remove any solids or construction debris that may have entered the pipe.

The Contractor shall arrange to have the water accumulated during construction and sanitary system cleaning operations removed from the sewer system by a Vactor truck. Water from the new sewer extension shall not be permitted to enter the existing City system until final project approval. Sediment or debris introduced to existing City sewers as a result of any construction activity shall be removed immediately by the Contractor in conformance with WSDOT Section 7–17.

1.2. Deflection Testing

Gravity sanitary sewers shall be tested for deflection prior to visual inspection.Thermoplastic pipe shall be tested for deflection not less than 30 days after the trench backfill and compaction has been completed. Deflection testing shall be conducted by pulling a mandrel (rigid or adjustable) with a diameter not less than 95 percent of the normal diameter of the pipe being tested. Mandrel testing shall be conducted in conformance with WSDOT Section 7–17.3(2)G.

1.3. Leakage Testing

All new gravity sanitary sewer mains and the right–of–way laterals shall be subject to a low–pressure air test per WSDOT Section 7–17.3(2)F. Low pressure air testing shall be conducted after backfilling is completed and the backfill material has been compacted in conformance with the approved plans. Conforming compaction shall be verified by nuclear gauge testing and/or proof rolling at the discretion of Engineering staff. The City Engineer or designee shall observe all testing to verify satisfactory completion. The City Engineer or designee may require that air test pressure be maintained at 4.0 psig with no drop for 15 minutes for a passing leakage test where groundwater pressure is deemed negligible, or at the City Engineer's or designee's discretion.

The Contractor shall furnish all necessary equipment and personnel for conducting the pressure test. The Contractor shall provide certification from a certified/accredited laboratory that testing equipment is accurate. All equipment and personnel shall be subject to approval by the City Engineer or designee.

If any portion of the sanitary system fails to meet the testing requirements, the Contractor shall determine, at their own expense, the source of leakage and shall repair or replace all defective materials or workmanship. The completed pipe installation shall meet the minimum testing requirements before being considered acceptable.

1.4. Television Inspection

All new gravity sanitary sewer extensions shall be visually inspected in conformance with WSDOT Section 7–17.3(2)H, following satisfactory trench compaction testing, flushing, low pressure air testing, and deflection testing. All manholes shall be channeled and grade rings set in place prior to sewer video inspection.

The remote camera used in sewer visual inspection shall be one specifically designed for such an application, with the ability to rotate the camera 180 degrees and lighting suitable to allow a clear picture of the entire periphery of the pipe. The camera shall proceed through the pipe at a sufficiently slow velocity to allow adequate inspection of all pipe All sewer lateral fittings and joints and suspect pipe joints shall be closely inspected by rotating the camera as needed to provide a clear view.

The Contractor shall introduce water to the new sewer system immediately prior to the visual inspection by adding water to the upstream manhole until water is seen flowing in the lowest manhole. Video inspection of the line shall begin when flow in the lowest manhole has stopped. A 1–inch sewer ball shall be attached to the front of the camera to provide a basis for estimating the depth of the ponding within the sewer pipe.

Television Inspection Acceptance Criteria:

1.4.1. Any ponding within a pipe shall be less than one–half inch (1/2") in depth.

1.4.2. The total accumulated ponding length, regardless of depth, from manhole to manhole shall be less than ten (10) percent of the total length from manhole to manhole.

Any sewer pipe that exceeds either of the above acceptance criteria will be rejected and require repair and/or replacement by the Contractor.

The Contractor shall bear all costs for the correction of any deficiencies found during TV inspection, including the costs for additional TV inspection and leakage testing needed to verify the deficiencies were corrected. All components of the video and recording equipment shall be sufficient to provide picture quality to the satisfaction of the City Engineer or designee.

Upon completion of the video inspection, the digital video, of common format, and written inspection report shall be submitted to the City for review. At a minimum, the inspection report shall contain the following information:

–Size, length, and material type of the sewer main.

–Location of all lateral connections.

–Estimated depth and location of all ponding over 1/4 inch in depth

–Manhole numbers that correspond to the approved plans

–Street name and/or location of sewer main

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.

CALL TWO BUSINESS DAYS BEFORE YOU DIG
1–800–424–5555
UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:

EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:

Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:

JJUTEAM

Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:

320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

General Notes

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:

C1-003

DWG.

3 OF 31

File: 1611001C-GV.dwg Path: C:\Users\EricKearney\JMJ TEAM\JMJ Projects - General\1611 - Fernandez\320 Todd Road Development\02 - CD\CAD\ Plotted by: EricKearney Date: 02-Jun-25 11:58:28am

TESTING AND INSPECTION

Stormwater system cleaning and testing requirements shall be as outlined in WSDOT Section 7-17.3(2) and the standards herein. Stormwater system cleaning and testing shall be completed to the satisfaction of the City Engineer, or designee, prior to final acceptance. After completion of all project utility work (sewer, water, storm, etc.) and associated utility trench backfill and compaction, stormwater lines shall be cleaned and tested by the Contractor prior to final project acceptance, as outlined in Section 209.1 through 209.4. At the end of the maintenance and warranty period, the developer/contractor is required to clean and flush the lines as outlined in the standards herein. Other testing may be required at the end of the maintenance and warranty period, as determined by the City Engineer.

209.1 Cleaning/Flushing

The Contractor shall arrange to have all water and debris accumulated during construction removed from the system. Stormwater cleaning operations shall consist of jetting all stormwater lines, both main lines and laterals. Jetting lines shall never result in pushing sediment or debris downstream and all sediment, debris and water shall be removed from the stormwater system by a vactor truck. Sediment or debris introduced to the City's stormwater system because of construction activity shall be removed immediately by the Contractor in conformance with WSDOT Section 7-04.

209.2 Deflection Testing

Stormwater pipes shall be tested for deflection prior to visual inspection. Thermoplastic pipe shall be tested for deflection not less than 30 days after the trench backfill and compaction has been completed. Deflection testing shall be conducted by pulling a mandrel (rigid or adjustable) with a diameter not less than 95 percent of the normal diameter of the pipe being tested. Mandrel testing shall be conducted in conformance with WSDOT Section 7-17.3(2)G.

209.3 Pressure Testing

All new stormwater pipes shall be subject to a low-pressure air test per WSDOT Section 7-17.3(2)F. Pressure testing shall be in accordance with the following, unless otherwise determined by the City Engineer, or designee.

1. Low pressure air testing shall be conducted after backfilling is completed. Backfill material shall be compacted in accordance with the approved plans.
2. Conforming compaction shall be verified by nuclear gauge testing and/or proof rolling. The City Engineer, or designee, shall observe all testing to verify satisfactory completion.
3. The Contractor shall furnish all necessary equipment and personnel for conducting the pressure test. The Contractor shall provide certification from certified/accredited laboratory that testing equipment is accurate. All equipment and personnel shall be subject to approval.
4. The Contractor shall conduct a preliminary pressure test prior to City observation, any portions of the system that fail the preliminary test should be remedied prior to City observation.
5. If any portion of the stormwater system fails to meet the testing requirements, the Contractor shall determine, at their own expense, the source of leakage and shall repair or replace all defective materials or workmanship. The completed pipe installation shall meet the minimum testing requirements before being considered acceptable.

209.4 Television Inspection

All new stormwater pipes shall be visually inspected in conformance with WSDOT Section 7-17.3(2)H, following satisfactory trench compaction testing, flushing, low pressure air testing, and deflection testing. All manholes and catch basins shall be watertight with grade rings set in place prior to stormwater video inspection. The remote camera used in stormwater visual inspection shall be one specifically designed for such an application, with the ability to rotate the camera 180 degrees and lighting suitable to allow a clear high-quality picture of the entire periphery of the pipe. The camera shall proceed through the pipe at an appropriate velocity to allow adequate inspection of all pipe joints. All pipe joints shall be closely inspected by rotating the camera as needed to provide a clear view. The Contractor shall introduce water, with dye, to the stormwater system immediately prior to the visual inspection. The water shall be added to the upstream manhole until water is seen flowing in the downstream manhole. An incremented 1-inch sewer ball shall be attached to the front of the camera to provide a basis for estimating the depth of the ponding within the stormwater pipe.

All new stormwater pipes shall be inspected by television camera with the City Engineer, or designee, present. Video and inspection reports shall be submitted to the City and include the following:

1. An electronic report of the inspection and copy of the inspection video in electronic form on a flash drive.
2. Video shall be labeled with the date and time, street name or location, upstream/ downstream structure, pipe size, pipe length and pipe material type.
3. Location and depths of all ponding ¼"or greater.
4. Location of deflections, deformation, or structural defects.
5. One file should be submitted with all stormwater pipe runs for the project. One-by-one submittals will not be accepted.
6. Video or inspection reports failing to meet criteria 1-5 above will not be reviewed and will be returned to the contractor/developer.

209.5 Acceptance Criteria

All new storm pipe installed (public and private) shall be tested, in accordance with Section 209, and video shall be reviewed and approved by the City Engineer, or designee, prior to the placement of curb and gutter or pavement. Unless determined otherwise by the City Engineer, or designee, all repairs identified shall be completed as follows:

1. Any ponding within a pipe shall be less than one-half inch (1/2") in depth.
2. The total accumulated ponding length, regardless of depth, from manhole to manhole shall be less than ten (10) percent of the total length from manhole to manhole.
3. The use of couplers is prohibited.
4. If a pipe needs to be cut into for the repair, the storm pipe run shall be removed and reinstalled from the nearest bell to the nearest catch basin.
5. If removal and replacement of any section of storm pipe is required to make a repair, the entire length of mainline shall be required to be retested after repairs are made.
6. A new video shall be required after the required repairs have been completed, in accordance with Section 209.4.

Any stormwater pipe that exceeds any of the above acceptance criteria will be rejected and require repair and/or replacement by the Contractor.

The Contractor shall bear all costs for the correction of any deficiencies found during TV inspection, including the costs for additional TV inspection and pressure testing needed to verify that the deficiencies were corrected. All components of the video and recording equipment shall be sufficient to provide picture quality to the satisfaction of the City Engineer, or designee.

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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CALL TWO BUSINESS DAYS BEFORE YOU DIG
1-800-424-5555
UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:
EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:
Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:
JJUTEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:
320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

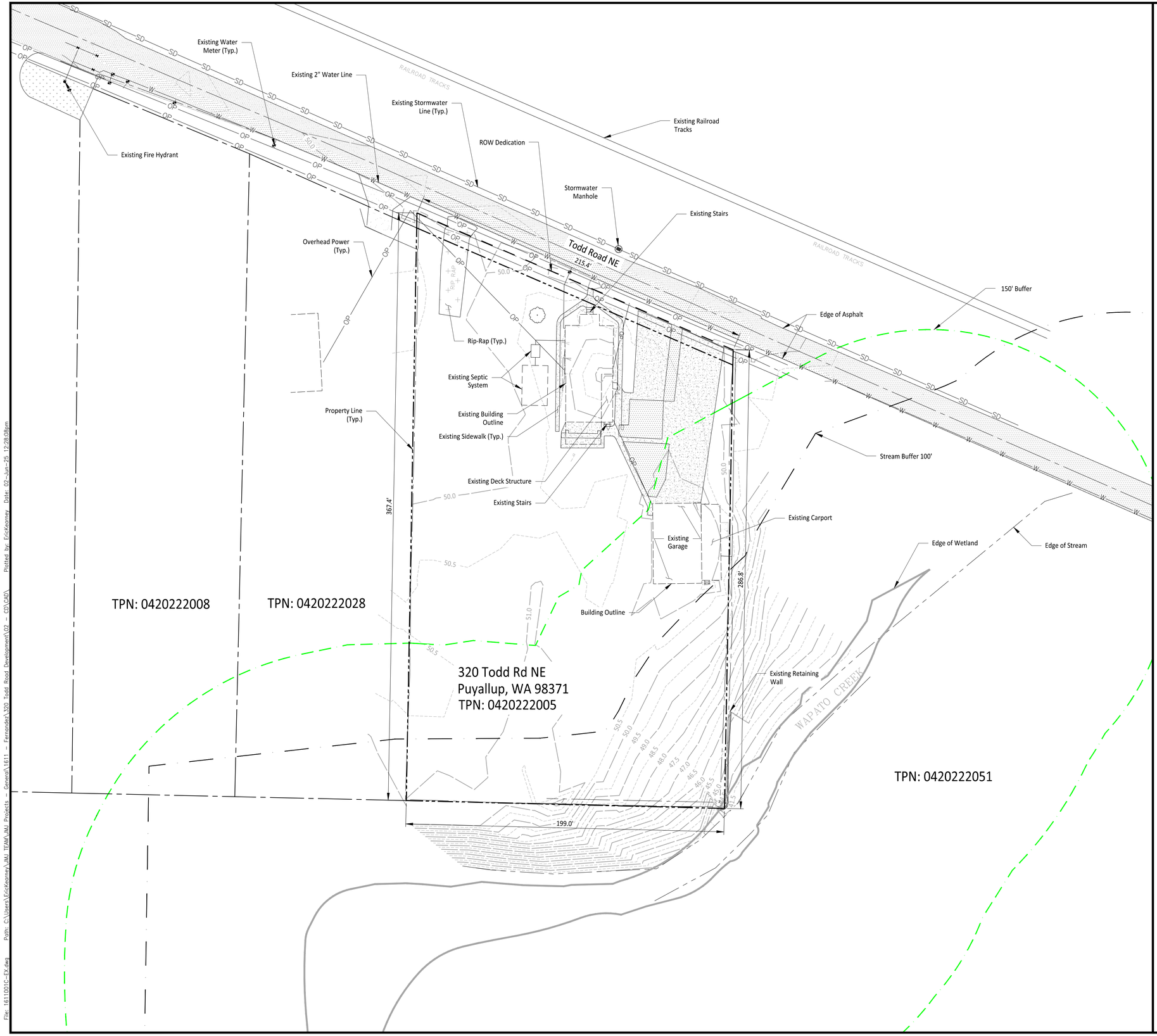
SHEET TITLE:
General Notes

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:
C1-004

DWG.
4 OF 31

File: 1611001C-GV.dwg Path: C:\Users\EricKearney\JMJ TEAM\JMJ Projects - General\1611 - Fernandez\320 Todd Road Development\02 - CD\CAD\ Plotted by: EricKearney Date: 02-Jun-25 11:58:51am



LEGEND

- Property Line
- Stream Buffer 100'
- Edge of Wetland Buffer 150'
- Wetland Boundry
- Existing Water Line
- Existing Storm water Line
- Existing Overhead Power
- Existing Water Meter
- Existing Water Valve
- Existing Concrete
- Existing Asphalt
- Existing Rip Rap

VERTICAL DATUM

Base:
Held Station TACO as Published on Washington State Reference Network Website (HTTP://WSRN3.ORG/) (2018)

Elevation: 341.348' (NAVD88)

Site #1: CE 500, A Set hub and tack on the North Side of Todd Road Northeast, 8.8' East of storm Drainage Manhole as shown hereon.

Elevation: 50.2' (NAVD88)

Site #2: CE 505, A set Hub and Tack in the back of yard of the site as shown hereon.

Elevation: 51.35' (NAVD88)

Site Area: 65,123 SQ FT (1.495 Acres)

HORIZONTAL DATUM

The North American Datum of 1983/2011 (NAD 83/2011 EPOCH 2010.00) Grid Coordinates were found to be 690850.70 / 1194622.67 at an "X" in a 2.5" Brass disk.

0 30 60 Feet
1" = 30'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:
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PO Box 309
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Architect:
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msgs Carve Architects
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Olympia, WA 98501

Engineer:
JJ TEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:
320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

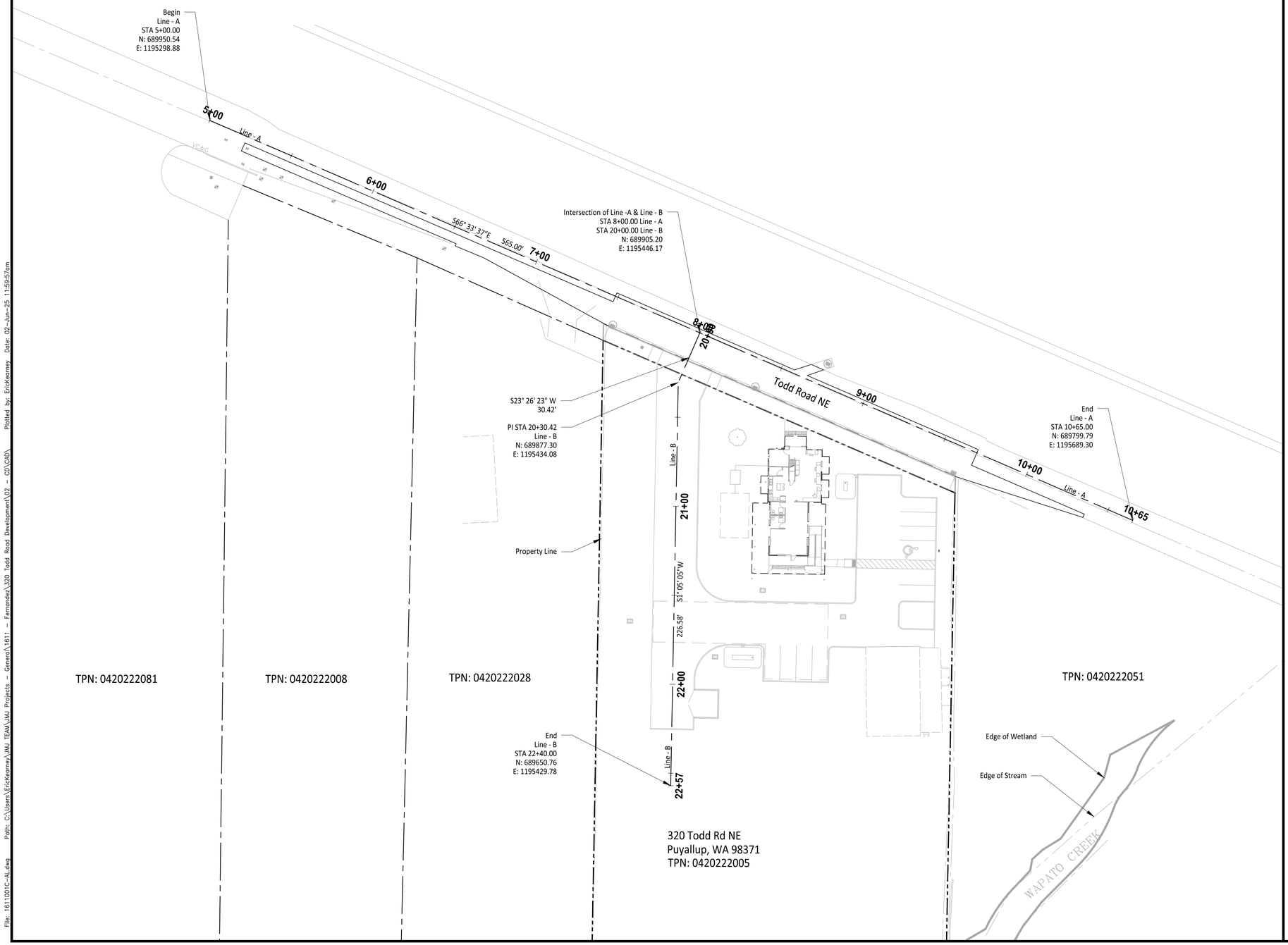
REV	DATE	DESCRIPTION

SHEET TITLE:
Existing Site Plan

PROJ.NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:
C1-101

DWG.
5 OF 31



HORIZONTAL DATUM

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0 30 60 Feet
1" = 30'

APPROVED

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CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Alignment Control Plan

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

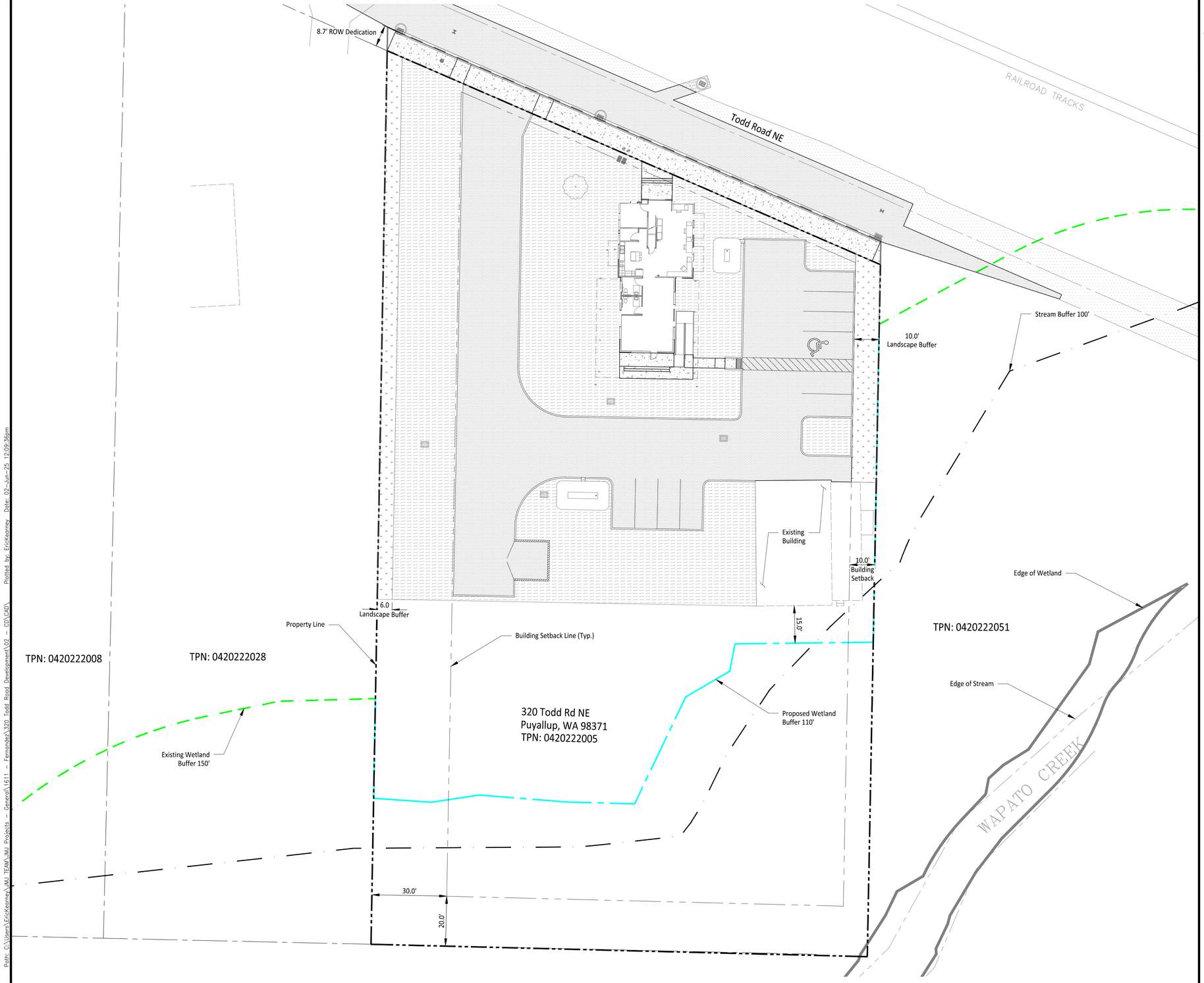
SHEET NUMBER:

C1-201

DWG.

6 OF 31

File: 1611001C-AL.dwg Path: C:\Users\EricKearney\JMJ TEAM\JMJ Projects - General\1611 - Fernandez\320 Todd Road Development\02 - CDs\CAD\ Plotted by: EricKearney Date: 02-Jun-25 11:59:57am



LEGEND

- Landscape Buffer
- Property Line
- ROW Dedication Line
- Proposed Wetland Buffer
- Existing Wetland Buffer

0 20 40 Feet
1" = 20'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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Owner/Developer:

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msgs Carve Architects
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Olympia, WA 98501

Engineer:

JMJTEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:

320 Todd Road Development

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IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

REV.	DATE	DESCRIPTION

SHEET TITLE:

Zone Transition Buffer Plan

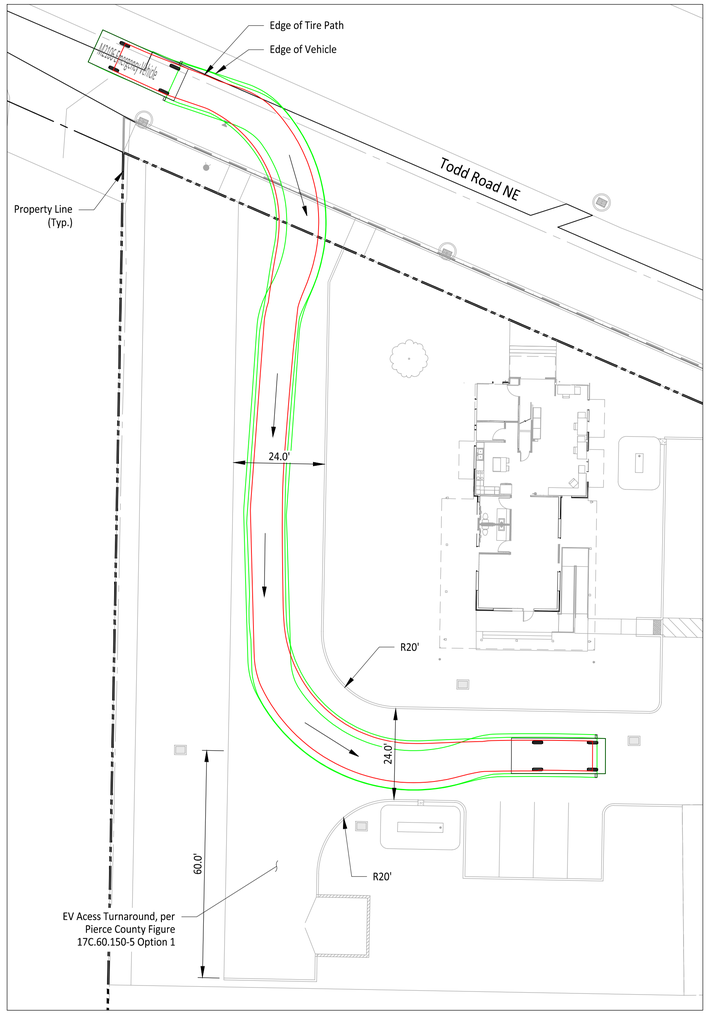
PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:

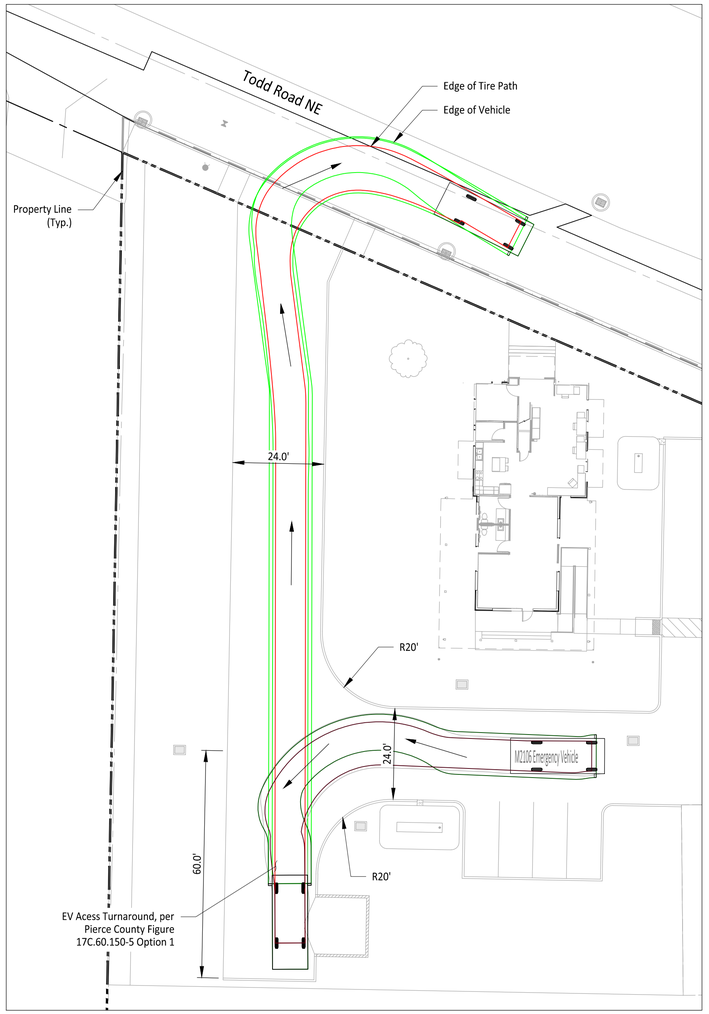
C1-301

DWG.

7 OF 31



EV - Entry



EV - Exit

TURNING MOVEMENT NOTES:

1. Turning movements based upon M2106 Emergency Vehicle and information provided by Central Pierce Fire Department.

FIRE HYDRANT/FDC LOCATION/ACCESS APPROVED

BY _____
CITY OF PUYALLUP
FIRE CODE OFFICIAL

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 FIRE CODE OFFICIAL.

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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0 20 40 Feet
1" = 20'

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UTILITIES UNDERGROUND LOCATION CENTER

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msgs Carve Architects
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Sumner, WA 98390
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Project:
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Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

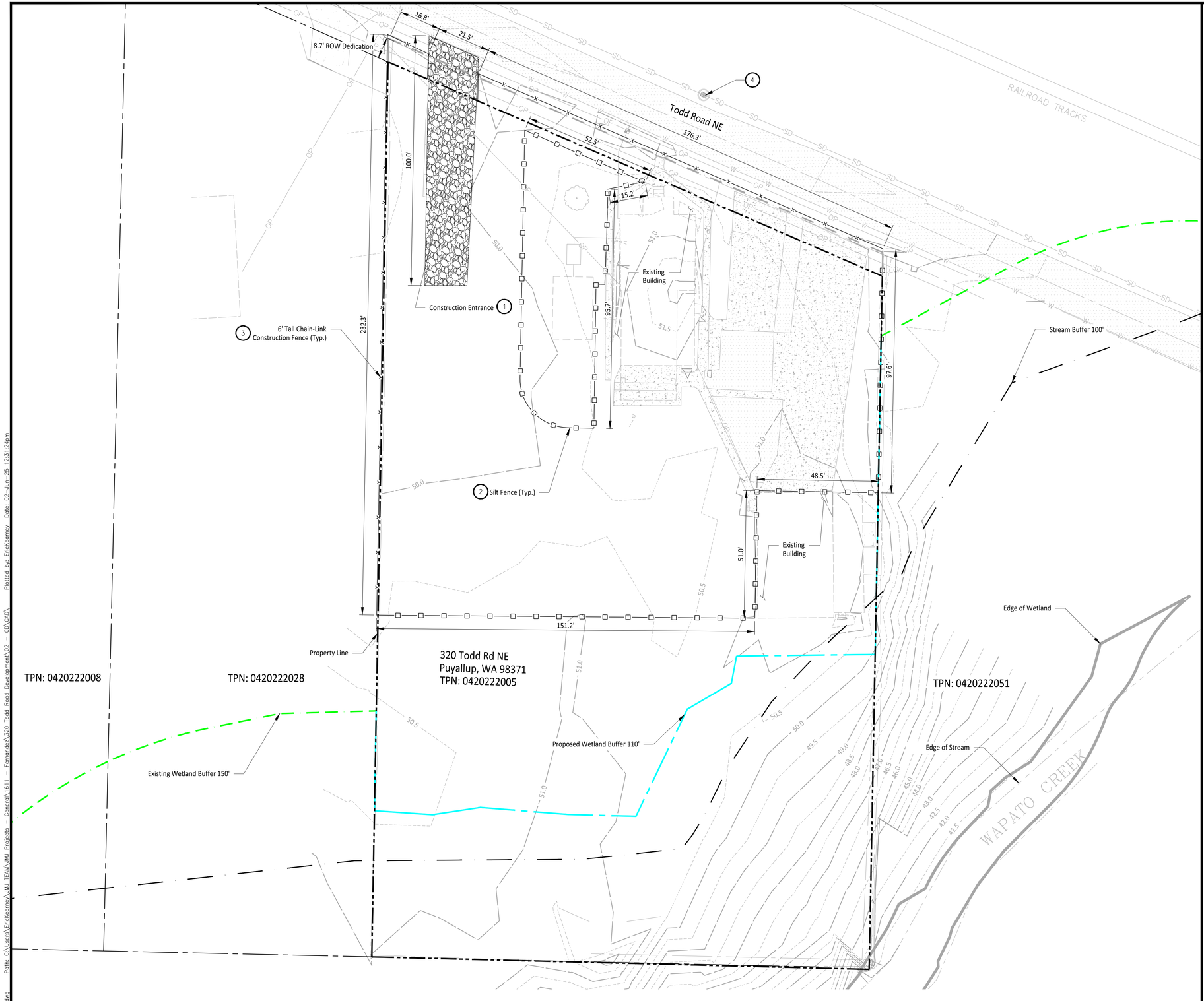
REV	DATE	DESCRIPTION

SHEET TITLE:
Fire Turning Movement

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:
C1-401

DWG.
8 OF 31



LEGEND

- Silt Fence
- Construction Fence
- Property Line
- ROW Line
- Construction Entrance

(#) CONSTRUCTION NOTES

1. Maintain construction entrance per City of Puyallup Standard Detail 05.01.01 and install wheel wash as needed per Washington DOE BMP C106.
2. Install silt fence per City of Puyallup Standard Detail 02.03.02. Silt Fence to mark clearing limits in the field.
3. Install Construction Fencing per DOE BMP C103.
4. Install Inlet Protection per WSDOT Std. Plan I-40.20-00.

GENERAL NOTES

1. Construct Pipe trench bedding and backfill as necessary per City of Puyallup Standard Detail 06.01.01.
2. Install straw bale barriers, wattles, and other necessary TESC measures as required.
3. Exposed soils shall be watered as necessary to prevent dust from leaving the site.
4. All concrete handling and equipment washing shall be in accordance with Washington DOE BMP C151.
5. Install high visibility construction fence where silt fence is not required as shown per DOE BMP C103.
6. A CESCL shall be available on-site or on-call for the duration of construction operations.
7. From April 1 to October 31 all disturbed areas at final grade & all exposed areas that are scheduled to remain unworked for 30+ days shall be stabilized within 10 days. From November 1 to March 31 all exposed soils at final grade shall be stabilized immediately using permanent or temporary measures. Exposed soils with an area +5,000 sqft that are scheduled to remain unworked for more than 24 hrs and exposed areas of less than 5,000 sqft that will remain unworked for more than 7 days shall be stabilized immediately. All disturbed areas which are not planned to be constructed on within 90 days from time of clearing & grading shall be revegetated with the native vegetation.
8. All BMP's per City of Puyallup standards and protection CSWPPP.
9. If necessary, alternative sediment control methods shall be submitted by the contractor for review and approval prior to construction.
10. Protect Low Impact Development BMPs

A. Protect all Permeable Pavement and Infiltration Areas from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that utilize infiltration BMPs. Leave infiltration areas high and/or place silt fence around the areas to ensure runoff will not accumulate silt within the subgrade. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden Bioretention/rain garden soils, and replacing the removed soils with soils meeting the design specification.

B. Prevent compacting Permeable Pavement and Infiltration BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.

C. Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements or base materials.

D. Pavement fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures in accordance with this manual or the manufacturer's procedures.

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

CONSTRUCTION SEQUENCE

1. Hold a preconstruction meeting with the City and obtain required permits.
2. Establish clearing and grading limits.
3. Construct temporary construction entrance.
4. Construct perimeter ditches, silt fences, and other erosion control devices as shown.
5. Construct protection devices for critical areas and significant trees proposed for retention.
6. Schedule an erosion control inspection with the City.
7. Clearly state at what point grading activities can begin, usually only after all drainage and erosion control measures are in place.
8. Identify erosion control measures which require regular maintenance.

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
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PO Box 309
Sumner, WA 98390

Architect:
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msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:
JMJ TEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:
320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES · STATE OF WASHINGTON · 41829 · REGISTERED PROFESSIONAL ENGINEER
06-02-25

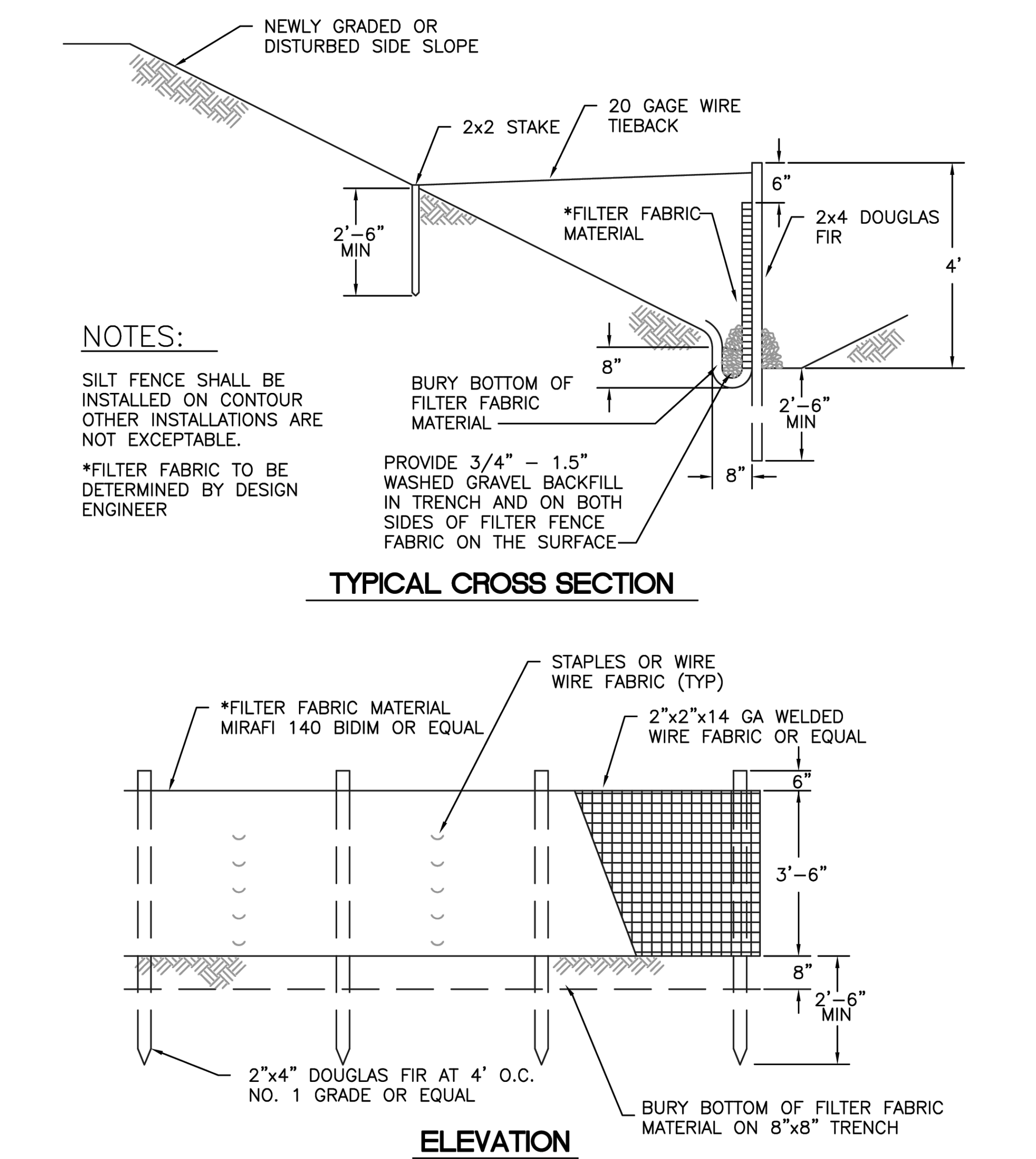
REV	DATE	DESCRIPTION

SHEET TITLE:
TESC Plan

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:
C2-101

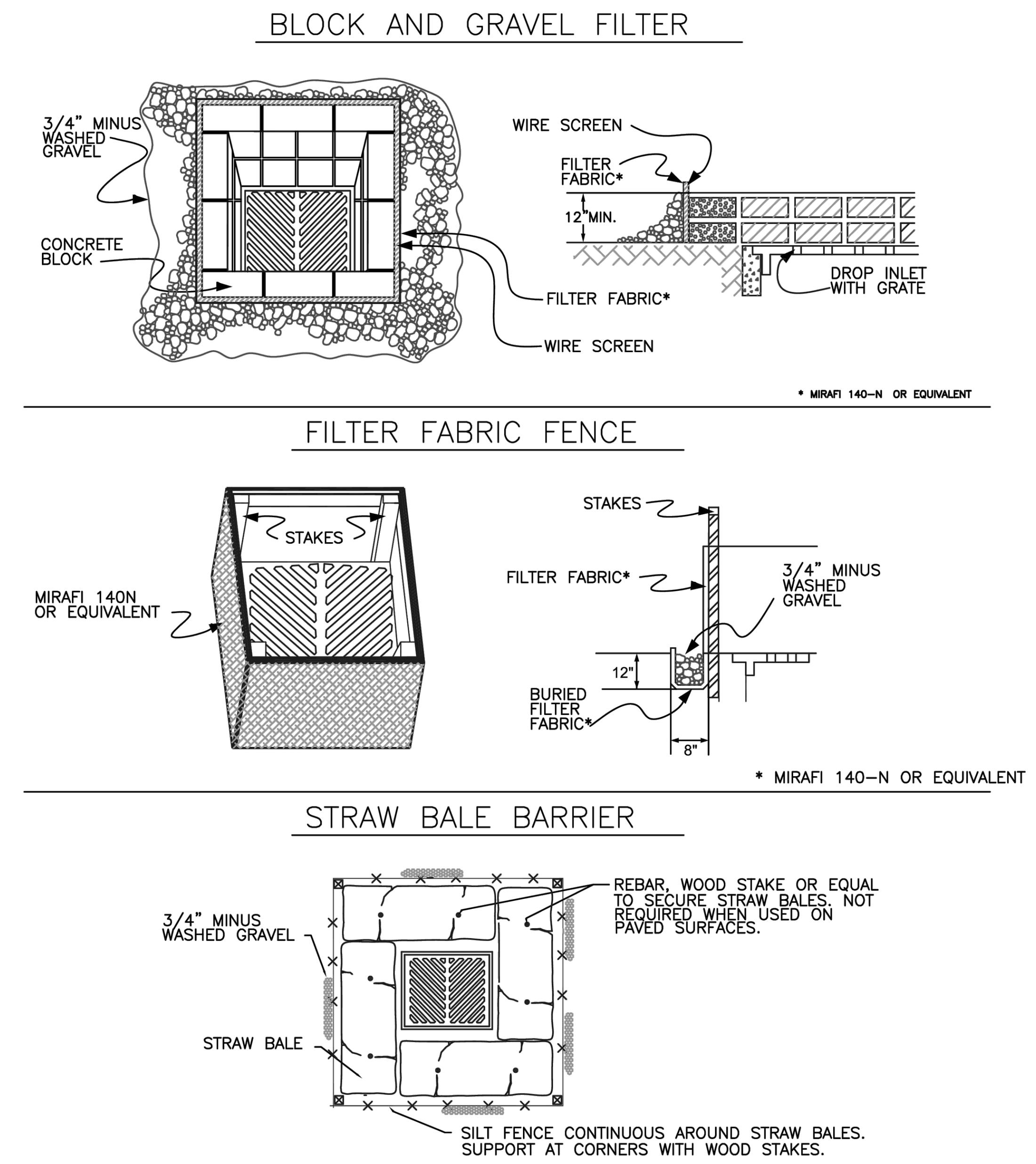
DWG.
9 OF 31



CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

SILTATION FENCE

CITY STANDARD 02.03.02



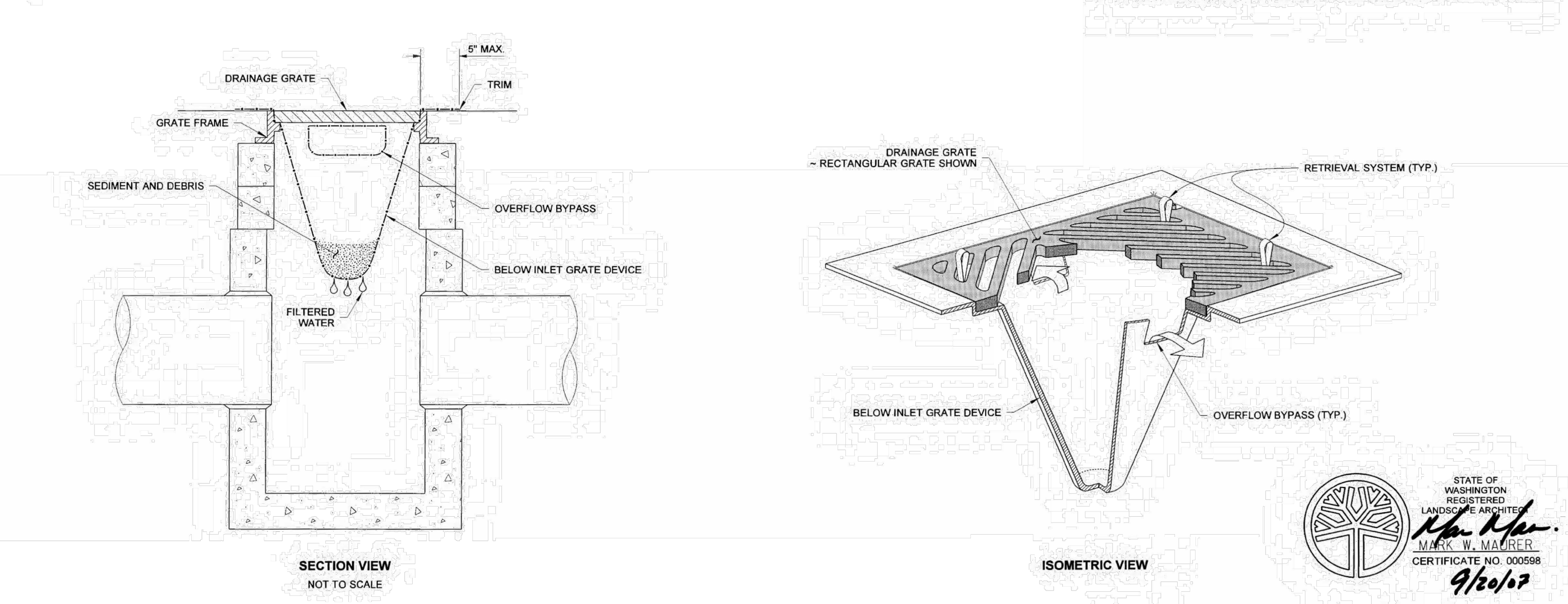
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

STORM DRAIN BARRIERS

CITY STANDARD 02.03.05

NOTES

1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).



STORM DRAIN INLET PROTECTION
STANDARD PLAN I-40.20-00
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Washington State Department of Transportation

CONDITIONS WHERE PRACTICE APPLIES

1. BLOCK AND GRAVEL FILTER – APPLICABLE FOR AREAS GREATER THAN 5% SLOPE.
2. FILTER FABRIC FENCE – APPLICABLE WHERE THE INLET DRAINS A RELATIVELY SMALL (ONE ACRE OR LESS) AND FLAT AREA (LESS THAN 5% SLOPE).
3. STRAW BALE BARRIER – APPLICABLE WHERE INLET DRAINS A RELATIVELY FLAT DISTURBED AREA (LESS THAN 5% SLOPE) IN WHICH SHEET FLOW (NOT EXCEEDING 0.5 FT/SEC.) OCCURES. BARRIERS OF THIS TYPE SHOULD NOT BE PLACED AROUND INLETS RECEIVING CONCENTRATED FLOWS SUCH AS THOSE ALONG MAJOR STREETS AND HIGHWAYS.

1. BLOCK AND GRAVEL FILTER – INSTALLATION PROCEDURE

A: PLACE WIRE MESH OVER THE DROP INLET SO THAT THE WIRE EXTENDS A MINIMUM OF ONE FOOT BEYOND EACH SIDE OF THE INLET STRUCTURE. USE WIRE SCREEN WITH 1/2-INCH OPENINGS. IF MORE THAN ONE STRIP OF MESH IS NECESSARY, OVERLAP THE STRIPS. PLACE FILTER FABRIC* OVER WIRE MESH.

B: PLACE CONCRETE BLOCKS LENGTHWISE ON THEIR SIDES IN A SINGLE ROW AROUND THE PERIMETER OF THE INLET, SO THAT THE OPEN ENDS FACE OUTWARD, NOT UPWARD. THE ENDS OF ADJACENT BLOCKS SHOULD ABUT. THE HIEGHT OF THE BARRIER CAN BE VARIED, DEPENDING ON DESIGN NEEDS, BY STACKING COMBINATIONS OF BLOCKS THAT ARE 4-INCH, 8-INCH AND 12-INCH WIDE. THE ROW OF BLOCKS SHOULD BE AT LEAST 12-INCHES BUT NO GREATER THAN 24-INCHES HIGH.

C: PLACE WIRE SCREEN OVER THE OVERSIDE VERTICAL FACE (OPEN END) OF THE CONCRETE BLOCKS TO PREVENT STONES FROM BEING WASHED THROUGH THE BLOCKS. USE WIRE SCREEN WITH 1/2-INCH OPENINGS.

D: PILE STONES AGAINST THE WIRE MESH TO THE TOP OF THE BLOCKS. USE 3/4" MINUS WASHED GRAVEL.

2. FILTER FABRIC FENCE – INSTALLATION PROCEDURE

A: PLACE 2-INCH BY 2-INCH WOODEN STAKES AROUND THE PERIMETER OF THE INLET A MAXIMUM OF 3 FEET APART AND DRIVE THEM AT LEAST 8-INCHES INTO THE GROUND. THE STAKES MUST BE AT LEAST 3 FEET LONG.

B: EXCAVATE A TRENCH APPROXIMATELY 8-INCHES WIDE AND 12-INCHES DEEP AROUND THE OUTSIDE PERIMETER OF THE STAKES.

C: STAPLE THE FILTER FABRIC* TO THE WOODEN STAKES SO THAT 32-INCHES OF THE FABRIC EXTENDS AND CAN BE FORMED INTO THE TRENCH, AND USE HEAVY-DUTY WIRE STAPLES AT LEAST 1/2-INCHES LONG.

D: BACKFILL THE TRENCH WITH 3/4-INCH MINUS WASHED GRAVEL ALL THE WAY AROUND.

3. STRAW BALE BARRIER – INSTALLATION PROCEDURE

A: EXCAVATE A 4-INCH DEEP TRENCH AROUND THE INLET. MAKE THE TRENCH AS WIDE AS A STRAW BALE.

B: ORIENT STRAW BALES WITH THE BINDINGS AROUND THE SIDES OF THE BALES RATHER THAN OVER AND UNDER THE BALES.

C: PLACE BALES LENGTHWISE AROUND THE INLET AND PRESS THE ENDS OF ADJACENT BALES SECURELY IN PLACE.

D: DRIVE TWO 2-INCH BY 2-INCH STAKES THROUGH EACH BALE TO ANCHOR THE BALE SECURELY IN PLACE.

E: BACKFILL THE EXCAVATED SOIL AND COMPACT IT AGAINST THE BALE.

F: WEDGE LOOSE STRAW BETWEEN BALES TO PREVENT WATER FROM FLOWING BETWEEN BALES.

* MIRAFI 140-N OR EQUIVALENT

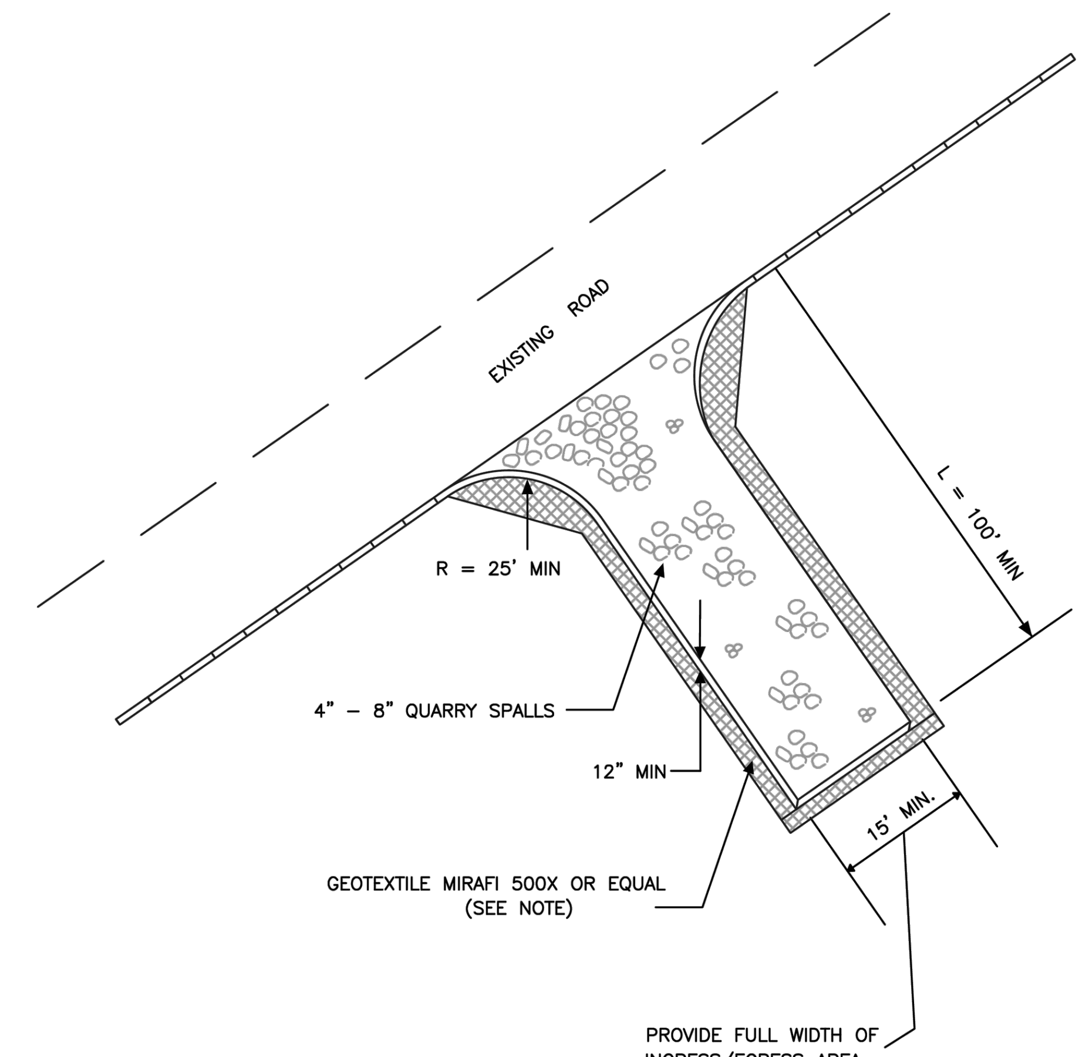
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

STORM DRAIN BARRIERS NOTES

CITY STANDARD 02.03.06

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.



CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

TEMPORARY CONSTRUCTION ENTRANCE

CITY STANDARD 05.01.01

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

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

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

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

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

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

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

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

GRADING, EROSION, AND SEDIMENTATION CONTROL NOTES

CITY STANDARD 05.02.01

APPROVED

BY ______________________
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE ______________________

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Sumner, WA 98390

Architect:
Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:
JMJ TEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:
320 Todd Road Development

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY

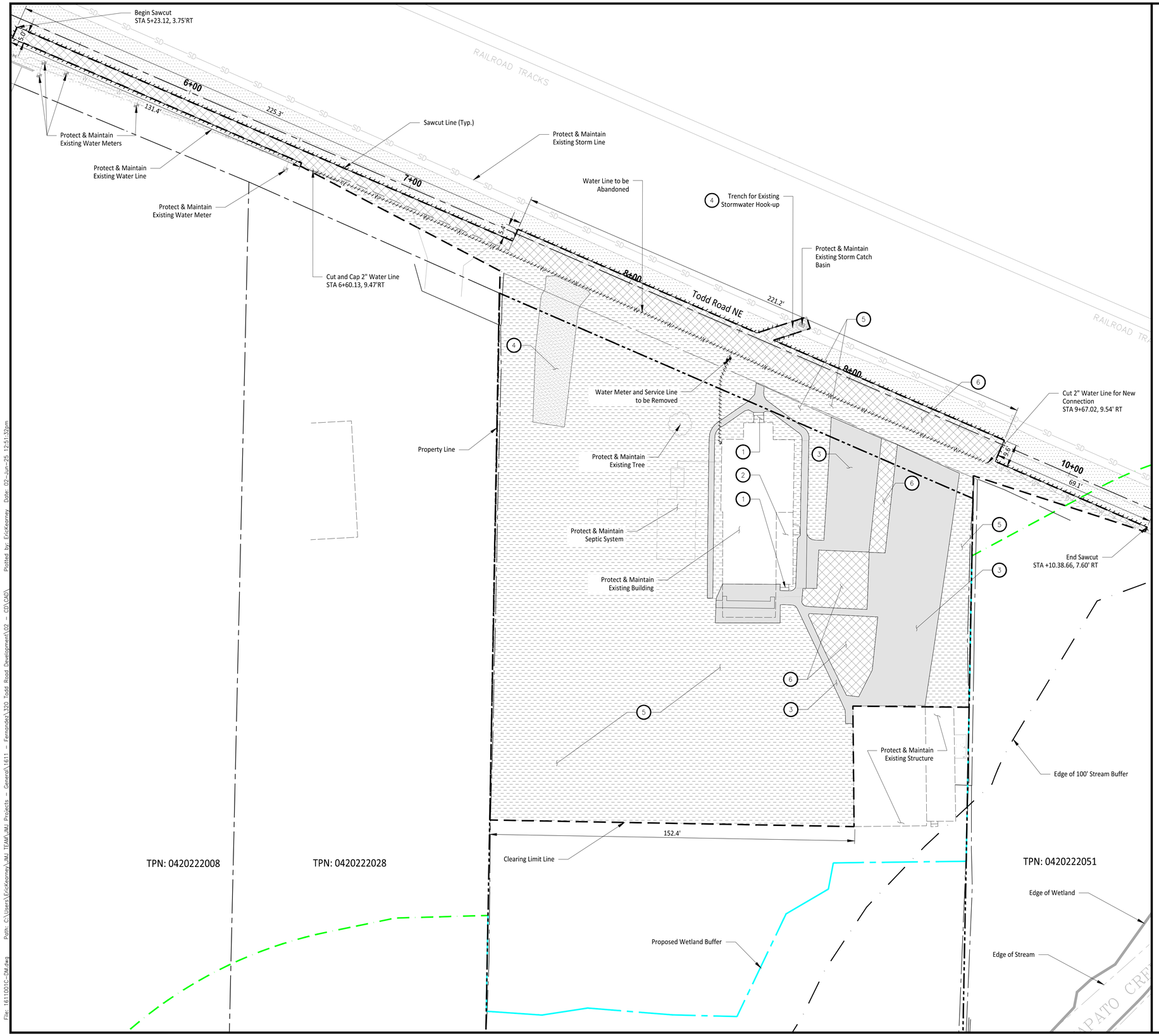
Civil Construction Permit

JUSTIN M. JONES, STATE OF WASHINGTON, 41829, REGISTERED PROFESSIONAL ENGINEER
06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:
TESC Details

PROJ NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones
SHEET NUMBER: C2-201
DWG. 10 OF 31



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LEGEND

- Property Line
- Sawcut Line
- Water Line to be Abandoned/ Remove as noted
- Clearing Limit Line
- Existing Water Line
- Existing Storm Line
- Existing Concrete to be Removed
- Existing Gravel to be Removed
- Existing Grass to be Removed
- Existing Asphalt to be Removed

GENERAL NOTES

1. Contractor to excavate organic material from the site and dispose of at a legal off-site disposal site.

DEMOLITION NOTES

1. Remove Existing Stairs
2. Remove Existing Deck Structure
3. Remove Existing Concrete
4. Remove Existing Gravel
5. Remove Existing Grass
6. Remove Existing Asphalt

DEMO QUANTITY

On-Site

Existing Concrete Areas to be Removed:	5,262 SF
Existing Grass Areas to be Removed:	25,613 SF
Existing Asphalt Areas to be Removed:	1,498 SF
Existing Gravel Area to be Removed:	801 SF
Total Disturbed Area:	33,174 SF

Off-Site

Existing Asphalt Areas to be Removed:	4,072 SF
Existing Grass Areas to be Removed:	3,150 SF
Existing Gravel Area to be Removed:	318 SF
Existing Concrete Area to be Removed:	457 SF
Total Disturbed Area:	7,997 SF

0 20 40 Feet
1" = 20'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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Justin Jones, PE
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Sumner, WA 98390
(206) 596-2020

Project:
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Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

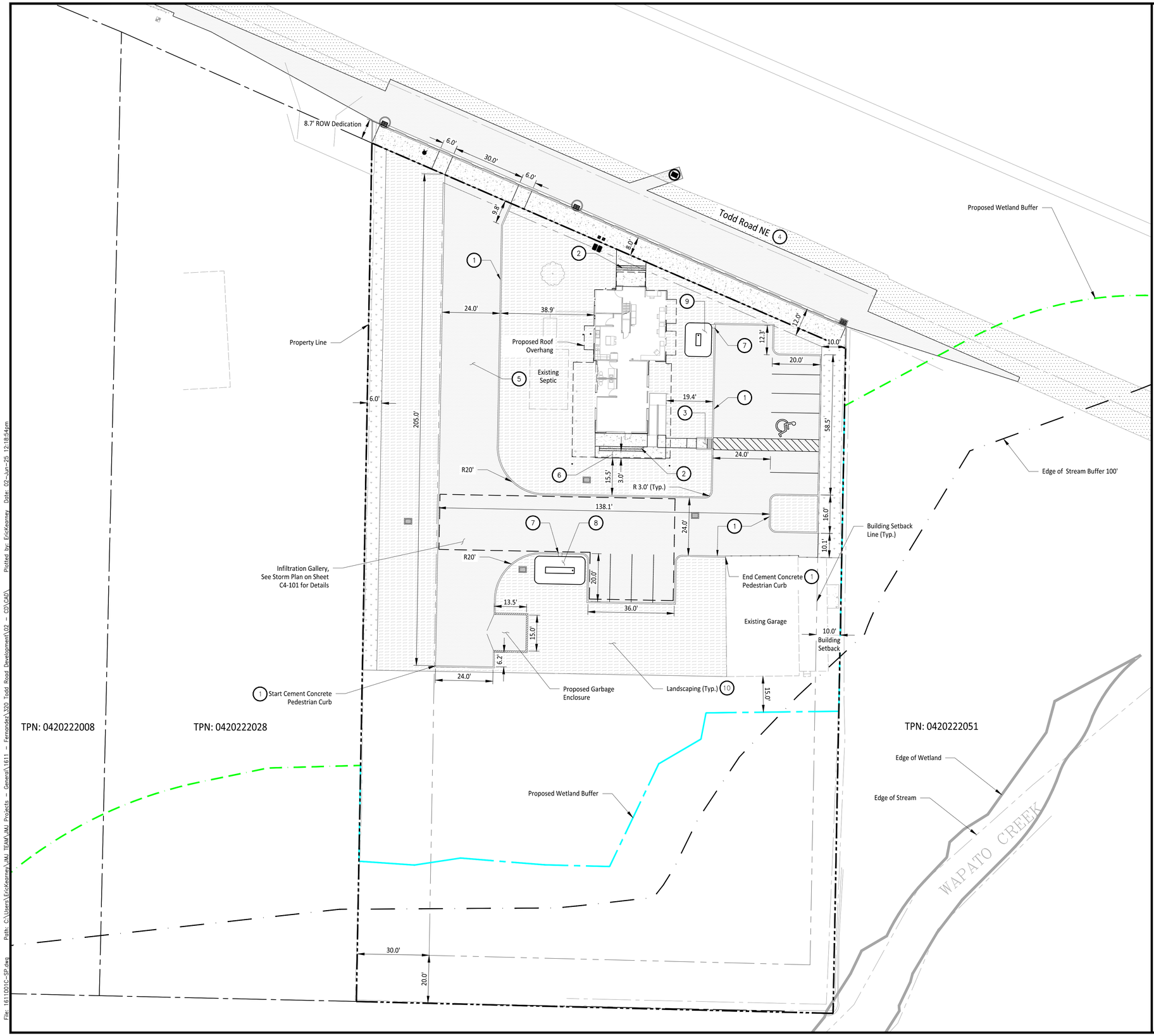
REV	DATE	DESCRIPTION

SHEET TITLE:
Demolition Plan

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:
C2-301

DWG.
11 OF 31



Existing Site Plan

LEGEND

- Property Line
- ROW Dedication
- Proposed Concrete
- Proposed Asphalt
- Proposed Gravel
- Proposed Landscaping
- Proposed Landscape Buffer

CONSTRUCTION NOTES

1. Install Cement Concrete Pedestrian Curb per WSDOT Std. Plan F-10.12-04 on Sheet C3-201.
2. Install Concrete Stairs per Architectural Plans.
3. Install Perpendicular Curb ramp per Detail D and WSDOT Std. Plan F-40. 15-04 on Sheet C3-202.
4. For Frontage Improvements, See Sheets C7-101.
5. Install Asphalt Pavement per Detail A on Sheet C3-201.
6. Install Concrete Sidewalk per Detail B on Sheet C3-201.
7. Install Pedestrian Curb Cut and Gravel Channel per Detail C on Sheet C3-201.
8. Install Biorention Cell A with Underdrain per Detail A on Sheet C4-201.
9. Install Biorententionn Cell B with Underdrain per Detail B on Sheet C4-201.
10. Amend all disturbed soil per City of Puyallup Standard Detail 01.02.08a on Sheet C3-201.

GENERAL NOTES

- Total Gross Floor Area = 3,060 SF
- Land Use: Non Medical, Clinical, or Dental Professional and Business Office
  - (1) Parking Space for each 300 SF of Gross Floor Area
  - 3,060 SF/(200 SF/Parking Space) = 10 Stalls
- Compact Parking Stalls:
  - (10 Stalls)*(0.3) = 3 Stalls
- Total Parking Count:
  - Standard = 6
  - Compact = 3
  - ADA Van = 1

0 20 40 Feet
1" = 20'

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APPROVED

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CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

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JUSTIN M. JONES — STATE OF WASHINGTON — 41829 — REGISTERED PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Proposed Site Plan

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

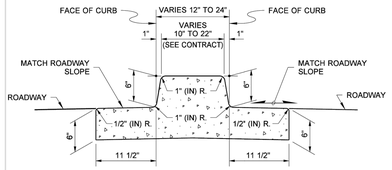
SHEET NUMBER:

C3-101

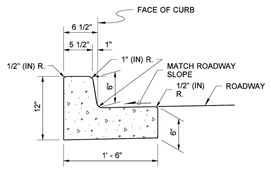
DWG.

12 OF 31

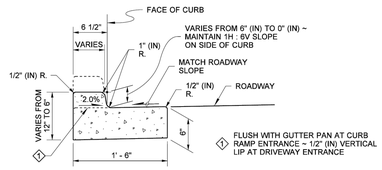
File: 1611001C-SP.dwg Path: C:\Users\EricKearney\JMJ TEAM\JMJ Projects - General\1611 - Fernandez\320 Todd Road Development\02 - CD\CAD\ Date: 02-Jun-25 12:18:54pm Plotted by: EricKearney



DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER

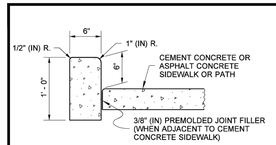


CEMENT CONCRETE TRAFFIC CURB AND GUTTER

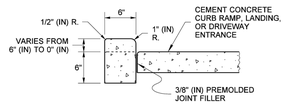


DEPRESSED CURB AND GUTTER SECTION

AT CURB RAMPS AND DRIVEWAY ENTRANCES



CEMENT CONCRETE PEDESTRIAN CURB

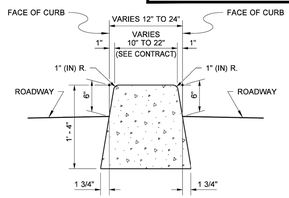


CEMENT CONCRETE PEDESTRIAN CURB

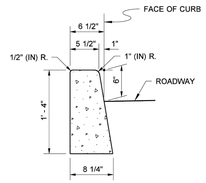
AT CURB RAMPS, LANDINGS, AND DRIVEWAY ENTRANCES

NOTE

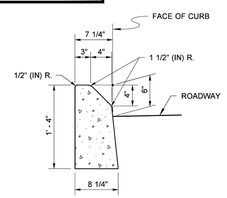
1. See **Standard Plan F-30.10** for Curb Expansion and Contraction Joint spacing. See **Standard Specification, Sections 8-04 and 9-04** for additional requirements.



DUAL-FACED CEMENT CONCRETE TRAFFIC CURB



CEMENT CONCRETE TRAFFIC CURB



MOUNTABLE CEMENT CONCRETE TRAFFIC CURB

MICHAEL S FLEMING
STATE OF WASHINGTON
38777
REGISTERED PROFESSIONAL ENGINEER

Michael S Fleming
Digitally signed by Michael S Fleming
Date: 2020.09.24 07:39:38 -07'00'

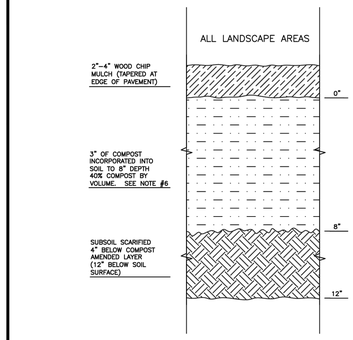
CEMENT CONCRETE CURBS

STANDARD PLAN F-10.12-04

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Date: 2020.09.24 07:57:43 -07'00'
STATE DESIGN ENGINEER
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



NOTES:

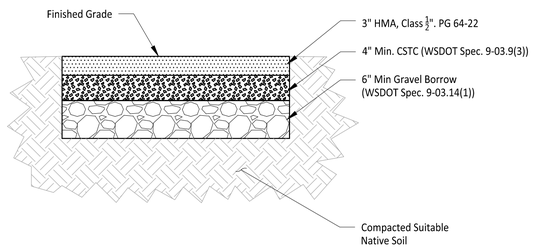
1. ALL SOIL AREAS DISTURBED OR COMPACTED DURING CONSTRUCTION, AND NOT COVERED BY BUILDINGS OR PAVEMENT, SHALL BE AMENDED WITH COMPOST AS DESCRIBED BELOW.
2. SUBSOIL SHOULD BE SCARIFIED (LOOSENED) 4 INCHES BELOW AMENDED LAYER, TO PRODUCE 12–INCH DEPTH OF UN–COMPACTED SOIL, EXCEPT WHERE SCARIFICATION WOULD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

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

SOIL AMENDMENT AND DEPTH

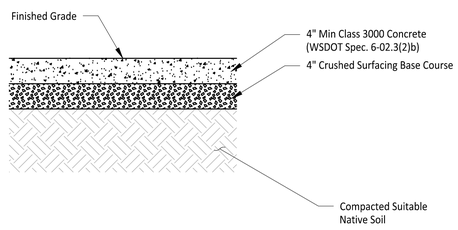
DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
LINDA LAN	CHRIS BEALE	COLLEEN HARRIS	XXXX	
FILE NAME: P:\DWG\COMMON\STDS\CITYSTDS\STR\01.02.08		DATE APPROVED: 08/01/2015	DATE REVISED: XX/XX/XX	SCALE: 1:1

01.02.08a



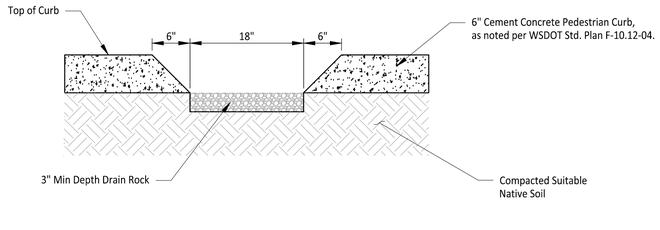
ASPHALT PAVEMENT DETAIL A

1" = 1'



CONCRETE SIDEWALK DETAIL B

1" = 1'



PEDESTRIAN CURB CUT DETAIL C

1" = 1'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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1–800–424–5555
UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:

EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:

Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:

JUTEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:

320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Hardscape Details

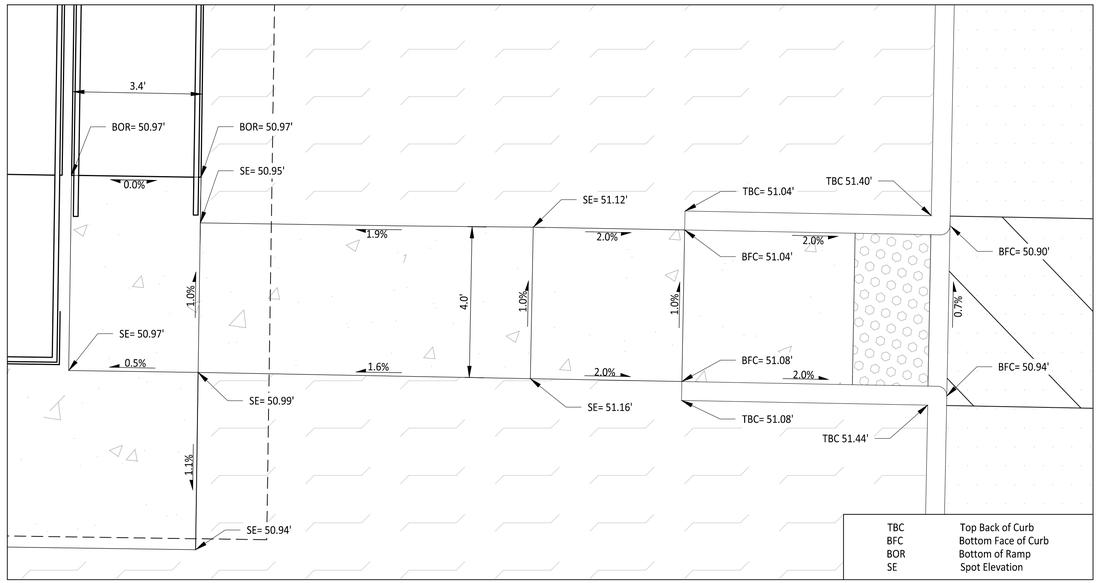
PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:

C3-201

DWG.

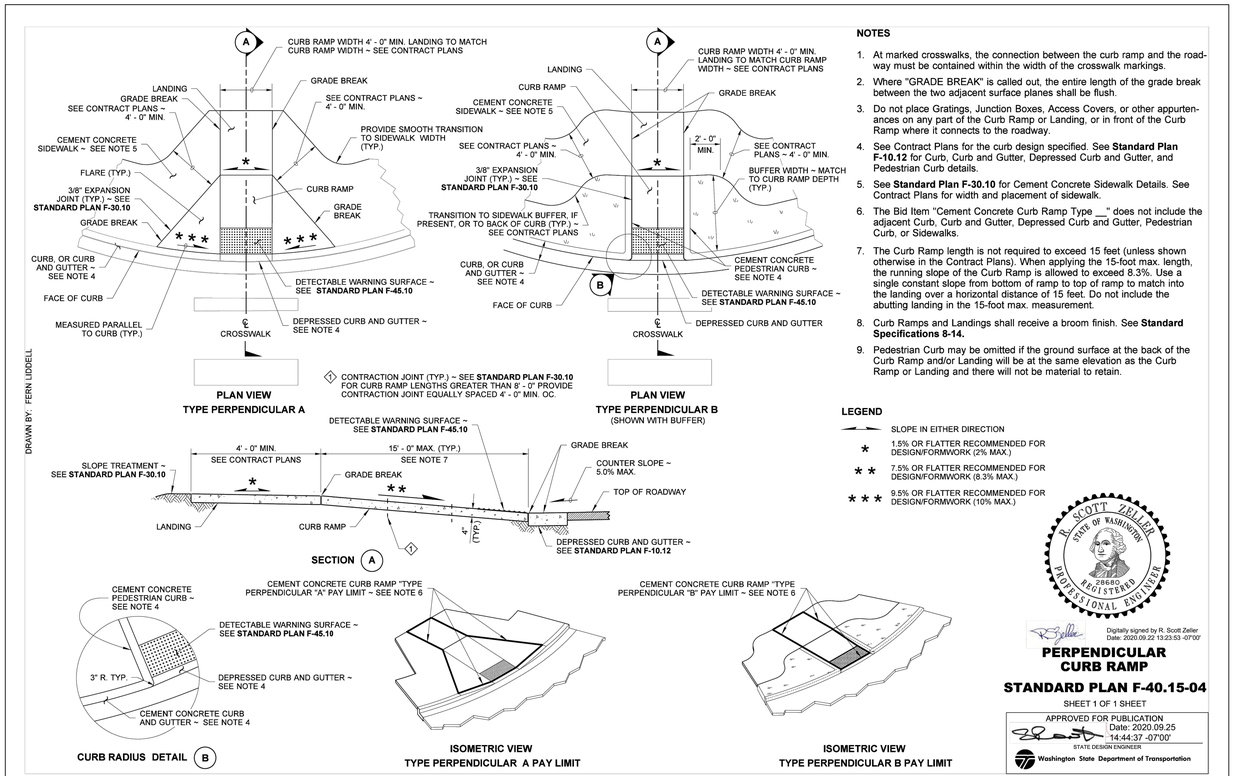
13 OF 31



PERPENDICULAR CURB RAMP

DETAIL D

1" = 2'



NOTES

1. At marked crosswalks, the connection between the curb ramp and the roadway must be contained within the width of the crosswalk markings.
2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing, or in front of the Curb Ramp where it connects to the roadway.
4. See Contract Plans for the curb design specified. See **Standard Plan F-10.12** for Curb, Curb and Gutter, Depressed Curb and Gutter, and Pedestrian Curb details.
5. See **Standard Plan F-30.10** for Cement Concrete Sidewalk Details. See Contract Plans for width and placement of sidewalk.
6. The Bid Item "Cement Concrete Curb Ramp Type __" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
7. The Curb Ramp length is not required to exceed 15 feet (unless shown otherwise in the Contract Plans). When applying the 15-foot max. length, the running slope of the Curb Ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the landing over a horizontal distance of 15 feet. Do not include the abutting landing in the 15-foot max. measurement.
8. Curb Ramps and Landings shall receive a broom finish. See **Standard Specifications 8-14.**
9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.

LEGEND

- SLOPE IN EITHER DIRECTION
- * 1.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)
- ** 7.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (8.3% MAX.)
- *** 9.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (10% MAX.)

DRAWN BY: FERN LIDDELL

R. SCOTT ZELLER — STATE OF WASHINGTON — 28680 — REGISTERED PROFESSIONAL ENGINEER

Digitally signed by R. Scott Zeller
Date: 2020.09.22 13:23:53 -07'00'

PERPENDICULAR CURB RAMP

STANDARD PLAN F-40.15-04

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Date: 2020.09.25 14:44:37 -07'00'
STATE DESIGN ENGINEER
Washington State Department of Transportation

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:

JMJTEAM

Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:

320 Todd Road Development

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Civil Construction Permit

JUSTIN M. JONES — STATE OF WASHINGTON — 41829 — REGISTERED PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Hardscape Details

PROJ. NO: 1611-001

DATE: June 02, 2025

DRAWN BY: E. Kearney

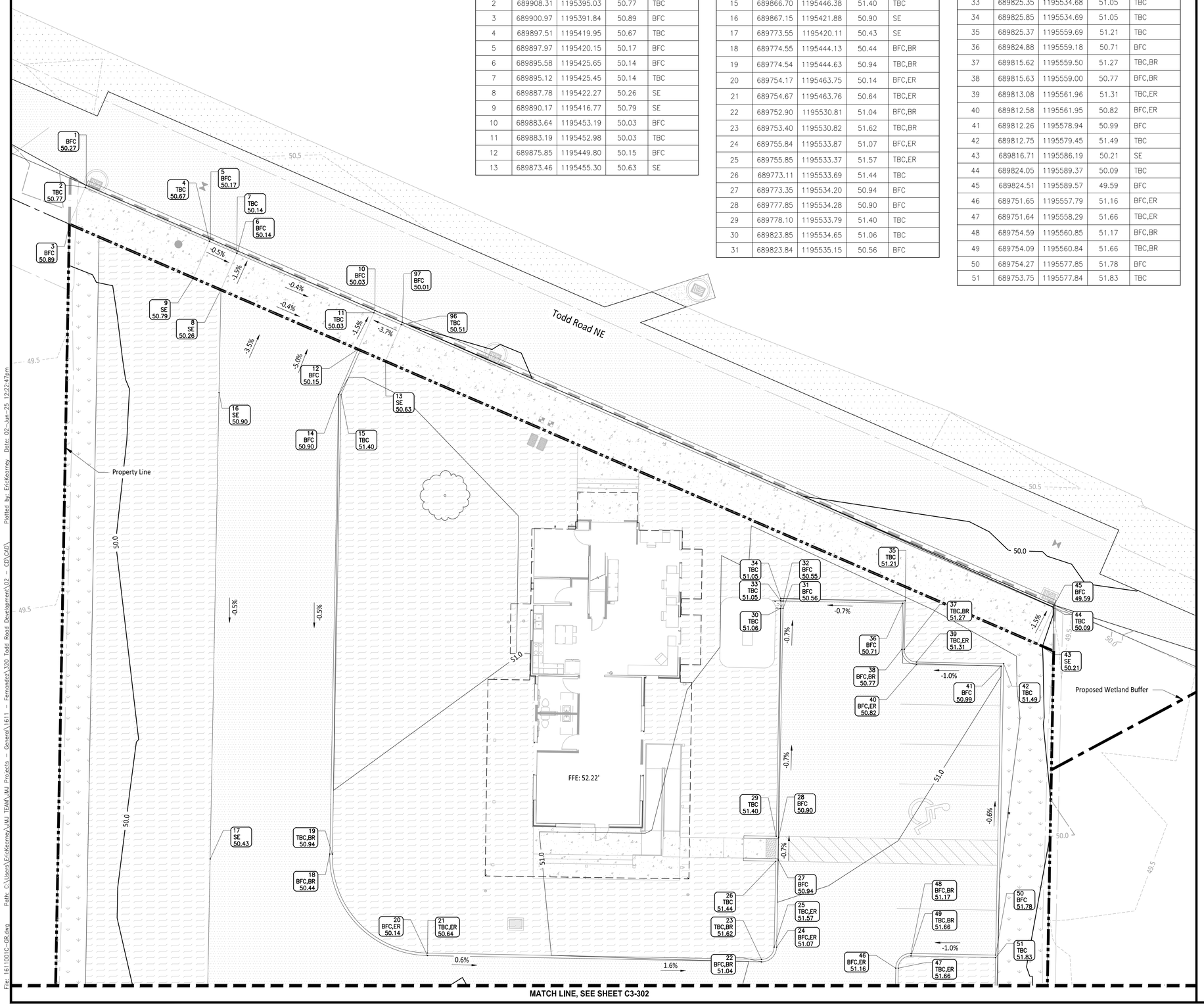
DESIGN BY: J. Jones

SHEET NUMBER:

C3-202

DWG.

14 OF 31



POINT TABLE

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	689908.77	1195395.22	50.27	BFC
2	689908.31	1195395.03	50.77	TBC
3	689900.97	1195391.84	50.89	BFC
4	689897.51	1195419.95	50.67	TBC
5	689897.97	1195420.15	50.17	BFC
6	689895.58	1195425.65	50.14	BFC
7	689895.12	1195425.45	50.14	TBC
8	689887.78	1195422.27	50.26	SE
9	689890.17	1195416.77	50.79	SE
10	689883.64	1195453.19	50.03	BFC
11	689883.19	1195452.98	50.03	TBC
12	689875.85	1195449.80	50.15	BFC
13	689873.46	1195455.30	50.63	SE

POINT TABLE

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
14	689866.81	1195445.88	50.90	BFC
15	689866.70	1195446.38	51.40	TBC
16	689867.15	1195421.88	50.90	SE
17	689773.55	1195420.11	50.43	SE
18	689774.55	1195444.13	50.44	BFC,BR
19	689774.54	1195444.63	50.94	TBC,BR
20	689754.17	1195463.75	50.14	BFC,ER
21	689754.67	1195463.76	50.64	TBC,ER
22	689752.90	1195530.81	51.04	BFC,BR
23	689753.40	1195530.82	51.62	TBC,BR
24	689755.84	1195533.87	51.07	BFC,ER
25	689755.85	1195533.37	51.57	TBC,ER
26	689773.11	1195533.69	51.44	TBC
27	689773.35	1195534.20	50.94	BFC
28	689777.85	1195534.28	50.90	BFC
29	689778.10	1195533.79	51.40	TBC
30	689823.85	1195534.65	51.06	TBC
31	689823.84	1195535.15	50.56	BFC

POINT TABLE

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
32	689825.34	1195535.18	50.55	BFC
33	689825.35	1195534.68	51.05	TBC
34	689825.85	1195534.69	51.05	TBC
35	689825.37	1195559.69	51.21	TBC
36	689824.88	1195559.18	50.71	BFC
37	689815.62	1195559.50	51.27	TBC,BR
38	689815.63	1195559.00	50.77	BFC,BR
39	689813.08	1195561.96	51.31	TBC,ER
40	689812.58	1195561.95	50.82	BFC,ER
41	689812.26	1195578.94	50.99	BFC
42	689812.75	1195579.45	51.49	TBC
43	689816.71	1195586.19	50.21	SE
44	689824.05	1195589.37	50.09	TBC
45	689824.51	1195589.57	49.59	BFC
46	689751.65	1195557.79	51.16	BFC,ER
47	689751.64	1195558.29	51.66	TBC,ER
48	689754.59	1195560.85	51.17	BFC,BR
49	689754.09	1195560.84	51.66	TBC,BR
50	689754.27	1195577.85	51.78	BFC
51	689753.75	1195577.84	51.83	TBC

LEGEND

BFC	Bottom Face of Curb
TBC	Top Back of Curb
BR	Beginning of Radius
ER	End of Radius
SE	Spot Elevation

0 10 20 Feet
1" = 10'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
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PO Box 309
Sumner, WA 98390

Architect:

Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:

JUTEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:

320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Grading Plan

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

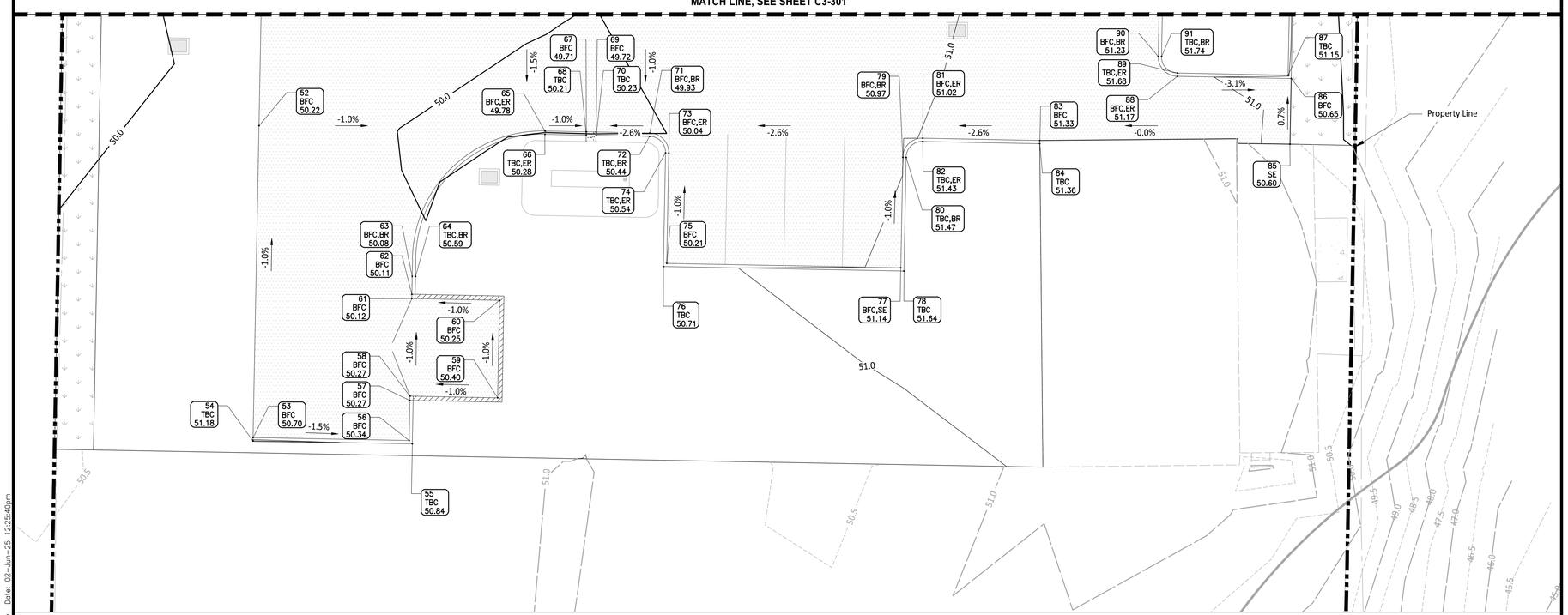
SHEET NUMBER:

C3-301

DWG:

15 OF 31

File: 1611001C-GR.dwg Path: C:\Users\EricKearney\JMJ TEAM\JMJ Projects - General\1611 - Fernandez\320 Todd Road Development\02 - CIV\CAD\ Plotted by: EricKearney Date: 02-Jun-25 12:22:47pm



POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
52	689731.00	1195419.30	50.22	BFC
53	689683.02	1195418.40	50.70	BFC
54	689682.52	1195418.39	51.18	TBC
55	689682.05	1195442.88	50.84	TBC
56	689682.56	1195442.39	50.34	BFC
57	689688.73	1195442.51	50.27	BFC
58	689689.39	1195442.52	50.27	BFC
59	689689.14	1195456.02	50.40	BFC
60	689704.14	1195456.30	50.25	BFC
61	689704.39	1195442.80	50.12	BFC
62	689705.06	1195442.82	50.11	BFC
63	689707.81	1195442.87	50.08	BFC,BR
64	689707.80	1195443.37	50.59	TBC,BR
65	689730.18	1195463.30	49.78	BFC,ER
66	689729.68	1195463.29	50.28	TBC,ER
67	689730.06	1195469.64	49.71	BFC
68	689729.56	1195469.63	50.21	TBC
69	689730.03	1195471.14	49.72	BFC
70	689729.50	1195471.16	50.23	TBC
71	689729.87	1195479.39	49.93	BFC,BR
72	689729.37	1195479.38	50.44	TBC,BR
73	689726.81	1195482.33	50.04	BFC,ER
74	689726.82	1195481.83	50.54	TBC,ER
75	689709.82	1195482.01	50.21	BFC

POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
76	689709.33	1195481.50	50.71	TBC
77	689709.14	1195518.00	51.14	BFC,SE
78	689708.63	1195518.49	51.64	TBC
79	689726.13	1195518.32	50.97	BFC,BR
80	689726.12	1195518.82	51.47	TBC,BR
81	689729.08	1195521.38	51.02	BFC,ER
82	689728.58	1195521.37	51.43	TBC,ER
83	689728.74	1195539.38	51.33	BFC
84	689728.24	1195539.37	51.36	TBC
85	689728.16	1195577.85	50.60	SE
86	689738.26	1195578.04	50.65	BFC
87	689738.77	1195577.55	51.15	TBC
88	689738.59	1195560.55	51.17	BFC,ER
89	689739.09	1195560.55	51.68	TBC,ER
90	689741.65	1195557.60	51.23	BFC,BR
91	689741.64	1195558.10	51.74	TBC,BR
96	689880.80	1195458.48	50.51	TBC
97	689881.26	1195458.68	50.01	BFC

LEGEND

BFC	Bottom Face of Curb
TBC	Top Back of Curb
BR	Beginning of Radius
ER	End of Radius
SE	Spot Elevation

0 10 20 Feet
1" = 10'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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(206) 596-2020

Project:
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Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

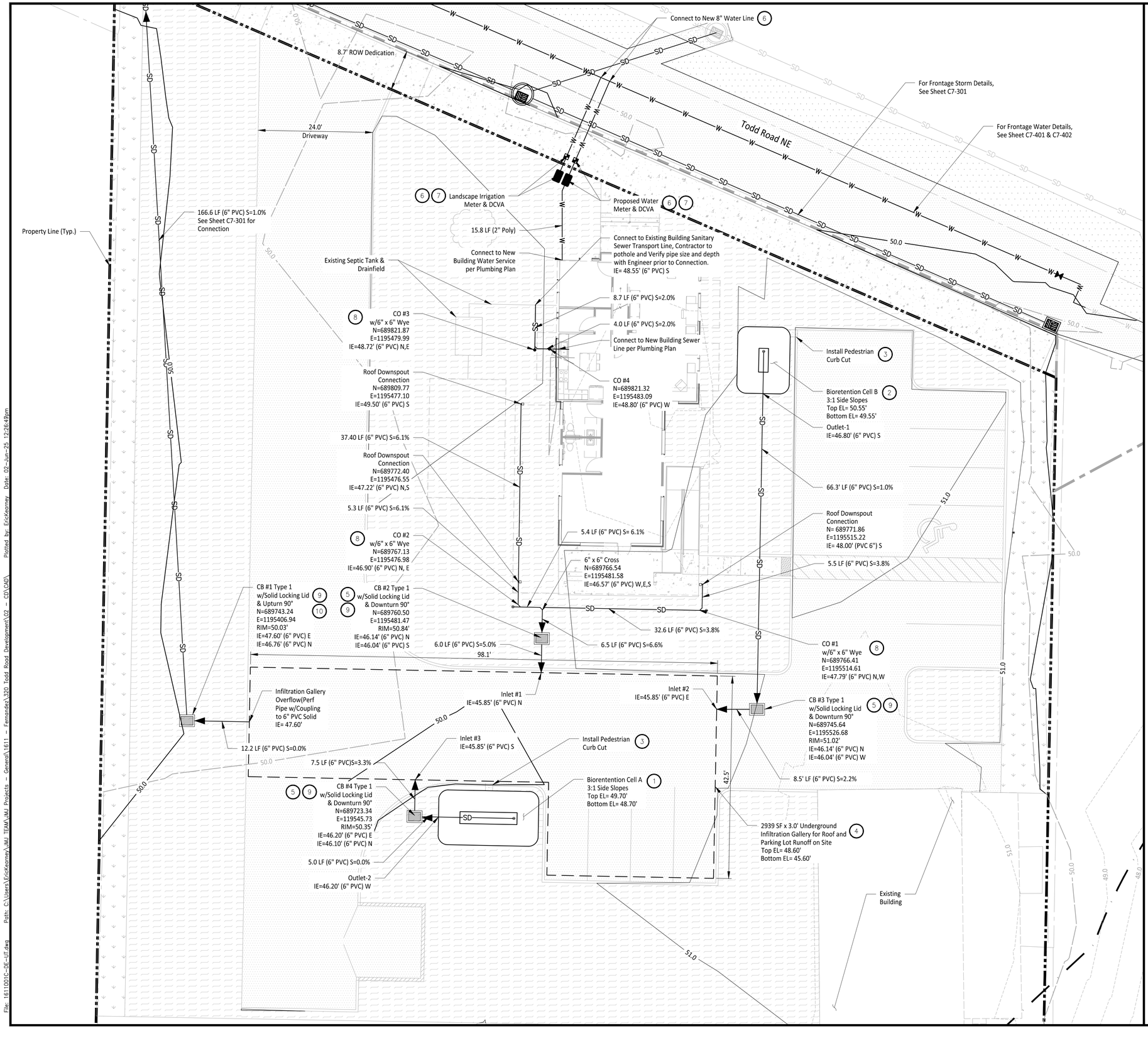
SHEET TITLE:
Grading Plan

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:
C3-302

DWG:
16 OF 31

File: 1611001C-GR.dwg Path: C:\Users\EricKearney\JMJ TEAM\JMJ Projects - General\1611 - Fernandez\320 Todd Road Development\02 - CIV\CAD\ Plotted by: EricKearney Date: 02-Jun-25 12:25:40pm



LEGEND

- Cleanout
- Water Meter
- DCVA
- Storm Catch Basin Type 1, Open Grate
- Storm Catch Basin Type 1, Solid Lid
- Property Line
- ROW Dedication Line
- SD — Storm Line
- SS — Sewer Line
- W — W — Water Line

CONSTRUCTION NOTES

1. Install Biorention Cell A with Underdrain per Detail A on Sheet C4-201.
2. Install Biorention Cell B with Underdrain per Detail B on Sheet C4-201.
3. Install Pedestrian Curb Cut per Detail C on Sheet C3-201.
4. Install Infiltration Gallery per Detail C on Sheet C4-202.
5. Install Downturn 90° Catch Basin per Detail E on Sheet C4-203.
6. Install 2" Water Service Connection per City of Puyallup Standard Detail 03.03.02 on Sheet C5-101.
7. Install 2" DCVA per City of Puyallup Standard Detail 03.04.01 on Sheet C5-101.
8. Install Clean out per City of Puyallup Standard Detail 02.01.09 on Sheet C4-202.
9. Install Catch Basin Type 1 per City of Puyallup Standard Detail 02.01.02 on Sheet C4-202.
10. Install Upturn 90° Catch Basin per Detail F on Sheet C4-203.

GENERAL NOTES

1. Storm Pipes shall be SDR 35 PVC.
2. Storm Line shall maintain 3-foot minimum coverage from Finished Grade.
3. Sewer Pipe shall be SDR 35 PVC.
4. Sewer Line shall maintain 3-foot minimum coverage from Finished Grade.
5. All POLY pipes shall be High Density Poly (iron pipe size) meeting ASTM D2239-SIDR 7, blue in color, 200 PSI minimum.
6. All POLY pipes shall maintain 3-foot minimum cover from Finished Grade.

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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0 10 20 Feet
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STATE OF WASHINGTON
41829
REGISTERED PROFESSIONAL ENGINEER
06-02-25

REV	DATE	DESCRIPTION

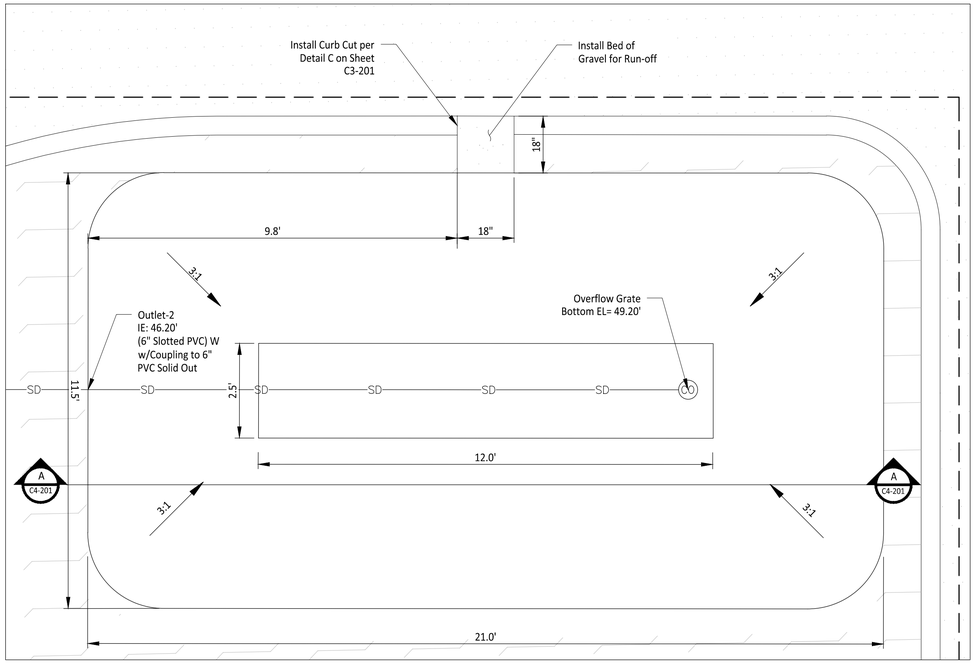
SHEET TITLE:
Composite Utility Plan

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:
C4-101

DWG.
17 OF 31

File: 1611001C-DE-Utl.dwg Path: C:\Users\EricKearney\JMJ TEAM\JMJ Projects - General\1611 - Fernandez\320 Todd Road Development\02 - CD\CAD\ Plotted by: EricKearney Date: 02-Jun-25 12:26:43pm



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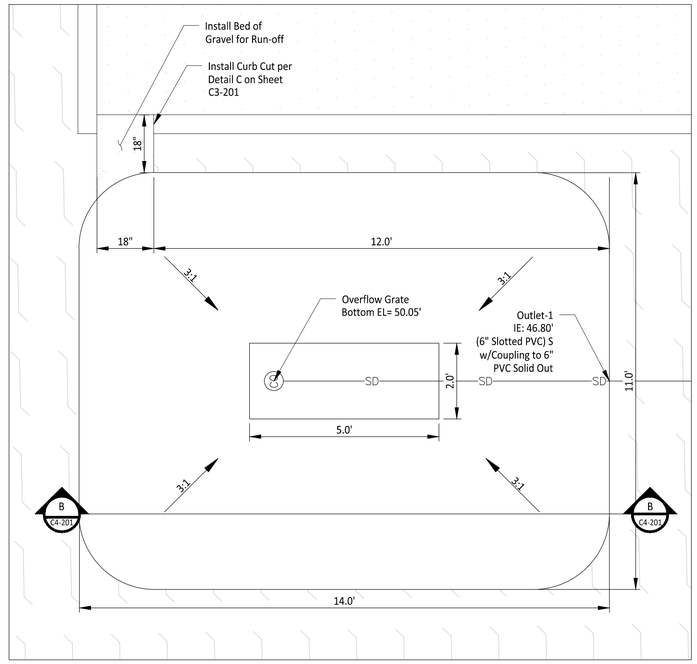

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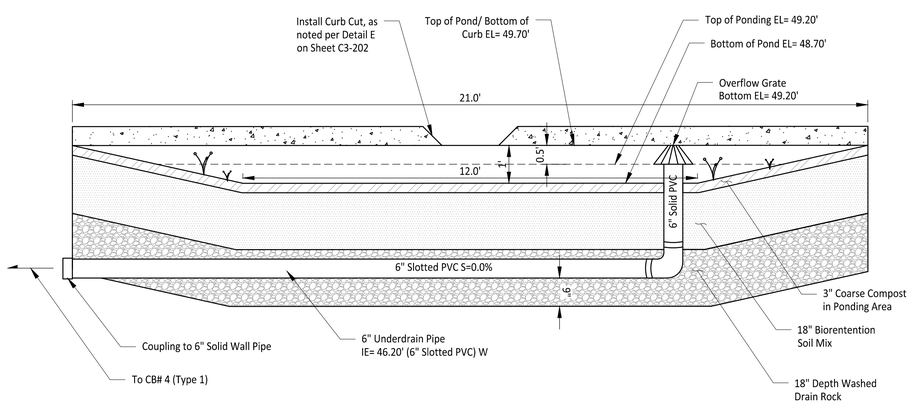
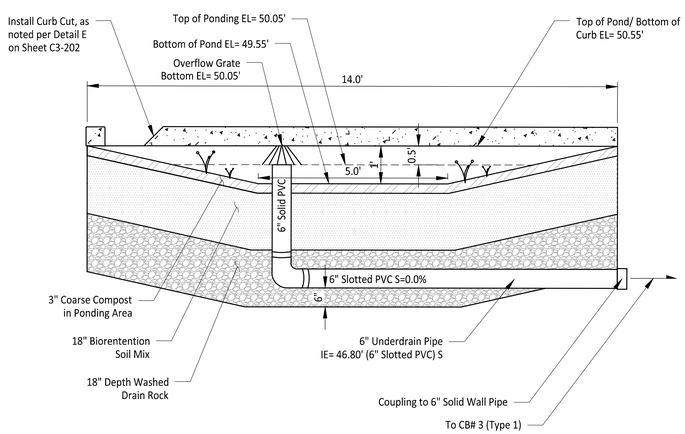


BIORETENTION SWALE A DETAIL A

1" = 2'



BIORETENTION SWALE B DETAIL B

1" = 2'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
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UTILITIES UNDERGROUND LOCATION CENTER

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PO Box 309
Sumner, WA 98390

Architect:

Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:

Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:

320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES — STATE OF WASHINGTON — 41829 — REGISTERED PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Storm Details

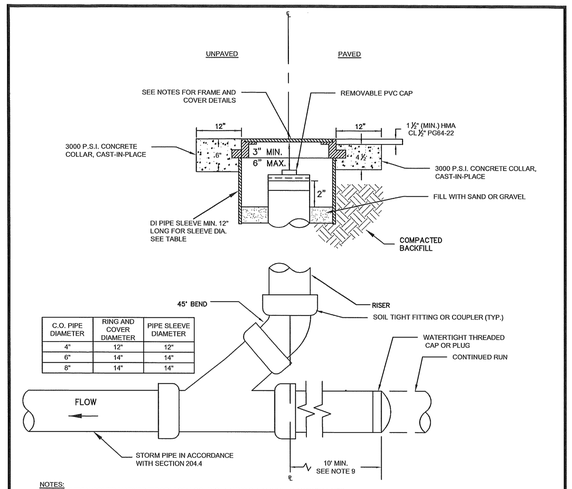
PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:

C4-201

DWG.

18 OF 31



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 ½"-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.

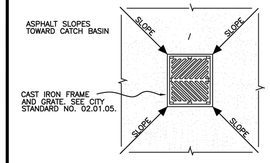
CITY OF PUYALLUP
PUBLIC WORKS AND DEVELOPMENT ENGINEERING

APPROVED FOR PUBLICATION — DATE SIGNED: 7/25/23

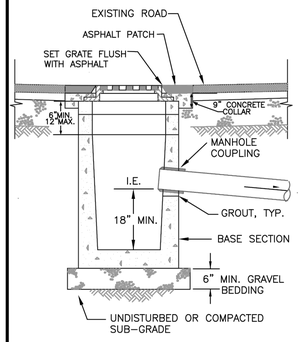
STORM DRAIN CLEANOUT

SCALE:	DATE REVISED:	CITY STANDARD
NTS	01/06/2023	02.01.09

FILE NAME: Y:\Sheet\Drawings\City Standards\201802 - PART 2 - STANDARD DETAILS\CAD\200902.01.09



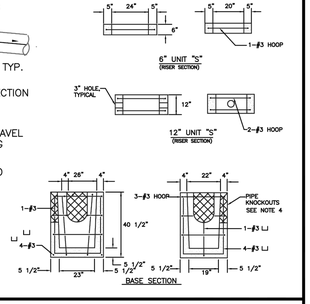
PLAN VIEW



SECTION VIEW

NOTES:

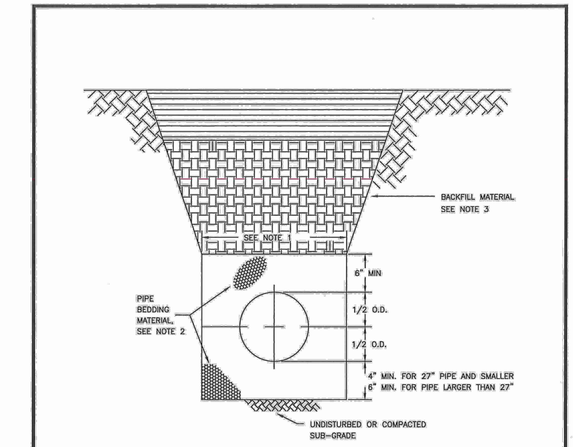
1. MAXIMUM LENGTH OF PIPE BETWEEN CATCH BASINS SHALL BE 400'.
2. TYPE I CATCH BASIN IS USED FOR DEPTHS LESS THAN 5'-0" FROM TOP OF GRATE TO I.E.(PIPE INVERT).
3. PRECAST BASE SECTION SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. KNOCKOUTS SHALL BE ON 4 SIDES WITH A MAXIMUM DIAMETER OF 20" TO PROVIDE FOR A MINIMUM SUMP DEPTH OF 18".
4. THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION SHALL NOT EXCEEED 1/2" PER FOOT.
5. CATCH BASIN SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C 478 (AASHTO M 199) AND ASTM C 890 UNLESS OTHERWISE NOTED.
6. CATCH BASIN MARKER WILL BE AFFIXED WITH MANUFACTURER'S EPOXY IN DRY WEATHER, 40 DEGREES OR WARMER. IF CURB EXISTS MARKER IS PLACED ON TOP OF CURB, IF A RAISED EDGE PLACE MARKER ON THE WEDGE, IF NO CURB PLACE ON PAVEMENT ON SIDE LEAST EXPOSED TO TRAFFIC



CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

CATCH BASIN TYPE 1 (AREA DRAIN)

DRAWN BY: LINDA LANSING	CHECKED BY: LINDA LIAN	APPROVED BY: COLLEEN HARRIS	REVISED BY: XXXX	CITY STANDARD
FILE NAME: F:\DWG\COMMON\STDS\CITY\200902_SDS02.01.02		DATE APPROVED: 09/01/1992	DATE REVISED: 06/01/2003	SCALE: NTS 02.01.02



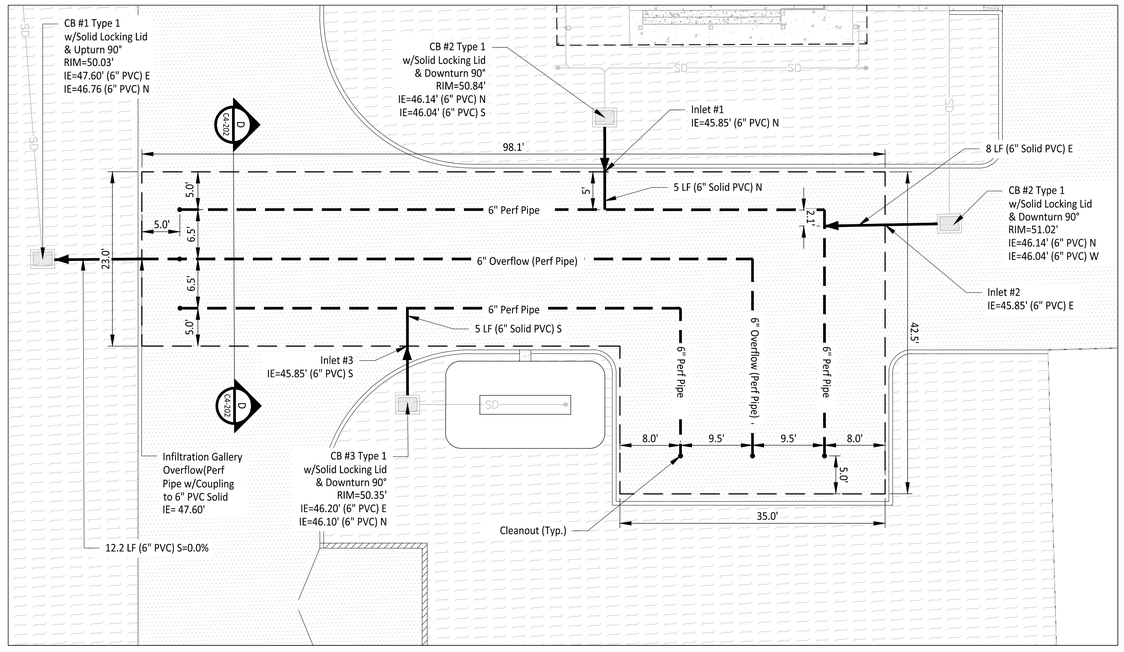
1. TRENCHING SHALL MEET THE REQUIREMENTS OF SECTION 7-08.3(1)A AND 2-06.3(1) OF THE WSDOT SPECIFICATIONS.
2. BEDDING MATERIAL SHALL CONFORM TO 9-03.12(3) GRAVEL BACKFILL FOR PIPE ZONE BEDDING.
3. GRAVEL BACKFILL SHALL CONFORM TO 9-03.12(1)A GRAVEL BACKFILL FOR FOUNDATIONS, CLASS A.

CITY OF PUYALLUP
OFFICE of THE CITY ENGINEER

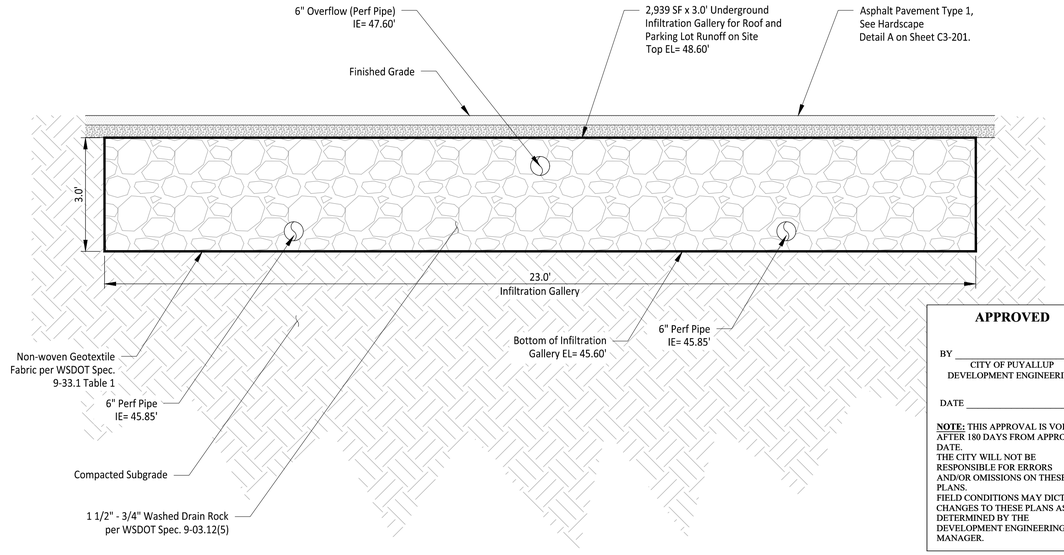
PIPE TRENCHING BEDDING AND BACKFILL

DRAWN BY: HALEWIDSAVOBODA	CHECKED BY: TED HILL	APPROVED BY: MARK PALMER	REVISED BY: V STOCKMAN	DATE REVISED: 08/29/13 03/15/17 XX/XX/XX XX/XX/XX	CITY STANDARD 06.01.01
FILE NAME: F:\DWG\COMMON\STDS\CITYSTD\06_MISC\06.01.06.01.01		DATE APPROVED: 03/01/2005	SCALE: NTS		

DATE SEALED: 3/21/17



INFILTRATION GALLERY
DETAIL C
1" = 10'



INFILTRATION GALLERY
DETAIL D
1" = 2'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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Architect:

Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:

JUSTEAM

Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:

320 Todd Road Development

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IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES — STATE OF WASHINGTON — 41829 — REGISTERED PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Storm Details

PROJ. NO:	1611-001	
DATE:	June 02, 2025	
DRAWN BY:	E. Kearney	DESIGN BY: J. Jones

SHEET NUMBER:

C4-202

DWG.

19 OF 31

Plotted by: EricKearney Date: 02-Jun-25 1:04:00pm
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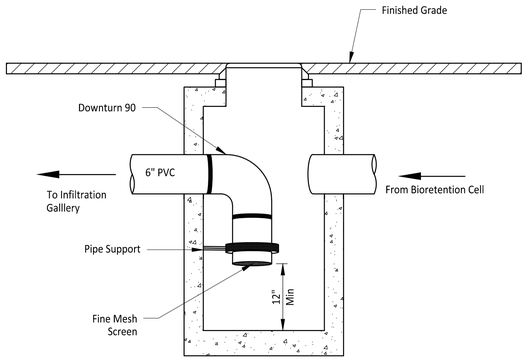
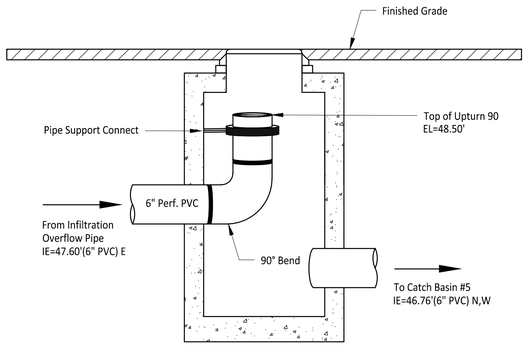
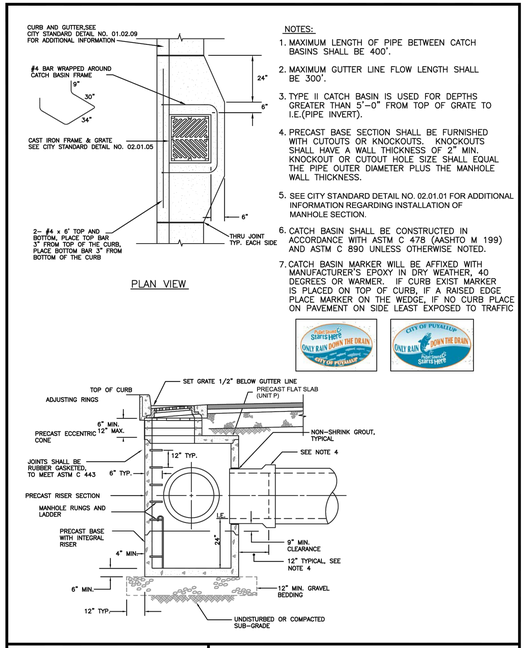


DOWNTURN 90
DETAIL E
NOT TO SCALE



UPTURN 90
DETAIL F
NOT TO SCALE



NOTES:

1. MAXIMUM LENGTH OF PIPE BETWEEN CATCH BASINS SHALL BE 400'.
2. MAXIMUM GUTTER LINE FLOW LENGTH SHALL BE 300'.
3. TYPE II CATCH BASIN IS USED FOR DEPTHS GREATER THAN 5'–0" FROM TOP OF GRATE TO I.E.(PIPE INVERT).
4. PRECAST BASE SECTION SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. KNOCKOUT OR CUTOUT HOLE SIZE SHALL EQUAL THE PIPE OUTER DIAMETER PLUS THE MANHOLE WALL THICKNESS.
5. SEE CITY STANDARD DETAIL NO. 02.01.01 FOR ADDITIONAL INFORMATION REGARDING INSTALLATION OF MANHOLE SECTION.
6. CATCH BASIN SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C 478 (AASHTO M 199) AND ASTM C 890 UNLESS OTHERWISE NOTED.
7. CATCH BASIN MARKER WILL BE AFFIXED WITH MANUFACTURER'S EPOXY IN DRY WEATHER, 40 DEGREES OR WARMER. IF CURB EXIST MARKER IS PLACED ON TOP OF CURB, IF A RAISED EDGE PLACE MARKER ON THE WEDGE, IF NO CURB PLACE ON PAVEMENT ON SIDE LEAST EXPOSED TO TRAFFIC

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

CATCH BASIN TYPE II

DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
LINDA LANSING	LINDA LIAN	COLLEEN HARRIS	XXXX	
FILE NAME: F:\DWG\COMMON\STDRCITY\2009\02_SDN02.01.04		DATE APPROVED: 09/01/1992	DATE REVISED: 06/01/2003	SCALE: NTS

02.01.04

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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Architect:

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Engineer:

JUTEAM

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JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Storm Details

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:

C4-203

DWG.

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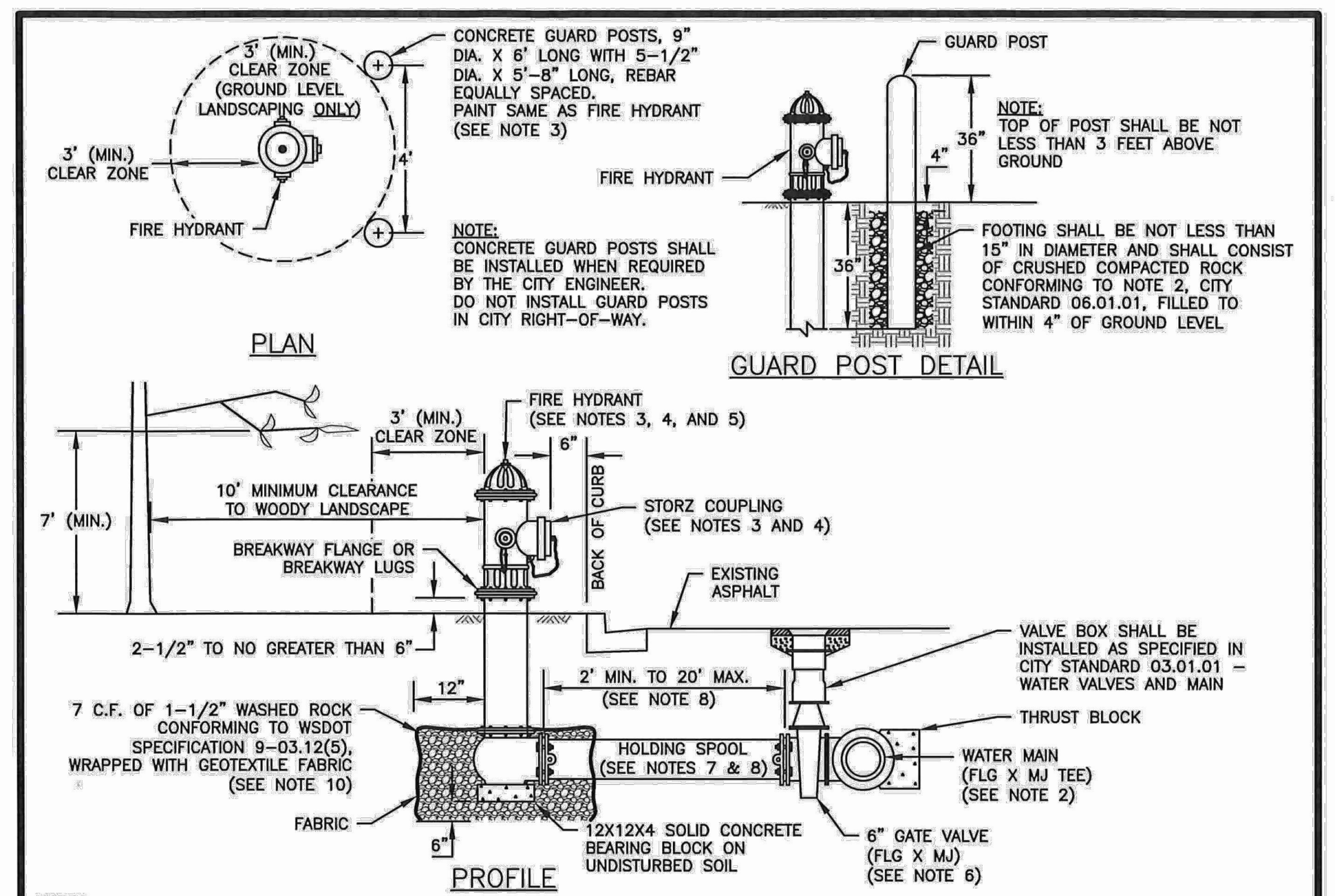
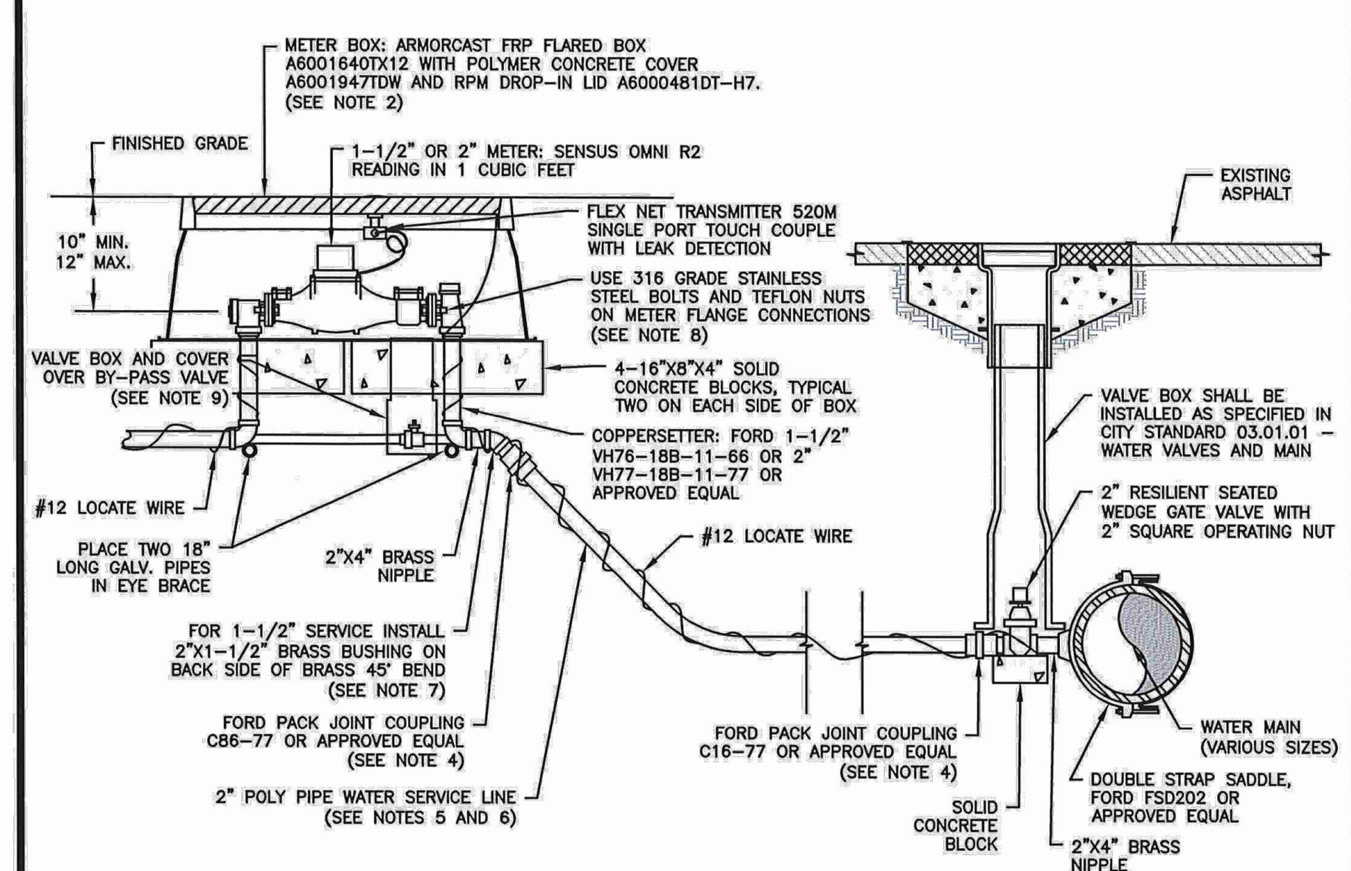
FIRE HYDRANT ASSEMBLY



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 5-1/4" 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.

CITY OF PUYALLUP OFFICE of THE CITY ENGINEER | APPROVED FOR PUBLICATION | FIRE HYDRANT ASSEMBLY | (NOT TO SCALE) | CITY STANDARD 03.05.01

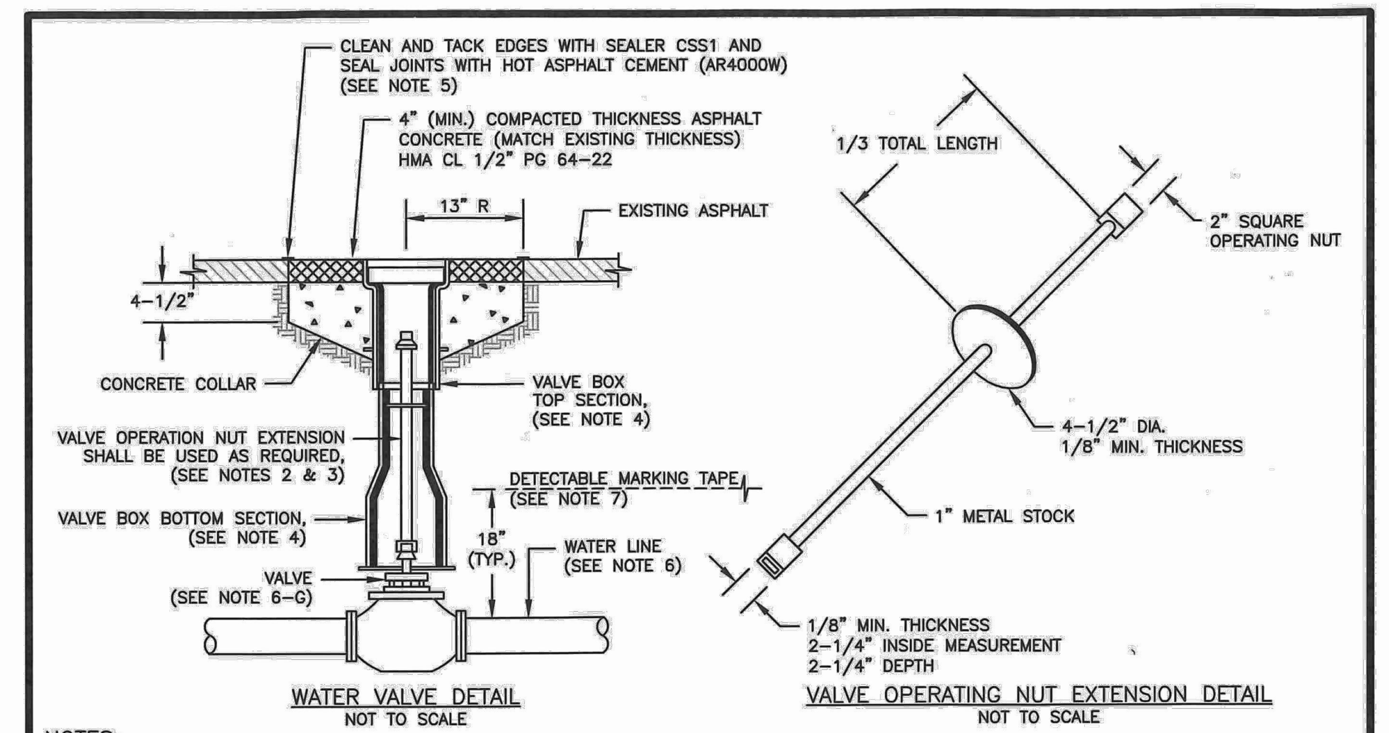
1-1/2" AND 2" WATER SERVICE CONNECTION



NOTES:
1. ALL MATERIALS AND FITTINGS SHALL BE AS SPECIFIED OR AN APPROVED EQUAL.
2. 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. 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. ANSI TIER 22 RATING REQUIRED.
3. 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.
4. ALL POLY PIPE COUPLINGS SHALL USE PIPE INSERT STIFFENERS.
5. 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.
6. ALL POLY PIPE SHALL BE HIGH DENSITY POLY (IRON PIPE SIZE) MEETING ASTM D-2239-SIDR 7, BLUE IN COLOR, 200 PSI MINIMUM.
7. FOR A 1-1/2" WATER SERVICE, ALL MATERIAL SHALL BE 2" FROM THE WATER MAIN TO THE COPPERSETTER. REDUCE FROM 2" TO 1-1/2" IMMEDIATELY BEFORE COPPERSETTER.
8. THE STAINLESS STEEL METER FLANGE BOLTS SHALL BE 5/8" DIAMETER FOR THE 1-1/2" METER, AND 3/4" DIAMETER FOR THE 2" METER.
9. PROVIDE A 6" CIRCULAR VALVE BOX WITH COVER (APPLIED ENGINEERING PRODUCT MODEL 708 WITH GREEN LID OR AN APPROVED EQUAL) OVER BY-PASS VALVE.
10. ALL WATER SERVICE LINES SHALL BE INSTALLED PERPENDICULAR (90 DEGREES) TO THE POINT OF CONNECTION TO THE WATER MAIN.

CITY OF PUYALLUP PUBLIC WORKS AND DEVELOPMENT ENGINEERING | APPROVED FOR PUBLICATION | 1-1/2" AND 2" WATER SERVICE CONNECTION | (NOT TO SCALE) | CITY STANDARD 03.03.02

WATER VALVES AND MAINS

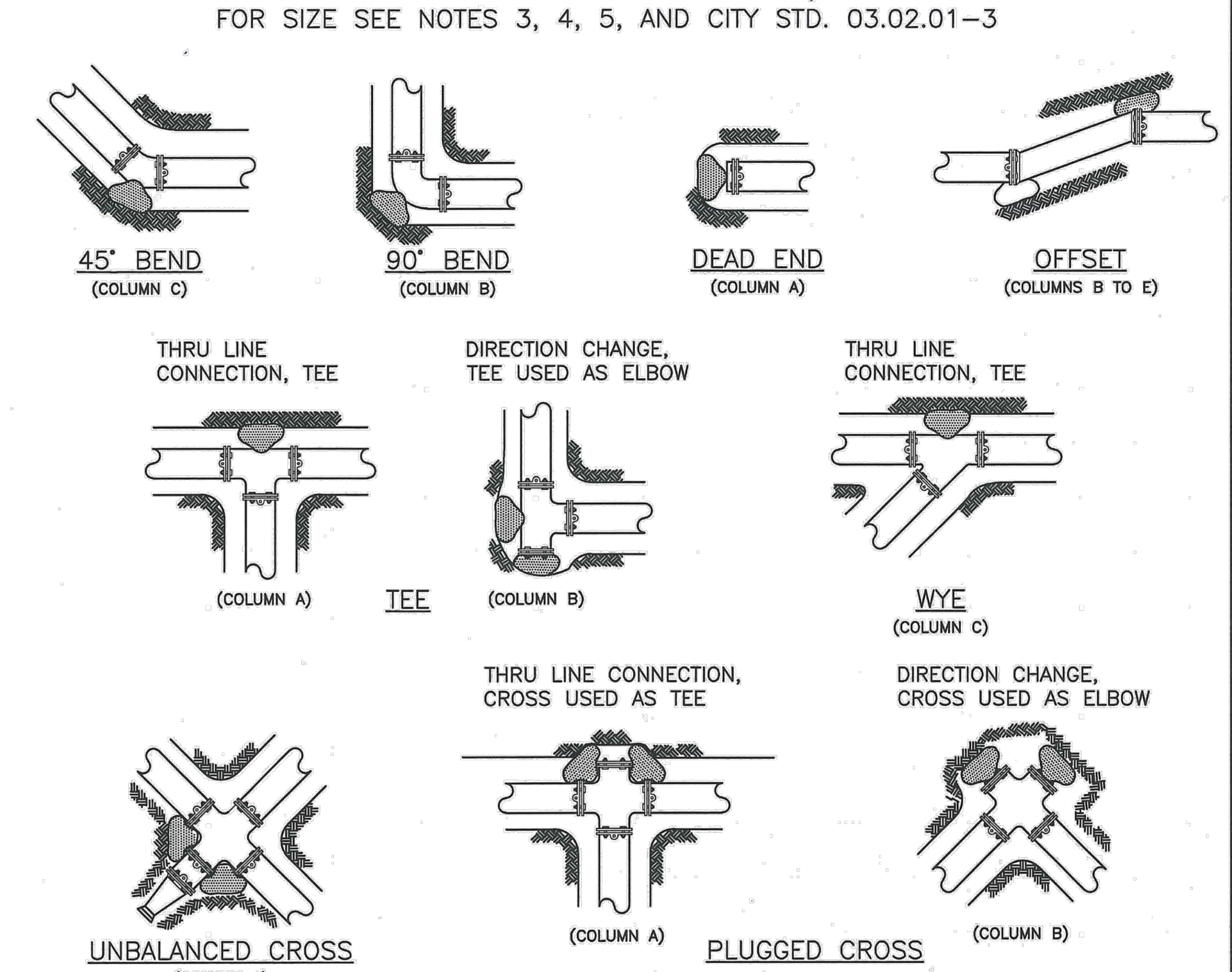


NOTES:
1. WATER MAINS SHALL HAVE A MINIMUM COVER OF 36" FROM PAVED FINAL GRADE IN IMPROVED RIGHT-OF-WAY AND IMPROVED EASEMENTS, AND A MINIMUM OF 48" IN UNIMPROVED RIGHT-OF-WAY AND UNIMPROVED EASEMENTS.
2. VALVE OPERATING NUT EXTENSIONS ARE REQUIRED WHEN THE VALVE NUT IS MORE THAN FIVE (5) FEET BELOW 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 COMFORMING 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.

CITY OF PUYALLUP OFFICE of THE CITY ENGINEER | APPROVED FOR PUBLICATION | WATER VALVES AND MAINS | (NOT TO SCALE) | CITY STANDARD 03.01.01

HORIZONTAL THRUST BLOCKING

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.

CITY OF PUYALLUP OFFICE of THE CITY ENGINEER | APPROVED FOR PUBLICATION | HORIZONTAL THRUST BLOCKING | (NOT TO SCALE) | CITY STANDARD 03.02.01-1

THRUST BLOCKING TABLE

TABLE 2: THRUST AT FITTINGS AT 200 PSI

SIZE	TEST PRESSURE (PSI)	THRUST FITTINGS AT 200 PSI				
		A	B	C	D	E
		TEE AND DEAD ENDS	90° BEND	45° BEND	22.5° BEND	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

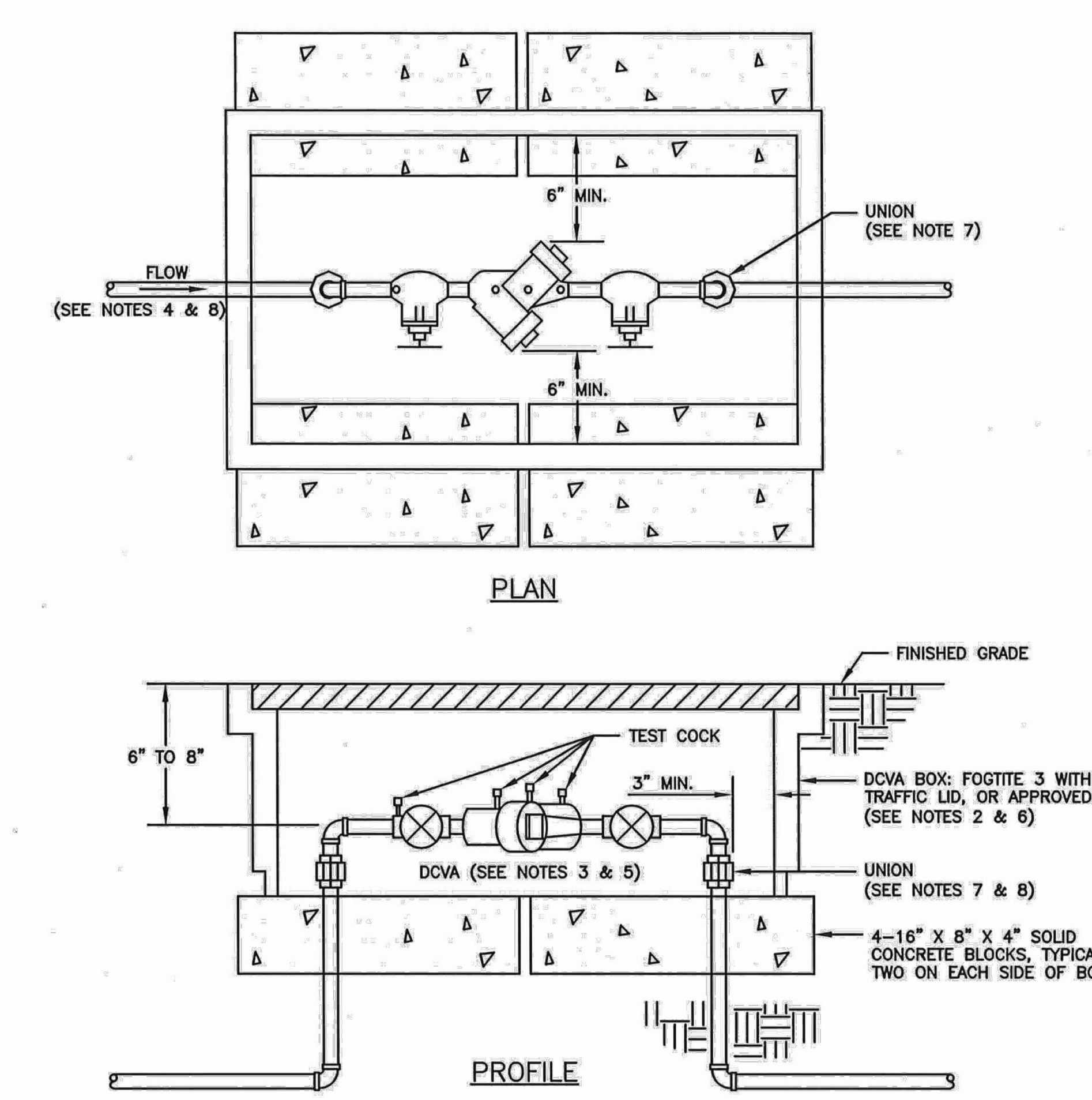
EXAMPLE:
FOR SAND AND GRAVEL BEARING VALUE FROM TABLE 3 IS 3,000 LBS/SF

$59{,}978\ LBS \div 3000\ LB/SF = 20$ 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.

CITY OF PUYALLUP OFFICE of THE CITY ENGINEER | APPROVED FOR PUBLICATION | THRUST BLOCKING TABLE | (NOT TO SCALE) | CITY STANDARD 03.02.01-3

2" AND SMALLER DOUBLE CHECK VALVE ASSEMBLY INSTALLATION



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.

CITY OF PUYALLUP OFFICE of THE CITY ENGINEER | APPROVED FOR PUBLICATION | 2" AND SMALLER DOUBLE CHECK VALVE ASSEMBLY INSTALLATION | (NOT TO SCALE) | CITY STANDARD 03.04.01

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.

CALL TWO BUSINESS DAYS BEFORE YOU DIG
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UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:
EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:
Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:
MJ TEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:
320 Todd Road Development

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY

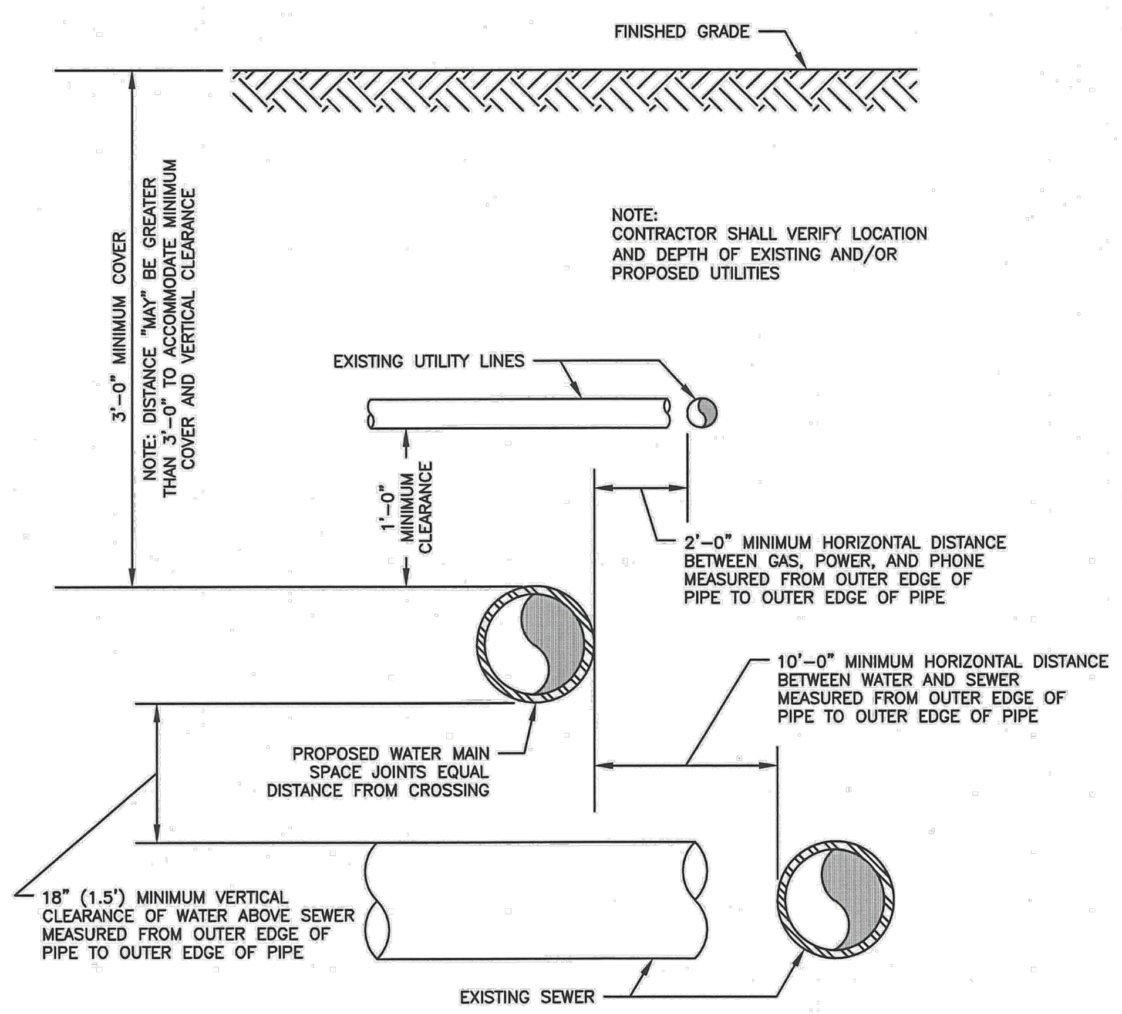
Civil Construction Permit

JUSTIN M. JONES, STATE OF WASHINGTON, 41829, REGISTERED PROFESSIONAL ENGINEER
06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:
Water Details

PROJ NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones
SHEET NUMBER: C5-101
DWG: 21 OF 31



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

CITY OF PUYALLUP
OFFICE of THE CITY ENGINEER

APPROVED FOR PUBLICATION

DATE SEALED: 2/5/2018

WATER MAIN CROSSING OTHER UTILITIES

(NOT TO SCALE)

CITY STANDARD 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.

CITY OF PUYALLUP
OFFICE of THE CITY ENGINEER

APPROVED FOR PUBLICATION

DATE SEALED: 2/5/2018

WATER MAIN CROSSING OTHER UTILITIES (NOTES)

(NOT TO SCALE)

CITY STANDARD 03.01.03-2

APPROVED

BY ______________________
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE ______________________

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
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Owner/Developer:
EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:
Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:
MJ TEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:
320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

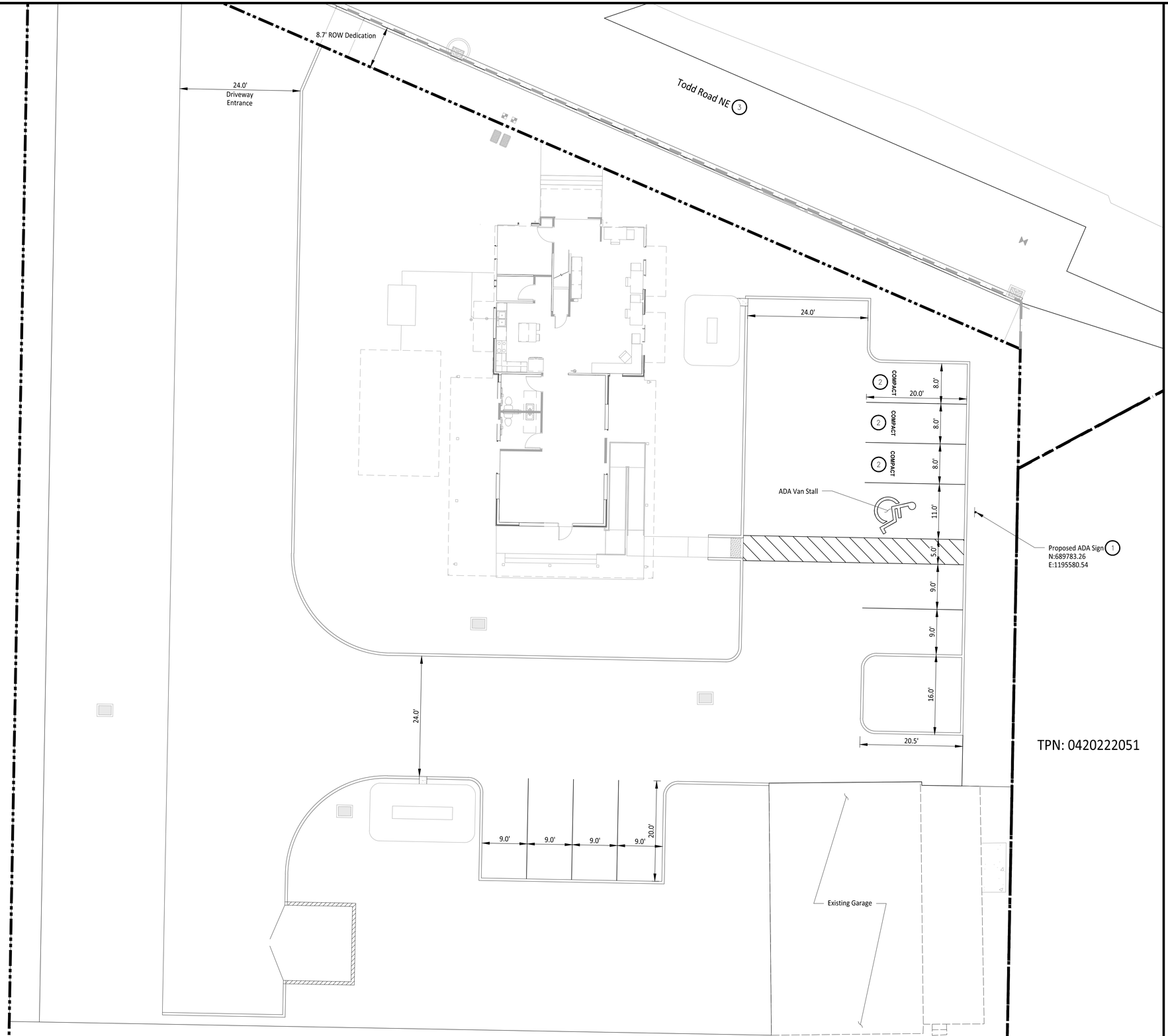
JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED PROFESSIONAL ENGINEER
06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:
Water Details

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones
SHEET NUMBER: C5-101
DWG: 22 OF 31

File: 1611001C-WATR-DT.dwg Path: C:\Users\EricKearney\MJ TEAM\MJ Projects - General\1611 - Fernandez\320 Todd Road Development\02 - CD\CAD\ Plotted by: EricKearney Date: 02-Jun-25 12:36:51pm



TPN: 0420222051

CONSTRUCTION NOTES

1. Install ADA Reserved Parking Sign and Van Accessible Sign, stacked, per MUTCD R7-8 and R7-8P.
2. Compact stalls shall be identified by Painting the word "COMPACT" in capital letters a minimum of 8" high at base of parking space and centered between striping.
3. See Frontage Improvements on Sheet C7-101 for Frontage Channelization.

PROPOSED PARKING COUNT

Proposed Compact Stalls	3 Stalls
Proposed Standard Stalls	6 Stalls
Proposed ADA Stalls	1 Stall
Total Stalls	10 Stalls

GENERAL NOTES

1. Install Signs per City of Puyallup Standard Detail 01.04.01.
2. All On-Site Pavement Markings shall be 4" wide solid white paint.

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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0 20 40 Feet
1" = 20'

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Civil Construction Permit

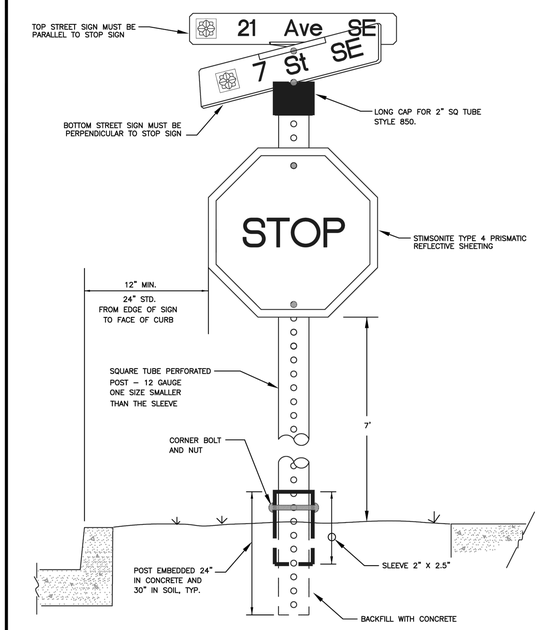
JUSTIN M. JONES STATE OF WASHINGTON 41829 REGISTERED PROFESSIONAL ENGINEER
06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:
Channelization & Signage Plan

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones
SHEET NUMBER: C6-101
DWG.
23 OF 31

File: 1611001C-CHAN.dwg Path: C:\Users\EricKearney\JMJ TEAM\JMJ Projects - General\1611 - Fernandez\320 Todd Road Development\02 - CDA (CAD)\ Plotted by: EricKearney Date: 02-Jun-25 12:37:52pm



NOTE:
ALL SIGN ASSEMBLIES SHALL USE A TELESPAR POST, SLEEVE AND PARTS.

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

STREET SIGN DETAIL

DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
JIM ERWIN-SVOBODA	LINDA LIAN	COLLEEN HARRIS	XXXX	01.04.01

FILE NAME	DATE APPROVED	DATE REVISED	SCALE
F:\DWG\COMMON\STDS\CITY2009\01_STR\01.04\01.04.01	07/01/2009	XX/XX/XX	1:1

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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STATE OF WASHINGTON
41829
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PROFESSIONAL ENGINEER
06-02-25

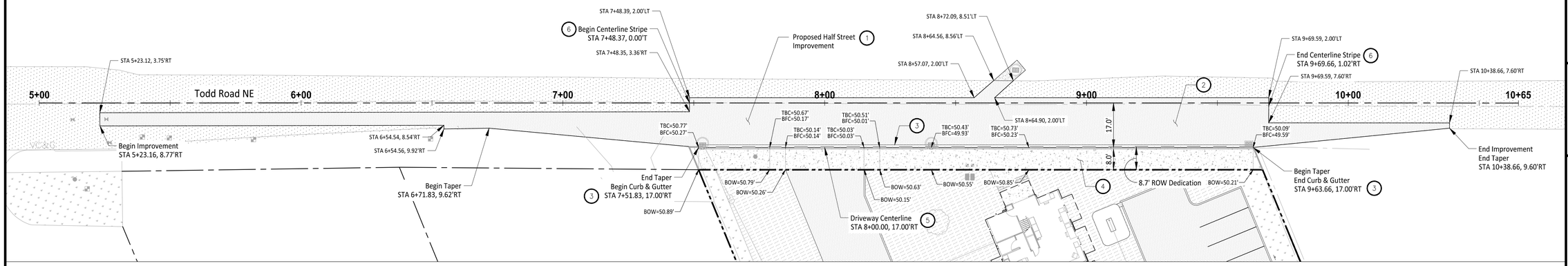
REV	DATE	DESCRIPTION

SHEET TITLE:
Channelization Details

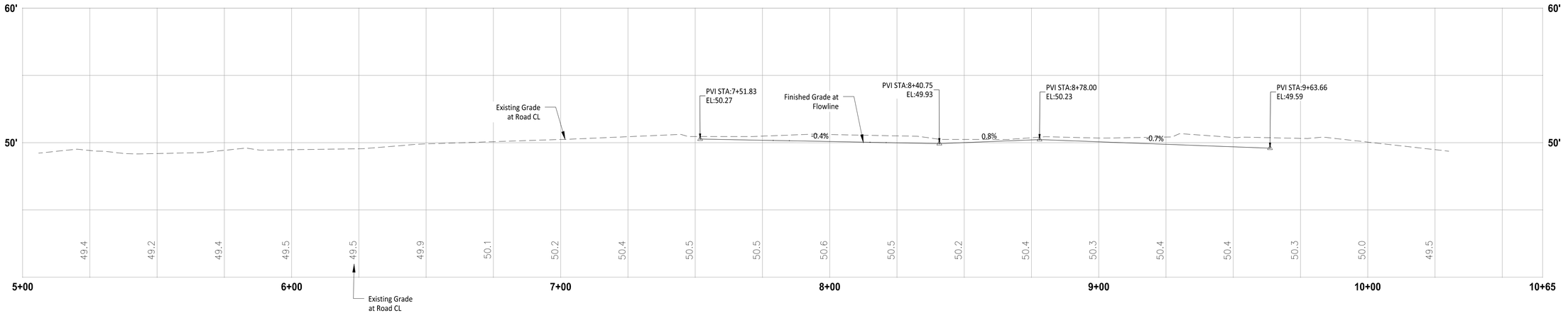
PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:
C6-102

DWG:
24 OF 31



PLAN



ROAD PROFILE

HORIZ: 1"=20'
VERT: 1"=10'

LEGEND

- Property Line
- ROW Dedication Line
- Proposed Concrete
- Proposed Asphalt
- Proposed Gravel
- Proposed Landscaping
- Existing Asphalt

(#) CONSTRUCTION NOTES

1. Install Half Street Improvement per City of Puyallup Standard Detail 01.01.19 on Sheet C7-501.
2. Install Asphalt Pavement per City of Puyallup Standard Detail 01.01.19 on Sheet C7-501.
3. Install Concrete Curb and Gutter per City of Puyallup Standard Detail 01.02.09 on Sheet C7-501.
4. Install Concrete Sidewalk per City of Puyallup Standard Detail 01.02.01 on Sheet C7-501.
5. Install Proposed Commercial Driveway per City of Puyallup Standard Detail 01.02.18 on Sheet C7-501.
6. Install 4" Yellow Centerline Stripe per City of Puyallup Standard Detail 01.03.10 on Sheet C7-501.

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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(206) 596-2020

Project:

320 Todd Road Development

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Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Frontage Improvement Plan & Profile

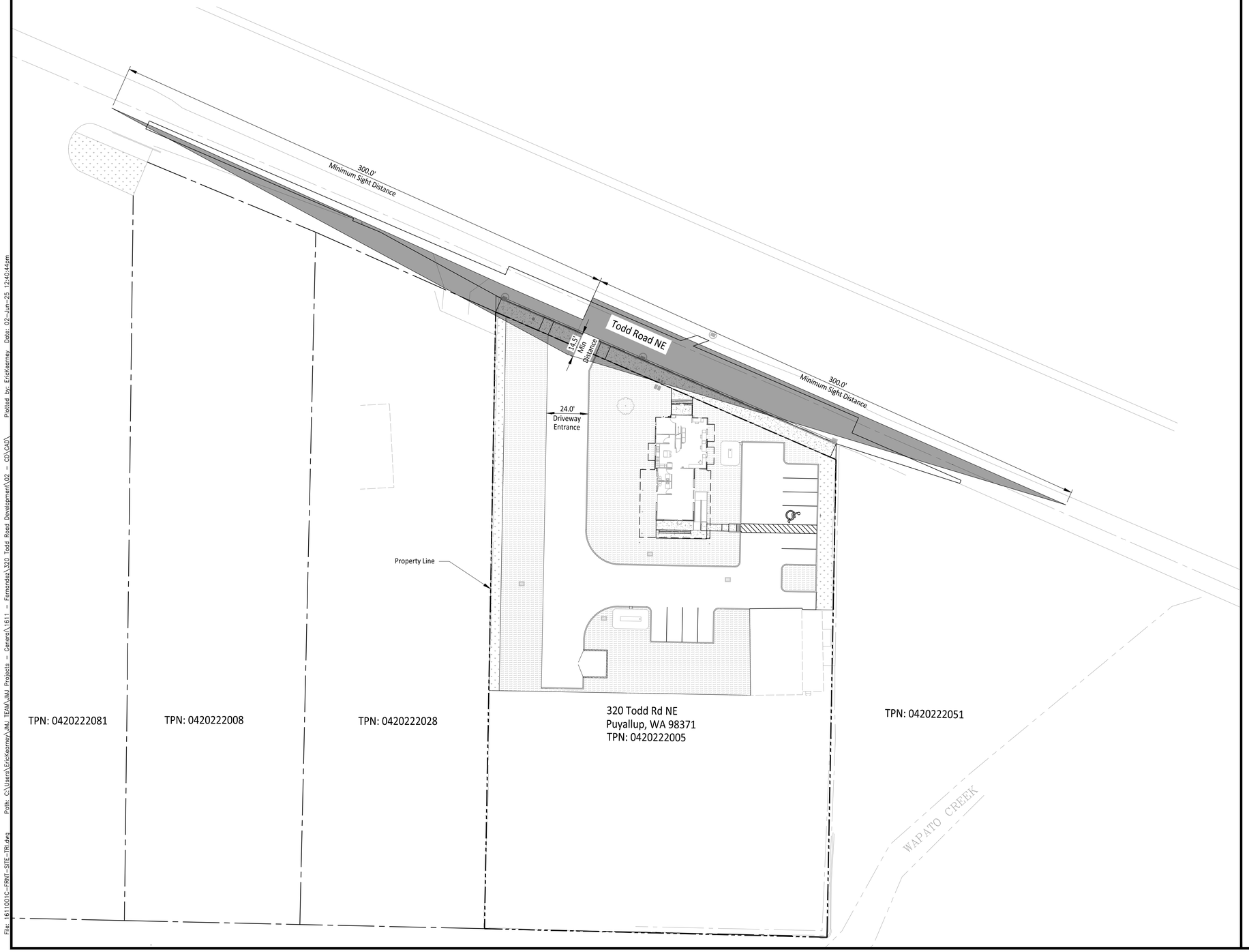
PROJ. NO:	1611-001
DATE:	June 02, 2025
DRAWN BY: E. Kearney	DESIGN BY: J. Jones

SHEET NUMBER:

C7-101

DWG:

25 OF 31



0 30 60 Feet
1" = 30'

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Frontage Site Triangle

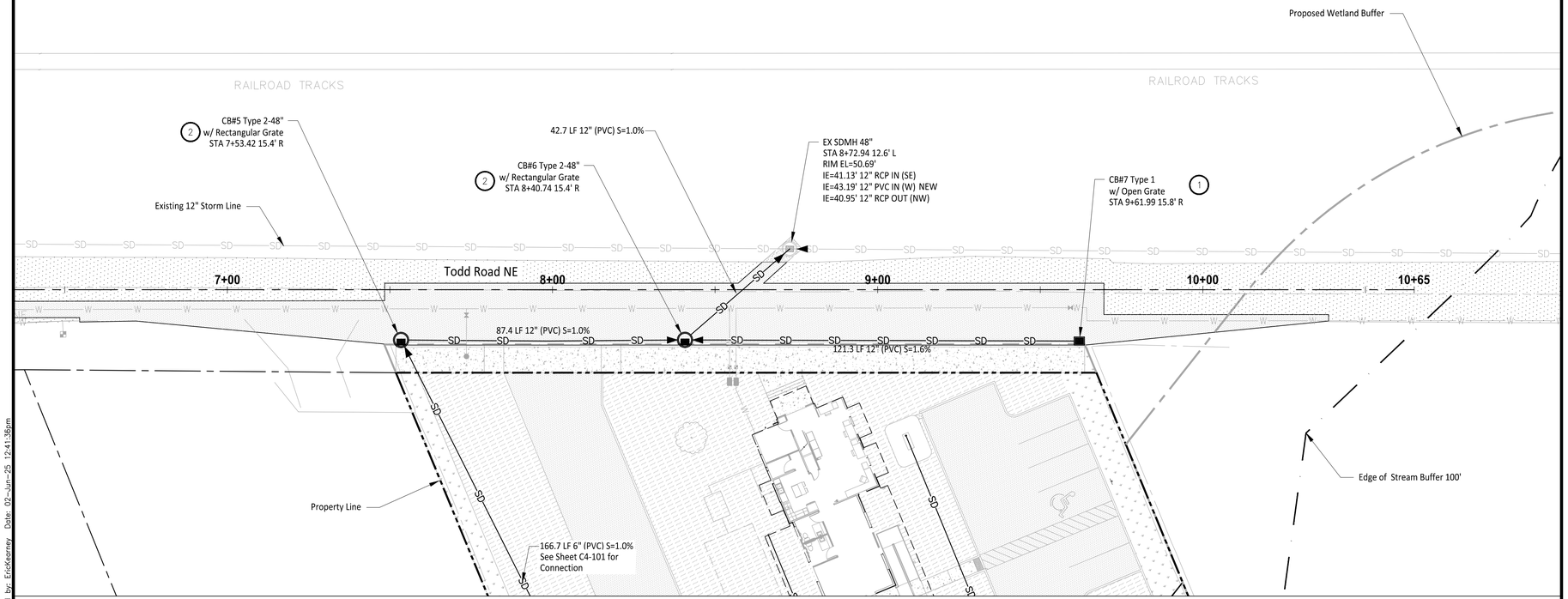
PROJ. NO:	1611-001
DATE:	June 02, 2025
DRAWN BY: E. Kearney	DESIGN BY: J. Jones

SHEET NUMBER:

C7-201

DWG.

26 OF 31



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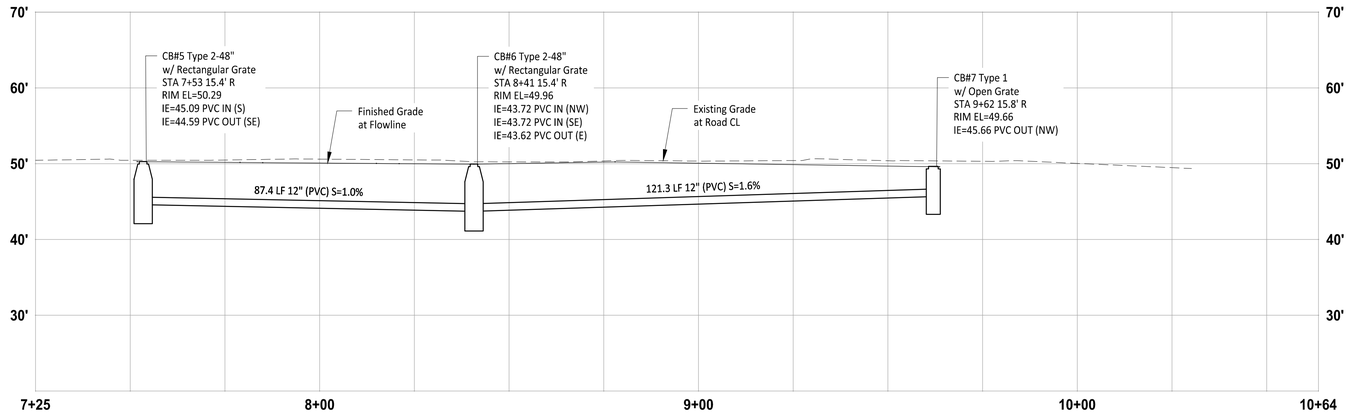


STORM PROFILE

HORIZ: 1"=20'
VERT: 1"=10'

LEGEND

- Storm Catch Basin Type 1, Open Grate
- Storm Catch Basin Type 2, Rectangular Open Grate
- Property Line
- SD — Storm Line

CONSTRUCTION NOTES

1. Install Catch Basin Type 1 per City of Puyallup Standard Detail 02.01.02 on Sheet C4-202.
2. Install Catch Basin Type 2 per City of Puyallup Standard Detail 02.01.04 on Sheet C4-203.

GENERAL NOTES

1. Storm Lines shall be SDR 35 PVC
2. Storm Line shall maintain 3-foot minimum cover from Finished Grade.

0 20 40 Feet
1" = 20'

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.

CALL TWO BUSINESS DAYS BEFORE YOU DIG
1-800-424-5555
UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:
EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:
Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:
320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

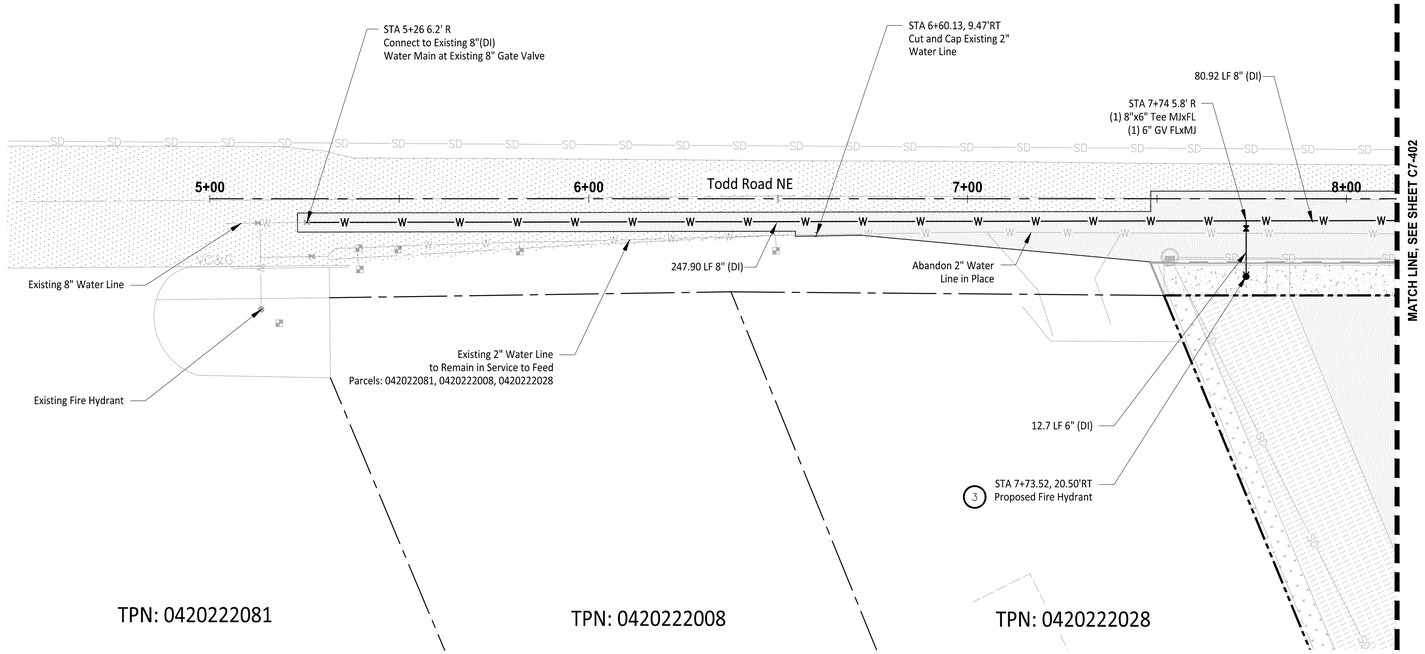
JUSTIN M. JONES — STATE OF WASHINGTON — 41829 — REGISTERED PROFESSIONAL ENGINEER
06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:
Frontage Storm Plan & Profile

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones
SHEET NUMBER: C7-301
DWG: 27 OF 31

File: 1611001C-FRNT-STRM-PP.dwg Path: C:\Users\EricKearney\JMJ TEAM\JMJ Projects - General\1611 - Fernandez\320 Todd Road Development\02 - CIV\CAD\ Plotted by: EricKearney Date: 02-Jun-25 12:41:36pm



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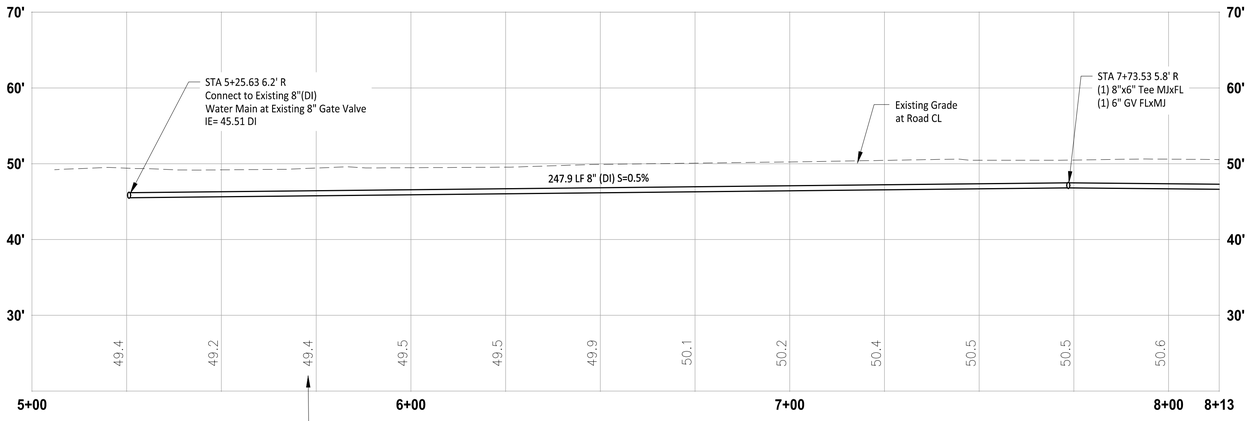

WATER PROFILE

HORIZ: 1"=20'
VERT: 1"=10'

LEGEND

- Property Line
- ROW Dedication
- Water Line
- Water Meter
- Gate Valve
- Fire Hydrant

(#) CONSTRUCTION NOTES

1. Install 2" Water Service Connection per City of Puyallup Standard Detail 03.03.02 on Sheet C5-101.
2. Install 2" DCVA per City of Puyallup Standard Detail 03.04.01 on Sheet C5-101.
3. Install Fire Hydrant per City of Puyallup Standard Detail 03.05.01 on Sheet C5.101.

GENERAL NOTES

1. All Ductile Iron pipes shall be Class 52.
2. All Ductile Iron Pipes shall maintain 3-foot minimum cover from Finished Grade.
3. All POLY pipes shall be High Density Poly (Iron Pipe Size) meeting ASTM D-2239-SIDR 7, blue in color, 200 PSI minimum.
4. All POLY pipes shall maintain 3-foot minimum cover from Finished Grade.

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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0 20 40 Feet
1" = 20'

CALL TWO BUSINESS DAYS BEFORE YOU DIG
1-800-424-5555
UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:
EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:
Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:
JUSTEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:
320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

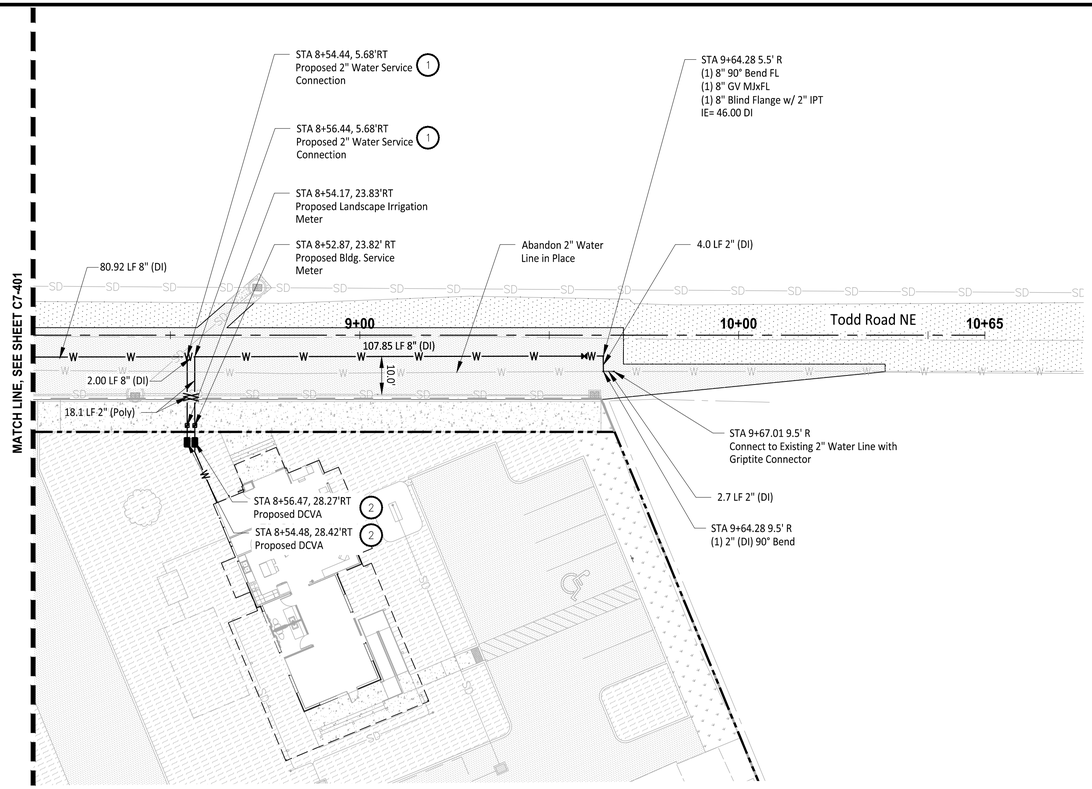
REV	DATE	DESCRIPTION

SHEET TITLE:
Frontage Water Plan & Profile

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:
C7-401

DWG.
28 OF 31



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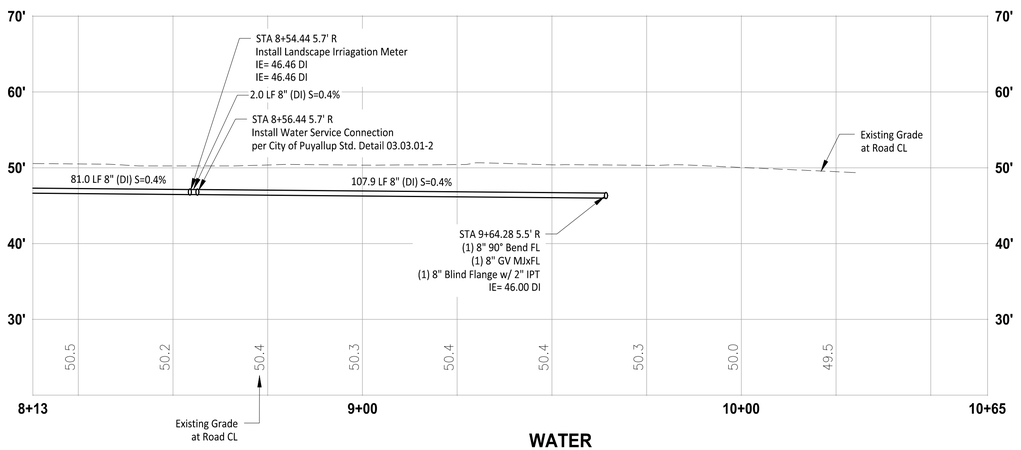

WATER PROFILE

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VERT: 1"=10'

LEGEND

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- ROW Dedication
- Water Line
- Water Meter
- Gate Valve
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APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

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UTILITIES UNDERGROUND LOCATION CENTER

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320 Todd Road Development

ONE INCH AT FULL SCALE.
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Civil Construction Permit

JUSTIN M. JONES — STATE OF WASHINGTON — 41829 — REGISTERED PROFESSIONAL ENGINEER

06-02-25

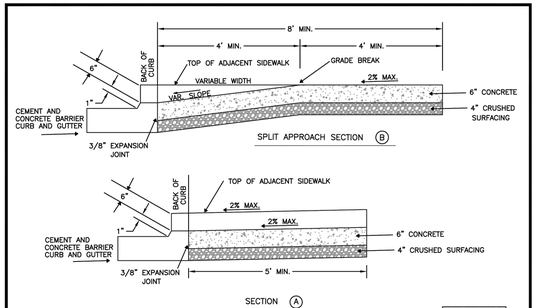
REV	DATE	DESCRIPTION

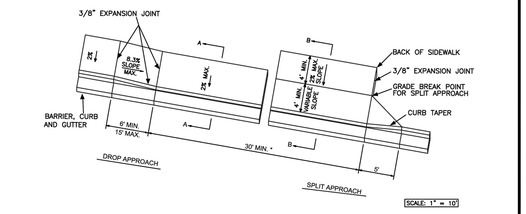
SHEET TITLE:
Frontage Water Plan & Profile

PROJ. NO:	1611-001
DATE:	June 02, 2025
DRAWN BY: E. Kearney	DESIGN BY: J. Jones

SHEET NUMBER:
C7-402

DWG.
29 OF 31





NOTES:
1. TO BE USED AS AN OPTION TO THE URBAN APPROACH WHEN GRADES ARE CREATING A SITE CONSTRAINT.
2. JOINTS IN PAVING SLAB SHALL NOT EXTEND INTO DRIVEWAY. ALL JOINTS SHALL BE CLEAN AND EDGED.
3. CONCRETE SHALL BE COMMERCIAL CONCRETE, 5.5 SACK MINIMUM, AASHTO GRADING 467 COARSE AGGREGATE, NO FLY ASH.
4. * 30 FEET MINIMUM WIDTH FOR TWO WAY TRAFFIC. MAXIMUM WIDTH DEPENDANT ON VEHICLE VOLUME AND DESIGN VEHICLE TYPE. DROP APPROACH RAMPS SHALL NOT EXCEED 8.3%, AS MEASURED WITH A SMART LEVEL, UNLESS RAMP LENGTH IS EXTENDED TO 15'.

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

URBAN COMMERCIAL APPROACH ALTERNATE 2

DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
JIM DEWIN/SVOBODA	LINDA LIAN	COLLEEN HARRIS	Linda Lian	
FILE NAME	DATE APPROVED	DATE REVISED	SCALE	
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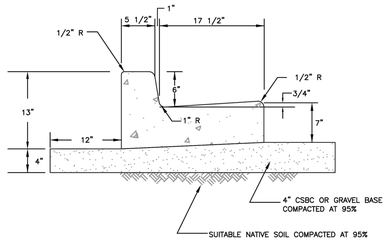

NOTES:
1. CONTRACTION JOINTS SHALL BE 3/8" x 2 1/4" ASPHALT SATURATED FELT PLACED IN ALL EXPOSED SURFACES OF CURB AND GUTTER AND SPACED AT 15' MAX. 10' MIN. O.C.
2. THRU JOINTS SHALL BE 3/8" ASPHALT SATURATED FELT PLACED AT POINTS OF TANGENCY ON CURVES, AT CATCH BASINS, AND AT EDGES OF ALLEY AND DRIVEWAYS. 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.

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

CURB AND GUTTER

DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
JIM DEWIN/SVOBODA	LINDA LIAN	COLLEEN HARRIS	Linda Lian	
FILE NAME	DATE APPROVED	DATE REVISED	SCALE	
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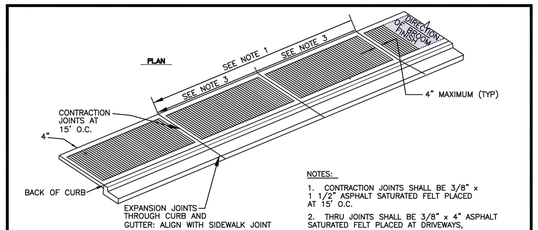

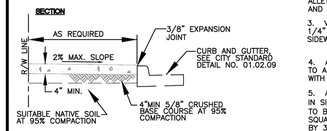

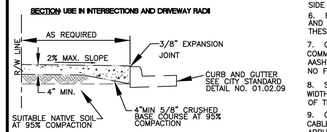

MINIMUM SIDEWALK WIDTHS
- 5'(RS ZONES) SINGLE FAMILY RESIDENTIAL AREAS (DETACHED DWELLINGS)
- 8'(RS ZONES) COMMERCIAL USES, WHEN REQUIRED BY DEVELOPMENT SERVICES MANAGER
- 8'(RM ZONES) MEDIUM AND HIGH DENSITY MULTI-FAMILY RESIDENTIAL AREAS
- 8'(ML ZONES) INDUSTRIAL AREAS
- 8'(CG, CBD ZONES) COMMERCIAL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

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.
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 SURFACE AND MATCH THE GRADE OF THE SIDEWALK.
10. CURB RAMPS SHALL BE CONSTRUCTED AT INTERSECTIONS USING A DESIGN PREPARED BY A LICENSED PROFESSIONAL ENGINEER. WHEN A RAMP DESIGN FAILS TO MEET ALL APPLICABLE DESIGN STANDARDS, THE ENGINEER SHALL DOCUMENT WHY THE PROPOSED RAMP ACHIEVES DESIGN STANDARDS TO THE MAXIMUM EXTENT FEASIBLE.

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

SIDEWALK WITHOUT PLANTING STRIP

DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
JIM DEWIN/SVOBODA	LINDA LIAN	COLLEEN HARRIS	XXXX	
FILE NAME	DATE APPROVED	DATE REVISED	SCALE	
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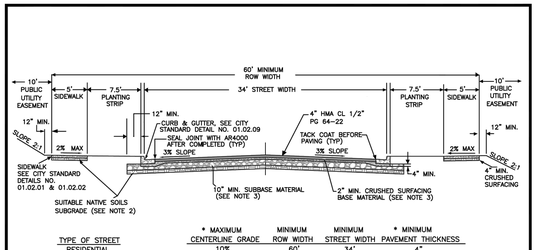

TYPE OF STREET (SERVING OVER 120 DWELLING UNITS)	* MAXIMUM CENTERLINE GRADE	MINIMUM ROW WIDTH	MINIMUM STREET WIDTH	* MINIMUM PAVEMENT THICKNESS
RESIDENTIAL	10%	60'	34'	4"

*MINIMUM CENTERLINE AND FLOWLINE GRADES FOR ALL STREETS SHALL BE 0.5%
*MATCH EXISTING PAVEMENT THICKNESS IF GREATER THAN 4"

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 COMPLIANCE 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. ADDITIONAL BIKE LANES AND/OR ON STREET PARKING MAY BE REQUIRED PER TRAFFIC ENGINEER.
13. A UTILITY EASEMENT OF 10' SHALL BE PROVIDED ON BOTH SIDES OF THE ROADWAY.
14. PLANTING STRIP SHALL BE PLANTED AS DIRECTED BY CITY PLANNING DEPARTMENT.

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

34' PUBLIC ROADWAY CROSS SECTION

DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
JIM DEWIN/SVOBODA	LINDA LIAN	COLLEEN HARRIS	XXXX	
FILE NAME	DATE APPROVED	DATE REVISED	SCALE	
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NOTES:
1. CENTERLINE STRIPE FOR CHANNELIZATION SHALL BE DETAIL B OR DETAIL C AS DIRECTED BY CITY. CENTERLINE STRIPE FOR ALL COLLECTORS SHALL BE DETAIL D WITH TYPE 2YY RPM SPACED AT 80' INTERVALS ON TANGENTS AND HORZ. CURVES WITH A RADIUS OF 5000' OR MORE AND 40' INTERVALS ON HORZ. CURVES LESS THAN 5000'. CENTERLINE STRIPE FOR ARTERIALS SHALL BE DETAIL E WITH RPM SPACING AS PREVIOUSLY DEFINED.
2. ROADS, UNLESS OTHERWISE DETERMINED BY THE CITY, (ARTERIALS & COLLECTORS) LONGITUDINAL LINES SHALL BE PAINTED. APPLIED 14 MILS WHEN WET.
3. NO PASSING ZONES IN ONE DIRECTION OR BOTH SHALL BE CLEARLY MARKED WITH CENTERLINE STRIPE, DETAIL B OR DETAIL C OR COMBINATION OF DETAIL D AND DETAIL E.
4. ON WIDE INTERSECTIONS SPACE TYPE 1 OR 2 RPM 4 FEET ON CENTER.

RAISED PAVEMENT MARKERS

TYPE 2 RPM (REFLECTIVE)

RAISED FACE COLORS	
TYPE 2WR	WHITE AND RED
TYPE 2YR	YELLOW AND RED
TYPE 2YY	YELLOW AND YELLOW
TYPE 2W	WHITE — ONE SIDE ONLY
TYPE 2Y	YELLOW — ONE SIDE ONLY

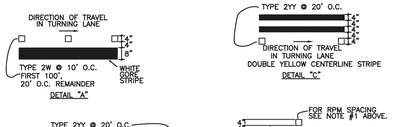
TYPE 1 RPM COLORS

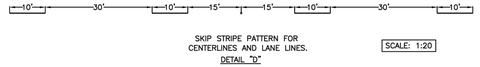
TYPE 1W	WHITE
TYPE 1Y	YELLOW

*TYPE 3 RPM COLORS

TYPE 3W	8" RUMBLE BAR — WHITE
TYPE 3Y	8" RUMBLE BAR — YELLOW

* CITY MAY REQUIRE REFLECTIVE.





CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

PAVEMENT MARKING DETAILS

DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
JIM DEWIN/SVOBODA	LINDA LIAN	COLLEEN HARRIS	XXXX	
FILE NAME	DATE APPROVED	DATE REVISED	SCALE	
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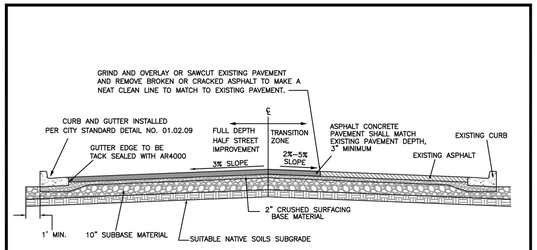


NOTES:
1. ALL DEPTHS ARE MINIMUM COMPACTED DEPTHS.
2. SUBGRADE PREPARATION SHALL MEET THE REQUIREMENTS OF WSDOT STANDARD SPEC. 2-06.3(1). IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MEET THE COMPACTION REQUIREMENTS AND CONTROL ALL WORK. THE CITY OF PUYALLUP RESERVES THE RIGHT TO REQUIRE TESTS 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

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

HALF STREET IMPROVEMENT

DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
JIM DEWIN/SVOBODA	LINDA LIAN	COLLEEN HARRIS	XXXX	
FILE NAME	DATE APPROVED	DATE REVISED	SCALE	
P:\DWG\COMMON\STD\CITY\2009\01_STR\01.01\01.01.19	05/01/2009	XX/XX/XX	1/8	01.01.19

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.

CALL TWO BUSINESS DAYS BEFORE YOU DIG
1-800-424-5555
UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:

EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:

Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:

Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:

320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES
STATE OF WASHINGTON
41829
REGISTERED
PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:

Frontage Details

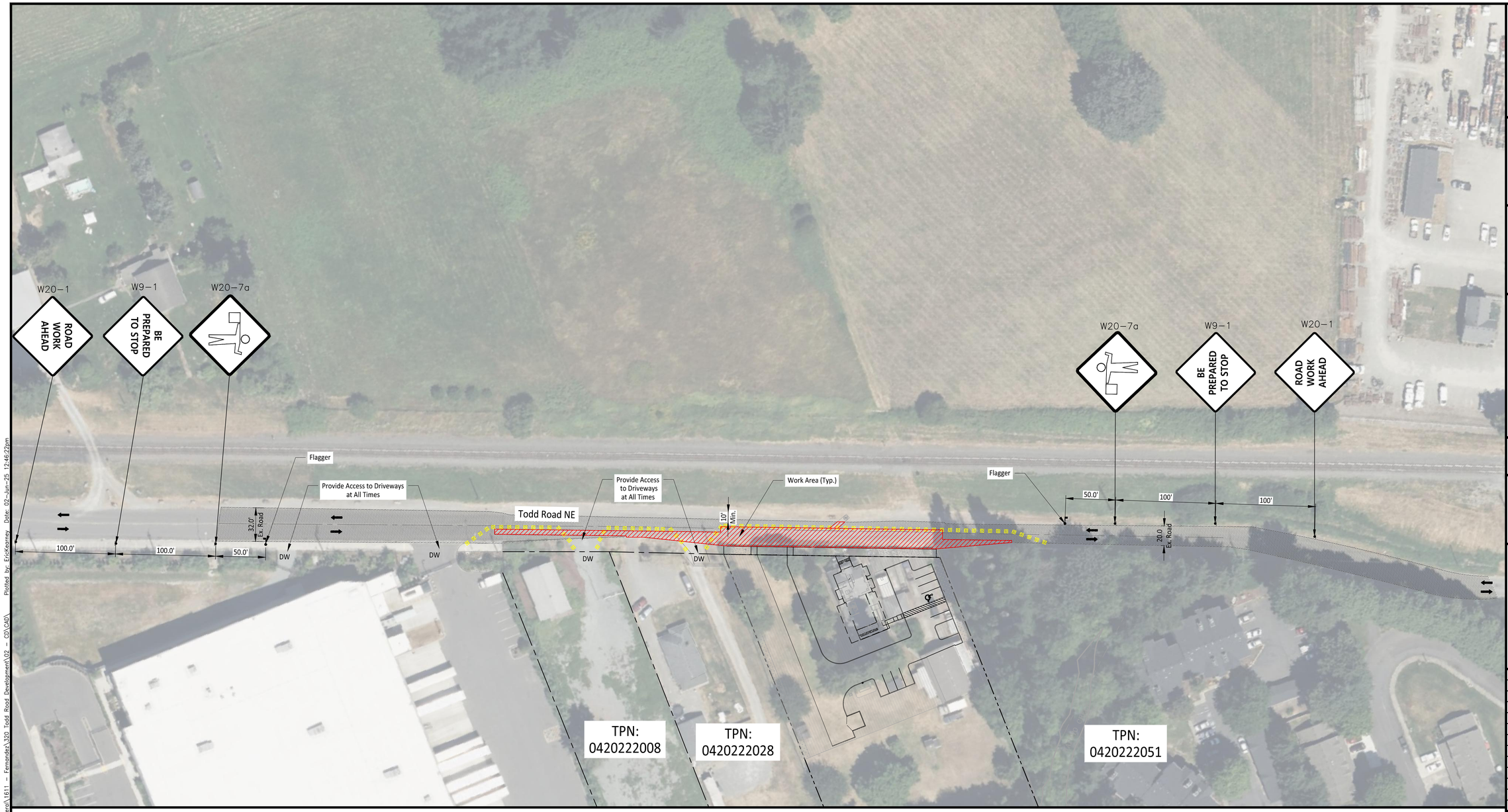
PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:

C7-501

DWG.

30 OF 31



LEGEND

Work Area

TRAFFIC CONTROL NOTES

1. All traffic control applications are to be pursuant to the Manual on Uniform Traffic Control Devicesa (MUTCD), current edition.
2. All traffic signs are to be 36" x 36" with orange background and black lettering (30" x 30" okay on streets classified as "Local").
3. The City of Puyallup reserves the right to adjust approved traffic control plans as needed during the project.
4. Sign spacing shall be 100 feet when speed limit is 25mph or less.

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.

0 50 100 Feet
1" = 50'

CALL TWO BUSINESS DAYS BEFORE YOU DIG
1–800–424–5555
UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:

EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:

Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

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Justin Jones, PE
PO Box 2066
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(206) 596-2020

Project:

320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES — STATE OF WASHINGTON — 41829 — REGISTERED PROFESSIONAL ENGINEER

06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE.

Traffic Control Plan

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:

C8-101

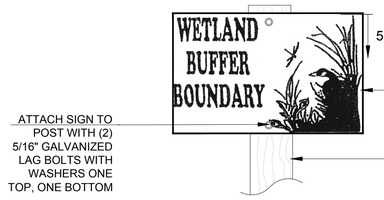
DWG.

31 OF 31

Date: 02-Jun-25 12:46:22pm
Plotted by: EricKearney
File: 1611001C-TCP.dwg Path: C:\Users\EricKearney\JMJ TEAM\JMJ Projects – General\1611 – Fernandez\320 Todd Road Development\02 – CDI\CAD\

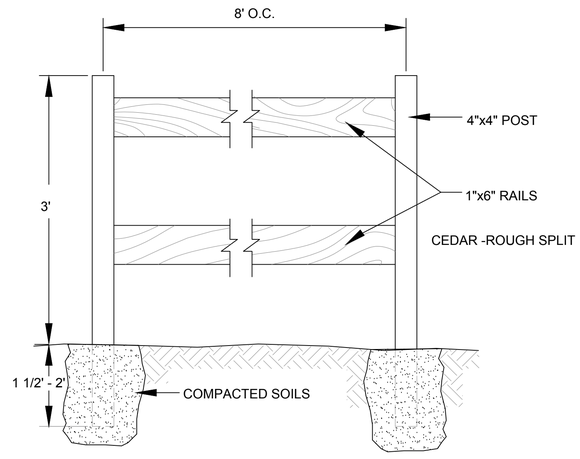
NATIVE PLANT LIST			
SYMBOL	QTY	DESCRIPTION	SIZE
TREES			
ACM	18	Acer macophyllum Big Leaf Maple	2 Gal. Min.
CRD	20	Crataegus douglasii Western Hawthrone	2 Gal. Min.
PIS	19	Picea sitchensis Sitka Spruce	2 Gal. Min.
PRE	20	Prunus emargenata Bitter Cherry	2 Gal. Min.
PSM	19	Pseudotsuga menziesii Douglas Fir	2 Gal. Min.
THP	19	Thuja plicata Western Red Cedar	2 Gal. Min.
TOTAL	115		
SHRUBS			
	28	Acer circinatum Vine Maple	1 Gal. Min.
	27	Berberis aquilfolium Tall Oregon Grape	1 Gal. Min.
	28	Berberis nervosa Oregon Grape	1 Gal. Min.
	28	Corylus cornuta Hazlenut	1 Gal. Min.
	31	Holodiscus discolor Oceansoray	1 Gal. Min.
	27	Ribes sanguineum Flowering Currant	1 Gal. Min.
	25	Rosa gymnocarpa Wild Rose	1 Gal. Min.
	34	Symphoricarpos albus Snowberry	1 Gal. Min.
TOTAL	228		

16,747 / 43,560 = 0.38 AC
300 TREES PER ACRE = 72 TREES 115
600 SHRUBS PER ACRE = 144 SHRUBS 228



- THE WETLAND/STREAM SIGN SHALL BE POSTED AT THE BOUNDARY BETWEEN THE SENSITIVE AREA BUFFER, SETBACK AREA OR SETBACK TRACT AND THE BUILDING SETBACK AREA.
- ONE SIGN SHALL BE POSTED PER LOT FOR EVERY 50 FEET OF SENSITIVE AREA BUFFER AND SHALL BE STATIONED IN A PROMINENT LOCATION, I.E.: AT THE CLOSEST POINT TO THE PROPOSED DEVELOPMENT. SIGNS MAY ALSO BE ATTACHED TO FENCES.

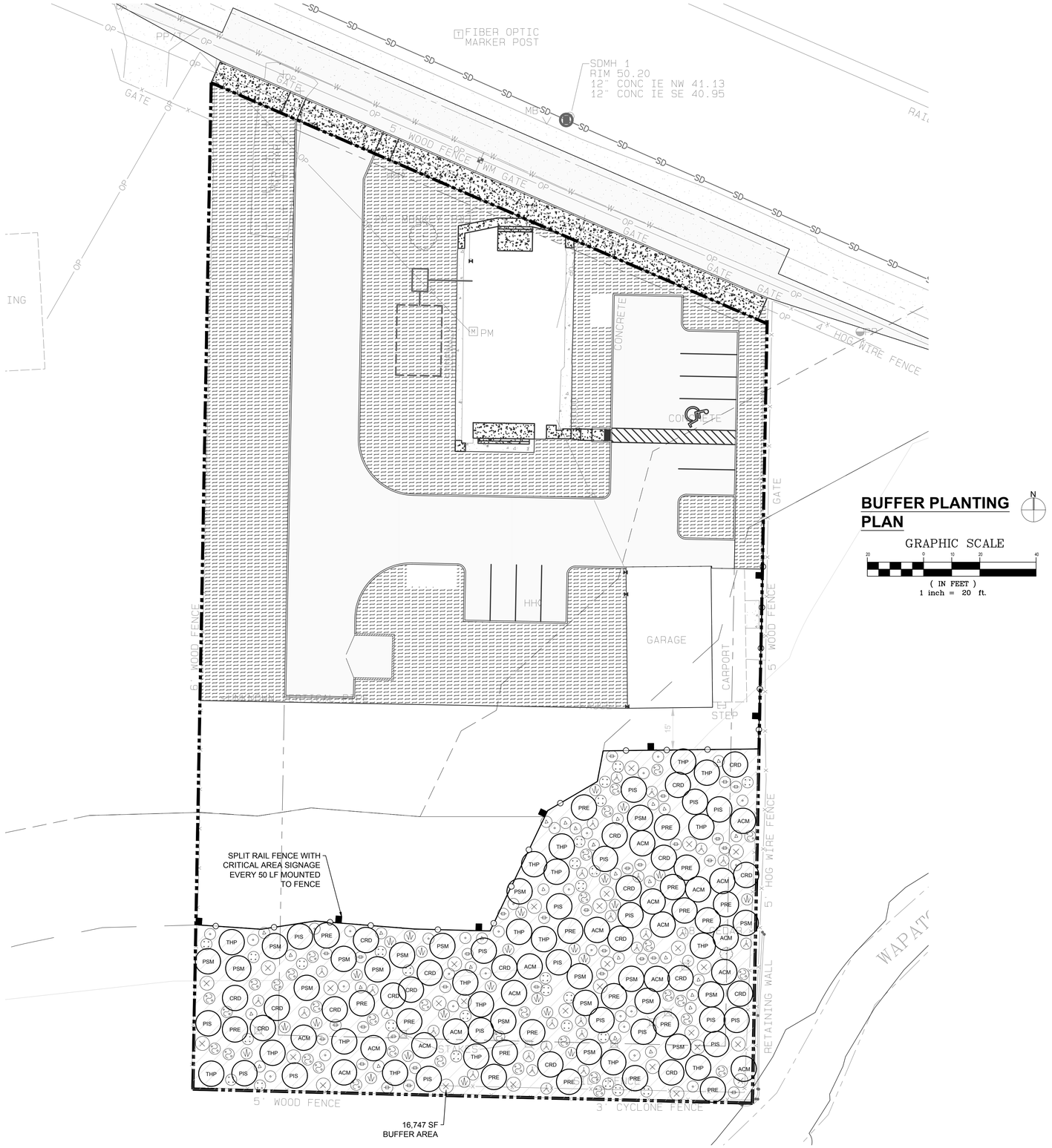
WETLAND / BUFFER SIGN AND INSTALLATION DETAIL



SPLIT RAIL FENCE DETAIL

NOT TO SCALE

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



BUFFER PLANTING PLAN

GRAPHIC SCALE

20 0 10 20 40

(IN FEET)
1 inch = 20 ft.

Nature By Design
Landscape Architecture
1320 Alameda Avenue, Suite B. Fircrest, WA 98466
www.naturebydesigninc.com
253.460.6067

PROJECT:
TODD ROAD BUFFER
320 TODD RD NE
PUYALLUP, WA
HABITAT TECHNOLOGIES

REVISIONS:

B. BUFFER ADJUSTED TO COMMENTS
C. UPDATED TO CIVIL BASE
D. UPDATED BUFFER PROPOSED
E. REVISED TO PLAN BUFFER TO 110 SETBACK

DRAWING ISSUED FOR:
AGENCY
REVIEW

DATE: MAY 6, 2025

STATE OF WASHINGTON · KATHERINE OWENS · NO. 699 · EXP. APRIL 2026 · LICENSED LANDSCAPE ARCHITECT

PROJECT NO:	2323
FILE NAME:	2323LSE
DRAWN BY:	KLO
CHECKED BY:	KLO
X-REFS:	CIVIL
PLOT SCALE:	1:1
DRAWING SCALES:	1:20

DRAWING CONTENTS

BUFFER PLANTING PLAN

DRAWING NO.:

L1

1 OF 1

ORIG. SHEET SIZE 22X34

GENERAL LANDSCAPE NOTES

1. Contractor is responsible for obtaining all necessary permits from the appropriate agency prior to commencing work. Contractor shall contact Line Locators (811) a min. of 48 hours prior to any digging or trenching. If there are any discrepancies with existing lines and landscaping, it is the contractor's responsibility to contact the landscape architect and request a site visit to address the conflicts. Contractor shall comply and conform to any and all local and state codes for work, schedules and any other project related requirements.

2. Contractor shall coordinate directly with the landscape architect for all landscape related issues, concerns, inspections and approvals. Contractor shall provide the landscape architect with a written request for a site visit to address any related items.

3. Scope of work shall include any and all specified and unspecified but related incidental work to achieve the design indicated on the landscape plans. All labor, materials, subcontractors, equipment, and related incidental items shall be supplied and installed to achieve a complete project, unless directed otherwise by the general contractor or landscape architect.

4. Contractor to verify all sub grades are set below required amendments to insure the finished grade will match what is intended by civil or drainage design. All sub grades and finished or final grades shall be graded to drain to the designed drainage system with positive drainage away from all structures.

5. **Grade Preparation:**

a. Slopes used for grass plantings or turf shall be less than 3:1 or 33 percent. Otherwise plantings should not require mechanized mowing equipment.

Soil Preparation.

a. Where soils are compacted, planting beds should be deep tilled to a depth of at least 12 inches. Soils shall be enhanced through the addition of the following materials: bark and forestry by-products, organic matter such as composted yard waste, organics and other amendments as needed through a soils test. Where Pit Planting, see planting detail for planting ring sizes and depths. Scarify the edges of planting pits to encourage root expansion.
b. On project sites where topsoil is limited or nonexistent, a minimum depth of 6 (six) inches of sandy loam topsoil should be tilled into the soil to a depth of 12 inches through all planting areas with compacted soils.
c. For all newly planted areas, three cubic yards of composted organic matter per 1,000 square feet of landscape area should be added to a depth of four inches to the top of the soil and Tilled in.
d. Seeded areas shall be fine graded and rolled. New Soil depths in lawn areas shall be 4 Inches.

6. Mulching of Newly Planted or Replanted Areas.

a. Mulches must be applied to the following depths: a minimum 3 (three) inches over bare soil, and two inches where plant materials will cover.
b. Mulches must include organic materials, such as wood chips and shredded bark.
c. Nonporous materials, such as plastic sheeting, shall not be used in any area of the landscape because of down-slope erosion and potential soil contamination from herbicide washing.
d. Mulch should be applied regularly to and maintained in all planting areas to assist soils in retaining moisture, reducing weed growth, and minimizing erosion.

7. Contractor shall field layout all plant material and contact the landscape architect for a site visit to approve the layout. Any field modifications shall be done by the landscape architect prior to planting.

8. Contractor shall immediately notify the landscape architect of any poor drainage condition in landscape areas. No standing water shall be permitted in any landscape areas - either on the surface or below the topsoil. The landscape architect shall coordinate the drainage solution with the general contractor and civil engineer. Once the concerns have been remedied planting shall commence.

9. All groundcover to be planted in a triangular spacing formation, equal in all directions to the centers of the groundcovers in distances indicated in the legend. Contractor shall verify all quantities of groundcovers by area calculations and spacing requirements.

10. Landscaping is to be per plan. Plant substitutions due to availability or otherwise will be allowed only with landscape architect, owner and agency approval. Any substitutions will be with material of similar size, growth characteristics, and quality.

11. All trees must be staked as necessary so as to maintain material in a healthy, vigorous growing condition.

12. Landscaping shall be installed in a professional workmanlike manner that is consistent and accepted throughout the industry. All landscape and irrigation work shall be performed by experienced persons familiar with scope of project.

13. All landscape material and labor is to be guaranteed for a period of one full year from the time of completion.

14. When planting 'Balled and Burlapped' product, remove all burlap, string & wire from any B&B plant material, cut and remove jute strings. Gently place in tact Rootbal into planting pit. If rootball breaks or is not solid - the plant is unacceptable and shall be replaced.

15. Street trees shall be high branching with canopy that starts at least 6' above finish grade.

16. All plant I.D. tags are to remain on the plant material until final inspection has been completed. Once approved all plant I.D. tags shall be removed and discarded appropriately.

17. Trees shall be cared for in accordance with the American National Standards Institute (ANSI) standard practices for trees, shrubs and other woody plant maintenance (ANSI 300) in order to allow them to reach there mature height and form.

18. Pruning of street trees shall be performed per the ANSI 300 standards so as to maintain the natural form of the tree, encourage vigorous growth to a mature spread and height, and avoid weakening the tree to create a hazard. Street trees shall not be topped pollarded, or otherwise pruned in a manner contrary to these goals, unless there is no practicable alternative that would preserve essential utility services.

19. Plant material selected is drought tolerant or native species. The project proponent (property Owner) shall be responsible for maintaining and watering all plant material throughout the first growing season and in times of drought.

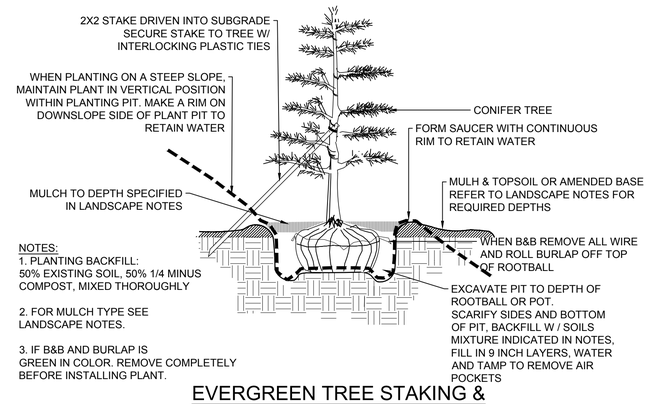
Temporary irrigation shall be provided via TREE GATOR BAGS attached to each tree. The bags shall be filled when $\frac{1}{4}$ empty - approximately 1 time per week and as needed during drought months. The bags will remain on the trees for the establishment period of two summer seasons afterwhich they shall be removed by the owner.

Owner may elect to have the contractor hired to water and warranty the plants for the establishment period. For planting warranties from contractor to be ensured, contractor shall be responsible for watering the plant material and keeping the mulch ring weed free for the first growing season as part of the contract.

It is recommended to install the landscaping in the Spring (February - April) or Fall (October - December)when dormant but before hard freeze.

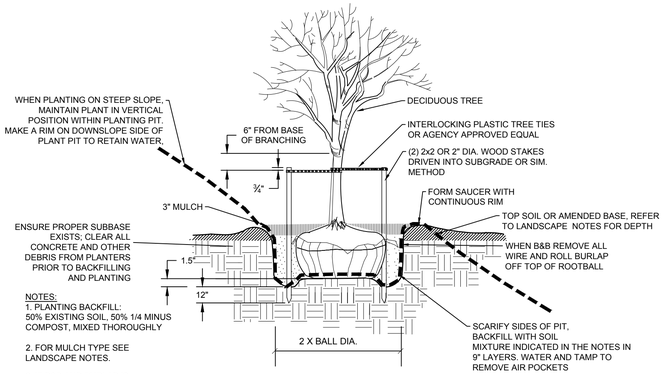
TEMPORARY IRRIGATION

The project proponent shall ensure that a minimum of **one (1) inch of water is supplied each week** to the restoration area between May 1 and October 15 for a least the first two years following initial planting. The calculated amount of required water shall include both natural rainfall and temporary irrigation.



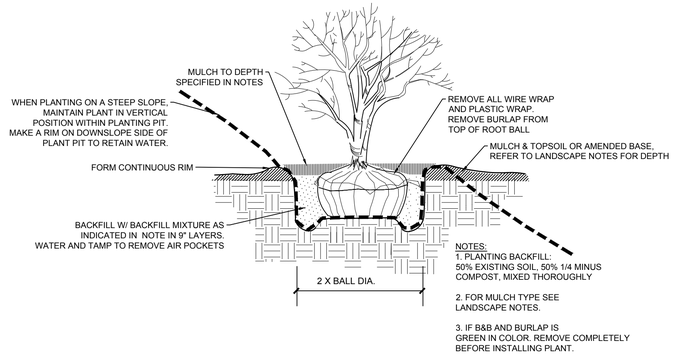
EVERGREEN TREE STAKING & PLANTING DETAIL

No Scale



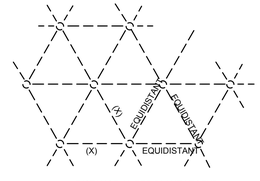
DECIDUOUS TREE PLANTING & STAKING DETAIL

No Scale



SHRUB PLANTING DETAIL

No Scale



DISTANCE (X) PER PLANT LEGEND

NOTES:

ALL GROUNDCOVER SHALL BE PLANTED AT EQUAL TRIANGULAR SPACING AS SPECIFIED IN THE PLANT LEGEND.

LOCATE GROUNDCOVER ONE-HALF OF SPECIFIED ON-CENTER SPACING FROM ANY CURB, SIDEWALK OR OTHER HARD SURFACE.

GROUNDCOVER PLANTING DETAIL

No Scale

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

Nature By Design
Landscape Architecture
1320 Alameda Avenue, Suite B. Fircrest, WA 98466
www.naturebydesigninc.com
253.460.6067

PROJECT:
TODD ROAD BUFFER
320 TODD RD NE
PUYALLUP, WA
HABITAT TECHNOLOGIES

REVISIONS:

B. BUFFER ADJUSTED TO COMMENTS
C. UPDATED TO CIVIL BASE
D. UPDATED BUFFER PROPOSED
E. REVISED TO PLAN BUFFER TO 110 SETBACK

DRAWING ISSUED FOR:
AGENCY REVIEW

DATE: MAY 6, 2025

STATE OF WASHINGTON · CATHERINE OWENS · No.692 · EXP. APRIL 9, 2027 · LICENSED LANDSCAPE ARCHITECT

PROJECT NO:	2323
FILE NAME:	2323LSE
DRAWN BY:	KLO
CHECKED BY:	KLO
X-REFS:	NONE
PLOT SCALE:	1:1
DRAWING SCALES:	N.T.S.

DRAWING CONTENTS

LANDSCAPE DETAILS & NOTES

DRAWING NO.:

L2

2 OF 2

ORIG. SHEET SIZE 22X34

APPENDIX C

Construction Stormwater General Permit (CSWGP)

Stormwater Pollution Prevention Plan (SWPPP)

for

320 Todd Rd Devlopment

Prepared for:
Department of Ecology
City of Puyallup

Permittee / Owner	Developer	Operator / Contractor
EJ Fernandez		TBD

320 Todd Rd NE, Puyallup, WA 98371

Certified Erosion and Sediment Control Lead (CESCL)

Name	Organization	Contact Phone Number

SWPPP Prepared By

Name	Organization	Contact Phone Number
Justin Jones, PE	JMJ Team	(206) 596-2020

SWPPP Preparation Date

06 / 02 / 2025

Project Construction Dates

Activity / Phase	Start Date	End Date
Begin Construction		

GENERAL INSTRUCTIONS AND CAVEATS

This template presents the recommended structure and content for preparation of a Construction Stormwater General Permit (CSWGP) Stormwater Pollution Prevention Plan (SWPPP).

The Department of Ecology's (Ecology) CSWGP requirements inform the structure and content of this SWPPP template; however, **you must customize this template to reflect the conditions of your site.**

A Construction Stormwater Site Inspection Form can be found on Ecology's website.

Using the SWPPP Template

Each section will include instructions and space for information specific to your project. Please read the instructions for each section and provide the necessary information when prompted. This Word template can be modified electronically. You may add/delete text, copy and paste, edit tables, etc. Some sections may be completed with brief answers while others may require several pages of explanation.

Follow this link to a copy of the Construction Stormwater General Permit: https://www.ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Construction-stormwater-permit

Table of Contents

List of Tables

List of Appendices

List of Acronyms and Abbreviations

Acronym / Abbreviation	Explanation
303(d)	Section of the Clean Water Act pertaining to Impaired Waterbodies
BFO	Bellingham Field Office of the Department of Ecology
BMP(s)	Best Management Practice(s)
CESCL	Certified Erosion and Sediment Control Lead
CO_2	Carbon Dioxide
CRO	Central Regional Office of the Department of Ecology
CSWGP	Construction Stormwater General Permit
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
ERO	Eastern Regional Office of the Department of Ecology
ERTS	Environmental Report Tracking System
ESC	Erosion and Sediment Control
GULD	General Use Level Designation
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
NWRO	Northwest Regional Office of the Department of Ecology
pH	Power of Hydrogen
RCW	Revised Code of Washington
SPCC	Spill Prevention, Control, and Countermeasure
su	Standard Units
SWMMEW	Stormwater Management Manual for Eastern Washington
SWMMWW	Stormwater Management Manual for Western Washington
SWPPP	Stormwater Pollution Prevention Plan
TESC	Temporary Erosion and Sediment Control
SWRO	Southwest Regional Office of the Department of Ecology
TMDL	Total Maximum Daily Load
VFO	Vancouver Field Office of the Department of Ecology
WAC	Washington Administrative Code
WSDOT	Washington Department of Transportation
WWHM	Western Washington Hydrology Model

Project Information (1.0)

Project/Site Name: 320 Todd Rd Devlopment
Street/Location: 320 Todd Rd NE
City: Puyallup State: WA Zip code: 98371
Subdivision:
Receiving waterbody: N/A

Existing Conditions (1.1)

Total acreage (including support activities such as off-site equipment staging yards, material storage areas, borrow areas).

Total acreage: 0.762 Acres

Disturbed acreage: 0.762 Acres

Existing structures: None

Landscape topography: Flat

Drainage patterns: Overland Flow to existing landscaping

Existing Vegetation: Trees

Critical Areas (wetlands, streams, high erosion risk, steep or difficult to stabilize slopes): None

List of known impairments for 303(d) listed or Total Maximum Daily Load (TMDL) for the receiving waterbody: None

Table 1 includes a list of suspected and/or known contaminants associated with the construction activity.

Table 1 – Summary of Site Pollutant Constituents

Constituent (Pollutant)	Location	Depth	Concentration
None	N/A	N/A	N/A

Proposed Construction Activities (1.2)

Description of site development (example: subdivision):
The project proposes the renovation of an existing two-story residential building and removal of an existing concrete driveway. The existing concrete will be replaced with an asphalt parking lot and driveway. Additionally, cement concrete walkways will be added to the site.

Description of construction activities (example: site preparation, demolition, excavation):
Construction activities include: Clearing and Grubbing, Sawcutting, Fence Installation, Utility Installation, Asphalt Paving, and Installation of New Gravel.

Description of site drainage including flow from and onto adjacent properties. Must be consistent with Site Map in Appendix A:

The project proposes the construction of a new infiltration gallery, cement concrete pavement, and bioretention cells to allow for infiltration of stormwater into native soils below. An infiltration gallery will infiltrate 100% of the runoff from the proposed roof and asphalt parking lot and driveway. Runoff form the asphalt parking lot and driveway will first sheetflow to one of two bioretention cells to treat the PGIS before entering the underground infiltration gallery. The cement concrete pavement wills sheetflow into the existing landscaping onsite.

Description of final stabilization (example: extent of revegetation, paving, landscaping):
Final stabilization of the site includes the following: On-site paving.

Contaminated Site Information:
Proposed activities regarding contaminated soils or groundwater (example: on-site treatment system, authorized sanitary sewer discharge):

Construction activities are not anticipated to disturb contaminated soils or groundwater on-site, as none are known to exist in the vicinity of the project.

Construction Stormwater Best Management Practices (BMPs) (2.0)

The SWPPP is a living document reflecting current conditions and changes throughout the life of the project. These changes may be informal (i.e. hand-written notes and deletions). Update the SWPPP when the CESCL has noted a deficiency in BMPs or deviation from original design.

The 12 Elements (2.1)

Element 1: Preserve Vegetation / Mark Clearing Limits (2.1.1)

List and describe BMPs:

BMP C102 – Buffer Zones
BMP C103 – High Visibility Plastic or Metal Fence
Lath & Flagging:

Prior to beginning land disturbing activities, including clearing and grading, all clearing limits and trees that are to be preserved within the construction area shall be clearly marked, both in the field and on the plans, to prevent damage and off-site impacts. Barrier fences shall be constructed as shown on the Temporary Erosion & Sediment Control Plans and in accordance with BMP C103.

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Element 2: Establish Construction Access (2.1.2)

List and describe BMPs:

BMP C105 – Stabilized Construction Entrance: The Proposed driveway entrance will be used as a construction entrance. Contractor will maintain the existing driveway approach and road to be free of sediment and debris.

BMP C107 – Construction Road/Parking Area Stabilization:

Adjacent roads and paved areas shall be cleaned thoroughly as needed. Sediment shall be removed from roads by shoveling or pickup sweeping and shall be transported to a controlled sediment disposal area.

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Element 3: Control Flow Rates (2.1.3)

Will you construct stormwater retention and/or detention facilities?
Yes (No)

Will you use permanent infiltration ponds or other low impact development (example: rain gardens, bio-retention, porous pavement) to control flow during construction?
(Yes) No

List and describe BMPs: Properties downstream from the development site shall be protected from erosion due to any increases in the volume, velocity, and peak flow rate stormwater runoff from the project site. If off-site discharges do occur, temporary basins shall be installed prior to the points of discharge.

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Element 4: Install Sediment Controls (2.1.4)

List and describe BMPs:

BMP C230 – Straw Bale Barrier: Straw bale barriers shall be installed as necessary to prevent sediment in construction stormwater from entering existing storm systems.
BMP C233 – Silt Fence: A silt fence will be installed as noted on the TESC plan along existing vegetation to prevent stormwater runoff from leaving the site.
BMP C235 – Straw Wattles: Straw wattle barriers shall be installed as necessary to prevent sediment in construction stormwater from entering existing storm systems.

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Element 5: Stabilize Soils (2.1.5)

West of the Cascade Mountains Crest

Season	Dates	Number of Days Soils Can be Left Exposed
During the Dry Season	May 1 – September 30	7 days
During the Wet Season	October 1 – April 30	2 days

Anticipated project dates: Start date: End date:

Will you construct during the wet season?
(Yes) No

List and describe BMPs: BMP C122 – Nets & Blankets: Nets and Blankets shall be installed to stabilize exposed soils/piles/slopes on site.
BMP C123 – Plastic Covering: Plastic Covering shall be installed to stabilize exposed soils/piles/slopes on site.

All exposed and unworked soils shall be stabilized by application of effective BMPs, which protect the soil from the erosive forces of raindrop impact, flowing water, and wind erosion. From October 1 through April 30, no soils shall remain exposed and unworked for more than 2 days. From May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days. This condition applies to all soils on site, whether at final grade or not. Additionally, except where approved chemical treatment, full dispersion, or infiltration is practiced, clearing, grading, and other soil disturbing activities are prohibited between November 1 and February 28.

In areas where the soils will remain unworked for more than 30 days or have reached final grade, the areas shall be graveled to stabilize exposed soils. If the slope is 2H:1V or greater with at least 10 feet of vertical relief, nets or blankets shall be used according to BMP C122. Sod shall be used in accordance with BMP C124 for disturbed areas that require immediate vegetative cover. Dust control shall be used as needed to prevent wind transport of dust from disturbed soil surfaces and in accordance with BMP C140.

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Element 6: Protect Slopes (2.1.6)

Will steep slopes be present at the site during construction?
Yes (No)

List and describe BMPs:

Slopes will be stabilized as indicated in Element No. 5 above. In addition, the following BMPs may be implemented where appropriate:

BMP C130 – Surface Roughening
BMP C200 – Interceptor Dike and Swale
BMP C205 – Subsurface Drains
BMP C207 – Check Dams

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Element 7: Protect Drain Inlets (2.1.7)

List and describe BMPs: N/A, no existing drainage structures onsite or downstream.

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Element 8: Stabilize Channels and Outlets (2.1.8)

Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches, will be installed at the outlets of all conveyance systems.

List and describe BMPs: BMP C209 – Outlet Proection:

Stabilizing channel and outlets is not applicable as the project will continue to discharge stormwater to the existing stormwater conveyance system on-site.

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Element 9: Control Pollutants (2.1.9)

The following pollutants are anticipated to be present on-site:

Table 2 – Pollutants

Pollutant (and source, if applicable)
N/A

List and describe BMPs: BMP C152 - Sawcutting and Surface Pollution Prevention
BMP C153 – Material Delivery, Storage Containment

All pollutants, including waste materials and demolition debris, that occur on site during construction shall be handled and disposed of in a manner that does not cause contamination of stormwater.

Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site (see Chapter 173 304 WAC for the definition of inert waste). On-site fueling tanks shall include secondary containment.

Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities that may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Spills should be reported to 911. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle. Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations shall be followed for application rates and procedures.

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Will maintenance, fueling, and/or repair of heavy equipment and vehicles occur on-site?

Yes No

List and describe BMPs: BMP C152 - Sawcutting and Surface Pollution Prevention
BMP C153 – Material Delivery, Storage Containment

All pollutants, including waste materials and demolition debris, that occur on site during construction shall be handled and disposed of in a manner that does not cause contamination of stormwater.

Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site (see Chapter 173 304 WAC for the definition of inert waste). On-site fueling tanks shall include secondary containment.

Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities that may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Spills should be reported to 911. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle. Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations shall be followed for application rates and procedures.

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Will wheel wash or tire bath system BMPs be used during construction?
Yes No

List and describe BMPs:

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Will pH-modifying sources be present on-site?

Yes No If yes, check the source(s).

Table 3 – pH-Modifying Sources

	None
	Bulk cement
	Cement kiln dust
	Fly ash
	Other cementitious materials
X	New concrete washing or curing waters
X	Waste streams generated from concrete grinding and sawing
	Exposed aggregate processes
	Dewatering concrete vaults
X	Concrete pumping and mixer washout waters
	Recycled concrete
	Other (i.e. calcium lignosulfate) [please describe]

List and describe BMPs: BMP C152 - Sawcutting and Surface Pollution Prevention
BMP C153 – Material Delivery, Storage Containment

All pollutants, including waste materials and demolition debris, that occur on site during construction shall be handled and disposed of in a manner that does not cause contamination of stormwater.

Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site (see Chapter 173 304 WAC for the definition of inert waste). On-site fueling tanks shall include secondary containment.

Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities that may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Spills should be reported to 911. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle. Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations shall be followed for application rates and procedures.

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Concrete trucks must not be washed out onto the ground, or into storm drains, open ditches, streets, or streams. Excess concrete must not be dumped on-site, except in designated concrete washout areas with appropriate BMPs installed.

Element 10: Control Dewatering (2.1.10)

Table 4 – Dewatering BMPs

	Infiltration
	Transport off-site in a vehicle (vacuum truck for legal disposal)
X	Ecology-approved on-site chemical treatment or other suitable treatment technologies
	Sanitary or combined sewer discharge with local sewer district approval (last resort)
	Use of sedimentation bag with discharge to ditch or swale (small volumes of localized dewatering)

List and describe BMPs:

Installation Schedules:

Inspection and Maintenance plan:

Responsible Staff:

Element 11: Maintain BMPs (2.1.11)

All temporary and permanent Erosion and Sediment Control (ESC) BMPs shall be maintained and repaired as needed to ensure continued performance of their intended function.

Maintenance and repair shall be conducted in accordance with each particular BMP specification (see *Volume II of the SWMMWW or Chapter 7 of the SWMMEW*).

Visual monitoring of all BMPs installed at the site will be conducted at least once every calendar week and within 24 hours of any stormwater or non-stormwater discharge from the site. If the site becomes inactive and is temporarily stabilized, the inspection frequency may be reduced to once every calendar month.

All temporary ESC BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed.

Trapped sediment shall be stabilized on-site or removed. Disturbed soil resulting from removal of either BMPs or vegetation shall be permanently stabilized.

Additionally, protection must be provided for all BMPs installed for the permanent control of stormwater from sediment and compaction. BMPs that are to remain in place following completion of construction shall be examined and restored to full operating condition. If sediment enters these BMPs during construction, the sediment shall be removed and the facility shall be returned to conditions specified in the construction documents.

Element 12: Manage the Project (2.1.12)

Clearing and grading activities for developments shall be permitted only if conducted pursuant to an approved site development plan (e.g., subdivision approval) that establishes permitted areas of clearing, grading, cutting, and filling. These permitted clearing and grading areas and any other areas required to preserve critical or sensitive areas, buffers, native growth protection easements, or tree retention areas as may be required by local jurisdictions, shall be delineated on the site plans and the development site.

Turbidity: For storms up to the water quality design event, turbidity downstream of a construction site may not increase more than 5 NTU, if upstream turbidity is 50 NTU or less, and may not increase more than 10 percent, if upstream turbidity is over 50 NTU. To the extent practicable, samples should be taken far enough downstream so that the construction site discharge has been well-mixed with the surface water. Whenever inspection and/or monitoring reveals that the BMPs identified in the Construction SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMPs or design changes shall be implemented as soon as possible.

pH: shall be within the range of 6.5 to 8.5 (freshwater) or 7.0 to 8.5 (marine water) with a human-caused variation within a range of less than 0.2 units. For Class A and lower water classifications, the permissible induced increase is 0.5 units (Stormwater Management Manual for Western Washington, Department of Ecology, February 2005 Edition).

A Certified Erosion and Sediment Control Specialist be identified by the contractor at a later date. This information will be added to this CSWPPP.

Table 5 – Management

X	Design the project to fit the existing topography, soils, and drainage patterns
X	Emphasize erosion control rather than sediment control
X	Minimize the extent and duration of the area exposed
X	Keep runoff velocities low
X	Retain sediment on-site
X	Thoroughly monitor site and maintain all ESC measures
X	Schedule major earthwork during the dry season
	Other (please describe)

Table 6 – BMP Implementation Schedule

Phase of Construction Project	Stormwater BMPs	Date	Wet/Dry Season
[Insert construction activity]	[Insert BMP]	[MM/DD/YYYY]	[Insert Season]
Phase of Construction Project	**Stormwater BMPs**	**Date**	**Wet/Dry Season**

[Insert construction activity]	[Insert BMP]	[MM/DD/YYYY]	[Insert Season]

Element 13: Protect Low Impact Development (LID) BMPs (2.1.13)

Protect all permeable pavement BMPs from sedimentation through installation and maintenance of erosion

and sediment control BMPs on portions of the site that drain into the permeable pavement BMPs. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden permeable pavement soils, and replacing the removed soils with soils meeting the design specification.

Prevent compacting of soils in areas of new permeable pavement BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.

Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements or base materials.

Pavement fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures in accordance with this manual or the manufacturer's procedures.

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

Pollution Prevention Team (3.0)

Table 7 – Team Information

Title	Name(s)	Phone Number
Certified Erosion and Sediment Control Lead (CESCL)		
Resident Engineer		
Emergency Ecology Contact		
Emergency Permittee/ Owner Contact		
Non-Emergency Owner Contact		
Monitoring Personnel		
Ecology Regional Office	[Insert Regional Office]	[Insert General Number]

Monitoring and Sampling Requirements (4.0)

Monitoring includes visual inspection, sampling for water quality parameters of concern, and documentation of the inspection and sampling findings in a site log book. A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Stormwater sampling data

File a blank form under Appendix D.

The site log book must be maintained on-site within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

Numeric effluent limits may be required for certain discharges to 303(d) listed waterbodies. See CSWGP Special Condition S8 and Section 5 of this template.

Complete the following paragraph for sites that discharge to impaired waterbodies for fine sediment, turbidity, phosphorus, or pH:

The receiving waterbody, insert waterbody name, is impaired for: insert impairment. All stormwater and dewatering discharges from the site are subject to an **effluent limit** of 8.5 su for pH and/or 25 NTU for turbidity.

Site Inspection (4.1)

Site inspections will be conducted at least once every calendar week and within 24 hours following any discharge from the site. For sites that are temporarily stabilized and inactive, the required frequency is reduced to once per calendar month.

The discharge point(s) are indicated on the Site Map (see Appendix A) and in accordance with the applicable requirements of the CSWGP.

Stormwater Quality Sampling (4.2)

Turbidity Sampling (4.2.1)

Requirements include calibrated turbidity meter or transparency tube to sample site discharges for compliance with the CSWGP. Sampling will be conducted at all discharge points at least once per calendar week.

Method for sampling turbidity:

Table 8 – Turbidity Sampling Method

	Turbidity Meter/Turbidimeter (required for disturbances 5 acres or greater in size)
X	Transparency Tube (option for disturbances less than 1 acre and up to 5 acres in size)

The benchmark for turbidity value is 25 nephelometric turbidity units (NTU) and a transparency less than 33 centimeters.

If the discharge's turbidity is 26 to 249 NTU **or** the transparency is less than 33 cm but equal to or greater than 6 cm, the following steps will be conducted:

1. Review the SWPPP for compliance with Special Condition S9. Make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.
3. Document BMP implementation and maintenance in the site log book.

If the turbidity exceeds 250 NTU **or** the transparency is 6 cm or less at any time, the following steps will be conducted:

1. Telephone or submit an electronic report to the applicable Ecology Region's Environmental Report Tracking System (ERTS) within 24 hours. https://www.ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue
    - Central Region (Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima): (509) 575-2490
    - Eastern Region (Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman): (509) 329-3400
    - Northwest Region (King, Kitsap, Island, San Juan, Skagit, Snohomish, Whatcom): (425) 649-7000
    - Southwest Region (Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum,): (360) 407-6300
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period
3. Document BMP implementation and maintenance in the site log book.
4. Continue to sample discharges daily until one of the following is true:
    - Turbidity is 25 NTU (or lower).
    - Transparency is 33 cm (or greater).
    - Compliance with the water quality limit for turbidity is achieved.
        - 1 - 5 NTU over background turbidity, if background is less than 50 NTU
        - 1% - 10% over background turbidity, if background is 50 NTU or greater
    - The discharge stops or is eliminated.

pH Sampling (4.2.2)

pH monitoring is required for “Significant concrete work” (i.e. greater than 1000 cubic yards poured concrete or recycled concrete over the life of the project).The use of engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD] or fly ash) also requires pH monitoring.

For significant concrete work, pH sampling will start the first day concrete is poured and continue until it is cured, typically three (3) weeks after the last pour.

For engineered soils and recycled concrete, pH sampling begins when engineered soils or recycled concrete are first exposed to precipitation and continues until the area is fully stabilized.

If the measured pH is 8.5 or greater, the following measures will be taken:

1. Prevent high pH water from entering storm sewer systems or surface water.
2. Adjust or neutralize the high pH water to the range of 6.5 to 8.5 su using appropriate technology such as carbon dioxide (CO_2) sparging (liquid or dry ice).
3. Written approval will be obtained from Ecology prior to the use of chemical treatment other than CO_2 sparging or dry ice.

Method for sampling pH:

Table 8 – pH Sampling Method

	pH meter
	pH test kit
	Wide range pH indicator paper

Discharges to 303(d) or Total Maximum Daily Load (TMDL) Waterbodies (5.0)

303(d) Listed Waterbodies (5.1)

Is the receiving water 303(d) (Category 5) listed for turbidity, fine sediment, phosphorus, or pH?

Yes No

List the impairment(s):

[Insert text here]

The receiving waterbody, insert waterbody name, is impaired for: insert impairment. All stormwater and dewatering discharges from the site are subject to an **effluent limit** of 8.5 su for pH and/or 25 NTU for turbidity.

List and describe BMPs:

[Insert text here]

TMDL Waterbodies (5.2)

Waste Load Allocation for CWSGP discharges:

[Insert text here]

List and describe BMPs:

[Insert text here]

Discharges to TMDL receiving waterbodies will meet in-stream water quality criteria at the point of discharge.

The Construction Stormwater General Permit Proposed New Discharge to an Impaired Water Body form is included in Appendix F.

Reporting and Record Keeping (6.0)

Record Keeping (6.1)

Site Log Book (6.1.1)

A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Sample logs

Records Retention (6.1.2)

Records will be retained during the life of the project and for a minimum of three (3) years following the termination of permit coverage in accordance with Special Condition S5.C of the CSWGP.

Permit documentation to be retained on-site:

- CSWGP
- Permit Coverage Letter
- SWPPP
- Site Log Book

Permit documentation will be provided within 14 days of receipt of a written request from Ecology. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with Special Condition S5.G.2.b of the CSWGP.

Updating the SWPPP (6.1.3)

The SWPPP will be modified if:

- Found ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site.
- There is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

The SWPPP will be modified within seven (7) days if inspection(s) or investigation(s) determine additional or modified BMPs are necessary for compliance. An updated timeline for BMP implementation will be prepared.

Reporting (6.2)

Discharge Monitoring Reports (6.2.1)

Cumulative soil disturbance is less than one (1) acre; therefore, Discharge Monitoring Reports (DMRs) will not be submitted to Ecology because water quality sampling is not being conducted at the site.

Cumulative soil disturbance is one (1) acre or larger; therefore, Discharge Monitoring Reports (DMRs) will be submitted to Ecology monthly. If there was no discharge during a given monitoring period the DMR will be submitted as required, reporting "No Discharge". The DMR due date is fifteen (15) days following the end of each calendar month.

DMRs will be reported online through Ecology's WQWebDMR System.

https://www.ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/WQWebPortal-guidance

Notification of Noncompliance (6.2.2)

If any of the terms and conditions of the permit is not met, and the resulting noncompliance may cause a threat to human health or the environment, the following actions will be taken:

1. Ecology will be notified within 24-hours of the failure to comply by calling the applicable Regional office ERTS phone number (Regional office numbers listed below).
2. Immediate action will be taken to prevent the discharge/pollution or otherwise stop or correct the noncompliance. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results submitted to Ecology within five (5) days of becoming aware of the violation.
3. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

Anytime turbidity sampling indicates turbidity is 250 NTUs or greater, or water transparency is 6 cm or less, the Ecology Regional office will be notified by phone within 24 hours of analysis as required by Special Condition S5.A of the CSWGP.

- Central Region at (509) 575-2490 for Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, or Yakima County

- Eastern Region at (509) 329-3400 for Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, or Whitman County
- Northwest Region at (425) 649-7000 for Island, King, Kitsap, San Juan, Skagit, Snohomish, or Whatcom County
- Southwest Region at (360) 407-6300 for Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, or Wahkiakum

Include the following information:

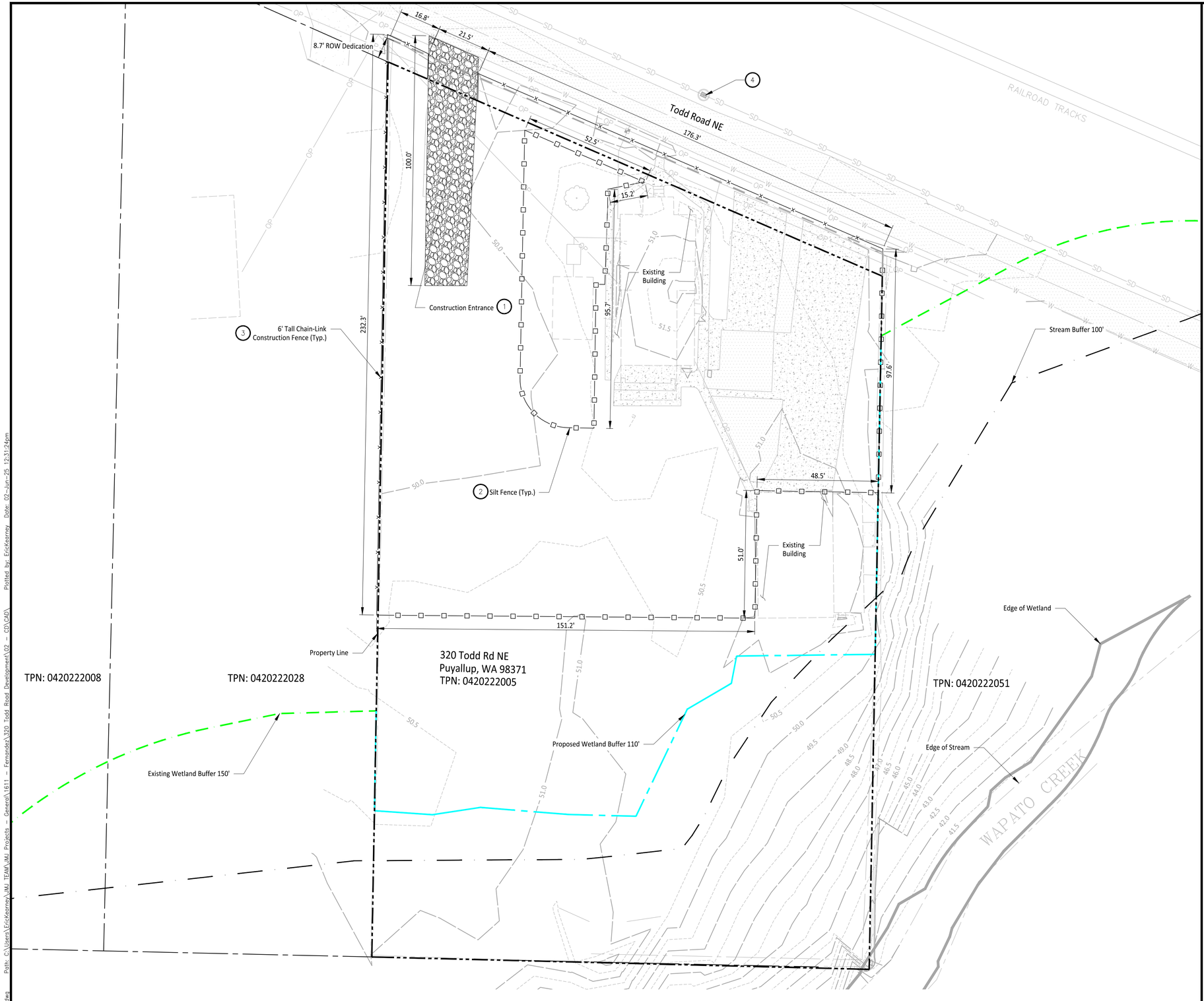
1. Your name and / Phone number
2. Permit number
3. City / County of project
4. Sample results
5. Date / Time of call
6. Date / Time of sample
7. Project name

In accordance with Special Condition S4.D.5.b of the CSWGP, the Ecology Regional office will be notified if chemical treatment other than CO_2 sparging is planned for adjustment of high pH water.

Appendix/Glossary

A. Site Map
B. BMP Detail
C. Correspondence
D. Site Inspection Form
E. Construction Stormwater General Permit (CSWGP)
F. 303(d) List Waterbodies / TMDL Waterbodies Information
G. Contaminated Site Information
H. Engineering Calculations

Appendix A: Site Map



LEGEND

- Silt Fence
- Construction Fence
- Property Line
- ROW Line
- Construction Entrance

(#) CONSTRUCTION NOTES

1. Maintain construction entrance per City of Puyallup Standard Detail 05.01.01 and install wheel wash as needed per Washington DOE BMP C106.
2. Install silt fence per City of Puyallup Standard Detail 02.03.02. Silt Fence to mark clearing limits in the field.
3. Install Construction Fencing per DOE BMP C103.
4. Install Inlet Protection per WSDOT Std. Plan I-40.20-00.

GENERAL NOTES

1. Construct Pipe trench bedding and backfill as necessary per City of Puyallup Standard Detail 06.01.01.
2. Install straw bale barriers, wattles, and other necessary TESC measures as required.
3. Exposed soils shall be watered as necessary to prevent dust from leaving the site.
4. All concrete handling and equipment washing shall be in accordance with Washington DOE BMP C151.
5. Install high visibility construction fence where silt fence is not required as shown per DOE BMP C103.
6. A CESCL shall be available on-site or on-call for the duration of construction operations.
7. From April 1 to October 31 all disturbed areas at final grade & all exposed areas that are scheduled to remain unworked for 30+ days shall be stabilized within 10 days. From November 1 to March 31 all exposed soils at final grade shall be stabilized immediately using permanent or temporary measures. Exposed soils with an area +5,000 sqft that are scheduled to remain unworked for more than 24 hrs and exposed areas of less than 5,000 sqft that will remain unworked for more than 7 days shall be stabilized immediately. All disturbed areas which are not planned to be constructed on within 90 days from time of clearing & grading shall be revegetated with the native vegetation.
8. All BMP's per City of Puyallup standards and protection CSWPPP.
9. If necessary, alternative sediment control methods shall be submitted by the contractor for review and approval prior to construction.
10. Protect Low Impact Development BMPs

A. Protect all Permeable Pavement and Infiltration Areas from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that utilize infiltration BMPs. Leave infiltration areas high and/or place silt fence around the areas to ensure runoff will not accumulate silt within the subgrade. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden Bioretention/rain garden soils, and replacing the removed soils with soils meeting the design specification.

B. Prevent compacting Permeable Pavement and Infiltration BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.

C. Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements or base materials.

D. Pavement fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures in accordance with this manual or the manufacturer's procedures.

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

CONSTRUCTION SEQUENCE

1. Hold a preconstruction meeting with the City and obtain required permits.
2. Establish clearing and grading limits.
3. Construct temporary construction entrance.
4. Construct perimeter ditches, silt fences, and other erosion control devices as shown.
5. Construct protection devices for critical areas and significant trees proposed for retention.
6. Schedule an erosion control inspection with the City.
7. Clearly state at what point grading activities can begin, usually only after all drainage and erosion control measures are in place.
8. Identify erosion control measures which require regular maintenance.

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.

CALL TWO BUSINESS DAYS BEFORE YOU DIG
1-800-424-5555
UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:
EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:
Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:
JMJ TEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:
320 Todd Road Development

ONE INCH AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES · STATE OF WASHINGTON · 41829 · REGISTERED PROFESSIONAL ENGINEER
06-02-25

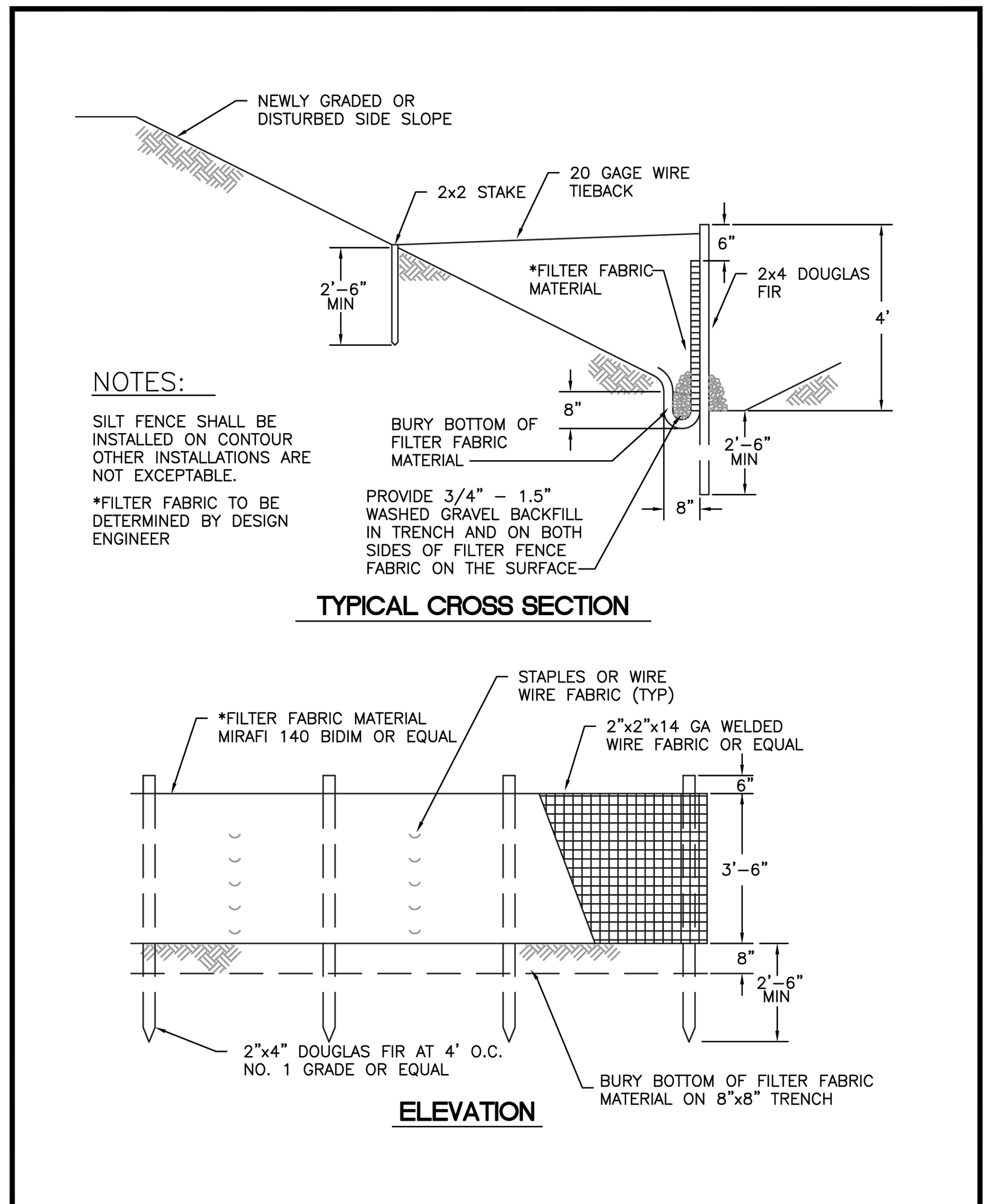
REV	DATE	DESCRIPTION

SHEET TITLE:
TESC Plan

PROJ. NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones

SHEET NUMBER:
C2-101

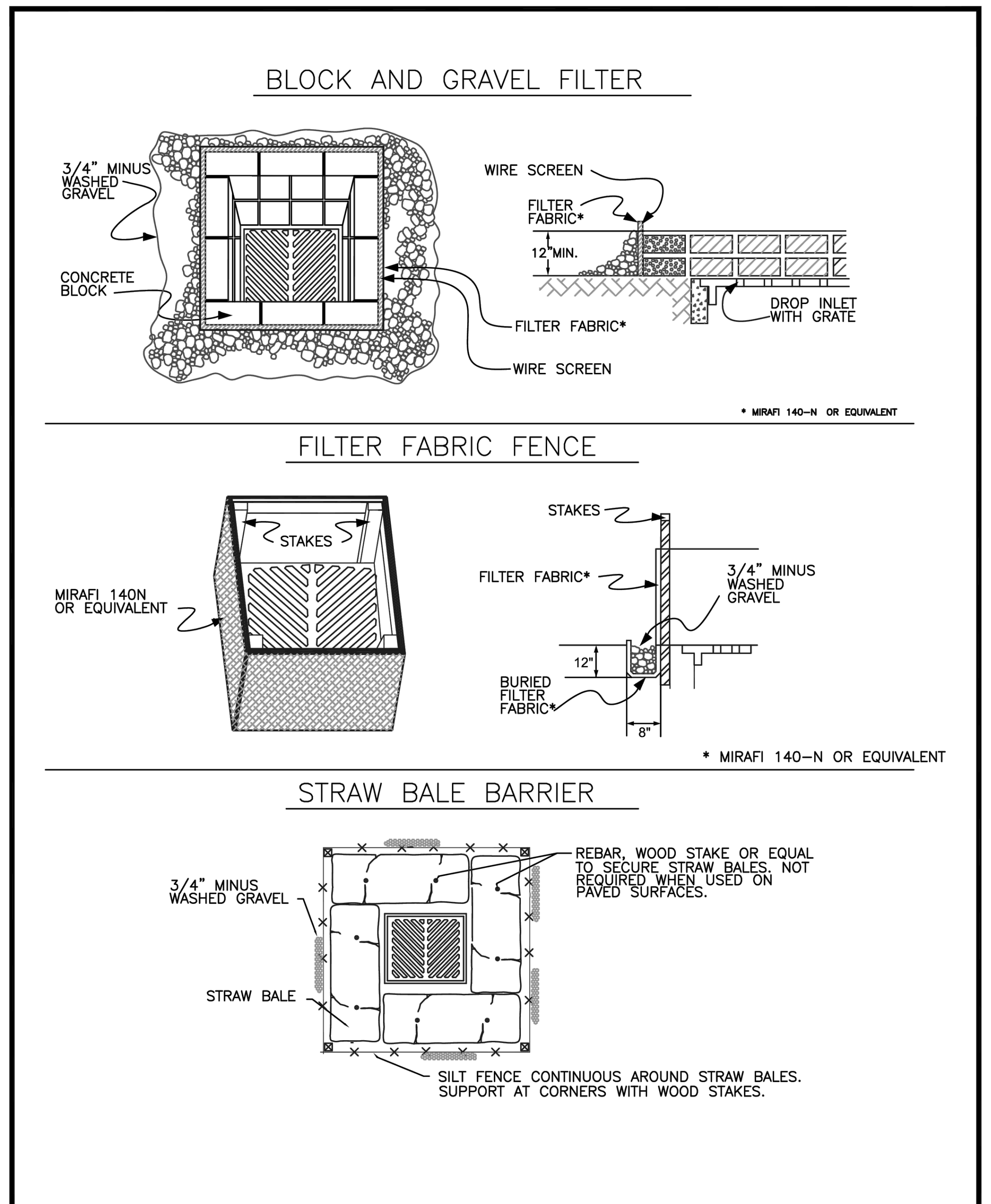
DWG.
9 OF 31



CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

SILTATION FENCE

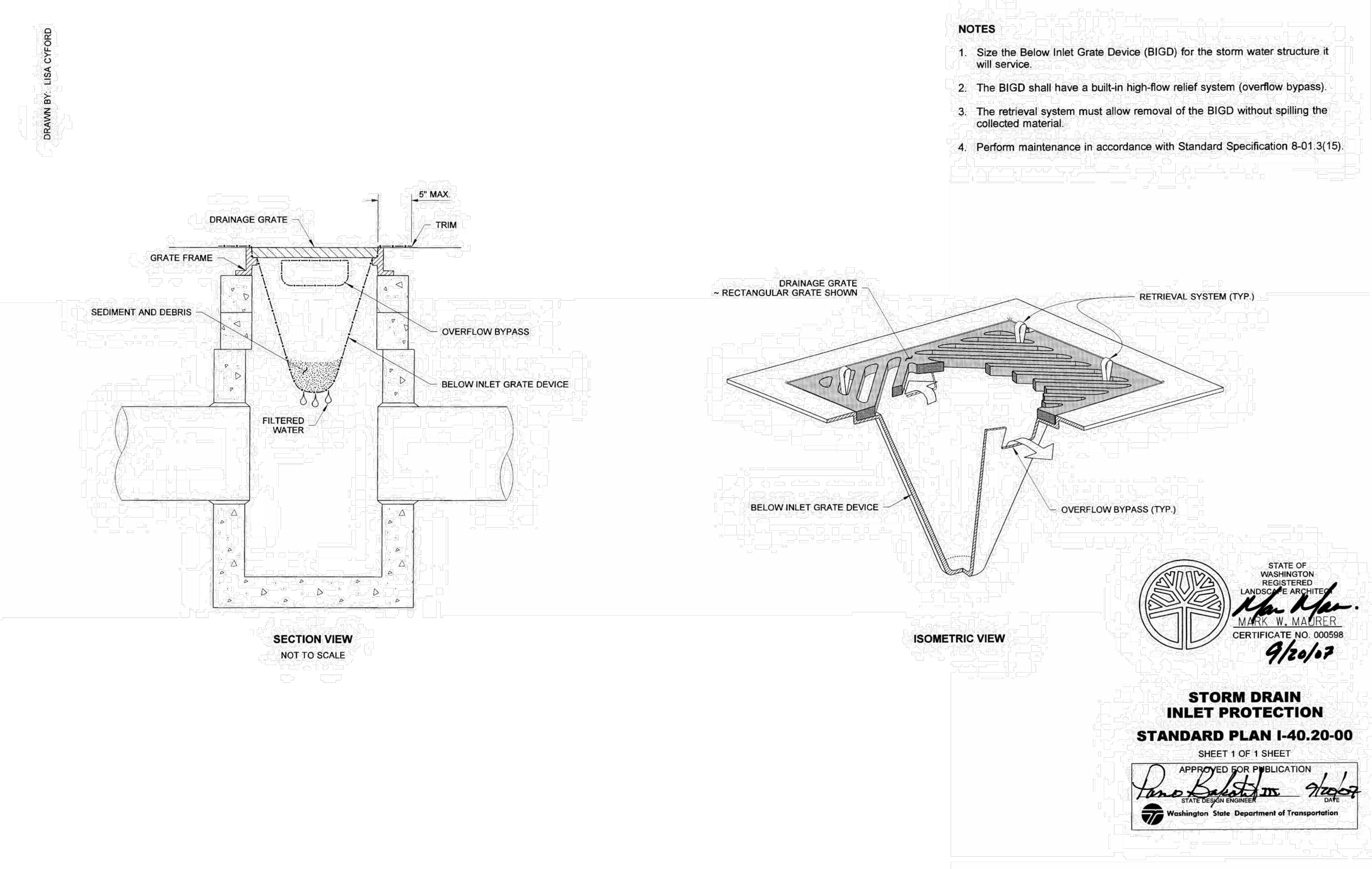
DRAWN BY LINDA LANSING | CHECKED BY LINDA LIAN | APPROVED BY COLLEEN HARRIS | REVISED BY XXXX | CITY STANDARD
DATE APPROVED 09/01/1992 | DATE REVISED 06/01/2003 | SCALE NTS | 02.03.02



CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

STORM DRAIN BARRIERS

DRAWN BY LINDA LANSING | CHECKED BY LINDA LIAN | APPROVED BY COLLEEN HARRIS | REVISED BY XXXX | CITY STANDARD
DATE APPROVED 09/01/1992 | DATE REVISED 06/01/2003 | SCALE NTS | 02.03.05



NOTES

1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
MARK W. MAURER
CERTIFICATE NO. 000598
9/20/07

STORM DRAIN INLET PROTECTION
STANDARD PLAN I-40.20-00
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
STATE DESIGN ENGINEER
Washington State Department of Transportation

CONDITIONS WHERE PRACTICE APPLIES

1. BLOCK AND GRAVEL FILTER – APPLICABLE FOR AREAS GREATER THAN 5% SLOPE.
2. FILTER FABRIC FENCE – APPLICABLE WHERE THE INLET DRAINS A RELATIVELY SMALL (ONE ACRE OR LESS) AND FLAT AREA (LESS THAN 5% SLOPE).
3. STRAW BALE BARRIER – APPLICABLE WHERE INLET DRAINS A RELATIVELY FLAT DISTURBED AREA (LESS THAN 5% SLOPE) IN WHICH SHEET FLOW (NOT EXCEEDING 0.5 FT/SEC.) OCCURES. BARRIERS OF THIS TYPE SHOULD NOT BE PLACED AROUND INLETS RECEIVING CONCENTRATED FLOWS SUCH AS THOSE ALONG MAJOR STREETS AND HIGHWAYS.

1. BLOCK AND GRAVEL FILTER – INSTALLATION PROCEDURE

A: PLACE WIRE MESH OVER THE DROP INLET SO THAT THE WIRE EXTENDS A MINIMUM OF ONE FOOT BEYOND EACH SIDE OF THE INLET STRUCTURE. USE WIRE SCREEN WITH 1/2-INCH OPENINGS. IF MORE THAN ONE STRIP OF MESH IS NECESSARY, OVERLAP THE STRIPS. PLACE FILTER FABRIC* OVER WIRE MESH.

B: PLACE CONCRETE BLOCKS LENGTHWISE ON THEIR SIDES IN A SINGLE ROW AROUND THE PERIMETER OF THE INLET, SO THAT THE OPEN ENDS FACE OUTWARD, NOT UPWARD. THE ENDS OF ADJACENT BLOCKS SHOULD ABUT. THE HIEGHT OF THE BARRIER CAN BE VARIED, DEPENDING ON DESIGN NEEDS, BY STACKING COMBINATIONS OF BLOCKS THAT ARE 4-INCH, 8-INCH AND 12-INCH WIDE. THE ROW OF BLOCKS SHOULD BE AT LEAST 12-INCHES BUT NO GREATER THAN 24-INCHES HIGH.

C: PLACE WIRE SCREEN OVER THE OVERSIDE VERTICAL FACE (OPEN END) OF THE CONCRETE BLOCKS TO PREVENT STONES FROM BEING WASHED THROUGH THE BLOCKS. USE WIRE SCREEN WITH 1/2-INCH OPENINGS.

D: PILE STONES AGAINST THE WIRE MESH TO THE TOP OF THE BLOCKS. USE 3/4" MINUS WASHED GRAVEL.

2. FILTER FABRIC FENCE – INSTALLATION PROCEDURE

A: PLACE 2-INCH BY 2-INCH WOODEN STAKES AROUND THE PERIMETER OF THE INLET A MAXIMUM OF 3 FEET APART AND DRIVE THEM AT LEAST 8-INCHES INTO THE GROUND. THE STAKES MUST BE AT LEAST 3 FEET LONG.

B: EXCAVATE A TRENCH APPROXIMATELY 8-INCHES WIDE AND 12-INCHES DEEP AROUND THE OUTSIDE PERIMETER OF THE STAKES.

C: STAPLE THE FILTER FABRIC* TO THE WOODEN STAKES SO THAT 32-INCHES OF THE FABRIC EXTENDS AND CAN BE FORMED INTO THE TRENCH, AND USE HEAVY-DUTY WIRE STAPLES AT LEAST 1/2-INCHES LONG.

D: BACKFILL THE TRENCH WITH 3/4-INCH MINUS WASHED GRAVEL ALL THE WAY AROUND.

3. STRAW BALE BARRIER – INSTALLATION PROCEDURE

A: EXCAVATE A 4-INCH DEEP TRENCH AROUND THE INLET. MAKE THE TRENCH AS WIDE AS A STRAW BALE.

B: ORIENT STRAW BALES WITH THE BINDINGS AROUND THE SIDES OF THE BALES RATHER THAN OVER AND UNDER THE BALES.

C: PLACE BALES LENGTHWISE AROUND THE INLET AND PRESS THE ENDS OF ADJACENT BALES SECURELY IN PLACE.

D: DRIVE TWO 2-INCH BY 2-INCH STAKES THROUGH EACH BALE TO ANCHOR THE BALE SECURELY IN PLACE.

E: BACKFILL THE EXCAVATED SOIL AND COMPACT IT AGAINST THE BALE.

F: WEDGE LOOSE STRAW BETWEEN BALES TO PREVENT WATER FROM FLOWING BETWEEN BALES.

* MIRAFI 140-N OR EQUIVALENT

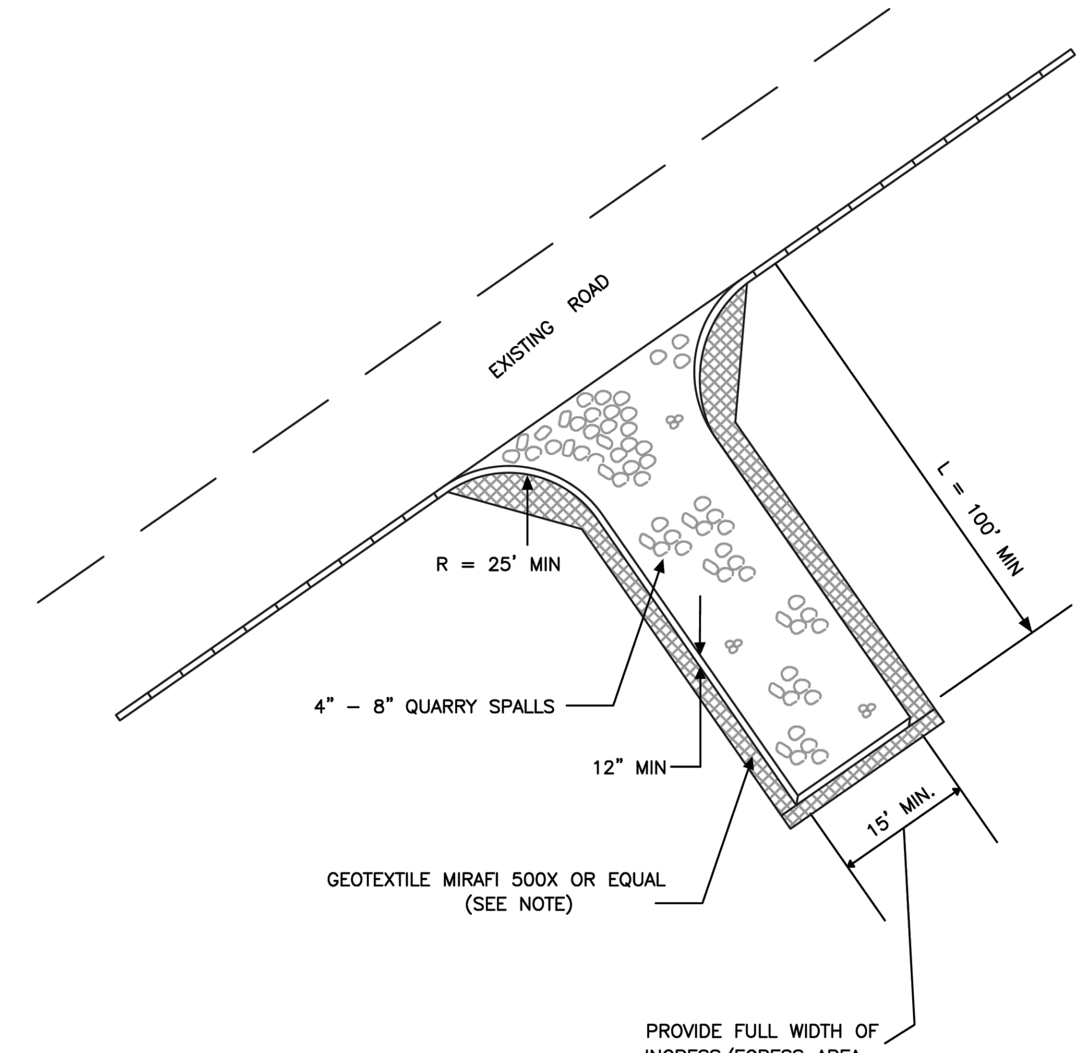
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

STORM DRAIN BARRIERS NOTES

DRAWN BY LINDA LANSING | CHECKED BY LINDA LIAN | APPROVED BY COLLEEN HARRIS | REVISED BY XXXX | CITY STANDARD
DATE APPROVED 09/01/1992 | DATE REVISED 06/01/2003 | SCALE NTS | 02.03.06

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.



CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

TEMPORARY CONSTRUCTION ENTRANCE

DRAWN BY JIM ERWIN-SVOBODA | CHECKED BY LINDA LIAN | APPROVED BY COLLEEN HARRIS | REVISED BY XXXX | CITY STANDARD
DATE APPROVED 07/01/2009 | DATE REVISED XX/XX/XX | SCALE 1:40 | 05.01.01

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

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

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

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

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

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

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

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

GRADING, EROSION, AND SEDIMENTATION CONTROL NOTES

DRAWN BY JIM ERWIN-SVOBODA | CHECKED BY LINDA LIAN | APPROVED BY COLLEEN HARRIS | REVISED BY LINDA LIAN | CITY STANDARD
DATE APPROVED 07/01/2009 | DATE REVISED 11/18/2014 | SCALE 1:1 | 05.02.01

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.

CALL TWO BUSINESS DAYS BEFORE YOU DIG
1-800-424-5555
UTILITIES UNDERGROUND LOCATION CENTER

Owner/Developer:
EJ Fernandez
PO Box 309
Sumner, WA 98390

Architect:
Garner Miller
msgs Carve Architects
510 Capitol Way South
Olympia, WA 98501

Engineer:
JMJTEAM
Justin Jones, PE
PO Box 2066
Sumner, WA 98390
(206) 596-2020

Project:
320 Todd Road Development

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY

Civil Construction Permit

JUSTIN M. JONES, STATE OF WASHINGTON, 41829, REGISTERED PROFESSIONAL ENGINEER
06-02-25

REV	DATE	DESCRIPTION

SHEET TITLE:
TESC Details

PROJ NO: 1611-001
DATE: June 02, 2025
DRAWN BY: E. Kearney
DESIGN BY: J. Jones
SHEET NUMBER: C2-201
DWG: 10 OF 31

Appendix B: BMP Detail

Appendix C: correspondence

Appendix D: Site Inspection Form

Appendix E: Construction Stormwater General Permit (CSWGP)

Appendix F: 303(d) List Waterbodies / TMDL Waterbodies Information

Appendix G: Contaminated Site Information

Appendix H: Engineering Calculations

APPENDIX D

WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: Flow Control and Treatment
Site Name:
Site Address:
City:

Report Date:	6/2/2025
Gage:	38 IN CENTRAL
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2024/06/28
Version:	4.3.1

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
C, Forest, Flat	0.762
Pervious Total	0.762
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.762

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Mitigated Land Use

West Drive Aisle and Curbing

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.19
Impervious Total	0.19
Basin Total	0.19

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Surface retention 1	Surface retention 1	

East Drive Aisle, Curbing, and Ramp

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.088
SIDEWALKS FLAT	0.002
Impervious Total	0.09
Basin Total	0.09

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Surface retention 2	Surface retention 2	

Landscaping and Concrete Bypass

Bypass:	Yes
GroundWater:	No

Pervious Land Use	acre
A B, Pasture, Flat	0.417
Pervious Total	0.417

Impervious Land Use	acre
SIDEWALKS FLAT	0.002
Impervious Total	0.002
Basin Total	0.419

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1

Roof

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.063
Impervious Total	0.063
Basin Total	0.063

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Gravel Trench Bed 1

Routing Elements
Predeveloped Routing

Mitigated Routing

Gravel Trench Bed 1

Bottom Length:	84.00 ft.
Bottom Width:	23.00 ft.
Trench bottom slope 1:	0 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	3
Pour Space of material for first layer:	0.33
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	0.85
Infiltration safety factor:	1
Total Volume Infiltrated (ac-ft.):	145.951
Total Volume Through Riser (ac-ft.):	0.025
Total Volume Through Facility (ac-ft.):	145.976
Percent Infiltrated:	99.98
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	2.9 ft.
Riser Diameter:	4 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.044	0.000	0.000	0.000
0.0333	0.044	0.000	0.000	0.038
0.0667	0.044	0.001	0.000	0.038
0.1000	0.044	0.001	0.000	0.038
0.1333	0.044	0.002	0.000	0.038
0.1667	0.044	0.002	0.000	0.038
0.2000	0.044	0.002	0.000	0.038
0.2333	0.044	0.003	0.000	0.038
0.2667	0.044	0.003	0.000	0.038
0.3000	0.044	0.004	0.000	0.038
0.3333	0.044	0.004	0.000	0.038
0.3667	0.044	0.005	0.000	0.038
0.4000	0.044	0.005	0.000	0.038
0.4333	0.044	0.006	0.000	0.038
0.4667	0.044	0.006	0.000	0.038
0.5000	0.044	0.007	0.000	0.038
0.5333	0.044	0.007	0.000	0.038
0.5667	0.044	0.008	0.000	0.038
0.6000	0.044	0.008	0.000	0.038
0.6333	0.044	0.009	0.000	0.038
0.6667	0.044	0.009	0.000	0.038
0.7000	0.044	0.010	0.000	0.038
0.7333	0.044	0.010	0.000	0.038

0.7667	0.044	0.011	0.000	0.038
0.8000	0.044	0.011	0.000	0.038
0.8333	0.044	0.012	0.000	0.038
0.8667	0.044	0.012	0.000	0.038
0.9000	0.044	0.013	0.000	0.038
0.9333	0.044	0.013	0.000	0.038
0.9667	0.044	0.014	0.000	0.038
1.0000	0.044	0.014	0.000	0.038
1.0333	0.044	0.015	0.000	0.038
1.0667	0.044	0.015	0.000	0.038
1.1000	0.044	0.016	0.000	0.038
1.1333	0.044	0.016	0.000	0.038
1.1667	0.044	0.017	0.000	0.038
1.2000	0.044	0.017	0.000	0.038
1.2333	0.044	0.018	0.000	0.038
1.2667	0.044	0.018	0.000	0.038
1.3000	0.044	0.019	0.000	0.038
1.3333	0.044	0.019	0.000	0.038
1.3667	0.044	0.020	0.000	0.038
1.4000	0.044	0.020	0.000	0.038
1.4333	0.044	0.021	0.000	0.038
1.4667	0.044	0.021	0.000	0.038
1.5000	0.044	0.022	0.000	0.038
1.5333	0.044	0.022	0.000	0.038
1.5667	0.044	0.022	0.000	0.038
1.6000	0.044	0.023	0.000	0.038
1.6333	0.044	0.023	0.000	0.038
1.6667	0.044	0.024	0.000	0.038
1.7000	0.044	0.024	0.000	0.038
1.7333	0.044	0.025	0.000	0.038
1.7667	0.044	0.025	0.000	0.038
1.8000	0.044	0.026	0.000	0.038
1.8333	0.044	0.026	0.000	0.038
1.8667	0.044	0.027	0.000	0.038
1.9000	0.044	0.027	0.000	0.038
1.9333	0.044	0.028	0.000	0.038
1.9667	0.044	0.028	0.000	0.038
2.0000	0.044	0.029	0.000	0.038
2.0333	0.044	0.029	0.000	0.038
2.0667	0.044	0.030	0.000	0.038
2.1000	0.044	0.030	0.000	0.038
2.1333	0.044	0.031	0.000	0.038
2.1667	0.044	0.031	0.000	0.038
2.2000	0.044	0.032	0.000	0.038
2.2333	0.044	0.032	0.000	0.038
2.2667	0.044	0.033	0.000	0.038
2.3000	0.044	0.033	0.000	0.038
2.3333	0.044	0.034	0.000	0.038
2.3667	0.044	0.034	0.000	0.038
2.4000	0.044	0.035	0.000	0.038
2.4333	0.044	0.035	0.000	0.038
2.4667	0.044	0.036	0.000	0.038
2.5000	0.044	0.036	0.000	0.038
2.5333	0.044	0.037	0.000	0.038
2.5667	0.044	0.037	0.000	0.038
2.6000	0.044	0.038	0.000	0.038
2.6333	0.044	0.038	0.000	0.038
2.6667	0.044	0.039	0.000	0.038

2.7000	0.044	0.039	0.000	0.038
2.7333	0.044	0.040	0.000	0.038
2.7667	0.044	0.040	0.000	0.038
2.8000	0.044	0.041	0.000	0.038
2.8333	0.044	0.041	0.000	0.038
2.8667	0.044	0.042	0.000	0.038
2.9000	0.044	0.042	0.000	0.038
2.9333	0.044	0.042	0.021	0.038
2.9667	0.044	0.043	0.058	0.038
3.0000	0.044	0.043	0.096	0.038

Bioretention 1

Bottom Length:	12.00 ft.
Bottom Width:	2.50 ft.
Material thickness of first layer:	0.25
Material type for first layer:	SMMWW 12 in/hr
Material thickness of second layer:	1.5
Material type for second layer:	SMMWW 12 in/hr
Material thickness of third layer:	1.5
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	6
Offset (in.):	0
Flow Through Underdrain (ac-ft.):	74.393
Total Outflow (ac-ft.):	80.785
Percent Through Underdrain:	92.09
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	8 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	
Gravel Trench Bed 1	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0159	0.0000	0.0000	0.0000
0.0467	0.0157	0.0000	0.0000	0.0000
0.0934	0.0154	0.0000	0.0000	0.0000
0.1401	0.0150	0.0001	0.0000	0.0000
0.1868	0.0147	0.0001	0.0000	0.0000
0.2335	0.0144	0.0001	0.0000	0.0000
0.2802	0.0140	0.0001	0.0000	0.0000
0.3269	0.0137	0.0002	0.0000	0.0000
0.3736	0.0134	0.0002	0.0000	0.0000
0.4203	0.0131	0.0002	0.0001	0.0000
0.4670	0.0128	0.0003	0.0001	0.0000
0.5137	0.0125	0.0003	0.0001	0.0000
0.5604	0.0122	0.0003	0.0002	0.0000
0.6071	0.0119	0.0004	0.0002	0.0000
0.6538	0.0116	0.0004	0.0002	0.0000
0.7005	0.0113	0.0005	0.0003	0.0000
0.7473	0.0110	0.0005	0.0003	0.0000
0.7940	0.0107	0.0006	0.0004	0.0000
0.8407	0.0104	0.0007	0.0005	0.0000
0.8874	0.0101	0.0007	0.0006	0.0000
0.9341	0.0099	0.0008	0.0006	0.0000
0.9808	0.0096	0.0009	0.0006	0.0000
1.0275	0.0093	0.0009	0.0007	0.0000
1.0742	0.0091	0.0010	0.0008	0.0000
1.1209	0.0088	0.0011	0.0009	0.0000
1.1676	0.0085	0.0012	0.0010	0.0000
1.2143	0.0083	0.0013	0.0011	0.0000
1.2610	0.0080	0.0014	0.0012	0.0000
1.3077	0.0078	0.0015	0.0012	0.0000
1.3544	0.0075	0.0016	0.0013	0.0000

1.4011	0.0073	0.0017	0.0015	0.0000
1.4478	0.0071	0.0018	0.0017	0.0000
1.4945	0.0068	0.0019	0.0019	0.0000
1.5412	0.0066	0.0020	0.0019	0.0000
1.5879	0.0064	0.0022	0.0021	0.0000
1.6346	0.0062	0.0023	0.0023	0.0000
1.6813	0.0059	0.0024	0.0023	0.0000
1.7280	0.0057	0.0026	0.0025	0.0000
1.7747	0.0055	0.0027	0.0027	0.0000
1.8214	0.0053	0.0028	0.0030	0.0000
1.8681	0.0051	0.0030	0.0030	0.0000
1.9148	0.0049	0.0031	0.0033	0.0000
1.9615	0.0047	0.0033	0.0036	0.0000
2.0082	0.0045	0.0034	0.0037	0.0000
2.0549	0.0043	0.0036	0.0038	0.0000
2.1016	0.0041	0.0037	0.0053	0.0000
2.1484	0.0040	0.0039	0.0057	0.0000
2.1951	0.0038	0.0041	0.0063	0.0000
2.2418	0.0036	0.0042	0.0063	0.0000
2.2885	0.0034	0.0044	0.0063	0.0000
2.3352	0.0033	0.0046	0.0063	0.0000
2.3819	0.0031	0.0048	0.0063	0.0000
2.4286	0.0030	0.0050	0.0063	0.0000
2.4753	0.0028	0.0052	0.0063	0.0000
2.5220	0.0026	0.0054	0.0063	0.0000
2.5687	0.0025	0.0056	0.0063	0.0000
2.6154	0.0023	0.0059	0.0063	0.0000
2.6621	0.0022	0.0061	0.0063	0.0000
2.7088	0.0021	0.0063	0.0063	0.0000
2.7555	0.0019	0.0066	0.0063	0.0000
2.8022	0.0018	0.0068	0.0063	0.0000
2.8489	0.0017	0.0071	0.0063	0.0000
2.8956	0.0016	0.0073	0.0063	0.0000
2.9423	0.0014	0.0076	0.0063	0.0000
2.9890	0.0013	0.0078	0.0063	0.0000
3.0357	0.0012	0.0081	0.0063	0.0000
3.0824	0.0011	0.0084	0.0063	0.0000
3.1291	0.0010	0.0087	0.0063	0.0000
3.1758	0.0009	0.0090	0.0063	0.0000
3.2225	0.0008	0.0093	0.0063	0.0000
3.2500	0.0007	0.0095	0.0063	0.0000

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.2500	0.015909	0.009468	0.0000	0.0042	0.0000
3.2967	0.016255	0.010219	0.0000	0.0042	0.0000
3.3434	0.016605	0.010986	0.0000	0.0051	0.0000
3.3901	0.016958	0.011770	0.0000	0.0053	0.0000
3.4368	0.017315	0.012570	0.0000	0.0054	0.0000
3.4835	0.017675	0.013387	0.0000	0.0055	0.0000
3.5302	0.018039	0.014221	0.0000	0.0056	0.0000
3.5769	0.018407	0.015072	0.0000	0.0058	0.0000
3.6236	0.018778	0.015941	0.0000	0.0059	0.0000
3.6703	0.019153	0.016827	0.0000	0.0060	0.0000
3.7170	0.019531	0.017730	0.0000	0.0062	0.0000
3.7637	0.019913	0.018651	0.0114	0.0063	0.0000
3.8104	0.020299	0.019590	0.1046	0.0064	0.0000
3.8571	0.020688	0.020547	0.2424	0.0065	0.0000

3.9038	0.021081	0.021522	0.3989	0.0067	0.0000
3.9505	0.021477	0.022516	0.5495	0.0068	0.0000
3.9973	0.021877	0.023529	0.6720	0.0069	0.0000
4.0440	0.022281	0.024560	0.7547	0.0071	0.0000
4.0907	0.022688	0.025610	0.8170	0.0072	0.0000
4.1374	0.023099	0.026679	0.8712	0.0073	0.0000
4.1841	0.023513	0.027768	0.9223	0.0075	0.0000
4.2308	0.023931	0.028875	0.9706	0.0076	0.0000
4.2500	0.024105	0.029337	1.0167	0.0076	0.0000

Bioretention 2

Bottom Length:	5.00 ft.
Bottom Width:	2.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	SMMWW 12 in/hr
Material thickness of second layer:	1.5
Material type for second layer:	SMMWW 12 in/hr
Material thickness of third layer:	1.5
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	6
Offset (in.):	0
Flow Through Underdrain (ac-ft.):	36.563
Total Outflow (ac-ft.):	39.875
Percent Through Underdrain:	91.69
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	8 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	
Gravel Trench Bed 1	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0121	0.0000	0.0000	0.0000
0.0467	0.0119	0.0000	0.0000	0.0000
0.0934	0.0116	0.0000	0.0000	0.0000
0.1401	0.0113	0.0000	0.0000	0.0000
0.1868	0.0111	0.0000	0.0000	0.0000
0.2335	0.0108	0.0000	0.0000	0.0000
0.2802	0.0105	0.0000	0.0000	0.0000
0.3269	0.0102	0.0001	0.0000	0.0000
0.3736	0.0100	0.0001	0.0000	0.0000
0.4203	0.0097	0.0001	0.0000	0.0000
0.4670	0.0094	0.0001	0.0000	0.0000
0.5137	0.0092	0.0001	0.0000	0.0000
0.5604	0.0089	0.0002	0.0001	0.0000
0.6071	0.0087	0.0002	0.0001	0.0000
0.6538	0.0084	0.0002	0.0001	0.0000
0.7005	0.0082	0.0002	0.0001	0.0000
0.7473	0.0079	0.0003	0.0001	0.0000
0.7940	0.0077	0.0003	0.0001	0.0000
0.8407	0.0074	0.0003	0.0002	0.0000
0.8874	0.0072	0.0004	0.0002	0.0000
0.9341	0.0070	0.0004	0.0002	0.0000
0.9808	0.0068	0.0004	0.0002	0.0000
1.0275	0.0065	0.0005	0.0002	0.0000
1.0742	0.0063	0.0005	0.0003	0.0000
1.1209	0.0061	0.0006	0.0003	0.0000
1.1676	0.0059	0.0006	0.0003	0.0000
1.2143	0.0057	0.0007	0.0004	0.0000
1.2610	0.0055	0.0007	0.0004	0.0000
1.3077	0.0053	0.0008	0.0004	0.0000
1.3544	0.0051	0.0009	0.0004	0.0000

1.4011	0.0049	0.0009	0.0005	0.0000
1.4478	0.0047	0.0010	0.0006	0.0000
1.4945	0.0045	0.0011	0.0006	0.0000
1.5412	0.0044	0.0011	0.0006	0.0000
1.5879	0.0042	0.0012	0.0007	0.0000
1.6346	0.0040	0.0013	0.0008	0.0000
1.6813	0.0038	0.0014	0.0008	0.0000
1.7280	0.0037	0.0015	0.0008	0.0000
1.7747	0.0035	0.0016	0.0009	0.0000
1.8214	0.0034	0.0017	0.0010	0.0000
1.8681	0.0032	0.0018	0.0010	0.0000
1.9148	0.0031	0.0019	0.0011	0.0000
1.9615	0.0029	0.0020	0.0012	0.0000
2.0082	0.0028	0.0021	0.0012	0.0000
2.0549	0.0026	0.0022	0.0013	0.0000
2.1016	0.0025	0.0023	0.0018	0.0000
2.1484	0.0023	0.0024	0.0019	0.0000
2.1951	0.0022	0.0025	0.0021	0.0000
2.2418	0.0021	0.0026	0.0021	0.0000
2.2885	0.0020	0.0028	0.0021	0.0000
2.3352	0.0019	0.0029	0.0021	0.0000
2.3819	0.0017	0.0030	0.0021	0.0000
2.4286	0.0016	0.0032	0.0021	0.0000
2.4753	0.0015	0.0033	0.0021	0.0000
2.5220	0.0014	0.0035	0.0021	0.0000
2.5687	0.0013	0.0036	0.0021	0.0000
2.6154	0.0012	0.0038	0.0021	0.0000
2.6621	0.0011	0.0040	0.0021	0.0000
2.7088	0.0010	0.0041	0.0021	0.0000
2.7555	0.0009	0.0043	0.0021	0.0000
2.8022	0.0009	0.0045	0.0021	0.0000
2.8489	0.0008	0.0047	0.0021	0.0000
2.8956	0.0007	0.0049	0.0021	0.0000
2.9423	0.0006	0.0051	0.0021	0.0000
2.9890	0.0006	0.0053	0.0021	0.0000
3.0357	0.0005	0.0055	0.0021	0.0000
3.0824	0.0004	0.0057	0.0021	0.0000
3.1291	0.0004	0.0059	0.0021	0.0000
3.1758	0.0003	0.0061	0.0021	0.0000
3.2225	0.0003	0.0063	0.0021	0.0000
3.2500	0.0002	0.0065	0.0021	0.0000

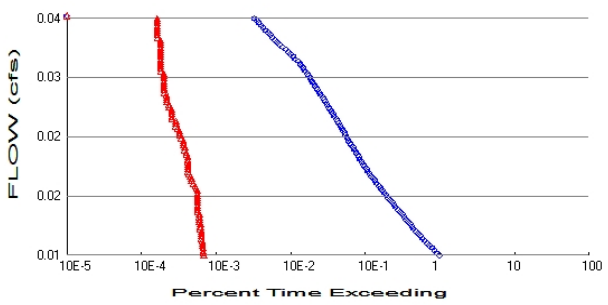
Bioretention Surface Hydraulic Table

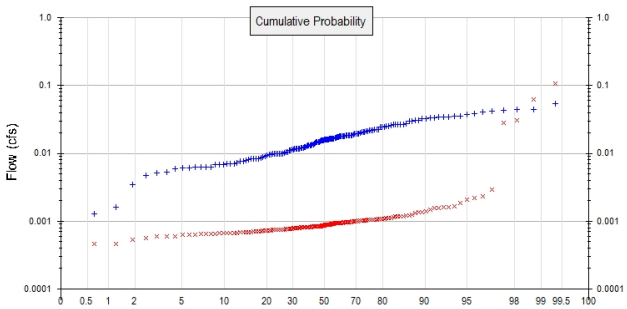
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.2500	0.012093	0.006486	0.0000	0.0014	0.0000
3.2967	0.012390	0.007057	0.0000	0.0014	0.0000
3.3434	0.012692	0.007643	0.0000	0.0017	0.0000
3.3901	0.012996	0.008243	0.0000	0.0018	0.0000
3.4368	0.013305	0.008857	0.0000	0.0018	0.0000
3.4835	0.013617	0.009486	0.0000	0.0018	0.0000
3.5302	0.013933	0.010129	0.0000	0.0019	0.0000
3.5769	0.014252	0.010787	0.0000	0.0019	0.0000
3.6236	0.014575	0.011460	0.0000	0.0020	0.0000
3.6703	0.014902	0.012149	0.0000	0.0020	0.0000
3.7170	0.015232	0.012852	0.0000	0.0021	0.0000
3.7637	0.015566	0.013572	0.0114	0.0021	0.0000
3.8104	0.015903	0.014306	0.1046	0.0021	0.0000
3.8571	0.016244	0.015057	0.2424	0.0022	0.0000

3.9038	0.016589	0.015824	0.3989	0.0022	0.0000
3.9505	0.016937	0.016607	0.5495	0.0023	0.0000
3.9973	0.017289	0.017406	0.6720	0.0023	0.0000
4.0440	0.017644	0.018222	0.7547	0.0024	0.0000
4.0907	0.018003	0.019054	0.8170	0.0024	0.0000
4.1374	0.018366	0.019903	0.8712	0.0024	0.0000
4.1841	0.018732	0.020770	0.9223	0.0025	0.0000
4.2308	0.019102	0.021653	0.9706	0.0025	0.0000
4.2500	0.019255	0.022022	1.0167	0.0025	0.0000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.762
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.417
Total Impervious Area: 0.345

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.016057
5 year	0.024981
10 year	0.029829
25 year	0.034764
50 year	0.037697
100 year	0.040109

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.000911
5 year	0.001721
10 year	0.002521
25 year	0.003934
50 year	0.00536
100 year	0.007184

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.012	0.001
1903	0.010	0.001
1904	0.016	0.001
1905	0.008	0.001
1906	0.003	0.001
1907	0.025	0.001
1908	0.018	0.001
1909	0.018	0.001
1910	0.025	0.001
1911	0.016	0.001

1912	0.053	0.003
1913	0.026	0.001
1914	0.006	0.002
1915	0.010	0.001
1916	0.016	0.001
1917	0.005	0.000
1918	0.017	0.001
1919	0.013	0.001
1920	0.016	0.001
1921	0.018	0.001
1922	0.018	0.001
1923	0.015	0.001
1924	0.007	0.001
1925	0.008	0.001
1926	0.016	0.001
1927	0.010	0.001
1928	0.012	0.001
1929	0.026	0.001
1930	0.016	0.001
1931	0.015	0.001
1932	0.012	0.001
1933	0.011	0.001
1934	0.034	0.001
1935	0.016	0.001
1936	0.014	0.001
1937	0.022	0.001
1938	0.013	0.001
1939	0.001	0.001
1940	0.015	0.001
1941	0.007	0.001
1942	0.022	0.001
1943	0.011	0.001
1944	0.021	0.001
1945	0.018	0.001
1946	0.010	0.001
1947	0.006	0.001
1948	0.035	0.001
1949	0.030	0.001
1950	0.008	0.001
1951	0.010	0.001
1952	0.045	0.031
1953	0.041	0.028
1954	0.015	0.001
1955	0.012	0.001
1956	0.006	0.001
1957	0.021	0.001
1958	0.043	0.002
1959	0.027	0.001
1960	0.007	0.001
1961	0.027	0.002
1962	0.015	0.001
1963	0.007	0.001
1964	0.008	0.002
1965	0.030	0.001
1966	0.008	0.001
1967	0.013	0.001
1968	0.013	0.001
1969	0.013	0.001

1970	0.021	0.001
1971	0.033	0.001
1972	0.021	0.002
1973	0.027	0.001
1974	0.015	0.001
1975	0.034	0.001
1976	0.018	0.001
1977	0.006	0.001
1978	0.030	0.001
1979	0.008	0.001
1980	0.017	0.001
1981	0.017	0.001
1982	0.007	0.001
1983	0.027	0.001
1984	0.011	0.001
1985	0.018	0.001
1986	0.016	0.001
1987	0.031	0.001
1988	0.019	0.001
1989	0.017	0.001
1990	0.020	0.001
1991	0.015	0.001
1992	0.022	0.001
1993	0.021	0.001
1994	0.032	0.001
1995	0.006	0.001
1996	0.035	0.001
1997	0.014	0.001
1998	0.016	0.001
1999	0.001	0.001
2000	0.012	0.001
2001	0.006	0.001
2002	0.022	0.001
2003	0.019	0.001
2004	0.018	0.001
2005	0.033	0.002
2006	0.010	0.001
2007	0.010	0.001
2008	0.017	0.001
2009	0.012	0.001
2010	0.010	0.001
2011	0.008	0.001
2012	0.012	0.001
2013	0.009	0.001
2014	0.007	0.001
2015	0.013	0.001
2016	0.005	0.001
2017	0.025	0.001
2018	0.045	0.002
2019	0.042	0.106
2020	0.014	0.001
2021	0.022	0.001
2022	0.009	0.001
2023	0.019	0.001
2024	0.035	0.001
2025	0.017	0.001
2026	0.027	0.001
2027	0.010	0.001

2028	0.008	0.000
2029	0.018	0.001
2030	0.034	0.001
2031	0.011	0.000
2032	0.006	0.001
2033	0.010	0.001
2034	0.010	0.001
2035	0.038	0.001
2036	0.020	0.001
2037	0.005	0.001
2038	0.016	0.001
2039	0.002	0.002
2040	0.009	0.001
2041	0.012	0.001
2042	0.037	0.063
2043	0.018	0.001
2044	0.024	0.001
2045	0.017	0.001
2046	0.019	0.001
2047	0.014	0.001
2048	0.018	0.001
2049	0.016	0.001
2050	0.012	0.001
2051	0.017	0.001
2052	0.010	0.001
2053	0.018	0.001
2054	0.022	0.001
2055	0.007	0.001
2056	0.008	0.001
2057	0.012	0.001
2058	0.015	0.001
2059	0.027	0.002

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0535	0.1064
2	0.0450	0.0631
3	0.0450	0.0310
4	0.0435	0.0281
5	0.0420	0.0029
6	0.0406	0.0023
7	0.0383	0.0022
8	0.0373	0.0021
9	0.0353	0.0019
10	0.0352	0.0017
11	0.0345	0.0016
12	0.0342	0.0016
13	0.0340	0.0015
14	0.0336	0.0015
15	0.0330	0.0015
16	0.0326	0.0014
17	0.0322	0.0014
18	0.0307	0.0013
19	0.0305	0.0013
20	0.0302	0.0012
21	0.0296	0.0012
22	0.0272	0.0012

23	0.0270	0.0012
24	0.0270	0.0012
25	0.0270	0.0012
26	0.0269	0.0012
27	0.0269	0.0011
28	0.0256	0.0011
29	0.0255	0.0011
30	0.0249	0.0011
31	0.0247	0.0011
32	0.0246	0.0011
33	0.0243	0.0011
34	0.0225	0.0011
35	0.0224	0.0011
36	0.0223	0.0011
37	0.0221	0.0010
38	0.0220	0.0010
39	0.0217	0.0010
40	0.0215	0.0010
41	0.0211	0.0010
42	0.0208	0.0010
43	0.0208	0.0010
44	0.0207	0.0010
45	0.0199	0.0010
46	0.0198	0.0010
47	0.0195	0.0010
48	0.0194	0.0010
49	0.0194	0.0010
50	0.0187	0.0010
51	0.0185	0.0010
52	0.0184	0.0010
53	0.0183	0.0010
54	0.0183	0.0010
55	0.0183	0.0010
56	0.0183	0.0010
57	0.0181	0.0010
58	0.0181	0.0010
59	0.0180	0.0009
60	0.0179	0.0009
61	0.0179	0.0009
62	0.0177	0.0009
63	0.0175	0.0009
64	0.0173	0.0009
65	0.0172	0.0009
66	0.0172	0.0009
67	0.0171	0.0009
68	0.0165	0.0009
69	0.0165	0.0009
70	0.0165	0.0009
71	0.0165	0.0009
72	0.0164	0.0009
73	0.0163	0.0009
74	0.0162	0.0009
75	0.0161	0.0009
76	0.0161	0.0009
77	0.0160	0.0009
78	0.0160	0.0009
79	0.0159	0.0009
80	0.0156	0.0009

81	0.0156	0.0009
82	0.0155	0.0008
83	0.0154	0.0008
84	0.0152	0.0008
85	0.0147	0.0008
86	0.0147	0.0008
87	0.0146	0.0008
88	0.0146	0.0008
89	0.0145	0.0008
90	0.0143	0.0008
91	0.0137	0.0008
92	0.0136	0.0008
93	0.0135	0.0008
94	0.0133	0.0008
95	0.0132	0.0008
96	0.0132	0.0008
97	0.0130	0.0008
98	0.0130	0.0008
99	0.0127	0.0008
100	0.0124	0.0008
101	0.0123	0.0008
102	0.0121	0.0008
103	0.0120	0.0008
104	0.0119	0.0008
105	0.0119	0.0008
106	0.0118	0.0008
107	0.0118	0.0008
108	0.0117	0.0008
109	0.0117	0.0008
110	0.0114	0.0008
111	0.0113	0.0008
112	0.0112	0.0008
113	0.0110	0.0008
114	0.0103	0.0008
115	0.0103	0.0008
116	0.0101	0.0008
117	0.0100	0.0007
118	0.0100	0.0007
119	0.0100	0.0007
120	0.0099	0.0007
121	0.0099	0.0007
122	0.0098	0.0007
123	0.0098	0.0007
124	0.0097	0.0007
125	0.0097	0.0007
126	0.0092	0.0007
127	0.0091	0.0007
128	0.0088	0.0007
129	0.0085	0.0007
130	0.0084	0.0007
131	0.0084	0.0007
132	0.0084	0.0007
133	0.0083	0.0007
134	0.0080	0.0007
135	0.0078	0.0007
136	0.0077	0.0007
137	0.0076	0.0007
138	0.0071	0.0007

139	0.0070	0.0007
140	0.0070	0.0007
141	0.0070	0.0007
142	0.0068	0.0007
143	0.0068	0.0007
144	0.0067	0.0007
145	0.0063	0.0007
146	0.0063	0.0006
147	0.0063	0.0006
148	0.0062	0.0006
149	0.0061	0.0006
150	0.0061	0.0006
151	0.0059	0.0006
152	0.0053	0.0006
153	0.0052	0.0006
154	0.0048	0.0006
155	0.0034	0.0005
156	0.0016	0.0005
157	0.0013	0.0005
158	0.0008	0.0004

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0080	54293	38	0	Pass
0.0083	50160	37	0	Pass
0.0086	46575	37	0	Pass
0.0089	43312	37	0	Pass
0.0092	40260	36	0	Pass
0.0095	37456	36	0	Pass
0.0098	34913	36	0	Pass
0.0101	32609	35	0	Pass
0.0104	30360	35	0	Pass
0.0107	28299	35	0	Pass
0.0110	26448	35	0	Pass
0.0113	24803	34	0	Pass
0.0116	23313	34	0	Pass
0.0119	21939	34	0	Pass
0.0122	20648	33	0	Pass
0.0125	19435	33	0	Pass
0.0128	18293	33	0	Pass
0.0131	17224	33	0	Pass
0.0134	16160	31	0	Pass
0.0137	15147	31	0	Pass
0.0140	14271	31	0	Pass
0.0143	13451	31	0	Pass
0.0146	12665	31	0	Pass
0.0149	11939	31	0	Pass
0.0152	11235	31	0	Pass
0.0155	10559	31	0	Pass
0.0158	9972	31	0	Pass
0.0161	9390	31	0	Pass
0.0164	8864	30	0	Pass
0.0167	8343	29	0	Pass
0.0170	7872	27	0	Pass
0.0173	7468	26	0	Pass
0.0176	7041	26	0	Pass
0.0179	6620	25	0	Pass
0.0182	6277	24	0	Pass
0.0185	5983	23	0	Pass
0.0188	5712	23	0	Pass
0.0191	5444	23	0	Pass
0.0194	5199	23	0	Pass
0.0197	4946	23	0	Pass
0.0200	4706	23	0	Pass
0.0203	4515	23	0	Pass
0.0206	4339	22	0	Pass
0.0209	4159	22	0	Pass
0.0212	3958	21	0	Pass
0.0215	3770	21	0	Pass
0.0218	3581	20	0	Pass
0.0221	3414	20	0	Pass
0.0224	3265	20	0	Pass
0.0227	3134	19	0	Pass
0.0230	3027	18	0	Pass
0.0233	2927	18	0	Pass
0.0236	2814	18	0	Pass

0.0239	2682	17	0	Pass
0.0242	2555	16	0	Pass
0.0245	2451	16	0	Pass
0.0248	2359	16	0	Pass
0.0251	2256	14	0	Pass
0.0254	2139	14	0	Pass
0.0257	2041	14	0	Pass
0.0260	1952	14	0	Pass
0.0263	1862	14	0	Pass
0.0266	1779	13	0	Pass
0.0269	1692	13	0	Pass
0.0272	1619	12	0	Pass
0.0275	1561	12	0	Pass
0.0278	1483	12	0	Pass
0.0281	1408	12	0	Pass
0.0284	1340	11	0	Pass
0.0287	1271	11	0	Pass
0.0290	1218	11	0	Pass
0.0293	1163	11	0	Pass
0.0296	1103	11	0	Pass
0.0299	1055	11	1	Pass
0.0302	1006	11	1	Pass
0.0305	964	11	1	Pass
0.0308	919	11	1	Pass
0.0311	872	10	1	Pass
0.0314	815	10	1	Pass
0.0317	774	10	1	Pass
0.0320	738	10	1	Pass
0.0323	694	10	1	Pass
0.0326	636	10	1	Pass
0.0329	601	10	1	Pass
0.0332	553	10	1	Pass
0.0335	517	10	1	Pass
0.0338	478	10	2	Pass
0.0341	433	10	2	Pass
0.0344	394	10	2	Pass
0.0347	363	10	2	Pass
0.0350	340	10	2	Pass
0.0353	310	9	2	Pass
0.0356	297	9	3	Pass
0.0359	273	9	3	Pass
0.0362	252	9	3	Pass
0.0365	237	9	3	Pass
0.0368	223	9	4	Pass
0.0371	206	9	4	Pass
0.0374	195	9	4	Pass
0.0377	180	9	5	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.

Model Default Modifications

Total of 0 changes have been made.

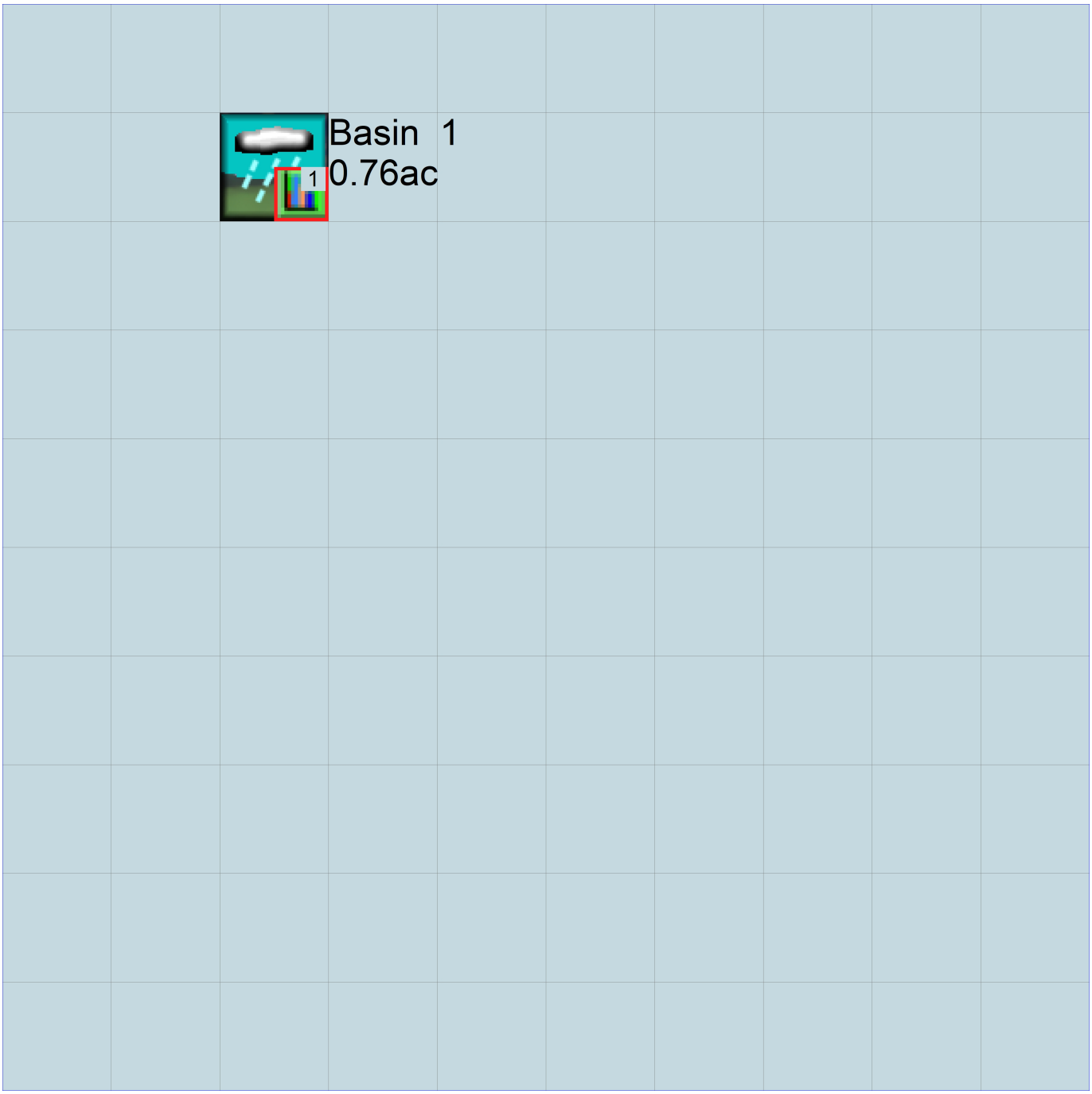
PERLND Changes

No PERLND changes have been made.

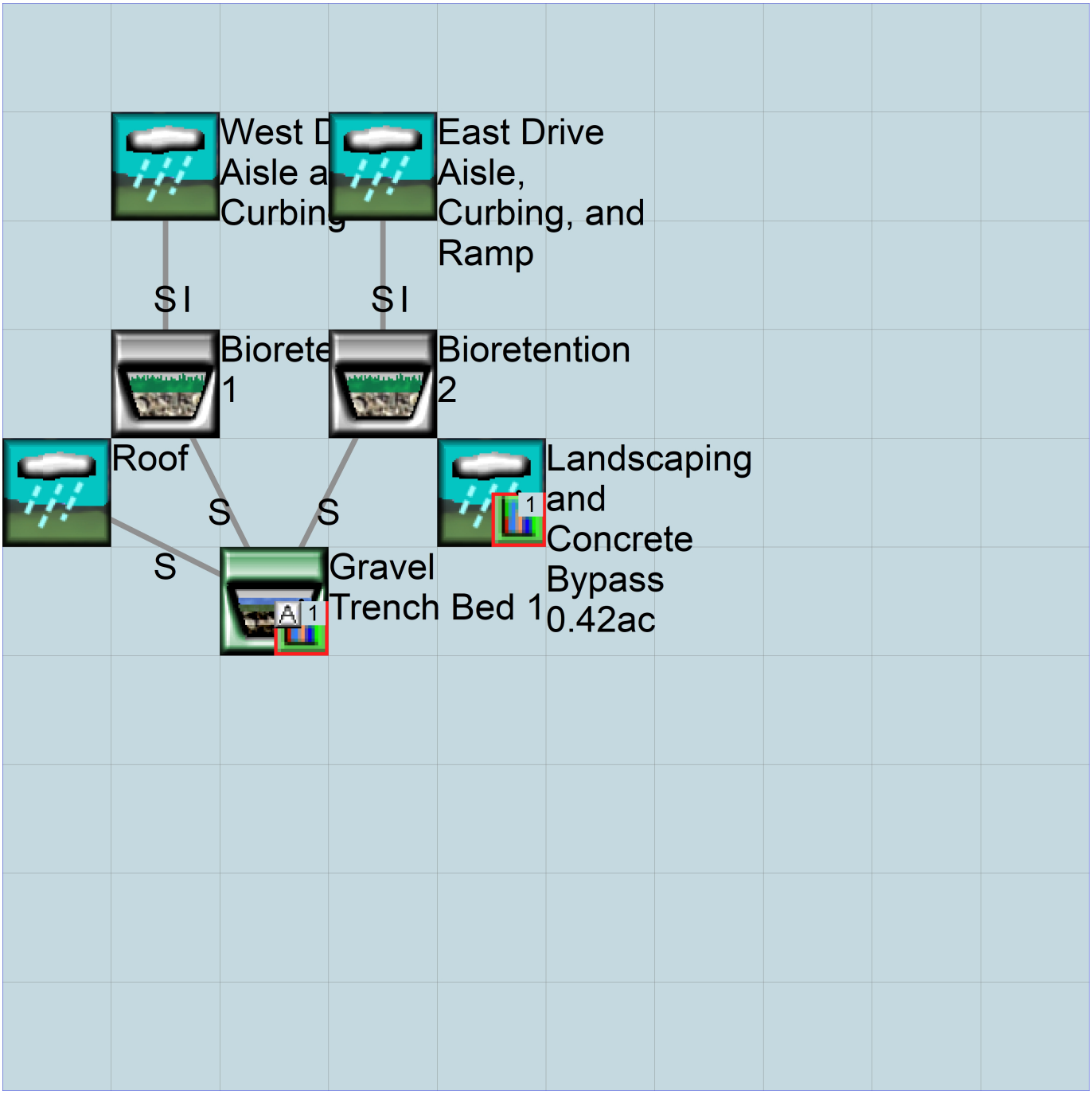
IMPLND Changes

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   Flow Control and Treatment.wdm
MESSU       25   PreFlow Control and Treatment.MES
            27   PreFlow Control and Treatment.L61
            28   PreFlow Control and Treatment.L62
            30   POCFlow Control and Treatment1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      10
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        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           ***
   10     C, Forest, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

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

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

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

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

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

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

END PERLND

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

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

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

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

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

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

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

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  10                       0.762     COPY   501     12
PERLND  10                       0.762     COPY   501     13

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

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



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

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

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

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

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

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

END EXT SOURCES

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

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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Flow Control and Treatment.wdm
MESSU       25   MitFlow Control and Treatment.MES
            27   MitFlow Control and Treatment.L61
            28   MitFlow Control and Treatment.L62
            30   POCFlow Control and Treatment1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND       1
      IMPLND       8
      PERLND       4
      IMPLND       4
      GENER        2
      RCHRES       1
      RCHRES       2
      GENER        4
      RCHRES       3
      RCHRES       4
      RCHRES       5
      COPY         1
      COPY       501
      COPY       601
      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
  601         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
    4        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
    4             0.
  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
    8      SIDEWALKS/FLAT         1    1    1   27    0
    4      ROOF TOPS/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
    8         0    0    1    0    0    0
    4         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
    8         0    0    4    0    0    0    1    9
    4         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
    8         0    0    0    0    0
    4         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
    8            400      0.01       0.1       0.1
    4            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
    8              0         0
    4              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
    8              0         0
    4              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
West Drive Aisle***
IMPLND   1                       0.19     RCHRES   1      5
East Drive Aisle***
IMPLND   1                      0.088     RCHRES   3      5
IMPLND   8                      0.002     RCHRES   3      5
Basin  4***
IMPLND   4                      0.063     RCHRES   5      5
Basin  3***
PERLND   4                      0.417     COPY   501     12
PERLND   4                      0.417     COPY   601     12
IMPLND   8                      0.002     COPY   501     15
IMPLND   8                      0.002     COPY   601     15

******Routing******
RCHRES   2                          1     RCHRES   5      6
RCHRES   2                                COPY     1     16
RCHRES   1                          1     RCHRES   5      7
RCHRES   1                                COPY     1     17
RCHRES   1                          1     RCHRES   2      8
RCHRES   4                          1     RCHRES   5      6
RCHRES   4                                COPY     1     16
RCHRES   3                          1     RCHRES   5      7
RCHRES   3                                COPY     1     17
RCHRES   3                          1     RCHRES   4      8
IMPLND   4                      0.063     COPY     1     15
RCHRES   5                          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
GENER    2 OUTPUT TIMSER      .0011111     RCHRES   1     EXTNL  OUTDGT 1
GENER    4 OUTPUT TIMSER      .0011111     RCHRES   3     EXTNL  OUTDGT 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     Surface retentio-009    2    1    1    1   28    0    1
    2     Bioretention  1         1    1    1    1   28    0    1
    3     Surface retentio-011    2    1    1    1   28    0    1
    4     Bioretention  2         1    1    1    1   28    0    1
    5     Gravel Trench Be-007    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
    3         1    0    0    0    0    0    0    0    0    0
    4         1    0    0    0    0    0    0    0    0    0
    5         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
    4         4    0    0    0    0    0    0    0    0    0    1    9
    5         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  1  0  0  0       2  1  2  2  2
    2       0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
    3       0  1  0  0    4  5  0  0  0       0  1  0  0  0       2  1  2  2  2
    4       0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
    5       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       0.0       0.0
    2             2      0.01       0.0       0.0       0.0       0.0
    3             3      0.01       0.0       0.0       0.0       0.0
    4             4      0.01       0.0       0.0       0.0       0.0
    5             5      0.02       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
```

```
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
           *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    4            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    5            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
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol4   RCHRES   4 VOL              4
  UVQUAN v2m4   GLOBAL     WORKSP  3        3
  UVQUAN vpo4   GLOBAL     WORKSP  4        3
  UVQUAN v2d4   GENER    4 K       1        3
*** User-Defined Target Variable Names
***                  addr or                        addr or
***                 <------>                       <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** User-Defined Target Variable Names
***                  addr or                        addr or
***                 <------>                       <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m4    1 WORKSP  3         1.0 QUAN
  UVNAME  vpo4    1 WORKSP  4         1.0 QUAN
  UVNAME  v2d4    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2           =  418.05
*** Compute remaining available pore space
  GENER   2                               vpo2           =  v2m2
  GENER   2                               vpo2          -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2           =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2           =  vpo2
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   4                               v2m4           =  284.39
*** Compute remaining available pore space
  GENER   4                               vpo4           =  v2m4
  GENER   4                               vpo4          -=  vol4
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo4 < 0.0) THEN
  GENER   4                               vpo4           =  0.0
END IF
*** Infiltration volume
  GENER   4                               v2d4           =  vpo4
```

END SPEC-ACTIONS
FTABLES
  FTABLE   5
   92   5
     Depth   Area   Volume Outflow1 Outflow2 Velocity Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (cfs)   (ft/sec)   (Minutes)***
  0.000000 0.044353 0.000000 0.000000 0.000000
  0.033333 0.044353 0.000488 0.000000 0.038014
  0.066667 0.044353 0.000976 0.000000 0.038014
  0.100000 0.044353 0.001464 0.000000 0.038014
  0.133333 0.044353 0.001952 0.000000 0.038014
  0.166667 0.044353 0.002439 0.000000 0.038014
  0.200000 0.044353 0.002927 0.000000 0.038014
  0.233333 0.044353 0.003415 0.000000 0.038014
  0.266667 0.044353 0.003903 0.000000 0.038014
  0.300000 0.044353 0.004391 0.000000 0.038014
  0.333333 0.044353 0.004879 0.000000 0.038014
  0.366667 0.044353 0.005367 0.000000 0.038014
  0.400000 0.044353 0.005855 0.000000 0.038014
  0.433333 0.044353 0.006342 0.000000 0.038014
  0.466667 0.044353 0.006830 0.000000 0.038014
  0.500000 0.044353 0.007318 0.000000 0.038014
  0.533333 0.044353 0.007806 0.000000 0.038014
  0.566667 0.044353 0.008294 0.000000 0.038014
  0.600000 0.044353 0.008782 0.000000 0.038014
  0.633333 0.044353 0.009270 0.000000 0.038014
  0.666667 0.044353 0.009758 0.000000 0.038014
  0.700000 0.044353 0.010245 0.000000 0.038014
  0.733333 0.044353 0.010733 0.000000 0.038014
  0.766667 0.044353 0.011221 0.000000 0.038014
  0.800000 0.044353 0.011709 0.000000 0.038014
  0.833333 0.044353 0.012197 0.000000 0.038014
  0.866667 0.044353 0.012685 0.000000 0.038014
  0.900000 0.044353 0.013173 0.000000 0.038014
  0.933333 0.044353 0.013661 0.000000 0.038014
  0.966667 0.044353 0.014148 0.000000 0.038014
  1.000000 0.044353 0.014636 0.000000 0.038014
  1.033333 0.044353 0.015124 0.000000 0.038014
  1.066667 0.044353 0.015612 0.000000 0.038014
  1.100000 0.044353 0.016100 0.000000 0.038014
  1.133333 0.044353 0.016588 0.000000 0.038014
  1.166667 0.044353 0.017076 0.000000 0.038014
  1.200000 0.044353 0.017564 0.000000 0.038014
  1.233333 0.044353 0.018052 0.000000 0.038014
  1.266667 0.044353 0.018539 0.000000 0.038014
  1.300000 0.044353 0.019027 0.000000 0.038014
  1.333333 0.044353 0.019515 0.000000 0.038014
  1.366667 0.044353 0.020003 0.000000 0.038014
  1.400000 0.044353 0.020491 0.000000 0.038014
  1.433333 0.044353 0.020979 0.000000 0.038014
  1.466667 0.044353 0.021467 0.000000 0.038014
  1.500000 0.044353 0.021955 0.000000 0.038014
  1.533333 0.044353 0.022442 0.000000 0.038014
  1.566667 0.044353 0.022930 0.000000 0.038014
  1.600000 0.044353 0.023418 0.000000 0.038014
  1.633333 0.044353 0.023906 0.000000 0.038014
  1.666667 0.044353 0.024394 0.000000 0.038014
  1.700000 0.044353 0.024882 0.000000 0.038014
  1.733333 0.044353 0.025370 0.000000 0.038014
  1.766667 0.044353 0.025858 0.000000 0.038014
  1.800000 0.044353 0.026345 0.000000 0.038014
  1.833333 0.044353 0.026833 0.000000 0.038014
  1.866667 0.044353 0.027321 0.000000 0.038014
  1.900000 0.044353 0.027809 0.000000 0.038014
  1.933333 0.044353 0.028297 0.000000 0.038014
  1.966667 0.044353 0.028785 0.000000 0.038014
  2.000000 0.044353 0.029273 0.000000 0.038014
  2.033333 0.044353 0.029761 0.000000 0.038014
  2.066667 0.044353 0.030248 0.000000 0.038014
  2.100000 0.044353 0.030736 0.000000 0.038014

```
2.133333  0.044353  0.031224  0.000000  0.038014
2.166667  0.044353  0.031712  0.000000  0.038014
2.200000  0.044353  0.032200  0.000000  0.038014
2.233333  0.044353  0.032688  0.000000  0.038014
2.266667  0.044353  0.033176  0.000000  0.038014
2.300000  0.044353  0.033664  0.000000  0.038014
2.333333  0.044353  0.034152  0.000000  0.038014
2.366667  0.044353  0.034639  0.000000  0.038014
2.400000  0.044353  0.035127  0.000000  0.038014
2.433333  0.044353  0.035615  0.000000  0.038014
2.466667  0.044353  0.036103  0.000000  0.038014
2.500000  0.044353  0.036591  0.000000  0.038014
2.533333  0.044353  0.037079  0.000000  0.038014
2.566667  0.044353  0.037567  0.000000  0.038014
2.600000  0.044353  0.038055  0.000000  0.038014
2.633333  0.044353  0.038542  0.000000  0.038014
2.666667  0.044353  0.039030  0.000000  0.038014
2.700000  0.044353  0.039518  0.000000  0.038014
2.733333  0.044353  0.040006  0.000000  0.038014
2.766667  0.044353  0.040494  0.000000  0.038014
2.800000  0.044353  0.040982  0.000000  0.038014
2.833333  0.044353  0.041470  0.000000  0.038014
2.866667  0.044353  0.041958  0.000000  0.038014
2.900000  0.044353  0.042445  0.000000  0.038014
2.933333  0.044353  0.042933  0.021395  0.038014
2.966667  0.044353  0.043421  0.058227  0.038014
3.000000  0.044353  0.043909  0.096846  0.038014
3.033333  0.044353  0.045388  0.125736  0.038014
END FTABLE  5
FTABLE      2
 71    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.015909  0.000000  0.000000
0.046703  0.015707  0.000016  0.000000
0.093407  0.015367  0.000034  0.000000
0.140110  0.015030  0.000053  0.000000
0.186813  0.014697  0.000076  0.000000
0.233516  0.014368  0.000100  0.000000
0.280220  0.014042  0.000127  0.000000
0.326923  0.013720  0.000156  0.000021
0.373626  0.013401  0.000188  0.000036
0.420330  0.013086  0.000222  0.000056
0.467033  0.012775  0.000260  0.000082
0.513736  0.012467  0.000299  0.000114
0.560440  0.012163  0.000342  0.000153
0.607143  0.011862  0.000388  0.000200
0.653846  0.011565  0.000436  0.000246
0.700549  0.011272  0.000488  0.000254
0.747253  0.010982  0.000543  0.000317
0.793956  0.010696  0.000601  0.000389
0.840659  0.010414  0.000662  0.000470
0.887363  0.010135  0.000727  0.000556
0.934066  0.009859  0.000795  0.000560
0.980769  0.009587  0.000867  0.000598
1.027473  0.009319  0.000942  0.000661
1.074176  0.009055  0.001022  0.000771
1.120879  0.008794  0.001104  0.000892
1.167582  0.008537  0.001191  0.001024
1.214286  0.008283  0.001282  0.001149
1.260989  0.008033  0.001376  0.001167
1.307692  0.007786  0.001475  0.001245
1.354396  0.007543  0.001577  0.001321
1.401099  0.007304  0.001684  0.001488
1.447802  0.007068  0.001796  0.001666
1.494505  0.006836  0.001911  0.001856
1.541209  0.006608  0.002032  0.001928
1.587912  0.006383  0.002156  0.002060
1.634615  0.006162  0.002285  0.002275
1.681319  0.005944  0.002419  0.002301
```

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1.728022  0.005730  0.002558  0.002504
1.774725  0.005520  0.002688  0.002746
1.821429  0.005313  0.002823  0.002959
1.868132  0.005109  0.002962  0.003001
1.914835  0.004910  0.003106  0.003269
1.961538  0.004714  0.003255  0.003551
2.008242  0.004521  0.003408  0.003737
2.054945  0.004333  0.003566  0.003771
2.101648  0.004147  0.003729  0.005266
2.148352  0.003966  0.003897  0.005736
2.195055  0.003788  0.004070  0.006250
2.241758  0.003613  0.004248  0.006250
2.288462  0.003443  0.004432  0.006250
2.335165  0.003275  0.004620  0.006250
2.381868  0.003112  0.004814  0.006250
2.428571  0.002952  0.005013  0.006250
2.475275  0.002795  0.005217  0.006250
2.521978  0.002643  0.005428  0.006250
2.568681  0.002493  0.005643  0.006250
2.615385  0.002348  0.005865  0.006250
2.662088  0.002206  0.006092  0.006250
2.708791  0.002068  0.006324  0.006250
2.755495  0.001933  0.006563  0.006250
2.802198  0.001802  0.006808  0.006250
2.848901  0.001674  0.007058  0.006250
2.895604  0.001550  0.007315  0.006250
2.942308  0.001430  0.007578  0.006250
2.989011  0.001313  0.007847  0.006250
3.035714  0.001200  0.008122  0.006250
3.082418  0.001091  0.008404  0.006250
3.129121  0.000985  0.008692  0.006250
3.175824  0.000882  0.008987  0.006250
3.222527  0.000784  0.009288  0.006250
3.250000  0.000689  0.009597  0.006250
END FTABLE  2
FTABLE      1
 23    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
0.000000  0.000689  0.000000  0.000000  0.000000
0.046703  0.016255  0.000751  0.000000  0.004167
0.093407  0.016605  0.001518  0.000000  0.005121
0.140110  0.016958  0.002302  0.000000  0.005250
0.186813  0.017315  0.003102  0.000000  0.005380
0.233516  0.017675  0.003920  0.000000  0.005510
0.280220  0.018039  0.004754  0.000000  0.005640
0.326923  0.018407  0.005605  0.000000  0.005769
0.373626  0.018778  0.006473  0.000000  0.005899
0.420330  0.019153  0.007359  0.000000  0.006029
0.467033  0.019531  0.008262  0.000000  0.006158
0.513736  0.019913  0.009183  0.011388  0.006288
0.560440  0.020299  0.010122  0.104618  0.006418
0.607143  0.020688  0.011079  0.242355  0.006548
0.653846  0.021081  0.012055  0.398865  0.006677
0.700549  0.021477  0.013048  0.549487  0.006807
0.747253  0.021877  0.014061  0.672007  0.006937
0.793956  0.022281  0.015092  0.754652  0.007067
0.840659  0.022688  0.016142  0.817028  0.007196
0.887363  0.023099  0.017211  0.871236  0.007326
0.934066  0.023513  0.018300  0.922263  0.007456
0.980769  0.023931  0.019408  0.970611  0.007585
1.000000  0.024105  0.019869  1.016663  0.007639
END FTABLE  1
FTABLE      4
 71    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.012093  0.000000  0.000000
0.046703  0.011919  0.000005  0.000000
0.093407  0.011627  0.000012  0.000000
```

```
0.140110  0.011339  0.000019  0.000000
0.186813  0.011054  0.000028  0.000000
0.233516  0.010773  0.000038  0.000000
0.280220  0.010495  0.000050  0.000000
0.326923  0.010221  0.000062  0.000007
0.373626  0.009951  0.000077  0.000012
0.420330  0.009684  0.000092  0.000019
0.467033  0.009421  0.000110  0.000027
0.513736  0.009161  0.000129  0.000038
0.560440  0.008905  0.000150  0.000051
0.607143  0.008653  0.000173  0.000067
0.653846  0.008404  0.000198  0.000082
0.700549  0.008159  0.000225  0.000085
0.747253  0.007918  0.000254  0.000106
0.793956  0.007680  0.000285  0.000130
0.840659  0.007446  0.000319  0.000157
0.887363  0.007215  0.000355  0.000185
0.934066  0.006988  0.000393  0.000187
0.980769  0.006764  0.000434  0.000199
1.027473  0.006544  0.000477  0.000220
1.074176  0.006328  0.000523  0.000257
1.120879  0.006115  0.000572  0.000297
1.167582  0.005906  0.000624  0.000341
1.214286  0.005701  0.000678  0.000383
1.260989  0.005499  0.000736  0.000389
1.307692  0.005301  0.000796  0.000415
1.354396  0.005106  0.000860  0.000440
1.401099  0.004915  0.000927  0.000496
1.447802  0.004728  0.000997  0.000555
1.494505  0.004544  0.001070  0.000619
1.541209  0.004364  0.001147  0.000643
1.587912  0.004187  0.001227  0.000687
1.634615  0.004014  0.001311  0.000758
1.681319  0.003844  0.001399  0.000767
1.728022  0.003679  0.001490  0.000835
1.774725  0.003516  0.001576  0.000915
1.821429  0.003358  0.001666  0.000986
1.868132  0.003203  0.001760  0.001000
1.914835  0.003051  0.001857  0.001090
1.961538  0.002904  0.001958  0.001184
2.008242  0.002760  0.002062  0.001246
2.054945  0.002619  0.002171  0.001257
2.101648  0.002482  0.002283  0.001755
2.148352  0.002349  0.002400  0.001912
2.195055  0.002219  0.002520  0.002083
2.241758  0.002093  0.002645  0.002083
2.288462  0.001970  0.002774  0.002083
2.335165  0.001851  0.002907  0.002083
2.381868  0.001736  0.003045  0.002083
2.428571  0.001624  0.003187  0.002083
2.475275  0.001516  0.003334  0.002083
2.521978  0.001412  0.003485  0.002083
2.568681  0.001311  0.003641  0.002083
2.615385  0.001213  0.003801  0.002083
2.662088  0.001120  0.003966  0.002083
2.708791  0.001030  0.004137  0.002083
2.755495  0.000943  0.004312  0.002083
2.802198  0.000860  0.004492  0.002083
2.848901  0.000781  0.004677  0.002083
2.895604  0.000705  0.004867  0.002083
2.942308  0.000633  0.005063  0.002083
2.989011  0.000565  0.005263  0.002083
3.035714  0.000500  0.005470  0.002083
3.082418  0.000439  0.005681  0.002083
3.129121  0.000381  0.005898  0.002083
3.175824  0.000327  0.006121  0.002083
3.222527  0.000276  0.006349  0.002083
3.250000  0.000230  0.006529  0.002083
END FTABLE  4
FTABLE      3
```

```
   23    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.000230  0.000000  0.000000  0.000000
  0.046703  0.012390  0.000572  0.000000  0.001389
  0.093407  0.012692  0.001157  0.000000  0.001707
  0.140110  0.012996  0.001757  0.000000  0.001750
  0.186813  0.013305  0.002371  0.000000  0.001793
  0.233516  0.013617  0.003000  0.000000  0.001837
  0.280220  0.013933  0.003643  0.000000  0.001880
  0.326923  0.014252  0.004302  0.000000  0.001923
  0.373626  0.014575  0.004975  0.000000  0.001966
  0.420330  0.014902  0.005663  0.000000  0.002010
  0.467033  0.015232  0.006367  0.000000  0.002053
  0.513736  0.015566  0.007086  0.011388  0.002096
  0.560440  0.015903  0.007821  0.104618  0.002139
  0.607143  0.016244  0.008572  0.242355  0.002183
  0.653846  0.016589  0.009338  0.398865  0.002226
  0.700549  0.016937  0.010121  0.549487  0.002269
  0.747253  0.017289  0.010920  0.672007  0.002312
  0.793956  0.017644  0.011736  0.754652  0.002356
  0.840659  0.018003  0.012568  0.817028  0.002399
  0.887363  0.018366  0.013418  0.871236  0.002442
  0.934066  0.018732  0.014284  0.922263  0.002485
  0.980769  0.019102  0.015168  0.970611  0.002528
  1.000000  0.019255  0.015536  1.016663  0.002546
  END FTABLE  3
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
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      2 PREC     ENGL    1              RCHRES   3     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    1              RCHRES   2     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   3     EXTNL  POTEV
WDM      1 EVAP     ENGL    1              RCHRES   4     EXTNL  POTEV

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   601 OUTPUT MEAN   1 1     48.4      WDM    901 FLOW     ENGL      REPL
RCHRES   5 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   5 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL      REPL
RCHRES   5 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   5 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
END EXT TARGETS

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

  MASS-LINK        6
RCHRES     ROFLOW                         RCHRES         INFLOW
  END MASS-LINK    6

  MASS-LINK        7
RCHRES     OFLOW  OVOL   1                 RCHRES         INFLOW IVOL
```

```
  END MASS-LINK    7

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

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

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16

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


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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APPENDIX E

#2 – Maintenance Checklist for Infiltration Basins and Trenches:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash and Debris	Any trash and debris which exceed five cubic feet per 1,000 square feet. If less than threshold, all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site.
General	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined in the Pierce County Noxious Weeds List. (Apply requirements of adopted integrated pest management policies for the use of herbicides.)	No danger of poisonous vegetation where maintenance personnel or the public might normally be. *(Coordinate with Tacoma-Pierce County Health Department) Complete eradication of noxious weeds may not be possible. Compliance with state or local eradication policies required.*
General	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.	No contaminants or pollutants present. *(Coordinate removal/cleanup with Pierce County Surface Water Management 253-798-2725 and/or Dept. of Ecology Spill Response 800-424-8802.)*
General	Rodent Holes	If the facility is constructed with a dam or berm, look for rodent holes or any evidence of water piping through the dam or berm.	Rodents removed and dam or berm repaired. *(Coordinate with Tacoma-Pierce County Health Department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)*
General	Beaver Dams	Beaver dam results in an adverse change in the functioning of the facility.	Facility returned to design function. *(Contact WDFW Region 6 to identify the appropriate Nuisance Wildlife Control Operator)*
General	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. *Apply insecticides in compliance with adopted integrated pest management policies.*
General	Performance	Check crest gauge against design expectations (see Maintenance and Source Control Manual).	Crest gauge results reflect design performance expectations. Reading recorded. County notified if not meeting design performance.
Crest Gauge	Crest Gauge Missing/ Broken	Crest gauge is not functioning properly, has been vandalized, or is missing.	Crest gauge present and functioning. Repair/replace crest gauge if missing or broken.
Storage Area	Water Not Infiltrating	Water ponding in infiltration basin after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events. (A percolation test pit or test of facility indicates facility is only working at 90 percent of its designed capabilities. If 2 inches or more sediment is present, remove).	Facility infiltrates as designed. Sediment is removed and/or facility is cleaned so that infiltration system works according to design.

#2 – Maintenance Checklist for Infiltration Basins and Trenches:

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

#2 – Maintenance Checklist for Infiltration Basins and Trenches:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Pond Berms (Dikes)	Tree Growth	Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees on berms removed. *If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.*
Emergency Overflow/ Spillway	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping.	Trees on emergency spillways removed. *If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.*
Emergency Overflow/ Spillway	Rock Missing	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of outflow path of spillway.	Rocks and pad depth restored to design standards. (Riprap on inside slopes need not be replaced.)
Emergency Overflow/ Spillway	Erosion	Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. *If erosion is occurring on compacted berms a professional engineer should be consulted to resolve source of erosion*.
Presettling Ponds and Vaults	Facility or sump filled with Sediment and/or Debris	6 inches or designed sediment trap depth of sediment.	No sediment present in presettling pond or vault. Sediment is removed.
Drain Rock	Water Ponding	If water enters the facility from the surface, inspect to see if water is ponding at the surface during storm events. If buried drain rock, observe drawdown through observation port or cleanout.	No water ponding on surface during storm events. *Clear piping through facility when ponding occurs. Replace rock material/sand reservoirs as necessary. Tilling of subgrade below reservoir may be necessary (for trenches) prior to backfill.*

If you are unsure whether a problem exists, contact a professional engineer.

#5 – Maintenance Checklist for Catch Basins:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	"Dump no pollutants" (or similar) stencil or stamp not visible	Stencil or stamp should be visible and easily read.	Warning signs (e.g., "Dump No Waste-Drains to Stream" or "Only rain down the drain"/ "Puget Sound starts here") painted or embossed on or adjacent to all storm drain inlets.
General	Trash and Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inlet capacity by more than 10 percent.	No trash or debris located immediately in front of catch basin or on grate opening.
General	Trash and Debris	Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the catch basin.
General	Trash and Debris	Trash or debris in any inlet or outlet pipe blocking more than one-third of its height.	Inlet and outlet pipes free of trash or debris.
General	Trash and Debris	Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.
General	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin.
General	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than one-fourth inch.	No holes and cracks in the top slab allowing material to run into the basin.
General	Structure Damage to Frame and/or Top Slab	Frame not sitting flush on top slab, i.e., separation of more than three-fourth inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.
General	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
General	Fractures or Cracks in Basin Walls/ Bottom	Grout fillet has separated or cracked wider than one-half-inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regrouted and secure at basin wall.
General	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
General	Vegetation	Vegetation growing across and blocking more than 10 percent of the basin opening.	No vegetation blocking opening to basin.

#5 – Maintenance Checklist for Catch Basins:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Vegetation	Vegetation growing in inlet/outlet pipe joints that is more than 6 inches tall and less than 6 inches apart.	No vegetation or root growth present.
General	Contamination and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.	No contaminants or pollutants present. *(Coordinate removal/cleanup with Pierce County Surface Water Management 253-798-2725 and/or Dept. of Ecology Spill Response 800-424-8802.)*
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is in place and secured.
Catch Basin Cover	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than one-half-inch of thread.	Mechanism opens with proper tools.
Catch Basin Cover	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Grates	Grate Opening Unsafe	Grate with opening wider than seven-eighths of an inch.	Grate opening meets design standards.
Grates	Trash and Debris	Trash and debris that is blocking more than 20 percent of grate surface inletting capacity.	Grate free of trash and debris.
Grates	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

If you are unsure whether a problem exists, contact a professional engineer.

#22 – Maintenance Checklist for Conveyance Systems (Pipes and Ditches):

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Pipes	Sediment & Debris	Accumulated sediment that exceeds 20 percent of the diameter of the pipe.	Pipe cleaned of all sediment and debris.
Pipes	Vegetation	Vegetation that reduces free movement of water though pipes.	Vegetation does not impede free movement of water through pipes. *Prohibit use of sand and sealant application and protect from construction runoff.*
Pipes	Damaged (Rusted, Bent or Crushed)	Protective coating is damaged: rust is causing more than 50 percent deterioration to any part of pipe.	Pipe repaired or replaced.
Pipes	Damaged (Rusted, Bent or Crushed)	Any dent that significantly impedes flow (i.e. decreases the cross section area of pipe by more than 20 percent).	Pipe repaired or replaced.
Pipes	Damaged (Rusted, Bent or Crushed)	Pipe has major cracks or tears allowing groundwater leakage.	Pipe repaired or replaced.
Open Ditches	Trash & Debris	Dumping of yard wastes such as grass clippings and branches. Unsightly accumulation of non-degradable materials such as glass, plastic, metal, foam, and coated paper.	No trash or debris present. Trash and debris removed and disposed of as prescribed by the County.
Open Ditches	Sediment Buildup	Accumulated sediment that exceeds 20 percent of the design depth.	Ditch cleaned of all sediment and debris so that it matches design.
Open Ditches	Vegetation	Vegetation (e.g. weedy shrubs or saplings) that reduces free movements of water through ditches.	Water flows freely though ditches. Grassy vegetation should be left alone.
Open Ditches	Erosion Damage to Slopes	Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.	No erosion damage present. Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.
Open Ditches	Erosion Damage to Slopes	Any erosion observed on a compacted berm embankment.	*If erosion is occurring on compacted berms a professional engineer should be consulted to resolve source of erosion.*
Open Ditches	Rock Lining Out of Place or Missing (If Applicable)	Native soil is exposed beneath the rock lining.	Rocks replaced to design standards.

If you are unsure whether a problem exists, contact a professional engineer.

#32 – Maintenance Checklist for Permeable Pavement:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Facility – General Requirements	Unstable Adjacent Area	Runoff from adjacent pervious areas deposits soil, mulch, or sediment on pavement.	No deposited soil or other materials on permeable pavement or other adjacent surfacing. All exposed soils that may erode to pavement surface mulched and/or planted.
Facility – General Requirements	Wearing Course Covered by Adjacent Vegetation	Vegetation growing beyond facility edge onto sidewalks, paths, and street edge.	Vegetation does not impede function of adjacent facilities or pose as safety hazard. Groundcovers and shrubs trimmed to avoid overreaching the sidewalks, paths and street edge.
Porous asphalt or pervious cement concrete	NA	None. Maintenance to prevent clogging with fine sediment.	Conventional street sweepers equipped with vacuums, water, and brushes or pressure washer used to restore permeability. Vacuum or pressure wash the pavement two to three times annually.
Porous asphalt or pervious cement concrete	NA	None. Maintenance to prevent clogging with fine sediment.	Use of sand and sealant application prohibited. Protect from construction runoff.
Porous asphalt or pervious cement concrete	Cracks	Major cracks or trip hazards.	Potholes or small cracks filled with patching mixes. Large cracks and settlement addressed by cutting and replacing the pavement section.
Porous asphalt or pervious cement concrete	NA	Utility cuts.	Any damage or change due to utility cuts replaced in kind.
All Pavement Types	Leaf and Debris Accumulation	Fallen leaves or debris.	Removed/disposed.
Interlocking concrete paver blocks	Missing or Damaged Paver Block	Interlocking paver block missing or damaged.	Individual damaged paver blocks removed and replaced or repaired per manufacturer's recommendations.
Interlocking concrete paver blocks	Settlement	Settlement of surface. When deviation from original grade impedes function.	Original grade re-established. May require resetting.
All pavement types	All Pavement Types	Sediment or debris accumulation between paver blocks, on surface of pavement, or in grid voids.	Sediment at surface does not inhibit infiltration. Remove/dispose of sediment.
Interlocking concrete paver blocks	Void material is missing or low	Loss of aggregate material between paver blocks.	Refill per manufacturer's recommendations.
Open-celled paving grid with gravel	Loss of Aggregate Material in Paving Grid	Loss of aggregate material in grid.	Aggregate gravel level maintained at the same level as the plastic rings or no more than 0.25 inch above the top of rings. Refill per manufacturer's recommendations.

#32 – Maintenance Checklist for Permeable Pavement:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Open-celled paving grid with grass	Lack of Grass Coverage	Loss of soil and/or grass material in grid.	Refill and/or replant per manufacturer's recommendations. Growing medium restored, facility aerated and reseeded or planted, and vegetated area amended as needed.
Inlet/outlet pipe	Pipe is Damaged	Pipe is damaged.	Pipe is repaired/replaced.
Inlet/outlet pipe	Pipe is Clogged	Pipe is clogged.	Roots or debris is removed.
Inlet/outlet pipe	Erosion	Native soil exposed or other signs of erosion damage present.	No eroded or scoured areas Cause of erosion or scour is addressed.
Underdrain pipe	Blocked Underdrain	Plant roots, sediment or debris reducing capacity of underdrain (may cause prolonged drawdown period).	Underdrains and orifice free of sediment and debris. Jet clean or rotary cut debris/roots from underdrain(s). If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly.
Spill Prevention and Response	NA	Storage or use of potential contaminants in the vicinity of facility.	Spill prevention measures exercised whenever handling or storing potential contaminants.
Spill Prevention and Response	Release of Pollutants	Any evidence of contaminants such as oil, gasoline, concrete slurries, paint, etc.	Spills are cleaned up as soon as possible to prevent contamination of stormwater. No contaminants or pollutants present. *(Coordinate source control, removal, and/or cleanup with Pierce County Surface Water Management 253-798-2725 and/or Dept. of Ecology Spill Response 800-424-8802.)*

If you are unsure whether a problem exists, contact a professional engineer.

Log Sheet

Use copies of this log sheet to keep track of when maintenance checks occur and what items, if any, are repaired or altered. The completed sheets will serve as a record of past maintenance activities and will provide valuable information on how your facilities are operating. This information will be useful for future requirements regarding the types of facilities that are installed. It helps to keep all log sheets in a designated area so that others can easily access them.

Date Checked: _____/____/_____
Checked By:
Name: _____
Position: _____
Address: _____ City: _____ State: _____ Zip: _____
Phone Number: (_____) _____

Part of Facility Checked	***Observations (List things that should be done)***	***Follow-up Actions Taken***	***Date Action Taken***