DRAINAGE REPORT AND STORMWATER POLLUTION PREVENTION PLAN

2401 INTER

PUYALLUP, WASHINGTON
PARCEL NO. 2105200150

January 2025

PROJECT ADDRESS:
2401 INTER AVE SE
PUYALLUP, WA 98372

PROPERTY OWNER:
MIKE PHAIR
615 EAST PIONEER #209
PUYALLUP, WA 98372

ENGINEER:
MCINNIS ENGINEERING
202 E 34th St. Tacoma, WA
CONTACT: WILL MCINNIS
(253) 414-1992

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Project Engineer's Certification:

"I hereby state that this Storm Drainage Report and Stormwater Pollution Prevention Plan for the 2401 Inter project has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that the city of Puyallup does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me."

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Section 1: Proposed Project Description

The project address is 2401 Inter Ave SE Puyallup, WA 98372. Parcel Number 2105200150. See Figure 1 in Appendix A. The project parcel consists of approximately 80,436 square feet (SF).

The proposed projects limits consist of approximately 80,436 SF. This includes the proposed parking for trucks, with another parking area for employees of the neighboring Western parcel. Contech water quality chamber, ADS detention chamber and landscaped areas. Areas cleared or regraded not proposed for impervious surface shall be restored to meet the soil amendment BMP requirements per the 2021 Pierce County Stormwater Management and Site Development Manual Volume III, Section 3.1 and establish a dense cover of lawn, landscape, or groundcover.

The project is accessed from Inter Ave at the south side of the parcel and will utilize the proposed driveway for access. According to the SCS soil mapping, the soils on the site are comprised completely of Briscot loam soils. The site is flat and maintains a 0%-2% slope. The parcel area within the clearing limits is flat with most of the slopes beyond the extents of the proposed site area. See Figure 2 in Appendix A. The parcel area within the Clearing limits is flat with most of the slopes beyond the extents of the proposed site area as shown in Figure 3: Surface Exhibit.

Table 1: Impervious/ Pervious Areas

Project Land Use	Existing Area (SF)	Proposed Area (SF)	Area Change (SF)
Roofs	891	0	-891
Asphalt Parking	-	61,680	+61,680
Landscape Area	-	18,853	+18,853
Gravel	50,100	-	-50,100
Native Land / Undisturbed	29,445	458	-28,987
Offsite Hard Surface	8,229	8,229	-
Total Impervious	59,775	69,909	+10,134
Total Pervious	29,445	19,311	-10,134
Project Area	**89,220**	**89,220**	-

1.1 Compliance with Minimum Requirement

The proposed project on-site improvements consist of approximately 63,475 SF of new hard surface. The proposed total hard area results in 77% of the site. Per the 2019 Western Washington Stormwater Management Manual this project must comply with all minimum requirements.

Minimum Requirement # 1: Preparation of Stormwater Site Plan

A stormwater site plan has been prepared and will be submitted to the City of Puyallup with this report. Additionally, see Figure 3 in Appendix A attached with this report.

Minimum Requirement # 2: Construction Stormwater Pollution Prevention

A temporary erosion and sediment control plan is part of the construction documents provided with this report (Figure 5, Appendix A). The proposed project has an approximate clearing and grading area of 80,436 SF. Earthwork estimates consist of 0 cubic yards (CY) of cut, 11,124 CY of fill with a net import of 11,124 CY. These estimates do not include stripping. The excess soil will be stockpiled for reuse on the site for amending the soils per soil amendment BMP requirements. See below for how each of the 13 elements of the Stormwater Pollution Prevention Plan (SWPPP) are addressed as follows.

TESC documents found under Figure 4.

- Element # 1: Preserve vegetation/mark clearing limits
  - Clearing limits are shown on the plan and as noted, shall be marked using high visibility plastic fencing. All vegetated area outside the marked clearing limits shall be preserved in existing conditions.

- Element # 2: Established Construction Entrance
  - As shown on the plans, a construction entrance is provided per City of Puyallup standards.

- Element # 3: Control Flow Rates
  - The proposed silt fence will be placed along all the downgradient boundaries of the proposed project limits as a precautionary measure. Contractor shall adjust silt fencing as necessary to keep sediment laden runoff onsite and are noted in the ESC plan.

- Element # 4: Install Sediment Control
  - Silt fence will be placed along all the downgradient boundaries of the proposed project limits to remove any sediment laden runoff from leaving the site, as shown on plans. Contractor shall adjust silt fencing as necessary to keep sediment laden runoff onsite.

- Element # 5: Stabilize Soils
  - Per the standard erosion control notes provided on the plans, all exposed soils shall be hydroseeded and exposed soils shall be covered if left unworked for longer than 14 days.

- Element # 6: Protect Slopes
  - No slopes over 20% are being disturbed. All exposed soils not covered by the parking surfaces will be hydroseeded and there will be no slopes greater than 2:1.

- Element # 7: Protect Drain Inlets.
  - Drain inlets are being protected from sediment and high energy flows through the use of catch basin inserts. Catch basin inserts will be installed in any existing catch basins within 500 feet from the project site.

- Element # 8: Stabilize Channels and Outlets.
  - There are no proposed channels or outlets proposed as part of the SWPPP. There is an existing swale that will need to be maintained according to the checklist in Appendix D.

- Element # 9: Control Pollutants.
  - The only pollutants generated by this project are those that are commonly associated with the construction operations. Contractor is responsible to follow all city of Puyallup pollution prevention measures. Contractor to follow all city of Puyallup pollution control standard, particularly when handling concrete, vehicle activity, and paving operations.

- Element # 10: Control De-watering.
  - Because of high groundwater, dewatering may be required on the site. If dewatering is required, the contractor will use Baker Tanks and every effort will be made to avoid discharge into the storm system

- Element # 11: Maintain BMPs
  - The contractor and property owner will be responsible for checking and maintaining all stormwater BMPs. Contractor to repair as needed or as specified by the inspector.

- Element # 12: Manage the Project.
  - The contractor will be tasked with managing the project and are responsible for ensuring all SWPPP measures are followed per the provided plans and this report.

- Element # 13: Protect Low Impact Development BMPs
  - The proposed project improvements consist of an underground Contech water quality system and an ADS stormtech detention chamber. The TESC plan provided with this document as Figure 4: Temporary Erosion and Sediment Control Plan, in Appendix A, shows silt fence at the top of all native flowpath areas and around all dispersion trenches. Contractor shall inspect LID proposed facility location pre and post construction to ensure no sediment laden water can enter the LID facilities area.

Minimum Requirement # 3: Source Control of Pollution

The plans provided with this report will be followed in the field to reduce the potential of pollution. It is anticipated that the only source of pollution generated on site will be from the grading. There is no anticipated pollutant post construction other than pollutants from vehicular traffic typical for a commercial parking lot. The property owners are responsible for the control of pollutants on their property, post construction.

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

The site flows to a swale at the north end of the property. The water then drains from east to west into a control structure. Data for the storm system is not yet available on the Puyallup GIS system but the water likely flows from the control structure to East Main, and ultimately discharges in the Puyallup River (see the control structure in Appendix E). The grade of the swale at the north end of the property will not be changed. The site drainage plan can be found on Figure 3 in Appendix A.

Minimum Requirement # 5: Onsite Stormwater Management

This project proposes more than 5,000 SF of new plus replaced hard surfaces and is therefore required achieve all minimum requirements per Volume 1, Chapter 2, of the Department of Ecology Stormwater Management Manual for Western Washington. According to the geotechnical report, the soil infiltrates at 0.35 in/hr, however, the groundwater was very high and therefore storm water will not be infiltrated but routed to a Contech water quality chamber, then stored in a StormTech Chamber, and then routed to the swale at the north end of the property.

Roof Area: Stormwater from the proposed roof area of 4,800 SF will flow into the Contech Water quality system and then into the StormTech Chamber which will ultimately be directed to the swale at the north end of the property.

Asphalt Area: The storm water from the asphalt parking area will flow through a catch basin to a water quality chamber for cleaning which will also flow into the Stormtech Chamber for storage and then will be directed to the swale at the north end of the property.

Minimum Requirement # 6: Runoff Treatment

This project proposes more than 5,000 square feet of new or replaced hard surfaces and therefore will be required to treat all runoff from PGHS. This project proposes Contech water quality system to treat runoff from proposed PGHS. Runoff from PGHS will enter the Contech water quality system before entering the StormTech Chamber where stormwater will be directed to the swale at the north end of the property. Entry velocity of runoff from the proposed PGHS will remain under a velocity of 1 foot per second as recommended by the Western Washington Stormwater and Site Development Manual, Volume 5, Hydrologic Analysis and Flow Control BMPs (3.7.7.1).

Remove all references to roof areas and revise the report for the current design.

Stand alone Operations and Maintenance Manual required. Prior to occupancy the approved manual shall be attached to the Storm Water Management Facilities Agreement (SWA) and recorded with Pierce County. Find guidance and pre-approved links here: https://www.cityofpuyallup.org/2157/Operations-and-Maintenance Find Storm Water Management Facilities Agreement here: https://www.cityofpuyallup.org/1591/Master-Document-List

Minimum Requirement # 7: Flow Control

This project is responsible for meeting Minimum Requirement #7 as it creates more than 5,000 square feet of new impervious surface. To satisfy minimum requirement #7, an ADS StormChamber detention system was designed to place beneath the new paved area that will receive stormwater immediately downstream of the water quality chamber.

The project will utilize the StormChamber model 3500 and the outflow will be attenuated with a control manhole with orifices as shown on the project plan. The details for the StormChamber 3500 are also shown on the plans, and the WWHM calculations for the sizing of the StormChamber system is included as an appendix in this report.

Minimum Requirement # 8: Wetland Protection

There is one very small wetland at the North end of the property. This wetland will not be disturbed during or after the construction process per City of Puyallup requirements. It will be protected during construction and identified with an orange fence.

Minimum Requirement # 9: Operation and Maintenance

Conveyance pipes and catch basin shall be checked per maintenance recommendations and after major storm events. A maintenance checklist has been provided in Appendix D. The StormTech Storm System has a separate O&M manual that has also been submitted with the plans.

Minimum Requirement # 10: Financial Liability

The owner shall bond or provide an assignment of funds as required by the code in order to ensure compliance with the Western Washington Stormwater Manual.

Section 2: Existing Condition Description

The project site is bounded by industrial/commercial parcels. The project site is accessed from Inter Ave. The site is sloping on the order of 0% to 2% trending down to the north. The site contains mostly natural landscaping with a gravel driveway, shed, and house on the southwest side of the lot. There is a small wetland located on the north side of the property. No obvious signs of surface water were observed or reported.

Section 3: Infiltration Rates / Soils Report

The USDA National Resource Conservation Service (NRCS) Web Soil Survey maps the proposed project as consisting of 100% Briscot loam (6A). According to the geotechnical report, the soil infiltrates at 0.35 in/hr, however, the groundwater was very high and therefore storm water will not be infiltrated but stored in a Stormtech Chamber and drain to the swale at the north end of the property. (see Figure 2 in Appendix A)

Section 4: Wells and Septic Systems

There are no existing wells or septic systems identified on the property.

Remove references to roofs and downspouts.

Section 5: Fuel Tanks

There are no identified fuel tanks on the property.

Section 6: Subbasins Description

The proposed project will consider this site as a single drainage basin. The roof area will drain to catch basins, followed by the water quality system followed by the StormTech Chamber for storage, and ultimately to the outlet on the north end of the property.

Section 7: Floodplain Analysis

The project does not have a stream located within the parcel. A flood area study is not required for the current storm drainage plan application.

Section 8: Aesthetic Consideration for Facilities

The proposed dispersion facilities for stormwater quality and management are based on city standards and contractor shall take aesthetics into consideration when installing stormwater management BMPs.

Section 9: Facility Sizing and Downstream Analysis

Facility Sizing

The proposed stormwater facilities were designed and sized per 2019 Western Washington Stormwater Management Manual. The proposed downspouts flow into the Stormtech Chamber are included in the WWHM calculated sizing parameters. The proposed sheet flow dispersion

facilities were sized according to Volume III, Section 3.2.3. See Appendix B for Stormtech Chamber sizing calculations.

Water Quality

The project proposes more than 5,000 square feet of new or replaced hard surfaces and is required to apply water quality control. Water quality will be achieved by means of a Contech water quality system.

No roof runoff proposed.

Flow Control

The project will utilize the StormChamber model 3500 and the outflow will be attenuated with a control manhole with orifices as shown on the project plan. The details for the StormChamber 3500 are also shown on the plans, and the WWHM calculations for the sizing of the StormChamber system is included as an appendix in this report.

Conveyance System

The roof runoff will be collected via PVC storm drainage piping and conveyed directly to the Stormtech Storm Chamber. All proposed pipes are required to be 12" diameter and minimum 0.5% slope. Per the Washington State Department of Ecology Western Washington Hydrology Model Version 2012 (WWHM).

See miscellaneous correction titled SWALE AND PRIVATE CATCH BASIN.

Downstream Analysis

All stormwater will be directed to the swale at the northern end of the property that flows from east to west into a control structure. Though it is not on the Puyallup GIS yet, the water likely flows from the control structure to East Main and ultimately discharges into the Puyallup river. It is anticipated that no adverse impacts will result from the proposed project.

Section 10: Utilities

All utilities will be designed and installed per City of Puyallup standards, storm facilities and conveyance systems will be designed and constructed with appropriate cover. Utility separation from water and sanitary sewer systems will meet minimum requirements of Washington State Department of Ecology Pipeline Separation Design and Installation Reference Guide, Version 9. Pipeline separation details has been included in the stormwater sheet of the plans.

Section 11: Covenants, Dedications, Easements

There are no covenants, dedications or easements proposed for this property at this time.

Section 12: Property Owners' Association Articles of Incorporation

There are no articles on incorporation proposed for this property.

Section 13: Other Permits or Conditions Placed on the Project

No other permits

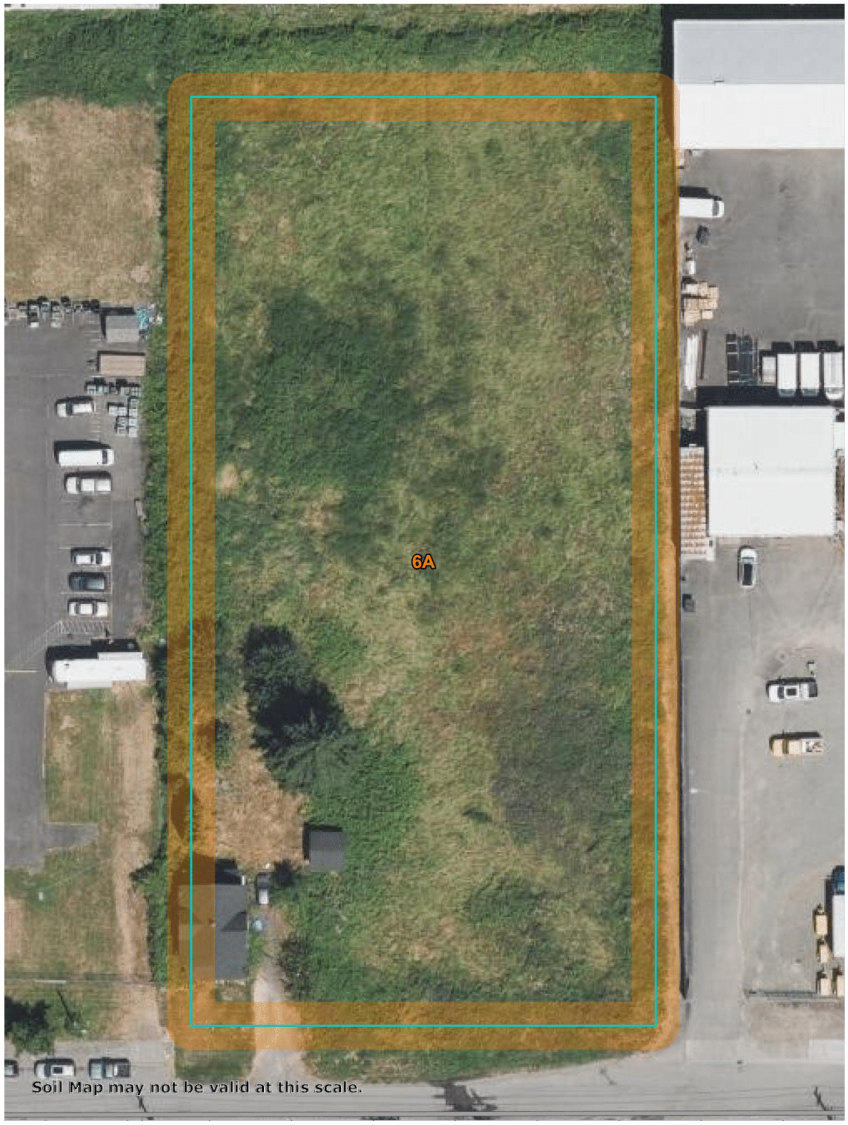
Appendix A – Supporting Figures

Figure 1: Vicinity Map

SITE ADDRESS
2401 INTER AVE SE
PUYALLUP, WA 98372

Figure 2: Site Soils

SITE ADDRESS
2401 INTER AVE SE
PUYALLUP, WA 98372



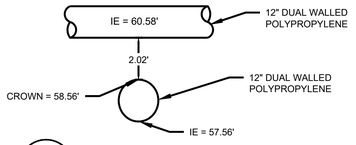
6A = BRISCOT LOAM

Figure 3: Grading and Drainage Plan Concept

2401 INTER

GRADING, DRAINAGE, AND UTILITY PLAN

A PORTION OF THE SW 1/4 OF SECTION 26, TOWNSHIP 20 N, RANGE 4 E, W.M. PIERCE COUNTY, WA



1 UTILITY CROSSING
SCALE:NTS

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.

KEYNOTES

1. PROPOSED ASPHALT PAVEMENT (8/C8)
2. PROPOSED CONCRETE PAVEMENT PER FRONTAGE IMPROVEMENT PLAN SEE SHEET C6
3. PROPOSED MINOR DRIVEWAY APPROACH (5/C8)
4. PROPOSED EXTRUDED CURB (8/C10)
5. PROPOSED CURB AND GUTTER PER FRONTAGE IMPROVEMENT PLAN SEE SHEET C6
6. PROPOSED SAW CUT AND ASPHALT RESTORATION PER FRONTAGE IMPROVEMENT PLAN SEE SHEET C6
7. PROPOSED STORM TECH SYSTEM (1-4/C11) (1-2/C12)
8. PROPOSED LANDSCAPE (3/C12)
9. PROPOSED STREET LIGHTING PER STREET LIGHTING PLAN SEE SHEET C7
10. PROPOSED TYPE 1 CATCH BASIN PER FRONTAGE IMPROVEMENT PLAN SEE SHEET C6

PROPOSED LEGEND

- PROPERTY LINE
- SETBACK
- PROPOSED CONCRETE
- PROPOSED ASPHALT
- PROPOSED INFILTRATION TRENCH
- PROPOSED INFILTRATION TRENCH
- PROPOSED INFILTRATION TRENCH
- SD — STORM DRAIN
- X — PROPOSED FENCE
- CATCH BASIN
- 58 — PROPOSED CONTOUR LINES

STORM STRUCTURE DETAILS:

△ # EACH STORM STRUCTURE IS NUMBERED IN A TRIANGLE BUBBLE AND THE ASSOCIATED INVERTS AND RIM ELEVATIONS ARE PROVIDED BELOW

1. TYPE 1 CATCH BASIN RIM = 62.11 IE 12" E = 60.62 (2/C9)
2. TYPE 1 CATCH BASIN RIM = 62.28 IE 12" W = 60.08 (2/C9)
3. CONTECH WATER QUALITY SYSTEM RIM = 62.51 IE 12" NE = 60.02 IE 12" NS = 57.72 (4/C12)
4. MANHOLE RIM = 62.77 IE 12" NE = 57.66 (3/C9)
5. FLOW CONTROL MANHOLE RIM = 62.96 IE 12" NE = 57.66 (4/C9)

STORM DRAIN PIPE SECTIONS

- (#) EACH PIPE SECTION IS NUMBERED IN A BUBBLE AND THE ASSOCIATED LENGTHS AND SLOPES ARE PROVIDED BELOW
- (1) 107 LF 12" DUAL WALLED POLYPROPYLENE @ 0.5% SLOPE
- (2) 12 LF 12" DUAL WALLED POLYPROPYLENE @ 0.5% SLOPE
- (3) 12 LF 12" DUAL WALLED POLYPROPYLENE @ 0.5% SLOPE
- (4) 125 LF 12" DUAL WALLED POLYPROPYLENE @ 0.5% SLOPE

N

0 10 **20** 40

SCALE: 1" = 20'
FOR 24" X 36" SHEET
LINE IS 1" AT
FULL SCALE

CALL BEFORE YOU DIG 1-800-424-5555 OR 811

McInnis ENGINEERING
mcinnisengineering.com
253.414.1992
202 East 34th Street
Tacoma, Washington 98404

2401 INTER
GRADING, DRAINAGE, AND UTILITY PLAN

2401 INTER AVE SE
PUYALLUP, WA 98372

JEFFREY W. MCINNIS — STATE OF WASHINGTON — 37399 — REGISTERED PROFESSIONAL ENGINEER — 01/24/25

NUM	DATE	DESCRIPTION
V1	01/24/25	INITIAL RELEASE

DESIGNED W. MCINNIS	SCALE 1"=20'
DRAWN W. MCINNIS	CHECKED J. MCINNIS
DATE 01/24/25	APPROVED J. MCINNIS

JOB NO. 24-166

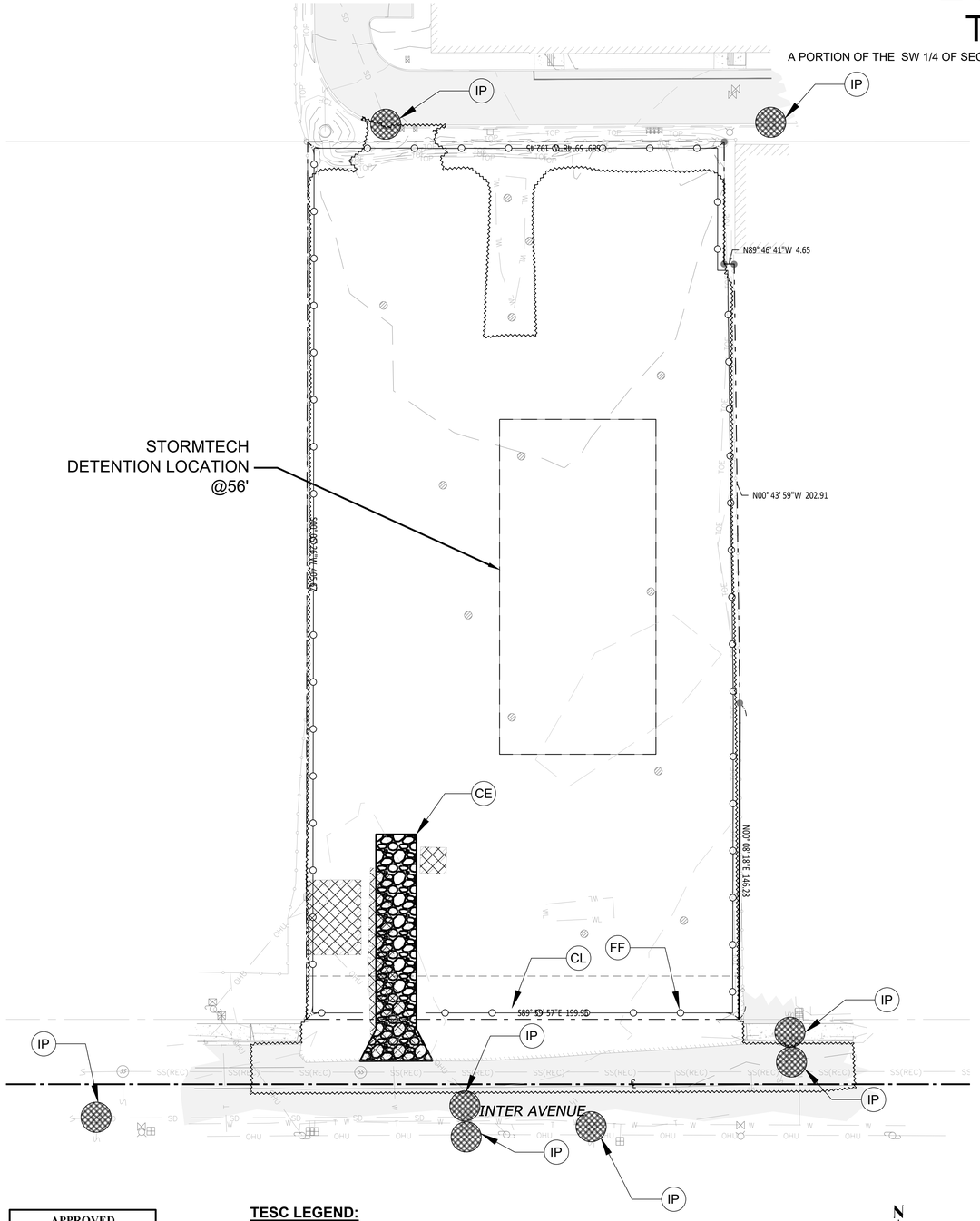
SHEET C5 OF C12

C5

Figure 4: Erosion Control Plan

2401 INTER
TESC PLAN

A PORTION OF THE SW 1/4 OF SECTION 26, TOWNSHIP 20 N, RANGE 4 E, W.M. PIERCE COUNTY, WA



TESC INSPECTION NOTES:

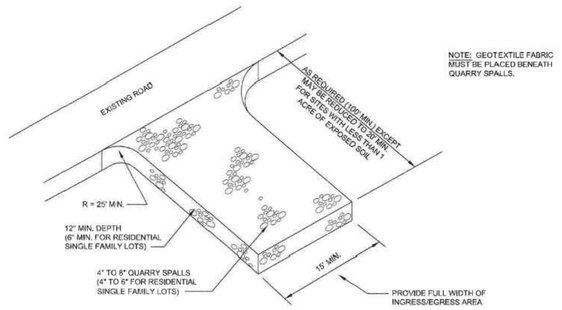
1. INSPECT ALL INLET PROTECTION ON CATCH BASINS. CLEAN OR REPLACE IF FULL OF SEDIMENT /DEBRIS AND REPAIR/REPLACE AS NEEDED IF DAMAGED TO MAINTAIN PROTECTION.
2. INSPECT ALL PERMANENT AND TEMPORARY STABILIZED SLOPES. REPAIR ANY DAMAGED SECTIONS AND RE-VEGETATE AS NEEDED TO ENSURE THE ESTABLISHMENT OF VEGETATION AND THAT NO EROSION OF THE SLOPES OCCUR.
3. INSPECT ALL FILTER FABRIC FENCING FOR SIGNS OF EROSION, DAMAGE OR FAILURES. REPAIR AND/OR REPLACE AS NEEDED. SEE FILTER FABRIC NOTES. SEDIMENT BUILD-UP ALONG FENCE SHALL BE REMOVED WHEN REACHES 1/3 THE FENCE HEIGHT. IF EROSION IS OCCURRING, CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL MEASURES AS NEEDED TO PREVENT EROSION.
4. ANY FILL/CUT SLOPES SHALL BE INSPECTED FOR EROSION. IF SIGNS OF EROSION ARE PRESENT, INSTALL APPROPRIATE BMPS AS NEEDED TO STOP EROSION AND STABILIZE SLOPES.
5. TESC LEAD RESPONSIBLE FOR NOTIFYING ENGINEER IF ADDITIONAL MEASURES ARE WARRANTED.

PERMANENT STABILIZATION NOTES:

1. ALL EXPOSED SOILS AND SLOPES SHALL BE SEEDED OR OTHERWISE STABILIZED IMMEDIATELY AFTER CONSTRUCTION AND GRADING ACTIVITIES HAVE BEEN COMPLETED.
2. SILT FENCE, IF DEEMED APPROPRIATE, SHALL REMAIN FOR A MINIMUM OF 30 DAYS AFTER THE FINAL STABILIZATION OF THE SLOPES HAS OCCURRED.
3. ALL TEMPORARY EROSION CONTROL BMP'S SHALL BE REMOVED 30 DAYS AFTER FINAL STABILIZATION HAS OCCURRED AS DIRECTED BY CITY OR COUNTY INSPECTOR.
4. CONTRACTOR SHALL REFER TO THE CONSTRUCTION SWPP FOR APPLICABLE BMPS.

CONSTRUCTION ENTRANCE NOTES:

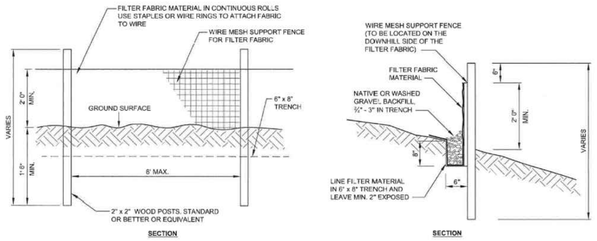
1. MATERIAL SHALL BE 4" TO 8" QUARRY SPALLS (4 TO 6 INCH FOR RESIDENTIAL SINGLE FAMILY LOTS) AND MAY BE TOP-DRESSED WITH 1 TO 3 INCH ROCK.
2. THE ROCK PAD SHALL BE AT LEAST 12" THICK AND 100' LONG (REDUCED TO 20 FEET FOR SITES LESS THAN 1 ACRE OF DISTURBED SOIL) WIDTH SHALL BE FULL WIDTH OF INGRESS AND EGRESS AREA. SMALLER PADS MAY BE APPROVED FOR SINGLE-FAMILY RESIDENTIAL AND COMMERCIAL SITES.
3. ADDITIONAL ROCK SHALL BE ADDED PERIODICALLY TO MAINTAIN FUNCTION OF THE PAD.
4. IF THE PAD DOES NOT ADEQUATELY REMOVE MUD FROM THE VEHICLE 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.



1 CONSTRUCTION ENTRANCE
SCALE:NTS

FILTER FABRIC FENCE NOTES:

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



2 FILTER FABRIC FENCE
SCALE:NTS

AMENDED SOILS NOTES:

- SOIL AMENDMENTS ARE REQUIRED FOR ALL DISTURBED AREAS IN ACCORDANCE WITH CS 01.02.0A AND DEPTH OF THE 2019 SURFACE WATER MANAGEMENT MANUAL
- AMENDED SOILS SHALL BE A MINIMUM OF 8" (NON-COMPACTED) WITH SUBSOILS SCARIFIED AT LEAST 4" WITH INCORPORATION OF THE UPPER MATERIAL TO AVOID STRATIFIED LAYERS, WHERE FEASIBLE.
- QUALITY OF COMPOST AND OTHER MATERIALS USED TO MEET THE ORGANIC CONTENT REQUIREMENTS ARE AS FOLLOWS:

a. THE ORGANIC CONTENT FOR "PRE-APPROVED" AMENDMENT RATES CAN BE MET ONLY USING COMPOST THAT MEETS THE DEFINITION OF "COMPOSTED MATERIALS" IN WAC 173-350-220. THE WAC IS AVAILABLE ONLINE AT: HTTP://WWW.ECY.WA.GOV/PROGRAMS/SWFA/FACILITIES/350.HTML THE COMPOST MUST ALSO HAVE AN ORGANIC MATTER CONTENT OF 35% TO 65%, AND A CARBON TO NITROGEN RATIO BELOW 25:1. THE CARBON TO NITROGEN RATIO MAY BE AS HIGH AS 35: 1 FOR PLANTINGS COMPOSED ENTIRELY OF PLANTS NATIVE TO THE PUGET SOUND LOWLANDS REGION.
b. CALCULATED AMENDMENT RATES MAY BE MET THROUGH USE OF COMPOSTED MATERIALS AS DEFINED ABOVE; OR OTHER ORGANIC MATERIALS AMENDED TO MEET THE CARBON TO NITROGEN RATIO REQUIREMENTS, AND MEETING THE CONTAMINANT STANDARDS OF GRADE A COMPOST.

- USE ONE OF THE FOLLOWING OPTIONS TO MEET THE POST CONSTRUCTION SOIL QUALITY AND DEPTH REQUIREMENTS. USE THE MOST RECENT VERSION OF "GUIDELINES FOR RESOURCES FOR IMPLEMENTING SOIL QUALITY AND DEPTH BMP T5.13" TO MEET THE REQUIREMENTS OF THIS BMP. THIS GUIDANCE CAN BE FOUND ONLINE AT:WWW.SOILSFORSALMON.ORG

a. LEAVE NATIVE VEGETATION AND SOIL UNDISTURBED, AND PROTECT FROM COMPACTION DURING CONSTRUCTION
b. AMEND EXISTING SITE TOPSOIL OR SUBSOIL EITHER AT DEFAULT "PRE-APPROVED" RATES, OR AT CUSTOM CALCULATED RA TES BASED ON SPECIFIC TESTS OF THE SOIL AND AMENDMENT
c. STOCKPILE EXISTING TOPSOIL DURING GRADING, AND REPLACE IT PRIOR TO PLANTING. STOCKPILED TOPSOIL MUST ALSO BE AMENDED IF NEEDED TO MEET THE ORGANIC MATTER OR DEPTH REQUIREMENTS, EITHER AT A DEFAULT "PRE-APPROVED" RATE OR AT A CUSTOM CALCULATED RATE.
d. IMPORT TOPSOIL MIX OF SUFFICIENT ORGANIC CONTENT AND DEPTH TO MEET THE REQUIREMENTS. MORE THAN ONE METHOD MAY BE USED ON DIFFERENT PORTIONS OF THE SAME SITE. SOIL THAT ALREADY MEETS THE DEPTH AND ORGANIC MATTER QUALITY STANDARDS, AND IS NOT COMPACTED, DOES NOT NEED TO BE AMENDED.

- AMENDED SOILS SHALL BE MAINTAINED AS FOLLOWS:

a. SOIL QUALITY AND DEPTH SHOULD BE ESTABLISHED TOWARD THE END OF CONSTRUCTION AND ONCE ESTABLISHED, SHOULD BE PROTECTED FROM COMPACTION, SUCH AS FROM LARGE MACHINERY USE, AND FROM EROSION.
b. SOIL SHOULD BE PLANTED AND MULCHED AFTER INSTALLATION.
c. PLANT DEBRIS OR ITS EQUIVALENT SHOULD BE LEFT ON THE SOIL SURFACE TO REPLENISH ORGANIC MA TIER.
d. IT SHOULD BE POSSIBLE TO REDUCE USE OF IRRIGATION, FERTILIZERS, HERBICIDES AND PESTICIDES. THESE ACTIVITIES SHOULD BE ADJUSTED WHERE POSSIBLE,RATHER THAN CONTINUING TO IMPLEMENT FORMERLY ESTABLISHED PRACTICES.

- SEE PROJECT CONSTRUCTION SWPPP FOR ADDITIONAL INFORMATION OR SECTION 2.2.1.4 OF CHAPTER 2 OF VOLUME 6 OF THE 2021 SURFACE WATER MANAGEMENT MANUAL

MULCHING NOTES:

1. MULCH MATERIALS USED SHALL BE STRAW OR HAY, AND SHALL BE APPLIED AT THE RATE OF 75-100 POUNDS PER 1000 SQ. FT. (APPX 2" THICK).
2. MULCH SHALL BE APPLIED IN ALL AREAS WITH EXPOSED SLOPES GREATER THAN 2: 1.
3. MULCHING SHALL BE USED IMMEDIATELY AFTER SEEDING OR IN AREAS WHICH CANNOT BE SEEDED BECAUSE OF THE SEASON.
4. ALL AREAS NEEDING MULCH SHALL BE COVERED BY NOVEMBER 1.

CONTRACTOR NOTES:

1. INLET PROTECTION SHALL BE INSTALLED IN ALL NEWLY CONSTRUCTED CATCH BASINS AND ALONG ALL IMPACTED FRONTAGE AND OFFSITE AREAS PER THE REQUIREMENTS OF THE CITY INSPECTOR PER DETAIL 3 ON THIS SHEET.
2. CONSTRUCTION FENCE CAN BE UTILIZED IN PLACE OF FILTER FABRIC FENCE ONLY IN AREAS WHERE THE GRADES DO NOT ALLOW THE POTENTIAL FOR ANY STORMWATER TO LEAVE THE SITE.
3. ALL DEMOLISHED MATERIALS SHALL BE REMOVED FROM THE SITE AND DISPOSED OF AT A CITY APPROVED LOCATION AND IN A MANNER CONSISTENT WITH CURRENT REGULATIONS AND REQUIREMENTS.
4. ALL AREAS THAT WILL BE UNWORKED FOR MORE THAN SEVEN (7) DAYS DURING THE DRY SEASON OR TWO (2) DAYS DURING THE WET SEASON, SHALL BE COVERED WITH STRAW, WOOD FIBER MULCH, COMPOST, PLASTIC SHEETING, OR OTHER EQUIVALENT PER CURRENT CITY OR COUNTY STANDARDS. SEE SEEDING NOTES AND MULCHING NOTES ON THIS SHEET.
5. CONTRACTOR SHALL DESIGNATE A WASHINGTON DEPT OF ECOLOGY CERTIFIED EROSION CONTROL LEAD PERSON, AND SHALL COMPLY WITH THE CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PREPARED FOR THE PROJECT.
6. AT ANY TIME DURING CONSTRUCTION IT IS DETERMINED BY THE CITY OR COUNTY THAT MUD AND DEBRIS ARE BEING TRACKED ONTO PUBLIC STREETS WITH INSUFFICIENT CLEANUP, ALL WORK SHALL CEASE ON THE PROJECT UNTIL THIS CONDITION IS CORRECTED. THE CONTRACTOR AND/OR THE OWNER SHALL IMMEDIATELY TAKE ALL STEPS NECESSARY TO PREVENT FUTURE TRACKING OF MUD AND DEBRIS INTO THE PUBLIC ROW, WHICH MAY INCLUDE THE INSTALLATION OF A WHEEL WASH FACILITY ON-SITE.
7. SEDIMENT LADEN RUNOFF SHALL NOT BE ALLOWED TO DISCHARGE BEYOND THE LIMITS OF THE IMPROVEMENTS. ADDITIONAL MEASURES SHALL BE INSTALLED AS NEEDED.
8. SAND BAGS SHALL BE SECURELY PLACED AROUND INSTALLED CATCH BASINS WITH INLET PROTECTION AS FIELD AND WEATHER CONDITIONS WARRANT SO TO PROTECT ALL DISPERSION AND INFILTRATION TRENCHES SEDIMENT LADEN RUNOFF.
9. TREES WITHIN WORKING LIMITS TO BE SAVED, SHALL BE MARKED AS SUCH ON SITE AND PROTECTION FENCE PLACED AROUND EACH TREE.

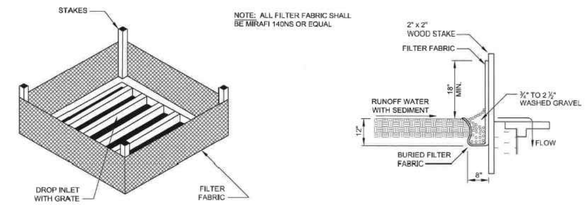
SEEDING NOTES:

1. THE FOLLOWING SEED MIXTURE SHALL BE AS BELOW AND SHALL BE APPLIED AT THE RATE RECOMMENDED BY THE SUPPLIER.

TABLE D.3.2.B TEMPORARY EROSION CONTROL SEED MIX

	% WEIGHT	% PURITY	% GERMINATION
CHEWINGS OR RED FESCUE FESTUCA *RUBRA VAR. COMMUTATA OR FESTUCA RUBRA*	40	98	90
ANNUAL OR PERENNIAL RYE *LOLIUM MULTIFLORUM OR LOLIUM PERENNE*	40	98	90
REDTOP OR COLONIAL BENTGRASS *AGROSTIS ALBA OR AGROSTIS TENUIS*	10	92	85
WHITE DUTCH CLOVER *TRIFOLIUM REPENS*	10	98	90

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



3 INLET PROTECTION
SCALE:NTS

CALL BEFORE YOU DIG
1-800-424-5555 OR 811

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.

TESC LEGEND:

CL	CLEARING/ GRADING/ DISTURBED LIMITS
FF	FILTER FABRIC FENCE SEE DETAIL 2/C3
CE	CONSTRUCTION ENTRANCE 1/C3
IP	INLET PROTECTION 3/C3
DR	DEMO AND REMOVE

N

0 15 30 60

SCALE: 1" = 30'
FOR 22" X 34" SHEET
LINE IS 1" AT
FULL SCALE

McInnis ENGINEERING
mcinnisengineering.com
253.414.1992
202 East 34th Street
Tacoma, Washington 98404

2401 INTER
TESC PLAN

2401 INTER AVE SE
PUYALLUP, WA 98372

JEFFREY W. McINNIS — STATE OF WASHINGTON — 37399 — REGISTERED PROFESSIONAL ENGINEER
01/24/25

NUM	DATE	DESCRIPTION
V1	01/24/25	INITIAL RELEASE

DESIGNED W. MCINNIS	SCALE 1"=30'
DRAWN W. MCINNIS	CHECKED J. MCINNIS
DATE 01/24/25	APPROVED J. MCINNIS

JOB NO. 24-166

SHEET C3 OF C12

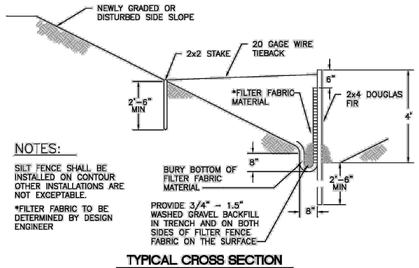
C3

File: Z:\Shared\McInnis Engineering Files\2024 Proposals-Projects\24-166 - 2401 Inter - Redesign Project\Engineering\CAD\ME\24-166 - SDEV - 2401 INTER - REV(V1)\24-166 - SDEV - 2401 INTER - 24-166 TESC PLAN.dwg Plotted By: ----

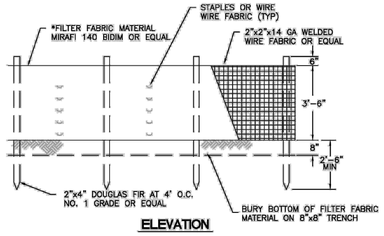
2401 INTER

TESC NOTES AND DETAILS

A PORTION OF THE SW 1/4 OF SECTION 26, TOWNSHIP 20 N, RANGE 4 E, W.M. PIERCE COUNTY, WA



TYPICAL CROSS SECTION



ELEVATION

CITY OF PUYALLUP
DEVELOPMENT ENGINEERING and PUBLIC WORKS DEPARTMENTS

SILTATION FENCE

DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
LINDA LANDINO	LINDA LIAN	COLLEEN HARRIS	XXXX	
FILE NAME: P:\DWG\COMMON\STDETCITY\2009\01_SDG\13.01.E1		DATE APPROVED: 04/01/2003	DATE REVISED: 04/01/2003	SCALE: NTS

02.03.02

1 SILTATION FENCE
SCALE:NTS

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 INCLUSIVE. 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

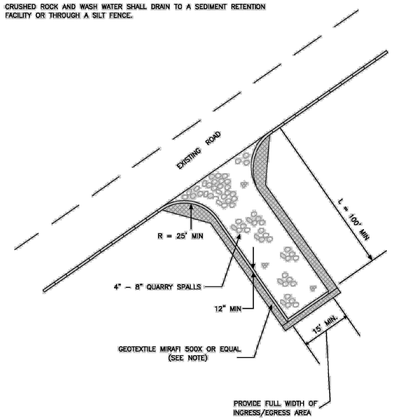
DRAWN BY	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
JIM BROWN-SVOBODA	LINDA LIAN	COLLEEN HARRIS	LINDA LIAN	
FILE NAME: P:\DWG\COMMON\STDETCITY\2009\01_SDG\13.01.E1		DATE APPROVED: 03/01/2009	DATE REVISED: 12/30/2014	SCALE: 11

05.02.01

2 GRADING, EROSION, AND SEDIMENTATION CONTROL NOTES
SCALE:NTS

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	CHECKED BY	APPROVED BY	REVISED BY	CITY STANDARD
JIM BROWN-SVOBODA	LINDA LIAN	COLLEEN HARRIS	XXXX	
FILE NAME: P:\DWG\COMMON\STDETCITY\2009\01_SDG\13.01.E1		DATE APPROVED: 03/01/2009	DATE REVISED: XX/XX/XX	SCALE: 140

05.01.01

3 TEMPORARY CONSTRUCTION ENTRANCE
SCALE:NTS

GENERAL 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. REPRESENTATIVES OF INVOLVED UTILITIES AND THE CITY OF PUYALLUP. CONTACT THE ENGINEERING SERVICES TO SCHEDULE THE MEETING (253-841-5568). THE CONTRACTOR IS RESPONSIBLE TO HAVE THEIR OWN 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 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 STANDARD DETAILS.
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, 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 AT (360)407-6300.
15. ANY DISTURBANCE OR DAMAGE TO CRITICAL AREAS AND ASSOCIATED BUFFERS, OR SIGNIFICANT TREES FOR PRESERVATION AND PROTECTION SHALL BE MITIGATED IN ACCORDANCE WITH A MITIGATION PLAN REVIEWED AND APPROVED BY THE CITY%%146S PLANNING DIVISION. PREPARATION AND IMPLEMENTATION OF THE MITIGATION PLAN SHALL BE AT THE DEVELOPER'S EXPENSE.
16. NO SURVEY MONUMENT SHALL BE REMOVED OR DESTROYED (THE PHYSICAL DISTURBANCE OR COVERING OF A MONUMENT SUCH THAT THE SURVEY POINT IS NO LONGER VISABLE OR READILY ACCESSIBLE) BEFORE A PERMIT IS OBTAINED FROM THE DEPARTMENT OF NATURAL RESOURCES (DNR).WAC 332-120-030(2) STATES "IT SHALL BE THE RESPONSIBILITY OF <THOSE> PERFORMING CONSTRUCTION WORK OR OTHER ACTIVITY (INCLUDING ROAD AND STREET RESURFACING PROJECTS TO ADEQUATELY SEARCH THE RECORDS AND THE PHYSICAL AREA OF THE PROPOSED CONSTRUCTION WORK OR OTHER ACTIVITY FOR THE PURPOSE OF LOCATING AND REFERENCING ANY KNOWN OR EXISTING SURVEY MONUMENTS" CONSTRUCTION SHALL NOT COMMENCE UNTIL WAC OUTLINED IN CHAPTER 332-120 IS COMPLIED WITH. SURVEY MONUMENTS SUBJECT TO WAC 332-120-030(2) INCLUDE LOCAL CONTROL POINTS AND LAND BOUNDARY SURVEY CORNERS.
17. EXPOSED SOILS WITH AN AREA GREATER THAN 5,000 SQUARE FEET THAT ARE SCHEDULED TO REMAIN UNWORKED FOR MORE THAN 24 HOURS AND EXPOSED AREAS OF LESS THAN 5,000 SQUARE FEET THAT WILL REMAIN UNWORKED FOR MORE THAN SEVEN (7) DAYS SHALL BE STABILIZED IMMEDIATELY.

GRADING, EROSION, AND SEDIMENTATION CONTROL NOTES

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

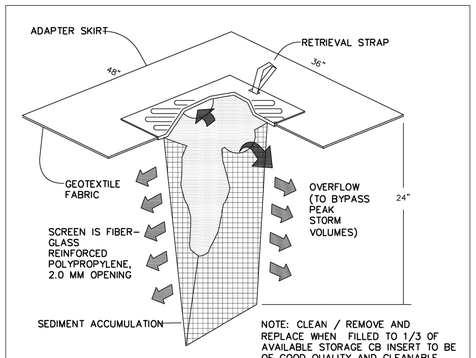
SEDIMENTATION NOTE

AT ANY TIME DURING CONSTRUCTION IT IS DETERMINED BY THE CITY THAT MUD AND DEBRIS ARE BEING TRACKED ONTO PUBLIC STREETS WITH INSUFFICIENT CLEANUP, ALL WORK SHALL CEASE ON THE PROJECT UNTIL THIS CONDITION IS CORRECTED. THE CONTRACTOR AND/OR THE OWNER SHALL IMMEDIATELY TAKE ALL STEPS NECESSARY TO PREVENT FUTURE TRACKING OF MUD AND DEBRIS INTO THE PUBLIC ROW, WHICH MAY INCLUDE THE INSTALLATION OF A WHEEL WASH FACILITY ON-SITE.

SEDIMENT LADEN RUNOFF SHALL NOT BE ALLOWED TO DISCHARGE BEYOND THE CONSTRUCTION LIMITS IN ACCORDANCE WITH CITY REGULATIONS.

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 INSPECTION WITH THE CITY.
7. CONSTRUCT STORM DRAINAGE RETENTION/DETENTION (CONTROL AND STORAGE) FACILITIES. PROVIDE EMERGENCY OVERFLOW AS APPLICABLE.
8. ALL DITCHES AND SWALES AS SHOWN SHALL BE PROVIDED TO DIRECT ALL SURFACE WATER TO THE RETENTION/DETENTION AND SEDIMENTATION POND AS CLEARING AND GRADING PROGRESSES. NO UNCONTROLLED SURFACE WATER SHALL BE ALLOWED TO LEAVE THE SITE OR BE DISCHARGED TO A CRITICAL AREA AT ANY TIME DURING THE GRADING OPERATIONS.
9. CLEARLY STATE AT WHAT POINT GRADING ACTIVITIES CAN BEGIN, USUALLY ONLY AFTER ALL DRAINAGE AND EROSION CONTROL MEASURES ARE IN PLACE.
10. IDENTIFY EROSION CONTROL MEASURES WHICH REQUIRE REGULAR MAINTENANCE.



DETAIL CBI-1
CATCH BASIN INSERT FOR TRASH & DEBRIS

4 CATCH BASIN INSERT
SCALE:NTS

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.

McInnis ENGINEERING
mcinnisengineering.com
253.414.1992
202 East 34th Street
Tacoma, Washington 98404

2401 INTER
TESC NOTES AND DETAILS

2401 INTER AVE SE
PUYALLUP, WA 98372

JEFFREY W. McINNIS
STATE OF WASHINGTON
37599
REGISTERED PROFESSIONAL ENGINEER
01/24/25

NUM	DATE	DESCRIPTION
V1	01/24/25	INITIAL RELEASE

DESIGNED	SCALE
W. MCINNIS	N.T.S.
DRAWN	CHECKED
W. MCINNIS	J. MCINNIS
DATE	APPROVED
01/24/25	J. MCINNIS

JOB NO.
24-166

SHEET
C4 OF C12

C4

CALL BEFORE YOU DIG
1-800-424-5555 OR 811

Appendix B – Hydrologic Calculation & WWHM Report

WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: 2401 StormTech - Copy
Site Name:
Site Address:
City:

Report Date:	1/22/2025
Gage:	38 IN CENTRAL
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2023/01/27
Version:	4.2.19

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

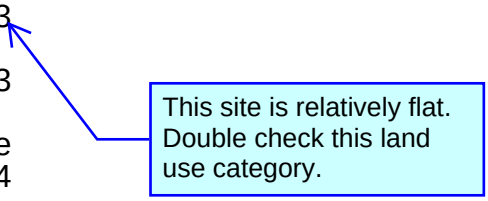
Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	1.85
Pervious Total	1.85
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.85

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Lawn, Flat	0.1
A B, Lawn, Steep	0.33
Pervious Total	0.43
Impervious Land Use	acre
ROADS FLAT	1.34
Impervious Total	1.34
Basin Total	1.77



Driveway Bypass

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS MOD	0.05
SIDEWALKS FLAT	0.03
Impervious Total	0.08
Basin Total	0.08

Routing Elements
Predeveloped Routing

Mitigated Routing

StormTech 1

Chamber Model: 3500
Dimensions
Max Row Length: 200
Number of Chambers: 200
Number of Endcaps: 16
Top Stone Depth: 12
Bottom Stone Depth: 9
Discharge Structure
Riser Height: 4.5 ft.
Riser Diameter: 18 in.
Notch Type: Rectangular
Notch Width: 0.010 ft.
Notch Height: 1.325 ft.
Orifice 1 Diameter: 0.626 in. Elevation:0 ft.
Element Flows To:
Outlet 1 Outlet 2

Plans show 20 endcaps.

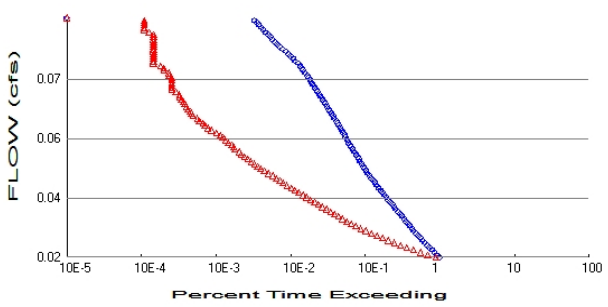
StormTech Hydraulic Table

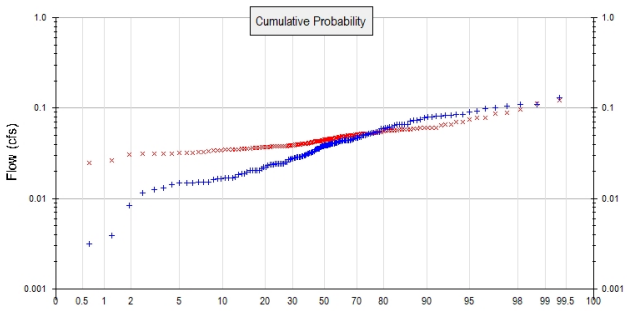
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.241	0.000	0.000	0.000
0.0833	0.241	0.008	0.003	0.000
0.1667	0.241	0.016	0.004	0.000
0.2500	0.241	0.024	0.005	0.000
0.3333	0.241	0.032	0.006	0.000
0.4167	0.241	0.040	0.006	0.000
0.5000	0.241	0.048	0.007	0.000
0.5833	0.241	0.056	0.008	0.000
0.6667	0.241	0.064	0.008	0.000
0.7500	0.241	0.072	0.009	0.000
0.8333	0.241	0.090	0.009	0.000
0.9167	0.241	0.107	0.010	0.000
1.0000	0.241	0.125	0.010	0.000
1.0833	0.241	0.143	0.011	0.000
1.1667	0.241	0.160	0.011	0.000
1.2500	0.241	0.178	0.011	0.000
1.3333	0.241	0.195	0.012	0.000
1.4167	0.241	0.213	0.012	0.000
1.5000	0.241	0.230	0.013	0.000
1.5833	0.241	0.247	0.013	0.000
1.6667	0.241	0.264	0.013	0.000
1.7500	0.241	0.281	0.014	0.000
1.8333	0.241	0.298	0.014	0.000
1.9167	0.241	0.315	0.014	0.000
2.0000	0.241	0.332	0.015	0.000
2.0833	0.241	0.348	0.015	0.000
2.1667	0.241	0.365	0.015	0.000
2.2500	0.241	0.381	0.016	0.000
2.3333	0.241	0.398	0.016	0.000
2.4167	0.241	0.414	0.016	0.000
2.5000	0.241	0.430	0.016	0.000
2.5833	0.241	0.446	0.017	0.000
2.6667	0.241	0.461	0.017	0.000

2.7500	0.241	0.477	0.017	0.000
2.8333	0.241	0.493	0.017	0.000
2.9167	0.241	0.508	0.018	0.000
3.0000	0.241	0.523	0.018	0.000
3.0833	0.241	0.538	0.018	0.000
3.1667	0.241	0.552	0.018	0.000
3.2500	0.241	0.567	0.019	0.000
3.3333	0.241	0.581	0.021	0.000
3.4167	0.241	0.595	0.023	0.000
3.5000	0.241	0.609	0.025	0.000
3.5833	0.241	0.622	0.028	0.000
3.6667	0.241	0.635	0.030	0.000
3.7500	0.241	0.648	0.033	0.000
3.8333	0.241	0.660	0.036	0.000
3.9167	0.241	0.672	0.039	0.000
4.0000	0.241	0.684	0.042	0.000
4.0833	0.241	0.695	0.045	0.000
4.1667	0.241	0.705	0.048	0.000
4.2500	0.241	0.714	0.051	0.000
4.3333	0.241	0.723	0.055	0.000
4.4167	0.241	0.731	0.059	0.000
4.5000	0.241	0.740	0.063	0.000
4.5833	0.241	0.748	0.445	0.000
4.6667	0.241	0.756	1.137	0.000
4.7500	0.241	0.764	2.002	0.000
4.8333	0.241	0.772	2.946	0.000
4.9167	0.241	0.780	3.876	0.000
5.0000	0.241	0.788	4.703	0.000
5.0833	0.241	0.796	5.358	0.000
5.1667	0.241	0.804	5.819	0.000
5.2500	0.241	0.812	6.136	0.000
5.3333	0.241	0.820	6.534	0.000
5.4167	0.241	0.828	6.850	0.000
5.5000	0.241	0.836	7.152	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 1.85
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.43
Total Impervious Area: 1.42

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.038985
5 year	0.060649
10 year	0.07242
25 year	0.084401
50 year	0.091522
100 year	0.097378

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.044266
5 year	0.056065
10 year	0.06443
25 year	0.075644
50 year	0.084482
100 year	0.093746

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.029	0.047
1903	0.024	0.052
1904	0.039	0.059
1905	0.019	0.036
1906	0.008	0.035
1907	0.060	0.046
1908	0.044	0.038
1909	0.044	0.041
1910	0.060	0.046
1911	0.039	0.046

1912	0.130	0.074
1913	0.062	0.038
1914	0.015	0.121
1915	0.025	0.036
1916	0.039	0.052
1917	0.013	0.027
1918	0.042	0.043
1919	0.031	0.032
1920	0.040	0.041
1921	0.044	0.039
1922	0.044	0.050
1923	0.036	0.037
1924	0.016	0.054
1925	0.020	0.031
1926	0.038	0.045
1927	0.024	0.038
1928	0.030	0.037
1929	0.062	0.057
1930	0.040	0.059
1931	0.037	0.038
1932	0.029	0.037
1933	0.028	0.039
1934	0.082	0.052
1935	0.038	0.032
1936	0.033	0.043
1937	0.053	0.052
1938	0.032	0.034
1939	0.002	0.039
1940	0.036	0.058
1941	0.017	0.058
1942	0.053	0.050
1943	0.028	0.047
1944	0.050	0.066
1945	0.045	0.048
1946	0.024	0.042
1947	0.015	0.033
1948	0.084	0.047
1949	0.072	0.060
1950	0.020	0.035
1951	0.025	0.057
1952	0.109	0.066
1953	0.099	0.061
1954	0.036	0.038
1955	0.029	0.035
1956	0.014	0.032
1957	0.051	0.036
1958	0.106	0.048
1959	0.065	0.055
1960	0.017	0.036
1961	0.066	0.088
1962	0.035	0.040
1963	0.017	0.031
1964	0.019	0.088
1965	0.073	0.051
1966	0.021	0.035
1967	0.032	0.046
1968	0.032	0.043
1969	0.032	0.039

1970	0.050	0.043
1971	0.079	0.043
1972	0.051	0.112
1973	0.065	0.070
1974	0.035	0.052
1975	0.083	0.060
1976	0.044	0.057
1977	0.015	0.031
1978	0.074	0.052
1979	0.020	0.045
1980	0.042	0.050
1981	0.040	0.045
1982	0.016	0.038
1983	0.066	0.050
1984	0.027	0.048
1985	0.043	0.054
1986	0.039	0.035
1987	0.074	0.050
1988	0.047	0.035
1989	0.042	0.032
1990	0.048	0.039
1991	0.038	0.056
1992	0.054	0.051
1993	0.052	0.049
1994	0.078	0.041
1995	0.015	0.037
1996	0.086	0.046
1997	0.033	0.039
1998	0.039	0.044
1999	0.003	0.044
2000	0.030	0.042
2001	0.015	0.032
2002	0.054	0.057
2003	0.047	0.041
2004	0.044	0.048
2005	0.080	0.096
2006	0.024	0.045
2007	0.024	0.052
2008	0.041	0.043
2009	0.028	0.034
2010	0.024	0.044
2011	0.020	0.042
2012	0.028	0.041
2013	0.022	0.039
2014	0.016	0.037
2015	0.032	0.058
2016	0.013	0.039
2017	0.060	0.060
2018	0.109	0.053
2019	0.102	0.061
2020	0.033	0.046
2021	0.054	0.045
2022	0.022	0.058
2023	0.046	0.070
2024	0.086	0.078
2025	0.040	0.038
2026	0.066	0.055
2027	0.024	0.049

2028	0.020	0.024
2029	0.044	0.038
2030	0.082	0.057
2031	0.027	0.025
2032	0.015	0.034
2033	0.024	0.041
2034	0.023	0.036
2035	0.093	0.052
2036	0.048	0.037
2037	0.012	0.052
2038	0.039	0.045
2039	0.004	0.078
2040	0.021	0.038
2041	0.029	0.043
2042	0.090	0.050
2043	0.044	0.049
2044	0.059	0.042
2045	0.040	0.033
2046	0.047	0.040
2047	0.035	0.040
2048	0.045	0.037
2049	0.040	0.049
2050	0.029	0.040
2051	0.042	0.055
2052	0.024	0.043
2053	0.043	0.038
2054	0.055	0.064
2055	0.017	0.039
2056	0.019	0.049
2057	0.029	0.032
2058	0.037	0.052
2059	0.066	0.059

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1298	0.1212
2	0.1094	0.1115
3	0.1092	0.0961
4	0.1055	0.0880
5	0.1019	0.0877
6	0.0986	0.0784
7	0.0930	0.0778
8	0.0905	0.0742
9	0.0857	0.0703
10	0.0856	0.0697
11	0.0839	0.0663
12	0.0831	0.0657
13	0.0824	0.0644
14	0.0816	0.0611
15	0.0801	0.0608
16	0.0792	0.0605
17	0.0782	0.0603
18	0.0744	0.0602
19	0.0740	0.0591
20	0.0734	0.0590
21	0.0719	0.0586
22	0.0660	0.0581

23	0.0656	0.0579
24	0.0656	0.0577
25	0.0656	0.0575
26	0.0654	0.0574
27	0.0652	0.0574
28	0.0622	0.0573
29	0.0619	0.0571
30	0.0604	0.0568
31	0.0601	0.0564
32	0.0598	0.0553
33	0.0590	0.0549
34	0.0546	0.0546
35	0.0544	0.0542
36	0.0541	0.0537
37	0.0538	0.0530
38	0.0535	0.0525
39	0.0526	0.0524
40	0.0521	0.0521
41	0.0513	0.0519
42	0.0505	0.0518
43	0.0504	0.0518
44	0.0503	0.0517
45	0.0483	0.0517
46	0.0480	0.0516
47	0.0473	0.0516
48	0.0472	0.0510
49	0.0470	0.0510
50	0.0455	0.0504
51	0.0448	0.0503
52	0.0446	0.0500
53	0.0445	0.0498
54	0.0444	0.0496
55	0.0443	0.0495
56	0.0443	0.0495
57	0.0440	0.0491
58	0.0438	0.0490
59	0.0437	0.0488
60	0.0435	0.0486
61	0.0435	0.0482
62	0.0430	0.0482
63	0.0424	0.0481
64	0.0419	0.0478
65	0.0417	0.0471
66	0.0417	0.0466
67	0.0414	0.0466
68	0.0402	0.0462
69	0.0401	0.0461
70	0.0401	0.0459
71	0.0400	0.0457
72	0.0398	0.0456
73	0.0396	0.0455
74	0.0393	0.0450
75	0.0391	0.0450
76	0.0390	0.0448
77	0.0389	0.0448
78	0.0389	0.0446
79	0.0385	0.0446
80	0.0379	0.0444

81	0.0378	0.0444
82	0.0376	0.0441
83	0.0373	0.0434
84	0.0368	0.0433
85	0.0357	0.0432
86	0.0356	0.0428
87	0.0355	0.0427
88	0.0354	0.0427
89	0.0352	0.0427
90	0.0346	0.0427
91	0.0332	0.0423
92	0.0329	0.0420
93	0.0329	0.0419
94	0.0322	0.0417
95	0.0321	0.0413
96	0.0320	0.0410
97	0.0316	0.0409
98	0.0315	0.0409
99	0.0308	0.0408
100	0.0302	0.0407
101	0.0297	0.0403
102	0.0295	0.0403
103	0.0291	0.0402
104	0.0289	0.0400
105	0.0288	0.0395
106	0.0287	0.0394
107	0.0286	0.0394
108	0.0284	0.0392
109	0.0283	0.0389
110	0.0278	0.0386
111	0.0275	0.0386
112	0.0272	0.0385
113	0.0267	0.0385
114	0.0251	0.0383
115	0.0251	0.0382
116	0.0245	0.0382
117	0.0243	0.0380
118	0.0242	0.0379
119	0.0242	0.0379
120	0.0241	0.0379
121	0.0240	0.0378
122	0.0238	0.0377
123	0.0238	0.0377
124	0.0236	0.0373
125	0.0235	0.0372
126	0.0224	0.0370
127	0.0221	0.0368
128	0.0214	0.0368
129	0.0206	0.0366
130	0.0204	0.0365
131	0.0204	0.0365
132	0.0203	0.0364
133	0.0203	0.0357
134	0.0195	0.0356
135	0.0190	0.0355
136	0.0187	0.0354
137	0.0186	0.0352
138	0.0174	0.0351

139	0.0169	0.0351
140	0.0169	0.0347
141	0.0169	0.0346
142	0.0165	0.0343
143	0.0164	0.0340
144	0.0163	0.0338
145	0.0152	0.0331
146	0.0152	0.0330
147	0.0152	0.0325
148	0.0150	0.0323
149	0.0148	0.0320
150	0.0148	0.0317
151	0.0143	0.0316
152	0.0130	0.0316
153	0.0126	0.0311
154	0.0115	0.0311
155	0.0084	0.0307
156	0.0039	0.0267
157	0.0031	0.0250
158	0.0020	0.0240

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0195	54293	48769	89	Pass
0.0202	50160	38105	75	Pass
0.0209	46603	30321	65	Pass
0.0217	43329	24360	56	Pass
0.0224	40265	19833	49	Pass
0.0231	37451	16321	43	Pass
0.0239	34936	13557	38	Pass
0.0246	32576	11257	34	Pass
0.0253	30321	9374	30	Pass
0.0260	28265	7884	27	Pass
0.0268	26437	6643	25	Pass
0.0275	24792	5667	22	Pass
0.0282	23290	4844	20	Pass
0.0290	21928	4117	18	Pass
0.0297	20642	3592	17	Pass
0.0304	19423	3120	16	Pass
0.0311	18282	2740	14	Pass
0.0319	17219	2410	13	Pass
0.0326	16166	2130	13	Pass
0.0333	15147	1890	12	Pass
0.0340	14271	1665	11	Pass
0.0348	13446	1476	10	Pass
0.0355	12670	1301	10	Pass
0.0362	11944	1158	9	Pass
0.0370	11246	1018	9	Pass
0.0377	10559	909	8	Pass
0.0384	9978	808	8	Pass
0.0391	9374	706	7	Pass
0.0399	8847	629	7	Pass
0.0406	8332	566	6	Pass
0.0413	7861	492	6	Pass
0.0420	7462	433	5	Pass
0.0428	7030	396	5	Pass
0.0435	6609	353	5	Pass
0.0442	6277	319	5	Pass
0.0450	5978	277	4	Pass
0.0457	5701	245	4	Pass
0.0464	5437	219	4	Pass
0.0471	5197	199	3	Pass
0.0479	4943	182	3	Pass
0.0486	4704	164	3	Pass
0.0493	4511	148	3	Pass
0.0501	4333	133	3	Pass
0.0508	4159	120	2	Pass
0.0515	3958	113	2	Pass
0.0522	3764	99	2	Pass
0.0530	3577	95	2	Pass
0.0537	3414	90	2	Pass
0.0544	3263	80	2	Pass
0.0551	3134	74	2	Pass
0.0559	3026	68	2	Pass
0.0566	2928	63	2	Pass
0.0573	2814	56	1	Pass

0.0581	2682	48	1	Pass
0.0588	2555	43	1	Pass
0.0595	2451	39	1	Pass
0.0602	2359	37	1	Pass
0.0610	2256	33	1	Pass
0.0617	2140	31	1	Pass
0.0624	2039	27	1	Pass
0.0631	1952	26	1	Pass
0.0639	1860	25	1	Pass
0.0646	1777	23	1	Pass
0.0653	1690	22	1	Pass
0.0661	1619	21	1	Pass
0.0668	1561	20	1	Pass
0.0675	1482	19	1	Pass
0.0682	1407	18	1	Pass
0.0690	1339	18	1	Pass
0.0697	1270	16	1	Pass
0.0704	1217	14	1	Pass
0.0712	1162	14	1	Pass
0.0719	1103	14	1	Pass
0.0726	1055	14	1	Pass
0.0733	1006	14	1	Pass
0.0741	963	14	1	Pass
0.0748	919	13	1	Pass
0.0755	872	13	1	Pass
0.0762	814	11	1	Pass
0.0770	772	11	1	Pass
0.0777	738	10	1	Pass
0.0784	694	8	1	Pass
0.0792	636	8	1	Pass
0.0799	601	8	1	Pass
0.0806	553	8	1	Pass
0.0813	517	8	1	Pass
0.0821	478	8	1	Pass
0.0828	433	8	1	Pass
0.0835	394	8	2	Pass
0.0842	363	8	2	Pass
0.0850	339	8	2	Pass
0.0857	310	8	2	Pass
0.0864	296	8	2	Pass
0.0872	273	8	2	Pass
0.0879	252	7	2	Pass
0.0886	237	6	2	Pass
0.0893	223	6	2	Pass
0.0901	206	6	2	Pass
0.0908	194	6	3	Pass
0.0915	180	6	3	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.0309 acre-feet
On-line facility target flow:	0.0156 cfs.
Adjusted for 15 min:	0.0156 cfs.
Off-line facility target flow:	0.0107 cfs.
Adjusted for 15 min:	0.0107 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
StormTech 1 POC	☐	483.89			☐	0.00			
Total Volume Infiltrated		483.89	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic

Predeveloped UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   2401 StormTech - Copy.wdm
MESSU       25   Pre2401 StormTech - Copy.MES
            27   Pre2401 StormTech - Copy.L61
            28   Pre2401 StormTech - Copy.L62
            30   POC2401 StormTech - Copy1.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                       1.85     COPY   501     12
PERLND  10                       1.85     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   2401 StormTech - Copy.wdm
MESSU       25   Mit2401 StormTech - Copy.MES
            27   Mit2401 StormTech - Copy.L61
            28   Mit2401 StormTech - Copy.L62
            30   POC2401 StormTech - Copy1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       9
      PERLND       7
      IMPLND       1
      IMPLND       4
      IMPLND       2
      IMPLND       8
      RCHRES       1
      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        StormTech  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 ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    9     A/B, Lawn, Steep        1    1    1    1   27    0
    7     A/B, Lawn, 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 ***
    9         0    0    1    0    0    0    0    0    0    0    0    0
    7         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  *********
    9         0    0    4    0    0    0    0    0    0    0    0    0    1    9
    7         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 ***
    9         0    0    0    0    0    0    0    0    0    0    0
    7         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
    9              0         5       0.8       400      0.15        0.3     0.996
    7              0         5       0.8       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
    9              0         0         2         2         0         0         0
    7              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    9          0.1       0.5      0.25         0       0.7      0.25
    7          0.1       0.5      0.25         0       0.7      0.25
  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
    9             0         0         0          0         3          1         0
    7             0         0         0          0         3          1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    1      ROADS/FLAT              1    1    1   27    0
    4      ROOF TOPS/FLAT          1    1    1   27    0
    2      ROADS/MOD               1    1    1   27    0
    8      SIDEWALKS/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
    4         0    0    1    0    0    0
    2         0    0    1    0    0    0
    8         0    0    1    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    4    1    9
    4         0    0    4    0    0    0    1    9
    2         0    0    4    0    0    0    1    9
    8         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
    4         0    0    0    0    0
    2         0    0    0    0    0
    8         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
    4            400      0.01       0.1       0.1
    2            400      0.05       0.1      0.08
    8            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
    4              0         0
    2              0         0
    8              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
    4              0         0
    2              0         0
    8              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   9                       0.4     RCHRES   1      2
PERLND   9                       0.4     RCHRES   1      3
PERLND   7                      0.07     RCHRES   1      2
PERLND   7                      0.07     RCHRES   1      3
IMPLND   1                      1.21     RCHRES   1      5
IMPLND   4                      0.11     RCHRES   1      5
Driveway Bypass***
IMPLND   2                      0.06     COPY   501     15
IMPLND   2                      0.06     COPY   601     15
IMPLND   8                      0.03     COPY   501     15
IMPLND   8                      0.03     COPY   601     15

******Routing******
PERLND   9                       0.4     COPY     1     12
PERLND   7                      0.07     COPY     1     12
IMPLND   1                      1.21     COPY     1     15
IMPLND   4                      0.11     COPY     1     15
PERLND   9                       0.4     COPY     1     13
PERLND   7                      0.07     COPY     1     13
```

```
RCHRES   1                           1     COPY   501     16
END SCHEMATIC

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



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

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

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

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

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                     ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *        *  *  *  *  *        ***
    1        0  1  0  0    4  0  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      0.04       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  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   66    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.242005  0.000000  0.000000
  0.083333  0.242005  0.008065  0.003070
  0.166667  0.242005  0.016132  0.004341
  0.250000  0.242005  0.024199  0.005317
  0.333333  0.242005  0.032267  0.006140
  0.416667  0.242005  0.040333  0.006864
```

```
  0.500000  0.242005  0.048399  0.007520
  0.583333  0.242005  0.056466  0.008122
  0.666667  0.242005  0.064531  0.008683
  0.750000  0.242005  0.072600  0.009210
  0.833333  0.242005  0.090456  0.009708
  0.916667  0.242005  0.108226  0.010182
  1.000000  0.242005  0.125938  0.010634
  1.083333  0.242005  0.143593  0.011068
  1.166667  0.242005  0.161185  0.011486
  1.250000  0.242005  0.178707  0.011889
  1.333333  0.242005  0.196180  0.012279
  1.416667  0.242005  0.213568  0.012657
  1.500000  0.242005  0.230888  0.013024
  1.583333  0.242005  0.248128  0.013381
  1.666667  0.242005  0.265287  0.013729
  1.750000  0.242005  0.282362  0.014068
  1.833333  0.242005  0.299345  0.014399
  1.916667  0.242005  0.316235  0.014722
  2.000000  0.242005  0.333025  0.015039
  2.083333  0.242005  0.349714  0.015349
  2.166667  0.242005  0.366286  0.015653
  2.250000  0.242005  0.382743  0.015951
  2.333333  0.242005  0.399082  0.016244
  2.416667  0.242005  0.415291  0.016532
  2.500000  0.242005  0.431365  0.016814
  2.583333  0.242005  0.447294  0.017092
  2.666667  0.242005  0.463074  0.017366
  2.750000  0.242005  0.478698  0.017635
  2.833333  0.242005  0.494155  0.017900
  2.916667  0.242005  0.509439  0.018161
  3.000000  0.242005  0.524537  0.018419
  3.083333  0.242005  0.539436  0.018673
  3.166667  0.242005  0.554138  0.018924
  3.250000  0.242005  0.568623  0.019171
  3.333333  0.242005  0.582876  0.019415
  3.416667  0.242005  0.596864  0.019657
  3.500000  0.242005  0.610605  0.019895
  3.583333  0.242005  0.624058  0.020130
  3.666667  0.242005  0.637206  0.020363
  3.750000  0.242005  0.650000  0.020593
  3.833333  0.242005  0.662436  0.020821
  3.916667  0.242005  0.674453  0.021046
  4.000000  0.242005  0.685990  0.021269
  4.083333  0.242005  0.696897  0.021489
  4.166667  0.242005  0.706876  0.021707
  4.250000  0.242005  0.716070  0.021923
  4.333333  0.242005  0.724953  0.022137
  4.416667  0.242005  0.733559  0.022349
  4.500000  0.242005  0.741792  0.022559
  4.583333  0.242005  0.750064  0.022767
  4.666667  0.242005  0.758130  0.022973
  4.750000  0.242005  0.766198  0.023177
  4.833333  0.242005  0.774264  0.023379
  4.916667  0.242005  0.782331  0.023580
  5.000000  0.242005  0.790397  0.023779
  5.083333  0.242005  0.798463  0.023976
  5.166667  0.242005  0.806531  0.024172
  5.250000  0.242005  0.814596  0.024366
  5.333333  0.242005  0.822663  0.024559
  5.416667  0.242005  0.830729  0.024750
  END FTABLE  1
END FTABLES

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

```
END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
COPY   601 OUTPUT MEAN   1 1     48.4      WDM    901 FLOW     ENGL      REPL
END EXT TARGETS

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

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

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

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

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

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

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


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1908/ 8/31 24: 0

RCHRES :    1

RELERR       STORS        STOR       MATIN      MATDIF
-0.00977     0.00000  0.0000E+00     0.00000  -3.432E-09

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1923/ 8/31 24: 0

RCHRES :    1

RELERR       STORS        STOR       MATIN      MATDIF
-1.891E-02     0.00000  0.0000E+00     0.00000  -1.650E-09

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
```

DATE/TIME: 1968/ 8/31 24: 0

RCHRES :   1

RELERR	STORS	STOR	MATIN	MATDIF
-2.925E-03	0.00000	0.0000E+00	0.00000	-1.121E-08

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238   1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1979/ 8/31 24: 0

RCHRES :   1

RELERR	STORS	STOR	MATIN	MATDIF
-3.434E-03	0.00000	0.0000E+00	0.00000	-9.818E-09

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238   1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1981/ 8/31 24: 0

RCHRES :   1

RELERR	STORS	STOR	MATIN	MATDIF
-1.163E-01	0.00000	0.0000E+00	0.00000	-2.418E-10

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.

REFVAL is the reference value (STORS+MATIN).
STOR is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

The count for the WARNING printed above has reached its maximum.

If the condition is encountered again the message will not be repeated.

Disclaimer

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Appendix C – Geotechnical Analysis

Cobalt Geosciences, LLC
P.O. Box 82243
Kenmore, Washington 98028

May 6, 2020

EJ Poultry
C/O Greg Zetterberg
gregzetterberg@gmail.com

RE: Additional Geotechnical Recommendations
Proposed Commercial Development
2401 Inter Avenue
Puyallup, Washington

In accordance with your authorization, Cobalt Geosciences, LLC has prepared this letter report to discuss groundwater elevations and the use of permeable pavements at the referenced site.

The purpose of our evaluation was to determine the feasibility of utilizing infiltration devices for stormwater runoff management. We previously prepared a Preliminary Geotechnical Investigation dated June 25, 2017 and a stormwater feasibility evaluation dated May 24, 2019.

Previous Test Pits TP-1 through TP-3

We excavated three test pits in June 2017 as part of our preliminary geotechnical investigation. All of the test pits encountered approximately 8 to 18 inches of topsoil and vegetation underlain by about 5 to 5.5 feet of medium stiff to stiff, silt with variable amounts of sand and local woody debris (Alluvium). These materials were underlain by loose to medium dense, very fine to fine grained sand with trace to some silt (Alluvium). These materials locally contained large woody debris and interbeds of silt/clay.

In May 2019, we excavated an area to conduct an in-situ infiltration test along with two hand borings to determine groundwater elevations prior to and following infiltration analysis. These hand borings encountered approximately 9 inches of grass and topsoil underlain by approximately 0.8 feet of fine to medium grained sand with silt (Alluvium?). This layer was underlain by approximately 3.7 feet of loose to medium dense, silty-fine to fine grained sand (Alluvium). This layer was underlain by fine to medium grained sand trace silt (Alluvium), which continued to the termination depths of the hand borings. Groundwater was encountered at 6 feet below grade prior to testing and 5.9 feet below grade following testing.

Based on the previous and recent explorations, the seasonal high regional groundwater elevation is about 5 feet below existing site elevations. We conducted several shallow hand borings in late 2019 and early 2020 to determine the depth to shallow perched groundwater. The results of these explorations can be found below.

Groundwater Elevations

Based on our discussions with Abbey Road Group, we understand that permeable concrete will likely be utilized to manage surface water runoff from new parking areas. Runoff from roof areas and possibly heavy duty pavement sections will likely be routed to a detention system.

We have recently evaluated groundwater elevations using shallow hand boring excavations at numerous locations within the property (Figure 1). The perched groundwater elevations based on elevations (for reference) from the site plan are as follows:

Location	Date	Groundwater Elevation (Feet)	Ground El.
P-1	12/20/19	56.4	~59.5
	1/4/20	56.8	
	1/28/20	56.8	
	2/11/20	57.0	
	3/15/20	56.5	
P-2	12/20/19	56.7	~60.2
	1/4/20	56.8	
	1/28/20	56.9	
	2/11/20	57.5	
	3/15/20	56.7	
P-3	12/20/19	55.7	~59.3
	1/4/20	55.9	
	1/28/20	56.1	
	2/11/20	56.6	
	3/15/20	56.0	
P-4	12/20/19	55.5	~59.1
	1/4/20	55.7	
	1/28/20	56.3	
	2/11/20	56.6	
	3/15/20	55.9	

Perched groundwater due to heavy precipitation is generally 2.5 feet or more below existing site elevations. We anticipate that at least 12 inches of native soils are required to allow clearance between the bottom of angular rock and groundwater.

We should be provided with final plans for review to determine if the intent of our recommendations have been incorporated. We should be on site to confirm soil conditions and provide additional recommendations if necessary. Any system should have adequate overflow to City infrastructure or a detention system.

Permeable Pavements

Typically, pervious pavements are supported by a leveling course and storage reservoir course placed on prepared native soils. These courses typically consist of open graded angular rock, 5/8 to 2 inches in diameter, with a total thickness ranging from 6 to 18 inches.

We understand that the site may be filled to create a finish grade approximately 0.5 to 1.5 feet higher than the existing elevations. While traffic loads and frequency are unknown at this time, we understand that vehicle traffic will include both heavy trucks as well as passenger vehicles. Based on our experience and review of Federal Highway Administration (FHWA) information, pervious pavements are primarily utilized in light duty traffic areas; therefore, the long term performance under heavy truck loads is not well known. Typically, permeable pavements are not recommended for heavy truck loads.

We recommend removal of loose topsoil prior to placement of imported fill materials. The depth to expose inorganic native soils will vary from 6 to 12 inches in most areas. The area around the existing residence may require additional soil removal.

The exposed subgrades should NOT be re-compacted to 95 percent of the modified proctor as is typical for roadway and parking lot subgrade preparation.

We recommend placement of Tensar TX160 geogrid over the resulting subgrade in all areas. The geogrid should be placed on level surfaces. Clean angular rock or imported sand and gravel with less than 5 percent fines should be placed in any low areas. Geogrid should be placed with at least 6 inches of overlap onto adjacent layers and should extend at least 2 feet beyond the edges of pavement areas.

For the heavy-duty pervious pavement section, we recommend placement of 8 inches of 2 inch clean angular rock over the geogrid. Over this layer, we recommend placement of 6 inches of 5/8 inch clean angular rock. The pervious concrete should be at least 8 inches thick. Note that some overexcavation of native soils may be required to achieve the design finish grade elevations. An additional layer of geogrid and/or local overexcavation of native soils may be required if unstable soils are encountered.

For the normal duty pervious pavement section, we recommend placement of 6 inches of 1.25 to 2 inch clean angular rock over the geogrid. Over this layer, we recommend placement of 6 inches of 5/8 inch clean angular rock. The pervious concrete should be at least 6 inches thick.

In either of the above sections, the reservoir course may be increased to allow for additional stormwater storage, if required.

Additional information regarding permeable pavement design, construction, and maintenance can be found in the Pierce County Stormwater and Site Development Manual (2015).

Erosion and Sediment Control

Erosion and sediment control (ESC) is used to reduce the transportation of eroded sediment to wetlands, streams, lakes, drainage systems, and adjacent properties. Erosion and sediment control measures should be implemented, and these measures should be in general accordance with local regulations. At a minimum, the following basic recommendations should be incorporated into the design of the erosion and sediment control features for the site:

- Schedule the soil, foundation, utility, and other work requiring excavation or the disturbance of the site soils, to take place during the dry season (generally May through September). However, provided precautions are taken using Best Management Practices (BMP's), grading activities can be completed during the wet season (generally October through April).
- All site work should be completed and stabilized as quickly as possible.
- Additional perimeter erosion and sediment control features may be required to reduce the possibility of sediment entering the surface water. This may include additional silt fences, silt

fences with a higher Apparent Opening Size (AOS), construction of a berm, or other filtration systems.

- Any runoff generated by dewatering discharge should be treated through construction of a sediment trap if there is sufficient space. If space is limited other filtration methods will need to be incorporated.

Closure

The information presented herein is based upon professional interpretation utilizing standard practices and a degree of conservatism deemed proper for this project. We emphasize that this report is valid for this project as outlined above and for the current site conditions and should not be used for any other site. Our recommendations are based on limited knowledge of proposed traffic loading conditions. We are not responsible for long-term performance of permeable concrete or asphalt.

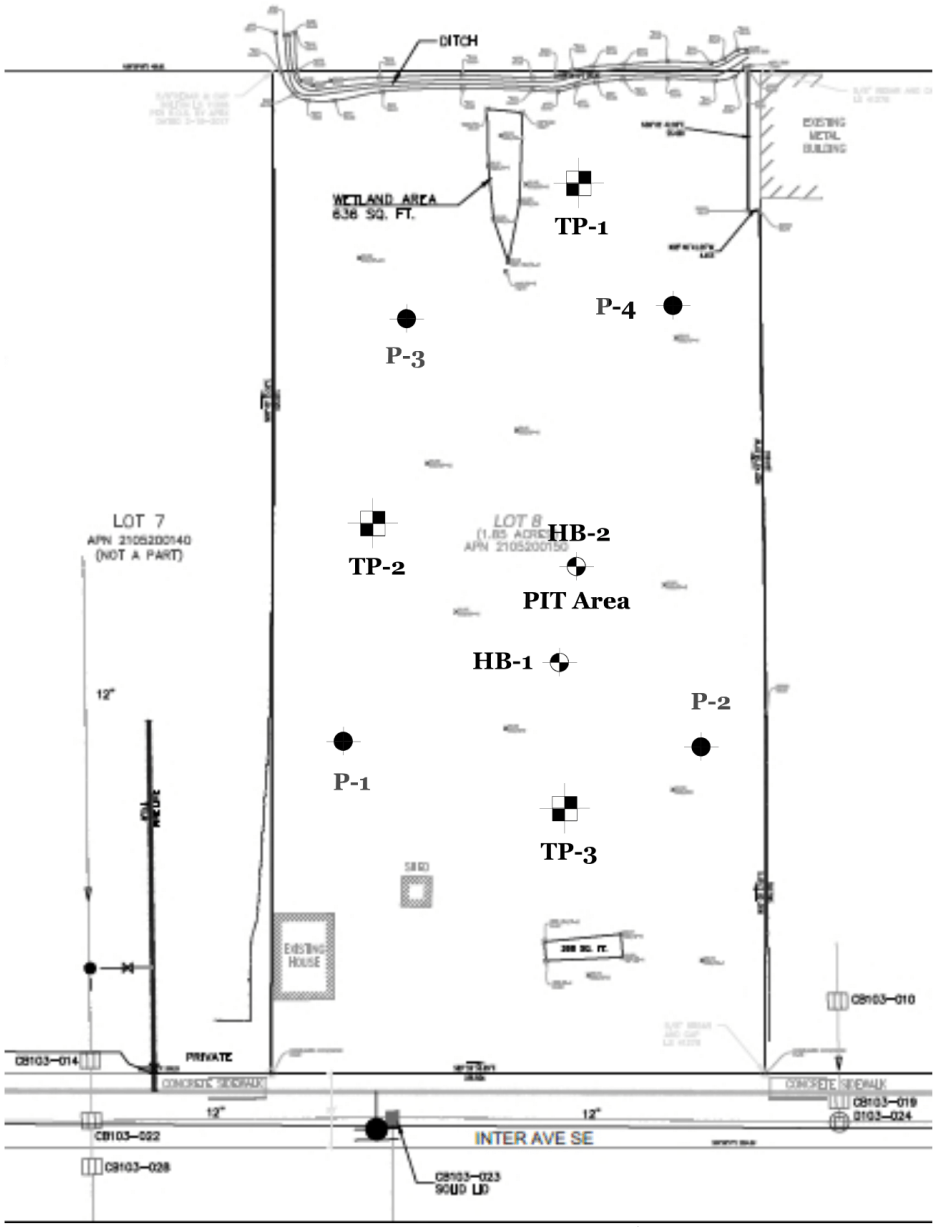
Sincerely,

Cobalt Geosciences, LLC

Exp. 6/26/2020

Phil Haberman, PE, LG, LEG
Principal

PH/sc



COBALT GEOSCIENCES	Stormwater Feasibility Evaluation 2401 Inter Avenue Puyallup, Washington	**SITE PLAN** **FIGURE 1**	Cobalt Geosciences, LLC P.O. Box 82243 Kenmore, WA 98028 (206) 331-1097 www.cobaltgeo.com cobaltgeo@gmail.com

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Appendix D – Maintenance and Operations

#3 – Maintenance Checklist for Closed Detention Systems (Tanks/Vaults):

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Storage Area	Plugged Air Vents	One-half of the cross-section of a vent is blocked at any point or the vent is damaged.	Vents open and functioning. Remove blockage or replace air vent if damaged.
Storage Area	Debris and Sediment	Accumulated sediment depth exceeds 10 percent of the diameter of the storage area for one-half length of storage vault or any point depth exceeds 15 percent of diameter.	All sediment and debris removed from storage area.
Storage Area	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability.)	All joint between tank/pipe sections are sealed.
Storage Area	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10 percent of its design shape. (Review required by engineer to determine structural stability.)	Tank/pipe repaired or replaced to design.
Storage Area	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than one-half inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound.	Vault replaced or repaired to design specifications and is structurally sound.
Storage Area	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than one-half inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.	No cracks more than one-fourth inch wide at the joint of the inlet/outlet pipe. No water or soil entering vault through joints or walls.
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.*
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole access cover/ lid is in place and secure.
Manhole	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 (may not apply to self-locking lids).	Mechanism opens with proper tools.
Manhole	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
Manhole	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.

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

Tanks and vaults are a confined space. Visual inspections should be performed aboveground. If entry is required, it should be performed by qualified personnel.

#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.

#20 – Maintenance Checklist for Grounds (Landscaping):

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Weeds (nonpoisonous)	Weeds growing in more than 20 percent of the landscaped area (trees and shrubs only). Any evidence of noxious weeds as defined in the Pierce County Noxious Weeds List.	Weeds present in less than 5 percent of the landscaped area.
General	Insect Hazard	Any presence of poison ivy or other poisonous vegetation or insect nests.	No poisonous vegetation or insect nests present in landscaped area.
General	Trash or Litter	See Detention Ponds (Checklist #1).	See Detention Ponds (Checklist #1).
General	Erosion of Ground Surface	Noticeable rills are seen in landscaped areas.	Causes of erosion are identified and steps taken to slow down/spread out the water. Eroded areas are filled, contoured, and seeded.
Trees and shrubs	Damage	Limbs or parts of trees or shrubs that are split or broken which affect more than 25 percent of the total foliage of the tree or shrub.	Trim trees/shrubs to restore shape. Replace trees/shrubs with severe damage.
Trees and shrubs	Damage	Trees or shrubs that have been blown down or knocked over.	Tree replanted, inspected for injury to stem or roots. Replace if severely damaged.
Trees and shrubs	Damage	Trees or shrubs which are not adequately supported or are leaning over, causing exposure of the roots.	Stakes and rubber-coated ties placed around young trees/shrubs for support.

#29 – Maintenance Checklist for Bioretention (Cells, Swales, and Planter Boxes):

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash	Trash and debris present.	No trash and debris present.
Concrete Sidewalls	Cracks or Failure in Concrete Planter Reservoir	Cracks wider than 0.5 inch or maintenance/inspection personnel determine that the planter is not structurally sound.	Concrete repaired or replaced.
Rockery Sidewalls	Instable Rockery	Rock walls are insecure.	Rockery sidewalls are stable (may require consultation with professional engineer, particularly for walls 4 feet or greater in height).
Earthen Side Slopes and Berms	Failure in Earthen Reservoir (Embankments, Dikes, Berms, and Side Slopes)	Erosion (gullies/rills) greater than 2 inches around inlets, outlet, and along side slopes.	Source of erosion eliminated and damaged area stabilized (regrade, rock, vegetation, erosion control blanket). For deep channels or cuts (over 3 inches in ponding depth), temporary erosion control measures are in place until permanent repairs can be made.
Earthen Side Slopes and Berms	Failure in Earthen Reservoir (Embankments, Dikes, Berms, and Side Slopes)	Erosion of sides causes slope to become a hazard.	The hazard is eliminated and slopes are stabilized.
Earthen Side Slopes and Berms	Failure in Earthen Reservoir Embankments, Dikes, Berms, and Side Slopes)	Settlement greater than 3 inches (relative to undisturbed sections of berm).	The design height is restored with additional mulch.
Earthen Side Slopes and Berms	Failure in Earthen Reservoir (Embankments, Dikes, Berms, and Side Slopes)	Downstream face of berm or embankment wet, seeps or leaks evident.	Holes are plugged and berm is compacted. May require consultation with professional engineer, particularly for larger berms.
Earthen Side Slopes and Berms	Failure in Earthen Reservoir (Embankments, Dikes, Berms, and Side Slopes)	Any evidence of rodent holes or water piping around holes if facility acts as dam or berm.	Rodents (see “Pests: Insects/Rodents”) removed or destroyed and berm repaired/ compacted.
Ponding Area	Sediment or Debris Accumulation	Accumulation of sediment or debris to extent that infiltration rate is reduced (see “Ponded water”) or surface storage capacity significantly impacted.	Sediment cleaned out to restore facility shape and depth. Damaged vegetation is replaced and mulched. Source of sediment identified and controlled (if feasible).
Ponding Area	Leaf Accumulation	Accumulated leaves in facility.	No leaves clogging outlet structure or impeding water flow.
Ponding Area	Basin Inlet via Surface Flow	Soil is exposed or signs of erosion are visible.	Erosion sources repaired and controlled.
Curb Cut Inlet	Sediment or Debris Accumulation	Sediment, vegetation, or debris partially or fully blocking inlet structure.	Curb cut is clear of debris. Source of the blockage is identified and action is taken to prevent future blockages.

#29 – Maintenance Checklist for Bioretention (Cells, Swales, and Planter Boxes):

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Splash Block Inlet	Water Not Properly Directed to Facility	Water is not being directed properly to the facility and away from the inlet structure.	Blocks are reconfigured to direct water to facility and away from structure.
Splash Block Inlet	Erosion	Water disrupts soil media.	Splash block is reconfigure/repaired.
Inlet/outlet pipe	Damaged Pipe	Pipe is damaged.	Pipe is repaired/replaced. No cracks more than 0.25 inched wide at the joint of inlet/outlet pipes exist.
Inlet/outlet pipe	Clogged Pipe	Pipe is clogged.	Pipe is clear of roots or debris. Source of the blockage is identified and action is taken to prevent future blockages.
Inlets/outlet and access pathways	Blocked Access	Maintain access for inspections.	Vegetation is cleared within 1 foot of inlets and outlets. Access pathways are maintained.
Ponding Area	Erosion	Water disrupts soil media.	No eroded or scoured areas in bioretention area. Cause of erosion or scour addressed. A cover of rock or cobbles or other erosion protection measure maintained (e.g., matting) to protect the ground where concentrated water enters or exits the facility (e.g., a pipe, curb cut or swale).
Trash Rack	Trash or Debris Accumulation	Trash or debris present on trash rack.	No trash or debris on trash rack. Clean and dispose trash.
Trash Rack	Damaged Trash Rack	Bar screen damaged or missing.	Barrier repaired or replaced to design standards.
Check Dams and Weirs	Sediment or Debris Accumulation	Sediment, vegetation, or debris accumulated at or blocking (or having the potential to block) check dam, weir, or orifice.	Blockage is cleared. Identify the source of the blockage and take actions to prevent future blockages.
Check Dams and Weirs	Erosion	Erosion and/or undercutting is present.	No eroded or undercut areas in bioretention area. Cause of erosion or undercutting addressed. Check dam or weir is repaired.
Check Dams and Weirs	Unlevel Top of Weir	Grade board or top of weir damaged or not level.	Weir restored to level position.
Flow Spreader	Sediment Accumulation	Sediment blocks 35 percent or more of ports/notches or, sediment fills 35 percent or more of sediment trap.	Sediment removed and disposed of.
Flow Spreader	Damaged or Unlevel Grade Board/Baffle	Grade board/baffle damaged or not level.	Board/baffle removed and reinstalled to level position.
Overflow/ emergency spillway	Sediment or Debris Accumulation	Overflow spillway is partially or fully plugged with sediment or debris.	No sediment or debris in overflow.
Overflow/ emergency spillway	Erosion	Native soil is exposed or other signs of erosion damage are present.	Erosion repaired and surface of spillway stabilized.

#29 – Maintenance Checklist for Bioretention (Cells, Swales, and Planter Boxes):

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Overflow/ emergency spillway	Missing Spillway Armament	Spillway armament is missing.	Armament replaced.
Underdrain	Blocked Underdrain	Plant roots, sediment or debris reducing capacity of underdrain. Prolonged surface ponding (see "Bioretention Soil").	Underdrains and orifice are free of sediment and debris.
Bioretention soil	Ponded Water	Excessive ponding water: Water overflows during storms smaller than the design event or ponded water remains in the basin 48 hours or longer after the end of a storm.	Cause of ponded water is identified and addressed: 1. Leaf or debris buildup is removed 2. Underdrain is clear 3. Other water inputs (e.g., groundwater, illicit connections) investigated 4. Contributing area verified If steps #1-4 do not solve the problem, imported bioretention soil is replaced and replanted.
Bioretention soil	Protection of Soil	Maintenance requiring entrance into the facility footprint.	Maintenance is performed without compacting bioretention soil media.
Vegetation	Bottom Swale and Upland Slope Vegetation	Less than 75 percent of swale bottom is covered with healthy/ surviving vegetation.	Plants are healthy and pest free. Cause of poor vegetation growth addressed. Bioretention area is replanted as necessary to obtain 75 percent survival rate or greater. Plant selection is appropriate for site growing conditions.
Trees and shrubs	Causing Problems for Operation of Facility	Large trees and shrubs interfere with operation of the basin or access for maintenance.	Trees and shrubs do not hinder facility performance or maintenance activities. Prune or remove large trees and shrubs.
Trees and shrubs	Dead Trees and Shrubs	Standing dead vegetation is present.	Trees and shrubs do not hinder facility performance or maintenance activities. Dead vegetation is removed and cause of dead vegetation is addressed. Specific plants with high mortality rate are replaced with more appropriate species.
Trees and shrubs adjacent to vehicle travel areas (or areas where visibility needs to be maintained)	Safety Issues	Vegetation causes some visibility (line of sight) or driver safety issues.	Appropriate height for sight clearance is maintained. Regular pruning maintains visual sight lines for safety or clearance along a walk or drive. Tree or shrub is removed or transplanted if presenting a continual safety hazard.
Emergent Vegetation	Conveyance Blocked	Vegetation compromises conveyance.	Sedges and rushes are clear of dead foliage.
Mulch	Lack of Mulch	Bare spots (without much cover) are present or mulch covers less than 2 inches.	Facility has a maximum 3-inch layer of an appropriate type of mulch and mulch is kept away from woody stems.
Vegetation	Accumulation of Clippings	Grass or other vegetation clippings accumulate to 2 inches or greater in depth.	Clippings removed.

#29 – Maintenance Checklist for Bioretention (Cells, Swales, and Planter Boxes):

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Noxious Weeds	Presence of Noxious Weeds	Listed noxious vegetation is present. See Pierce County Noxious Weeds List..	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality.
Vegetation	Weeds	Weeds are present (unless on edge and providing erosion control).	Weed material removed and disposed of. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality.
Excessive Vegetation	Adjacent Facilities Compromised	Low-lying vegetation growing beyond facility edge onto sidewalks, paths, or street edge poses pedestrian safety hazard or may clog adjacent permeable pavement surfaces due to associated leaf litter, mulch, and soil.	Vegetation does not impede function of adjacent facilities or pose as safety hazard. Groundcovers and shrubs trimmed at facility edge. Excessive leaf litter is removed.
Excessive Vegetation	Causes Facility to Not Function Properly	Excessive vegetation density inhibits stormwater flow beyond design ponding or becomes a hazard for pedestrian and vehicular circulation and safety.	Pruning and/or thinning vegetation maintains proper plant density and aesthetics. Plants that are weak, broken, or not true to form are removed or replaced in-kind. Appropriate plants are present.
Irrigation (if any)	NA	Irrigation system present.	Manufacturer's instructions for O&M are met.
Plant watering	Plant Establishment	Plant establishment period (1-3 years).	Plants are watered as necessary during periods of no rain to ensure plant establishment.
Summer Watering (after establishment)	Drought Period	Longer term period (3+ years).	Plants are watered as necessary during drought conditions and trees are watered up to five years after planting.
Spill Prevention and Response	Spill Prevention	Storage or use of potential contaminants in the vicinity of facility.	Spill prevention measures are implemented whenever handling or storing potential contaminants.
Spill Prevention and Response	Spill Response	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.)*
Safety	Safety (Slopes)	Erosion of sides causes slope to exceed 1:3 or otherwise becomes a hazard.	Actions taken to eliminate the hazard.
Safety	Safety (Hydraulic Structures)	Hydraulic structures (pipes, culverts, vaults, etc.) become a hazard to children playing in and around the facility.	Actions taken to eliminate the hazard (such as covering and securing any openings).

#29 – Maintenance Checklist for Bioretention (Cells, Swales, and Planter Boxes):

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Aesthetics	Aesthetics	Damage/vandalism/debris accumulation.	Facility restored to original aesthetic conditions.
Aesthetics	Edging	Grass is starting to encroach on swale.	Edging repaired.
Pest Control	Pests: Insects/Rodents	Pest of concern is present and impacting facility function.	Pests removed or destroyed and facility returned to original functionality. Do not use pesticides or *Bacillus thuringiensis israelensis (Bti)*.
Pest Control	Mosquitoes	Standing water remains in the basin for more than three days following storms.	All inlets, overflows and other openings are protected with mosquito screens. No mosquito infestation present.

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

Appendix E – Swale Control Structure