D|C|G
civil structural

DRAINAGE MEMORANDUM

TO: City of Mercer Island

FROM: Ben Iddins, P.E.

DATE: March 12, 2020

RE: 8720 SE 52nd Pl, Mercer Island, WA
On-site Drainage System Design Summary

This memorandum summarizes the drainage system design in accordance with the 2012 edition of the Washington State Department of Ecology Stormwater Management Manual for Western Washington (as amended in 2014) and the City of Mercer Island Drainage Requirements (the combination of which is hereafter referred to as "the Manual").

1 PROJECT SUMMARY

The site at 8720 SE 52nd Pl on Mercer Island totals 26,348 square feet and will be redeveloped with a single family residence with attached garage. The site currently contains a single family residence which will be demolished and replaced with a new single family residence. The site is accessed off SE 52nd Pl via a paved driveway which will be removed and replaced in the same location with permeable pavement. The new plus replaced impervious surfaces total 6,927 square feet comprised of the new house, detached garage, permeable pavement driveway, and permeable pavement walkway. See TABLE 1 for a summary of land cover calculations. Since the project will add greater than 5,000 SF of new plus replaced impervious surfaces, it is subject to Minimum Requirements 1 through 9 as outlined in Section I-2.4, Figure 2.4.1 of the Manual.

TABLE 1 **Land Cover Summary**

		Area (SF)	Area (acres)
Existing Conditions	Pervious Surface (forest and grass)	26,348	0.60
	Impervious Surface (House, garage, driveway, and walkways)	3,776	0.09
Developed Conditions	House	4,344	0.10
	Detached Garage	640	0.01
	Driveway and Walkways	1,943	0.04
	Total Impervious Surface	6,927	0.16
	Pervious Surface (Landscaping and forest)	19,421	0.45

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Tel 206.523.0024

The areas in TABLE 1 were determined by area measurements in AutoCAD from a topographic survey. As shown in TABLE 1, the developed site impervious surfaces total 6,927 SF.

2 DRAINAGE SYSTEM CONVEYANCE

The onsite stormwater system is comprised of four Type I catch basins, 4" and 6" SDR35 PVC pipe (or N-12 HDPE pipe) or ductile iron pipe, perforated D2729 footing drain pipe, two infiltration trenches, permeable pavement surfacing, and a permeable pavement facility. Roof runoff is collected by a roof downspout system and conveyed to the proposed infiltration trenches (two separate trenches) or permeable pavement facility within the proposed permeable pavement driveway. Permeable pavement surfacing will be utilized for all at-grade hard surfaces. Any overflow from the permeable pavement driveway will be collected by a Type I catch basin equipped with an oil water separator, located at the low point in the driveway, and conveyed to infiltration trench #1 which is located downgradient of the proposed house. Overflow from the proposed infiltration trenches, one of which is located downgradient of the house and the other located to the south side of the house, will flow out of the top of Type I catch basins associated with the trenches and disperse within natural vegetation on the site that is to be protected during construction. A minimum dispersion flow path of 60 feet is provided on the site for the overflows from the infiltration trenches. See the Drainage Plan in Attachment A for additional details on the proposed drainage system.

Infiltration Sizing

The proposed infiltration trenches, permeable pavement facility, and permeable pavement surfacing were designed in accordance with the 2014 DOE Manual and the City of Mercer Island Storm Water Flow Control/Detention Design Requirements. The results of the modeling show 100% mitigation of stormwater for all rain events within the WWHM2012 rainfall data (zero overflow through the riser and zero flow for each return period through the 100-year rainfall event). Due to the geotechnical investigation results (see Section 5 of this report), the proposed infiltration facilities are shallow and designed so the bottom of each infiltration facility is located a minimum of one foot above the dense glacial till layer, therefore exceeding the one foot separation requirement listed in Table 1 of the City of Mercer Island Storm Water Flow Control/Detention Design Requirements. All of the proposed infiltration facilities were sized using a 0.25 in/hr design infiltration rate as specified by the geotechnical engineer.

The permeable pavement surfacing on the site, which includes all at-grade hard surfaces minus the permeable pavement above the permeable pavement facility, totals 823 SF and will not receive run-on from additional hard surfaces. The permeable pavement surfacing was modeled in WWHM2012 as a gravel trench bed with a rock storage layer depth of 0.5' and a total area equivalent to the area of permeable pavement surfacing (823 SF). The model shows that a 6" rock storage layer is sufficient to provide 100% mitigation of stormwater.

The permeable pavement facility totals 1,120 SF and is located within the permeable pavement driveway. The facility is setback 10 feet from the proposed house and garage and receives 640 SF of roof runoff from the garage and 182 SF of roof runoff from the house. The permeable pavement facility was modeled in WWHM2012 as a gravel trench bed with a rock storage layer depth of 1' and a total area equivalent to the area of permeable pavement directly above the storage layer (1,120 SF). The model

shows that a 1' rock storage layer is sufficient to provide 100% mitigation of stormwater from the contributing roof area and the area of permeable pavement above the facility. The permeable pavement facility will include an impermeable check dam centrally located within the facility to provide 1' minimum ponding depth throughout the facility.

Infiltration trench #1, located northwesterly of the proposed house, is setback 10' from the house and northern property line and will receive stormwater runoff from the northern roof area of the house (2,580 SF of roof area). The required facility footprint to provide 100% infiltration based on the results of the WWHM model is 970 SF with a rock storage layer depth of 2'. The footprint of the provided infiltration trench, as shown on the Drainage Plan, matches the required footprint (970 SF), therefore providing 100% infiltration.

Infiltration trench #2, located south of the proposed house, is setback 10' minimum from the house and southern property line and will receive stormwater runoff from the southern roof area of the house (1,582 SF of roof area). The required facility footprint to provide 100% infiltration based on the results of the WWHM model is 600 SF with a rock storage layer depth of 2'. The footprint of the provided infiltration trench, as shown on the Drainage Plan, matches the required footprint (600 SF), therefore providing 100% infiltration.

3 Level 1 Downstream Analysis

Per the Manual, development projects that discharge stormwater offsite shall submit an offsite analysis report that assesses the potential off-site water quality, erosion, slope stability, and drainage impacts associated with the project and the appropriate mitigation of those impacts up to 1/4 mile downstream of the site. Since the project proposes to fully infiltrate stormwater generated from all new and replaced impervious surfaces onsite, thus not discharging stormwater offsite, a downstream analysis is not required.

4 Minimum Requirements

Since the project will add greater than 5,000 SF of new plus replaced impervious surfaces, it is subject to Minimum Requirements #1 through 9 (MR#1-9). The project meets MR#1-9 as follows:

4.1 Minimum Requirement #1 – Stormwater Site Plans

The Stormwater Site Plan was prepared in accordance with Volume 1 Chapter 3 of the Stormwater Manual and includes the minimum requirements applicable to the subject site based on thresholds of new and replaced site impervious coverage.

4.2 Minimum Requirement #2 – Construction Stormwater Pollution Prevention

The Construction Stormwater Pollution Prevention Plan (SWPP) was prepared in accordance with Volume 1 Chapter 2 Section 2.5.2 of the Stormwater Manual. The Temporary Erosion and Sediment Control Plan (TESC Plan) can be seen in in the Project Plans submitted under separate cover and serves

as a guide for the contractor to implement a final TESC Plan. As the site disturbance is less than one acre, a Stormwater Permit is not required.

4.3 Minimum Requirement #3 – Source Control

The proposed catch basins, infiltration trenches, and permeable pavement serve as source control of pollution on the project site. In order to control pollutants, proper maintenance and cleaning of debris, sediment, and oil from stormwater collection and conveyance systems is required per the operation and maintenance recommendations found in Volume 5 Section 4.6 of the Stormwater Manual in addition to the BMPs in Volume IV Section 2.2. See Attachment D for operation and maintenance requirements pertaining to the project.

4.4 Minimum Requirement #4 – Preservation of Natural Drainage Systems and Outfalls

The proposed drainage system will emulate the natural pre-developed conditions of the site (i.e., forested conditions) as much as possible as runoff from all new and replaced impervious surfaces will be fully infiltrated onsite.

4.5 Minimum Requirement #5 – On-site Stormwater Management

The On-Site Stormwater Management requirements applicable to this project were determined using List #2. The project complies with List #2 as described below.

Lawn and landscaped areas:

All disturbed pervious surfaces will be amended in accordance with the Post-Construction Soil Quality and Depth requirements as listed under BMP T5.13 in Chapter 5 of Volume V.

Roof:

1. Full Dispersion is infeasible because the required vegetated flowpath is not available onsite. However, Downspout Full Infiltration is feasible and therefore will be utilized for runoff from all roofs.

Other Hard Surfaces:

1. Full dispersion is infeasible because the required vegetated flowpath is not available onsite.
2. Permeable pavement will be utilized for all other hard surfaces.

Therefore, MR#5 is satisfied.

4.6 Minimum Requirement #6 – Runoff Treatment

Runoff treatment is not required for this project since less than 5,000 SF of pollution generating impervious surfaces is proposed.

4.7 Minimum Requirement #7 – Runoff Treatment

Per Section 2.5.7 of The Manual (Minimum Requirement #7 – Flow Control), stormwater detention is not required if all new plus replaced stormwater runoff is fully infiltrated onsite from a proposed development.

"This standard requirement (in reference to flow control) is waived for sites that will reliably infiltrate all the runoff from impervious surfaces and converted pervious surfaces."

By using Western Washington Hydrology Model (WWHM) software, DCG was able to design two infiltration trenches, a permeable pavement facility, and permeable pavement surfacing that fully infiltrates stormwater generated onsite from all new and replaced impervious surfaces (see Attachment B). Given that no stormwater will be discharged from the site and will not contribute to the City's public storm drain system, a downstream analysis nor capacity analysis calculations are required to be completed.

Note that onsite infiltration is the only method to mitigate stormwater on this site given that there is not a public storm drain system fronting the site.

4.8 Minimum Requirement #8 – Wetlands Protection

The thresholds for Minimum Requirements #6 and #7 apply to Minimum Requirement #8. Since this project does not trigger Minimum Requirement #6 and Minimum Requirement #7, it also does not trigger Minimum Requirement #8.

4.9 Minimum Requirement #9 – Operation & Maintenance

An operation and maintenance manual consistent with Volume V of the Manual has been provided in Attachment D.

5 Soils

A soils investigation including infiltration testing was completed by Ages Engineering, LLC and summarized in a report dated November 30, 2016. Three hand-augured test holes were completed to a maximum depth of 7 feet below existing surface grades. Test hole locations and details are summarized in the Geotechnical Report included as Attachment C.

The site is underlain with native silty sand with gravel consistent with Glacial Till. The Glacial Till was weathered to a light brown color and to a medium dense consistency in the upper 4 feet. Groundwater was not encountered in any of the test holes.

Based on the results of the subsurface study, it is the recommendation of the geotechnical engineer that the soil and groundwater conditions at the site are suitable for the proposed storm water infiltration system. In all locations on the site, the bottom of the infiltration facilities shall be located no less than a minimum of 1 foot above the impermeable layer which resides at 4 feet below existing grade.

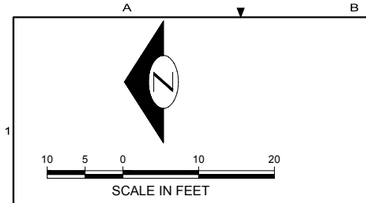
Long-term infiltration rates were determined using the USDA Soil Textural Classification method. Grainsize distribution tests were completed on soils obtained from the proposed infiltration facility

location. According to Table 3.7 in the 2005 DOE Manual, a long term design infiltration rate of 0.25 inches per hour should be utilized for design.

6 ATTACHMENTS

ATTACHMENT A – DRAINAGE PLAN
ATTACHMENT B – WWHM REPORT (INFILTRATION MODELING)
ATTACHMENT C – GEOTECHNICAL REPORT
ATTACHMENT D – OPERATION AND MAINTENANCE MANUAL

ATTACHMENT A - DRAINAGE PLAN



KEY NOTES		
KEY	DESCRIPTION	DETAIL/ SHEET
1	EX MINOR CONTOUR (TYP)	-
2	EX MAJOR CONTOUR (TYP)	-
3	PROPOSED MINOR CONTOUR (TYP)	-
4	PROPOSED MAJOR CONTOUR (TYP)	-
5	LIMITS OF DISTURBANCE. PRIOR TO START OF CONSTRUCTION, CONTRACTOR TO STAKE LIMITS OF DISTURBANCE FOR ARBORIST SITE INSPECTION	-
6	SAWCUT EX ASPHALT	-

LEGEND:

- PERMEABLE PAVEMENT FACILITY EXTENTS
- BELOW GRADE GRAVEL INFILTRATION FACILITY
- PERMEABLE PAVERS (D / C05)
- ASPHALT
- TREE PROTECTION FENCING
- EXISTING TREE TO BE REMOVED
- LIMITS — LIMITS OF DISTURBANCE

CAD FILE NUMBER: P:\CLIENTS\BUILD URBAN\8720 SE 52ND PL - MERCER ISLAND\DWG\DRAWING\8720 SE 52ND PL.DWG|LAST MODIFIED BY: RBRYANT - SAVE DATE: 3/12/2020 10:15 AM - SHEET SET: 8720 SE 52ND PL

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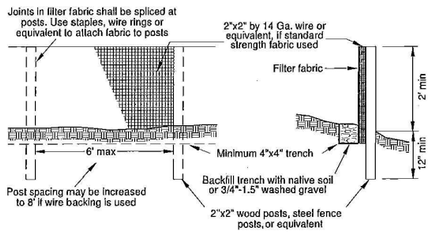
OWNER: BUILD URBAN, LLC
999 N. NORTHGATE WAY, SUITE 215
SEATTLE, WA 98103

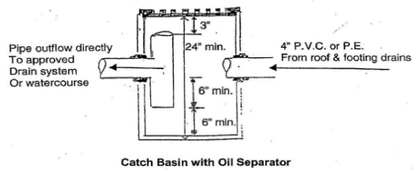
PROJECT: 8720 SE 52ND PL
MERCER ISLAND, WA 98040
GRADING PLAN

PROJ. MANAGER:	TG, BI
DESIGNED BY:	BI
DRAWN BY:	JA, RB
CHECKED BY:	TG
SCALE:	SCALE
DATE: 3/12/2020	REV. A
SHEET	3 OF 6

SHEET NUMBER
C03



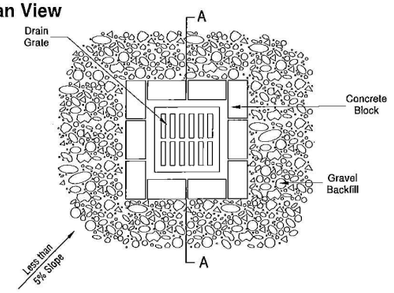
SILT FENCE
D.O.E. FIGURE 4.20
NOT TO SCALE — A / C01



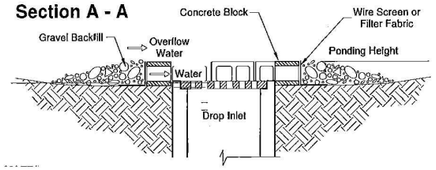
Catch Basin with Oil Separator

CB W/ OIL/WATER SEPARATOR
NOT TO SCALE — E / C04

Plan View

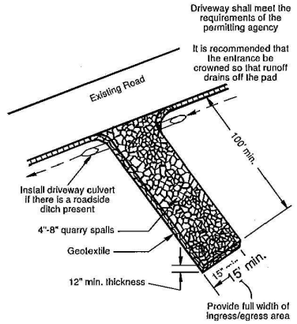


Section A - A

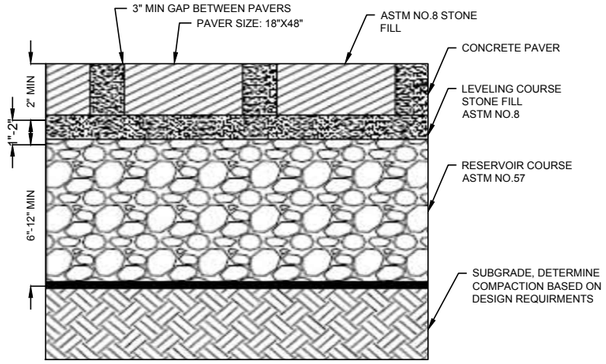


Notes:
1. Drop inlet sediment barriers are to be used for small, nearly level drainage areas. (less than 5%)
2. Excavate a basin of sufficient size adjacent to the drop inlet.
3. The top of the structure (ponding height) must be well below the ground elevation downslope to prevent runoff from bypassing the inlet. A temporary dike may be necessary on the downslope side of the structure.

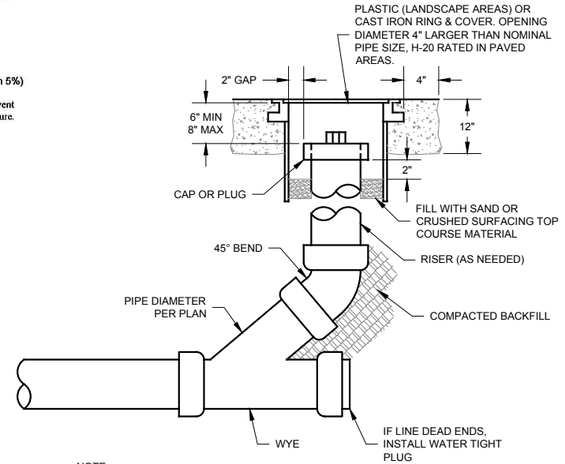
TEMPORARY INLET PROTECTION
NOT TO SCALE — B / C01



STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE — C / C01



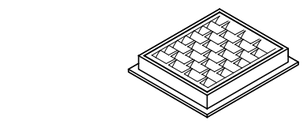
PERVIOUS CONCRETE BLOCK OR PAVER SYSTEM
NOT TO SCALE — D / C03 & C04



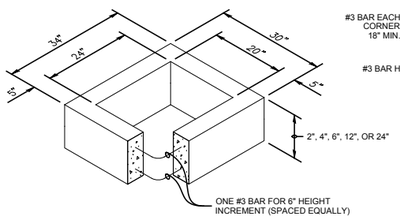
NOTE

CAST IRON COVER SHALL READ "SEWER", "STORM" OR "CO."

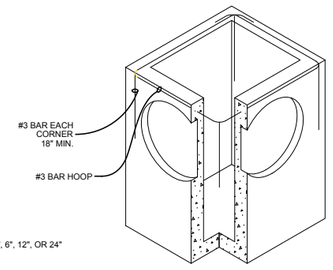
STORM DRAIN & SEWER CLEANOUT
NOT TO SCALE — G / C04



FRAME AND VANED GRATE



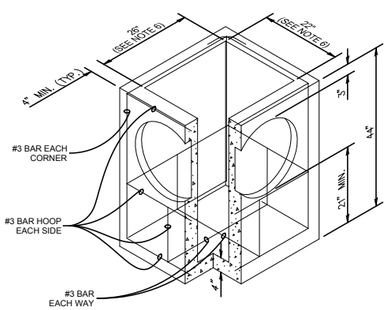
RECTANGULAR ADJUSTMENT SECTION



ALTERNATIVE PRECAST BASE SECTION

PIPE ALLOWANCES	
PIPE MATERIAL	MAXIMUM INSIDE DIAMETER
REINFORCED OR PLAIN CONCRETE	12"
ALL METAL PIPE	15"
CPSSP ⁎ (STD. SPEC. 9-05.20)	12"
SOLID WALL PVC (STD. SPEC. 9-05.12(1))	15"
PROFILE WALL PVC (STD. SPEC. 9-05.12(2))	15"

⁎ CORRUGATED POLYETHYLENE STORM SEWER PIPE

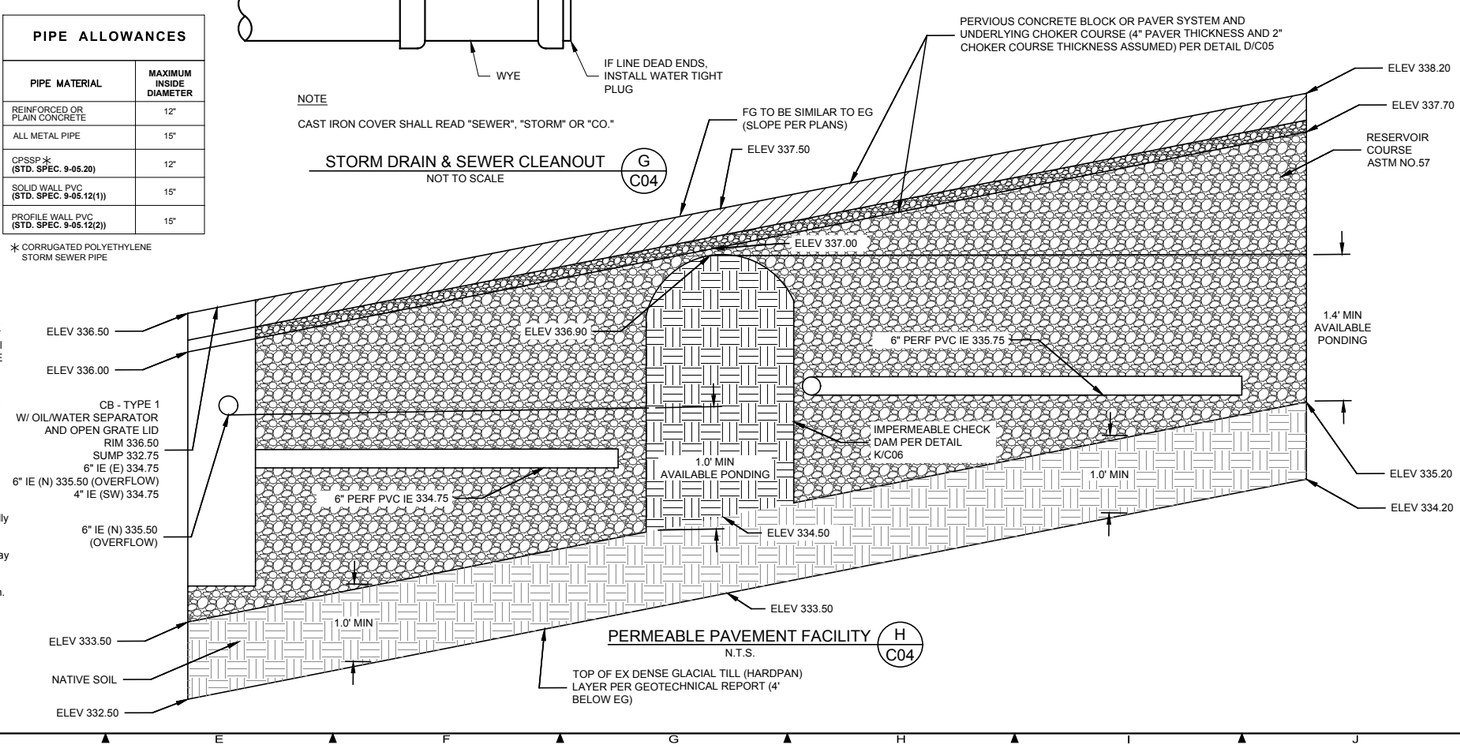


PRECAST BASE SECTION

NOTES

1. As acceptable alternatives to the rebar shown in the PRECAST BASE SECTION, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the ALTERNATIVE PRECAST BASE SECTION. Wire mesh shall not be placed in the knockouts.
2. The knockout diameter shall not be greater than 20". Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification 9-04.3.
3. The maximum depth from the finished grade to the lowest pipe invert shall be 5'.
4. The frame and grate may be installed with the flange down, or integrally cast into the adjustment section with flange up.
5. The Precast Base Section may have a rounded floor, and the walls may be sloped at a rate of 1:24 or steeper.
6. The opening shall be measured at the top of the Precast Base Section.
7. All pickup holes shall be grouted full after the basin has been placed.

CATCH BASIN TYPE 1
PER WSDOT STD PLAN B-5.20-00
NOT TO SCALE — F / C04



PERMEABLE PAVEMENT FACILITY
N.T.S. — H / C04

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SEATTLE, WA 98103

PROJECT: 8720 SE 52ND PL
MERCER ISLAND, WA 98040
ESC & DRAINAGE DETAIL

PROJ. MANAGER:	TG, BI
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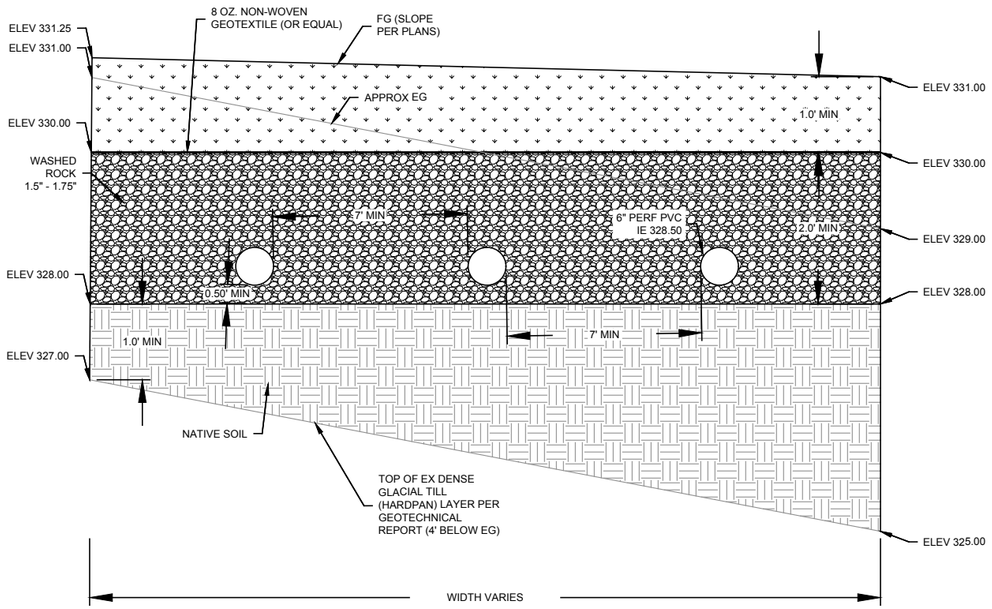
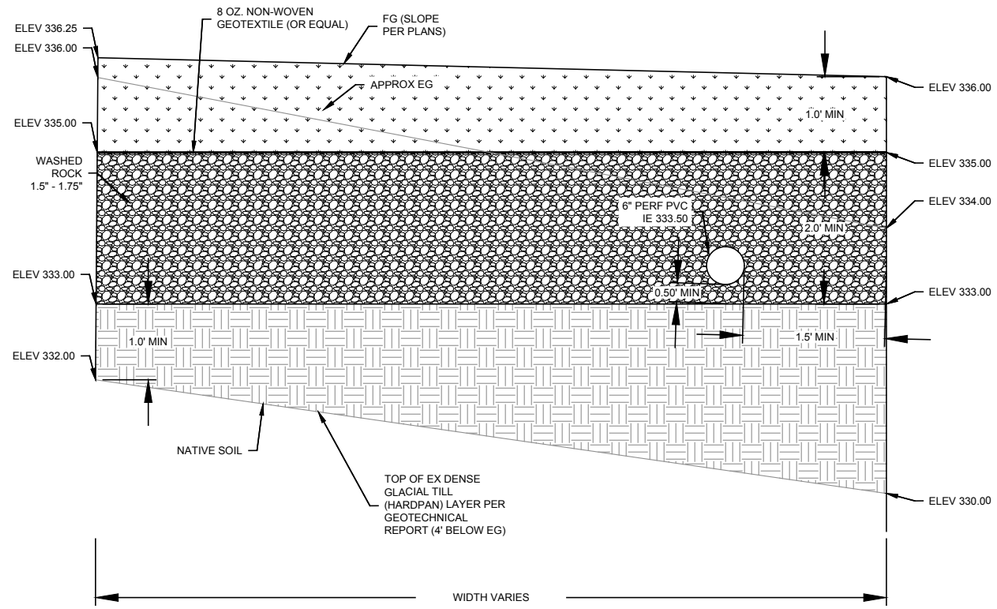
CHECKED BY:	TG
SCALE:	SCALE
DATE: 3/12/2020	REV. A
SHEET	5 OF 6

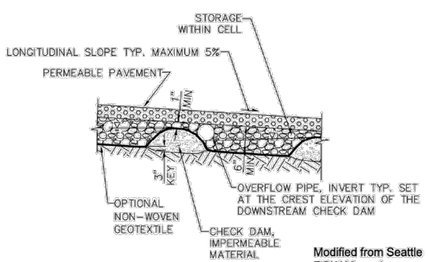
SHEET NUMBER
C05



INFILTRATION TRENCH #1 (I / C04)
N.T.S.

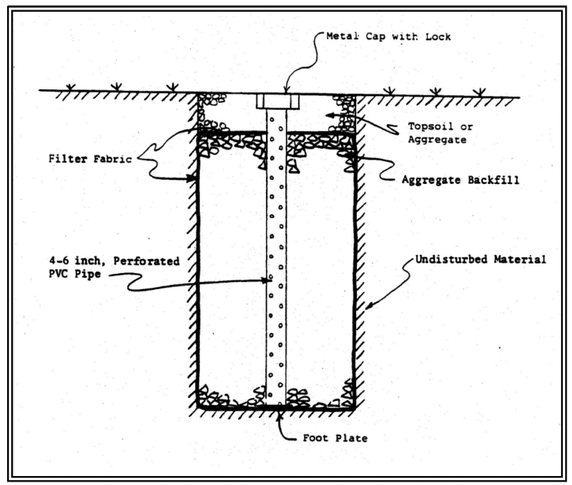


INFILTRATION TRENCH #2 (J / C04)
N.T.S.



Modified from Seattle ROW Manual Figure 6-25

CHECK DAM (K / C04)
PER 2012 DOE MANUAL FIG. 5.3.6
N.T.S.



OBSERVATION WELL
PER D.O.E. FIGURE 3.3.10
N.T.S.
(L / C04)

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PROJECT: 8720 SE 52ND PL
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DETAILS

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CHECKED BY:	TG
SCALE:	SCALE
DATE: 3/12/2020	REV. A
SHEET	6 OF 6

SHEET NUMBER
C06

CAD FILE NUMBER: P:\CLIENTS\BUILD URBAN\8720 SE 52ND PL - MERCER ISLAND\WORKING\8720 SE 52ND PL.DWG\LAST MODIFIED BY: RBRYANT - SAVE DATE: 3/12/2020 10:15 AM - SHEET SET: 8720 SE 52ND PL - ORIGINAL SHEET SIZE: ANSI FULL BLEED D (34.00 X 22.00 INCHES)\AUTOCAD VERSION: CIVIL 3D 2015

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Full Infiltration
Site Name:	8720 SE 52nd Pl
Site Address:	8720 SE 52nd Pl
City:	Mercer Island
Report Date:	10/17/2017
Gage:	Seatac
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2017/08/18
Version:	4.2.13

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

PPS

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
DRIVEWAYS MOD	0.0189
Impervious Total	0.0189
Basin Total	0.0189

Element Flows To:

Surface	Interflow	Groundwater

Trench - North Roof

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.0592
Impervious Total	0.0592
Basin Total	0.0592

Element Flows To:

Surface	Interflow	Groundwater

PPF

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.0189
DRIVEWAYS MOD	0.0257
Impervious Total	0.0446
Basin Total	0.0446

Element Flows To:

Surface	Interflow	Groundwater

Trench - South Roof

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.0363
Impervious Total	0.0363
Basin Total	0.0363

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
DRIVEWAYS MOD	0.0189
Impervious Total	0.0189
Basin Total	0.0189

Element Flows To:

Surface	Interflow	Groundwater
PPS	PPS	

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.0592
Impervious Total	0.0592
Basin Total	0.0592

Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed 2	Gravel Trench Bed 2	

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.0189
DRIVEWAYS MOD	0.0257
Impervious Total	0.0446
Basin Total	0.0446

Element Flows To:

Surface	Interflow	Groundwater
PPF	PPF	

Trench - South Roof

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.0363
Impervious Total	0.0363
Basin Total	0.0363

Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed 4	Gravel Trench Bed 4	

Routing Elements
Predeveloped Routing

Mitigated Routing

PPS

Bottom Length:	82.30 ft.
Bottom Width:	10.00 ft.
Trench bottom slope 1:	0.001 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	0.5
Pour Space of material for first layer:	0.3
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	0.5
Infiltration safety factor:	0.5
Total Volume Infiltrated (ac-ft.):	2.997
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	2.997
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	10 in.
Element Flows To:	
Outlet 1	Outlet 2

Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.018	0.000	0.000	0.000
0.0167	0.018	0.000	0.000	0.004
0.0333	0.018	0.000	0.000	0.004
0.0500	0.018	0.000	0.000	0.004
0.0667	0.018	0.000	0.000	0.004
0.0833	0.018	0.000	0.000	0.004
0.1000	0.018	0.000	0.000	0.004
0.1167	0.018	0.000	0.000	0.004
0.1333	0.018	0.000	0.000	0.004
0.1500	0.018	0.000	0.000	0.004
0.1667	0.018	0.000	0.000	0.004
0.1833	0.018	0.001	0.000	0.004
0.2000	0.018	0.001	0.000	0.004
0.2167	0.018	0.001	0.000	0.004
0.2333	0.018	0.001	0.000	0.004
0.2500	0.018	0.001	0.000	0.004
0.2667	0.018	0.001	0.000	0.004
0.2833	0.018	0.001	0.000	0.004
0.3000	0.018	0.001	0.000	0.004
0.3167	0.018	0.001	0.000	0.004
0.3333	0.018	0.001	0.000	0.004
0.3500	0.018	0.002	0.000	0.004
0.3667	0.018	0.002	0.000	0.004
0.3833	0.018	0.002	0.000	0.004

0.4000	0.018	0.002	0.000	0.004
0.4167	0.018	0.002	0.000	0.004
0.4333	0.018	0.002	0.000	0.004
0.4500	0.018	0.002	0.000	0.004
0.4667	0.018	0.002	0.000	0.004
0.4833	0.018	0.002	0.000	0.004
0.5000	0.018	0.002	0.000	0.004
0.5167	0.018	0.003	0.019	0.004
0.5333	0.018	0.003	0.053	0.004
0.5500	0.018	0.003	0.098	0.004
0.5667	0.018	0.004	0.151	0.004
0.5833	0.018	0.004	0.211	0.004
0.6000	0.018	0.004	0.276	0.004
0.6167	0.018	0.005	0.346	0.004
0.6333	0.018	0.005	0.420	0.004
0.6500	0.018	0.005	0.497	0.004
0.6667	0.018	0.006	0.575	0.004
0.6833	0.018	0.006	0.654	0.004
0.7000	0.018	0.006	0.733	0.004
0.7167	0.018	0.006	0.810	0.004
0.7333	0.018	0.007	0.885	0.004
0.7500	0.018	0.007	0.957	0.004
0.7667	0.018	0.007	1.024	0.004
0.7833	0.018	0.008	1.087	0.004
0.8000	0.018	0.008	1.145	0.004
0.8167	0.018	0.008	1.196	0.004
0.8333	0.018	0.009	1.242	0.004
0.8500	0.018	0.009	1.282	0.004
0.8667	0.018	0.009	1.316	0.004
0.8833	0.018	0.010	1.346	0.004
0.9000	0.018	0.010	1.372	0.004
0.9167	0.018	0.010	1.411	0.004
0.9333	0.018	0.011	1.439	0.004
0.9500	0.018	0.011	1.467	0.004
0.9667	0.018	0.011	1.494	0.004
0.9833	0.018	0.012	1.520	0.004
1.0000	0.018	0.012	1.546	0.004
1.0167	0.018	0.012	1.572	0.004
1.0333	0.018	0.012	1.597	0.004
1.0500	0.018	0.013	1.622	0.004
1.0667	0.018	0.013	1.646	0.004
1.0833	0.018	0.013	1.670	0.004
1.1000	0.018	0.014	1.694	0.004
1.1167	0.018	0.014	1.717	0.004
1.1333	0.018	0.014	1.740	0.004
1.1500	0.018	0.015	1.763	0.004
1.1667	0.018	0.015	1.785	0.004
1.1833	0.018	0.015	1.808	0.004
1.2000	0.018	0.016	1.830	0.004
1.2167	0.018	0.016	1.851	0.004
1.2333	0.018	0.016	1.873	0.004
1.2500	0.018	0.017	1.894	0.004
1.2667	0.018	0.017	1.915	0.004
1.2833	0.018	0.017	1.935	0.004
1.3000	0.018	0.017	1.956	0.004
1.3167	0.018	0.018	1.976	0.004
1.3333	0.018	0.018	1.996	0.004
1.3500	0.018	0.018	2.016	0.004

1.3667	0.018	0.019	2.036	0.004
1.3833	0.018	0.019	2.055	0.004
1.4000	0.018	0.019	2.075	0.004
1.4167	0.018	0.020	2.094	0.004
1.4333	0.018	0.020	2.113	0.004
1.4500	0.018	0.020	2.131	0.004
1.4667	0.018	0.021	2.150	0.004
1.4833	0.018	0.021	2.168	0.004
1.5000	0.018	0.021	2.187	0.004

Gravel Trench Bed 2

Bottom Length:	97.00 ft.
Bottom Width:	10.00 ft.
Trench bottom slope 1:	0.001 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	2
Pour Space of material for first layer:	0.3
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	0.5
Infiltration safety factor:	0.5
Total Volume Infiltrated (ac-ft.):	9.287
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	9.287
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	2 ft.
Riser Diameter:	10 in.
Element Flows To:	
Outlet 1	Outlet 2

Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.022	0.000	0.000	0.000
0.0333	0.022	0.000	0.000	0.005
0.0667	0.022	0.000	0.000	0.005
0.1000	0.022	0.000	0.000	0.005
0.1333	0.022	0.000	0.000	0.005
0.1667	0.022	0.001	0.000	0.005
0.2000	0.022	0.001	0.000	0.005
0.2333	0.022	0.001	0.000	0.005
0.2667	0.022	0.001	0.000	0.005
0.3000	0.022	0.002	0.000	0.005
0.3333	0.022	0.002	0.000	0.005
0.3667	0.022	0.002	0.000	0.005
0.4000	0.022	0.002	0.000	0.005
0.4333	0.022	0.002	0.000	0.005
0.4667	0.022	0.003	0.000	0.005
0.5000	0.022	0.003	0.000	0.005
0.5333	0.022	0.003	0.000	0.005
0.5667	0.022	0.003	0.000	0.005
0.6000	0.022	0.004	0.000	0.005
0.6333	0.022	0.004	0.000	0.005
0.6667	0.022	0.004	0.000	0.005
0.7000	0.022	0.004	0.000	0.005
0.7333	0.022	0.004	0.000	0.005
0.7667	0.022	0.005	0.000	0.005
0.8000	0.022	0.005	0.000	0.005
0.8333	0.022	0.005	0.000	0.005

0.8667	0.022	0.005	0.000	0.005
0.9000	0.022	0.006	0.000	0.005
0.9333	0.022	0.006	0.000	0.005
0.9667	0.022	0.006	0.000	0.005
1.0000	0.022	0.006	0.000	0.005
1.0333	0.022	0.006	0.000	0.005
1.0667	0.022	0.007	0.000	0.005
1.1000	0.022	0.007	0.000	0.005
1.1333	0.022	0.007	0.000	0.005
1.1667	0.022	0.007	0.000	0.005
1.2000	0.022	0.008	0.000	0.005
1.2333	0.022	0.008	0.000	0.005
1.2667	0.022	0.008	0.000	0.005
1.3000	0.022	0.008	0.000	0.005
1.3333	0.022	0.008	0.000	0.005
1.3667	0.022	0.009	0.000	0.005
1.4000	0.022	0.009	0.000	0.005
1.4333	0.022	0.009	0.000	0.005
1.4667	0.022	0.009	0.000	0.005
1.5000	0.022	0.010	0.000	0.005
1.5333	0.022	0.010	0.000	0.005
1.5667	0.022	0.010	0.000	0.005
1.6000	0.022	0.010	0.000	0.005
1.6333	0.022	0.010	0.000	0.005
1.6667	0.022	0.011	0.000	0.005
1.7000	0.022	0.011	0.000	0.005
1.7333	0.022	0.011	0.000	0.005
1.7667	0.022	0.011	0.000	0.005
1.8000	0.022	0.012	0.000	0.005
1.8333	0.022	0.012	0.000	0.005
1.8667	0.022	0.012	0.000	0.005
1.9000	0.022	0.012	0.000	0.005
1.9333	0.022	0.012	0.000	0.005
1.9667	0.022	0.013	0.000	0.005
2.0000	0.022	0.013	0.000	0.005
2.0333	0.022	0.014	0.053	0.005
2.0667	0.022	0.015	0.151	0.005
2.1000	0.022	0.016	0.276	0.005
2.1333	0.022	0.016	0.420	0.005
2.1667	0.022	0.017	0.575	0.005
2.2000	0.022	0.018	0.733	0.005
2.2333	0.022	0.019	0.885	0.005
2.2667	0.022	0.019	1.024	0.005
2.3000	0.022	0.020	1.145	0.005
2.3333	0.022	0.021	1.242	0.005
2.3667	0.022	0.022	1.316	0.005
2.4000	0.022	0.022	1.372	0.005
2.4333	0.022	0.023	1.439	0.005
2.4667	0.022	0.024	1.494	0.005
2.5000	0.022	0.025	1.546	0.005
2.5333	0.022	0.025	1.597	0.005
2.5667	0.022	0.026	1.646	0.005
2.6000	0.022	0.027	1.694	0.005
2.6333	0.022	0.028	1.740	0.005
2.6667	0.022	0.028	1.785	0.005
2.7000	0.022	0.029	1.830	0.005
2.7333	0.022	0.030	1.873	0.005
2.7667	0.022	0.031	1.915	0.005

2.8000	0.022	0.031	1.956	0.005
2.8333	0.022	0.032	1.996	0.005
2.8667	0.022	0.033	2.036	0.005
2.9000	0.022	0.033	2.075	0.005
2.9333	0.022	0.034	2.113	0.005
2.9667	0.022	0.035	2.150	0.005
3.0000	0.022	0.036	2.187	0.005

PPF

Bottom Length:	112.00 ft.
Bottom Width:	10.00 ft.
Trench bottom slope 1:	0.001 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	1
Pour Space of material for first layer:	0.3
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	0.5
Infiltration safety factor:	0.5
Total Volume Infiltrated (ac-ft.):	7.052
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	7.052
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	1 ft.
Riser Diameter:	10 in.
Element Flows To:	
Outlet 1	Outlet 2

Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.025	0.000	0.000	0.000
0.0222	0.025	0.000	0.000	0.006
0.0444	0.025	0.000	0.000	0.006
0.0667	0.025	0.000	0.000	0.006
0.0889	0.025	0.000	0.000	0.006
0.1111	0.025	0.000	0.000	0.006
0.1333	0.025	0.001	0.000	0.006
0.1556	0.025	0.001	0.000	0.006
0.1778	0.025	0.001	0.000	0.006
0.2000	0.025	0.001	0.000	0.006
0.2222	0.025	0.001	0.000	0.006
0.2444	0.025	0.001	0.000	0.006
0.2667	0.025	0.002	0.000	0.006
0.2889	0.025	0.002	0.000	0.006
0.3111	0.025	0.002	0.000	0.006
0.3333	0.025	0.002	0.000	0.006
0.3556	0.025	0.002	0.000	0.006
0.3778	0.025	0.002	0.000	0.006
0.4000	0.025	0.003	0.000	0.006
0.4222	0.025	0.003	0.000	0.006
0.4444	0.025	0.003	0.000	0.006
0.4667	0.025	0.003	0.000	0.006
0.4889	0.025	0.003	0.000	0.006
0.5111	0.025	0.003	0.000	0.006
0.5333	0.025	0.004	0.000	0.006
0.5556	0.025	0.004	0.000	0.006

0.5778	0.025	0.004	0.000	0.006
0.6000	0.025	0.004	0.000	0.006
0.6222	0.025	0.004	0.000	0.006
0.6444	0.025	0.005	0.000	0.006
0.6667	0.025	0.005	0.000	0.006
0.6889	0.025	0.005	0.000	0.006
0.7111	0.025	0.005	0.000	0.006
0.7333	0.025	0.005	0.000	0.006
0.7556	0.025	0.005	0.000	0.006
0.7778	0.025	0.006	0.000	0.006
0.8000	0.025	0.006	0.000	0.006
0.8222	0.025	0.006	0.000	0.006
0.8444	0.025	0.006	0.000	0.006
0.8667	0.025	0.006	0.000	0.006
0.8889	0.025	0.006	0.000	0.006
0.9111	0.025	0.007	0.000	0.006
0.9333	0.025	0.007	0.000	0.006
0.9556	0.025	0.007	0.000	0.006
0.9778	0.025	0.007	0.000	0.006
1.0000	0.025	0.008	0.000	0.006
1.0222	0.025	0.008	0.029	0.006
1.0444	0.025	0.009	0.082	0.006
1.0667	0.025	0.009	0.151	0.006
1.0889	0.025	0.010	0.232	0.006
1.1111	0.025	0.011	0.323	0.006
1.1333	0.025	0.011	0.420	0.006
1.1556	0.025	0.012	0.523	0.006
1.1778	0.025	0.012	0.628	0.006
1.2000	0.025	0.013	0.733	0.006
1.2222	0.025	0.013	0.835	0.006
1.2444	0.025	0.014	0.933	0.006
1.2667	0.025	0.015	1.024	0.006
1.2889	0.025	0.015	1.107	0.006
1.3111	0.025	0.016	1.180	0.006
1.3333	0.025	0.016	1.242	0.006
1.3556	0.025	0.017	1.294	0.006
1.3778	0.025	0.017	1.337	0.006
1.4000	0.025	0.018	1.372	0.006
1.4222	0.025	0.019	1.421	0.006
1.4444	0.025	0.019	1.458	0.006
1.4667	0.025	0.020	1.494	0.006
1.4889	0.025	0.020	1.529	0.006
1.5111	0.025	0.021	1.563	0.006
1.5333	0.025	0.021	1.597	0.006
1.5556	0.025	0.022	1.630	0.006
1.5778	0.025	0.023	1.662	0.006
1.6000	0.025	0.023	1.694	0.006
1.6222	0.025	0.024	1.725	0.006
1.6444	0.025	0.024	1.755	0.006
1.6667	0.025	0.025	1.785	0.006
1.6889	0.025	0.025	1.815	0.006
1.7111	0.025	0.026	1.844	0.006
1.7333	0.025	0.027	1.873	0.006
1.7556	0.025	0.027	1.901	0.006
1.7778	0.025	0.028	1.929	0.006
1.8000	0.025	0.028	1.956	0.006
1.8222	0.025	0.029	1.983	0.006
1.8444	0.025	0.029	2.009	0.006

1.8667	0.025	0.030	2.036	0.006
1.8889	0.025	0.031	2.062	0.006
1.9111	0.025	0.031	2.087	0.006
1.9333	0.025	0.032	2.113	0.006
1.9556	0.025	0.032	2.138	0.006
1.9778	0.025	0.033	2.162	0.006
2.0000	0.025	0.033	2.187	0.006

Gravel Trench Bed 4

Bottom Length:	60.00 ft.
Bottom Width:	10.00 ft.
Trench bottom slope 1:	0.001 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	2
Pour Space of material for first layer:	0.3
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	0.5
Infiltration safety factor:	0.5
Total Volume Infiltrated (ac-ft.):	5.689
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	5.689
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	2 ft.
Riser Diameter:	10 in.
Element Flows To:	
Outlet 1	Outlet 2

Gravel Trench Bed Hydraulic Table

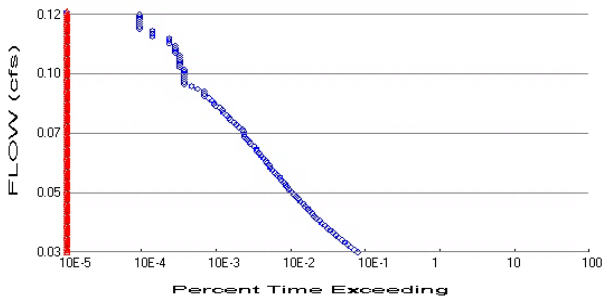
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.013	0.000	0.000	0.000
0.0333	0.013	0.000	0.000	0.003
0.0667	0.013	0.000	0.000	0.003
0.1000	0.013	0.000	0.000	0.003
0.1333	0.013	0.000	0.000	0.003
0.1667	0.013	0.000	0.000	0.003
0.2000	0.013	0.000	0.000	0.003
0.2333	0.013	0.001	0.000	0.003
0.2667	0.013	0.001	0.000	0.003
0.3000	0.013	0.001	0.000	0.003
0.3333	0.013	0.001	0.000	0.003
0.3667	0.013	0.001	0.000	0.003
0.4000	0.013	0.001	0.000	0.003
0.4333	0.013	0.001	0.000	0.003
0.4667	0.013	0.001	0.000	0.003
0.5000	0.013	0.002	0.000	0.003
0.5333	0.013	0.002	0.000	0.003
0.5667	0.013	0.002	0.000	0.003
0.6000	0.013	0.002	0.000	0.003
0.6333	0.013	0.002	0.000	0.003
0.6667	0.013	0.002	0.000	0.003
0.7000	0.013	0.002	0.000	0.003
0.7333	0.013	0.003	0.000	0.003
0.7667	0.013	0.003	0.000	0.003
0.8000	0.013	0.003	0.000	0.003
0.8333	0.013	0.003	0.000	0.003

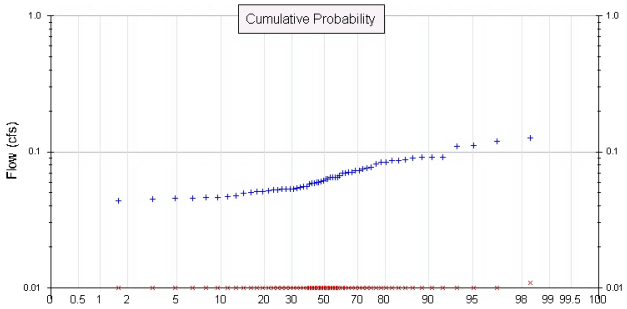
0.8667	0.013	0.003	0.000	0.003
0.9000	0.013	0.003	0.000	0.003
0.9333	0.013	0.003	0.000	0.003
0.9667	0.013	0.004	0.000	0.003
1.0000	0.013	0.004	0.000	0.003
1.0333	0.013	0.004	0.000	0.003
1.0667	0.013	0.004	0.000	0.003
1.1000	0.013	0.004	0.000	0.003
1.1333	0.013	0.004	0.000	0.003
1.1667	0.013	0.004	0.000	0.003
1.2000	0.013	0.005	0.000	0.003
1.2333	0.013	0.005	0.000	0.003
1.2667	0.013	0.005	0.000	0.003
1.3000	0.013	0.005	0.000	0.003
1.3333	0.013	0.005	0.000	0.003
1.3667	0.013	0.005	0.000	0.003
1.4000	0.013	0.005	0.000	0.003
1.4333	0.013	0.005	0.000	0.003
1.4667	0.013	0.006	0.000	0.003
1.5000	0.013	0.006	0.000	0.003
1.5333	0.013	0.006	0.000	0.003
1.5667	0.013	0.006	0.000	0.003
1.6000	0.013	0.006	0.000	0.003
1.6333	0.013	0.006	0.000	0.003
1.6667	0.013	0.006	0.000	0.003
1.7000	0.013	0.007	0.000	0.003
1.7333	0.013	0.007	0.000	0.003
1.7667	0.013	0.007	0.000	0.003
1.8000	0.013	0.007	0.000	0.003
1.8333	0.013	0.007	0.000	0.003
1.8667	0.013	0.007	0.000	0.003
1.9000	0.013	0.007	0.000	0.003
1.9333	0.013	0.008	0.000	0.003
1.9667	0.013	0.008	0.000	0.003
2.0000	0.013	0.008	0.000	0.003
2.0333	0.013	0.009	0.053	0.003
2.0667	0.013	0.009	0.151	0.003
2.1000	0.013	0.010	0.276	0.003
2.1333	0.013	0.010	0.420	0.003
2.1667	0.013	0.010	0.575	0.003
2.2000	0.013	0.011	0.733	0.003
2.2333	0.013	0.011	0.885	0.003
2.2667	0.013	0.012	1.024	0.003
2.3000	0.013	0.012	1.145	0.003
2.3333	0.013	0.013	1.242	0.003
2.3667	0.013	0.013	1.316	0.003
2.4000	0.013	0.014	1.372	0.003
2.4333	0.013	0.014	1.439	0.003
2.4667	0.013	0.015	1.494	0.003
2.5000	0.013	0.015	1.546	0.003
2.5333	0.013	0.015	1.597	0.003
2.5667	0.013	0.016	1.646	0.003
2.6000	0.013	0.016	1.694	0.003
2.6333	0.013	0.017	1.740	0.003
2.6667	0.013	0.017	1.785	0.003
2.7000	0.013	0.018	1.830	0.003
2.7333	0.013	0.018	1.873	0.003
2.7667	0.013	0.019	1.915	0.003

2.8000	0.013	0.019	1.956	0.003
2.8333	0.013	0.020	1.996	0.003
2.8667	0.013	0.020	2.036	0.003
2.9000	0.013	0.021	2.075	0.003
2.9333	0.013	0.021	2.113	0.003
2.9667	0.013	0.021	2.150	0.003
3.0000	0.013	0.022	2.187	0.003

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.159

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.159

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.063095
5 year	0.079807
10 year	0.091174
25 year	0.105931
50 year	0.117235
100 year	0.128819

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.082	0.000
1950	0.087	0.000
1951	0.050	0.000
1952	0.044	0.000
1953	0.049	0.000
1954	0.051	0.000
1955	0.059	0.000
1956	0.056	0.000
1957	0.063	0.000
1958	0.052	0.000

1959	0.055	0.000
1960	0.053	0.000
1961	0.053	0.000
1962	0.048	0.000
1963	0.054	0.000
1964	0.054	0.000
1965	0.065	0.000
1966	0.043	0.000
1967	0.076	0.000
1968	0.091	0.000
1969	0.059	0.000
1970	0.059	0.000
1971	0.070	0.000
1972	0.070	0.000
1973	0.045	0.000
1974	0.065	0.000
1975	0.073	0.000
1976	0.051	0.000
1977	0.054	0.000
1978	0.070	0.000
1979	0.091	0.000
1980	0.084	0.000
1981	0.065	0.000
1982	0.091	0.000
1983	0.075	0.000
1984	0.046	0.000
1985	0.064	0.000
1986	0.056	0.000
1987	0.086	0.000
1988	0.053	0.000
1989	0.073	0.000
1990	0.109	0.000
1991	0.090	0.000
1992	0.046	0.000
1993	0.045	0.000
1994	0.046	0.000
1995	0.058	0.000
1996	0.065	0.000
1997	0.059	0.000
1998	0.061	0.000
1999	0.126	0.000
2000	0.061	0.000
2001	0.070	0.000
2002	0.077	0.000
2003	0.066	0.000
2004	0.119	0.011
2005	0.052	0.000
2006	0.047	0.000
2007	0.112	0.000
2008	0.087	0.000
2009	0.083	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1262	0.0109
2	0.1195	0.0000
3	0.1119	0.0000

4	0.1091	0.0000
5	0.0914	0.0000
6	0.0914	0.0000
7	0.0910	0.0000
8	0.0899	0.0000
9	0.0872	0.0000
10	0.0866	0.0000
11	0.0864	0.0000
12	0.0837	0.0000
13	0.0833	0.0000
14	0.0815	0.0000
15	0.0771	0.0000
16	0.0761	0.0000
17	0.0748	0.0000
18	0.0729	0.0000
19	0.0727	0.0000
20	0.0704	0.0000
21	0.0702	0.0000
22	0.0701	0.0000
23	0.0697	0.0000
24	0.0664	0.0000
25	0.0651	0.0000
26	0.0651	0.0000
27	0.0647	0.0000
28	0.0645	0.0000
29	0.0635	0.0000
30	0.0634	0.0000
31	0.0614	0.0000
32	0.0608	0.0000
33	0.0595	0.0000
34	0.0592	0.0000
35	0.0591	0.0000
36	0.0587	0.0000
37	0.0576	0.0000
38	0.0557	0.0000
39	0.0557	0.0000
40	0.0548	0.0000
41	0.0542	0.0000
42	0.0535	0.0000
43	0.0535	0.0000
44	0.0532	0.0000
45	0.0532	0.0000
46	0.0526	0.0000
47	0.0523	0.0000
48	0.0518	0.0000
49	0.0511	0.0000
50	0.0507	0.0000
51	0.0502	0.0000
52	0.0494	0.0000
53	0.0476	0.0000
54	0.0467	0.0000
55	0.0462	0.0000
56	0.0462	0.0000
57	0.0458	0.0000
58	0.0455	0.0000
59	0.0446	0.0000
60	0.0436	0.0000
61	0.0433	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0315	1683	0	0	Pass
0.0324	1518	0	0	Pass
0.0333	1361	0	0	Pass
0.0341	1250	0	0	Pass
0.0350	1138	0	0	Pass
0.0359	1030	0	0	Pass
0.0367	947	0	0	Pass
0.0376	857	0	0	Pass
0.0385	791	0	0	Pass
0.0393	726	0	0	Pass
0.0402	662	0	0	Pass
0.0411	624	0	0	Pass
0.0419	565	0	0	Pass
0.0428	520	0	0	Pass
0.0437	469	0	0	Pass
0.0445	439	0	0	Pass
0.0454	417	0	0	Pass
0.0463	383	0	0	Pass
0.0471	363	0	0	Pass
0.0480	336	0	0	Pass
0.0489	315	0	0	Pass
0.0497	292	0	0	Pass
0.0506	271	0	0	Pass
0.0515	253	0	0	Pass
0.0523	237	0	0	Pass
0.0532	218	0	0	Pass
0.0541	201	0	0	Pass
0.0549	191	0	0	Pass
0.0558	182	0	0	Pass
0.0566	171	0	0	Pass
0.0575	159	0	0	Pass
0.0584	154	0	0	Pass
0.0592	139	0	0	Pass
0.0601	131	0	0	Pass
0.0610	121	0	0	Pass
0.0618	115	0	0	Pass
0.0627	110	0	0	Pass
0.0636	102	0	0	Pass
0.0644	99	0	0	Pass
0.0653	92	0	0	Pass
0.0662	87	0	0	Pass
0.0670	80	0	0	Pass
0.0679	76	0	0	Pass
0.0688	74	0	0	Pass
0.0696	69	0	0	Pass
0.0705	62	0	0	Pass
0.0714	59	0	0	Pass
0.0722	55	0	0	Pass
0.0731	52	0	0	Pass
0.0740	51	0	0	Pass
0.0748	50	0	0	Pass
0.0757	48	0	0	Pass
0.0766	43	0	0	Pass

0.0774	40	0	0	Pass
0.0783	37	0	0	Pass
0.0792	33	0	0	Pass
0.0800	32	0	0	Pass
0.0809	30	0	0	Pass
0.0817	27	0	0	Pass
0.0826	26	0	0	Pass
0.0835	24	0	0	Pass
0.0843	21	0	0	Pass
0.0852	20	0	0	Pass
0.0861	19	0	0	Pass
0.0869	17	0	0	Pass
0.0878	15	0	0	Pass
0.0887	15	0	0	Pass
0.0895	15	0	0	Pass
0.0904	12	0	0	Pass
0.0913	10	0	0	Pass
0.0921	8	0	0	Pass
0.0930	8	0	0	Pass
0.0939	8	0	0	Pass
0.0947	8	0	0	Pass
0.0956	8	0	0	Pass
0.0965	8	0	0	Pass
0.0973	8	0	0	Pass
0.0982	7	0	0	Pass
0.0991	7	0	0	Pass
0.0999	7	0	0	Pass
0.1008	7	0	0	Pass
0.1017	7	0	0	Pass
0.1025	7	0	0	Pass
0.1034	6	0	0	Pass
0.1043	6	0	0	Pass
0.1051	6	0	0	Pass
0.1060	6	0	0	Pass
0.1068	5	0	0	Pass
0.1077	5	0	0	Pass
0.1086	5	0	0	Pass
0.1094	3	0	0	Pass
0.1103	3	0	0	Pass
0.1112	3	0	0	Pass
0.1120	2	0	0	Pass
0.1129	2	0	0	Pass
0.1138	2	0	0	Pass
0.1146	2	0	0	Pass
0.1155	2	0	0	Pass
0.1164	2	0	0	Pass
0.1172	2	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

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

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
PPS POC	☐	2.73			☐	100.00			
Gravel Trench Bed 2 POC	☐	8.45			☐	100.00			
PPF POC	☐	6.42			☐	100.00			
Gravel Trench Bed 4 POC	☐	5.18			☐	100.00			
Total Volume Infiltrated		22.77	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

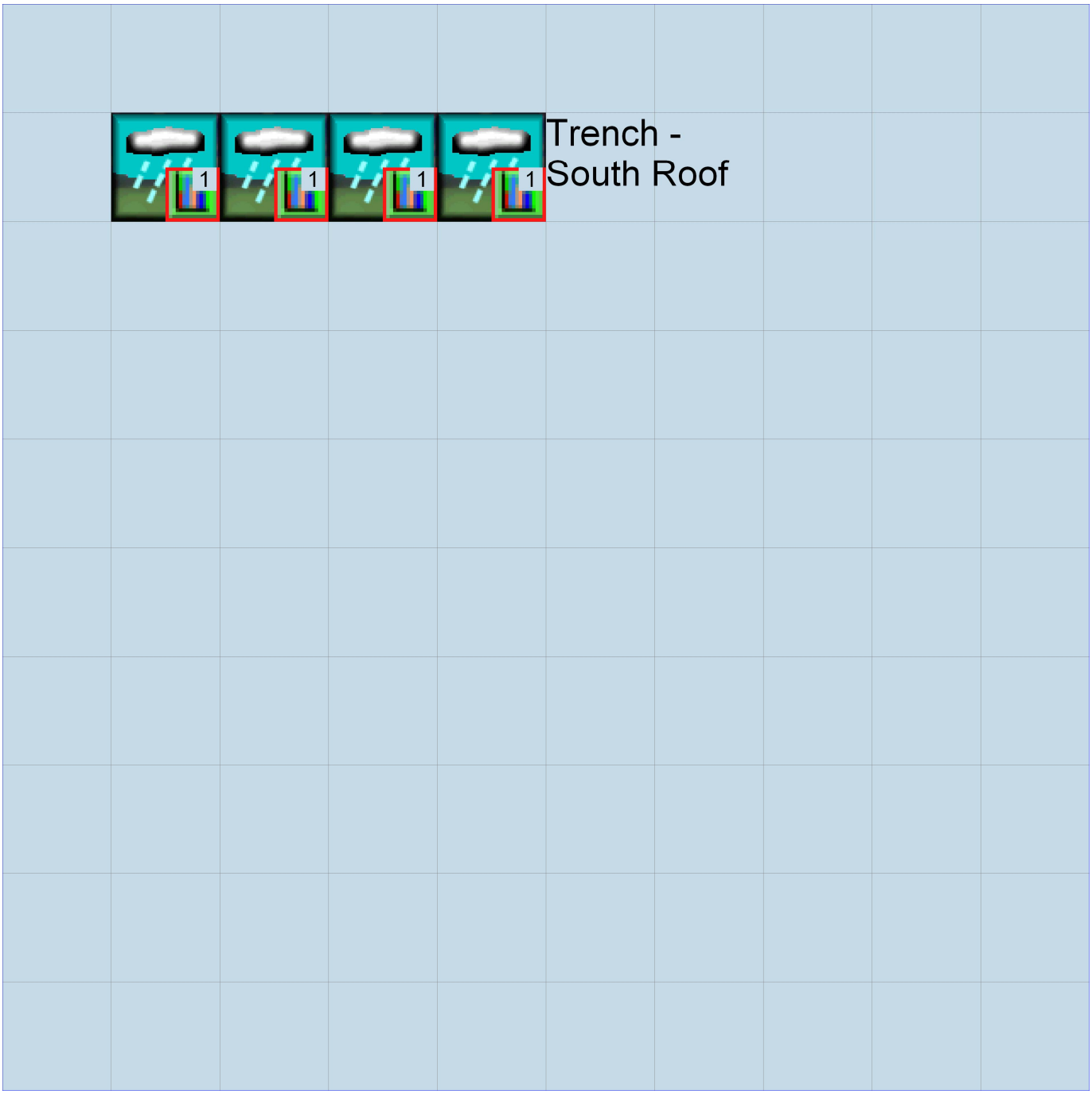
PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 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   Full Infiltration.wdm
MESSU       25   PreFull Infiltration.MES
            27   PreFull Infiltration.L61
            28   PreFull Infiltration.L62
            30   POCFull Infiltration1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND       6
      IMPLND       4
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        PPS                        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
  END GEN-INFO
  *** Section PWATER***

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

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

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
```

```
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  END PWAT-PARM1

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

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

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

END PERLND

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

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    6         0    0    1    0    0    0
    4         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    6         0    0    4    0    0    0    1    9
    4         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    6         0    0    0    0    0
    4         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    6            400      0.05       0.1      0.08
    4            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    6              0         0
    4              0         0
  END IWAT-PARM3
```

```
  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    6              0         0
    4              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
PPS***
IMPLND   6                      0.0189     COPY   501     15
Trench - North Roof***
IMPLND   4                      0.0592     COPY   501     15
PPF***
IMPLND   4                      0.0189     COPY   501     15
IMPLND   6                      0.0257     COPY   501     15
Trench - South Roof***
IMPLND   4                      0.0363     COPY   501     15

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

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



<-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    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           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       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 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   Full Infiltration.wdm
MESSU       25   MitFull Infiltration.MES
            27   MitFull Infiltration.L61
            28   MitFull Infiltration.L62
            30   POCFull Infiltration1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND       6
      IMPLND       4
      RCHRES       1
      RCHRES       2
      RCHRES       3
      RCHRES       4
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        PPS                        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
  END GEN-INFO
  *** Section PWATER***

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

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
```

```
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
  END PRINT-INFO

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

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

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

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

END PERLND

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

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    6         0    0    1    0    0    0
    4         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    6         0    0    4    0    0    0    1    9
    4         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    6         0    0    0    0    0
    4         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    6            400      0.05       0.1      0.08
    4            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
```

```
    # -  # ***PETMAX    PETMIN
    6              0         0
    4              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    6              0         0
    4              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
IMPLND   6                      0.0189     RCHRES   1      5
Basin  2***
IMPLND   4                      0.0592     RCHRES   2      5
Basin  3***
IMPLND   4                      0.0189     RCHRES   3      5
IMPLND   6                      0.0257     RCHRES   3      5
Trench - South Roof***
IMPLND   4                      0.0363     RCHRES   4      5

******Routing******
IMPLND   6                      0.0189     COPY     1     15
IMPLND   4                      0.0592     COPY     1     15
IMPLND   4                      0.0189     COPY     1     15
IMPLND   6                      0.0257     COPY     1     15
IMPLND   4                      0.0363     COPY     1     15
RCHRES   1                           1     COPY   501     17
RCHRES   2                           1     COPY   501     17
RCHRES   3                           1     COPY   501     17
RCHRES   4                           1     COPY   501     17
END SCHEMATIC

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



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                         in  out                            ***
    1     PPS                     2    1    1    1   28    0    1
    2     Gravel Trench Be-008    2    1    1    1   28    0    1
    3     PPF                     2    1    1    1   28    0    1
    4     Gravel Trench Be-015    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

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

```
  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
    4         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
    1        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    3        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    4        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50        ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.02       0.0       0.0       0.5       0.0
    2              2      0.02       0.0       0.0       0.5       0.0
    3              3      0.02       0.0       0.0       0.5       0.0
    4              4      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
           *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    4            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   92    5
      Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
       (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.018893  0.000000  0.000000  0.000000
  0.016667  0.018893  0.000094  0.000000  0.004763
  0.033333  0.018893  0.000189  0.000000  0.004763
  0.050000  0.018894  0.000283  0.000000  0.004763
  0.066667  0.018894  0.000378  0.000000  0.004763
  0.083333  0.018894  0.000472  0.000000  0.004763
  0.100000  0.018894  0.000567  0.000000  0.004763
  0.116667  0.018894  0.000661  0.000000  0.004763
  0.133333  0.018894  0.000756  0.000000  0.004763
  0.150000  0.018894  0.000850  0.000000  0.004763
  0.166667  0.018894  0.000945  0.000000  0.004763
  0.183333  0.018894  0.001039  0.000000  0.004763
  0.200000  0.018894  0.001134  0.000000  0.004763
  0.216667  0.018894  0.001228  0.000000  0.004763
  0.233333  0.018894  0.001323  0.000000  0.004763
  0.250000  0.018894  0.001417  0.000000  0.004763
  0.266667  0.018894  0.001511  0.000000  0.004763
  0.283333  0.018894  0.001606  0.000000  0.004763
  0.300000  0.018894  0.001700  0.000000  0.004763
  0.316667  0.018894  0.001795  0.000000  0.004763
  0.333333  0.018894  0.001889  0.000000  0.004763
  0.350000  0.018894  0.001984  0.000000  0.004763
```

0.366667	0.018894	0.002078	0.000000	0.004763
0.383333	0.018894	0.002173	0.000000	0.004763
0.400000	0.018894	0.002267	0.000000	0.004763
0.416667	0.018894	0.002362	0.000000	0.004763
0.433333	0.018894	0.002456	0.000000	0.004763
0.450000	0.018894	0.002551	0.000000	0.004763
0.466667	0.018894	0.002645	0.000000	0.004763
0.483333	0.018894	0.002740	0.000000	0.004763
0.500000	0.018894	0.002834	0.000000	0.004763
0.516667	0.018894	0.003149	0.019025	0.004763
0.533333	0.018894	0.003464	0.053769	0.004763
0.550000	0.018894	0.003779	0.098682	0.004763
0.566667	0.018894	0.004094	0.151685	0.004763
0.583333	0.018894	0.004409	0.211431	0.004763
0.600000	0.018894	0.004723	0.276837	0.004763
0.616667	0.018894	0.005038	0.346911	0.004763
0.633333	0.018894	0.005353	0.420687	0.004763
0.650000	0.018894	0.005668	0.497185	0.004763
0.666667	0.018894	0.005983	0.575411	0.004763
0.683333	0.018894	0.006298	0.654348	0.004763
0.700000	0.018894	0.006613	0.732975	0.004763
0.716667	0.018894	0.006928	0.810279	0.004763
0.733333	0.018894	0.007243	0.885276	0.004763
0.750000	0.018894	0.007557	0.957039	0.004763
0.766667	0.018894	0.007872	1.024723	0.004763
0.783333	0.018894	0.008187	1.087600	0.004763
0.800000	0.018894	0.008502	1.145088	0.004763
0.816667	0.018894	0.008817	1.196793	0.004763
0.833333	0.018894	0.009132	1.242541	0.004763
0.850000	0.018894	0.009447	1.282423	0.004763
0.866667	0.018894	0.009762	1.316838	0.004763
0.883333	0.018894	0.010077	1.346532	0.004763
0.900000	0.018894	0.010392	1.372649	0.004763
0.916667	0.018894	0.010706	1.411859	0.004763
0.933333	0.018894	0.011021	1.439820	0.004763
0.950000	0.018894	0.011336	1.467247	0.004763
0.966667	0.018894	0.011651	1.494171	0.004763
0.983333	0.018894	0.011966	1.520619	0.004763
1.000000	0.018894	0.012281	1.546614	0.004763
1.016667	0.018894	0.012596	1.572180	0.004763
1.033333	0.018894	0.012911	1.597336	0.004763
1.050000	0.018894	0.013226	1.622103	0.004763
1.066667	0.018894	0.013541	1.646497	0.004763
1.083333	0.018894	0.013855	1.670534	0.004763
1.100000	0.018894	0.014170	1.694231	0.004763
1.116667	0.018894	0.014485	1.717601	0.004763
1.133333	0.018894	0.014800	1.740657	0.004763
1.150000	0.018894	0.015115	1.763412	0.004763
1.166667	0.018894	0.015430	1.785876	0.004763
1.183333	0.018894	0.015745	1.808062	0.004763
1.200000	0.018894	0.016060	1.829979	0.004763
1.216667	0.018894	0.016375	1.851636	0.004763
1.233333	0.018894	0.016690	1.873043	0.004763
1.250000	0.018894	0.017004	1.894208	0.004763
1.266667	0.018894	0.017319	1.915139	0.004763
1.283333	0.018894	0.017634	1.935844	0.004763
1.300000	0.018894	0.017949	1.956330	0.004763
1.316667	0.018894	0.018264	1.976603	0.004763
1.333333	0.018894	0.018579	1.996671	0.004763
1.350000	0.018894	0.018894	2.016538	0.004763
1.366667	0.018894	0.019209	2.036212	0.004763
1.383333	0.018894	0.019524	2.055698	0.004763
1.400000	0.018894	0.019839	2.075001	0.004763
1.416667	0.018894	0.020153	2.094126	0.004763
1.433333	0.018894	0.020468	2.113078	0.004763
1.450000	0.018894	0.020783	2.131861	0.004763
1.466667	0.018894	0.021098	2.150480	0.004763
1.483333	0.018894	0.021413	2.168939	0.004763
1.500000	0.018894	0.021728	2.187243	0.004763
1.516667	0.018894	0.022043	2.205395	0.004763

```
END FTABLE  1
FTABLE      2
 92    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
0.000000  0.022268  0.000000  0.000000  0.000000
0.033333  0.022268  0.000223  0.000000  0.005613
0.066667  0.022268  0.000445  0.000000  0.005613
0.100000  0.022268  0.000668  0.000000  0.005613
0.133333  0.022268  0.000891  0.000000  0.005613
0.166667  0.022268  0.001113  0.000000  0.005613
0.200000  0.022268  0.001336  0.000000  0.005613
0.233333  0.022268  0.001559  0.000000  0.005613
0.266667  0.022268  0.001781  0.000000  0.005613
0.300000  0.022268  0.002004  0.000000  0.005613
0.333333  0.022268  0.002227  0.000000  0.005613
0.366667  0.022268  0.002450  0.000000  0.005613
0.400000  0.022268  0.002672  0.000000  0.005613
0.433333  0.022268  0.002895  0.000000  0.005613
0.466667  0.022268  0.003118  0.000000  0.005613
0.500000  0.022268  0.003340  0.000000  0.005613
0.533333  0.022268  0.003563  0.000000  0.005613
0.566667  0.022268  0.003786  0.000000  0.005613
0.600000  0.022268  0.004008  0.000000  0.005613
0.633333  0.022268  0.004231  0.000000  0.005613
0.666667  0.022268  0.004454  0.000000  0.005613
0.700000  0.022268  0.004676  0.000000  0.005613
0.733333  0.022268  0.004899  0.000000  0.005613
0.766667  0.022268  0.005122  0.000000  0.005613
0.800000  0.022269  0.005344  0.000000  0.005613
0.833333  0.022269  0.005567  0.000000  0.005613
0.866667  0.022269  0.005790  0.000000  0.005613
0.900000  0.022269  0.006012  0.000000  0.005613
0.933333  0.022269  0.006235  0.000000  0.005613
0.966667  0.022269  0.006458  0.000000  0.005613
1.000000  0.022269  0.006681  0.000000  0.005613
1.033333  0.022269  0.006903  0.000000  0.005613
1.066667  0.022269  0.007126  0.000000  0.005613
1.100000  0.022269  0.007349  0.000000  0.005613
1.133333  0.022269  0.007571  0.000000  0.005613
1.166667  0.022269  0.007794  0.000000  0.005613
1.200000  0.022269  0.008017  0.000000  0.005613
1.233333  0.022269  0.008239  0.000000  0.005613
1.266667  0.022269  0.008462  0.000000  0.005613
1.300000  0.022269  0.008685  0.000000  0.005613
1.333333  0.022269  0.008907  0.000000  0.005613
1.366667  0.022269  0.009130  0.000000  0.005613
1.400000  0.022269  0.009353  0.000000  0.005613
1.433333  0.022269  0.009575  0.000000  0.005613
1.466667  0.022269  0.009798  0.000000  0.005613
1.500000  0.022269  0.010021  0.000000  0.005613
1.533333  0.022269  0.010244  0.000000  0.005613
1.566667  0.022269  0.010466  0.000000  0.005613
1.600000  0.022269  0.010689  0.000000  0.005613
1.633333  0.022269  0.010912  0.000000  0.005613
1.666667  0.022269  0.011134  0.000000  0.005613
1.700000  0.022269  0.011357  0.000000  0.005613
1.733333  0.022269  0.011580  0.000000  0.005613
1.766667  0.022269  0.011802  0.000000  0.005613
1.800000  0.022269  0.012025  0.000000  0.005613
1.833333  0.022269  0.012248  0.000000  0.005613
1.866667  0.022269  0.012470  0.000000  0.005613
1.900000  0.022269  0.012693  0.000000  0.005613
1.933333  0.022269  0.012916  0.000000  0.005613
1.966667  0.022269  0.013138  0.000000  0.005613
2.000000  0.022269  0.013881  0.000000  0.005613
2.033333  0.022269  0.014623  0.053769  0.005613
2.066667  0.022269  0.015365  0.151685  0.005613
2.100000  0.022269  0.016108  0.276837  0.005613
2.133333  0.022269  0.016850  0.420687  0.005613
```

```
2.166667  0.022269  0.017592  0.575411  0.005613
2.200000  0.022269  0.018335  0.732975  0.005613
2.233333  0.022269  0.019077  0.885276  0.005613
2.266667  0.022269  0.019819  1.024723  0.005613
2.300000  0.022269  0.020562  1.145088  0.005613
2.333333  0.022269  0.021304  1.242541  0.005613
2.366667  0.022269  0.022046  1.316838  0.005613
2.400000  0.022269  0.022788  1.372649  0.005613
2.433333  0.022269  0.023531  1.439820  0.005613
2.466667  0.022269  0.024273  1.494171  0.005613
2.500000  0.022269  0.025015  1.546614  0.005613
2.533333  0.022269  0.025758  1.597336  0.005613
2.566667  0.022269  0.026500  1.646497  0.005613
2.600000  0.022269  0.027242  1.694231  0.005613
2.633333  0.022269  0.027985  1.740657  0.005613
2.666667  0.022269  0.028727  1.785876  0.005613
2.700000  0.022269  0.029469  1.829979  0.005613
2.733333  0.022269  0.030212  1.873043  0.005613
2.766667  0.022269  0.030954  1.915139  0.005613
2.800000  0.022269  0.031696  1.956330  0.005613
2.833333  0.022269  0.032438  1.996671  0.005613
2.866667  0.022269  0.033181  2.036212  0.005613
2.900000  0.022269  0.033923  2.075001  0.005613
2.933333  0.022269  0.034665  2.113078  0.005613
2.966667  0.022269  0.035408  2.150480  0.005613
3.000000  0.022270  0.036150  2.187243  0.005613
3.033333  0.022270  0.036892  2.223398  0.005613
END FTABLE  2
FTABLE      3
 92    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
0.000000  0.025712  0.000000  0.000000  0.000000
0.022222  0.025712  0.000171  0.000000  0.006481
0.044444  0.025712  0.000343  0.000000  0.006481
0.066667  0.025712  0.000514  0.000000  0.006481
0.088889  0.025712  0.000686  0.000000  0.006481
0.111111  0.025712  0.000857  0.000000  0.006481
0.133333  0.025712  0.001028  0.000000  0.006481
0.155556  0.025712  0.001200  0.000000  0.006481
0.177778  0.025712  0.001371  0.000000  0.006481
0.200000  0.025712  0.001543  0.000000  0.006481
0.222222  0.025712  0.001714  0.000000  0.006481
0.244444  0.025712  0.001886  0.000000  0.006481
0.266667  0.025712  0.002057  0.000000  0.006481
0.288889  0.025712  0.002228  0.000000  0.006481
0.311111  0.025712  0.002400  0.000000  0.006481
0.333333  0.025712  0.002571  0.000000  0.006481
0.355556  0.025712  0.002743  0.000000  0.006481
0.377778  0.025712  0.002914  0.000000  0.006481
0.400000  0.025712  0.003085  0.000000  0.006481
0.422222  0.025712  0.003257  0.000000  0.006481
0.444444  0.025712  0.003428  0.000000  0.006481
0.466667  0.025712  0.003600  0.000000  0.006481
0.488889  0.025712  0.003771  0.000000  0.006481
0.511111  0.025712  0.003942  0.000000  0.006481
0.533333  0.025712  0.004114  0.000000  0.006481
0.555556  0.025712  0.004285  0.000000  0.006481
0.577778  0.025712  0.004457  0.000000  0.006481
0.600000  0.025712  0.004628  0.000000  0.006481
0.622222  0.025712  0.004800  0.000000  0.006481
0.644444  0.025712  0.004971  0.000000  0.006481
0.666667  0.025712  0.005142  0.000000  0.006481
0.688889  0.025712  0.005314  0.000000  0.006481
0.711111  0.025712  0.005485  0.000000  0.006481
0.733333  0.025712  0.005657  0.000000  0.006481
0.755556  0.025712  0.005828  0.000000  0.006481
0.777778  0.025712  0.005999  0.000000  0.006481
0.800000  0.025712  0.006171  0.000000  0.006481
0.822222  0.025712  0.006342  0.000000  0.006481
```

```
0.844444  0.025712  0.006514  0.000000  0.006481
0.866667  0.025712  0.006685  0.000000  0.006481
0.888889  0.025712  0.006856  0.000000  0.006481
0.911111  0.025712  0.007028  0.000000  0.006481
0.933333  0.025712  0.007199  0.000000  0.006481
0.955556  0.025712  0.007371  0.000000  0.006481
0.977778  0.025712  0.007542  0.000000  0.006481
1.000000  0.025712  0.008114  0.000000  0.006481
1.022222  0.025712  0.008685  0.029284  0.006481
1.044444  0.025712  0.009256  0.082732  0.006481
1.066667  0.025712  0.009828  0.151685  0.006481
1.088889  0.025712  0.010399  0.232654  0.006481
1.111111  0.025712  0.010970  0.323094  0.006481
1.133333  0.025712  0.011542  0.420687  0.006481
1.155556  0.025712  0.012113  0.523118  0.006481
1.177778  0.025712  0.012685  0.628019  0.006481
1.200000  0.025712  0.013256  0.732975  0.006481
1.222222  0.025712  0.013827  0.835581  0.006481
1.244444  0.025712  0.014399  0.933531  0.006481
1.266667  0.025712  0.014970  1.024723  0.006481
1.288889  0.025712  0.015541  1.107385  0.006481
1.311111  0.025712  0.016113  1.180216  0.006481
1.333333  0.025712  0.016684  1.242541  0.006481
1.355556  0.025712  0.017256  1.294473  0.006481
1.377778  0.025712  0.017827  1.337097  0.006481
1.400000  0.025712  0.018398  1.372649  0.006481
1.422222  0.025712  0.018970  1.421241  0.006481
1.444444  0.025712  0.019541  1.458162  0.006481
1.466667  0.025712  0.020113  1.494171  0.006481
1.488889  0.025712  0.020684  1.529333  0.006481
1.511111  0.025712  0.021255  1.563705  0.006481
1.533333  0.025712  0.021827  1.597336  0.006481
1.555556  0.025712  0.022398  1.630275  0.006481
1.577778  0.025712  0.022970  1.662561  0.006481
1.600000  0.025712  0.023541  1.694231  0.006481
1.622222  0.025712  0.024112  1.725321  0.006481
1.644444  0.025712  0.024684  1.755860  0.006481
1.666667  0.025712  0.025255  1.785876  0.006481
1.688889  0.025712  0.025826  1.815397  0.006481
1.711111  0.025712  0.026398  1.844445  0.006481
1.733333  0.025712  0.026969  1.873043  0.006481
1.755556  0.025712  0.027541  1.901211  0.006481
1.777778  0.025712  0.028112  1.928967  0.006481
1.800000  0.025712  0.028683  1.956330  0.006481
1.822222  0.025712  0.029255  1.983315  0.006481
1.844444  0.025713  0.029826  2.009938  0.006481
1.866667  0.025713  0.030398  2.036212  0.006481
1.888889  0.025713  0.030969  2.062153  0.006481
1.911111  0.025713  0.031540  2.087770  0.006481
1.933333  0.025713  0.032112  2.113078  0.006481
1.955556  0.025713  0.032683  2.138085  0.006481
1.977778  0.025713  0.033254  2.162804  0.006481
2.000000  0.025713  0.033826  2.187243  0.006481
2.022222  0.025713  0.034397  2.211412  0.006481
END FTABLE  3
FTABLE      4
 92    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
0.000000  0.013774  0.000000  0.000000  0.000000
0.033333  0.013774  0.000138  0.000000  0.003472
0.066667  0.013774  0.000275  0.000000  0.003472
0.100000  0.013774  0.000413  0.000000  0.003472
0.133333  0.013774  0.000551  0.000000  0.003472
0.166667  0.013774  0.000689  0.000000  0.003472
0.200000  0.013774  0.000826  0.000000  0.003472
0.233333  0.013774  0.000964  0.000000  0.003472
0.266667  0.013774  0.001102  0.000000  0.003472
0.300000  0.013774  0.001240  0.000000  0.003472
0.333333  0.013774  0.001377  0.000000  0.003472
```

0.366667	0.013774	0.001515	0.000000	0.003472
0.400000	0.013774	0.001653	0.000000	0.003472
0.433333	0.013774	0.001791	0.000000	0.003472
0.466667	0.013774	0.001928	0.000000	0.003472
0.500000	0.013774	0.002066	0.000000	0.003472
0.533333	0.013774	0.002204	0.000000	0.003472
0.566667	0.013774	0.002342	0.000000	0.003472
0.600000	0.013774	0.002479	0.000000	0.003472
0.633333	0.013774	0.002617	0.000000	0.003472
0.666667	0.013774	0.002755	0.000000	0.003472
0.700000	0.013774	0.002893	0.000000	0.003472
0.733333	0.013774	0.003030	0.000000	0.003472
0.766667	0.013774	0.003168	0.000000	0.003472
0.800000	0.013774	0.003306	0.000000	0.003472
0.833333	0.013774	0.003444	0.000000	0.003472
0.866667	0.013775	0.003581	0.000000	0.003472
0.900000	0.013775	0.003719	0.000000	0.003472
0.933333	0.013775	0.003857	0.000000	0.003472
0.966667	0.013775	0.003995	0.000000	0.003472
1.000000	0.013775	0.004132	0.000000	0.003472
1.033333	0.013775	0.004270	0.000000	0.003472
1.066667	0.013775	0.004408	0.000000	0.003472
1.100000	0.013775	0.004546	0.000000	0.003472
1.133333	0.013775	0.004683	0.000000	0.003472
1.166667	0.013775	0.004821	0.000000	0.003472
1.200000	0.013775	0.004959	0.000000	0.003472
1.233333	0.013775	0.005097	0.000000	0.003472
1.266667	0.013775	0.005234	0.000000	0.003472
1.300000	0.013775	0.005372	0.000000	0.003472
1.333333	0.013775	0.005510	0.000000	0.003472
1.366667	0.013775	0.005648	0.000000	0.003472
1.400000	0.013775	0.005785	0.000000	0.003472
1.433333	0.013775	0.005923	0.000000	0.003472
1.466667	0.013775	0.006061	0.000000	0.003472
1.500000	0.013775	0.006199	0.000000	0.003472
1.533333	0.013775	0.006336	0.000000	0.003472
1.566667	0.013775	0.006474	0.000000	0.003472
1.600000	0.013775	0.006612	0.000000	0.003472
1.633333	0.013775	0.006749	0.000000	0.003472
1.666667	0.013775	0.006887	0.000000	0.003472
1.700000	0.013775	0.007025	0.000000	0.003472
1.733333	0.013775	0.007163	0.000000	0.003472
1.766667	0.013775	0.007300	0.000000	0.003472
1.800000	0.013775	0.007438	0.000000	0.003472
1.833333	0.013775	0.007576	0.000000	0.003472
1.866667	0.013775	0.007714	0.000000	0.003472
1.900000	0.013775	0.007851	0.000000	0.003472
1.933333	0.013775	0.007989	0.000000	0.003472
1.966667	0.013775	0.008127	0.000000	0.003472
2.000000	0.013775	0.008586	0.000000	0.003472
2.033333	0.013775	0.009045	0.053769	0.003472
2.066667	0.013775	0.009504	0.151685	0.003472
2.100000	0.013775	0.009964	0.276837	0.003472
2.133333	0.013775	0.010423	0.420687	0.003472
2.166667	0.013775	0.010882	0.575411	0.003472
2.200000	0.013775	0.011341	0.732975	0.003472
2.233333	0.013775	0.011800	0.885276	0.003472
2.266667	0.013775	0.012260	1.024723	0.003472
2.300000	0.013775	0.012719	1.145088	0.003472
2.333333	0.013775	0.013178	1.242541	0.003472
2.366667	0.013775	0.013637	1.316838	0.003472
2.400000	0.013775	0.014096	1.372649	0.003472
2.433333	0.013775	0.014555	1.439820	0.003472
2.466667	0.013775	0.015015	1.494171	0.003472
2.500000	0.013775	0.015474	1.546614	0.003472
2.533333	0.013775	0.015933	1.597336	0.003472
2.566667	0.013775	0.016392	1.646497	0.003472
2.600000	0.013775	0.016851	1.694231	0.003472
2.633333	0.013775	0.017310	1.740657	0.003472
2.666667	0.013775	0.017770	1.785876	0.003472

```
  2.700000  0.013775  0.018229  1.829979  0.003472
  2.733333  0.013775  0.018688  1.873043  0.003472
  2.766667  0.013775  0.019147  1.915139  0.003472
  2.800000  0.013775  0.019606  1.956330  0.003472
  2.833333  0.013775  0.020066  1.996671  0.003472
  2.866667  0.013775  0.020525  2.036212  0.003472
  2.900000  0.013775  0.020984  2.075001  0.003472
  2.933333  0.013775  0.021443  2.113078  0.003472
  2.966667  0.013775  0.021902  2.150480  0.003472
  3.000000  0.013775  0.022361  2.187243  0.003472
  3.033333  0.013775  0.022821  2.223398  0.003472
  END FTABLE  4
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    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL       REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL       REPL
RCHRES   1 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL       REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL       REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL       REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL       REPL
RCHRES   2 HYDR   RO     1 1        1      WDM   1004 FLOW     ENGL       REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1005 FLOW     ENGL       REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1006 FLOW     ENGL       REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1007 STAG     ENGL       REPL
RCHRES   3 HYDR   RO     1 1        1      WDM   1008 FLOW     ENGL       REPL
RCHRES   3 HYDR   O      1 1        1      WDM   1009 FLOW     ENGL       REPL
RCHRES   3 HYDR   O      2 1        1      WDM   1010 FLOW     ENGL       REPL
RCHRES   3 HYDR   STAGE  1 1        1      WDM   1011 STAG     ENGL       REPL
RCHRES   4 HYDR   RO     1 1        1      WDM   1012 FLOW     ENGL       REPL
RCHRES   4 HYDR   O      1 1        1      WDM   1013 FLOW     ENGL       REPL
RCHRES   4 HYDR   O      2 1        1      WDM   1014 FLOW     ENGL       REPL
RCHRES   4 HYDR   STAGE  1 1        1      WDM   1015 STAG     ENGL       REPL
END EXT TARGETS

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

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

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


END MASS-LINK

END RUN
```

Mitigated HSPF Message File

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ATTACHMENT C - GEOTECHNICAL REPORT

Ages Engineering, LLC

A Geotechnical & Environmental Services LLC

P.O. Box 935
Puyallup, WA. 98371

Main (253) 845-7000

www.agesengineering.com

November 30, 2016
Revised February 27, 2017
Project No. A-1297

Jeff Wegner
Build Urban
999 N. Northlake Way
Seattle, WA. 98103

Subject: Geotechnical Evaluation
SE 52nd Place Residential
8720 SE 52nd Place
Mercer Island, Washington

Dear Mr. Wegner,

As requested, we have completed a geotechnical evaluation of the soil and groundwater conditions at the subject site located at 8720 SE 52nd Place in Mercer Island, Washington. The location of the site is shown on the Site Vicinity Map provided in Figure 1.

We discussed the project with you and the project Civil Engineer. Based on our conversations, we understand the site will be developed with a new single-family residence located in approximately the same location as the existing single-family residence on the site. Site access will be provided by a driveway that extends east from the site to a shared driveway. The shared driveway extends north from SE 52nd Place. The development storm water from the new single-family residence will discharge to an infiltration system located in the northwestern portion of the site. The development storm water from the new garage and driveway will discharge to an infiltration system located in the eastern end of the site.

The conclusions and recommendations presented in this report are based on our understanding of the above stated site and the planned project design features. If actual site conditions differ, the planned project design features are different than we expect, or if changes are made, we should review them in order to modify or supplement our conclusions and recommendations as necessary.

SCOPE OF WORK

The purpose of our service was to perform a geotechnical evaluation of the site soil and groundwater conditions to develop design and construction recommendations for the new storm water infiltration system planned on the site. Specifically, the scope of services for this Geotechnical Evaluation included the following:

- Reviewing the available geologic, hydrogeologic and geotechnical data for the site area, and conducting a geologic reconnaissance of the site area.
- Addressing the appropriate geotechnical regulatory requirements for the planned site development, including a Geologic Hazard evaluation.
- Advancing three test holes in the planned new storm water system location to a maximum depth of 7.0 feet below surface grades.
- Providing geotechnical design and construction recommendations for the storm water infiltration system planned on the site.

SITE CONDITIONS

Surface

The subject site is a residential lot located at SE 52nd Place in Mercer Island, Washington. The subject site is currently occupied with a single-family residence located in the center of the site. The site is bordered with single-family residential parcels to the north, east, and west, and by SE 52nd Place to the south. Site access will be provided by a driveway that extends east from the site to a shared driveway. The shared driveway extends north from SE 52nd Place. The location of the site is shown on the Site Vicinity Map provided in Figure 1.

The site slopes down to the west at surface grades ranging from 8 to 20 percent. Elevation relief across the site is ranges from 15 to 20 feet. Site vegetation consists of typical landscape bushes and trees around the residence, with some native growth along the site perimeter.

Mapped Soils

The Geologic Map of Mercer Island, Washington by Kathy G. Troost and Aaron P. Wisher, (October 2006) maps the soil in the vicinity of the site as GlacialTill (Qvt). The Glacial Till was deposited during the Vashon stade of the Fraser Glaciation, approximately 12,000 to 15,000 years ago. The Glacial Till was deposited along the base of the advancing glacial ice and was consequently over-ridden by the glacial ice mass. The Glacial Till is a well-graded mixture of sand, silt and gravel with minor clay and cobble content. The Glacial Till will typically be found in a dense to very dense condition where undisturbed. The near surface soils at the site have been disturbed by natural weathering processes that have occurred since their deposition. No springs or groundwater seepage was observed on the surface of the site at the time of our site visit. A copy of the Geologic Map for the subject site is provided in Figure 3.

The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) maps the soils in the vicinity of the site as Alderwood gravelly sandy loam (AgC) soils that form on 8 to 15 percent slopes. According to the NRCS the Alderwood soils at the site are described as glacial till deposits and are classified as having a "moderate" potential for erosion when exposed. A copy of the USDA NRCS map for the subject site is provided in Figure 4.

Site Explorations

On October 27, 2016 and November 8, 2016 a representative from our office was on site to explore subsurface conditions at the site by advancing three hand-augured test holes to a maximum depth of 7.0 feet below existing surface grades. The approximate Test Hole locations are shown on the Exploration Location Plan provided in Figure 2.

Our representative continuously monitored the excavations, maintained logs of the subsurface conditions encountered in each test hole, obtained representative soil samples, and observed pertinent site features. The specific number, location, and depth of the explorations were selected by Ages Engineering, LLC personnel in the field. The soils encountered were visually classified in accordance with the Unified Soil Classification System (USCS) provided in Figure 5. The explorations performed as part of this evaluation indicate subsurface conditions at specific locations only and actual subsurface conditions can vary across the site. Furthermore, the nature and extent of any such variation may not become evident until additional explorations are performed or construction activities begin. The test hole logs are provided in Figure 6.

Representative soil samples obtained from the test holes were placed in sealed containers and taken to a laboratory for further examination and testing. The moisture content of the soils obtained during our exploration were determined and are presented on the test hole logs.

Site Soils

In general, the soils we observed underlying the site during our site explorations confirm the mapped stratigraphy of the site area. The site is underlain with native silty sand with gravel consistent with Glacial Till.

The Glacial Till was weathered to a light brown color and to a medium dense consistency in the upper 4.0 feet. The dense unweathered glacial till was encountered at a depth of 4.0 feet below surface grades. All of the test holes were terminated in the native glacial till. The test hole logs are provided in Figure 6.

Groundwater

We did not encounter groundwater seepage in any of the test holes advanced on the site. However, we expect a seasonal perched water table may develop under the site at times during the wet winter season. Perched groundwater levels and flow rates will fluctuate seasonally and typically reach their highest levels during and shortly following the wet winter months (October through May).

GEOLOGIC HAZARDS

General

According to Section 19.16 in the City of Mercer Island Municipal Code, geologic hazard areas are defined as "Areas susceptible to erosion, sliding, earthquake, or other geological events based on a

combination of slope (gradient or aspect), soils, geologic material, hydrology, vegetation, or alterations, including landslide hazard areas, erosion hazard areas and seismic hazard areas".

Landslide

According to Section 19.16 in the City of Mercer Island municipal code, Landslide Hazard Areas are defined as, "Those areas subject to landslides based on a combination of geologic, topographic, and hydrologic factors, including:

1. Areas of historic failures;
2. Areas with all three of the following characteristics:
    a. Slopes steeper than 15 percent; and
    b. Hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and
    c. Springs or ground water seepage;
3. Areas that have shown evidence of past movement or that are underlain or covered by mass wastage debris from past movements;
4. Areas potentially unstable because of rapid stream incision and stream bank erosion; or
5. Steep Slope. Any slope of 40 percent or greater calculated by measuring the vertical rise over any 30-foot horizontal run."

During our site visit and subsurface exploration, we did not observe any evidence of past site movement or areas of historic failures. We did not observe any areas of rapid stream incision or any areas sloping 40 percent or greater. We did observe slopes steeper than 15 percent on the southwestern portion of the site. However, we did not observe any intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock. Based on these factors, according to the city of Mercer Island municipal code, the site is not classified as having landslide hazard areas.

Erosion

According to Section 19.16 in the City of Mercer Island municipal code, Erosion Hazard areas are defined as, "Those areas greater than 15 percent slope and subject to a severe risk of erosion due to wind, rain, water, slope and other natural agents including those soil types and/or areas identified by the U.S. Department of Agriculture's Natural Resources Conservation Service as having a "severe" or "very severe" rill and inter-rill erosion hazard."

The site does have any areas sloping steeper than 15 percent along the southwestern portion of the site. However, based on our subsurface exploration, the site is underlain with soils having a "moderate" potential for erosion when exposed. Therefore, according to the City of Mercer Island municipal code, the site is not classified as having erosion hazard areas.

In our opinion, regardless of the erosion hazard classification at the site, Temporary Erosion and Sediment Control (TESC) measures should be in place prior to the start of construction activities at the site. In our opinion, the potential for erosion is not a limiting factor in site development. Erosion hazards

can be mitigated by applying Best Management Practices (BMPs) outlined in the Washington State Department of Ecology's (Ecology) *Stormwater Management Manual for Western Washington.* TESC measures, as required by the City of Mercer Island, should be in place prior to the start of construction activities at the site.

Seismic

According to Section 19.16 in the City of Mercer Island municipal code, seismic hazard areas are defined as, "areas subject to severe risk of damage as a result of earthquake induced ground shaking, slope failure, settlement, soil liquefaction or surface faulting."

We observed no site features indicating past seismic disturbance. We did not find any published information during our research of the site indicating the site is located in a seismically sensitive area. Structures constructed on this site using the seismic criteria provided in the City of Mercer Island municipal code and the International Building Code (IBC) will have no greater chance of seismic damage during an earthquake than any other residential structure in the Puget Sound area.

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in pore water pressure. The increase in water pressure is typically induced by vibrations such as those associated with earthquakes. Liquefaction mainly affects geologically recent deposits of loose, fine-grained sands that are below the groundwater table. Due to the site being underlain with glacially consolidated till soils that are in a medium dense to dense condition, it is our opinion, the liquefaction potential of the site should be considered very low.

DISSCUSSION AND RECOMMENDATIONS

Based on our study, in our opinion, soil and groundwater conditions at the site are suitable for the proposed storm water infiltration system. The infiltration system for the new single-family residence can be located along the northwestern portion of the site. The infiltration system for the new garage and driveway can be located along the eastern end of the site under the driveway.

The following sections provide detailed recommendations regarding these issues and other geotechnical design considerations. These recommendations should be incorporated into the final design drawings and construction specifications.

Site Preparation and Grading

To prepare the site for construction, all vegetation, organic surface soils, and other deleterious materials including any existing structures, foundations or abandoned utility lines should be stripped and removed from the new infiltration facility areas.

Once clearing and stripping operations are complete, cut operations can be initiated to establish desired infiltration facility grades. We expect that no fill will be necessary in the infiltration facility locations.

A representative of Ages Engineering, LLC should observe the infiltration facility excavation operations to verify that soil conditions are as expected.

If structural fill will be utilized on the site, we recommend it consist of an imported granular structural fill that exceeds the permeability of the existing soils on the site. Accordingly, the owner should be prepared to import a wet-weather structural fill. For wet weather structural fill, we recommend importing a granular soil that meets the following gradation requirements:

U. S. Sieve Size	Percent Passing
6 inches	100
No. 4	75 maximum
No. 200	5 maximum*

* Based on the ¾ inch fraction

Prior to use, Ages Engineering, LLC should examine and test all materials to be imported to the site for use as structural fill.

Structural fill should be placed in uniform loose layers not exceeding 12 inches and compacted to a minimum of 95 percent of the soils' laboratory maximum dry density as determined by American Society for Testing and Materials (ASTM) Test Designation D-1557 (Modified Proctor). The moisture content of the soil at the time of compaction should be within two percent of its optimum, as determined by this same ASTM standard. In non-structural areas, the degree of compaction can be reduced to 90 percent.

Infiltration Facility

The City of Mercer Island utilizes the1992 or 2005 *Surface Water Management Manual for Western Washington* (SMMWW) as their storm water code. Based on the 2005 SMMWW, we recommend the infiltration facility consist of an infiltration trench.

Based on our site exploration, we understand the upper 4.0 feet of soil in the vicinity of the planned infiltration system consists of silty sand consistent with weathered glacial till having a USDA textural classification of Sandy Loam. We expect this layer is continuous off of the site. We expect the impermeable layer is at the elevation of the dense glacial till on the site at a depth of 4.0 feet below surface grades. No groundwater seepage was encountered at the site. Due to the lack of mottling in the weathered glacial till soils observed on the site, we do not expect the groundwater elevation to change during the wet winter months. We expect the groundwater flow is to the west.

The infiltration facility for the new residence can be constructed along the west side of the new structure. The impermeable layer in the infiltration facility area is at 4.0 feet below the surface. Therefore, the bottom of the infiltration facility should be placed no less than 1.0 feet above this layer at a maximum depth of 3.0 feet below the surface. We understand the facility will be covered with a shallow layer of fill to accommodate planting of a grass lawn. To prevent the infiltrated storm water from mounding and cropping

out on the downward slope, the infiltration facility should have a minimum setback of 10.0 feet from the site property lines.

We performed a preliminary groundwater mounding analysis on the site to determine the potential for the infiltrated groundwater to crop out on the slope located to the south and west of the site. We used the site topography and geotechnical recommendations provided in this report along with a preliminary facility design provided by the project Civil engineer. Accordingly, for the new residence, we used an irregular 'L'-shaped facility measuring 60 feet long by 60 feet wide that is setback 10.0 feet from the sites' western (downhill) property line. We used a bottom of facility at 3.0 feet below surface grades and the top of the facility and maximum water level at 1.0 feet below surface grades. This will result in a 2.0 foot thick facility with 1.0 feet of cover over it. Based on our analysis, we determined the facility would have to remain full for a total of 36 continuous uninterrupted days for the stored water in the facility to crop out on the sites' western or southern slopes. In our opinion, the risk for the facility to remain full for 36 continuous days is very low. Based on this preliminary analysis, it is our opinion that a 10-foot setback from the sites' western property line is sufficient to prevent the infiltrated storm water from cropping out on the ground surface downhill of the site. We also performed a groundwater mounding analysis for the facility planned along the eastern end of the site adjacent the garage and driveway. Accordingly, we used a rectangular-shaped facility measuring 39 feet long by 20 feet wide that is setback approximately 20 feet from the new residence and 40 feet from the sites' south property line. Based on our analysis, we determined the facility would have to remain full for a total of 130 continuous uninterrupted days for the stored water in the facility to crop out at the base of the sites' southern slope. In our opinion, the risk for the facility to remain full for 130 continuous days is very low.

Infiltration Rate Determination

The City of Mercer Island utilizes the1992 or 2005 *Surface Water Management Manual for Western Washington* (SMMWW) as their storm water code. According to Section 3.3.6 in the 2005 SMMWW, infiltration rates can be determined using either correlation to grain size distribution from soil samples, textural analysis, or by in-situ field measurements. To determine the long-term infiltration rate for the site, we utilized the USDA Soil Textural Classification method. Accordingly, we performed grainsize distribution tests on soils obtained from the planned infiltration facility location. Using the results of the grainsize analysis, we correlated the grainsize results with the Textural Triangle found in Figure 3.7 in the 2005 SMMWW. Based on the Textural Tringle, the site soils would be best classified as Sandy Loam. According to Table 3.7, Recommended Infiltration Rates based on USDA Textural Classification, the Sandy Loam soils will have a Long-term (Design) Infiltration rate of 0.25 inches per hour.

Suspended solids within the collected storm water can lower the permeability of the underlying soil and reduce the infiltration rate of the facility. To reduce the potential for clogging the infiltration system, the infiltration system should not be connected to the sites' storm water system until after construction is complete and the site is stabilized. Temporary detention systems may be utilized through construction. These temporary storm water systems should be located outside of the planned location of the infiltration system. We recommend that we observe the excavation of the infiltration system to verify that suitable soils

have been exposed.

ADDITIONAL SERVICES

Ages Engineering, LLC should review the final project designs and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into project design. If changes are made in the loads, grades, locations, configurations or types of facilities to be constructed, the conclusions and recommendations presented in this report may not be fully applicable. If such changes are made, we should be given the opportunity to review our recommendations and provide written modifications or verifications, as necessary.

We should also provide geotechnical services during construction to observe compliance with our design concepts, specifications, and recommendations. This will allow for expedient design changes if subsurface conditions differ from those anticipated prior to the start of construction.

LIMITATIONS

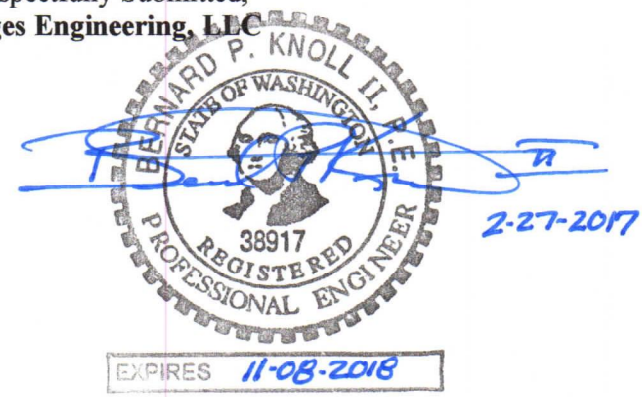
We prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. This report is the copyrighted property of Ages Engineering, LLC and is intended for the exclusive use of Build Urban and their authorized representatives for use in the design, permitting, and construction portions of this project.

The analysis and recommendations presented in this report are based on data obtained from others and our site explorations, and should not be construed as a warranty of the subsurface conditions. Variations in subsurface conditions are possible. The nature and extent of which may not become evident until development continues. If variations appear evident, Ages Engineering, LLC should be requested to reevaluate the recommendations in this report prior to proceeding with construction. A contingency for unanticipated subsurface conditions should be included in the budget and schedule. Sufficient monitoring, testing and consultation should be provided by our firm during construction to confirm that the conditions encountered are consistent with those indicated during our exploration, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities comply with contract plans and specifications.

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

We trust this information is sufficient for your current needs. If you have any questions, or require additional information, please call.

Respectfully Submitted,
Ages Engineering, LLC



Bernard P. Knoll, II, P.E.
Principal

BPK:bpk
Project No.: A-1297

ATTACHMENTS: Figure 1 – Site Vicinity Map
Figure 2 – Exploration Location Plan
Figure 3 – Geologic Map
Figure 4 – USDA NRCS
Figure 5 – USCS
Figure 6 - Test Hole Logs

Approximate Site Location

Ages Engineering, LLC
P. O. Box 935
Puyallup, WA. 98371

Main (253) 845-7000
www.agesengineering.com

Site Vicinity Map
52nd Place Residence
8720 SE 52nd Place
Mercer Island, Washington

Project No.: A-1297	February 2017	**Figure 1**

KEY:

APPROXIMATE LOCATION OF TEST HOLE TH-1

Ages Engineering, LLC
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Exploration Location Plan
52nd Place Residence
8720 SE 52nd Place
Mercer Island, Washington

Project No.: A-1297	February 2017	**Figure 2**

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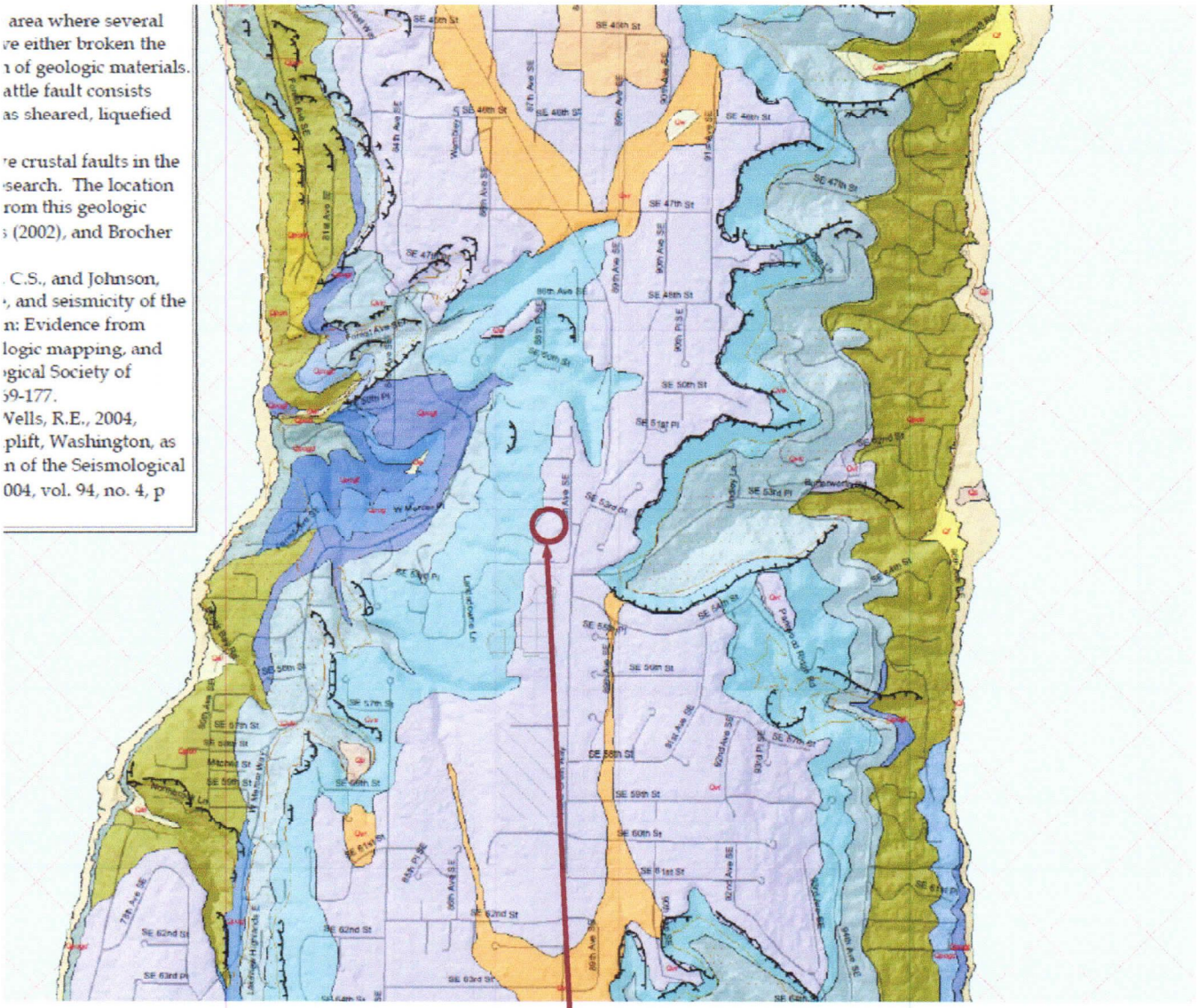

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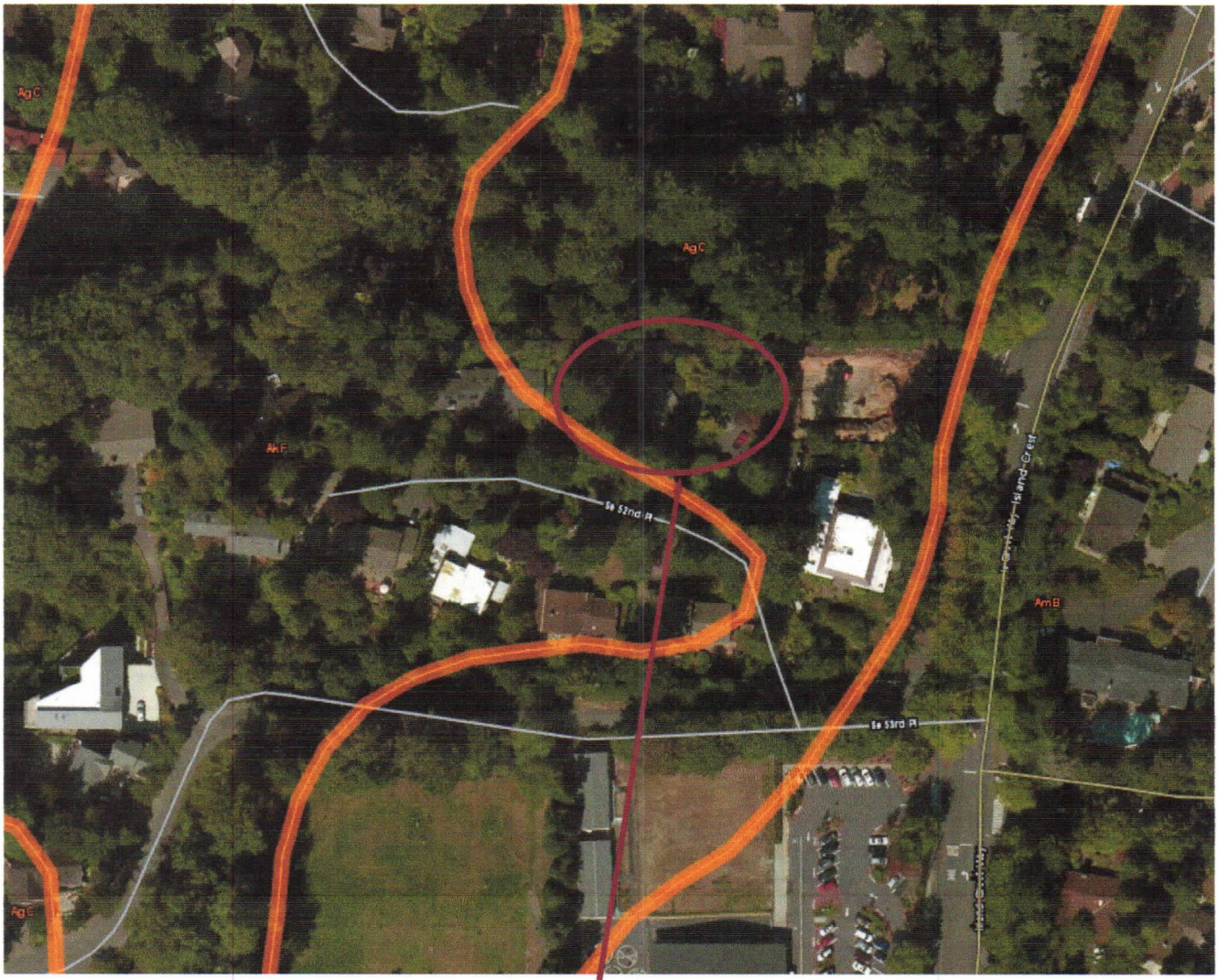
Geologic Map
52nd Place Residence
8720 SE 52nd Place
Mercer Island, Washington

Project No.: A-1297	February 2017	**Figure 3**



Approximate Site Location

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USDA NRCS Map
52nd Place Residence
8720 SE 52nd Place
Mercer Island, Washington

Project No.: A-1297	February 2017	**Figure 4**

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS More than 50% Retained on No. 200 Sieve	GRAVEL More than 50% Of Coarse Fraction Retained on No. 4 Sieve	GRAVEL WITH < 5 % FINES	GW	Well-Graded GRAVEL
			GP	Poorly-Graded GRAVEL
		GRAVEL WITH BETWEEN 5 AND 15 % FINES	GW-GM	Well-Graded GRAVEL with silt
			GW-GC	Well-Graded GRAVEL with clay
			GP-GM	Poorly-Graded GRAVEL with silt
			GP-GC	Poorly-Graded GRAVEL with clay
		GRAVEL WITH > 15 % FINES	GM	Silty GRAVEL
			GC	Clayey GRAVEL
	SAND More than 50% Of Coarse Fraction Passes No. 4 Sieve	SAND WITH < 5 % FINES	SW	Well-Graded SAND
			SP	Poorly-Graded SAND
		SAND WITH BETWEEN 5 AND 15 % FINES	SW-SM	Well-Graded SAND with silt
			SW-SC	Well-Graded SAND with clay
			SP-SM	Poorly-Graded SAND with silt
			SP-SC	Poorly-Graded SAND with clay
		SAND WITH > 15 % FINES	SM	Silty SAND
			SC	Clayey SAND
FINE GRAINED SOILS More than 50% Passes No. 200 Sieve	SILT AND CLAY	Liquid Limit Less than 50	ML	Inorganic SILT with low plasticity
			CL	Lean inorganic CLAY with low plasticity
			OL	Organic SILT with low plasticity
		Liquid Limit 50 or more	MH	Elastic inorganic SILT with moderate to high plasticity
			CH	Fat inorganic CLAY with moderate to high plasticity
			OH	Organic SILT or CLAY with moderate to high plasticity
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

(1) Soil descriptions are based on visual field and laboratory observations using the classification methods described in ASTM D-2488. Where laboratory data are available, classifications are in accordance with ASTM D-2487.

(2) Solid lines between soil descriptions indicate a change in the interpreted geologic unit. Dashed lines indicate stratigraphic change within the unit.

(3) Fines are material passing the U.S. No. 200 Sieve.

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Unified Soil Classification System (USCS)
52nd Place Residence
8720 SE 52nd Place
Mercer Island, Washington

Project No.: A-1297	February 2017	**Figure 5**

Ages Engineering, LLC

P.O. Box 935
Puyallup, WA. 98371
Office (253) 845-7000

Test Hole TH-1

DATE: October 27, 2016 LOGGED BY: BPK ELEV:

Depth (feet)	Soil Description	Notes M%	Notes Other
0	**TOPSOIL**		
	Light brown silty **SAND** with gravel, cobbles to 4 inches, moist, medium dense. (SM) (Weathered Glacial Till)		
5	Grayish-brown silty **SAND** with gravel, cobbles to 4 inches, moist, dense. (SM) (Glacial Till)		
	Test Hole terminated at 6.0 feet below surface grades.		
	No groundwater seepage encountered.		

Test Hole TH-2

DATE: October 27, 2016 LOGGED BY: BPK ELEV:

Depth (feet)	Soil Description	Notes M%	Notes Other
0	**TOPSOIL**		
	Light brown silty **SAND** with gravel, cobbles to 4 inches, moist, medium dense. (SM) (Weathered Glacial Till)		
5	Light brown silty **SAND** with gravel, cobbles to 4 inches, moist, dense. (SM) (Glacial Till)		
	Test Hole terminated at a depth of 7.0 feet below surface grades.		
	No groundwater seepage encountered.		

Test Hole TH-2

DATE: November 8, 2016 LOGGED BY: BPK ELEV:

Depth (feet)	Soil Description	Notes M%	Notes Other
0	**TOPSOIL**		
	Light brown silty **SAND** with gravel, cobbles to 4 inches, moist, medium dense. (SM) (Weathered Glacial Till)		
5	Light brown silty **SAND** with gravel, cobbles to 4 inches, moist, dense. (SM) (Glacial Till)		
	Test Hole terminated at a depth of 7.0 feet below surface grades.		
	No groundwater seepage encountered.		

Figure 6

Project No.: A-1297

Ages Engineering, LLC

A Geotechnical & Environmental Services LLC

P.O. Box 935
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Main (253) 845-7000

www.agesengineering.com

August 9, 2017
Project No. A-1297

Jeff Wegner
Build Urban
999 N. Northlake Way
Seattle, WA. 98103

Subject: Response to Correction Notice
SE 52nd Place Residential
8720 SE 52nd Place
Mercer Island, Washington

Reference: Geotechnical Evaluation, SE 52nd Place Residential, prepared by Ages Engineering, LLC and dated February 27, 2017

Dear Mr. Wegner,

As requested, we are providing additional information for the subject site located at 8720 SE 52nd Place in Mercer Island, Washington. We received an email from the project Civil Engineer with two review comments they received from the City of Mercer Island. We also received a pdf copy of the project plans with the City of Mercer Island review comments. The first item contains an incomplete sentence. However, we believe we have interpreted it adequately enough to address the question. The two comments are as follows:

1. "Please provide a report by professional to clearly address any impacts to the erosion, slope, downhill neighboring properties due to If there are negative impacts, how you are going to mitigate.
2. There is no soil log at this location of the proposed infiltration system (south of the house). The soil log is required for each proposed infiltration system"

We were provided with a plan set containing Architecture, Structural, Civil and a topographic site plan. Based on our previous knowledge of the planned site development and our review of the plans provided to us, we understand the site will be developed with a new single-family residence located in approximately the same location as the existing single-family residence on the site. Site access will remain from a driveway that extends east from the site to a shared driveway. The shared driveway extends south to SE 52nd Place. The development storm water for the project will discharge on site. The roof downspouts from the single-family residence will discharge to infiltration systems constructed to the south and west of the new residence. Pervious pavers will be utilized as walkways around the new structure, and the driveway will be constructed as a permeable pavement facility.

DISSCUSSION AND RECOMMENDATIONS

Correction Item 1

"Please provide a report by professional to clearly address any impacts to the erosion, slope, downhill neighboring properties due to If there are negative impacts, how you are going to mitigate."

The sites' southern and western slope area is currently stable. The existing soils underlying the slope area are composed of medium dense to dense silty sand with gravel consistent with glacial till that will exhibit a high shear strength and low compressibility, even in a sloping environment. Additionally, the surface inclinations of the slope area are considered gradual for the type of soils that underlie the slope. The primary factors that contribute to slope instability are surface water, ground water, and slope inclination relative to soil composition.

Due to current and planned surface grades on the site, the surface water on the slope will be limited to the rainfall that falls and lands on the area. We expect this surface water will be mostly absorbed by the surface soils and only flow overland during brief periods of intense rainfall. The downhill flow path is relatively short and currently promotes surface water flow down to the southwest to a shared easement driveway and the adjacent neighbor to the west's driveway. At no time have we observed any surface features indicating that surface water flows across the site. Therefore, if surface water does occasionally collect and flow overland, it does not have a long enough or steep enough flow path to build up the erosive energy necessary to cause rills, ravines, or any other site feature.

Due to the planned infiltration systems, permeable pavers, and permeable pavement facility collecting only the rainfall that lands on the site, the amount of groundwater on the site will remain the same as in the preconstruction condition. We do not expect more rainfall to fall on the site than at previous times. However, due to the rainfall being concentrated in the new specific locations delineated by the facilities, the periodic groundwater conditions on the site will be altered. The native soils on the site are inherently stable due to their density and composition. The storm water facilities have been sized to accommodate the relatively slow infiltration rate of these soils, and as such, we expect the soils will transmit the expected amount of groundwater at a similarly slow rate. Due to the inherent stability of the till soils on the site, and the relatively slow rate of water transmission through the soils, we expect the overall stability of the slope area will be unaffected by the new and changing groundwater conditions.

The inclination of the slope is considered gradual for the type of soil underlying the slope. Due to their gradation and relative density, without the effects of water, the native soils can remain stable in an environment much steep than exists on the site. A soils ability to remain stable in a sloping environment is related to the slope inclination relative to the soils internal friction angle. The soils underlying the site have a natural angle of internal friction in the range of 34 to 35 degrees. With the slope are inclined at no more than 25 percent (14 degrees), the native soils will be naturally resistant to downslope migration.

Based on these factors, it is our opinion that the sites' southern and western slope areas are currently stable. Additionally, it is our opinion the slopes will remain stable after construction of the storm water facilities is complete and the long-term stability of the slope will remain as expected.

Furthermore, we do not expect any adverse impacts to the site, the site slopes, or the neighboring properties.

Correction Item 2

"There is no soil log at this location of the proposed infiltration system (south of the house). The soil log is required for each proposed infiltration system."

On July 28, 2017 a representative from our office was on site to explore subsurface conditions at the site by advancing one hand-augured test hole to a maximum depth of 7.0 feet below existing surface grades. The Test Hole was located along the south side of the property in the center of the exact planned location of the new infiltration facility. The subsurface conditions were as follows:

Test Hole TH-101		
Depth (feet)	**Soil Description**	**Notes**
0 to 1.5	Topsoil	
1.5 to 4.0	Light brown silty **SAND** with gravel, cobbles to 4 inches, moist, medium dense. (SM) (Weathered Glacial Till)	
4.0 to 7.0	Grayish-brown silty **SAND** with gravel, cobbles to 4 inches, moist, dense. (SM) (Glacial Till)	
Test Hole terminated at 7.0 feet below surface grades.		
No groundwater seepage encountered.		

Based on the results of our subsurface exploration performed in the location of the southern infiltration facility, it is our opinion the conditions are the same as in other location explored on the site. Therefore the recommendations provided in the referenced report are appropriate for the infiltration facility planned along the south side of the site.

LIMITATIONS

We prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. This report is the copyrighted property of Ages Engineering, LLC and is intended for the exclusive use of Build Urban and their authorized representatives for use in the design, permitting, and construction portions of this project.

The analysis and recommendations presented in this report are based on data obtained from others and our site explorations, and should not be construed as a warranty of the subsurface conditions.

Variations in subsurface conditions are possible. The nature and extent of which may not become evident until development continues. If variations appear evident, Ages Engineering, LLC should be requested to reevaluate the recommendations in this report prior to proceeding with construction. A contingency for unanticipated subsurface conditions should be included in the budget and schedule. Sufficient monitoring, testing and consultation should be provided by our firm during construction to confirm that the conditions encountered are consistent with those indicated during our exploration, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities comply with contract plans and specifications.

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

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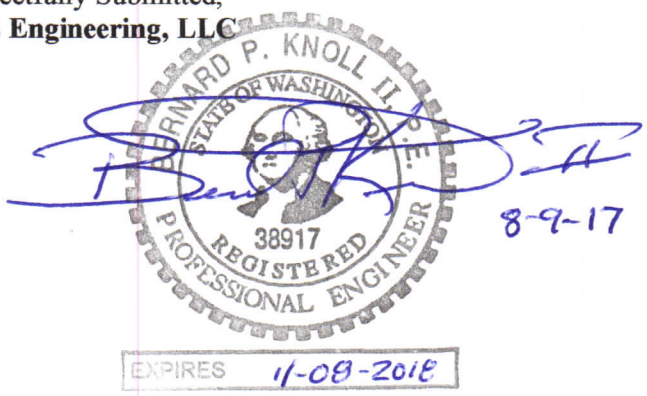
We trust this information is sufficient for your current needs. If you have any questions, or require additional information, please call.

Respectfully Submitted,
Ages Engineering, LLC



Bernard P. Knoll, II, P.E.
Principal

BPK:bpk

8720 SE 52nd Pl Mercer Island SFR
Operation and Maintenance Manual

Person or Organization Responsible for Maintenance of the On-Site Storm System:

Build Urban, LLC
999 N Northgate Way, Suite 215
Seattle, WA 98103

The Location Where the Operation and Maintenance Manual is to be Kept:

8720 SE 52nd Pl
Mercer Island, WA 98040

*Note: The manual and maintenance activity log must be made available to the City of Mercer Island for inspection purposes.

Description of On-Site Storm System

The on-site storm system for the 8720 SE 52nd Pl SFR consists of four Type I catch basins, 4" and 6" SDR35 PVC pipe (or N-12 HDPE pipe) or ductile iron pipe, perforated D2729 footing drain pipe, two infiltration trenches, permeable pavement surfacing, and a permeable pavement facility.

Roof runoff is collected by a roof downspout system and conveyed to the proposed infiltration trenches (two separate trenches) or permeable pavement facility within the proposed permeable pavement driveway. Permeable pavement surfacing will be utilized for all at-grade hard surfaces. Any overflow from the permeable pavement driveway will be collected by a Type I catch basin equipped with an oil water separator, located at the low point in the driveway, and conveyed to infiltration trench #1 which is located downgradient of the proposed house. Overflow from the proposed infiltration trenches, one of which is located downgradient of the house and the other located to the south side of the house, will flow out of the top of Type I catch basins associated with the trenches and disperse within natural vegetation on the site that is to be protected during construction. A minimum dispersion flow path of 60 feet is provided on the site for the overflows from the infiltration trenches.

The Type I catch basins, permeable pavement, infiltration trenches, and storm drain cleanouts serve as source control of pollution for the project site. In order to control pollutants, proper maintenance and cleaning of debris, sediments, and oil from stormwater collection and conveyance systems is required per the operation and maintenance recommendations found in Volume 5 Section 4.6 of the Stormwater Manual in addition to the BMPs in Volume IV Section 2.2. See the attached sheets for operation and maintenance requirements pertaining to the project.

Contact Information for Stormwater Facility Manufacturers and Installers:

Contractor (Installer of On-Site Stormwater Facilities)
TBD

Civil Engineer (Designer of On-Site Stormwater Facilities)
Ben Iddins, P.E.
Davido Consulting Group, Inc
9706 4th Ave NE, Suite 300
Seattle, WA 98115
Phone – 206.523.0024 Ext. 115
ben@dcgengr.com

Attachments

- Maintenance Standards for Infiltration (2014 DOE Manual)
- Maintenance Standards for Catch Basins (2014 DOE Manual)
- Maintenance Standards and Procedures for Permeable Pavement

Table V-4.5.2(2) Maintenance Standards - Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Poisonous/Noxious Vegetation	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Contaminants and Pollution	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Rodent Holes	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1)
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate	Sediment is removed

Table V-4.5.2(2) Maintenance Standards - Infiltration (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
		time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events. (A percolation test pit or test of facility indicates facility is only working at 90% of its designed capabilities. Test every 2 to 5 years. If two inches or more sediment is present, remove).	and/or facility is cleaned so that infiltration system works according to design.
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than 1/2 full.	Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Gravel in rock filter is replaced.
Side Slopes of Pond	Erosion	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Emergency Overflow Spillway and Berms over 4 feet in height.	Tree Growth	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Piping	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Emergency Overflow Spillway	Rock Missing	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Erosion	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Pre-settling Ponds and Vaults	Facility or sump filled with Sediment and/or debris	6" or designed sediment trap depth of sediment.	Sediment is removed.

Table V-4.5.2(5) Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks. Frame is sit-

Table V-4.5.2(5) Maintenance Standards - Catch Basins (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	ting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	Locking Mechanism Not	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into	Mechanism opens with

Table V-4.5.2(5) Maintenance Standards - Catch Basins (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
	Working	frame have less than 1/2 inch of thread.	proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

No. 22 - Maintenance Standards and Procedures for Permeable Pavement.

Note that the inspection and routine maintenance frequencies listed below are recommended by Ecology. They do not supersede or replace the municipal stormwater permit requirements for inspection frequency required of municipal stormwater permittees for "stormwater treatment and flow control BMPs/facilities."

Compo-nent	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Surface/Wearing Course				
Permeable Pavements, all	A, S		Runoff from adjacent pervious areas deposits soil, mulch or sediment on paving	• Clean deposited soil or other materials from permeable pavement or other adjacent surfacing • Check if surface elevation of planted area is too high, or slopes towards pavement, and can be regraded (prior to regrading, protect permeable pavement by covering with temporary plastic and secure covering in place) • Mulch and/or plant all exposed soils that may erode to pavement surface
Porous asphalt or pervious con-crete		A or B	None (routine maintenance)	Clean surface debris from pavement surface using one or a combination of the following methods: • Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Vacuum/sweep permeable paving installation using: o Walk-behind vacuum (sidewalks) o High efficiency regenerative air or vacuum sweeper (roadways, parking lots) o ShopVac or brush brooms (small areas) • Hand held pressure washer or power washer with rotating brushes • Follow equipment manufacturer guidelines for when equipment is most effective for cleaning permeable pavement. Dry weather is more effective for some equipment.
	A[b]		Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)	• Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility) • Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 square feet. Perform an additional test for each additional 2,500 square feet up to 15,000 square feet total. Above 15,000 square feet, add one test for every 10,000 square feet. • If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability. To clean clogged pavement surfaces, use one or combination of the following methods: • Combined pressure wash and vacuum system calibrated to not dislodge wearing course aggregate. • Hand held pressure washer or power washer with rotating brushes • Pure vacuum sweepers Note: If the annual/biannual routine maintenance standard to clean the pavement surface is conducted using equipment from the list above, corrective maintenance may not be needed.

[a] Frequency: A= Annually; B= Biannually (twice per year); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).

[b] Inspection should occur during storm event.

Compo-nent	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Surface/Wearing Course (cont'd)				
Porous asphalt or pervious concrete (contin-ued)	A		Sediment present at the surface of the pavement	• Assess the overall performance of the pavement system during a rain event. If water runs off the pavement and/or there is ponding then see above. Determine source of sediment loading and evaluate whether or not the source can be reduced/eliminated. If the source cannot be addressed, consider increasing frequency of routine cleaning (e.g., twice per year instead of once per year).
	Summer		Moss growth inhibits infiltration or poses slip safety hazard	• Sidewalks: Use a stiff broom to remove moss in the summer when it is dry • Parking lots and roadways: Pressure wash, vacuum sweep, or use a combination of the two for cleaning moss from pavement surface. May require stiff broom or power brush in areas of heavy moss.
	A		Major cracks or trip hazards and concrete spalling and raveling	• Fill potholes or small cracks with patching mixes • Large cracks and settlement may require cutting and replacing the pavement section. Replace in-kind where feasible. Replacing porous asphalt with conventional asphalt is acceptable if it is a small percentage of the total facility area and does not impact the overall facility function. • Take appropriate precautions during pavement repair and replacement efforts to prevent clogging of adjacent porous materials
Interlocking concrete paver blocks and aggregate pavers		A or B	None (routine maintenance)	Clean pavement surface using one or a combination of the following methods: • Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Vacuum/sweep permeable paving installation using: o Walk-behind vacuum (sidewalks) o High efficiency regenerative air or vacuum sweeper (roadways, parking lots) o ShopVac or brush brooms (small areas) • Note: Vacuum settings may have to be adjusted to prevent excess uptake of aggregate from paver openings or joints. Vacuum surface openings in dry weather to remove dry, encrusted sediment.
	A [b]		Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)]	• Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility) • Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 square feet. Perform an additional test for each additional 2,500 square feet up to 15,000 square feet total. Above 15,000 square feet, add one test for every 10,000 square feet. • If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability. • Clogging is usually an issue in the upper 2 to 3 centimeters of aggregate. Remove the upper layer of encrusted sediment, and fines, and/or vegetation from openings and joints between the pavers by mechanical means and/or suction equipment (e.g., pure vacuum sweeper). • Replace aggregate in paver cells, joints, or openings per manufacturer's recommendations

[a] Frequency: A= Annually; B= Biannually (twice per year); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).

[b] Inspection should occur during storm event.

Compo-nent	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Surface/Wearing Course (cont'd)				
Interlocking concrete paver blocks and aggregate pavers (continued)		A or B	None (routine maintenance)	Clean pavement surface using one or a combination of the following methods: • Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Vacuum/sweep permeable paving installation using: o Walk-behind vacuum (sidewalks) o High efficiency regenerative air or vacuum sweeper (roadways, parking lots) o ShopVac or brush brooms (small areas) • Note: Vacuum settings may have to be adjusted to prevent excess uptake of aggregate from paver openings or joints. Vacuum surface openings in dry weather to remove dry, encrusted sediment.
	A [b]		Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)]	• Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility) • Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 square feet. Perform an additional test for each additional 2,500 square feet up to 15,000 square feet total. Above 15,000 square feet, add one test for every 10,000 square feet. • If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability. • Clogging is usually an issue in the upper 2 to 3 centimeters of aggregate. Remove the upper layer of encrusted sediment, and fines, and/or vegetation from openings and joints between the pavers by mechanical means and/or suction equipment (e.g., pure vacuum sweeper). • Replace aggregate in paver cells, joints, or openings per manufacturer's recommendations
	A		Sediment present at the surface of the pavement	• Assess the overall performance of the pavement system during a rain event. If water runs off the pavement and/or there is ponding, then see above. • Determine source of sediment loading and evaluate whether or not the source can be reduced/eliminated. If the source cannot be addressed, consider increasing frequency of routine cleaning (e.g., twice per year instead of once per year).
	Summer		Moss growth inhibits infiltration or poses slip safety hazard	• Sidewalks: Use a stiff broom to remove moss in the summer when it is dry • Parking lots and roadways: Vacuum sweep or stiff broom/power brush for cleaning moss from pavement
	A		Paver block missing or damaged	Remove individual damaged paver blocks by hand and replace or repair per manufacturer's recommendations
	A		Loss of aggregate material between paver blocks	Refill per manufacturer's recommendations for interlocking paver sections
		A	Settlement of surface	May require resetting

[a] Frequency: A= Annually; B= Biannually (twice per year); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).

[b] Inspection should occur during storm event.

Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Surface/Wearing Course (cont'd)				
Open-celled paving grid with gravel		A or B	None (routine maintenance)	• Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Follow equipment manufacturer guidelines for cleaning surface.
	A [b]		Aggregate is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)	• Use vacuum truck to remove and replace top course aggregate • Replace aggregate in paving grid per manufacturer's recommendations
	A		Paving grid missing or damaged	• Remove pins, pry up grid segments, and replace gravel • Replace grid segments where three or more adjacent rings are broken or damaged • Follow manufacturer guidelines for repairing surface.
	A		Settlement of surface	May require resetting
	A		Loss of aggregate material in paving grid	Replenish aggregate material by spreading gravel with a rake (gravel level should be maintained at the same level as the plastic rings or no more than 1/4 inch above the top of rings). See manufacturer's recommendations.
		A	Weeds present	• Manually remove weeds • Presence of weeds may indicate that too many fines are present (refer to Actions Needed under "Aggregate is clogged" to address this issue)
Open-celled paving grid with grass		A or B	None (routine maintenance)	• Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Follow equipment manufacturer guidelines for cleaning surface.
	A [b]		Aggregate is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)	• Rehabilitate per manufacturer's recommendations.
	A		Paving grid missing or damaged	• Remove pins, pry up grid segments, and replace grass • Replace grid segments where three or more adjacent rings are broken or damaged • Follow manufacturer guidelines for repairing surface.

[a] Frequency: A= Annually; B= Biannually (twice per year); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).

[b] Inspection should occur during storm event.

Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Surface/Wearing Course (cont'd)				
Open-celled p grid with grass	A		Settlement of surface	• May require resetting
	A		Poor grass coverage in paving grid	• Restore growing medium, reseed or plant, aerate, and/or amend vegetated area as needed • Traffic loading may be inhibiting grass growth; reconsider traffic loading if feasible
		As needed	None (routine maintenance)	• Use a mulch mower to mow grass
		A	None (routine maintenance)	• Sprinkle a thin layer of compost on top of grass surface (1/2" top dressing) and sweep it in • Do not use fertilizer
		A	Weeds present	• Manually remove weeds • Mow, torch, or inoculate and replace with preferred vegetation
Inlets/Outlets/Pipes				
Inlet/outlet pi	A		Pipe is damaged	Repair/replace
	A		Pipe is clogged	Remove roots or debris
Underdrain p	Clean p as needed	Clean orifice at biannually (may need more frequent cleaning during wet season)	Plant roots, sediment or debris reducing capacity of underdrain (may cause prolonged drawdown period)	• Jet clean or rotary cut debris/roots from underdrain(s) • If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly
Raised subsurface overflow pipe	Clean p as needed	Clean orifice at biannually (may need more frequent cleaning during wet season)	Plant roots, sediment or debris reducing capacity of underdrain	• Jet clean or rotary cut debris/roots from underdrain(s) • If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly
Outlet structu	A, S		Sediment, vegetation, or debris reducing capacity of outlet structure	• Clear the blockage • Identify the source of the blockage and take actions to prevent future blockages

[a] Frequency: A= Annually; B= Biannually (twice per year); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).
[b] Inspection should occur during storm event.

Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Inlets/Outlets/Pipes (cont'd)				
Overflow	B		Native soil is exposed or othe signs of erosion damage are present at discharge point	Repair erosion and stabilize surface
Aggregate Storage Reservoir				
Observation	A, S		Water remains in the storage aggregate longer than anticipated by	If immediate cause of extended ponding is not identified, schedule investigation of subsurface materials or other potential causes of system failure.
Vegetation				
Adjacent lar shrubs or trees		As needed	Vegetation related fallout clog will potentially clog voids	• Sweep leaf litter and sediment to prevent surface clogging and ponding • Prevent large root systems from damaging subsurface structural components
		Once in May a Once in September	Vegetation growing beyond facility edge onto sidewalks, paths, and street edge	Edging and trimming of planted areas to control groundcovers and shrubs from overreaching the sidewalks, paths and street edge improves appearance and reduces clogging of permeable pavements by leaf litter, mulch and soil.
Leaves, needles, and organic debris		In fall (October t December) after leaf drop (1-3 times, depending on canopy cover)	Accumulation of organic debri and leaf litter	Use leaf blower or vacuum to blow or remove leaves, evergreen needles, and debris (i.e., flowers, blossoms) off of and away from permeable pavement

[a] Frequency: A= Annually; B= Biannually (twice per year); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).

[b] Inspection should occur during storm event.