



5. Preliminary Stormwater Technical Information Report (TIR)

Villages at North Shore Camas, Washington

Preliminary Stormwater Technical Information Report

Date:	July 2025
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AKS Job Number:	9095

Certificate of the Engineer

Villages at North Shore

Camas, Washington

Preliminary Technical Information Report

This Preliminary Technical Information Report (TIR) and the data contained herein were prepared by the undersigned, whose seal, as a Professional Engineer licensed to practice as such, is affixed below. All information required by Camas Municipal Code (CMC) Chapter 14.02 is included in the proposed stormwater plan and the proposed facilities are feasible.



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2024 Stormwater Management Manual for Western Washington, (Ecology Publication No. 24-10-013, July 2024) – “SWMMWW”

Preliminary Stormwater Technical Information Report (TIR)

VILLAGES AT NORTH SHORE CAMAS, WASHINGTON

Section A – Project Overview

This report analyzes the effects the proposed development will have on the existing stormwater conveyance system; documents the criteria, methodology, and informational sources used to design the proposed stormwater system; and presents the results from the hydraulic analysis. The proposed plan is to subdivide the subject site into a 102-lot subdivision, several Tracts and 6 mixed-use lots for development composed of commercial stores on the bottom floor with residential units above (Villages at North Shore).

Section A.1 – Site Location

The Villages at North Shore is located on two parcels of land, totaling approximately 36.04 acres. Parcels 177885-000 and 178175-000 have a site address 313 SE Leadbetter Road, Camas, WA 98607, and 305 SE 252nd Ave, Camas, WA 98607, respectively. Access to the site will be from NE 252nd Avenue. The project is located within the Northeast ¼ of Section 34, Township 2 North, Range 3 East, Willamette Meridian, Clark County. The site is zoned North Shore Mixed Use (MX-NS), North Shore Higher Density Residential (HD-NS), North Shore Low Density Residential (LD-NS) & North Shore Commercial (C-NS).

Section A.2 – Site Topography and Critical Areas

The site has a single house and detached shop on it with a combination of asphalt and gravel driveways that access from NE 252nd Avenue. The site has significant variability with regards to the topography. There is a series of high points that create a ridge line that goes from the southeast portion of the site towards the northwest. The grades vary from sloping hills to exposed rock out croppings. There is an isolated pond in the north center of the site with a creek valley that flows north from the south-center of the site. According to Clark County Geographic Information Services (GIS), portions of the site have slopes up to 40 percent. However, the majority of the grades on site range from 10 to 25 percent. The existing vegetation consists of evergreen and deciduous trees and shrubs, turfgrass, and field grass.

Section A.3 – Existing On-Site Stormwater System

The site consists of two threshold discharge areas (TDAs). The ridgeline is the divider between these 2 TDAs. The isolated pond is a subarea that overflows the runoff to combine with the valley stream and mix with that TDA. South of the ridgeline runoff travels along the surface to shallow concentrated flows in route to Lacamas Lake. See the pre-developed basin plan within Appendix D for existing drainage patterns for the site.

Section A.4 – Site Parameters That Influence Stormwater Design

The Villages at North Shore project site consists of (OmE) Olympic Stony Clay loam, 3-30% slopes, well drained, non-hydric, WWHMSoil Group 3 soil, (VaB) Vadar Silt Loam, 3-8% Slopes, well drained, non-hydric, WWHMSoil Group 2 soil, (LiB) Lauren very gravelly loam, 0-8% slopes, somewhat excessively drained, non-Hydric, WWHMSoil Group 1 soil, & (ThA) Tisch silt loam, 0-3% slopes, poorly drained, Hydric, WWHMSoil Group 5 soil. A Geotechnical report was issued by Columbia West Engineering, Inc in November 2023. It is recommended to grade the site such that infiltration is inhibited from buildings and pavement areas. Therefore, infiltration facilities will not be proposed. Design recommendation and testing results are outlined within the project geotechnical report (Appendix G). The site is in the Lacamas

watershed above Round Lake dam. Stormwater runoff exiting the site will require phosphorus treatment for all pollution-generating surfaces. Due to the ridge in the middle of the site stormwater will be analyzed as two separate TDAs.

Section A.5 – Adjacent Property Drainage

Adjacent properties do not drain onto the project site. Surrounding parcels generally drain away from the site.

Section A.6 – Adjacent Site Areas

The site is bound by existing farm estates to the north. Properties to the east and west are zoned North Shore Lower Density Residential (LD-NS). The property bordering the south side of the site is zoned North Shore Park/open space (POS-NS).

Section A.7 – General Project Stormwater Description

Proposed site improvements for the development include sidewalks, public streets, open space tracts, 102 detached single-family homes & 6 mixed-use apartment complexes. Construction will take place in several phases with the North Shore Collector being a separate capital improvement project. Stormwater is proposed to follow the existing drainage pattern and maintain the 2 separate TDAs. Each of the detention ponds will be equipped with an emergency overflow outlet that will release runoff at peak stormwater events, while keeping flows at or below the required release rates. Site stormwater will be collected by catch basins and conveyed to the respective treatment and detention facility within each basin or subbasin.

TDA 1 – Runoff from driveways, parking areas, sidewalks, roadways, and any landscaped areas that contribute runoff to the roadways, will be collected and conveyed to water quality/filter media facilities. Stormwater from each water quality structure will then be discharged into a detention pond where runoff will be stored and released through the overflow/emergency outlet into its natural drainage outfall location. This TDA will meet MR #5 utilizing List #2 for each surface type to demonstrate compliance of feasibility. The post-developed discharge rates from the site will not exceed the pre-developed discharge rates as determined by a continuous simulation model for the range of rates from 50% of the 2-year peak flow to of the 50-year peak flow. The water quality structures, and detention ponds are located in Tract B & F. Stormwater from pollution generating surfaces will be treated by mechanical filtration to meet MR #6 guidelines for water quality. Roof run off from the buildings and rear yard pervious landscaped areas may be routed directly to the detention pond. The roof areas that bypass WQ facilities will not be included in the impervious surface mitigated basin area to calculate the WQ flow (Appendix D).

TDA 2 – Runoff from driveways, parking areas, sidewalks, roadways, roof tops, buildings and any landscaped areas that contribute runoff to the roadways, will be collected and conveyed to a water quality/filter media facility. Stormwater from the water quality structure will then be discharged into a piped conveyance system following an access road down the hill to the south to connect with Leadbetter Road, the natural drainage direction for this basin. This TDA will discharge directly to Lacamas Lake and is therefore flow control exempt from MR #7. The water quality structure is located in Tract J and will be owned and maintained by the HOA. Stormwater from pollution generating surfaces will be treated by mechanical filtration to meet MR #6 guidelines for water quality. The assumed pollution generating areas are included in the impervious surface mitigated basin area shown on the Post-Developed Basin Map (Appendix D).

Due to the location of the entire site being within the Lacamas Lake watershed above the Round Lake dam, water quality for the site is required to meet phosphorus treatment per the 2024 Stormwater Management Manual for Western Washington (SWMMWW). See the development plans, Appendix C, and the Stormwater Basin Map, Appendix D, for stormwater information.

Section B – Minimum Requirements

Section B.1 – Determination of Applicable Minimum Requirements

Proposed land disturbances shall include grading, excavation, and removal of unsuitable soils for the proposed developments. Due to the amount of proposed hard surfaces (greater than 5,000 square feet), the project is required to meet MR #'s 1 through 9 per Figure I-3.1 of the 2024 Stormwater Management Manual for Western Washington (SWMMWW) (see Appendix B).

The tables in this section provide information pertaining to each stormwater subbasin within the project area. See the Stormwater Basin Maps for basin locations (Appendix D).

Table B-1: Proposed Hard Surface and Landscaping

Sub-Basin	Existing Hard Surfaces (acres)	New Hard Surfaces (acres)	Replaced Hard Surfaces (acres)	Native Vegetation Replaced with Landscaping (acres)	Total Land Disturbed (acres)
1A	0.000	2.801	0.000	1.328	4.128
1B	0.000	0.141	0.000	0.152	0.292
2A	0.000	2.336	0.000	0.728	3.063
2B	0.000	2.932	0.000	0.776	3.708
3A	0.000	12.331	0.000	3.495	15.827
3B	0.000	0.486	0.000	0.268	0.753

Note: Assumes Single Residence and mixed-use lots are 85% impervious.

Tables B-2 and B-3 present information for the mitigated site basins, differentiated between pollution- and non-pollution-generating surfaces. It is important to note that all non-pollution-generating areas directly mixing or having the opportunity to mix with stormwater runoff from pollution-generating surface areas are classified as pollution-generating.

Table B-2: Pollution-Generating Surfaces

Sub-Basin	Hard Surfaces (acres)	Pervious Surfaces (acres)	Total Surface Area (acres)
1A	2.801	1.328	4.128
1B	0.141	0.152	0.292
2A	2.336	0.728	3.063
2B	2.932	0.776	3.708
3A	12.331	3.495	15.827
3B	0.000	0.000	0.000

Note: Assumes Single Residence and mixed-use lots are 85% impervious.

Table B-3: Non-Pollution-Generating Surfaces

Sub-Basin	Hard Surfaces (acres)	Pervious Surfaces (acres)	Total Surface Area (acres)
1A	0.000	0.000	0.000
1B	0.000	0.000	0.000
2A	0.000	0.000	0.000
2B	0.000	0.000	0.000
3A	0.000	0.000	0.000
3B	0.486	0.268	0.753

Note: Assumes Single Residence and mixed-use lots are 85% impervious.

The developed basin's effective hard surfaces and the applicability of MRs #6 through #8 are summarized in Table B-4, below.

Table B-4: Effective Hard Surfaces

TDA	Hard Surface Area (acres)	MR #6 Required (Y/N)	MR #7 Required (Y/N)	MR #8 Required (Y/N)
1	8.210	Y	Y	Y
2	12.331	Y*	N	N

* Excludes WQ requirement for subbasin 3B (Emergency Access Road).

Section C – Soils Evaluation

Section C.1 – Soil Suitability for Low Impact Development BMPs

The Villages at North Shore development is not suitable for infiltration of stormwater. The project geotechnical report dated November 17, 2023, and within Appendix G, and states, “Based on subsurface exploration, infiltration of concentrated stormwater is infeasible due to the presence of shallow bedrock and clayey residual soils.”

Section C.2 – Water Table Information

Per the project geotechnical report, groundwater seepage was not specifically encountered. Seeps and springs within the basalt formation have been observed on surrounding sites and have been associated with regional rain events. Therefore, drainage design may need to be altered during the course of construction as seeps and springs become evident over time. See geotechnical report in Appendix G.

Section C.3 – Soil Parameters

Per Natural Resources Conservation Service (NRCS) Soil Survey of Clark County, Washington, on-site soils consist of the following:

- LIB (Lauren very gravelly loam, 0 to 8 percent slopes), 11.5 percent of the site (Type B soil / WWHM Soil Group 1)
- OmE (Olympic stony clay loam, 3 to 30 percent slopes), 49.4 percent of the site (Type C soil / WWHM Soil Group 3)
- ThA (Tisch silt loam, 0 to 3 percent slopes), 10.0 percent of the site (Type C/D soil / WWHM Soil group 5)
- VaB (Vader silt loam, 3 to 8 percent slopes), 27.2 percent of the site (Type B soil / WWHM Soil Group 2)

Soil parameters are further explained by the soils report provided by Columbia West Engineering, dated November 2023 (Appendix G). *“Although soil conditions may vary from the broad USDA descriptions, Lauren soils are generally coarse-textured sands and gravels with moderate permeability, moderate shear strength and low shrink-swell potential. Olympic and Vader series soils are more fine textured silt and clay with variable amounts of gravel. Olympic and Vader soils are typically fine-textured, poorly drained soils that develop over bedrock and exhibit slow permeability and have a low shear strength.”*

Section C.4 – Infiltration Rate Testing

A geotechnical site investigation was performed on site by Columbia West Engineering. See Appendix G for the full report. Infiltration testing was not conducted due to the minor amount of clayey gravel soil encountered at the site that sits on top of the bedrock. Due to the relatively impermeable nature of the basalt bedrock and residual soils, infiltration of concentrated stormwater onsite is not recommended.

Section C.5 – Complex Soil Conditions

A geotechnical report has been prepared and is attached to this report, see Appendix G. Existing soil conditions are summarized, and recommendations are presented in relation to site stormwater design considerations. Bedrock likely is not complex by definition, but precludes any feasible infiltration.

Section D – Source Control

Volume IV of the SWMMWW contains the following applicable source control best management practices (BMPs) for residential development. The source control BMPs and applicable notes to control stormwater runoff impacted by these activities will be included in the Erosion Control Plans and Details and in the Stormwater Pollution Prevention Plan (SWPPP).

- S407: BMPs for Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots
- S411: BMPs for Landscaping and Lawn/Vegetation Management

Section E – On-Site Stormwater Management BMPs

Per Figure I-3.3 of the SWMMWW, the project proposes to meet List #2 to satisfy MR #5. Table I-3.2, Lawn and Landscaped areas will meet post-construction soil quality and quantity requirements per BMP T5.13. Roofs and other hard surfaces cannot utilize “full dispersion”, downspout infiltration, or permeable pavement due the lack of infiltration of the existing soils. The sites topography, space limitations & lack of infiltration prevent the use of surface bioretention facilities.

Section F – Runoff Treatment Analysis and Design

MR #6 requires that at least 91% of the post-developed pollution-generating runoff volume, as predicted by a continuous runoff model, be treated. All water conveyed to the treatment facilities through piping will be treated as pollutant-generating runoff due to the mixing of pollutant and non-pollutant generating surfaces before treatment. Stormwater will be treated by mechanical filter cartridges located in concrete structures before leaving the site or entering each of the site’s stormwater detention ponds.

The Villages of North Shore development is within the Lacamas Lake watershed, above the Round Lake dam, which requires phosphorus treatment. Lacamas Lake is listed as a category 5-303d waterbody for total phosphorus. Phosphorous treatment will be met by using filter media approved by the Washington Department of Ecology. This design satisfies the design requirement of CMC Chapter 14.02 by adhering to all relevant regulations from the State of Washington and City of Camas.

Table F-1: Water Quality Structure

TDA & Subbasin	New Pollutant-Generating Impervious Surface (acres) (WWHM)	New Pollutant-Generating Pervious Surface (acres) (WWHM)	Required Water Quality Flow Rate (cubic feet per second)	Provided Water Quality Flow Rate* (cubic feet per second)	Required Number of Treatment Filter Cartridges (Cartridge size)
WQ Vault 1A	3.820	2.530	0.5817	0.5880	14 (27")
WQ Vault 1B	0.141	0.147	0.0243	0.0420	1 (27")
WQ Vault 2A	2.336	0.728	0.3340	0.3360	8 (27")
WQ Vault 2B	2.932	0.776	0.4142	0.4200	10 (27")
WQ Vault 3A	12.331	3.495	1.7512	1.7640	42 (27")

**Note: Provided water quality flow rate is determined by using off-line BMP approved flow rates for Contech Phosphosorb media (0.042 cfs per 27" cartridge).*

Section G – Flow Control Analysis and Design

The Villages at North Shore development consists of 2 TDAs. The site will be required to meet flow control standards as stated above. The project proposes detention ponds BMP D.1 to meet the flow control requirements. The ponds will be equipped with an overflow outlet that will only release runoff from the system during high flow events while designed to maintain pre-development release rates at or below required flows.

TDA 1 is split into 4 subbasins (subbasin 1A, 1B, 2A & 2B). Subbasins 1A, 2A & 2B propose to use a detention pond per BMP D.1 to meet the flow control requirements. Subbasin 1B is a small off-site basin for site access involving pavement widening only. There will be no mitigation of flows from this basin but flows from the other 3 subbasins will over detain such that TDA-1, as a whole, meets the flow requirement. The proposed discharge from each detention pond will be through a flow spreader dispersion BMP towards the natural discharge location of a wetland stream located in the northeast corner of the site. Discharge from TDA 1 has been analyzed and designed to meet MR #7.

TDA 2 is split into two subbasins (subbasin 3A & 3B). This TDA will capture all runoff to be discharged into a piped conveyance system following the access road down the hill to the south to connect with Leadbetter Road, the natural drainage direction for these subbasins. This TDA will discharge directly to Lacamas Lake which has a large water body flow exemption and is therefore flow control exempt from MR #7.

All facilities were sized with the use of WWHM 2012 (see Appendix F) for flow control WWHM output.

Section H – Wetland Protection

The site contains two category III wetlands associated with natural drainage on-site (wetland A & wetland B). The wetlands are to be protected by a buffer. A wetland hydroperiod analysis (Method 2), general protection and protection from pollutants are required for this project based on Figure I-3.5 of the SWMMWW, and is included in Appendix H of this report. To meet protection from pollutants, site discharge will be treated before entering the wetlands. Discharge to the wetland will meet the requirements for MR #8 by not altering flow to the wetland by more than 20% on a monthly basis for the

months of October, November, and December, and 15% for the remaining months. Additionally, discharge to the wetland will meet the requirements by not altering flow to the wetland by more than 20% on a daily basis, MR #8 should be considered met.

The wetland basin maps, Included in Appendix H, delineate the pre-developed and post-developed impervious, field, forest, and pond areas upstream of the wetland. The wetland basin areas shown below in Table H.1 & H.2 are separated into areas draining to the wetlands from off-site, and areas onsite flowing to the wetland.

Table H-1: Wetland A Category III Basin Areas

Surface Type	Pre-developed Off-site Flow Area (acres)	Pre-developed On-site Flow Area (acres)	Post-developed Off-site Flow Area (acres)	Post-developed On-site Flow Area (acres)
Impervious	1.022	0.000	1.022	2.615
Field	0.853	1.350	0.853	1.677
Forest	0.000	2.813	0.000	0.000
Pond	0.000	0.000	0.000	0.182
Total	1.875	4.163	1.875	4.474

*Note: Post-developed pervious areas to follow BMP T5.13 and are modeled as Field. The total wetland basin area is approximately 6.349 acres excluding the wetland buffer and wetland boundary.

Table H-2: Wetland B Category III Basin Areas

Surface Type	Pre-developed Off-site Flow Area (acres)	Pre-developed On-site Flow Area (acres)	Post-developed Off-site Flow Area (acres)	Post-developed On-site Flow Area (acres)
Impervious	6.585	0.070	6.585	4.497
Field	129.833	1.407	129.833	1.363
Forest	21.904	5.486	21.904	0.000
Pond	0.057	0.000	0.057	0.771
Total	158.379	6.963	158.379	6.631

*Note: Post-developed pervious areas to follow BMP T5.13 and are modeled as Field. The total wetland basin area is approximately 165.010 acres excluding the wetland buffer and wetland boundary.

Wetland Hydroperiod Protection (Method 2) requires that the runoff entering the wetlands after development will remain similar to the pre-development condition. WWHM was used to obtain resultant flow rates (Appendix H). This model is separate and standalone from the flow control model discussed in MR #7. The final stormwater design will follow the requirements contained in Section I-C of the SWMMWW.

The two wetlands located within the project site are category III wetlands (Wetland A & Wetland B). Historically, TDA #1 contributes runoff into these wetlands. Wetland A is an isolated depression. Subbasin 1A will discharge runoff, after treatment and flow control, to wetland A. Due to the required street layout for access and the North Shore Boulevard alignment, wetland A will have a significant buffer reduction after development. The model for wetland A demonstrates an excess amount of runoff into the buffer failing to meet the historic runoff volumes per MR #8 requirements. Pond 1A is modeled with a flow splitter such that a 0.5" orifice will route runoff to the wetland A buffer with the remainder of flows to discharge to subbasin 1B. Based on historic stormwater maintenance guidance, a 0.5" orifice is the smallest diameter that can be utilized without a high risk of plugging. Given the site conditions (City

required alignment for North Shore Blvd) and SWMWW guidelines, it is infeasible to reduce flows any further to meet MR #8 requirements. An added proposal is to provide a high flow overflow to the existing wetland A depression (located approximately 3" above the OHWL). Since the model exceeds the historic flows to the wetland, the proposed overflow will limit the excess quantity that remains within the wetland as well as provide an emergency spillway during flooding events. Therefore, the maximum extent practicable to meet MR #8 for wetland A has been provided.

The remainder of TDA-1 will discharge to wetland B. The detention ponds for subbasins 1A, 2A and 2B have been designed to discharge runoff at a rate to meet the flow control requirements of MR #7. These ponds were used to model the hydroperiod for wetland B along with the existing off-site base flow. The runoff volumes for the monthly basis are satisfied per MR #8 requirements. There are only a select number of days that exceed the MR #8 threshold. A sensitivity analysis was performed using the WWHM model to see what effect further pond modifications would have to the wetland B runoff volumes. Pond 2B was quadrupled in size, with the flow control orifice reduced by half in an attempt to severely restrict runoff to wetland B. The results were very minimal with the runoff volumes still exceeding the hydroperiod threshold. This suggests that pond alterations beyond the flow control requirement will not have a significant impact on the wetland runoff volumes. Furthermore, the nature of wetland B is that of a stream with a shallow wetland ponding area at the upstream location. Any excess runoff that enters the wetland "pond" will quickly leave the wetland as stream flow following the natural downstream route of historic runoff. In effect, this reduces the impacts that may result from exceeding the minimum number of daily flow volumes as demonstrated in the WWHM model. Therefore, the maximum extent practicable to meet MR #8 for wetland B has been provided.



Appendix A: Map Submittals

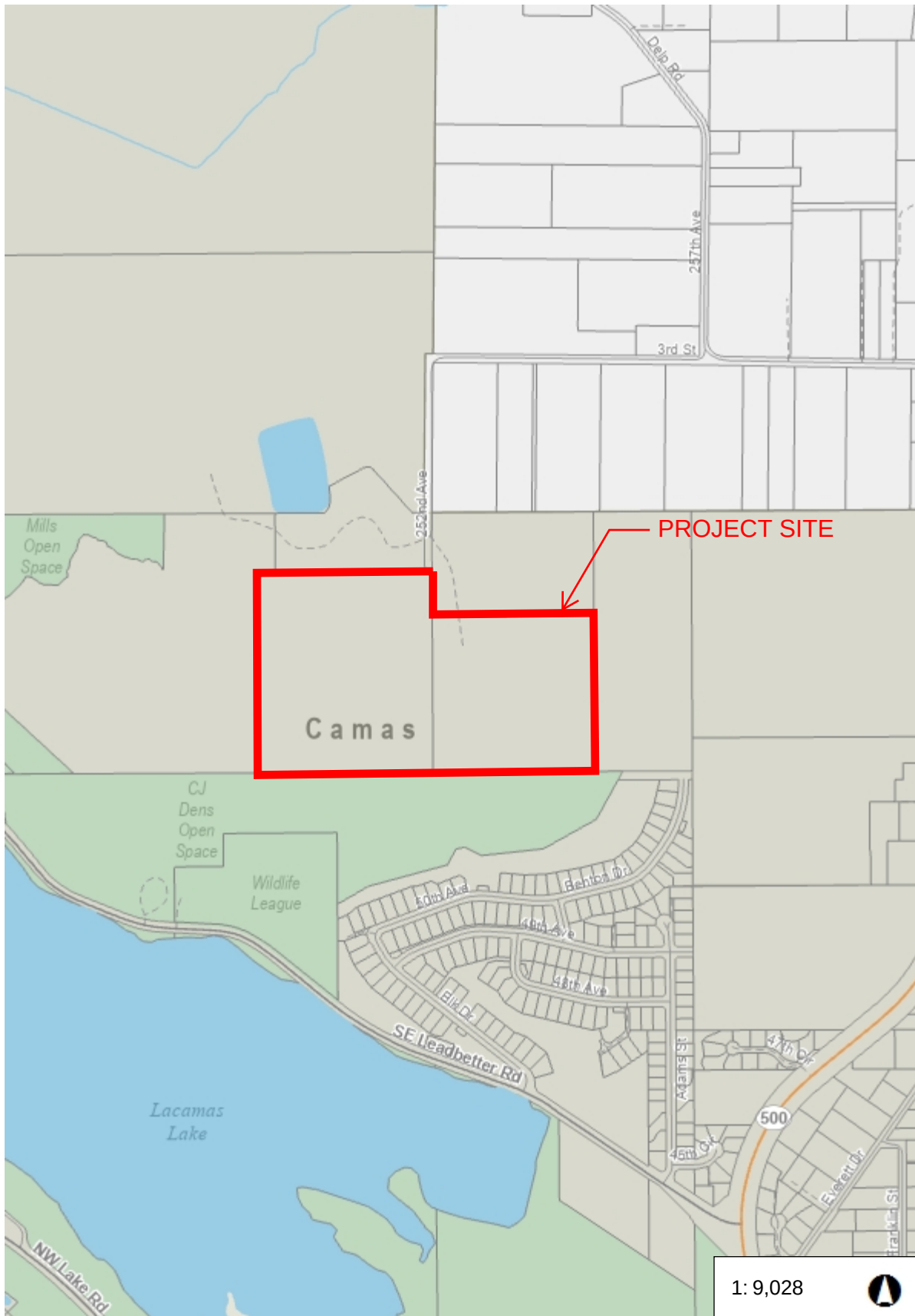


Villages at North Shore



Legend

Taxlots



Notes:

1: 9,028



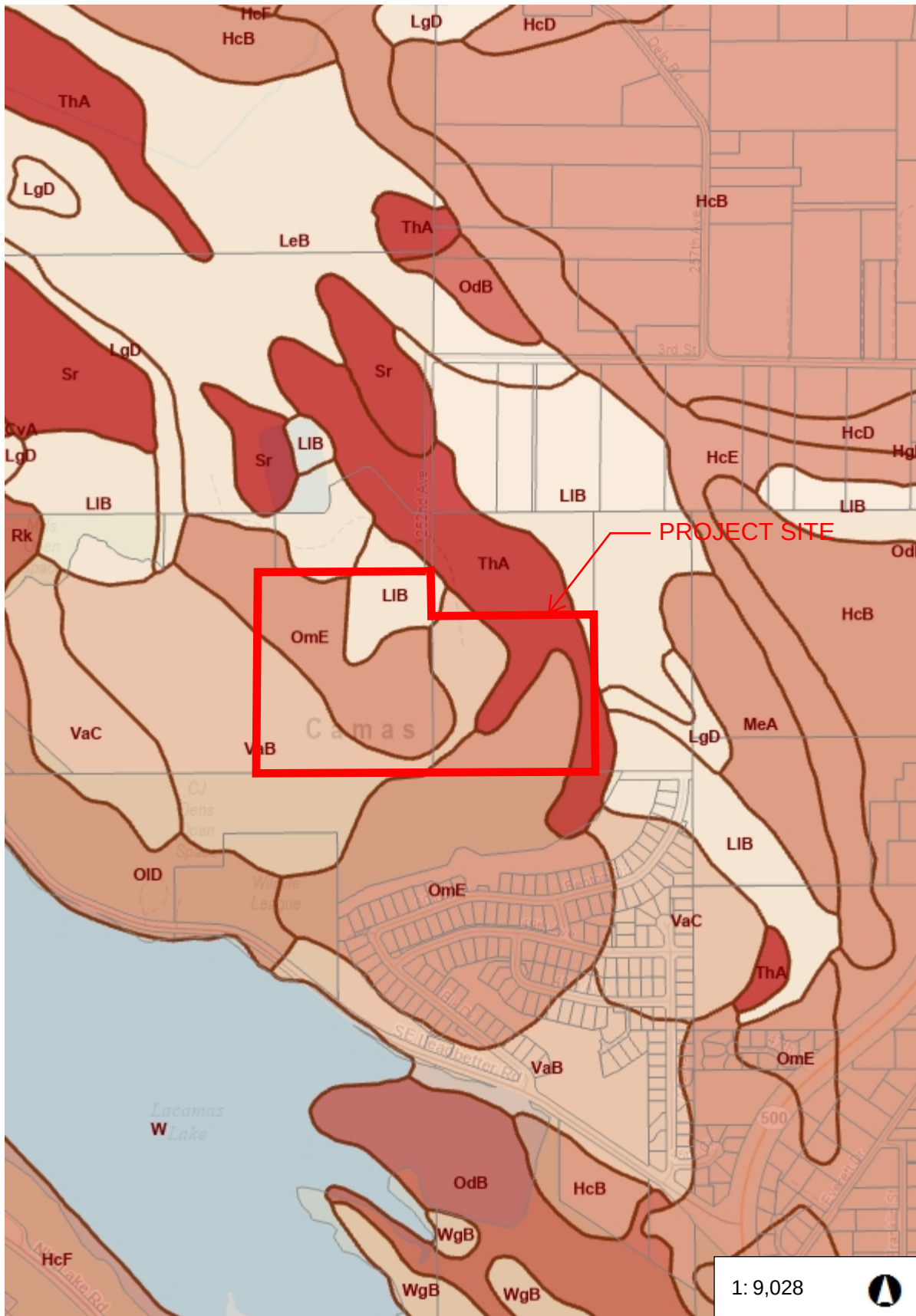
1,504.7 0 752.33 1,504.7 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - <http://gis.clark.wa.gov>

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information. Taxlot (i.e., parcel) boundaries cannot be used to determine the location of property lines on the ground.



Villages at North Shore - Soils Map



Legend

- Taxlots
- Soil Type
- WWHM Soil Group**
 - 1 - Excessively drained soils
 - 2 - Well drained soils
 - 3 - Moderately drained soils
 - 4 - Poorly drained soils
 - 5 - Wetland soils
 - Unknown

Notes:

1: 9,028

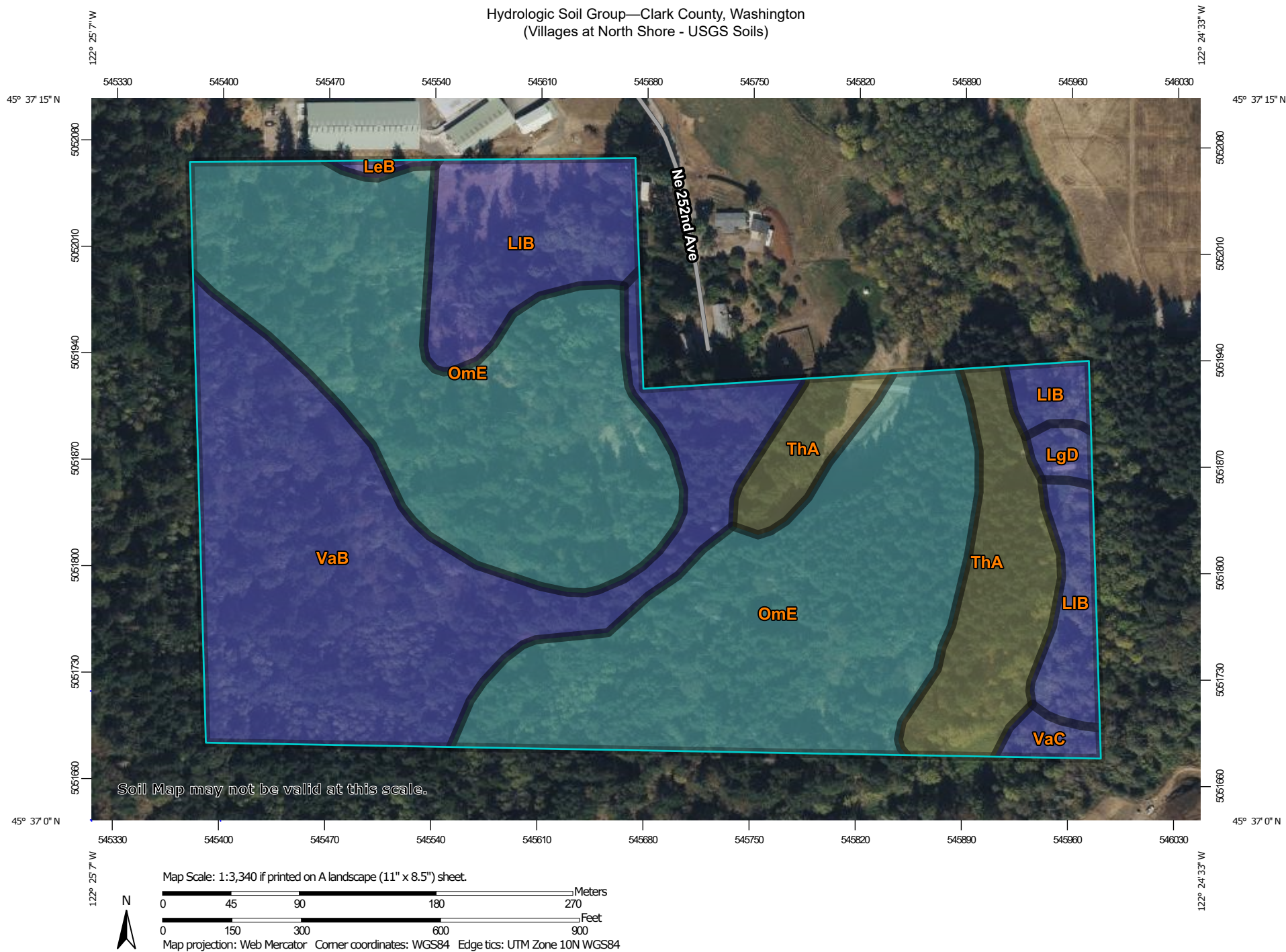


1,504.7 0 752.33 1,504.7 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - <http://gis.clark.wa.gov>

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Hydrologic Soil Group—Clark County, Washington (Villages at North Shore - USGS Soils)



Hydrologic Soil Group—Clark County, Washington
(Villages at North Shore - USGS Soils)

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clark County, Washington
 Survey Area Data: Version 22, Aug 26, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 26, 2022—Oct 11, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
LeB	Lauren loam, 0 to 8 percent slopes	B	0.1	0.3%
LgD	Lauren gravelly loam, 8 to 20 percent slopes	B	0.4	0.8%
LIB	Lauren very gravelly loam, 0 to 8 percent slopes	B	5.3	11.5%
OmE	Olympic stony clay loam, 3 to 30 percent slopes	C	23.0	49.4%
ThA	Tisch silt loam, 0 to 3 percent slopes	C/D	4.6	10.0%
VaB	Vader silt loam, 3 to 8 percent slopes	B	12.6	27.2%
VaC	Vader silt loam, 8 to 15 percent slopes	B	0.4	0.9%
Totals for Area of Interest			46.5	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Appendix B: New Development Flow Chart

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

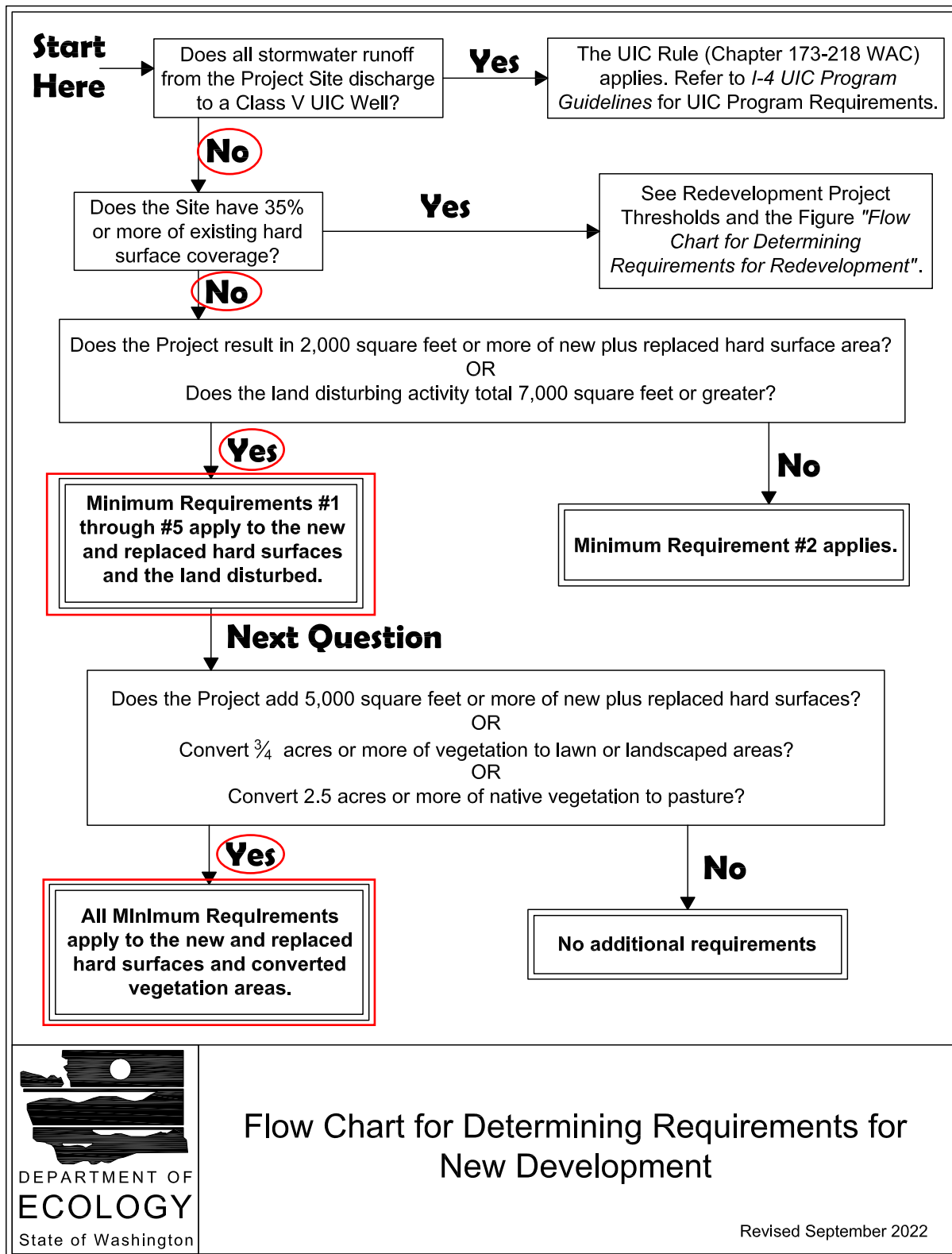
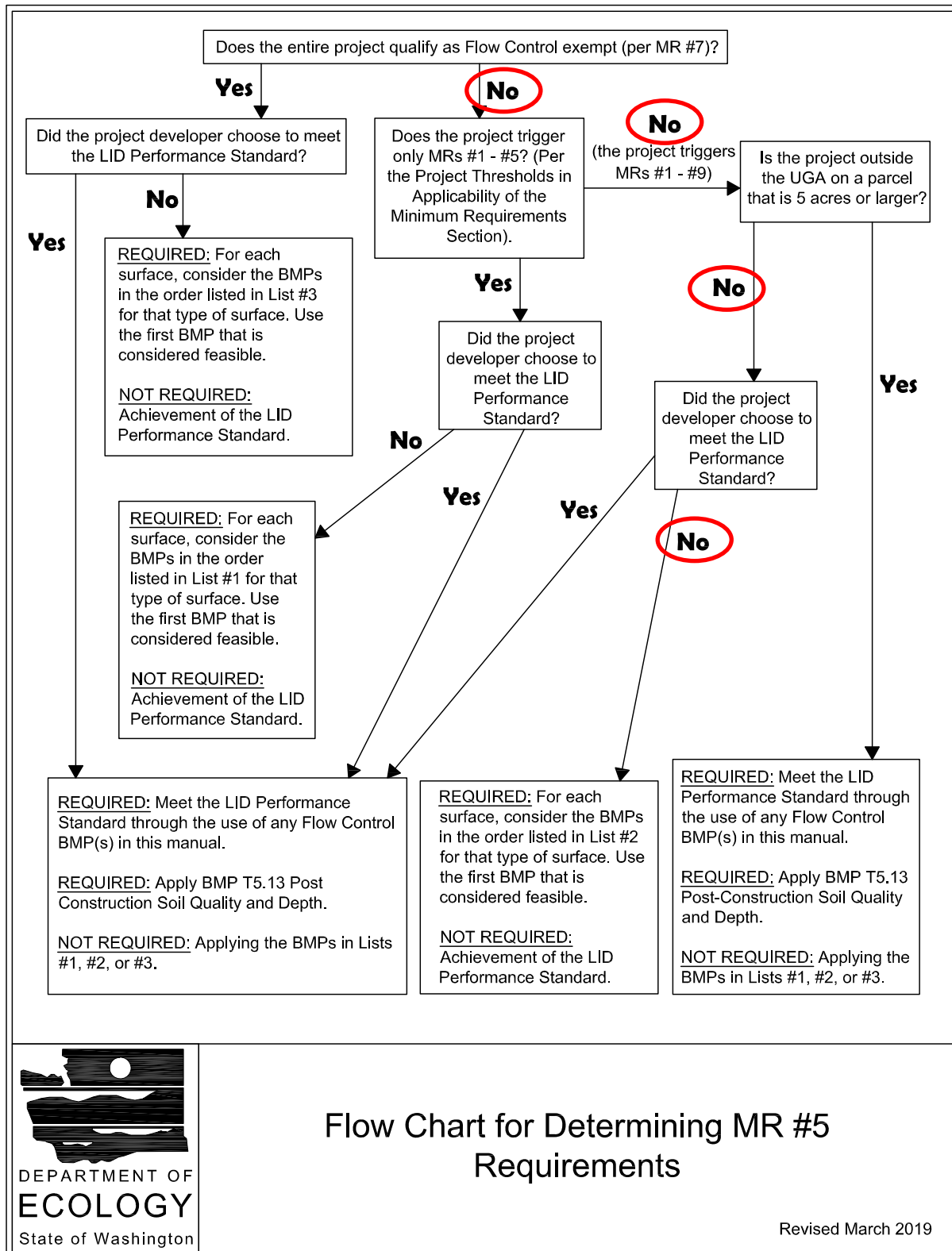


Figure I-3.3: Flow Chart for Determining MR #5 Requirements



Appendix C: Development Plans

PRELIMINARY STORMWATER PLAN OVERVIEW
VILLAGE AT NORTH SHORE
HSR DEV - MILLS, LLC
CAMAS, WASHINGTON



JOB NUMBER:	9095
DATE:	7/22/2025
DESIGNED BY:	BDH
DRAWN BY:	LPM
CHECKED BY:	BDH

P10.0

LEGEND

EXISTING GROUND CONTOUR (2 FT)

EXISTING GROUND CONTOUR (10 FT)

FINISHED GRADE CONTOUR (2 FT)

FINISHED GRADE CONTOUR (10 FT)

DRAINAGE FLOW DIRECTION

GRADING LIMITS

352

350

352

350

→

GENERAL NOTES

1. CONTOUR INTERVAL IS 2 FEET.
2. TREES ARE NOT SHOWN.
3. STORMWATER TREATMENT AND DETENTION FACILITIES FOR THIS DEVELOPMENT ARE TO BE PRIVATELY OWNED AND MAINTAINED.
4. ACCORDING TO CLARK COUNTY GIS, THE SITE IS NOT WITHIN OR ADJACENT TO A 100-YEAR FLOODPLAIN. THE SITE IS ADJACENT TO A SHORELINE MANAGEMENT AREA TO THE SOUTH.
5. THERE ARE NO KNOWN EXISTING ON-SITE STORMWATER FACILITIES.
6. ACCORDING TO CLARK GIS, NO FLOODPLAIN, FLOODWAYS, OR SHORELINE EXIST ON-SITE.
7. THE EXISTING SITE CONTAINS TWO THRESHOLD DISCHARGE AREAS (TDAs). THE DRAINAGE IS SPLIT INTO THESE TWO TDAs DIAGONALLY AT APPROXIMATELY THE CENTER OF THE SITE BY A RIDGE. THE NORTHERN TDA (#1) SURFACE FLOWS NORTHEAST INTO EXISTING WETLANDS, AND THE SOUTH TDA (#2) SURFACE FLOWS SOUTHWEST INTO SHALLOW CONCENTRATED FLOWS, ULTIMATELY INTO LACAMAS LAKE.
8. PROPOSED DRAINAGE FLOW ROUTES TO FOLLOW EXISTING FLOW ROUTES TO EXTENT POSSIBLE, MAINTAINING THE ULTIMATE DISCHARGE POINTS FOR BOTH ON SITE TDAs IN THE POST DEVELOPED CONDITION..
9. ROOF AREAS FOR ALL LOTS DRAIN TO STORM SEWER MAIN AND SUBSEQUENTLY TO PRIVATE STORMWATER FACILITIES.
10. SEE OVERALL THRESHOLD DISCHARGE AREA (TDA) VICINITY MAP ON THIS SHEET, P10.0.
11. PRELIMINARY STORM SIZING LISTED BELOW TO BE FINALIZED DURING FINAL ENGINEERING:
STORM MAIN: 12" MIN. DIAMETER
CATCH BASIN LEADS: 10" MIN. DIAMETER

TDA VICINITY MAP
N.T.S.

SEE SHEET P10.2

SEE SHEET P10.1

SEE SHEET P10.1

AKS DRAWING FILE: 9095 P10.0 STD.DWG | LAYOUT: P10.0

EXISTING GROUND CONTOUR (2 FT) ——— 352 ———

EXISTING GROUND CONTOUR (10 FT) ——— 350 ———

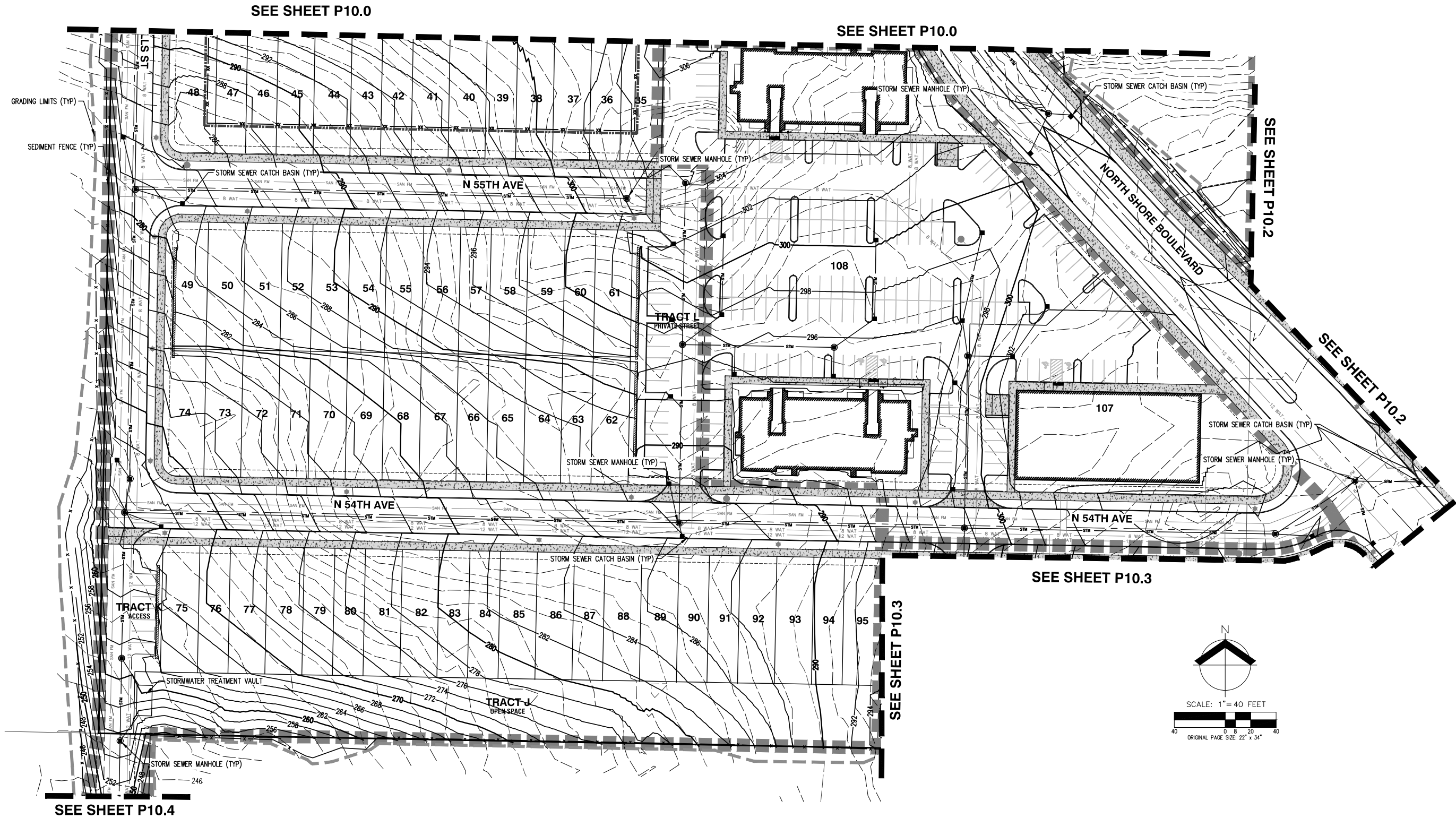
FINISHED GRADE CONTOUR (2 FT) ——— 352 ———

FINISHED GRADE CONTOUR (10 FT) ——— **350** ———

DRAINAGE FLOW DIRECTION

GRADING LIMITS

1. SEE SHEET P10.0 FOR STORMWATER NOTES.



**PRELIMINARY STORMWATER PLAN
VILLAGE AT NORTH SHORE
HSR DEV - MILLS, LLC
CAMAS, WASHINGTON**



B NUMBER: 9095
 TE: 7/22/2025
 SIGNED BY: BDH
 AWN BY: LPM
 CHECKED BY: BDH

P10.1

PRELIMINARY STORMWATER PLAN
VILLAGE AT NORTH SHORE
HSR DEV - MILLS, LLC
CAMAS, WASHINGTON



JOB NUMBER: 9095
DATE: 7/22/2025
DESIGNED BY: BDH
DRAWN BY: LPM
CHECKED BY: BDH

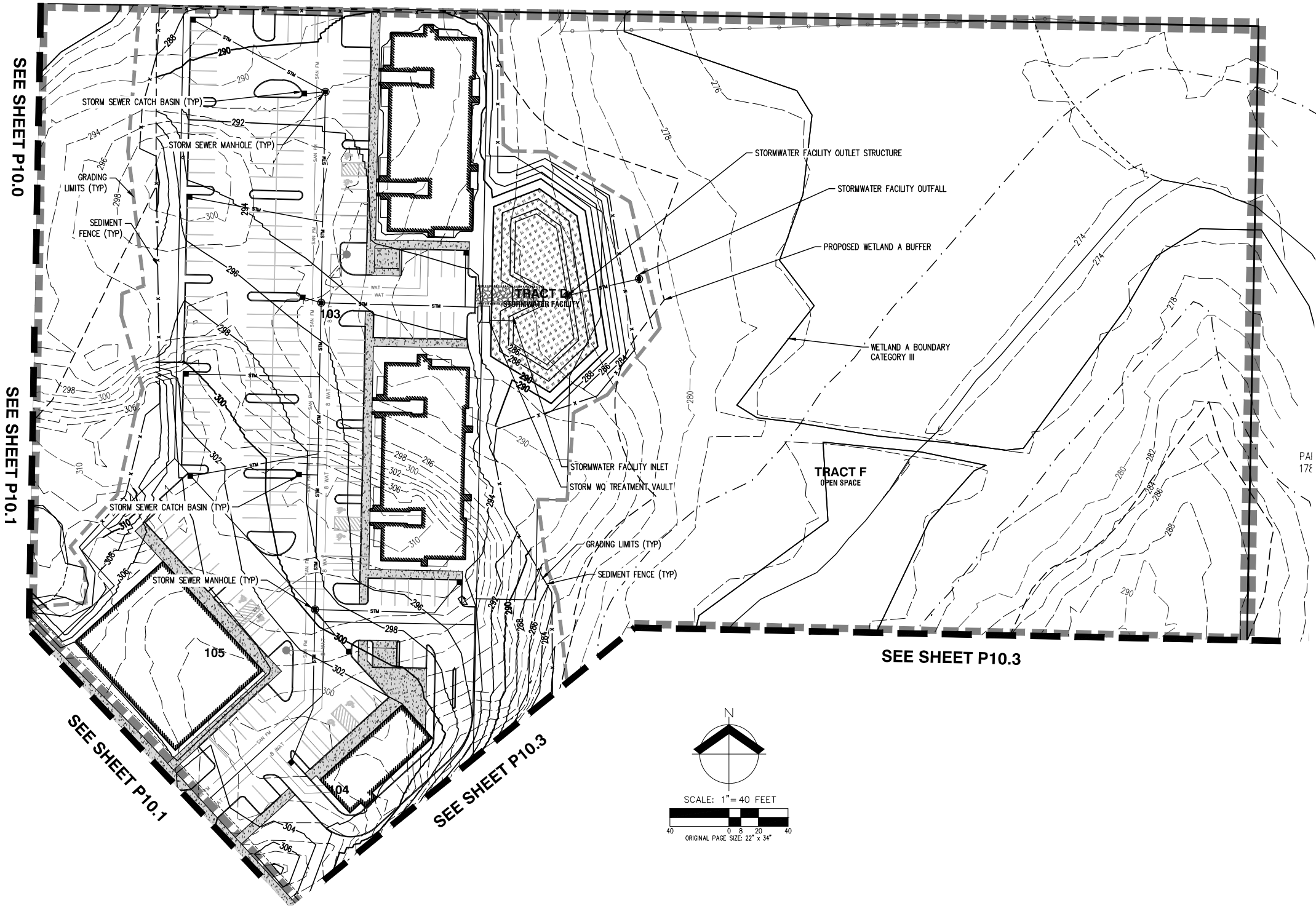
P10.2

LEGEND

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EXISTING GROUND CONTOUR (10 FT)	---
FINISHED GRADE CONTOUR (2 FT)	---
FINISHED GRADE CONTOUR (10 FT)	---
DRAINAGE FLOW DIRECTION	→
GRADING LIMITS	---

GENERAL NOTES

- SEE SHEET P10.0 FOR STORMWATER NOTES.



**PRELIMINARY STORMWATER PLAN
VILLAGE AT NORTH SHORE
HSR DEV - MILLS, LLC
CAMAS, WASHINGTON**



JOB NUMBER:	9095
DATE:	7/22/2025
DESIGNED BY:	BDH
DRAWN BY:	LPM
CHECKED BY:	BDH

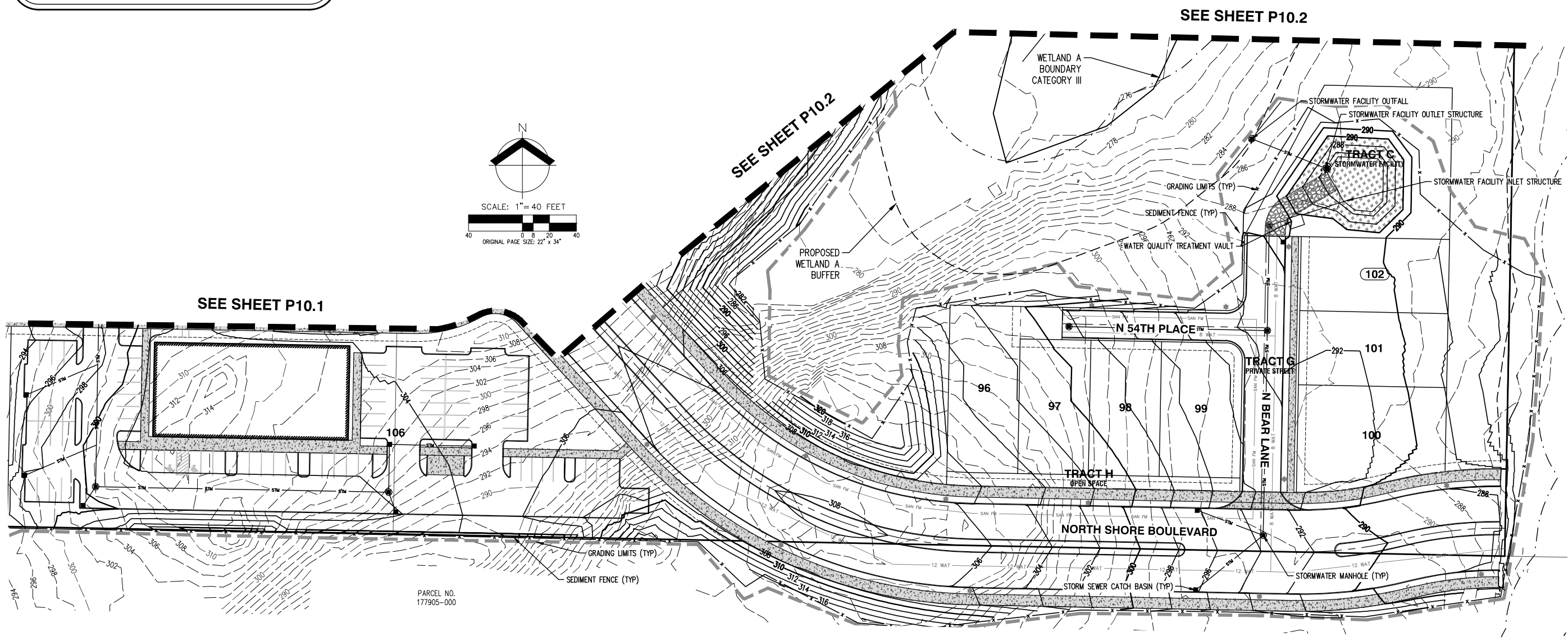
P10.3

LEGEND

EXISTING GROUND CONTOUR (2 FT)	---
EXISTING GROUND CONTOUR (10 FT)	---
FINISHED GRADE CONTOUR (2 FT)	---
FINISHED GRADE CONTOUR (10 FT)	---
DRAINAGE FLOW DIRECTION	→
GRADING LIMITS	---

GENERAL NOTES

1. SEE SHEET P10.0 FOR STORMWATER NOTES.



**PRELIMINARY STORMWATER PLAN
VILLAGE AT NORTH SHORE
HSR DEV - MILLS, LLC
CAMAS, WASHINGTON**



JOB NUMBER:	9095
DATE:	7/22/2025
DESIGNED BY:	BDH
DRAWN BY:	LPM
CHECKED BY:	BDH

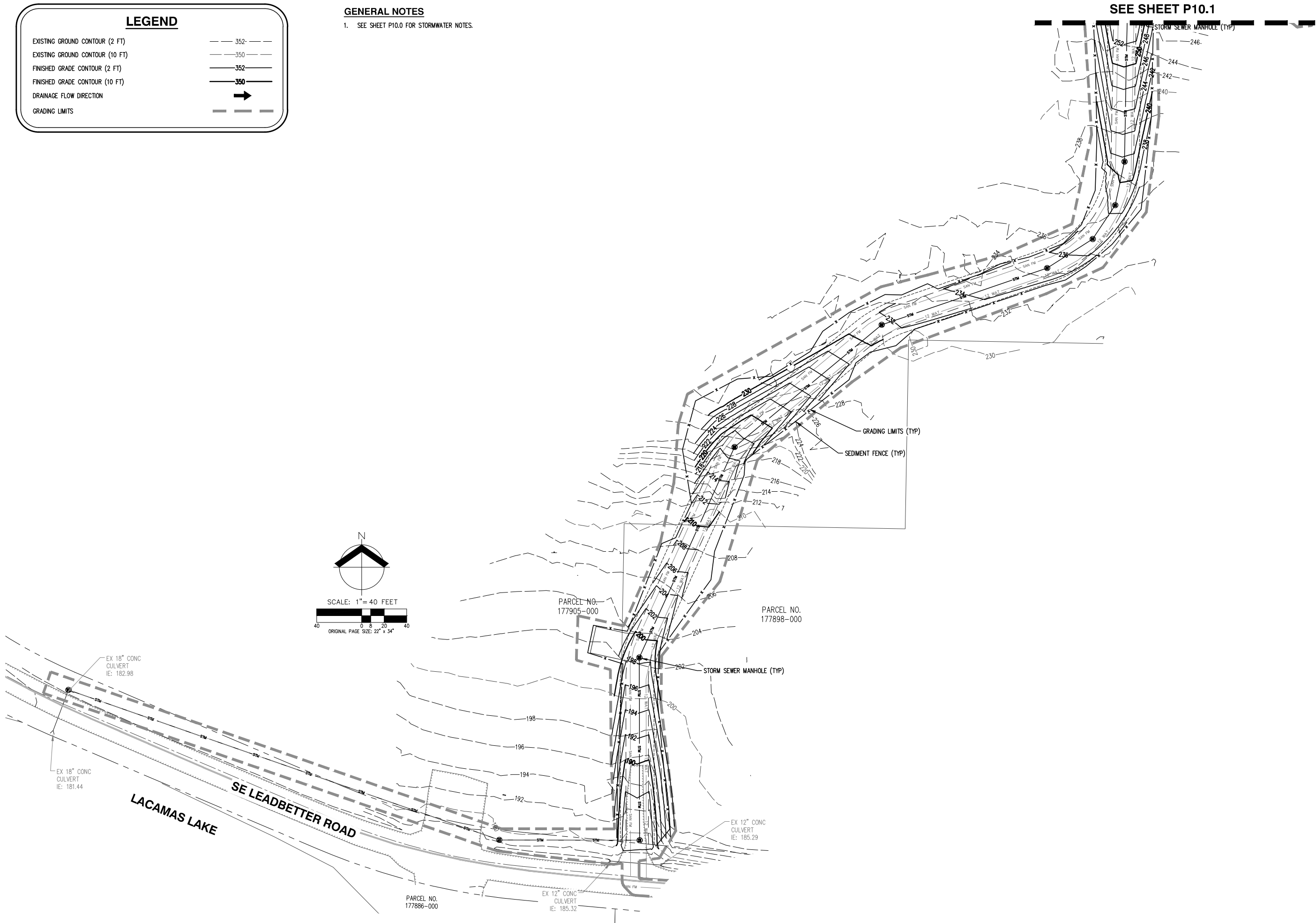
P10.4

LEGEND

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EXISTING GROUND CONTOUR (10 FT)	--- 350 ---
FINISHED GRADE CONTOUR (2 FT)	--- 352 ---
FINISHED GRADE CONTOUR (10 FT)	--- 350 ---
DRAINAGE FLOW DIRECTION	➔
GRADING LIMITS	- - - - -

GENERAL NOTES

1. SEE SHEET P10.0 FOR STORMWATER NOTES.



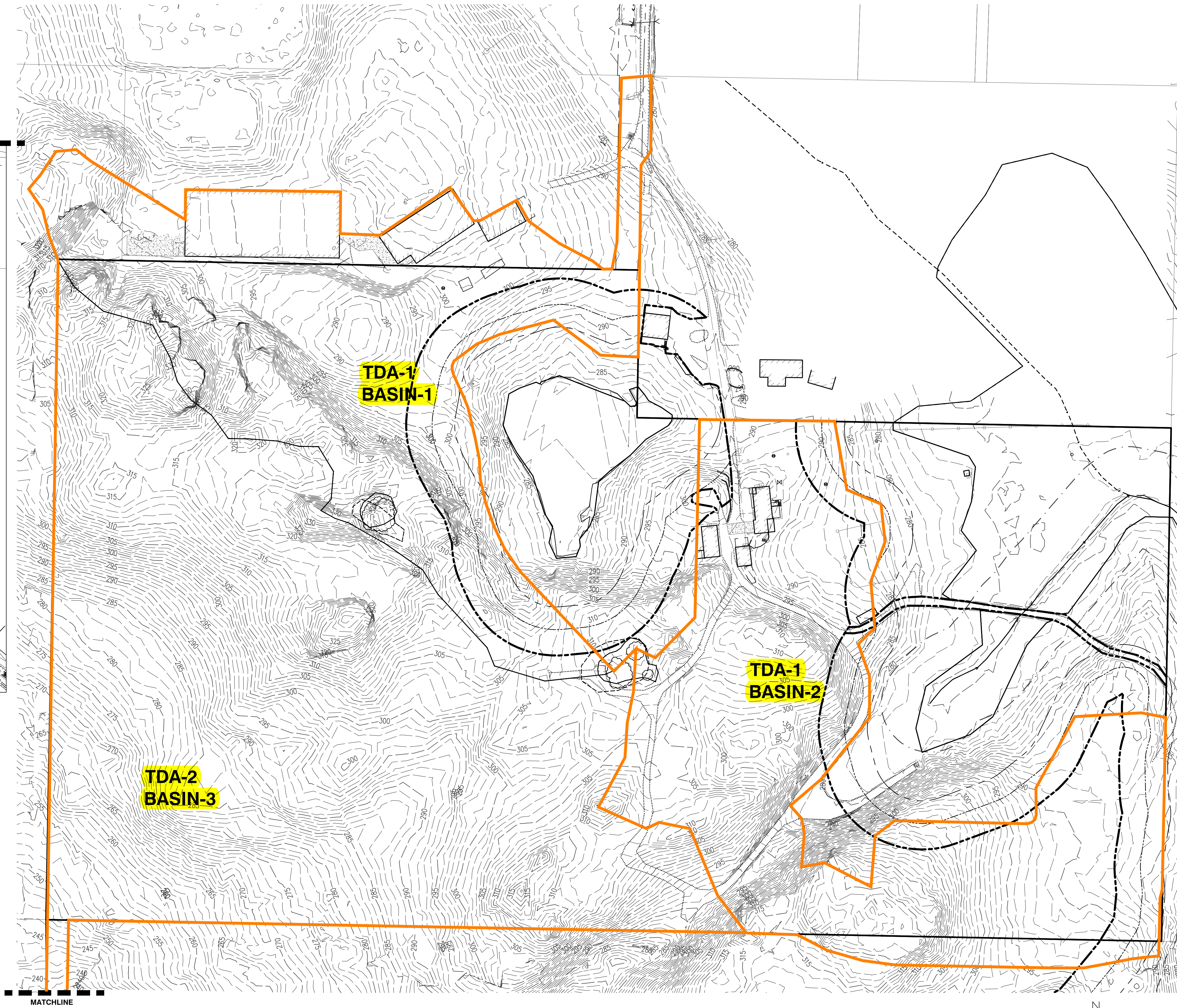
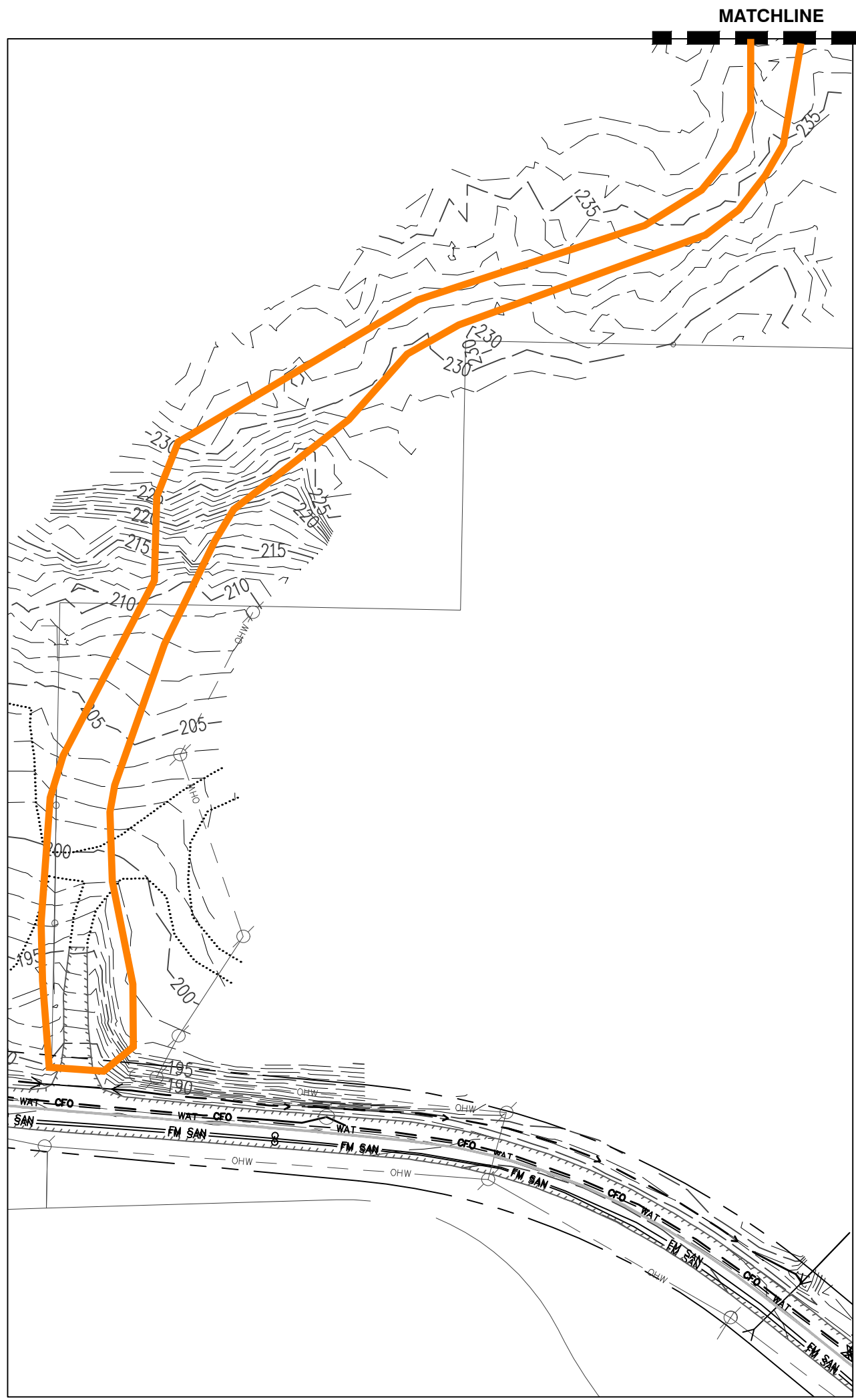


Appendix D: Stormwater Basin Maps

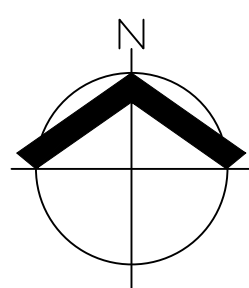
EXISTING STORM BASIN MAP
VILLAGE AT NORTH SHORE
HSR
CAMAS WASHINGTON

JOB NUMBER:	9095
DATE:	
DESIGNED BY:	MAZ
DRAWN BY:	MAZ
CHECKED BY:	BHH

C-01



SCALE: 1" = 80 FEET
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ORIGINAL PAGE SIZE: 22" x 34"





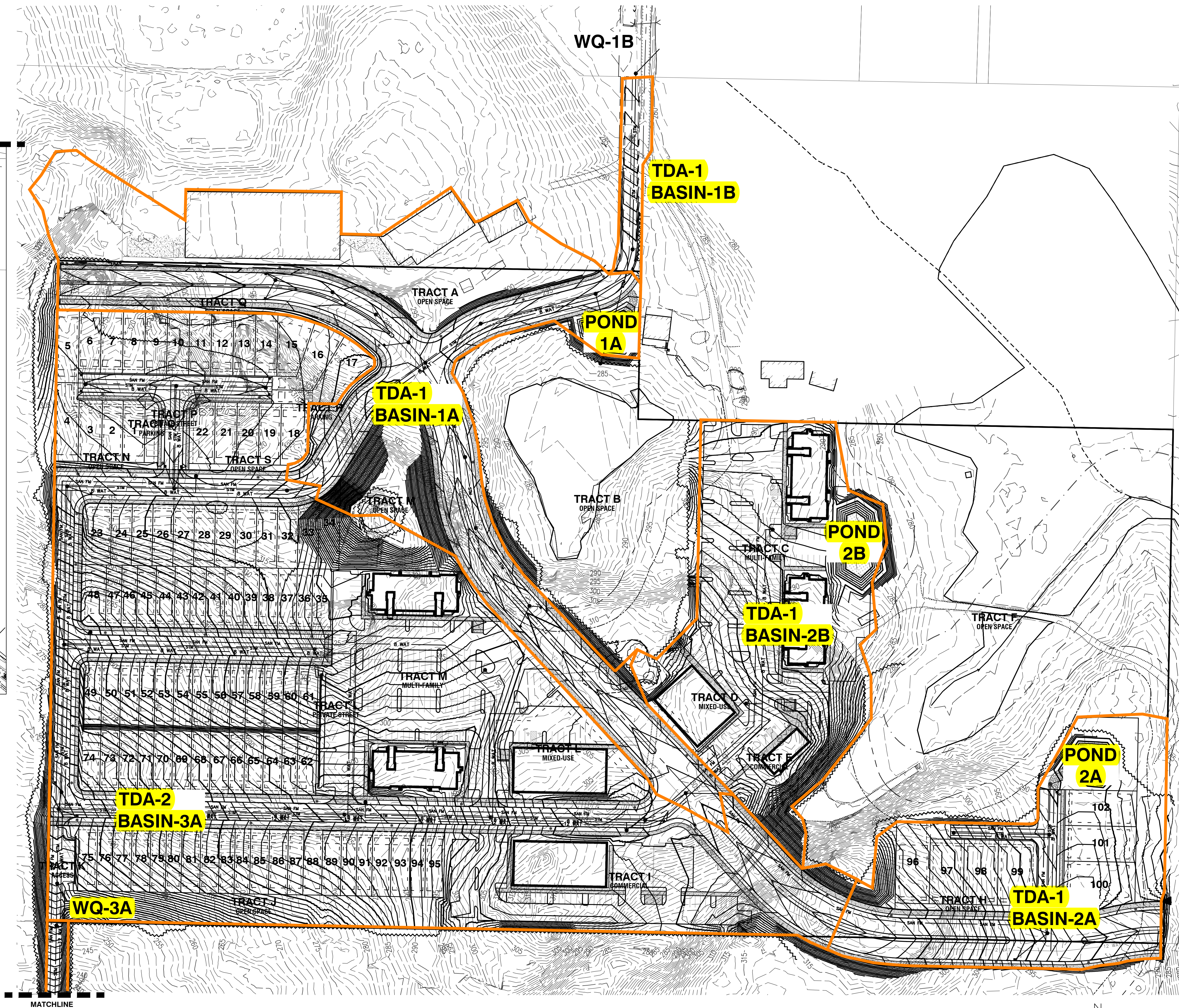
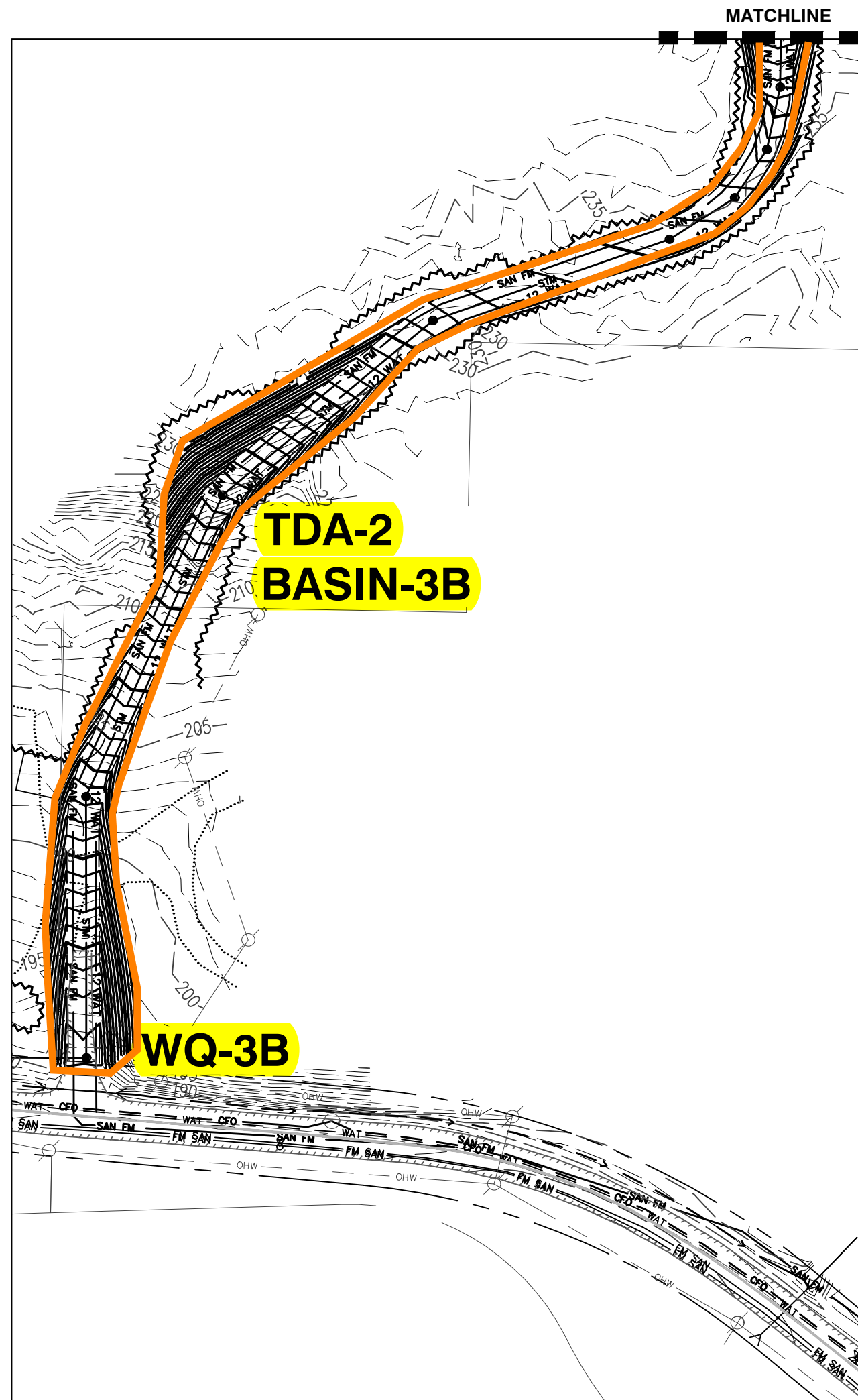
AKS ENGINEERING & FORESTRY, LLC
9600 NE 126TH AVE, STE 2520
VANCOUVER, WA 98682
360.882.0419
WWW.AKS-ENG.COM

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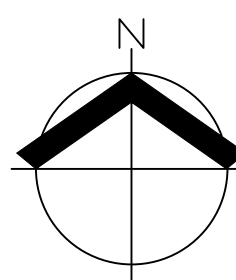
DEVELOPED STORM BASIN MAP
VILLAGE AT NORTH SHORE
HSR
CAMAS WASHINGTON

JOB NUMBER:	9095
DATE:	
DESIGNED BY:	MAZ
DRAWN BY:	MAZ
CHECKED BY:	BHH

C-02



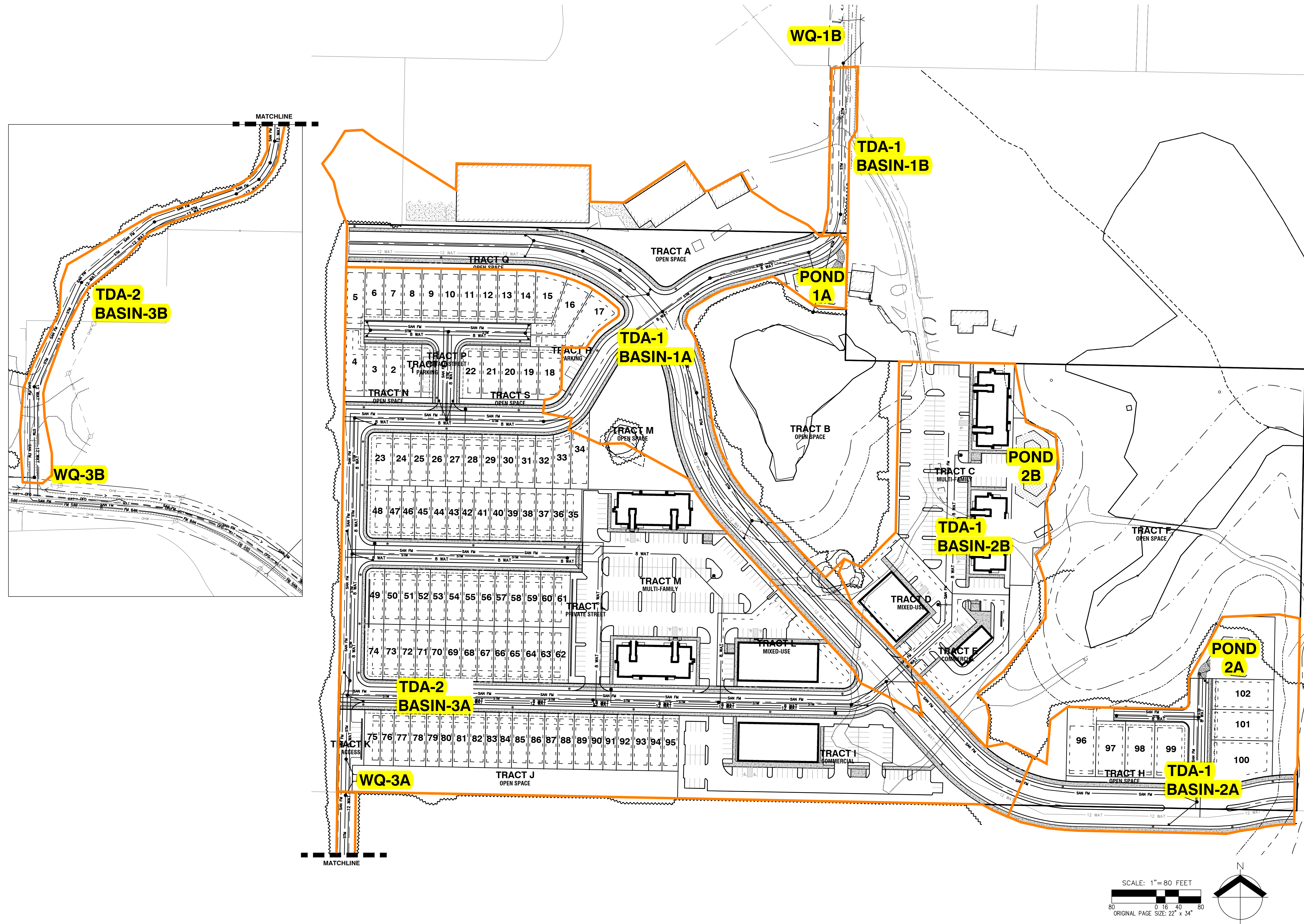
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0 16 40 80
ORIGINAL PAGE SIZE: 22" x 34"



CAMAS WASHINGTON

JOB NUMBER:	9095
DATE:	
DESIGNED BY:	MAZ
DRAWN BY:	MAZ
CHECKED BY:	BHH

C-02





Appendix E: BMP Details

V-12 Miscellaneous LID BMPs

V-12.1 Introduction to Miscellaneous LID BMPs

BMPs in this section have been grouped because they have the following in common:

- They employ Low Impact Development (LID) Principles
- They cannot be used to meet [I-3.4.6 MR6: Runoff Treatment](#)
- They typically cannot, by themselves, be used to meet the [Flow Control Performance Standard](#) within [I-3.4.7 MR7: Flow Control](#) or the [LID Performance Standard](#) within [I-3.4.5 MR5: On-Site Stormwater Management](#)
 - Some of the BMPs in this chapter do allow for some amount of Flow Control credit. See the guidance for each individual BMP for details.
- The design methods for each BMP in this section are unique. They do not have strong enough design similarities to other BMPs in this volume to place them in the other BMP categories identified in this volume.

BMP T5.13: Post-Construction Soil Quality and Depth

Purpose and Definition

Naturally occurring (undisturbed) soil and vegetation provide important stormwater functions including: infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition. These functions are largely lost when development strips away native soil and vegetation and replaces it with minimal topsoil and sod. Not only are these important stormwater functions lost, but such landscapes themselves can become pollution generating pervious surfaces due to increased use of pesticides, fertilizers and other landscaping and household/industrial chemicals, the concentration of pet wastes, and pollutants that accompany roadside litter.

Establishing soil quality and depth can obtain greater stormwater functions in the post-development landscape and help preserve the plant and soil system more effectively. This type of approach provides a soil/landscape system with adequate depth, permeability, and organic matter to sustain itself and to continue working as an effective stormwater infiltration system.

Applications and Limitations

Amending soils to establish a minimum soil quality and depth is not the same as preservation of naturally occurring soil and vegetation. However, establishing a minimum soil quality and depth will provide improved on-site management of stormwater flow and water quality.

This BMP can be considered infeasible on till soil slopes greater than 33 percent.

In addition to providing some amount of Flow Control benefit, this BMP also offers the following benefits:

- Amended soils can be included in designs for dispersion BMPs (see [V-3 Dispersion BMPs](#)) to improve dispersal and absorption of stormwater flows.
- This BMP creates a medium for healthy plant growth, reducing the need for fertilizers and pesticides and peak summer irrigation needs ([Chollak, n.d.](#)).
- This BMP can improve overall site water quality performance by promoting infiltration; increasing cation exchange capacity, pollutant adsorption, and filtration; and buffering soil pH ([USDA and USCC, 2005](#)).

Design Guidelines

Organic Matter

Soil organic matter can be attained through numerous materials such as compost, composted woody material, biosolids, forest product residuals, or other locally available materials deemed suitable for this application. The materials used must be appropriate and beneficial to the plant cover to be established and must not have an excessive percentage of clay fines.

Soil Retention

Retain, in an undisturbed state, the duff layer and native topsoil to the maximum extent practicable. In any areas requiring grading, remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas, to be reapplied to other portions of the site where feasible.

Soil Quality

All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility, or engineered as structural fill or slope shall, at project completion, demonstrate the following:

1. A topsoil layer comprised as follows:
 - **Planting Beds:** 8-10 percent organic content using 3 inches of compost incorporated to an 8-inch depth or a topsoil mix containing 35-40 percent compost by volume.
 - **Turf areas:** 3-5 percent organic content using 1.75 inches of compost incorporated to an 8-inch depth or a topsoil mix containing 20-25 percent compost by volume.
 - pH between 6.0 and 8.0 or a pH appropriate for installed plants.
2. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.

3. Mulch planting beds with 2 inches of organic material.
4. Use compost and other materials that meet the following organic content requirements:
 - The organic content must be met using the compost specification for [BMP T7.30: Bioretention](#), with the exception that the compost may have up to 35% biosolids or manure.
 - The compost must also have an organic matter content of 40% to 65%, and a carbon to nitrogen ratio below 25:1. The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region.

The resulting soil should be conducive to the type of vegetation to be established.

Implementation Options

The soil quality design guidelines listed above can be met by using one of the methods listed below:

1. Leave undisturbed native vegetation and soil, and protect from compaction during construction.
2. Amend existing site topsoil or subsoil with organic content at the rates given above.
3. Stockpile existing topsoil during grading, and replace it prior to planting. Stockpiled topsoil must also be amended if needed to meet the organic matter or depth requirements as given above.
4. Import topsoil mix of sufficient organic content and depth to meet the requirements.

More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

Construction Criteria

Protecting and enhancing site soils requires planning and sequencing of construction activities to reduce impacts. The following recommended steps are adapted from the *Low Impact Development Technical Guidance Manual for Puget Sound* ([WSU and PSP, 2012](#)) and the Building Soil – A Foundation for Success website (<http://www.buildingsoil.org/>). These steps begin with land clearing and grading and continue through end of construction (prior to planting) and after planting is complete:

Land Clearing and Grading Phase

- Fence all vegetation and soil protection areas prior to first disturbance, and communicate those areas to clearing and grading operators. The root zones of trees that may extend into the grading zone should be protected or cut rather than ripped during grading.
- Chip land-clearing debris on-site and reuse as erosion-control cover or stockpile for reuse as mulch at end of project.

- Stockpile topsoil to be reused with a breathable cover, such as wood chips or landscape fabric.
- If amended, topsoils will be placed at end of project. Grade 8 to 12 inches below finish grade to allow for placing the topsoil.

Construction Phase

- Ensure erosion and sediment control BMPs are in place before and modified after grading to protect construction activities. Compost-based BMPs (compost “blankets” for surface, and compost berms or socks for perimeter controls) give a “two-for-one” benefit because the compost can be reused as soil amendment at the end of the project.
- Lay out roads and driveways immediately after grading and place rock bases for them as soon as possible. Keep as much construction traffic as possible on the road base, and off open soils. This will improve erosion compliance, reduce soil compaction, and increase site safety by keeping rolling equipment on a firm base.
- Protect amended/restored soils from equipment-caused compaction by using steel plates or other BMPs if equipment access is unavoidable across amended soils.
- Maintain vegetation and soil protection area barriers and temporary tree root zone protection BMPs throughout construction and ensure that all contractors understand their importance.

End of Construction, Soil Preparation Before Planting

- Ensure vegetation and soil protection barriers are maintained through the end of construction.
- Disturbed or graded soil areas that have received vehicle traffic will need to be decompacted to a minimum 12-inch depth. This can be done with a cat-mounted ripper or with bucket-mounted ripping teeth.
- Amend all disturbed areas with compost or other specified amendments ≥ 8 inches deep by tilling, ripping, or mixing with a bucket loader. Alternatively, place amended stockpiled topsoil or import an amended topsoil. It is good practice to scarify or mix amended soils several inches into the underlying subsoil to enhance infiltration and root penetration. Compost from erosion BMPs (compost blankets, berms, or socks) can be reused as appropriate if immediately followed by planting and mulching so there is no lapse in erosion control.
- Amended topsoil can be placed as soon as building exterior work is complete. During this step, vehicles should stay on roads and driveway pads. Compost, soil blends provide good ongoing erosion protection.
- Avoid tilling through tree roots – instead use shallow amendment and mulching.
- Final preparation for turf areas should include raking rocks, rolling, and possibly placing 1 to 2 inches of sandy loam topsoil before seeding or sodding.

- Plan for amended soil to settle by placing amended soil slightly higher than desired final grade, or retain or import a smaller amount of amended topsoil to meet final grades adjacent to hardscape such as sidewalks.
- Keep compost, topsoil, and mulch delivery tickets so inspector can verify that quantities and products used match those intended per the design.

After Planting and End of Project Phase

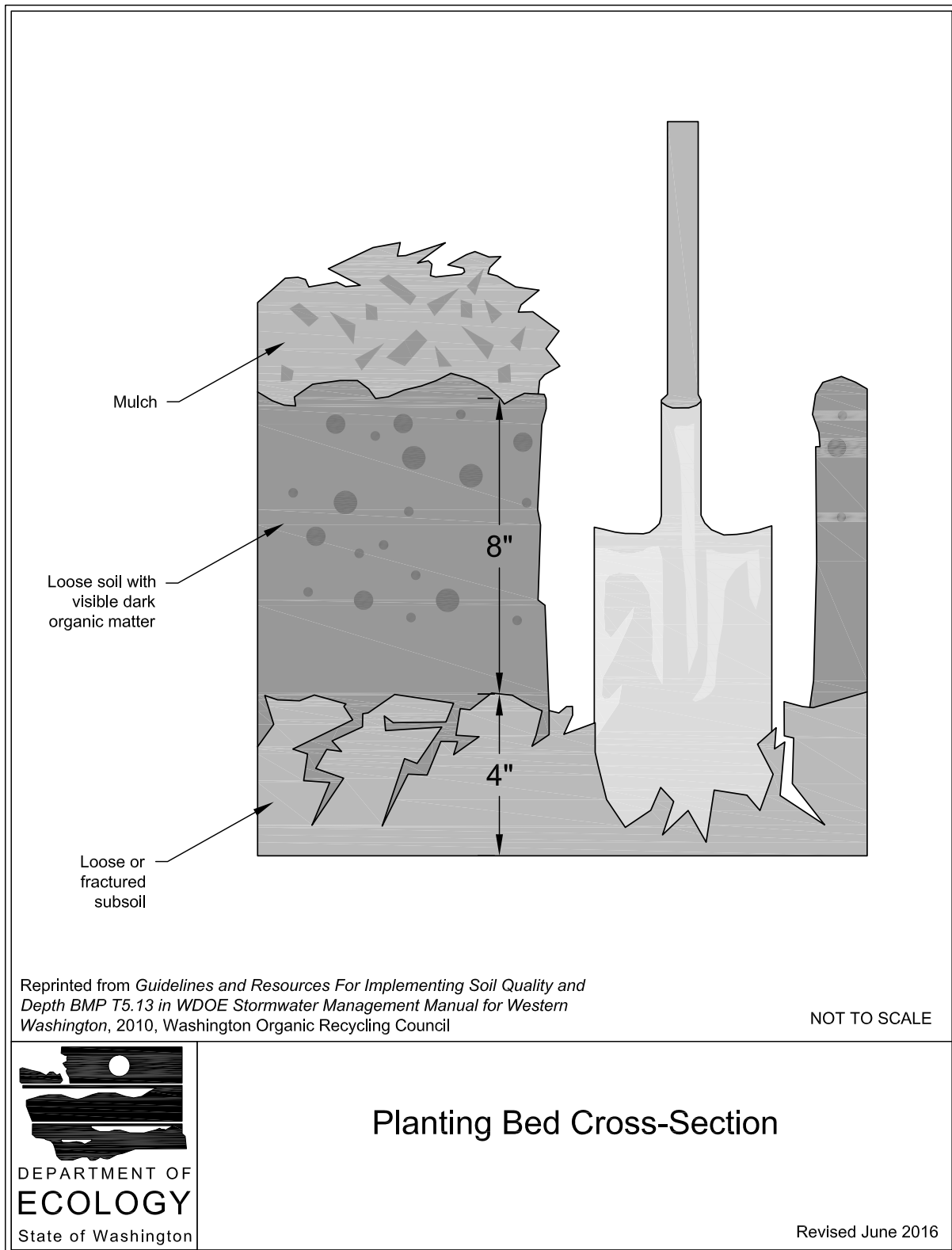
- Remove protection area barriers, including sediment fences, filter socks, and curb and storm drain barriers. Evaluate trees for stress and need for treatment, such as pruning, root-feeding, mulching etc. Plan to have an arborist on-site, as appropriate.
- Mulch all planting beds where soil has been amended and replanted with 2 to 3 inches of arborist wood chip or other specified mulch.
- Communicate a landscape management plan to property owners that includes: on-site reuse of organics (e.g. mulch leaves, mulch-mow grass clippings) to maintain soil health; avoiding pesticide use; and minimal organic-based fertilization.

Operation and Maintenance Criteria

- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant and mulch areas immediately after amending and settling the soil to stabilize the site as soon as possible.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Landscape management plans should continually renew organic levels through mulch-mowing on turf areas, allowing fallen leaves to remain on beds, and/or replenishing mulch layers every 1 to 2 years.
- Minimize or eliminate use of irrigation, herbicides, pesticides and fertilizers. Landscape management personnel should be trained to minimize chemical inputs, use nontoxic alternatives, and manage the landscape areas to minimize erosion, recognize soil and plant health problems, and optimize water storage and soil permeability.
- Remove weeds as necessary or appropriate through manual removal, tilling and/or re-mulching.
- Protect amended areas from excessive foot traffic and equipment to prevent compaction and erosion.

Runoff Model Representation

All areas meeting the soil quality and depth design criteria may be entered into approved runoff models as “Pasture” rather than “Lawn/Landscaping”.

Figure V-12.1: Planting Bed Cross-Section

V-11 Manufactured Treatment Devices as BMPs

V-11.1 Introduction to Manufactured Treatment Devices as BMPs

Traditional best management practices (BMPs) such as wetponds and filtration swales may not be appropriate in many situations due to size and space constraints or their inability to remove target pollutants. Because of this, the stormwater treatment industry emerged to develop new manufactured stormwater treatment devices.

Manufactured treatment devices are emerging technologies that are new to the stormwater treatment marketplace. These devices include both permanent and construction site treatment technologies. Many of these devices have not undergone complete performance testing, so their performance claims cannot be verified.

Ecology has established a program, the Technology Assessment Protocol – Ecology (TAPE), to evaluate the capabilities of manufactured treatment devices. Manufactured treatment devices that have been evaluated by TAPE are approved at some level of use designation under specified conditions. Their use is restricted in accordance with their evaluation as explained in [V-11.3 Approval Process for Manufactured Treatment Devices](#). The recommendations for use of individual manufactured treatment devices may change as we collect more data on their performance. Updated recommendations on their use are posted to Ecology's TAPE website at the following address:

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

Manufactured treatment devices can also be considered for retrofit situations, where TAPE approval may not be required.

V-11.2 Use Level Designations of Manufactured Treatment Devices

Ecology's Technology Assessment Protocol - Ecology (TAPE) program developed "use level designations" to assess levels of development for manufactured treatment devices. The use level designations are based upon the quantity, quality, and type of performance data. There are three use level designations:

- pilot use level designation (PULD),
- conditional use level designation (CULD), and
- general use level designation (GULD).

V-13.3 Other Detention Design Options

This section presents options beyond the BMPs provided in this manual that the designer may want to consider incorporating into the project design for detaining flows to meet Flow Control requirements.

Use of Parking Lots for Additional Detention

Parking lots may be used to provide additional detention volume, provided that all of the following criteria are met:

1. The depth of water detained does not exceed 1 foot (or other depth established by the permitting authority or local jurisdiction) at any location in the parking lot for runoff events up to and including the 100 year event.
2. The gradient of the parking lot area subject to ponding is 1 percent or greater.
3. The emergency overflow path is identified and noted on the engineering plan(s). The overflow must not create a significant adverse impact to downstream properties or drainage system(s).
4. Fire lanes used for emergency equipment must be free of ponding water for all runoff events up to and including the 100 year event.
5. A downstream Runoff Treatment BMP with sorptive oil removal is needed prior to discharge to surface or groundwater.

Use of Roofs for Detention

Detention ponding on roofs of structures may be used to meet Flow Control requirements provided all of the following are met:

1. The roof support structure is analyzed by a structural engineer to address the weight of ponded water (including an appropriate safety factor).
2. The roof area subject to ponding is sufficiently waterproofed to achieve a minimum service life of 30 years.
3. The minimum pitch of the roof area subject to ponding is 1/4 inch per foot.
4. An overflow system is included in the design to safely convey the 100 year peak flow from the roof.
5. A mechanism is included in the design to allow the ponding area to be drained for maintenance purposes or in the event the restrictor device is plugged.

BMP D.1: Detention Ponds

The design criteria in this section are for detention ponds (this BMP). However, many of the criteria also apply to [BMP T7.10: Infiltration Ponds](#), [BMP T10.10: Wetponds - Basic and Large](#), and

BMP T10.40: Combined Detention and Wetpool Facilities.

Dam Safety for Detention BMPs

Stormwater detention BMPs that can impound 10 acre-feet (435,600 cubic feet; 3.26 million gallons) or more with the water level measured at the embankment crest are subject to the state's dam safety requirements, even if water storage is intermittent and infrequent ([WAC 173-175-020 \(1\)](#)). The principal safety concern is for the downstream population at risk if the dam should breach and allow an uncontrolled release of the pond contents. Peak flows from dam failures are typically much larger than the 100-year flows which detention BMPs are typically designed to accommodate.

Dam safety considerations generally apply only to the volume of water stored above natural ground level. Per the definition of dam height in [WAC 173-175-030](#), natural ground elevation is measured from the downstream toe of the dam. If a trench is cut through natural ground to install an outlet pipe for a spillway or low-level drain, the natural ground elevation is measured from the base of the trench where the natural ground remains undisturbed.

With regard to the engineering design of stormwater detention BMPs, the primary effect of the state's dam safety requirements is in sizing the emergency spillway to accommodate the runoff from the dam safety design storm without overtopping the dam. The hydrologic computation procedures are the same as for the original pond design, except that the computations must use more extreme precipitation values and the appropriate dam safety design storm hyetographs. This information is described in detail within guidance documents developed by and available from Ecology's Dam Safety Office. In addition to the other design requirements for stormwater detention BMPs, dam safety requirements should be an integral part of planning and design for stormwater detention ponds. It is most cost-effective to consider these requirements from the beginning of the project.

In addition to the hydrologic and hydraulic issues related to precipitation and runoff, other dam safety requirements include geotechnical issues, construction inspection and documentation, dam breach analysis, inundation mapping, emergency action planning, and periodic inspections by project owners and by Dam Safety engineers. All of these requirements, plus procedural requirements for plan review and approval and payment of construction permit fees are described in detail in guidance documents developed by and available from the Dam Safety Office.

In addition to the written guidance documents, Dam Safety engineers are available to provide technical assistance to project owners and designers in understanding and addressing the dam safety requirements for their specific project. In the interest of providing a smooth integration of dam safety requirements into the stormwater detention project and streamlining Dam Safety's engineering review and issuance of the construction permit, it is recommended and requested that Dam Safety be contacted early in the project's planning process. The Dam Safety Office is located in the Ecology headquarters building in Lacey.

For more information about dam safety, please refer to Ecology's Dam Safety Office's Website at:

<https://www.ecology.wa.gov/Water-Shorelines/Water-supply/Dams>

Design Criteria

Standard details for detention ponds are shown in [Figure V-13.9: Typical Detention Pond](#), [Figure V-13.10: Typical Detention Pond Sections](#), and [Figure V-13.11: Overflow Structure](#). Control structure details and design guidance are provided in [V-13.2 Control Structure Design](#).

General

1. Detention ponds must be designed as flow through systems (however, parking lot storage may be utilized through a back up system; see [V-13.3 Other Detention Design Options](#)). Developed flows must enter through a conveyance system separate from the control structure and outflow conveyance system. Maximizing distance between the inlet and outlet is encouraged to promote sedimentation.
2. Detention pond bottoms should be level and be located a minimum of 0.5 foot (preferably 1 foot) below the inlet and outlet to provide sediment storage.
3. Design guidelines for outflow control structures are specified in [V-13.2 Control Structure Design](#).
4. A geotechnical analysis and report must be prepared for slopes over 15%, or if located within 200 feet of the top of a slope steeper than 40%, or landslide hazard area. The scope of the geotechnical report should include the assessment of impoundment seepage on the stability of the natural slope where the pond will be located within the setback limits set forth in this section.

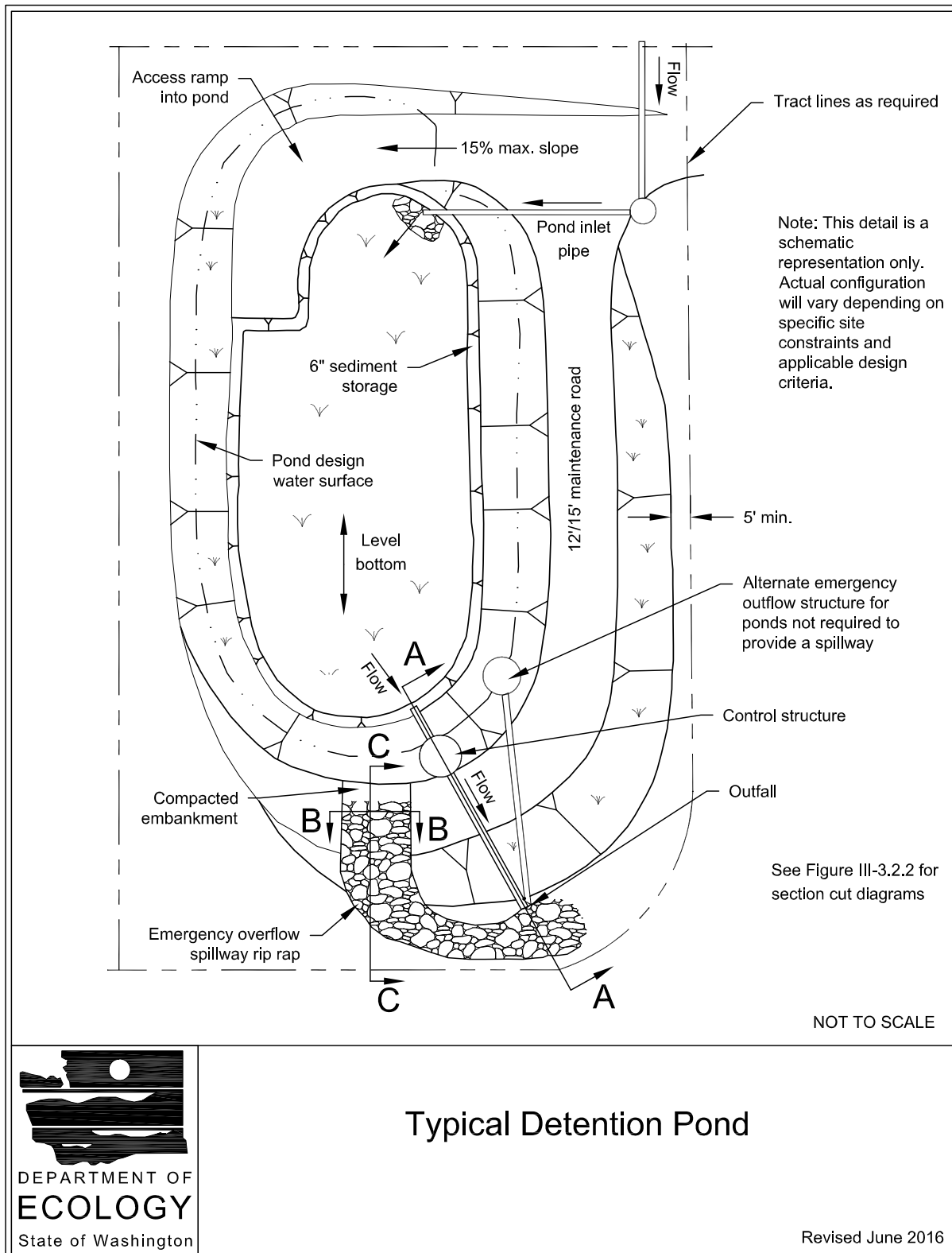
Figure V-13.9: Typical Detention Pond

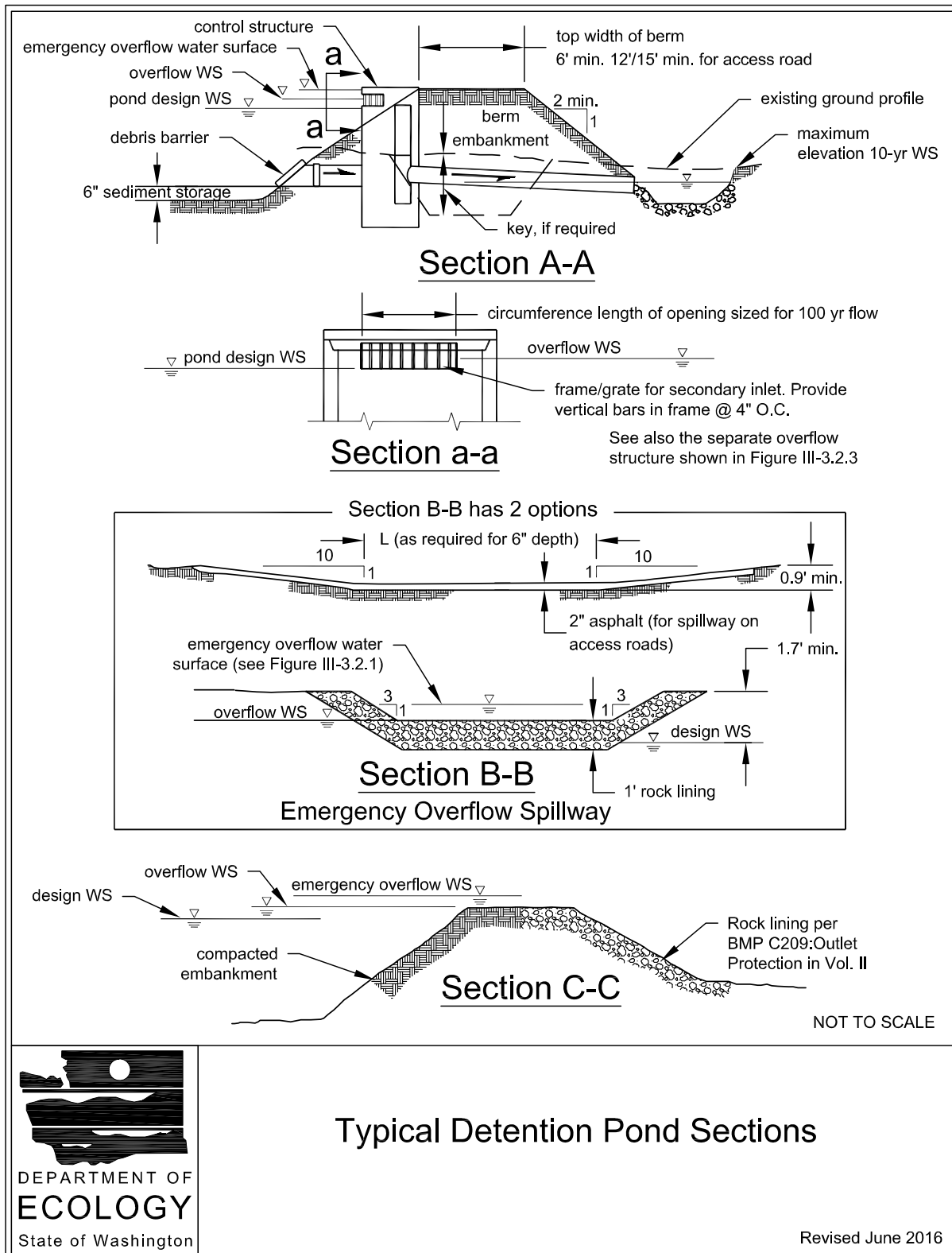
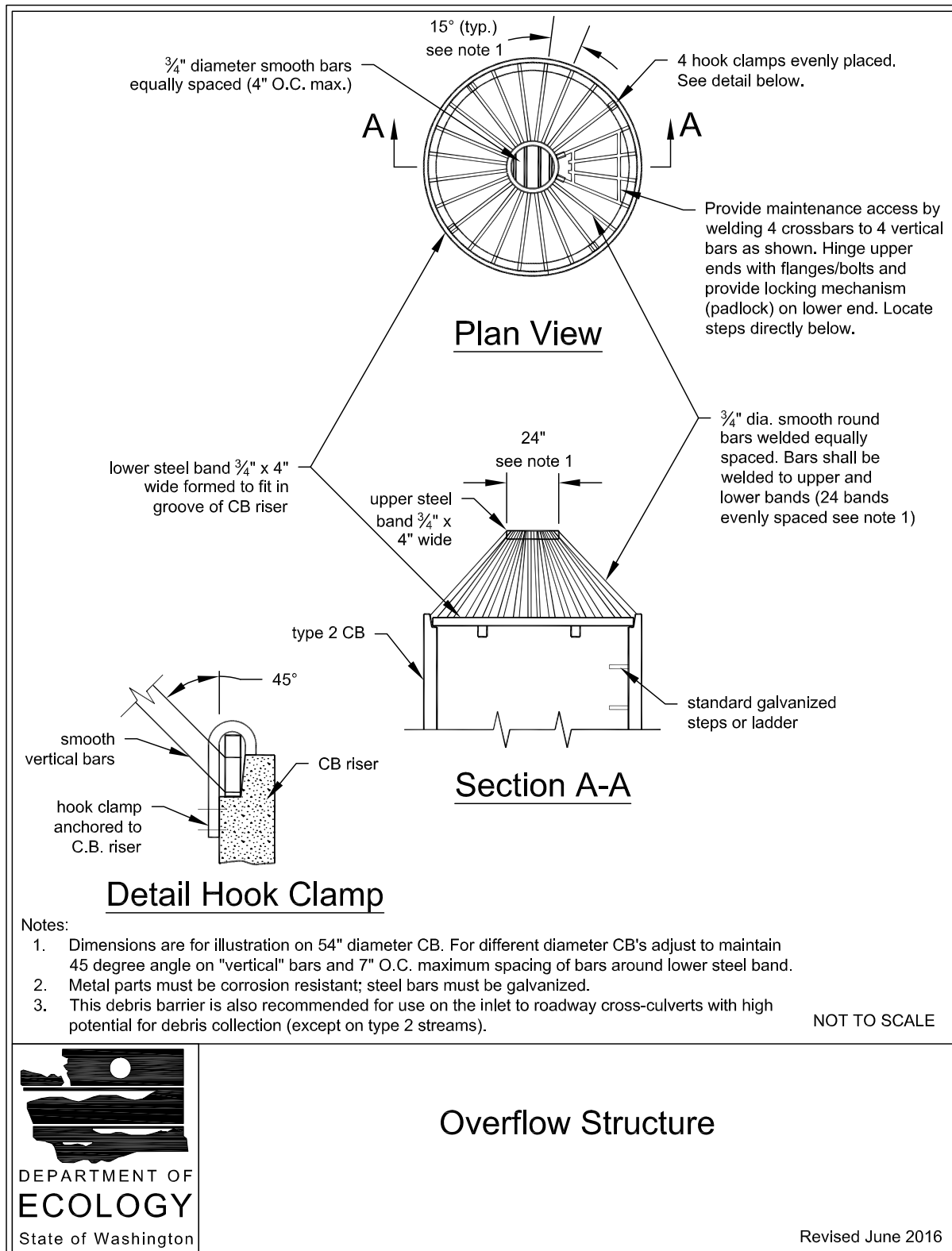
Figure V-13.10: Typical Detention Pond Sections

Figure V-13.11: Overflow Structure

Side Slopes

1. Interior side slopes up to the emergency overflow water surface should not be steeper than 3H:1V unless a fence is provided (see [Fencing](#) below).
2. Exterior side slopes must not be steeper than 2H:1V, unless analyzed for stability by a geotechnical engineer.
3. Detention pond walls may be vertical retaining walls, provided:
 - They are constructed of reinforced concrete per [BMP D.3: Detention Vaults](#).
 - A fence is provided along the top of the wall.
 - The entire detention pond perimeter may be retaining walls, however, it is recommended that at least 25 percent of the pond perimeter be a vegetated soil slope not steeper than 3H:1V. If the entire pond perimeter is to be retaining walls, provide ladders on the walls for safety reasons.
 - The design is stamped by a licensed engineer in the state of Washington with structural expertise.

Other retaining walls such as rockeries, concrete, masonry unit walls, and keystone type walls may be used if designed by a geotechnical engineer or a civil engineer with structural expertise.

Inlet

Reduce flow velocities of the discharge to the pond from the inlet pipe by using the methods described in [V-1.4.3 Outfall Systems](#).

Embankments

1. Pond berm embankments higher than 6 feet must be designed by a licensed engineer in the state of Washington with geotechnical expertise
2. For berm embankments 6 feet or less, the minimum top width should be 6 feet, or as recommended by a geotechnical engineer.
3. Construct pond berm embankments on native consolidated soil (or adequately compacted and stable fill soils analyzed by a geotechnical engineer) free of loose surface soil materials, roots, and other organic debris.
4. Construct pond berm embankments greater than 4 feet in height by excavating a key equal to 50 percent of the berm embankment cross sectional height and width, unless specified otherwise by a geotechnical engineer.
5. Embankment compaction should be accomplished in such a manner as to produce a dense, low permeability engineered fill that can tolerate post-construction settlements with a minimum of cracking. Place the embankment fill on a stable subgrade and compact to a minimum of 95% of the Standard Proctor Maximum Density (ASTM Procedure D698) or

95% of the Modified Proctor Maximum Density (ASTM Procedure D1557). Placement moisture content should lie within 1% dry to 3% wet of the optimum moisture content. The referenced compaction standard may have to be increased to comply with local regulations.

Construct the berm embankment of soils with the following characteristics: a minimum of 20% silt and clay, a maximum of 60% sand, a maximum of 60% silt, with nominal gravel and cobble content. Soils outside this specified range can be used, provided the design satisfactorily addresses the engineering concerns posed by these soils. The paramount concerns with these soils are their susceptibility to internal erosion or piping, and to surface erosion from wave action and runoff on the upstream and downstream slopes, respectively. Note: In general, excavated glacial till is well suited for berm embankment material.

6. Place anti seepage filter-drain diaphragms on outflow pipes in berm embankments impounding water with depths greater than 8 feet at the design water surface. See *Dam Safety Guidelines Part IV: Dam Design and Construction*, ([Ecology, 1993](#)) Section 3.3.B on pages 3-27 to 3-30.

Primary Overflow

1. Provide a primary overflow (usually a riser pipe within the control structure; see [V-13.2 Control Structure Design](#)) in all detention ponds, tanks, and vaults to bypass the 50 year developed peak flow over or around the restrictor system. This assumes the facility will be full due to plugged orifices or high inflows. The primary overflow is intended to protect against breaching of a pond embankment (or overflows of the upstream conveyance system in the case of a detention tank or vault). The design must provide controlled discharge directly into the downstream conveyance system or another acceptable discharge point.
2. Provide a secondary inlet to the control structure in ponds as additional protection against overtopping should the inlet pipe to the control structure become plugged. A grated opening ("jailhouse window") in the control structure manhole functions as a weir (see [Figure V-13.10: Typical Detention Pond Sections](#)) when used as a secondary inlet.

Note: The maximum circumferential length of this opening must not exceed one half the control structure circumference. The "birdcage" overflow structure as shown in [Figure V-13.11: Overflow Structure](#) may also be used as a secondary inlet.

Emergency Overflow Spillway

- In addition to the primary overflow (described above), ponds, tanks, and vaults must have an emergency overflow spillway. Emergency overflow spillways are intended to control the location of overtopping in the event of total control structure failure (e.g. blockage of the control structure outlet pipe) or extreme inflows, and direct overflows back into the downstream conveyance system or other acceptable discharge point.
- For impoundments of 10 acre-feet or greater, the emergency overflow spillway must meet the state's dam safety requirements (see [Dam Safety for Detention BMPs](#) above).
- For impoundments under 10 acre-feet, ponds must have an emergency overflow spillway that is sized to pass the 100 year developed peak flow in the event of total control structure failure (e.g. blockage of the control structure outlet pipe) or extreme inflows.

- As an option for ponds with berms less than 2 feet in height and located at grades less than 5 percent, emergency overflow may be provided by an emergency overflow structure, such as a Type II manhole fitted with a birdcage as shown in [Figure V-13.11: Overflow Structure](#). The emergency overflow structure must be designed to pass the 100 year developed peak flow, with a minimum 6 inches of freeboard, directly to the downstream conveyance system or another acceptable discharge point. Where an emergency overflow spillway would discharge to a slope steeper than 15%, consideration should be given to providing an emergency overflow structure in addition to the spillway.
- Armor the emergency overflow spillway with riprap in conformance with [BMP C209: Outlet Protection](#). The spillway must be armored full width, beginning at a point midway across the berm embankment and extending downstream to where emergency overflows reenter the conveyance system (see [Figure V-13.10: Typical Detention Pond Sections](#)).
- Emergency overflow spillway designs must be analyzed as broad crested trapezoidal weirs as described in [Methods of Analysis](#) (below). Either one of the weir sections shown in [Figure V-13.10: Typical Detention Pond Sections](#) may be used.
- Design the emergency overflow spillway to allow a minimum of 1 foot of freeboard above the maximum design storm (100-year, 24-hour storm) water surface level.

Access

1. Provide maintenance access road(s) to the control structure and other drainage structures associated with the pond (e.g. inlet or bypass structures). It is recommended that manhole and catch basin lids be in or at the edge of the access road and at least 3 feet from a property line.
2. An access ramp is needed for removal of sediment with a trackhoe and truck. Extend the ramp to the pond bottom if the pond bottom is greater than 1,500 square feet (measured without the ramp). If the pond bottom is less than 1,500 square feet (measured without the ramp), the ramp may end at an elevation 4 feet above the pond bottom.

On large, deep ponds, provide truck access to the pond bottom via an access ramp so loading can be done in the pond bottom. On small deep ponds, the truck can remain on the ramp for loading. On small shallow ponds, a ramp to the bottom may not be required if the trackhoe can load a truck parked at the pond edge or on the internal berm of a wetpond or combined pond (trackhoes can negotiate interior pond side slopes).

3. The internal berm of [BMP T10.10: Wetponds - Basic and Large](#) or [BMP T10.40: Combined Detention and Wetpool Facilities](#) may be used for access if all of the following apply:
 - The internal berm is no more than 4 feet above the first wetpool cell.
 - The first wetpool cell is less than 1,500 square feet (measured without the ramp).
 - The internal berm is designed to support a loaded truck, considering the berm is normally submerged and saturated.
4. If a fence is required, access should be limited by a double posted gate or by bollards – two fixed bollards on each side of the access road and two removable bollards equally located

between the fixed bollards.

5. The design guidelines for access roads and ramps:
 - A maximum grade of 15%.
 - A minimum of 40 feet outside turning radius.
 - Locate fence gates only on straight sections of road.
 - 15 feet in width on curves and 12 feet on straight sections.
 - The drivable surface should have a 20-year design life to carry the load of a 24-ton truck; assume three trips per year.
 - Provide a paved apron where access roads connect to paved public roadways.
 - A truck turnaround is required at the terminus of the road.
6. Construct access roads and ramps with asphalt pavement, permeable pavement, gravel surface, or modular grid pavement. All surfaces must conform to the jurisdictional standards and manufacturer's specifications.

Fencing

1. A fence is needed at the emergency overflow water surface elevation, or higher, where a pond interior side slope is steeper than 3H:1V, or where the impoundment is a wall greater than 24 inches in height. The fence need only be constructed for those slopes steeper than 3H:1V. Other regulations such as the International Building Code or Uniform Building Code may require fencing of vertical walls. If more than 10 percent of slopes are steeper 3H:1V, it is recommended that the entire pond be fenced.

Fences discourage access to portions of a pond where steep side slopes (steeper than 3:1) increase the potential for slipping into the pond. Fences also serve to guide those who have fallen into a pond to side slopes that are flat enough (flatter than 3:1 and unfenced) to allow for easy escape.

2. It is recommended that fences be 6 feet in height. For example designs, see WSDOT Standard Plan L-2, Type 1 or Type 3 chain link fence. The fence may be a minimum of 4 feet in height if the depth of the impoundment (measured from the lowest elevation in the bottom of the impoundment, directly adjacent to the bottom of the fenced slope, up to the emergency overflow water surface) is 5 feet or less. For example designs, see WSDOT Standard Plan L-2, Type 4 or Type 6 chain link fence.
3. Access road gates may be 16 feet in width consisting of two swinging sections 8 feet in width. Provide additional vehicular access gates as needed to facilitate maintenance access.
4. Pedestrian access gates (if needed) should be 4 feet in width.
5. Vertical metal balusters or 9 gauge galvanized steel fabric with bonded vinyl coating can be used as fence material. For steel fabric fences, consider the following aesthetic features:

- a. Vinyl coating that is compatible with the surrounding environment (e.g. green in open, grassy areas and black or brown in wooded areas). All posts, cross bars, and gates may be painted or coated the same color as the vinyl clad fence fabric.
 - b. Fence posts and rails that conform to WSDOT Standard Plan L 2 for Types 1, 3, or 4 chain link fence.
- 6. For metal baluster fences, Uniform Building Code standards apply.
- 7. Wood fences may be used in subdivisions where the fence will be maintained by homeowners associations or adjacent lot owners.
- 8. Wood fences should have pressure treated posts (ground contact rated) either set in 24 inch deep concrete footings or attached to footings by galvanized brackets. Rails and fence boards may be cedar, pressure treated fir, or hemlock.
- 9. Where only short stretches of the pond perimeter (< 10 percent) have side slopes steeper than 3:1, use split rail fences (3 foot minimum height) or densely planted thorned hedges (e.g., barberry, holly) in place of a standard fence.

Sediment Depth Marker

Consider providing a fixed vertical sediment depth marker installed in the BMP to measure sediment deposition over time.

Signage

Detention ponds (this BMP), [BMP T7.10: Infiltration Ponds](#), [BMP T10.10: Wetponds - Basic and Large](#), and [BMP T10.40: Combined Detention and Wetpool Facilities](#) should have a sign placed for maximum visibility from adjacent streets, sidewalks, and paths. An example of sign specifications for a permanent surface water control pond is illustrated in [Figure V-13.12: Example of Permanent Surface Water Control Pond Sign](#).



Appendix F: Flow Control & Water Quality Analysis

WWHM2012

PROJECT REPORT

**TDA #1 FLOW CONTROL
WITH OVERFLOW/EMERGENCY
OUTLET**

General Model Information

WWHM2012 Project Name: 9095 Villages

Site Name:

Site Address:

City:

Report Date: 7/11/2025

Gage: Lacamas

Data Start: 1948/10/01

Data End: 2008/09/30

Timestep: 15 Minute

Precip Scale: 1.300

Version Date: 2025/05/13

Version: 4.3.2

POC Thresholds

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

High Flow Threshold for POC1: 50 Year

Low Flow Threshold for POC2: 50 Percent of the 2 Year

High Flow Threshold for POC2: 50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass: No

GroundWater: No

Pervious Land Use	acre
SG4, Forest, Steep	5.236
SG4, Field, Mod	1.203

Pervious Total 6.439

Impervious Land Use	acre
ROADS FLAT	0.178
ROOF TOPS FLAT	0.844

Impervious Total 1.022

Basin Total 7.461

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		

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Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Forest, Steep	7.979
Pervious Total	7.979
Impervious Land Use	acre
Impervious Total	0
Basin Total	7.979

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 1	POC 1	

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Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Forest, Steep	14.548
Pervious Total	14.548
Impervious Land Use	acre
Impervious Total	0
Basin Total	14.548

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 2	POC 2	

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*Mitigated Land Use***Basin 1A**

Bypass: No

GroundWater: No

Pervious Land Use acre
 SG4, Field, Mod 2.53

Pervious Total 2.53

Impervious Land Use acre
 ROADS FLAT 0.178
 ROADS MOD 2.798
 ROOF TOPS FLAT 0.844

Impervious Total 3.82

Basin Total 6.35

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Trapezoidal Pond 1A Trapezoidal Pond 1A

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Basin 1B

Bypass:	Yes
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 0.147
Pervious Total	0.147
Impervious Land Use ROADS MOD	acre 0.141
Impervious Total	0.141
Basin Total	0.288

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 1	POC 1	

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Basin 2A

Bypass:	No
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 0.728
Pervious Total	0.728
Impervious Land Use ROADS MOD	acre 2.336
Impervious Total	2.336
Basin Total	3.064

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
Trapezoidal Pond 2A	Trapezoidal Pond 2A	

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Basin 2B

Bypass:	No
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 0.776
Pervious Total	0.776
Impervious Land Use ROADS MOD	acre 2.932
Impervious Total	2.932
Basin Total	3.708

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
Trapezoidal Pond 2B	Trapezoidal Pond 2B	

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Basin 3A

Bypass:	No
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 3.495
Pervious Total	3.495
Impervious Land Use ROADS MOD	acre 12.331
Impervious Total	12.331
Basin Total	15.826

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 2	POC 2	

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Basin 3B

Bypass:	No
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 0.268
Pervious Total	0.268
Impervious Land Use ROADS MOD	acre 0.486
Impervious Total	0.486
Basin Total	0.754

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 2	POC 2	

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Routing Elements
Predeveloped Routing

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Mitigated Routing**Trapezoidal Pond 1A**

Bottom Length: 40.00 ft.
 Bottom Width: 40.00 ft.
 Depth: 4 ft.
 Volume at riser head: 0.1689 acre-feet.
 Side slope 1: 3 To 1
 Side slope 2: 3 To 1
 Side slope 3: 3 To 1
 Side slope 4: 3 To 1
 Discharge Structure
 Riser Height: 3 ft.
 Riser Diameter: 18 in.
 Notch Type: Rectangular
 Notch Width: 0.500 ft.
 Notch Height: 1.200 ft.
 Orifice 1 Diameter: 4.000 in. Elevation:-0.387083333333333 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.036	0.000	0.270	0.000
0.0444	0.037	0.001	0.285	0.000
0.0889	0.037	0.003	0.299	0.000
0.1333	0.038	0.005	0.313	0.000
0.1778	0.038	0.006	0.326	0.000
0.2222	0.039	0.008	0.338	0.000
0.2667	0.039	0.010	0.351	0.000
0.3111	0.040	0.012	0.362	0.000
0.3556	0.040	0.013	0.374	0.000
0.4000	0.041	0.015	0.385	0.000
0.4444	0.041	0.017	0.395	0.000
0.4889	0.042	0.019	0.406	0.000
0.5333	0.042	0.021	0.416	0.000
0.5778	0.043	0.023	0.426	0.000
0.6222	0.043	0.025	0.436	0.000
0.6667	0.044	0.027	0.445	0.000
0.7111	0.045	0.029	0.455	0.000
0.7556	0.045	0.031	0.464	0.000
0.8000	0.046	0.033	0.473	0.000
0.8444	0.046	0.035	0.481	0.000
0.8889	0.047	0.037	0.490	0.000
0.9333	0.047	0.039	0.498	0.000
0.9778	0.048	0.041	0.507	0.000
1.0222	0.048	0.043	0.515	0.000
1.0667	0.049	0.045	0.523	0.000
1.1111	0.050	0.048	0.531	0.000
1.1556	0.050	0.050	0.539	0.000
1.2000	0.051	0.052	0.547	0.000
1.2444	0.051	0.054	0.554	0.000
1.2889	0.052	0.057	0.562	0.000
1.3333	0.052	0.059	0.569	0.000

1.3778	0.053	0.061	0.576	0.000
1.4222	0.054	0.064	0.584	0.000
1.4667	0.054	0.066	0.591	0.000
1.5111	0.055	0.069	0.598	0.000
1.5556	0.055	0.071	0.605	0.000
1.6000	0.056	0.074	0.612	0.000
1.6444	0.057	0.076	0.618	0.000
1.6889	0.057	0.079	0.625	0.000
1.7333	0.058	0.081	0.632	0.000
1.7778	0.058	0.084	0.638	0.000
1.8222	0.059	0.086	0.650	0.000
1.8667	0.060	0.089	0.680	0.000
1.9111	0.060	0.092	0.718	0.000
1.9556	0.061	0.095	0.763	0.000
2.0000	0.062	0.097	0.813	0.000
2.0444	0.062	0.100	0.868	0.000
2.0889	0.063	0.103	0.926	0.000
2.1333	0.064	0.106	0.988	0.000
2.1778	0.064	0.109	1.052	0.000
2.2222	0.065	0.111	1.119	0.000
2.2667	0.066	0.114	1.188	0.000
2.3111	0.066	0.117	1.259	0.000
2.3556	0.067	0.120	1.331	0.000
2.4000	0.067	0.123	1.405	0.000
2.4444	0.068	0.126	1.481	0.000
2.4889	0.069	0.129	1.557	0.000
2.5333	0.070	0.132	1.634	0.000
2.5778	0.070	0.136	1.712	0.000
2.6222	0.071	0.139	1.790	0.000
2.6667	0.072	0.142	1.869	0.000
2.7111	0.072	0.145	1.948	0.000
2.7556	0.073	0.148	2.027	0.000
2.8000	0.074	0.152	2.107	0.000
2.8444	0.074	0.155	2.202	0.000
2.8889	0.075	0.158	2.299	0.000
2.9333	0.076	0.162	2.398	0.000
2.9778	0.076	0.165	2.499	0.000
3.0222	0.077	0.168	2.605	0.000
3.0667	0.078	0.172	2.831	0.000
3.1111	0.079	0.175	3.150	0.000
3.1556	0.079	0.179	3.538	0.000
3.2000	0.080	0.183	3.977	0.000
3.2444	0.081	0.186	4.455	0.000
3.2889	0.081	0.190	4.958	0.000
3.3333	0.082	0.193	5.471	0.000
3.3778	0.083	0.197	5.979	0.000
3.4222	0.084	0.201	6.470	0.000
3.4667	0.084	0.205	6.929	0.000
3.5111	0.085	0.208	7.345	0.000
3.5556	0.086	0.212	7.710	0.000
3.6000	0.087	0.216	8.019	0.000
3.6444	0.087	0.220	8.272	0.000
3.6889	0.088	0.224	8.476	0.000
3.7333	0.089	0.228	8.646	0.000
3.7778	0.090	0.232	8.886	0.000
3.8222	0.090	0.236	9.067	0.000
3.8667	0.091	0.240	9.243	0.000
3.9111	0.092	0.244	9.415	0.000

3.9556	0.093	0.248	9.583	0.000
4.0000	0.094	0.252	9.747	0.000
4.0444	0.094	0.256	9.907	0.000

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Trapezoidal Pond 2A

Bottom Length: 40.00 ft.
 Bottom Width: 40.00 ft.
 Depth: 4 ft.
 Volume at riser head: 0.1689 acre-feet.
 Side slope 1: 3 To 1
 Side slope 2: 3 To 1
 Side slope 3: 3 To 1
 Side slope 4: 3 To 1
 Discharge Structure
 Riser Height: 3 ft.
 Riser Diameter: 18 in.
 Notch Type: Rectangular
 Notch Width: 0.330 ft.
 Notch Height: 1.333 ft.
 Orifice 1 Diameter: 4.000 in. Elevation:-0.3333333333333333 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.036	0.000	0.250	0.000
0.0444	0.037	0.001	0.266	0.000
0.0889	0.037	0.003	0.282	0.000
0.1333	0.038	0.005	0.296	0.000
0.1778	0.038	0.006	0.310	0.000
0.2222	0.039	0.008	0.323	0.000
0.2667	0.039	0.010	0.336	0.000
0.3111	0.040	0.012	0.348	0.000
0.3556	0.040	0.013	0.360	0.000
0.4000	0.041	0.015	0.371	0.000
0.4444	0.041	0.017	0.382	0.000
0.4889	0.042	0.019	0.393	0.000
0.5333	0.042	0.021	0.404	0.000
0.5778	0.043	0.023	0.414	0.000
0.6222	0.043	0.025	0.424	0.000
0.6667	0.044	0.027	0.434	0.000
0.7111	0.045	0.029	0.443	0.000
0.7556	0.045	0.031	0.453	0.000
0.8000	0.046	0.033	0.462	0.000
0.8444	0.046	0.035	0.471	0.000
0.8889	0.047	0.037	0.480	0.000
0.9333	0.047	0.039	0.488	0.000
0.9778	0.048	0.041	0.497	0.000
1.0222	0.048	0.043	0.505	0.000
1.0667	0.049	0.045	0.513	0.000
1.1111	0.050	0.048	0.521	0.000
1.1556	0.050	0.050	0.529	0.000
1.2000	0.051	0.052	0.537	0.000
1.2444	0.051	0.054	0.545	0.000
1.2889	0.052	0.057	0.553	0.000
1.3333	0.052	0.059	0.560	0.000
1.3778	0.053	0.061	0.568	0.000
1.4222	0.054	0.064	0.575	0.000

1.4667	0.054	0.066	0.582	0.000
1.5111	0.055	0.069	0.589	0.000
1.5556	0.055	0.071	0.596	0.000
1.6000	0.056	0.074	0.603	0.000
1.6444	0.057	0.076	0.610	0.000
1.6889	0.057	0.079	0.620	0.000
1.7333	0.058	0.081	0.642	0.000
1.7778	0.058	0.084	0.670	0.000
1.8222	0.059	0.086	0.702	0.000
1.8667	0.060	0.089	0.737	0.000
1.9111	0.060	0.092	0.776	0.000
1.9556	0.061	0.095	0.817	0.000
2.0000	0.062	0.097	0.860	0.000
2.0444	0.062	0.100	0.904	0.000
2.0889	0.063	0.103	0.951	0.000
2.1333	0.064	0.106	0.998	0.000
2.1778	0.064	0.109	1.047	0.000
2.2222	0.065	0.111	1.097	0.000
2.2667	0.066	0.114	1.148	0.000
2.3111	0.066	0.117	1.200	0.000
2.3556	0.067	0.120	1.253	0.000
2.4000	0.067	0.123	1.305	0.000
2.4444	0.068	0.126	1.359	0.000
2.4889	0.069	0.129	1.413	0.000
2.5333	0.070	0.132	1.467	0.000
2.5778	0.070	0.136	1.521	0.000
2.6222	0.071	0.139	1.575	0.000
2.6667	0.072	0.142	1.630	0.000
2.7111	0.072	0.145	1.695	0.000
2.7556	0.073	0.148	1.761	0.000
2.8000	0.074	0.152	1.828	0.000
2.8444	0.074	0.155	1.896	0.000
2.8889	0.075	0.158	1.966	0.000
2.9333	0.076	0.162	2.036	0.000
2.9778	0.076	0.165	2.108	0.000
3.0222	0.077	0.168	2.200	0.000
3.0667	0.078	0.172	2.426	0.000
3.1111	0.079	0.175	2.746	0.000
3.1556	0.079	0.179	3.133	0.000
3.2000	0.080	0.183	3.573	0.000
3.2444	0.081	0.186	4.051	0.000
3.2889	0.081	0.190	4.553	0.000
3.3333	0.082	0.193	5.066	0.000
3.3778	0.083	0.197	5.575	0.000
3.4222	0.084	0.201	6.065	0.000
3.4667	0.084	0.205	6.524	0.000
3.5111	0.085	0.208	6.941	0.000
3.5556	0.086	0.212	7.306	0.000
3.6000	0.087	0.216	7.614	0.000
3.6444	0.087	0.220	7.867	0.000
3.6889	0.088	0.224	8.072	0.000
3.7333	0.089	0.228	8.242	0.000
3.7778	0.090	0.232	8.482	0.000
3.8222	0.090	0.236	8.663	0.000
3.8667	0.091	0.240	8.839	0.000
3.9111	0.092	0.244	9.011	0.000
3.9556	0.093	0.248	9.179	0.000
4.0000	0.094	0.252	9.342	0.000

4.0444

0.094

0.256

9.503

0.000

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Trapezoidal Pond 2B

Bottom Length: 60.00 ft.
 Bottom Width: 60.00 ft.
 Depth: 4 ft.
 Volume at riser head: 0.3329 acre-feet.
 Side slope 1: 3 To 1
 Side slope 2: 3 To 1
 Side slope 3: 3 To 1
 Side slope 4: 3 To 1
 Discharge Structure
 Riser Height: 3 ft.
 Riser Diameter: 18 in.
 Notch Type: Rectangular
 Notch Width: 0.330 ft.
 Notch Height: 1.333 ft.
 Orifice 1 Diameter: 4.000 in. Elevation: 0 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.082	0.000	0.000	0.000
0.0444	0.083	0.003	0.091	0.000
0.0889	0.084	0.007	0.129	0.000
0.1333	0.084	0.011	0.158	0.000
0.1778	0.085	0.015	0.183	0.000
0.2222	0.086	0.018	0.204	0.000
0.2667	0.087	0.022	0.224	0.000
0.3111	0.087	0.026	0.242	0.000
0.3556	0.088	0.030	0.258	0.000
0.4000	0.089	0.034	0.274	0.000
0.4444	0.090	0.038	0.289	0.000
0.4889	0.090	0.042	0.303	0.000
0.5333	0.091	0.046	0.317	0.000
0.5778	0.092	0.050	0.330	0.000
0.6222	0.093	0.054	0.342	0.000
0.6667	0.094	0.058	0.354	0.000
0.7111	0.094	0.063	0.366	0.000
0.7556	0.095	0.067	0.377	0.000
0.8000	0.096	0.071	0.388	0.000
0.8444	0.097	0.075	0.399	0.000
0.8889	0.098	0.080	0.409	0.000
0.9333	0.098	0.084	0.419	0.000
0.9778	0.099	0.089	0.429	0.000
1.0222	0.100	0.093	0.439	0.000
1.0667	0.101	0.097	0.448	0.000
1.1111	0.102	0.102	0.457	0.000
1.1556	0.102	0.107	0.466	0.000
1.2000	0.103	0.111	0.475	0.000
1.2444	0.104	0.116	0.484	0.000
1.2889	0.105	0.120	0.492	0.000
1.3333	0.106	0.125	0.501	0.000
1.3778	0.107	0.130	0.509	0.000
1.4222	0.107	0.135	0.517	0.000

1.4667	0.108	0.139	0.525	0.000
1.5111	0.109	0.144	0.533	0.000
1.5556	0.110	0.149	0.541	0.000
1.6000	0.111	0.154	0.549	0.000
1.6444	0.112	0.159	0.556	0.000
1.6889	0.112	0.164	0.567	0.000
1.7333	0.113	0.169	0.590	0.000
1.7778	0.114	0.174	0.618	0.000
1.8222	0.115	0.179	0.651	0.000
1.8667	0.116	0.184	0.687	0.000
1.9111	0.117	0.190	0.726	0.000
1.9556	0.118	0.195	0.767	0.000
2.0000	0.119	0.200	0.811	0.000
2.0444	0.119	0.205	0.856	0.000
2.0889	0.120	0.211	0.903	0.000
2.1333	0.121	0.216	0.951	0.000
2.1778	0.122	0.222	1.001	0.000
2.2222	0.123	0.227	1.051	0.000
2.2667	0.124	0.233	1.102	0.000
2.3111	0.125	0.238	1.155	0.000
2.3556	0.126	0.244	1.208	0.000
2.4000	0.127	0.249	1.261	0.000
2.4444	0.128	0.255	1.315	0.000
2.4889	0.128	0.261	1.369	0.000
2.5333	0.129	0.266	1.423	0.000
2.5778	0.130	0.272	1.478	0.000
2.6222	0.131	0.278	1.533	0.000
2.6667	0.132	0.284	1.588	0.000
2.7111	0.133	0.290	1.653	0.000
2.7556	0.134	0.296	1.719	0.000
2.8000	0.135	0.302	1.787	0.000
2.8444	0.136	0.308	1.855	0.000
2.8889	0.137	0.314	1.925	0.000
2.9333	0.138	0.320	1.996	0.000
2.9778	0.139	0.326	2.068	0.000
3.0222	0.140	0.332	2.160	0.000
3.0667	0.141	0.339	2.387	0.000
3.1111	0.142	0.345	2.706	0.000
3.1556	0.143	0.351	3.094	0.000
3.2000	0.144	0.358	3.534	0.000
3.2444	0.145	0.364	4.012	0.000
3.2889	0.145	0.371	4.515	0.000
3.3333	0.146	0.377	5.028	0.000
3.3778	0.147	0.384	5.537	0.000
3.4222	0.148	0.390	6.028	0.000
3.4667	0.149	0.397	6.487	0.000
3.5111	0.150	0.404	6.904	0.000
3.5556	0.151	0.410	7.269	0.000
3.6000	0.152	0.417	7.578	0.000
3.6444	0.153	0.424	7.831	0.000
3.6889	0.154	0.431	8.035	0.000
3.7333	0.155	0.438	8.206	0.000
3.7778	0.156	0.445	8.447	0.000
3.8222	0.157	0.452	8.628	0.000
3.8667	0.158	0.459	8.804	0.000
3.9111	0.159	0.466	8.976	0.000
3.9556	0.161	0.473	9.144	0.000
4.0000	0.162	0.480	9.308	0.000

4.0444

0.163

0.487

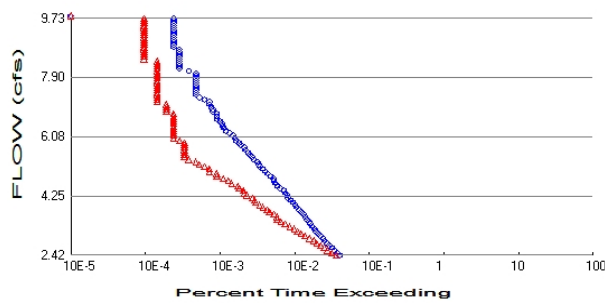
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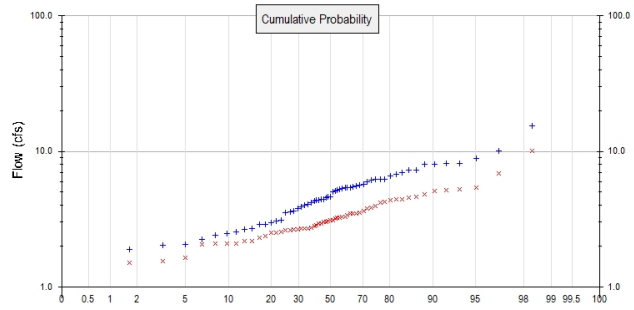
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Analysis Results

POC 1



+ Predeveloped x Mitigated



Predeveloped Landuse Totals for POC #1

Total Pervious Area: 7.979
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 4.181
Total Impervious Area: 9.229

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	4.837897
5 year	6.947841
10 year	8.034248
25 year	9.107557
50 year	9.732275
100 year	10.239391

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	3.084473
5 year	4.233885
10 year	5.048842
25 year	6.140893
50 year	7.000336
100 year	7.899697

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	3.593	3.118
1950	4.421	2.948
1951	6.179	2.628
1952	4.019	3.832
1953	5.045	2.719
1954	8.075	3.492
1955	3.891	2.177
1956	6.998	5.273
1957	6.564	3.037
1958	5.357	4.646

1959	3.082	1.634
1960	2.904	2.500
1961	6.257	3.627
1962	4.587	3.296
1963	5.082	3.036
1964	4.589	2.845
1965	4.156	2.944
1966	5.645	3.196
1967	5.246	2.608
1968	5.928	4.349
1969	6.256	5.373
1970	15.456	10.105
1971	2.657	2.083
1972	4.048	2.666
1973	4.377	3.487
1974	6.164	5.191
1975	3.624	2.514
1976	5.535	3.241
1977	0.451	1.487
1978	8.138	4.430
1979	5.478	4.430
1980	3.045	2.187
1981	7.223	4.209
1982	5.163	3.507
1983	8.826	4.248
1984	2.963	2.093
1985	2.059	2.792
1986	2.685	2.710
1987	4.424	2.542
1988	2.537	2.100
1989	2.899	2.373
1990	2.234	2.051
1991	5.384	2.648
1992	5.362	2.706
1993	6.809	4.533
1994	4.528	3.296
1995	3.804	3.773
1996	8.058	6.840
1997	10.011	5.109
1998	8.158	3.956
1999	5.362	3.124
2000	3.540	1.505
2001	2.021	1.545
2002	7.263	3.251
2003	5.728	3.494
2004	1.877	2.682
2005	2.393	2.300
2006	4.323	3.074
2007	2.481	3.366
2008	4.347	4.817

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	15.4560	10.1050
2	10.0109	6.8403
3	8.8256	5.3726
4	8.1581	5.2730

5	8.1380	5.1906
6	8.0751	5.1093
7	8.0581	4.8166
8	7.2629	4.6456
9	7.2234	4.5327
10	6.9977	4.4299
11	6.8085	4.4297
12	6.5639	4.3486
13	6.2573	4.2480
14	6.2557	4.2095
15	6.1788	3.9559
16	6.1640	3.8319
17	5.9284	3.7727
18	5.7277	3.6274
19	5.6449	3.5069
20	5.5352	3.4940
21	5.4777	3.4916
22	5.3835	3.4872
23	5.3624	3.3665
24	5.3622	3.2965
25	5.3572	3.2963
26	5.2462	3.2512
27	5.1633	3.2412
28	5.0819	3.1964
29	5.0455	3.1240
30	4.5893	3.1182
31	4.5868	3.0740
32	4.5281	3.0374
33	4.4240	3.0356
34	4.4209	2.9482
35	4.3766	2.9445
36	4.3469	2.8450
37	4.3229	2.7917
38	4.1565	2.7194
39	4.0476	2.7099
40	4.0191	2.7058
41	3.8909	2.6815
42	3.8038	2.6660
43	3.6240	2.6484
44	3.5933	2.6282
45	3.5396	2.6083
46	3.0822	2.5416
47	3.0451	2.5139
48	2.9628	2.4999
49	2.9041	2.3728
50	2.8993	2.2996
51	2.6845	2.1868
52	2.6570	2.1767
53	2.5367	2.1001
54	2.4815	2.0935
55	2.3933	2.0833
56	2.2335	2.0515
57	2.0587	1.6340
58	2.0208	1.5448
59	1.8771	1.5049
60	0.4514	1.4867

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
2.4189	843	751	89	Pass
2.4928	779	659	84	Pass
2.5667	715	581	81	Pass
2.6406	668	525	78	Pass
2.7144	609	464	76	Pass
2.7883	572	417	72	Pass
2.8622	532	379	71	Pass
2.9361	506	335	66	Pass
3.0099	462	288	62	Pass
3.0838	429	256	59	Pass
3.1577	405	228	56	Pass
3.2315	386	207	53	Pass
3.3054	365	181	49	Pass
3.3793	341	156	45	Pass
3.4532	324	138	42	Pass
3.5270	306	123	40	Pass
3.6009	291	121	41	Pass
3.6748	274	110	40	Pass
3.7486	259	96	37	Pass
3.8225	241	90	37	Pass
3.8964	225	79	35	Pass
3.9703	212	71	33	Pass
4.0441	199	63	31	Pass
4.1180	186	61	32	Pass
4.1919	170	57	33	Pass
4.2657	167	48	28	Pass
4.3396	159	44	27	Pass
4.4135	151	43	28	Pass
4.4874	135	38	28	Pass
4.5612	123	36	29	Pass
4.6351	116	30	25	Pass
4.7090	111	27	24	Pass
4.7829	108	23	21	Pass
4.8567	99	19	19	Pass
4.9306	91	19	20	Pass
5.0045	85	15	17	Pass
5.0783	78	15	19	Pass
5.1522	72	13	18	Pass
5.2261	70	11	15	Pass
5.3000	67	10	14	Pass
5.3738	59	8	13	Pass
5.4477	56	7	12	Pass
5.5216	52	7	13	Pass
5.5954	50	7	14	Pass
5.6693	46	7	15	Pass
5.7432	44	7	15	Pass
5.8171	40	7	17	Pass
5.8909	38	7	18	Pass
5.9648	34	6	17	Pass
6.0387	33	5	15	Pass
6.1125	31	5	16	Pass
6.1864	28	5	17	Pass
6.2603	25	5	20	Pass

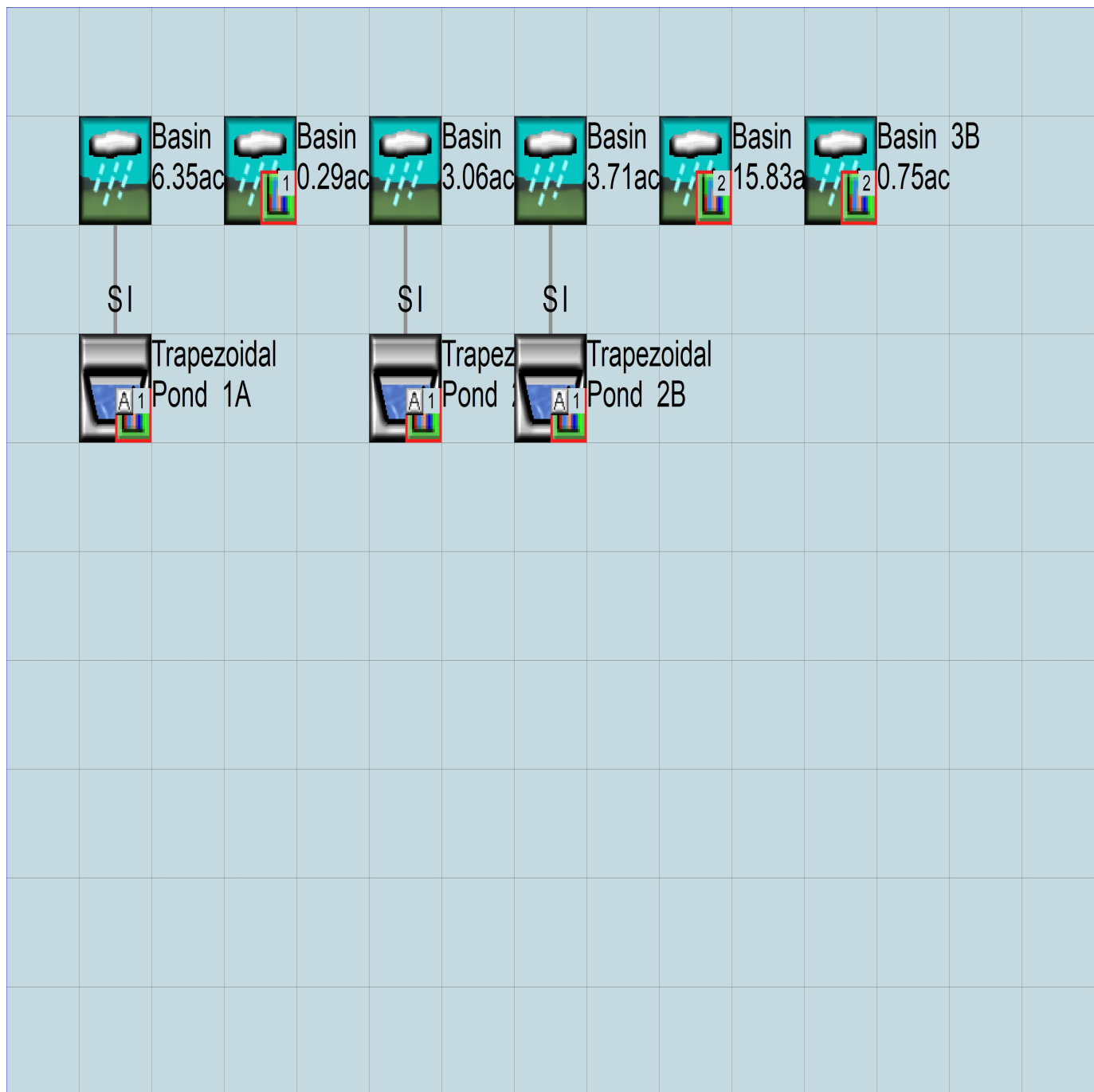
6.3342	24	5	20	Pass
6.4080	23	5	21	Pass
6.4819	22	5	22	Pass
6.5558	21	5	23	Pass
6.6297	19	5	26	Pass
6.7035	19	5	26	Pass
6.7774	19	5	26	Pass
6.8513	17	4	23	Pass
6.9251	17	4	23	Pass
6.9990	16	4	25	Pass
7.0729	15	4	26	Pass
7.1468	15	3	20	Pass
7.2206	13	3	23	Pass
7.2945	11	3	27	Pass
7.3684	10	3	30	Pass
7.4422	10	3	30	Pass
7.5161	10	3	30	Pass
7.5900	10	3	30	Pass
7.6639	10	3	30	Pass
7.7377	10	3	30	Pass
7.8116	10	3	30	Pass
7.8855	10	3	30	Pass
7.9593	10	3	30	Pass
8.0332	10	3	30	Pass
8.1071	8	3	37	Pass
8.1810	6	3	50	Pass
8.2548	6	3	50	Pass
8.3287	6	3	50	Pass
8.4026	6	3	50	Pass
8.4765	6	2	33	Pass
8.5503	6	2	33	Pass
8.6242	6	2	33	Pass
8.6981	6	2	33	Pass
8.7719	6	2	33	Pass
8.8458	5	2	40	Pass
8.9197	5	2	40	Pass
8.9936	5	2	40	Pass
9.0674	5	2	40	Pass
9.1413	5	2	40	Pass
9.2152	5	2	40	Pass
9.2890	5	2	40	Pass
9.3629	5	2	40	Pass
9.4368	5	2	40	Pass
9.5107	5	2	40	Pass
9.5845	5	2	40	Pass
9.6584	5	2	40	Pass
9.7323	5	2	40	Pass

Appendix

Predeveloped Schematic



Mitigated Schematic



WWHM2012

PROJECT REPORT

**TDAs 1 & 2 Water Quality
for Basins 1A, 1B, 2A, 2B
& 3A (Mechanical Filter
Structure)**

General Model Information

WWHM2012 Project Name: 9095 Villages-WQ

Site Name:

Site Address:

City:

Report Date: 7/11/2025

Gage: Lacamas

Data Start: 1948/10/01

Data End: 2008/09/30

Timestep: 15 Minute

Precip Scale: 1.300

Version Date: 2025/05/13

Version: 4.3.2

POC Thresholds

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

High Flow Threshold for POC1: 50 Year

Low Flow Threshold for POC2: 50 Percent of the 2 Year

High Flow Threshold for POC2: 50 Year

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

High Flow Threshold for POC3: 50 Year

Low Flow Threshold for POC4: 50 Percent of the 2 Year

High Flow Threshold for POC4: 50 Year

Low Flow Threshold for POC5: 50 Percent of the 2 Year

High Flow Threshold for POC5: 50 Year

*Mitigated Land Use***Basin 1A**

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Field, Mod 2.53

Pervious Total 2.53

Impervious Land Use acre
ROADS FLAT 0.178
ROADS MOD 2.798
ROOF TOPS FLAT 0.844

Impervious Total 3.82

Basin Total 6.35

Element Flow Components:

Surface Interflow Groundwater
Component Flows To:
POC 1 POC 1

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Basin 1B

Bypass:	No
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 0.147
Pervious Total	0.147
Impervious Land Use ROADS MOD	acre 0.141
Impervious Total	0.141
Basin Total	0.288

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 2	POC 2	

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Basin 2A

Bypass:	No
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 0.728
Pervious Total	0.728
Impervious Land Use ROADS MOD	acre 2.336
Impervious Total	2.336
Basin Total	3.064

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 3	POC 3	

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Basin 2B

Bypass:	No
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 0.776
Pervious Total	0.776
Impervious Land Use ROADS MOD	acre 2.932
Impervious Total	2.932
Basin Total	3.708

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 4	POC 4	

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Basin 3A

Bypass:	No
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 3.495
Pervious Total	3.495
Impervious Land Use ROADS MOD	acre 12.331
Impervious Total	12.331
Basin Total	15.826

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 5	POC 5	

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Basin 3B

Bypass:	No
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 0.268
Pervious Total	0.268
Impervious Land Use ROADS MOD	acre 0.486
Impervious Total	0.486
Basin Total	0.754

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		

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Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 0.7448 acre-feet

On-line facility target flow: 1.07 cfs.

Adjusted for 15 min: 1.07 cfs.

Off-line facility target flow: 0.5817 cfs.

Adjusted for 15 min: 0.5817 cfs.

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Water Quality

Water Quality BMP Flow and Volume for POC #2

On-line facility volume: 0.0314 acre-feet

On-line facility target flow: 0.0456 cfs.

Adjusted for 15 min: 0.0456 cfs.

Off-line facility target flow: 0.0243 cfs.

Adjusted for 15 min: 0.0243 cfs.

DRAFT

Water Quality

Water Quality BMP Flow and Volume for POC #3

On-line facility volume: 0.3928 acre-feet

On-line facility target flow: 0.6039 cfs.

Adjusted for 15 min: 0.6039 cfs.

Off-line facility target flow: 0.334 cfs.

Adjusted for 15 min: 0.334 cfs.

DRAFT

Water Quality

Water Quality BMP Flow and Volume for POC #4

On-line facility volume: 0.4805 acre-feet

On-line facility target flow: 0.7457 cfs.

Adjusted for 15 min: 0.7457 cfs.

Off-line facility target flow: 0.4142 cfs.

Adjusted for 15 min: 0.4142 cfs.

DRAFT

Water Quality

Water Quality BMP Flow and Volume for POC #5

On-line facility volume: 2.0424 acre-feet

On-line facility target flow: 3.159 cfs.

Adjusted for 15 min: 3.159 cfs.

Off-line facility target flow: 1.7512 cfs.

Adjusted for 15 min: 1.7512 cfs.

DRAFT

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.

DRAFT

Mitigated Schematic





Appendix G: Soils Report

Geotechnical Site Investigation

Mills Property

Camas, Washington

November 17, 2023

Geotechnical ■ Environmental ■ Special Inspections

Columbia West
Engineering, Inc





November 17, 2023

HSR Development
500 E. Broadway, Suite 120
Vancouver, Washington 98660

Attn: Steven Waugh

Geotechnical Site Investigation

Mills Property
Camas, Washington
Columbia West Project: HSR-1-01-1

Columbia West is pleased to present this geotechnical site investigation report for the Mills Property in Camas, Washington. Our services were conducted in accordance with our proposal dated August 14, 2023.

We appreciate the opportunity to work on the project. Please contact us if you have any questions regarding this document.

Sincerely,

Columbia West

Daniel Lehto, PE, GE
Principal Engineer

DEL:ASR
Attachments
Document ID:Mills Property Geotechnical Report.docx

EXECUTIVE SUMMARY

This executive summary presents the primary geotechnical considerations associated with the proposed Mills Property project located in Camas, Washington. Our conclusions and recommendations are based upon the subsurface information presented in this report and proposed development information provided by the design team. Detailed discussion of the geotechnical considerations summarized here is presented in respective sections of the report.

- The site is characterized by pinnacled basalt and basalt outcrops. Thin soil profiles were observed in some areas. Based on subsurface exploration, infiltration of concentrated stormwater is infeasible due to the presence of shallow bedrock and clayey residual soils.
- Although site reconnaissance and Clark County GIS Mapping indicate the presence of slopes greater than 15 percent in the southern boundary of the parcel, site slopes do not meet the definition of a landslide hazard according to *Camas Municipal Code, Section 16.59*.
- Excavator refusal was encountered in all test pits in the proposed development area at depths ranging from 0 to 10 Below Ground Surface (BGS). Excavations at the site will require rock excavation techniques to install necessary elements. Though not specifically encountered, seeps and springs within the basalt formation have been observed on surrounding sites and have been associated with regional rain events. Therefore, drainage design may need to be altered during the course of construction as seeps and springs become evident over time.

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GEOTECHNICAL SITE INVESTIGATION MILLS PROPERTY CAMAS, WASHINGTON

1.0 INTRODUCTION

Columbia West Engineering, Inc. (Columbia West) was retained by HSR Development to conduct a geotechnical site investigation for the proposed Mills Property project located in Camas, Washington. The purpose of the investigation was to provide geotechnical engineering recommendations for use in design and construction of the proposed development. This report summarizes the investigation and provides field assessment documentation and laboratory analytical test reports. This report is subject to the limitations expressed in Section 11.0, *Conclusion and Limitations*, and Appendix C.

1.1 GENERAL SITE INFORMATION

As indicated on Figures 1 and 2, the subject site is located north of Lacamas Lake with an address of 313 SE Leadbetter Road in Camas, Washington. The site is accessed via SE 252nd Avenue, as there is no access to the site directly from SE Leadbetter Road. The site is comprised of tax parcel 177885000 totaling approximately 21 acres. The approximate latitude and longitude are N 45° 37' 09" and W 122° 24' 57", and the legal description is a portion of the NE ¼ of Section 34, T2N, R3E, Willamette Meridian. The regulatory jurisdictional agency is the City of Camas.

1.2 PROJECT UNDERSTANDING

Based on design team correspondence, proposed development is likely to include construction of a residential subdivision. A layout of the planned infrastructure was not available at the time of this writing. Proposed development will likely include paved neighborhood access roads, essential underground utilities, and stormwater management facilities.

We anticipate maximum loads for the residential buildings will be less than 20 kips per column and 3 kips per foot for perimeter footings. Allowable total and differential static settlement tolerances for the structures are 1 inch and 0.5 inch over a 50-foot span, respectively. We also anticipate that proposed structures will be Risk Category II with a fundamental period less than 0.5 second. We should be contacted to revise our recommendations if the assumptions stated above are incorrect.

2.0 SCOPE OF SERVICES

Columbia West's scope of services was outlined in a proposal dated August 14, 2023. In accordance with our proposal, we performed the following geotechnical services:

- Reviewed information available in our files from previous geological and geotechnical studies conducted at and in the vicinity of the site.
- Reviewed preliminary site plans and structural information provided by the design team.
- Conducted subsurface exploration at the site, to include:
 - Excavated 13 test pits to depths ranging from 4 to 10 feet BGS due to excavator refusal. Two shovel pits were also explored in an area proposed for the off-site sewer alignment.
- Collected disturbed soil samples from test pits for laboratory analysis.
- Classified and logged observed soil and groundwater conditions.
- Prepared this geotechnical site investigation report for the proposed development, which includes:

- Summary of soil index properties, regional geology, soil conditions, and observed groundwater conditions.
- Summary of geologic and seismic literature research used to evaluate relevant seismic risks, including locations of faults, earthquake magnitudes, and seismic factors from the 2018 IBC and ASCE 7-16
- Summary of City of Camas Code Chapter 16.59 - Geologically Hazardous Areas research
- Liquefaction potential
- Fill- and load-induced settlement potential
- Geotechnical design and construction recommendations for:
 - Shallow foundations
 - Lateral earth pressures
 - Site preparation and grading, organic stripping, fill placement and compaction, over-excavation, and construction monitoring and testing.
 - Structural fill materials, onsite soil suitability, and import aggregate specifications.
 - Utility trench excavation and backfill.
 - Drainage and management of groundwater conditions
 - Asphaltic concrete pavement construction for access roads and parking lots
 - Seismic design parameters in accordance with ASCE 7-16

3.0 REGIONAL GEOLOGY AND SOIL CONDITIONS

The subject site lies within the Willamette Valley/Puget Sound Lowland, a wide physiographic depression flanked by the mountainous Coast Range on the west and the Cascade Range on the east. Inclined or uplifted structural zones within the Willamette Valley/Puget Sound Lowland constitute highland areas and depressed structural zones form sediment-filled basins. The site is located in the central-eastern portion of the Portland/Vancouver Basin, an open, somewhat elliptical, northwest-trending syncline approximately 60 miles wide.

According to the *Geologic Map of the Camas Quadrangle, Clark County, Washington, and Multnomah County, Oregon* (US Geological Survey, Scientific Investigations Map 3017, 2008), near-surface geology is expected to primarily consist of upper-Oligocene basaltic-andesite of Elkhorn Mountain (Tbem). The Elkhorn Mountain Formation is comprised of a series of lava flows and flow breccia consisting of dark grey basalt and andesite.

The *Web Soil Survey* (United States Department of Agriculture, Natural Resource Conservation Service [USDA NRCS], 2022 Website) identifies surface soils as primarily Lauren very gravelly loam, Olympic Stony Clay Loam, Vader Silt Loam, and a small pocket of Lauren loam along the north property boundary. Although soil conditions may vary from the broad USDA descriptions, Lauren soils are generally coarse-textured sands and gravels with moderate permeability, moderate shear strength, and low shrink-swell potential. Olympic and Vader series soils are more fine textured silt and clay with variable amounts of gravel. Olympic and Vader soils are typically fine-textured, poorly drained soils that develop over bedrock and exhibit slow permeability and have low shear strength.

4.0 REGIONAL SEISMOLOGY

Recent research and subsurface mapping investigations within the Pacific Northwest appear to suggest the historic potential risk for a large earthquake event with strong localized ground movement may be underestimated. Past earthquakes in the Pacific Northwest appear to have caused

landslides and ground subsidence, in addition to severe flooding near coastal areas. Earthquakes may also induce soil liquefaction, which occurs when elevated horizontal ground acceleration and velocity cause soil particles to interact as a fluid as opposed to a solid. Liquefaction of soil can result in lateral spreading and temporary loss of bearing capacity and shear strength. Liquefaction is discussed later in Section 7.0, *Geologic Hazards*

Three scenario earthquakes are possible with the local seismic setting. Two of the possible earthquake sources are associated with the Cascadia Subduction Zone (CSZ), and the third event is a shallow, local crustal earthquake that could occur in the North American Plate. The three earthquake scenarios are discussed below.

Cascadia Subduction Zone

The Cascadia Subduction Zone is a potential source of strong earthquake activity in the Portland/Vancouver Basin. This phenomenon is the result of the earth's large tectonic plate movement. Geologic evidence indicates that volcanic ocean floor activity along the Juan de Fuca ridge in the Pacific Ocean causes the Juan de Fuca Plate to perpetually move east and subduct under the North American Continental Plate. The subduction zone results in historic volcanic and potential earthquake activity in proximity to the plate interface, believed to lie approximately 20 to 50 miles west of the general location of the Oregon and Washington coast (Geomatrix Consultants, 1995).

Evidence suggests that this subduction zone has generated eight great earthquakes in the last 4,000 years, with the most recent event occurring approximately 300 years ago (Weaver and Shedlock, 1991).

Two types of subduction zone earthquakes are possible and considered in this report:

- 1 An interface event earthquake on the seismogenic part of the interface between the Juan de Fuca Plate and the North American Plate on the CSZ. This source is capable of generating earthquakes with a moment magnitude of 9.0.
- 2 A deep intraplate earthquake on the seismogenic part of the subducting Juan de Fuca Plate. These events typically occur at depths of between 30 and 60 km. This source is capable of generating an event with a moment magnitude of up to 8.0.

Crustal Events

There are at least six major known fault zones in the vicinity of the site that may be capable of generating potentially destructive horizontal accelerations. These fault zones are described briefly in Table 1.

Table 1. Faults Within the Site Vicinity

Fault Name	Proximity to Site (km) per USGS	Mapped Length (km) per USGS
Beaverton fault zone	26	15
Helvetia fault zone	24	7
Oatfield fault zone	18	29
Portland Hills fault zone	13	49
East Bank fault	13	29
Lacamas Lake fault	1	24

5.0 GEOTECHNICAL AND GEOLOGIC FIELD INVESTIGATION

Subsurface conditions were explored by excavating thirteen test pits (TP-1 through TP-13) using a track-mounted excavator at the approximate locations shown on Figure 2. The test pits were excavated on October 13, 2023 to a maximum depth of 10 feet BGS. Two supplemental excavations (S-1 and S-2) were explored by shovel in an area proposed for sanitary sewer alignment which will connect the subdivision sewer to SE Leadbetter Road. No soil logs were produced for explorations S-1 and S-2, as bedrock was encountered within a few inches of the surface.

Subsurface conditions were logged in accordance with the Unified Soil Classification System (USCS). Disturbed soil samples were collected at representative depth intervals. Test pit logs are presented in Appendix A. Soil descriptions and classification information are also provided in Appendix A. Analytical laboratory test results are presented in Appendix B.

5.1 SURFACE INVESTIGATION AND SITE DESCRIPTION

The site is located north of Lacamas Lake with address 313 SE Leadbetter Road in Camas, Washington and consists of tax parcel 177885000 which totals approximately 21 acres. The site is accessed via SE 252nd Avenue and is bound by a dairy farm to the north, wooded private and public land to the west and south, and residential acreage parcels to the east. The site is currently undeveloped and heavily wooded. Site terrain is undulating and characterized by grades of 0 to 15 percent with some steeper areas existing where basalt outcrops create short slopes of up to 25 percent. A gravel access road has been constructed into the site and remnant overgrown logging trails were observed in a few locations.

5.2 SUBSURFACE CONDITIONS

The test pits were excavated through up to 10 inches of forest duff and organic topsoil zone. Underlying the surface vegetation, residual soils and basalt bedrock were encountered. Subsurface lithology may generally be described by the soil units identified in the following text.

5.2.1 Silty and Clayey Gravel Residual Soils

Underlying the surface vegetation, medium dense to dense silty SAND with gravel, clayey GRAVEL or SILT with minor gravel was observed to a maximum depth of 10 feet BGS. The moisture content of the residual soils ranged from 20 to 41 percent at the time of exploration. Atterberg limits analysis indicates a range of plasticity index from 8 to 15, indicating minor to moderate plasticity.

5.2.2 Weathered to Bright Basalt Bedrock

Underlying the residual soils, dense to very dense weathered basalt or intact basalt was encountered and caused excavator refusal at depths ranging from ground surface to 10 feet BGS. Digging was extremely slow, and the formation will likely require blasting to move significant quantities of the material.

5.2.3 Groundwater

Groundwater was not observed in the test pits at the time of exploration. However, our experience on adjacent sites underlain by the Elkhorn Mountain Basalt has shown that significant seeps and springs may manifest during rain events, sometimes several days after a rain. The formation may have connectivity to a more regional aquifer.

6.0 INFILTRATION INFEASIBILITY

Infiltration testing was not conducted due to the minor amount of clayey gravel soil encountered at the site. Due to the relatively impermeable nature of the basalt bedrock and residual soils, infiltration of concentrated stormwater onsite is not recommended, as this would likely result in uncontrolled runoff as the water travels along the undulated surface of the bedrock and finds new places to discharge.

7.0 GEOLOGIC HAZARDS

Camas Municipal Code, Section 16.59 defines geologic hazard requirements for proposed development in areas subject to City of Camas jurisdiction. Three potential geologic hazards have been identified: (1) erosion hazard areas, (2) landslide hazard areas, and (3) seismic hazard areas. Hazard mapping provided by *Clark County Maps Online* indicates potential landslide hazard areas (slopes greater than 15 percent) in a few areas, primarily in the central portion of the property.

Columbia West conducted a geologic hazard review to assess whether these hazards are present at the subject property proposed for development, and if so, to provide mitigation recommendations. The geologic hazard review was based upon physical and visual reconnaissance, subsurface exploration, laboratory analysis of collected soil samples, and review of maps and other published technical literature. The results of the geologic hazard review are discussed in the following sections.

7.1 EROSION HAZARDS

Camas Municipal Code, Section 16.59.020.A defines an erosion hazard as areas where slope grades meet or exceed 40 percent. Based upon review of slope grade mapping published by *Clark County Maps Online*, maximum slope grades of 15 to 25 percent are mapped at the site. Therefore, site slopes do not meet the definition of an erosion hazard according to *Camas Municipal Code*. However, implementation of proper erosion control BMPs are recommended for the site during construction and in the finished grade condition.

7.2 LANDSLIDE HAZARDS

Columbia West conducted a review of available mapping, *Clark County GIS data*, and site reconnaissance to evaluate the potential presence of a landslide hazard on or near the subject site.

7.2.1 Geologic Literature Review

Columbia West reviewed *Slope Stability, Clark County, Washington* (Fiksdal, 1975) to assess site slope characteristics. The Fiksdal report identifies four levels of potential instability within Clark County: (1) stable areas - no slides or unstable slopes, (2) areas of potential instability because of underlying geologic conditions and physical characteristics associated with steepness, (3) areas of historical or still active landslides, and (4) older landslide debris. The site is mapped as (1) stable - no slides or unstable slopes.

Columbia West also reviewed the *Geologic Map of the Camas Quadrangle, Clark County, Washington, and Multnomah County, Oregon* (US Geological Survey, *Scientific Investigations Map* 3017, 2008) which indicates that no active landslides or historic landslide deposits are mapped at the subject site or in the surrounding vicinity.

7.2.1 Slope Reconnaissance and Slope Stability Assessment

To observe geomorphic conditions, Columbia West personnel conducted visual and physical reconnaissance of slopes on the property. Subsurface native soils at the locations observed generally consisted of clayey gravel or silty SAND with gravel. Soil horizons appeared firm and well developed. Shallow and surficial basalt bedrock was observed throughout the site.

Site reconnaissance and review of topographic mapping published by *Clark County Maps Online* indicates that site topography is undulated and characterized by pinnacled basalt flows. Short slopes between 15 and 25 percent are present in a few areas throughout the site. Slopes appear planar with no observed evidence of instability. Most bedrock encountered was slightly to moderately weathered or intact. There was no observed direct evidence of large-scale, mass slope movements or historic landslides. No landslide debris was observed within explored site soils and groundwater seeps or springs within the face of the slopes were not observed.

Camas Municipal Code defines a landslide hazard as slopes mapped by Fiksdal as 'areas of potential instability' or areas meeting all three of the following characteristics: 1) slopes steeper than 15 percent; 2) hillsides intersecting geologic contacts with permeable sediment overlying low permeability sediment or bedrock, and; 3) any springs or groundwater seepage. The above-mentioned criteria were not observed during our field investigation or site research. Based upon the results of slope reconnaissance, subsurface exploration, and site research, in Columbia West's opinion slopes on the subject site do not meet the definition of a landslide hazard according to *Camas Municipal Code*.

7.3 SEISMIC HAZARD AREAS

Seismic hazards include areas subject to severe risk of earthquake-induced damage. Damage may occur due to soil liquefaction, dynamic settlement, ground shaking amplification, or surface faulting rupture. These seismic hazards are discussed below.

7.3.1 Soil Liquefaction and Dynamic Settlement

According to the *Liquefaction Susceptibility Map of Clark County, Washington* (Washington State Department of Natural Resources, 2004), the site is mapped as very low susceptibility for liquefaction due to basalt bedrock. Liquefaction, defined as the transformation of the behavior of a granular material from a solid to a liquid due to increased pore-water pressure and reduced effective stress, may occur when granular materials quickly compact under cyclic stresses caused by a seismic event. The effects of liquefaction may include immediate ground settlement, lateral spreading, and differential compaction.

Soils most susceptible to liquefaction are recent geologic deposits, such as river and floodplain sediments. These soils are generally saturated, cohesionless, loose to medium dense sands within 50 feet of ground surface. Potentially liquefiable soils located above the existing, historic, or expected ground water levels do not generally pose a liquefaction hazard. It is important to note that changes in perched ground water elevation may occur due to project development or other factors not observed at the time of investigation.

Based upon the results of subsurface exploration, literature review, and laboratory analysis, the above-mentioned criteria were not observed during the geotechnical site investigation. Therefore, the potential for soil liquefaction is considered to be very low.

7.3.2 Ground Shaking Amplification

Review of the *Site Class Map of Clark County, Washington* (Washington State Department of Natural Resources, 2004), indicates that site soils may be represented by Site Class B as defined in *2018 IBC Section 1613.3.2*. A designation of Site Class B indicates that minimal amplification of seismic energy may occur during a seismic event due to subsurface conditions. This designation does not represent a geologic hazard in Columbia West's opinion and will not prohibit development if properly accounted for during the design process. Additional seismic information is presented in Section 8.2, *Seismic Design Considerations*.

7.3.3 Fault Rupture

Because there are no known geologic seismic faults within the site boundaries, fault rupture is unlikely.

8.0 DESIGN RECOMMENDATIONS

The geotechnical site investigation suggests the proposed development is generally compatible with surface and subsurface soils, provided the recommendations presented in this report are incorporated in design and implemented during construction. Design and construction recommendations are presented in the following sections.

8.1 Shallow Foundation Support

Proposed residential structures may be supported by conventional spread footings bearing on firm native soil or engineered structural fill.

Any loose or disturbed soil should be improved or removed and replaced with structural fill. If footing subgrade soils are above their optimum moisture content, we recommend that a minimum of 6 inches of compacted aggregate be placed over exposed subgrade soils. The aggregate pad should extend 6 inches beyond the edge of the foundations and consist of imported granular material as described in Section 9.6.1, *Structural Fill*. Columbia West should observe exposed subgrade conditions prior to placement of crushed aggregate to verify adequate subgrade support.

8.1.1 Footing Dimensions and Bearing Capacity

Continuous perimeter wall and isolated spread footings should have minimum width dimensions of 18 and 24 inches, respectively. The base of exterior footings should bear at least 18 inches below the lowest adjacent exterior grade. The base of interior footings should bear at least 12 inches below the base of the floor.

Footings bearing on subgrade prepared as recommended above should be sized based on an allowable bearing pressure of 2,500 psf. As the allowable bearing pressure is a net bearing pressure, the weight of the footing and associated backfill may be ignored when calculating footing sizes. The recommended allowable bearing pressure applies to the total of dead plus long-term live loads and may be increased by 50 percent for transient lateral forces such as seismic or wind.

8.1.2 Shallow Foundation Settlement

Foundation settlement is a significant structural design consideration. Provided subgrade soils are prepared as described above and in Section 9.1, *Site Preparation and Grading*, we anticipate that post-construction static foundation settlement will be less than approximately 1 inch. Differential settlement between comparably loaded foundations is not expected to exceed approximately 0.5

inch over a distance of 50 feet. The risk of differential settlement may increase where structural elements are founded upon both bedrock and soil beneath the same linear footing. Therefore, Columbia West recommends foundations be constructed on a uniform material whenever possible.

8.1.3 Resistance to Sliding

Lateral foundation loads can be resisted by passive earth pressure on the sides of the footing and by friction at the base of the footings. Recommended passive earth pressure for footings confined by native soil or engineered structural fill is 250 pcf. The upper 6 inches of soil should be neglected when calculating passive pressure resistance. Adjacent floor slabs and pavement, if present, should also be neglected from the analysis. The recommended passive pressure resistance assumes that a minimum horizontal clearance of 10 feet is maintained between the footing face and adjacent downgradient slopes.

The estimated coefficient of friction between in situ native soil or engineered structural fill and in-place poured concrete is 0.35. The estimated coefficient of friction between compacted crushed aggregate and in-place poured concrete is 0.45.

8.1.4 Subgrade Observation

Upon completion of stripping and prior to the placement of structural fill or pavement improvements, exposed subgrade soil should be evaluated by proof rolling with a fully-loaded dump truck or similar heavy, rubber tire construction equipment. When the subgrade is too wet for proof rolling, a foundation probe may be used to identify areas of soft, loose, or unsuitable soil. Subgrade evaluation should be performed by Columbia West. If soft or yielding subgrade areas are identified during evaluation, we recommend the subgrade be over-excavated and backfilled with compacted imported granular fill.

8.1.5 Floor Slabs

Floor slabs can be supported on firm, competent, native soil or engineered structural fill prepared as described in this report. Disturbed soils and unsuitable fills in proposed slab locations, if encountered, should be removed and replaced with structural fill.

To provide a capillary break, slabs should be underlain by at least 6 inches of compacted crushed aggregate that contains less than 5 percent by weight passing the No. 200 Sieve. Geotextile may be used below the crushed aggregate layer to increase subgrade support. Recommendations for floor slab base aggregate and subgrade geotextile are discussed in Section 9.6, *Materials*.

Floor slabs with maximum floor load of 150 psf may be designed assuming a modulus of subgrade reaction, k , of 125 pci.

8.2 SEISMIC DESIGN CONSIDERATIONS

Seismic design for proposed structures is prescribed by ASCE 7-16. Based on literature review and results of subsurface exploration conducted by Columbia West, site soils meet the criteria for Site Class B. Seismic design parameters for Site Class B are presented in Table 2.

Table 2. ASCE 7-16 Seismic Design Parameters¹

	Short Period	1 Second Period
MCE Spectral Acceleration	0.795	0.348
Site Class	B	
Site Coefficient	$F_a = 1.0$	$F_v = 1.0$
Adjusted Spectral Response Acceleration	$S_{MS} = 0.795$	$S_{M1} = 0.348$
Design Spectral Response Acceleration	$S_{DS} = 0.53$	$S_{D1} = 0.232$

1. The structural engineer should evaluate ASCE 7-16 code requirements and exceptions to determine if these parameters are valid for design.

As discussed in Section 7.3, *Seismic Hazards Area*, liquefaction and lateral spreading are not design considerations for the site.

8.3 RETAINING STRUCTURES

Lateral earth pressures should be considered during design of retaining walls and below-grade structures. Hydrostatic pressure and additional surcharge loading should also be considered. Wall foundation construction and bearing capacity should adhere to specifications provided previously in Section 8.1, *Shallow Foundation Support*.

Permanent retaining walls that are not restrained from rotation and are retaining undisturbed native soil should be designed for active earth pressures using an equivalent fluid pressure of 39 pcf. Walls retaining undisturbed native soils that are restrained from rotation should be designed for an at-rest equivalent fluid pressure of 64 pcf. For walls with imported well-drained granular backfill meeting WSDOT 9.03.12(2), an equivalent fluid pressure of 34 pcf is applicable for active and 60 pcf for at rest is applicable.

The recommended earth pressures assume a maximum wall height of 10 feet with level backfill. These values also assume that adequate drainage is provided behind retaining walls to prevent hydrostatic pressures from developing. Lateral earth pressures induced by surcharge loads may be estimated using the criteria presented on Figure 3.

Seismic forces may be calculated by superimposing a uniform lateral force of $10H^2$ pounds per lineal foot of wall, where H is the total wall height in feet. The force should be applied as a distributed load with the resultant located at $0.6H$ from the base of the wall.

8.3.1 Wall Drainage and Backfill

A minimum 6-inch-diameter, perforated collector pipe should be placed at the base of retaining walls. The pipe should be embedded in a minimum 2-foot-wide zone of angular drain rock that is wrapped in a drainage geotextile fabric and extends up the back of the wall to within 1 foot of finished grade. The drain rock and geotextile drainage fabric should meet the specifications provided in Section 9.6, *Materials*. The perforated collector pipes should discharge at an appropriate location away from the base of the wall. The discharge pipe(s) should not be tied directly into

stormwater drainage systems, unless measures are taken to prevent backflow into the drainage system of the wall.

Backfill material placed behind the walls and extending a horizontal distance of $\frac{1}{2} H$, where H is the height of the retaining wall, should consist of select granular material placed and compacted as described in Section 9.6.1, *Structural Fill*.

Settlement of up to 1 percent of the wall height commonly occurs immediately adjacent to the wall as the wall rotates and develops active lateral earth pressures. Consequently, we recommend that construction of flatwork adjacent to retaining walls be delayed at least four weeks after placement of wall backfill, unless survey data indicates that settlement is complete prior to that time.

8.4 PAVEMENT RECOMMENDATIONS

We understand that public roadways for the subdivision will be constructed in accordance with City of Camas standards. For dry weather construction, pavement surface sections should bear upon competent subgrade consisting of scarified and compacted native soil or engineered structural fill. Wet weather construction may require an increased thickness of base aggregate as discussed later in Section 9.2, *Construction Traffic and Staging*.

In general, AC paving is not recommended during cold weather (temperatures less than 40 degrees Fahrenheit). Compacting under these conditions can result in low compaction and premature pavement distress. Each AC mix design has a recommended compaction temperature range that is specific for the particular AC binder used. In colder temperatures, it is more difficult to maintain the temperature of the AC mix, as it can lose heat while stored in the delivery truck, as it is placed, and in the time between placement and compaction.

If AC paving must take place during cold-weather construction as defined in this section, the contractor and design team should discuss options for minimizing risk to pavement serviceability.

8.5 DRAINAGE

At a minimum, site drainage should include surface water collection and conveyance to properly designed stormwater management structures and facilities. Drainage design in general should conform to City of Camas regulations. Finished site grading should be conducted with positive drainage away from structures at a minimum 2 percent slope for a distance of at least 10 feet. Depressions or shallow areas that may retain ponding water should be avoided.

Recommendations for foundation drains and subdrains are presented in the following sections. Drain rock and geotextile drainage fabric should meet the requirements presented in Section 9.6, *Materials*. Drains should be closely monitored after construction to assess their effectiveness. If additional surface or shallow subsurface seeps become evident, the drainage provisions may require modification or additional drains. We should be consulted to provide appropriate recommendations.

8.5.1 Foundation Drains

Roof drains are recommended for all structures. Perimeter building foundation drains should be considered for shallow foundations constructed below existing site grades but are not necessary for the functionality of the buildings.

Foundation and roof drains, where installed, should consist of separate systems that gravity flow away from foundations to an approved discharge location. Perimeter foundation drains should consist of 4-inch perforated PVC pipe surrounded by a minimum 2-foot-wide zone of clean, washed drain rock wrapped with geotextile drainage fabric. The wrapped drain rock zone should extend up the sides of embedded walls to within 12 inches of proposed finished grade. Foundation drains should be constructed with a minimum slope of ½ percent. The drainpipe's invert elevation should be at least 18 inches below the elevation of the floor slab. Figure 4 presents a typical foundation drain detail.

8.5.2 Subdrains

Subdrains should be considered if portions of the site are cut below surrounding grades. Shallow groundwater or seeps should be conveyed via drainage channel or perforated pipe into an approved discharge. Recommendations for design and installation of perforated drainage pipe may be performed on a case-by-case basis by Columbia West during construction. Failure to provide adequate surface and sub-surface drainage may result in soil slumping or unanticipated settlement of structures exceeding tolerable limits. A typical perforated drainpipe trench detail is presented in Figure 5.

8.5.2 Drainage Mat

Site improvements construction in some areas may occur at or near the shallow groundwater table, particularly if work is conducted during wet-weather conditions. A drainage mat is typically required in areas that require structural fill placed on top of a natural drainage swale or known seep or spring area. Dewatering may be necessary, and a drainage mat may be required to achieve sufficient elevation for fill placement. A typical drainage mat is shown on Figure 6. Columbia West should determine drainage mat location, extent, and thickness when subsurface conditions are exposed. Drainage mats may need to be constructed in conjunction with subdrains to convey captured water to an approved discharge location.

9.0 CONSTRUCTION RECOMMENDATIONS

9.1 SITE PREPARATION AND GRADING

Site vegetation primarily consisted of up to 10 inches of forest duff at the time of our exploration. Thicker root zones may be present in areas of mature trees and shrub growth. Where encountered, pavement, vegetation, organic material, unsuitable fill, and deleterious material should be cleared from areas identified for structures and site grading. Vegetation, root zones, organic material, and debris should be removed from the site. Stripped topsoil should also be removed or used only as landscape fill in nonstructural areas with slopes less than 25 percent. The post-construction maximum depth of landscape fill placed or spread at any location onsite should not exceed one foot. Actual stripping depths should be determined based upon visual observations made during construction when soil conditions are exposed.

9.1.1 Subgrade Evaluation

Upon completion of stripping and prior to the placement of structural fill or pavement improvements, exposed subgrade soil should be evaluated by proof rolling with a fully-loaded dump truck or similar heavy, rubber tire construction equipment. When the subgrade is too wet for proof rolling, a foundation probe may be used to identify areas of soft, loose, or unsuitable soil.

Subgrade evaluation should be performed by Columbia West. If soft or yielding subgrade areas are identified during evaluation, we recommend the subgrade be over-excavated and backfilled with compacted imported granular fill.

9.2 CONSTRUCTION TRAFFIC AND STAGING

Where encountered, near-surface fine-textured soils will be easily disturbed during construction. This includes native clayey soils, as well as potential imported fine-textured soils. If not carefully executed, site preparation, excavation, and grading can create extensive soft areas resulting in significant repair costs. Earthwork planning should include considerations for minimizing subgrade disturbance, particularly during wet-weather conditions.

If construction occurs during wet-weather conditions, or if the moisture content of the surficial soil is more than a few percentage points above optimum, site stripping and cutting may need to be accomplished using track-mounted equipment. Under these conditions, granular haul roads and staging areas will also be necessary to provide a firm support base and sustain construction equipment.

The recommended base aggregate thickness for pavement sections is intended to support post-construction design traffic loads and will not provide adequate support for construction traffic. Staging areas and haul roads will require an increased base thickness during wet weather conditions. The configuration of staging and haul road areas, as well as the required thickness of granular material, will vary with the contractor's means and methods. Therefore, design and construction of staging areas and haul roads should be the responsibility of the contractor. Based on our experience, between 12 and 18 inches of imported granular material is generally required in staging areas and between 18 and 24 inches in haul road areas. In areas of heavy construction traffic, geotextile separation fabric may be placed between the subgrade soil and imported granular material to increase subgrade support and minimize fines migration into the base aggregate layer.

Project stakeholders should understand that wet weather construction is risky and costly. Proper construction methods and techniques are critical to overall project integrity and should be observed and documented by Columbia West.

9.3 CUT AND FILL SLOPES

Fill slopes should consist of structural fill material as discussed in Section 9.6.1, *Structural Fill*. Fill placed on existing grades steeper than 5H:1V should be horizontally benched at least 10 feet into the slope. Fill slopes greater than six feet in height should be vertically keyed into existing subsurface soil. A typical fill slope cross-section is shown in Figure 7. Drainage implementations, including subdrains or perforated drainpipe trenches, may also be necessary in proximity to cut and fill slopes if seeps or springs are encountered. Drainage design may be performed on a case-by-case basis. Extent, depth, and location of drainage may be determined in the field by Columbia West during construction when soil conditions are exposed. Failure to provide adequate drainage may result in soil sloughing, settlement, or erosion.

Final cut or fill slopes at the site should not exceed 2H:1V or 10 feet in height without individual slope stability analysis. The values above assume a minimum horizontal setback for loads of 10 feet from top of cut or fill slope face or overall slope height divided by three (H/3), whichever is greater. A minimum slope setback detail for structures is presented in Figure 8.

Concentrated drainage or water flow over the face of slopes should be prohibited, and adequate protection against erosion is required. Fill slopes should be overbuilt, compacted, and trimmed at least two feet horizontally to provide adequate compaction of the outer slope face. Proper cut and fill slope construction is critical to overall project stability and should be observed and documented by Columbia West.

9.4 EXCAVATION

The site was explored to a maximum depth of 10 feet BGS with an excavator. Weathered and competent basalt bedrock was encountered as shallow as 1.5 feet BGS onsite (TP-11) and at the ground surface in the off-site sewer alignment (S-1 and S-2) and all test pits terminated by refusal on competent bedrock. Intact basalt was observed at or near the surface throughout the site. Excavation at the site will require blasting or special rock excavation techniques to alter the surface.

Groundwater was not encountered, however the basalt formation is known to have seeps and springs show themselves after periods of wet weather, sometimes several days after an event. Recommendations as described in Section 9.5, *Dewatering*, should be considered where subsurface construction activities intersect shallow groundwater table.

Temporary excavation sidewalls should maintain a vertical cut to a depth of approximately 4 feet in the near-surface clay, provided groundwater seepage is not present in the sidewalls. In sandy soil, excavations will likely slough and cave, even at shallow depths. Open-cut excavation techniques may be used to excavate trenches between 4 and 8 feet deep, provided the walls of the excavation are cut at a maximum slope of 1H:1V and groundwater seepage is not present. Excavation slopes should be reduced to 1.5H:1V or 2H:1V if excessive sloughing or raveling occurs.

Shoring may be required if open-cut excavations are infeasible or if excavations are proposed adjacent to existing infrastructure. Typical methods for stabilizing excavations consist of soldier piles and timber lagging, sheet pile walls, tiebacks and shotcrete, or prefabricated hydraulic shoring. As a wide variety of shoring and dewatering systems are available, we recommend that the contractor be responsible for selecting the appropriate shoring and dewatering systems.

The contractor should be held responsible for site safety, sloping, and shoring. All excavation activity should be conducted in accordance with applicable OSHA requirements. Columbia West is not responsible for contractor activities and in no case should excavation be conducted in excess of applicable local, state, and federal laws.

9.5 DEWATERING

Groundwater was not observed at the time of our investigation. Seeps and springs are likely to be encountered during periods of wet weather. Generalized recommendations for temporary construction dewatering are presented in the following section.

9.5.1 Construction Dewatering

The contractor should be responsible for temporary drainage of surface water, perched water, and groundwater. Dewatering should be performed to the extent necessary to prevent standing water and/or erosion of exposed site soils. During rough and finished grading of building pad areas, the contractor should keep all footing excavations and slab subgrade soils free of standing water.

The contractor's proposed dewatering plan should be capable of maintaining groundwater levels at least two feet below the base of proposed trench excavations. Without adequate trench dewatering, running soil, caving, and sloughing will increase backfill volumes and may result in damage to adjacent structures or utilities. Significant pumping and dewatering may be required to temporarily reduce the groundwater elevation to the recommended depth. Dewatering via a sump within excavation zones may be insufficient to control groundwater and provide excavation side slope stability. Dewatering may be more feasibly conducted by installing a system of temporary well points and pumps around proposed excavation areas or utility trenches. Depending on proposed utility depths, a site-specific dewatering plan may be necessary.

If groundwater is present at the base of utility excavations, we recommend placing 18 to 24 inches of stabilization material at the base of the excavation. Subgrade geotextile placed directly over trench subgrade soils may reduce the required thickness of the stabilization material. The actual thickness of stabilization material should be determined at the time of construction based on observed field conditions. Trench stabilization material should be placed in one lift and compacted until well keyed. Stabilization material and geotextile fabric should meet the requirements presented in Section 9.6, *Materials*.

9.6 MATERIALS

9.6.1 Structural Fill

Areas proposed for fill placement should be appropriately prepared as described in Section 9.1, *Site Preparation and Grading*. Engineered fill placement should be observed by Columbia West. Compaction of engineered structural fill should be verified by nuclear gauge field compaction testing performed in accordance with ASTM D6938. Field compaction testing should be performed for each vertical foot of engineered fill placed.

Various materials may be acceptable for use as structural fill. Structural fill should be free of organic material or other unsuitable material and meet specifications provided in the following sections. Representative samples of proposed engineered structural fill should be submitted for laboratory analysis and approval by Columbia West prior to placement.

9.6.1.1 Onsite Soil

Minimal residual soil was encountered during the site investigation. Most onsite soil will be suitable for use as structural fill if adequately dried or moisture-conditioned to achieve recommended compaction specifications. Native clay soil with a plasticity index greater than 25, if encountered, should be evaluated and approved by Columbia West prior to use as structural fill. Laboratory analysis indicated that the moisture content of the near-surface clay was above optimum at the time of exploration. Moisture conditioning will likely be necessary to dry the soil prior to applying compaction effort. In addition, the near-surface clay will be moisture sensitive and difficult, if not impossible, to compact during wet weather conditions. Therefore, structural fill placement using onsite soil should be performed during dry summer months if possible. Onsite soil may also require addition of moisture during extended periods of dry weather.

If significant grading is proposed, blasting or specialized rock excavation techniques will be required in areas of shallow bedrock. Due to the minor weathering of much of the basalt encountered, blast

spoils will likely require further crushing to reduce particle size and produce a well-graded product suitable for reuse as structural fill.

Onsite soil used as structural fill should be placed in loose lifts not exceeding 8 inches in depth and compacted using standard conventional compaction equipment. The soil moisture content should be within a few percentage points of optimum conditions. The soil should be compacted to at least 95 percent of maximum dry density as determined by the modified Proctor moisture-density relationship test (*ASTM D1557*). Compacted onsite fill soils should be covered shortly after placement.

9.6.1.2 Imported Granular Material

Imported granular material should consist of pit- or quarry-run rock, crushed rock, or crushed gravel and sand. The imported granular material should also be durable, angular, and fairly well graded between coarse and fine material; should have less than 5 percent fines (material passing the U.S. Standard No. 200 sieve) by dry weight; and should have at least two mechanically fractured faces. Imported granular material should be placed in loose lifts not exceeding 12 inches in depth and compacted to at least 95 percent of maximum dry density as determined by the modified Proctor moisture-density relationship test (*ASTM D1557*). During wet-weather conditions or where wet subgrade conditions are present, the initial loose lift of granular fill should be approximately 18 inches thick and should be compacted with a smooth-drum roller operating in static mode.

9.6.1.3 Stabilization Material

Stabilization material should consist of durable, 4- or 6-inch-minus pit- or quarry-run rock, crushed rock, or crushed gravel and sand that is free of organics and other deleterious material. The material should have a maximum particle size of 6 inches with less than 5 percent by dry weight passing the U.S. Standard No. 4 sieve. The material should have at least two mechanically fractured faces.

Stabilization material should be placed in loose lifts between 12 and 24 inches thick and be compacted to a firm, unyielding condition. Equipment with vibratory action should not be used when compacting stabilization material over wet, fine-textured soils. If stabilization material is used to stabilize soft subgrade below pavement or construction haul roads, a subgrade geotextile should be placed as a separation barrier between the soil subgrade and the stabilization material.

9.6.1.4 Trench Backfill

Trench backfill placed below, adjacent to, and up to at least 12 inches above utility lines (i.e., the pipe zone) should consist of well-graded granular material meeting *WSDOT 9-03.12(3)* specifications for *Gravel Backfill for Pipe Zone Bedding*. Pipe zone backfill should be compacted to at least 90 percent of maximum dry density, as determined by the modified Proctor moisture-density relationship test (*ASTM D1557*), or as required by the local jurisdictional agency or pipe manufacturer.

Within structural areas (below pavement and building pads), trench backfill above the pipe zone should consist of *WSDOT 9-03.19 Bank Run Gravel for Trench Backfill* or *WSDOT 9-03.14(2) Select Borrow* with a maximum particle size of 2 ½-inches. Trench backfill material within 18 inches of the top of utility pipes should be hand compacted (i.e., no heavy compaction equipment). Remaining trench backfill should be compacted to at least 95 percent of the maximum dry density as

determined by the modified Proctor moisture-density relationship test (*ASTM D1557*), or as required by the local jurisdictional agency or pipe manufacturer.

Outside of structural areas, trench backfill placed above the pipe zone should be compacted to at least 90 percent of the maximum dry density as determined by the modified Proctor moisture-density relationship test (*ASTM D1557*), or as required by the local jurisdictional agency or pipe manufacturer.

9.6.1.5 Floor Slab Base Aggregate

Base aggregate for building floor slabs should consist of 1 ¼"-minus crushed aggregate meeting *WSDOT 9-03.9(3)* specifications for *Crushed Surfacing*. Slab base aggregate should be compacted to at least at least 95 percent of the maximum dry density as determined by the modified Proctor moisture-density relationship test (*ASTM D1557*).

9.6.2 Pavement Base Aggregate

Base aggregate for pavement should consist of 1 ¼"-minus crushed aggregate meeting *WSDOT 9-03.9(3)* specifications for *Crushed Surfacing*. Pavement base aggregate should be compacted to at least at least 95 percent of the maximum dry density as determined by the modified Proctor moisture-density relationship test (*ASTM D1557*).

9.6.2.1 Retaining Wall Backfill

Backfill material placed behind retaining walls and extending a horizontal distance of ½ H, where H is the height of the retaining wall, should consist of free-draining granular material meeting *WSDOT 9-03.12(2)* specifications for *Gravel Backfill for Walls*. The wall backfill should be separated from structural fill, native soil, and/or topsoil using a geotextile fabric that meets the specifications provided below for drainage geotextiles.

Wall backfill located within a horizontal distance of 3 feet from the face of a retaining wall should be compacted to 90 percent of the maximum dry density, as determined by *ASTM D1557*. Backfill placed within 3 feet of the wall should be compacted in loose lifts less than 6 inches thick using hand-operated tamping equipment (such as a jumping jack or vibratory plate compactor). Remaining wall backfill should be compacted to at least 95 percent of the maximum dry density, as determined by *ASTM D1557*.

9.6.2.2 Retaining Wall Leveling Pad

Crushed aggregate used as a leveling pad for retaining wall footings should consist of 1 ¼"-minus crushed aggregate meeting *WSDOT 9-03.9(3)* specifications for *Crushed Surfacing*. The leveling pad material should be compacted to at least 95 percent of the maximum dry density as determined by the modified Proctor moisture-density relationship test (*ASTM D1557*).

9.6.2.3 Drain Rock

Drain rock should consist of angular, granular material with a maximum particle size of 2 inches and less than 2 percent by weight passing the No. 200 sieve. Drain rock should be free of roots, organic debris, and other unsuitable material and should have at least two mechanically fractured faces. Drain rock should be compacted to a firm, unyielding condition. Drain rock should be completely wrapped in a geotextile drainage fabric meeting the requirements presented below.

9.6.3 Geotextile Fabric

9.6.3.1 Subgrade Geotextile

Subgrade geotextile should meet the specifications provided in *WSDOT 9-33.2(1), Table 3, Geotextile for Separation or Soil Stabilization*. The geotextile should be installed in accordance with the manufacturer's recommendations. A minimum initial aggregate base lift of 6 inches is required over geotextiles. All stabilization material should be underlain by a subgrade geotextile.

9.6.3.2 Drainage Geotextile

Subgrade geotextile should meet the specifications provided in *WSDOT 9-33.2(1), Table 2, Geotextile for Underground Drainage Filtration Properties*. The AOS should be between the No. 70 and No. 100 sieve. The water permittivity should be greater than 1.5/sec. The geotextile should be installed in accordance with the manufacturer's recommendations. A minimum initial aggregate base lift of 6 inches is required over geotextiles.

9.6.4 Geotextile Fabric

9.6.4.1 Subgrade Geotextile

Subgrade geotextile should meet the specifications provided in *WSDOT 9-33.2(1), Table 3, Geotextile for Separation or Soil Stabilization*. The geotextile should be installed in accordance with the manufacturer's recommendations. A minimum initial aggregate base lift of 6 inches is required over geotextiles. All stabilization material should be underlain by a subgrade geotextile.

9.6.4.2 Drainage Geotextile

Subgrade geotextile should meet the specifications provided in *WSDOT 9-33.2(1), Table 2, Geotextile for Underground Drainage Filtration Properties*. The AOS should be between the No. 70 and No. 100 sieve. The water permittivity should be greater than 1.5/sec. The geotextile should be installed in accordance with the manufacturer's recommendations. A minimum initial aggregate base lift of 6 inches is required over geotextiles.

9.6.5 Pavement

9.6.5.1 Asphaltic Concrete

Asphaltic concrete should consist of HMA Class ½" adhering to *WSDOT 9-03.8(6), HMA Proportions of Materials*. The asphalt binder should consist of PG 58-22 meeting *WSDOT 9-02.1(4), Performance Graded (PG) Asphalt Binder*. Asphalt should be compacted to 91 percent of the theoretical maximum density as determined by *ASTM D2041*. Minimum and maximum asphalt lift thicknesses should be 2 and 3 inches, respectively. Nuclear gauge density testing should be conducted to verify adherence to recommended specifications. Testing frequency should be in accordance with WSDOT and City of Camas specifications.

9.7 EROSION CONTROL MEASURES

Soil at this site is susceptible to erosion by wind and water; therefore, erosion control measures should be carefully planned and installed before construction begins. Surface water runoff should be collected and directed away from sloped areas to prevent water from running down the slope face. Measures that can be employed to reduce erosion include the use of silt fences, hay bales, buffer

zones of natural growth, sedimentation ponds, and granular haul roads. All erosion control methods should be in accordance with local jurisdiction standards.

10.0 OBSERVATION OF CONSTRUCTION

Satisfactory earthwork and foundation performance depends to a large degree on the quality of construction. Subsurface conditions observed during construction should be compared with those encountered during the subsurface explorations. Recognition of changed conditions often requires experience; therefore, qualified personnel should visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those anticipated. In addition, sufficient observation of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications.

11.0 CONCLUSIONS AND LIMITATIONS

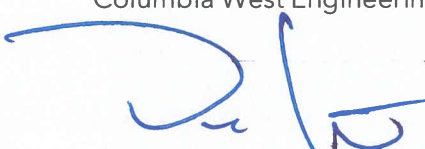
This geotechnical site investigation report was prepared in accordance with accepted standard conventional principles and practices of geotechnical engineering. This investigation pertains only to material tested and observed as of the date of this report and is based upon proposed site development as described in the text herein. This report is a professional opinion containing recommendations established by engineering interpretations of subsurface soils based upon conditions observed during site exploration. Soil conditions may differ between tested locations or over time. Slight variations may produce impacts to the performance of structural facilities if not adequately addressed. This underscores the importance of diligent QA/QC construction observation and testing to verify soil conditions are as anticipated in this report.

Therefore, this report contains several recommendations for field observation and testing by Columbia West personnel during construction activities. Columbia West cannot accept responsibility for deviations from recommendations described in this report. Future performance of structural facilities is often related to the degree of construction observation by qualified personnel. These services should be performed to the full extent recommended.

This report is not an environmental assessment and should not be construed as a representative warranty of site subsurface conditions. The discovery of adverse environmental conditions, or subsurface soils that deviate from those described in this report, should immediately prompt further investigation. The above statements are in lieu of all other statements expressed or implied.

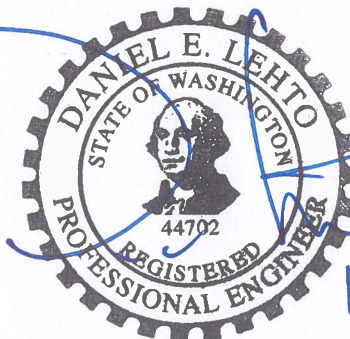
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Sincerely,
Columbia West Engineering, Inc.


Daniel E. Lehto, PE, GE
Principal

DEL:ASR

Document ID: Mills Property Geotechnical Report.docx



Expires: 6-5-25

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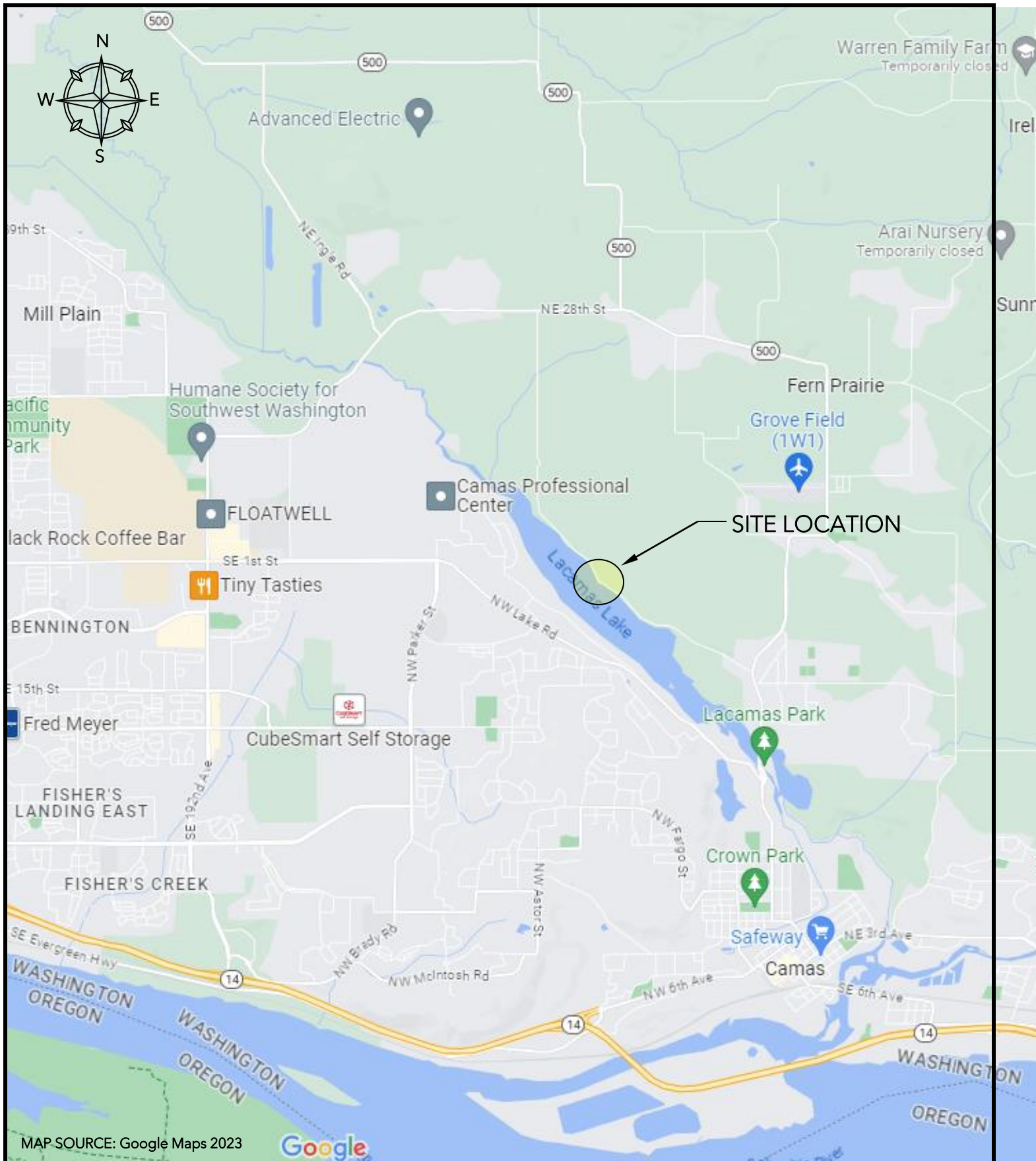
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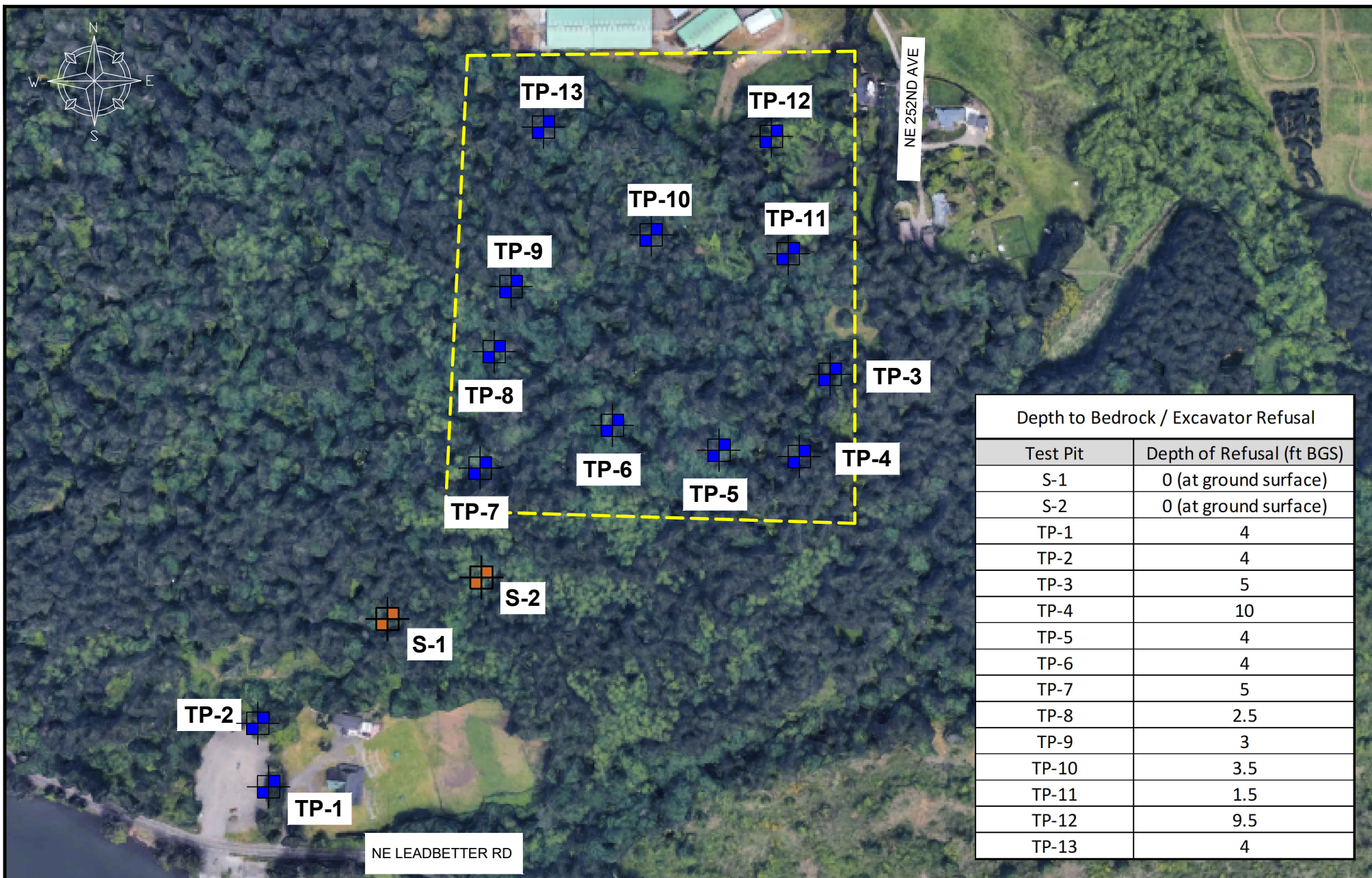
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FIGURES



MAP SOURCE: Google Maps 2023





SCALE BAR 1:5000



— APPROXIMATE SITE BOUNDARY

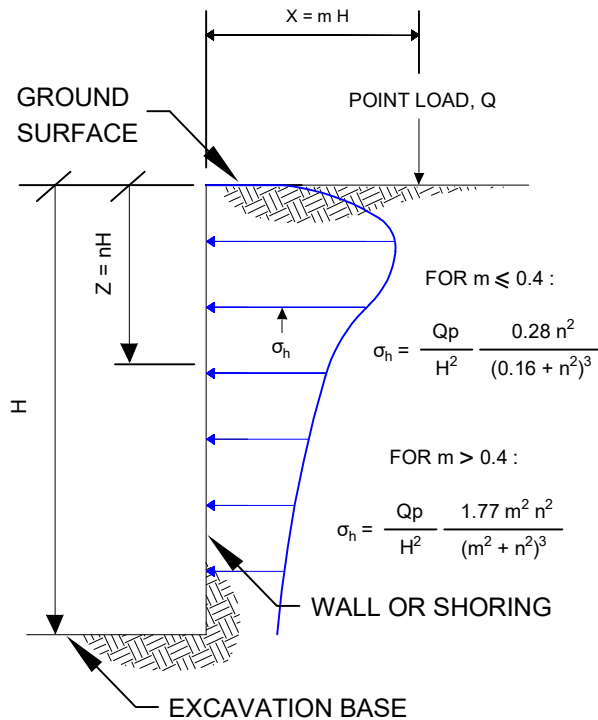


APPROXIMATE TEST PIT LOCATION

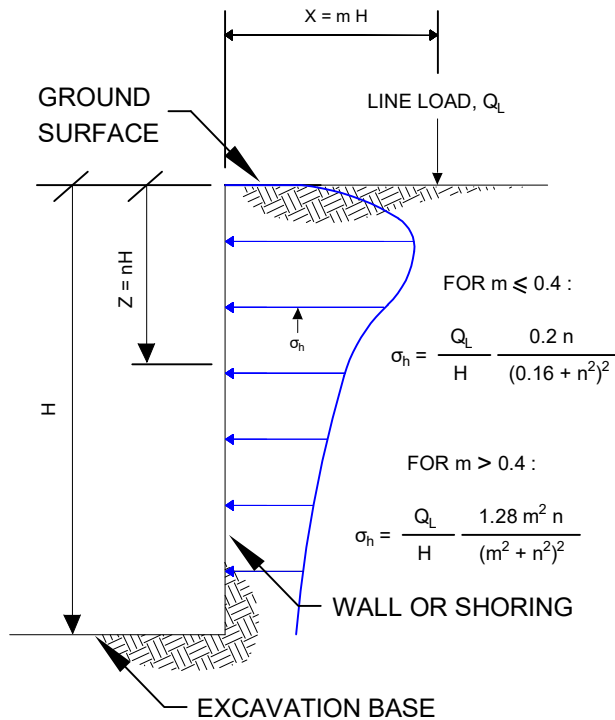


APPROXIMATE SUPPLEMENTAL SHOVEL PIT

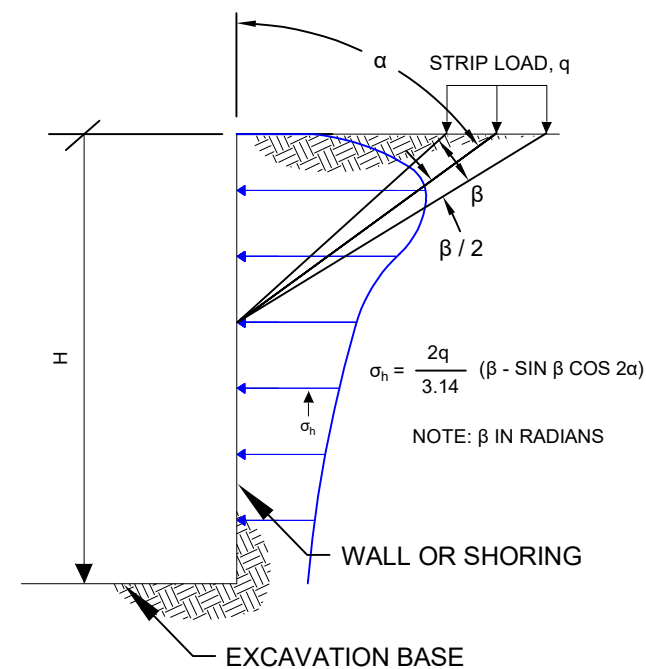
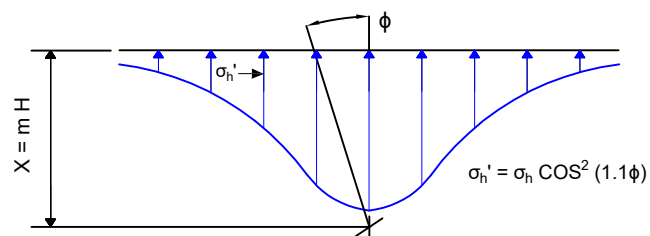
VERTICAL POINT LOAD



LINE LOAD PARALLEL TO WALL

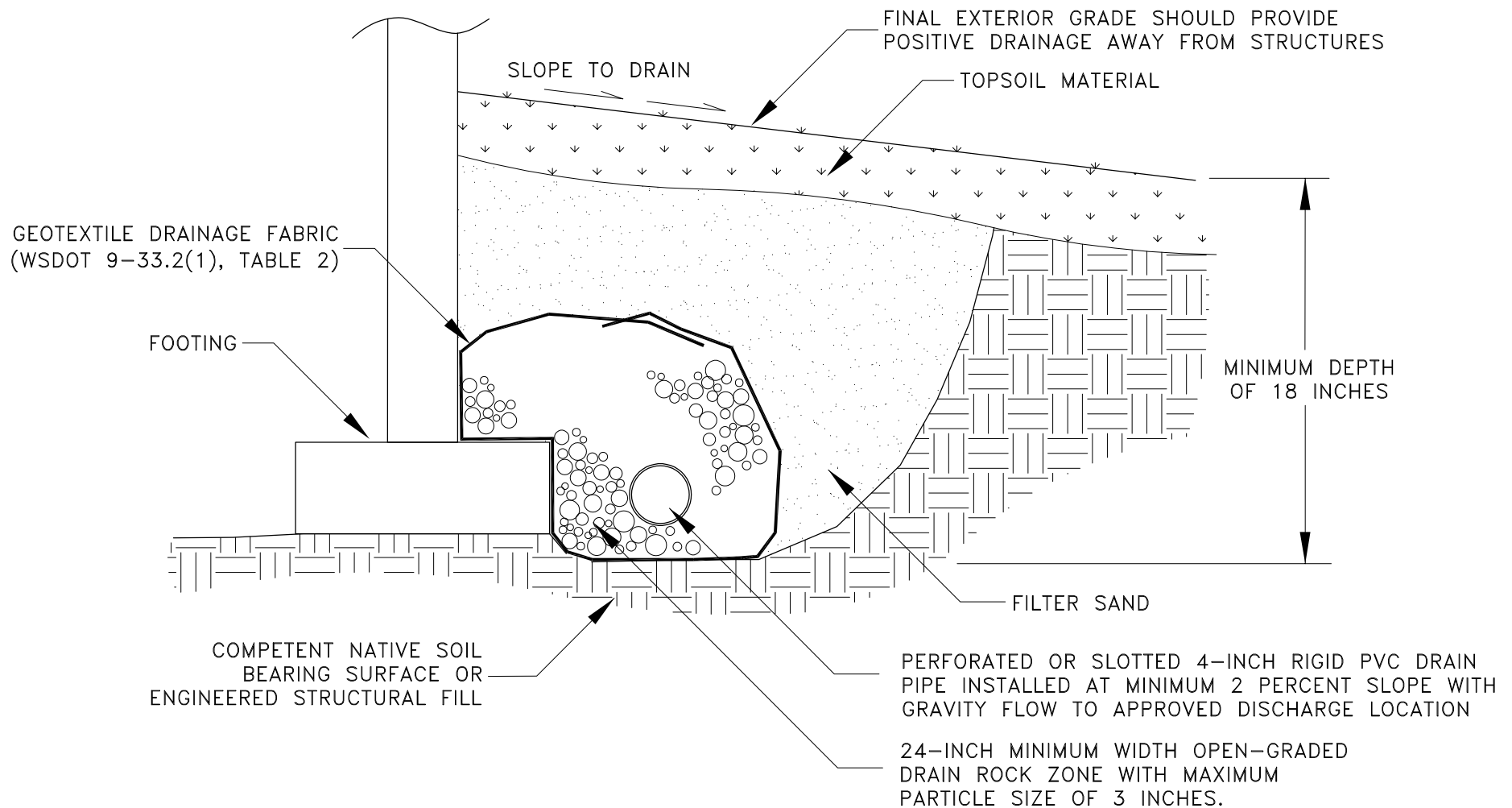


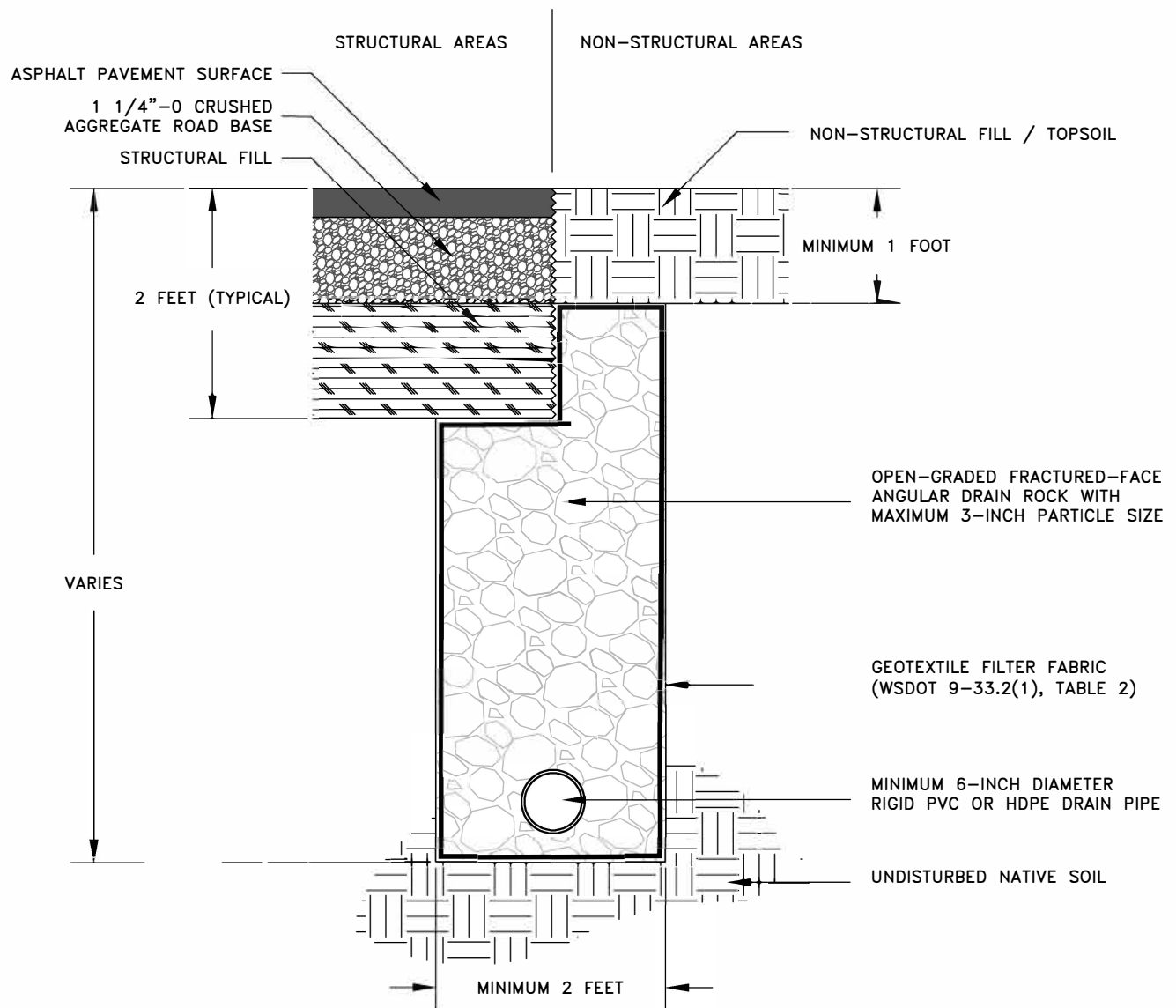
STRIP LOAD PARALLEL TO WALL

VERTICAL POINT LOAD
HORIZONTAL PRESSURE DISTRIBUTION

NOTES:

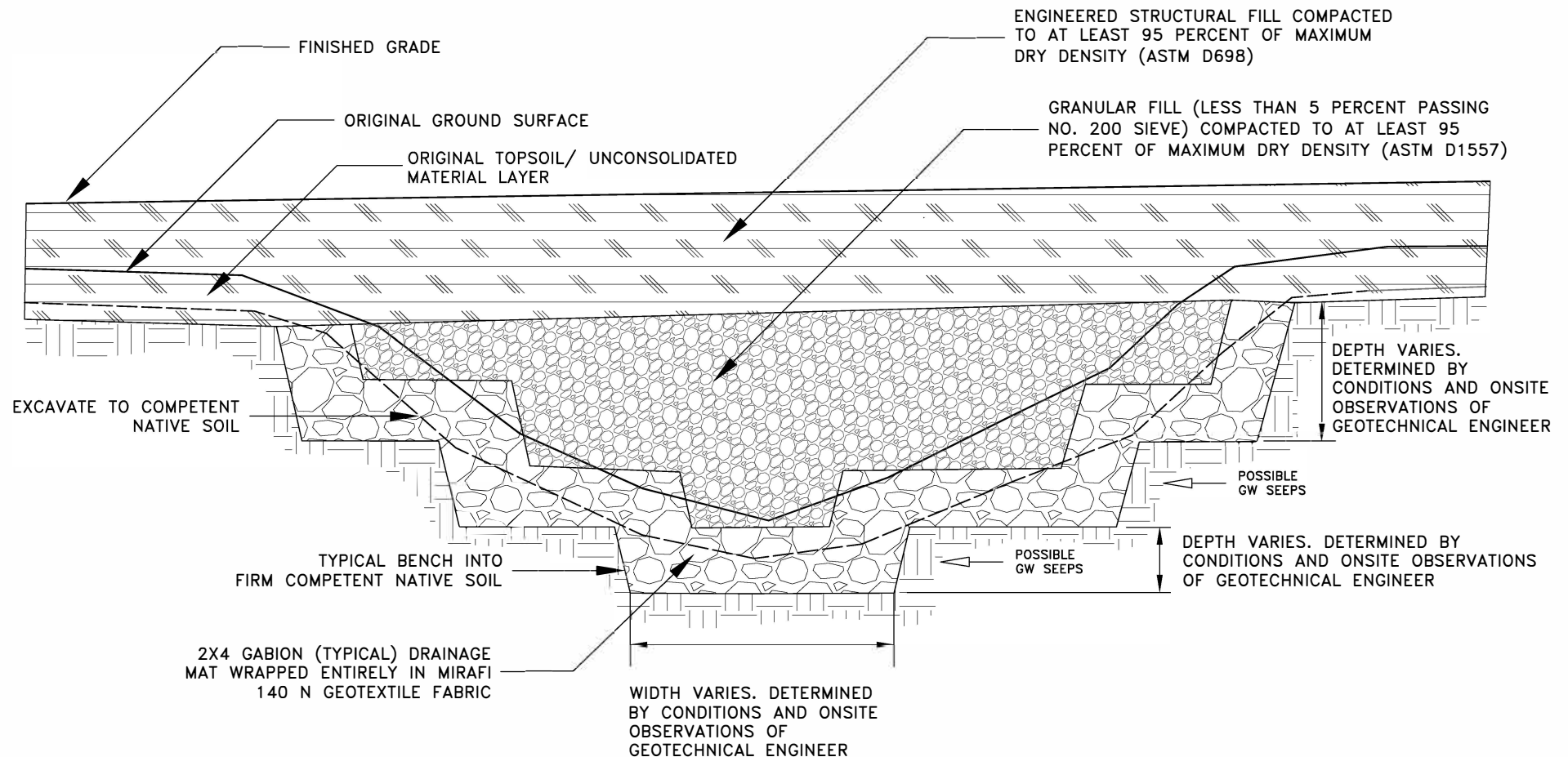
1. FIGURE SHOULD BE USED JOINTLY WITH RECOMMENDATIONS PRESENTED IN THE REPORT TEXT.
2. LATERAL EARTH PRESSURES ASSUME RIGID WALLS WITH BACKFILL MATERIALS HAVING A POISSON'S RATIO OF 0.5.
3. TOTAL LATERAL EARTH PRESSURES RESULTING FROM COMBINED LOADS MAY BE CALCULATED USING SUPERPOSITION.
4. DRAWING IS NOT TO SCALE.

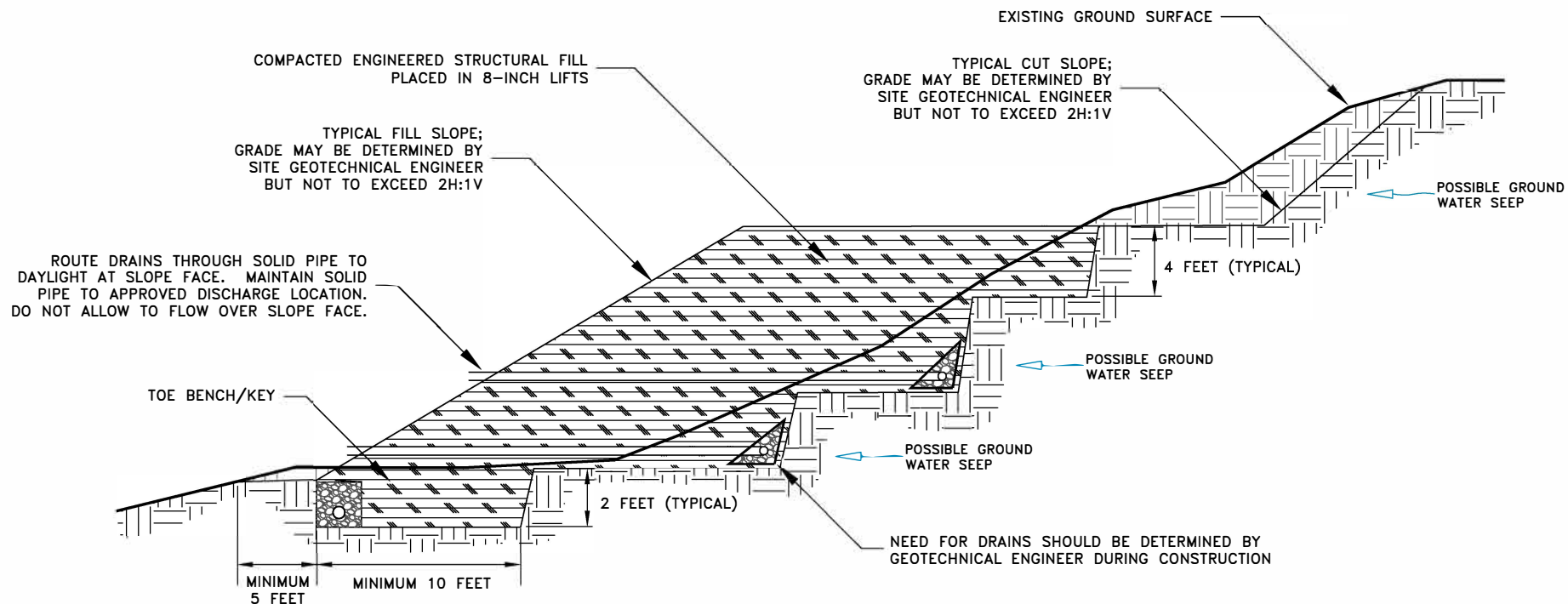




NOTE: LOCATION, INVERT ELEVATION, DEPTH OF TRENCH, AND EXTENT OF PERFORATED PIPE REQUIRED MAY BE MODIFIED BY THE GEOTECHNICAL ENGINEER DURING CONSTRUCTION BASED UPON FIELD OBSERVATION AND SITE-SPECIFIC SOIL CONDITIONS.

TYPICAL DRAINAGE MAT CROSS-SECTION



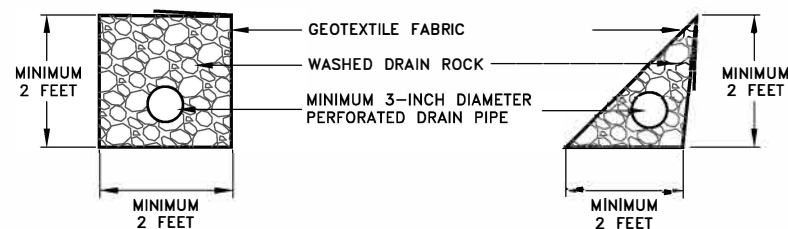


DRAIN SPECIFICATIONS

GEOTEXTILE FABRIC SHALL MEET WSDOT 9-33.2(1), TABLE 2, GEOTEXTILE FOR UNDERGROUND DRAINAGE FILTRATION PROPERTIES WITH AOS BETWEEN No. 70 AND No. 100 SIEVE. WATER PERMITIVITY SHOULD BE GREATER THAN 1.5/SEC.

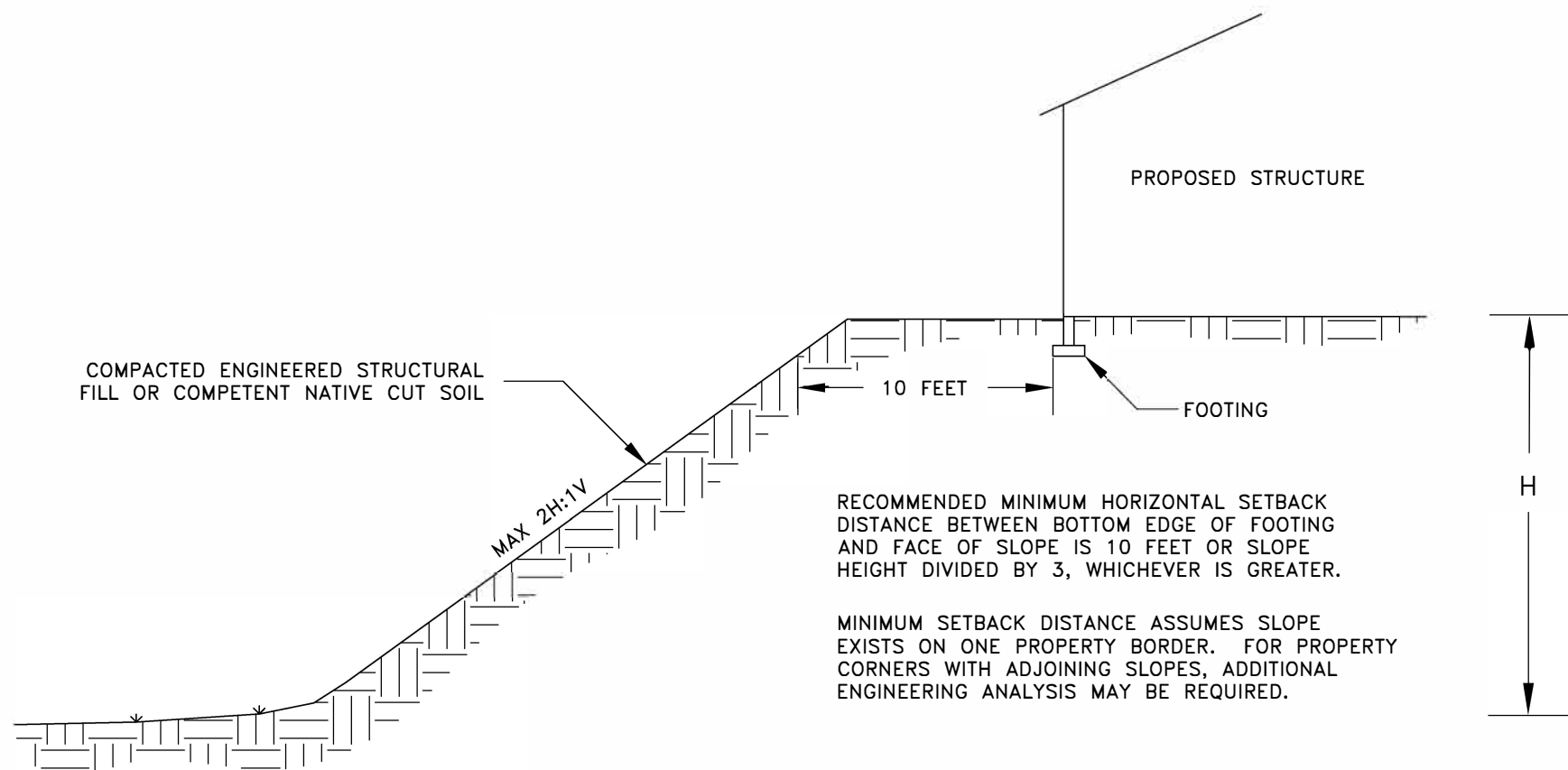
WASHED DRAIN ROCK SHALL BE OPEN-GRADED ANGULAR DRAIN ROCK WITH LESS THAN 2 PERCENT PASSING THE No. 200 SIEVE AND A MAXIMUM PARTICLE SIZE OF 2 INCHES.

TYPICAL DRAIN SECTION DETAIL



NOTES:

1. DRAWING IS NOT TO SCALE.
2. DRAWING REPRESENTS TYPICAL CUT AND FILL SLOPE CROSS SECTION AND MAY NOT BE SITE-SPECIFIC.



NOTES:

1. DRAWING IS NOT TO SCALE.
2. SLOPES AND PROFILES SHOWN ARE APPROXIMATE.
3. DRAWING REPRESENTS TYPICAL FOUNDATION SETBACK DETAIL AND MAY NOT BE SITE-SPECIFIC.

APPENDIX A

SUBSURFACE EXPLORATION PROGRAM

FIELD EXPLORATIONS

GENERAL

We explored subsurface conditions at the site by excavating thirteen test pits (TP-1 through TP-13) to depths between 1.5 and 10 feet BGS. Excavation services were provided by L&S Contractors of Battle Ground, Washington on October 13, 2023. The test pit locations are shown in Figures 2. The test pit logs are presented in this appendix.

SOIL SAMPLING

Representative grab samples of the soil observed in the test pit explorations were obtained from the walls and/or base of the test pits using the excavator bucket.

SOIL CLASSIFICATION

The soil samples were classified in accordance with the Unified Soil Classification System presented in Appendix A. The exploration log indicates the depths at which the soils or their characteristics change, although the change actually could be gradual. If the change occurred between sample locations, the depth was interpreted. Classifications are shown on the exploration log.

EXPLORATION LEGEND

Symbol	Description	
SPT	Sample obtained from the indicated depth in general accordance with ASTM D1586, <i>Standard Penetration Test and Split-Barrel Sampling of Soils</i>	
SHELBY	Sample obtained from the indicated depth using thin-wall Shelby tube in general accordance with ASTM D1587, <i>Thin-Walled Tube Sampling of Fine-Grained Soils</i>	
D&M 300	Sample obtained from the indicated depth using Dames & Moore sampler and 300-pound hammer or pushed	
D&M 140	Sample obtained from the indicated depth using Dames & Moore sampler and 140-pound hammer or pushed	
CSS	Sample obtained from the indicated depth using 3-inch-outer-diameter California split-spoon sampler and 140-pound hammer	
GRAB	Grab sample obtained from the indicated depth	<u>Graphical Log of Subsurface Lithology</u>
CORE	Rock core interval at the indicated depth	
	Water level observed during exploration	

Geotechnical Acronyms			
AASHTO	American Association of State Highway and Transportation Officials	P	Push Sample
ASTM	American Society for Testing and Materials	PP	Pocket Penetrometer
ATT	Atterberg Limits	PSF	Pounds Per Square Foot
BGS	Below Ground Surface	P200	Percent Passing No. 200 Sieve
CBR	California Bearing Ratio	RES	Resilient Modulus
CON	Consolidation Test	SIEV	Sieve Analysis
DCPT	Dynamic Cone Penetration Test	SPT	Standard Penetration Test
DD	Dry Density	TS	Torvane Shear
DS	Direct Shear	UC	Unconfined Compressive Strength
HYD	Hydrometer	UU	Unconsolidated Undrained Triaxial Test
IR	Infiltration Rate	USCS	United Soil Classification System
MC	Moisture Content	VS	Vane Shear
MD	Moisture-Density Relationship	WD	Wet Density
OC	Organic Content		

SOIL DESCRIPTION AND CLASSIFICATION

Particle-Size Classification

COMPONENT	ASTM / USCS		AASHTO	
	size range	sieve size range	size range	sieve size range
Boulders	Greater than 300 mm	Greater than 12 inches	-	-
Cobbles	75 mm to 300 mm	3 inches to 12 inches	Greater than 75 mm	Greater than 3 inches
Gravel	75 mm to 4.75 mm	3 inches to No. 4 sieve	75 mm to 2.00 mm	3 inches to No. 10 sieve
Coarse	75 mm to 19.0 mm	3 inches to 3/4-inch sieve	-	-
Fine	19.0 mm to 4.75 mm	3/4-inch to No. 4 sieve	-	-
Sand	4.75 mm to 0.075 mm	No. 4 to No. 200 sieve	2.00 mm to 0.075 mm	No. 10 to No. 200 sieve
Coarse	4.75 mm to 2.00 mm	No. 4 to No. 10 sieve	2.00 mm to 0.425 mm	No. 10 to No. 40 sieve
Medium	2.00 mm to 0.425 mm	No. 10 to No. 40 sieve	-	-
Fine	0.425 mm to 0.075 mm	No. 40 to No. 200 sieve	0.425 mm to 0.075 mm	No. 40 to No. 200 sieve
Fines (Silt and Clay)	Less than 0.075 mm	Passing No. 200 sieve	Less than 0.075 mm	Passing No. 200 sieve

Consistency for Cohesive Soil

CONSISTENCY	SPT N-VALUE (BLOWS PER FOOT)	D&M N-VALUE (BLOWS PER FOOT)	POCKET PENETROMETER (UNCONFINED COMPRESSIVE STRENGTH, tsf)
Very Soft	Less than 2	Less than 3	Less than 0.25
Soft	2 to 4	3 to 6	0.25 to 0.50
Medium Stiff	4 to 8	6 to 12	0.50 to 1.0
Stiff	8 to 15	12 to 25	1.0 to 2.0
Very Stiff	15 to 30	25 to 65	2.0 to 4.0
Hard	30 to 60	65 to 145	Greater than 4.0
Very Hard	Greater than 60	Greater than 145	-

Relative Density for Granular Soil

RELATIVE DENSITY	SPT N-VALUE (BLOWS PER FOOT)	D&M N-VALUE (BLOWS PER FOOT)
Very Loose	0 to 4	0 to 11
Loose	4 to 10	11 to 26
Medium Dense	10 to 30	26 to 74
Dense	30 to 50	74 to 120
Very Dense	Greater than 50	Greater than 120

Moisture Designations

TERM	FIELD IDENTIFICATION
Dry	No moisture. Dusty or dry.
Damp	Some moisture. Cohesive soils are usually below plastic limit and are moldable.
Moist	Grains appear darkened, but no visible water is present. Cohesive soils will clump. Sand will bulk. Soils are often at or near plastic limit.
Wet	Visible water on larger grains. Sand and silt exhibit dilatancy. Cohesive soil can be readily remolded. Soil leaves wetness on the hand when squeezed. Soil is much wetter than optimum moisture content and is above plastic limit.

Additional Constituents

Percent	Silt and Clay In:		Percent	Sand and Gravel In:	
	Fine-Grained Soil	Coarse-Grained Soil		Fine-Grained Soil	Coarse-Grained Soil
< 5	trace	trace	< 5	trace	trace
5 – 12	minor	with	5 – 15	minor	minor
> 12	some	silty/clayey	15 – 30	with	with
			> 30	sandy/gravelly	with (approx. percentage)

AASHTO SOIL CLASSIFICATION SYSTEM

TABLE 1. Classification of Soils and Soil-Aggregate Mixtures

General Classification	Granular Materials (35 Percent or Less Passing .075 mm)				Silt-Clay Materials (More than 35 Percent Passing 0.075)		
Group Classification	A-1	A-3	A-2	A-4	A-5	A-6	A-7
Sieve analysis, percent passing:							
2.00 mm (No. 10)	-	-	-	-	-	-	-
0.425 mm (No. 40)	50 max	51 min	-	-	-	-	-
0.075 mm (No. 200)	25 max	10 max	35 max	36 min	36 min	36 min	36 min
<u>Characteristics of fraction passing 0.425 mm (No. 40)</u>							
Liquid limit				40 max	41 min	40 max	41 min
Plasticity index	6 max	N.P.		10 max	10 max	11 min	11 min
General rating as subgrade	Excellent to good				Fair to poor		

Note: The placing of A-3 before A-2 is necessary in the "left to right elimination process" and does not indicate superiority of A-3 over A-2.

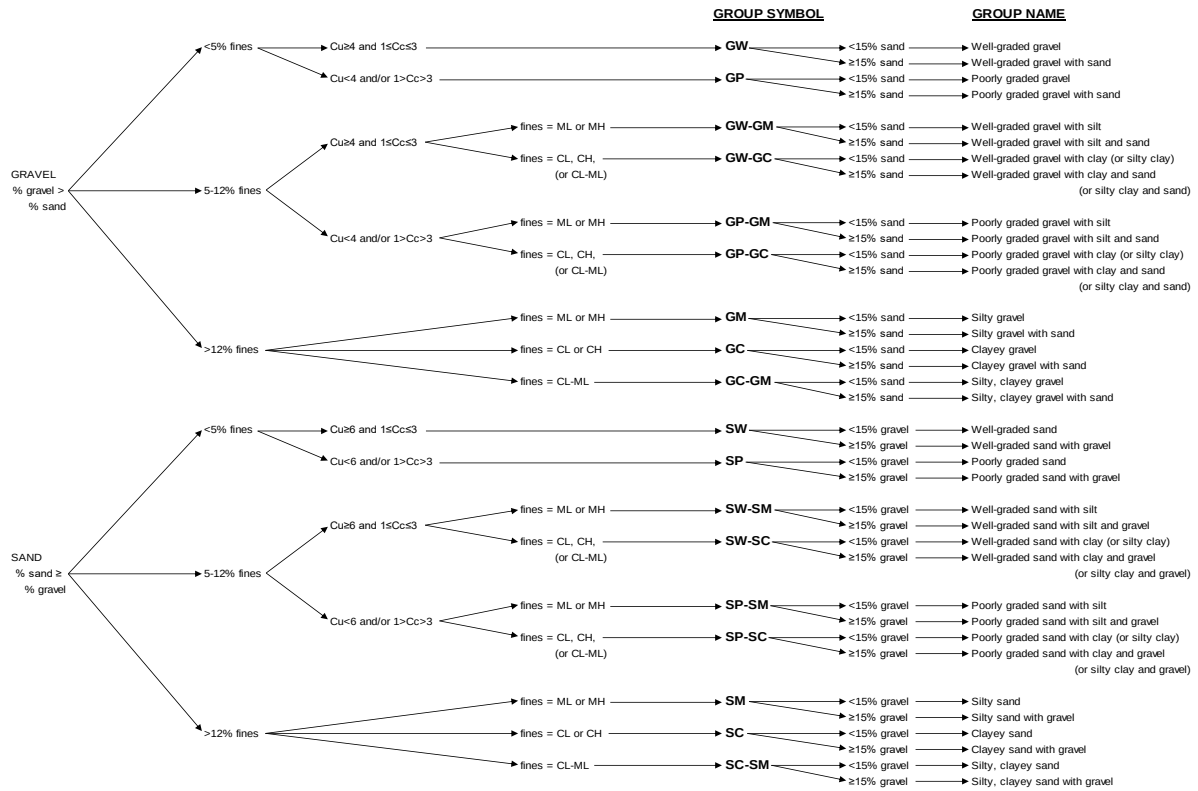
TABLE 2. Classification of Soils and Soil-Aggregate Mixtures

	Granular Materials							Silt-Clay Materials			
General Classification	(35 Percent or Less Passing 0.075 mm)							(More than 35 Percent Passing 0.075 mm)			
	A-1		A-2					A-7			
								A-7-5, A-7-6			
Group Classification	A-1-a	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7-6
<u>Sieve analysis, percent passing:</u>											
2.00 mm (No. 10)	50 max	-	-	-	-	-	-	-	-	-	-
0.425 mm (No. 40)	30 max	50 max	51 min	-	-	-	-	-	-	-	-
0.075 mm (No. 200)	15 max	25 max	10 max	35 max	35 max	35 max	35 max	36 min	36 min	36 min	36 min
<u>Characteristics of fraction passing 0.425 mm (No. 40)</u>											
Liquid limit				40 max	41 min	40 max	41 min	40 max	41 min	40 max	41 min
Plasticity index	6 max		N.P.	10 max	10 max	11 min	11 min	10 max	10 max	11 min	11min
Usual types of significant constituent materials	Stone fragments, gravel and sand		Fine sand	Silty or clayey gravel and sand				Silty soils		Clayey soils	
General ratings as subgrade	Excellent to Good							Fair to poor			

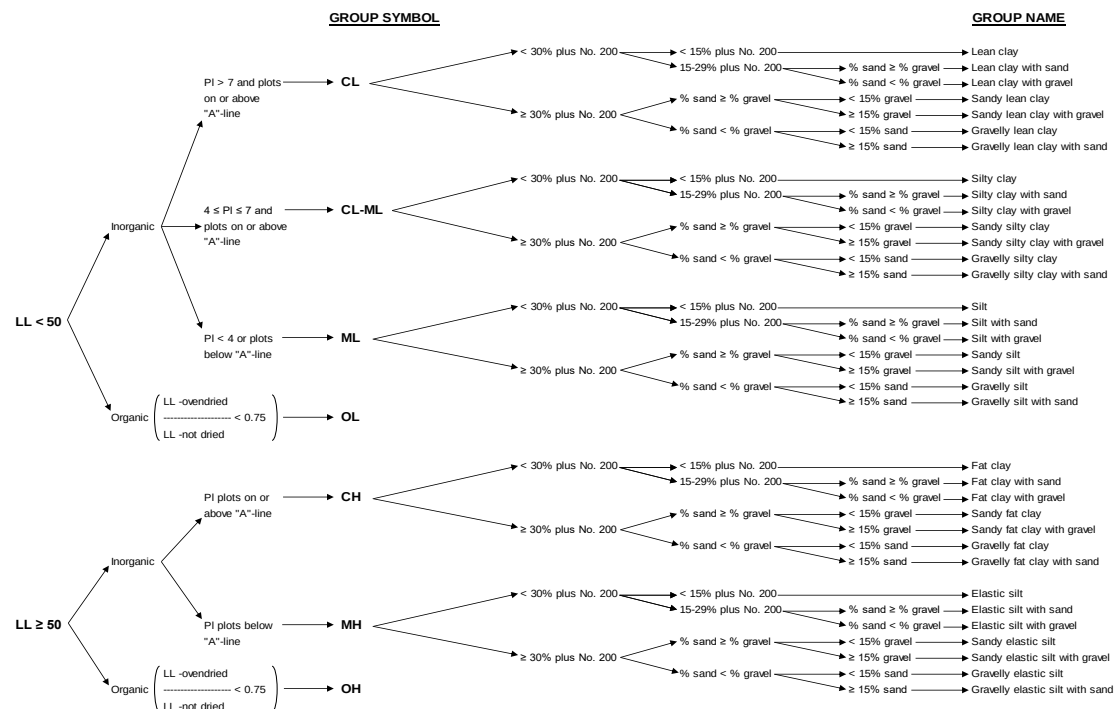
Note: Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30 (see Figure 2).

AASHTO = American Association of State Highway and Transportation Officials

UNIFIED SOIL CLASSIFICATION SYSTEM



Flow Chart for Classifying Coarse-Grained Soils (More Than 50% Retained on No. 200 Sieve)



Flow Chart for Classifying Fine-Grained Soil (50% or More Passes No. 200 Sieve)

ROCK CLASSIFICATION SYSTEM

STRENGTH	DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH (PSI)
Extremely Weak (R0)	Easily indented by thumbnail	35 to 150
Very Weak (R1)	Scratched with fingernail, peeled by knife, indented by rock pick	150 to 275
Weak (R2)	Peeled by knife, indented by rock pick	725 to 3,500
Medium Strong (R3)	Cannot be peeled or scraped with a knife	3,500 to 7,250
Strong (R4)	Requires more than one blow with a rock hammer to fracture it	7,250 to 14,500
Very Strong (R5)	Requires many blows with a rock hammer to fracture it	14,500 to 36,250
Extremely Strong (R6)	Can only be chipped with a rock hammer	Greater than 36,250

WEATHERING	DESCRIPTION
Decomposed	A soil formed in place with original texture of rock destroyed
Completely Weathered	Rock wholly weathered but rock texture preserved
Highly Weathered	Rock weakened so that large pieces can be broken by hand
Moderately Weathered	Rock mass is decomposed locally
Slightly Weathered	Discoloration along discontinuities
Fresh	No visible signs of weathering or discoloring

JOINT SPACING	DESCRIPTION
Very Close	Less than 0.2 foot
Close	0.2 foot to 1 foot
Moderately Close	1 foot to 3 feet
Wide	3 feet to 10 feet
Very Wide	Greater than 10 feet

FRACTURING	FRACTURE SPACING
Very Intensely Fractured	Chips, fragments, with scattered short core lengths
Intensely Fractured	0.1 foot to 0.3 foot with scattered fragments
Moderately Fractured	0.3 foot to 1 foot
Slightly Fractured	1 foot to 3 feet
Very Slightly Fractured	Greater than 3 feet
Unfractured	No fractures observed

HEALING	DESCRIPTION
Not Healed	Discontinued surface, fractured zone, sheared material, filling is not cemented
Partly Healed	Less than 50% of fractures or sheared zone bonding
Moderately Healed	Greater than 50% fractures or sheared zone bonding
Totally Healed	All fragments are bonded

QUALITY	RQD (%)
Very poor	Less than 25%
Poor	25 to 50%
Fair	51 to 75%
Good	76 to 90%

Rock Quality Designation (RQD) is a measure of quality of rock core taken from a borehole. The length of core pieces is measured along center line of the pieces. All pieces of intact rock core equal to or greater than 100 mm (4 in.) long are summed and divided by the total length of the core run to obtain RQD value

[illegible]

PROJECT NAME Mills Camas						CLIENT HSR Development			PROJECT NO. HSR-1-01-1		TEST PIT NO. TP-2		
PROJECT LOCATION Camas, Washington						CONTRACTOR L&S Contractors Inc.		EQUIPMENT Excavator		TECHNICIAN SSC		DATE 10-13-2023	
TEST PIT LOCATION See Figure 2						GROUNDWATER DEPTH Groundwater not observed.				START TIME 0822		FINISH TIME 0835	
Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS			Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						2 to 3 inches forest duff (topsoil).							
				GW-GM		Fine tree roots extend to 8 inches in depth. Brown GRAVEL with silt, moist, dense, fine angular aggregate (0.1 to 0.25 inch).							
				GC		Decomposed/weathered bedrock, very dense clayey gravel.							
						Bottom of test pit at 4 feet due to practical refusal on bedrock.							
5													
10													
15													

PROJECT NAME Mills Camas						CLIENT HSR Development		PROJECT NO. HSR-1-01-1		TEST PIT NO. TP-3			
PROJECT LOCATION Camas, Washington						CONTRACTOR L&S Contractors Inc.		EQUIPMENT Excavator		TECHNICIAN SSC		DATE 10-13-2023	
TEST PIT LOCATION See Figure 2						GROUNDWATER DEPTH Groundwater not observed.				START TIME 0909		FINISH TIME 0917	
Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS			Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						6 to 8 inches forest duff with fine tree roots.							
				GC		Grey weathered bedrock, moist, dense to very dense clayey gravel. Difficult digging from 1 to 5 feet.							
5						Bottom of test pit at 5 feet due to practical refusal on bedrock.							
10													
15													

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TEST PIT LOG

PROJECT NAME Mills Camas						CLIENT HSR Development		PROJECT NO. HSR-1-01-1		TEST PIT NO. TP-4	
PROJECT LOCATION Camas, Washington						CONTRACTOR L&S Contractors Inc.		EQUIPMENT Excavator		TECHNICIAN SSC	
TEST PIT LOCATION See Figure 2						GROUNDWATER DEPTH Groundwater not observed.		START TIME 0918		FINISH TIME 0935	
Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0	TP4.1			ML		6 to 8 inches forest duff with fine tree roots.	41	45	41	15	
5						Brown SILT with trace gravel (0.1 to 0.25 inch), moist, medium stiff to stiff.					
						Difficult digging from 8 to 10 feet. Intermixed weathered bedrock gravel and boulders at 8 feet.					
10	TP4.2		A-7-6(4)	SM		Brown silty SAND with gravel, moist, medium dense.					
15						Bottom of test pit at 10 feet due to practical refusal on bedrock.					

[illegible]

[illegible]

PROJECT NAME Mills Camas						CLIENT HSR Development		PROJECT NO. HSR-1-01-1		TEST PIT NO. TP-7			
PROJECT LOCATION Camas, Washington						CONTRACTOR L&S Contractors Inc.		EQUIPMENT Excavator		TECHNICIAN SSC		DATE 10-13-2023	
TEST PIT LOCATION See Figure 2						GROUNDWATER DEPTH Groundwater not observed.				START TIME 1020		FINISH TIME 1033	
Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS			Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						8 to 10 inches forest duff with tree roots.							
						Fine tree roots extend to 1.5 feet in depth.							
				GC		Grey weathered bedrock, moist, dense to very dense clayey gravel.							
						Difficult digging from 3 to 5 feet.							
5						Bottom of test pit at 5 feet due to practical refusal on bedrock.							
10													
15													

PROJECT NAME Mills Camas						CLIENT HSR Development		PROJECT NO. HSR-1-01-1		TEST PIT NO. TP-8			
PROJECT LOCATION Camas, Washington						CONTRACTOR L&S Contractors Inc.		EQUIPMENT Excavator		TECHNICIAN SSC		DATE 10-13-2023	
TEST PIT LOCATION See Figure 2						GROUNDWATER DEPTH Groundwater not observed.				START TIME 1040		FINISH TIME 1045	
Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS			Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						8 to 10 inches forest duff with tree roots. Fine tree roots extend to 1.5 feet in depth.							
				GC		Grey weathered bedrock, moist, dense to very dense clayey gravel.							
						Bottom of test pit at 2.5 feet due to practical refusal on bedrock.							
5													
10													
15													

TEST PIT LOG

[illegible]

PROJECT NAME Mills Camas						CLIENT HSR Development		PROJECT NO. HSR-1-01-1		TEST PIT NO. TP-10			
PROJECT LOCATION Camas, Washington						CONTRACTOR L&S Contractors Inc.		EQUIPMENT Excavator		TECHNICIAN SSC		DATE 10-13-2023	
TEST PIT LOCATION See Figure 2						GROUNDWATER DEPTH Groundwater not observed.				START TIME 1130		FINISH TIME 1146	
Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS			Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						8 to 10 inches forest duff with tree roots.							
				GC		Fine tree roots extend to 1.5 feet in depth. Grey-brown weathered bedrock, moist, dense to very dense clayey gravel. Difficult digging from 1.5 to 3.5 feet.							
						Bottom of test pit at 3.5 feet due to practical refusal on bedrock.							
5													
15													

PROJECT NAME Mills Camas						CLIENT HSR Development		PROJECT NO. HSR-1-01-1		TEST PIT NO. TP-11			
PROJECT LOCATION Camas, Washington						CONTRACTOR L&S Contractors Inc.		EQUIPMENT Excavator		TECHNICIAN SSC		DATE 10-13-2023	
TEST PIT LOCATION See Figure 2						GROUNDWATER DEPTH Groundwater not observed.				START TIME 1150		FINISH TIME 1155	
Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS			Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						8 inches forest duff with tree roots.							
				GC		Grey weathered bedrock, moist, dense to very dense clayey gravel.							
						Bottom of test pit at 1.5 feet due to practical refusal on bedrock.							
5													
10													
15													

PROJECT NAME Mills Camas						CLIENT HSR Development			PROJECT NO. HSR-1-01-1		TEST PIT NO. TP-12		
PROJECT LOCATION Camas, Washington						CONTRACTOR L&S Contractors Inc.		EQUIPMENT Excavator		TECHNICIAN SSC		DATE 10-13-2023	
TEST PIT LOCATION See Figure 2						GROUNDWATER DEPTH Groundwater not observed.			START TIME 1210		FINISH TIME 1230		
Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS			Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0	TP12.1					2 to 3 inches root zone underlain by 6 inches topsoil.							
				ML		Brown SILT with gravel (0.1 to 3 inches), moist, medium stiff, low plasticity.							
5						Increase in gravel and weathered bedrock at 6 feet. Difficult digging from 6 feet to 9.5 feet.							
	TP12.2					Weathered bedrock boulders at 9 feet.							
10						Bottom of test pit at 9.5 feet due to practical refusal on bedrock.							
15													

[illegible]

APPENDIX B LABORATORY TESTING

CLASSIFICATION

The soil samples were classified in the laboratory to confirm field classifications. The laboratory classifications are shown on the exploration log if those classifications differed from the field classifications.

ATTERBERG LIMITS

Atterberg limits (plastic and liquid limits) testing was performed on select soil samples in general accordance with ASTM D4318. The plastic limit is defined as the moisture content where the soil becomes brittle. The liquid limit is defined as the moisture content where the soil begins to act similar to a liquid. The plasticity index is the difference between the liquid and plastic limits. The test results are presented in this appendix.

MOISTURE CONTENT

We determined the natural moisture content of select soil samples in general accordance with ASTM D2216. The natural moisture content is a ratio of the weight of the water to soil in a test sample and is expressed as a percentage. The test results are presented in this appendix.

PARTICLE-SIZE ANALYSIS

We completed particle-size analysis on select soil samples in general accordance with ASTM D6913. This test is a quantitative determination of the soil particle size distribution expressed as a percentage of dry soil weight.

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PARTICLE-SIZE ANALYSIS REPORT

PROJECT Mills Camas 313 SE Leadbetter Road Camas, Washington 98607	CLIENT HSR Development 500 E. Broadway, Suite 120 Vancouver, Washington 98660	PROJECT NO. HSR-1-01-1 REPORT DATE 10/30/23 DATE SAMPLED 10/13/23	LAB ID S23-1356 FIELD ID TP4.2 SAMPLED BY SSC																																																																																																																																																																																																
MATERIAL DATA																																																																																																																																																																																																			
MATERIAL SAMPLED brown Silty SAND with Gravel	MATERIAL SOURCE Test Pit TP-04 depth = 8 feet	USCS SOIL TYPE SM, Silty Sand with Gravel																																																																																																																																																																																																	
SPECIFICATIONS none		AASHTO CLASSIFICATION A-7-6(4)																																																																																																																																																																																																	
LABORATORY TEST DATA																																																																																																																																																																																																			
LABORATORY EQUIPMENT Rainhart "Mary Ann" Sifter, air-dried prep, hand washed, composite sieve - #4 split		TEST PROCEDURE ASTM D6913, Method A																																																																																																																																																																																																	
ADDITIONAL DATA initial dry mass (g) = 1842.3 as-received moisture content = 41% liquid limit = 41 plastic limit = 26 plasticity index = 15 fineness modulus = n/a coefficient of curvature, C_c = n/a coefficient of uniformity, C_u = n/a effective size, $D_{(10)}$ = n/a $D_{(30)}$ = n/a $D_{(60)}$ = 0.317 mm NOTE: Entire sample used for analysis; did not meet minimum size required.		SIEVE DATA % gravel = 22.0% % sand = 33.1% % silt and clay = 45.0% <table border="1"> <thead> <tr> <th colspan="2">SIEVE SIZE</th> <th colspan="4">PERCENT PASSING</th> </tr> <tr> <th>US</th> <th>mm</th> <th colspan="2">SIEVE</th> <th colspan="2">SPECS</th> </tr> <tr> <th></th> <th></th> <th>act.</th> <th>interp.</th> <th>max</th> <th>min</th> </tr> </thead> <tbody> <tr><td>6.00"</td><td>150.0</td><td></td><td></td><td>100%</td><td></td></tr> <tr><td>4.00"</td><td>100.0</td><td></td><td></td><td>100%</td><td></td></tr> <tr><td>3.00"</td><td>75.0</td><td></td><td></td><td>100%</td><td></td></tr> <tr><td>2.50"</td><td>63.0</td><td></td><td></td><td>100%</td><td></td></tr> <tr><td>2.00"</td><td>50.0</td><td>100%</td><td></td><td></td><td></td></tr> <tr><td>1.75"</td><td>45.0</td><td></td><td></td><td>99%</td><td></td></tr> <tr><td>1.50"</td><td>37.5</td><td></td><td></td><td>97%</td><td></td></tr> <tr><td>1.25"</td><td>31.5</td><td></td><td></td><td>94%</td><td></td></tr> <tr><td>1.00"</td><td>25.0</td><td></td><td></td><td>91%</td><td></td></tr> <tr><td>7/8"</td><td>22.4</td><td></td><td></td><td>90%</td><td></td></tr> <tr><td>3/4"</td><td>19.0</td><td></td><td></td><td>89%</td><td></td></tr> <tr><td>5/8"</td><td>16.0</td><td></td><td></td><td>88%</td><td></td></tr> <tr><td>1/2"</td><td>12.5</td><td></td><td></td><td>86%</td><td></td></tr> <tr><td>3/8"</td><td>9.50</td><td></td><td></td><td>84%</td><td></td></tr> <tr><td>1/4"</td><td>6.30</td><td></td><td></td><td>81%</td><td></td></tr> <tr><td>#4</td><td>4.75</td><td></td><td></td><td>78%</td><td></td></tr> <tr><td>#8</td><td>2.36</td><td></td><td></td><td>76%</td><td></td></tr> <tr><td>#10</td><td>2.00</td><td></td><td></td><td>76%</td><td></td></tr> <tr><td>#16</td><td>1.18</td><td></td><td></td><td>72%</td><td></td></tr> <tr><td>#20</td><td>0.850</td><td></td><td></td><td>70%</td><td></td></tr> <tr><td>#30</td><td>0.600</td><td></td><td></td><td>66%</td><td></td></tr> <tr><td>#40</td><td>0.425</td><td></td><td></td><td>63%</td><td></td></tr> <tr><td>#50</td><td>0.300</td><td></td><td></td><td>59%</td><td></td></tr> <tr><td>#60</td><td>0.250</td><td></td><td></td><td>57%</td><td></td></tr> <tr><td>#80</td><td>0.180</td><td></td><td></td><td>54%</td><td></td></tr> <tr><td>#100</td><td>0.150</td><td></td><td></td><td>52%</td><td></td></tr> <tr><td>#140</td><td>0.106</td><td></td><td></td><td>48%</td><td></td></tr> <tr><td>#170</td><td>0.090</td><td></td><td></td><td>47%</td><td></td></tr> <tr><td>#200</td><td>0.075</td><td></td><td></td><td>45%</td><td></td></tr> </tbody> </table>		SIEVE SIZE		PERCENT PASSING				US	mm	SIEVE		SPECS				act.	interp.	max	min	6.00"	150.0			100%		4.00"	100.0			100%		3.00"	75.0			100%		2.50"	63.0			100%		2.00"	50.0	100%				1.75"	45.0			99%		1.50"	37.5			97%		1.25"	31.5			94%		1.00"	25.0			91%		7/8"	22.4			90%		3/4"	19.0			89%		5/8"	16.0			88%		1/2"	12.5			86%		3/8"	9.50			84%		1/4"	6.30			81%		#4	4.75			78%		#8	2.36			76%		#10	2.00			76%		#16	1.18			72%		#20	0.850			70%		#30	0.600			66%		#40	0.425			63%		#50	0.300			59%		#60	0.250			57%		#80	0.180			54%		#100	0.150			52%		#140	0.106			48%		#170	0.090			47%		#200	0.075			45%	
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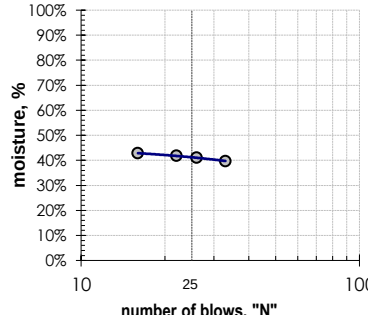
ATTERBERG LIMITS REPORT

PROJECT Mills Camas 313 SE Leadbetter Road Camas, Washington 98607	CLIENT HSR Development 500 E. Broadway, Suite 120 Vancouver, Washington 98660	PROJECT NO. HSR-1-01-1	LAB ID S23-1356
		REPORT DATE 10/30/23	FIELD ID TP4.2
		DATE SAMPLED 10/13/23	SAMPLED BY SSC

MATERIAL DATA

MATERIAL SAMPLED brown Silty SAND with Gravel	MATERIAL SOURCE Test Pit TP-04 depth = 8 feet	USCS SOIL TYPE SM, Silty Sand with Gravel
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LABORATORY TEST DATA

LABORATORY EQUIPMENT		TEST PROCEDURE				
Liquid Limit Machine, Hand Rolled		ASTM D4318				
ATTERBERG LIMITS	LIQUID LIMIT DETERMINATION				LIQUID LIMIT 	
liquid limit = 41 plastic limit = 26 plasticity index = 15	wet soil + pan weight, g = dry soil + pan weight, g = pan weight, g = N (blows) = moisture, % =	①	②	③		④
		32.63	33.85	33.77		33.71
		29.16	29.98	29.91		29.83
		20.42	20.56	20.67		20.77
		33	26	22	16	
		39.7 %	41.1 %	41.8 %	42.8 %	
SHRINKAGE	PLASTIC LIMIT DETERMINATION					
shrinkage limit = n/a shrinkage ratio = n/a	wet soil + pan weight, g = dry soil + pan weight, g = pan weight, g = moisture, % =	①	②	③	④	
		27.58	27.20			
		26.23	25.81			
		20.93	20.42			
			25.5 %	25.8 %		

PLASTICITY CHART		ADDITIONAL DATA % gravel = 22.0% % sand = 33.1% % silt and clay = 45.0% % silt = n/a % clay = n/a moisture content = 41%
DATE TESTED 10/27/23		TESTED BY MRS

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Engineering, Inc



PARTICLE-SIZE ANALYSIS REPORT

PROJECT Mills Camas 313 SE Leadbetter Road Camas, Washington 98607	CLIENT HSR Development 500 E. Broadway, Suite 120 Vancouver, Washington 98660	PROJECT NO. HSR-1-01-1	LAB ID S23-1357
		REPORT DATE 10/30/23	FIELD ID TP9.1
		DATE SAMPLED 10/13/23	SAMPLED BY SSC

MATERIAL DATA			
MATERIAL SAMPLED brownish red Silty SAND with Gravel	MATERIAL SOURCE Test Pit TP-09 depth = 2 feet	USCS SOIL TYPE SM, Silty Sand with Gravel	
SPECIFICATIONS none		AASHTO CLASSIFICATION A-4(1)	

LABORATORY TEST DATA																																																																																																																																																																																													
LABORATORY EQUIPMENT Rainhart "Mary Ann" Sifter, air-dried prep, hand washed, composite sieve - #4 split		TEST PROCEDURE ASTM D6913, Method A																																																																																																																																																																																											
ADDITIONAL DATA initial dry mass (g) = 1551.4 as-received moisture content = 20% liquid limit = 39 plastic limit = 31 plasticity index = 8 fineness modulus = n/a coefficient of curvature, C_c = n/a coefficient of uniformity, C_u = n/a effective size, $D_{(10)}$ = n/a $D_{(30)}$ = n/a $D_{(60)}$ = 0.573 mm		SIEVE DATA % gravel = 15.6% % sand = 40.1% % silt and clay = 44.4% <table border="1"> <thead> <tr> <th colspan="2">SIEVE SIZE</th> <th colspan="2">PERCENT PASSING</th> <th colspan="2">SPECS</th> </tr> <tr> <th>US</th> <th>mm</th> <th>act.</th> <th>interp.</th> <th>max</th> <th>min</th> </tr> </thead> <tbody> <tr><td>6.00"</td><td>150.0</td><td></td><td>100%</td><td></td><td></td></tr> <tr><td>4.00"</td><td>100.0</td><td></td><td>100%</td><td></td><td></td></tr> <tr><td>3.00"</td><td>75.0</td><td></td><td>100%</td><td></td><td></td></tr> <tr><td>2.50"</td><td>63.0</td><td></td><td>100%</td><td></td><td></td></tr> <tr><td>2.00"</td><td>50.0</td><td></td><td>100%</td><td></td><td></td></tr> <tr><td>1.75"</td><td>45.0</td><td></td><td>100%</td><td></td><td></td></tr> <tr><td>1.50"</td><td>37.5</td><td></td><td>100%</td><td></td><td></td></tr> <tr><td>1.25"</td><td>31.5</td><td></td><td>100%</td><td></td><td></td></tr> <tr><td>1.00"</td><td>25.0</td><td></td><td>100%</td><td></td><td></td></tr> <tr><td>7/8"</td><td>22.4</td><td></td><td>100%</td><td></td><td></td></tr> <tr><td>3/4"</td><td>19.0</td><td>100%</td><td></td><td></td><td></td></tr> <tr><td>5/8"</td><td>16.0</td><td></td><td>99%</td><td></td><td></td></tr> <tr><td>1/2"</td><td>12.5</td><td></td><td>99%</td><td></td><td></td></tr> <tr><td>3/8"</td><td>9.50</td><td>98%</td><td></td><td></td><td></td></tr> <tr><td>1/4"</td><td>6.30</td><td></td><td>90%</td><td></td><td></td></tr> <tr><td>#4</td><td>4.75</td><td>84%</td><td></td><td></td><td></td></tr> <tr><td>#8</td><td>2.36</td><td></td><td>73%</td><td></td><td></td></tr> <tr><td>#10</td><td>2.00</td><td>70%</td><td></td><td></td><td></td></tr> <tr><td>#16</td><td>1.18</td><td></td><td>65%</td><td></td><td></td></tr> <tr><td>#20</td><td>0.850</td><td>62%</td><td></td><td></td><td></td></tr> <tr><td>#30</td><td>0.600</td><td></td><td>60%</td><td></td><td></td></tr> <tr><td>#40</td><td>0.425</td><td>58%</td><td></td><td></td><td></td></tr> <tr><td>#50</td><td>0.300</td><td></td><td>56%</td><td></td><td></td></tr> <tr><td>#60</td><td>0.250</td><td>55%</td><td></td><td></td><td></td></tr> <tr><td>#80</td><td>0.180</td><td></td><td>52%</td><td></td><td></td></tr> <tr><td>#100</td><td>0.150</td><td>50%</td><td></td><td></td><td></td></tr> <tr><td>#140</td><td>0.106</td><td></td><td>47%</td><td></td><td></td></tr> <tr><td>#170</td><td>0.090</td><td></td><td>46%</td><td></td><td></td></tr> <tr><td>#200</td><td>0.075</td><td>44%</td><td></td><td></td><td></td></tr> </tbody> </table>		SIEVE SIZE		PERCENT PASSING		SPECS		US	mm	act.	interp.	max	min	6.00"	150.0		100%			4.00"	100.0		100%			3.00"	75.0		100%			2.50"	63.0		100%			2.00"	50.0		100%			1.75"	45.0		100%			1.50"	37.5		100%			1.25"	31.5		100%			1.00"	25.0		100%			7/8"	22.4		100%			3/4"	19.0	100%				5/8"	16.0		99%			1/2"	12.5		99%			3/8"	9.50	98%				1/4"	6.30		90%			#4	4.75	84%				#8	2.36		73%			#10	2.00	70%				#16	1.18		65%			#20	0.850	62%				#30	0.600		60%			#40	0.425	58%				#50	0.300		56%			#60	0.250	55%				#80	0.180		52%			#100	0.150	50%				#140	0.106		47%			#170	0.090		46%			#200	0.075	44%			
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GRAIN SIZE DISTRIBUTION

• sieve sizes —○— sieve data

DATE TESTED 10/26/23	TESTED BY MRS

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COLUMBIA WEST ENGINEERING, INC. authorized signature



ATTERBERG LIMITS REPORT

PROJECT Mills Camas 313 SE Leadbetter Road Camas, Washington 98607	CLIENT HSR Development 500 E. Broadway, Suite 120 Vancouver, Washington 98660	PROJECT NO. HSR-1-01-1	LAB ID S23-1357
		REPORT DATE 10/30/23	FIELD ID TP9.1
		DATE SAMPLED 10/13/23	SAMPLED BY SSC

MATERIAL DATA

MATERIAL SAMPLED brownish red Silty SAND with Gravel	MATERIAL SOURCE Test Pit TP-09 depth = 2 feet	USCS SOIL TYPE SM, Silty Sand with Gravel
---	---	--

LABORATORY TEST DATA

LABORATORY EQUIPMENT		TEST PROCEDURE	
Liquid Limit Machine, Hand Rolled		ASTM D4318	
ATTERBERG LIMITS		LIQUID LIMIT DETERMINATION	
liquid limit = 39			
plastic limit = 31			
plasticity index = 8			

PLASTICITY CHART		ADDITIONAL DATA % gravel = 15.6% % sand = 40.1% % silt and clay = 44.4% % silt = n/a % clay = n/a moisture content = 20%
DATE TESTED 10/27/23		TESTED BY MRS

APPENDIX C REPORT LIMITATIONS AND IMPORTANT INFORMATION



Geotechnical and Environmental Report Limitations and Important Information

Report Purpose, Use, and Standard of Care

This report has been prepared in accordance with standard fundamental principles and practices of geotechnical engineering and/or environmental consulting, and in a manner consistent with the level of care and skill typical of currently practicing local engineers and consultants. This report has been prepared to meet the specific needs of specific individuals for the indicated site. It may not be adequate for use by other consultants, contractors, or engineers, or if change in project ownership has occurred. It should not be used for any other reason than its stated purpose without prior consultation with Columbia West Engineering, Inc. (Columbia West). It is a unique report and not applicable for any other site or project. If site conditions are altered, or if modifications to the project description or proposed plans are made after the date of this report, it may not be valid. Columbia West cannot accept responsibility for use of this report by other individuals for unauthorized purposes, or if problems occur resulting from changes in site conditions for which Columbia West was not aware or informed.

Report Conclusions and Preliminary Nature

This geotechnical or environmental report should be considered preliminary and summary in nature. The recommendations contained herein have been established by engineering interpretations of subsurface soils based upon conditions observed during site exploration. The exploration and associated laboratory analysis of collected representative samples identifies soil conditions at specific discreet locations. It is assumed that these conditions are indicative of actual conditions throughout the subject property. However, soil conditions may differ between tested locations at different seasonal times of the year, either by natural causes or human activity. Distinction between soil types may be more abrupt or gradual than indicated on the soil logs. This report is not intended to stand alone without understanding of concomitant instructions, correspondence, communication, or potential supplemental reports that may have been provided to the client.

Because this report is based upon observations obtained at the time of exploration, its adequacy may be compromised with time. This is particularly relevant in the case of natural disasters, earthquakes, floods, or other significant events. Report conclusions or interpretations may also be subject to revision if significant development or other manmade impacts occur within or in proximity to the subject property. Groundwater conditions, if presented in this report, reflect observed conditions at the time of investigation. These conditions may change annually, seasonally or as a result of adjacent development.

Additional Investigation and Construction QA/QC

Columbia West should be consulted prior to construction to assess whether additional investigation above and beyond that presented in this report is necessary. Even slight variations in soil or site conditions may produce impacts to the performance of structural facilities if not adequately addressed. This underscores the importance of diligent QA/QC construction observation and testing to verify soil conditions do not differ materially or significantly from the interpreted conditions utilized for preparation of this report.

Therefore, this report contains several recommendations for field observation and testing by Columbia West personnel during construction activities. Actual subsurface conditions are more readily observed and discerned during the earthwork phase of construction when soils are exposed. Columbia West cannot accept responsibility for deviations from recommendations described in this

report or future performance of structural facilities if another consultant is retained during the construction phase or Columbia West is not engaged to provide construction observation to the full extent recommended.

Collected Samples

Uncontaminated samples of soil or rock collected in connection with this report will be retained for thirty days. Retention of such samples beyond thirty days will occur only at client's request and in return for payment of storage charges incurred. All contaminated or environmentally impacted materials or samples are the sole property of the client. Client maintains responsibility for proper disposal.

Report Contents

This geotechnical or environmental report should not be copied or duplicated unless in full, and even then only under prior written consent by Columbia West, as indicated in further detail in the following text section entitled *Report Ownership*. The recommendations, interpretations, and suggestions presented in this report are only understandable in context of reference to the whole report. Under no circumstances should the soil boring or test pit excavation logs, monitor well logs, or laboratory analytical reports be separated from the remainder of the report. The logs or reports should not be redrawn or summarized by other entities for inclusion in architectural or civil drawings, or other relevant applications.

Report Limitations for Contractors

Geotechnical or environmental reports, unless otherwise specifically noted, are not prepared for the purpose of developing cost estimates or bids by contractors. The extent of exploration or investigation conducted as part of this report is usually less than that necessary for contractor's needs. Contractors should be advised of these report limitations, particularly as they relate to development of cost estimates. Contractors may gain valuable information from this report, but should rely upon their own interpretations as to how subsurface conditions may affect cost, feasibility, accessibility and other components of the project work. If believed necessary or relevant, contractors should conduct additional exploratory investigation to obtain satisfactory data for the purposes of developing adequate cost estimates. Clients or developers cannot insulate themselves from attendant liability by disclaiming accuracy for subsurface ground conditions without advising contractors appropriately and providing the best information possible to limit potential for cost overruns, construction problems, or misunderstandings.

Report Ownership

Columbia West retains the ownership and copyright property rights to this entire report and its contents, which may include, but may not be limited to, figures, text, logs, electronic media, drawings, laboratory reports, and appendices. This report was prepared solely for the client, and other relevant approved users or parties, and its distribution must be contingent upon prior express written consent by Columbia West. Furthermore, client or approved users may not use, lend, sell, copy, or distribute this document without express written consent by Columbia West. Client does not own nor have rights to electronic media files that constitute this report, and under no circumstances should said electronic files be distributed or copied. Electronic media is susceptible to unauthorized manipulation or modification, and may not be reliable.

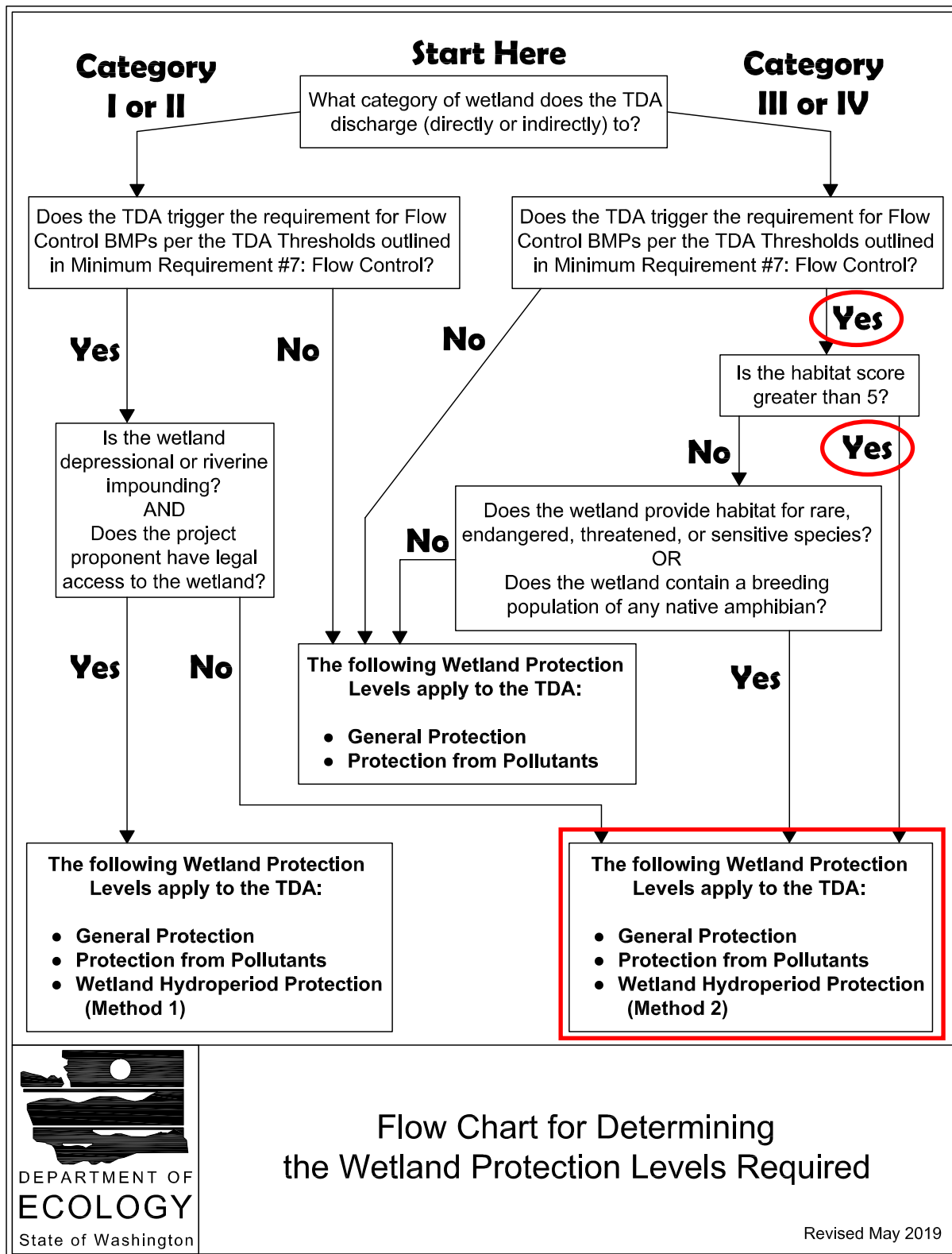
Consultant Responsibility

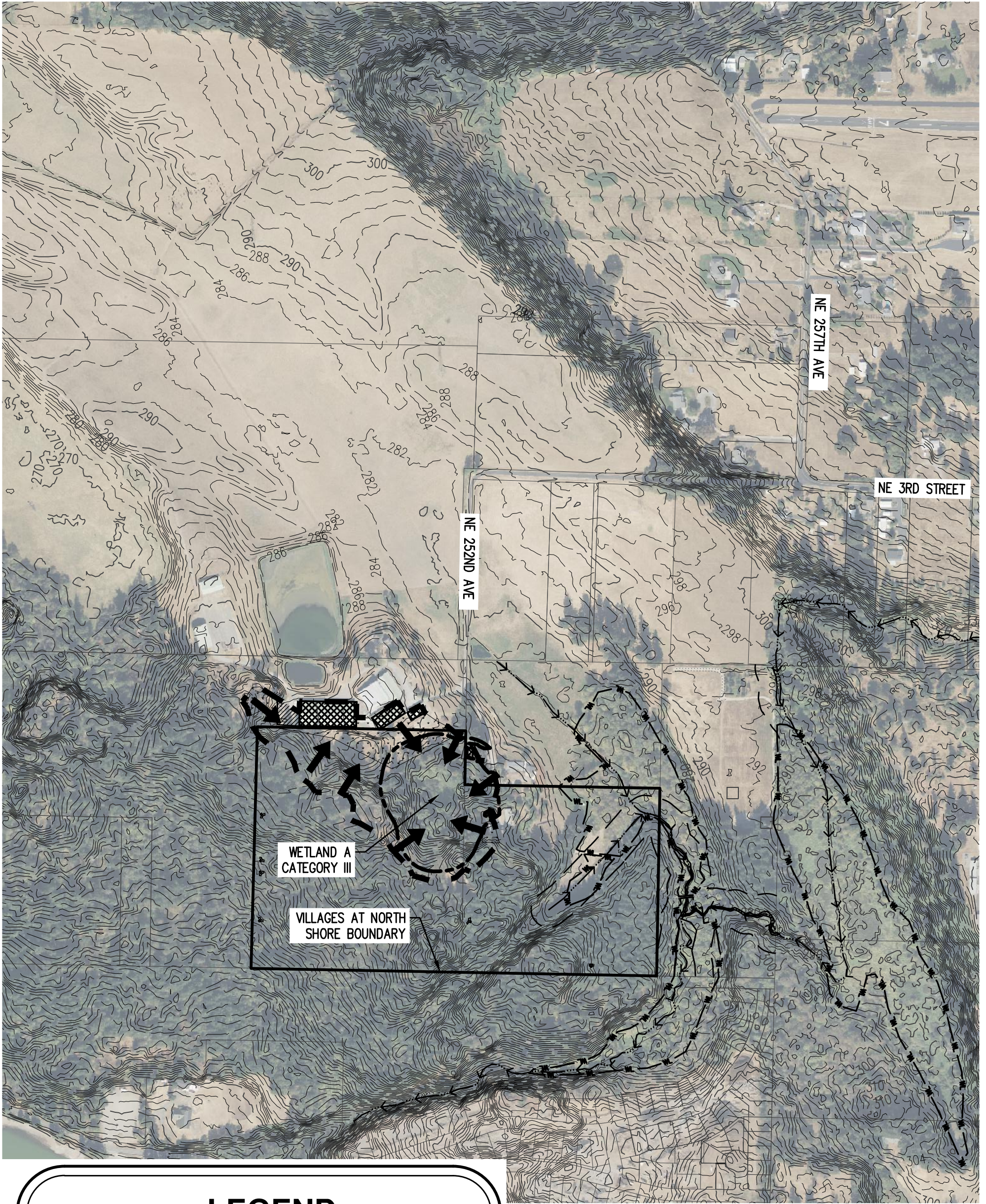
Geotechnical and environmental engineering and consulting is much less exact than other scientific or engineering disciplines, and relies heavily upon experience, judgment, interpretation, and opinion often based upon media (soils) that are variable, anisotropic, and non-homogenous. This often results in unrealistic expectations, unwarranted claims, and uninformed disputes against a geotechnical or environmental consultant. To reduce potential for these problems and assist relevant parties in better understanding of risk, liability, and responsibility, geotechnical and environmental reports often provide definitive statements or clauses defining and outlining consultant responsibility. The client is encouraged to read these statements carefully and request additional information from Columbia West if necessary.



Appendix H: Wetland Protection

Figure I-3.5: Flow Chart for Determining Wetland Protection Level Requirements





LEGEND

- EXISTING GROUND CONTOUR (2 FT)

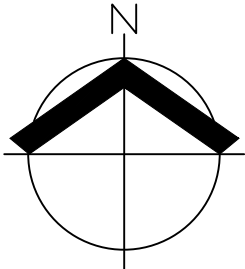
— — — 282 — — —
- EXISTING GROUND CONTOUR (10 FT)

— — — 280 — — —
- PRE-DEVELOPED BASIN BOUNDARY

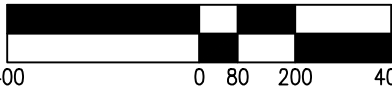
— — — — —
- CJ DENS/ENCLAVE
- EXISTING FIELD
- EXISTING ROOF
- EXISTING ROAD
- DRAINAGE FLOW DIRECTION

NOTES

1. UNHATCHED AREAS WITHIN THE WETLAND BASIN ARE FORESTED.
2. LATEST AVAILABLE AERIAL IMAGERY FROM BING LIVE MAPS.
3. VILLAGES AT NORTH SHORE BASIN IS BASED OFF OF PROPOSED SITE IMPROVEMENTS AS FOUND IN THE PRELIMINARY STORM TIR.
4. WETLAND BOUNDARY PER ELS.



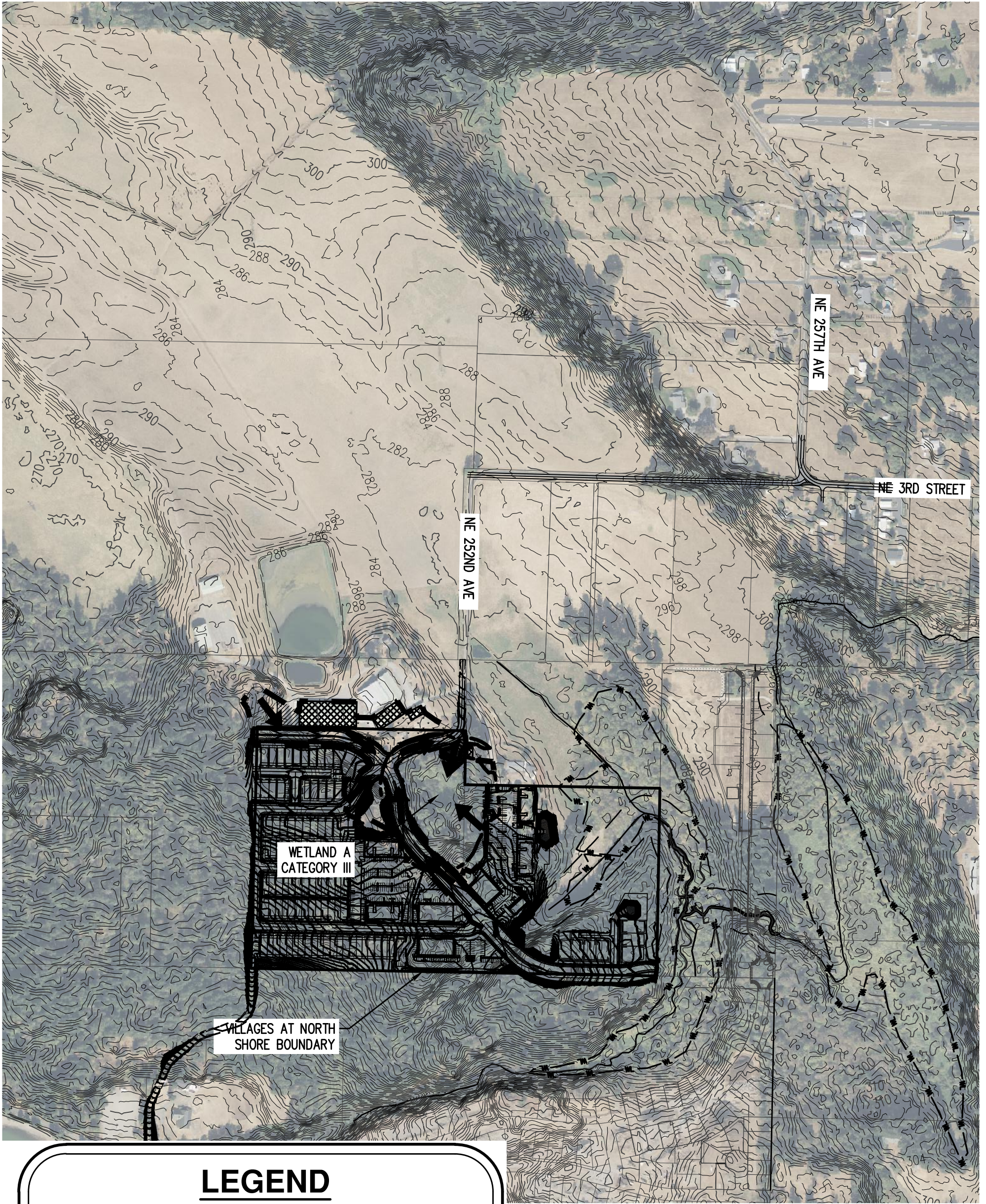
SCALE: 1"= 400 FEET



DATE: 07/15/2025

WETLAND A PRE-DEVELOPMENT BASIN MAP		EXHIBIT
VILLAGES AT NORTH SHORE		A
AKS ENGINEERING & FORESTRY, LLC 9600 NE 126TH AVE, STE 2520 VANCOUVER, WA 98682 360.882.0419 WWW.AKS-ENG.COM		DRWN: MAZ CHKD: BDH AKS JOB: 9095



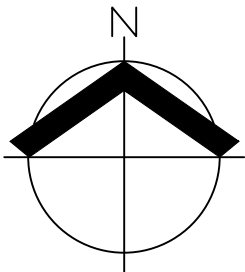


LEGEND

- FINISHED GRADE CONTOUR (2 FT) ——— 282 ———
- FINISHED GRADE CONTOUR (10 FT) ——— 280 ———
- EXISTING GROUND CONTOUR (2 FT) - - - 282 - - -
- EXISTING GROUND CONTOUR (10 FT) - - - 280 - - -
- POST-DEVELOPED BASIN BOUNDARY ——— 280 ———
- CJ DENS/ENCLAVE [Pattern]
- EXISTING FIELD [Pattern]
- EXISTING ROOF [Pattern]
- EXISTING ROAD [Pattern]
- DRAINAGE FLOW DIRECTION →

NOTES

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2. LATEST AVAILABLE AERIAL IMAGERY FROM BING LIVE MAPS.
3. VILLAGES AT NORTH SHORE BASIN IS BASED OFF OF PROPOSED SITE IMPROVEMENTS AS FOUND IN THE PRELIMINARY STORM TIR.
4. WETLAND BOUNDARY PER ELS.



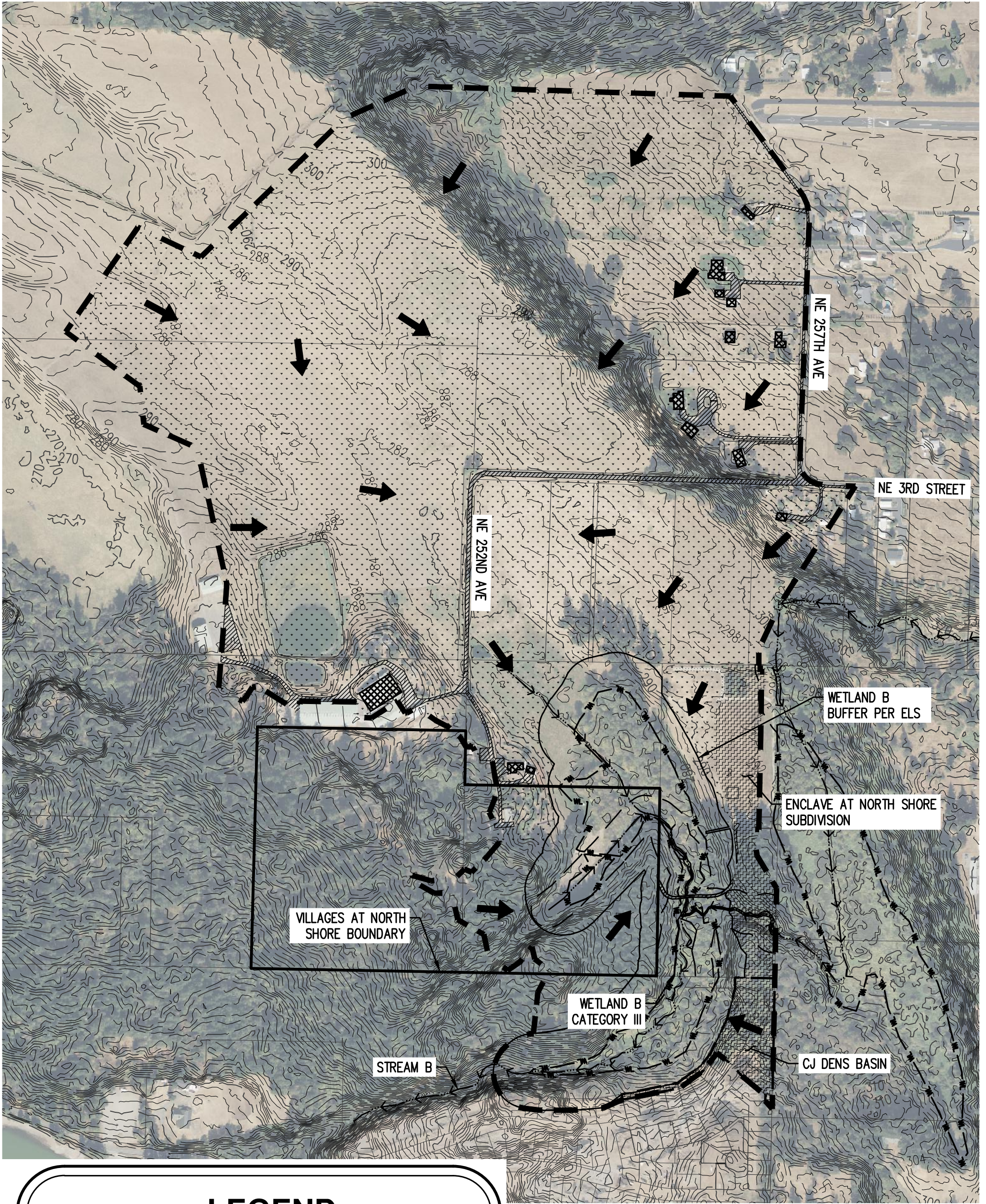
SCALE: 1" = 400 FEET



DATE: 07/15/2025

WETLAND A POST-DEVELOPMENT BASIN MAP		EXHIBIT
VILLAGES AT NORTH SHORE		B
AKS ENGINEERING & FORESTRY, LLC 9600 NE 126TH AVE, STE 2520 VANCOUVER, WA 98682 360.882.0419 WWW.AKS-ENG.COM		DRWN: MAZ CHKD: BDH AKS JOB: 9095



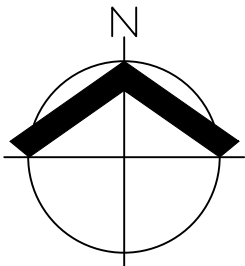


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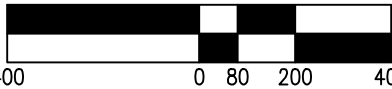
- EXISTING GROUND CONTOUR (2 FT) ——— 282 ———
- EXISTING GROUND CONTOUR (10 FT) ——— 280 ———
- PRE-DEVELOPED BASIN BOUNDARY ———
- CJ DENS/ENCLAVE [Hatched Box]
- EXISTING FIELD [Stippled Box]
- EXISTING ROOF [Cross-hatched Box]
- EXISTING ROAD [Diagonal-hatched Box]
- DRAINAGE FLOW DIRECTION [Arrow]

NOTES

1. UNHATCHED AREAS WITHIN THE WETLAND BASIN ARE FORESTED.
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3. VILLAGES AT NORTH SHORE BASIN IS BASED OFF OF PROPOSED SITE IMPROVEMENTS AS FOUND IN THE PRELIMINARY STORM TIR.
4. WETLAND BOUNDARY PER ELS.



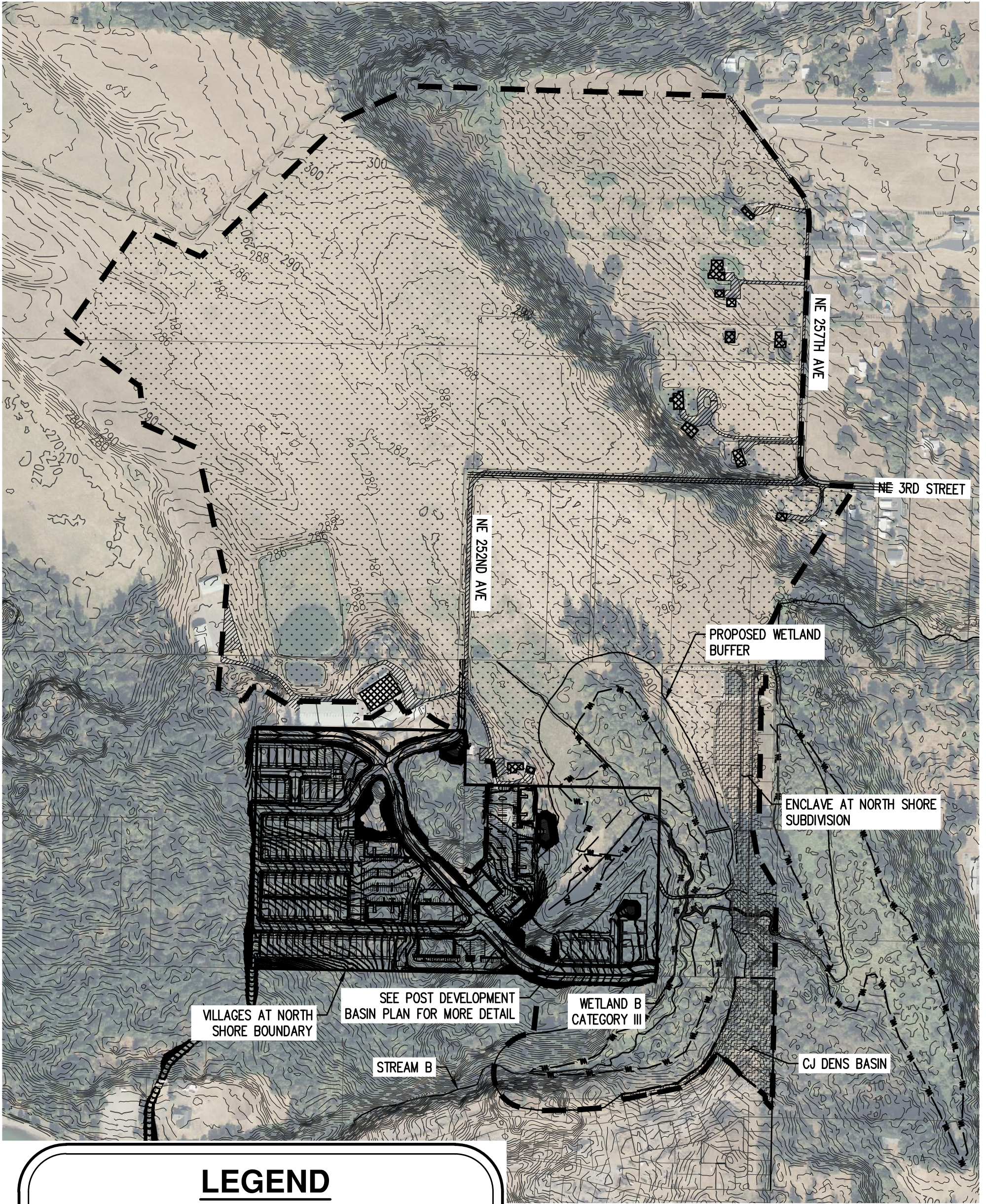
SCALE: 1"= 400 FEET



DATE: 07/15/2025

WETLAND B PRE-DEVELOPMENT BASIN MAP		EXHIBIT
VILLAGES AT NORTH SHORE		C
AKS ENGINEERING & FORESTRY, LLC 9600 NE 126TH AVE, STE 2520 VANCOUVER, WA 98682 360.882.0419 WWW.AKS-ENG.COM		DRWN: MAZ CHKD: BDH AKS JOB: 9095



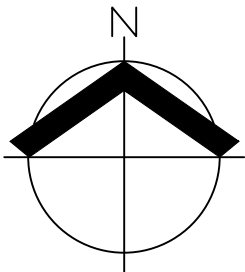


LEGEND

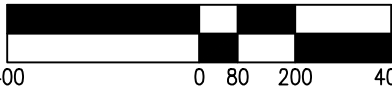
FINISHED GRADE CONTOUR (2 FT)	
FINISHED GRADE CONTOUR (10 FT)	
EXISTING GROUND CONTOUR (2 FT)	
EXISTING GROUND CONTOUR (10 FT)	
POST-DEVELOPED BASIN BOUNDARY	
CJ DENS/ENCLAVE	
EXISTING FIELD	
EXISTING ROOF	
EXISTING ROAD	
DRAINAGE FLOW DIRECTION	

NOTES

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4. WETLAND BOUNDARY PER ELS.



SCALE: 1"= 400 FEET



DATE: 07/15/2025

WETLAND B POST-DEVELOPMENT BASIN MAP		EXHIBIT
VILLAGES AT NORTH SHORE		D
AKS ENGINEERING & FORESTRY, LLC 9600 NE 126TH AVE, STE 2520 VANCOUVER, WA 98682 360.882.0419 WWW.AKS-ENG.COM		DRWN: MAZ CHKD: BDH AKS JOB: 9095



General Model Information

WWHM2012 Project Name: 9095 Wetland A

Site Name:

Site Address:

City:

Report Date: 7/11/2025

Gage: Lacamas

Data Start: 1948/10/01

Data End: 2008/09/30

Timestep: 15 Minute

Precip Scale: 1.300

Version Date: 2025/05/13

Version: 4.3.2

POC Thresholds

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

High Flow Threshold for POC1: 50 Year

Low Flow Threshold for POC2: 50 Percent of the 2 Year

High Flow Threshold for POC2: 50 Year

Landuse Basin Data

Predeveloped Land Use

Lateral I Basin 1

Bypass: No
Impervious Land Use acre
ROOF TOPS FLAT 0.844
Element Flow Component:
Surface
Component Flows To:
Lateral Basin 1

DRAFT

Lateral I Basin 2

Bypass: No
Impervious Land Use acre
ROADS FLAT 0.1
Element Flow Component:
Surface
Component Flows To:
Lateral Basin 1

DRAFT

Lateral Basin 1

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Field, Flat 2.203

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 3 Lateral Basin 3 Lateral Basin 3

DRAFT

Lateral Basin 2

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Steep 2.813

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 3 Lateral Basin 3 Lateral Basin 3

DRAFT

Lateral Basin 3

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Mod 3.963

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 8 Lateral Basin 8 Lateral Basin 8

POC 1

DRAFT

Lateral I Basin 3

Bypass: No
Impervious Land Use acre
ROADS FLAT 1.36
Element Flow Component:
Surface
Component Flows To:
Lateral Basin 4

DRAFT

Lateral I Basin 4

Bypass: No
Impervious Land Use acre
ROOF TOPS FLAT 0.49
Element Flow Component:
Surface
Component Flows To:
Lateral Basin 4

DRAFT

Lateral Basin 4

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Field, Flat 29.61

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 5 Lateral Basin 5 Lateral Basin 5

DRAFT

Lateral Basin 5

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Steep 19.19

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 7 Lateral Basin 7 Lateral Basin 7

DRAFT

Lateral I Basin 5

Bypass: No
Impervious Land Use acre
ROADS STEEP 0.24
Element Flow Component:
Surface
Component Flows To:
Lateral Basin 7

DRAFT

Lateral Basin 6

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Steep 2.31

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 7 Lateral Basin 7 Lateral Basin 7

DRAFT

Lateral Basin 7

Bypass: No

GroundWater: No

Pervious Land Use acre
 SG4, Field, Flat 96.92

Element Flow Components:

Surface	Interflow	Groundwater
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Component Flows To:

Lateral Basin 8	Lateral Basin 8	Lateral Basin 8
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DRAFT

Lateral Basin 8

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Mod 17.503

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

POC 2 POC 2 POC 2

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Lateral Basin 9

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Steep .93

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 8 Lateral Basin 8 Lateral Basin 8

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Lateral Basin 10

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Mod 3.9

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 8 Lateral Basin 8 Lateral Basin 8

DRAFT

CJ Dens

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Field, Flat	0.522
Pervious Total	0.522
Impervious Land Use	acre
ROADS FLAT	0.38
ROOF TOPS FLAT	0.413
DRIVEWAYS FLAT	0.096
SIDEWALKS FLAT	0.083
PARKING FLAT	0.034
POND	0.057
Impervious Total	1.063
Basin Total	1.585

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
CJ Dens Trapezoidal Pond 1		

Lateral Basin 11

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Lawn, Flat 1.53

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 8 Lateral Basin 8 Lateral Basin 8

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Lateral Basin 12

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Steep 1.06

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 8 Lateral Basin 8 Lateral Basin 8

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Lateral Basin 13

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Field, Flat 2.15

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 8 Lateral Basin 8 Lateral Basin 8

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Gravel

Bypass: No
Impervious Land Use acre
ROADS FLAT 0.09
Element Flow Component:
Surface
Component Flows To:
Lateral Basin 8

DRAFT

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Field, Flat	1.119
Pervious Total	1.119
Impervious Land Use	acre
ROADS FLAT	0.992
ROOF TOPS FLAT	0.372
DRIVEWAYS FLAT	0.197
SIDEWALKS FLAT	0.283
Impervious Total	1.844
Basin Total	2.963

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
SSD Table 1	SSD Table 1	

DRAFT

Lateral Basin 14

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Lawn, Steep .21

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 8 Lateral Basin 8 Lateral Basin 8

DRAFT

Lateral Basin 15

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Field, Flat .82

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 8 Lateral Basin 8 Lateral Basin 8

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Mitigated Land Use

Lateral Basin 1

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Steep .322

Element Flow Components:

Surface	Interflow	Groundwater
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Component Flows To:

Lateral Basin 2	Lateral Basin 2	Lateral Basin 2
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DRAFT

Lateral Basin 2

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Mod 2.31

Element Flow Components:

Surface	Interflow	Groundwater
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Component Flows To:

POC 1	POC 1	POC 1
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DRAFT

Basin 1

Bypass: No

GroundWater: No

Pervious Land Use	acre
SG4, Lawn, Flat	1.327
SG4, Field, Flat	1.203

Pervious Total	2.53
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Impervious Land Use	acre
ROADS FLAT	0.178
ROADS MOD	2.616
ROOF TOPS FLAT	0.844
POND	0.182

Impervious Total	3.82
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Basin Total	6.35
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Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
Trapezoidal Pond 1A		

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Lateral I Basin 1

Bypass: No
Impervious Land Use acre
ROADS FLAT 1.36
Element Flow Component:
Surface
Component Flows To:
Lateral Basin 3

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Lateral I Basin 2

Bypass: No
Impervious Land Use acre
ROOF TOPS FLAT 0.49
Element Flow Component:
Surface
Component Flows To:
Lateral Basin 3

DRAFT

Lateral Basin 3

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Field, Flat 29.61

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 4 Lateral Basin 4 Lateral Basin 4

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Lateral Basin 4

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Steep 19.19

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 5 Lateral Basin 5 Lateral Basin 5

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Lateral Basin 5

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Field, Flat 96.92

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 7 Lateral Basin 7 Lateral Basin 7

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Lateral I Basin 3

Bypass: No
Impervious Land Use acre
ROADS STEEP 0.24
Element Flow Component:
Surface
Component Flows To:
Lateral Basin 5

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Lateral Basin 6

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Steep 2.31

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 5 Lateral Basin 5 Lateral Basin 5

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Lateral Basin 7

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Forest, Mod 16.852

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

POC 2 POC 2 POC 2

DRAFT

CJ Dens

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Field, Flat	0.522
Pervious Total	0.522
Impervious Land Use	acre
ROADS FLAT	0.38
ROOF TOPS FLAT	0.413
DRIVEWAYS FLAT	0.096
SIDEWALKS FLAT	0.083
PARKING FLAT	0.034
POND	0.057
Impervious Total	1.063
Basin Total	1.585

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
CJ Dens Trapezoidal Pond 1	CJ Dens Trapezoidal Pond 2	

Lateral Basin 8

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Lawn, Flat 1.53

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 7 Lateral Basin 7 Lateral Basin 7

DRAFT

Lateral Basin 9

Bypass: No

GroundWater: No

Pervious Land Use acre

SG4, Field, Flat .94

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 7 Lateral Basin 7 Lateral Basin 7

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Lateral I Basin 4

Bypass: No
Impervious Land Use acre
ROADS FLAT 0.09
Element Flow Component:
Surface
Component Flows To:
Lateral Basin 7

DRAFT

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SG4, Field, Flat	1.119
Pervious Total	1.119
Impervious Land Use	acre
ROADS FLAT	0.992
ROOF TOPS FLAT	0.372
DRIVEWAYS FLAT	0.197
SIDEWALKS FLAT	0.283
Impervious Total	1.844
Basin Total	2.963

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
SSD Table 1	SSD Table 1	

DRAFT

Lateral Basin 10

Bypass: No

GroundWater: No

Pervious Land Use acre
SG4, Lawn, Steep .21

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 7 Lateral Basin 7 Lateral Basin 7

DRAFT

Lateral Basin 11

Bypass: No

GroundWater: No

Pervious Land Use acre

SG4, Field, Flat .82

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Lateral Basin 7 Lateral Basin 7 Lateral Basin 7

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Basin 2A

Bypass:	No
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 0.728
Pervious Total	0.728
Impervious Land Use ROADS MOD	acre 2.336
Impervious Total	2.336
Basin Total	3.064

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
Trapezoidal Pond 2A	Trapezoidal Pond 2A	

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Basin 2B

Bypass:	No
GroundWater:	No
Pervious Land Use SG4, Field, Mod	acre 0.776
Pervious Total	0.776
Impervious Land Use ROADS MOD	acre 2.932
Impervious Total	2.932
Basin Total	3.708

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
Trapezoidal Pond 2B	Trapezoidal Pond 2B	

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Routing Elements

Predeveloped Routing

CJ Dens Trapezoidal Pond 1

Bottom Length: 31.50 ft.
 Bottom Width: 31.50 ft.
 Depth: 5 ft.
 Volume at riser head: 0.1821 acre-feet.
 Side slope 1: 3 To 1
 Side slope 2: 3 To 1
 Side slope 3: 3 To 1
 Side slope 4: 3 To 1
 Discharge Structure
 Riser Height: 4 ft.
 Riser Diameter: 12 in.
 Notch Type: Rectangular
 Notch Width: 0.250 ft.
 Notch Height: 2.000 ft.
 Orifice 1 Diameter: 2.125 in. Elevation: 0 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:
 Lateral Basin 8

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.022	0.000	0.000	0.000
0.0556	0.023	0.001	0.028	0.000
0.1111	0.023	0.002	0.040	0.000
0.1667	0.024	0.003	0.050	0.000
0.2222	0.024	0.005	0.057	0.000
0.2778	0.025	0.006	0.064	0.000
0.3333	0.025	0.008	0.070	0.000
0.3889	0.026	0.009	0.076	0.000
0.4444	0.026	0.011	0.081	0.000
0.5000	0.027	0.012	0.086	0.000
0.5556	0.027	0.014	0.091	0.000
0.6111	0.028	0.015	0.095	0.000
0.6667	0.028	0.017	0.100	0.000
0.7222	0.029	0.018	0.104	0.000
0.7778	0.030	0.020	0.108	0.000
0.8333	0.030	0.022	0.111	0.000
0.8889	0.031	0.023	0.115	0.000
0.9444	0.031	0.025	0.119	0.000
1.0000	0.032	0.027	0.122	0.000
1.0556	0.032	0.029	0.125	0.000
1.1111	0.033	0.031	0.129	0.000
1.1667	0.034	0.032	0.132	0.000
1.2222	0.034	0.034	0.135	0.000
1.2778	0.035	0.036	0.138	0.000
1.3333	0.035	0.038	0.141	0.000
1.3889	0.036	0.040	0.144	0.000
1.4444	0.037	0.042	0.147	0.000
1.5000	0.037	0.044	0.150	0.000
1.5556	0.038	0.047	0.152	0.000

1.6111	0.038	0.049	0.155	0.000
1.6667	0.039	0.051	0.158	0.000
1.7222	0.040	0.053	0.160	0.000
1.7778	0.040	0.055	0.163	0.000
1.8333	0.041	0.058	0.165	0.000
1.8889	0.042	0.060	0.168	0.000
1.9444	0.042	0.062	0.170	0.000
2.0000	0.043	0.065	0.173	0.000
2.0556	0.044	0.067	0.186	0.000
2.1111	0.044	0.070	0.208	0.000
2.1667	0.045	0.072	0.235	0.000
2.2222	0.046	0.075	0.266	0.000
2.2778	0.046	0.077	0.300	0.000
2.3333	0.047	0.080	0.336	0.000
2.3889	0.048	0.082	0.375	0.000
2.4444	0.048	0.085	0.416	0.000
2.5000	0.049	0.088	0.458	0.000
2.5556	0.050	0.091	0.502	0.000
2.6111	0.051	0.094	0.547	0.000
2.6667	0.051	0.096	0.592	0.000
2.7222	0.052	0.099	0.639	0.000
2.7778	0.053	0.102	0.686	0.000
2.8333	0.054	0.105	0.734	0.000
2.8889	0.054	0.108	0.781	0.000
2.9444	0.055	0.111	0.830	0.000
3.0000	0.056	0.114	0.878	0.000
3.0556	0.057	0.118	0.936	0.000
3.1111	0.057	0.121	0.996	0.000
3.1667	0.058	0.124	1.057	0.000
3.2222	0.059	0.127	1.119	0.000
3.2778	0.060	0.131	1.183	0.000
3.3333	0.060	0.134	1.249	0.000
3.3889	0.061	0.137	1.315	0.000
3.4444	0.062	0.141	1.753	0.000
3.5000	0.063	0.144	1.844	0.000
3.5556	0.064	0.148	1.937	0.000
3.6111	0.064	0.151	2.031	0.000
3.6667	0.065	0.155	2.126	0.000
3.7222	0.066	0.159	2.223	0.000
3.7778	0.067	0.162	2.322	0.000
3.8333	0.068	0.166	2.422	0.000
3.8889	0.069	0.170	2.524	0.000
3.9444	0.069	0.174	2.627	0.000
4.0000	0.070	0.178	2.732	0.000
4.0556	0.071	0.182	2.872	0.000
4.1111	0.072	0.186	3.125	0.000
4.1667	0.073	0.190	3.440	0.000
4.2222	0.074	0.194	3.784	0.000
4.2778	0.075	0.198	4.124	0.000
4.3333	0.075	0.202	4.425	0.000
4.3889	0.076	0.206	4.664	0.000
4.4444	0.077	0.211	4.833	0.000
4.5000	0.078	0.215	4.950	0.000
4.5556	0.079	0.219	5.096	0.000
4.6111	0.080	0.224	5.212	0.000
4.6667	0.081	0.228	5.323	0.000
4.7222	0.082	0.233	5.429	0.000
4.7778	0.083	0.237	5.532	0.000

4.8333	0.084	0.242	5.631	0.000
4.8889	0.085	0.247	5.727	0.000
4.9444	0.085	0.252	5.820	0.000
5.0000	0.086	0.256	5.910	0.000
5.0556	0.087	0.261	5.998	0.000

Discharge Structure

Riser Height: 4 ft.
 Riser Diameter: 12 in.
 Notch Type: Rectangular
 Notch Width: 0.250 ft.
 Notch Height: 2.000 ft.
 Orifice 1 Diameter: 2.125 in. Elevation: 0 ft.
 Element Flow Outlets:
 Outlet 1 Outlet 2
 Outlets Flow To:
 Lateral Basin 8

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.022	0.000	0.000	0.000
0.0556	0.023	0.001	0.028	0.000
0.1111	0.023	0.002	0.040	0.000
0.1667	0.024	0.003	0.050	0.000
0.2222	0.024	0.005	0.057	0.000
0.2778	0.025	0.006	0.064	0.000
0.3333	0.025	0.008	0.070	0.000
0.3889	0.026	0.009	0.076	0.000
0.4444	0.026	0.011	0.081	0.000
0.5000	0.027	0.012	0.086	0.000
0.5556	0.027	0.014	0.091	0.000
0.6111	0.028	0.015	0.095	0.000
0.6667	0.028	0.017	0.100	0.000
0.7222	0.029	0.018	0.104	0.000
0.7778	0.030	0.020	0.108	0.000
0.8333	0.030	0.022	0.111	0.000
0.8889	0.031	0.023	0.115	0.000
0.9444	0.031	0.025	0.119	0.000
1.0000	0.032	0.027	0.122	0.000
1.0556	0.032	0.029	0.125	0.000
1.1111	0.033	0.031	0.129	0.000
1.1667	0.034	0.032	0.132	0.000
1.2222	0.034	0.034	0.135	0.000
1.2778	0.035	0.036	0.138	0.000
1.3333	0.035	0.038	0.141	0.000
1.3889	0.036	0.040	0.144	0.000
1.4444	0.037	0.042	0.147	0.000
1.5000	0.037	0.044	0.150	0.000
1.5556	0.038	0.047	0.152	0.000
1.6111	0.038	0.049	0.155	0.000
1.6667	0.039	0.051	0.158	0.000
1.7222	0.040	0.053	0.160	0.000
1.7778	0.040	0.055	0.163	0.000
1.8333	0.041	0.058	0.165	0.000
1.8889	0.042	0.060	0.168	0.000
1.9444	0.042	0.062	0.170	0.000

2.0000	0.043	0.065	0.173	0.000
2.0556	0.044	0.067	0.186	0.000
2.1111	0.044	0.070	0.208	0.000
2.1667	0.045	0.072	0.235	0.000
2.2222	0.046	0.075	0.266	0.000
2.2778	0.046	0.077	0.300	0.000
2.3333	0.047	0.080	0.336	0.000
2.3889	0.048	0.082	0.375	0.000
2.4444	0.048	0.085	0.416	0.000
2.5000	0.049	0.088	0.458	0.000
2.5556	0.050	0.091	0.502	0.000
2.6111	0.051	0.094	0.547	0.000
2.6667	0.051	0.096	0.592	0.000
2.7222	0.052	0.099	0.639	0.000
2.7778	0.053	0.102	0.686	0.000
2.8333	0.054	0.105	0.734	0.000
2.8889	0.054	0.108	0.781	0.000
2.9444	0.055	0.111	0.830	0.000
3.0000	0.056	0.114	0.878	0.000
3.0556	0.057	0.118	0.936	0.000
3.1111	0.057	0.121	0.996	0.000
3.1667	0.058	0.124	1.057	0.000
3.2222	0.059	0.127	1.119	0.000
3.2778	0.060	0.131	1.183	0.000
3.3333	0.060	0.134	1.249	0.000
3.3889	0.061	0.137	1.315	0.000
3.4444	0.062	0.141	1.753	0.000
3.5000	0.063	0.144	1.844	0.000
3.5556	0.064	0.148	1.937	0.000
3.6111	0.064	0.151	2.031	0.000
3.6667	0.065	0.155	2.126	0.000
3.7222	0.066	0.159	2.223	0.000
3.7778	0.067	0.162	2.322	0.000
3.8333	0.068	0.166	2.422	0.000
3.8889	0.069	0.170	2.524	0.000
3.9444	0.069	0.174	2.627	0.000
4.0000	0.070	0.178	2.732	0.000
4.0556	0.071	0.182	2.872	0.000
4.1111	0.072	0.186	3.125	0.000
4.1667	0.073	0.190	3.440	0.000
4.2222	0.074	0.194	3.784	0.000
4.2778	0.075	0.198	4.124	0.000
4.3333	0.075	0.202	4.425	0.000
4.3889	0.076	0.206	4.664	0.000
4.4444	0.077	0.211	4.833	0.000
4.5000	0.078	0.215	4.950	0.000
4.5556	0.079	0.219	5.096	0.000
4.6111	0.080	0.224	5.212	0.000
4.6667	0.081	0.228	5.323	0.000
4.7222	0.082	0.233	5.429	0.000
4.7778	0.083	0.237	5.532	0.000
4.8333	0.084	0.242	5.631	0.000
4.8889	0.085	0.247	5.727	0.000
4.9444	0.085	0.252	5.820	0.000
5.0000	0.086	0.256	5.910	0.000
5.0556	0.087	0.261	5.998	0.000

SSD Table 1

Depth: 6 ft.
 Discharge Structure: 1
 Riser Height: 5 ft.
 Riser Diameter: 18 in.
 Notch Type: Rectangular
 Notch Width: 0.330 ft.
 Notch Height: 1.250 ft.
 Orifice 1 Diameter: 2.000 in. Elevation: 0 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:
 Lateral Basin 8

SSD Table Hydraulic Table

Stage (feet)	Area (ac.)	Volume (ac.-ft.)	Outlet Struct	NotUsed	NotUsed	NotUsed	NotUsed
0.000	0.058	0.000	0.000	0.000	0.000	0.000	0.000
0.170	0.058	0.005	0.045	0.000	0.000	0.000	0.000
0.330	0.058	0.011	0.062	0.000	0.000	0.000	0.000
0.500	0.058	0.018	0.077	0.000	0.000	0.000	0.000
0.670	0.058	0.024	0.089	0.000	0.000	0.000	0.000
0.830	0.058	0.032	0.099	0.000	0.000	0.000	0.000
1.000	0.058	0.039	0.109	0.000	0.000	0.000	0.000
1.170	0.058	0.047	0.117	0.000	0.000	0.000	0.000
1.330	0.058	0.054	0.125	0.000	0.000	0.000	0.000
1.500	0.058	0.062	0.133	0.000	0.000	0.000	0.000
1.670	0.058	0.070	0.140	0.000	0.000	0.000	0.000
1.830	0.058	0.079	0.147	0.000	0.000	0.000	0.000
2.000	0.058	0.087	0.154	0.000	0.000	0.000	0.000
2.170	0.058	0.095	0.160	0.000	0.000	0.000	0.000
2.330	0.058	0.104	0.166	0.000	0.000	0.000	0.000
2.500	0.058	0.112	0.172	0.000	0.000	0.000	0.000
2.670	0.058	0.121	0.177	0.000	0.000	0.000	0.000
2.830	0.058	0.129	0.183	0.000	0.000	0.000	0.000
3.000	0.058	0.138	0.188	0.000	0.000	0.000	0.000
3.170	0.058	0.146	0.193	0.000	0.000	0.000	0.000
3.330	0.058	0.155	0.198	0.000	0.000	0.000	0.000
3.500	0.058	0.164	0.203	0.000	0.000	0.000	0.000
3.670	0.058	0.172	0.208	0.000	0.000	0.000	0.000
3.830	0.058	0.181	0.237	0.000	0.000	0.000	0.000
4.000	0.058	0.189	0.348	0.000	0.000	0.000	0.000
4.170	0.058	0.197	0.496	0.000	0.000	0.000	0.000
4.330	0.058	0.205	0.655	0.000	0.000	0.000	0.000
4.500	0.058	0.214	0.837	0.000	0.000	0.000	0.000
4.670	0.058	0.222	1.026	0.000	0.000	0.000	0.000
4.830	0.058	0.229	1.225	0.000	0.000	0.000	0.000
5.000	0.058	0.237	1.471	0.000	0.000	0.000	0.000
5.170	0.058	0.244	2.582	0.000	0.000	0.000	0.000
5.330	0.058	0.251	4.324	0.000	0.000	0.000	0.000
5.500	0.058	0.258	6.122	0.000	0.000	0.000	0.000
5.670	0.058	0.265	7.256	0.000	0.000	0.000	0.000
5.830	0.058	0.271	7.947	0.000	0.000	0.000	0.000
6.000	0.058	0.276	8.581	0.000	0.000	0.000	0.000

Discharge Structure: 1

Riser Height: 5 ft.
 Riser Diameter: 18 in.
 Notch Type: Rectangular
 Notch Width: 0.330 ft.
 Notch Height: 1.250 ft.
 Orifice 1 Diameter: 2.000 in. Elevation: 0 ft.
 Element Flow Outlets:
 Outlet 1 Outlet 2
 Outlets Flow To:
 Lateral Basin 8

SSD Table Hydraulic Table

Stage (feet)	Area (ac.)	Volume (ac-ft.)	Outlet Struct	NotUsed	NotUsed	NotUsed	NotUsed
0.000	0.058	0.000	0.000	0.000	0.000	0.000	0.000
0.170	0.058	0.005	0.045	0.000	0.000	0.000	0.000
0.330	0.058	0.011	0.062	0.000	0.000	0.000	0.000
0.500	0.058	0.018	0.077	0.000	0.000	0.000	0.000
0.670	0.058	0.024	0.089	0.000	0.000	0.000	0.000
0.830	0.058	0.032	0.099	0.000	0.000	0.000	0.000
1.000	0.058	0.039	0.109	0.000	0.000	0.000	0.000
1.170	0.058	0.047	0.117	0.000	0.000	0.000	0.000
1.330	0.058	0.054	0.125	0.000	0.000	0.000	0.000
1.500	0.058	0.062	0.133	0.000	0.000	0.000	0.000
1.670	0.058	0.070	0.140	0.000	0.000	0.000	0.000
1.830	0.058	0.079	0.147	0.000	0.000	0.000	0.000
2.000	0.058	0.087	0.154	0.000	0.000	0.000	0.000
2.170	0.058	0.095	0.160	0.000	0.000	0.000	0.000
2.330	0.058	0.104	0.166	0.000	0.000	0.000	0.000
2.500	0.058	0.112	0.172	0.000	0.000	0.000	0.000
2.670	0.058	0.121	0.177	0.000	0.000	0.000	0.000
2.830	0.058	0.129	0.183	0.000	0.000	0.000	0.000
3.000	0.058	0.138	0.188	0.000	0.000	0.000	0.000
3.170	0.058	0.146	0.193	0.000	0.000	0.000	0.000
3.330	0.058	0.155	0.198	0.000	0.000	0.000	0.000
3.500	0.058	0.164	0.203	0.000	0.000	0.000	0.000
3.670	0.058	0.172	0.208	0.000	0.000	0.000	0.000
3.830	0.058	0.181	0.237	0.000	0.000	0.000	0.000
4.000	0.058	0.189	0.348	0.000	0.000	0.000	0.000
4.170	0.058	0.197	0.496	0.000	0.000	0.000	0.000
4.330	0.058	0.205	0.655	0.000	0.000	0.000	0.000
4.500	0.058	0.214	0.837	0.000	0.000	0.000	0.000
4.670	0.058	0.222	1.026	0.000	0.000	0.000	0.000
4.830	0.058	0.229	1.225	0.000	0.000	0.000	0.000
5.000	0.058	0.237	1.471	0.000	0.000	0.000	0.000
5.170	0.058	0.244	2.582	0.000	0.000	0.000	0.000
5.330	0.058	0.251	4.324	0.000	0.000	0.000	0.000
5.500	0.058	0.258	6.122	0.000	0.000	0.000	0.000
5.670	0.058	0.265	7.256	0.000	0.000	0.000	0.000
5.830	0.058	0.271	7.947	0.000	0.000	0.000	0.000
6.000	0.058	0.276	8.581	0.000	0.000	0.000	0.000

Mitigated Routing**Trapezoidal Pond 1A**

Bottom Length: 40.00 ft.
 Bottom Width: 40.00 ft.
 Depth: 4 ft.
 Volume at riser head: 0.1689 acre-feet.
 Side slope 1: 3 To 1
 Side slope 2: 3 To 1
 Side slope 3: 3 To 1
 Side slope 4: 3 To 1
 Discharge Structure
 Riser Height: 3 ft.
 Riser Diameter: 18 in.
 Notch Type: Rectangular
 Notch Width: 0.500 ft.
 Notch Height: 1.200 ft.
 Orifice 1 Diameter: 4.000 in. Elevation: 0 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:
 Flow Splitter 1

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.036	0.000	0.000	0.000
0.0444	0.037	0.001	0.091	0.000
0.0889	0.037	0.003	0.129	0.000
0.1333	0.038	0.005	0.158	0.000
0.1778	0.038	0.006	0.183	0.000
0.2222	0.039	0.008	0.204	0.000
0.2667	0.039	0.010	0.224	0.000
0.3111	0.040	0.012	0.242	0.000
0.3556	0.040	0.013	0.258	0.000
0.4000	0.041	0.015	0.274	0.000
0.4444	0.041	0.017	0.289	0.000
0.4889	0.042	0.019	0.303	0.000
0.5333	0.042	0.021	0.317	0.000
0.5778	0.043	0.023	0.330	0.000
0.6222	0.043	0.025	0.342	0.000
0.6667	0.044	0.027	0.354	0.000
0.7111	0.045	0.029	0.366	0.000
0.7556	0.045	0.031	0.377	0.000
0.8000	0.046	0.033	0.388	0.000
0.8444	0.046	0.035	0.399	0.000
0.8889	0.047	0.037	0.409	0.000
0.9333	0.047	0.039	0.419	0.000
0.9778	0.048	0.041	0.429	0.000
1.0222	0.048	0.043	0.439	0.000
1.0667	0.049	0.045	0.448	0.000
1.1111	0.050	0.048	0.457	0.000
1.1556	0.050	0.050	0.466	0.000
1.2000	0.051	0.052	0.475	0.000
1.2444	0.051	0.054	0.484	0.000
1.2889	0.052	0.057	0.492	0.000
1.3333	0.052	0.059	0.501	0.000

1.3778	0.053	0.061	0.509	0.000
1.4222	0.054	0.064	0.517	0.000
1.4667	0.054	0.066	0.525	0.000
1.5111	0.055	0.069	0.533	0.000
1.5556	0.055	0.071	0.541	0.000
1.6000	0.056	0.074	0.549	0.000
1.6444	0.057	0.076	0.556	0.000
1.6889	0.057	0.079	0.564	0.000
1.7333	0.058	0.081	0.571	0.000
1.7778	0.058	0.084	0.578	0.000
1.8222	0.059	0.086	0.591	0.000
1.8667	0.060	0.089	0.621	0.000
1.9111	0.060	0.092	0.660	0.000
1.9556	0.061	0.095	0.706	0.000
2.0000	0.062	0.097	0.757	0.000
2.0444	0.062	0.100	0.812	0.000
2.0889	0.063	0.103	0.871	0.000
2.1333	0.064	0.106	0.933	0.000
2.1778	0.064	0.109	0.998	0.000
2.2222	0.065	0.111	1.065	0.000
2.2667	0.066	0.114	1.134	0.000
2.3111	0.066	0.117	1.206	0.000
2.3556	0.067	0.120	1.279	0.000
2.4000	0.067	0.123	1.353	0.000
2.4444	0.068	0.126	1.429	0.000
2.4889	0.069	0.129	1.505	0.000
2.5333	0.070	0.132	1.583	0.000
2.5778	0.070	0.136	1.661	0.000
2.6222	0.071	0.139	1.740	0.000
2.6667	0.072	0.142	1.819	0.000
2.7111	0.072	0.145	1.899	0.000
2.7556	0.073	0.148	1.978	0.000
2.8000	0.074	0.152	2.058	0.000
2.8444	0.074	0.155	2.154	0.000
2.8889	0.075	0.158	2.251	0.000
2.9333	0.076	0.162	2.350	0.000
2.9778	0.076	0.165	2.451	0.000
3.0222	0.077	0.168	2.558	0.000
3.0667	0.078	0.172	2.785	0.000
3.1111	0.079	0.175	3.104	0.000
3.1556	0.079	0.179	3.492	0.000
3.2000	0.080	0.183	3.932	0.000
3.2444	0.081	0.186	4.410	0.000
3.2889	0.081	0.190	4.913	0.000
3.3333	0.082	0.193	5.426	0.000
3.3778	0.083	0.197	5.935	0.000
3.4222	0.084	0.201	6.426	0.000
3.4667	0.084	0.205	6.885	0.000
3.5111	0.085	0.208	7.301	0.000
3.5556	0.086	0.212	7.667	0.000
3.6000	0.087	0.216	7.976	0.000
3.6444	0.087	0.220	8.229	0.000
3.6889	0.088	0.224	8.433	0.000
3.7333	0.089	0.228	8.603	0.000
3.7778	0.090	0.232	8.844	0.000
3.8222	0.090	0.236	9.025	0.000
3.8667	0.091	0.240	9.202	0.000
3.9111	0.092	0.244	9.374	0.000

3.9556	0.093	0.248	9.541	0.000
4.0000	0.094	0.252	9.706	0.000
4.0444	0.094	0.256	9.866	0.000

DRAFT

Flow Splitter 1

Bottom Length: 10.00 ft.
 Bottom Length: 10.00 ft.
 Depth: 10 ft.
 Side slope 1: 0 To 1
 Side slope 2: 0 To 1
 Side slope 3: 0 To 1
 Side slope 4: 0 To 1
 Control Structure Splitter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Primary(cfs)	Secondary(cfs)
0.000	0.002	0.000	0.000	0.000
0.111	0.002	0.000	0.002	0.144
0.222	0.002	0.000	0.003	0.204
0.333	0.002	0.000	0.003	0.250
0.444	0.002	0.001	0.004	0.289
0.555	0.002	0.001	0.005	0.323
0.666	0.002	0.001	0.005	0.354
0.777	0.002	0.001	0.006	0.382
0.888	0.002	0.002	0.006	0.409
1.000	0.002	0.002	0.006	0.434
1.111	0.002	0.002	0.007	0.457
1.222	0.002	0.002	0.007	0.480
1.333	0.002	0.003	0.007	0.501
1.444	0.002	0.003	0.008	0.521
1.555	0.002	0.003	0.008	0.541
1.666	0.002	0.003	0.008	0.560
1.777	0.002	0.004	0.009	0.578
1.888	0.002	0.004	0.009	0.640
2.000	0.002	0.004	0.009	0.757
2.111	0.002	0.004	0.009	0.901
2.222	0.002	0.005	0.010	1.065
2.333	0.002	0.005	0.010	1.242
2.444	0.002	0.005	0.010	1.429
2.555	0.002	0.005	0.010	1.622
2.666	0.002	0.006	0.011	1.819
2.777	0.002	0.006	0.011	2.018
2.888	0.002	0.006	0.011	2.251
3.000	0.002	0.006	0.011	2.503
3.111	0.002	0.007	0.012	3.104
3.222	0.002	0.007	0.012	4.167
3.333	0.002	0.007	0.012	5.426
3.444	0.002	0.007	0.012	6.660
3.555	0.002	0.008	0.012	7.667
3.666	0.002	0.008	0.013	8.336
3.777	0.002	0.008	0.013	8.844
3.888	0.002	0.008	0.013	9.288
4.000	0.002	0.009	0.013	9.706
4.111	0.002	0.009	0.013	10.10
4.222	0.002	0.009	0.013	10.47
4.333	0.002	0.009	0.014	10.83
4.444	0.002	0.010	0.014	11.18
4.555	0.002	0.010	0.014	11.51
4.666	0.002	0.010	0.014	11.83
4.777	0.002	0.011	0.014	12.14
4.888	0.002	0.011	0.015	12.45
5.000	0.002	0.011	0.015	12.74
5.111	0.002	0.011	0.015	13.02

5.222	0.002	0.012	0.015	13.30
5.333	0.002	0.012	0.015	13.57
5.444	0.002	0.012	0.015	13.84
5.555	0.002	0.012	0.016	14.10
5.666	0.002	0.013	0.016	14.35
5.777	0.002	0.013	0.016	14.60
5.888	0.002	0.013	0.016	14.85
6.000	0.002	0.013	0.016	15.08
6.111	0.002	0.014	0.016	15.32
6.222	0.002	0.014	0.016	15.55
6.333	0.002	0.014	0.017	15.78
6.444	0.002	0.014	0.017	16.00
6.555	0.002	0.015	0.017	16.22
6.666	0.002	0.015	0.017	16.44
6.777	0.002	0.015	0.017	16.65
6.888	0.002	0.015	0.017	16.86
7.000	0.002	0.016	0.017	17.07
7.111	0.002	0.016	0.018	17.27
7.222	0.002	0.016	0.018	17.48
7.333	0.002	0.016	0.018	17.67
7.444	0.002	0.017	0.018	17.87
7.555	0.002	0.017	0.018	18.07
7.666	0.002	0.017	0.018	18.26
7.777	0.002	0.017	0.018	18.45
7.888	0.002	0.018	0.019	18.64
8.000	0.002	0.018	0.019	18.82
8.111	0.002	0.018	0.019	19.00
8.222	0.002	0.018	0.019	19.19
8.333	0.002	0.019	0.019	19.37
8.444	0.002	0.019	0.019	19.54
8.555	0.002	0.019	0.019	19.72
8.666	0.002	0.019	0.020	19.89
8.777	0.002	0.020	0.020	20.07
8.888	0.002	0.020	0.020	20.24
9.000	0.002	0.020	0.020	20.41
9.111	0.002	0.020	0.205	20.58
9.222	0.002	0.021	0.389	20.74
9.333	0.002	0.021	0.475	20.91
9.444	0.002	0.021	0.545	21.07
9.555	0.002	0.021	0.607	21.23
9.666	0.002	0.022	0.664	21.39
9.777	0.002	0.022	0.715	21.55
9.888	0.002	0.022	0.763	21.71
10.00	0.002	0.023	0.808	21.87
10.11	0.002	0.023	0.851	22.02

Discharge Structure

Riser Height: 9 ft.

Riser Diameter: 6 in.

Orifice 1 Diameter: 0.500 in. Elevation: 0 ft.

Element Outlets:

Outlet 1 Outlet 2

Outlet Flows To:

Lateral Basin 2 Lateral Basin 7

CJ Dens Trapezoidal Pond 2

Bottom Length: 31.50 ft.
 Bottom Width: 31.50 ft.
 Depth: 5 ft.
 Volume at riser head: 0.1821 acre-feet.
 Side slope 1: 3 To 1
 Side slope 2: 3 To 1
 Side slope 3: 3 To 1
 Side slope 4: 3 To 1
 Discharge Structure
 Riser Height: 4 ft.
 Riser Diameter: 12 in.
 Notch Type: Rectangular
 Notch Width: 0.250 ft.
 Notch Height: 2.000 ft.
 Orifice 1 Diameter: 2.125 in. Elevation: 0 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:
 Lateral Basin 7

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.022	0.000	0.000	0.000
0.0556	0.023	0.001	0.028	0.000
0.1111	0.023	0.002	0.040	0.000
0.1667	0.024	0.003	0.050	0.000
0.2222	0.024	0.005	0.057	0.000
0.2778	0.025	0.006	0.064	0.000
0.3333	0.025	0.008	0.070	0.000
0.3889	0.026	0.009	0.076	0.000
0.4444	0.026	0.011	0.081	0.000
0.5000	0.027	0.012	0.086	0.000
0.5556	0.027	0.014	0.091	0.000
0.6111	0.028	0.015	0.095	0.000
0.6667	0.028	0.017	0.100	0.000
0.7222	0.029	0.018	0.104	0.000
0.7778	0.030	0.020	0.108	0.000
0.8333	0.030	0.022	0.111	0.000
0.8889	0.031	0.023	0.115	0.000
0.9444	0.031	0.025	0.119	0.000
1.0000	0.032	0.027	0.122	0.000
1.0556	0.032	0.029	0.125	0.000
1.1111	0.033	0.031	0.129	0.000
1.1667	0.034	0.032	0.132	0.000
1.2222	0.034	0.034	0.135	0.000
1.2778	0.035	0.036	0.138	0.000
1.3333	0.035	0.038	0.141	0.000
1.3889	0.036	0.040	0.144	0.000
1.4444	0.037	0.042	0.147	0.000
1.5000	0.037	0.044	0.150	0.000
1.5556	0.038	0.047	0.152	0.000
1.6111	0.038	0.049	0.155	0.000
1.6667	0.039	0.051	0.158	0.000
1.7222	0.040	0.053	0.160	0.000
1.7778	0.040	0.055	0.163	0.000

1.8333	0.041	0.058	0.165	0.000
1.8889	0.042	0.060	0.168	0.000
1.9444	0.042	0.062	0.170	0.000
2.0000	0.043	0.065	0.173	0.000
2.0556	0.044	0.067	0.186	0.000
2.1111	0.044	0.070	0.208	0.000
2.1667	0.045	0.072	0.235	0.000
2.2222	0.046	0.075	0.266	0.000
2.2778	0.046	0.077	0.300	0.000
2.3333	0.047	0.080	0.336	0.000
2.3889	0.048	0.082	0.375	0.000
2.4444	0.048	0.085	0.416	0.000
2.5000	0.049	0.088	0.458	0.000
2.5556	0.050	0.091	0.502	0.000
2.6111	0.051	0.094	0.547	0.000
2.6667	0.051	0.096	0.592	0.000
2.7222	0.052	0.099	0.639	0.000
2.7778	0.053	0.102	0.686	0.000
2.8333	0.054	0.105	0.734	0.000
2.8889	0.054	0.108	0.781	0.000
2.9444	0.055	0.111	0.830	0.000
3.0000	0.056	0.114	0.878	0.000
3.0556	0.057	0.118	0.936	0.000
3.1111	0.057	0.121	0.996	0.000
3.1667	0.058	0.124	1.057	0.000
3.2222	0.059	0.127	1.119	0.000
3.2778	0.060	0.131	1.183	0.000
3.3333	0.060	0.134	1.249	0.000
3.3889	0.061	0.137	1.315	0.000
3.4444	0.062	0.141	1.753	0.000
3.5000	0.063	0.144	1.844	0.000
3.5556	0.064	0.148	1.937	0.000
3.6111	0.064	0.151	2.031	0.000
3.6667	0.065	0.155	2.126	0.000
3.7222	0.066	0.159	2.223	0.000
3.7778	0.067	0.162	2.322	0.000
3.8333	0.068	0.166	2.422	0.000
3.8889	0.069	0.170	2.524	0.000
3.9444	0.069	0.174	2.627	0.000
4.0000	0.070	0.178	2.732	0.000
4.0556	0.071	0.182	2.872	0.000
4.1111	0.072	0.186	3.125	0.000
4.1667	0.073	0.190	3.440	0.000
4.2222	0.074	0.194	3.784	0.000
4.2778	0.075	0.198	4.124	0.000
4.3333	0.075	0.202	4.425	0.000
4.3889	0.076	0.206	4.664	0.000
4.4444	0.077	0.211	4.833	0.000
4.5000	0.078	0.215	4.950	0.000
4.5556	0.079	0.219	5.096	0.000
4.6111	0.080	0.224	5.212	0.000
4.6667	0.081	0.228	5.323	0.000
4.7222	0.082	0.233	5.429	0.000
4.7778	0.083	0.237	5.532	0.000
4.8333	0.084	0.242	5.631	0.000
4.8889	0.085	0.247	5.727	0.000
4.9444	0.085	0.252	5.820	0.000
5.0000	0.086	0.256	5.910	0.000

5.0556

0.087

0.261

5.998

0.000

DRAFT

SSD Table 1

Depth: 6 ft.
 Discharge Structure: 1
 Riser Height: 5 ft.
 Riser Diameter: 18 in.
 Notch Type: Rectangular
 Notch Width: 0.330 ft.
 Notch Height: 1.250 ft.
 Orifice 1 Diameter: 2.000 in. Elevation: 0 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:
 Lateral Basin 7

SSD Table Hydraulic Table

Stage (feet)	Area (ac.)	Volume (ac.-ft.)	Outlet Struct	NotUsed	NotUsed	NotUsed	NotUsed
0.000	0.058	0.000	0.000	0.000	0.000	0.000	0.000
0.170	0.058	0.005	0.045	0.000	0.000	0.000	0.000
0.330	0.058	0.011	0.062	0.000	0.000	0.000	0.000
0.500	0.058	0.018	0.077	0.000	0.000	0.000	0.000
0.670	0.058	0.024	0.089	0.000	0.000	0.000	0.000
0.830	0.058	0.032	0.099	0.000	0.000	0.000	0.000
1.000	0.058	0.039	0.109	0.000	0.000	0.000	0.000
1.170	0.058	0.047	0.117	0.000	0.000	0.000	0.000
1.330	0.058	0.054	0.125	0.000	0.000	0.000	0.000
1.500	0.058	0.062	0.133	0.000	0.000	0.000	0.000
1.670	0.058	0.070	0.140	0.000	0.000	0.000	0.000
1.830	0.058	0.079	0.147	0.000	0.000	0.000	0.000
2.000	0.058	0.087	0.154	0.000	0.000	0.000	0.000
2.170	0.058	0.095	0.160	0.000	0.000	0.000	0.000
2.330	0.058	0.104	0.166	0.000	0.000	0.000	0.000
2.500	0.058	0.112	0.172	0.000	0.000	0.000	0.000
2.670	0.058	0.121	0.177	0.000	0.000	0.000	0.000
2.830	0.058	0.129	0.183	0.000	0.000	0.000	0.000
3.000	0.058	0.138	0.188	0.000	0.000	0.000	0.000
3.170	0.058	0.146	0.193	0.000	0.000	0.000	0.000
3.330	0.058	0.155	0.198	0.000	0.000	0.000	0.000
3.500	0.058	0.164	0.203	0.000	0.000	0.000	0.000
3.670	0.058	0.172	0.208	0.000	0.000	0.000	0.000
3.830	0.058	0.181	0.237	0.000	0.000	0.000	0.000
4.000	0.058	0.189	0.348	0.000	0.000	0.000	0.000
4.170	0.058	0.197	0.496	0.000	0.000	0.000	0.000
4.330	0.058	0.205	0.655	0.000	0.000	0.000	0.000
4.500	0.058	0.214	0.837	0.000	0.000	0.000	0.000
4.670	0.058	0.222	1.026	0.000	0.000	0.000	0.000
4.830	0.058	0.229	1.225	0.000	0.000	0.000	0.000
5.000	0.058	0.237	1.471	0.000	0.000	0.000	0.000
5.170	0.058	0.244	2.582	0.000	0.000	0.000	0.000
5.330	0.058	0.251	4.324	0.000	0.000	0.000	0.000
5.500	0.058	0.258	6.122	0.000	0.000	0.000	0.000
5.670	0.058	0.265	7.256	0.000	0.000	0.000	0.000
5.830	0.058	0.271	7.947	0.000	0.000	0.000	0.000
6.000	0.058	0.276	8.581	0.000	0.000	0.000	0.000

Trapezoidal Pond 2A

Bottom Length: 40.00 ft.
 Bottom Width: 40.00 ft.
 Depth: 4 ft.
 Volume at riser head: 0.1689 acre-feet.
 Side slope 1: 3 To 1
 Side slope 2: 3 To 1
 Side slope 3: 3 To 1
 Side slope 4: 3 To 1
 Discharge Structure
 Riser Height: 3 ft.
 Riser Diameter: 18 in.
 Notch Type: Rectangular
 Notch Width: 0.330 ft.
 Notch Height: 1.333 ft.
 Orifice 1 Diameter: 4.000 in. Elevation:-0.33 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:
 Lateral Basin 7

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.036	0.000	0.249	0.000
0.0444	0.037	0.001	0.265	0.000
0.0889	0.037	0.003	0.281	0.000
0.1333	0.038	0.005	0.295	0.000
0.1778	0.038	0.006	0.309	0.000
0.2222	0.039	0.008	0.322	0.000
0.2667	0.039	0.010	0.335	0.000
0.3111	0.040	0.012	0.347	0.000
0.3556	0.040	0.013	0.359	0.000
0.4000	0.041	0.015	0.371	0.000
0.4444	0.041	0.017	0.382	0.000
0.4889	0.042	0.019	0.392	0.000
0.5333	0.042	0.021	0.403	0.000
0.5778	0.043	0.023	0.413	0.000
0.6222	0.043	0.025	0.423	0.000
0.6667	0.044	0.027	0.433	0.000
0.7111	0.045	0.029	0.443	0.000
0.7556	0.045	0.031	0.452	0.000
0.8000	0.046	0.033	0.461	0.000
0.8444	0.046	0.035	0.470	0.000
0.8889	0.047	0.037	0.479	0.000
0.9333	0.047	0.039	0.488	0.000
0.9778	0.048	0.041	0.496	0.000
1.0222	0.048	0.043	0.504	0.000
1.0667	0.049	0.045	0.513	0.000
1.1111	0.050	0.048	0.521	0.000
1.1556	0.050	0.050	0.529	0.000
1.2000	0.051	0.052	0.537	0.000
1.2444	0.051	0.054	0.544	0.000
1.2889	0.052	0.057	0.552	0.000
1.3333	0.052	0.059	0.560	0.000
1.3778	0.053	0.061	0.567	0.000
1.4222	0.054	0.064	0.574	0.000

1.4667	0.054	0.066	0.582	0.000
1.5111	0.055	0.069	0.589	0.000
1.5556	0.055	0.071	0.596	0.000
1.6000	0.056	0.074	0.603	0.000
1.6444	0.057	0.076	0.610	0.000
1.6889	0.057	0.079	0.620	0.000
1.7333	0.058	0.081	0.642	0.000
1.7778	0.058	0.084	0.669	0.000
1.8222	0.059	0.086	0.701	0.000
1.8667	0.060	0.089	0.737	0.000
1.9111	0.060	0.092	0.775	0.000
1.9556	0.061	0.095	0.816	0.000
2.0000	0.062	0.097	0.859	0.000
2.0444	0.062	0.100	0.904	0.000
2.0889	0.063	0.103	0.950	0.000
2.1333	0.064	0.106	0.998	0.000
2.1778	0.064	0.109	1.047	0.000
2.2222	0.065	0.111	1.097	0.000
2.2667	0.066	0.114	1.148	0.000
2.3111	0.066	0.117	1.200	0.000
2.3556	0.067	0.120	1.252	0.000
2.4000	0.067	0.123	1.305	0.000
2.4444	0.068	0.126	1.358	0.000
2.4889	0.069	0.129	1.412	0.000
2.5333	0.070	0.132	1.466	0.000
2.5778	0.070	0.136	1.521	0.000
2.6222	0.071	0.139	1.575	0.000
2.6667	0.072	0.142	1.629	0.000
2.7111	0.072	0.145	1.694	0.000
2.7556	0.073	0.148	1.760	0.000
2.8000	0.074	0.152	1.827	0.000
2.8444	0.074	0.155	1.896	0.000
2.8889	0.075	0.158	1.965	0.000
2.9333	0.076	0.162	2.036	0.000
2.9778	0.076	0.165	2.108	0.000
3.0222	0.077	0.168	2.200	0.000
3.0667	0.078	0.172	2.426	0.000
3.1111	0.079	0.175	2.745	0.000
3.1556	0.079	0.179	3.133	0.000
3.2000	0.080	0.183	3.572	0.000
3.2444	0.081	0.186	4.050	0.000
3.2889	0.081	0.190	4.553	0.000
3.3333	0.082	0.193	5.065	0.000
3.3778	0.083	0.197	5.574	0.000
3.4222	0.084	0.201	6.065	0.000
3.4667	0.084	0.205	6.524	0.000
3.5111	0.085	0.208	6.940	0.000
3.5556	0.086	0.212	7.305	0.000
3.6000	0.087	0.216	7.614	0.000
3.6444	0.087	0.220	7.867	0.000
3.6889	0.088	0.224	8.071	0.000
3.7333	0.089	0.228	8.241	0.000
3.7778	0.090	0.232	8.482	0.000
3.8222	0.090	0.236	8.663	0.000
3.8667	0.091	0.240	8.839	0.000
3.9111	0.092	0.244	9.010	0.000
3.9556	0.093	0.248	9.178	0.000
4.0000	0.094	0.252	9.342	0.000

4.0444 0.094 0.256 9.502 0.000

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Trapezoidal Pond 2B

Bottom Length: 600.00 ft.
 Bottom Width: 60.00 ft.
 Depth: 4 ft.
 Volume at riser head: 2.9205 acre-feet.
 Side slope 1: 3 To 1
 Side slope 2: 3 To 1
 Side slope 3: 3 To 1
 Side slope 4: 3 To 1
 Discharge Structure
 Riser Height: 3 ft.
 Riser Diameter: 18 in.
 Notch Type: Rectangular
 Notch Width: 0.330 ft.
 Notch Height: 1.333 ft.
 Orifice 1 Diameter: 4.000 in. Elevation:-0.3333333333333333 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:
 Lateral Basin 7

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.826	0.000	0.250	0.000
0.0444	0.830	0.036	0.266	0.000
0.0889	0.834	0.073	0.282	0.000
0.1333	0.838	0.111	0.296	0.000
0.1778	0.842	0.148	0.310	0.000
0.2222	0.846	0.185	0.323	0.000
0.2667	0.850	0.223	0.336	0.000
0.3111	0.854	0.261	0.348	0.000
0.3556	0.858	0.299	0.360	0.000
0.4000	0.862	0.337	0.371	0.000
0.4444	0.867	0.376	0.382	0.000
0.4889	0.871	0.414	0.393	0.000
0.5333	0.875	0.453	0.404	0.000
0.5778	0.879	0.492	0.414	0.000
0.6222	0.883	0.531	0.424	0.000
0.6667	0.887	0.571	0.434	0.000
0.7111	0.891	0.610	0.443	0.000
0.7556	0.895	0.650	0.453	0.000
0.8000	0.899	0.690	0.462	0.000
0.8444	0.903	0.730	0.471	0.000
0.8889	0.907	0.770	0.480	0.000
0.9333	0.912	0.811	0.488	0.000
0.9778	0.916	0.851	0.497	0.000
1.0222	0.920	0.892	0.505	0.000
1.0667	0.924	0.933	0.513	0.000
1.1111	0.928	0.974	0.521	0.000
1.1556	0.932	1.016	0.529	0.000
1.2000	0.936	1.057	0.537	0.000
1.2444	0.940	1.099	0.545	0.000
1.2889	0.945	1.141	0.553	0.000
1.3333	0.949	1.183	0.560	0.000
1.3778	0.953	1.225	0.568	0.000
1.4222	0.957	1.268	0.575	0.000

1.4667	0.961	1.310	0.582	0.000
1.5111	0.965	1.353	0.589	0.000
1.5556	0.969	1.396	0.596	0.000
1.6000	0.974	1.439	0.603	0.000
1.6444	0.978	1.483	0.610	0.000
1.6889	0.982	1.526	0.621	0.000
1.7333	0.986	1.570	0.642	0.000
1.7778	0.990	1.614	0.670	0.000
1.8222	0.994	1.658	0.702	0.000
1.8667	0.999	1.702	0.738	0.000
1.9111	1.003	1.747	0.776	0.000
1.9556	1.007	1.792	0.817	0.000
2.0000	1.011	1.836	0.860	0.000
2.0444	1.015	1.882	0.905	0.000
2.0889	1.020	1.927	0.951	0.000
2.1333	1.024	1.972	0.999	0.000
2.1778	1.028	2.018	1.048	0.000
2.2222	1.032	2.064	1.098	0.000
2.2667	1.036	2.110	1.149	0.000
2.3111	1.041	2.156	1.201	0.000
2.3556	1.045	2.202	1.253	0.000
2.4000	1.049	2.249	1.306	0.000
2.4444	1.053	2.295	1.359	0.000
2.4889	1.057	2.342	1.413	0.000
2.5333	1.062	2.389	1.467	0.000
2.5778	1.066	2.437	1.522	0.000
2.6222	1.070	2.484	1.576	0.000
2.6667	1.074	2.532	1.630	0.000
2.7111	1.079	2.580	1.695	0.000
2.7556	1.083	2.628	1.761	0.000
2.8000	1.087	2.676	1.828	0.000
2.8444	1.091	2.724	1.897	0.000
2.8889	1.096	2.773	1.966	0.000
2.9333	1.100	2.822	2.037	0.000
2.9778	1.104	2.871	2.109	0.000
3.0222	1.108	2.920	2.201	0.000
3.0667	1.113	2.969	2.427	0.000
3.1111	1.117	3.019	2.746	0.000
3.1556	1.121	3.069	3.134	0.000
3.2000	1.125	3.119	3.573	0.000
3.2444	1.130	3.169	4.051	0.000
3.2889	1.134	3.219	4.554	0.000
3.3333	1.138	3.270	5.066	0.000
3.3778	1.142	3.320	5.575	0.000
3.4222	1.147	3.371	6.066	0.000
3.4667	1.151	3.422	6.525	0.000
3.5111	1.155	3.474	6.941	0.000
3.5556	1.160	3.525	7.306	0.000
3.6000	1.164	3.577	7.615	0.000
3.6444	1.168	3.629	7.868	0.000
3.6889	1.173	3.681	8.072	0.000
3.7333	1.177	3.733	8.242	0.000
3.7778	1.181	3.785	8.483	0.000
3.8222	1.186	3.838	8.664	0.000
3.8667	1.190	3.891	8.840	0.000
3.9111	1.194	3.944	9.011	0.000
3.9556	1.199	3.997	9.179	0.000
4.0000	1.203	4.050	9.343	0.000

4.0444

1.207

4.104

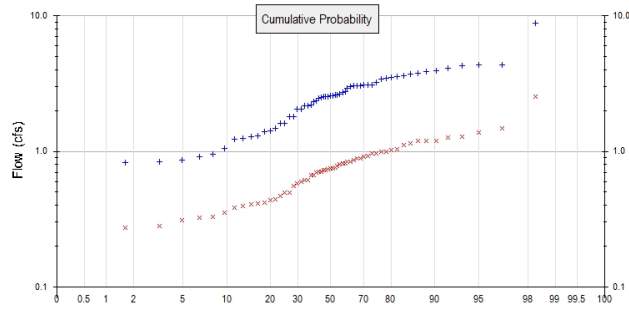
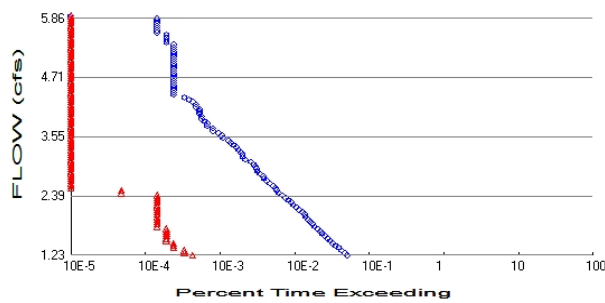
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DRAFT

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area: 8.979
Total Impervious Area: 0.944

Mitigated Landuse Totals for POC #1

Total Pervious Area: 5.162
Total Impervious Area: 3.82

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	2.460675
5 year	3.857876
10 year	4.621008
25 year	5.399987
50 year	5.863931
100 year	6.245905

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.739848
5 year	1.123217
10 year	1.32814
25 year	1.534826
50 year	1.656892
100 year	1.756871

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	1.796	0.559
1950	2.376	0.725
1951	3.209	0.972
1952	2.330	0.577
1953	2.645	0.800
1954	3.589	1.189
1955	2.034	0.612
1956	3.751	1.117
1957	3.061	1.000
1958	3.099	0.704

1959	1.278	0.438
1960	1.308	0.408
1961	3.401	1.025
1962	2.778	0.745
1963	3.037	0.810
1964	2.457	0.751
1965	2.520	0.670
1966	2.992	0.906
1967	2.717	0.782
1968	3.076	0.962
1969	2.566	0.887
1970	8.867	2.529
1971	1.616	0.419
1972	2.179	0.664
1973	2.530	0.697
1974	3.558	1.033
1975	2.046	0.594
1976	2.938	0.883
1977	0.080	0.032
1978	4.119	1.275
1979	3.478	0.835
1980	1.614	0.496
1981	3.740	1.138
1982	2.545	0.764
1983	4.308	1.369
1984	1.392	0.442
1985	0.958	0.329
1986	1.223	0.412
1987	2.199	0.710
1988	0.827	0.326
1989	0.910	0.352
1990	1.048	0.310
1991	2.613	0.810
1992	3.065	0.833
1993	3.510	0.992
1994	2.514	0.736
1995	2.178	0.611
1996	4.339	1.270
1997	4.353	1.470
1998	3.893	1.203
1999	2.600	0.859
2000	1.241	0.467
2001	0.838	0.272
2002	3.953	1.197
2003	3.071	0.920
2004	0.858	0.280
2005	1.407	0.385
2006	2.571	0.731
2007	1.474	0.395
2008	1.812	0.499

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	8.8672	2.5294
2	4.3533	1.4702
3	4.3388	1.3691
4	4.3083	1.2748

5	4.1193	1.2700
6	3.9530	1.2026
7	3.8934	1.1965
8	3.7513	1.1886
9	3.7405	1.1379
10	3.5885	1.1166
11	3.5575	1.0327
12	3.5103	1.0249
13	3.4781	0.9999
14	3.4006	0.9921
15	3.2092	0.9724
16	3.0993	0.9618
17	3.0758	0.9196
18	3.0709	0.9065
19	3.0647	0.8869
20	3.0607	0.8826
21	3.0372	0.8587
22	2.9923	0.8347
23	2.9376	0.8333
24	2.7776	0.8098
25	2.7165	0.8096
26	2.6449	0.7997
27	2.6131	0.7817
28	2.6000	0.7638
29	2.5713	0.7507
30	2.5657	0.7453
31	2.5453	0.7360
32	2.5302	0.7309
33	2.5202	0.7253
34	2.5136	0.7095
35	2.4570	0.7038
36	2.3764	0.6967
37	2.3296	0.6700
38	2.1992	0.6641
39	2.1792	0.6122
40	2.1779	0.6111
41	2.0456	0.5941
42	2.0344	0.5772
43	1.8125	0.5585
44	1.7964	0.4991
45	1.6163	0.4958
46	1.6139	0.4670
47	1.4745	0.4416
48	1.4074	0.4376
49	1.3923	0.4187
50	1.3081	0.4120
51	1.2779	0.4082
52	1.2411	0.3953
53	1.2231	0.3848
54	1.0483	0.3520
55	0.9577	0.3294
56	0.9101	0.3258
57	0.8584	0.3096
58	0.8375	0.2800
59	0.8274	0.2724
60	0.0799	0.0323

DRAFT

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
1.2303	1060	9	0	Pass
1.2771	987	7	0	Pass
1.3239	894	7	0	Pass
1.3707	822	5	0	Pass
1.4176	741	5	0	Pass
1.4644	680	5	0	Pass
1.5112	626	4	0	Pass
1.5580	579	4	0	Pass
1.6048	531	4	0	Pass
1.6516	489	4	0	Pass
1.6984	459	4	0	Pass
1.7452	425	4	0	Pass
1.7920	391	3	0	Pass
1.8388	360	3	0	Pass
1.8856	342	3	0	Pass
1.9324	318	3	0	Pass
1.9792	297	3	1	Pass
2.0260	284	3	1	Pass
2.0728	266	3	1	Pass
2.1196	238	3	1	Pass
2.1664	221	3	1	Pass
2.2132	204	3	1	Pass
2.2600	190	3	1	Pass
2.3068	173	3	1	Pass
2.3536	159	3	1	Pass
2.4004	143	3	2	Pass
2.4472	130	1	0	Pass
2.4940	121	1	0	Pass
2.5408	115	0	0	Pass
2.5877	108	0	0	Pass
2.6345	97	0	0	Pass
2.6813	88	0	0	Pass
2.7281	81	0	0	Pass
2.7749	79	0	0	Pass
2.8217	71	0	0	Pass
2.8685	67	0	0	Pass
2.9153	65	0	0	Pass
2.9621	62	0	0	Pass
3.0089	59	0	0	Pass
3.0557	54	0	0	Pass
3.1025	46	0	0	Pass
3.1493	42	0	0	Pass
3.1961	42	0	0	Pass
3.2429	40	0	0	Pass
3.2897	37	0	0	Pass
3.3365	35	0	0	Pass
3.3833	32	0	0	Pass
3.4301	29	0	0	Pass
3.4769	27	0	0	Pass
3.5237	23	0	0	Pass
3.5705	22	0	0	Pass
3.6173	20	0	0	Pass
3.6641	17	0	0	Pass

3.7109	17	0	0	Pass
3.7578	14	0	0	Pass
3.8046	14	0	0	Pass
3.8514	13	0	0	Pass
3.8982	12	0	0	Pass
3.9450	12	0	0	Pass
3.9918	11	0	0	Pass
4.0386	11	0	0	Pass
4.0854	11	0	0	Pass
4.1322	10	0	0	Pass
4.1790	10	0	0	Pass
4.2258	9	0	0	Pass
4.2726	8	0	0	Pass
4.3194	7	0	0	Pass
4.3662	5	0	0	Pass
4.4130	5	0	0	Pass
4.4598	5	0	0	Pass
4.5066	5	0	0	Pass
4.5534	5	0	0	Pass
4.6002	5	0	0	Pass
4.6470	5	0	0	Pass
4.6938	5	0	0	Pass
4.7406	5	0	0	Pass
4.7874	5	0	0	Pass
4.8342	5	0	0	Pass
4.8810	5	0	0	Pass
4.9279	5	0	0	Pass
4.9747	5	0	0	Pass
5.0215	5	0	0	Pass
5.0683	5	0	0	Pass
5.1151	5	0	0	Pass
5.1619	5	0	0	Pass
5.2087	5	0	0	Pass
5.2555	5	0	0	Pass
5.3023	5	0	0	Pass
5.3491	5	0	0	Pass
5.3959	4	0	0	Pass
5.4427	4	0	0	Pass
5.4895	4	0	0	Pass
5.5363	4	0	0	Pass
5.5831	3	0	0	Pass
5.6299	3	0	0	Pass
5.6767	3	0	0	Pass
5.7235	3	0	0	Pass
5.7703	3	0	0	Pass
5.8171	3	0	0	Pass
5.8639	3	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.

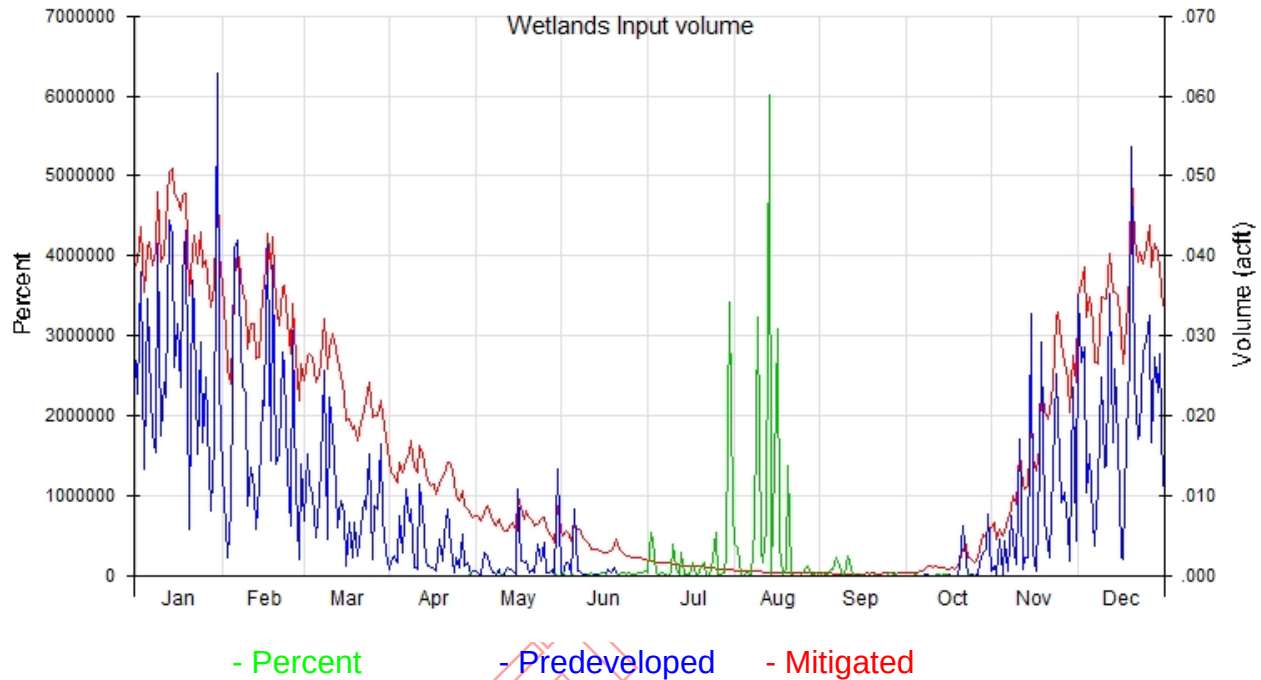
Adjusted for 15 min: 0 cfs.

Off-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

DRAFT

Wetland Input Volumes



Wetlands Input Volume for POC 1

Average Annual Volume (acft)

Series 1: 501 POC 1 Predeveloped flow

Series 2: 801 POC 1 Mitigated flow

Month	Series 1	Series 2	Percent	Pass/Fail
Jan	0.8248	1.2957	157.1	Fail
Feb	0.5507	0.9491	172.4	Fail
Mar	0.2951	0.7276	246.6	Fail
Apr	0.1046	0.3728	356.5	Fail
May	0.0554	0.2142	386.9	Fail
Jun	0.0164	0.1127	688.6	Fail
Jul	0.0001	0.0405	29684.7	Fail
Aug	0.0001	0.0146	25093.2	Fail
Sep	0.0001	0.0084	7021.9	Fail
Oct	0.0260	0.0523	201.4	Fail
Nov	0.2495	0.4844	194.2	Fail
Dec	0.6353	1.1181	176.0	Fail

Day	Predevel	Mitigated	Percent	Pass/Fail
Jan1	0.0270	0.0387	143.7	Fail
2	0.0227	0.0393	172.8	Fail
3	0.0381	0.0437	114.8	Pass
4	0.0134	0.0355	264.7	Fail
5	0.0346	0.0410	118.4	Pass
6	0.0279	0.0418	149.6	Fail
7	0.0176	0.0387	219.6	Fail
8	0.0154	0.0408	264.6	Fail
9	0.0416	0.0481	115.6	Pass
10	0.0176	0.0392	223.5	Fail
11	0.0242	0.0403	166.4	Fail
12	0.0224	0.0439	196.0	Fail
13	0.0445	0.0504	113.5	Pass
14	0.0426	0.0510	119.7	Pass

15	0.0261	0.0477	183.0	Fail
16	0.0314	0.0473	150.4	Fail
17	0.0237	0.0458	193.5	Fail
18	0.0376	0.0475	126.2	Fail
19	0.0431	0.0477	110.7	Pass
20	0.0058	0.0350	601.4	Fail
21	0.0370	0.0405	109.7	Pass
22	0.0327	0.0425	130.1	Fail
23	0.0153	0.0391	255.8	Fail
24	0.0291	0.0429	147.4	Fail
25	0.0167	0.0386	230.8	Fail
26	0.0248	0.0395	159.6	Fail
27	0.0134	0.0355	264.2	Fail
28	0.0081	0.0335	412.6	Fail
29	0.0166	0.0363	219.1	Fail
30	0.0628	0.0500	79.6	Fail
31	0.0243	0.0405	166.7	Fail
Feb1	0.0127	0.0364	286.4	Fail
2	0.0063	0.0307	487.6	Fail
3	0.0023	0.0259	1149.2	Fail
4	0.0080	0.0240	298.9	Fail
5	0.0409	0.0370	90.7	Pass
6	0.0419	0.0405	96.5	Pass
7	0.0353	0.0397	112.3	Pass
8	0.0239	0.0354	148.3	Fail
9	0.0230	0.0342	148.8	Fail
10	0.0087	0.0283	324.9	Fail
11	0.0135	0.0314	233.6	Fail
12	0.0108	0.0315	292.1	Fail
13	0.0058	0.0271	468.2	Fail
14	0.0112	0.0274	244.6	Fail
15	0.0219	0.0354	161.6	Fail
16	0.0212	0.0358	168.8	Fail
17	0.0412	0.0427	103.7	Pass
18	0.0145	0.0384	265.9	Fail
19	0.0389	0.0423	108.8	Pass
20	0.0139	0.0340	244.6	Fail
21	0.0151	0.0314	207.2	Fail
22	0.0280	0.0359	128.3	Fail
23	0.0260	0.0363	139.6	Fail
24	0.0128	0.0318	248.7	Fail
25	0.0062	0.0278	450.3	Fail
26	0.0307	0.0339	110.3	Pass
27	0.0111	0.0273	247.0	Fail
28	0.0021	0.0219	1020.7	Fail
29	0.0140	0.0264	188.8	Fail
Mar1	0.0068	0.0244	357.8	Fail
2	0.0152	0.0274	179.8	Fail
3	0.0115	0.0278	242.4	Fail
4	0.0102	0.0273	268.2	Fail
5	0.0047	0.0242	510.2	Fail
6	0.0097	0.0249	258.3	Fail
7	0.0138	0.0269	194.6	Fail
8	0.0257	0.0321	124.7	Fail
9	0.0046	0.0258	563.3	Fail
10	0.0223	0.0284	127.4	Fail
11	0.0181	0.0303	167.5	Fail
12	0.0108	0.0284	261.7	Fail

13	0.0061	0.0271	446.0	Fail
14	0.0093	0.0251	270.3	Fail
15	0.0079	0.0228	289.2	Fail
16	0.0012	0.0194	1559.0	Fail
17	0.0066	0.0195	293.6	Fail
18	0.0023	0.0184	790.4	Fail
19	0.0067	0.0189	280.8	Fail
20	0.0025	0.0170	678.2	Fail
21	0.0060	0.0191	320.1	Fail
22	0.0094	0.0207	220.3	Fail
23	0.0084	0.0219	259.7	Fail
24	0.0153	0.0241	157.9	Fail
25	0.0021	0.0198	957.1	Fail
26	0.0087	0.0201	231.9	Fail
27	0.0083	0.0199	239.3	Fail
28	0.0166	0.0218	131.6	Fail
29	0.0073	0.0203	278.4	Fail
30	0.0029	0.0173	593.2	Fail
31	0.0007	0.0145	2006.5	Fail
Apr1	0.0016	0.0130	835.9	Fail
2	0.0024	0.0124	517.4	Fail
3	0.0016	0.0116	718.0	Fail
4	0.0076	0.0142	188.0	Fail
5	0.0029	0.0129	438.4	Fail
6	0.0108	0.0144	133.9	Fail
7	0.0069	0.0154	224.1	Fail
8	0.0083	0.0169	204.5	Fail
9	0.0010	0.0137	1353.6	Fail
10	0.0007	0.0128	1727.3	Fail
11	0.0114	0.0162	141.8	Fail
12	0.0082	0.0154	187.2	Fail
13	0.0018	0.0130	724.7	Fail
14	0.0011	0.0119	1054.2	Fail
15	0.0010	0.0113	1173.2	Fail
16	0.0009	0.0115	1258.7	Fail
17	0.0006	0.0101	1650.8	Fail
18	0.0047	0.0116	247.3	Fail
19	0.0019	0.0124	636.9	Fail
20	0.0049	0.0126	256.4	Fail
21	0.0083	0.0142	171.6	Fail
22	0.0035	0.0140	402.6	Fail
23	0.0004	0.0119	2900.6	Fail
24	0.0023	0.0101	439.1	Fail
25	0.0010	0.0095	948.4	Fail
26	0.0052	0.0107	204.0	Fail
27	0.0012	0.0087	751.6	Fail
28	0.0016	0.0084	530.5	Fail
29	0.0001	0.0076	7743.0	Fail
30	0.0006	0.0073	1182.9	Fail
May1	0.0006	0.0075	1223.4	Fail
2	0.0003	0.0073	2623.9	Fail
3	0.0002	0.0069	2840.0	Fail
4	0.0030	0.0080	269.3	Fail
5	0.0024	0.0088	369.5	Fail
6	0.0014	0.0081	582.1	Fail
7	0.0004	0.0068	1737.4	Fail
8	0.0003	0.0062	2382.2	Fail
9	0.0009	0.0071	773.7	Fail

10	0.0000	0.0063	16170.0	Fail
11	0.0001	0.0056	5072.0	Fail
12	0.0009	0.0057	620.1	Fail
13	0.0008	0.0063	798.6	Fail
14	0.0006	0.0066	1140.5	Fail
15	0.0001	0.0056	4543.8	Fail
16	0.0108	0.0101	92.8	Pass
17	0.0018	0.0085	463.1	Fail
18	0.0016	0.0071	441.1	Fail
19	0.0019	0.0081	420.1	Fail
20	0.0004	0.0073	1897.0	Fail
21	0.0008	0.0068	856.5	Fail
22	0.0005	0.0062	1306.6	Fail
23	0.0039	0.0066	168.4	Fail
24	0.0018	0.0070	380.5	Fail
25	0.0042	0.0072	171.8	Fail
26	0.0004	0.0062	1387.5	Fail
27	0.0003	0.0051	1501.1	Fail
28	0.0007	0.0048	674.4	Fail
29	0.0000	0.0042	24147.5	Fail
30	0.0134	0.0087	64.8	Fail
31	0.0003	0.0058	2041.5	Fail
Jun1	0.0000	0.0049	42860.3	Fail
2	0.0016	0.0056	348.0	Fail
3	0.0015	0.0053	356.9	Fail
4	0.0000	0.0044	18893.1	Fail
5	0.0082	0.0065	79.1	Fail
6	0.0006	0.0059	988.6	Fail
7	0.0004	0.0055	1300.3	Fail
8	0.0002	0.0048	2195.6	Fail
9	0.0002	0.0044	2324.2	Fail
10	0.0000	0.0039	11303.2	Fail
11	0.0000	0.0034	29606.2	Fail
12	0.0003	0.0034	1233.8	Fail
13	0.0002	0.0034	2121.4	Fail
14	0.0000	0.0032	22159.6	Fail
15	0.0000	0.0030	29992.7	Fail
16	0.0000	0.0028	23359.4	Fail
17	0.0007	0.0029	395.4	Fail
18	0.0005	0.0030	646.3	Fail
19	0.0011	0.0038	341.8	Fail
20	0.0003	0.0045	1418.7	Fail
21	0.0000	0.0034	21634.1	Fail
22	0.0000	0.0028	33785.7	Fail
23	0.0000	0.0026	8464.5	Fail
24	0.0000	0.0024	31750.3	Fail
25	0.0000	0.0023	10920.0	Fail
26	0.0000	0.0023	12676.9	Fail
27	0.0000	0.0022	7729.2	Fail
28	0.0000	0.0022	40093.2	Fail
29	0.0000	0.0021	30435.4	Fail
30	0.0000	0.0020	50248.7	Fail
Jul1	0.0000	0.0019	41262.5	Fail
2	0.0000	0.0019	532103.6	Fail
3	0.0000	0.0018	441379.1	Fail
4	0.0000	0.0017	38470.0	Fail
5	0.0000	0.0017	16123180.0	Fail
6	0.0000	0.0016	34868.5	Fail

7	0.0000	0.0016	16734.5	Fail
8	0.0000	0.0016	5102.5	Fail
9	0.0000	0.0016	34871.8	Fail
10	0.0000	0.0015	386386.4	Fail
11	0.0000	0.0014	94733.8	Fail
12	0.0000	0.0013	57794300.0	Fail
13	0.0000	0.0013	279485.1	Fail
14	0.0000	0.0013	28298.7	Fail
15	0.0000	0.0012	12215.2	Fail
16	0.0000	0.0012	17137.3	Fail
17	0.0000	0.0012	172998.4	Fail
18	0.0000	0.0012	10786.1	Fail
19	0.0000	0.0012	4200.5	Fail
20	0.0000	0.0012	131451.4	Fail
21	0.0000	0.0011	155932.1	Fail
22	0.0000	0.0010	44311010.0	Fail
23	0.0000	0.0010	41661340.0	Fail
24	0.0000	0.0009	197869.4	Fail
25	0.0000	0.0009	536635.9	Fail
26	0.0000	0.0009	35580060.0	Fail
27	0.0000	0.0008	25492.9	Fail
28	0.0000	0.0008	34558.3	Fail
29	0.0000	0.0008	257157.2	Fail
30	0.0000	0.0008	3431471.0	Fail
31	0.0000	0.0007	859975.3	Fail
Aug1	0.0000	0.0007	392594.6	Fail
2	0.0000	0.0007	342383.5	Fail
3	0.0000	0.0007	18039200.0	Fail
4	0.0000	0.0006	28279980.0	Fail
5	0.0000	0.0006	40660.4	Fail
6	0.0000	0.0006	21767.8	Fail
7	0.0000	0.0006	18200210.0	Fail
8	0.0000	0.0005	607829.1	Fail
9	0.0000	0.0005	3238471.0	Fail
10	0.0000	0.0005	323507.1	Fail
11	0.0000	0.0005	172521.0	Fail
12	0.0000	0.0005	581330.2	Fail
13	0.0000	0.0005	6011631.0	Fail
14	0.0000	0.0005	12748.1	Fail
15	0.0000	0.0004	1357267.0	Fail
16	0.0000	0.0004	3088170.0	Fail
17	0.0000	0.0004	374067.3	Fail
18	0.0000	0.0004	13916.7	Fail
19	0.0000	0.0004	88600.0	Fail
20	0.0000	0.0004	1379876.0	Fail
21	0.0000	0.0004	11309.3	Fail
22	0.0000	0.0004	5188.1	Fail
23	0.0000	0.0004	5376.1	Fail
24	0.0000	0.0004	2223.8	Fail
25	0.0000	0.0004	29555.6	Fail
26	0.0000	0.0004	105147.4	Fail
27	0.0000	0.0003	128758.6	Fail
28	0.0000	0.0003	5843.6	Fail
29	0.0000	0.0003	12289.3	Fail
30	0.0000	0.0003	34867.2	Fail
31	0.0000	0.0003	7499.1	Fail
Sep1	0.0000	0.0003	36797.4	Fail
2	0.0000	0.0003	8513.4	Fail

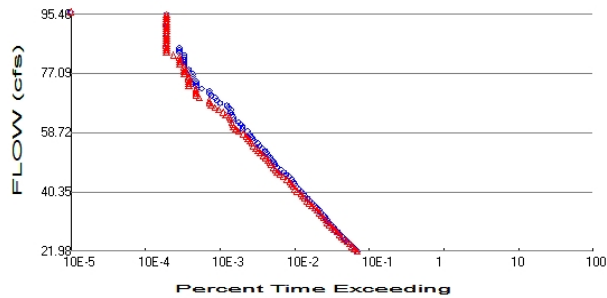
3	0.0000	0.0003	17166.0	Fail
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16	0.0000	0.0002	4216.2	Fail
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22	0.0000	0.0003	3023.4	Fail
23	0.0000	0.0003	5013.7	Fail
24	0.0000	0.0003	2581.0	Fail
25	0.0000	0.0003	35945.2	Fail
26	0.0000	0.0003	8918.8	Fail
27	0.0000	0.0003	9140.8	Fail
28	0.0000	0.0003	4669.9	Fail
29	0.0000	0.0003	4533.1	Fail
30	0.0000	0.0004	4533.5	Fail
Oct1	0.0000	0.0004	6868.6	Fail
2	0.0000	0.0004	4947.6	Fail
3	0.0000	0.0004	3575.0	Fail
4	0.0000	0.0005	9521.6	Fail
5	0.0000	0.0005	2836.3	Fail
6	0.0000	0.0005	4457.9	Fail
7	0.0000	0.0006	1902.2	Fail
8	0.0003	0.0010	345.0	Fail
9	0.0000	0.0012	4295.0	Fail
10	0.0000	0.0011	3657.6	Fail
11	0.0001	0.0013	2069.5	Fail
12	0.0000	0.0011	24385.0	Fail
13	0.0000	0.0010	7051.3	Fail
14	0.0000	0.0009	14642.6	Fail
15	0.0000	0.0008	16062.5	Fail
16	0.0001	0.0009	1026.3	Fail
17	0.0000	0.0010	4001.4	Fail
18	0.0000	0.0009	3087.5	Fail
19	0.0000	0.0012	4407.0	Fail
20	0.0012	0.0016	136.2	Fail
21	0.0062	0.0032	51.8	Fail
22	0.0019	0.0039	202.7	Fail
23	0.0000	0.0023	12321.8	Fail
24	0.0001	0.0020	1493.0	Fail
25	0.0000	0.0017	5634.9	Fail
26	0.0002	0.0023	1074.9	Fail
27	0.0016	0.0032	203.5	Fail
28	0.0028	0.0051	181.1	Fail
29	0.0033	0.0047	142.2	Fail
30	0.0078	0.0061	78.0	Fail

31	0.0005	0.0061	1214.4	Fail
Nov1	0.0013	0.0067	514.6	Fail
2	0.0001	0.0046	4550.4	Fail
3	0.0046	0.0059	128.8	Fail
4	0.0001	0.0050	5441.0	Fail
5	0.0045	0.0055	122.2	Fail
6	0.0006	0.0070	1152.8	Fail
7	0.0076	0.0084	111.1	Pass
8	0.0043	0.0101	231.5	Fail
9	0.0015	0.0090	599.5	Fail
10	0.0171	0.0154	90.0	Pass
11	0.0008	0.0115	1395.5	Fail
12	0.0022	0.0109	490.7	Fail
13	0.0024	0.0113	477.5	Fail
14	0.0328	0.0198	60.4	Fail
15	0.0030	0.0146	491.7	Fail
16	0.0006	0.0132	2115.6	Fail
17	0.0137	0.0160	116.7	Pass
18	0.0293	0.0248	84.7	Pass
19	0.0070	0.0206	292.9	Fail
20	0.0037	0.0197	528.9	Fail
21	0.0023	0.0204	884.6	Fail
22	0.0133	0.0240	180.6	Fail
23	0.0252	0.0321	127.1	Fail
24	0.0199	0.0331	166.2	Fail
25	0.0091	0.0293	322.4	Fail
26	0.0104	0.0268	257.9	Fail
27	0.0060	0.0246	406.8	Fail
28	0.0019	0.0204	1093.5	Fail
29	0.0236	0.0276	117.2	Pass
30	0.0044	0.0242	551.4	Fail
Dec1	0.0351	0.0350	99.7	Pass
2	0.0266	0.0366	137.5	Fail
3	0.0286	0.0386	135.1	Fail
4	0.0103	0.0323	313.2	Fail
5	0.0152	0.0349	229.7	Fail
6	0.0072	0.0318	443.2	Fail
7	0.0037	0.0268	720.9	Fail
8	0.0112	0.0265	236.1	Fail
9	0.0248	0.0348	140.5	Fail
10	0.0135	0.0346	256.0	Fail
11	0.0138	0.0347	251.3	Fail
12	0.0352	0.0402	114.1	Pass
13	0.0167	0.0355	212.1	Fail
14	0.0259	0.0354	136.8	Fail
15	0.0169	0.0350	207.5	Fail
16	0.0025	0.0300	1206.4	Fail
17	0.0020	0.0266	1335.1	Fail
18	0.0174	0.0313	180.1	Fail
19	0.0266	0.0377	141.9	Fail
20	0.0537	0.0507	94.5	Pass
21	0.0245	0.0421	172.0	Fail
22	0.0172	0.0392	228.2	Fail
23	0.0178	0.0405	227.7	Fail
24	0.0279	0.0390	139.9	Fail
25	0.0295	0.0411	139.4	Fail
26	0.0326	0.0438	134.5	Fail
27	0.0167	0.0387	232.1	Fail

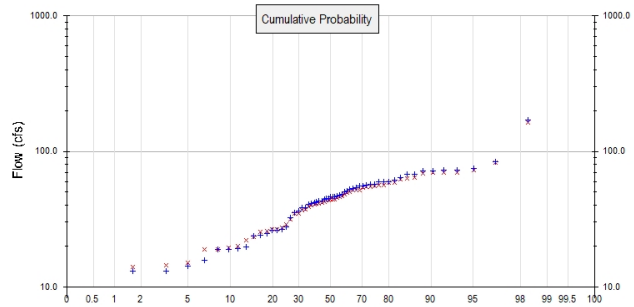
28	0.0274	0.0416	151.8	Fail
29	0.0229	0.0405	177.1	Fail
30	0.0277	0.0384	138.5	Fail
31	0.0110	0.0337	307.6	Fail

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POC 2



+ Predeveloped x Mitigated



Predeveloped Landuse Totals for POC #2

Total Pervious Area: 186.753
Total Impervious Area: 6.031

Mitigated Landuse Totals for POC #2

Total Pervious Area: 174.057
Total Impervious Area: 14.175

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	Flow(cfs)
2 year	43.965007
5 year	65.684116
10 year	77.169118
25 year	88.683932
50 year	95.455897
100 year	100.9882

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	Flow(cfs)
2 year	41.738753
5 year	62.023302
10 year	74.206754
25 year	88.086348
50 year	97.387256
100 year	105.880336

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	Predeveloped	Mitigated
1949	35.338	34.540
1950	45.145	43.770
1951	55.818	51.989
1952	45.068	45.304
1953	44.237	42.418
1954	61.254	58.360
1955	36.300	34.569
1956	75.282	72.626
1957	56.489	53.775
1958	55.900	55.318
1959	19.674	19.864

1960	26.125	25.488
1961	59.327	56.260
1962	53.249	51.651
1963	50.030	47.926
1964	46.024	44.039
1965	46.114	43.870
1966	57.171	54.586
1967	40.811	38.800
1968	52.541	49.987
1969	42.780	41.484
1970	170.563	163.045
1971	27.592	27.209
1972	42.695	41.105
1973	50.765	49.635
1974	72.122	69.856
1975	38.531	37.419
1976	53.700	51.513
1977	4.359	6.878
1978	72.907	69.419
1979	59.381	58.409
1980	32.423	31.444
1981	71.763	68.757
1982	47.775	45.922
1983	72.798	69.316
1984	26.267	25.692
1985	18.914	22.099
1986	23.729	23.211
1987	38.300	36.677
1988	13.014	14.984
1989	15.751	19.544
1990	18.909	18.795
1991	41.084	39.888
1992	46.892	44.526
1993	63.956	61.968
1994	46.241	44.185
1995	41.631	41.607
1996	83.165	82.224
1997	68.172	64.395
1998	59.795	55.995
1999	43.046	40.560
2000	19.090	18.818
2001	12.986	14.033
2002	67.823	63.330
2003	57.267	54.764
2004	14.158	14.458
2005	26.422	26.529
2006	48.440	46.997
2007	23.971	26.452
2008	24.734	28.981

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	170.5630	163.0450
2	83.1654	82.2237
3	75.2822	72.6257
4	72.9067	69.8557
5	72.7977	69.4191

6	72.1222	69.3162
7	71.7633	68.7566
8	68.1723	64.3947
9	67.8231	63.3300
10	63.9564	61.9678
11	61.2535	58.4088
12	59.7947	58.3597
13	59.3812	56.2595
14	59.3272	55.9947
15	57.2666	55.3178
16	57.1709	54.7637
17	56.4888	54.5863
18	55.9000	53.7747
19	55.8180	51.9889
20	53.6998	51.6510
21	53.2488	51.5126
22	52.5413	49.9873
23	50.7653	49.6345
24	50.0304	47.9259
25	48.4400	46.9966
26	47.7753	45.9220
27	46.8923	45.3035
28	46.2410	44.5256
29	46.1144	44.1845
30	46.0236	44.0393
31	45.1451	43.8699
32	45.0677	43.7703
33	44.2374	42.4184
34	43.0455	41.6065
35	42.7800	41.4840
36	42.6953	41.1052
37	41.6312	40.5596
38	41.0838	39.8878
39	40.8108	38.7999
40	38.5309	37.4194
41	38.3000	36.6771
42	36.2999	34.5693
43	35.3376	34.5402
44	32.4227	31.4437
45	27.5917	28.9812
46	26.4220	27.2091
47	26.2674	26.5292
48	26.1245	26.4515
49	24.7340	25.6922
50	23.9711	25.4883
51	23.7288	23.2108
52	19.6738	22.0989
53	19.0902	19.8642
54	18.9137	19.5439
55	18.9088	18.8182
56	15.7511	18.7946
57	14.1576	14.9843
58	13.0136	14.4583
59	12.9861	14.0327
60	4.3587	6.8782

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
21.9825	1438	1443	100	Pass
22.7247	1342	1332	99	Pass
23.4668	1250	1238	99	Pass
24.2090	1148	1144	99	Pass
24.9511	1061	1051	99	Pass
25.6933	993	971	97	Pass
26.4354	909	889	97	Pass
27.1776	855	831	97	Pass
27.9197	790	770	97	Pass
28.6619	733	710	96	Pass
29.4041	693	662	95	Pass
30.1462	647	620	95	Pass
30.8884	612	580	94	Pass
31.6305	574	551	95	Pass
32.3727	540	513	95	Pass
33.1148	511	476	93	Pass
33.8570	475	455	95	Pass
34.5991	449	421	93	Pass
35.3413	422	391	92	Pass
36.0835	388	359	92	Pass
36.8256	360	333	92	Pass
37.5678	338	307	90	Pass
38.3099	311	283	90	Pass
39.0521	287	267	93	Pass
39.7942	275	256	93	Pass
40.5364	259	227	87	Pass
41.2785	241	213	88	Pass
42.0207	218	201	92	Pass
42.7629	209	189	90	Pass
43.5050	200	181	90	Pass
44.2472	191	166	86	Pass
44.9893	175	147	84	Pass
45.7315	161	133	82	Pass
46.4736	151	122	80	Pass
47.2158	137	116	84	Pass
47.9579	123	110	89	Pass
48.7001	114	101	88	Pass
49.4423	111	97	87	Pass
50.1844	104	92	88	Pass
50.9266	99	87	87	Pass
51.6687	95	79	83	Pass
52.4109	89	73	82	Pass
53.1530	84	68	80	Pass
53.8952	76	63	82	Pass
54.6373	72	58	80	Pass
55.3795	67	56	83	Pass
56.1217	61	53	86	Pass
56.8638	57	50	87	Pass
57.6060	55	47	85	Pass
58.3481	53	43	81	Pass
59.0903	49	37	75	Pass
59.8324	42	34	80	Pass
60.5746	42	32	76	Pass

61.3167	40	31	77	Pass
62.0589	37	30	81	Pass
62.8011	32	29	90	Pass
63.5432	31	28	90	Pass
64.2854	30	25	83	Pass
65.0275	29	23	79	Pass
65.7697	29	20	68	Pass
66.5118	27	18	66	Pass
67.2540	26	16	61	Pass
67.9961	21	15	71	Pass
68.7383	19	15	78	Pass
69.4805	18	11	61	Pass
70.2226	16	10	62	Pass
70.9648	15	10	66	Pass
71.7069	15	10	66	Pass
72.4491	12	10	83	Pass
73.1912	10	8	80	Pass
73.9334	10	8	80	Pass
74.6755	10	8	80	Pass
75.4177	9	8	88	Pass
76.1599	9	8	88	Pass
76.9020	9	7	77	Pass
77.6442	8	7	87	Pass
78.3863	8	7	87	Pass
79.1285	7	7	100	Pass
79.8706	7	6	85	Pass
80.6128	7	6	85	Pass
81.3549	7	6	85	Pass
82.0971	7	6	85	Pass
82.8393	7	5	71	Pass
83.5814	6	4	66	Pass
84.3236	6	4	66	Pass
85.0657	6	4	66	Pass
85.8079	4	4	100	Pass
86.5500	4	4	100	Pass
87.2922	4	4	100	Pass
88.0343	4	4	100	Pass
88.7765	4	4	100	Pass
89.5187	4	4	100	Pass
90.2608	4	4	100	Pass
91.0030	4	4	100	Pass
91.7451	4	4	100	Pass
92.4873	4	4	100	Pass
93.2294	4	4	100	Pass
93.9716	4	4	100	Pass
94.7137	4	4	100	Pass
95.4559	4	4	100	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #2

On-line facility volume: 0 acre-feet

On-line facility target flow: 0 cfs.

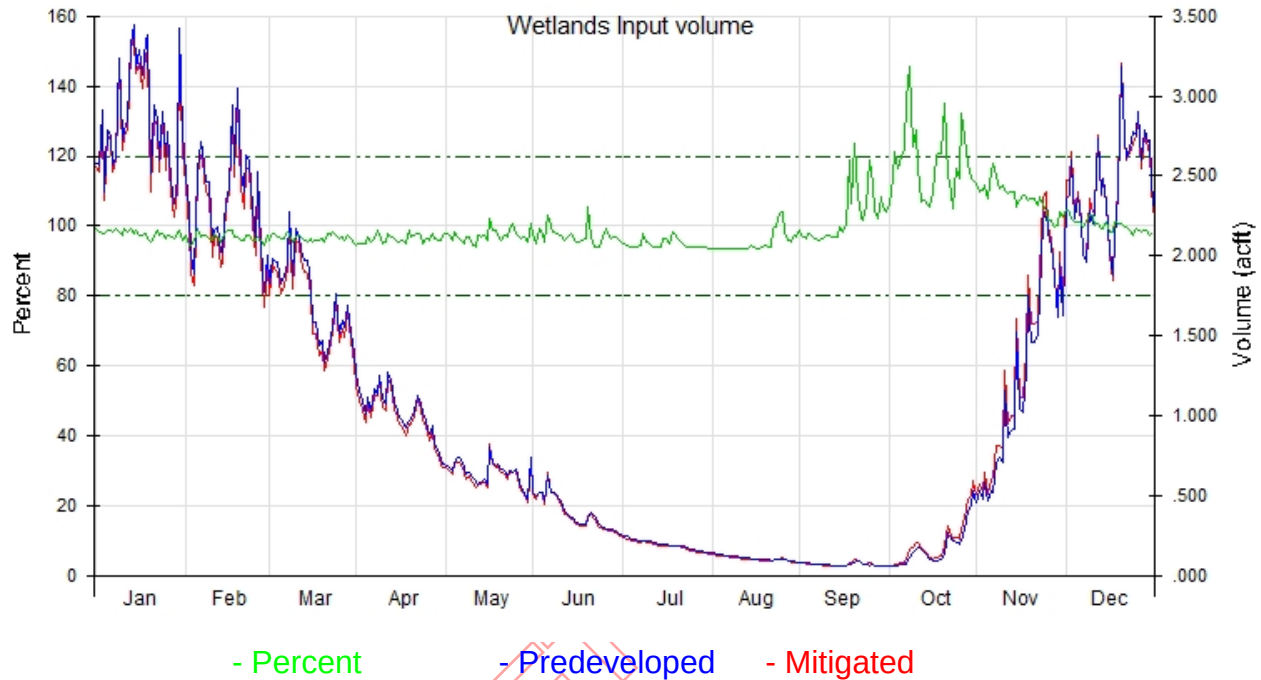
Adjusted for 15 min: 0 cfs.

Off-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

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Wetland Input Volumes



Wetlands Input Volume for POC 2

Average Annual Volume (acft)

Series 1: 502 POC 2 Predeveloped flow

Series 2: 802 POC 2 Mitigated flow

Month	Series 1	Series 2	Percent	Pass/Fail
Jan	88.1071	86.2552	97.9	Pass
Feb	67.7631	65.5827	96.8	Pass
Mar	54.5738	52.7595	96.7	Pass
Apr	31.2606	30.1183	96.3	Pass
May	20.0884	19.5539	97.3	Pass
Jun	11.9694	11.6579	97.4	Pass
Jul	6.1646	5.8536	95.0	Pass
Aug	3.4479	3.2776	95.1	Pass
Sep	2.1180	2.1724	102.6	Pass
Oct	5.1739	6.0632	117.2	Pass
Nov	36.5533	38.9519	106.6	Pass
Dec	75.3808	75.5580	100.2	Pass

Day	Predevel	Mitigated	Percent	Pass/Fail
Jan1	2.5793	2.5565	99.1	Pass
2	2.5646	2.5252	98.5	Pass
3	2.9150	2.8563	98.0	Pass
4	2.3967	2.3484	98.0	Pass
5	2.7856	2.7549	98.9	Pass
6	2.7557	2.7197	98.7	Pass
7	2.5696	2.5225	98.2	Pass
8	2.6180	2.5993	99.3	Pass
9	3.2331	3.1794	98.3	Pass
10	2.7283	2.6569	97.4	Pass
11	2.7861	2.7593	99.0	Pass
12	2.8470	2.7915	98.1	Pass
13	3.3301	3.2979	99.0	Pass
14	3.4471	3.3716	97.8	Pass

15	3.1705	3.1374	99.0	Pass
16	3.2887	3.2049	97.5	Pass
17	3.1290	3.0509	97.5	Pass
18	3.3528	3.2720	97.6	Pass
19	3.3855	3.2659	96.5	Pass
20	2.5173	2.4027	95.4	Pass
21	2.9450	2.8557	97.0	Pass
22	2.8462	2.8104	98.7	Pass
23	2.5991	2.5273	97.2	Pass
24	2.8993	2.8397	97.9	Pass
25	2.6296	2.5345	96.4	Pass
26	2.7745	2.6956	97.2	Pass
27	2.4779	2.4057	97.1	Pass
28	2.3261	2.2399	96.3	Pass
29	2.4838	2.4241	97.6	Pass
30	3.4209	3.3861	99.0	Pass
31	2.7736	2.6639	96.0	Pass
Feb1	2.5097	2.4383	97.2	Pass
2	2.2840	2.1580	94.5	Pass
3	2.0122	1.8999	94.4	Pass
4	1.8941	1.8133	95.7	Pass
5	2.5386	2.5200	99.3	Pass
6	2.7118	2.6320	97.1	Pass
7	2.6696	2.5946	97.2	Pass
8	2.4657	2.3991	97.3	Pass
9	2.4633	2.3744	96.4	Pass
10	2.0823	1.9958	95.8	Pass
11	2.1614	2.1168	97.9	Pass
12	2.1763	2.1064	96.8	Pass
13	2.0247	1.9338	95.5	Pass
14	2.0198	1.9598	97.0	Pass
15	2.3459	2.3028	98.2	Pass
16	2.4245	2.3986	98.9	Pass
17	2.9396	2.8981	98.6	Pass
18	2.5781	2.4973	96.9	Pass
19	3.0501	2.9612	97.1	Pass
20	2.5352	2.4344	96.0	Pass
21	2.4002	2.3006	95.8	Pass
22	2.6296	2.5563	97.2	Pass
23	2.6024	2.5340	97.4	Pass
24	2.3080	2.2110	95.8	Pass
25	2.0925	2.0052	95.8	Pass
26	2.5268	2.4460	96.8	Pass
27	2.0674	1.9826	95.9	Pass
28	1.7764	1.6808	94.6	Pass
29	2.0006	1.9457	97.3	Pass
Mar1	1.8294	1.7544	95.9	Pass
2	1.9800	1.9402	98.0	Pass
3	1.9648	1.9115	97.3	Pass
4	1.9616	1.9028	97.0	Pass
5	1.8222	1.7598	96.6	Pass
6	1.8831	1.8138	96.3	Pass
7	1.9526	1.9222	98.4	Pass
8	2.2719	2.2173	97.6	Pass
9	1.8771	1.7944	95.6	Pass
10	2.1657	2.0950	96.7	Pass
11	2.1339	2.0786	97.4	Pass
12	2.0382	1.9717	96.7	Pass

13	1.9770	1.8968	95.9	Pass
14	1.9740	1.8869	95.6	Pass
15	1.8197	1.7565	96.5	Pass
16	1.5885	1.5155	95.4	Pass
17	1.5819	1.5175	95.9	Pass
18	1.4444	1.3822	95.7	Pass
19	1.4660	1.4095	96.2	Pass
20	1.3383	1.2783	95.5	Pass
21	1.3932	1.3600	97.6	Pass
22	1.4990	1.4612	97.5	Pass
23	1.5580	1.5284	98.1	Pass
24	1.7656	1.7198	97.4	Pass
25	1.5147	1.4605	96.4	Pass
26	1.5973	1.5456	96.8	Pass
27	1.5554	1.4897	95.8	Pass
28	1.6943	1.6467	97.2	Pass
29	1.5220	1.4682	96.5	Pass
30	1.4028	1.3294	94.8	Pass
31	1.2608	1.1915	94.5	Pass
Apr1	1.1600	1.0988	94.7	Pass
2	1.0985	1.0418	94.8	Pass
3	1.0121	0.9632	95.2	Pass
4	1.1150	1.0816	97.0	Pass
5	1.0337	0.9855	95.3	Pass
6	1.1634	1.1237	96.6	Pass
7	1.1391	1.1266	98.9	Pass
8	1.2479	1.2195	97.7	Pass
9	1.1070	1.0536	95.2	Pass
10	1.0755	1.0280	95.6	Pass
11	1.2714	1.2460	98.0	Pass
12	1.2343	1.1940	96.7	Pass
13	1.0844	1.0438	96.3	Pass
14	1.0320	0.9865	95.6	Pass
15	0.9888	0.9456	95.6	Pass
16	0.9654	0.9280	96.1	Pass
17	0.9242	0.8770	94.9	Pass
18	0.9653	0.9540	98.8	Pass
19	0.9771	0.9461	96.8	Pass
20	1.0328	1.0032	97.1	Pass
21	1.1316	1.1081	97.9	Pass
22	1.0770	1.0478	97.3	Pass
23	1.0238	0.9716	94.9	Pass
24	0.9703	0.9336	96.2	Pass
25	0.8838	0.8461	95.7	Pass
26	0.9378	0.9184	97.9	Pass
27	0.8220	0.7918	96.3	Pass
28	0.7931	0.7609	95.9	Pass
29	0.7330	0.7026	95.8	Pass
30	0.6996	0.6822	97.5	Pass
May1	0.6911	0.6754	97.7	Pass
2	0.6765	0.6589	97.4	Pass
3	0.6595	0.6338	96.1	Pass
4	0.7058	0.6948	98.4	Pass
5	0.7383	0.7139	96.7	Pass
6	0.7261	0.6957	95.8	Pass
7	0.6763	0.6430	95.1	Pass
8	0.6305	0.6093	96.6	Pass
9	0.6431	0.6244	97.1	Pass

10	0.6185	0.5846	94.5	Pass
11	0.5897	0.5532	93.8	Pass
12	0.5753	0.5588	97.1	Pass
13	0.5857	0.5681	97.0	Pass
14	0.6007	0.5850	97.4	Pass
15	0.5756	0.5507	95.7	Pass
16	0.8044	0.8199	101.9	Pass
17	0.7049	0.6967	98.8	Pass
18	0.6847	0.6767	98.8	Pass
19	0.7030	0.6832	97.2	Pass
20	0.6722	0.6454	96.0	Pass
21	0.6581	0.6406	97.4	Pass
22	0.6237	0.6030	96.7	Pass
23	0.6520	0.6447	98.9	Pass
24	0.6427	0.6462	100.6	Pass
25	0.6677	0.6531	97.8	Pass
26	0.5930	0.5734	96.7	Pass
27	0.5543	0.5345	96.4	Pass
28	0.5232	0.5075	97.0	Pass
29	0.4751	0.4533	95.4	Pass
30	0.7371	0.7437	100.9	Pass
31	0.5187	0.5078	97.9	Pass
Jun1	0.5035	0.4789	95.1	Pass
2	0.5256	0.5209	99.1	Pass
3	0.5199	0.5082	97.7	Pass
4	0.4725	0.4501	95.3	Pass
5	0.6302	0.6483	102.9	Pass
6	0.5201	0.5203	100.0	Pass
7	0.5254	0.5173	98.5	Pass
8	0.5056	0.4948	97.9	Pass
9	0.4792	0.4653	97.1	Pass
10	0.4437	0.4293	96.8	Pass
11	0.4048	0.3881	95.9	Pass
12	0.3809	0.3698	97.1	Pass
13	0.3654	0.3567	97.6	Pass
14	0.3511	0.3383	96.3	Pass
15	0.3369	0.3210	95.3	Pass
16	0.3231	0.3084	95.4	Pass
17	0.3262	0.3135	96.1	Pass
18	0.3248	0.3135	96.5	Pass
19	0.3524	0.3708	105.2	Pass
20	0.3914	0.3798	97.1	Pass
21	0.3783	0.3553	93.9	Pass
22	0.3479	0.3266	93.9	Pass
23	0.3200	0.3015	94.2	Pass
24	0.3027	0.2927	96.7	Pass
25	0.2916	0.2889	99.1	Pass
26	0.2905	0.2838	97.7	Pass
27	0.2859	0.2757	96.4	Pass
28	0.2802	0.2718	97.0	Pass
29	0.2704	0.2604	96.3	Pass
30	0.2625	0.2521	96.0	Pass
Jul1	0.2532	0.2403	94.9	Pass
2	0.2452	0.2319	94.6	Pass
3	0.2382	0.2245	94.2	Pass
4	0.2324	0.2187	94.1	Pass
5	0.2274	0.2137	94.0	Pass
6	0.2229	0.2093	93.9	Pass

7	0.2195	0.2079	94.7	Pass
8	0.2216	0.2172	98.0	Pass
9	0.2211	0.2112	95.5	Pass
10	0.2169	0.2056	94.7	Pass
11	0.2111	0.1989	94.2	Pass
12	0.2055	0.1931	94.0	Pass
13	0.2003	0.1881	93.9	Pass
14	0.1959	0.1844	94.1	Pass
15	0.1955	0.1888	96.6	Pass
16	0.1946	0.1871	96.1	Pass
17	0.1911	0.1814	95.0	Pass
18	0.1902	0.1869	98.3	Pass
19	0.1895	0.1856	97.9	Pass
20	0.1917	0.1851	96.6	Pass
21	0.1889	0.1800	95.3	Pass
22	0.1820	0.1717	94.3	Pass
23	0.1746	0.1641	94.0	Pass
24	0.1683	0.1580	93.9	Pass
25	0.1632	0.1534	94.0	Pass
26	0.1589	0.1491	93.8	Pass
27	0.1551	0.1455	93.8	Pass
28	0.1520	0.1428	94.0	Pass
29	0.1492	0.1401	93.9	Pass
30	0.1462	0.1370	93.7	Pass
31	0.1431	0.1340	93.7	Pass
Aug1	0.1401	0.1312	93.6	Pass
2	0.1373	0.1286	93.6	Pass
3	0.1345	0.1259	93.6	Pass
4	0.1318	0.1233	93.6	Pass
5	0.1291	0.1208	93.6	Pass
6	0.1271	0.1190	93.7	Pass
7	0.1252	0.1173	93.6	Pass
8	0.1227	0.1147	93.5	Pass
9	0.1199	0.1121	93.5	Pass
10	0.1173	0.1096	93.5	Pass
11	0.1147	0.1072	93.5	Pass
12	0.1123	0.1050	93.5	Pass
13	0.1099	0.1027	93.5	Pass
14	0.1081	0.1020	94.3	Pass
15	0.1070	0.1007	94.1	Pass
16	0.1047	0.0981	93.7	Pass
17	0.1021	0.0956	93.6	Pass
18	0.1000	0.0940	94.0	Pass
19	0.0999	0.0943	94.4	Pass
20	0.0979	0.0919	93.9	Pass
21	0.0954	0.0895	93.8	Pass
22	0.0957	0.0951	99.4	Pass
23	0.0980	0.0979	99.9	Pass
24	0.1022	0.1059	103.6	Pass
25	0.1071	0.1113	103.9	Pass
26	0.1035	0.1018	98.3	Pass
27	0.0971	0.0933	96.1	Pass
28	0.0913	0.0873	95.6	Pass
29	0.0880	0.0855	97.2	Pass
30	0.0848	0.0821	96.7	Pass
31	0.0830	0.0819	98.7	Pass
Sep1	0.0813	0.0786	96.7	Pass
2	0.0787	0.0757	96.2	Pass

3	0.0772	0.0756	98.0	Pass
4	0.0758	0.0737	97.2	Pass
5	0.0737	0.0710	96.4	Pass
6	0.0715	0.0687	96.1	Pass
7	0.0696	0.0668	96.0	Pass
8	0.0682	0.0657	96.3	Pass
9	0.0674	0.0655	97.2	Pass
10	0.0668	0.0650	97.4	Pass
11	0.0653	0.0631	96.6	Pass
12	0.0639	0.0618	96.8	Pass
13	0.0628	0.0609	97.0	Pass
14	0.0638	0.0635	99.5	Pass
15	0.0639	0.0628	98.3	Pass
16	0.0628	0.0631	100.4	Pass
17	0.0723	0.0861	119.0	Pass
18	0.0769	0.0818	106.5	Pass
19	0.0833	0.1030	123.6	Fail
20	0.0890	0.0966	108.6	Pass
21	0.0820	0.0841	102.6	Pass
22	0.0742	0.0755	101.8	Pass
23	0.0682	0.0722	105.9	Pass
24	0.0664	0.0788	118.8	Pass
25	0.0669	0.0751	112.3	Pass
26	0.0635	0.0663	104.4	Pass
27	0.0599	0.0611	102.0	Pass
28	0.0598	0.0647	108.3	Pass
29	0.0600	0.0634	105.6	Pass
30	0.0593	0.0616	103.9	Pass
Oct1	0.0579	0.0613	105.8	Pass
2	0.0568	0.0646	113.7	Pass
3	0.0571	0.0692	121.3	Fail
4	0.0650	0.0757	116.5	Pass
5	0.0673	0.0805	119.7	Pass
6	0.0674	0.0825	122.4	Fail
7	0.0737	0.1005	136.4	Fail
8	0.1126	0.1637	145.4	Fail
9	0.1410	0.1727	122.5	Fail
10	0.1627	0.2076	127.6	Fail
11	0.1735	0.2026	116.7	Pass
12	0.1642	0.1756	106.9	Pass
13	0.1416	0.1523	107.5	Pass
14	0.1240	0.1313	105.9	Pass
15	0.1059	0.1114	105.2	Pass
16	0.0933	0.1025	109.9	Pass
17	0.0946	0.1132	119.6	Pass
18	0.0943	0.1139	120.9	Fail
19	0.1037	0.1253	120.8	Fail
20	0.1366	0.1845	135.1	Fail
21	0.2699	0.3074	113.9	Pass
22	0.2505	0.2835	113.2	Pass
23	0.2185	0.2299	105.2	Pass
24	0.2090	0.2432	116.3	Pass
25	0.1982	0.2255	113.8	Pass
26	0.2197	0.2904	132.2	Fail
27	0.2870	0.3603	125.5	Fail
28	0.4046	0.4774	118.0	Pass
29	0.4373	0.4975	113.8	Pass
30	0.5266	0.5953	113.0	Pass

31	0.4557	0.5117	112.3	Pass
Nov1	0.5267	0.5770	109.5	Pass
2	0.4773	0.5256	110.1	Pass
3	0.5804	0.6489	111.8	Pass
4	0.4724	0.5083	107.6	Pass
5	0.5269	0.6073	115.3	Pass
6	0.5210	0.6146	118.0	Pass
7	0.7138	0.8174	114.5	Pass
8	0.7354	0.8158	110.9	Pass
9	0.7085	0.7901	111.5	Pass
10	1.1620	1.2811	110.2	Pass
11	0.8673	0.9475	109.2	Pass
12	0.9077	0.9964	109.8	Pass
13	0.9169	1.0048	109.6	Pass
14	1.5256	1.6119	105.7	Pass
15	1.0386	1.1174	107.6	Pass
16	1.0216	1.1135	109.0	Pass
17	1.2870	1.3964	108.5	Pass
18	1.7479	1.8738	107.2	Pass
19	1.4619	1.5738	107.7	Pass
20	1.4603	1.5754	107.9	Pass
21	1.5120	1.6004	105.8	Pass
22	1.7410	1.8860	108.3	Pass
23	2.2277	2.3555	105.7	Pass
24	2.2993	2.3997	104.4	Pass
25	2.1463	2.1817	101.6	Pass
26	2.0705	2.1089	101.9	Pass
27	1.8711	1.8677	99.8	Pass
28	1.6149	1.6169	100.1	Pass
29	1.9486	2.0245	103.9	Pass
30	1.6322	1.6736	102.5	Pass
Dec1	2.3584	2.4697	104.7	Pass
2	2.3748	2.4699	104.0	Pass
3	2.6041	2.6533	101.9	Pass
4	2.2293	2.2548	101.1	Pass
5	2.3714	2.4001	101.2	Pass
6	2.2114	2.2300	100.8	Pass
7	2.0092	2.0026	99.7	Pass
8	1.9650	1.9862	101.1	Pass
9	2.2867	2.3551	103.0	Pass
10	2.2043	2.2712	103.0	Pass
11	2.2988	2.3082	100.4	Pass
12	2.7380	2.7560	100.7	Pass
13	2.3935	2.3748	99.2	Pass
14	2.4854	2.4618	99.1	Pass
15	2.3287	2.3528	101.0	Pass
16	2.0340	2.0029	98.5	Pass
17	1.8811	1.8494	98.3	Pass
18	2.1098	2.1309	101.0	Pass
19	2.3928	2.4095	100.7	Pass
20	3.1792	3.2038	100.8	Pass
21	2.7407	2.7331	99.7	Pass
22	2.6073	2.6039	99.9	Pass
23	2.6705	2.6377	98.8	Pass
24	2.7806	2.7077	97.4	Pass
25	2.7595	2.7446	99.5	Pass
26	2.9001	2.8695	98.9	Pass
27	2.5971	2.5490	98.1	Pass

28	2.7915	2.7619	98.9	Pass
29	2.7185	2.6756	98.4	Pass
30	2.7286	2.6564	97.4	Pass
31	2.3015	2.2600	98.2	Pass

DRAFT

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

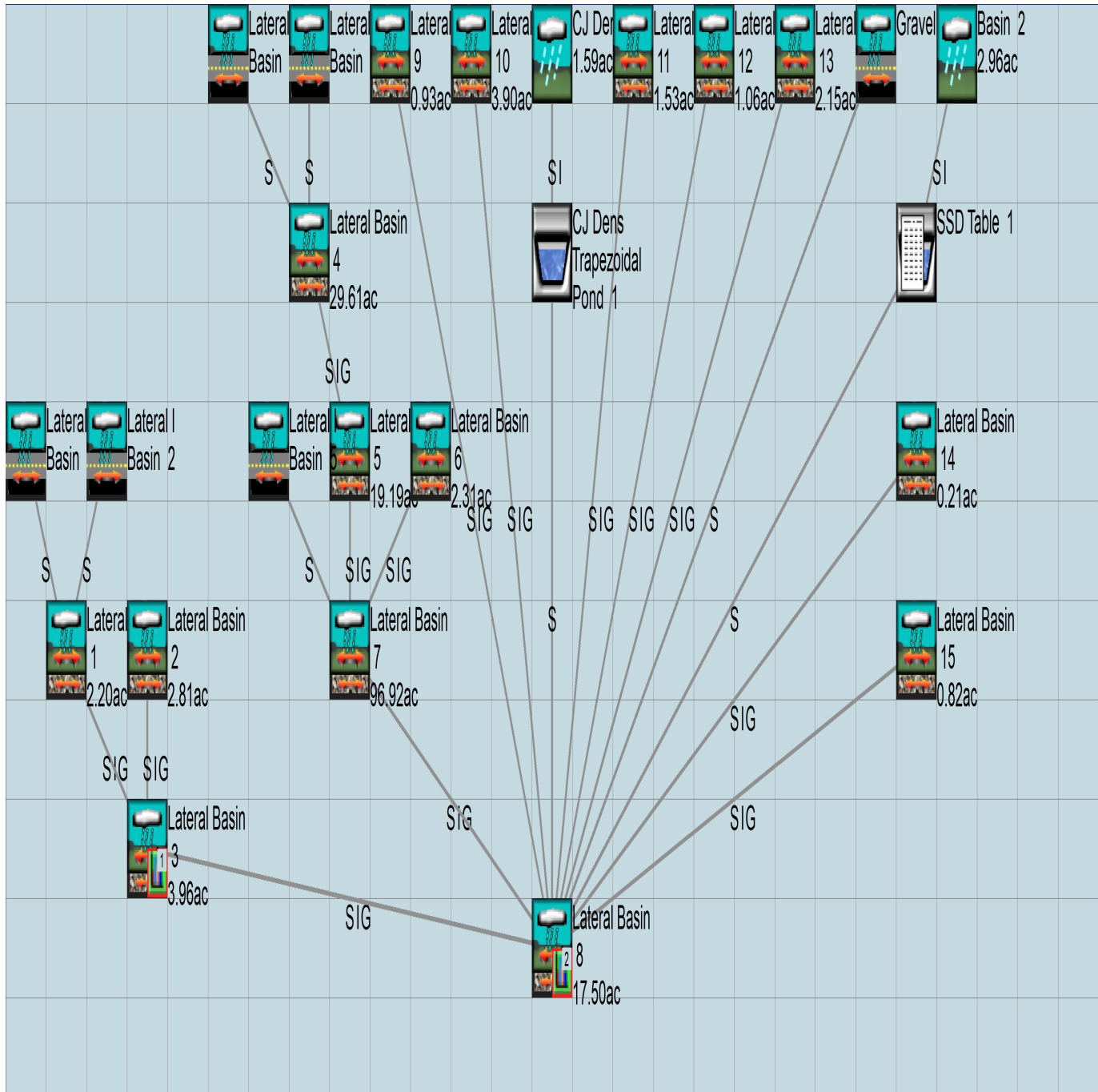
IMPLND Changes

No IMPLND changes have been made.

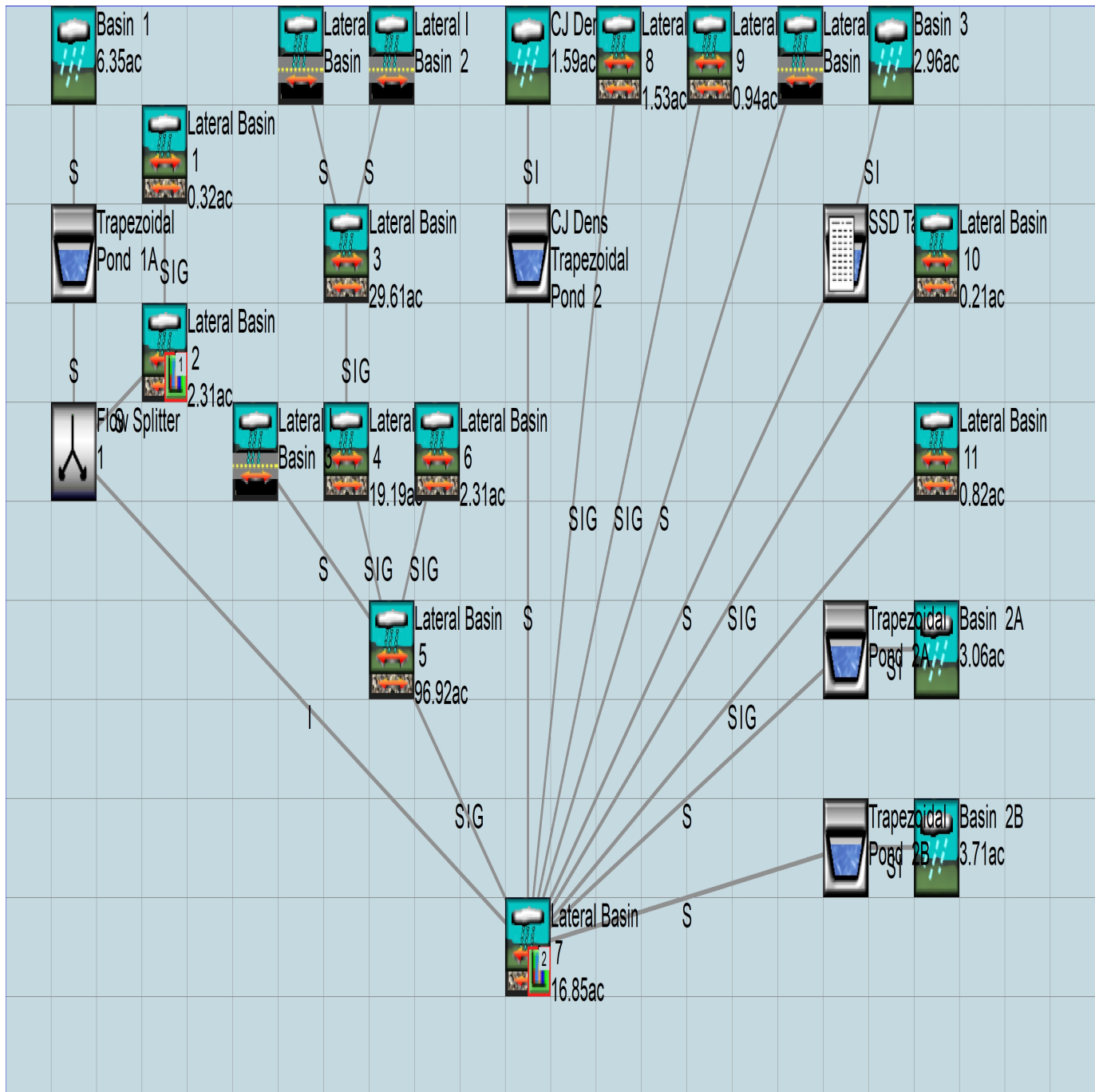
DRAFT

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

RUN

GLOBAL

```

WWM4 model simulation
START      1948 10 01      END      2008 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     9095 Wetland A.wdm
MESSU    25     Pre9095 Wetland A.MES
          27     Pre9095 Wetland A.L61
          28     Pre9095 Wetland A.L62
          30     POC9095 Wetland A1.dat
          31     POC9095 Wetland A2.dat

```

END FILES

OPN SEQUENCE

INGRP INDELT 00:15

```

IMPLND    16
IMPLND    17
PERLND    48
IMPLND    21
IMPLND    22
IMPLND    23
PERLND    55
PERLND    58
PERLND    59
PERLND    31
IMPLND     1
IMPLND     4
IMPLND     5
IMPLND     8
IMPLND    11
IMPLND    14
PERLND    60
PERLND    61
PERLND    62
IMPLND    24
PERLND    63
PERLND    64
RCHRES     1
RCHRES     2
PERLND    47
PERLND    53
PERLND    54
PERLND    49
PERLND    56
PERLND    57
COPY      501
COPY       1
COPY      502
COPY       2
DISPLY     1
DISPLY     2

```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INF01

```

# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      Lateral Basin  3      MAX      1      2      30      9
2      Lateral Basin  8      MAX      1      2      31      9

```

END DISPLY-INF01

END DISPLY

COPY

```

TIMESERIES
# - # NPT NMN ***
1 1 1
501 1 1
502 1 1
2 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 ***
48 SG4, Forest, Steep 1 1 1 1 27 0
55 SG4, Forest, Steep 1 1 1 1 27 0
58 SG4, Forest, Steep 1 1 1 1 27 0
59 SG4, Forest, Mod 1 1 1 1 27 0
31 SG4, Field, Flat 1 1 1 1 27 0
60 SG4, Lawn, Flat 1 1 1 1 27 0
61 SG4, Forest, Steep 1 1 1 1 27 0
62 SG4, Field, Flat 1 1 1 1 27 0
63 SG4, Lawn, Steep 1 1 1 1 27 0
64 SG4, Field, Flat 1 1 1 1 27 0
47 SG4, Field, Flat 1 1 1 1 27 0
53 SG4, Field, Flat 1 1 1 1 27 0
54 SG4, Forest, Steep 1 1 1 1 27 0
49 SG4, Forest, Mod 1 1 1 1 27 0
56 SG4, Field, Flat 1 1 1 1 27 0
57 SG4, Forest, Mod 1 1 1 1 27 0
END GEN-INFO
*** Section PWATER***

```

```

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
48 0 0 1 0 0 0 0 0 0 0 0 0
55 0 0 1 0 0 0 0 0 0 0 0 0
58 0 0 1 0 0 0 0 0 0 0 0 0
59 0 0 1 0 0 0 0 0 0 0 0 0
31 0 0 1 0 0 0 0 0 0 0 0 0
60 0 0 1 0 0 0 0 0 0 0 0 0
61 0 0 1 0 0 0 0 0 0 0 0 0
62 0 0 1 0 0 0 0 0 0 0 0 0
63 0 0 1 0 0 0 0 0 0 0 0 0
64 0 0 1 0 0 0 0 0 0 0 0 0
47 0 0 1 0 0 0 0 0 0 0 0 0
53 0 0 1 0 0 0 0 0 0 0 0 0
54 0 0 1 0 0 0 0 0 0 0 0 0
49 0 0 1 0 0 0 0 0 0 0 0 0
56 0 0 1 0 0 0 0 0 0 0 0 0
57 0 0 1 0 0 0 0 0 0 0 0 0
END ACTIVITY

```

```

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
48 0 0 4 0 0 0 0 0 0 0 0 0 1 9
55 0 0 4 0 0 0 0 0 0 0 0 0 1 9
58 0 0 4 0 0 0 0 0 0 0 0 0 1 9
59 0 0 4 0 0 0 0 0 0 0 0 0 1 9
31 0 0 4 0 0 0 0 0 0 0 0 0 1 9
60 0 0 4 0 0 0 0 0 0 0 0 0 1 9

```

61	0	0	4	0	0	0	0	0	0	0	0	0	1	9
62	0	0	4	0	0	0	0	0	0	0	0	0	1	9
63	0	0	4	0	0	0	0	0	0	0	0	0	1	9
64	0	0	4	0	0	0	0	0	0	0	0	0	1	9
47	0	0	4	0	0	0	0	0	0	0	0	0	1	9
53	0	0	4	0	0	0	0	0	0	0	0	0	1	9
54	0	0	4	0	0	0	0	0	0	0	0	0	1	9
49	0	0	4	0	0	0	0	0	0	0	0	0	1	9
56	0	0	4	0	0	0	0	0	0	0	0	0	1	9
57	0	0	4	0	0	0	0	0	0	0	0	0	1	9

END PRINT-INFO

PWAT-PARM1

<PLS > PWATER variable monthly parameter value flags ***														
#	-	#	CSNO	RTOP	UZFG	VCS	VUZ	VNN	VIFW	VIRC	VLE	INFC	HWT	***
48			0	0	0	0	0	0	0	0	0	0	0	
55			0	0	0	0	0	0	0	0	0	0	0	
58			0	0	0	0	0	0	0	0	0	0	0	
59			0	0	0	0	0	0	0	0	0	0	0	
31			0	0	0	0	0	0	0	0	0	0	0	
60			0	0	0	0	0	0	0	0	0	0	0	
61			0	0	0	0	0	0	0	0	0	0	0	
62			0	0	0	0	0	0	0	0	0	0	0	
63			0	0	0	0	0	0	0	0	0	0	0	
64			0	0	0	0	0	0	0	0	0	0	0	
47			0	0	0	0	0	0	0	0	0	0	0	
53			0	0	0	0	0	0	0	0	0	0	0	
54			0	0	0	0	0	0	0	0	0	0	0	
49			0	0	0	0	0	0	0	0	0	0	0	
56			0	0	0	0	0	0	0	0	0	0	0	
57			0	0	0	0	0	0	0	0	0	0	0	

END PWAT-PARM1

PWAT-PARM2

<PLS > PWATER input info: Part 2 ***									
#	-	#	***FOREST	LZSN	INFILT	LSUR	SLSUR	KVARY	AGWRC
48			0	6	0.04	400	0.15	0	0.96
55			0	6	0.04	400	0.15	0	0.96
58			0	6	0.04	400	0.15	0	0.96
59			0	6	0.04	400	0.1	0	0.96
31			0	6	0.03	400	0.05	0	0.96
60			0	6	0.02	400	0.05	0	0.96
61			0	6	0.04	400	0.15	0	0.96
62			0	6	0.03	400	0.05	0	0.96
63			0	6	0.02	400	0.15	0	0.96
64			0	6	0.03	400	0.05	0	0.96
47			0	6	0.03	400	0.05	0	0.96
53			0	6	0.03	400	0.05	0	0.96
54			0	6	0.04	400	0.15	0	0.96
49			0	6	0.04	400	0.1	0	0.96
56			0	6	0.03	400	0.05	0	0.96
57			0	6	0.04	400	0.1	0	0.96

END PWAT-PARM2

PWAT-PARM3

<PLS > PWATER input info: Part 3 ***									
#	-	#	***PETMAX	PETMIN	INFEXP	INFILD	DEEPPFR	BASETP	AGWETP
48			0	0	3	2	0	0	0
55			0	0	3	2	0	0	0
58			0	0	3	2	0	0	0
59			0	0	3	2	0	0	0
31			0	0	3	2	0	0	0
60			0	0	3	2	0	0	0
61			0	0	3	2	0	0	0
62			0	0	3	2	0	0	0
63			0	0	3	2	0	0	0
64			0	0	3	2	0	0	0
47			0	0	3	2	0	0	0
53			0	0	3	2	0	0	0
54			0	0	3	2	0	0	0

49	0	0	3	2	0	0	0
56	0	0	3	2	0	0	0
57	0	0	3	2	0	0	0

END PWAT-PARM3

PWAT-PARM4

<PLS > PWATER input info: Part 4 ***

#	-	#	CEPSC	UZZN	NSUR	INTFW	IRC	LZETP	***
48			0.2	0.4	0.35	2	0.4	0.7	
55			0.2	0.4	0.35	2	0.4	0.7	
58			0.2	0.4	0.35	2	0.4	0.7	
59			0.2	0.4	0.35	2	0.4	0.7	
31			0.15	0.4	0.3	2	0.4	0.4	
60			0.1	0.2	0.25	2	0.4	0.25	
61			0.2	0.4	0.35	2	0.4	0.7	
62			0.15	0.4	0.3	2	0.4	0.4	
63			0.1	0.2	0.25	2	0.4	0.25	
64			0.15	0.4	0.3	2	0.4	0.4	
47			0.15	0.4	0.3	2	0.4	0.4	
53			0.15	0.4	0.3	2	0.4	0.4	
54			0.2	0.4	0.35	2	0.4	0.7	
49			0.2	0.4	0.35	2	0.4	0.7	
56			0.15	0.4	0.3	2	0.4	0.4	
57			0.2	0.4	0.35	2	0.4	0.7	

END PWAT-PARM4

PWAT-STATE1

<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***

#	-	#	***	CEPS	SURS	UZZS	IFWS	LZS	AGWS	GWVS
48				0	0	0	0	2.5	1	0
55				0	0	0	0	2.5	1	0
58				0	0	0	0	2.5	1	0
59				0	0	0	0	2.5	1	0
31				0	0	0	0	2.5	1	0
60				0	0	0	0	2.5	1	0
61				0	0	0	0	2.5	1	0
62				0	0	0	0	2.5	1	0
63				0	0	0	0	2.5	1	0
64				0	0	0	0	2.5	1	0
47				0	0	0	0	2.5	1	0
53				0	0	0	0	2.5	1	0
54				0	0	0	0	2.5	1	0
49				0	0	0	0	2.5	1	0
56				0	0	0	0	2.5	1	0
57				0	0	0	0	2.5	1	0

END PWAT-STATE1

END PERLND

IMPLND

GEN-INFO

<PLS ><-----Name-----> Unit-systems Printer ***

#	-	#	User	t-series	Engl	Metr	***
			in	out			***
16			1	1	1	27	0
17			1	1	1	27	0
21			1	1	1	27	0
22			1	1	1	27	0
23			1	1	1	27	0
1			1	1	1	27	0
4			1	1	1	27	0
5			1	1	1	27	0
8			1	1	1	27	0
11			1	1	1	27	0
14			1	1	1	27	0
24			1	1	1	27	0

END GEN-INFO

*** Section IWATER***

ACTIVITY

```

<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
16      0      0      1      0      0      0
17      0      0      1      0      0      0
21      0      0      1      0      0      0
22      0      0      1      0      0      0
23      0      0      1      0      0      0
1       0      0      1      0      0      0
4       0      0      1      0      0      0
5       0      0      1      0      0      0
8       0      0      1      0      0      0
11      0      0      1      0      0      0
14      0      0      1      0      0      0
24      0      0      1      0      0      0
END ACTIVITY

```

```

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
16      0      0      4      0      0      0      1      9
17      0      0      4      0      0      0      1      9
21      0      0      4      0      0      0      1      9
22      0      0      4      0      0      0      1      9
23      0      0      4      0      0      0      1      9
1       0      0      4      0      0      0      1      9
4       0      0      4      0      0      0      1      9
5       0      0      4      0      0      0      1      9
8       0      0      4      0      0      0      1      9
11      0      0      4      0      0      0      1      9
14      0      0      4      0      0      0      1      9
24      0      0      4      0      0      0      1      9
END PRINT-INFO

```

```

IWAT-PARM1
<PLS > I WATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
16      0      0      0      0      0
17      0      0      0      0      0
21      0      0      0      0      0
22      0      0      0      0      0
23      0      0      0      0      0
1       0      0      0      0      0
4       0      0      0      0      0
5       0      0      0      0      0
8       0      0      0      0      0
11      0      0      0      0      0
14      0      0      0      0      0
24      0      0      0      0      0
END IWAT-PARM1

```

```

IWAT-PARM2
<PLS > I WATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC
16      400      0.01      0.1      0.1
17      400      0.01      0.1      0.1
21      400      0.01      0.1      0.1
22      400      0.01      0.1      0.1
23      400      0.1      0.1      0.05
1       400      0.01      0.1      0.1
4       400      0.01      0.1      0.1
5       400      0.01      0.1      0.1
8       400      0.01      0.1      0.1
11      400      0.01      0.1      0.1
14      400      0.01      0.1      0.1
24      400      0.01      0.1      0.1
END IWAT-PARM2

```

```

IWAT-PARM3
<PLS > I WATER input info: Part 3 ***
# - # *** PETMAX PETMIN

```



```

16      0      0
17      0      0
21      0      0
22      0      0
23      0      0
1       0      0
4       0      0
5       0      0
8       0      0
11      0      0
14      0      0
24      0      0
END IWAT-PARM3

```

```

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS      SURS
16      0      0
17      0      0
21      0      0
22      0      0
23      0      0
1       0      0
4       0      0
5       0      0
8       0      0
11      0      0
14      0      0
24      0      0
END IWAT-STATE1

```

END IMPLND

SCHEMATIC

<-Source-> <Name> #	<-Area--> <-factor-->	<-Target-> <Name> #	MBLK Tbl#	*** ***
Lateral I Basin 1***				
IMPLND 16	0.3831	PERLND 47	50	
Lateral Basin 1***				
PERLND 47	0.5559	PERLND 49	30	
PERLND 47	0.5559	PERLND 49	34	
PERLND 47	0.5559	PERLND 49	38	
Lateral Basin 10***				
PERLND 59	0.2228	PERLND 57	30	
PERLND 59	0.2228	PERLND 57	34	
PERLND 59	0.2228	PERLND 57	38	
CJ Dens***				
PERLND 31	0.522	RCHRES 1	2	
PERLND 31	0.522	RCHRES 1	3	
IMPLND 1	0.38	RCHRES 1	5	
IMPLND 4	0.413	RCHRES 1	5	
IMPLND 5	0.096	RCHRES 1	5	
IMPLND 8	0.083	RCHRES 1	5	
IMPLND 11	0.034	RCHRES 1	5	
IMPLND 14	0.057	RCHRES 1	5	
Lateral I Basin 2***				
IMPLND 17	0.0454	PERLND 47	50	
Lateral Basin 2***				
PERLND 48	0.7098	PERLND 49	30	
PERLND 48	0.7098	PERLND 49	34	
PERLND 48	0.7098	PERLND 49	38	
Basin 2***				
PERLND 31	1.119	RCHRES 2	2	
PERLND 31	1.119	RCHRES 2	3	
IMPLND 1	0.992	RCHRES 2	5	
IMPLND 4	0.372	RCHRES 2	5	
IMPLND 5	0.197	RCHRES 2	5	
IMPLND 8	0.283	RCHRES 2	5	
Lateral I Basin 3***				
IMPLND 21	0.0459	PERLND 53	50	

Lateral I Basin 4***
 IMPLND 22 0.0165 PERLND 53 50
 Lateral Basin 4***
 PERLND 53 1.543 PERLND 54 30
 PERLND 53 1.543 PERLND 54 34
 PERLND 53 1.543 PERLND 54 38
 Lateral Basin 5***
 PERLND 54 0.198 PERLND 56 30
 PERLND 54 0.198 PERLND 56 34
 PERLND 54 0.198 PERLND 56 38
 Lateral I Basin 5***
 IMPLND 23 0.0025 PERLND 56 50
 Lateral Basin 6***
 PERLND 55 0.0238 PERLND 56 30
 PERLND 55 0.0238 PERLND 56 34
 PERLND 55 0.0238 PERLND 56 38
 Gravel***
 IMPLND 24 0.0051 PERLND 57 50
 Lateral Basin 7***
 PERLND 56 5.5373 PERLND 57 30
 PERLND 56 5.5373 PERLND 57 34
 PERLND 56 5.5373 PERLND 57 38
 Lateral Basin 9***
 PERLND 58 0.0531 PERLND 57 30
 PERLND 58 0.0531 PERLND 57 34
 PERLND 58 0.0531 PERLND 57 38
 Lateral Basin 11***
 PERLND 60 0.0874 PERLND 57 30
 PERLND 60 0.0874 PERLND 57 34
 PERLND 60 0.0874 PERLND 57 38
 Lateral Basin 12***
 PERLND 61 0.0606 PERLND 57 30
 PERLND 61 0.0606 PERLND 57 34
 PERLND 61 0.0606 PERLND 57 38
 Lateral Basin 13***
 PERLND 62 0.1228 PERLND 57 30
 PERLND 62 0.1228 PERLND 57 34
 PERLND 62 0.1228 PERLND 57 38
 Lateral Basin 14***
 PERLND 63 0.012 PERLND 57 30
 PERLND 63 0.012 PERLND 57 34
 PERLND 63 0.012 PERLND 57 38
 Lateral Basin 15***
 PERLND 64 0.0468 PERLND 57 30
 PERLND 64 0.0468 PERLND 57 34
 PERLND 64 0.0468 PERLND 57 38
 Lateral Basin 3***
 PERLND 49 0.2264 PERLND 57 30
 PERLND 49 0.2264 PERLND 57 34
 PERLND 49 0.2264 PERLND 57 38
 Lateral Basin 3***
 PERLND 49 3.963 COPY 501 12
 Lateral Basin 8***
 PERLND 57 17.503 COPY 502 12
 PERLND 57 17.503 COPY 502 13
 PERLND 57 17.503 COPY 502 14

*****Routing*****

RCHRES 1 .0571 PERLND 57 60
 RCHRES 2 .0571 PERLND 57 60
 END SCHEMATIC

NETWORK

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	#<-factor->	strg	<Name>	#	#
COPY	501	OUTPUT	MEAN	1 1	48.4	DISPLY	1	INPUT
COPY	502	OUTPUT	MEAN	1 1	48.4	DISPLY	2	INPUT

TIMSER 1
 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      CJ Dens Trapezoi-030      1      1      1      1      28      0      1
2      SSD Table 1      1      1      1      1      28      0      1
END GEN-INFO
*** Section RCHRES***

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
1      1      0      0      0      0      0      0      0      0      0
2      1      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      1      9
2      4      0      0      0      0      0      0      0      0      1      9
END PRINT-INFO

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

HYDR-PARM2
# - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><-----> ***
1      1      0.01      0.0      0.0      0.5      0.0
2      2      0.01      0.0      0.0      0.5      0.0
END HYDR-PARM2

HYDR-INIT
RCHRES      Initial conditions for each HYDR section      ***
# - # *** VOL      Initial value of COLIND      Initial value of OUTDGT
      *** ac-ft      for each possible exit      for each possible exit
<-----><-----> <-----><-----><-----><-----> *** <-----><-----><-----><-----><----->
1      0      4.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
2      0      4.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
FTABLE      1
91      4
      Depth      Area      Volume      Outflow1      Velocity      Travel Time***
      (ft)      (acres)      (acre-ft)      (cfs)      (ft/sec)      (Minutes)***
0.000000      0.022779      0.000000      0.000000
0.055556      0.023264      0.001279      0.028883
0.111111      0.023753      0.002585      0.040847
0.166667      0.024248      0.003918      0.050027
0.222222      0.024748      0.005279      0.057766
0.277778      0.025253      0.006668      0.064584
0.333333      0.025763      0.008085      0.070748
0.388889      0.026279      0.009531      0.076417
0.444444      0.026799      0.011005      0.081693
0.500000      0.027324      0.012509      0.086649

```

0.555556	0.027855	0.014042	0.091336
0.611111	0.028391	0.015604	0.095794
0.666667	0.028931	0.017196	0.100053
0.722222	0.029477	0.018819	0.104139
0.777778	0.030028	0.020472	0.108070
0.833333	0.030584	0.022155	0.111863
0.888889	0.031145	0.023870	0.115531
0.944444	0.031712	0.025616	0.119087
1.000000	0.032283	0.027394	0.122540
1.055556	0.032860	0.029203	0.125898
1.111111	0.033441	0.031045	0.129168
1.166667	0.034028	0.032919	0.132358
1.222222	0.034620	0.034826	0.135473
1.277778	0.035216	0.036766	0.138517
1.333333	0.035818	0.038739	0.141497
1.388889	0.036425	0.040746	0.144414
1.444444	0.037038	0.042786	0.147274
1.500000	0.037655	0.044861	0.150080
1.555556	0.038277	0.046970	0.152834
1.611111	0.038905	0.049114	0.155539
1.666667	0.039537	0.051293	0.158198
1.722222	0.040175	0.053508	0.160813
1.777778	0.040818	0.055757	0.163386
1.833333	0.041466	0.058043	0.165919
1.888889	0.042119	0.060365	0.168415
1.944444	0.042777	0.062723	0.170873
2.000000	0.043440	0.065118	0.173297
2.055556	0.044108	0.067550	0.186468
2.111111	0.044782	0.070019	0.208194
2.166667	0.045460	0.072526	0.235130
2.222222	0.046144	0.075070	0.266005
2.277778	0.046833	0.077653	0.300049
2.333333	0.047526	0.080274	0.336716
2.388889	0.048225	0.082934	0.375588
2.444444	0.048929	0.085633	0.416328
2.500000	0.049638	0.088371	0.458652
2.555556	0.050353	0.091148	0.502317
2.611111	0.051072	0.093965	0.547110
2.666667	0.051796	0.096823	0.592841
2.722222	0.052526	0.099721	0.639338
2.777778	0.053261	0.102659	0.686445
2.833333	0.054000	0.105639	0.734018
2.888889	0.054745	0.108659	0.781924
2.944444	0.055495	0.111722	0.830039
3.000000	0.056250	0.114826	0.878245
3.055556	0.057010	0.117972	0.936465
3.111111	0.057775	0.121160	0.996168
3.166667	0.058546	0.124391	1.057317
3.222222	0.059321	0.127665	1.119876
3.277778	0.060102	0.130983	1.183814
3.333333	0.060887	0.134344	1.249100
3.388889	0.061678	0.137748	1.315705
3.444444	0.062474	0.141197	1.753851
3.500000	0.063275	0.144690	1.844582
3.555556	0.064081	0.148228	1.936961
3.611111	0.064892	0.151810	2.030957
3.666667	0.065708	0.155438	2.126544
3.722222	0.066530	0.159111	2.223694
3.777778	0.067356	0.162830	2.322382
3.833333	0.068188	0.166595	2.422583
3.888889	0.069024	0.170407	2.524275
3.944444	0.069866	0.174265	2.627436
4.000000	0.070713	0.178170	2.732044
4.055556	0.071565	0.182122	2.872469
4.111111	0.072422	0.186122	3.125264
4.166667	0.073284	0.190169	3.440530
4.222222	0.074151	0.194264	3.784790
4.277778	0.075024	0.198408	4.123963
4.333333	0.075901	0.202600	4.425520
4.388889	0.076784	0.206842	4.664787

```

4.444444 0.077671 0.211132 4.833535
4.500000 0.078564 0.215472 4.950246
4.555556 0.079462 0.219862 5.096106
4.611111 0.080365 0.224301 5.212280
4.666667 0.081273 0.228791 5.323343
4.722222 0.082186 0.233332 5.429923
4.777778 0.083104 0.237923 5.532527
4.833333 0.084028 0.242566 5.631572
4.888889 0.084956 0.247260 5.727410
4.944444 0.085890 0.252005 5.820336
5.000000 0.086829 0.256803 5.910602

```

END FTABLE 1

FTABLE 2

37 4

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.058000	0.000000	0.000000		
0.170000	0.058000	0.005193	0.044755		
0.330000	0.058000	0.011161	0.062356		
0.500000	0.058000	0.017609	0.076754		
0.670000	0.058000	0.024425	0.088850		
0.830000	0.058000	0.031543	0.098891		
1.000000	0.058000	0.038915	0.108547		
1.170000	0.058000	0.046504	0.117412		
1.330000	0.058000	0.054281	0.125183		
1.500000	0.058000	0.062221	0.132943		
1.670000	0.058000	0.070301	0.140274		
1.830000	0.058000	0.078501	0.146840		
2.000000	0.058000	0.086804	0.153509		
2.170000	0.058000	0.095192	0.159900		
2.330000	0.058000	0.103651	0.165690		
2.500000	0.058000	0.112165	0.171628		
2.670000	0.058000	0.120721	0.177368		
2.830000	0.058000	0.129303	0.182605		
3.000000	0.058000	0.137899	0.188009		
3.170000	0.058000	0.146495	0.193263		
3.330000	0.058000	0.155077	0.198080		
3.500000	0.058000	0.163632	0.203073		
3.670000	0.058000	0.172146	0.207947		
3.830000	0.058000	0.180605	0.236899		
4.000000	0.058000	0.188994	0.347589		
4.170000	0.058000	0.197297	0.495645		
4.330000	0.058000	0.205497	0.654966		
4.500000	0.058000	0.213577	0.836956		
4.670000	0.058000	0.221516	1.025852		
4.830000	0.058000	0.229293	1.225254		
5.000000	0.058000	0.236883	1.471327		
5.170000	0.058000	0.244255	2.581571		
5.330000	0.058000	0.251373	4.323604		
5.500000	0.058000	0.258189	6.122265		
5.670000	0.058000	0.264636	7.256359		
5.830000	0.058000	0.270604	7.946961		
6.000000	0.058000	0.275798	8.581160		

END FTABLE 2

END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap<--Mult-->Tran	<-Target	vols>	<-Grp>	<-Member->	***
<Name>	#	<Name> #	tem strg<-factor->strg	<Name>	#	#	<Name> # #
WDM	2	PREC	ENGL 1.3	PERLND	1	999	EXTNL PREC
WDM	2	PREC	ENGL 1.3	IMPLND	1	999	EXTNL PREC
WDM	1	EVAP	ENGL 0.8	PERLND	1	999	EXTNL PETINP
WDM	1	EVAP	ENGL 0.8	IMPLND	1	999	EXTNL PETINP

END EXT SOURCES

EXT TARGETS

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

COPY 502 OUTPUT MEAN 1 1 48.4 WDM 502 FLOW ENGL REPL
 END EXT TARGETS

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

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

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

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

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

MASS-LINK 14
 PERLND PWATER AGWO 0.083333 COPY INPUT MEAN
 END MASS-LINK 14

MASS-LINK 30
 PERLND PWATER SURO PERLND EXTNL SURLI
 END MASS-LINK 30

MASS-LINK 34
 PERLND PWATER IFWO PERLND EXTNL IFWLI
 END MASS-LINK 34

MASS-LINK 38
 PERLND PWATER AGWO PERLND EXTNL AGWLI
 END MASS-LINK 38

MASS-LINK 50
 IMPLND IWATER SURO PERLND EXTNL SURLI
 END MASS-LINK 50

MASS-LINK 60
 RCHRES ROFLOW 12.00000 PERLND EXTNL SURLI
 END MASS-LINK 60

END MASS-LINK
 END RUN

Mitigated UCI File

RUN

GLOBAL

```

wwHM4 model simulation
START      1948 10 01      END      2008 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      9095 Wetland A.wdm
MESSU    25      Mit9095 Wetland A.MES
          27      Mit9095 Wetland A.L61
          28      Mit9095 Wetland A.L62
          30      POC9095 Wetland A1.dat
          31      POC9095 Wetland A2.dat

```

END FILES

OPN SEQUENCE

INGRP INDELT 00:15

```

PERLND 50
PERLND 34
PERLND 31
IMPLND 1
IMPLND 2
IMPLND 4
IMPLND 14
IMPLND 25
IMPLND 26
IMPLND 27
PERLND 68
IMPLND 5
IMPLND 8
IMPLND 11
PERLND 70
PERLND 71
IMPLND 28
PERLND 72
PERLND 73
PERLND 32
RCHRES 1
RCHRES 2
RCHRES 3
RCHRES 4
RCHRES 5
RCHRES 6
PERLND 65
PERLND 66
PERLND 51
PERLND 67
PERLND 69
COPY    501
COPY    1
COPY    502
COPY    2
DISPLY  1
DISPLY  2

```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INF01

```

# - #<-----Title----->***TRAN PIVL DIG1 FIL1 PYR DIG2 FIL2 YRND
1      Lateral Basin 2      MAX      1      2      30      9
2      Lateral Basin 7      MAX      1      2      31      9

```

END DISPLY-INF01

END DISPLY

COPY

TIMESERIES

#	-	#	NPT	NMN	***
1			1	1	
501			1	1	
502			1	1	
2			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			***
50			SG4, Forest, Steep	1	1	1	1	27 0
34			SG4, Lawn, Flat	1	1	1	1	27 0
31			SG4, Field, Flat	1	1	1	1	27 0
68			SG4, Forest, Steep	1	1	1	1	27 0
70			SG4, Lawn, Flat	1	1	1	1	27 0
71			SG4, Field, Flat	1	1	1	1	27 0
72			SG4, Lawn, Steep	1	1	1	1	27 0
73			SG4, Field, Flat	1	1	1	1	27 0
32			SG4, Field, Mod	1	1	1	1	27 0
65			SG4, Field, Flat	1	1	1	1	27 0
66			SG4, Forest, Steep	1	1	1	1	27 0
51			SG4, Forest, Mod	1	1	1	1	27 0
67			SG4, Field, Flat	1	1	1	1	27 0
69			SG4, Forest, Mod	1	1	1	1	27 0

END GEN-INFO

*** Section PWATER***

ACTIVITY

<PLS >		***** Active Sections *****												***	
#	-	#	ATMP	SNOW	PWAT	SED	PST	PWG	PQAL	MSTL	PEST	NITR	PHOS	TRAC	***
50			0	0	1	0	0	0	0	0	0	0	0	0	0
34			0	0	1	0	0	0	0	0	0	0	0	0	0
31			0	0	1	0	0	0	0	0	0	0	0	0	0
68			0	0	1	0	0	0	0	0	0	0	0	0	0
70			0	0	1	0	0	0	0	0	0	0	0	0	0
71			0	0	1	0	0	0	0	0	0	0	0	0	0
72			0	0	1	0	0	0	0	0	0	0	0	0	0
73			0	0	1	0	0	0	0	0	0	0	0	0	0
32			0	0	1	0	0	0	0	0	0	0	0	0	0
65			0	0	1	0	0	0	0	0	0	0	0	0	0
66			0	0	1	0	0	0	0	0	0	0	0	0	0
51			0	0	1	0	0	0	0	0	0	0	0	0	0
67			0	0	1	0	0	0	0	0	0	0	0	0	0
69			0	0	1	0	0	0	0	0	0	0	0	0	0

END ACTIVITY

PRINT-INFO

<PLS >		***** Print-flags *****												PIVL	PYR	
#	-	#	ATMP	SNOW	PWAT	SED	PST	PWG	PQAL	MSTL	PEST	NITR	PHOS	TRAC	*****	*****
50			0	0	4	0	0	0	0	0	0	0	0	0	1	9
34			0	0	4	0	0	0	0	0	0	0	0	0	1	9
31			0	0	4	0	0	0	0	0	0	0	0	0	1	9
68			0	0	4	0	0	0	0	0	0	0	0	0	1	9
70			0	0	4	0	0	0	0	0	0	0	0	0	1	9
71			0	0	4	0	0	0	0	0	0	0	0	0	1	9
72			0	0	4	0	0	0	0	0	0	0	0	0	1	9
73			0	0	4	0	0	0	0	0	0	0	0	0	1	9
32			0	0	4	0	0	0	0	0	0	0	0	0	1	9

65	0	0	4	0	0	0	0	0	0	0	0	0	1	9
66	0	0	4	0	0	0	0	0	0	0	0	0	1	9
51	0	0	4	0	0	0	0	0	0	0	0	0	1	9
67	0	0	4	0	0	0	0	0	0	0	0	0	1	9
69	0	0	4	0	0	0	0	0	0	0	0	0	1	9

END PRINT-INFO

PWAT-PARM1

<PLS >		PWATER variable monthly parameter value flags ***												
#	-	#	CSNO	RTOP	UZFG	VCS	VUZ	VNN	VIFW	VIRC	VLE	INFC	HWT	***
50			0	0	0	0	0	0	0	0	0	0	0	
34			0	0	0	0	0	0	0	0	0	0	0	
31			0	0	0	0	0	0	0	0	0	0	0	
68			0	0	0	0	0	0	0	0	0	0	0	
70			0	0	0	0	0	0	0	0	0	0	0	
71			0	0	0	0	0	0	0	0	0	0	0	
72			0	0	0	0	0	0	0	0	0	0	0	
73			0	0	0	0	0	0	0	0	0	0	0	
32			0	0	0	0	0	0	0	0	0	0	0	
65			0	0	0	0	0	0	0	0	0	0	0	
66			0	0	0	0	0	0	0	0	0	0	0	
51			0	0	0	0	0	0	0	0	0	0	0	
67			0	0	0	0	0	0	0	0	0	0	0	
69			0	0	0	0	0	0	0	0	0	0	0	

END PWAT-PARM1

PWAT-PARM2

<PLS >		PWATER input info: Part 2 ***							
#	-	#	***FOREST	LZSN	INFILT	LSUR	SLSUR	KVARY	AGWRC
50			0	6	0.04	400	0.15	0	0.96
34			0	6	0.02	400	0.05	0	0.96
31			0	6	0.03	400	0.05	0	0.96
68			0	6	0.04	400	0.15	0	0.96
70			0	6	0.02	400	0.05	0	0.96
71			0	6	0.03	400	0.05	0	0.96
72			0	6	0.02	400	0.15	0	0.96
73			0	6	0.03	400	0.05	0	0.96
32			0	6	0.03	400	0.1	0	0.96
65			0	6	0.03	400	0.05	0	0.96
66			0	6	0.04	400	0.15	0	0.96
51			0	6	0.04	400	0.1	0	0.96
67			0	6	0.03	400	0.05	0	0.96
69			0	6	0.04	400	0.1	0	0.96

END PWAT-PARM2

PWAT-PARM3

<PLS >		PWATER input info: Part 3 ***							
#	-	#	***PETMAX	PETMIN	INFEXP	INFILD	DEEPPFR	BASETP	AGWETP
50			0	0	3	2	0	0	0
34			0	0	3	2	0	0	0
31			0	0	3	2	0	0	0
68			0	0	3	2	0	0	0
70			0	0	3	2	0	0	0
71			0	0	3	2	0	0	0
72			0	0	3	2	0	0	0
73			0	0	3	2	0	0	0
32			0	0	3	2	0	0	0
65			0	0	3	2	0	0	0
66			0	0	3	2	0	0	0
51			0	0	3	2	0	0	0
67			0	0	3	2	0	0	0
69			0	0	3	2	0	0	0

END PWAT-PARM3

PWAT-PARM4

<PLS >		PWATER input info: Part 4 ***							
#	-	#	CEPSC	UZSN	NSUR	INTFW	IRC	LZETP	***
50			0.2	0.4	0.35	2	0.4	0.7	
34			0.1	0.2	0.25	2	0.4	0.25	
31			0.15	0.4	0.3	2	0.4	0.4	
68			0.2	0.4	0.35	2	0.4	0.7	

70	0.1	0.2	0.25	2	0.4	0.25
71	0.15	0.4	0.3	2	0.4	0.4
72	0.1	0.2	0.25	2	0.4	0.25
73	0.15	0.4	0.3	2	0.4	0.4
32	0.15	0.4	0.3	2	0.4	0.4
65	0.15	0.4	0.3	2	0.4	0.4
66	0.2	0.4	0.35	2	0.4	0.7
51	0.2	0.4	0.35	2	0.4	0.7
67	0.15	0.4	0.3	2	0.4	0.4
69	0.2	0.4	0.35	2	0.4	0.7

END PWAT-PARM4

PWAT-STATE1

<PLS > *** Initial conditions at start of simulation
 ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***

#	-	#	***	CEPS	SURS	UZS	IFWS	LZS	AGWS	GwVS
50				0	0	0	0	2.5	1	0
34				0	0	0	0	2.5	1	0
31				0	0	0	0	2.5	1	0
68				0	0	0	0	2.5	1	0
70				0	0	0	0	2.5	1	0
71				0	0	0	0	2.5	1	0
72				0	0	0	0	2.5	1	0
73				0	0	0	0	2.5	1	0
32				0	0	0	0	2.5	1	0
65				0	0	0	0	2.5	1	0
66				0	0	0	0	2.5	1	0
51				0	0	0	0	2.5	1	0
67				0	0	0	0	2.5	1	0
69				0	0	0	0	2.5	1	0

END PWAT-STATE1

END PERLND

IMPLND

GEN-INFO

<PLS ><-----Name-----> Unit-systems Printer ***
 # - # User t-series Engl Metr ***
 in out ***

1		ROADS/FLAT	1	1	1	27	0
2		ROADS/MOD	1	1	1	27	0
4		ROOF TOPS/FLAT	1	1	1	27	0
14		POND	1	1	1	27	0
25		ROADS/FLAT	1	1	1	27	0
26		ROOF TOPS/FLAT	1	1	1	27	0
27		ROADS/STEEP	1	1	1	27	0
5		DRIVEWAYS/FLAT	1	1	1	27	0
8		SIDEWALKS/FLAT	1	1	1	27	0
11		PARKING/FLAT	1	1	1	27	0
28		ROADS/FLAT	1	1	1	27	0

END GEN-INFO

*** Section IWATER***

ACTIVITY

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

1		0	0	1	0	0	0
2		0	0	1	0	0	0
4		0	0	1	0	0	0
14		0	0	1	0	0	0
25		0	0	1	0	0	0
26		0	0	1	0	0	0
27		0	0	1	0	0	0
5		0	0	1	0	0	0
8		0	0	1	0	0	0
11		0	0	1	0	0	0
28		0	0	1	0	0	0

END ACTIVITY

PRINT-INFO

```

<ILS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW IWAT  SLD  IWG  IQAL  *****
1      0      0      4      0      0      4      1      9
2      0      0      4      0      0      0      1      9
4      0      0      4      0      0      0      1      9
14     0      0      4      0      0      0      1      9
25     0      0      4      0      0      0      1      9
26     0      0      4      0      0      0      1      9
27     0      0      4      0      0      0      1      9
5      0      0      4      0      0      0      1      9
8      0      0      4      0      0      0      1      9
11     0      0      4      0      0      0      1      9
28     0      0      4      0      0      0      1      9
END PRINT-INFO

```

```

IWAT-PARM1
<PLS >  IWATER variable monthly parameter value flags  ***
# - # CSNO RTOP  VRS  VNN RTLI  ***
1      0      0      0      0      0
2      0      0      0      0      0
4      0      0      0      0      0
14     0      0      0      0      0
25     0      0      0      0      0
26     0      0      0      0      0
27     0      0      0      0      0
5      0      0      0      0      0
8      0      0      0      0      0
11     0      0      0      0      0
28     0      0      0      0      0
END IWAT-PARM1

```

```

IWAT-PARM2
<PLS >  IWATER input info: Part 2  ***
# - # ***  LSUR  SLSUR  NSUR  RETSC
1      400    0.01    0.1    0.1
2      400    0.05    0.1    0.08
4      400    0.01    0.1    0.1
14     400    0.01    0.1    0.1
25     400    0.01    0.1    0.1
26     400    0.01    0.1    0.1
27     400    0.1     0.1    0.05
5      400    0.01    0.1    0.1
8      400    0.01    0.1    0.1
11     400    0.01    0.1    0.1
28     400    0.01    0.1    0.1
END IWAT-PARM2

```

```

IWAT-PARM3
<PLS >  IWATER input info: Part 3  ***
# - # *** PETMAX  PETMIN
1      0      0
2      0      0
4      0      0
14     0      0
25     0      0
26     0      0
27     0      0
5      0      0
8      0      0
11     0      0
28     0      0
END IWAT-PARM3

```

```

IWAT-STATE1
<PLS >  *** Initial conditions at start of simulation
# - # ***  RETS  SURS
1      0      0
2      0      0
4      0      0
14     0      0

```

25	0	0
26	0	0
27	0	0
5	0	0
8	0	0
11	0	0
28	0	0

END IWAT-STATE1

END IMPLND

SCHEMATIC

<-Source-> <Name> #	<--Area--> <-factor-->	<-Target-> <Name> #	MBLK Tbl#	*** ***
Basin 1***				
PERLND 34	1.327	RCHRES 1	2	
PERLND 31	1.203	RCHRES 1	2	
IMPLND 1	0.178	RCHRES 1	5	
IMPLND 2	2.616	RCHRES 1	5	
IMPLND 4	0.844	RCHRES 1	5	
IMPLND 14	0.182	RCHRES 1	5	
Lateral Basin 1***				
PERLND 50	0.1394	PERLND 51	30	
PERLND 50	0.1394	PERLND 51	34	
PERLND 50	0.1394	PERLND 51	38	
Lateral I Basin 1***				
IMPLND 25	0.0459	PERLND 65	50	
Lateral Basin 10***				
PERLND 72	0.0125	PERLND 69	30	
PERLND 72	0.0125	PERLND 69	34	
PERLND 72	0.0125	PERLND 69	38	
Lateral I Basin 2***				
IMPLND 26	0.0165	PERLND 65	50	
CJ Dens***				
PERLND 31	0.522	RCHRES 2	2	
PERLND 31	0.522	RCHRES 2	3	
IMPLND 1	0.38	RCHRES 2	5	
IMPLND 4	0.413	RCHRES 2	5	
IMPLND 5	0.096	RCHRES 2	5	
IMPLND 8	0.083	RCHRES 2	5	
IMPLND 11	0.034	RCHRES 2	5	
IMPLND 14	0.057	RCHRES 2	5	
Basin 3***				
PERLND 31	1.119	RCHRES 3	2	
PERLND 31	1.119	RCHRES 3	3	
IMPLND 1	0.992	RCHRES 3	5	
IMPLND 4	0.372	RCHRES 3	5	
IMPLND 5	0.197	RCHRES 3	5	
IMPLND 8	0.283	RCHRES 3	5	
Basin 2A***				
PERLND 32	0.728	RCHRES 4	2	
PERLND 32	0.728	RCHRES 4	3	
IMPLND 2	2.336	RCHRES 4	5	
Basin 2B***				
PERLND 32	0.776	RCHRES 5	2	
PERLND 32	0.776	RCHRES 5	3	
IMPLND 2	2.932	RCHRES 5	5	
Lateral Basin 3***				
PERLND 65	1.543	PERLND 66	30	
PERLND 65	1.543	PERLND 66	34	
PERLND 65	1.543	PERLND 66	38	
Lateral I Basin 3***				
IMPLND 27	0.0025	PERLND 67	50	
Lateral Basin 4***				
PERLND 66	0.198	PERLND 67	30	
PERLND 66	0.198	PERLND 67	34	
PERLND 66	0.198	PERLND 67	38	
Lateral I Basin 4***				
IMPLND 28	0.0053	PERLND 69	50	
Lateral Basin 5***				

PERLND	67	5.7512	PERLND	69	30
PERLND	67	5.7512	PERLND	69	34
PERLND	67	5.7512	PERLND	69	38
Lateral Basin	6***				
PERLND	68	0.0238	PERLND	67	30
PERLND	68	0.0238	PERLND	67	34
PERLND	68	0.0238	PERLND	67	38
Lateral Basin	8***				
PERLND	70	0.0908	PERLND	69	30
PERLND	70	0.0908	PERLND	69	34
PERLND	70	0.0908	PERLND	69	38
Lateral Basin	9***				
PERLND	71	0.0558	PERLND	69	30
PERLND	71	0.0558	PERLND	69	34
PERLND	71	0.0558	PERLND	69	38
Lateral Basin	11***				
PERLND	73	0.0487	PERLND	69	30
PERLND	73	0.0487	PERLND	69	34
PERLND	73	0.0487	PERLND	69	38
Lateral Basin	2***				
PERLND	51	2.31	COPY	501	12
PERLND	51	2.31	COPY	501	13
PERLND	51	2.31	COPY	501	14
Lateral Basin	7***				
PERLND	69	16.852	COPY	502	12
PERLND	69	16.852	COPY	502	13
PERLND	69	16.852	COPY	502	14

*****Routing*****

PERLND	50	0.322	COPY	1	12
PERLND	50	0.322	COPY	1	13
PERLND	50	0.322	COPY	1	14
RCHRES	1	1	RCHRES	6	6
RCHRES	6	.4329	PERLND	51	63
RCHRES	6		COPY	1	17
RCHRES	6	.0593	PERLND	69	66
RCHRES	6		COPY	2	18
PERLND	67	96.92	COPY	2	12
PERLND	67	96.92	COPY	2	13
PERLND	67	96.92	COPY	2	14
RCHRES	2	.0593	PERLND	69	60
RCHRES	2		COPY	2	16
PERLND	70	1.53	COPY	2	12
PERLND	70	1.53	COPY	2	13
PERLND	70	1.53	COPY	2	14
PERLND	71	0.94	COPY	2	12
PERLND	71	0.94	COPY	2	13
PERLND	71	0.94	COPY	2	14
IMPLND	28	0.09	COPY	2	15
RCHRES	3	.0593	PERLND	69	60
RCHRES	3		COPY	2	16
PERLND	72	0.21	COPY	2	12
PERLND	72	0.21	COPY	2	13
PERLND	72	0.21	COPY	2	14
PERLND	73	0.82	COPY	2	12
PERLND	73	0.82	COPY	2	13
PERLND	73	0.82	COPY	2	14
RCHRES	4	.0593	PERLND	69	60
RCHRES	4		COPY	2	16
RCHRES	5	.0593	PERLND	69	60
RCHRES	5		COPY	2	16

END SCHEMATIC

NETWORK

<-Volume->	<-Grp>	<-Member->	<-Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	#<-factor-->	strg	<Name>	#	#
COPY	501	OUTPUT	MEAN	1	1	48.4	DISPLY	1
COPY	502	OUTPUT	MEAN	1	1	48.4	DISPLY	2
							INPUT	TIMSER 1
							INPUT	TIMSER 1

```

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

```

RCHRES

GEN-INFO

```

RCHRES          Name          Nexits      Unit Systems      Printer          ***
# - #<-----><-----> User T-series Engl Metr LKFG      ***
              in out
1      Trapezoidal Pond-014      1      1      1      1      28      0      1
2      CJ Dens Trapezoi-050      1      1      1      1      28      0      1
3      SSD Table 1                1      1      1      1      28      0      1
4      Trapezoidal Pond-059      1      1      1      1      28      0      1
5      Trapezoidal Pond-061      1      1      1      1      28      0      1
6      Flow Splitter 1-017        2      1      1      1      28      0      1

```

END GEN-INFO

*** Section RCHRES***

ACTIVITY

```

<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
1      1      0      0      0      0      0      0      0      0      0
2      1      0      0      0      0      0      0      0      0      0
3      1      0      0      0      0      0      0      0      0      0
4      1      0      0      0      0      0      0      0      0      0
5      1      0      0      0      0      0      0      0      0      0
6      1      0      0      0      0      0      0      0      0      0

```

END ACTIVITY

PRINT-INFO

```

<PLS > ***** Print-flags ***** PIVL PYR *****
# - # HYDR ADCA CONS HEAT SED GQL OXRX NUTR PLNK PHCB PIVL PYR *****
1      4      0      0      0      0      0      0      0      0      0      1      9
2      4      0      0      0      0      0      0      0      0      0      1      9
3      4      0      0      0      0      0      0      0      0      0      1      9
4      4      0      0      0      0      0      0      0      0      0      1      9
5      4      0      0      0      0      0      0      0      0      0      1      9
6      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 *** ODFGTFG for each FUNCT for each
      FG FG FG FG possible exit *** possible exit
      * * * * *
1      0 1 0 0      4 0 0 0 0      0 0 0 0 0      2 2 2 2 2
2      0 1 0 0      4 0 0 0 0      0 0 0 0 0      2 2 2 2 2
3      0 1 0 0      4 0 0 0 0      0 0 0 0 0      2 2 2 2 2
4      0 1 0 0      4 0 0 0 0      0 0 0 0 0      2 2 2 2 2
5      0 1 0 0      4 0 0 0 0      0 0 0 0 0      2 2 2 2 2
6      0 1 0 0      4 5 0 0 0      0 0 0 0 0      2 2 2 2 2

```

END HYDR-PARM1

HYDR-PARM2

```

# - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><----->
1      1      0.01      0.0      0.0      0.5      0.0
2      2      0.01      0.0      0.0      0.5      0.0
3      3      0.01      0.0      0.0      0.5      0.0
4      4      0.01      0.0      0.0      0.5      0.0
5      5      0.11      0.0      0.0      0.5      0.0
6      6      0.01      0.0      0.0      0.0      0.0

```

END HYDR-PARM2

HYDR-INIT

```

RCHRES          Initial conditions for each HYDR section          ***
# - # *** VOL      Initial value of COLIND      Initial value of OUTDGT
      *** ac-ft      for each possible exit      for each possible exit
<-----><-----> <-----><-----><-----><-----> *** <-----><-----><-----><----->
1      0      4.0 0.0 0.0 0.0 0.0      0.0 0.0 0.0 0.0 0.0

```


2	0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES

FTABLE 1
91 4

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.036731	0.000000	0.000000		
0.044444	0.037222	0.001643	0.091535		
0.088889	0.037717	0.003309	0.129450		
0.133333	0.038215	0.004996	0.158543		
0.177778	0.038716	0.006706	0.183070		
0.222222	0.039220	0.008438	0.204679		
0.266667	0.039728	0.010192	0.224214		
0.311111	0.040239	0.011969	0.242179		
0.355556	0.040753	0.013769	0.258900		
0.400000	0.041271	0.015592	0.274605		
0.444444	0.041792	0.017437	0.289459		
0.488889	0.042316	0.019307	0.303587		
0.533333	0.042843	0.021199	0.317087		
0.577778	0.043374	0.023115	0.330034		
0.622222	0.043907	0.025054	0.342493		
0.666667	0.044444	0.027018	0.354514		
0.711111	0.044985	0.029005	0.366140		
0.755556	0.045528	0.031017	0.377409		
0.800000	0.046075	0.033052	0.388350		
0.844444	0.046625	0.035112	0.398992		
0.888889	0.047179	0.037197	0.409357		
0.933333	0.047736	0.039306	0.419466		
0.977778	0.048295	0.041440	0.429337		
1.022222	0.048859	0.043599	0.438987		
1.066667	0.049425	0.045783	0.448428		
1.111111	0.049995	0.047992	0.457675		
1.155556	0.050568	0.050227	0.466739		
1.200000	0.051144	0.052487	0.475630		
1.244444	0.051724	0.054773	0.484358		
1.288889	0.052306	0.057085	0.492931		
1.333333	0.052893	0.059423	0.501358		
1.377778	0.053482	0.061787	0.509646		
1.422222	0.054074	0.064177	0.517800		
1.466667	0.054670	0.066593	0.525829		
1.511111	0.055269	0.069037	0.533737		
1.555556	0.055872	0.071506	0.541529		
1.600000	0.056478	0.074003	0.549210		
1.644444	0.057086	0.076527	0.556786		
1.688889	0.057699	0.079077	0.564260		
1.733333	0.058314	0.081655	0.571636		
1.777778	0.058933	0.084261	0.578919		
1.822222	0.059555	0.086894	0.591601		
1.866667	0.060180	0.089555	0.621493		
1.911111	0.060808	0.092243	0.660532		
1.955556	0.061440	0.094960	0.706148		
2.000000	0.062075	0.097705	0.757001		
2.044444	0.062714	0.100478	0.812209		
2.088889	0.063355	0.103279	0.871125		
2.133333	0.064000	0.106110	0.933241		
2.177778	0.064648	0.108968	0.998141		
2.222222	0.065299	0.111856	1.065476		
2.266667	0.065954	0.114773	1.134943		
2.311111	0.066612	0.117719	1.206274		
2.355556	0.067273	0.120694	1.279234		
2.400000	0.067938	0.123699	1.353606		

2.444444 0.068605 0.126733 1.429196
 2.488889 0.069276 0.129797 1.505823
 2.533333 0.069950 0.132891 1.583321
 2.577778 0.070628 0.136015 1.661536
 2.622222 0.071309 0.139169 1.740320
 2.666667 0.071993 0.142354 1.819538
 2.711111 0.072680 0.145568 1.899061
 2.755556 0.073370 0.148814 1.978766
 2.800000 0.074064 0.152090 2.058537
 2.844444 0.074761 0.155398 2.154060
 2.888889 0.075462 0.158736 2.251469
 2.933333 0.076165 0.162105 2.350726
 2.977778 0.076872 0.165506 2.451794
 3.022222 0.077582 0.168939 2.558514
 3.066667 0.078296 0.172403 2.785002
 3.111111 0.079012 0.175898 3.104602
 3.155556 0.079732 0.179426 3.492248
 3.200000 0.080455 0.182986 3.932124
 3.244444 0.081182 0.186578 4.410345
 3.288889 0.081912 0.190202 4.913098
 3.333333 0.082645 0.193859 5.426196
 3.377778 0.083381 0.197548 5.935227
 3.422222 0.084120 0.201270 6.426033
 3.466667 0.084863 0.205026 6.885402
 3.511111 0.085609 0.208814 7.301933
 3.555556 0.086359 0.212635 7.667028
 3.600000 0.087111 0.216490 7.975995
 3.644444 0.087867 0.220379 8.229264
 3.688889 0.088626 0.224301 8.433678
 3.733333 0.089388 0.228257 8.603882
 3.777778 0.090154 0.232246 8.844724
 3.822222 0.090923 0.236270 9.025761
 3.866667 0.091695 0.240329 9.202070
 3.911111 0.092471 0.244421 9.374010
 3.955556 0.093249 0.248548 9.541896
 4.000000 0.094031 0.252710 9.706005

END FTABLE 1

FTABLE 6

90	5						
Depth	Area	Volume	Outflow1	Outflow2	Velocity	Travel Time***	
(ft)	(acres)	(acre-ft)	(cfs)	(cfs)	(ft/sec)	(Minutes)***	
0.000000	0.002296	0.000000	0.000000	0.000000			
0.111111	0.002296	0.000255	0.002261	0.144730			
0.222222	0.002296	0.000510	0.003198	0.204679			
0.333333	0.002296	0.000765	0.003917	0.250679			
0.444444	0.002296	0.001020	0.004523	0.289459			
0.555556	0.002296	0.001275	0.005057	0.323625			
0.666667	0.002296	0.001530	0.005539	0.354514			
0.777778	0.002296	0.001786	0.005983	0.382919			
0.888889	0.002296	0.002041	0.006396	0.409357			
1.000000	0.002296	0.002296	0.006784	0.434189			
1.111111	0.002296	0.002551	0.007151	0.457675			
1.222222	0.002296	0.002806	0.007500	0.480014			
1.333333	0.002296	0.003061	0.007834	0.501358			
1.444444	0.002296	0.003316	0.008154	0.521830			
1.555556	0.002296	0.003571	0.008461	0.541529			
1.666667	0.002296	0.003826	0.008758	0.560535			
1.777778	0.002296	0.004081	0.009046	0.578919			
1.888889	0.002296	0.004336	0.009324	0.640076			
2.000000	0.002296	0.004591	0.009594	0.757001			
2.111111	0.002296	0.004846	0.009857	0.901811			
2.222222	0.002296	0.005102	0.010113	1.065476			
2.333333	0.002296	0.005357	0.010363	1.242564			
2.444444	0.002296	0.005612	0.010607	1.429196			
2.555556	0.002296	0.005867	0.010845	1.622348			
2.666667	0.002296	0.006122	0.011079	1.819538			
2.777778	0.002296	0.006377	0.011307	2.018650			
2.888889	0.002296	0.006632	0.011531	2.251469			
3.000000	0.002296	0.006887	0.011751	2.502997			
3.111111	0.002296	0.007142	0.011966	3.104602			

3.222222	0.002296	0.007397	0.012178	4.167297
3.333333	0.002296	0.007652	0.012386	5.426196
3.444444	0.002296	0.007907	0.012591	6.660413
3.555556	0.002296	0.008162	0.012792	7.667028
3.666667	0.002296	0.008418	0.012991	8.336862
3.777778	0.002296	0.008673	0.013186	8.844724
3.888889	0.002296	0.008928	0.013379	9.288566
4.000000	0.002296	0.009183	0.013568	9.706005
4.111111	0.002296	0.009438	0.013756	10.10132
4.222222	0.002296	0.009693	0.013940	10.47774
4.333333	0.002296	0.009948	0.014122	10.83777
4.444444	0.002296	0.010203	0.014302	11.18342
4.555556	0.002296	0.010458	0.014480	11.51631
4.666667	0.002296	0.010713	0.014656	11.83776
4.777778	0.002296	0.010968	0.014829	12.14891
4.888889	0.002296	0.011223	0.015000	12.45068
5.000000	0.002296	0.011478	0.015170	12.74390
5.111111	0.002296	0.011733	0.015338	13.02925
5.222222	0.002296	0.011989	0.015503	13.30736
5.333333	0.002296	0.012244	0.015667	13.57874
5.444444	0.002296	0.012499	0.015830	13.84387
5.555556	0.002296	0.012754	0.015991	14.10317
5.666667	0.002296	0.013009	0.016150	14.35702
5.777778	0.002296	0.013264	0.016307	14.60573
5.888889	0.002296	0.013519	0.016463	14.84963
6.000000	0.002296	0.013774	0.016618	15.08897
6.111111	0.002296	0.014029	0.016771	15.32401
6.222222	0.002296	0.014284	0.016923	15.55497
6.333333	0.002296	0.014539	0.017073	15.78207
6.444444	0.002296	0.014794	0.017222	16.00549
6.555556	0.002296	0.015049	0.017370	16.22540
6.666667	0.002296	0.015305	0.017517	16.44197
6.777778	0.002296	0.015560	0.017662	16.65534
6.888889	0.002296	0.015815	0.017806	16.86566
7.000000	0.002296	0.016070	0.017949	17.07305
7.111111	0.002296	0.016325	0.018091	17.27764
7.222222	0.002296	0.016580	0.018232	17.47952
7.333333	0.002296	0.016835	0.018372	17.67882
7.444444	0.002296	0.017090	0.018510	17.87563
7.555556	0.002296	0.017345	0.018648	18.07003
7.666667	0.002296	0.017600	0.018785	18.26213
7.777778	0.002296	0.017855	0.018920	18.45198
7.888889	0.002296	0.018110	0.019055	18.63968
8.000000	0.002296	0.018365	0.019189	18.82530
8.111111	0.002296	0.018621	0.019321	19.00890
8.222222	0.002296	0.018876	0.019453	19.19055
8.333333	0.002296	0.019131	0.019584	19.37031
8.444444	0.002296	0.019386	0.019714	19.54824
8.555556	0.002296	0.019641	0.019844	19.72439
8.666667	0.002296	0.019896	0.019972	19.89882
8.777778	0.002296	0.020151	0.020100	20.07157
8.888889	0.002296	0.020406	0.020227	20.24270
9.000000	0.002296	0.020661	0.020353	20.41225
9.111111	0.002296	0.020916	0.020539	20.58025
9.222222	0.002296	0.021171	0.020753	20.74676
9.333333	0.002296	0.021426	0.020975	20.91182
9.444444	0.002296	0.021681	0.021200	21.07545
9.555556	0.002296	0.021937	0.021427	21.23770
9.666667	0.002296	0.022192	0.021656	21.39860
9.777778	0.002296	0.022447	0.021887	21.55819
9.888889	0.002296	0.022702	0.022120	21.71649

END FTABLE 6

FTABLE 2

91 4

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.022779	0.000000	0.000000		
0.055556	0.023264	0.001279	0.028883		
0.111111	0.023753	0.002585	0.040847		
0.166667	0.024248	0.003918	0.050027		

0.222222	0.024748	0.005279	0.057766
0.277778	0.025253	0.006668	0.064584
0.333333	0.025763	0.008085	0.070748
0.388889	0.026279	0.009531	0.076417
0.444444	0.026799	0.011005	0.081693
0.500000	0.027324	0.012509	0.086649
0.555556	0.027855	0.014042	0.091336
0.611111	0.028391	0.015604	0.095794
0.666667	0.028931	0.017196	0.100053
0.722222	0.029477	0.018819	0.104139
0.777778	0.030028	0.020472	0.108070
0.833333	0.030584	0.022155	0.111863
0.888889	0.031145	0.023870	0.115531
0.944444	0.031712	0.025616	0.119087
1.000000	0.032283	0.027394	0.122540
1.055556	0.032860	0.029203	0.125898
1.111111	0.033441	0.031045	0.129168
1.166667	0.034028	0.032919	0.132358
1.222222	0.034620	0.034826	0.135473
1.277778	0.035216	0.036766	0.138517
1.333333	0.035818	0.038739	0.141497
1.388889	0.036425	0.040746	0.144414
1.444444	0.037038	0.042786	0.147274
1.500000	0.037655	0.044861	0.150080
1.555556	0.038277	0.046970	0.152834
1.611111	0.038905	0.049114	0.155539
1.666667	0.039537	0.051293	0.158198
1.722222	0.040175	0.053508	0.160813
1.777778	0.040818	0.055757	0.163386
1.833333	0.041466	0.058043	0.165919
1.888889	0.042119	0.060365	0.168415
1.944444	0.042777	0.062723	0.170873
2.000000	0.043440	0.065118	0.173297
2.055556	0.044108	0.067550	0.186468
2.111111	0.044782	0.070019	0.208194
2.166667	0.045460	0.072526	0.235130
2.222222	0.046144	0.075070	0.266005
2.277778	0.046833	0.077653	0.300049
2.333333	0.047526	0.080274	0.336716
2.388889	0.048225	0.082934	0.375588
2.444444	0.048929	0.085633	0.416328
2.500000	0.049638	0.088371	0.458652
2.555556	0.050353	0.091148	0.502317
2.611111	0.051072	0.093965	0.547110
2.666667	0.051796	0.096823	0.592841
2.722222	0.052526	0.099721	0.639338
2.777778	0.053261	0.102659	0.686445
2.833333	0.054000	0.105639	0.734018
2.888889	0.054745	0.108659	0.781924
2.944444	0.055495	0.111722	0.830039
3.000000	0.056250	0.114826	0.878245
3.055556	0.057010	0.117972	0.936465
3.111111	0.057775	0.121160	0.996168
3.166667	0.058546	0.124391	1.057317
3.222222	0.059321	0.127665	1.119876
3.277778	0.060102	0.130983	1.183814
3.333333	0.060887	0.134344	1.249100
3.388889	0.061678	0.137748	1.315705
3.444444	0.062474	0.141197	1.753851
3.500000	0.063275	0.144690	1.844582
3.555556	0.064081	0.148228	1.936961
3.611111	0.064892	0.151810	2.030957
3.666667	0.065708	0.155438	2.126544
3.722222	0.066530	0.159111	2.223694
3.777778	0.067356	0.162830	2.322382
3.833333	0.068188	0.166595	2.422583
3.888889	0.069024	0.170407	2.524275
3.944444	0.069866	0.174265	2.627436
4.000000	0.070713	0.178170	2.732044
4.055556	0.071565	0.182122	2.872469

4.111111	0.072422	0.186122	3.125264
4.166667	0.073284	0.190169	3.440530
4.222222	0.074151	0.194264	3.784790
4.277778	0.075024	0.198408	4.123963
4.333333	0.075901	0.202600	4.425520
4.388889	0.076784	0.206842	4.664787
4.444444	0.077671	0.211132	4.833535
4.500000	0.078564	0.215472	4.950246
4.555556	0.079462	0.219862	5.096106
4.611111	0.080365	0.224301	5.212280
4.666667	0.081273	0.228791	5.323343
4.722222	0.082186	0.233332	5.429923
4.777778	0.083104	0.237923	5.532527
4.833333	0.084028	0.242566	5.631572
4.888889	0.084956	0.247260	5.727410
4.944444	0.085890	0.252005	5.820336
5.000000	0.086829	0.256803	5.910602

END FTABLE 2

FTABLE 3

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Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.058000	0.000000	0.000000		
0.170000	0.058000	0.005193	0.044755		
0.330000	0.058000	0.011161	0.062356		
0.500000	0.058000	0.017609	0.076754		
0.670000	0.058000	0.024425	0.088850		
0.830000	0.058000	0.031543	0.098891		
1.000000	0.058000	0.038915	0.108547		
1.170000	0.058000	0.046504	0.117412		
1.330000	0.058000	0.054281	0.125183		
1.500000	0.058000	0.062221	0.132943		
1.670000	0.058000	0.070301	0.140274		
1.830000	0.058000	0.078501	0.146840		
2.000000	0.058000	0.086804	0.153509		
2.170000	0.058000	0.095192	0.159900		
2.330000	0.058000	0.103651	0.165690		
2.500000	0.058000	0.112165	0.171628		
2.670000	0.058000	0.120721	0.177368		
2.830000	0.058000	0.129303	0.182605		
3.000000	0.058000	0.137899	0.188009		
3.170000	0.058000	0.146495	0.193263		
3.330000	0.058000	0.155077	0.198080		
3.500000	0.058000	0.163632	0.203073		
3.670000	0.058000	0.172146	0.207947		
3.830000	0.058000	0.180605	0.236899		
4.000000	0.058000	0.188994	0.347589		
4.170000	0.058000	0.197297	0.495645		
4.330000	0.058000	0.205497	0.654966		
4.500000	0.058000	0.213577	0.836956		
4.670000	0.058000	0.221516	1.025852		
4.830000	0.058000	0.229293	1.225254		
5.000000	0.058000	0.236883	1.471327		
5.170000	0.058000	0.244255	2.581571		
5.330000	0.058000	0.251373	4.323604		
5.500000	0.058000	0.258189	6.122265		
5.670000	0.058000	0.264636	7.256359		
5.830000	0.058000	0.270604	7.946961		
6.000000	0.058000	0.275798	8.581160		

END FTABLE 3

FTABLE 4

91 4

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.036731	0.000000	0.249423		
0.044444	0.037222	0.001643	0.265688		
0.088889	0.037717	0.003309	0.281014		
0.133333	0.038215	0.004996	0.295546		
0.177778	0.038716	0.006706	0.309397		
0.222222	0.039220	0.008438	0.322653		

0.266667	0.039728	0.010192	0.335386
0.311111	0.040239	0.011969	0.347653
0.355556	0.040753	0.013769	0.359501
0.400000	0.041271	0.015592	0.370971
0.444444	0.041792	0.017437	0.382097
0.488889	0.042316	0.019307	0.392908
0.533333	0.042843	0.021199	0.403430
0.577778	0.043374	0.023115	0.413684
0.622222	0.043907	0.025054	0.423690
0.666667	0.044444	0.027018	0.433465
0.711111	0.044985	0.029005	0.443024
0.755556	0.045528	0.031017	0.452381
0.800000	0.046075	0.033052	0.461549
0.844444	0.046625	0.035112	0.470538
0.888889	0.047179	0.037197	0.479359
0.933333	0.047736	0.039306	0.488020
0.977778	0.048295	0.041440	0.496530
1.022222	0.048859	0.043599	0.504897
1.066667	0.049425	0.045783	0.513127
1.111111	0.049995	0.047992	0.521228
1.155556	0.050568	0.050227	0.529204
1.200000	0.051144	0.052487	0.537062
1.244444	0.051724	0.054773	0.544807
1.288889	0.052306	0.057085	0.552443
1.333333	0.052893	0.059423	0.559975
1.377778	0.053482	0.061787	0.567407
1.422222	0.054074	0.064177	0.574742
1.466667	0.054670	0.066593	0.581986
1.511111	0.055269	0.069037	0.589140
1.555556	0.055872	0.071506	0.596209
1.600000	0.056478	0.074003	0.603194
1.644444	0.057086	0.076527	0.610100
1.688889	0.057699	0.079077	0.620375
1.733333	0.058314	0.081655	0.642041
1.777778	0.058933	0.084261	0.669772
1.822222	0.059555	0.086894	0.701845
1.866667	0.060180	0.089555	0.737371
1.911111	0.060808	0.092243	0.775763
1.955556	0.061440	0.094960	0.816593
2.000000	0.062075	0.097705	0.859525
2.044444	0.062714	0.100478	0.904284
2.088889	0.063355	0.103279	0.950638
2.133333	0.064000	0.106110	0.998389
2.177778	0.064648	0.108968	1.047359
2.222222	0.065299	0.111856	1.097392
2.266667	0.065954	0.114773	1.148347
2.311111	0.066612	0.117719	1.200093
2.355556	0.067273	0.120694	1.252514
2.400000	0.067938	0.123699	1.305499
2.444444	0.068605	0.126733	1.358945
2.488889	0.069276	0.129797	1.412757
2.533333	0.069950	0.132891	1.466845
2.577778	0.070628	0.136015	1.521123
2.622222	0.071309	0.139169	1.575512
2.666667	0.071993	0.142354	1.629933
2.711111	0.072680	0.145568	1.694559
2.755556	0.073370	0.148814	1.760580
2.800000	0.074064	0.152090	1.827810
2.844444	0.074761	0.155398	1.896225
2.888889	0.075462	0.158736	1.965803
2.933333	0.076165	0.162105	2.036522
2.977778	0.076872	0.165506	2.108363
3.022222	0.077582	0.168939	2.200074
3.066667	0.078296	0.172403	2.426285
3.111111	0.079012	0.175898	2.745613
3.155556	0.079732	0.179426	3.132993
3.200000	0.080455	0.182986	3.572608
3.244444	0.081182	0.186578	4.050573
3.288889	0.081912	0.190202	4.553075
3.333333	0.082645	0.193859	5.065927

3.377778	0.083381	0.197548	5.574717
3.422222	0.084120	0.201270	6.065286
3.466667	0.084863	0.205026	6.524422
3.511111	0.085609	0.208814	6.940726
3.555556	0.086359	0.212635	7.305596
3.600000	0.087111	0.216490	7.614344
3.644444	0.087867	0.220379	7.867396
3.688889	0.088626	0.224301	8.071598
3.733333	0.089388	0.228257	8.241592
3.777778	0.090154	0.232246	8.482230
3.822222	0.090923	0.236270	8.663064
3.866667	0.091695	0.240329	8.839175
3.911111	0.092471	0.244421	9.010920
3.955556	0.093249	0.248548	9.178613
4.000000	0.094031	0.252710	9.342533

END FTABLE 4

FTABLE 5

91	4					
Depth	Area	Volume	Outflow1	Velocity	Travel Time***	
(ft)	(acres)	(acre-ft)	(cfs)	(ft/sec)	(Minutes)***	
0.000000	0.826446	0.000000	0.250679			
0.044444	0.830488	0.036821	0.266868			
0.088889	0.834534	0.073821	0.282130			
0.133333	0.838582	0.111002	0.296607			
0.177778	0.842634	0.148362	0.310410			
0.222222	0.846689	0.185902	0.323625			
0.266667	0.850747	0.223623	0.336321			
0.311111	0.854809	0.261525	0.348555			
0.355556	0.858874	0.299606	0.360374			
0.400000	0.862942	0.337869	0.371817			
0.444444	0.867014	0.376312	0.382919			
0.488889	0.871088	0.414937	0.393707			
0.533333	0.875166	0.453743	0.404208			
0.577778	0.879247	0.492730	0.414443			
0.622222	0.883332	0.531898	0.424431			
0.666667	0.887420	0.571248	0.434189			
0.711111	0.891511	0.610780	0.443733			
0.755556	0.895605	0.650493	0.453075			
0.800000	0.899702	0.690389	0.462229			
0.844444	0.903803	0.730467	0.471206			
0.888889	0.907907	0.770727	0.480014			
0.933333	0.912015	0.811170	0.488663			
0.977778	0.916125	0.851795	0.497163			
1.022222	0.920239	0.892603	0.505519			
1.066667	0.924356	0.933594	0.513739			
1.111111	0.928477	0.974769	0.521830			
1.155556	0.932600	1.016126	0.529797			
1.200000	0.936727	1.057666	0.537647			
1.244444	0.940857	1.099391	0.545383			
1.288889	0.944991	1.141298	0.553011			
1.333333	0.949128	1.183390	0.560535			
1.377778	0.953268	1.225665	0.567960			
1.422222	0.957411	1.268125	0.575289			
1.466667	0.961557	1.310769	0.582526			
1.511111	0.965707	1.353597	0.589673			
1.555556	0.969860	1.396609	0.596736			
1.600000	0.974017	1.439806	0.603715			
1.644444	0.978176	1.483189	0.610615			
1.688889	0.982339	1.526756	0.620981			
1.733333	0.986505	1.570508	0.642711			
1.777778	0.990674	1.614445	0.670481			
1.822222	0.994847	1.658568	0.702585			
1.866667	0.999023	1.702876	0.738134			
1.911111	1.003202	1.747370	0.776546			
1.955556	1.007385	1.792049	0.817392			
2.000000	1.011570	1.836915	0.860337			
2.044444	1.015759	1.881967	0.905107			
2.088889	1.019951	1.927205	0.951472			
2.133333	1.024147	1.972629	0.999230			
2.177778	1.028346	2.018240	1.048207			

2.222222	1.032548	2.064038	1.098245
2.266667	1.036753	2.110022	1.149204
2.311111	1.040962	2.156194	1.200954
2.355556	1.045173	2.202552	1.253377
2.400000	1.049388	2.249098	1.306363
2.444444	1.053607	2.295831	1.359810
2.488889	1.057828	2.342752	1.413622
2.533333	1.062053	2.389861	1.467709
2.577778	1.066281	2.437157	1.521986
2.622222	1.070513	2.484641	1.576372
2.666667	1.074747	2.532314	1.630791
2.711111	1.078985	2.580174	1.695513
2.755556	1.083227	2.628224	1.761542
2.800000	1.087471	2.676461	1.828780
2.844444	1.091719	2.724888	1.897204
2.888889	1.095970	2.773503	1.966789
2.933333	1.100224	2.822307	2.037516
2.977778	1.104482	2.871301	2.109365
3.022222	1.108742	2.920484	2.201078
3.066667	1.113006	2.969856	2.427286
3.111111	1.117274	3.019418	2.746612
3.155556	1.121544	3.069169	3.133989
3.200000	1.125818	3.119111	3.573602
3.244444	1.130095	3.169242	4.051565
3.288889	1.134376	3.219564	4.554064
3.333333	1.138659	3.270075	5.066914
3.377778	1.142946	3.320778	5.575702
3.422222	1.147236	3.371671	6.066268
3.466667	1.151530	3.422754	6.525403
3.511111	1.155827	3.474029	6.941704
3.555556	1.160127	3.525495	7.306572
3.600000	1.164430	3.577151	7.615318
3.644444	1.168736	3.629000	7.868368
3.688889	1.173046	3.681039	8.072567
3.733333	1.177359	3.733270	8.242560
3.777778	1.181675	3.785693	8.483196
3.822222	1.185995	3.838308	8.664028
3.866667	1.190318	3.891115	8.840137
3.911111	1.194644	3.944114	9.011880
3.955556	1.198973	3.997306	9.179572
4.000000	1.203306	4.050690	9.343490

END FTABLE 5

END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap<--Mult-->	Tran	<-Target	vols>	<-Grp>	<-Member->	***	
<Name>	#	<Name>	#	tem	strg<-factor->	strg	<Name>	#	#
WDM	2	PREC	ENGL	1.3			PERLND	1	999
WDM	2	PREC	ENGL	1.3			IMPLND	1	999
WDM	1	EVAP	ENGL	0.8			PERLND	1	999
WDM	1	EVAP	ENGL	0.8			IMPLND	1	999
WDM	1	EVAP	ENGL	0.8			RCHRES	1	
WDM	1	EVAP	ENGL	0.8			RCHRES	4	
WDM	1	EVAP	ENGL	0.8			RCHRES	5	

END EXT SOURCES

EXT TARGETS

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***
<Name>	#	<Name>	#	#<-factor->	strg	<Name>	#	<Name>	tem	strg
COPY	1	OUTPUT	MEAN	1	1	48.4	WDM	701	FLOW	ENGL
COPY	501	OUTPUT	MEAN	1	1	48.4	WDM	801	FLOW	ENGL
COPY	2	OUTPUT	MEAN	1	1	48.4	WDM	702	FLOW	ENGL
COPY	502	OUTPUT	MEAN	1	1	48.4	WDM	802	FLOW	ENGL

END EXT TARGETS

MASS-LINK

<Volume>	<-Grp>	<-Member->	<--Mult-->	<Target>	<-Grp>	<-Member->	***
<Name>		<Name>	#	#<-factor->	<Name>	#	#
MASS-LINK			2				

PERLND	PWATER	SURO		0.083333	RCHRES	INFLOW	IVOL
END MASS-LINK		2					
MASS-LINK		3					
PERLND	PWATER	IFW0		0.083333	RCHRES	INFLOW	IVOL
END MASS-LINK		3					
MASS-LINK		5					
IMPLND	IWATER	SURO		0.083333	RCHRES	INFLOW	IVOL
END MASS-LINK		5					
MASS-LINK		6					
RCHRES	ROFLOW				RCHRES	INFLOW	
END MASS-LINK		6					
MASS-LINK		12					
PERLND	PWATER	SURO		0.083333	COPY	INPUT	MEAN
END MASS-LINK		12					
MASS-LINK		13					
PERLND	PWATER	IFW0		0.083333	COPY	INPUT	MEAN
END MASS-LINK		13					
MASS-LINK		14					
PERLND	PWATER	AGW0		0.083333	COPY	INPUT	MEAN
END MASS-LINK		14					
MASS-LINK		15					
IMPLND	IWATER	SURO		0.083333	COPY	INPUT	MEAN
END MASS-LINK		15					
MASS-LINK		16					
RCHRES	ROFLOW				COPY	INPUT	MEAN
END MASS-LINK		16					
MASS-LINK		17					
RCHRES	OLOW	OVOL	1		COPY	INPUT	MEAN
END MASS-LINK		17					
MASS-LINK		18					
RCHRES	OLOW	OVOL	2		COPY	INPUT	MEAN
END MASS-LINK		18					
MASS-LINK		30					
PERLND	PWATER	SURO			PERLND	EXTNL	SURLI
END MASS-LINK		30					
MASS-LINK		34					
PERLND	PWATER	IFW0			PERLND	EXTNL	IFWLI
END MASS-LINK		34					
MASS-LINK		38					
PERLND	PWATER	AGW0			PERLND	EXTNL	AGWLI
END MASS-LINK		38					
MASS-LINK		50					
IMPLND	IWATER	SURO			PERLND	EXTNL	SURLI
END MASS-LINK		50					
MASS-LINK		60					
RCHRES	ROFLOW			12.00000	PERLND	EXTNL	SURLI
END MASS-LINK		60					
MASS-LINK		63					
RCHRES	OLOW	OVOL	1	12.00000	PERLND	EXTNL	SURLI
END MASS-LINK		63					
MASS-LINK		66					
RCHRES	OLOW	OVOL	2	12.00000	PERLND	EXTNL	SURLI
END MASS-LINK		66					

END MASS-LINK

END RUN

DRAFT

Predeveloped HSPF Message File

DRAFT

Mitigated HSPF Message File

DRAFT

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