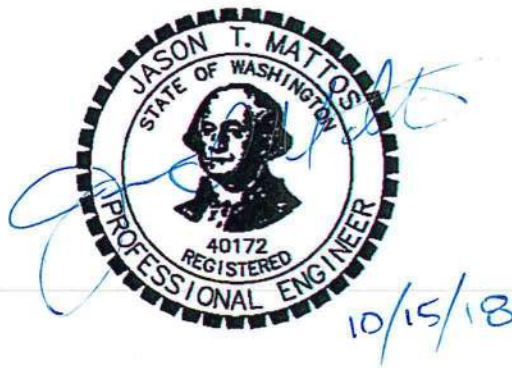


# SUNSET TERRACE

## PRELIMINARY TECHNICAL INFORMATION REPORT

**Prepared for:**  
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PRJ #: \_\_\_\_\_ 1795  
ENG #: \_\_\_\_\_  
DATE: \_\_\_\_\_ 10/11/2018  
JOB #: \_\_\_\_\_ 1795

**SUNSET TERRACE**  
**PRELIMINARY STORM DESIGN**  
**REPORT NARRATIVE**

The storm system for the Sunset Terrace Subdivision will be designed in accordance with the Puget Sound Stormwater Management Manual per Ch. I-2. The proposed storm system will be designed to collect, convey, treat, and release stormwater runoff from the developed site.

- A. Description of on-site hydrologic soil groups and their suitability for the proposed design and verification of soil conditions through field reconnaissance.

**The soils report by GeoStandards lists the soils as follows:**

**Topsoil: 12 to 24 inches of organic-rich silt loam with organic debris.**

**Fill: A mixture of crushed rock, silt, and sand littered with organic debris.**

**At a depth of 9 feet, weathered rock classified as saprolite is prevalent throughout the site.**

**SCS soil group is Schneider-Rock outcrop complex and belongs to Hydrologic Soil Group B.**

- B. Identification of the approximate amount of new impervious surface contemplated for the proposal.

**The proposed development will have approximately 6.32 acres of new impervious area.**

- C. Identification of where runoff characteristics will be altered, e.g., where runoff curve numbers will be revised by the proposed development.

The previous use of this site was a single family residence. The site is partially field and partially forested. The predeveloped runoff curve numbers (RCN) used to find flow rates for various storm events were 98 for impervious areas and 78 for meadow areas and 72 for forest areas. The forest and meadow RCN numbers do not reflect the steep slope of the site and are being used to reflect a conservative design. Final engineering will explore the use of a higher curve number. The developed runoff curve numbers (RCN) used to find flow rates for various storm events were 98 for impervious areas and 80 for pervious areas.

- D. Discussion of how on-site conveyance system design will provide for ultimate build-out of the upstream area based on the maximum density achievable under the Puget Sound 1992 comprehensive plan, if applicable.

The site is located below Old Pacific Highway. The upstream stormwater basin area that is off-site to the northeast is cut off from the highway and is routed to an existing culvert that passes flow onto the project site. With the proposed application, the predeveloped offsite flow from this basin will be routed either to a detention facility or directly released to the Big Lake Pond system pending state approval.

E. Description of onsite stormwater system.

Design Storm	Pre-Developed Flow (cfs)	Developed Flow (cfs)	Allowable Flow (cfs)	Mitigated Flow (cfs)
Water Quality	0.27	2.66	N/A	0.59
2 year	2.10	6.54	1.05	1.02
10 year	4.18	9.45	4.18	2.26
100 year	8.33	14.65	8.33	6.63

The preliminary stormwater design to develop Sunset Terrace will either utilize a detention pond for flow control or have a direct release to the Big Lake basin system pending approval from the State. Runoff treatment for pollution generating impervious surfaces will be handled by a biofiltration swale or other approved BMP's for water quality. Many of the roofs and rear yards will utilize a clean line that will connect directly to the detention facility or the direct line to Big Lake. Roads and a small amount of roof and rear yard area will be treated by a swale. Design calculations for the detention pond can be found in appendix B. Design Calculations from Kessi Engineering will also be included for the flow towards the 18" culvert. During the final engineering stage, other stormwater treatment options may be explored provided they meet the Department of Ecology's Best Management Practices. The preliminary stormwater design is subject to change during final engineering.

F. Listing of proposed BMPs which will meet the treatment requirements of this chapter and are appropriate for the site.

Treatment will be required for all pollution generating surfaces. Roads, sidewalks, and driveways will be need water quality treatment. This application proposes a swale in the bottom of the detention pond on the west side of the site. Runoff will pass through the swale before the detention. The biofiltration swale has been preliminary sized to have a 5' bottom width by 200' long, set at a 4% slope. The WQ flow was calculated using the water quality storm or 64% of the 2-year 24 hr. storm event, and only considered the impervious area with a time of concentration of 6 minutes.

G. Description of the location of stormwater facilities on the site.

The proposed swale and detention pond will be located on the west end of the site. See attached post-developed basin map.

H. For agricultural sites with drain tiles, a discussion of the impact of construction on the drain tiles and site drainage and the impact of the drainage tiles on proposed stormwater

facilities.

There are no known drain tiles on site.

- I. Discussion of who will maintain the facility after construction and the proposed method of funding for maintenance, if the facility will be privately maintained.

The main treatment facility will be owned and maintained by the City of Kalama. The swale will be publically owned and maintained.

- J. Listing of additional permits (e.g., wetland, floodplain, and shoreline management permits) that may be required in connection with the stormwater facilities.

No additional permits are required for this site.

## Maps Appendix A

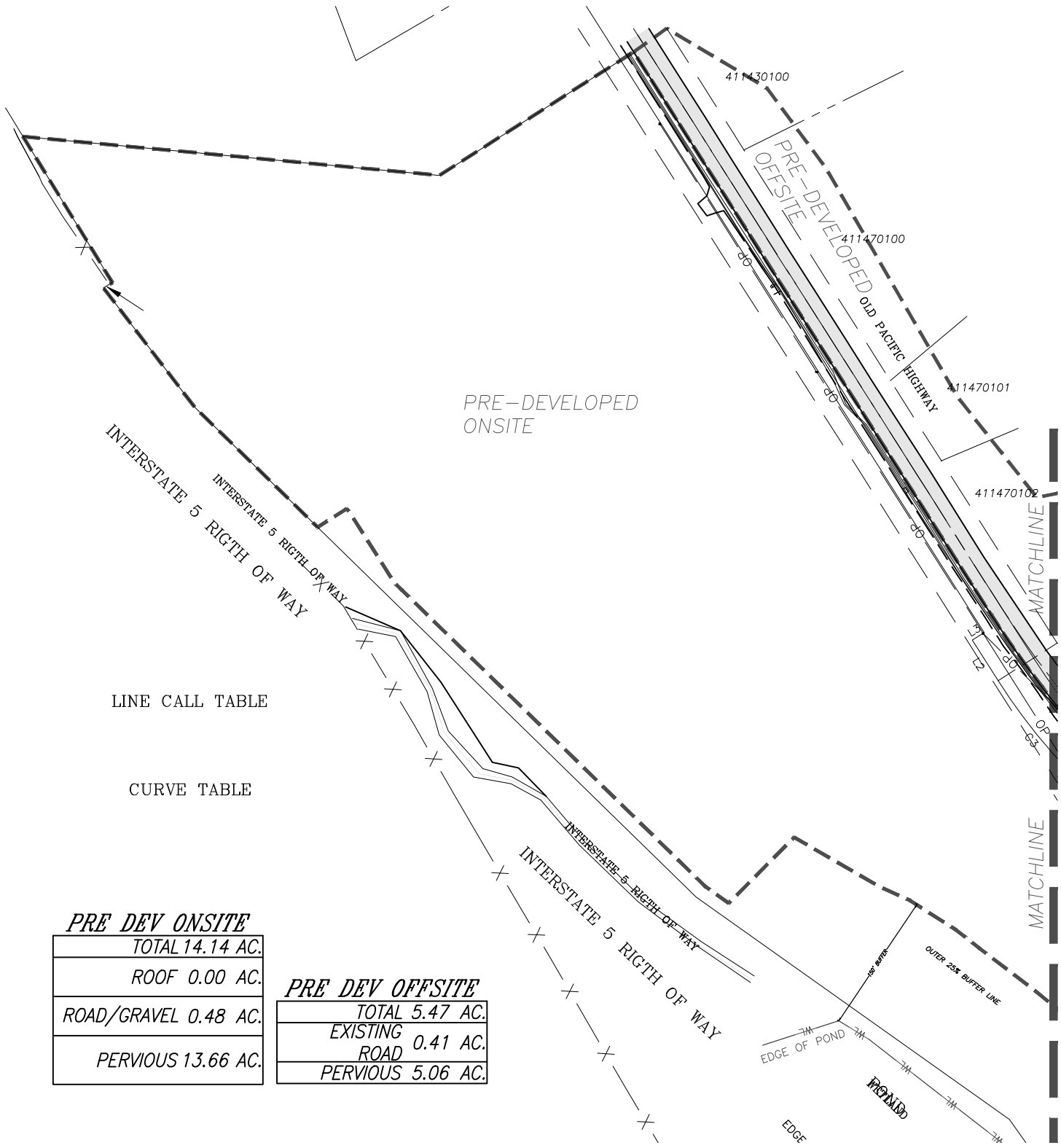
<b>General Location Map</b>	<b>A1</b>
<b>Basin Maps</b>	<b>A2</b>

Google Maps



Imagery ©2017 Google, Map data ©2017 Google 500 ft

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LINE CALL TABLE

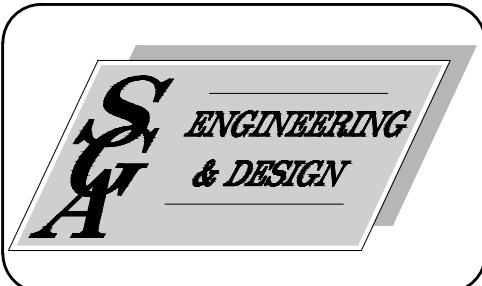
CURVE TABLE

**PRE DEV ONSITE**

TOTAL 14.14 AC.
ROOF 0.00 AC.
ROAD/GRAVEL 0.48 AC.
PERVIOUS 13.66 AC.

**PRE DEV OFFSITE**

TOTAL 5.47 AC.
EXISTING ROAD 0.41 AC.
PERVIOUS 5.06 AC.



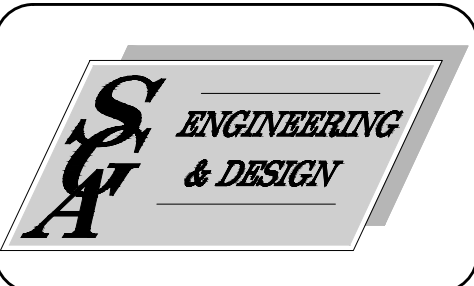
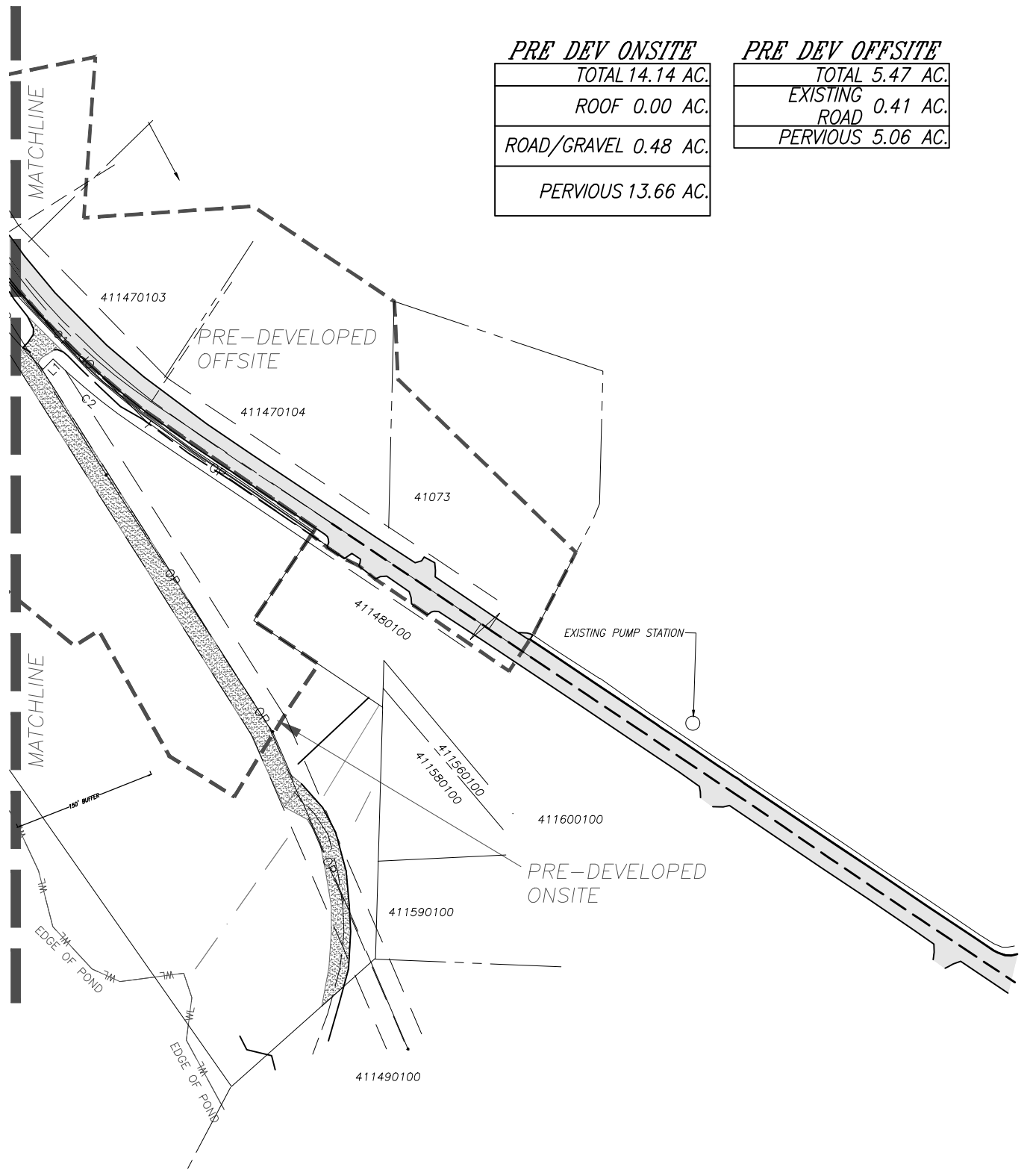
**PRE-DEVELOPED BASIN 1  
FOR  
SUNSET TERRACE  
KALAMA  
COWLITZ COUNTY, WASHINGTON**

10/5/2018  
JOB #: 1795  
SCALE: 1" = 150'

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<i>PRE DEV ONSITE</i>
TOTAL 14.14 AC.
ROOF 0.00 AC.
ROAD/GRAVEL 0.48 AC.
PERVIOUS 13.66 AC.

<i>PRE DEV OFFSITE</i>
TOTAL 5.47 AC.
EXISTING ROAD 0.41 AC.
PERVIOUS 5.06 AC.

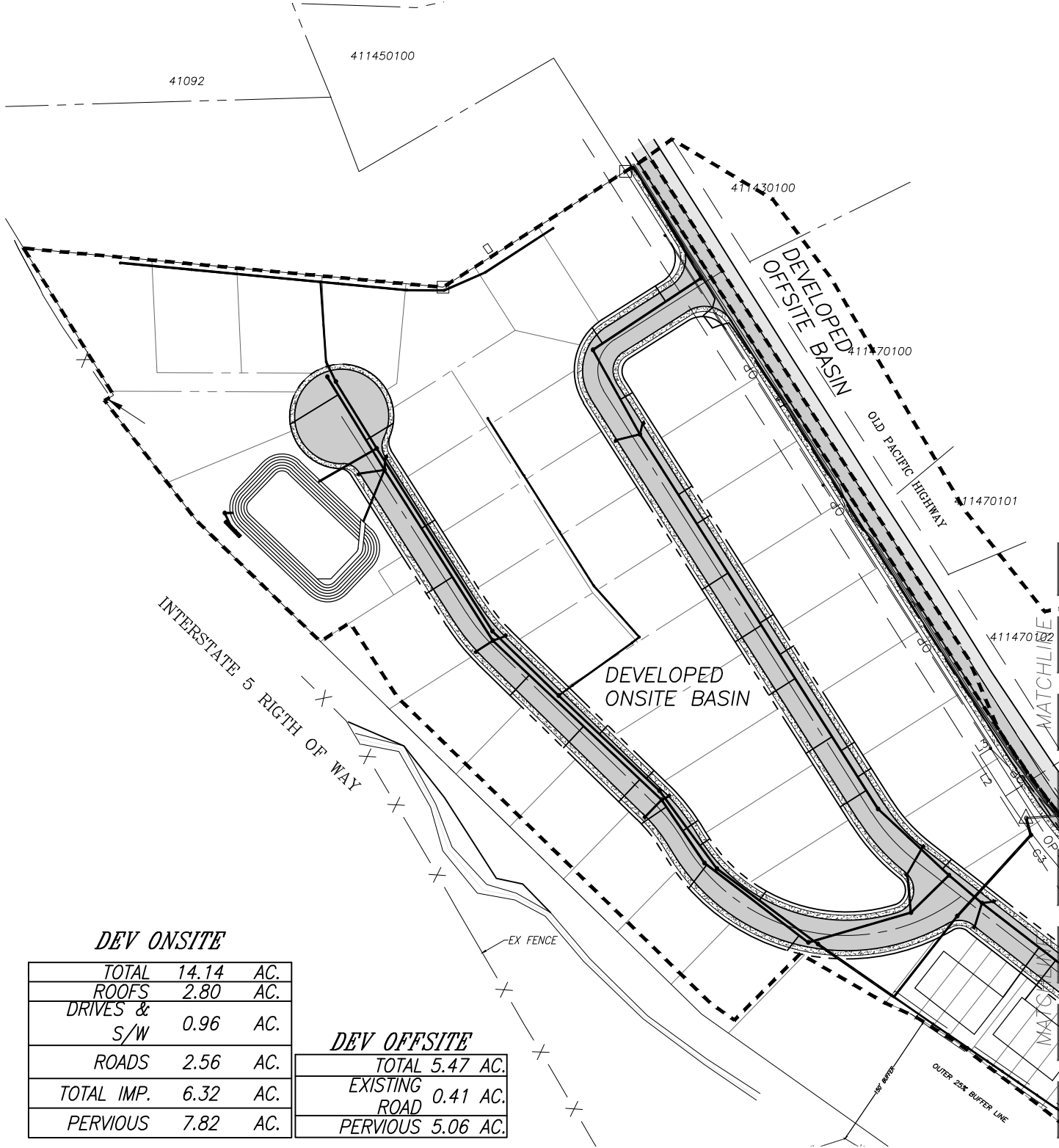


*PRE-DEVELOPED BASIN 2  
FOR  
SUNSET TERRACE  
KALAMA  
COWLITZ COUNTY, WASHINGTON*

10/5/2018  
JOB #: 1795  
SCALE: 1" = 150'



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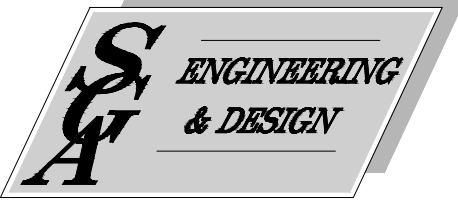


**DEV ONSITE**

TOTAL	14.14	AC.
ROOFS	2.80	AC.
DRIVES & S/W	0.96	AC.
ROADS	2.56	AC.
TOTAL IMP.	6.32	AC.
PERVIOUS	7.82	AC.

**DEV OFFSITE**

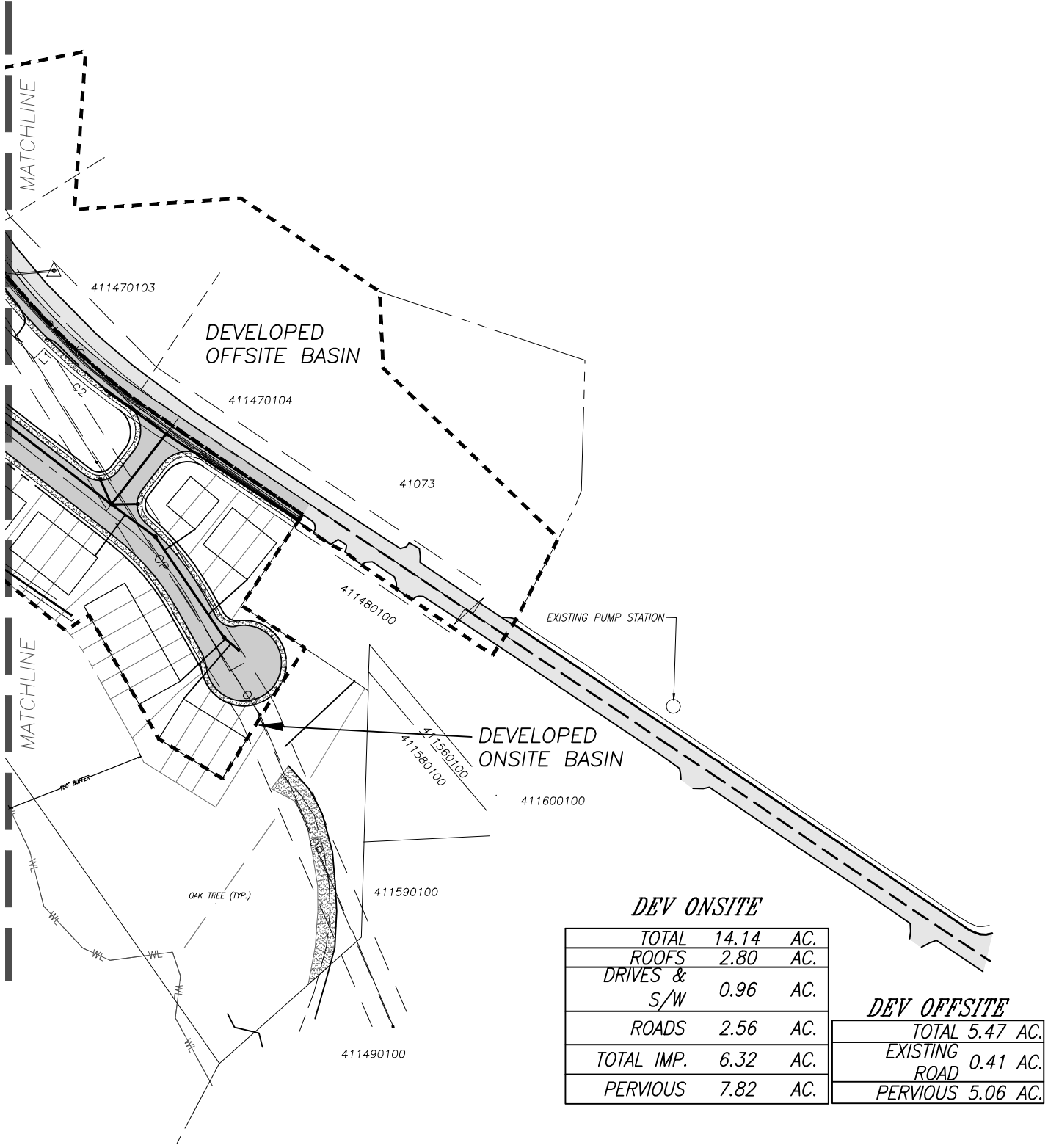
TOTAL	5.47	AC.
EXISTING ROAD	0.41	AC.
PERVIOUS	5.06	AC.



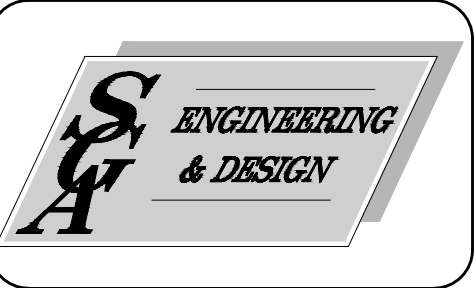
**DEVELOPED BASIN 1  
FOR  
SUNSET TERRACE  
KALAMA  
COWLITZ COUNTY, WASHINGTON**

10/5/2018  
JOB #: 1795  
SCALE: 1" = 150'

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<i>DEV ONSITE</i>		<i>DEV OFFSITE</i>	
TOTAL	14.14 AC.	TOTAL	5.47 AC.
ROOFS	2.80 AC.	EXISTING ROAD	0.41 AC.
DRIVES & S/W	0.96 AC.	PERVIOUS	5.06 AC.
ROADS	2.56 AC.		
TOTAL IMP.	6.32 AC.		
PERVIOUS	7.82 AC.		



**DEVELOPED BASIN 2  
 FOR  
 SUNSET TERRACE  
 KALAMA  
 COWLITZ COUNTY, WASHINGTON**

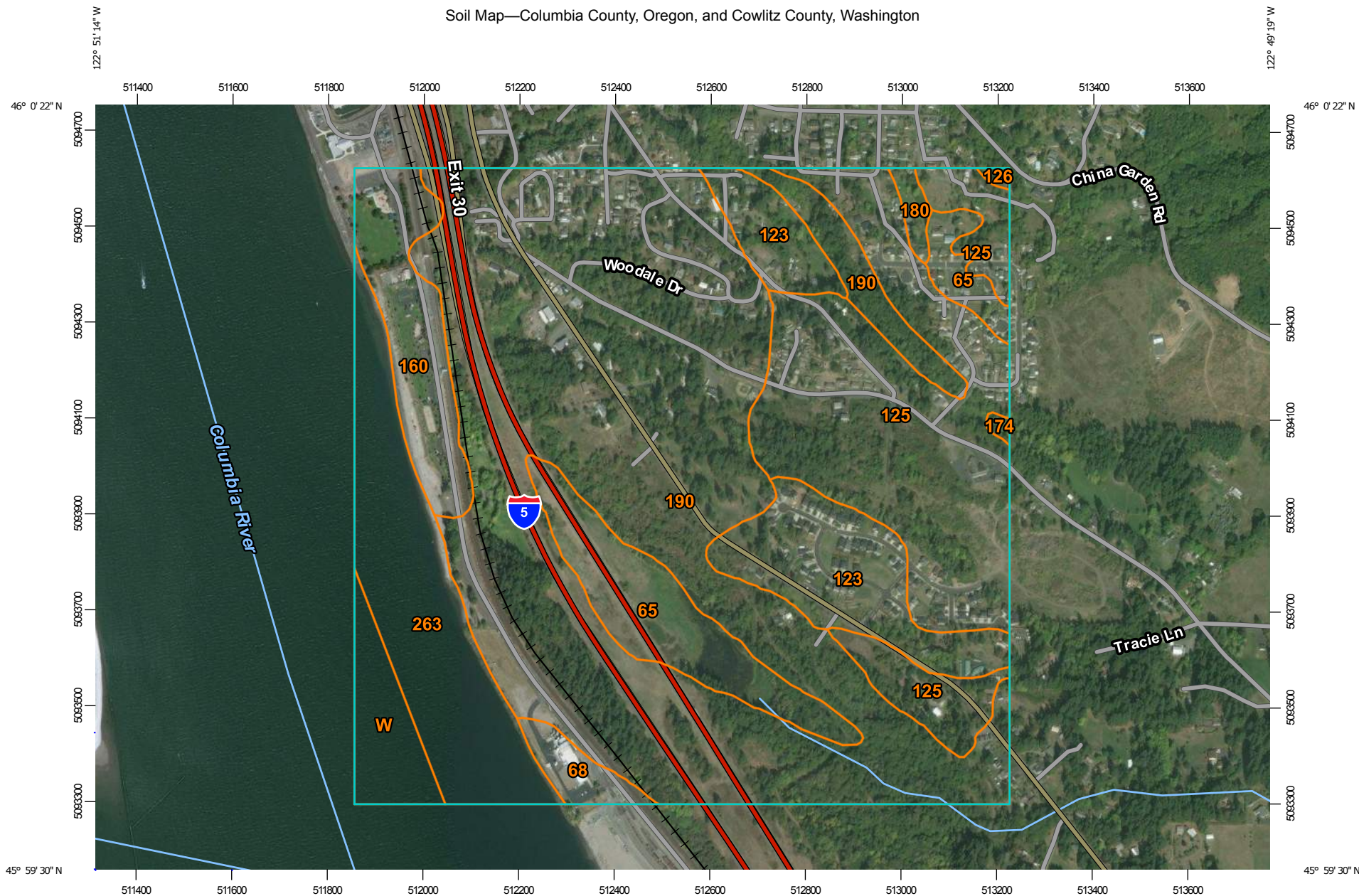
10/5/2018  
 JOB #: 1795  
 SCALE: 1" = 150'

# **Hydraulic Calculations Appendix B**

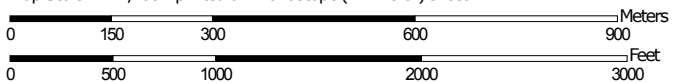
**Soil Description**

**Water Quality Design**

Soil Map—Columbia County, Oregon, and Cowlitz County, Washington



Map Scale: 1:11,200 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84






## MAP LEGEND




















### Area of Interest (AOI)







Area of Interest (AOI)

### Soils


-  Soil Map Unit Polygons
-  Soil Map Unit Lines
-  Soil Map Unit Points

### Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


### 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 scales ranging from 1:20,000 to 1:24,000.

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: Columbia County, Oregon

Survey Area Data: Version 15, Sep 17, 2018

Soil Survey Area: Cowlitz County, Washington

Survey Area Data: Version 19, Sep 10, 2018

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Sep 29, 2015—Sep 13, 2016

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.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
W	Water	11.6	2.6%
<b>Subtotals for Soil Survey Area</b>		<b>11.6</b>	<b>2.6%</b>
<b>Totals for Area of Interest</b>		<b>450.9</b>	<b>100.0%</b>

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
65	Godfrey silt loam, 0 to 3 percent slopes	29.6	6.6%
68	Greenwater gravelly loamy sand, 0 to 8 percent slopes	5.5	1.2%
123	Mart silt loam, 0 to 8 percent slopes	36.5	8.1%
125	Mart silt loam, 20 to 30 percent slopes	88.9	19.7%
126	Mart silt loam, 30 to 65 percent slopes	0.5	0.1%
160	Pilchuck loamy fine sand, 0 to 8 percent slopes	22.6	5.0%
174	Rose Valley silt loam, 0 to 8 percent slopes	0.5	0.1%
180	Sara silt loam, 8 to 15 percent slopes	2.2	0.5%
190	Schneider-Rock outcrop complex, 15 to 65 percent slopes	210.5	46.7%
263	Water	42.5	9.4%
<b>Subtotals for Soil Survey Area</b>		<b>439.3</b>	<b>97.4%</b>
<b>Totals for Area of Interest</b>		<b>450.9</b>	<b>100.0%</b>



## Cowlitz County, Washington

### 190—Schneider-Rock outcrop complex, 15 to 65 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2f5s  
*Elevation:* 50 to 1,800 feet  
*Mean annual precipitation:* 60 to 75 inches  
*Mean annual air temperature:* 48 to 52 degrees F  
*Frost-free period:* 150 to 200 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Schneider and similar soils:* 55 percent  
*Rock outcrop:* 30 percent  
*Minor components:* 10 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Schneider

##### Setting

*Landform:* Mountain slopes  
*Parent material:* Residuum and colluvium from breccia and andesite

##### Typical profile

*H1 - 0 to 12 inches:* very gravelly loam  
*H2 - 12 to 28 inches:* extremely gravelly loam  
*H3 - 28 to 45 inches:* extremely gravelly loam  
*H4 - 45 to 49 inches:* unweathered bedrock

##### Properties and qualities

*Slope:* 15 to 65 percent  
*Depth to restrictive feature:* 40 to 60 inches to lithic bedrock  
*Natural drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately high to high (0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water storage in profile:* Low (about 3.9 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7e  
*Hydrologic Soil Group:* B  
*Hydric soil rating:* No

### **Description of Rock Outcrop**

#### **Properties and qualities**

*Slope:* 15 to 65 percent

*Depth to restrictive feature:* 0 inches to lithic bedrock

#### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 8s

*Hydric soil rating:* No

### **Minor Components**

#### **Unnamed, shallow**

*Percent of map unit:* 10 percent

*Hydric soil rating:* No

## **Data Source Information**

Soil Survey Area: Columbia County, Oregon

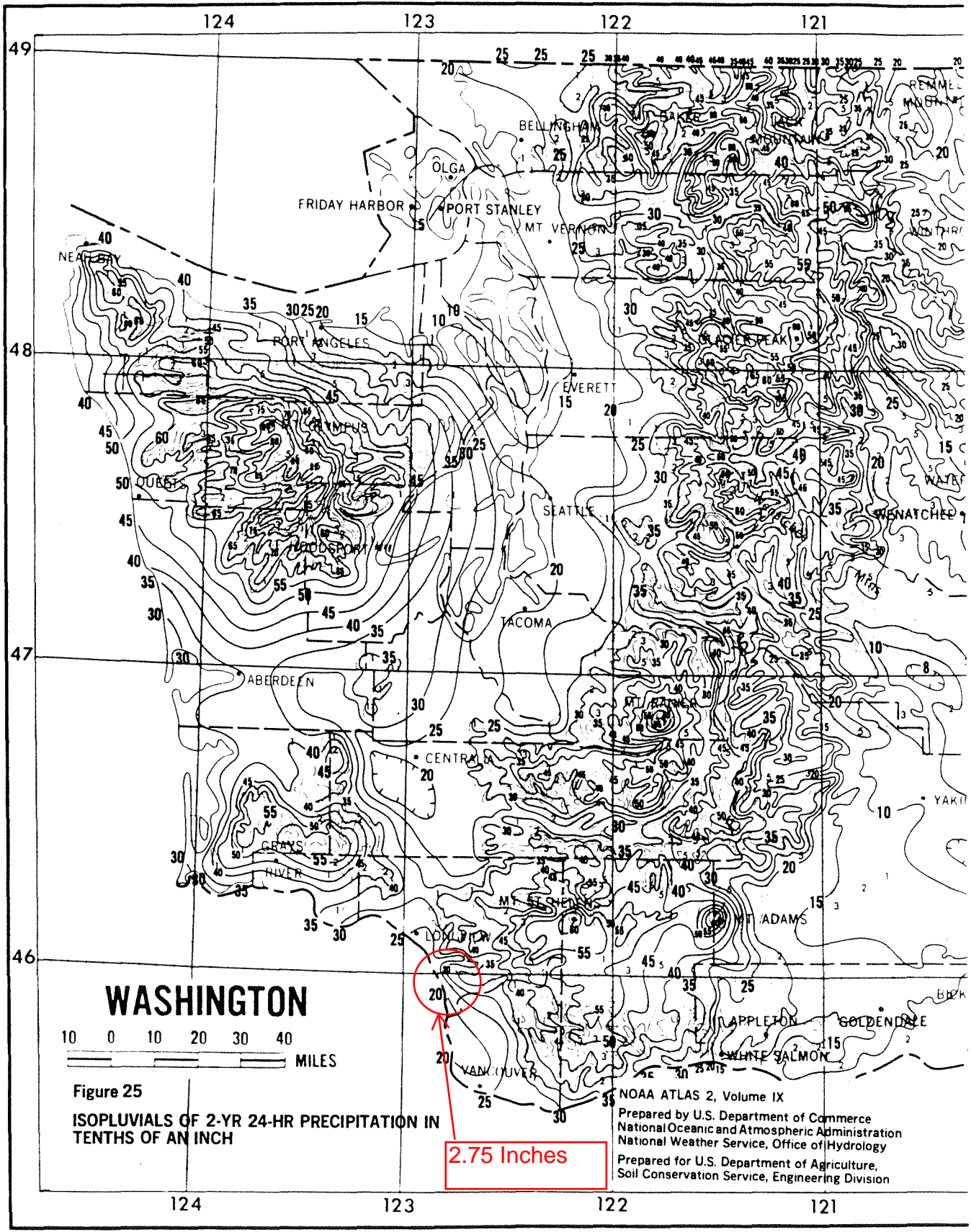
Survey Area Data: Version 15, Sep 17, 2018

Soil Survey Area: Cowlitz County, Washington

Survey Area Data: Version 19, Sep 10, 2018



STORMWATER MANAGEMENT MANUAL FOR THE PUGET SOUND BASIN



WASHINGTON

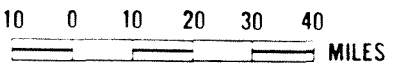
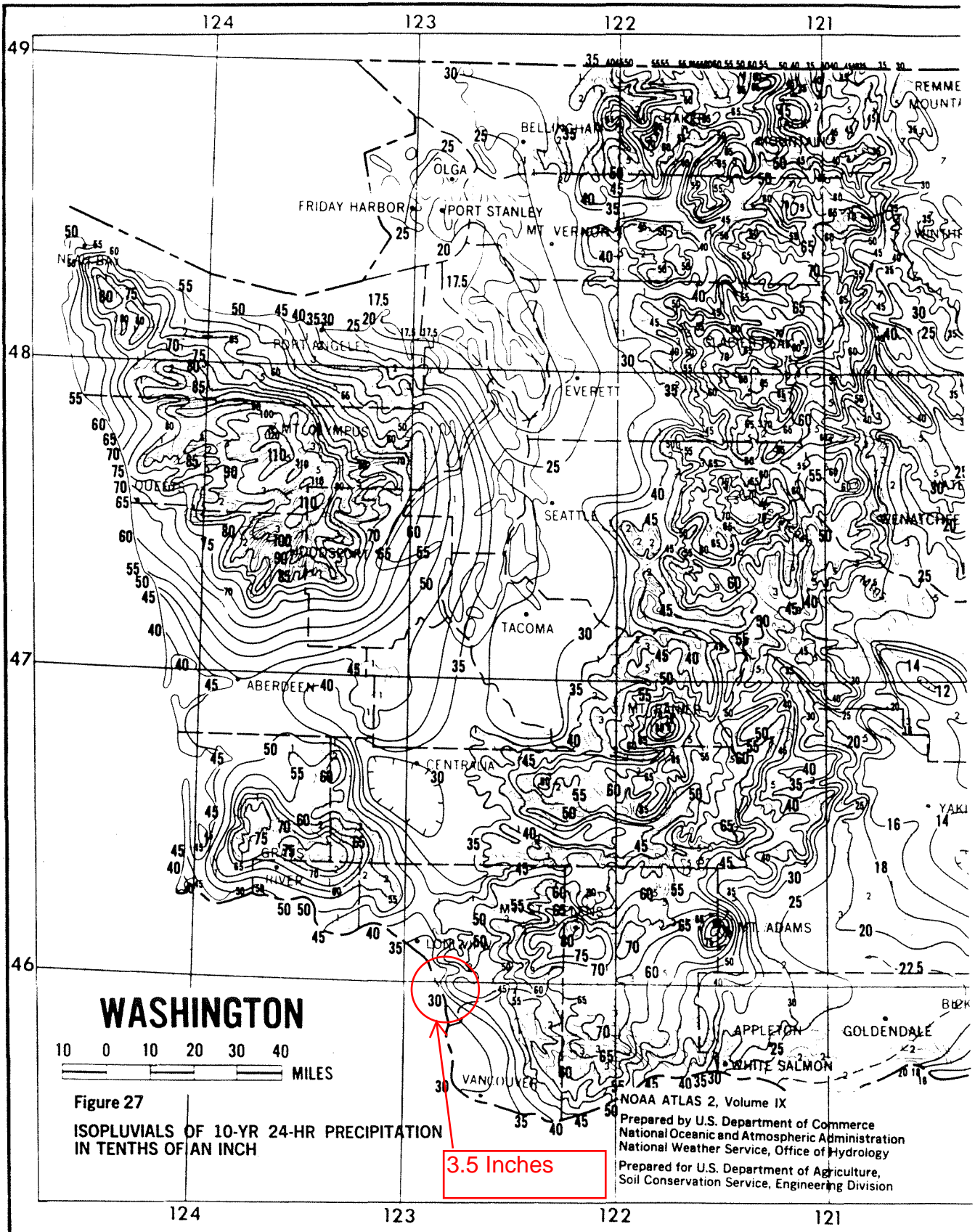


Figure 25  
ISOPLUVIALS OF 2-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IX  
Prepared by U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
National Weather Service, Office of Hydrology  
Prepared for U.S. Department of Agriculture,  
Soil Conservation Service, Engineering Division

STORMWATER MANAGEMENT MANUAL FOR THE PUGET SOUND BASIN

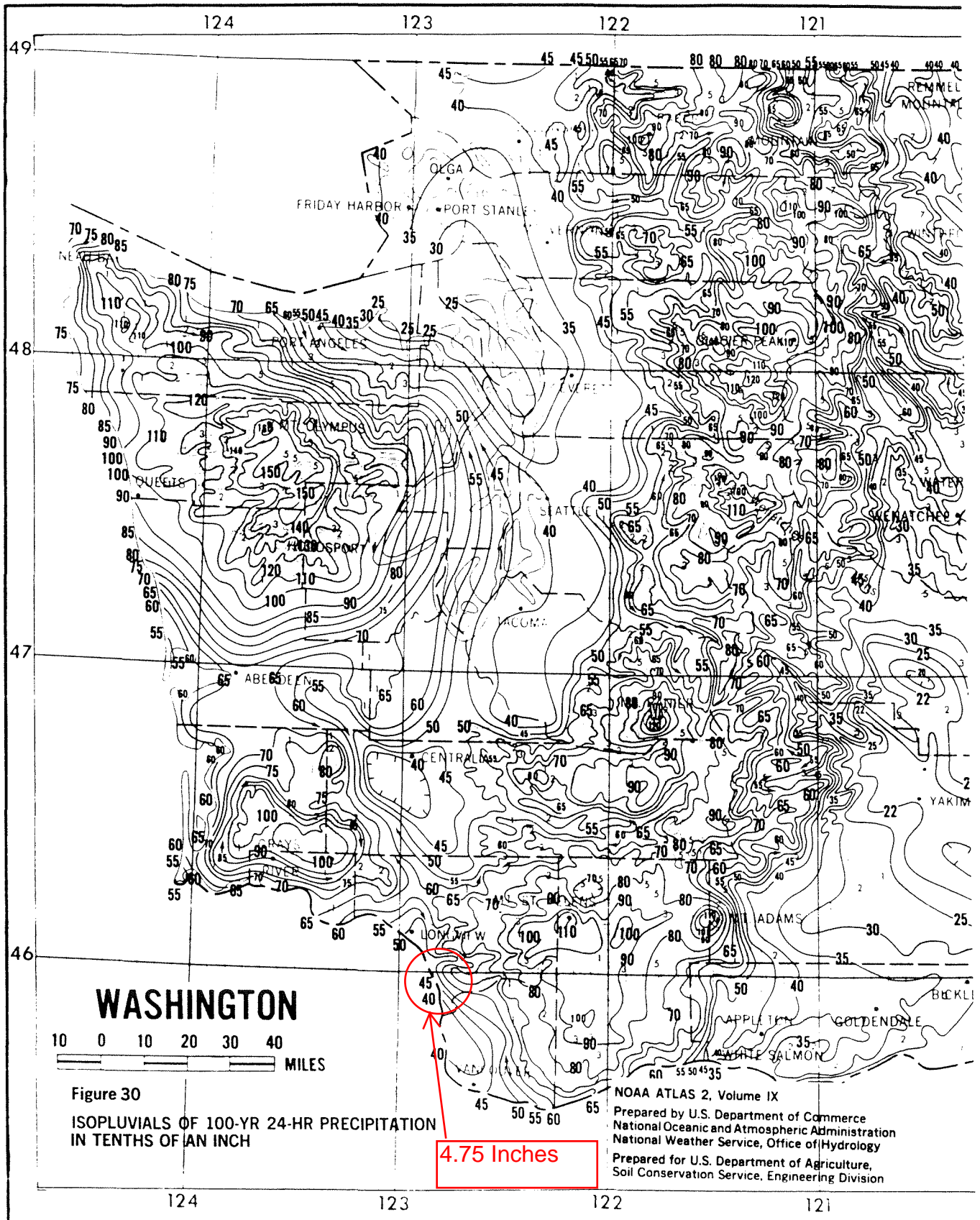


**WASHINGTON**  
 10 0 10 20 30 40  
 MILES

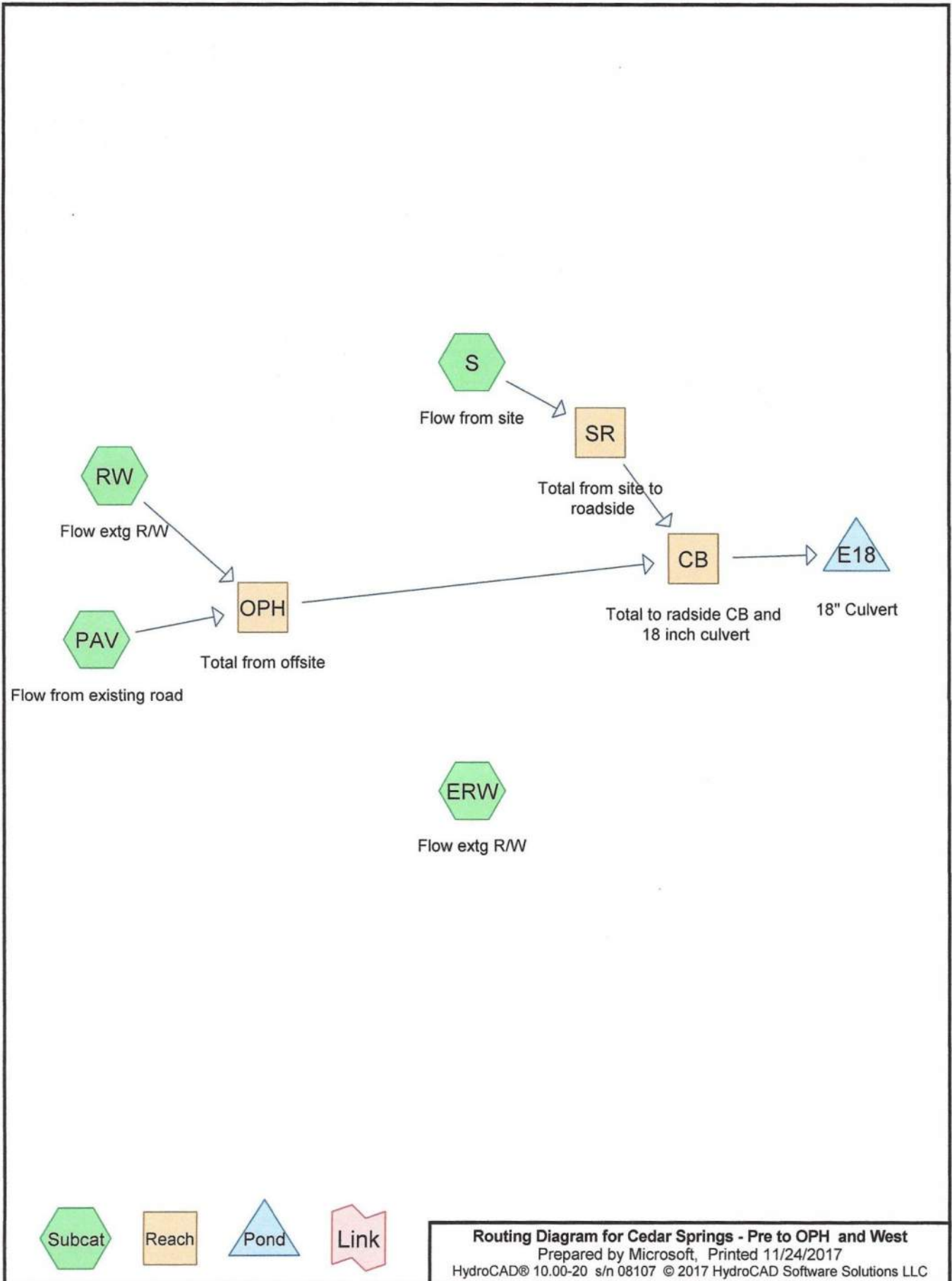
**Figure 27**  
**ISOPLUVIALS OF 10-YR 24-HR PRECIPITATION**  
**IN TENTHS OF AN INCH**

NOAA ATLAS 2, Volume IX  
 Prepared by U.S. Department of Commerce  
 National Oceanic and Atmospheric Administration  
 National Weather Service, Office of Hydrology  
 Prepared for U.S. Department of Agriculture,  
 Soil Conservation Service, Engineering Division

STORMWATER MANAGEMENT MANUAL FOR THE PUGET SOUND BASIN







**Cedar Springs - Pre to OPH and West**

Prepared by Microsoft

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CEDAR SPRINGS - PRE  
Type IA 24-hr 2-yr Rainfall=2.75"

Printed 11/24/2017

Page 2

**Summary for Subcatchment ERW: Flow extg R/W**

Runoff = 0.12 cfs @ 8.03 hrs, Volume= 0.052 af, Depth> 1.72"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2-yr Rainfall=2.75"

Area (ac)	CN	Description
* 0.179	78	Field (HSG B)
* 0.180	98	Widened and add sidewalk
0.359	88	Weighted Average
0.179	78	49.86% Pervious Area
0.180	98	50.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow, 26 in 105</b> Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow, 5 in 237</b> Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Subcatchment PAV: Flow from existing road**

Runoff = 0.26 cfs @ 7.90 hrs, Volume= 0.085 af, Depth> 2.52"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2-yr Rainfall=2.75"

Area (ac)	CN	Description
* 0.405	98	Extg Rd.
0.405	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Assumed</b>

**Summary for Subcatchment RW: Flow extg R/W**

Runoff = 0.05 cfs @ 8.07 hrs, Volume= 0.028 af, Depth> 0.94"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2-yr Rainfall=2.75"

Area (ac)	CN	Description
* 0.359	78	Field (HSG B)
0.359	78	100.00% Pervious Area

**Cedar Springs - Pre to OPH and West**

Prepared by Microsoft

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CEDAR SPRINGS - PRE  
Type IA 24-hr 2-yr Rainfall=2.75"

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Page 3

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow, 26 in 105</b>
					Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow, 5 in 237</b>
					Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Subcatchment S: Flow from site**

Runoff = 0.65 cfs @ 8.07 hrs, Volume= 0.369 af, Depth> 0.94"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2-yr Rainfall=2.75"

Area (ac)	CN	Description
* 4.080	78	Field (HSG B)
* 0.621	76	Wooded - young growth - brush
4.701	78	Weighted Average
4.701	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow, 26 in 105</b>
					Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow, 5 in 237</b>
					Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Reach CB: Total to roadside CB and 18 inch culvert**

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 1.06" for 2-yr event  
Inflow = 0.93 cfs @ 8.02 hrs, Volume= 0.482 af  
Outflow = 0.93 cfs @ 8.02 hrs, Volume= 0.482 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Summary for Reach OPH: Total from offsite**

Inflow Area = 0.764 ac, 53.01% Impervious, Inflow Depth > 1.78" for 2-yr event  
Inflow = 0.30 cfs @ 7.95 hrs, Volume= 0.113 af  
Outflow = 0.30 cfs @ 7.95 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



**Cedar Springs - Pre to OPH and West**

Prepared by Microsoft

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CEDAR SPRINGS - PRE  
Type IA 24-hr 2-yr Rainfall=2.75"

Printed 11/24/2017

Page 4

**Summary for Reach SR: Total from site to roadside**

Inflow Area = 4.701 ac, 0.00% Impervious, Inflow Depth > 0.94" for 2-yr event  
 Inflow = 0.65 cfs @ 8.07 hrs, Volume= 0.369 af  
 Outflow = 0.65 cfs @ 8.07 hrs, Volume= 0.369 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Summary for Pond E18: 18" Culvert**

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 1.06" for 2-yr event  
 Inflow = 0.93 cfs @ 8.02 hrs, Volume= 0.482 af  
 Outflow = 0.93 cfs @ 8.02 hrs, Volume= 0.482 af, Atten= 0%, Lag= 0.0 min  
 Primary = 0.93 cfs @ 8.02 hrs, Volume= 0.482 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 110.01' @ 8.02 hrs Surf.Area= 6 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.482 af (100% of inflow)

Center-of-Mass det. time= 0.0 min ( 829.3 - 829.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	110.00'	13,662 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	5	0	0
111.00	193	99	99
113.00	1,468	1,661	1,760
114.00	2,783	2,126	3,886
115.00	4,604	3,694	7,579
116.00	7,561	6,083	13,662

Device	Routing	Invert	Outlet Devices
#1	Primary	108.22'	<b>18.0" Round Culvert</b> L= 60.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 108.22' / 107.62' S= 0.0100 '/ Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

**Primary OutFlow** Max=8.66 cfs @ 8.02 hrs HW=110.01' (Free Discharge)

←1=Culvert (Inlet Controls 8.66 cfs @ 4.90 fps)

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Type IA 24-hr 10-yr Rainfall=3.50"

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**Summary for Subcatchment ERW: Flow extg R/W**

Runoff = 0.16 cfs @ 8.03 hrs, Volume= 0.071 af, Depth&gt; 2.36"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10-yr Rainfall=3.50"

Area (ac)	CN	Description
* 0.179	78	Field (HSG B)
* 0.180	98	Widened and add sidewalk
0.359	88	Weighted Average
0.179	78	49.86% Pervious Area
0.180	98	50.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow, 26 in 105</b> Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow, 5 in 237</b> Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Subcatchment PAV: Flow from existing road**

Runoff = 0.33 cfs @ 7.90 hrs, Volume= 0.110 af, Depth&gt; 3.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10-yr Rainfall=3.50"

Area (ac)	CN	Description
* 0.405	98	Extg Rd.
0.405	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Assumed</b>

**Summary for Subcatchment RW: Flow extg R/W**

Runoff = 0.09 cfs @ 8.05 hrs, Volume= 0.044 af, Depth&gt; 1.48"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10-yr Rainfall=3.50"

Area (ac)	CN	Description
* 0.359	78	Field (HSG B)
0.359	78	100.00% Pervious Area



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Type IA 24-hr 10-yr Rainfall=3.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow, 26 in 105</b>
					Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow, 5 in 237</b>
					Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Subcatchment S: Flow from site**

Runoff = 1.17 cfs @ 8.05 hrs, Volume= 0.579 af, Depth> 1.48"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10-yr Rainfall=3.50"

Area (ac)	CN	Description
* 4.080	78	Field (HSG B)
* 0.621	76	Wooded - young growth - brush
4.701	78	Weighted Average
4.701	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow, 26 in 105</b>
					Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow, 5 in 237</b>
					Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Reach CB: Total to roadside CB and 18 inch culvert**

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 1.61" for 10-yr event  
Inflow = 1.57 cfs @ 8.02 hrs, Volume= 0.734 af  
Outflow = 1.57 cfs @ 8.02 hrs, Volume= 0.734 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Summary for Reach OPH: Total from offsite**

Inflow Area = 0.764 ac, 53.01% Impervious, Inflow Depth > 2.42" for 10-yr event  
Inflow = 0.41 cfs @ 7.96 hrs, Volume= 0.154 af  
Outflow = 0.41 cfs @ 7.96 hrs, Volume= 0.154 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

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**Summary for Reach SR: Total from site to roadside**

Inflow Area = 4.701 ac, 0.00% Impervious, Inflow Depth > 1.48" for 10-yr event  
 Inflow = 1.17 cfs @ 8.05 hrs, Volume= 0.579 af  
 Outflow = 1.17 cfs @ 8.05 hrs, Volume= 0.579 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Summary for Pond E18: 18" Culvert**

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 1.61" for 10-yr event  
 Inflow = 1.57 cfs @ 8.02 hrs, Volume= 0.734 af  
 Outflow = 1.57 cfs @ 8.02 hrs, Volume= 0.734 af, Atten= 0%, Lag= 0.0 min  
 Primary = 1.57 cfs @ 8.02 hrs, Volume= 0.734 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 110.01' @ 8.02 hrs Surf.Area= 7 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.734 af (100% of inflow)

Center-of-Mass det. time= 0.0 min ( 808.5 - 808.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	110.00'	13,662 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	5	0	0
111.00	193	99	99
113.00	1,468	1,661	1,760
114.00	2,783	2,126	3,886
115.00	4,604	3,694	7,579
116.00	7,561	6,083	13,662

Device	Routing	Invert	Outlet Devices
#1	Primary	108.22'	<b>18.0" Round Culvert</b> L= 60.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 108.22' / 107.62' S= 0.0100 '/ Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

**Primary OutFlow** Max=8.68 cfs @ 8.02 hrs HW=110.01' (Free Discharge)

←1=Culvert (Inlet Controls 8.68 cfs @ 4.91 fps)

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Type IA 24-hr 100-yr Rainfall=4.75"

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**Summary for Subcatchment ERW: Flow extg R/W**

Runoff = 0.25 cfs @ 8.03 hrs, Volume= 0.104 af, Depth&gt; 3.48"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100-yr Rainfall=4.75"

Area (ac)	CN	Description
* 0.179	78	Field (HSG B)
* 0.180	98	Widened and add sidewalk
0.359	88	Weighted Average
0.179	78	49.86% Pervious Area
0.180	98	50.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow, 26 in 105</b> Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow, 5 in 237</b> Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Subcatchment PAV: Flow from existing road**

Runoff = 0.45 cfs @ 7.90 hrs, Volume= 0.152 af, Depth&gt; 4.51"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100-yr Rainfall=4.75"

Area (ac)	CN	Description
* 0.405	98	Extg Rd.
0.405	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Assumed</b>

**Summary for Subcatchment RW: Flow extg R/W**

Runoff = 0.17 cfs @ 8.04 hrs, Volume= 0.074 af, Depth&gt; 2.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100-yr Rainfall=4.75"

Area (ac)	CN	Description
* 0.359	78	Field (HSG B)
0.359	78	100.00% Pervious Area



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Type IA 24-hr 100-yr Rainfall=4.75"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow, 26 in 105</b>
					Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow, 5 in 237</b>
					Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Subcatchment S: Flow from site**

Runoff = 2.18 cfs @ 8.04 hrs, Volume= 0.969 af, Depth> 2.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100-yr Rainfall=4.75"

Area (ac)	CN	Description
* 4.080	78	Field (HSG B)
* 0.621	76	Wooded - young growth - brush
4.701	78	Weighted Average
4.701	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow, 26 in 105</b>
					Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow, 5 in 237</b>
					Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Reach CB: Total to roadside CB and 18 inch culvert**

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 2.62" for 100-yr event  
Inflow = 2.76 cfs @ 8.02 hrs, Volume= 1.195 af  
Outflow = 2.76 cfs @ 8.02 hrs, Volume= 1.195 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Summary for Reach OPH: Total from offsite**

Inflow Area = 0.764 ac, 53.01% Impervious, Inflow Depth > 3.55" for 100-yr event  
Inflow = 0.61 cfs @ 7.97 hrs, Volume= 0.226 af  
Outflow = 0.61 cfs @ 7.97 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

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CEDAR SPRINGS - PRE  
Type IA 24-hr 100-yr Rainfall=4.75"

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**Summary for Reach SR: Total from site to roadside**

Inflow Area = 4.701 ac, 0.00% Impervious, Inflow Depth > 2.47" for 100-yr event  
 Inflow = 2.18 cfs @ 8.04 hrs, Volume= 0.969 af  
 Outflow = 2.18 cfs @ 8.04 hrs, Volume= 0.969 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Summary for Pond E18: 18" Culvert**

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 2.62" for 100-yr event  
 Inflow = 2.76 cfs @ 8.02 hrs, Volume= 1.195 af  
 Outflow = 2.76 cfs @ 8.02 hrs, Volume= 1.195 af, Atten= 0%, Lag= 0.0 min  
 Primary = 2.76 cfs @ 8.02 hrs, Volume= 1.195 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 110.02' @ 8.02 hrs Surf.Area= 9 sf Storage= 0 cf

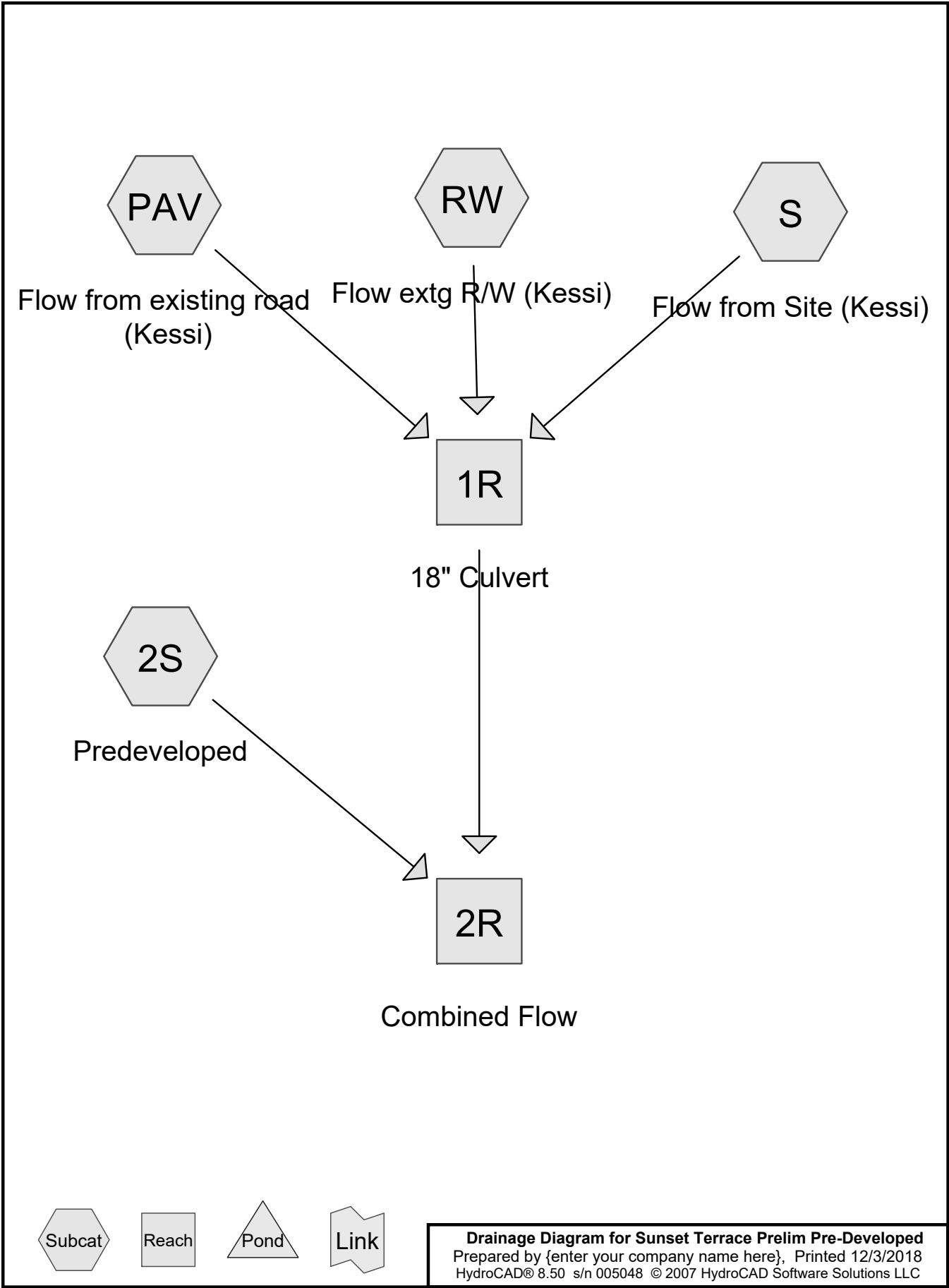
Plug-Flow detention time= 0.0 min calculated for 1.192 af (100% of inflow)  
 Center-of-Mass det. time= 0.0 min ( 784.1 - 784.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	110.00'	13,662 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	5	0	0
111.00	193	99	99
113.00	1,468	1,661	1,760
114.00	2,783	2,126	3,886
115.00	4,604	3,694	7,579
116.00	7,561	6,083	13,662

Device	Routing	Invert	Outlet Devices
#1	Primary	108.22'	<b>18.0" Round Culvert</b> L= 60.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 108.22' / 107.62' S= 0.0100 ' / Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

**Primary OutFlow** Max=8.71 cfs @ 8.02 hrs HW=110.02' (Free Discharge)  
 ←1=Culvert (Inlet Controls 8.71 cfs @ 4.93 fps)



**Sunset Terrace Prelim Pre-Developed**

Type IA 24-hr 2 yr Rainfall=2.75"

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**Summary for Subcatchment 2S: Predeveloped**

Runoff = 1.18 cfs @ 8.06 hrs, Volume= 0.807 af, Depth> 0.68"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2 yr Rainfall=2.75"

Area (ac)	CN	Description
* 13.660	72	Pervious
* 0.210	98	Existing Road
* 0.270	85	Gravel Access
14.140	73	Weighted Average
13.930	72	Pervious Area
0.210	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	300	0.1500	0.44		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 2.75"
1.7	300	0.1800	2.97		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
13.1	600	Total			

**Summary for Subcatchment PAV: Flow from existing road (Kessi)**

Runoff = 0.26 cfs @ 7.90 hrs, Volume= 0.085 af, Depth> 2.52"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2 yr Rainfall=2.75"

Area (ac)	CN	Description
* 0.405	98	Extg Rd.
0.405	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Assumed</b>

**Summary for Subcatchment RW: Flow extg R/W (Kessi)**

Runoff = 0.05 cfs @ 8.07 hrs, Volume= 0.028 af, Depth> 0.94"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2 yr Rainfall=2.75"

Area (ac)	CN	Description
* 0.359	78	
0.359	78	Pervious Area

**Sunset Terrace Prelim Pre-Developed**

Type IA 24-hr 2 yr Rainfall=2.75"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Subcatchment S: Flow from Site (Kessi)**

Runoff = 0.65 cfs @ 8.07 hrs, Volume= 0.369 af, Depth> 0.94"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2 yr Rainfall=2.75"

Area (ac)	CN	Description
* 4.080	78	Field (HSG B)
* 0.621	76	Wooded - young growth - brush
4.701	78	Weighted Average
4.701	78	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Reach 1R: 18" Culvert**

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 1.06" for 2 yr event  
 Inflow = 0.93 cfs @ 8.02 hrs, Volume= 0.482 af  
 Outflow = 0.93 cfs @ 8.03 hrs, Volume= 0.482 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 3.66 fps, Min. Travel Time= 0.3 min  
 Avg. Velocity = 2.31 fps, Avg. Travel Time= 0.4 min

Peak Storage= 15 cf @ 8.03 hrs, Average Depth at Peak Storage= 0.30'  
 Bank-Full Depth= 1.50', Capacity at Bank-Full= 10.50 cfs

18.0" Diameter Pipe, n= 0.013  
 Length= 60.0' Slope= 0.0100 '/'  
 Inlet Invert= 0.00', Outlet Invert= -0.60'



# Sunset Terrace Prelim Pre-Developed

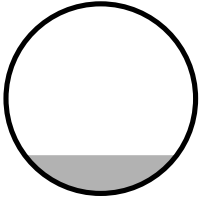
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Type IA 24-hr 2 yr Rainfall=2.75"

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## Summary for Reach 2R: Combined Flow

Inflow Area = 19.605 ac, 3.14% Impervious, Inflow Depth > 0.79" for 2 yr event  
Inflow = 2.10 cfs @ 8.05 hrs, Volume= 1.288 af  
Outflow = 2.10 cfs @ 8.05 hrs, Volume= 1.288 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Sunset Terrace Prelim Pre-Developed**

Type IA 24-hr 10 yr Rainfall=3.50"

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**Summary for Subcatchment 2S: Predeveloped**

Runoff = 2.62 cfs @ 8.03 hrs, Volume= 1.347 af, Depth&gt; 1.14"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10 yr Rainfall=3.50"

Area (ac)	CN	Description
* 13.660	72	Pervious
* 0.210	98	Existing Road
* 0.270	85	Gravel Access
14.140	73	Weighted Average
13.930	72	Pervious Area
0.210	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	300	0.1500	0.44		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 2.75"
1.7	300	0.1800	2.97		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
13.1	600	Total			

**Summary for Subcatchment PAV: Flow from existing road (Kessi)**

Runoff = 0.33 cfs @ 7.90 hrs, Volume= 0.110 af, Depth&gt; 3.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10 yr Rainfall=3.50"

Area (ac)	CN	Description
* 0.405	98	Extg Rd.
0.405	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Assumed</b>

**Summary for Subcatchment RW: Flow extg R/W (Kessi)**

Runoff = 0.09 cfs @ 8.05 hrs, Volume= 0.044 af, Depth&gt; 1.48"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10 yr Rainfall=3.50"

Area (ac)	CN	Description
* 0.359	78	
0.359	78	Pervious Area

**Sunset Terrace Prelim Pre-Developed**

Type IA 24-hr 10 yr Rainfall=3.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Subcatchment S: Flow from Site (Kessi)**

Runoff = 1.17 cfs @ 8.05 hrs, Volume= 0.579 af, Depth> 1.48"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10 yr Rainfall=3.50"

Area (ac)	CN	Description
* 4.080	78	Field (HSG B)
* 0.621	76	Wooded - young growth - brush
4.701	78	Weighted Average
4.701	78	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Reach 1R: 18" Culvert**

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 1.61" for 10 yr event  
Inflow = 1.57 cfs @ 8.02 hrs, Volume= 0.734 af  
Outflow = 1.56 cfs @ 8.03 hrs, Volume= 0.733 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Max. Velocity= 4.26 fps, Min. Travel Time= 0.2 min  
Avg. Velocity = 2.60 fps, Avg. Travel Time= 0.4 min

Peak Storage= 22 cf @ 8.03 hrs, Average Depth at Peak Storage= 0.39'  
Bank-Full Depth= 1.50', Capacity at Bank-Full= 10.50 cfs

18.0" Diameter Pipe, n= 0.013  
Length= 60.0' Slope= 0.0100 '/'  
Inlet Invert= 0.00', Outlet Invert= -0.60'

# Sunset Terrace Prelim Pre-Developed

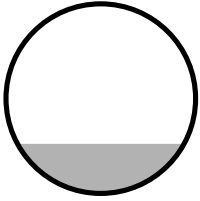
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Type IA 24-hr 10 yr Rainfall=3.50"

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## Summary for Reach 2R: Combined Flow

Inflow Area = 19.605 ac, 3.14% Impervious, Inflow Depth > 1.27" for 10 yr event  
Inflow = 4.18 cfs @ 8.03 hrs, Volume= 2.080 af  
Outflow = 4.18 cfs @ 8.03 hrs, Volume= 2.080 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Sunset Terrace Prelim Pre-Developed**

Type IA 24-hr 100 yr Rainfall=4.75"

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**Summary for Subcatchment 2S: Predeveloped**

Runoff = 5.57 cfs @ 8.02 hrs, Volume= 2.391 af, Depth> 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100 yr Rainfall=4.75"

Area (ac)	CN	Description
* 13.660	72	Pervious
* 0.210	98	Existing Road
* 0.270	85	Gravel Access
14.140	73	Weighted Average
13.930	72	Pervious Area
0.210	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	300	0.1500	0.44		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 2.75"
1.7	300	0.1800	2.97		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
13.1	600	Total			

**Summary for Subcatchment PAV: Flow from existing road (Kessi)**

Runoff = 0.45 cfs @ 7.90 hrs, Volume= 0.152 af, Depth> 4.51"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100 yr Rainfall=4.75"

Area (ac)	CN	Description
* 0.405	98	Extg Rd.
0.405	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Assumed</b>

**Summary for Subcatchment RW: Flow extg R/W (Kessi)**

Runoff = 0.17 cfs @ 8.04 hrs, Volume= 0.074 af, Depth> 2.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100 yr Rainfall=4.75"

Area (ac)	CN	Description
* 0.359	78	
0.359	78	Pervious Area

**Sunset Terrace Prelim Pre-Developed**

Type IA 24-hr 100 yr Rainfall=4.75"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Subcatchment S: Flow from Site (Kessi)**

Runoff = 2.18 cfs @ 8.04 hrs, Volume= 0.969 af, Depth> 2.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100 yr Rainfall=4.75"

Area (ac)	CN	Description
* 4.080	78	Field (HSG B)
* 0.621	76	Wooded - young growth - brush
4.701	78	Weighted Average
4.701	78	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

**Summary for Reach 1R: 18" Culvert**

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 2.62" for 100 yr event  
Inflow = 2.76 cfs @ 8.02 hrs, Volume= 1.195 af  
Outflow = 2.76 cfs @ 8.03 hrs, Volume= 1.195 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Max. Velocity= 5.01 fps, Min. Travel Time= 0.2 min  
Avg. Velocity = 2.99 fps, Avg. Travel Time= 0.3 min

Peak Storage= 33 cf @ 8.02 hrs, Average Depth at Peak Storage= 0.53'  
Bank-Full Depth= 1.50', Capacity at Bank-Full= 10.50 cfs

18.0" Diameter Pipe, n= 0.013  
Length= 60.0' Slope= 0.0100 '/'  
Inlet Invert= 0.00', Outlet Invert= -0.60'

# Sunset Terrace Prelim Pre-Developed

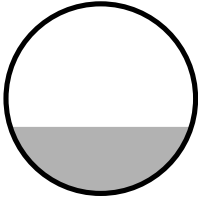
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Type IA 24-hr 100 yr Rainfall=4.75"

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## Summary for Reach 2R: Combined Flow

Inflow Area = 19.605 ac, 3.14% Impervious, Inflow Depth > 2.19" for 100 yr event  
Inflow = 8.33 cfs @ 8.02 hrs, Volume= 3.586 af  
Outflow = 8.33 cfs @ 8.02 hrs, Volume= 3.586 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Sunset Terrace Prelim Pre-Developed**

Type IA 24-hr WQ Rainfall=1.60"

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**Summary for Subcatchment 2S: Predeveloped**

Runoff = 0.17 cfs @ 18.46 hrs, Volume= 0.188 af, Depth&gt; 0.16"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr WQ Rainfall=1.60"

Area (ac)	CN	Description
* 13.660	72	Pervious
* 0.210	98	Existing Road
* 0.270	85	Gravel Access
14.140	73	Weighted Average
13.930	72	Pervious Area
0.210	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	300	0.1500	0.44		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 2.75"
1.7	300	0.1800	2.97		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
13.1	600	Total			

**Summary for Subcatchment PAV: Flow from existing road (Kessi)**

Runoff = 0.14 cfs @ 7.91 hrs, Volume= 0.046 af, Depth&gt; 1.38"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr WQ Rainfall=1.60"

Area (ac)	CN	Description
* 0.405	98	Extg Rd.
0.405	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Assumed</b>

**Summary for Subcatchment RW: Flow extg R/W (Kessi)**

Runoff = 0.01 cfs @ 9.02 hrs, Volume= 0.008 af, Depth&gt; 0.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr WQ Rainfall=1.60"

Area (ac)	CN	Description
* 0.359	78	
0.359	78	Pervious Area



# Sunset Terrace Prelim Pre-Developed

Type IA 24-hr WQ Rainfall=1.60"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

## Summary for Subcatchment S: Flow from Site (Kessi)

Runoff = 0.09 cfs @ 9.02 hrs, Volume= 0.107 af, Depth> 0.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr WQ Rainfall=1.60"

Area (ac)	CN	Description
* 4.080	78	Field (HSG B)
* 0.621	76	Wooded - young growth - brush
4.701	78	Weighted Average
4.701	78	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	105	0.2500	0.30		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

## Summary for Reach 1R: 18" Culvert

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 0.35" for WQ event  
Inflow = 0.18 cfs @ 8.01 hrs, Volume= 0.162 af  
Outflow = 0.18 cfs @ 8.03 hrs, Volume= 0.162 af, Atten= 1%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Max. Velocity= 2.26 fps, Min. Travel Time= 0.4 min  
Avg. Velocity = 1.71 fps, Avg. Travel Time= 0.6 min

Peak Storage= 5 cf @ 8.02 hrs, Average Depth at Peak Storage= 0.14'  
Bank-Full Depth= 1.50', Capacity at Bank-Full= 10.50 cfs

18.0" Diameter Pipe, n= 0.013  
Length= 60.0' Slope= 0.0100 '/'  
Inlet Invert= 0.00', Outlet Invert= -0.60'

# Sunset Terrace Prelim Pre-Developed

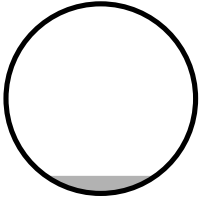
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Type IA 24-hr WQ Rainfall=1.60"

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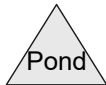
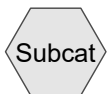
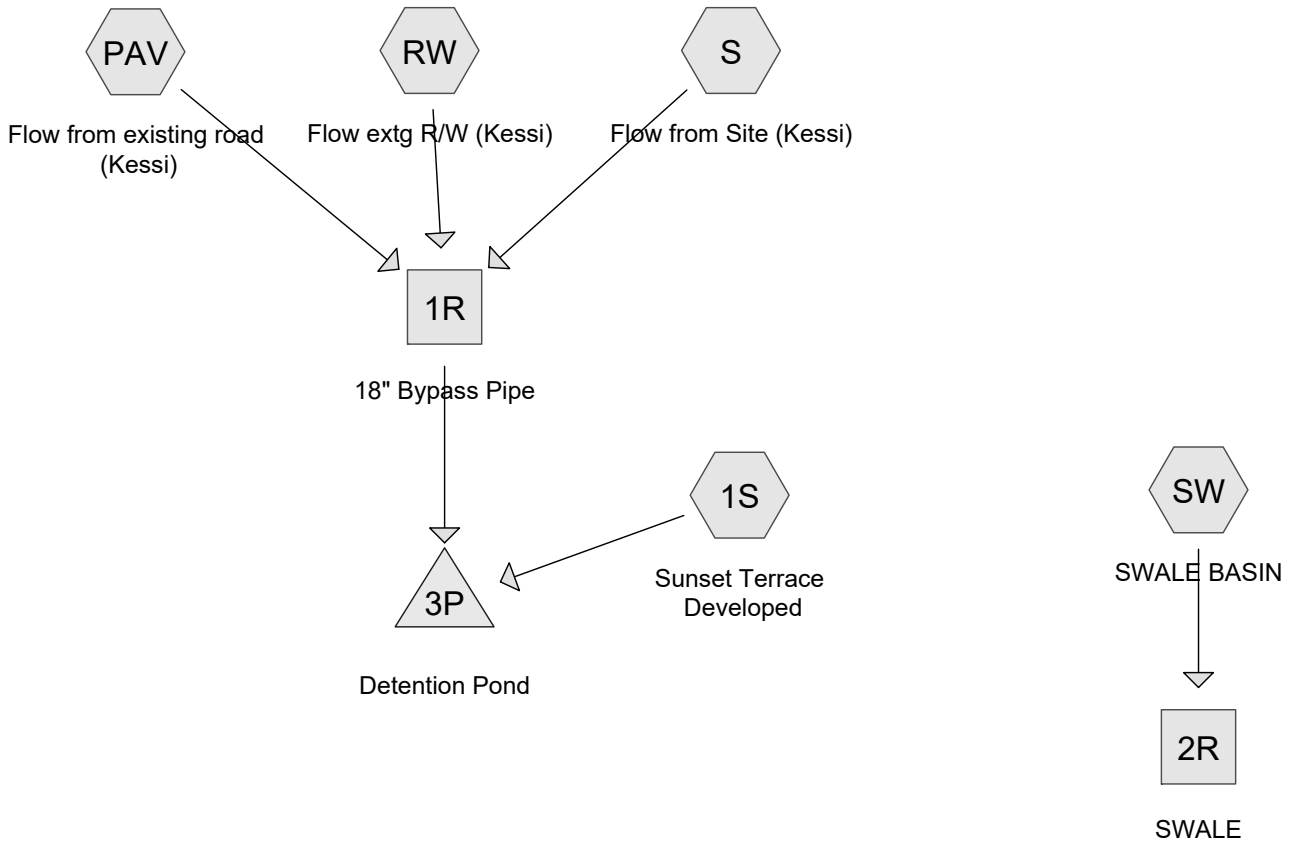
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## Summary for Reach 2R: Combined Flow

Inflow Area = 19.605 ac, 3.14% Impervious, Inflow Depth > 0.21" for WQ event  
Inflow = 0.27 cfs @ 17.48 hrs, Volume= 0.350 af  
Outflow = 0.27 cfs @ 17.48 hrs, Volume= 0.350 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



**Drainage Diagram for Sunset Terrace Prelim Dev - Revised Copy**  
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## Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.310	75	PERVIOUS (SW)
0.621	76	Wooded - young growth - brush (S)
0.359	78	(RW)
4.080	78	Field (HSG B) (S)
7.820	80	Pervious (1S)
0.405	98	Extg Rd. (PAV)
2.560	98	ROADS (SW)
1.240	98	ROOF (SW)
2.560	98	Roadways (1S)
2.800	98	Roof (1S)
0.960	98	SW & DW (SW)
0.960	98	Sidewalk & DW (1S)
<b>29.675</b>		<b>TOTAL AREA</b>

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## Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.000	HSG A	
4.080	HSG B	S
0.000	HSG C	
0.000	HSG D	
25.595	Other	1S, PAV, RW, S, SW
<b>29.675</b>		<b>TOTAL AREA</b>

**Sunset Terrace Prelim Dev - Revised Copy**

Type IA 24-hr 2 yr Rainfall=2.75"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SBUH method, Split Pervious/Imperv.  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: Sunset Terrace** Runoff Area=14.140 ac 44.70% Impervious Runoff Depth>1.71"  
Tc=6.0 min CN=80/98 Runoff=5.67 cfs 2.016 af

**Subcatchment PAV: Flow from existing** Runoff Area=0.405 ac 100.00% Impervious Runoff Depth>2.52"  
Tc=5.0 min CN=0/98 Runoff=0.26 cfs 0.085 af

**Subcatchment RW: Flow extg R/W (Kessi)** Runoff Area=0.359 ac 0.00% Impervious Runoff Depth>0.94"  
Flow Length=210' Tc=22.5 min CN=78/0 Runoff=0.05 cfs 0.028 af

**Subcatchment S: Flow from Site (Kessi)** Runoff Area=4.701 ac 0.00% Impervious Runoff Depth>0.94"  
Flow Length=210' Tc=22.5 min CN=78/0 Runoff=0.63 cfs 0.369 af

**Subcatchment SW: SWALE BASIN** Runoff Area=10.070 ac 47.27% Impervious Runoff Depth>1.61"  
Tc=6.0 min CN=75/98 Runoff=3.69 cfs 1.350 af

**Reach 1R: 18" Bypass Pipe** Avg. Depth=0.17' Max Vel=8.19 fps Inflow=0.92 cfs 0.482 af  
D=18.0" n=0.013 L=1,000.0' S=0.1000 '/' Capacity=33.22 cfs Outflow=0.91 cfs 0.480 af

**Reach 2R: SWALE** Avg. Depth=0.67' Max Vel=0.79 fps Inflow=3.69 cfs 1.350 af  
n=0.240 L=200.0' S=0.0400 '/' Capacity=7.86 cfs Outflow=3.65 cfs 1.343 af

**Pond 3P: Detention Pond** Peak Elev=5.05' Storage=1.082 af Inflow=6.54 cfs 2.496 af  
Outflow=1.02 cfs 1.438 af

**Total Runoff Area = 29.675 ac Runoff Volume = 3.848 af Average Runoff Depth = 1.56"**  
**61.30% Pervious = 18.190 ac 38.70% Impervious = 11.485 ac**

**Sunset Terrace Prelim Dev - Revised Copy**

Type IA 24-hr 2 yr Rainfall=2.75"

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**Summary for Subcatchment 1S: Sunset Terrace Developed**

Runoff = 5.67 cfs @ 7.96 hrs, Volume= 2.016 af, Depth> 1.71"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2 yr Rainfall=2.75"

Area (ac)	CN	Description
* 7.820	80	Pervious
* 2.800	98	Roof
* 2.560	98	Roadways
* 0.960	98	Sidewalk & DW
14.140	88	Weighted Average
7.820	80	Pervious Area
6.320	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Summary for Subcatchment PAV: Flow from existing road (Kessi)**

Runoff = 0.26 cfs @ 7.90 hrs, Volume= 0.085 af, Depth> 2.52"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2 yr Rainfall=2.75"

Area (ac)	CN	Description
* 0.405	98	Extg Rd.
0.405	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Assumed

**Summary for Subcatchment RW: Flow extg R/W (Kessi)**

Runoff = 0.05 cfs @ 8.07 hrs, Volume= 0.028 af, Depth> 0.94"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2 yr Rainfall=2.75"

Area (ac)	CN	Description
* 0.359	78	
0.359	78	Pervious Area

**Sunset Terrace Prelim Dev - Revised Copy**

Type IA 24-hr 2 yr Rainfall=2.75"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	105	0.2500	0.29		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
16.4	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
22.5	210	Total			

**Summary for Subcatchment S: Flow from Site (Kessi)**

Runoff = 0.63 cfs @ 8.07 hrs, Volume= 0.369 af, Depth> 0.94"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2 yr Rainfall=2.75"

Area (ac)	CN	Description
* 4.080	78	Field (HSG B)
* 0.621	76	Wooded - young growth - brush
4.701	78	Weighted Average
4.701	78	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	105	0.2500	0.29		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
16.4	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
22.5	210	Total			

**Summary for Subcatchment SW: SWALE BASIN**

Runoff = 3.69 cfs @ 7.96 hrs, Volume= 1.350 af, Depth> 1.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 2 yr Rainfall=2.75"

Area (ac)	CN	Description
* 1.240	98	ROOF
* 2.560	98	ROADS
* 0.960	98	SW & DW
* 5.310	75	PERVIOUS
10.070	86	Weighted Average
5.310	75	Pervious Area
4.760	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry,</b>



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Type IA 24-hr 2 yr Rainfall=2.75"

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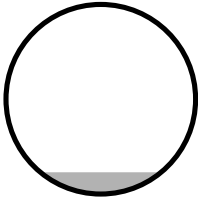
**Summary for Reach 1R: 18" Bypass Pipe**

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 1.06" for 2 yr event  
Inflow = 0.92 cfs @ 8.02 hrs, Volume= 0.482 af  
Outflow = 0.91 cfs @ 8.09 hrs, Volume= 0.480 af, Atten= 1%, Lag= 3.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Max. Velocity= 8.19 fps, Min. Travel Time= 2.0 min  
Avg. Velocity = 5.17 fps, Avg. Travel Time= 3.2 min

Peak Storage= 111 cf @ 8.05 hrs, Average Depth at Peak Storage= 0.17'  
Bank-Full Depth= 1.50', Capacity at Bank-Full= 33.22 cfs

18.0" Diameter Pipe, n= 0.013  
Length= 1,000.0' Slope= 0.1000 '  
Inlet Invert= 0.00', Outlet Invert= -100.00'



**Summary for Reach 2R: SWALE**

Inflow Area = 10.070 ac, 47.27% Impervious, Inflow Depth > 1.61" for 2 yr event  
Inflow = 3.69 cfs @ 7.96 hrs, Volume= 1.350 af  
Outflow = 3.65 cfs @ 8.06 hrs, Volume= 1.343 af, Atten= 1%, Lag= 5.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Max. Velocity= 0.79 fps, Min. Travel Time= 4.2 min  
Avg. Velocity = 0.44 fps, Avg. Travel Time= 7.6 min

Peak Storage= 932 cf @ 7.99 hrs, Average Depth at Peak Storage= 0.67'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.86 cfs

5.00' x 1.00' deep channel, n= 0.240  
Side Slope Z-value= 3.0 ' ' Top Width= 11.00'  
Length= 200.0' Slope= 0.0400 '  
Inlet Invert= 0.00', Outlet Invert= -8.00'



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Type IA 24-hr 2 yr Rainfall=2.75"

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## Summary for Pond 3P: Detention Pond

Inflow Area = 19.605 ac, 34.30% Impervious, Inflow Depth > 1.53" for 2 yr event  
Inflow = 6.54 cfs @ 7.98 hrs, Volume= 2.496 af  
Outflow = 1.02 cfs @ 20.86 hrs, Volume= 1.438 af, Atten= 84%, Lag= 772.8 min  
Primary = 1.02 cfs @ 20.86 hrs, Volume= 1.438 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Peak Elev= 5.05' @ 20.86 hrs Surf.Area= 0.280 ac Storage= 1.082 af

Plug-Flow detention time= 406.4 min calculated for 1.438 af (58% of inflow)  
Center-of-Mass det. time= 163.9 min ( 912.0 - 748.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1.360 af	<b>60.00'W x 145.00'L x 6.00'H Prismaoid Z=3.0x 0.77</b>

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	<b>4.2" Vert. Orifice/Grate</b> C= 0.600
#2	Primary	5.05'	<b>24.0" Vert. Orifice/Grate</b> C= 0.600
#3	Primary	5.50'	<b>12.0" Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=1.02 cfs @ 20.86 hrs HW=5.05' (Free Discharge)

- 1=Orifice/Grate (Orifice Controls 1.02 cfs @ 10.64 fps)
- 2=Orifice/Grate (Orifice Controls 0.00 cfs @ 0.20 fps)
- 3=Orifice/Grate ( Controls 0.00 cfs)

**Sunset Terrace Prelim Dev - Revised Copy**

Type IA 24-hr 10 yr Rainfall=3.50"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SBUH method, Split Pervious/Imperv.  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: Sunset Terrace** Runoff Area=14.140 ac 44.70% Impervious Runoff Depth>2.36"  
Tc=6.0 min CN=80/98 Runoff=7.97 cfs 2.780 af

**Subcatchment PAV: Flow from existing** Runoff Area=0.405 ac 100.00% Impervious Runoff Depth>3.26"  
Tc=5.0 min CN=0/98 Runoff=0.33 cfs 0.110 af

**Subcatchment RW: Flow extg R/W (Kessi)** Runoff Area=0.359 ac 0.00% Impervious Runoff Depth>1.48"  
Flow Length=210' Tc=22.5 min CN=78/0 Runoff=0.09 cfs 0.044 af

**Subcatchment S: Flow from Site (Kessi)** Runoff Area=4.701 ac 0.00% Impervious Runoff Depth>1.48"  
Flow Length=210' Tc=22.5 min CN=78/0 Runoff=1.15 cfs 0.579 af

**Subcatchment SW: SWALE BASIN** Runoff Area=10.070 ac 47.27% Impervious Runoff Depth>2.22"  
Tc=6.0 min CN=75/98 Runoff=5.21 cfs 1.867 af

**Reach 1R: 18" Bypass Pipe** Avg. Depth=0.22' Max Vel=9.58 fps Inflow=1.54 cfs 0.733 af  
D=18.0" n=0.013 L=1,000.0' S=0.1000 '/' Capacity=33.22 cfs Outflow=1.53 cfs 0.731 af

**Reach 2R: SWALE** Avg. Depth=0.80' Max Vel=0.87 fps Inflow=5.21 cfs 1.867 af  
n=0.240 L=200.0' S=0.0400 '/' Capacity=7.86 cfs Outflow=5.17 cfs 1.858 af

**Pond 3P: Detention Pond** Peak Elev=5.50' Storage=1.209 af Inflow=9.45 cfs 3.511 af  
Outflow=2.26 cfs 2.381 af

**Total Runoff Area = 29.675 ac Runoff Volume = 5.380 af Average Runoff Depth = 2.18"**  
**61.30% Pervious = 18.190 ac 38.70% Impervious = 11.485 ac**

**Summary for Subcatchment 1S: Sunset Terrace Developed**

Runoff = 7.97 cfs @ 7.96 hrs, Volume= 2.780 af, Depth> 2.36"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10 yr Rainfall=3.50"

Area (ac)	CN	Description
* 7.820	80	Pervious
* 2.800	98	Roof
* 2.560	98	Roadways
* 0.960	98	Sidewalk & DW
14.140	88	Weighted Average
7.820	80	Pervious Area
6.320	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Summary for Subcatchment PAV: Flow from existing road (Kessi)**

Runoff = 0.33 cfs @ 7.90 hrs, Volume= 0.110 af, Depth> 3.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10 yr Rainfall=3.50"

Area (ac)	CN	Description
* 0.405	98	Extg Rd.
0.405	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Assumed

**Summary for Subcatchment RW: Flow extg R/W (Kessi)**

Runoff = 0.09 cfs @ 8.06 hrs, Volume= 0.044 af, Depth> 1.48"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10 yr Rainfall=3.50"

Area (ac)	CN	Description
* 0.359	78	
0.359	78	Pervious Area

**Sunset Terrace Prelim Dev - Revised Copy**

Type IA 24-hr 10 yr Rainfall=3.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	105	0.2500	0.29		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
16.4	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
22.5	210	Total			

**Summary for Subcatchment S: Flow from Site (Kessi)**

Runoff = 1.15 cfs @ 8.06 hrs, Volume= 0.579 af, Depth> 1.48"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10 yr Rainfall=3.50"

Area (ac)	CN	Description
* 4.080	78	Field (HSG B)
* 0.621	76	Wooded - young growth - brush
4.701	78	Weighted Average
4.701	78	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	105	0.2500	0.29		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
16.4	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
22.5	210	Total			

**Summary for Subcatchment SW: SWALE BASIN**

Runoff = 5.21 cfs @ 7.96 hrs, Volume= 1.867 af, Depth> 2.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 10 yr Rainfall=3.50"

Area (ac)	CN	Description
* 1.240	98	ROOF
* 2.560	98	ROADS
* 0.960	98	SW & DW
* 5.310	75	PERVIOUS
10.070	86	Weighted Average
5.310	75	Pervious Area
4.760	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry,</b>

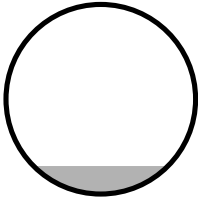
Summary for Reach 1R: 18" Bypass Pipe

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 1.61" for 10 yr event
Inflow = 1.54 cfs @ 8.02 hrs, Volume= 0.733 af
Outflow = 1.53 cfs @ 8.07 hrs, Volume= 0.731 af, Atten= 1%, Lag= 3.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.58 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 5.83 fps, Avg. Travel Time= 2.9 min

Peak Storage= 161 cf @ 8.05 hrs, Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 33.22 cfs

18.0" Diameter Pipe, n= 0.013
Length= 1,000.0' Slope= 0.1000 '/'
Inlet Invert= 0.00', Outlet Invert= -100.00'



Summary for Reach 2R: SWALE

Inflow Area = 10.070 ac, 47.27% Impervious, Inflow Depth > 2.22" for 10 yr event
Inflow = 5.21 cfs @ 7.96 hrs, Volume= 1.867 af
Outflow = 5.17 cfs @ 8.05 hrs, Volume= 1.858 af, Atten= 1%, Lag= 5.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.87 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 0.49 fps, Avg. Travel Time= 6.8 min

Peak Storage= 1,191 cf @ 7.99 hrs, Average Depth at Peak Storage= 0.80'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.86 cfs

5.00' x 1.00' deep channel, n= 0.240
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 200.0' Slope= 0.0400 '/'
Inlet Invert= 0.00', Outlet Invert= -8.00'



‡

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Type IA 24-hr 10 yr Rainfall=3.50"

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**Summary for Pond 3P: Detention Pond**

Inflow Area = 19.605 ac, 34.30% Impervious, Inflow Depth > 2.15" for 10 yr event  
 Inflow = 9.45 cfs @ 7.98 hrs, Volume= 3.511 af  
 Outflow = 2.26 cfs @ 11.24 hrs, Volume= 2.381 af, Atten= 76%, Lag= 195.9 min  
 Primary = 2.26 cfs @ 11.24 hrs, Volume= 2.381 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 5.50' @ 11.24 hrs Surf.Area= 0.293 ac Storage= 1.209 af

Plug-Flow detention time= 350.9 min calculated for 2.381 af (68% of inflow)  
 Center-of-Mass det. time= 158.3 min ( 897.4 - 739.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1.360 af	<b>60.00'W x 145.00'L x 6.00'H Prismaoid Z=3.0x 0.77</b>

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	<b>4.2" Vert. Orifice/Grate</b> C= 0.600
#2	Primary	5.05'	<b>24.0" Vert. Orifice/Grate</b> C= 0.600
#3	Primary	5.50'	<b>12.0" Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=2.26 cfs @ 11.24 hrs HW=5.50' (Free Discharge)

- 1=Orifice/Grate (Orifice Controls 1.07 cfs @ 11.11 fps)
- 2=Orifice/Grate (Orifice Controls 1.19 cfs @ 2.28 fps)
- 3=Orifice/Grate ( Controls 0.00 cfs)



**Sunset Terrace Prelim Dev - Revised Copy**

Type IA 24-hr 100 yr Rainfall=4.75"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SBUH method, Split Pervious/Imperv.  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: Sunset Terrace** Runoff Area=14.140 ac 44.70% Impervious Runoff Depth>3.49"  
Tc=6.0 min CN=80/98 Runoff=12.02 cfs 4.111 af

**Subcatchment PAV: Flow from existing** Runoff Area=0.405 ac 100.00% Impervious Runoff Depth>4.51"  
Tc=5.0 min CN=0/98 Runoff=0.45 cfs 0.152 af

**Subcatchment RW: Flow extg R/W (Kessi)** Runoff Area=0.359 ac 0.00% Impervious Runoff Depth>2.47"  
Flow Length=210' Tc=22.5 min CN=78/0 Runoff=0.16 cfs 0.074 af

**Subcatchment S: Flow from Site (Kessi)** Runoff Area=4.701 ac 0.00% Impervious Runoff Depth>2.47"  
Flow Length=210' Tc=22.5 min CN=78/0 Runoff=2.14 cfs 0.968 af

**Subcatchment SW: SWALE BASIN** Runoff Area=10.070 ac 47.27% Impervious Runoff Depth>3.31"  
Tc=6.0 min CN=75/98 Runoff=7.95 cfs 2.778 af

**Reach 1R: 18" Bypass Pipe** Avg. Depth=0.29' Max Vel=11.34 fps Inflow=2.73 cfs 1.194 af  
D=18.0" n=0.013 L=1,000.0' S=0.1000 '/' Capacity=33.22 cfs Outflow=2.70 cfs 1.192 af

**Reach 2R: SWALE** Avg. Depth=1.00' Max Vel=0.98 fps Inflow=7.95 cfs 2.778 af  
n=0.240 L=200.0' S=0.0400 '/' Capacity=7.86 cfs Outflow=7.92 cfs 2.767 af

**Pond 3P: Detention Pond** Peak Elev=5.97' Storage=1.352 af Inflow=14.65 cfs 5.303 af  
Outflow=6.63 cfs 4.129 af

**Total Runoff Area = 29.675 ac Runoff Volume = 8.084 af Average Runoff Depth = 3.27"**  
**61.30% Pervious = 18.190 ac 38.70% Impervious = 11.485 ac**

**Summary for Subcatchment 1S: Sunset Terrace Developed**

Runoff = 12.02 cfs @ 7.95 hrs, Volume= 4.111 af, Depth> 3.49"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100 yr Rainfall=4.75"

Area (ac)	CN	Description
* 7.820	80	Pervious
* 2.800	98	Roof
* 2.560	98	Roadways
* 0.960	98	Sidewalk & DW
14.140	88	Weighted Average
7.820	80	Pervious Area
6.320	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Summary for Subcatchment PAV: Flow from existing road (Kessi)**

Runoff = 0.45 cfs @ 7.90 hrs, Volume= 0.152 af, Depth> 4.51"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100 yr Rainfall=4.75"

Area (ac)	CN	Description
* 0.405	98	Extg Rd.
0.405	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Assumed

**Summary for Subcatchment RW: Flow extg R/W (Kessi)**

Runoff = 0.16 cfs @ 8.05 hrs, Volume= 0.074 af, Depth> 2.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100 yr Rainfall=4.75"

Area (ac)	CN	Description
* 0.359	78	
0.359	78	Pervious Area

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Type IA 24-hr 100 yr Rainfall=4.75"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	105	0.2500	0.29		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
16.4	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
22.5	210	Total			

**Summary for Subcatchment S: Flow from Site (Kessi)**

Runoff = 2.14 cfs @ 8.05 hrs, Volume= 0.968 af, Depth> 2.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100 yr Rainfall=4.75"

Area (ac)	CN	Description
* 4.080	78	Field (HSG B)
* 0.621	76	Wooded - young growth - brush
4.701	78	Weighted Average
4.701	78	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	105	0.2500	0.29		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
16.4	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
22.5	210	Total			

**Summary for Subcatchment SW: SWALE BASIN**

Runoff = 7.95 cfs @ 7.95 hrs, Volume= 2.778 af, Depth> 3.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr 100 yr Rainfall=4.75"

Area (ac)	CN	Description
* 1.240	98	ROOF
* 2.560	98	ROADS
* 0.960	98	SW & DW
* 5.310	75	PERVIOUS
10.070	86	Weighted Average
5.310	75	Pervious Area
4.760	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry,</b>

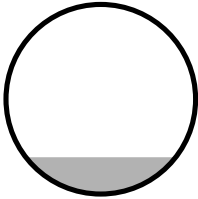
Summary for Reach 1R: 18" Bypass Pipe

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 2.62" for 100 yr event
Inflow = 2.73 cfs @ 8.02 hrs, Volume= 1.194 af
Outflow = 2.70 cfs @ 8.06 hrs, Volume= 1.192 af, Atten= 1%, Lag= 2.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.34 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 6.71 fps, Avg. Travel Time= 2.5 min

Peak Storage= 240 cf @ 8.04 hrs, Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 33.22 cfs

18.0" Diameter Pipe, n= 0.013
Length= 1,000.0' Slope= 0.1000 '/'
Inlet Invert= 0.00', Outlet Invert= -100.00'



Summary for Reach 2R: SWALE

Inflow Area = 10.070 ac, 47.27% Impervious, Inflow Depth > 3.31" for 100 yr event
Inflow = 7.95 cfs @ 7.95 hrs, Volume= 2.778 af
Outflow = 7.92 cfs @ 8.04 hrs, Volume= 2.767 af, Atten= 0%, Lag= 5.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.98 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 6.0 min

Peak Storage= 1,610 cf @ 7.98 hrs, Average Depth at Peak Storage= 1.00'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.86 cfs

5.00' x 1.00' deep channel, n= 0.240
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 200.0' Slope= 0.0400 '/'
Inlet Invert= 0.00', Outlet Invert= -8.00'



‡

**Summary for Pond 3P: Detention Pond**

Inflow Area = 19.605 ac, 34.30% Impervious, Inflow Depth > 3.25" for 100 yr event  
 Inflow = 14.65 cfs @ 7.98 hrs, Volume= 5.303 af  
 Outflow = 6.63 cfs @ 8.67 hrs, Volume= 4.129 af, Atten= 55%, Lag= 41.7 min  
 Primary = 6.63 cfs @ 8.67 hrs, Volume= 4.129 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 5.97' @ 8.67 hrs Surf.Area= 0.306 ac Storage= 1.352 af

Plug-Flow detention time= 249.6 min calculated for 4.120 af (78% of inflow)  
 Center-of-Mass det. time= 110.2 min ( 836.9 - 726.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1.360 af	<b>60.00'W x 145.00'L x 6.00'H Prismatic Z=3.0x 0.77</b>

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	<b>4.2" Vert. Orifice/Grate</b> C= 0.600
#2	Primary	5.05'	<b>24.0" Vert. Orifice/Grate</b> C= 0.600
#3	Primary	5.50'	<b>12.0" Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=6.63 cfs @ 8.67 hrs HW=5.97' (Free Discharge)

- 1=Orifice/Grate (Orifice Controls 1.12 cfs @ 11.60 fps)
- 2=Orifice/Grate (Orifice Controls 4.65 cfs @ 3.27 fps)
- 3=Orifice/Grate (Orifice Controls 0.86 cfs @ 2.35 fps)

**Sunset Terrace Prelim Dev - Revised Copy**

Type IA 24-hr WQ Rainfall=1.60"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SBUH method, Split Pervious/Imperv.  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: Sunset Terrace** Runoff Area=14.140 ac 44.70% Impervious Runoff Depth>0.80"  
Tc=6.0 min CN=80/98 Runoff=2.50 cfs 0.943 af

**Subcatchment PAV: Flow from existing** Runoff Area=0.405 ac 100.00% Impervious Runoff Depth>1.38"  
Tc=5.0 min CN=0/98 Runoff=0.14 cfs 0.046 af

**Subcatchment RW: Flow extg R/W (Kessi)** Runoff Area=0.359 ac 0.00% Impervious Runoff Depth>0.27"  
Flow Length=210' Tc=22.5 min CN=78/0 Runoff=0.01 cfs 0.008 af

**Subcatchment S: Flow from Site (Kessi)** Runoff Area=4.701 ac 0.00% Impervious Runoff Depth>0.27"  
Flow Length=210' Tc=22.5 min CN=78/0 Runoff=0.09 cfs 0.107 af

**Subcatchment SW: SWALE BASIN** Runoff Area=10.070 ac 47.27% Impervious Runoff Depth>0.76"  
Tc=6.0 min CN=75/98 Runoff=1.67 cfs 0.636 af

**Reach 1R: 18" Bypass Pipe** Avg. Depth=0.08' Max Vel=5.02 fps Inflow=0.18 cfs 0.162 af  
D=18.0" n=0.013 L=1,000.0' S=0.1000 '/' Capacity=33.22 cfs Outflow=0.18 cfs 0.161 af

**Reach 2R: SWALE** Avg. Depth=0.43' Max Vel=0.61 fps Inflow=1.67 cfs 0.636 af  
n=0.240 L=200.0' S=0.0400 '/' Capacity=7.86 cfs Outflow=1.65 cfs 0.631 af

**Pond 3P: Detention Pond** Peak Elev=1.82' Storage=0.317 af Inflow=2.66 cfs 1.103 af  
Outflow=0.59 cfs 0.836 af

**Total Runoff Area = 29.675 ac Runoff Volume = 1.740 af Average Runoff Depth = 0.70"**  
**61.30% Pervious = 18.190 ac 38.70% Impervious = 11.485 ac**

**Sunset Terrace Prelim Dev - Revised Copy**

Type IA 24-hr WQ Rainfall=1.60"

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**Summary for Subcatchment 1S: Sunset Terrace Developed**

Runoff = 2.50 cfs @ 7.98 hrs, Volume= 0.943 af, Depth&gt; 0.80"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr WQ Rainfall=1.60"

Area (ac)	CN	Description
* 7.820	80	Pervious
* 2.800	98	Roof
* 2.560	98	Roadways
* 0.960	98	Sidewalk & DW
14.140	88	Weighted Average
7.820	80	Pervious Area
6.320	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Summary for Subcatchment PAV: Flow from existing road (Kessi)**

Runoff = 0.14 cfs @ 7.91 hrs, Volume= 0.046 af, Depth&gt; 1.38"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr WQ Rainfall=1.60"

Area (ac)	CN	Description
* 0.405	98	Extg Rd.
0.405	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Assumed

**Summary for Subcatchment RW: Flow extg R/W (Kessi)**

Runoff = 0.01 cfs @ 16.38 hrs, Volume= 0.008 af, Depth&gt; 0.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr WQ Rainfall=1.60"

Area (ac)	CN	Description
* 0.359	78	
0.359	78	Pervious Area



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Type IA 24-hr WQ Rainfall=1.60"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	105	0.2500	0.29		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
16.4	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
22.5	210	Total			

**Summary for Subcatchment S: Flow from Site (Kessi)**

Runoff = 0.09 cfs @ 16.38 hrs, Volume= 0.107 af, Depth> 0.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr WQ Rainfall=1.60"

Area (ac)	CN	Description
* 4.080	78	Field (HSG B)
* 0.621	76	Wooded - young growth - brush
4.701	78	Weighted Average
4.701	78	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	105	0.2500	0.29		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
16.4	105	0.0211	0.11		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.50"
22.5	210	Total			

**Summary for Subcatchment SW: SWALE BASIN**

Runoff = 1.67 cfs @ 7.93 hrs, Volume= 0.636 af, Depth> 0.76"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type IA 24-hr WQ Rainfall=1.60"

Area (ac)	CN	Description
* 1.240	98	ROOF
* 2.560	98	ROADS
* 0.960	98	SW & DW
* 5.310	75	PERVIOUS
10.070	86	Weighted Average
5.310	75	Pervious Area
4.760	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry,</b>

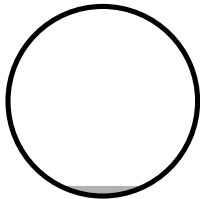
Summary for Reach 1R: 18" Bypass Pipe

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 0.35" for WQ event
Inflow = 0.18 cfs @ 8.01 hrs, Volume= 0.162 af
Outflow = 0.18 cfs @ 8.10 hrs, Volume= 0.161 af, Atten= 2%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.02 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 3.83 fps, Avg. Travel Time= 4.3 min

Peak Storage= 36 cf @ 8.05 hrs, Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 33.22 cfs

18.0" Diameter Pipe, n= 0.013
Length= 1,000.0' Slope= 0.1000 '/'
Inlet Invert= 0.00', Outlet Invert= -100.00'



Summary for Reach 2R: SWALE

Inflow Area = 10.070 ac, 47.27% Impervious, Inflow Depth > 0.76" for WQ event
Inflow = 1.67 cfs @ 7.93 hrs, Volume= 0.636 af
Outflow = 1.65 cfs @ 8.07 hrs, Volume= 0.631 af, Atten= 1%, Lag= 8.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.61 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 9.8 min

Peak Storage= 539 cf @ 7.98 hrs, Average Depth at Peak Storage= 0.43'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.86 cfs

5.00' x 1.00' deep channel, n= 0.240
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 200.0' Slope= 0.0400 '/'
Inlet Invert= 0.00', Outlet Invert= -8.00'



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Type IA 24-hr WQ Rainfall=1.60"

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**Summary for Pond 3P: Detention Pond**

Inflow Area = 19.605 ac, 34.30% Impervious, Inflow Depth > 0.68" for WQ event  
 Inflow = 2.66 cfs @ 7.98 hrs, Volume= 1.103 af  
 Outflow = 0.59 cfs @ 15.57 hrs, Volume= 0.836 af, Atten= 78%, Lag= 455.6 min  
 Primary = 0.59 cfs @ 15.57 hrs, Volume= 0.836 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1.82' @ 15.57 hrs Surf.Area= 0.195 ac Storage= 0.317 af

Plug-Flow detention time= 296.0 min calculated for 0.836 af (76% of inflow)  
 Center-of-Mass det. time= 146.9 min ( 910.4 - 763.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1.360 af	<b>60.00'W x 145.00'L x 6.00'H Prismaoid Z=3.0x 0.77</b>

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	<b>4.2" Vert. Orifice/Grate</b> C= 0.600
#2	Primary	5.05'	<b>24.0" Vert. Orifice/Grate</b> C= 0.600
#3	Primary	5.50'	<b>12.0" Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=0.59 cfs @ 15.57 hrs HW=1.82' (Free Discharge)

- 1=Orifice/Grate (Orifice Controls 0.59 cfs @ 6.17 fps)
- 2=Orifice/Grate ( Controls 0.00 cfs)
- 3=Orifice/Grate ( Controls 0.00 cfs)

## **Geotechnical Report Appendix C**

(Refer to the preliminary application packet)