SUNSET TERRACE

PRELIMINARY TECHNICAL INFORMATION REPORT

Prepared for:

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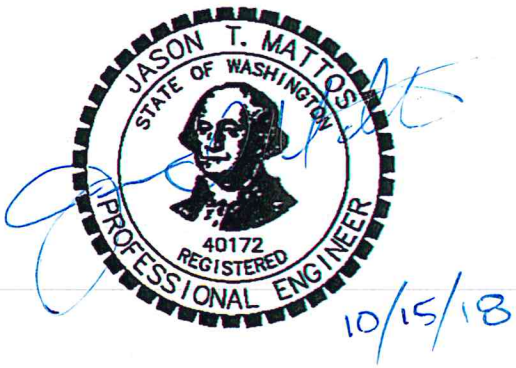


PRJ #: 1795
ENG #:
DATE: 10/11/2018
JOB #: 1795

1795 Prelim TIR .doc

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 75 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	2.37	N/A	0.65
2 year	2.10	5.02	1.05	1.03
10 year	4.18	8.61	4.18	3.47
100 year	8.33	12.56	8.33	8.29

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 10' bottom width by 100' long, set at a 1% 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.

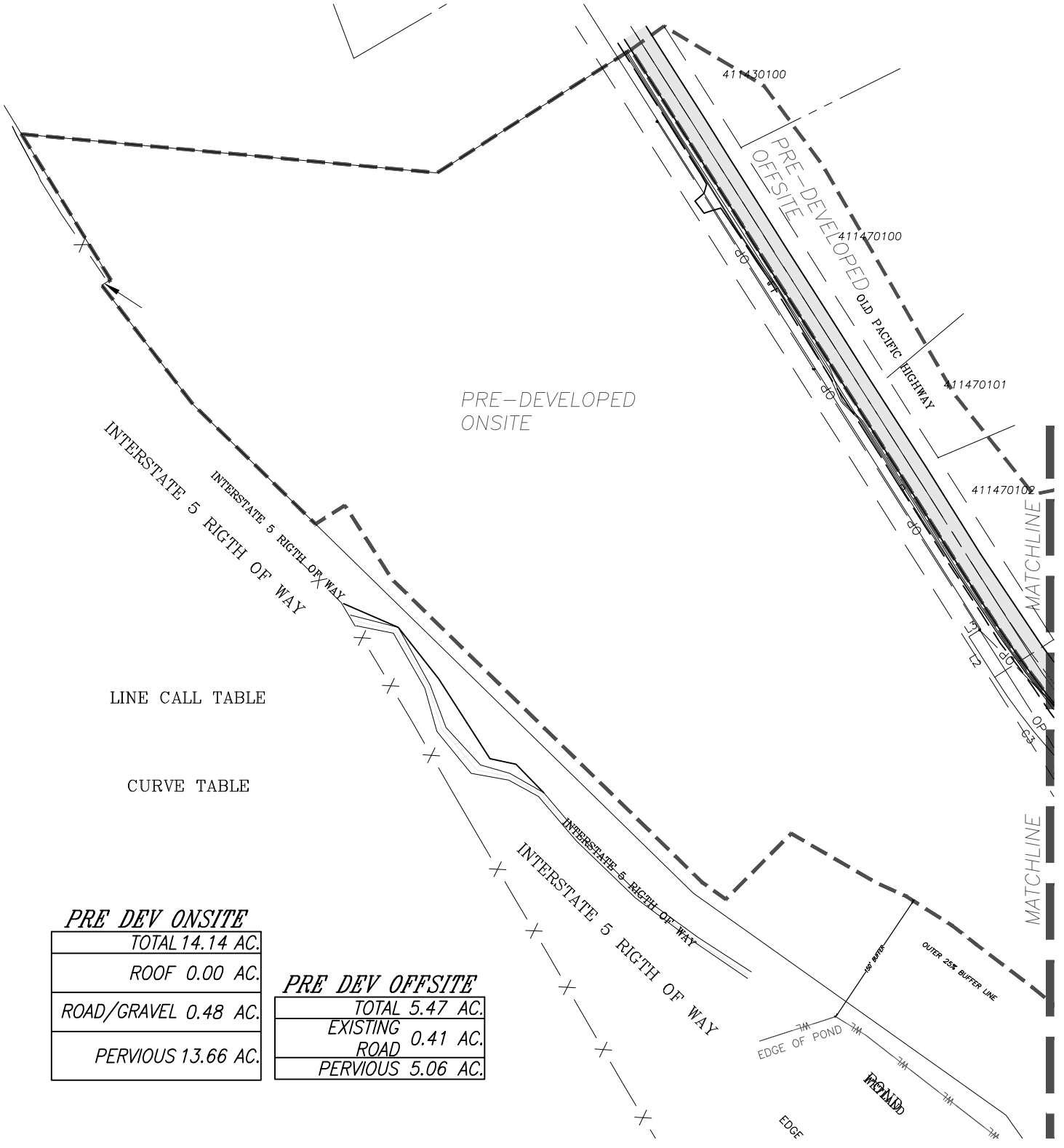
J. Listing of additional permits (e.g., wetland, floodplain, and shoreline management permits) that may be required in connection with the stormwater facilities.

No additional permits are required for this site.

Maps Appendix A

Google Maps

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



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.	

SGA ENGINEERING & DESIGN

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

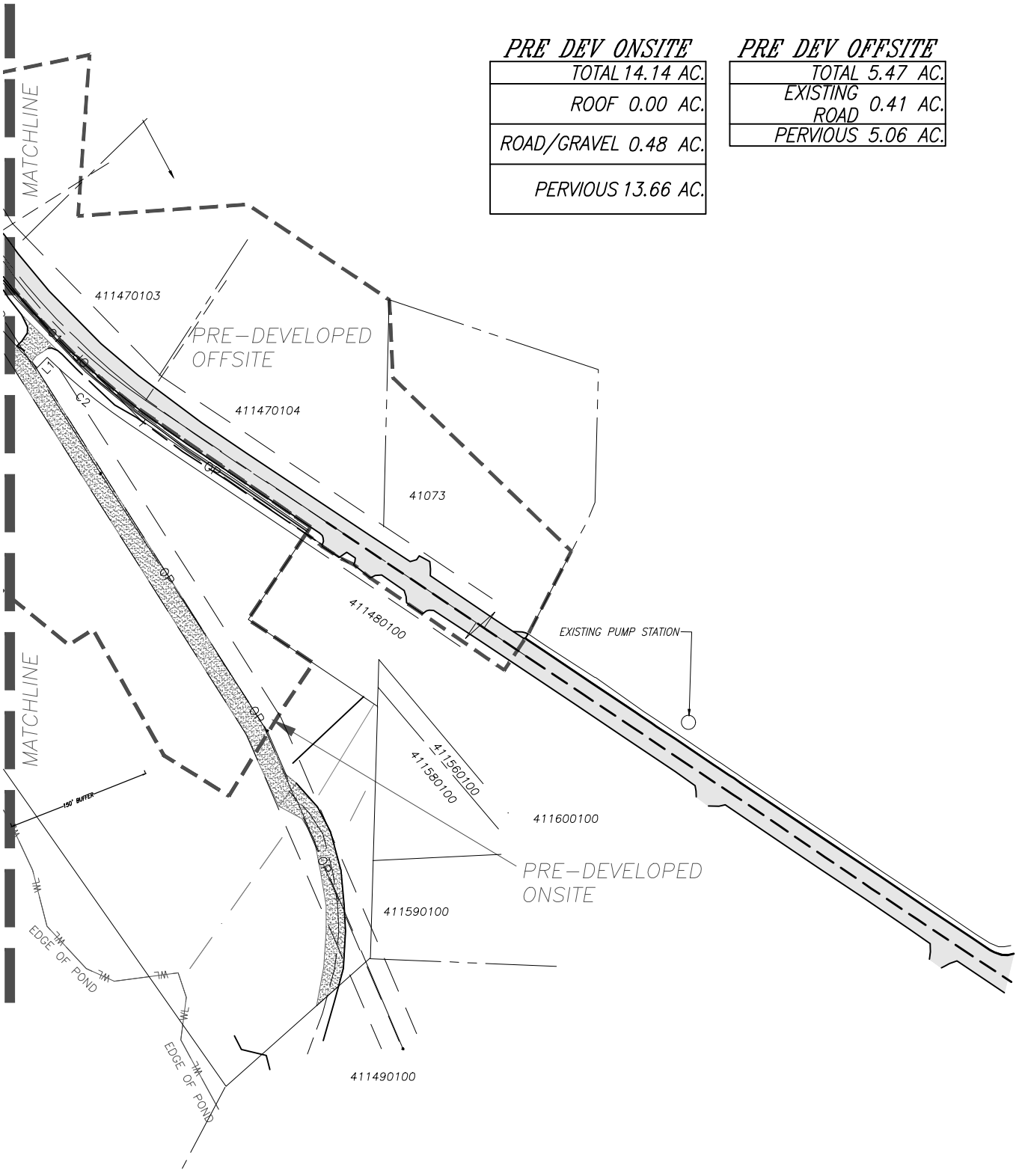
10/5/2018

JOB #: 1795

SCALE: 1" = 150'

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.



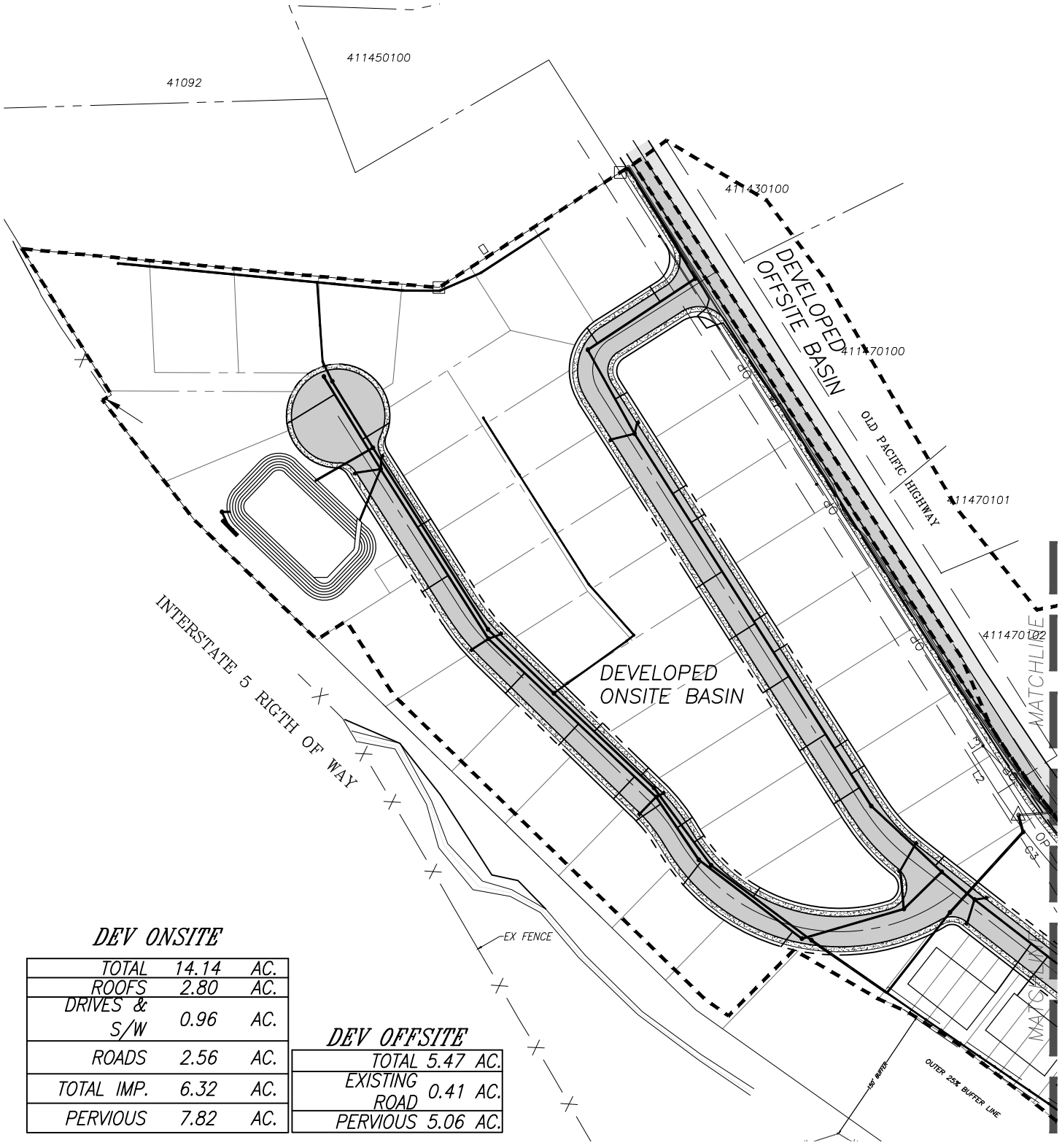
ENGINEERING & DESIGN

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

10/5/2018

JOB #: 1795

SCALE: 1" = 150'



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.

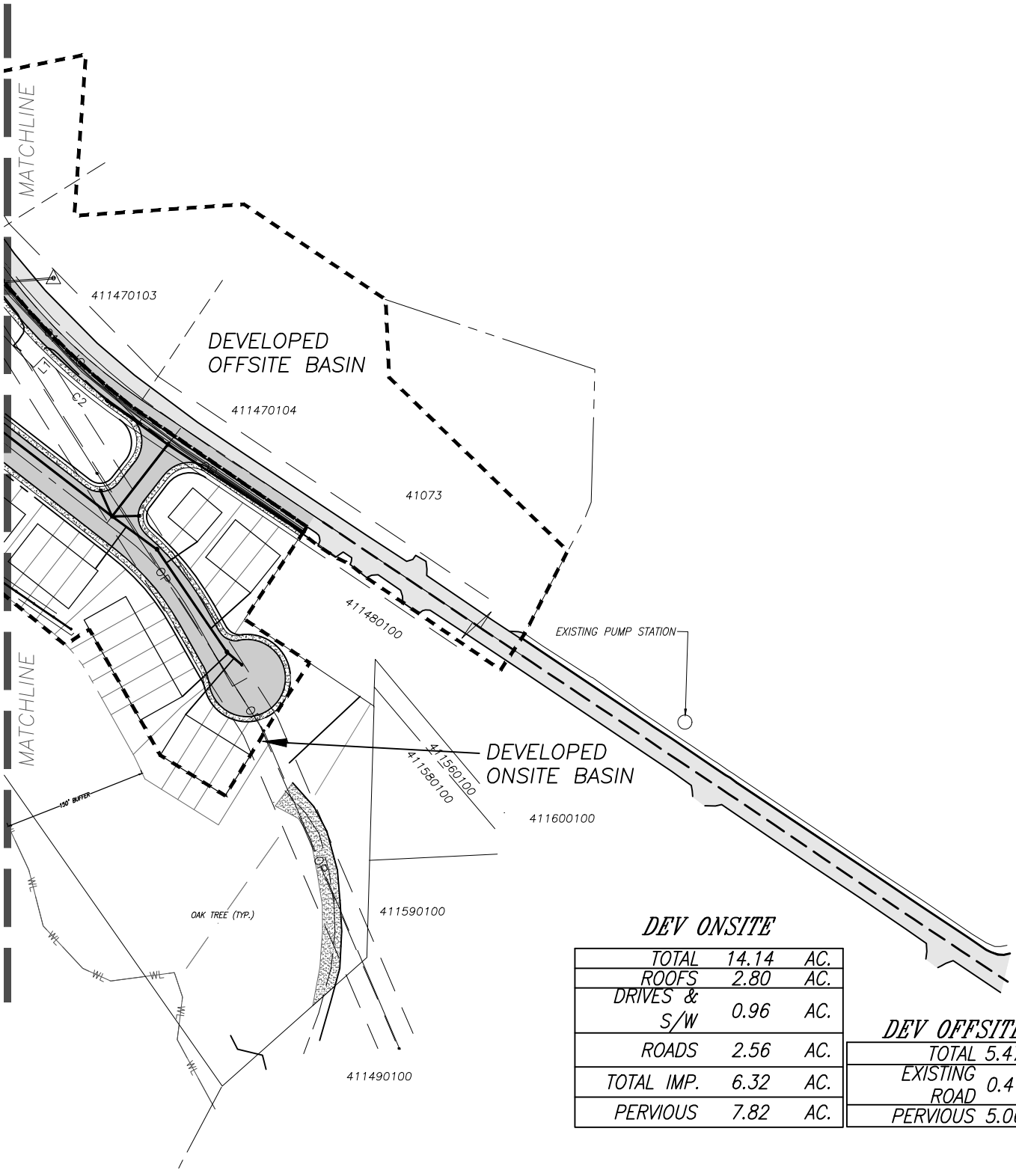
SGA ENGINEERING & DESIGN

DEVELOPED BASIN 1
FOR
SUNSET TERRACE
KALAMA
COWLITZ COUNTY, WASHINGTON

10/5/2018

JOB #: 1795

SCALE: 1" = 150'



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ROADS	2.56	AC.
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DEV OFFSITE

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

SGA ENGINEERING & DESIGN

DEVELOPED BASIN 2
FOR
SUNSET TERRACE
KALAMA
COWLITZ COUNTY, WASHINGTON

10/5/2018

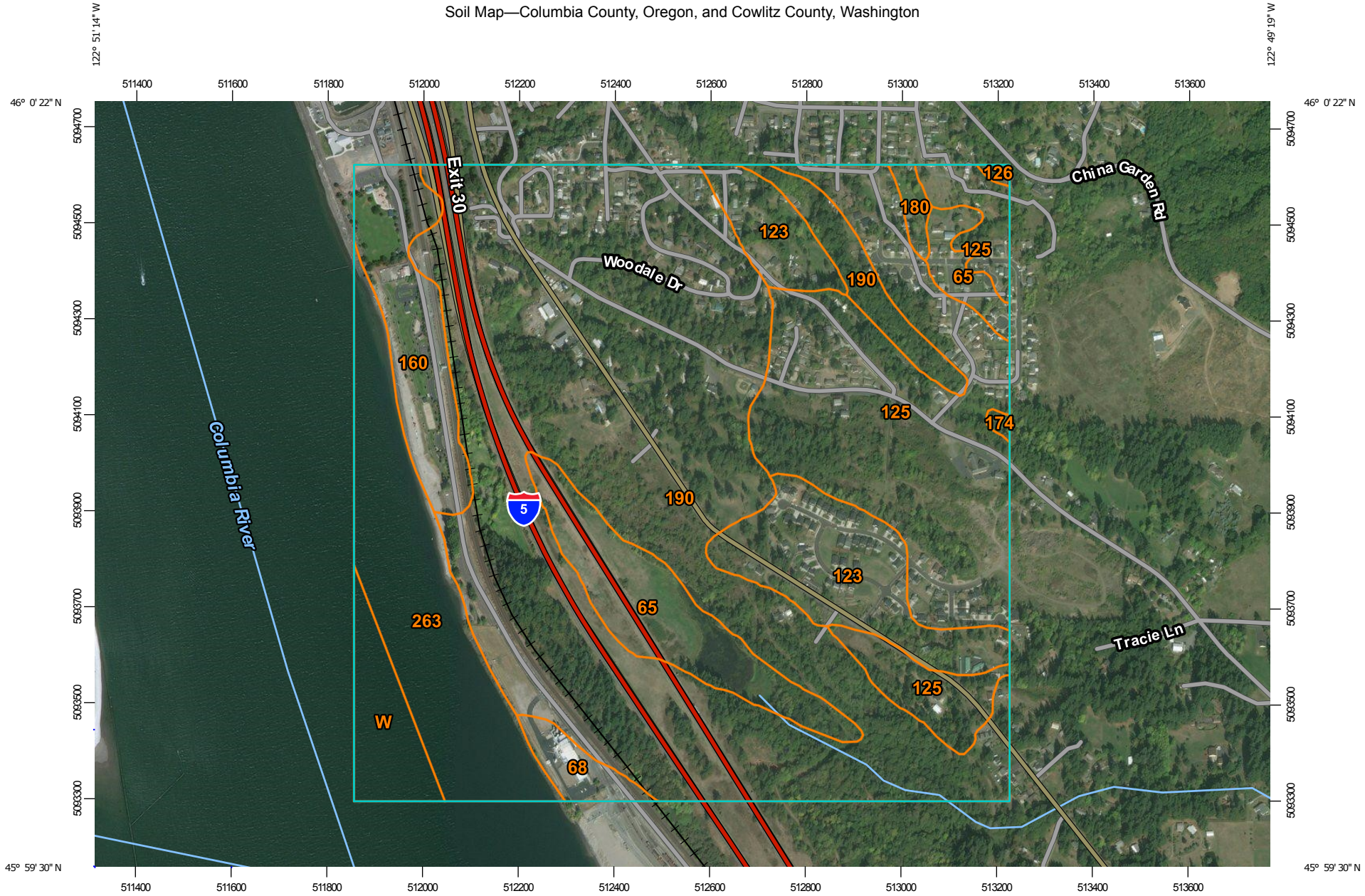
JOB #: 1795

SCALE: 1" = 150'

Hydraulic Calculations Appendix B

Soil Description

Water Quality Design



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

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

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%
Subtotals for Soil Survey Area		**11.6**	**2.6%**
Totals for Area of Interest		**450.9**	**100.0%**

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%
Subtotals for Soil Survey Area		**439.3**	**97.4%**
Totals for Area of Interest		**450.9**	**100.0%**

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

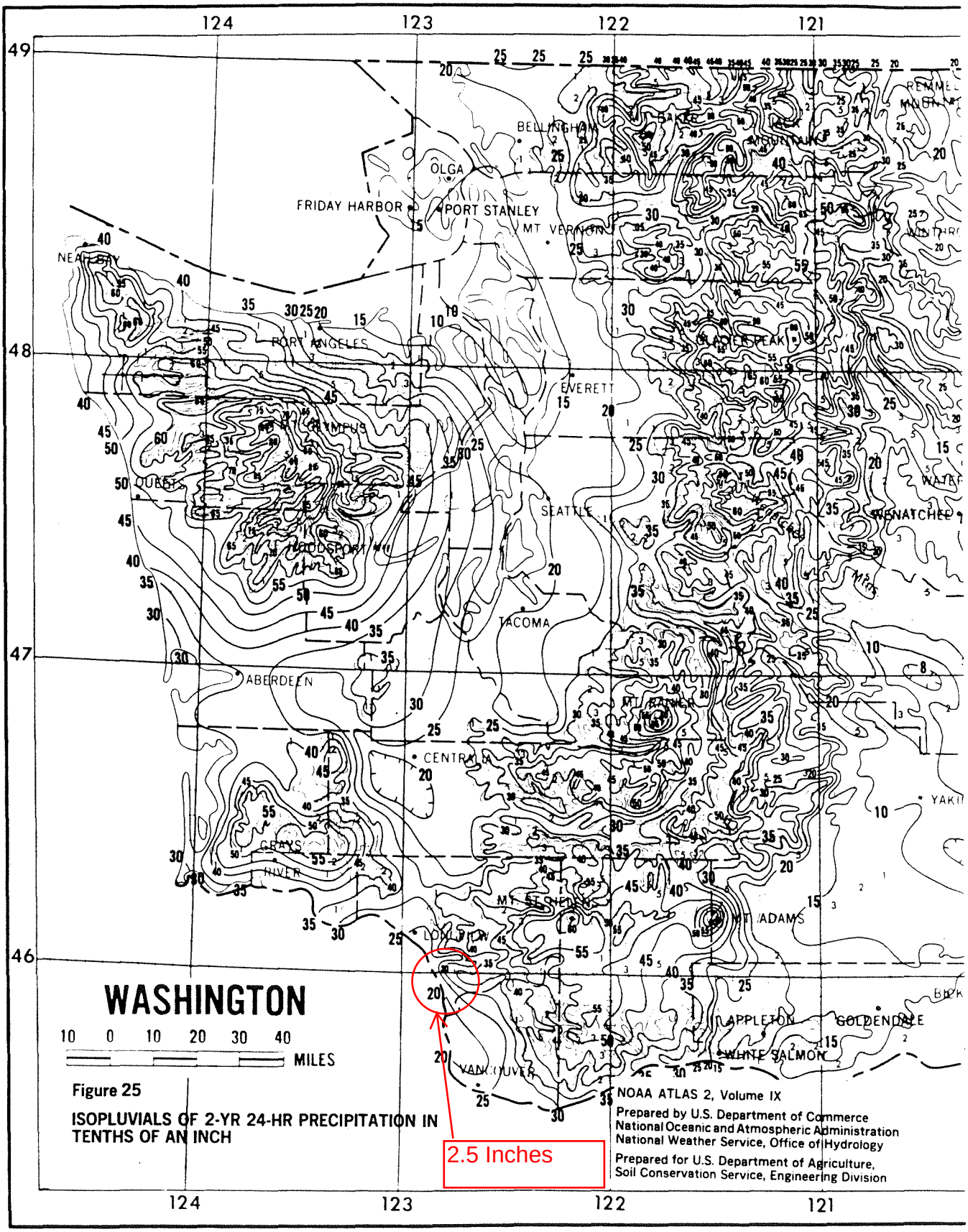


Figure 25

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

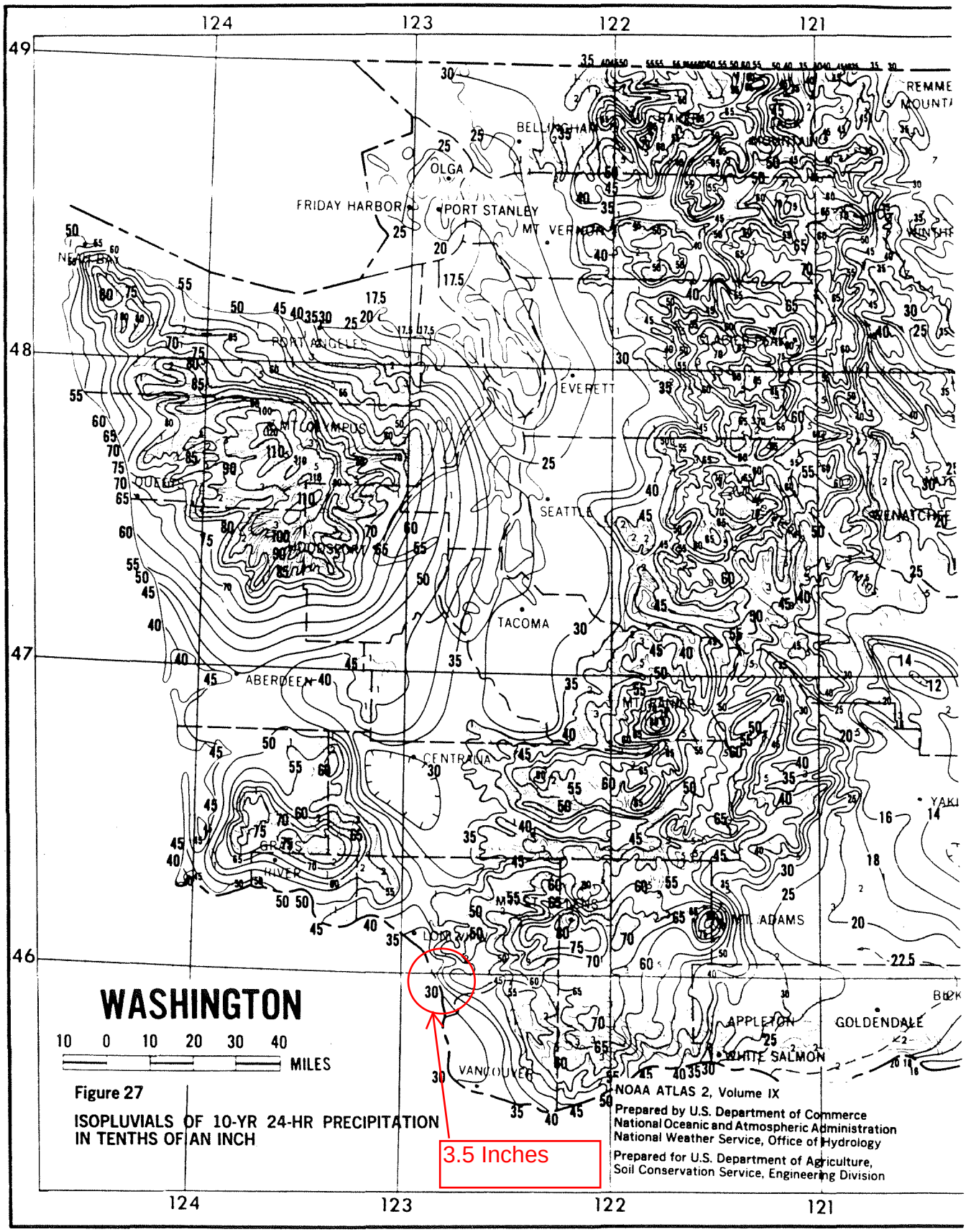


Figure 27

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

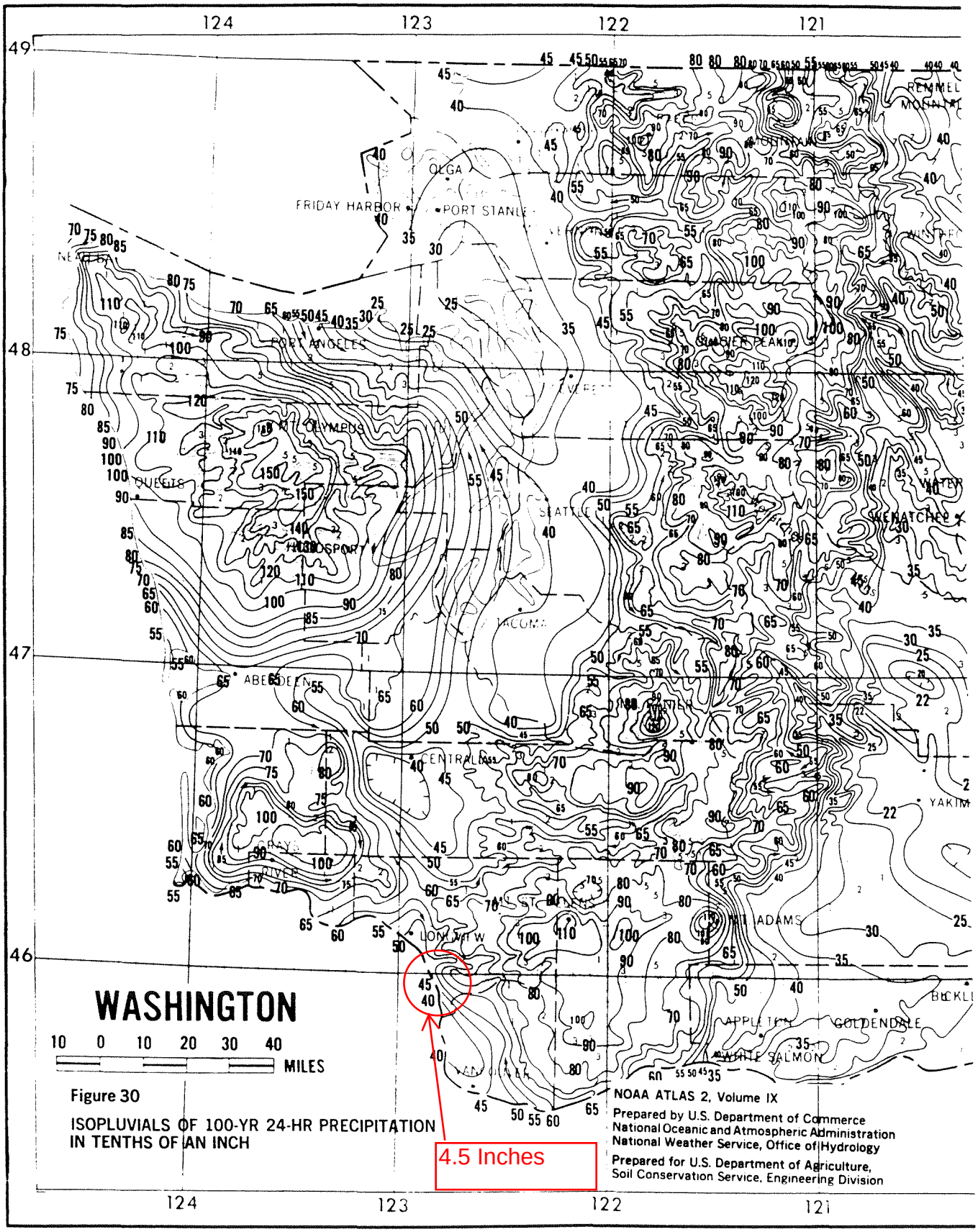


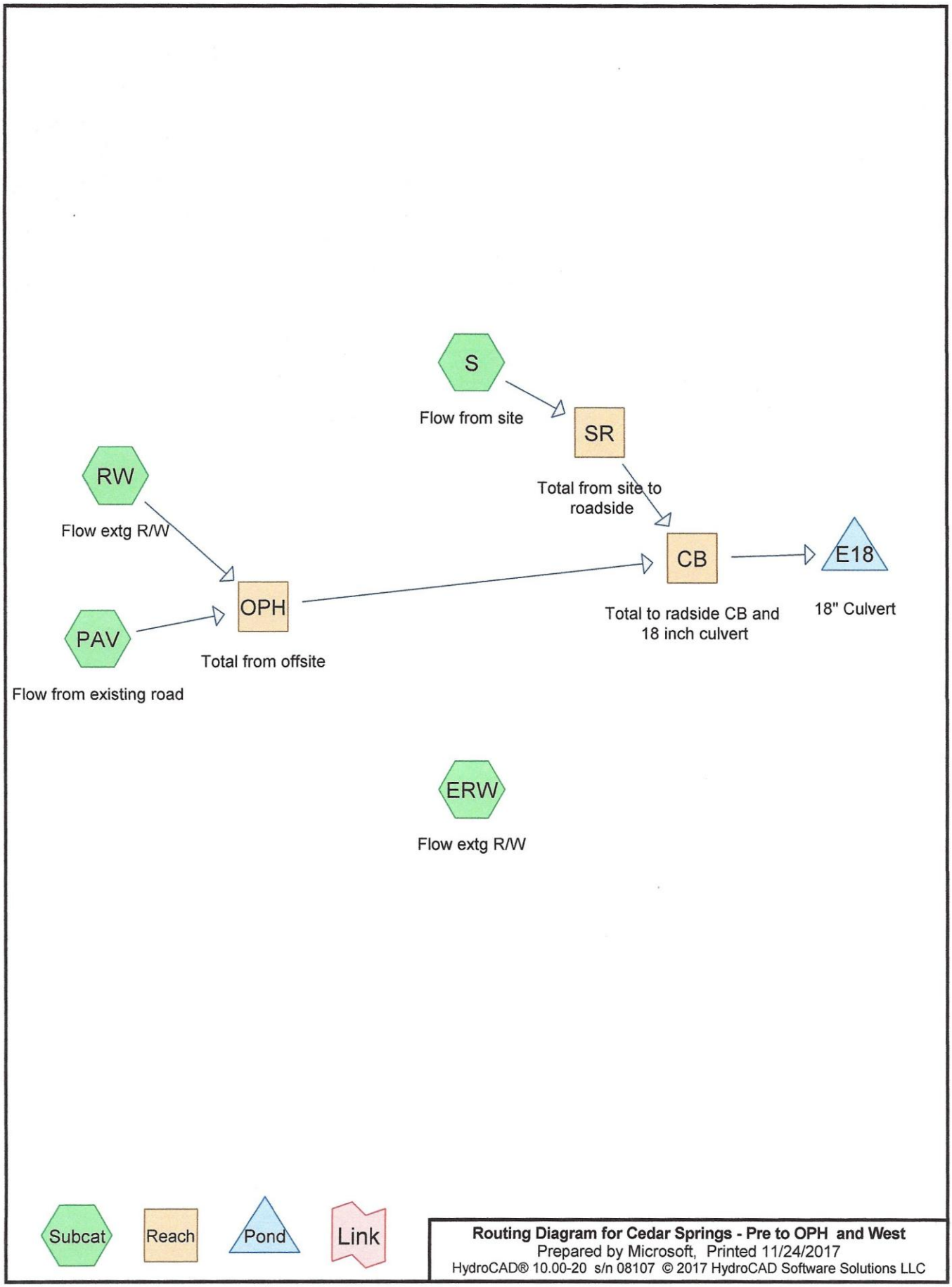
Figure 30

ISOPLUVIALS OF 100-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


S
Flow from site
SR
Total from site to roadside
RW
Flow extg R/W
CB
E18
18" Culvert
OPH
Total from offsite
Total to radside CB and 18 inch culvert
PAV
Flow from existing road
ERW
Flow extg R/W
Subcat
Reach
Pond
Link
Routing Diagram for Cedar Springs - Pre to OPH and West
Prepared by Microsoft, Printed 11/24/2017
HydroCAD® 10.00-20 s/n 08107 © 2017 HydroCAD Software Solutions LLC

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		**Sheet Flow, 26 in 105** Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		**Sheet Flow, 5 in 237** 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					**Direct Entry, Assumed**

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

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

Summary for Reach CB: Total to radside 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

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	**Custom Stage Data (Prismatic)** 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'	**18.0" Round Culvert** 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)

Summary for Subcatchment ERW: Flow extg R/W

Runoff = 0.16 cfs @ 8.03 hrs, Volume= 0.071 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
*	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		**Sheet Flow, 26 in 105** Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		**Sheet Flow, 5 in 237** 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> 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					**Direct Entry, Assumed**

Summary for Subcatchment RW: Flow extg R/W

Runoff = 0.09 cfs @ 8.05 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	Field (HSG B)
	0.359	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		**Sheet Flow, 26 in 105** Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		**Sheet Flow, 5 in 237** 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		**Sheet Flow, 26 in 105** Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		**Sheet Flow, 5 in 237** Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

Summary for Reach CB: Total to radside 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

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	**Custom Stage Data (Prismatic)** 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'	**18.0" Round Culvert** 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)

Summary for Subcatchment ERW: Flow extg R/W

Runoff = 0.25 cfs @ 8.03 hrs, Volume= 0.104 af, Depth> 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		**Sheet Flow, 26 in 105** Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		**Sheet Flow, 5 in 237** 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> 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					**Direct Entry, Assumed**

Summary for Subcatchment RW: Flow extg R/W

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	Field (HSG B)
	0.359	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		**Sheet Flow, 26 in 105** Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		**Sheet Flow, 5 in 237** 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		**Sheet Flow, 26 in 105** Grass: Dense n= 0.240 P2= 2.75"
15.7	105	0.0211	0.11		**Sheet Flow, 5 in 237** Grass: Dense n= 0.240 P2= 2.75"
21.5	210	Total			

Summary for Reach CB: Total to radside 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

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

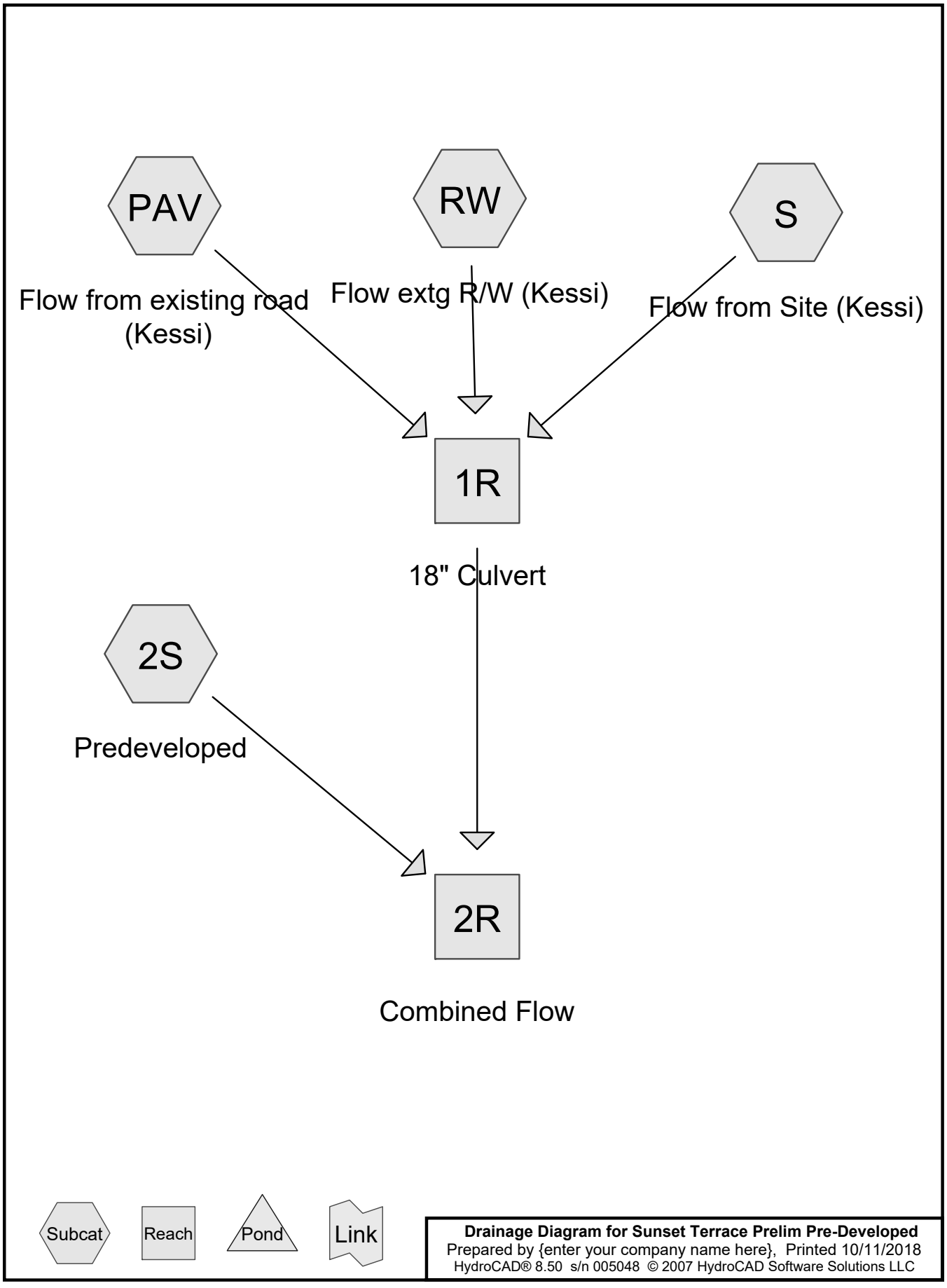
Plug-Flow detention time= 0.0 min calculated for 1.192 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (784.1 - 784.1)

Volume	Invert	Avail.Storage	Storage Description
#1	110.00'	13,662 cf	**Custom Stage Data (Prismatic)** 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'	**18.0" Round Culvert** 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)



Drainage Diagram for Sunset Terrace Prelim Pre-Developed
Prepared by {enter your company name here}, Printed 10/11/2018

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		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.75"
1.7	300	0.1800	2.97		**Shallow Concentrated Flow,** 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					**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

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

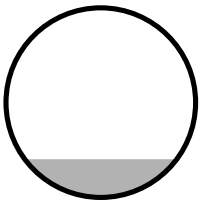
Summary for Reach 1R: 18" Culvert

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'



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

Summary for Subcatchment 2S: Predeveloped

Runoff = 2.62 cfs @ 8.03 hrs, Volume= 1.347 af, Depth> 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		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.75"
1.7	300	0.1800	2.97		**Shallow Concentrated Flow,** 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> 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 @ 8.05 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

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

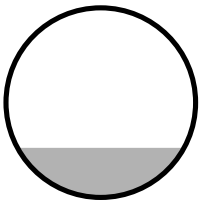
Summary for Reach 1R: 18" Culvert

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'



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

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		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.75"
1.7	300	0.1800	2.97		**Shallow Concentrated Flow,** 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					**Direct Entry, Assumed**

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

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

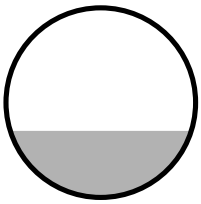
Summary for Reach 1R: 18" Culvert

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'



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

Summary for Subcatchment 2S: Predeveloped

Runoff = 0.17 cfs @ 18.46 hrs, Volume= 0.188 af, Depth> 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		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.75"
1.7	300	0.1800	2.97		**Shallow Concentrated Flow,** 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> 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 @ 9.02 hrs, Volume= 0.008 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
*	0.359	78	
	0.359	78	Pervious Area

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

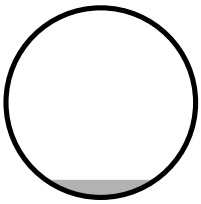
Summary for Reach 1R: 18" Culvert

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

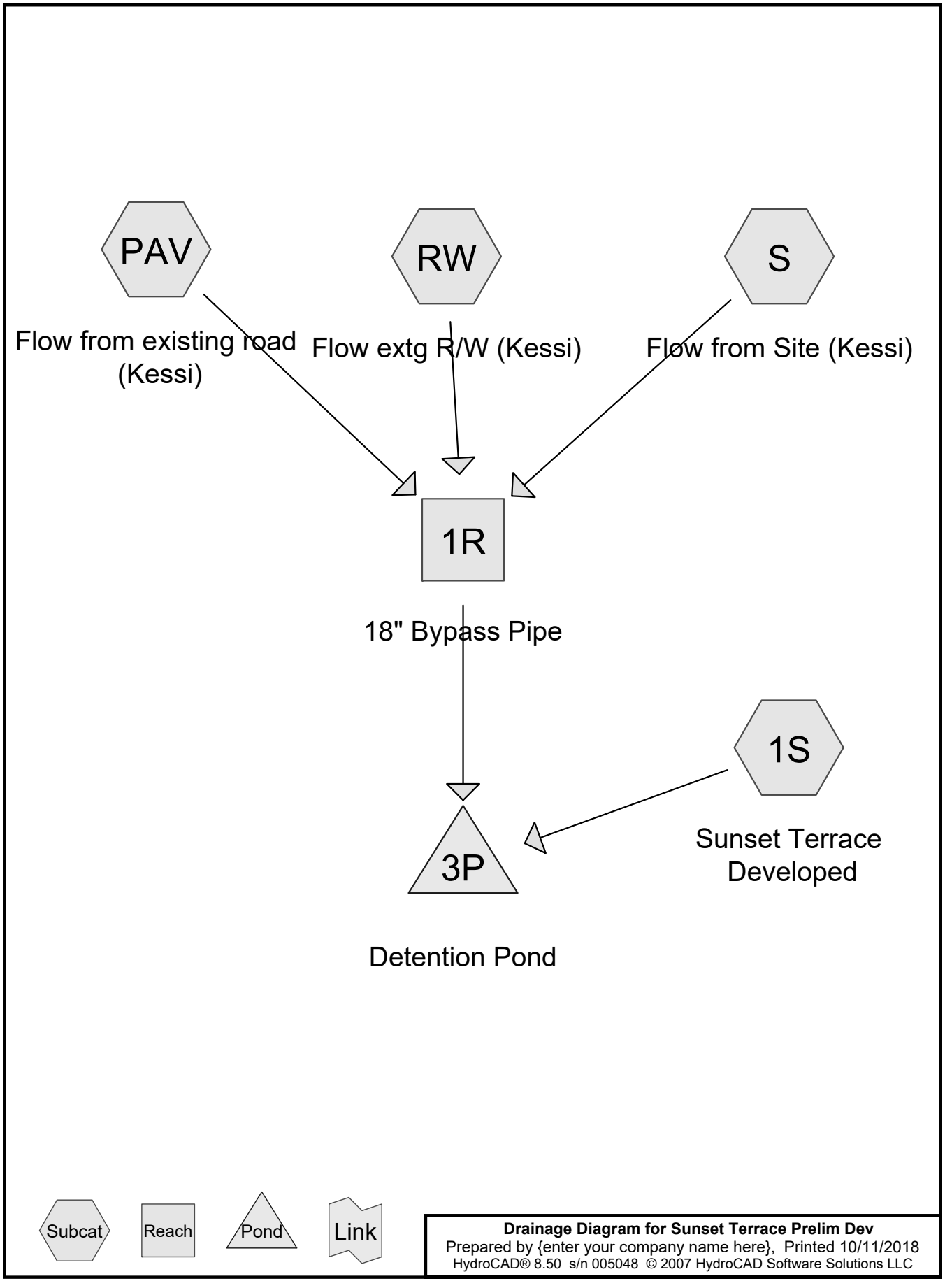
18.0" Diameter Pipe, n= 0.013
Length= 60.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.60'



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
Prepared by {enter your company name here}, Printed 10/11/2018

Summary for Subcatchment 1S: Sunset Terrace Developed

Runoff = 4.33 cfs @ 7.97 hrs, Volume= 1.616 af, Depth> 1.37"

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=2.50"

	Area (ac)	CN	Description
*	7.820	75	Pervious
*	2.800	98	Roof
*	2.560	98	Roadways
*	0.960	98	Sidewalk & DW
	14.140	85	Weighted Average
	7.820	75	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 = 0.23 cfs @ 7.90 hrs, Volume= 0.077 af, Depth> 2.27"

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=2.50"

	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 = 0.04 cfs @ 8.09 hrs, Volume= 0.023 af, Depth> 0.78"

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=2.50"

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

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

Summary for Subcatchment S: Flow from Site (Kessi)

Runoff = 0.48 cfs @ 8.09 hrs, Volume= 0.304 af, Depth> 0.78"

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=2.50"

	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		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.50"
16.4	105	0.0211	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.50"
22.5	210	Total			

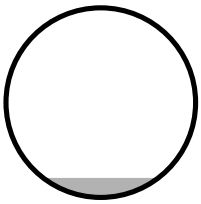
Summary for Reach 1R: 18" Bypass Pipe

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 0.89" for 2 yr event
Inflow = 0.73 cfs @ 8.02 hrs, Volume= 0.404 af
Outflow = 0.72 cfs @ 8.09 hrs, Volume= 0.402 af, Atten= 1%, Lag= 4.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.64 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 4.92 fps, Avg. Travel Time= 3.4 min

Peak Storage= 94 cf @ 8.05 hrs, Average Depth at Peak Storage= 0.15'
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 Pond 3P: Detention Pond

Inflow Area = 19.605 ac, 34.30% Impervious, Inflow Depth > 1.24" for 2 yr event
Inflow = 5.02 cfs @ 7.98 hrs, Volume= 2.018 af
Outflow = 1.03 cfs @ 16.47 hrs, Volume= 1.482 af, Atten= 79%, Lag= 509.3 min
Primary = 1.03 cfs @ 16.47 hrs, Volume= 1.482 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 3.63' @ 16.47 hrs Surf.Area= 0.212 ac Storage= 0.621 af

Plug-Flow detention time= 310.8 min calculated for 1.482 af (73% of inflow)
Center-of-Mass det. time= 147.5 min (900.1 - 752.6)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.935 af	**60.00'W x 125.00'L x 5.00'H Prismatoid Z=3.0** x 0.77

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**4.6" Vert. Orifice/Grate** C= 0.600
#2	Primary	3.63'	**24.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	4.27'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.03 cfs @ 16.47 hrs HW=3.63' (Free Discharge)
- **1=Orifice/Grate** (Orifice Controls 1.03 cfs @ 8.93 fps)
- **2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.11 fps)
- **3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Subcatchment 1S: Sunset Terrace Developed

Runoff = 7.12 cfs @ 7.96 hrs, Volume= 2.562 af, Depth> 2.17"

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	75	Pervious
*	2.800	98	Roof
*	2.560	98	Roadways
*	0.960	98	Sidewalk & DW
	14.140	85	Weighted Average
	7.820	75	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

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

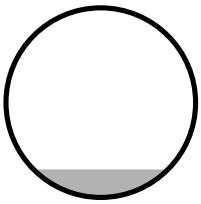
Summary for Reach 1R: 18" Bypass Pipe

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 Pond 3P: Detention Pond

Inflow Area = 19.605 ac, 34.30% Impervious, Inflow Depth > 2.02" for 10 yr event
Inflow = 8.61 cfs @ 7.98 hrs, Volume= 3.294 af
Outflow = 3.47 cfs @ 8.98 hrs, Volume= 2.643 af, Atten= 60%, Lag= 59.9 min
Primary = 3.47 cfs @ 8.98 hrs, Volume= 2.643 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 4.27' @ 8.98 hrs Surf.Area= 0.228 ac Storage= 0.761 af

Plug-Flow detention time= 225.5 min calculated for 2.643 af (80% of inflow)
Center-of-Mass det. time= 100.5 min (843.3 - 742.8)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.935 af	**60.00'W x 125.00'L x 5.00'H Prismatoid Z=3.0** x 0.77

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**4.6" Vert. Orifice/Grate** C= 0.600
#2	Primary	3.63'	**24.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	4.27'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=3.46 cfs @ 8.98 hrs HW=4.27' (Free Discharge)
- **1=Orifice/Grate** (Orifice Controls 1.12 cfs @ 9.72 fps)
- **2=Orifice/Grate** (Orifice Controls 2.34 cfs @ 2.72 fps)
- **3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Subcatchment 1S: Sunset Terrace Developed

Runoff = 10.15 cfs @ 7.96 hrs, Volume= 3.573 af, Depth> 3.03"

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=4.50"

	Area (ac)	CN	Description
*	7.820	75	Pervious
*	2.800	98	Roof
*	2.560	98	Roadways
*	0.960	98	Sidewalk & DW
	14.140	85	Weighted Average
	7.820	75	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 = 0.43 cfs @ 7.90 hrs, Volume= 0.144 af, Depth> 4.26"

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=4.50"

	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 = 0.15 cfs @ 8.05 hrs, Volume= 0.068 af, Depth> 2.27"

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=4.50"

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

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

Summary for Subcatchment S: Flow from Site (Kessi)

Runoff = 1.93 cfs @ 8.05 hrs, Volume= 0.888 af, Depth> 2.27"

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=4.50"

	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		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.50"
16.4	105	0.0211	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.50"
22.5	210	Total			

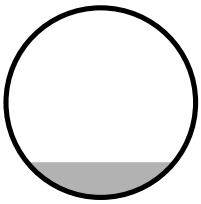
Summary for Reach 1R: 18" Bypass Pipe

Inflow Area = 5.465 ac, 7.41% Impervious, Inflow Depth > 2.41" for 100 yr event
Inflow = 2.48 cfs @ 8.02 hrs, Volume= 1.099 af
Outflow = 2.46 cfs @ 8.07 hrs, Volume= 1.097 af, Atten= 1%, Lag= 2.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.02 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 6.56 fps, Avg. Travel Time= 2.5 min

Peak Storage= 224 cf @ 8.04 hrs, Average Depth at Peak Storage= 0.28'
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 Pond 3P: Detention Pond

Inflow Area = 19.605 ac, 34.30% Impervious, Inflow Depth > 2.86" for 100 yr event
Inflow = 12.56 cfs @ 7.98 hrs, Volume= 4.670 af
Outflow = 8.29 cfs @ 8.26 hrs, Volume= 3.989 af, Atten= 34%, Lag= 16.6 min
Primary = 8.29 cfs @ 8.26 hrs, Volume= 3.989 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 4.79' @ 8.26 hrs Surf.Area= 0.241 ac Storage= 0.884 af

Plug-Flow detention time= 171.3 min calculated for 3.981 af (85% of inflow)
Center-of-Mass det. time= 76.4 min (810.2 - 733.8)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.935 af	**60.00'W x 125.00'L x 5.00'H Prismatoid Z=3.0** x 0.77

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**4.6" Vert. Orifice/Grate** C= 0.600
#2	Primary	3.63'	**24.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	4.27'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=8.28 cfs @ 8.26 hrs HW=4.79' (Free Discharge)
- **1=Orifice/Grate** (Orifice Controls 1.19 cfs @ 10.33 fps)
- **2=Orifice/Grate** (Orifice Controls 6.94 cfs @ 3.67 fps)
- **3=Orifice/Grate** (Orifice Controls 0.15 cfs @ 3.03 fps)

Summary for Subcatchment 1S: Sunset Terrace Developed

Runoff = 2.22 cfs @ 7.93 hrs, Volume= 0.857 af, Depth> 0.73"

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	75	Pervious
*	2.800	98	Roof
*	2.560	98	Roadways
*	0.960	98	Sidewalk & DW
	14.140	85	Weighted Average
	7.820	75	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> 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> 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

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

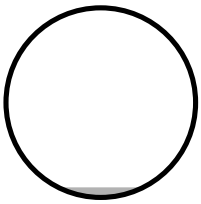
Summary for Reach 1R: 18" Bypass Pipe

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 Pond 3P: Detention Pond

Inflow Area = 19.605 ac, 34.30% Impervious, Inflow Depth > 0.62" for WQ event
Inflow = 2.37 cfs @ 7.94 hrs, Volume= 1.017 af
Outflow = 0.65 cfs @ 11.13 hrs, Volume= 0.878 af, Atten= 73%, Lag= 191.2 min
Primary = 0.65 cfs @ 11.13 hrs, Volume= 0.878 af

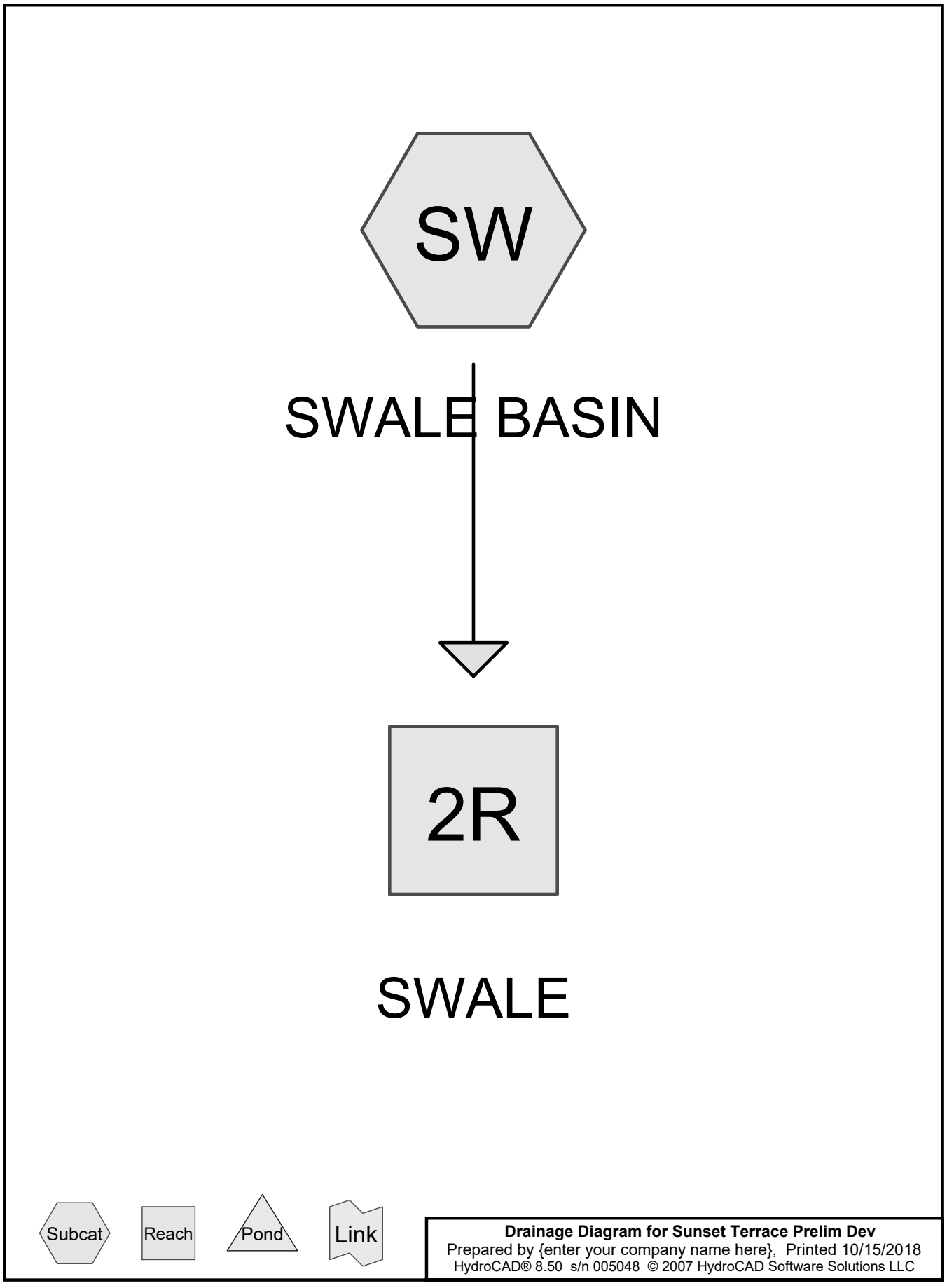
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1.55' @ 11.13 hrs Surf.Area= 0.165 ac Storage= 0.230 af

Plug-Flow detention time= 213.5 min calculated for 0.878 af (86% of inflow)
Center-of-Mass det. time= 125.1 min (883.9 - 758.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.935 af	**60.00'W x 125.00'L x 5.00'H Prismatoid Z=3.0**x 0.77

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**4.6" Vert. Orifice/Grate** C= 0.600
#2	Primary	3.63'	**24.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	4.27'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.65 cfs @ 11.13 hrs HW=1.55' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.65 cfs @ 5.61 fps)
└**2=Orifice/Grate** (Controls 0.00 cfs)
└**3=Orifice/Grate** (Controls 0.00 cfs)



Drainage Diagram for Sunset Terrace Prelim Dev
Prepared by {enter your company name here}, Printed 10/15/2018

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					**Direct Entry,**

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 @ 8.06 hrs, Volume= 0.631 af, Atten= 1%, Lag= 8.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.32 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 9.6 min

Peak Storage= 514 cf @ 7.98 hrs, Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.27 cfs

10.00' x 1.00' deep channel, n= 0.240
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.00'

‡

Geotechnical Report Appendix C

(Refer to the preliminary application packet)