# Drainage Report for: Blossom Ridge

APN: 223-0091-002 Prepared by CNA Engineering Inc. *Vertical Datum NAVD 88* (Conversion factor to NGVD 29 = -2.549' Per VertCon for BM #15-61)

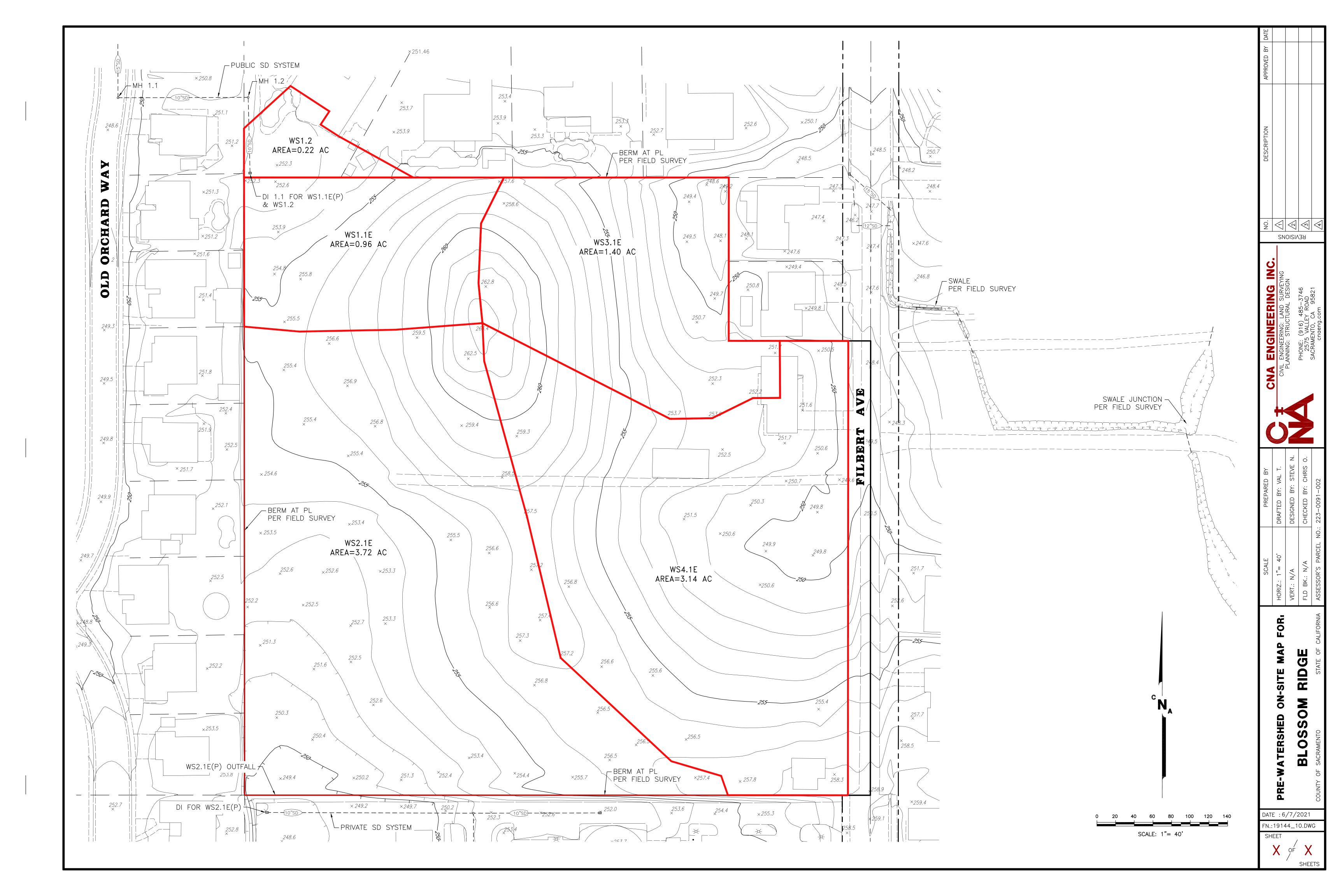
# Introduction and background

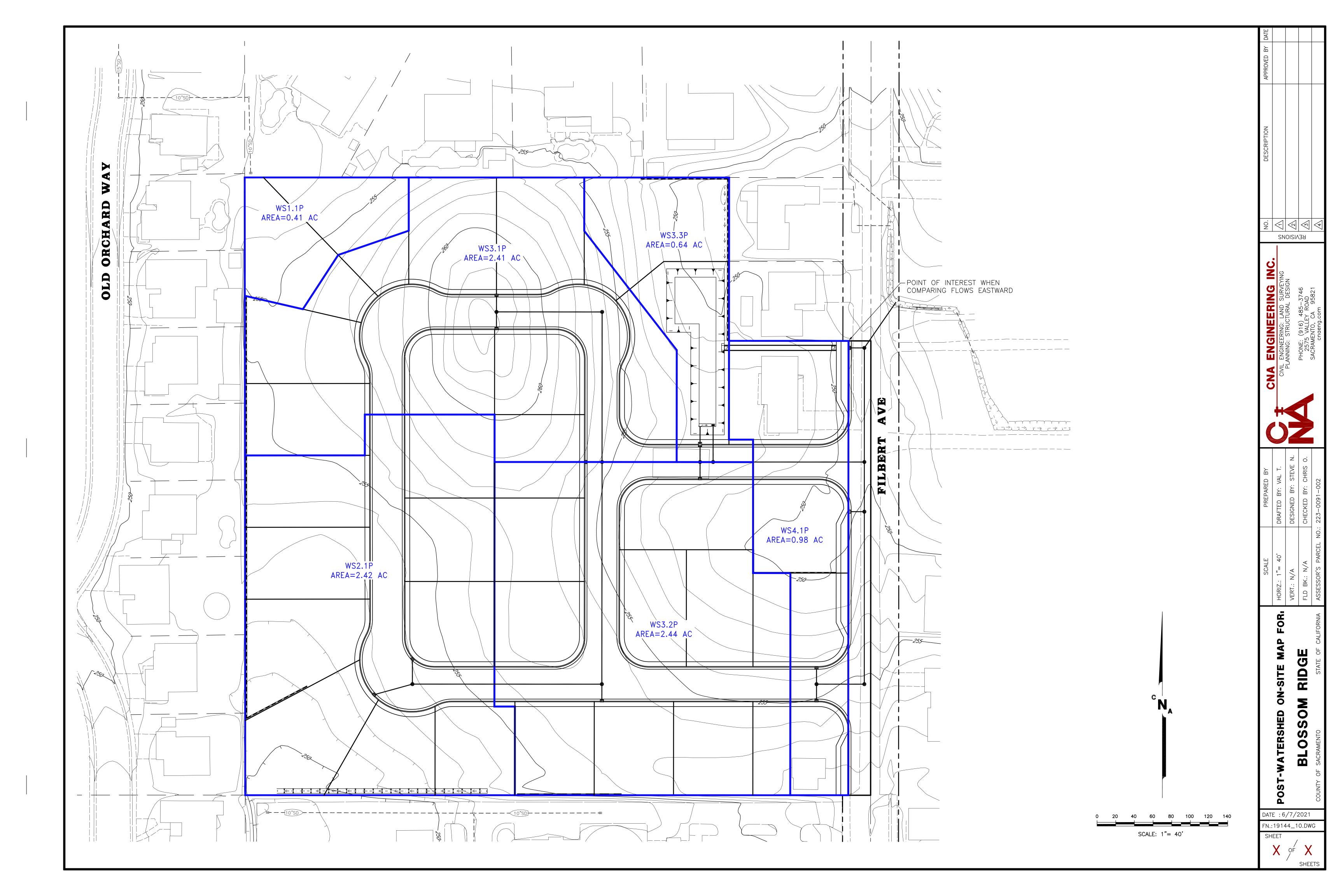
Project site is located on Filbert Avenue, north of the intersection with Greenback Lane.

The project drains to three directions. Each drainage direction is discussed separately in the following chapters.

The scope of this study includes:

- 100-, 10- and 2-year post-development peak control to the pre- development level;
- Design public pipe system;
- Preliminary design Low Impact Development facilities.





# 1. North-West Direction of Drainage

Watershed WS1.1E currently drains northwest to the backyard of the single-family residence. There is a public inlet located in the backyard that collects drainage and conveys it to Old Orchard Way. Per discussion with the Sacramento County Water Resources the proposed design should meet 2 criteria:

- Do not increase the 2-, 10- and 100-year flows in the historical direction;
- Make sure the existing pipe system is capable of conveying Nolte flows in the postdevelopment conditions. The system needs to be checked up to the Manhole MH13 (MH1.1) per DWR.

# 1.1 Watersheds Descriptions

#### Watershed WS1.1E conditions are:

Total shed area = 0.96 acres;

Mean Elevation – 255 ft;

Precipitation Zone – 3;

Imperviousness – 2% - open space grassland;

Length of longest watercourse – 299 ft;

Length along longest watercourse to centroid – 156 ft;

Existing basin slope is 3.8%;

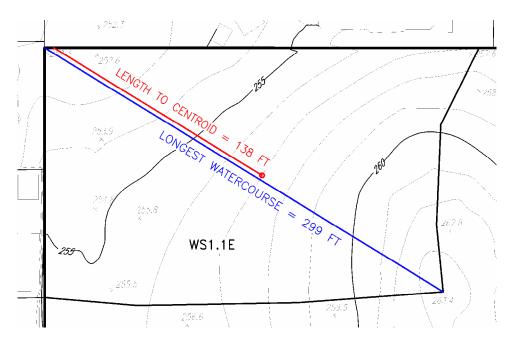


Figure 1 – WS1.1E Lengths.

#### Watershed WS1.1P conditions are:

Total shed area = 0.41 acres;

Mean Elevation – 255 ft;

Precipitation Zone – 3;

- Imperviousness 30% RD-3;
- Length of longest watercourse 176 ft;

Length along longest watercourse to centroid – 71 ft;

Basin slope is 3.8%;

Hydrologic Soils group B per USDA GIS Map.

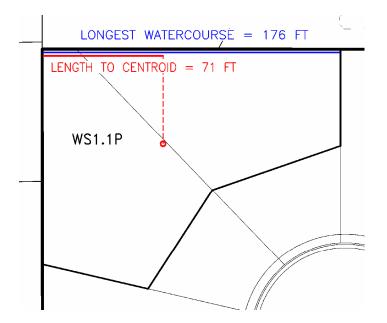


Figure 2 – WS1.1P Lengths.

*Watershed WS1.2* – offsite (collected by the existing Type DI):

Total shed area = 0.22 acres;

Existing imperviousness = 50%.

# 1.2 SacCalc Analysis

#### Results are presented below.

#### Sacramento method results (Project: Blossom Ridge)

(100-year, 1-day rainfall)									
ID	Peak flow (cfs)	Time of peak (hours)	Basin arca (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)			
W\$1-1E	2.6	12.05	.00						
WS2-1E	8.4	12.09	.01						
WS1-1P	1.5	12:02	.00						
WS3-1E	4.1	12.05	.00						
WS4-1E	6,9	12.09	.00						
PRE	10,	12:08	.01						
WS4-1P	3.2	12.03	.00						
WS3-1P	6.1	12:07	.00						
WS3-2P	6.7	12:06	.00						
WS2-1P	6.9	12:05	.00						
DV001	3.2	12:11	.00			.05			
WS3-3P	2.3	12:02	.00						
JNC001	18.	12:06	.01						
POND	7.4	12:25	.01	2.9	.4	.00			
POST	8.1	12:24	.01						
WSC-1	35.	12:09	.02						

(10-year, 1-day rainfall)										
ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Pcak storage (ac-ft)	Diversion volume (ac-ft)				
W\$1-1E	1.5	12.05	.00							
WS2-1E	4.8	12.09	.01							
WS1-1P	.8	12:02	.00							
W\$3-1E	2.3	12.05	.00							
WS4-1E	3.9	12:09	.00							
PRE	5.8	12.08	.01							
WS4-1P	2.0	12.02	.00							
WS3-1P	4.0	12:05	.00							
WS3-2P	4.3	12:04	.00							
WS2-1P	4.4	12:04	.00							
DV001	3.2	12:01	.00			.01				
WS3-3P	1.3	12:02	.00							
JNC001	13.	12:04	.01							
POND	3.0	12:34	.01	2,2	.3					
POST	4.2	12:03	.01							
WSC-1	23.	12:07	.02							

			2-year, 1-day r	aintait)		
ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
WS1-1E	.7	12.05	.00			
WS2-1E	2.3	12.09	.01			
WS1-1P	.4	12.02	.00			
W\$3-1E	1.1	12.05	.00			
WS4-1E	1.9	12:09	.00			
PRE	2.8	12:08	.01			
WS4-1P	1.0	12:02	.00			
WS3-1P	2.0	12:05	.00			
WS3-2P	2.2	12:04	.00			
WS2-1P	2.3	12:04	.00			
DV001	2.3	12:04	.00			.00
WS3-3P	.7	12:02	.00			
INC001	7.1	12:04	.01			
POND	2.2	12:24	.01	1.2	.1	.00
POST	2.6	12:07	.01			
WSC-1	12.	12:07	.02			

Figure 3 – SacCalc Results for 2-, 10-, and 100-year 24 hour storm events.

	<u>Nolte method results</u> (Project: Blossom Ridge_Nolte) (Hydrologic zone 1)						
ID	Drainage area (acres)	Impervious area (%)	Design Q (cfs)				
WS1-1E	0.96	20.00	0.27				
WS1-2	0.22	50.00	0.06				
WS2-1E	3.82	20.00	1.07				
WS2-1P	2.39	38.60	0.67				
WS1-1P	0.41	30.00	0.11				
WS-211	0.76	40.00	0.21				
WS-212	1.23	30.00	0.34				
WS-311	1.14	30.00	0.32				
WS-312	0.40	40.00	0.11				
WS-313	0.64	25.00	0.18				
WS-314	0.56	40.00	0.16				
WS-321	0.94	40.00	0.26				
WS-322	0.82	40.00	0.23				
WS-323	0.99	40.00	0.28				
WS-411	0.44	30.00	0.12				
WS-412	0.50	30.00	0.14				
WS-413	0.08	30.00	0.02				
WS-414	0.24	30.00	0.07				

Nol	te metho	d result	ts
(Project:	Blossom	Ridge	Nolte)
(Hy	/drologie	zone 1	)

Figure 4 – SacCalc Results Nolte flows.

As can be seen from the results above, the development will not increase runoff offsite in the North-West Direction during 2-, 10- and 100-year events and for Nolte flows.

# 1.3 Hydraflow Pipe Analysis – Existing Off-site System

Flows from WS1.1P and WS1.2 are entered in the DI1.1 (Node #3) located offsite of the project.

Total flow entered is 0.22 + 0.41 = 0.63 cfs. (See Figure 4 above).

Pipes and nodes information is as follows (refer to the WS Map above). Existing SD facilities have been surveyed:

Structure	Structure	Rim	Invert	Pipe size and	Slope	n-value	
#	ID	Elevation	(FL)	material	downstream		
				(downstream)			
1	MH 1.1	248.50	244.30	15", PVC	0.0100	0.015	
			(out)		(assumed)		
2	MH 1.2	249.72	246.98	10", PVC	0.0192	0.015	
			(out)				
	DI 1.1	252.25	240 (2	10" DUC	0.0010	0.015	
3	(WS1.1P & WS1.2)	252.35	249.63	10", PVC	0.0310	0.015	

#### Table 1 – Existing Storm Drain System Information.

As can be seen from the results below, HGL<sub>Nolte</sub> for the system northwest of the project does not get closer than 12" below the rims of manholes and 6" below the rims of drop inlets. The system is considered to have sufficient capacity.

# Outfall #2 2 #1 3 **#**3 Project File: North Pipe System\_Proposed Flows.stm Number of lines: 3 Date: 10-29-2020

# Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2009 Plan

Hydraflow Storm Sewers Extension v6.066

# **Storm Sewer Inventory Report**

Line		Alignr	nent			Flow	Data					Physical	Data				Line ID
No.	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	9.141	89.850	MH	0.00	0.00	0.00	0.0	242.50	1.09	242.60	15	Cir	0.015	1.00	248.50	
2	1	139.424			0.00	0.00	0.00	0.0	244.30	1.92	246.98	10	Cir	0.015	1.00	249.72	
3	2	81.000	88.765	DrGrt	0.63	0.00	0.00	0.0	247.12	3.10	249.63	10	Cir	0.015	1.00	252.35	
Project	File: Nortl	h Pipe Sys	tem_Prop	osed Flow	vs.stm							Number o	of lines: 3			Date: 1	0-29-2020

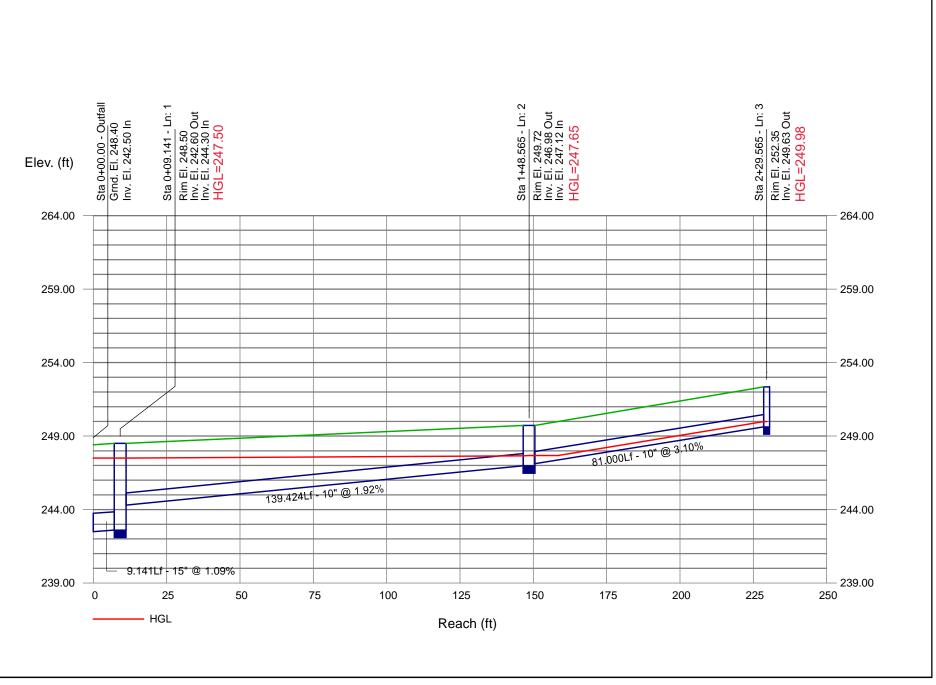
# **Structure Report**

Struct No.	Structure ID	Junction Type	Rim Elev.		Structure			Line Out			Line In	
NO.		туре	(ft)	Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1		Manhole	248.50	Cir	4.00	4.00	15	Cir	242.60	10	Cir	244.30
2		Manhole	249.72	Cir	4.00	4.00	10	Cir	246.98	10	Cir	247.12
3		DropGrate	252.35	Rect	2.00	2.00	10	Cir	249.63			
Project	File: North Pipe System_Prop	oosed Flows.stm					Nu	mber of Struct	ures: 3	Run	Date: 10-29-20	)20

Hydraflow Storm Sewers Extension v6.066

# Storm Sewer Summary Report

	0.63 0.63 0.63	15 10 10	Cir Cir Cir	9.141 139.424 81.000	242.50 244.30 247.12	242.60 246.98 249.63	1.094 1.922	247.50* 247.51	247.50* 247.65	0.00 0.03	247.51 247.68	End 1	Manhole
								247.51	247.65	0.03	247.68	1	Marchala
	0.63	10	Cir	81.000	247.12	240.62			1			'	Manhole
						243.00	3.099	247.68	249.98	n/a	249.98 j	2	DropGrate
roject													



# 2. South-West Direction of Drainage

Watershed WS2.1E currently drains southwest to the church property. The most of the watershed drainage is designed to be collected into the proposed pipe drainage system. The system will convey the flows to the detention basin and later off-site in the easterly direction. Per discussion with the Sacramento County Water Resources the proposed design should meet this criteria:

- Do not increase the 2-, 10- and 100-year flows in the historical direction. This direction is considered overland release path for this watershed.

# 2.1 Watersheds Descriptions

#### Watershed WS2.1E conditions are:

Total shed area = 3.82 acres;

Mean Elevation – 255 ft;

Precipitation Zone – 3;

Imperviousness – 2% - open space grassland;

Length of longest watercourse – 565 ft;

Length along longest watercourse to centroid – 252 ft;

Existing basin slope is 2.5%;

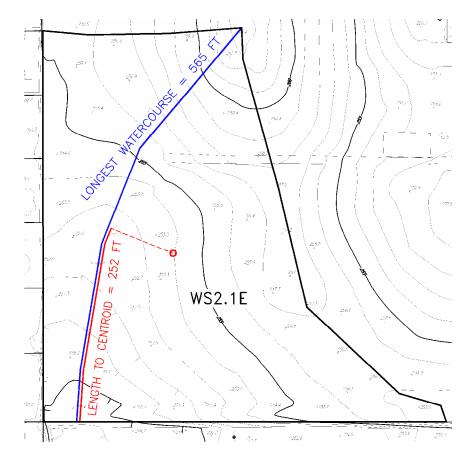


Figure 5 – WS2.1E Lengths.

#### Watershed WS2.1P conditions are:

Total shed area = 2.42 acres;

Mean Elevation – 255 ft;

Precipitation Zone – 3;

Imperviousness – combined, based on proposed zoning area:

RD-3 = 1.21 acres – 50%;

RD-4 = 1.21 acres – 50%.

Length of longest watercourse – 602 ft;

Length along longest watercourse to centroid – 291 ft;

Proposed basin slope is 1.0%;

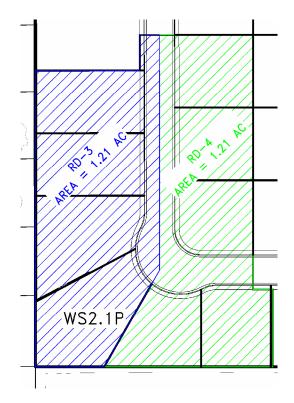
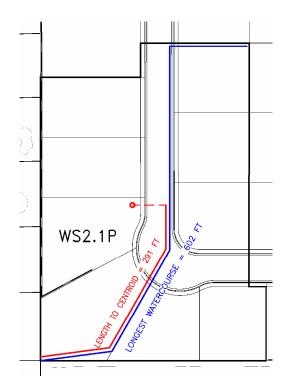
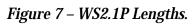


Figure 6 – WS2.1P Zoning.





# 2.2 SacCalc Analysis

As can be seen from the results in the Figure 3, the development will not increase runoff offsite in the South-West Direction during 2-, 10- and 100-year events.

# 3. East Direction of Drainage

Watershed WS3.1E currently drains northeast to the backyards of the single-family residences located on Filbert Avenue. Drainage fills up the front yards and finds its way across Filbert Avenue either via existing cross culvert or spilling over the sag of the roadway. Similarly, Watershed WS4.1E currently drains east towards Filbert Avenue, follows along the road and finds release in the same location. There is a drainage swale across Filbert Avenue that receives the drainage form the project site. This swale runs east towards the junction with another swale coming from the north direction. The swale junction has been surveyed and is located approximately 340 feet east of the Filbert centerline. Per discussion with the Sacramento County Water Resources the proposed design should meet the following criteria:

- Do not increase the 2-, 10- and 100-year flows in the historical direction;
- Design the pipe system that outfalls into the existing swale. If the tie-in location is in the Right-of-Way, no easement would be necessary;
- Design the proposed pipe system to be capable to convey Nolte flows in the postdevelopment conditions;
- Analyze downstream conditions.

# 3.1 Watersheds Descriptions

#### Watershed WS3.1E conditions are:

Total shed area = 1.40 acres;

Mean Elevation – 255 ft;

Precipitation Zone – 3;

Imperviousness – 2% - open space grassland;

Length of longest watercourse – 289 ft;

Length along longest watercourse to centroid – 130 ft;

Existing basin slope is 5.5%;

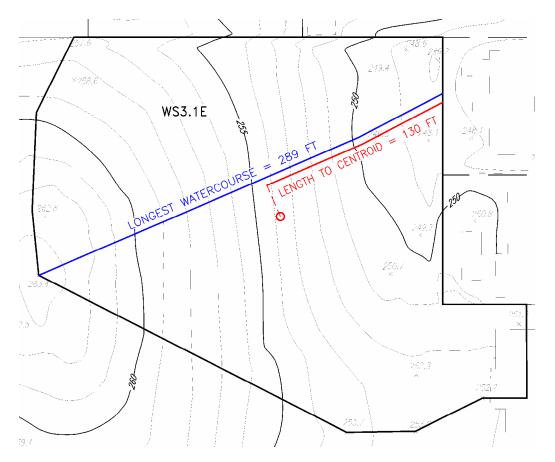


Figure 8 – WS3.1E Lengths.

#### *Watershed WS4.1E conditions are:*

Total shed area = 3.14 acres;

Mean Elevation – 255 ft;

Precipitation Zone – 3;

Imperviousness – 2% - open space grassland;

Length of longest watercourse – 514 ft;

Length along longest watercourse to centroid – 291 ft;

Existing basin slope is 2.5%;

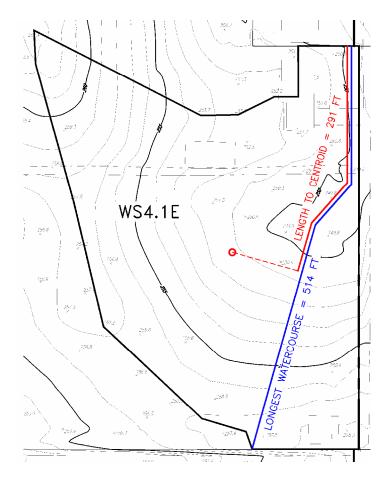


Figure 9 – WS4.1E Lengths.

#### Watershed WS3.1P conditions are:

Total shed area = 2.41 acres;

Mean Elevation – 255 ft;

Precipitation Zone – 3;

Imperviousness – combined, based on proposed zoning area:

RD-2 = 0.32 acres;

RD-3 = 1.37 acres ;

RD-4 = 0.72 acres.

Length of longest watercourse – 776 ft;

Length along longest watercourse to centroid – 322 ft;

Proposed average basin slope is 0.5%;

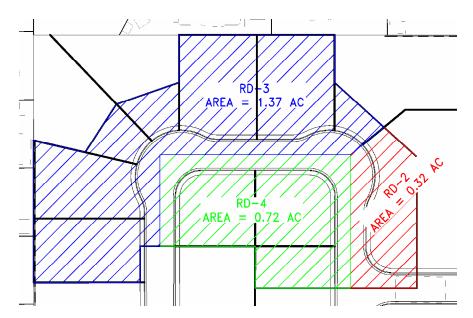


Figure 10 – WS3.1P Zoning.

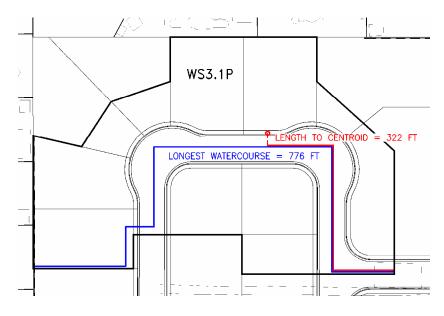


Figure 11 – WS3.1P Lengths.

#### Watershed WS3.2P conditions are:

Total shed area = 2.44 acres;

Mean Elevation – 255 ft;

Precipitation Zone – 3;

Imperviousness – combined, based on proposed zoning area:

RD-3 = 0.57acres - 23%;

RD-4 = 1.87 acres – 77%.

Length of longest watercourse – 646 ft;

Length along longest watercourse to centroid – 283 ft;

Proposed average basin slope is 0.5%;

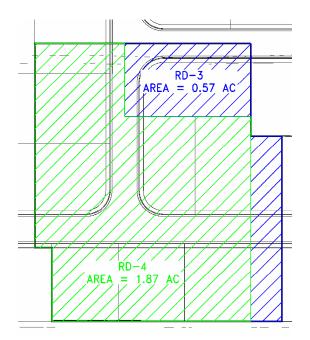


Figure 12 – WS3.2P Zoning.

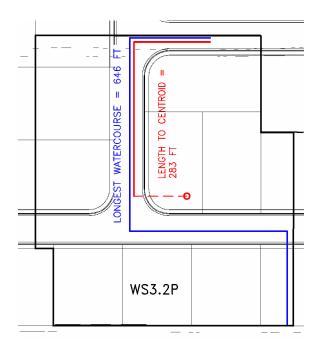


Figure 13 – WS3.2P Lengths.

#### Watershed WS3.3P conditions are:

Total shed area = 0.64 acres;

Mean Elevation – 255 ft;

Precipitation Zone – 3;

Imperviousness – combined, based on proposed zoning area:

RD-3 = 0.34 acres;

RD-4 = 0.30 acres.

Length of longest watercourse – 186 ft;

Length along longest watercourse to centroid – 41 ft;

Proposed average basin slope is 1.0%;

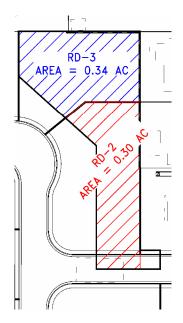


Figure 14 – WS3.2P Zoning.

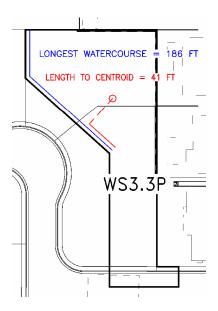


Figure 15 – WS3.2P Lengths.

#### Watershed WS4.1P conditions are:

Total shed area = 0.98 acres;

Mean Elevation – 255 ft;

Precipitation Zone – 3;

Imperviousness – 30% - RD-3.

Length of longest watercourse – 533 ft;

Length along longest watercourse to centroid – 167 ft;

Proposed average basin slope is 2.0%;

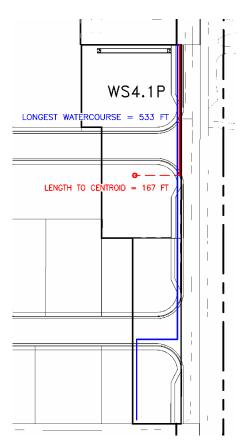


Figure 16 – WS4.1P Lengths.

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#### 3.2 Peak Control

Due to the drainage issues downstream of the proposed development, the project is required not to increase the peak flows during 24 hour 2-, 10- and 100-year events. In order to satisfy this requirement the detention in the back of Lot 2 basin is proposed. On-site grades are design to allow the drainage to enter the basin by both: pipe system and overland flows. Flow restriction in the detention basin is proposed per detail in the Preliminary Grading Plan. Total depth of the basin is 3' with 3:1 side slopes. Watershed WS2.1P is connected to the basin via the drainage pipe system, but overland release of it follows the historical path south of the development.

#### 3.3 SacCalc Analysis

As can be seen from the results in the Figure 3 – PRE and POST, the development will not increase runoff offsite in the East Direction during 2-, 10- and 100-year events. Watershed WS2.1P is connected to the basin using Diversion function. Inlet capacity as calculated below is used as a diverted flow.

#### Inlet capacity per HEC- 22 (USDOT, FHWA, September 2009):

 $Q_{cap} = K D^{5/3}$ , where

D – depth of flow at curb = 0.38 ft – difference between FL and TBW per Preliminary Grading Plan;

K - coefficient of inlet capacity based on transverse and longitudinal gutter slopes. See figure below.

 $S_{\rm L}$  - longitudinal gutter slope – ranges from 0.75% to 1.50% for WS2.1P. Average of 1.2% is taken.

ST - transverse gutter slope = 6.2% per Sacramento County 4-30 detail for type 1A gutter.

K = 16 for the above values per the graph below.

 $Q_{cap} = K D^{5/3} = 16 \times 0.38^{5/3} = 3.19 \text{ cfs.}$ 

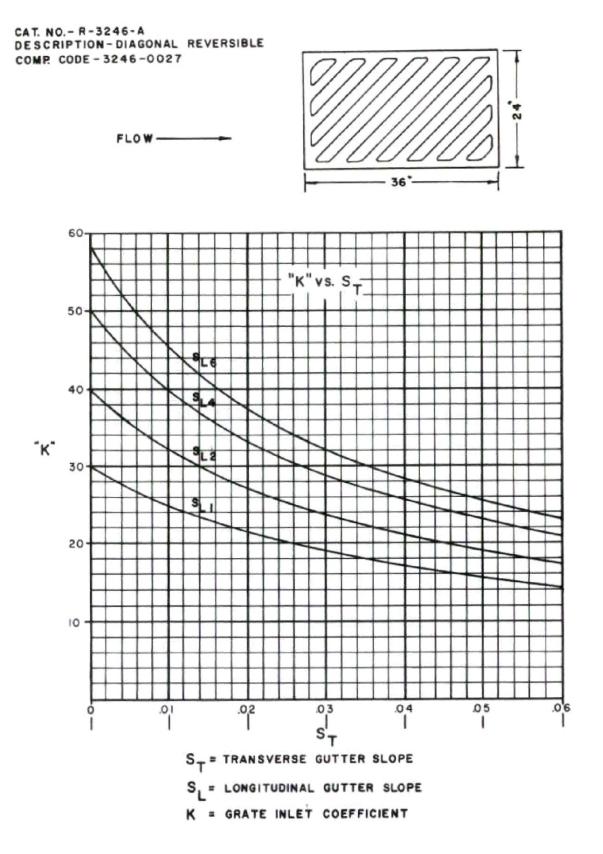


Figure 17 – Inlet Capacity.

## 3.4 Overland Release

Elevation of the sidewalk low point on the north access road adjacent to the basin is designed to be lower than the gutter flow line east of the basin in order to direct the overland flow into the basin. 5 foot wide weir and concrete spillway is proposed on the north side of the existing house on lot 1. Flow of 8.1 cfs as a post-developed condition downstream of the pond is used for the calculation.

The Report for the spillway is presented below. The detail is provided in the Preliminary Grading Plan.

# **Channel Report**

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc.

- - -

#### **Overland Release**

# Rectangular

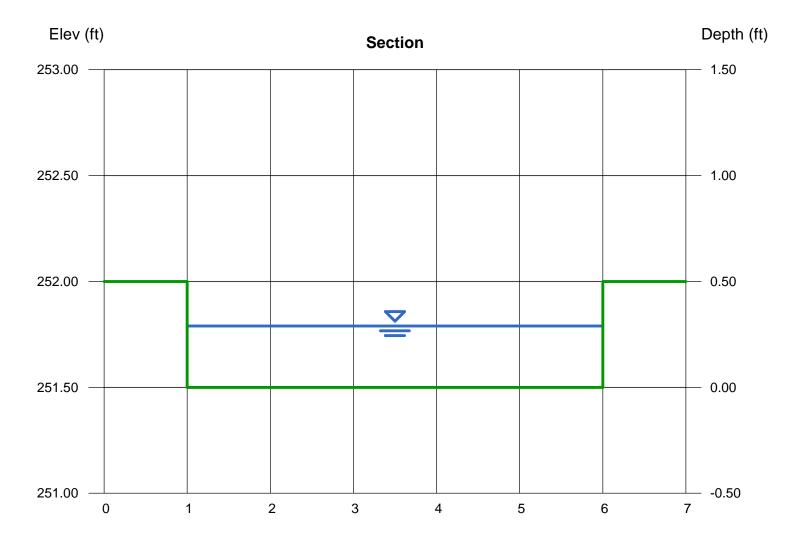
Bottom Width (ft)	= 5.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 251.50
Slope (%)	= 2.35
N-Value	= 0.016

#### Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.10

# HighlightedDepth (ft)= 0.29Q (cfs)= 8.100Area (sqft)= 1.45Velocity (ft/s)= 5.59Wetted Perim (ft)= 5.58Crit Depth Xc (ft)= 0.44

Crit Depth, Yc (ft)	=	0.44
Top Width (ft)	=	5.00
EGL (ft)	=	0.78



Friday, May 28 2021

**CNA Engineering** 

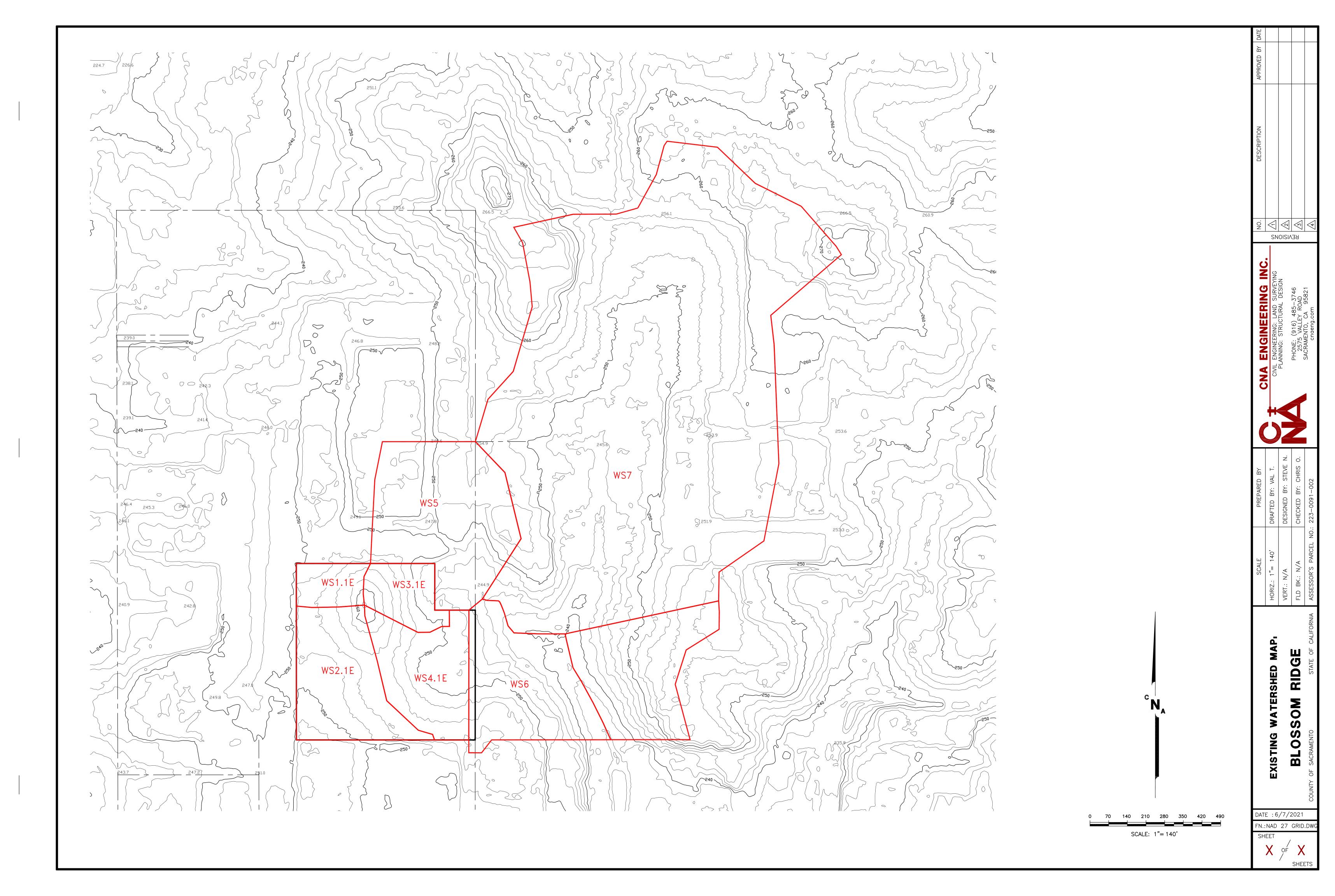
### 3.5 Downstream Analysis

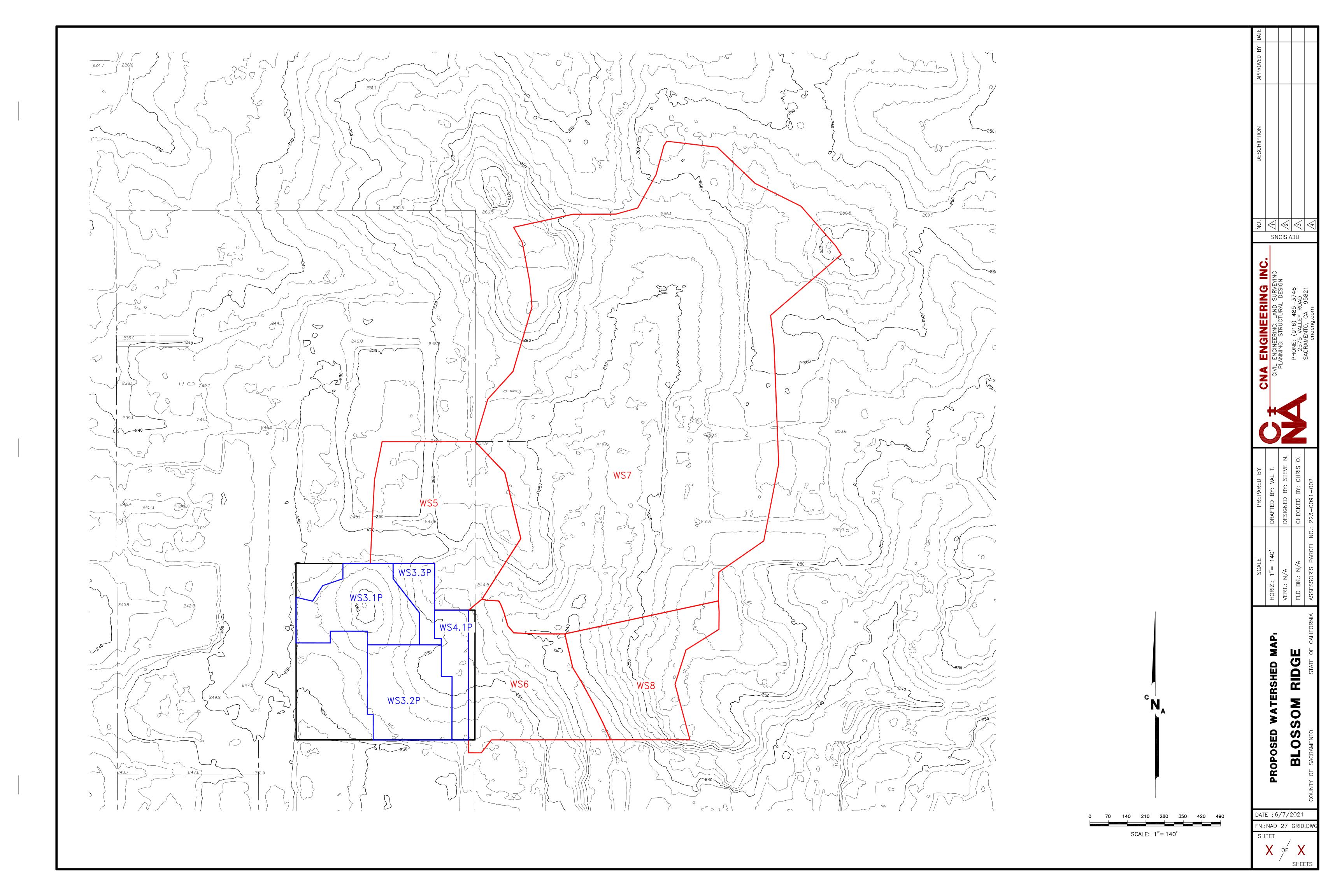
In order to evaluate the effect of the development downstream of the project Hec-Ras analysis has been performed. The goal of this analysis is to analyze the impact of the proposed development on the existing downstream developments and make sure that no adverse effect appear due to the development.

Exisitng conditions are as follows: onsite flows from WS3.1E & WS4.1E cross Filbert Avenue and fall into the swale. This swale alos conveys flows from WS5 as shonw on the Watershed Map. Further down flows from WS7 enter at the swales merging point. Flows from WS6 and WS7 enter the swale along its length. The Hec-Ras model is extended inside the subdivision to establish the proper downstream boundary conditions with a normal depth. At the Palms Subdivision northern boundary there is a CMP round inlet with 30" pipe that extends inside the subdivision pipe drain system. This pipe is disregarded in this floodplain analysis for simplicity of computations.

All drainage facilities and grades have been surveyed.

On-site watersheds have been described previously. Off-site watersheds are described below.





## **3.5.1 Off-site Watersheds Descriptions**

#### Watershed WS5 conditions are:

Total shed area = 6.04 acres;

Mean Elevation – 250 ft;

Precipitation Zone – 3;

Imperviousness – 30% - RD-2;

Length of longest watercourse – 816 ft;

Length along longest watercourse to centroid – 468 ft;

Existing basin slope is 1.0%;

Hydrologic Soils group B per USDA GIS Map.

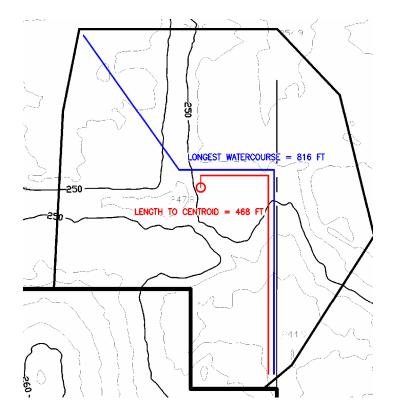


Figure 18 – WS5 Lengths.

Watershed WS6 conditions are:

Total shed area = 4.44 acres;

Mean Elevation – 250 ft;

Precipitation Zone – 3;

Imperviousness – 30% - RD-2;

Length of longest watercourse – 506 ft;

Length along longest watercourse to centroid – 215 ft;

Existing basin slope is 3.0%;

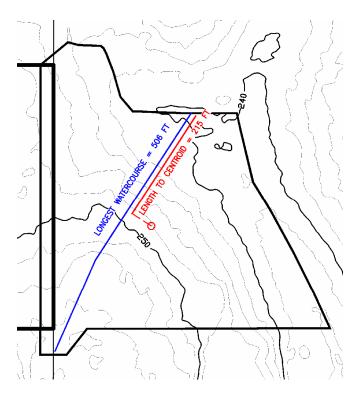


Figure 19 – WS6 Lengths.

#### Watershed WS7 conditions are:

Total shed area = 37.21 acres;

Mean Elevation – 250 ft;

Precipitation Zone – 3;

Imperviousness – 30% - RD-2;

Length of longest watercourse – 1,897 ft;

Length along longest watercourse to centroid – 894 ft;

Existing basin slope is 1.0%;

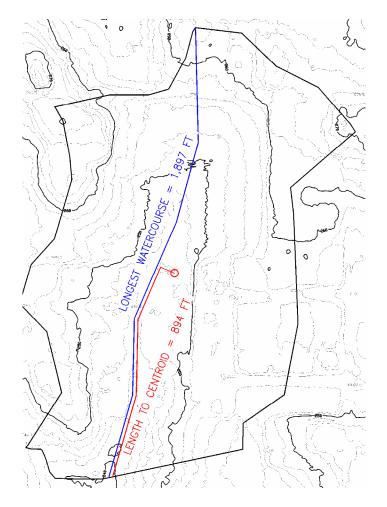


Figure 21 – WS7 Lengths.

#### Watershed WS8 conditions are:

Total shed area = 4.20 acres;

Mean Elevation – 250 ft;

Precipitation Zone – 3;

Imperviousness – 30% - RD-2;

Length of longest watercourse – 573 ft;

Length along longest watercourse to centroid – 210 ft;

Existing basin slope is 3.0%;

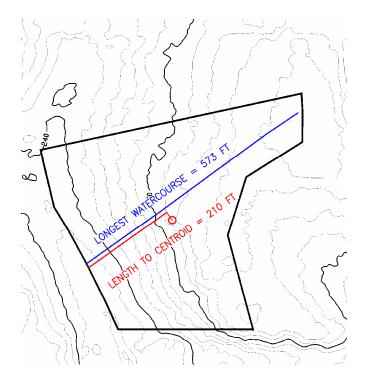


Figure 22 – WS8 Lengths.

### 3.5.2 HEC-RAS Analysis

Pre-Project conditions are analyzed in HEC-RAS.

- 1. Unsteady Flow Analysis has been performed in HEC-RAS. SacCalc results have been imported into HEC-RAS in the following locations for the Pre-Project conditions:
  - WS5 flow at section 1000;
  - WS3.1E & WS4.1 combined (PRE) flow at section 968;
  - WS6 flow between sections 350 and 770;
  - WS8 flow between sections 250 and 450;
  - WS7 flow at section 571.
- 2. Post-Project conditions:
  - WS5 flow at section 1000;
  - Mitigated combined (POST) flow at section 968;
  - WS6 flow between sections 350 and 770;
  - WS8 flow between sections 250 and 450;
  - WS7 flow at section 571.

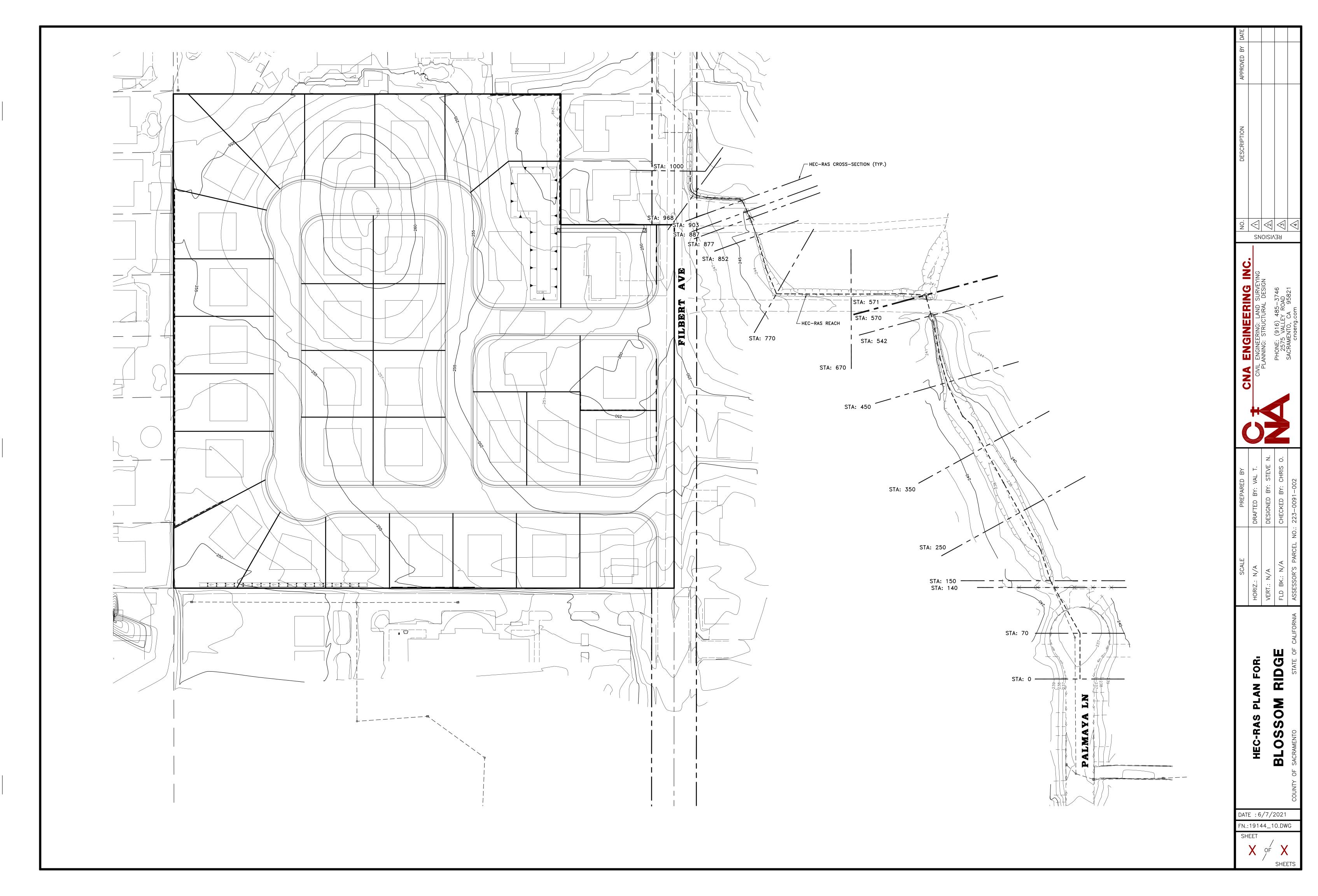
3 culverts have been in locations per field survey.

At the end of the river normal depth of 0.007 has been applied to account for the slope of the private road as per field survey.

Manning's n-value of 0.045 as for main channels with tall weeds and stones as well as flood plains with high grass has been used for the swale cross sections in HEC-RAS. Manning's n-value of 0.016 has been used for pavement in sections 0 and 70.

All the channel's bed sections were surveyed and LiDar information has been used to fill the gaps in field shots for some of the overbank data.

Simulation time of 10 seconds has been utilized in the HEC-RAS model provided attached for review.



# 3.5.3 Analysis of the Results

As a result of the development flow rate and water surface elevations during 100-, 10-, & 2- year storm events do not increase.

## 4. Proposed Pipe Systems Analysis

The tie-in point for the System in Filbert Avenue is an existing swale in the Right-of-Way as described in Section 3 and shown in the Preliminary Grading Plan. Starting elevation for the HGL<sub>pipe</sub> will is established as a 10-year HGL in the swale per Sacramento County Standards.

### 4.1 Initial HGL for Pipe System Analysis

Initial 10-year HGL in the pipe system is obtained from the downstream channel calculation.

#### 4.1.1 Watershed Description

#### Watershed WSC.1 conditions are:

Total shed area = 15.60 acres – all the project area has been conservatively included as the most of the site will be collected by the proposed pipe system;

Mean Elevation – 250 ft;

Precipitation Zone – 3;

Imperviousness – combined, based on existing zoning areas:

RD-2 + AR-2 = 6.65 acres;

RD-3 = 5.15 acres;

RD-4 = 3.80 acres.

Length of longest watercourse – 1,066 ft;

Length along longest watercourse to centroid - 412 ft;

Basin slope is 0.5%;

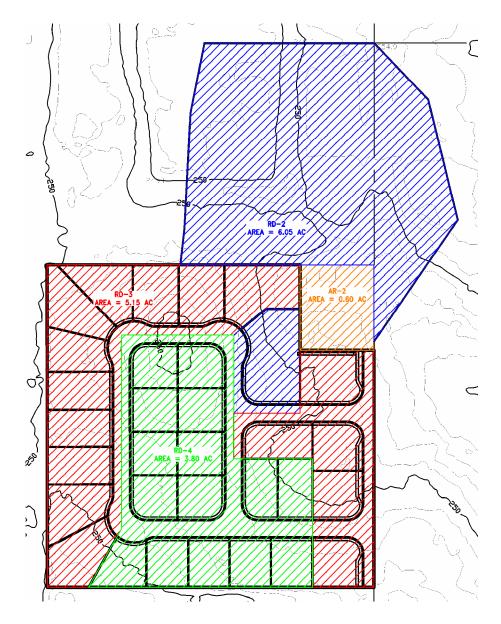


Figure 18 – WSC.1 Zoning.

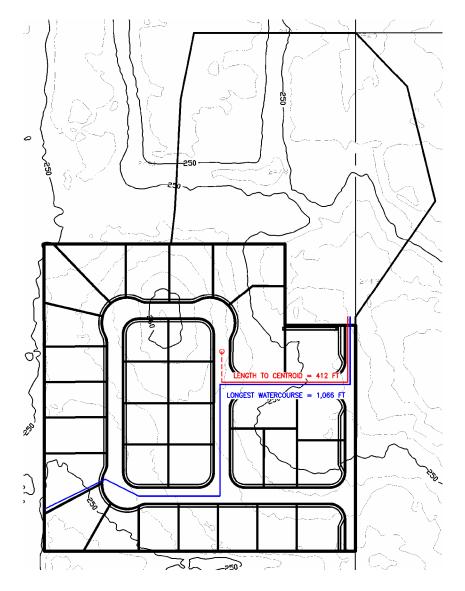
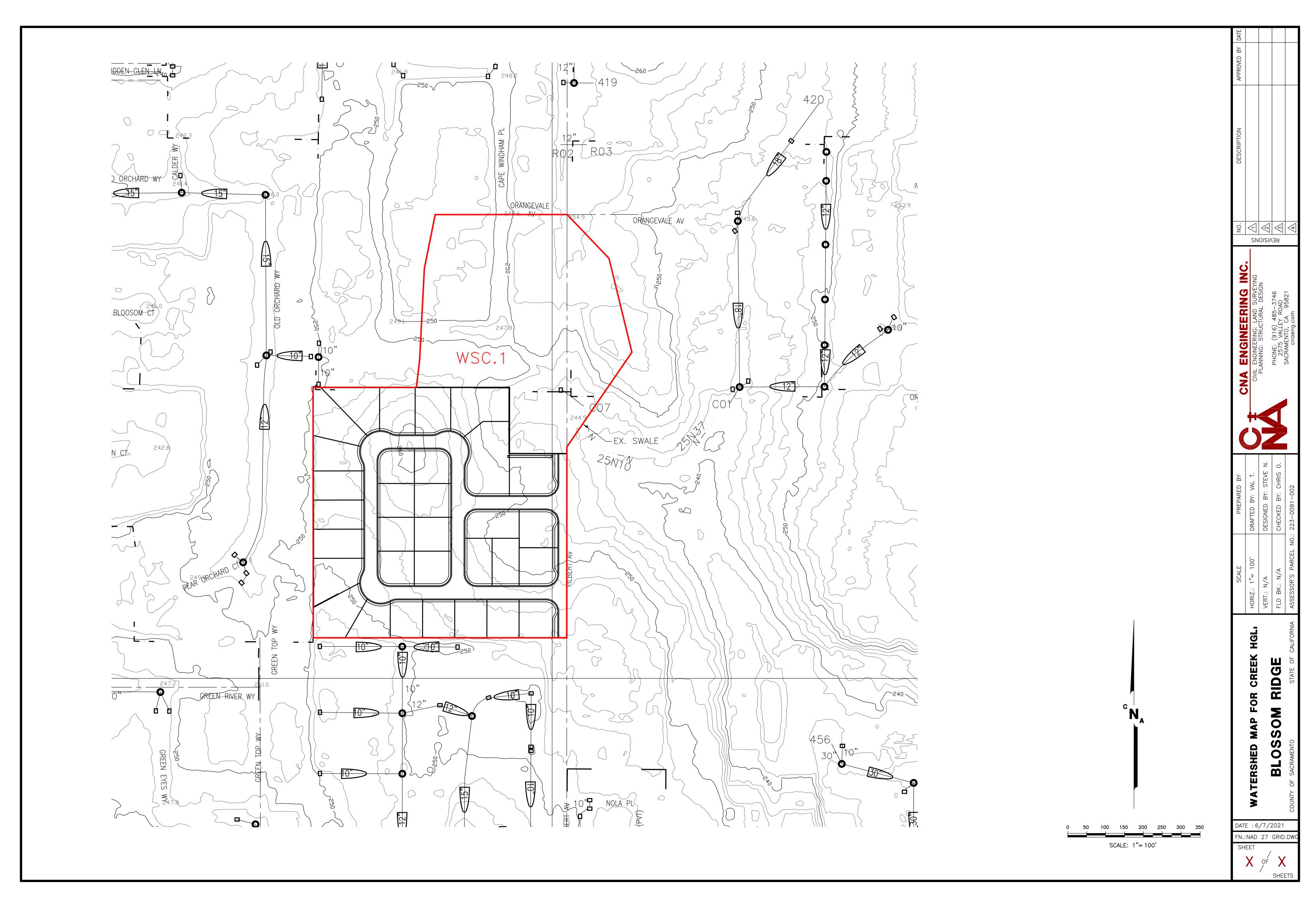
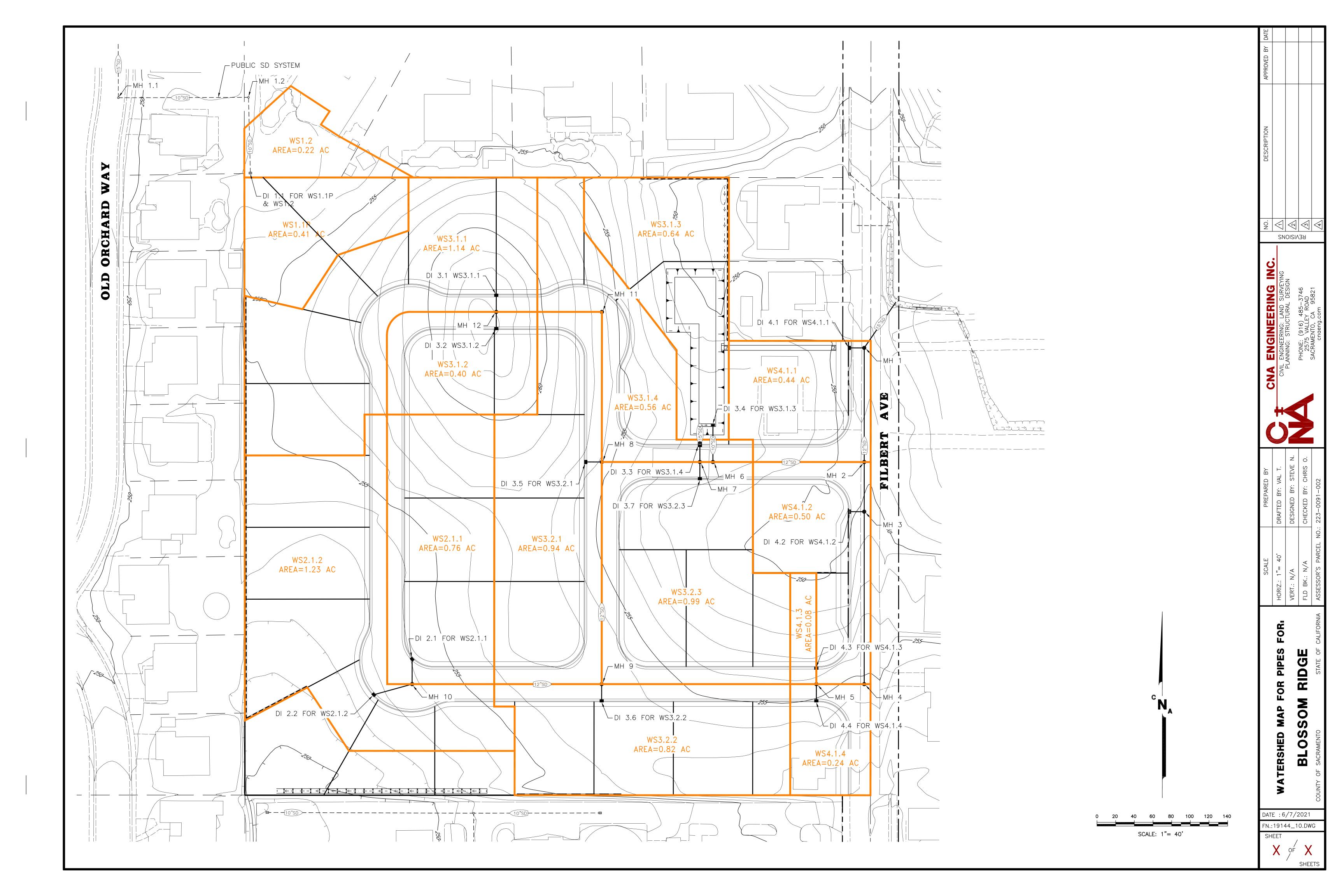


Figure 19 – WSC.1 Lengths.





#### 4.1.2 SacCalc Analysis

Per SacCalc results for WSC.1 for 10-year event, peak flow is 23.0 cfs.

#### 4.1.3 Hydraflow Channel Analysis

10-year 24-hour flow as calculated above for the watershed WSC.1 (23 cfs) has been run through the channel calculator. See report below. The geometry of the section has been obtained from the field work. N-value of 0.040 has been used for the earth channel with some weeds.

Water depth in the channel reaches 1.66' above the flow line which results in the WSE of **246.78'**. This elevation is taken as a boundary condition for the pipe system at the last node of the system.

### 4.2 Pipe Analysis

#### 4.2.1 Watersheds Description

Areas and conditions for the purpose of calculations are assumed to be as follows:

- **WS2.1.1** (collected by the proposed type B DI):

Total shed area = 0.76 acres;

Proposed imperviousness = 40% - RD-4;

- *WS2.1.2* (collected by the proposed type B DI):

Total shed area = 1.23 acres;

Proposed imperviousness = 30% - RD-3;

- **WS3.1.1** (collected by the proposed type B DI):

Total shed area = 1.14 acres;

Proposed imperviousness = 30% - RD-3;

- *WS3.1.2* (collected by the proposed type B DI):

Total shed area = 0.40 acres;

Proposed imperviousness = 40% - RD-4;

- **WS3.1.3** (collected by the proposed type F DI in the pond):

Total shed area = 0.64 acres;

Proposed imperviousness = 25% - RD-2;

- **WS3.1.4** (collected by the proposed type J DI):

Total shed area = 0.56 acres;

Proposed imperviousness = 40% - RD-4;

- *WS3.2.1* (collected by the proposed type B DI):

#### Val Tarasau

Total shed area = 0.94 acres;

Proposed imperviousness = 40% - RD-4;

- **WS3.2.2** (collected by the proposed type B DI):

Total shed area = 0.82 acres;

Proposed imperviousness = 40% - RD-4;

- **WS3.2.3** (collected by the proposed type B DI):

Total shed area = 0.99 acres;

Proposed imperviousness = 40% - RD-4;

- **WS4.1.1** (collected by the proposed type B DI):

Total shed area = 0.44 acres;

Proposed imperviousness = 30% - RD-3;

- *WS4.1.2* (collected by the proposed type B DI):

Total shed area = 0.50 acres;

Proposed imperviousness = 30% - RD-3;

- **WS4.1.3** (collected by the proposed type B DI):

Total shed area = 0.08 acres;

Proposed imperviousness = 30% - RD-3;

- **WS4.1.4** (collected by the proposed type B DI):

Total shed area = 0.24 acres;

Proposed imperviousness = 30% - RD-3;

#### 4.2.2 SacCalc Analysis

	(Proj	ect: Blossom Ridge_Nolte) (Hydrologic zone 1)	
ID	Drainage area (acres)	Impervious area (%)	Design Q (cfs)
WS1-1E	0.96	20.00	0.27
WS1-2	0.22	50.00	0.06
WS2-1E	3.82	20.00	1.07
WS2-1P	2.39	38.60	0.67
WS1-1P	0.41	30.00	0.11
WS-211	0.76	40.00	0.21
WS-212	1.23	30.00	0.34
WS-311	1.14	30.00	0.32
WS-312	0.40	40.00	0.11
WS-313	0.64	25.00	0.18
WS-314	0.56	40.00	0.16
WS-321	0.94	40.00	0.26
WS-322	0.82	40.00	0.23
WS-323	0.99	40.00	0.28
WS-411	0.44	30.00	0.12
WS-412	0.50	30.00	0.14
WS-413	0.08	30.00	0.02
WS-414	0.24	30.00	0.07

Nol	te metho	d result	ts
(Project:	Blossom	Ridge_	Nol

#### 4.2.3 Hydraflow Analysis

Pipes and nodes information is as follows (refer to the WS Map above).

There is a concrete V-gutter between nodes 5 and 6 in the detention basin. This connection has been modeled as a 15" pipe (as upstream) in order to analyze the system capacity for conveyance of Nolte flows.

Structure	Structure	Rim	Invert	Pipe size and	Slope	n-value
#	ID	Elevation	(FL)	material	downstream	
				(downstream)		
1	MH 1	248.35	245.33	12", RCP	0.0035	0.015

Val Tarasau

2	MH 2	249.80	245.76	12", RCP	0.0035	0.015
3	MH 6	253.21	246.57	12", PVC	0.0050	0.015
4	DI 3.4 (WS3.1.3)	249.79	246.76	10", PVC	0.0050	0.015
5	FES	N/A	249.00	15", PVC (assumed connection for purpose of SD design)	0.0029 (actual gutter – assumed as pipe)	0.015
6	DI 3.3 (WS3.1.4)	252.65	249.09	15", PVC	0.0050	0.015
7	MH 7	253.14	249.19	15", PVC	0.0050	0.015
8	MH 8	254.53	249.51	12", PVC	0.0030	0.015
9	MH 9	255.74	250.23	12", PVC	0.0030	0.015
10	MH 10	254.88	250.84	12", PVC	0.0030	0.015
11	DI 2.2 (WS2.1.2)	253.57	250.97	12", PVC	0.0030	0.015
12	DI 4.1 (WS4.1.1)	247.97	245.39	12", PVC	0.0035	0.015
13	MH 3	250.39	245.95	12", PVC	0.0035	0.015
14	DI 3.7 (WS3.2.3)	252.65	249.28	12", PVC	0.0050	0.015
15	DI 3.5 (WS3.2.1)	254.04	246.60	12", PVC	0.0050	0.015
16	DI 3.6 (WS3.2.2)	255.24	250.32	12", PVC	0.0050	0.015
17	DI 2.1 (WS2.1.1)	253.88	250.92	12", PVC	0.0030	0.015
18	MH 4	255.30	249.65	12", PVC	0.0200	0.015
19	MH 5	255.85	250.17	12", PVC	0.0250	0.015

20	DI 4.3 (WS4.1.3)	255.36	250.34	12", PVC	0.0100	0.015
21	MH 11	254.91	250.00	12", PVC	0.0030	0.015
22	DI 4.2 (WS4.1.2)	249.94	246.03	12", PVC	0.0050	0.015
23	DI 4.4 (WS4.1.4)	255.36	250.34	12", PVC	0.0100	0.015
24	MH 12	255.10	250.34	12", PVC	0.0030	0.015
25	DI 3.1 (WS3.1.1)	254.61	250.43	12", PVC	0.0050	0.015
26	DI 3.2 (WS3.1.2)	254.61	250.43	12", PVC	0.0050	0.015

### Table 2 – Proposed Storm Drain System Information.

246.78' is used as downstream boundary condition as determined above.

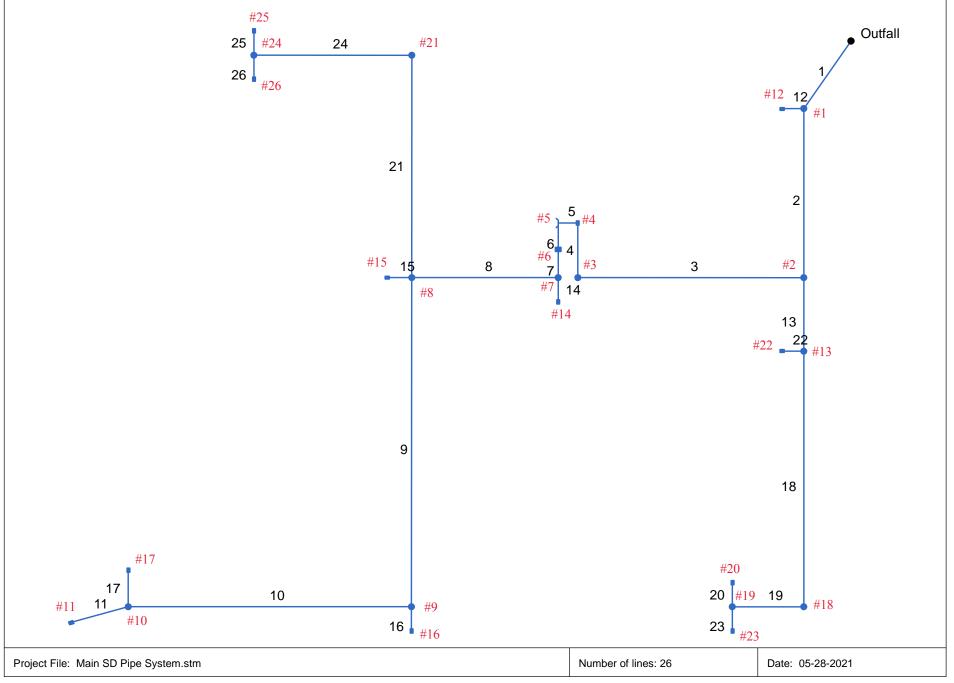
Structure #	Structure ID	Rim Elevation	HGL	Rim – HGL
1	MH 1	248.35	247.28	1.07
2	MH 2	249.80	248.11	1.69
3	MH 6	253.21	248.96	4.25
4	DI 3.4	249.79	249.78	0.01
5	FES	N/A	249.93	N/A
6	DI 3.3	252.65	249.98	2.67
7	MH 7	253.14	250.07	3.07
8	MH 8	254.53	250.37	4.16
9	MH 9	255.74	250.79	4.95
10	MH 10	254.88	251.28	3.60
11	DI 2.2	253.57	251.34	2.23

12	DI 4.1	247.97	247.28	0.69
13	MH 3	250.39	248.11	2.28
14	DI 3.7	252.65	250.07	2.58
15	DI 3.5	254.04	250.37	3.67
16	DI 3.6	255.24	250.79	4.45
17	DI 2.1	253.88	251.29	2.59
18	MH 4	255.30	249.78	5.52
19	MH 5	255.85	250.30	5.55
20	DI 4.3	255.36	250.42	4.94
21	MH 11	254.91	250.48	4.43
22	DI 4.2	249.94	248.11	1.83
23	DI 4.4	255.36	250.45	4.91
24	MH 12	255.10	250.73	4.37
25	DI 3.1	254.61	250.78	3.83
26	DI 3.2	254.61	250.74	3.87

#### Table 3 – Summary of Nolte Results.

As can be seen from the results below, HGL<sub>Nolte</sub> for the system does not get closer than 12" below the rims of manholes and 6" below the rims of drop inlets except for DI 3.4. This DI is placed in the detention area to collect the drainage and restrict the higher flows, so its opening is set at the elevation of the pond. The system is considered to have sufficient capacity to convey Nolte flows.

## Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2009 Plan



Hydraflow Storm Sewers Extension v6.066

# **Storm Sewer Inventory Report**

Line No.		Alignr	nent			Flow	Data		Physical Da						Line ID		
NO.	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	59.377	124.661	MH	0.00	0.00	0.00	0.0	245.12	0.35	245.33	12	Cir	0.015	0.85	248.35	
2	1	122.261	-34.657	MH	0.00	0.00	0.00	0.0	245.33	0.35	245.76	12	Cir	0.015	1.00	249.80	
3	2	162.049	90.000	MH	0.00	0.00	0.00	0.0	245.76	0.50	246.57	12	Cir	0.015	1.00	253.21	
4	3	39.500	89.996	Grate	0.18	0.00	0.00	0.0	246.57	0.48	246.76	10	Cir	0.015	1.50	249.79	
5	4	13.969	-90.000	Hdwl	0.00	0.00	0.00	0.0	248.96	0.29	249.00	15	Cir	0.015	1.50	252.00	
6	5	19.334	-89.901	Curb	0.16	0.00	0.00	0.0	249.00	0.47	249.09	15	Cir	0.015	0.50	252.65	
7	6	20.164	-0.099	MH	0.00	0.00	0.00	0.0	249.09	0.50	249.19	15	Cir	0.015	1.00	253.14	
8	7	105.022	90.004	ΜН	0.00	0.00	0.00	0.0	249.19	0.30	249.51	12	Cir	0.015	1.00	254.53	
9	8	238.000	-89.967	MH	0.00	0.00	0.00	0.0	249.51	0.30	250.23	12	Cir	0.015	1.00	255.74	
10	9	203.020	89.967	ΜΗ	0.00	0.00	0.00	0.0	250.23	0.30	250.84	12	Cir	0.015	1.00	254.88	
11	10	42.548	-15.436	Comb	0.34	0.00	0.00	0.0	250.84	0.31	250.97	12	Cir	0.013	1.00	0.00	
12	1	15.832	55.344	Comb	0.12	0.00	0.00	0.0	245.33	0.38	245.39	12	Cir	0.015	1.00	247.97	
13	2	53.200	0.000	ΜН	0.00	0.00	0.00	0.0	245.76	0.36	245.95	12	Cir	0.015	1.00	250.39	
14	7	17.830	-0.003	Comb	0.28	0.00	0.00	0.0	249.19	0.50	249.28	12	Cir	0.015	1.00	252.65	
15	8	17.033	-0.006	Comb	0.26	0.00	0.00	0.0	249.51	0.53	249.60	12	Cir	0.015	1.00	254.04	
16	9	17.830	0.000	Comb	0.23	0.00	0.00	0.0	250.23	0.50	250.32	12	Cir	0.015	1.00	255.24	
17	10	26.686	89.996	Comb	0.21	0.00	0.00	0.0	250.84	0.30	250.92	12	Cir	0.013	1.00	0.00	
18	13	184.800		мн	0.00	0.00	0.00	0.0	245.95	2.00	249.65	12	Cir	0.015	1.00	255.30	
19	18	51.241	90.000	MH	0.00	0.00	0.00	0.0	249.65	1.01	250.17	12	Cir	0.015	1.00	255.85	
	-		90.000		0.00	0.00		0.0						0.015	1.00		
20	19	17.000		Comb			0.00		250.17	1.00	250.34	12	Cir			255.36	
21	8	160.784		MH	0.00	0.00	0.00	0.0	249.51	0.30	250.00	12	Cir	0.015	1.00	254.91	
22	13	15.689	90.000	Comb	0.14	0.00	0.00	0.0	245.95	0.51	246.03	12	Cir	0.015	1.00	249.94	
Proiect I	File: Main	SD Pipe S	System.st	m				Number of lines: 26 Date:									5-28-2021

Hydraflow Storm Sewers Extension v6.066

# **Storm Sewer Inventory Report**

Line		Alignr	nent			Flow	Data					Physical	Data				Line ID
No.	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
23	19	17.830	-90.001	Comb	0.07	0.00	0.00	0.0	250.17	0.95	250.34	12	Cir	0.015	1.00	255.36	
24	21		-90.028		0.00	0.00	0.00	0.0	250.00	0.30	250.34	12	Cir	0.015	1.00	255.10	
25	24	17.830	90.000	Comb	0.32	0.00	0.00	0.0	250.34	0.50	250.43	12	Cir	0.015	1.00	254.61	
26	24	17.830	-90.000	Comb	0.11	0.00	0.00	0.0	250.34	0.50	250.43	12	Cir	0.015	1.00	254.61	
Project	File: Mair	n SD Pipe S	System.st	m								Number o	of lines: 26			Date: 0	5-28-2021

# **Structure Report**

Struct	Structure ID	Junction	Rim		Structure			Line Out			Line In	
No.		Туре	Elev. (ft)	Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1		Manhole	248.35	Cir	4.00	4.00	12	Cir	245.33	12 12	Cir Cir	245.33 245.33
2		Manhole	249.80	Cir	4.00	4.00	12	Cir	245.76	12 12	Cir Cir	245.76 245.76
3		Manhole	253.21	Cir	4.00	4.00	12	Cir	246.57	10	Cir	246.57
4		Grate	249.79	Rect	3.00	2.00	10	Cir	246.76	15	Cir	248.96
5		OpenHeadwall	252.00	n/a	n/a	n/a	15	Cir	249.00	15	Cir	249.00
6		Curb-Horiz	252.65	Rect	3.00	4.00	15	Cir	249.09	15	Cir	249.09
7		Manhole	253.14	Cir	4.00	4.00	15	Cir	249.19	12 12	Cir Cir	249.19 249.19
8		Manhole	254.53	Cir	4.00	4.00	12	Cir	249.51	12 12 12	Cir Cir Cir	249.51 249.51 249.51
9		Manhole	255.74	Cir	4.00	4.00	12	Cir	250.23	12 12	Cir Cir	250.23 250.23
10		Manhole	254.88	Cir	4.00	4.00	12	Cir	250.84	12 12	Cir Cir	250.84 250.84
11		Combination	0.00	Rect	3.00	2.00	12	Cir	250.97			
12		Combination	247.97	Rect	3.00	2.00	12	Cir	245.39			
13		Manhole	250.39	Cir	4.00	4.00	12	Cir	245.95	12 12	Cir Cir	245.95 245.95
14		Combination	252.65	Rect	3.00	2.00	12	Cir	249.28			
15		Combination	254.04	Rect	3.00	2.00	12	Cir	249.60			
16		Combination	255.24	Rect	3.00	2.00	12	Cir	250.32			
17		Combination	0.00	Rect	3.00	2.00	12	Cir	250.92			
18		Manhole	255.30	Cir	4.00	4.00	12	Cir	249.65	12	Cir	249.65
Project F		n.stm					   Ni	Imber of Struct	ures: 26	Run	Date: 05-28-20	)21

Hydraflow Storm Sewers Extension v6.066

# **Structure Report**

Struct No.	Structure ID	Junction	Rim Elev.		Structure			Line Out			Line In	
NO.		Туре	(ft)	Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
19		Manhole	255.85	Cir	4.00	4.00	12	Cir	250.17	12 12	Cir Cir	250.17 250.17
20		Combination	255.36	Rect	3.00	2.00	12	Cir	250.34			
21		Manhole	254.91	Cir	4.00	4.00	12	Cir	250.00	12	Cir	250.00
22		Combination	249.94	Rect	3.00	2.00	12	Cir	246.03			
23		Combination	255.36	Rect	3.00	2.00	12	Cir	250.34			
24		Manhole	255.10	Cir	4.00	4.00	12	Cir	250.34	12 12	Cir Cir	250.34 250.34
25		Combination	254.61	Rect	3.00	2.00	12	Cir	250.43			
26		Combination	254.61	Rect	3.00	2.00	12	Cir	250.43			
Droject	File: Main SD Pipe System.							Jumber of Struct	 		Date: 05-28-20	21

# Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		2.44	12	Cir	59.377	245.12	245.33	0.354	246.78*	247.15*	0.13	247.28	End	Manhole
2		2.32	12	Cir	122.261	245.33	245.76	0.352	247.28*	247.97*	0.14	248.11	1	Manhole
3		2.09	12	Cir	162.049	245.76	246.57	0.500	248.11*	248.85*	0.11	248.96	2	Manhole
4		2.09	10	Cir	39.500	246.57	246.76	0.481	248.96*	249.44*	0.34	249.78	3	Grate
5		1.91	15	Cir	13.969	248.96	249.00	0.286	249.78	249.81	0.12	249.93	4	OpenHeadwall
6		1.91	15	Cir	19.334	249.00	249.09	0.465	249.93	249.95	0.04	249.98	5	Curb-Horiz
7		1.75	15	Cir	20.164	249.09	249.19	0.496	249.98	250.00	0.07	250.07	6	Manhole
3		1.47	12	Cir	105.022	249.19	249.51	0.305	250.07	250.29	0.08	250.37	7	Manhole
9		0.78	12	Cir	238.000	249.51	250.23	0.303	250.37	250.72	0.06	250.79	8	Manhole
10		0.55	12	Cir	203.020	250.23	250.84	0.300	250.79	251.21	0.07	251.28	9	Manhole
11		0.34	12	Cir	42.548	250.84	250.97	0.306	251.28	251.31	0.03	251.34	10	Combination
12		0.12	12	Cir	15.832	245.33	245.39	0.379	247.28*	247.28*	0.00	247.28	1	Combination
13		0.23	12	Cir	53.200	245.76	245.95	0.357	248.11*	248.11*	0.00	248.11	2	Manhole
14		0.28	12	Cir	17.830	249.19	249.28	0.505	250.07	250.07	0.00	250.07	7	Combination
15		0.26	12	Cir	17.033	249.51	249.60	0.528	250.37	250.37	0.00	250.37	8	Combination
16		0.23	12	Cir	17.830	250.23	250.32	0.505	250.79	250.79	0.01	250.79	9	Combination
17		0.21	12	Cir	26.686	250.84	250.92	0.300	251.28	251.28	0.01	251.29	10	Combination
18		0.09	12	Cir	184.800	245.95	249.65	2.002	248.11	249.78	n/a	249.78 j	13	Manhole
19		0.09	12	Cir	51.241	249.65	250.17	1.015	249.78	250.30	0.04	250.30	18	Manhole
20		0.02	12	Cir	17.000	250.17	250.34	1.000	250.30	250.40	n/a	250.42 j	19	Combination
21		0.43	12	Cir	160.784	249.51	250.00	0.305	250.37	250.45	0.02	250.48	8	Manhole
22		0.14	12	Cir	15.689	245.95	246.03	0.510	248.11*	248.11*	0.00	248.11	13	Combination
23		0.07	12	Cir	17.830	250.17	250.34	0.953	250.30	250.45	n/a	250.45 j	19	Combination
Project F	ile: Main SD Pipe System.stm								Number o	of lines: 26		Run	Date: 05-2	28-2021
NOTES:	Known Qs only ; *Surcharged (	HGL abov	re crown). ; i	- Line cont	ains hyd. i	ump.			1			I		

Page 1

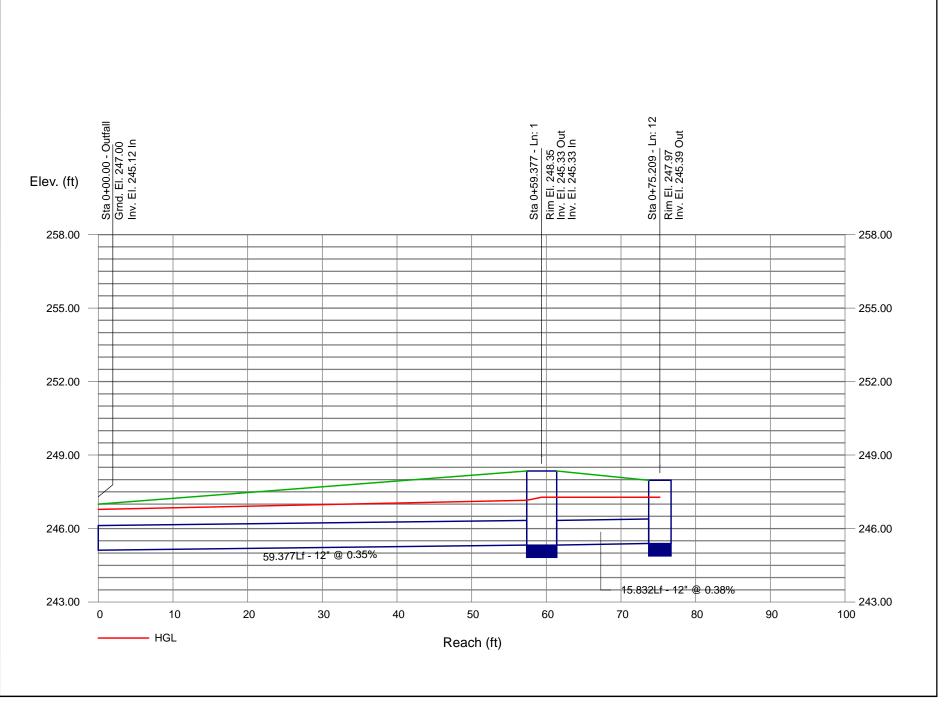
Hydraflow Storm Sewers Extension v6.066

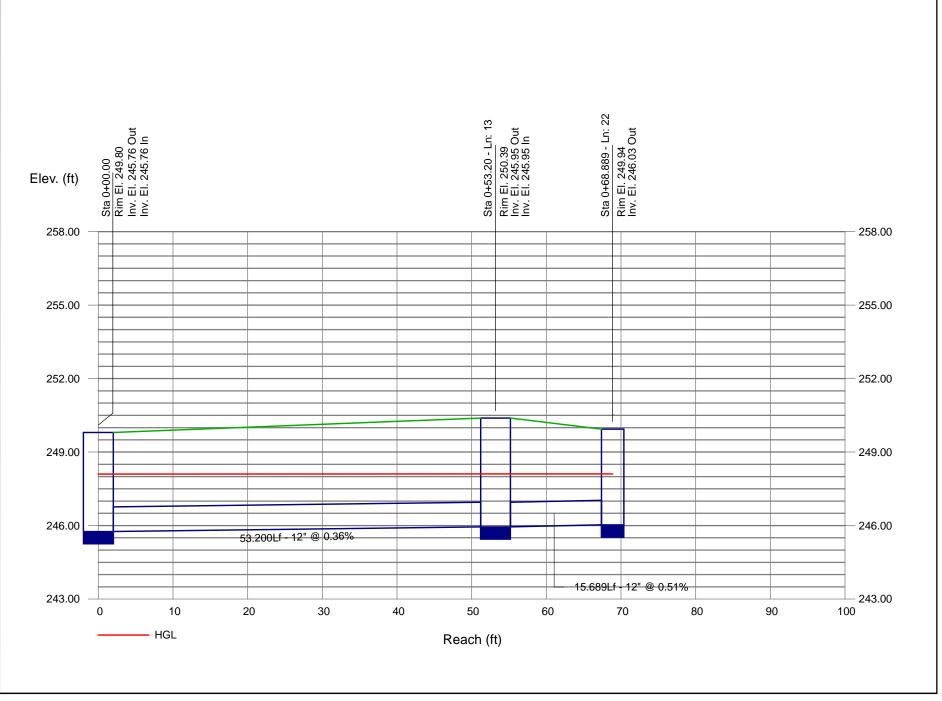
# Storm Sewer Summary Report

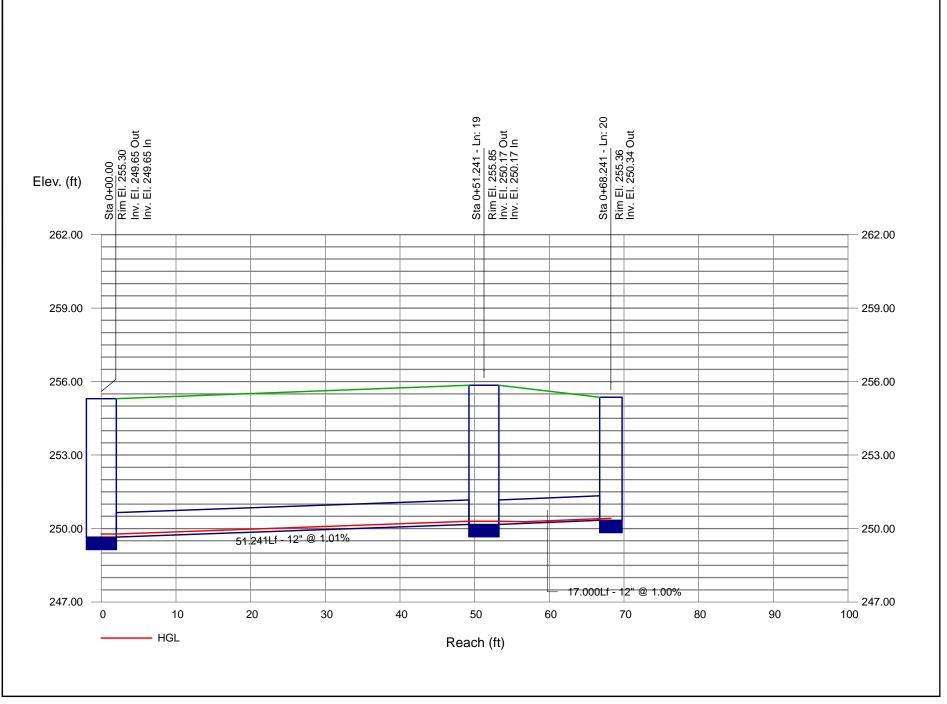
ine o.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type	
4		0.43	12	Cir	113.175	250.00	250.34	0.300	250.48	250.68	0.05	250.73	21	Manhole	
5		0.32	12	Cir	17.830	250.34	250.43	0.505	250.73	250.75	0.04	250.78	24	Combination	
6		0.11	12	Cir	17.830	250.34	250.43	0.505	250.73	250.73	0.00	250.74	24	Combination	
Project File: Main SD Pipe System.stm									Number of lines: 26				Run Date: 05-28-2021		

	Sta 0+00.00 - Outfall Grnd. El. 247.00 Inv. El. 245.12 In	Sta 0+59.377 - Ln: 1	.8.35 5.33 Out 5.33 In	Sta 1+81.638 - Ln: 2	.9.80 5.76 Out 5.76 In	Sta 3+43.686 - Ln: 3	.3.21 6.57 Out 6.57 In	Sta 3+83.186 - Ln: 4	.9.79 6.76 Out 8.96 In	Sta 3+97.155 - Ln: 5 Gmd. El. 252.00	9.00 Out 9.00 In	Sta 4+16.489 - Ln: 6	2.65 9.09 Out 9.09 In	Sta 4+36.654 - Ln: 7	3.14 9.19 Out 9.19 In	Sta 5+41.676 - Ln: 8 Rim El. 254.53 Inv. El. 249.51 Out	lnv. El. 249.51 ln Sta 7+79.676 - Ln: 9	.5.74 0.23 Out 0.23 In	Sta 9+82.697 - Ln: 10 Rim El. 254.88 Inv. El. 250.84 Out	Inv. El. 250.84 In Sta 10+25.244 - Ln: 11 Rim El. 255.97 Inv. El. 250.97 Out
v. (ft)	Sta 0+00.0 Grnd. El. 2 Inv. El. 24	Sta 0+59.3	Rim El. 248.35 Inv. El. 245.33 Out Inv. El. 245.33 In	Sta 1+81.(	Rim El. 249.80 Inv. El. 245.76 Out Inv. El. 245.76 In	Sta 3+43.(	Rim El. 253.21 Inv. El. 246.57 Out Inv. El. 246.57 In	Sta 3+83.	Rim El. 249.79 Inv. El. 246.76 Out Inv. El. 248.96 In	Sta 3+97. Grnd. El. 2	Inv. El. 249.00 Out Inv. El. 249.00 In	Sta 4+16.4	Rim El. 252.65 Inv. El. 249.09 Out Inv. El. 249.09 In	Sta 4+36.(	Rim El. 253.14 Inv. El. 249.19 Out Inv. El. 249.19 In	Sta 5+41.676 - Ln: 8 Rim El. 254.53 Inv. El. 249.51 Out	Inv. El. 24 Sta 7+79.(	Rim El. 255.74 Inv. El. 250.23 Out Inv. El. 250.23 In	Sta 9+82.697 - Ln: 1 Rim El. 254.88 Inv. El. 250.84 Out	Inv. El. 250.84 In Sta 10+25.244 - Ln Rim El. 255.97 Inv. El. 250.97 Out
.66.00 -																				266.00
261.00 -																				261.00
256.00 -																				256.00
51.00 -											238.0	)00Lf -	12" @	0.30%						251.00
46.00 -						62.04	39 9Lf - 12"	13.9 9.500	969Lf - 1 Lf - 10" (	- 15" @ 5" @ 0.2 @ 0.48% 105.02	0.47% 29%	)	0.30%				- 203.0	020Lf - 1	42.548L	f- 12" @ 0.31% — 246.00
41.00 -	59	.377Lf	- 122.2 - 12" @ (		<del>- 12" @ 0.</del> 6	35%			20.164	Lf - 15"	@ 0.5	0%								241.00

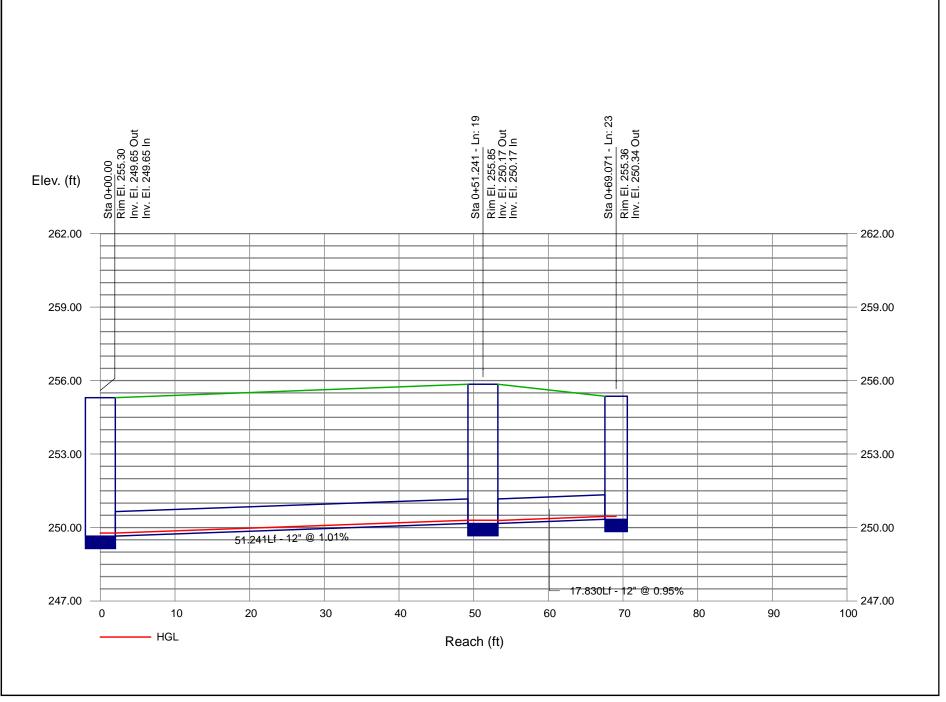
Hydraflow Storm Sewers Extension

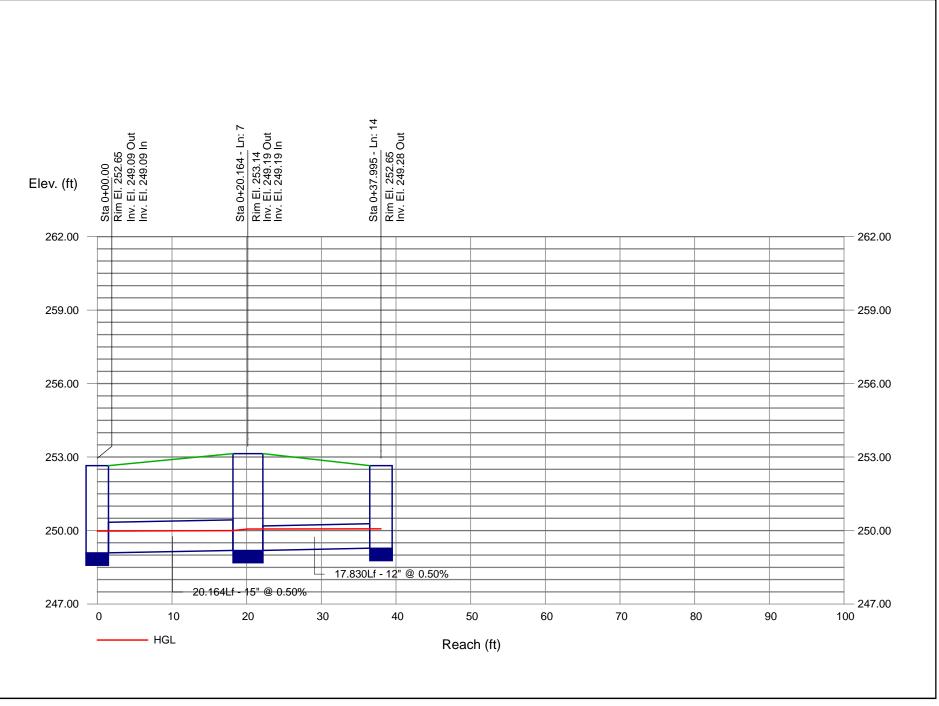


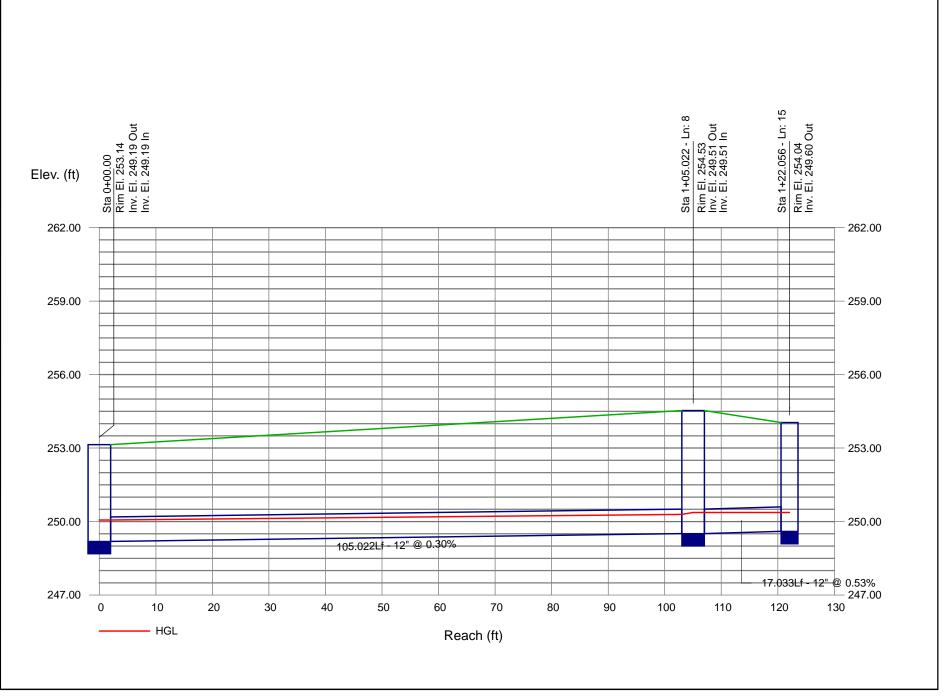


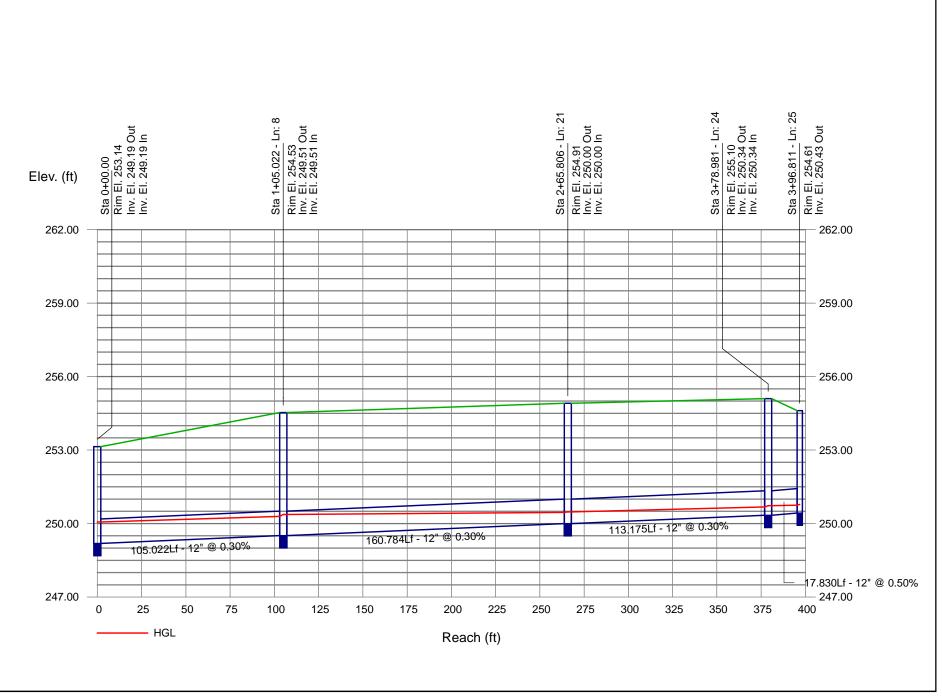


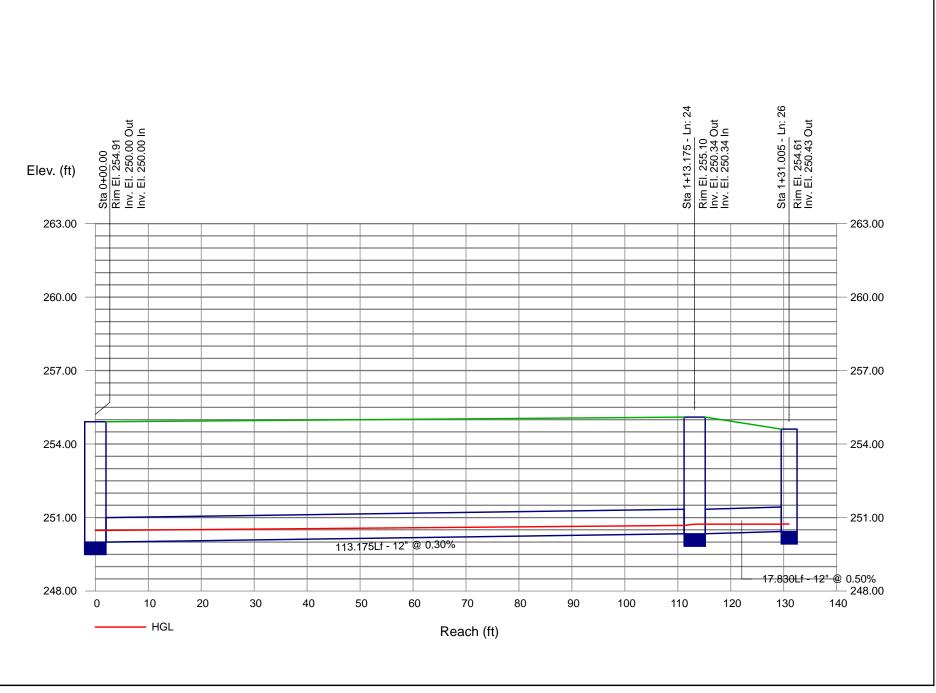
Hydraflow Storm Sewers Extension



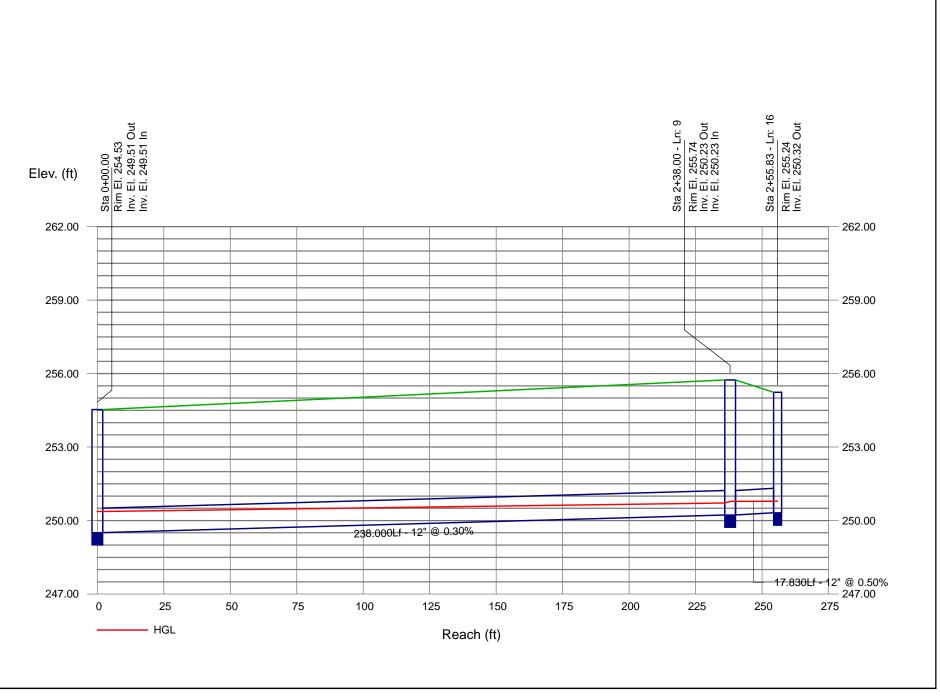




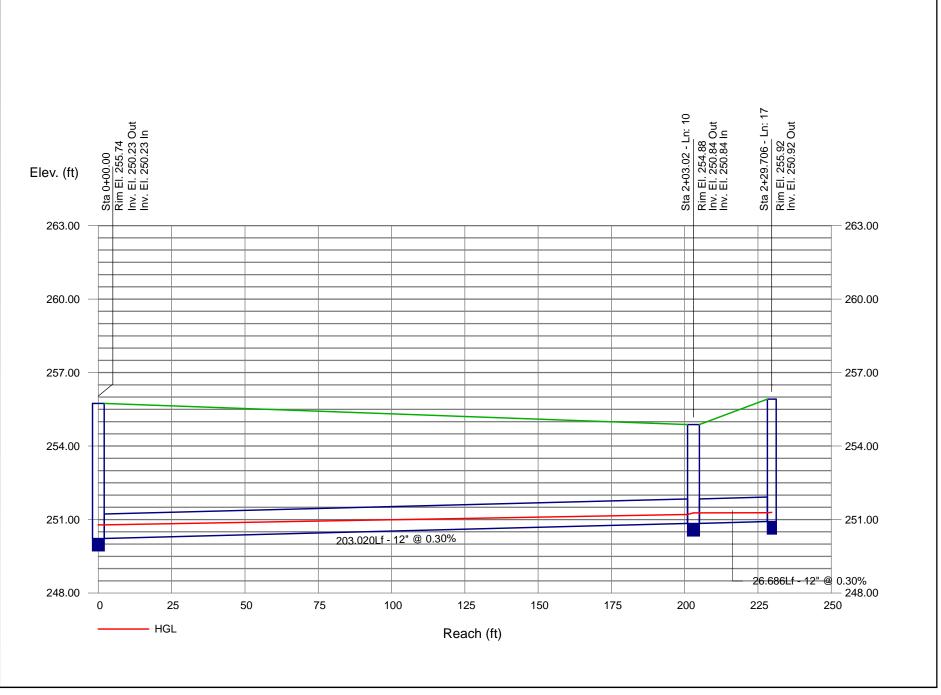


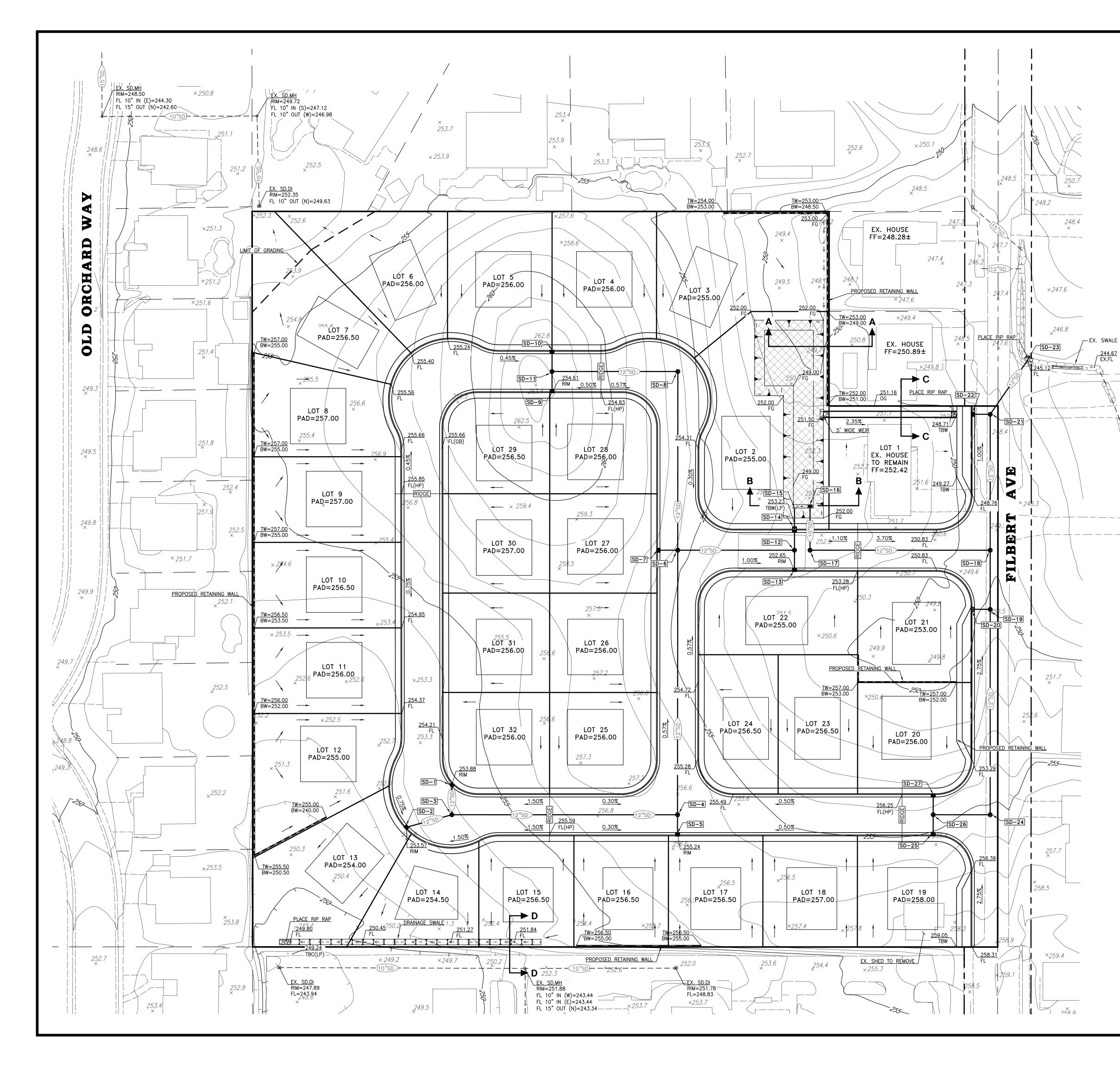


# **Storm Sewer Profile**



# **Storm Sewer Profile**





HATCH LEGEND: DETENTION BASIN STORM DRAIN KEYNOTES: SD-1 PROP. TYPE "B" SD.DI RIM=253.88, FL=250.92 SD-2 PROP. TYPE "B" SD.DI RIM=253.57, FL=250.97 SD-3 PROP. SD.MH RIM=254.88, FL=250.84 SD-4 PROP. SD.MH RIM=255.74, FL=250.23 SD-5 PROP. TYPE "B" SD.DI RIM=255.24, FL=250.32 SD-6 PROP. SD.MH RIM=254.53, FL=249.51 SD-7 PROP. TYPE "B" SD.DI RIM=254.04, FL=249.60 SD-8 PROP. SD.MH REVISIONS RIM=254.91, FL=250.00 SD-9 PROP. TYPE "B" SD.DI RIM=254.61, FL=250.43 SD-10 PROP. TYPE "B" SD.DI RIM=254.61, FL=250.43 SD-11 PROP. SD.MH Z RIM=255.10, FL=250.34 SD-12 PROP. SD.MH G RIM=253.14, FL=249.19 RIN SD-13 PROP. TYPE "B" SD.DI RIM=252.65, FL=249.28 SD-14 PROP. TYPE "J" SD.DI RIM=252.65, FL=249.09 ш CIN 6) 44 Z ()242.82 EX.FL 239.59 EX.FL SD-15 PROP. PIPE SYSTEM OUTFALL TO THE BASIN FL=249.00 SD-16 PROP. TYPE "F" SD.DI RIM=249.79, OPENING=248.96, FL=246.76 SD-17 PROP. SD.MH RIM=253.29, FL=246.57 SD-18 PROP. SD.MH RIM=249.80, FL=245.76 SD-19 PROP. SD.MH RIM=250.39, FL=245.95 SD-20 PROP. TYPE "B" SD.DI RIM=249.94, FL=246.03 SD-21 PROP. SD.MH RIM=248.35, FL=245.33 SD-22 PROP. TYPE "B" SD.DI RIM=247.97, FL=245.39 SD-23 PROP. PIPE SYSTEM OUTFALL FL=245.12 SD-24 PROP. SD.MH RIM=255.30, FL=249.65 SD-25 PROP. TYPE "B" SD.DI RIM=255.36, FL=250.34 SD-26 PROP. SD.MH RIM=255.85, FL=250.17 Ō SD-27 PROP. TYPE "B" SD.DI RIM=255.36, FL=250.34 RIDGE AN Ч U N N Δ MO GR S ARY SO NIWI В PR

0 20 40 60 80 100 120 140

SCALE: 1"= 40'

DATE : 6/7/2021

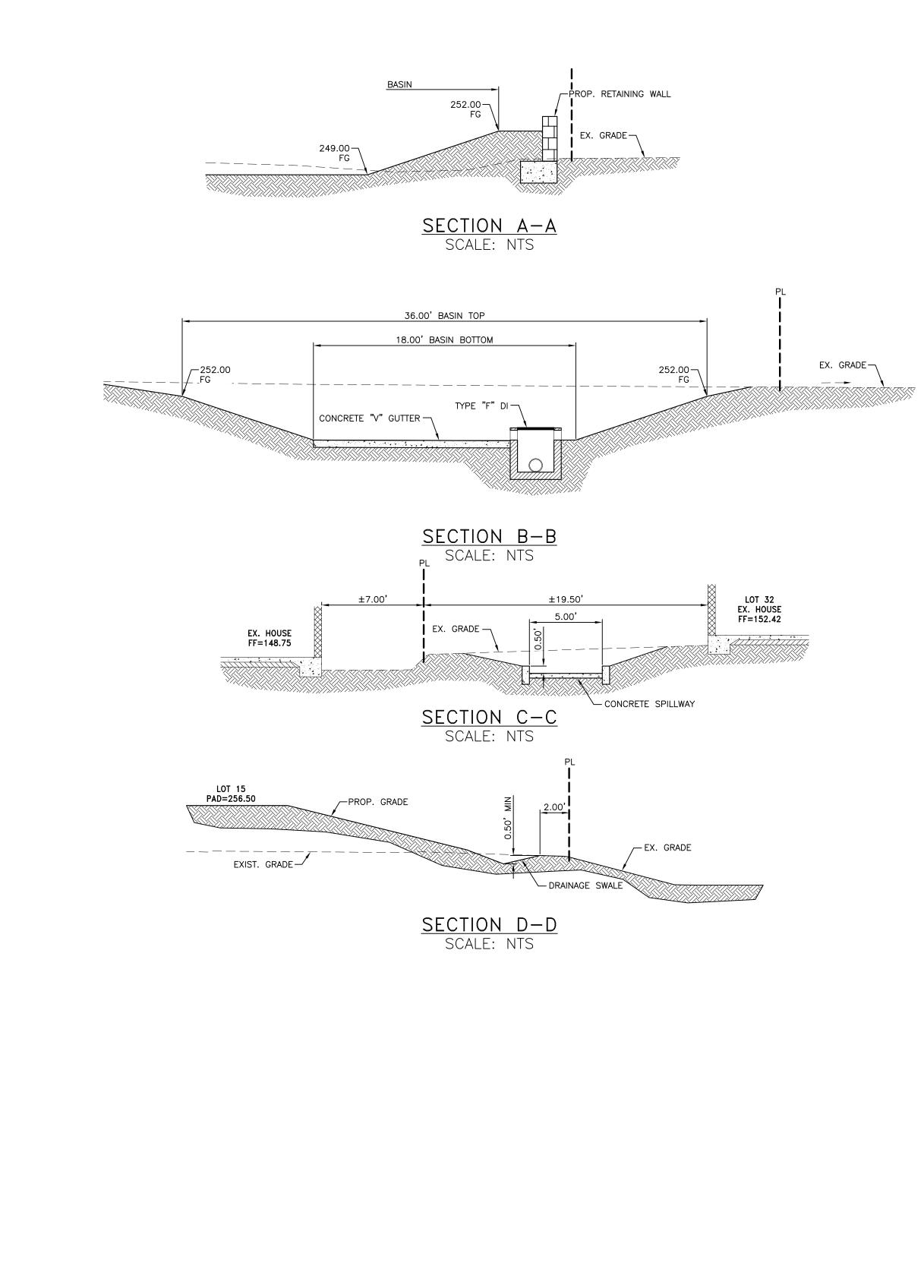
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SHEETS

SHEET

X OF



FN.:			SCALE	PREPARED BY	CNA ENCINEERING INC	NO.	DESCRIPTION	APPROVED BY DATE
E : 6 1914 EET X	CROSS S	ECTIONS FOR	HORIZ.: N/A	DRAFTED BY: VAL T.	CIVIL ENGINEERING: LAND SURVEYING	SN SN		
			VERT.: N/A	DESIGNED BY: STEVE N.	PLANNING: STRUCTURAL DESIGN			
	BLOSSOM	RIDGE	FLD BK.: N/A	CHECKED BY: CHRIS O.	PHONE: (916) 485–3746 2575 VALLEY ROAD	к		
G	COUNTY OF SACRAMENTO	STATE OF CALIFORNIA	ASSESSOR'S PARCEL NO.: 223-0091-002	10.: 223-0091-002	SACRAMENIU, CA 95821 cnaeng.com	4		

# Low Impact Development Design

Residential LID Credits Worksheets are used to calculate the points for the project (see below). The required minimum for the project is 100 points. Information used is described below.

Total area = 9.31 acres to the Filbert Right-of Way;

Drainage Basin = 0.19 acres.

Number of Units = 32.

No new trees are counted in the calculations.

There are 3 discharges and, therefore, 3 points of compliance.

LID features will be constructed with building permits. Feasibility analysis is provided below with preliminary design and calculations. Final design will be provided at the time of building permit with each lot design or final Improvement plans.

## Northwest POC

Watershed WS1.1P constitutes the point of compliance. It consists of portions of lots 6 and 7.

To show future ability to comply with LID standards a sample lot has been reviewed. Lot 7 has been thoroughly reviewed and calculations are provided below.

### *Lot* 7

30% Imperviousness is taken into account for proposed zoning RD-3.

Area of Lot 7 sloping northwest =  $\pm 9,300$  ft<sup>2</sup> = 0.21 acres.

Mulch bed is proposed as LID feature for Lot 7. Depth of amended soil:

 $D_{BMP} = (D_{DR} * R_V) / (\emptyset * A_{BMP} / [A_{BMP} + A_i]) = (0.64 * 0.89) / (0.35 * 1,150 / [1,150 + 1,500]) = 3.75'' => 4'' is proposed.$ 

 $D_{DR} = 0.64$ ' for impervious area;

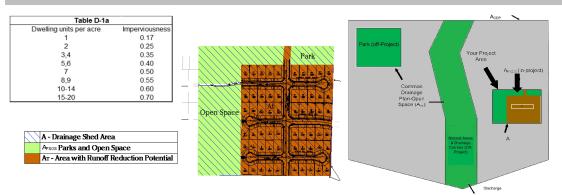
 $\emptyset = 0.35$  - amended soil porosity;

Rv = 0.89 – Volumetric Runoff coefficient for 100% imperviousness per Stormwater Quality Design Manual;

 $A_{BMP} = 375 \text{ ft}^2 - 25\%$  of contributing impervious area – minimum BMP area; per LID calculator in order to achieve 100 points, Area of mulch bed is 1,150 ft<sup>2</sup>.

 $A_i$  = 1,500 ft<sup>2</sup> – assumed portion of total impervious area sloping northwest – lot is split in two drainage directions.

Appendix D-1: Residential Sites: Low In	npact Development (LID	) Credits and Treat	ment BMP Sizir	ng Calculations		
Name of Drainage Shed: Blossom R	Ridae Lot 7			Fill in Blue Highligh	nted boxes	
Location of project: Sacramen						
Step 1 - Open Space and Pervious Area						
Is your project within the drainage area of a common drainage p	plan that includes open space? If no	t, skip to 1 b.				
1 a. Common Drainage Plan Area			acres	A <sub>CDP</sub>		
	-					
Common Drainage Plan Open Space (Off-projec			0 acres	A <sub>os</sub>	see area example	
<ul> <li>a. Natural storage reservoirs and drainage corridor</li> <li>b. Buffer zones for natural water bodies</li> </ul>	S		0 acres		below	
<ul> <li>c. Natural areas including existing trees, other vege</li> </ul>	tation and soil		0 acres			
d. Common landscape area/park	tation, and soli		0 acres 0 acres			
e. Regional Flood Control/Drainage basins			0 acres			
			0 acres			
1 b. Project Drainage Shed Area (Total)			0.21 acres	А		
Project Constitute Onese Constant (In project constant			0.00 acres	٨		
Project-Specific Open Space (In-project, comm	-			A <sub>PSOS</sub>	see area example	
a. Natural storage reservoirs and drainage corridor	s		0.00 acres		below	
b. Buffer zones for natural water bodies			0.00 acres			
c. Natural areas including existing trees, other vege	etation, and soil		0.00 acres			
d. Landscape area/park			0.00 acres			
e. Flood Control/Drainage basins			0.00 acres			
** Doesn't include impervious areas within individua	al lots and surrounding individ	ual units. That is accour	nted for below using	g Form D-1a in Step 2.		
Area with Runoff Reduction Potential	A - A <sub>PSOS</sub> =		0.21 acres	A <sub>T</sub>		
	-					
Number of Units in A <sub>T</sub>		1				
Number of units per acre in A <sub>T</sub>	DU/A <sub>T</sub> =	5		DUA		
	_					
Assumed Initial Impervious Fraction of AT		0.4		1		
(determined using Table D-1a)						
Open Space & Pervious Area LID Credit (Step 1	)					
	(A <sub>OS</sub> /A <sub>CDP</sub> +A <sub>PSOS</sub> /A)x100 =		0 pts			
						_



Step 2 - Runoff Reduction Credits				
Runoff Reduction Measures			Effective Area Managed (A <sub>C</sub> )	
Disconnected Roof Drains (see Fact Sheet)	use Form D-1a for credits		0.00	acres
Disconnected Pavement (see Fact Sheet)	use Form D-1b for credits		0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-1c for credits		0.00	acres
Alternative Driveway Design (see Fact Sheet)	use Form D-1d for credits		0.00	acres
Total Effective Area Managed (Credit Area)		Ac	0.00	acres EAM
Runoff Reduction Credit (Step 2)		(A <sub>C</sub> / A <sub>T</sub> )*100 =	0 pts	

Form D-1a: Disconnected Roof Drains Worksheet See Fact Sheet for more information regarding Disconnected Roof Drain	credit guidelines		
1. Determine efficiency Multiplier			Effective Area Managed (A <sub>c</sub> )
Runoff is directed to a dispersal trench or dry well	1.00		
(Type A and B soils only) Runoff is directed across landscaping, determine setback			
25 ft + Use multiplier of	1.00		
≥ 20 and < 25 ft Use multiplier of ≥ 15 and < 20 ft Use multiplier of	0.90 0.70		
> 10 and < 15 ft Use multiplier of	0.45		
$\geq$ 5 and < 10 ft Use multiplier of	0.25	_	
Efficiency M	ultiplier	Box J1	
2. Determine percentage of roof drains disconnected	<b></b>	<b>—</b> • •	
		Box J2	
<ol> <li>Select project density in dwelling units per acre:</li> <li>Use reduction factor of</li> </ol>	0.08		
2 Use reduction factor of	0.13		
3,4 Use reduction factor of 5,6 Use reduction factor of	0.19 0.23		
7 Use reduction factor of	0.29		
8,9 Use reduction factor of	0.33		
10-14 Use reduction factor of 15-20 Use reduction factor of	0.37 0.44		
Reduction F	actor 0	23 Box J3	
4. Determine Area Managed	0.	20 B0x33	
Multiply Box J3 by A <sub>T</sub> , and ent	er the result in Box J4	0.0 acres Box J4	
		J.O acles	
5. Multiply Boxes J1, J2 and J4, and enter 60% of the Result in Box			0.0 acres Box J
This is the amount of area credit to enter into the "Disconnected Roc	f Drains" Box of Form D-1		
Form D-1b: Disconnected Pavement Worksheet			
See Fact Sheet for more information regarding NDC Pavement credit guid	delines		Effective Area Managed (A <sub>c</sub> )
Divided Sidewalks			
1. Determine percentage of units with divided Sidewalks		Box K1	
		DOXICI	
Multiply Box K1, $A_T$ , and 0.04 and enter 60% of the result in Box K I his is the amount of area credit to enter into the "Disconnected Pay	amont" Hay at harm 11-1		0.00 acres Box K
Form D-1c: Interceptor Tree Worksheet See Fact Sheet for more information regarding Interceptor Tree credit gui	delines		Effective Area Managed (A <sub>c</sub> )
New Evergreen Trees			Lifetilve Alea Mahayeu (AC)
-			
1. Enter number of new evergreen trees that qualify as Interceptor 1	rees in Box L1.	tre	es Box L1
2. Multiply Box L1 by 200 and enter result in Box L2		0 sq.	ft. Box L2
New Deciduous Trees			
3. Enter number of new deciduous trees that qualify as Interceptor 1	rees in Box L3.	tre	es Box L3
			es Bux Lo
4. Multiply Box L3 by 100 and enter result in Box L4		0 sq.	ft. Box L4
Existing Tree Canopy			
	ing Tree generatie Devil C		
<ol><li>Enter square footage of existing tree canopy that qualifies as Exis</li></ol>	ting Tree canopy in Box L5.	sq.	ft. Box L5
6. Multiply Box L5 by 0.5 and enter the result in Box L6		0 sq.	ft. Box L6
Total Interceptor Tree Credits			
Add Boxes L2, L4, and L6 and enter it into Box L7		0 sq.	ft. Box L7
Divide Box L7 by 43,560 and multiply by 20% to get effective area m	anaged and enter the result in Box I.8	0.00 acr	es Box L8
This is the amount of area credit to enter into the "Interceptor Trees"		0.00	55 257.25
Form D-1d: Alternative Driveway Design	na aradit midaliaan		
See Fact Sheet for more information regarding Alternative Driveway Desi	gn creat guidennes		
	Iltiplier:		
Cobblestone Block F Pervious Concrete/A	0.40		
Modular Block			
Porous Pavement Porous Gravel	0.75		
Not Directly-connected	1.00		
		Box M1	
2. Determine percentage of units with Alternative Driveways:		Box M2	
4. Multiply Boxes M1, M2, $A_T$ and 0.04, and enter the result in Box M			0.00 acres
This is the amount of area credit to enter into the "Alternative Drivew	ay Design" Box of Form D-1		0.00

Step 3 - Runoff Management Cr	redits						
Capture and Use Credits	barrole Cistome	nd automatically arrest	ad evetame				
Impervious Area Managed by Rain (see Fact Sheet)	i barreis, Cisterns, a				0.00	acres	
(see Fact Sheet)		enter ga	llons, for simple rain barrels		0.00	acres	
Automated-Control Capture and Us	Jse System						
(see Fact Sheet, then enter impervious are	ea managed by the system	)			0.00	acres	
<b>Bioretention/Infiltration Credits</b>							
Impervious Area Managed by Biore		Bioretention Ar	easq ft				
(see Fact Sheet)		Subdrain Elevati	on inches				
		Ponding Depth, inch	es inches		0.00	acres	
Impervious Area Managed by Infiltr	tration BMPs						
(see Fact Sheet)		Drawdown Time, I Soil Infiltration Rate, in					
					0.00		
	Sizing Option 1:	Capture Volume, acre	-ft capture_vol	_inf	0.00	acres	
\$	Sizing Option 2: In	filtration BMP surface area, so	g ft soil_surface	e_area	0.00	acres	
	Basin or trench	? Basin	approximate BMP dep	th 0.00 ft			
Impervious Area Managed by Amer	ended Soil or Mulch E	Beds					
(see Fact Sheet)		Mulched Infiltration Area, so	g ft 1,150 mulch_area		0.11	acres	
					0.44	٨	
Total Effective Area Managed by Cap	pture-and-Use/Biore	tention/Infiltration BMP	S		0.11	A <sub>LIDc</sub>	
Runoff Management Credit (Ste	ep 3)			$A_{LIDC}/A_{T}^{*}200 =$	100.6	pts	
Total LID Credits (Step 1	4 . 0 . 2)				400.0		
Does project require hydromodificati			D compliant, check for trea	atment sizing in Step 4	100.6		
boes project require riyuromounicati	tion management?	ryes, proceed to using	Sacriw.				
Adjusted Area for Flow Deced New I				A <sub>T</sub> - A <sub>C</sub> -A <sub>LIDC</sub> =	0.10	٨	
Adjusted Area for Flow-Based, Non-L	LID Treatment			AT - AC -ALIDC =	0.10	A <sub>AT</sub>	
Adjusted Impervious Fraction of A for	or Volume-Based, No	on-LID Treatment		(A <sub>T</sub> *I-A <sub>C</sub> -A <sub>LIDC</sub> ) / A =	0.000	I <sub>A</sub>	
,	,			( 1 0 2100)		~	
OTOD, No. of different trees							
STOP: No additional trea							
Step 4a Treatment - Flow-Base							
Step 4a Treatment - Flow-Base Form D-1e							
Step 4a Treatment - Flow-Base		od)	ient x Rainfall Intensity x Ad	djusted Treatment Are	a		_
Step 4a Treatment - Flow-Base Form D-1e Calculate treatment flow (cfs):		od)	ient x Rainfall Intensity x Ad	djusted Treatment Are	a		
Step 4a Treatment - Flow-Base Form D-1e		od)	ient x Rainfall Intensity x Ad	djusted Treatment Are	a		
Step 4a Treatment - Flow-Base Form D-1e Calculate treatment flow (cfs):		od)	7	djusted Treatment Are	a		
Step 4a Treatment - Flow-Base Form D-1e Calculate treatment flow (cfs): Determine C Factor using Table D-1b	ed (Rational Meth	od)	c	djusted Treatment Are	a		
Step 4a Treatment - Flow-Base Form D-1e Calculate treatment flow (cfs):	ed (Rational Meth	od) Flow = Runoff Coeffic	c	djusted Treatment Are	a		
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I	ed (Rational Meth	Flow = Runoff Coeffic	C	djusted Treatment Are	a		
Step 4a Treatment - Flow-Base Form D-1e Calculate treatment flow (cfs): Determine C Factor using Table D-1b	ed (Rational Meth	od) Flow = Runoff Coeffic	C	djusted Treatment Are	a		
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I	ed (Rational Meth	Flow = Runoff Coeffic	C	djusted Treatment Are	a		
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I           Determine i using Table D-1c (Rainfall I         AAT from Step 2	ed (Rational Meth	Flow = Runoff Coeffic	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are	a		
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I           Determine i using Table D-1c (Rainfall I         AAT from Step 2	ed (Rational Meth	od) Flow = Runoff Coeffic 0.	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are	a		
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I           Determine i using Table D-1c (Rainfall I         AAT from Step 2	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub>	od) Flow = Runoff Coeffic 0.	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are		able D-1c	
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I           Determine i using Table D-1c (Rainfall I         A <sub>AT</sub> from Step 2	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub>	od) Flow = Runoff Coeffic 0.	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are		able D-1c	
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I           Determine i using Table D-1c (Rainfall I         A <sub>AT</sub> from Step 2           F           TABLE	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub> E D-1b	od)           Flow = Runoff Coeffic	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are		able D-1c	1
Step 4a Treatment - Flow-Base Form D-1e Calculate treatment flow (cfs): Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall I A <sub>AT</sub> from Step 2 F	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub> E D-1b Runoff Coefficie	od)           Flow = Runoff Coeffic	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are	T;		1
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I           Determine i using Table D-1c (Rainfall I         A <sub>AT</sub> from Step 2           F         TABLE           Development Type         Development Type	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub> E D-1b Runoff Coefficie C	od)           Flow = Runoff Coeffic	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are	Ta	fall Intensity	
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I           Determine i using Table D-1c (Rainfall I         AAT from Step 2           F           TABLE           Development Type         Single-family areas	ed (Rational Meth Intensity) Flow = C * i * A <sub>kT</sub> E D-1b Runoff Coefficie C 0.50	od)           Flow = Runoff Coeffic	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are	Ta Rain Roseville	f <b>all Intensity</b> i = 0.20 in/hr	
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I           Determine i using Table D-1c (Rainfall I         A <sub>AT</sub> from Step 2           F         TABLE           Development Type         Development Type	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub> E D-1b Runoff Coefficie C	od)           Flow = Runoff Coeffic	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are	Ta	fall Intensity	
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I           Determine i using Table D-1c (Rainfall I         A <sub>AT</sub> from Step 2           F           Development Type           Single-family areas         Multi-units, detached	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub> E D-1b Runoff Coefficie C 0.50 0.60	od)           Flow = Runoff Coeffic	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are	Ta Rain Roseville Sacramento	f <b>all Intensity</b> i = 0.20 in/hr i = 0.18 in/hr	
Step 4a Treatment - Flow-Base           Form D-1e           Calculate treatment flow (cfs):           Determine C Factor using Table D-1b           Determine i using Table D-1c (Rainfall I           A <sub>AT</sub> from Step 2           F           TABLE           Development Type           Single-family areas           Multi-units, detached           Apartment dwelling areas	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub> E D-1b Runoff Coefficie C 0.50 0.60 0.60 0.70	od) Flow = Runoff Coeffic	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are	Ta Rain Roseville Sacramento	f <b>all Intensity</b> i = 0.20 in/hr i = 0.18 in/hr	
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine C Factor using Table D-1b           Determine i using Table D-1c (Rainfall I         Aar from Step 2           F         TABLE           Development Type         Single-family areas           Multi-units, detached         Apartment develing areas           Multi-units, attached         User Specified	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub> E D-1b Runoff Coefficier C 0.50 0.60 0.70 0.75 0.00	od) Flow = Runoff Coeffic	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are	Ta Rain Roseville Sacramento	f <b>all Intensity</b> i = 0.20 in/hr i = 0.18 in/hr	
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I           Determine i using Table D-1c (Rainfall I         A <sub>AT</sub> from Step 2           F         TABLE           Development Type         Single-family areas           Multi-units, detached         Apartment dwelling areas           Multi-units, attached         Metached	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub> E D-1b Runoff Coefficier C 0.50 0.60 0.70 0.75 0.00	od) Flow = Runoff Coeffic	C 18 i 0 A <sub>AT</sub>	djusted Treatment Are	Ta Rain Roseville Sacramento	f <b>all Intensity</b> i = 0.20 in/hr i = 0.18 in/hr	
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine C Factor using Table D-1b           Determine i using Table D-1c (Rainfall I         Aar from Step 2           F         TABLE           Development Type         Single-family areas           Multi-units, detached         Apartment develing areas           Multi-units, attached         User Specified	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub> E D-1b Runoff Coefficie C 0.50 0.60 0.70 0.75 0.00 SCE-WEF)	od) Flow = Runoff Coeffic	C 18 i 0 A <sub>AT</sub> 10 cfs	djusted Treatment Are	Ta Rain Roseville Sacramento	f <b>all Intensity</b> i = 0.20 in/hr i = 0.18 in/hr	
Step 4a       Treatment - Flow-Base         Form D-1e       Calculate treatment flow (cfs):         Determine C Factor using Table D-1b       Determine i using Table D-1c (Rainfall I         Determine i using Table D-1c (Rainfall I       Aart from Step 2         F       TABLE         Development Type       Single-family areas         Multi-units, detached       Apartment dwelling areas         Multi-units, attached       User Specified         O Treatment - Volume-Based (AS       Water quality volume (Acre-Feet):	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub> E D-1b Runoff Coefficie C 0.50 0.60 0.70 0.75 0.00 SCE-WEF)	od) Flow = Runoff Coeffic 0.1 0.1 0.1 0.1 0.1 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	С 18 і 0 А <sub>лт</sub> 10 сfs		Ta Rain Roseville Sacramento Folsom	fall Intensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
Step 4a       Treatment - Flow-Base         Form D-1e       Calculate treatment flow (cfs):         Determine C Factor using Table D-1b       Determine i using Table D-1c (Rainfall I         Determine i using Table D-1c (Rainfall I       Axt from Step 2         F       TABLE         Development Type       Single-family areas         Multi-units, detached       Apartment dwelling areas         Multi-units, attached       User Specified         o       Treatment - Volume-Based (AS)	ed (Rational Meth Intensity) Flow = C * i * A <sub>AT</sub> E D-1b Runoff Coefficie C 0.50 0.60 0.70 0.75 0.00 SCE-WEF)	od) Flow = Runoff Coeffic 0. 0.1 0.1 0.1 0.1	C 18 i 0 A <sub>AT</sub> 10 cfs	djusted Treatment Are	Ta Rain Roseville Sacramento	fall Intensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
Step 4a Treatment - Flow-Base         Form D-1e         Calculate treatment flow (cfs):         Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I         Axr from Step 2         F         Development Type         Single-family areas         Multi-units, detached         Apartment, dwelling areas         Multi-units, attached         User Specified         O Treatment - Volume-Based (AS         e water quality volume (Acre-Feet):         from Step 1	ed (Rational Meth	od)         Flow = Runoff Coeffic         0.1         0.1         0.1         0.1         0.1         0.21	C 18 i O AAT 10 cfs etention Volume (P <sub>0</sub> ) A		Ta Rain Roseville Sacramento Folsom	fall Intensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine C Factor using Table D-1b           Determine i using Table D-1c (Rainfall I         Aar from Step 2           F         TABLE           Development Type         Single-family areas           Multi-units, detached         Apartment dwelling areas           Multi-units, attached         User Specified           O Treatment - Volume-Based (AS         Water quality volume (Acre-Feet):           from Step 1         Si Maximized Detention Volume from figure	ed (Rational Meth	od) Flow = Runoff Coeffic 0.1 0.1 0.1 0.1 0.1 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	С 18 і 0 А <sub>лт</sub> 10 сfs		Ta Rain Roseville Sacramento Folsom	fall Intensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
Step 4a         Treatment - Flow-Base           Form D-1e         Calculate treatment flow (cfs):           Determine C Factor using Table D-1b         Determine C Factor using Table D-1b           Determine i using Table D-1c (Rainfall I         Determine i using Table D-1c (Rainfall I           A <sub>AT</sub> from Step 2         F           Development Type         Single-family areas           Multi-units, detached         Apartment dwelling areas           Multi-units, detached         User Specified           Dereatment - Volume-Based (AS         e water quality volume (Acre-Feet):           from Step 1         S: Maximized Detention Volume from figundit x E of this manual using I <sub>A</sub> from Step	ed (Rational Meth	od)         Flow = Runoff Coeffic         0.1         0.1         0.1         0.1         0.1         0.21	C 18 i O AAT 10 cfs etention Volume (P <sub>0</sub> ) A		Ta Rain Roseville Sacramento Folsom	fall Intensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
Step 4a Treatment - Flow-Base         Form D-1e         Calculate treatment flow (cfs):         Determine C Factor using Table D-1b         Determine i using Table D-1c (Rainfall I         Determine i using Table D-1c (Rainfall I         A <sub>AT</sub> from Step 2         F         Development Type         Single-family areas         Multi-units, detached         Apartment dwelling areas         Multi-units, attached         User Specified         Treatment - Volume-Based (AS         water quality volume (Acre-Feet):         from Step 1         Standard Detention Volume from figu	ed (Rational Meth	od)           Flow = Runoff Coeffic           0.1           0.1           0.1           0.1           0.1           0.1           0.21	C 18 i O AAT 10 cfs etention Volume (P <sub>0</sub> ) A		Ta Rain Roseville Sacramento Folsom	fall Intensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	

# Southwest POC

Southwest portion of Watershed WS2.1P constitutes the point of compliance. It consists of portions of lots 13, 14 & 15.

Lot 14 has been thoroughly reviewed and calculations are provided below.

# Lot 14

40% Imperviousness is taken into account for proposed zoning RD-4.

Area of Lot 14 sloping southwest =  $\pm 5,000$  ft<sup>2</sup> = 0.11 acres.

Mulch bed is proposed as LID feature for Lot 14. Depth of amended soil:

 $D_{BMP} = (D_{DR} * R_V) / (\emptyset * A_{BMP} / [A_{BMP} + A_i]) = (0.64 * 0.89) / (0.35 * 600 / [600 + 1,200]) = 4.88'' => 6'' is proposed.$ 

D<sub>DR</sub> = 0.64' for impervious area;

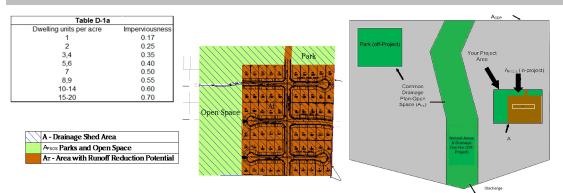
 $\emptyset = 0.35$  - amended soil porosity;

Rv = 0.89 – Volumetric Runoff coefficient for 100% imperviousness per Stormwater Quality Design Manual;

 $A_{BMP}$  = 300 ft<sup>2</sup> - 25% of contributing impervious area – minimum BMP area; per LID calculator in order to achieve 100 points, Area of mulch bed is 600 ft<sup>2</sup>.

 $A_i = 1,200 \text{ ft}^2$  – assumed portion of total impervious area sloping southwest – lot is split in two drainage directions.

Appendix D-1: Residential Site	s: Low Impact Development (L	ID) Credits and Trea	atment BMP Sizin	ng Calculations		
Name of Drainage Shed:	Blossom Ridge Lot 14			Fill in Blue Highligh	ted boxes	
Location of project:		,		5 5		
Step 1 - Open Space and Pervi						
Is your project within the drainage area of a com	mon drainage plan that includes open space? I	f not, skip to 1 b.				
1 a. Common Drainage Plan Area			acres	A <sub>CDP</sub>		
Common Drainage Plan Open Space	(Off-project)	r	0 acres	Aos	see area example	
a. Natural storage reservoirs and drain			0 acres		below	
b. Buffer zones for natural water bodie	5		0 acres		wored	
c. Natural areas including existing trees	s, other vegetation, and soil		0 acres			
d. Common landscape area/park			0 acres			
e. Regional Flood Control/Drainage ba	sins		0 acres			
1 b. Project Drainage Shed Area (To	al)		0.11 acres	A		
Project-Specific Open Space (In-pro	ject, communal**)		0.00 acres	A <sub>PSOS</sub>	see area example	
a. Natural storage reservoirs and drain	age corridors		0.00 acres		below	
b. Buffer zones for natural water bodie	3		0.00 acres		Delow	
c. Natural areas including existing trees	s, other vegetation, and soil		0.00 acres			
d. Landscape area/park			0.00 acres			
e. Flood Control/Drainage basins			0.00 acres			
** Doesn't include impervious areas with	hin individual lots and surrounding indi	vidual units. That is acco	unted for below using	g Form D-1a in Step 2.		
Area with Runoff Reduction Potentia	A - A <sub>PSOS</sub> =		0.11 acres	A <sub>T</sub>		
Number of Units in A <sub>T</sub>		1				
Number of units per acre in A <sub>T</sub>	DU/A <sub>T</sub> =	. 10		DUA		
Assumed Initial Impervious Fraction	of A <sub>T</sub>	0.6		T		
(determined using Table D-1a)						
Open Space & Pervious Area LID Cr	edit (Step 1)					
	(A <sub>OS</sub> /A <sub>CDP</sub> +A <sub>PSOS</sub> /A)x100 =		0 pts			



Step 2 - Runoff Reduction Credits						
Runoff Reduction Measures				ffective Area lanaged (A <sub>c</sub> )		
Disconnected Roof Drains (see Fact Sheet)	use Form D-1a for credits			0.00	acres	
Disconnected Pavement (see Fact Sheet)	use Form D-1b for credits			0.00	acres	
Interceptor Trees (see Fact Sheet)	use Form D-1c for credits			0.00	acres	
Alternative Driveway Design (see Fact Sheet)	use Form D-1d for credits		→	0.00	acres	
Total Effective Area Managed (Credit Area)		Ac		0.00	acres	EAM
Runoff Reduction Credit (Step 2)		(A <sub>C</sub> / A <sub>T</sub> )*100 =	0	pts		

Form D-1a: Disconnected Roof I See Fact Sheet for more information regard		dit guidelines					Effective Area Managed (A.)
1. Determine efficiency Multiplier							Effective Area Managed (A <sub>c</sub> )
Runoff is directed to a dispersal trench of	r dry well	1.00					
(Type A and B soils only) Runoff is directed across landscaping, de							
25 ft + Us	se multiplier of	1.00					
	se multiplier of se multiplier of	0.90 0.70					
<u>&gt;</u> 10 and < 15 ft Us	se multiplier of	0.45					
≥ 5 and < 10 ft Us	se multiplier of	0.25	-	_			
	Efficiency Mult	iplier	→	Box	J1		
2. Determine percentage of roof drains	disconnected			-			
2. Determine percentage of roof drains of				Box	J2		
<ol> <li>Select project density in dwelling units</li> <li>Use reduction factor of</li> </ol>	s per acre:	0.08					
2 Use reduction factor of		0.13					
3,4 Use reduction factor of		0.19					
5,6 Use reduction factor of 7 Use reduction factor of		0.23 0.29					
8,9 Use reduction factor of		0.33					
10-14 Use reduction factor of 15-20 Use reduction factor of		0.37 0.44					
	Reduction Fac	tor	→	.37 Box	12		
4. Determine Area Managed			0.	. <u></u>	33		
° °	ultiply Box J3 by A <sub>T</sub> , and enter	the result in Box J4		0.0 acres Box	J4		
			Y	0.0 acres		-	
5. Multiply Boxes J1, J2 and J4, and enter						L	0.0 acres Box
This is the amount of area credit to enter		Drains" Box of Form D-1					
Form D-1b: Disconnected Paver							
See Fact Sheet for more information regard	ing NDC Pavement credit guidel	ines				E	Effective Area Managed (A <sub>c</sub> )
Divided Sidewalks							
1. Determine percentage of units with div	vided Sidewalks			Box K1			
			<b></b>	Doxiti			
Multiply Box K1, $A_T$ , and 0.04 and enter 6 I his is the amount of area credit to enter		nent" Box of Form D-1					0.00 acres Box K
Form D-1c: Interceptor Tree Wo							
See Fact Sheet for more information regard		lines					
New Evergreen Trees						E	Effective Area Managed (A <sub>C</sub> )
New Lvergreen nees							
1. Enter number of new evergreen trees	that qualify as Interceptor Tre	es in Box L1.				trees	Box L1
2. Multiply Box L1 by 200 and enter resu	Ilt in Box L2				0	sq. ft.	Box L2
New Deciduous Trees							
New Deciduous Trees							
3. Enter number of new deciduous trees	that qualify as Interceptor Tre	es in Box L3.				trees	Box L3
						1003	DOXED
4. Multiply Box L3 by 100 and enter resu	Ilt in Box L4				0	sq. ft.	Box L4
Existing Tree Canopy							
				-			
<ol><li>Enter square footage of existing tree of existing</li></ol>	canopy that qualifies as Existing	g Tree canopy in Box L5.				sq. ft.	Box L5
				-			
6. Multiply Box L5 by 0.5 and enter the re	esult in Box L6				0	sq. ft.	Box L6
Total Interceptor Tree Credits							
Add Boxes L2, L4, and L6 and enter it into	to Box L7				0	sq. ft.	Box L7
Divide Box L7 by 43,560 and multiply by 2	20% to get effective area man	aged and enter the result i	in Box I 8		0.00	acres	Box L8
This is the amount of area credit to enter					0.00	40.00	207.20
Form D-1d: Alternative Driveway	/ Design						
See Fact Sheet for more information regard	ing Alternative Driveway Design	credit guidelines					
1. Select type of driveway	ervious Driveway: Multip	alian					
	Cobblestone Block F	0.40					
	Pervious Concrete/A Modular Block	0.60					
Po	orous Pavement	0.75					
No	Porous Gravel ot Directly-connected	1.00					
				Box M1			
				_ 3/101			
2. Determine percentage of units with Alt	ternative Driveways:			Box M2			
4. Multiply Boxes M1, M2, A <sub>T</sub> and 0.04, a	and enter the result in Box M						0.00 acres
This is the amount of area credit to enter		Design" Box of Form D-1					0.00

Big 5.4. Planding langer bords	Stop 2 Dupoff Mongroupert Condition					
Imperiation Area Banaged by Rainbareb. (Literin, and addination) windly system         0.00         0.00         0.00           Imperiation Area Banaged by Bandwells         0.00         0.00         0.00         0.00           Imperiation Area Banaged by Bandwells         0.00         <						
Improve		erns and automatically-emptied s	vstems			
Amount of Capitar days by pairs         0.00         ord           Binder Schwart days by pairs and the state of the st				0.00	acres	
0.05         0.05         0.05           Brightendermittention Condition         0.05         0.05           Brightendermittention Condition         0.05         0.05           Brightendermittention Condition         0.05         0.05         0.05           Brightendermittention Condition         0.05         0.05         0.05         0.05           Brightendermittention         0.05         0.05         0.05         0.05         0.05           Brightendermittention         0.05 </td <td></td> <td>enter galions,</td> <td>for aimple fair barrela</td> <td>0.00</td> <td>acres</td>		enter galions,	for aimple fair barrela	0.00	acres	
Description         Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<>				0.00		
Imperiations And Managed by Biorelention BMPs	(see Fact Sneet, then enter impervious area managed by th	e system)		0.00	acres	
be fact bedie Building begins, holes bedie bedi						
Period potent outs area damaged by fulfication BMPs is in the second set of the second second set of the second second set of the second set of the second second second set of the second second set of the second second second second second set of the second secon						
Big         Description         D	(see Fact Sheet)			0.00		
		Ponding Depth, inches	inches	0.00	acies	
is if not if there is a ready in the isolation if the ready as a ready in the ready as a ready as a ready in the ready as a ready as ready as ready as a ready as ready as ready as a ready as a read	Impervious Area Managed by Infiltration BMPs					
Storp Option 1:       Capture Volume, some		Drawdown Time, hrs	drawdown_hrs_inf			
Sing Option 2:       with window takes uses, using						
Basin or trend(r)       Basin       experimental UP set (000)         Impervious Area Managed by Amended Soil of Mulch Beds       D000       mark         Loc fact Some()       Mulchel affindation Area, sgt (000)       D000       Area         Total Effective Area Managed by Amended Soil of Mulch Beds       D000       Area         Remoof Management Credit (Step 3)       Area       D000       Area         Remoof Management Credit (Step 14/2-3)       Lib Comparent, check for Hexament sizing in Step 4       100.2         Dotes project require hydrohemolification management? H yes, proceed to using Stachtl.       Ar-Ar-Arace (	Sizing Option	1: Capture Volume, acre-ft	capture_vol_inf	0.00	acres	
Bail of trends?       Bail       approximate BBP exp (DUD)*         Impervious Area Managed by Anended Soi of Mulch Bads       BoD_mulch_area       DDB       acce         Total Effective Area Managed by Capture-and-Use/Bioretention/Infitration BMPs       DDB       Acce         Aunoff Management Credit (Step 3)       Aunoff Arazon       DDDB       Acce         Aunoff Management Credit (Step 3)       LD complant, thesk for tesament storegers Step 4       DDDB       DDD         Does protect require hydromodification management? If yes, proceed to using Step 4       DDDB       Acce         Adjusted Area for Flow-Based, Non-LD Treatment       Ar-Ac-Acce =       DDDB       Acc         Adjusted Interview Flow-Based (Rational Method)       For Pacing Caption of A for Volume-Based (Rational Method)       Total ED       C         Fore Area for Flow-Based (Rational Method)       Fore a curred Caption using Table D-1b       C       C         Calculate treatment flow (ds):       Fore a curred Coefficient (Rational)       C       C         Determine Lang Table D-1b       C       C       C       C         Determine Coefficient (Coefficient (Rational)       C       C       C       C       C         Single Family Breas       0.050       Acc       C       C       C       C       C       C <td< td=""><td>Sizing Option</td><td>2: Infiltration BMP surface area, so ft</td><td>soil surface area</td><td>0.00</td><td>acres</td></td<>	Sizing Option	2: Infiltration BMP surface area, so ft	soil surface area	0.00	acres	
$\begin{tabular}{ c                                   $				1		
Use Fast Sheel         0.06         use           Total Effective Area Managed by Capture-and-Use/Bioredention/Infiltration BMPs         0.06         A.oc.           Runoff Management Credit (Step 3)         A.oc./Ar/200 =         1002         pts           Total LID Creditis (Step 1-2A-3)         LID complexet, check for treatment scrips (Step 4         1002         pts           Total LUD Creditis (Step 1-2A-3)         LID complexet, check for treatment scrips (Step 4         1002         pts           Adjusted Area for Flow-Based, Non-LID Treatment         Ar - A.c A.oc. =         0.05         A.st           Adjusted Area for Flow-Based, Non-LID Treatment         (Ar/Ac-A.oc.) (A =         0.099         1s           Further treatment is required, see choose flow-based or volume-based sizing in Step 4         Step 4a Treatment Area         Step 4a Treatment Area           Determine (Step)         Flow = Chift (Art         0.005         A.sr           For = C         C         C         Step 4a Treatment Area           Determine (Lusing Table D-1c (Rantall knensity)         0.10         i         A.sr           Multi-unit, additional (Ascelered Concerticent (Rational))         Good         A.sr         Step 4a Treatment Area           Determine (Lusing Table D-1c (Rantall knensity)         0.10         i         A.sr         Steparerife in Step 1	Basin o	r trench? Basin	approximate BMP depth 0.00	ft		
tes Fact Sheel         0.06         acce           Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs         0.06         A.co.           Runoff Management Credit (Step 3)         A.co./Ar.200 =         100.2         pts           Total LD Creditis (Step 1-2A-3)         LD complexet, check for treatment scring in Step 4         100.2         pts           Total LD Creditis (Step 1-2A-3)         LD complexet, check for treatment scring in Step 4         100.2         pts           Adjusted Area for Flow-Based, Non-LD Treatment         ArA.cA.co. =         0.05         A.st.           Adjusted Area for Flow-Based, Non-LD Treatment         (Ar.1-Ka:-A.uc) (A =         0.099         1s.           Further treatment is required, see choose flow-based or volume-based sizing in Step 4         Step 4a Treatment Area         Step 4a Treatment Area           Calculate treatment flow (ch):         Flow = Runoff Coefficient (Rational)         C         C           Calculate treatment flow (ch):         Flow = Runoff Coefficient (Rational)         C         C           Determine i using Table D-1c (Rantall Intensity)         0.00         Arr.         C           Multi-units, distanded         0.00         Arr.         C         C           Step 4a Treatment Flow (ch):         Flow = C         C         S         S <td>Immensions Area Menseed by Amended Call and</td> <td>Mulah Dada</td> <td></td> <td></td> <td></td>	Immensions Area Menseed by Amended Call and	Mulah Dada				
Total Effective Area Managed by Capture-and-UserBioretention/Infiltration BMPs       0.05       A_ons         Runoff Management Credit (Step 3)       A_oo/Ar/200 = 1002       pts         Total LD Credits (Step 1-2-43)       LD complexet check for beament sizing nStep 4       100.2         Does project require hydromodification management? If yes, proceed to using SacHM.       Ar. Ac. Ac. C. 0.05       Arr         Adjusted Area for Flow-Based, Non-LD Treatment       Ar. Ac. Ac. C. 0.05       Arr         Adjusted Area for Flow-Based, Non-LD Treatment       Ar. Ac. Ac. C. 0.05       Arr         Further treatment is required, see choose flow-based or volume-based sizing in Step 4       Step 4.7       Step 4.7         Step 4.7       Textement Area       Step 4.7       Arr         Calculate treatment flow desc (Rational Method)       Fore - Runoff Coefficient x Ranfall Intensity       Step 4.7         Fore Det       C       C       Step 4.7       Step 4.7         Determine Using Table D-to (Rainfall Intensity)       0.18       i       Arr         Autor Step 2       0.05       Aur       Step 4.7       Step 4.7         Determine Using Table D-to (Rainfall Intensity)       0.18       i       Step 5.00       Nor         Single-Family areas       0.50       Aur       Step 5.00       Nor       Step 5.00 <t< td=""><td></td><td></td><td>600 mulch area</td><td>0.06</td><td>30700</td></t<>			600 mulch area	0.06	30700	
Runoff Management Credit (Stop 1)       Aucc/A+200 = 1002 pts         Total LD Credits (Stop 1+2+3)       LD complant, check for treatment size in 18 tep 4       1002         Does project require hydromodification management? If yes, proceed to using BacHM.       Aucc/A+200 = 0.05 Avr       1002         Adjusted Area for Flow-Based, Non-LD Treatment       Ar - Ac-Ac_oc = 0.05 Avr       Avr         Adjusted Impervious Fraction of A for Volume-Based, Non-LD Treatment       (Ar+FAc-Aucc) / A = 0.099 is.       S         Further treatment is required, see choose flow-based or volume-based sizing in Step 4       S       S         Further treatment flow (ds):       Flow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Ares       S         Determine (using Table D-1e (Rainfall Intensity)       0.10 Avr       G         Determine (using Table D-1e (Rainfall Intensity)       0.10 Avr       For a C + 1* Avr       0.00 ds         Toble D-1e (Rainfall Intensity)       0.10 Avr       For a C + 1* Avr       0.00 ds         Toble D-1e (Rainfall Intensity)       0.00 ds       For a C + 1* Avr       0.00 ds         Total LD Cree Flow (D = 0.00 ds)       For a C + 1* Avr       0.00 ds       For a C + 1* Avr       0.00 ds         Total C = 0.01 do Avr       For a C + 1* Avr       0.00 ds       For a C + 0* Avr       For a C + 0* Avr       For a C + 0* Avr       For a C + 0* Avr <td>(add Fact Oned)</td> <td>Maichea Innication Alea, sq it</td> <td>Huich_area</td> <td>0.00</td> <td>80163</td>	(add Fact Oned)	Maichea Innication Alea, sq it	Huich_area	0.00	80163	
Runoff Management Credit (Stop 1)       Auoc/A+200 = 1002 pts         Total LDD Credits (Stop 1+2+3)       LD complant, theck for testment sizing in Step 4       1002         Does project require hydromodification management? If yes, proceed to using backly.       1002       Aur         Adjusted Area for Flow-Based, Non-LD Treatment       Ar + Ac + Acoc = 0.05 Aur       Aur         Adjusted Area for Flow-Based, Non-LD Treatment       Ar + Ac + Acoc = 0.059 Aur       Aur         Adjusted Area for Flow-Based (Non-LD Treatment       Ar + Ac + Acoc = 0.059 Aur       Aur         Step 43 Treatment 1 St required, see choose flow-based or volume-based sizing in Step 4       Step 43 Treatment - Flow-Based (Rational Method)         Form 7-16       C       C         Calculate treatment flow (ch):       Flow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Area         Determine C Factor using Table D-1b       C         Calculate treatment flow (ch):       Flow = C + 1 + Aur         Total LD Coefficient (Rational), Dation at the set of the s						
Total LD Credits (Step 1+2+3)       LD compliant: check for treatment sizing in Step 4       100.2         Does project require hydromodification management? If yes, proceed to using SacHM.       Ar : A_c : A_ucc = 0.05       Ar:         Adjusted Area for Flow-Based, Non-LID Treatment       Ar : A_c : A_ucc = 0.05       Ar:         Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment       (Ar'tAc:A_ucc) / A = 0.009       is.         Further treatment is required, see choose flow-based or volume-based sizing in Step 4       Step 4 a Treatment - Flow-Based (Rational Method)         Form 1-10       C       C       C         Calculate treatment flow (cfs):       Flow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Area       Determine i using Table D-1c (Rainfall Intensity)       0.16       i         Ar, from Step 2       0.05       Ar:       C       C       C       C         Determine Type       Runoff Coefficient (Rational), Arit Multi-unity, C       C       C       C       C         Single-family areas       0.50       Ar:       C	Total Effective Area Managed by Capture-and-Use	e/Bioretention/Infiltration BMPs		0.06	A <sub>LIDc</sub>	
Total LD Credits (Step 1+2+3)       LD compliant: check for treatment sizing in Step 4       100.2         Does project require hydromodification management? If yes, proceed to using SacHM.       Ar : A_c : A_ucc = 0.05       Ar:         Adjusted Area for Flow-Based, Non-LID Treatment       Ar : A_c : A_ucc = 0.05       Ar:         Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment       (Ar'tAc:A_ucc) / A = 0.009       is.         Further treatment is required, see choose flow-based or volume-based sizing in Step 4       Step 4 a Treatment - Flow-Based (Rational Method)         Form 1-10       C       C       C         Calculate treatment flow (cfs):       Flow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Area       Determine i using Table D-1c (Rainfall Intensity)       0.16       i         Ar, from Step 2       0.05       Ar:       C       C       C       C         Determine Type       Runoff Coefficient (Rational), Arit Multi-unity, C       C       C       C       C         Single-family areas       0.50       Ar:       C						
Total LID Credits (Step 1+2+3)       LID compliant; check for treatment sign in Step 4       100.2         Does project require hydromodification management? If yes, proceed to using SacHM.       Ar : Ac: -Ac::::::::::::::::::::::::::::::	Runoff Management Credit (Step 3)		A <sub>LIDC</sub> /A	AT*200 = 100.2	pts	
Descripter require hydromodification management? If yes, proceed to using SacHM.         Adjusted Area for Flow-Based, Non-LID Treatment       Ar, -Ar, -Ar, -Ar, -O, -0.00, Ar, r.         Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment       (Ar't-Ar, -Ar, -0.00, Ar, r.         Further treatment is required, see choose flow-based or volume-based sizing in Step 4       Step 43 Treatment - Flow-Based (Rational Method)         Form D-1e       Calculate treatment flow (cls):       Flow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Area         Determine C Factor using Table D-1b       C         Determine (using Table D-1c (Rainfall Intensity)       0.15         Determine (using Table D-1c (Rainfall Intensity)       0.15         Flow = C * 1* Ar, 0.00       cls         TABLE D-1b       Table D-1c         Runoff Coefficient (Rational), Ary (Rational), Ary (Rational), Ary (Rational), Cost       Table D-1c         Null-units, discloned       0.50         Ary from Step 2       0.00         C - Single-family areas       0.50         Multi-units, discloned       0.60         Apartment dwelling areas       0.75         Multi-units, discloned       0.75         Multi-units, discloned       0.75         Multi-units, discloned       0.75         Viger Specified Draw Down time       0.11					•	
Adjusted Area for Flow-Based, Non-LID Treatment       A + A_0 + A_0 as 0       0.03       A+         Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment       (A++A_0+A_0 as 0) / A 0.099       1a         Further treatment is required, see choose flow-based or volume-based sizing in Step 4         Step 4a Treatment - Flow-Based (Rational Method)         Form D-16         Calculate treatment flow (ds):         Flow = Runoff Coefficient x Rainfall Intensity × Adjusted Treatment Area         Determine C Factor using Table D-1b         C         Table D-1c (Rainfall Intensity)         Table D-1c (Rainfall Intensity)         Table D-1c         Table D-1b         Table D-1b         Table D-1c         Runoff Coefficient (Rational), Dingle family areas       0.00       dis         Table D-1c         Runoff Coefficient (Rational), Dingle family areas       0.10       dis         Table D-1c         Rainfall Intensity       0.20       in thr         Specified Draw Down time         Development Type       0.50         C       0.00       dis <td></td> <td></td> <td></td> <td>in Step 4 100.2</td> <td></td>				in Step 4 100.2		
Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment (Ar <sup>+</sup> A-C-A <sub>LCC</sub> )/A = 0.009 1,  Further treatment is required, see choose flow-based or volume-based sizing in Step 4 Step 4a Treatment - Flow-Based (Rational Method) Form D-1e Calculate treatment flow (cfs): Flow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Area Determine i using Table D-1b C Determine i using Table D-1c (Rainfall Intensity) 0.18 i A <sub>1</sub> : from Step 2 0.05 A <sub>1</sub> : Flow = C <sup>+1+</sup> A <sub>A</sub> 0.00 cfs Table D-1c Runoff Coefficient (Rational), Dispectification of a for Volume-Based (ASCE-WEF) volume-Based (ASC	Does project require hydromodification managem	nent? If yes, proceed to using Sac	HM.			
Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment  Fund Let  Step 4a Treatment - Flow-Based (Rational Method) Form D-1e Calculate treatment flow (ds): Fow = Runoff Coefficient Rainfall Intensity Adjusted Treatment Area Determine i using Table D-1b C Determine i using Table D-1c (Rainfall Intensity) O O Determine i using Table D-1c (Rainfall Intensity) O O Determine i using Table D-1c (Rainfall Intensity) O O O Determine i using Table D-1c (Rainfall Intensity) O O O D O D O TABLE D-1b Table D-1c Runoff Coefficient (Rational), D O O O O O O O O O O O O O O O O O O						
Further treatment is required, see choose flow-based or volume-based sizing in Step 4         Step 4a Treatment - Flow-Based (Rational Method)         Calculate treatment flow (cfs):         Flow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Area         Determine C Factor using Table D-1b         C         Calculate treatment flow (cfs):         Flow = Runoff Coefficient (Rational),         Table D-1c (Rainfall Intensity)         Arr         Runoff Coefficient (Rational),         C         Single-family areas       0.05         Multi-units, detached       O.00       chainfall Intensity         Null-units, detached       Colspan="2">Colspan="2">Table D-1c         Table D-1c         Poevelopment Type       C         Null-units, detached       O.60         Apartment dwelling areas       0.75         Water quality volume (Acre-Fee):       WQV = Area x Maximized Detention Volume (Po)         readict of this manual using I, trom Step 2.       Po         O.11       A <td>Adjusted Area for Flow-Based, Non-LID Treatmen</td> <td>t</td> <td>A<sub>T</sub> - A</td> <td><math>_{\rm C}</math> -A<sub>LIDC</sub> = 0.05 A<sub>AT</sub></td> <td></td>	Adjusted Area for Flow-Based, Non-LID Treatmen	t	A <sub>T</sub> - A	$_{\rm C}$ -A <sub>LIDC</sub> = 0.05 A <sub>AT</sub>		
Further treatment is required, see choose flow-based or volume-based sizing in Step 4         Step 4a Treatment - Flow-Based (Rational Method)         Form D-16         Calculate treatment flow (cfs):       Flow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Area         Determine C Factor using Table D-1b       C         Determine i using Table D-1c (Rainfall Intensity)       0.19         A <sub>tr</sub> from Step 2       0.05         Table D-1c (Rainfall Intensity)         Table D-1c         Runoff Coefficient (Rational),         C         Single-family areas         0.05         Multi-units, detached         0.60         Apartment disclabed         0.05         NULL-units, attached         Determine i = 0.20 in/hr         Serville       Table D-1c         Rainfall Intensity         Null-units, attached       0.60         Null-units, attached       0.60         O       Table D-1c         Table D-1c         Rainfall Intensity       Rosevil	Adjusted Impervious Fraction of A for Volume-Ba	sed Non-I ID Treatment	(A+*I-AA	(no) / A = 0.099 la		
Step 4a Treatment - Flow-Based (Rational Method)         Form D-1e         Calculate treatment flow (cfs):         Flow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Area         Determine C Factor using Table D-1b         C         Determine i using Table D-1c (Rainfall Intensity)         A <sub>xT</sub> from Step 2         0.05         A <sub>xT</sub> from Step 2         0.05         A <sub>xT</sub> from Step 2         0.06         C         Rainfall Intensity         0.09         cfs         TABLE D-1b         Rainfall Intensity         Roseville         i = 0.20 in/hr         Single-family areas         0.70         Multi-units, datached         0.70         User Specified         0.00         o Teament - Volume-Based (ASCE-WEF)         e water quality volume (Acre-Feet):         WOV = Area x Maximized Detention Volume (Po)         .fm Step 1			(1111)			
Step 4a Treatment - Flow-Based (Rational Method)         Form D-1e         Calculate treatment flow (cfs):         Flow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Area         Determine C Factor using Table D-1b         C         Determine i using Table D-1c (Rainfall Intensity)         A <sub>xT</sub> from Step 2         0.05         A <sub>xT</sub> from Step 2         0.05         A <sub>xT</sub> from Step 2         0.06         C         Rainfall Intensity         0.09         cfs         TABLE D-1b         Rainfall Intensity         Roseville         i = 0.20 in/hr         Single-family areas         0.70         Multi-units, datached         0.70         User Specified         0.00         o Teament - Volume-Based (ASCE-WEF)         e water quality volume (Acre-Feet):         WOV = Area x Maximized Detention Volume (Po)         .fm Step 1						
Flow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Area         Determine C Factor using Table D-1b       C         Determine i using Table D-1c (Rainfall Intensity)       0.05       Avr         TABLE D-1c (Rainfall Intensity)       0.05       Avr         TABLE D-1b       Table D-1c         TABLE D-1b       Table D-1c         TABLE D-1b       Table D-1c         Runoff Coefficient (Rational), Development Type       C         Rainfall Intensity         Rotard D       C         Multi-units, detached       0.70         Multi-units, attached       0.70         Multi-units, attached       0.70         WOV = Area x Maximized Detention Volume (Po)         User Specified       Do 0.11       A       Po         Maximized Detention Volume (Are-Feel): <th colspan<="" td=""><td></td><td></td><td>r volume-based sizing</td><td>g in Step 4</td><td></td></th>	<td></td> <td></td> <td>r volume-based sizing</td> <td>g in Step 4</td> <td></td>			r volume-based sizing	g in Step 4	
Calculate treatment flow (cfs): Fow = Runoff Coefficient x Rainfall Intensity x Adjusted Treatment Area Determine C Factor using Table D-1b C Determine i using Table D-1c (Rainfall Intensity) 0.18 i A <sub>xT</sub> from Step 2 0.00 A <sub>xT</sub> Flow = C * i * A <sub>xT</sub> 0.00 cfs Table D-1c Runoff Coefficient (Rational), C Single-family areas 0.50 Multi-units, detached 0.60 Apartment dwelling areas 0.70 Multi-units, detached 0.75 User Specified 0.00 C Teterment - Volume-Based (ASCE-WEF) e water quality volume (Acre-Fee): WQV = Area x Maximized Detention Volume (P <sub>0</sub> ) trom Step 1 0.11 A Teterment - Volume from figures E-1 to C 0.11 P <sub>0</sub> E teatment volume (acre-fie):		Method)				
Determine C Factor using Table D-1b       C         Determine i using Table D-1c (Rainfall Intensity)       0.18 $A_{xT}$ from Step 2       0.05 $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = C * i * $A_{xT}$ 0.00         r flow = flow = 0.75       is a cramento         t set regulative volume (Acre-Feet):       WDV = Area x Maximized Detention Volume (P_0)         t from Step 1       0.11       A         e vater quality volume (Acre-Feet):       0.11       P_0         e tratiment volume (acre-fit):       0.11       P_0						
$\begin{tabular}{ c c c c } \hline C \\ \hline$		Elow - Runoff Coofficient	v Dainfall Intensity v Adjusted Treet			
$\begin{tabular}{ c c c c } \hline C \\ \hline$	Calculate treatment flow (cfs):	Flow = Runon Coemclent.	x Rainair intensity x Aujusteu Trea	ment Area		
$A_{AT}$ from Step 2       0.05 $A_{AT}$ Flow = C + i + A_{AT}       0.00       ofs         TABLE D-1b         Table D-1c $\frac{Povelopment Type C}{C}$ C         Single-family areas       0.50         Multi-units, detached       0.60         Apartment dwelling areas       0.70         Multi-units, attached       0.75         User Specified       0.00 <b>b Teatment - Volume-Based (ASCE-WEF)</b> e water quality volume (Acre-Feet):       WQV = Area x Maximized Detention Volume (P <sub>0</sub> )    (tom Step 1          0.11       A		Flow = Ruhon Coemclent.	x Rainai intensity x Aujusteu Trea	ment Area		
$A_{AT}$ from Step 2       0.05 $A_{AT}$ $Flow = C + i + A_{AT}$ 0.00       ofs         TABLE D-1b         Table D-1c $\frac{Povelopment Type}{C}$ C         Single-family areas       0.50         Multi-units, detached       0.60         Apartment dwelling areas       0.70         Multi-units, attached       0.75         User Specified       0.00 <b>D Tetetment - Volume-Based (ASCE-WEF)</b> a water quality volume (Acre-Feel):       WQV = Area x Maximized Detention Volume (Po)         from Step 1       0.11       A       Inso Specified Draw Down time $c_i$ : Maximized Detention Volume from figures E-1 to e       0.11       Po $c_i$ Maximized Detention Volume from Step 2.       0.11       Po				ment Area		
Flow = C * i * A <sub>AT</sub> 0.00       cfs         TABLE D-1b       Table D-1c         Runoff Coefficient (Rational),       Rainfall Intensity       Rainfall Intensity         Single-family areas       0.50       Nulti-units, detached       0.60         Apartment dwelling areas       0.70       Scaramento       i = 0.20       in/hr         Single-family areas       0.70       Scaramento       i = 0.20       in/hr         Secret areation       0.60       Apartment dwelling areas       0.70       Scoramento       i = 0.20       in/hr         Secret areation       0.60       0.00       Scoramento       i = 0.20       in/hr         Secret areation       0.00       Scoramento       i = 0.20       in/hr         Secret areation       0.00       Scoramento       i = 0.20       in/hr         Secret areating areas       0.70       Multi-units, attached       0.20       in/hr         Secret areating areas       0.11       A       hrs       Specified Draw Down time         Secret areation Volume (Acre-Fleet):       WQV = Area x Maximized Detention Volume (Poil       hrs       Specified Draw Down time         Secret areation volume (acre-fl):       Secret areation volume (acre-fl):       Secret areation volume (acr				ment Area		
Flow = C * i * A <sub>AT</sub> 0.00       cfs         TABLE D-1b       Table D-1c         Pevelopment Type       C       Rainfall Intensity         Single-family areas       0.50       Nulti-units, detached       0.60         Apartment dwelling areas       0.70       Scaramento       i = 0.20       in/hr         Sacramento dwelling areas       0.75       Scaramento       i = 0.20       in/hr         User Specified       0.00       Source       Scaramento       i = 0.20       in/hr         Portextment - Volume-Based (ASCE-WEF)       WQV = Area x Maximized Detention Volume (Po)       Mutimized Detention Volume from figures E-1 to       E       0.11       A       hrs       Specified Draw Down time         c: Maximized Detention Volume (acre-ft):       E       0.11       Po       Po       Po	Determine C Factor using Table D-1b			ment Area		
Flow = C * i * A <sub>AT</sub> 0.00       cts         TABLE D-1b       Table D-1c         Pevelopment Type       C       Rainfall Intensity         Single-family areas       0.50       Roseville       i = 0.20 in/hr         Single-family areas       0.70       Scaramento       i = 0.18 in/hr         Apartment dwelling areas       0.70       Scaramento       i = 0.20 in/hr         User Specified       0.00       Scoramento       i = 0.20 in/hr         O Treatment - Volume-Based (ASCE-WEF)       WQV = Area x Maximized Detention Volume (Po)       Multi-units, attached       0.11         e water quality volume (Acre-Feet):       WQV = Area x Maximized Detention Volume (Po)       hrs       Specified Draw Down time         es: Maximized Detention Volume (from Step 2.       0.11       A       hrs       Specified Draw Down time         es: Maximized Detention Volume (acre-ft):       E       0.11       Po       Po	Determine C Factor using Table D-1b			ment Area		
TABLE D-1b         Table D-1c         Runoff Coefficient (Rational),         Development Type       C         Single-family areas       0.50         Multi-units, detached       0.60         Apartment dwelling areas       0.70         Multi-units, attached       0.75         User Specified       0.00         De Treatment - Volume-Based (ASCE-WEF)       WQV = Area x Maximized Detention Volume (Po)         from Step 1       0.11       A       Ins       Specified Draw Down time         e: Maximized Detention Volume (from Step 2.       0.11       Po       Po	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity)	0.18	C	ment Area		
TABLE D-1b         Table D-1c         Runoff Coefficient (Rational),         Development Type       C         Single-family areas       0.50         Multi-units, detached       0.60         Apartment dwelling areas       0.70         Multi-units, attached       0.75         User Specified       0.00         De Treatment - Volume-Based (ASCE-WEF)       WQV = Area x Maximized Detention Volume (Po)         from Step 1       0.11       A       Ins       Specified Draw Down time         e: Maximized Detention Volume (from Step 2.       0.11       Po       Po	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity)	0.18	C	ment Area		
Runoff Coefficient (Rational),         Development Type       C         Single-family areas       0.50         Multi-units, detached       0.60         Apartment dwelling areas       0.70         Multi-units, statached       0.75         User Specified       0.00         b Treatment - Volume-Based (ASCE-WEF)         e water quality volume (Acre-Feet):       WQV = Area x Maximized Detention Volume (P <sub>0</sub> )         .from Step 1       0.11       A         of this manual using I <sub>h</sub> from Step 2.       e treatment volume (acre-ft):	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2	0.18	C	ment Area		
Runoff Coefficient (Rational),         Development Type       C         Single-family areas       0.50         Multi-units, detached       0.60         Apartment dwelling areas       0.70         Multi-units, statached       0.75         User Specified       0.00         b Treatment - Volume-Based (ASCE-WEF)         e water quality volume (Acre-Feet):       WQV = Area x Maximized Detention Volume (P <sub>0</sub> )         .from Step 1       0.11       A         of this manual using I <sub>h</sub> from Step 2.       e treatment volume (acre-ft):	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2	0.18	C i A <sub>AT</sub>	ment Area		
Development Type       C         Single-family areas       0.50         Wulti-units, detached       0.60         Apartment dwelling areas       0.70         Multi-units, attached       0.75         User Specified       0.00         De Treatment - Volume-Based (ASCE-WEF)       WQV = Area x Maximized Detention Volume (Po)         from Step 1       0.11       A       hrs       Specified Draw Down time         c: Maximized Detention Volume (acre-fte):       E       0.11       Po         et reatment volume (acre-ft):       E       0.11       Po	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2	0.18	C i A <sub>AT</sub>	ment Area		
Development Type       C         Single-family areas       0.50         Wulti-units, detached       0.60         Apartment dwelling areas       0.70         Multi-units, attached       0.75         User Specified       0.00         De Treatment - Volume-Based (ASCE-WEF)       WQV = Area x Maximized Detention Volume (Po)         from Step 1       0.11       A       hrs       Specified Draw Down time         c: Maximized Detention Volume (acre-fte):       E       0.11       Po         et reatment volume (acre-ft):       E       0.11       Po	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * .	0.18	C i A <sub>AT</sub>		D-1c	
Development Type       C         Single-family areas       0.50         Wulti-units, detached       0.60         Apartment dwelling areas       0.70         Multi-units, attached       0.75         User Specified       0.00         De Treatment - Volume-Based (ASCE-WEF)       WQV = Area x Maximized Detention Volume (Po)         from Step 1       0.11       A       hrs       Specified Draw Down time         c: Maximized Detention Volume (acre-fte):       E       0.11       Po         et reatment volume (acre-ft):       E       0.11       Po	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * .	0.18	C i A <sub>AT</sub>		D-1c	
Single-family areas       0.50         Multi-units, detached       0.60         Apartment dwelling areas       0.70         Multi-units, statched       0.75         User Specified       0.00 <b>b</b> Treatment - Volume-Based (ASCE-WEF)         e water quality volume (Acre-Feet):       WQV = Area x Maximized Detention Volume (P <sub>0</sub> )         from Step 1       0.11       A         e <sub>0</sub> : Maximized Detention Volume from figures E-1 to endix E of this manual using I <sub>k</sub> from Step 2.       E         e treatment volume (acre-ft):       0.11       P <sub>0</sub>	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b	0.18 0.05 A <sub>AT</sub> 0.00	C i A <sub>AT</sub>		D-1c	
Multi-units, detached       0.60         Apartment dwelling areas       0.70         Multi-units, attached       0.75         User Specified       0.00         Do Treatment - Volume-Based (ASCE-WEF)       E         e water quality volume (Acre-Feet):       WQV = Area x Maximized Detention Volume (P <sub>0</sub> )         .from Step 1       0.11       A       hrs       Specified Draw Down time         6: Maximized Detention Volume from figures E-1 to entits manual using I <sub>h</sub> from Step 2.       E       0.11       P <sub>0</sub>	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Cor	0.18 0.05 A <sub>AT</sub> 0.00	C i A <sub>AT</sub>	Table		
Multi-units, attached       0.75         User Specified       0.00 <b>b</b> Treatment - Volume-Based (ASCE-WEF)         e water quality volume (Acre-Feet):       WQV = Area x Maximized Detention Volume (P <sub>0</sub> )         .from Step 1       0.11       A       Ihrs       Specified Draw Down time         o: Maximized Detention Volume from figures E-1 to endix E of this manual using I <sub>h</sub> from Step 2.       E       0.11       P <sub>0</sub>	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con	A <sub>AT</sub> 0.00	C i A <sub>AT</sub>	Table Rainfall I	ntensity	
User Specified       0.00         > Treatment - Volume-Based (ASCE-WEF)         e water quality volume (Acre-Feet):       WQV = Area x Maximized Detention Volume (P <sub>0</sub> )         from Step 1       0.11       A       hrs       Specified Draw Down time         e: Maximized Detention Volume from figures E-1 to endix E of this manual using I <sub>k</sub> from Step 2.       E       0.11       P <sub>0</sub>	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con Development Type Single-family areas	A <sub>AT</sub> 0.00	C i A <sub>AT</sub>	Table Rainfall I Roseville	ntensity i = 0.20 in/hr	
b       Treatment - Volume-Based (ASCE-WEF)         e water quality volume (Acre-Feet):       WQV = Area x Maximized Detention Volume (Po)         .from Step 1       0.11       A       Ihrs       Specified Draw Down time         o: Maximized Detention Volume from figures E-1 to endix E of this manual using I <sub>h</sub> from Step 2.       E       0.11       Po	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Cod Single-family areas Multi-units, detached	A <sub>AT</sub> 0.00	C i A <sub>AT</sub>	Table Rainfall I Roseville Sacramento	ntensity i = 0.20 in/hr i = 0.18 in/hr	
e water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P <sub>o</sub> ) from Step 1 0.11 A hrs Specified Draw Down time p: Maximized Detention Volume from figures E-1 to E-0.11 P <sub>o</sub> e treatment volume (acre-ft):	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached	A <sub>AT</sub> 0.00 efficient (Rational), C 0.50 0.60 0.70 0.75	C i A <sub>AT</sub>	Table Rainfall I Roseville Sacramento	ntensity i = 0.20 in/hr i = 0.18 in/hr	
e water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P <sub>o</sub> ) from Step 1 0.11 A hrs Specified Draw Down time o: Maximized Detention Volume from figures E-1 to E 0.11 P <sub>o</sub> e treatment volume (acre-ft):	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached	A <sub>AT</sub> 0.00 efficient (Rational), C 0.50 0.60 0.70 0.75	C i A <sub>AT</sub>	Table Rainfall I Roseville Sacramento	ntensity i = 0.20 in/hr i = 0.18 in/hr	
from Step 1 0.11 A hrs Specified Draw Down time a: Maximized Detention Volume from figures E-1 to E-0.11 Po endix E of this manual using I <sub>A</sub> from Step 2. e treatment volume (acre-ft):	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified	A <sub>AT</sub> 0.00 efficient (Rational), C 0.50 0.60 0.70 0.75	C i A <sub>AT</sub>	Table Rainfall I Roseville Sacramento	ntensity i = 0.20 in/hr i = 0.18 in/hr	
₀: Maximized Detention Volume from figures E-1 to E-0.11 P₀ endix E of this manual using I₄ from Step 2. e treatment volume (acre-ft):	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified Treatment - Volume-Based (ASCE-WEF)	A <sub>AT</sub> 0.00 efficient (Rational), C 0.50 0.60 0.70 0.75 0.00	C i A <sub>AT</sub> cfs	Table Rainfall I Roseville Sacramento	ntensity i = 0.20 in/hr i = 0.18 in/hr	
₀: Maximized Detention Volume from figures E-1 to E-0.11 P₀ endix E of this manual using I₄ from Step 2. e treatment volume (acre-ft):	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified Treatment - Volume-Based (ASCE-WEF)	A <sub>AT</sub> 0.00 efficient (Rational), C 0.50 0.60 0.70 0.75 0.00	C i A <sub>AT</sub> cfs	Table Rainfall I Roseville Sacramento	ntensity i = 0.20 in/hr i = 0.18 in/hr	
endix E of this manual using I <sub>A</sub> from Step 2.	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified D Treatment - Volume-Based (ASCE-WEF) e water quality volume (Acre-Feet):	0.18           0.05           A <sub>AT</sub> 0.00             efficient (Rational), C           0.50           0.60           0.75           0.00   WQV = Area x Maximized Detention	C i A <sub>AT</sub> cfs ion Volume (P <sub>0</sub> )	Table Rainfall I Roseville Sacramento Folsom	ntensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
e treatment volume (acre-ft):	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified D Treatment - Volume-Based (ASCE-WEF) e water quality volume (Acre-Feet):	0.18           0.05           A <sub>AT</sub> 0.00             efficient (Rational), C           0.50           0.60           0.75           0.00   WQV = Area x Maximized Detention	C i A <sub>AT</sub> cfs ion Volume (P <sub>0</sub> )	Table Rainfall I Roseville Sacramento Folsom	ntensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
e treatment volume (acre-ft):	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con Development Type Single-family areas Multi-units, attached Apartment dwelling areas Multi-units, attached User Specified D Treatment - Volume-Based (ASCE-WEF) e water quality volume (Acre-Feet): .from Step 1	0.18           0.05           AAT           0.00           efficient (Rational), C           0.60           0.70           0.75           0.00	C i A <sub>AT</sub> cfs ion Volume (P <sub>0</sub> )	Table Rainfall I Roseville Sacramento Folsom	ntensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Cod Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified D Treatment - Volume-Based (ASCE-WEF) e water quality volume (Acre-Feet): .from Step 1 g: Maximized Detention Volume from figures E-1 to	0.18           0.05           AAT           0.00           efficient (Rational), C           0.60           0.70           0.75           0.00	C i A <sub>AT</sub> cfs ion Volume (P <sub>0</sub> )	Table Rainfall I Roseville Sacramento Folsom	ntensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified D Treatment - Volume-Based (ASCE-WEF) e water quality volume (Acre-Feet): .from Step 1 g: Maximized Detention Volume from figures E-1 to endix E of this manual using I <sub>A</sub> from Step 2.	0.18           0.05           AAT           0.00           efficient (Rational), C           0.60           0.70           0.75           0.00	C i A <sub>AT</sub> cfs ion Volume (P <sub>0</sub> )	Table Rainfall I Roseville Sacramento Folsom	ntensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
	Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfall Intensity) A <sub>AT</sub> from Step 2 Flow = C * i * . TABLE D-1b Runoff Con Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified D Treatment - Volume-Based (ASCE-WEF) e water quality volume (Acre-Feet): .from Step 1 g: Maximized Detention Volume from figures E-1 to endix E of this manual using I <sub>A</sub> from Step 2.	0.18           0.05           A <sub>AT</sub> 0.00           efficient (Rational), 0.50           0.60           0.70           0.75           0.00	C i A <sub>AT</sub> cfs	Table Rainfall I Roseville Sacramento Folsom	ntensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	

## East POC

The rest of the proposed lots contribute to the east point of compluiance. Proposed frontage improvements are also added to the impervious area.

Lot 26 has been thoroughly reviewed and calculations are provided below.

## *Lot 26*

40% Imperviousness is taken into account for proposed zoning RD-4.

Area of Lot  $26 = \pm 10,300$  ft<sup>2</sup> = 0.24 acres to the CL of proposed road.

Mulch bed is proposed as LID feature for Lot 26. Depth of amended soil:

 $D_{BMP} = (D_{DR} * R_V) / (\emptyset * A_{BMP} / [A_{BMP} + A_i]) = (0.64 * 0.89) / (0.35 * 1,350 / [1,350 + 5,100]) = 7.77'' => 8'' is proposed.$ 

D<sub>DR</sub> = 0.64' for impervious area;

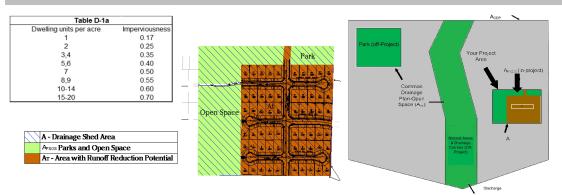
 $\emptyset = 0.35$  - amended soil porosity;

Rv = 0.89 – Volumetric Runoff coefficient for 100% imperviousness per Stormwater Quality Design Manual;

 $A_{BMP}$  = 1,275 ft<sup>2</sup> - 25% of contributing impervious area – minimum BMP area; per LID calculator in order to achieve 100 points, Area of mulch bed is 1,350 ft<sup>2</sup>.

 $A_i = 5,100 \text{ ft}^2$  – assumed portion of total impervious area including a prtion of the proposed road to the centerline.

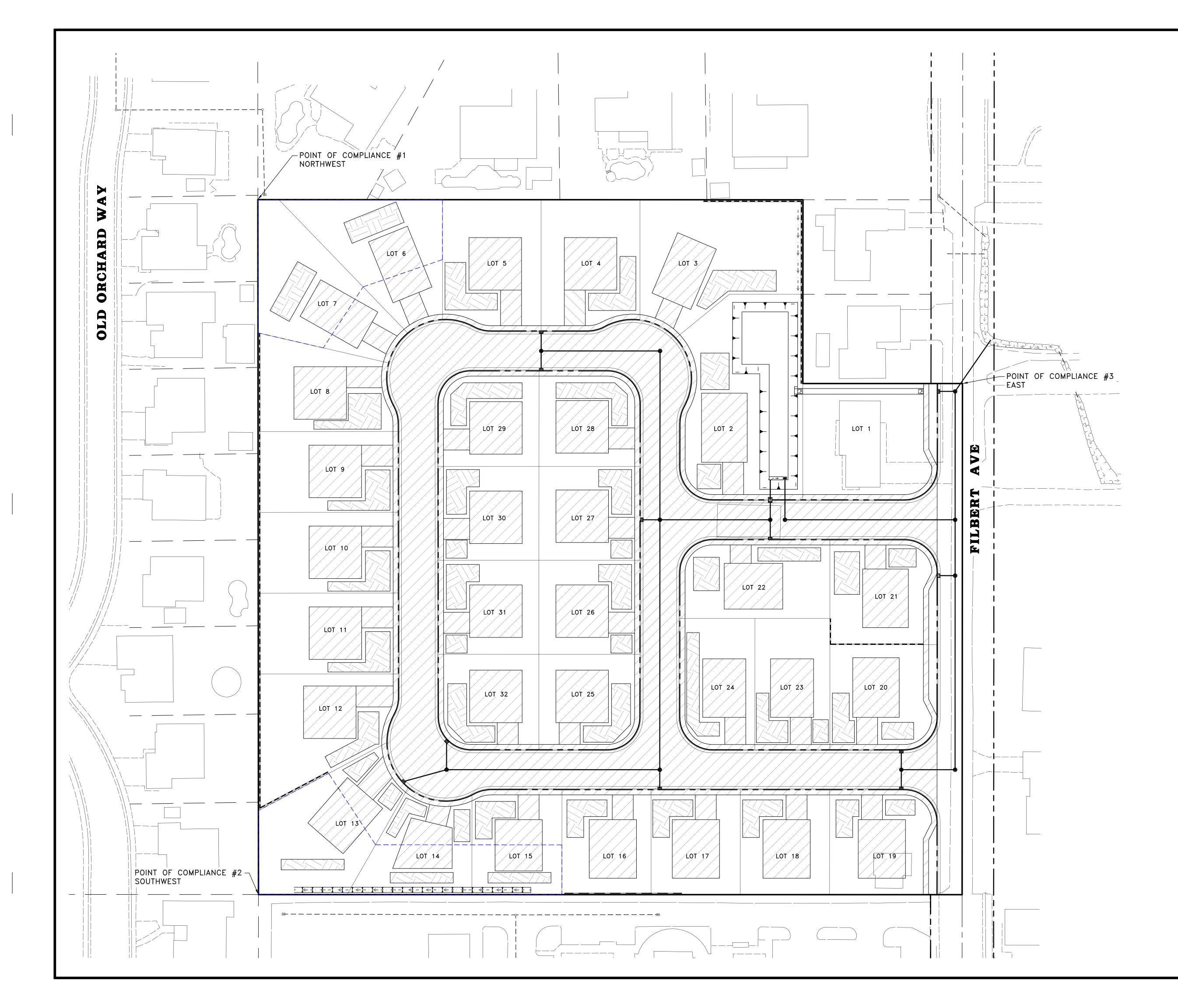
Appendix D-1: Residential Sites: Low Impact Development (LI	D) Credits and Treatment BMP Sizin	ng Calculations	
Name of Drainage Shed: Blossom Ridge Lot 26		Fill in Blue Highlighted boxes	
Location of project: Sacramento		· · · · · · · · · · · · · · · · · · ·	
Step 1 - Open Space and Pervious Area Credits			
Is your project within the drainage area of a common drainage plan that includes open space? If n	not, skip to 1 b.		
1 a. Common Drainage Plan Area	acres	A <sub>CDP</sub>	
Common Drainage Plan Open Space (Off-project)	0 acres	A <sub>os</sub> coo a	rea example
a. Natural storage reservoirs and drainage corridors	0 acres		below
b. Buffer zones for natural water bodies	0 acres		below
c. Natural areas including existing trees, other vegetation, and soil	0 acres		
d. Common landscape area/park	0 acres		
e. Regional Flood Control/Drainage basins	0 acres		
1 b. Project Drainage Shed Area (Total)	0.24 acres	A	
Project-Specific Open Space (In-project, communal**)	0.00 acres	A <sub>PSOS</sub>	rea example
a. Natural storage reservoirs and drainage corridors	0.00 acres		below
b. Buffer zones for natural water bodies	0.00 acres		below
c. Natural areas including existing trees, other vegetation, and soil	0.00 acres		
d. Landscape area/park	0.00 acres		
e. Flood Control/Drainage basins	0.00 acres		
** Doesn't include impervious areas within individual lots and surrounding individual	dual units. That is accounted for below usin	g Form D-1a in Step 2.	
Area with Runoff Reduction Potential A - A <sub>PSOS</sub> =	0.24 acres	A <sub>T</sub>	
Number of Units in $A_{\rm T}$	1		
Number of units per acre in $A_T$ DU/A <sub>T</sub> =	5	DUA	
Assumed Initial Impervious Fraction of A <sub>T</sub> (determined using Table D-1a)	0.4	I	
Open Space & Pervious Area LID Credit (Step 1)			
(A <sub>OS</sub> /A <sub>CDP</sub> +A <sub>PSOS</sub> /A)x100 =	0 pts		



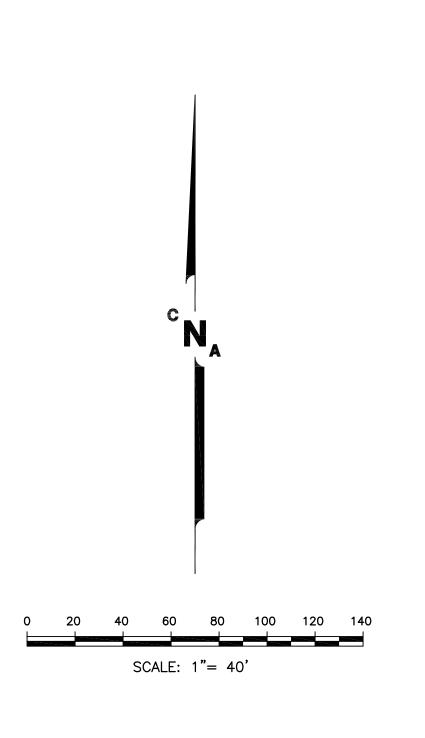
Step 2 - Runoff Reduction Credits					
Runoff Reduction Measures			Effective A Managed		
Disconnected Roof Drains (see Fact Sheet)	use Form D-1a for credits		0.00	acres	
Disconnected Pavement (see Fact Sheet)	use Form D-1b for credits		0.00	acres	
Interceptor Trees (see Fact Sheet)	use Form D-1c for credits		→ 0.00	acres	
Alternative Driveway Design (see Fact Sheet)	use Form D-1d for credits		→ 0.00	acres	
Total Effective Area Managed (Credit Area)		Ac	0.00	acres	EAM
Runoff Reduction Credit (Step 2)		(A <sub>C</sub> / A <sub>T</sub> )*100 =	0	pts	

Form D-1a: Disconnected Roof Drains Worksheet See Fact Sheet for more information regarding Disconnected Roof Drain cre	dit guidelines		
1. Determine efficiency Multiplier			Effective Area Managed (A <sub>c</sub> )
Runoff is directed to a dispersal trench or dry well	1.00		
(Type A and B soils only) Runoff is directed across landscaping, determine setback			
25 ft + Use multiplier of	1.00		
≥ 20 and < 25 ft Use multiplier of ≥ 15 and < 20 ft Use multiplier of	0.90 0.70		
> 10 and < 15 ft Use multiplier of	0.45		
$\geq$ 5 and < 10 ft Use multiplier of	0.25	-	
Efficiency Mult	iplier	Box J1	
2. Determine percentage of roof drains disconnected		<b>-</b>	
		Box J2	
<ol> <li>Select project density in dwelling units per acre:</li> <li>Use reduction factor of</li> </ol>	0.08		
2 Use reduction factor of	0.13		
3,4     Use reduction factor of       5,6     Use reduction factor of	0.19 0.23		
7 Use reduction factor of	0.29		
8,9 Use reduction factor of	0.33		
10-14 Use reduction factor of 15-20 Use reduction factor of	0.37 0.44		
Reduction Fac	tor 0.2	3 Box J3	
4. Determine Area Managed	0.2	D0x33	
Multiply Box J3 by A <sub>1</sub> , and enter	the result in Box J4 0.	1 Box J4	
	0.	1 acres DOX 34	
5. Multiply Boxes J1, J2 and J4, and enter 60% of the Result in Box J			0.0 acres Box J
This is the amount of area credit to enter into the "Disconnected Roof I	Drains" Box of Form D-1		
Form D-1b: Disconnected Pavement Worksheet			
See Fact Sheet for more information regarding NDC Pavement credit guidel	ines		Effective Area Managed (A <sub>c</sub> )
Divided Sidewalks			
1. Determine percentage of units with divided Sidewalks		Box K1	
		DOXINI	
Multiply Box K1, A <sub>T</sub> , and 0.04 and enter 60% of the result in Box K This is the amount of area credit to enter into the "Disconnected Paver	opt" Hoy of Form 11-1		0.00 acres Box K
Form D-1c: Interceptor Tree Worksheet See Fact Sheet for more information regarding Interceptor Tree credit guide	ines		Effective Area Managed (A <sub>c</sub> )
New Evergreen Trees			Lifetilive Alea Mahayeu (AC)
-			
1. Enter number of new evergreen trees that qualify as Interceptor Tre	es in Box L1.	tre	es Box L1
2. Multiply Box L1 by 200 and enter result in Box L2		0 sq.	ft. Box L2
New Deciduous Trees			
3. Enter number of new deciduous trees that qualify as Interceptor Tre	es in Box L3.	tre	es Box L3
			es Dux L3
4. Multiply Box L3 by 100 and enter result in Box L4		0 sq.	ft. Box L4
Existing Tree Canopy			
	The energy is David 5		
5. Enter square footage of existing tree canopy that qualifies as Existin	g Tree canopy in Box L5.	sq.	ft. Box L5
6. Multiply Box L5 by 0.5 and enter the result in Box L6		0 sq.	ft. Box L6
Total Interceptor Tree Credits			
Add Boxes L2, L4, and L6 and enter it into Box L7		0 sq.	ft. Box L7
Divide Box L7 by 43,560 and multiply by 20% to get effective area man	aged and enter the result in Box L8	0.00 acr	es Box L8
This is the amount of area credit to enter into the "Interceptor Trees" Be			
Form D-1d: Alternative Driveway Design See Fact Sheet for more information regarding Alternative Driveway Design	aradit auidaliaas		
See Fact Sneet for more information regarding Alternative Driveway Design 1. Select type of driveway	oroan guidelines		
Pervious Driveway: Multi	blier:		
Cobblestone Block F Pervious Concrete/A	0.40		
Modular Block			
Porous Pavement Porous Gravel	0.75		
Not Directly-connected	1.00		
		Box M1	
2. Determine percentage of units with Alternative Driveways:		Box M2	
4. Multiply Boxes M1, M2, $A_T$ and 0.04, and enter the result in Box M			0.00 acres
This is the amount of area credit to enter into the "Alternative Driveway	Design" Box of Form D-1		

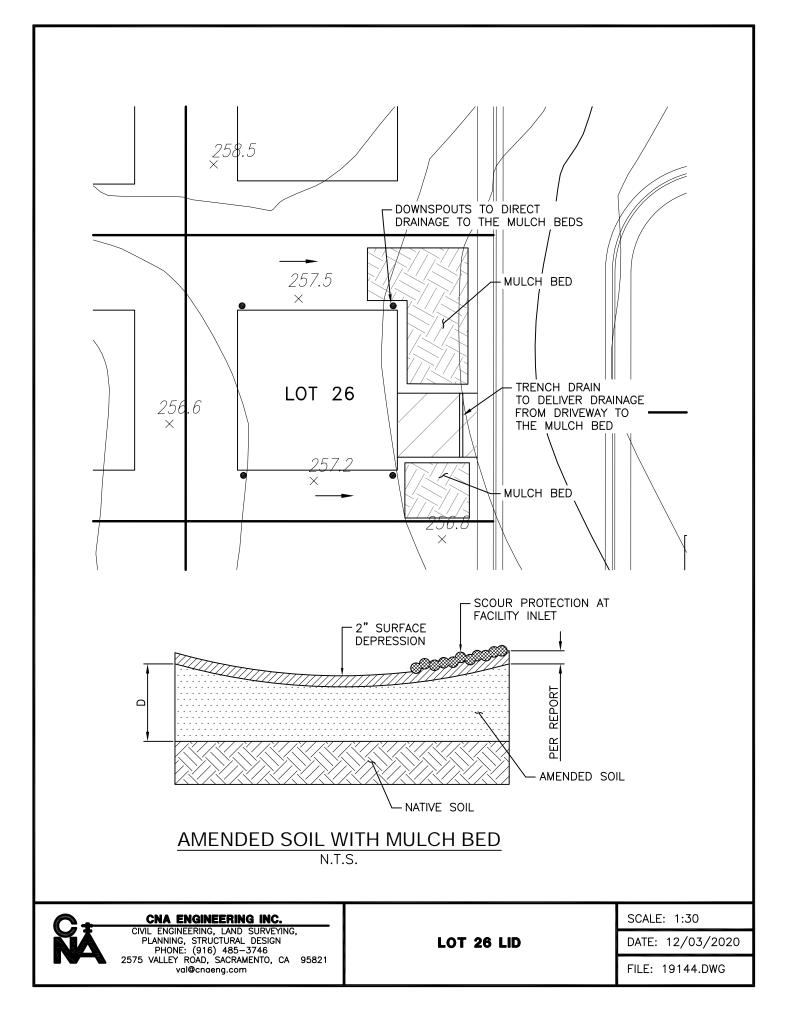
Step 3 - Runoff Management C Capture and Use Credits Impervious Area Managed by Rain	Credits					
	in harrols Cistorns and	automatically-emptied sy	retoms			
(see Fact Sheet)	in barreis, cisterns, and		for simple rain barrels	0.00	) acres	
		enter galions, i	or simple rain barrels	0.00	J dues	
Automated-Control Capture and L				0.00	5	
(see Fact Sheet, then enter impervious a	area managed by the system)			0.00	) acres	
<b>Bioretention/Infiltration Credits</b>	ts					
Impervious Area Managed by Bio	pretention BMPs	Bioretention Area	sq ft			
(see Fact Sheet)		Subdrain Elevation	inches			
		Ponding Depth, inches	inches	0.00	D acres	
Impervious Area Managed by Infil (see Fact Sheet)	iltration BMPs	Desudeurs Time has	drawdown_hrs_inf			
(See Face Sheet)		Drawdown Time, hrs Soil Infiltration Rate, in/hr	soil_inf_rate			
	Sizing Option 1:	Capture Volume, acre-ft	capture_vol_inf	0.00	) acres	
	Sizing Option 2: Infiltra	ation BMP surface area, sq ft	soil_surface_area	0.00	) acres	
	Basin or trench?	Basin	approximate BMP depth	0.00 ft		
Impervious Area Managed by Ame						
(see Fact Sheet)	٨	Aulched Infiltration Area, sq ft	1,350 mulch_area	0.12	2 acres	
Total Effective Area Managed by Ca	anture-and-Use/Bioreten	tion/Infiltration BMPs		0.12	2 A <sub>LIDc</sub>	
Total Encouve Area Managed by Oa				0.12		
				(1. 1000)		
Runoff Management Credit (St	tep 3)			$A_{LIDC}/A_{T}^{*}200 = 103.3$	3 pts	
Total LID Credits (Step	1+2+3)	LID cor	npliant, check for treatmer	t sizing in Step 4 103.3	3	
Does project require hydromodifica					, ,	
	<b>,</b>					
Adjusted Area for Flow-Based, Non-	-LID Treatment			A <sub>T</sub> - A <sub>C</sub> -A <sub>LIDC</sub> = 0.12	2 A <sub>AT</sub>	
, ajaotoa , aoa ioi i ion Daoba, iton						
Adjusted Impervious Fraction of A f	for Volume-Based, Non-I	LID Treatment	(A <sub>1</sub>	*I-A <sub>C</sub> -A <sub>LIDC</sub> ) / A = 0.000		
					<b>-</b>	
STOP: No additional tre	astmont noodod					
Step 4a Treatment - Flow-Bas		1				
Form D-1e						
		Flow – Runoff Coefficient v				
Calculate treatment flow (cfs):			Rainfall Intensity x Adjuste	d Treatment Area		
	_		Rainfall Intensity x Adjuste	d Treatment Area		
Calculate treatment flow (cfs): Determine C Factor using Table D-1b	_		Rainfall Intensity x Adjuste	d Treatment Area		
	_			d Treatment Area		
	° [	0.18		d Treatment Area		
Determine C Factor using Table D-1b	° [			d Treatment Area		
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal	° [	0.18	C	d Treatment Area		
Determine C Factor using Table D-1b	° [			d Treatment Area		
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2	) [] II Intensity)	0.18	C	d Treatment Area		
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2	° [	0.18	C	d Treatment Area		
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2	) [] II Intensity)	0.18	C i A <sub>AT</sub>	d Treatment Area		
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal $A_{AT}$ from Step 2	) [] II Intensity)	0.18	C i A <sub>AT</sub>	d Treatment Area	Table D-1c	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal $A_{AT}$ from Step 2	) Il Intensity) Flow = C * i * A <sub>AT</sub>	0.18	C i A <sub>AT</sub>	d Treatment Area	Table D-1c	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal $A_{AT}$ from Step 2	ill Intensity)	0.18	C i A <sub>AT</sub>	d Treatment Area	Table D-1c	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL	il Intensity) [ Flow = C * i * A <sub>AT</sub> [ LE D-1b Runoff Coefficient	0.18	C i A <sub>AT</sub>			
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL	II Intensity)	0.18	C i A <sub>AT</sub>	R	ainfall Intensity	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL Development Type Single-family areas	Flow = C * i * $A_{AT}$ E D-1b Runoff Coefficient 1 0.50	0.18	C i A <sub>AT</sub>	Roseville	ainfall Intensity i = 0.20 in/hr	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL	II Intensity)	0.18	C i A <sub>AT</sub>	R	ainfall Intensity	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL Development Type Single-family areas Multi-units, detached	a       []         III Intensity)       []         Flow = C * i * A <sub>AT</sub> []         LE D-1b       []         Runoff Coefficient       0.50         0.50       0.60	0.18	C i A <sub>AT</sub>	Roseville Sacramento	ainfall Intensity i = 0.20 in/hr i = 0.18 in/hr	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>λτ</sub> from Step 2 TABL Development Type Single-family areas Multi-units, detached Apartment dwelling areas	a       []         II Intensity)       []         Flow = C * i * A <sub>AT</sub> []         LE D-1b       []         Runoff Coefficient       C         0.60       0.60         0.60       0.70	0.18	C i A <sub>AT</sub>	Roseville Sacramento	ainfall Intensity i = 0.20 in/hr i = 0.18 in/hr	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>λT</sub> from Step 2 TABL Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified	a       []         II Intensity)       []         Flow = C * i * A <sub>AT</sub> []         LE D-1b       []         Runoff Coefficient       0.50         0.60       0.70         0.75       0.00	0.18	C i A <sub>AT</sub>	Roseville Sacramento	ainfall Intensity i = 0.20 in/hr i = 0.18 in/hr	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached	a       []         II Intensity)       []         Flow = C * i * A <sub>AT</sub> []         LE D-1b       []         Runoff Coefficient       0.50         0.60       0.70         0.75       0.00	0.18	C i A <sub>AT</sub>	Roseville Sacramento	ainfall Intensity i = 0.20 in/hr i = 0.18 in/hr	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>λT</sub> from Step 2 TABL Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified	a       []         II Intensity)       []         Flow = C * i * A <sub>AT</sub> []         LE D-1b       []         Runoff Coefficient       C         0.60       0.60         0.70       0.75         0.00       []         ASCE-WEF]       []	0.18	C i A <sub>AT</sub> cfs	Roseville Sacramento	ainfall Intensity i = 0.20 in/hr i = 0.18 in/hr	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified Treatment - Volume-Based (A	a       []         II Intensity)       []         Flow = C * i * A <sub>AT</sub> []         LE D-1b       []         Runoff Coefficient       C         0.60       0.60         0.70       0.75         0.00       []         ASCE-WEF]       []	0.18 0.12 0.00 (Rational),	C i A <sub>AT</sub> cfs	Roseville Sacramento	ainfall Intensity i = 0.20 in/hr i = 0.18 in/hr	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified Treatment - Volume-Based (A	a       []         II Intensity)       []         Flow = C * i * A <sub>AT</sub> []         LE D-1b       []         Runoff Coefficient       C         0.60       0.60         0.70       0.75         0.00       []         ASCE-WEF]       []	0.18 0.12 0.00 (Rational),	C i A <sub>AT</sub> cfs	Roseville Sacramento	ainfall Intensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified Treatment - Volume-Based (A water quality volume (Acre-Feet): from Step 1	a       []         II Intensity)       []         Flow = C * i * A <sub>AT</sub> []         LE D-1b       []         Runoff Coefficient       0.60         0.60       0.70         0.75       0.00         ASCE-WEF)       []	0.18 0.12 0.00 (Rational), Area x Maximized Detention	C i A <sub>AT</sub> cfs	Roseville Sacramento Folsom	ainfall Intensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified Treatment - Volume-Based (A water quality volume (Acre-Feet): from Step 1 ; Maximized Detention Volume from fig	a       []         III Intensity)       []         Flow = C * 1 * A <sub>AT</sub> []         E D-1b       []         Runoff Coefficient       C         0.50       0.60         0.75       0.00         ASCE-WEF)       WQV =         igures E-1 to       E	0.18 0.12 0.00 (Rational),	C i A <sub>AT</sub> cfs	Roseville Sacramento Folsom	ainfall Intensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified Treatment - Volume-Based (A water quality volume (Acre-Feet): from Step 1 : Maximized Detention Volume from fit indix E of this manual using I <sub>A</sub> from Ste	a       []         III Intensity)       []         Flow = C * 1 * A <sub>AT</sub> []         E D-1b       []         Runoff Coefficient       C         0.50       0.60         0.75       0.00         ASCE-WEF)       WQV =         igures E-1 to       E	0.18 0.12 0.00 (Rational), Area x Maximized Detention	C i A <sub>AT</sub> cfs	Roseville Sacramento Folsom	ainfall Intensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	
Determine C Factor using Table D-1b Determine i using Table D-1c (Rainfal A <sub>AT</sub> from Step 2 TABL Development Type Single-family areas Multi-units, detached Apartment dwelling areas Multi-units, attached User Specified Treatment - Volume-Based (A water quality volume (Acre-Feet): from Step 1 ; Maximized Detention Volume from fig	a       []         III Intensity)       []         Flow = C * 1 * A <sub>AT</sub> []         E D-1b       []         Runoff Coefficient       C         0.50       0.60         0.75       0.00         ASCE-WEF)       WQV =         igures E-1 to       E	0.18 0.12 0.00 (Rational), Area x Maximized Detention 0.24 A 0.00 Po	C i A <sub>AT</sub> cfs	Roseville Sacramento Folsom	ainfall Intensity i = 0.20 in/hr i = 0.18 in/hr i = 0.20 in/hr	



HATCH LEGEND:
PROPOSED NEW IMPERVIOUS AREA: IMPROVEMENTS, BUILDINGS, DRIVEWAYS.
LID PLANTERS.
MULCH BEDS.



FN.:	ΠΔΤ		SCALE	PREPARED BY	CNA FNGINFFRING INC	NO.	DESCRIPTION	APPROVED BY DATE
	PRELIMINARY	LID PLAN FOR.	HORIZ.: 1"= 40'	DRAFTED BY: VAL T.	5	SN SN		
	(		VERT.: N/A	DESIGNED BY: STEVE N.	NQ			
0.DW	BLOSSO	M RIDGE	FLD BK.: N/A	CHECKED BY: CHRIS O.		З К		
,	COUNTY OF SACRAMENTO	STATE OF CALIFORNIA	ASSESSOR'S PARCEL NO.: 223-0091-002	0.: 223-0091-002	SACRAMENIO, CA 95821 cnaeng.com	4		



# Conclusions

- The subdivision has been designed not to increase the peak flows during 100-, 10- and 2year 24-hour events. Proposed design has incorporated the required grading to mitigate the increase of the flow during these storm events.
- 2. Proposed on-site and off-site public storm drain systems have been designed to suffice for the purpose of conveying drainage considering Nolte flow.
- 3. Low Impact Development standards have been preliminary incorporated into the design of the subdivision.