PRELIMINARY

DRAINAGE STUDY

J@B STORAGE

County of Sacramento, California

March 29, 2024 (v.3)

Prepared by:

mortonpitalo
600 Coolidge Drive, Suite 140
Folsom, CA 95630
Telephone: (916) 927-2400
Fax: (916) 357-7888

5220 BRADSHAW ROAD & 9680 JACKSON ROAD

DRAINAGE STUDY

FOR
5220 BRADSHAW ROAD & 9680 JACKSON ROAD
J & B STORAGE IMPROVEMENTS

M&P Project No. 18-0053-00

Sacramento, California

March 29, 2024

PREPARED BY:

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PROJECT BACKGROUND

The Jackson and Bradshaw project is located within the County of Sacramento, California. The project footprint is approximately 7.1 acres, and it is bounded by Jackson Road to the north and Bradshaw Road to the south. Improvements include 400 square foot office with associated parking, truck parking, water, sewer, and storm drain. See **Appendix-A** for Boundary and Topographic Survey.

OBJECTIVE

The primary objective of this drainage study is to satisfy the County's drainage design requirements by evaluating the drainage impacts of the proposed project to the County's existing storm drain system on Bradshaw Road.

SITE HYDROLOGY / HYDRAULIC ANALYSIS

PRE-DEVELOPMENT CONDITIONS

The topography of the site is generally flat with the elevations varying from 63 to 66 feet in elevation. The general drainage pattern of the property is to drain from north to south into a roadside existing ditch on the East side of the property. See **Appendix-A** for Boundary and Topographic Survey.

The undeveloped shed was modeled with the SacCalc software to reflect existing conditions. The shed was modeled for a 10-year 24-hour storm event. The project location has an average existing slope of 0.67%. With SacCalc, it was determined that the existing conditions during a 10-year 24-hour storm event produces a peak discharge of 7.8 cubic feet per second. See **Appendix-B** for the Pre-Development SacCalc Watershed Map. Refer to the Pre-Development SacCalc Results in **Appendix-D**.

POST-DEVELOPMENT CONDITIONS

This proposed development will primarily include truck parking with porous gravel pavement and concrete pavement for the drive aisles. The porous gravel pavement and a new bioretention basin will be constructed to provide Low Impact Development (LID) / treatment measures prior to discharge to the County's storm drain system.

The following table summarizes the bioretention basin's characteristics and storage capacities. (Refer to the Post-Development Drainage Watershed Map in **Appendix-C** for basin location).

Table 1 – BIORETENTION BASIN NO.1 (Volume – Depth – Elevation Relationship)

Elevation, ft	Depth, ft	Volume, cf	Volume, ac-ft
60	0	0	0
61	1.0	12,502	0.287
62	2.0	29,969	0.688
63	3.0	52,403	1.203

The post-development shed, and bioretention parameters were incorporated into the SacCalc model. For a 10-year 24-hour storm event, the proposed shed produces a peak discharge of 12 cubic feet per second. An 18-inch pipe is placed at the outlet for the bioretention basin which allows the 10-year flow rate to be reduced to 6.9 cubic feet per second. This provides a storage elevation of 61.3 feet that requires a storage volume capacity of 0.40 acre-feet. Refer to the Post-Development SacCalc Results in **Appendix-D**.

NOLTE HGL ANALYSIS

The design runoff (peak flows) was computed using the Nolte Chart, Figure 2-5 of the County's Hydrology Manual (Volume 2) in **Appendix-E**. For each sub-watershed area, the Nolte design flows were computed accordingly.

The starting HGL for Nolte design event is assumed to be at the top of the existing 60-inch storm drainpipe at the proposed manhole (Node MH-1) located on Bradshaw Road at the southeast corner of the project. The flowline of the 60-inch pipe is approximately 53.56 feet (NAVD 88), therefore the assumed HGL is 59.0 feet (NAVD 88). See **Appendix-F** for the Nolte Watershed Map.

Results show that the HGLs remain within the entire drain system and flows are conveyed to the point of connection to the existing storm drain system located within Bradshaw Road. Refer to **Appendix-F** for the Nolte Hydraflow Results.

LOW IMPACT DEVELOPMENT (LID) AND HYDROMODIFICATION

The project will provide an integrated storm water management system that would meet the County of Sacramento's Low Impact Development (LID), storm water quality treatment, and flood control requirements. This strategy will be implemented throughout the project site to ensure storm water runoff is captured, stored, and naturally treated on-site, thereby resulting in a cleaner discharge to the receiving drainage system.

LOW IMPACT DEVELOPMENT (LID)

Storm water quality design standards shall be based on the Stormwater Quality Design Manual, Integrated Design Solutions for Urban Development, (July 2018) manual. Planting new trees, providing porous gravel pavement, and constructing a bioretention basin will be used to satisfy the project's LID requirements.

Based on the County of Sacramento's Storm Water Quality Design Manual, LID measures will include the following:

- Total project shed area served = 7.10 acres
- Future commercial areas assumed to be 90% impervious
- Porous gravel pavement area: Total shed area served = 2.28 acres
- Bioretention basin
    - Bioretention area = 5,150SF total
- Proposed landscaped/open space areas = 1.35 acres

Refer to **Appendix-G** for the post-development stormwater quality watershed map.

Based on the Commercial LID calculations worksheet in the County's Storm Water Quality Design Manual (see **Appendix-G** for the LID Worksheets), the project utilized a combination of a porous gravel pavement and a new bioretention basin to achieve LID compliance.

TRASH CAPTURE

Trash capture requirements will be met with the utilization of one (1) on-site bioretention basins at the discharge outlets.

HYDROMODIFICATION

Per the Hydromodification Map in the Stormwater Quality Design Manual (see **Appendix-H**), Hydromodification will be required because the project is located within the applicable zone of the County of Sacramento. The SAHM model was utilized to analyze the flow rate impact based on the improvement plans and proposed LID measures. See **Appendix-I** for SAHM Project Report.

STORM DRAIN TIE-IN TO BRADSHAW ROAD

The site will be served by the County's existing storm drain system on Bradshaw Road near the East side of the property. See **Appendix-J** for the grading plan.

SUMMARY OF RESULTS

The following table summarizes the pre- and post-development 10- and 100-year 24-hour peak flow rates:

Table 2 – Pre- and Post-Development Design Storm Flow Rates

Condition	Outfall	10-Year 24-Hour, cfs	100-Year 24-Hour, cfs
Existing	EXSHED	7.8	13
Proposed	PROSHD	23	20
	Outfall to Bradshaw at DE001	6.9	12

In summary:

- The proposed site will meet the County of Sacramento LID and storm water quality treatment requirements. Low Impact Development (LID) will be provided via porous pavement and a new bioretention basin. Storm water quality treatment will be provided by the on-site porous pavement and bioretention basin prior to the discharge point.

- Hydromodification is not required based on proposed LID treatments.

- Using County criteria for peak runoffs, it was determined that the Notle HGL of the on-site drainage system will be below the ground surface at all locations.

- The 10-year detention volume requirement of 0.27 acre-feet of water can be fully accommodated by the proposed bioretention basin, which will have a total holding capacity of 0.93 acre-feet of storm water.

REFERENCES

1. Volume 2 of the Sacramento City/County Drainage Manual, Hydrology Standards, County of Sacramento, December 1996.
2. Stormwater Quality Design Manual, Integrated Design Solutions for Urban Development, July 2018.

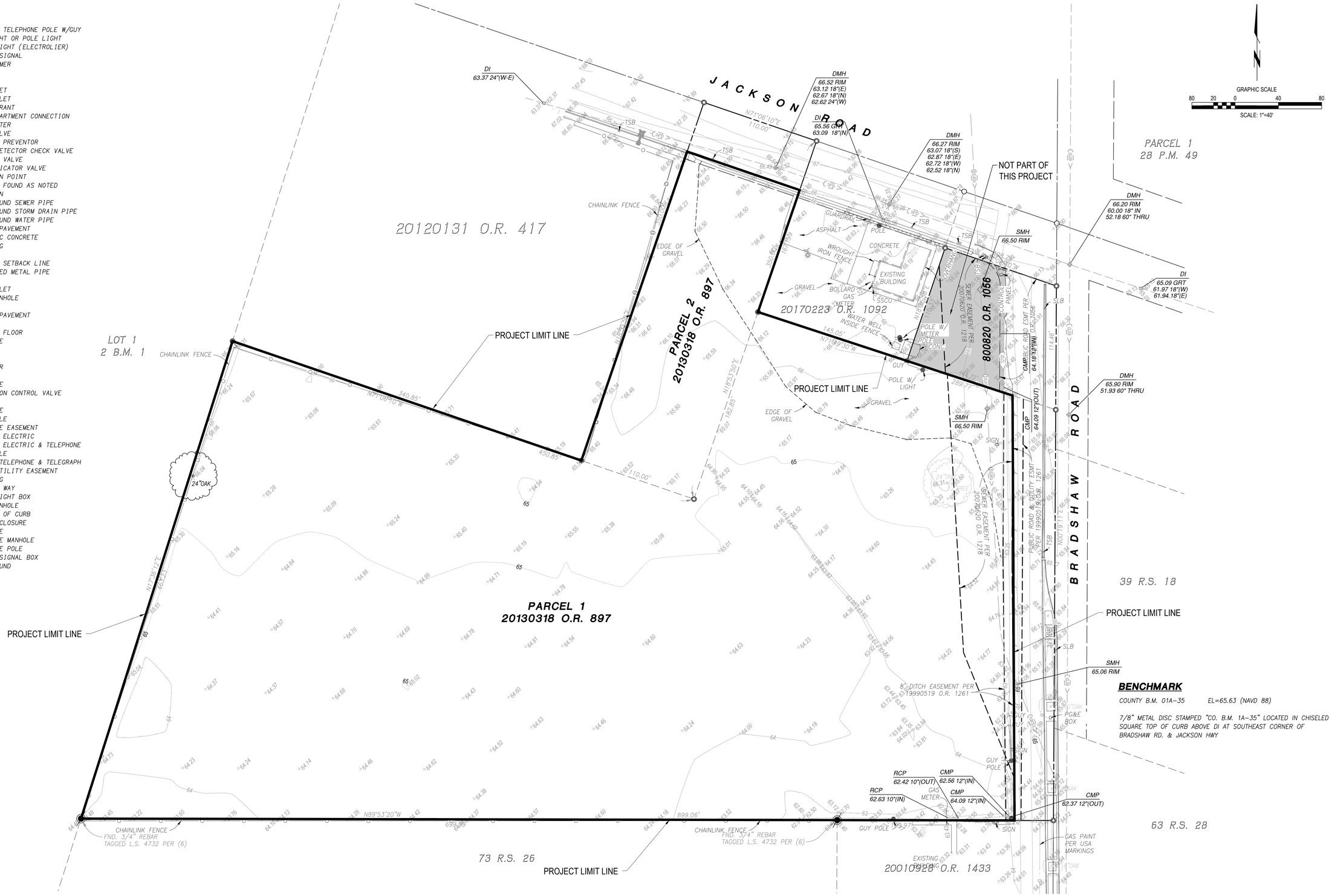
APPENDIX A:

Boundary and Topographic Survey

LEGEND

- POWER OR TELEPHONE POLE W/GUY
- AREA LIGHT OR POLE LIGHT
- STREET LIGHT (ELECTROLIER)
- TRAFFIC SIGNAL
- TRANSFORMER
- MANHOLE
- CLEANOUT
- CURB INLET
- DRAIN INLET
- FIRE HYDRANT
- FIRE DEPARTMENT CONNECTION
- WATER METER
- WATER VALVE
- BACKFLOW PREVENTOR
- DOUBLE DETECTOR CHECK VALVE
- BLOW OFF VALVE
- POST INDICATOR VALVE
- DIMENSION POINT
- MONUMENT FOUND AS NOTED
- ROAD SIGN
- 8"S UNDERGROUND SEWER PIPE
- 12"D UNDERGROUND STORM DRAIN PIPE
- 12"W UNDERGROUND WATER PIPE
- EDGE OF PAVEMENT

AC	ASPHALTIC CONCRETE
BEG	BEGINNING
BLDG	BUILDING
BSL	BUILDING SETBACK LINE
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
DI	DRAIN INLET
DMH	DRAIN MANHOLE
ELEC	ELECTRIC
EP	EDGE OF PAVEMENT
ESMT	EASEMENT
FF	FINISHED FLOOR
FL	FLOW LINE
FNC	FENCE
FND	FOUND
GM	GAS METER
GRT	GRATE
GV	GAS VALVE
ICV	IRRIGATION CONTROL VALVE
INV	INVERT
I. P.	IRON PIPE
JP	JOINT POLE
L. E.	LANDSCAPE EASEMENT
OHE	OVERHEAD ELECTRIC
OHT&E	OVERHEAD ELECTRIC & TELEPHONE
PP	POWER POLE
PT&T	PACIFIC TELEPHONE & TELEGRAPH
P. U. E.	PUBLIC UTILITY EASEMENT
RET	RETAINING
R/W	RIGHT OF WAY
SLB	STREET LIGHT BOX
SMH	SEWER MANHOLE
TBC	TOP BACK OF CURB
T. E.	TRASH ENCLOSURE
TELE	TELEPHONE
TMH	TELEPHONE MANHOLE
TP	TELEPHONE POLE
TSB	TRAFFIC SIGNAL BOX
UG	UNDERGROUND
UTIL	UTILITY
WD	WOOD



GRAPHIC SCALE
80 20 0 40 80
SCALE: 1"=40'

BENCHMARK

COUNTY B.M. 01A–35 EL=65.63 (NAVD 88)

7/8" METAL DISC STAMPED "CO. B.M. 1A–35" LOCATED IN CHISELED SQUARE TOP OF CURB ABOVE DI AT SOUTHEAST CORNER OF BRADSHAW RD. & JACKSON HWY

NOT FOR CONSTRUCTION

REVISIONS NO.	DESCRIPTION	APPD. ENGR.	DATE	APPD. E.U.	DATE
△					
△					
△					
△					
△					

SCALE:
HORIZ. 1" = 40'
VERT. 1" = N/A

BENCH MARK COUNTY B.M. 01A-35
EL=65.63 (NAVD 88)

COMPUTED	MJC
DESIGNED	DVG
DRAWN	CEC
PROJ. ENGR.	EKY

REGISTERED PROFESSIONAL ENGINEER EDWIN KHO YU No. C58345 Exp. 06-30-2023 CIVIL STATE OF CALIFORNIA

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BOUNDARY AND TOPOGRAPHIC SURVEY
J @ B STORAGE
5220 BRADSHAW ROAD & 9680 JACKSON ROAD
SACRAMENTO, CALIFORNIA

DATE JULY 2021
SHEET C-6
6 OF 6

JOB NO. 18-0053-00

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APPENDIX B:

Pre-Development SacCalc Watershed Map

LEGEND

- POWER OR TELEPHONE POLE W/GUY
- AREA LIGHT OR POLE LIGHT
- STREET LIGHT (ELECTROLIER)
- TRAFFIC SIGNAL
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- MANHOLE
- CLEANOUT
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- DRAIN INLET
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- FIRE DEPARTMENT CONNECTION
- WATER METER
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- BLOW OFF VALVE
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- MONUMENT FOUND AS NOTED
- ROAD SIGN
- (8"S) UNDERGROUND SEWER PIPE
- (12"D) UNDERGROUND STORM DRAIN PIPE
- (12"W) UNDERGROUND WATER PIPE
- EDGE OF PAVEMENT

AC	ASPHALTIC CONCRETE
BEG	BEGINNING
BLDG	BUILDING
BSL	BUILDING SETBACK LINE
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
DI	DRAIN INLET
DMH	DRAIN MANHOLE
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EP	EDGE OF PAVEMENT
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FF	FINISHED FLOOR
FL	FLOW LINE
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FND	FOUND
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GRT	GRATE
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INV	INVERT
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TELE	TELEPHONE
TMH	TELEPHONE MANHOLE
TP	TELEPHONE POLE
TSB	TRAFFIC SIGNAL BOX
UG	UNDERGROUND
UTIL	UTILITY
WD	WOOD

Existing Watershed SacCalc Summary

Total Area:	7.1	ac		FT	Miles
Length of longest watercourse:	920	ft	L=90%Longest WC	828	0.157
Length along longest watercourse to centroid (Lc):	605	ft			0.115
Upper elevation:	66.4	ft			
Lower Elevation:	63.2	ft			
Slope (S):	0.0035	ft/ft	18.4 ft/mi		
Composite Basin "n":	0.070				
Composite Infiltration Rate:	0.100	in/hr			
Composite % Impervious:	2%				
Lag Time (Basin "n")(4):	17.9	min			

JACKSON ROAD

BRADSHAW ROAD

PROJECT LIMIT LINE

PARCEL 2
20130318 O.R. 897

PARCEL 1
20130318 O.R. 897

ExShed
7.10 Ac

LENGTH OF LONGEST
WATER COURSE = 920-FT

CENTROID OF WATERSHED

LOT 1
2 B.M. 1

PARCEL 1
28 P.M. 49

NOT PART OF
THIS PROJECT

20170223 O.R. 1092

800820 O.R. 1056

20010928 O.R. 1433

73 R.S. 26

39 R.S. 18

63 R.S. 28

POINT OF INTEREST

GRAPHIC SCALE
80 20 0 40 80
SCALE: 1"=40'

BENCHMARK

COUNTY B.M. 01A–35 EL=65.63 (NAVD 88)

7/8" METAL DISC STAMPED "CO. B.M. 1A–35" LOCATED IN CHISELED SQUARE TOP OF CURB ABOVE DI AT SOUTHEAST CORNER OF BRADSHAW RD. & JACKSON HWY

NOT FOR CONSTRUCTION

REVISIONS NO.	DESCRIPTION	APPD. ENGR.	DATE	APPD. E.U.	DATE
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SCALE:
HORIZ. 1" = 40'
VERT. 1" = N/A

BENCH MARK COUNTY B.M. 01A-35
EL=65.63 (NAVD 88)

COMPUTED	MJC
DESIGNED	DVG
DRAWN	CEC
PROJ. ENGR.	EKY

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PRE-DEVELOPMENT SACCALC WATERSHED MAP

J @ B STORAGE
5220 BRADSHAW ROAD & 9680 JACKSON ROAD
SACRAMENTO, CALIFORNIA

DATE JULY 2021
SHEET C-6
6 OF 6

JOB NO. 18-0053-00

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APPENDIX C:

Post-Development SacCalc Watershed Map

Proposed Watershed SacCalc Summary

Total Area:	7.1	ac			Miles
Length of longest watercourse:	990	ft	L=90%Longest WC	891	0.169
Length along longest watercourse to centroid (Lc):	815	ft			0.154
Upper elevation:		ft			
Lower Elevation:		ft			
Slope (S):	0.0050	ft/ft	26.4 ft/mi		
Composite Basin "n":	0.031				
Composite Infiltration Rate:	0.080	in/hr			
Composite % Impervious:	48%				
Lag Time (Basin "n")(4):	8.5	min			

(4) Per equation 7-1 Sacramento Drainage Manual-See Below
(5) Per SacCalc Output

LEGEND:
- WATERSHED BOUNDARY
- BIORETENTION BASIN
- POROUS GRAVEL PAVEMENT
- PROPOSED DI
- PROPOSED DRAINAGE MANHOLE
- EXISTING DRAINAGE MANHOLE
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE

GRAPHIC SCALE
40 20 0 40
1 in = 40 ft

JACKSON ROAD
BRADSHAW ROAD

NOT PART OF THIS PROJECT

PROJECT LIMIT LINE

063-0070-21 TEICHERT LAND CO. IR
063-0070-04 AGUILERA FAMILY TRUST M-2
063-0070-05 J&B STORAGE LLC GC VAPOTS
063-0070-06 JJ ENTERPRISE INC GC
063-0070-17 GR TRUCKING LLC IR
063-0070-18 HERBAUGH/WILCOX

DMA 1 0.76 AC
DMA 2 0.88 AC
DMA 3 1.31 AC
DMA 4 0.65 AC
DMA 5 0.57 AC
DMA 6 0.08 AC
DMA 7 2.85 AC
ProShed 7.10 Ac

CENTROID OF WATERSHED
LENGTH OF LONGEST WATER COURSE = 990-FT
POINT OF INTEREST
DETENTION BASIN

VALLEY OAK (TO REMAIN)

NOT FOR CONSTRUCTION

REVISIONS NO.	DESCRIPTION	APPD. ENGR.	DATE	APPD. E.U.	DATE

SCALE:
HORIZ. 1" = 40'
VERT. 1" = N/A

BENCH MARK COUNTY B.M. 01A-35
EL=65.63 (NAVD 88)

COMPUTED	MJC
DESIGNED	DVG
DRAWN	CEC
PROJ. ENGR.	EKY

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POST-DEVELOPMENT SACCALC WATERSHED MAP

J @ B STORAGE
5220 BRADSHAW ROAD & 9680 JACKSON ROAD
SACRAMENTO, CALIFORNIA

DATE MARCH 2024
SHEET C-2
2 OF 6

JOB NO. 18-0053-00

APPENDIX D:

Pre- and Post-Development SacCalc Input and Results

SacCalc Input Summary

Development Condition	Basic Parameters											
	Shed	Area (SF)	Area (Ac)	Land Use	Infiltration Rate, in/hr	Initial Loss, in	% Impervious	Impervious Area, sf	Pervious Area, sf	Basin "n"	Slope, ft/ft	Lag Time, min
Pre-Development	ExShed	309070	7.10	Open Space Grassland	0.10	0.10	2%	6181	302889	0.070	0.0067	17.9
Post-Development	ProShd	309070	7.10	Commercial	0.08	0.10	48%	149678	159393	0.031	0.0050	8.5

Assumptions:
Sacramento Method Rainfall Zone 2 (Figure 2-11 Sacramento Drainage Manual)
Mean Elevation = 65-feet
Hydrologic Soils Group (HSG) C (Web Soil Survey)
Initial Loss = 0.10 in (Table 5-1 Sacramento Drainage Manual)
Infiltration Rate (Table 5-2 Sacramento Drainage Manual)
Basin "n" (Table 7-1 Sacramento Drainage Manual)
Lag Time (Equation 7-1 Sacramento Drainage Manual)

Existing Watershed SacCalc Summary

Total Area:	7.1	ac		FT	Miles
Length of longest watercourse:	920	ft	L=90%Longest WC	828	0.157
Length along longest watercourse to centroid (Lc):	605	ft			0.115
Upper elevation:	66.4	ft			
Lower Elevation:	63.2	ft			
Slope (S):	0.0035	ft/ft	18.4 ft/mi		
Composite Basin "n":	0.070				
Composite Infiltration Rate:	0.100	in/hr			
Composite % Impervious:	2%				
Lag Time (Basin "n")(4):	17.9	min			

(4) Per equation 7-1 Sacramento Drainage Manual-See Below

(5) Per SacCalc Output

Proposed Watershed SacCalc Summary

Total Area:	7.1	ac			Miles
Length of longest watercourse:	990	ft	L=90%Longest WC	891	0.169
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Lower Elevation:		ft			
Slope (S):	0.0050	ft/ft	26.4 ft/mi		
Composite Basin "n":	0.031				
Composite Infiltration Rate:	0.080	in/hr			
Composite % Impervious:	48%				
Lag Time (Basin "n")(4):	8.5	min			

(4) Per equation 7-1 Sacramento Drainage Manual-See Below

(5) Per SacCalc Output

Lag Equation

The Basin "n" lag equation, which was originally developed by Snyder[11] and later revised by the U.S. Corps of Engineers and the U.S. Bureau of Reclamation,[17] is expressed as:

$$L_g = Cn \left[\frac{LL_c}{S^{0.5}} \right]^{0.33} \qquad (7\text{-}1)$$

where:

- C = 1560 (174)
- L_g = Lag Time, min (sec)
- L = Length of longest watercourse, measured as approximately 90% of the distance from the point of interest to the headwater divide of the basin, miles (m)
- L_c = Length along the longest watercourse measured upstream from the point of interest to a point close to the centroid of the basin, miles (m)
- S = Overall slope of the longest watercourse between the headwaters and concentration point, ft/mile (m/m)
- n = Basin "n" from Table 7-1.

View HEC-1 output

Sacramento method results
(Project: Bradshaw Jackson)
(100-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
EXSHED	13.	12:13	.01			
PROSHD	20.	12:05	.01			
DE001	12.	12:13	.01		.4	

(10-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
EXSHED	7.8	12:13	.01			
PROSHD	12.	12:05	.01			
DE001	6.9	12:14	.01		.3	

Sacramento Hydrologic Calculator Report

March 27, 2024 11:18

Project Title: Bradshaw Jackson
Comments:
Prepared by: MDH

Method: Sacramento County HEC-1 method
Date: 3/27/2024

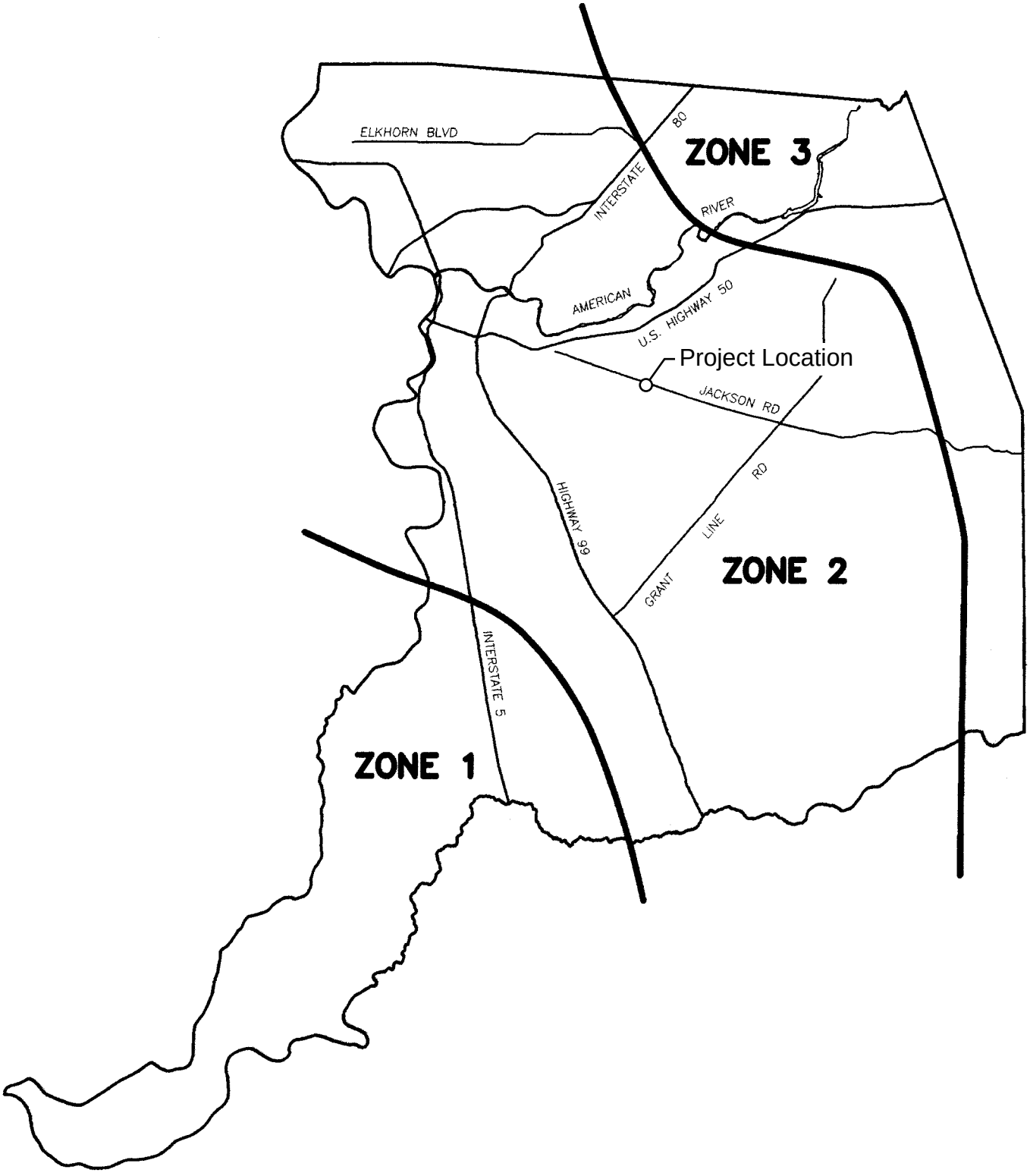
Watershed Hydrologic Summary Data

Watershed	Area (acres)	Mean Elevation (ft)	Lag Times		Basin "n"		Loss Rates		Percent Impervious	
			Method	Lag Time (min)	Method	Basin "n"	Method	Loss Rate (in/hr)	Method	Impervious Area (%)
EXSHED	7.1	65	Specified	17.9	-	-	Specified	.1	Specified	2
PROSHD	7.1	65	Specified	8.5	-	-	Specified	.08	Specified	48

Detention Basin Data

Detention Basin	Initial Condition		Pond Storage Relation										Outlet Data			
													Elev. (ft)	Area (sq ft)	Q Coef.	Exponent
DE001	Volume (ac-ft)	0	Volume (ac-ft)	0	0.185	0.237	0.294	0.356	0.423	0.495	0.654	0.833	0.93	-	-	-	-
			Discharge (cfs)	0.42	0.5	3.27	8.32	14.86	17.12	17.54	18.35	19.12	19.5	-	-	-	-

Pump Data							
Pump Hydrograph Name		Pump 1	Pump 2	Pump 3	Pump 4	Pump 5
	Pump Discharge (cfs)					
	Elevation at which Pump Turns On (ft)					
	Elevation at which Pump Turns Off (ft)					



Note : See foldout map in the back of Hydrology Standards for larger scale map of Rainfall Zones.

Sacramento City and County Rainfall Zones Sacramento Method

Date **December 1996**

Figure **2-11**

Infiltration

Initial Losses

The initial loss depth in the infiltration calculations represents the higher infiltration capacity of the unsaturated soil at the beginning of a storm. All precipitation is assumed to infiltrate until the initial loss depth is satisfied.

Initial losses are dependent on the soil condition. Dry soil infiltrates significantly greater amounts of precipitation than moist soil. There is also a correlation between the recurrence frequency of a storm and the initial loss. Calibration modelling with HEC-1 in the Sacramento area has shown that higher initial losses were appropriate for the more frequent events. Initial losses recommended for the City and County of Sacramento are shown in Table 5-1.

Table 5-1. Initial Losses

Recurrence Interval	Loss inches (millimeters)
2	0.40 (10.2)
5	0.25 (6.4)
10	0.20 (5.1)
25	0.15 (3.8)
50	0.12 (3.1)
100	0.10 (2.5)
200	0.08 (2.0)
500	0.06 (1.5)

Continued on next page...

Map Scale: 1:1,750 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Sacramento County, California
Survey Area Data: Version 23, Aug 31, 2023

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

Date(s) aerial images were photographed: Apr 23, 2022—Apr 24, 2022

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
157	Hedge loam, 0 to 2 percent slopes	C/D	0.1	0.7%
214	San Joaquin silt loam, 0 to 3 percent slopes	C	9.8	99.3%
Totals for Area of Interest			**9.9**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Infiltration (continued)

Constant Losses (Cont.)

Table 5-2. Infiltration Rates by Hydrologic Soil-Cover Groups (inches/hour)

Cover	% Imp	Soil Group		
		B	C	D
Highways, Parking	95	0.14	0.07	0.04
Commercial, Offices	90	0.16	0.08	0.05
Intensive Industrial	85	0.162	0.082	0.052
Apartments, HDR	80	0.165	0.085	0.055
Mobil Home Park	75	0.167	0.087	0.057
Condominiums, MDR	70	0.17	0.09	0.06
Residential: 8-10 du/acre, Ext Indust	60	0.18	0.10	0.07
Residential: 6-8 du/acre, LDR, School	50	0.18	0.10	0.07
Residential: 4-6 du/acre	40	0.18	0.10	0.07
Residential: 3-4 du/acre	30	0.18	0.10	0.07
Residential: 2-3 du/acre	25	0.18	0.10	0.07
Residential: 1-2 du/acre	20	0.18	0.10	0.07
Residential: 0.5-1 du/acre	15	0.18	0.10	0.07
Residential: 0.2-0.5 du/acre, Ag Res	10	0.18	0.10	0.07
Residential: <0.2 du/acre, Recreation	5	0.18	0.10	0.07
Open Space, Grassland, Ag	2	0.18	0.10	0.07
Open Space, Woodland, Natural	1	0.19	0.11	0.08
Dense Oak, Shrubs, Vines	1	0.25	0.16	0.12
*Sacramento County does not contain significant areas of Type "A" soils.				

Summary for Pond 3P: Basin

Inflow = 20.14 cfs @ 12.08 hrs, Volume= 1.922 af
Outflow = 14.86 cfs @ 12.18 hrs, Volume= 1.832 af, Atten= 26%, Lag= 5.6 min
Primary = 14.86 cfs @ 12.18 hrs, Volume= 1.832 af
Routed to nonexistent node 1P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 11.60' @ 12.18 hrs Surf.Area= 0.323 ac Storage= 0.356 af

Plug-Flow detention time= 80.7 min calculated for 1.831 af (95% of inflow)
Center-of-Mass det. time= 51.9 min (782.1 - 730.1)

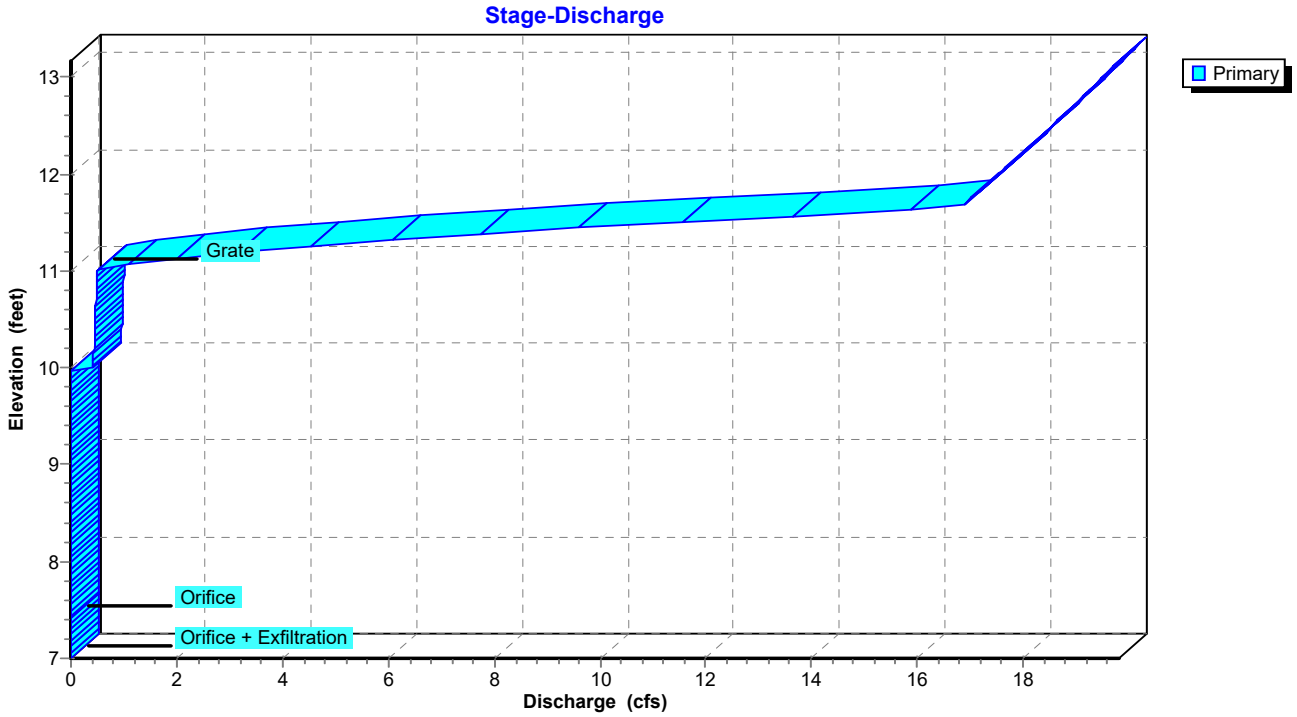
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	1.016 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	7.00'	0.000 af	**3.00'D x 3.00'H Vertical Cone/Cylinder**
		1.016 af	Total Available Storage

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
10.00	0.122	0.000	0.000
13.17	0.519	1.016	1.016

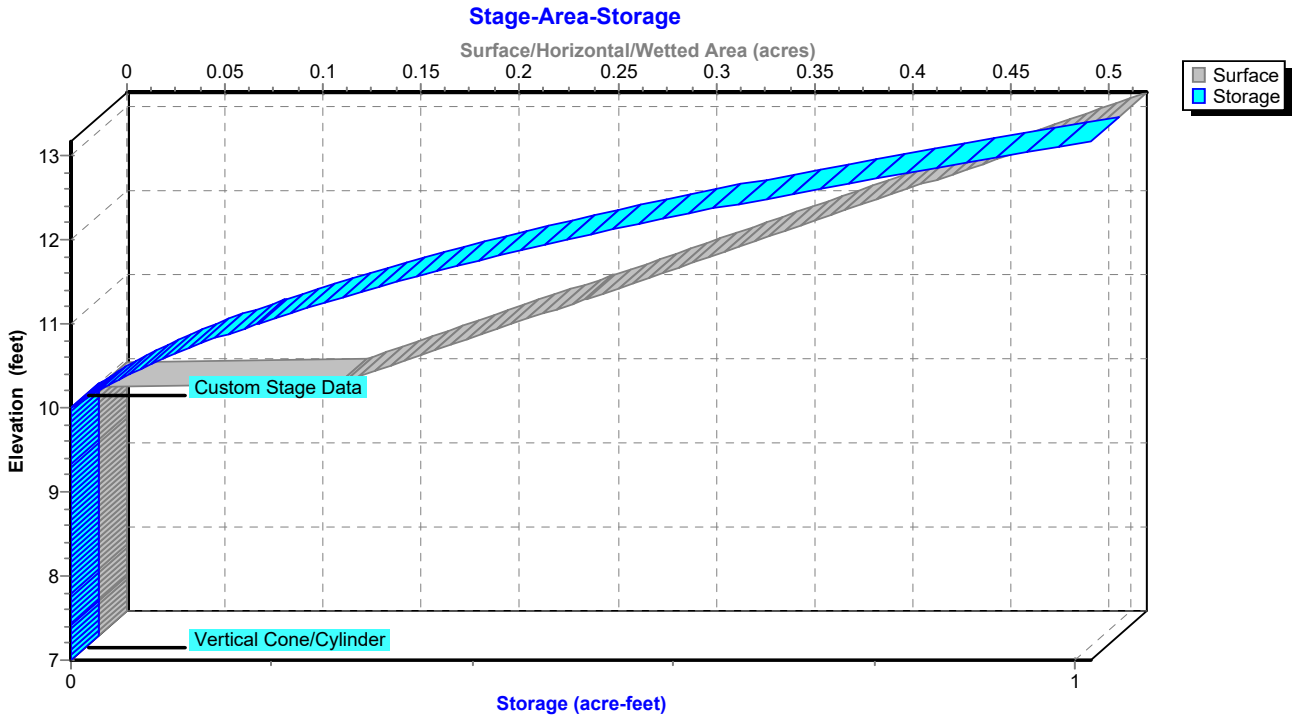
Device	Routing	Invert	Outlet Devices
#1	Primary	7.00'	**18.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Device 1	11.00'	**36.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 4	7.00'	**5.000 in/hr Exfiltration over Surface area**
#4	Device 1	7.42'	**3.2" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=14.85 cfs @ 12.18 hrs HW=11.60' (Free Discharge)
↑└─**1=Orifice** (Passes 14.85 cfs of 16.69 cfs potential flow)
↑└─**2=Grate** (Weir Controls 14.31 cfs @ 2.53 fps)
└─**4=Orifice** (Orifice Controls 0.54 cfs @ 9.69 fps)
↑└─**3=Exfiltration** (Passes 0.54 cfs of 1.63 cfs potential flow)

Pond 3P: Basin



Pond 3P: Basin



Stage-Discharge for Pond 3P: Basin

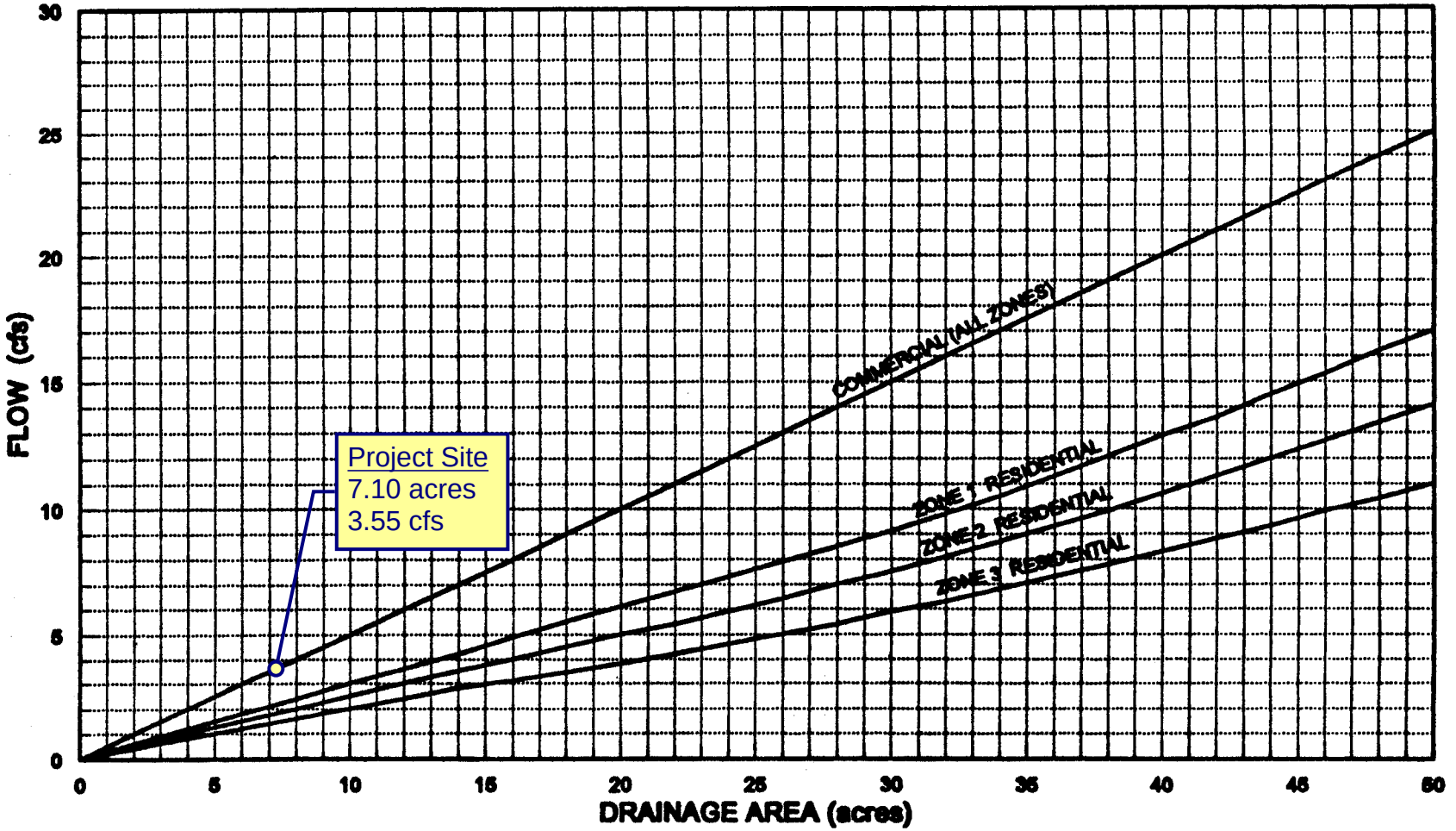
Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
7.00	0.00	9.60	0.00	12.20	17.95
7.05	0.00	9.65	0.00	12.25	18.05
7.10	0.00	9.70	0.00	12.30	18.15
7.15	0.00	9.75	0.00	12.35	18.25
7.20	0.00	9.80	0.00	12.40	18.35
7.25	0.00	9.85	0.00	12.45	18.45
7.30	0.00	9.90	0.00	12.50	18.54
7.35	0.00	9.95	0.00	12.55	18.64
7.40	0.00	10.00	0.42	12.60	18.74
7.45	0.00	10.05	0.42	12.65	18.83
7.50	0.00	10.10	0.43	12.70	18.93
7.55	0.00	10.15	0.43	12.75	19.03
7.60	0.00	10.20	0.44	12.80	19.12
7.65	0.00	10.25	0.44	12.85	19.22
7.70	0.00	10.30	0.45	12.90	19.31
7.75	0.00	10.35	0.45	12.95	19.40
7.80	0.00	10.40	0.45	13.00	19.50
7.85	0.00	10.45	0.46	13.05	19.59
7.90	0.00	10.50	0.46	13.10	19.68
7.95	0.00	10.55	0.47	13.15	**19.77**
8.00	0.00	10.60	0.47		
8.05	0.00	10.65	0.47		
8.10	0.00	10.70	0.48		
8.15	0.00	10.75	0.48		
8.20	0.00	10.80	0.48		
8.25	0.00	10.85	0.49		
8.30	0.00	10.90	0.49		
8.35	0.00	10.95	0.50		
8.40	0.00	11.00	0.50		
8.45	0.00	11.05	0.85		
8.50	0.00	11.10	1.48		
8.55	0.00	11.15	2.30		
8.60	0.00	11.20	3.27		
8.65	0.00	11.25	4.37		
8.70	0.00	11.30	5.58		
8.75	0.00	11.35	6.91		
8.80	0.00	11.40	8.32		
8.85	0.00	11.45	9.83		
8.90	0.00	11.50	11.43		
8.95	0.00	11.55	13.11		
9.00	0.00	11.60	14.86		
9.05	0.00	11.65	16.69		
9.10	0.00	11.70	16.91		
9.15	0.00	11.75	17.02		
9.20	0.00	11.80	17.12		
9.25	0.00	11.85	17.23		
9.30	0.00	11.90	17.33		
9.35	0.00	11.95	17.44		
9.40	0.00	12.00	17.54		
9.45	0.00	12.05	17.64		
9.50	0.00	12.10	17.75		
9.55	0.00	12.15	17.85		

Stage-Area-Storage for Pond 3P: Basin

Elevation (feet)	Surface (acres)	Storage (acre-feet)
7.00	0.000	0.000
7.10	0.000	0.000
7.20	0.000	0.000
7.30	0.000	0.000
7.40	0.000	0.000
7.50	0.000	0.000
7.60	0.000	0.000
7.70	0.000	0.000
7.80	0.000	0.000
7.90	0.000	0.000
8.00	0.000	0.000
8.10	0.000	0.000
8.20	0.000	0.000
8.30	0.000	0.000
8.40	0.000	0.000
8.50	0.000	0.000
8.60	0.000	0.000
8.70	0.000	0.000
8.80	0.000	0.000
8.90	0.000	0.000
9.00	0.000	0.000
9.10	0.000	0.000
9.20	0.000	0.000
9.30	0.000	0.000
9.40	0.000	0.000
9.50	0.000	0.000
9.60	0.000	0.000
9.70	0.000	0.000
9.80	0.000	0.000
9.90	0.000	0.000
10.00	0.122	0.000
10.10	0.135	0.013
10.20	0.147	0.027
10.30	0.160	0.043
10.40	0.172	0.059
10.50	0.185	0.077
10.60	0.197	0.096
10.70	0.210	0.117
10.80	0.222	0.138
10.90	0.235	0.161
11.00	0.247	0.185
11.10	0.260	0.210
11.20	0.272	0.237
11.30	0.285	0.265
11.40	0.297	0.294
11.50	0.310	0.324
11.60	0.323	0.356
11.70	0.335	0.389
11.80	0.348	0.423
11.90	0.360	0.458
12.00	0.373	0.495
12.10	0.385	0.533
12.20	0.398	0.572
12.30	0.410	0.612
12.40	0.423	0.654
12.50	0.435	0.697
12.60	0.448	0.741
12.70	0.460	0.786
12.80	0.473	0.833
12.90	0.485	0.881
13.00	0.498	0.930
13.10	**0.510**	**0.980**

APPENDIX E:

Figure 2-5 of the County's Hydrology Manual (Volume 2)



NOTE: Design runoff for multiple family development shall be based on the following formula:

Qm = Qr + (Qc - Qr) (I-50)/40

Where:

RD- 7	I = 60
RD-10	I = 70
RD-20	I = 80
RD-30	I = 90

Source: County of Sacramento Master Drainage Plan, Part 1, County-wide Hydrology, Nolte and Assoc.

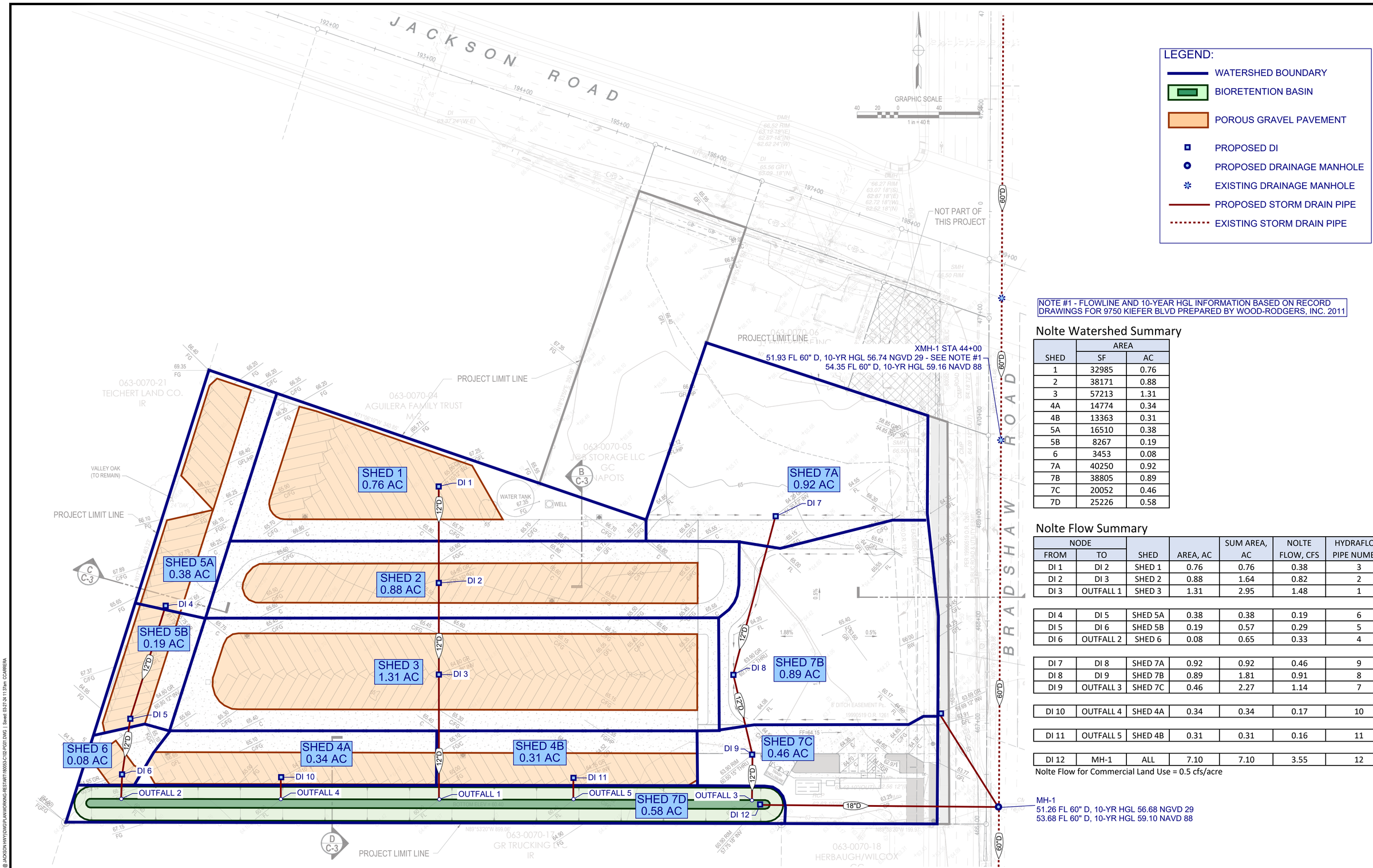
Design Runoff
Nolte Method
Drainage Areas, <50 Acres

Date December 1996

Figure 2–5

APPENDIX F:

Nolte Watershed Map and Hydraulic Calculations



NOTE #1 - FLOWLINE AND 10-YEAR HGL INFORMATION BASED ON RECORD DRAWINGS FOR 9750 KIEFER BLVD PREPARED BY WOOD-RODGERS, INC. 2011

Nolte Watershed Summary

SHED	AREA	
	SF	AC
1	32985	0.76
2	38171	0.88
3	57213	1.31
4A	14774	0.34
4B	13363	0.31
5A	16510	0.38
5B	8267	0.19
6	3453	0.08
7A	40250	0.92
7B	38805	0.89
7C	20052	0.46
7D	25226	0.58

Nolte Flow Summary

NODE				SUM AREA,	NOLTE	HYDRAFLOW
FROM	TO	SHED	AREA, AC	AC	FLOW, CFS	PIPE NUMBER
DI 1	DI 2	SHED 1	0.76	0.76	0.38	3
DI 2	DI 3	SHED 2	0.88	1.64	0.82	2
DI 3	OUTFALL 1	SHED 3	1.31	2.95	1.48	1
DI 4	DI 5	SHED 5A	0.38	0.38	0.19	6
DI 5	DI 6	SHED 5B	0.19	0.57	0.29	5
DI 6	OUTFALL 2	SHED 6	0.08	0.65	0.33	4
DI 7	DI 8	SHED 7A	0.92	0.92	0.46	9
DI 8	DI 9	SHED 7B	0.89	1.81	0.91	8
DI 9	OUTFALL 3	SHED 7C	0.46	2.27	1.14	7
DI 10	OUTFALL 4	SHED 4A	0.34	0.34	0.17	10
DI 11	OUTFALL 5	SHED 4B	0.31	0.31	0.16	11
DI 12	MH-1	ALL	7.10	7.10	3.55	12

Nolte Flow for Commercial Land Use = 0.5 cfs/acre

NOT FOR CONSTRUCTION

Dwg: X:\2018\18-0053-00 (BRADSHAW @ JACKSON HWY)\ENGR\LAN\WORKING-RESTART\180053-C102-P001.DWG | Saved: 03-27-24 11:37am CCARRERA

REVISIONS NO.	DESCRIPTION	APPD. ENGR.	DATE	APPD. E.U.	DATE
△					
△					
△					
△					
△					

SCALE:
HORIZ. 1" = 40'
VERT. 1" = N/A

BENCH MARK COUNTY B.M. 01A-35
EL=65.63 (NAVD 88)

COMPUTED	MJC
DESIGNED	DVG
DRAWN	CEC
PROJ. ENGR.	EKY

REGISTERED PROFESSIONAL ENGINEER EDWIN KHO YU No. C58345 Exp. 06-30-2023 CIVIL STATE OF CALIFORNIA

MORTON & PITALO, INC.
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING
Folsom ∗ Sacramento ∗ Fresno
75 Iron Point Circle, Suite #120
Folsom, CA 95630

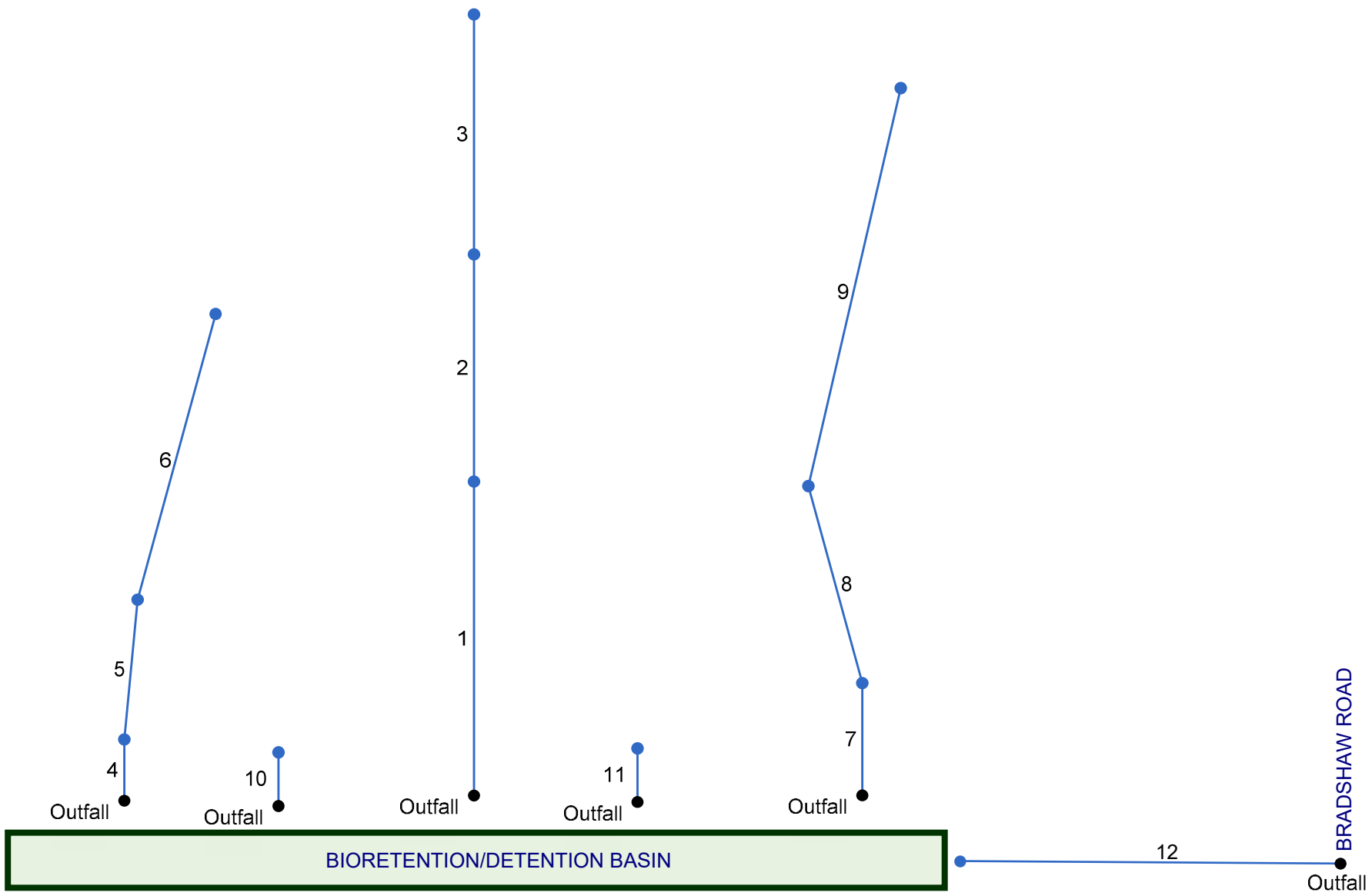
NOLTE WATERSHED MAP

J @ B STORAGE
5220 BRADSHAW ROAD & 9680 JACKSON ROAD
SACRAMENTO, CALIFORNIA

DATE MARCH 2024
SHEET C-2
2 OF 6

JOB NO. 18-0053-00

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: JAB Nolte_24.0327.stm	Number of lines: 11	Date: 3/27/2024

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	-90 deg	1.48	12	Cir	123.000	60.40	60.70	0.244	61.70*	61.91*	0.01	61.92	End	Manhole
2	0 deg	0.82	12	Cir	89.000	60.70	60.90	0.225	61.92*	61.97*	0.00	61.97	1	Manhole
3	0 deg	0.38	12	Cir	94.000	60.90	61.10	0.213	61.97	61.98	0.00	61.98	2	Manhole
4	-90 deg	0.33	12	Cir	24.000	60.40	60.50	0.417	61.70*	61.70*	0.00	61.70	End	Manhole
5	5.4 deg	0.29	12	Cir	55.000	60.50	60.80	0.545	61.70	61.71	0.00	61.71	4	Manhole
6	9.8 deg	0.19	12	Cir	116.000	60.80	61.75	0.819	61.71	61.93	n/a	61.93 j	5	Manhole
7	-90 deg	1.14	12	Cir	44.000	60.40	60.50	0.227	61.70*	61.75*	0.01	61.76	End	Manhole
8	-15.2 deg	0.91	12	Cir	80.000	60.50	60.70	0.250	61.76*	61.81*	0.01	61.82	7	Manhole
9	28.2 deg	0.46	12	Cir	160.000	60.70	61.20	0.313	61.82	61.85	0.01	61.86	8	Manhole
10	-90 deg	0.17	10	Cir	21.000	60.40	60.75	1.667	61.70*	61.70*	0.00	61.70	End	Manhole
11	-90 deg	0.16	10	Cir	21.000	60.40	60.75	1.667	61.70*	61.70*	0.00	61.70	End	Manhole
12	180 deg	3.55	18	Cir	233.000	57.28	57.75	0.202	59.10*	59.37*	0.06	59.43	End	Manhole

Project File: JAB Nolte_24.0328.stm | Number of lines: 12 | Run Date: 3/28/2024

NOTES: Known Qs only ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	123.000	0.01	0.03	0.01	0.00	0.00	0.0	4.7	0.0	1.48	1.76	1.88	12	0.24	60.40	60.70	61.70	61.91	60.40	64.80	-90 deg
2	1	89.000	0.01	0.02	0.01	0.00	0.00	0.0	3.2	0.0	0.82	1.69	1.04	12	0.22	60.70	60.90	61.92	61.97	64.80	64.90	0 deg
3	2	94.000	0.01	0.01	0.01	0.00	0.00	0.0	0.0	0.0	0.38	1.64	0.50	12	0.21	60.90	61.10	61.97	61.98	64.90	65.00	0 deg
4	End	24.000	0.01	0.03	0.01	0.00	0.00	0.0	10.5	0.0	0.33	2.30	0.42	12	0.42	60.40	60.50	61.70	61.70	60.40	64.55	-90 deg
5	4	55.000	0.01	0.02	0.01	0.00	0.00	0.0	8.0	0.0	0.29	2.63	0.38	12	0.55	60.50	60.80	61.70	61.71	64.55	64.80	5.4 deg
6	5	116.000	0.01	0.01	0.01	0.00	0.00	0.0	0.0	0.0	0.19	3.22	1.13	12	0.82	60.80	61.75	61.71	61.93	64.80	65.75	9.8 deg
7	End	44.000	0.01	0.03	0.01	0.00	0.00	0.0	5.7	0.0	1.14	1.70	1.45	12	0.23	60.40	60.50	61.70	61.75	60.40	63.90	-90 deg
8	7	80.000	0.01	0.02	0.01	0.00	0.00	0.0	4.6	0.0	0.91	1.78	1.16	12	0.25	60.50	60.70	61.76	61.81	63.90	63.90	-15.2 deg
9	8	160.000	0.01	0.01	0.01	0.00	0.00	0.0	0.0	0.0	0.46	1.99	0.72	12	0.31	60.70	61.20	61.82	61.85	63.90	64.20	28.2 deg
10	End	21.000	0.01	0.01	0.01	0.00	0.00	0.0	0.0	0.0	0.17	2.83	0.31	10	1.67	60.40	60.75	61.70	61.70	60.40	64.75	-90 deg
11	End	21.000	0.01	0.01	0.01	0.00	0.00	0.0	0.0	0.0	0.16	2.83	0.29	10	1.67	60.40	60.75	61.70	61.70	60.40	64.75	-90 deg
12	End	233.000	0.01	0.01	0.01	0.00	0.00	0.0	0.0	0.0	3.55	4.72	2.01	18	0.20	57.28	57.75	59.10	59.37	64.80	61.40	180 deg

Project File: JAB Nolte_24.0328.stm

Number of lines: 12

Run Date: 3/28/2024

NOTES:Known Qs only ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
(1)	(in) (2)	(cfs) (3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(ft) (12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(K) (23)	(ft) (24)
1	12	1.48	60.40	61.70	1.00	0.79	1.88	0.06	61.76	0.173	123.000	60.70	61.91	1.00	0.79	1.88	0.06	61.97	0.173	0.173	0.212	0.15	0.01
2	12	0.82	60.70	61.92	1.00	0.79	1.04	0.02	61.94	0.053	89.000	60.90	61.97	1.00	0.79	1.04	0.02	61.98	0.053	0.053	0.047	0.15	0.00
3	12	0.38	60.90	61.97	1.00	0.79	0.48	0.00	61.97	0.011	94.000	61.10	61.98	0.88	0.73	0.52	0.00	61.98	0.010	0.011	0.010	1.00	0.00
4	12	0.33	60.40	61.70	1.00	0.79	0.42	0.00	61.70	0.009	24.000	60.50	61.70	1.00	0.79	0.42	0.00	61.70	0.009	0.009	0.002	0.15	0.00
5	12	0.29	60.50	61.70	1.00	0.79	0.37	0.00	61.70	0.007	55.000	60.80	61.71	0.91	0.75	0.39	0.00	61.71	0.006	0.006	0.003	0.21	0.00
6	12	0.19	60.80	61.71	0.91	0.10	0.25	0.06	61.77	0.000	116.000	61.75	61.93 j	0.18**	0.10	2.00	0.06	61.99	0.000	0.000	n/a	1.00	n/a
7	12	1.14	60.40	61.70	1.00	0.79	1.45	0.03	61.73	0.103	44.000	60.50	61.75	1.00	0.79	1.45	0.03	61.78	0.102	0.102	0.045	0.31	0.01
8	12	0.91	60.50	61.76	1.00	0.79	1.16	0.02	61.78	0.065	80.000	60.70	61.81	1.00	0.79	1.16	0.02	61.83	0.065	0.065	0.052	0.53	0.01
9	12	0.46	60.70	61.82	1.00	0.79	0.59	0.01	61.82	0.017	160.000	61.20	61.85	0.65	0.54	0.85	0.01	61.86	0.029	0.023	0.037	1.00	0.01
10	10	0.17	60.40	61.70	0.83	0.55	0.31	0.00	61.70	0.006	21.000	60.75	61.70	0.83	0.55	0.31	0.00	61.70	0.006	0.006	0.001	1.00	0.00
11	10	0.16	60.40	61.70	0.83	0.55	0.29	0.00	61.70	0.005	21.000	60.75	61.70	0.83	0.55	0.29	0.00	61.70	0.005	0.005	0.001	1.00	0.00
12	18	3.55	57.28	59.10	1.50	1.77	2.01	0.06	59.16	0.114	233.000	57.75	59.37	1.50	1.77	2.01	0.06	59.43	0.114	0.114	0.266	1.00	0.06

Project File: JAB Nolte_24.0328.stm | Number of lines: 12 | Run Date: 3/28/2024

Notes: ; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraflow HGL Computation Procedure

General Procedure:

Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

Col. 21 The average of the downstream and upstream friction slopes.

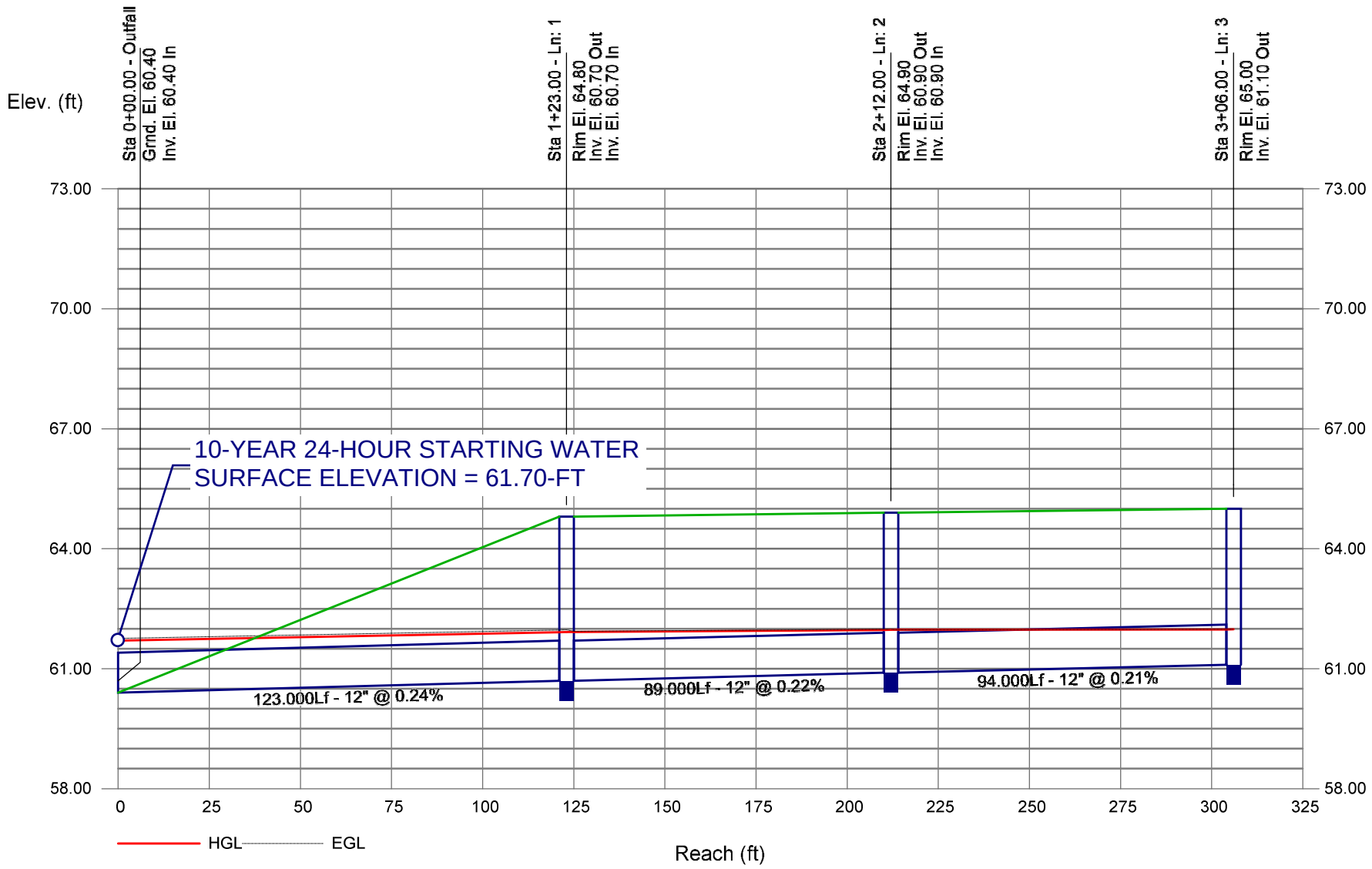
Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

Storm Sewer Profile

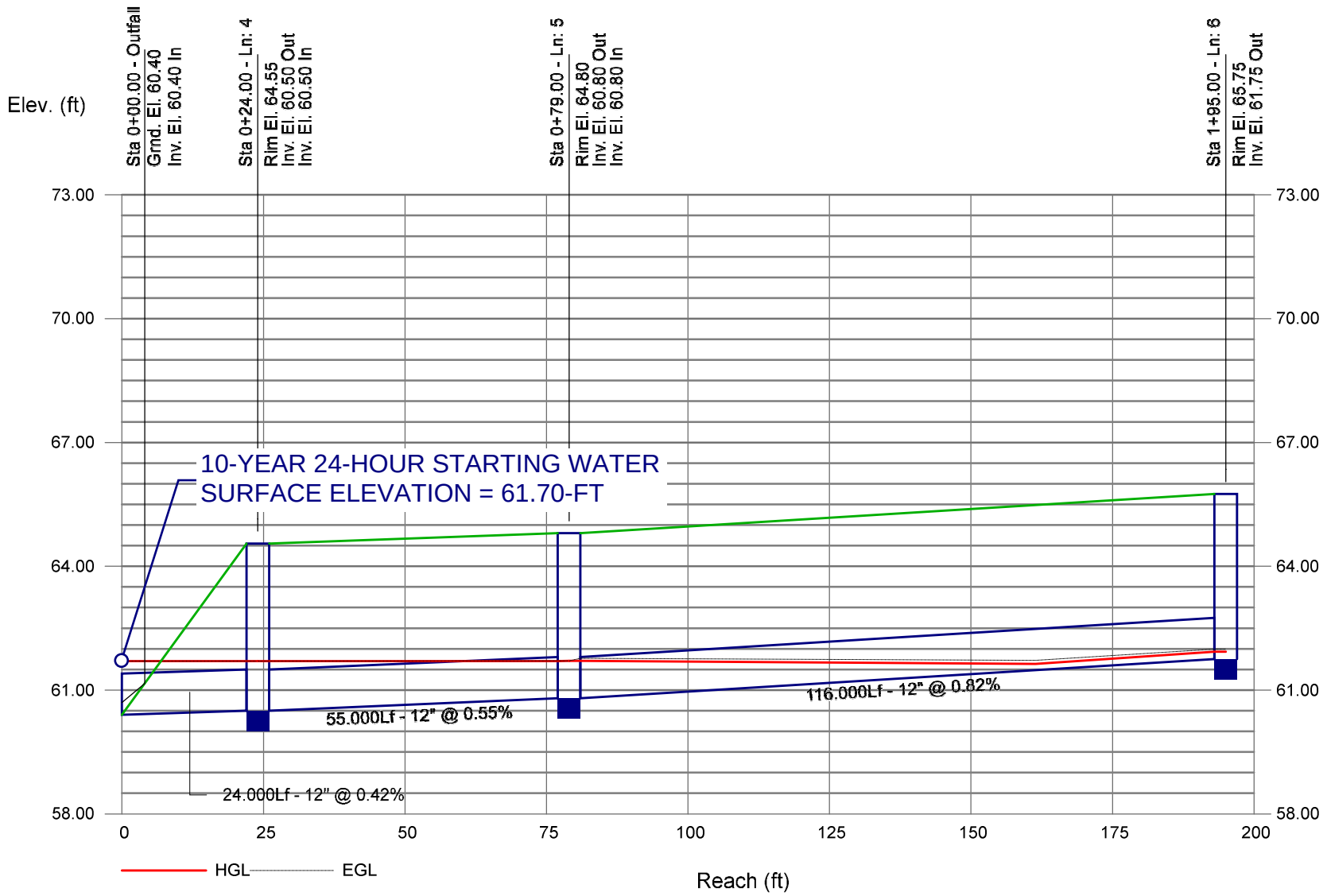
Proj. file: JAB Nolte_24.0327.stm



NOLTE FLOW - PROFILE PIPES 1 - 3

Storm Sewer Profile

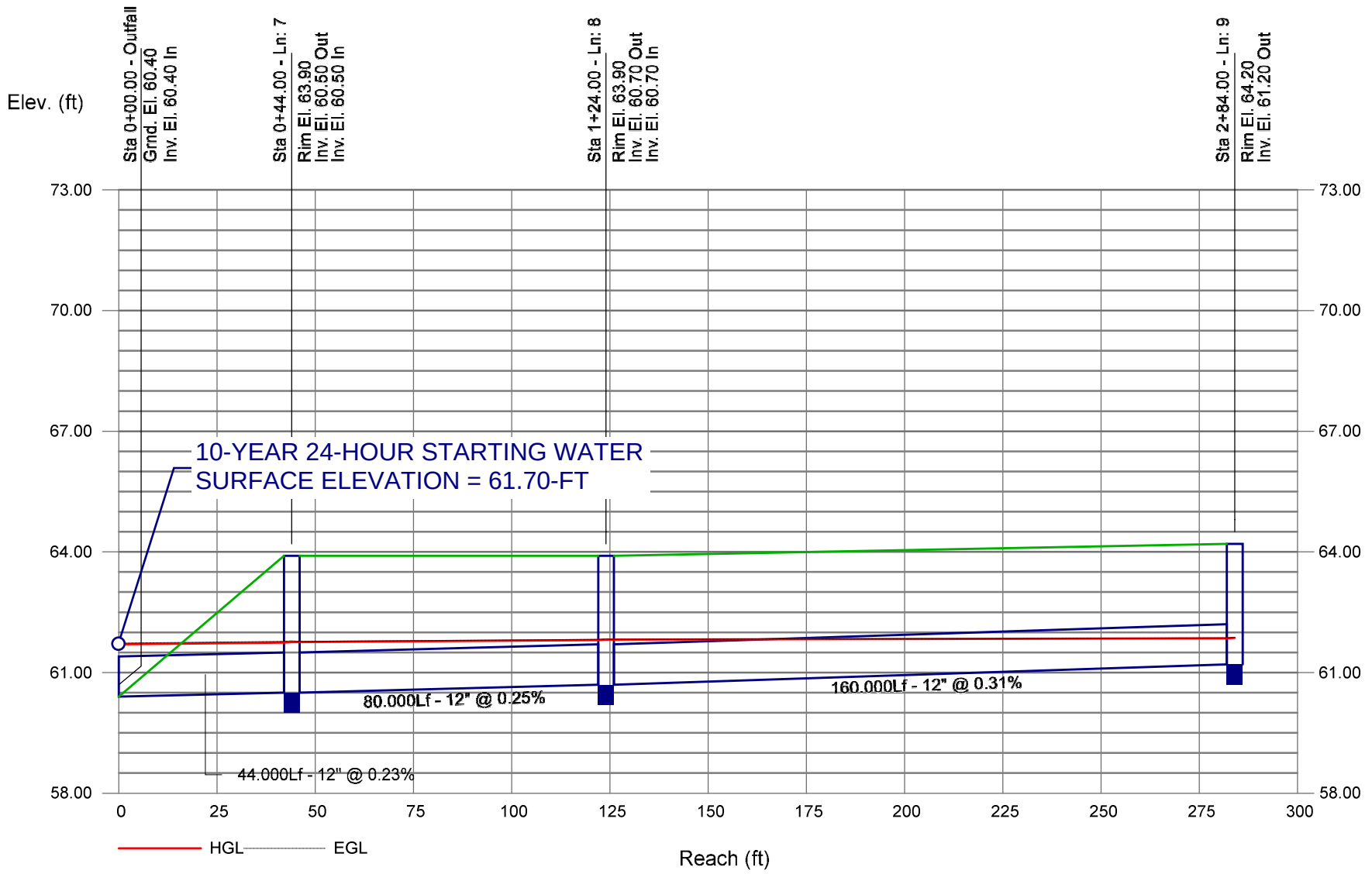
Proj. file: JAB Nolte_24.0327.stm



NOLTE FLOW - PROFILE PIPES 4 - 6

Storm Sewer Profile

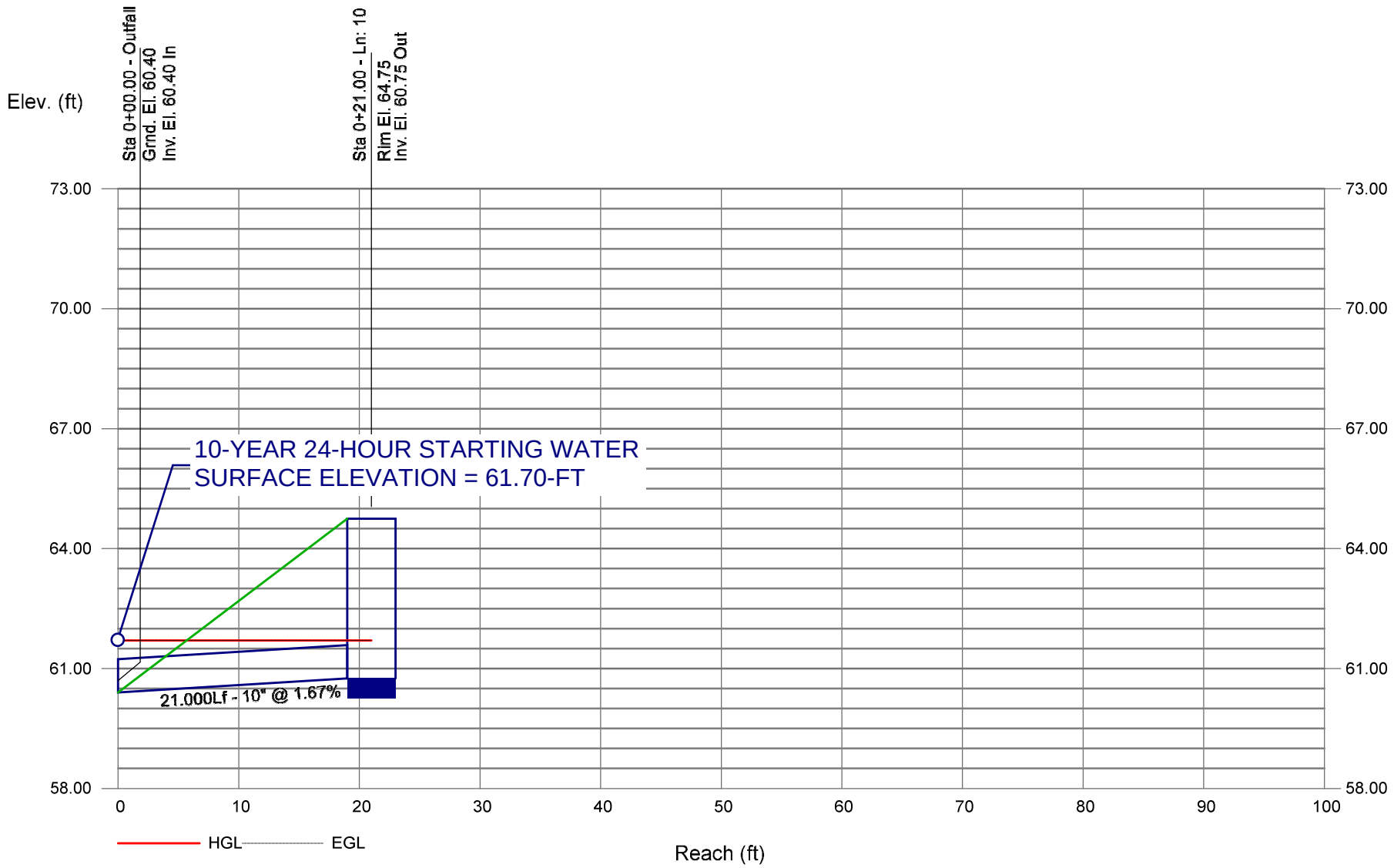
Proj. file: JAB Nolte_24.0327.stm



NOLTE FLOW - PROFILE PIPES 7 - 9

Storm Sewer Profile

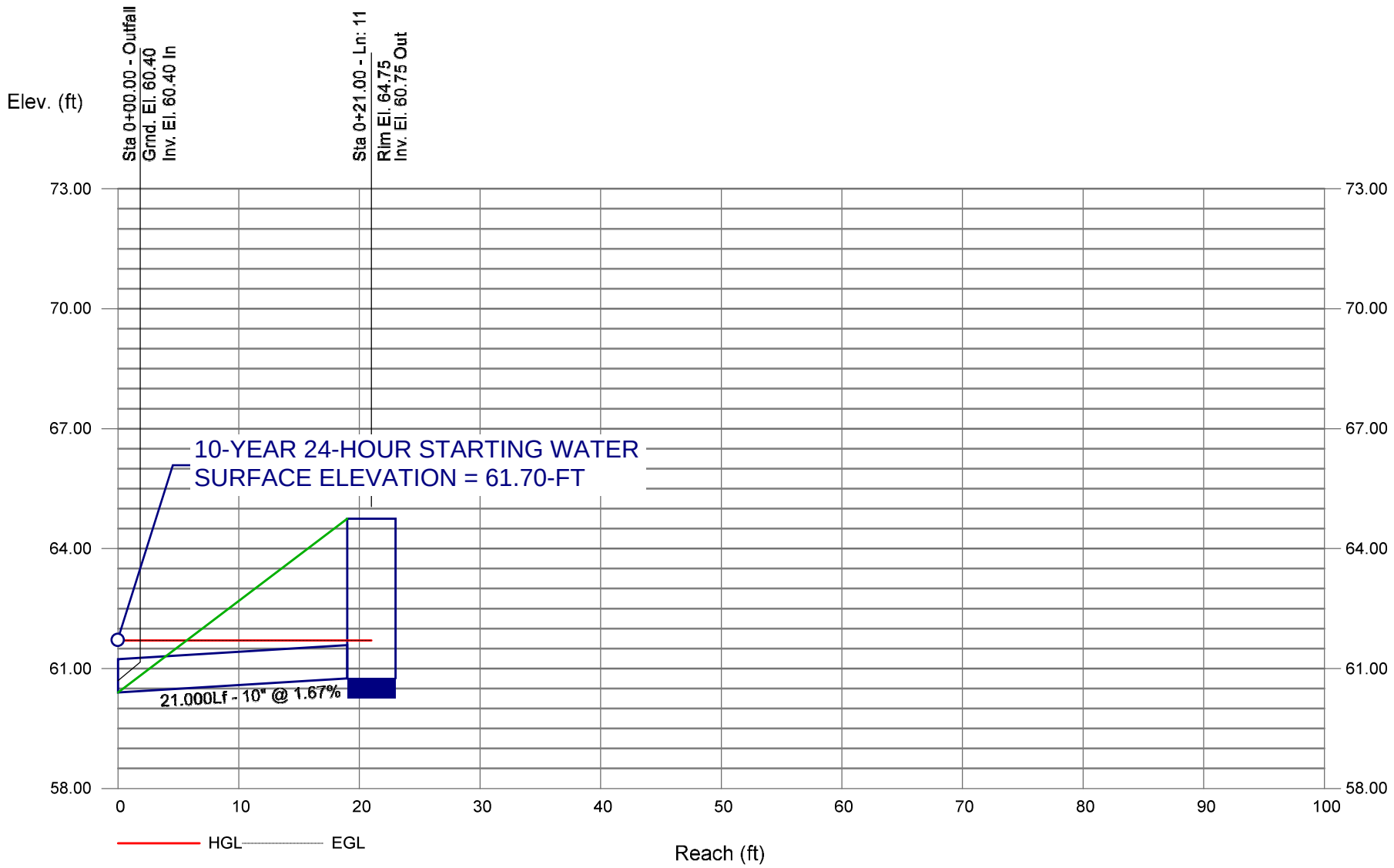
Proj. file: JAB Nolte_24.0327.stm



NOLTE FLOW - PROFILE PIPES 10 - 10

Storm Sewer Profile

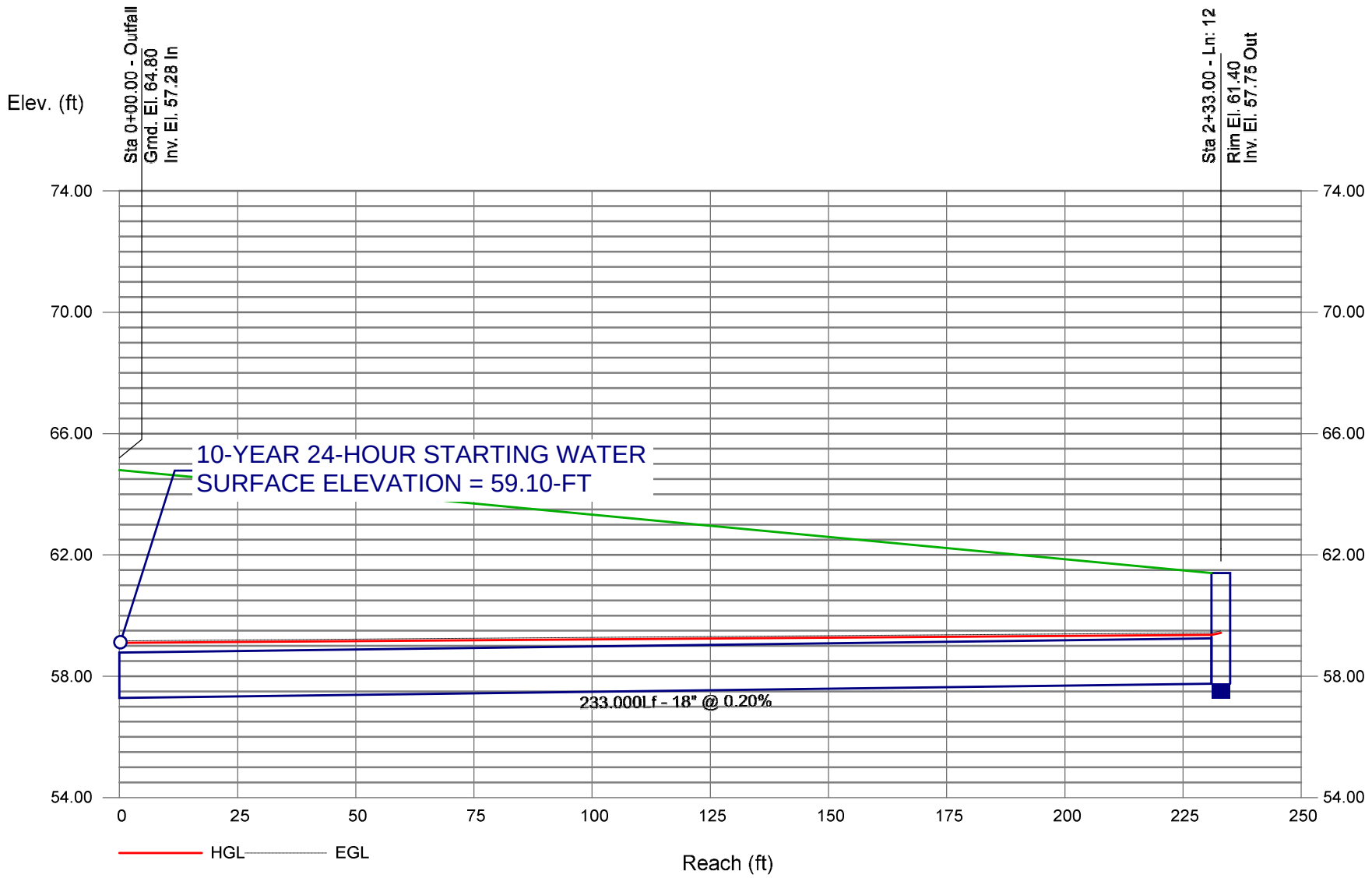
Proj. file: JAB Nolte_24.0327.stm



NOLTE FLOW - PROFILE PIPES 11 - 11

Storm Sewer Profile

Proj. file: JAB Nolte_24.0328.stm



NOLTE FLOW - PROFILE PIPES 12 - 12

APPENDIX G:

Post-Development Stormwater Watershed Map and LID Worksheets

LID Worksheet Summary

DMA	Area		Impervious		Pervious (Landscape)		Pervious (Landscape w/o Bioretention Basin)	
	sf	ac	sf	ac	sf	ac	sf	ac
DMA 1	32985	0.76	12561	0.29	4088	0.09	-	-
DMA 2	38171	0.88	19573	0.45	1165	0.03	-	-
DMA 3	57213	1.31	21604	0.50	896	0.02	-	-
DMA 4	28138	0.65	11003	0.25	0	0.00	-	-
DMA 5	24777	0.57	8540	0.20	3478	0.08	-	-
DMA 6	3453	0.08	1256	0.03	1041	0.02	-	-
DMA 7	124333	2.85	75949	1.74	48162	1.11	42802	0.98
Totals	309070	7.10	150487	3.45	58830	1.35	42802	0.98

Existing Tree Canopy
sf
-
-
-
-
950
-
-

Bioretention Basin	Subdrain Elevation	Ponding Depth
sf	in	in
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
5360	18	12

Porous Gravel Pavement		Gravel Depth	Sand Depth	
sf	ac	ft	ft	Porosity
16335	0.38	1.00	0.58	0.35
17433	0.40	1.00	0.58	0.35
34713	0.80	1.00	0.58	0.35
17135	0.39	1.00	0.58	0.35
12759	0.29	1.00	0.58	0.35
1156	0.03	1.00	0.58	0.35
-	-	-	-	-
99532	2.28			

LEGEND:

- WATERSHED BOUNDARY
- BIORETENTION BASIN
- POROUS GRAVEL PAVEMENT
- PROPOSED DI
- PROPOSED DRAINAGE MANHOLE
- EXISTING DRAINAGE MANHOLE
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE

GRAPHIC SCALE
40 20 0 40
1 in = 40 ft

JACKSON ROAD

BRADSHAW ROAD

NOT PART OF THIS PROJECT

PROJECT LIMIT LINE

063-0070-06
JJ ENTERPRISE INC
GC

063-0070-21
TEICHERT LAND CO.
IR

063-0070-04
AGUILERA FAMILY TRUST
M-2

063-0070-05
J&B STORAGE LLC
GC
NAPOTS

063-0070-17
GR TRUCKING LLC
IR

063-0070-18
HERBAUGH/WILCOX
GC

DMA 1
0.76 AC

DMA 2
0.88 AC

DMA 3
1.31 AC

DMA 4
0.65 AC

DMA 5
0.57 AC

DMA 6
0.08 AC

DMA 7
2.85 AC

VALLEY OAK
(TO REMAIN)
EXISTING TREE
CANOPY TO REMAIN

WATER TANK
WELL

FF=64.15

NOT FOR CONSTRUCTION

Dwg: X:\2018\18-0053-00 (BRADSHAW @ JACKSON HWY)\DWG\PLAN\WORKING\RESTART\180053-C102-PQVI.DWG | Saved: 03-27-24 11:37am CCARRERA

REVISIONS NO.	DESCRIPTION	APPD. ENGR.	DATE	APPD. E.U.	DATE

SCALE:
HORIZ. 1" = 40'
VERT. 1" = N/A

BENCH MARK COUNTY B.M. 01A-35
EL=65.63 (NAVD 88)

COMPUTED	MJC
DESIGNED	DVG
DRAWN	CEC
PROJ. ENGR.	EKY

REGISTERED PROFESSIONAL ENGINEER
EDWIN KHO YU
No. C59345
Exp. 06-30-2023
CIVIL
STATE OF CALIFORNIA

MORTON & PITALO, INC.
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING
Folsom ∗ Sacramento ∗ Fresno
75 Iron Point Circle, Suite #120
Folsom, CA 95630
phone: (916) 984-7621
web: www.mpengr.com

WATER QUALITY WATERSHED MAP

J @ B STORAGE
5220 BRADSHAW ROAD & 9680 JACKSON ROAD
SACRAMENTO, CALIFORNIA

DATE MARCH 2024
SHEET C-2
2 OF 6

JOB NO. 18-0053-00

LID Worksheet Summary

DMA	Area		Impervious		Pervious (Landscape)		Pervious (Landscape w/o Bioretention Basin)		Existing Tree Canopy	Bioretention Basin	Subdrain Elevation	Ponding Depth	Porous Gravel Pavement		Gravel Depth	Sand Depth	Porosity	Design Treatment Volume	Required Treatement Volume (1)	Actual LID Credits per DMA (1)	Allowable LID Credits per DMA (2)	Percent of Site	Prorated LID Credits
	sf	ac	sf	ac	sf	ac	sf	ac	sf	sf	in	in	sf	ac	ft	ft		ac-ft	ac-ft				
DMA 1	32985	0.76	12561	0.29	4088	0.09	-	-	-	-	-	-	16335	0.38	1.00	0.58	0.35	0.208	0.016	53.5	53.5	10.7%	5.7
DMA 2	38171	0.88	19573	0.45	1165	0.03	-	-	-	-	-	-	17433	0.40	1.00	0.58	0.35	0.222	0.021	41.5	41.5	12.4%	5.1
DMA 3	57213	1.31	21604	0.50	896	0.02	-	-	-	-	-	-	34713	0.80	1.00	0.58	0.35	0.442	0.030	43.9	43.9	18.5%	8.1
DMA 4	28138	0.65	11003	0.25	0	0.00	-	-	-	-	-	-	17135	0.39	1.00	0.58	0.35	0.218	0.015	41.4	41.4	9.1%	3.8
DMA 5	24777	0.57	8540	0.20	3478	0.08	-	-	950	-	-	-	12759	0.29	1.00	0.58	0.35	0.162	0.011	56.4	56.4	8.0%	4.5
DMA 6	3453	0.08	1256	0.03	1041	0.02	-	-	-	-	-	-	1156	0.03	1.00	0.58	0.35	0.015	0.001	66.2	66.2	1.1%	0.7
DMA 7	124333	2.85	75949	1.74	48162	1.11	42802	0.98	-	5360	18	12	-	-	-	-	-	-	-	231.6	200.0	40.2%	80.5
Totals	309070	7.10	150487	3.45	58830	1.35	42802	0.98					99532	2.28				1.27	0.094			Total Project LID Points	108.4

(1) Required Treatment Volume and LID Credits per Commercial LID Worksheet (excel)
(2) Maximum allowable LID points per DMA is 200

Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: DMA 1
Location of project: Sacramento

Fill in Blue Highlighted boxes

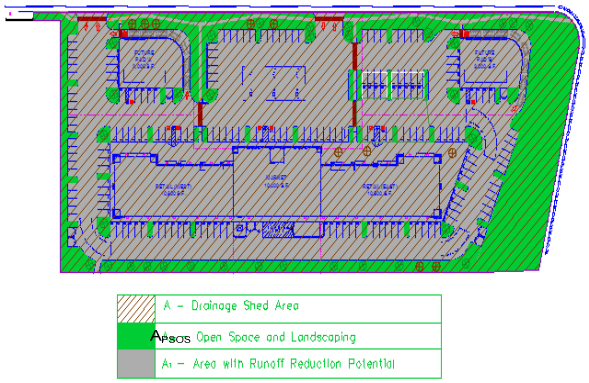
Step 1 - Open Space and Pervious Area Credits

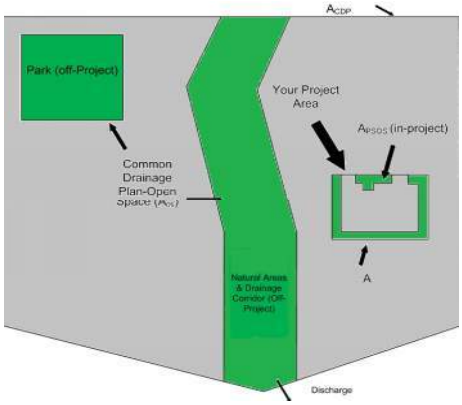
Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

1 a. Common Drainage Plan Area	0	acres	A_{CDP}	
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}	**see area example below**
a. Natural storage reservoirs and drainage corridors	0	acres		
b. Buffer zones for natural water bodies	0	acres		
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)	0.76	acres	A	
Project-Specific Open Space (In-project, communal)**	0.09	acres	A_{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00	acres		
b. Buffer zones for natural water bodies	0.00	acres		
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres		**see area example below**
d. Landscape area/park	0.09	acres		
e. Flood Control/Drainage basins	0.00	acres		

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS}$ =	0.67	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	0.88		I
Open Space & Pervious Area LID Credit (Step 1)	$(A_{OS}/A_{CDP}+A_{PSOS}/A)x100$ =	12	pts	





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)		acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits →					0.28	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)	0	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits →					0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.28	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100$ =		42	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement	0.29	acres	Box K1
3. Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porous Pavement)	0.38	acres	Box K2
4. Ratio of Areas (Box K1 / Box K2)	0.76		Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

0.83 — Box K4

6. Enter Efficiency of Porous Pavement (see table below)	0.75		Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6	0.29	acres	Box K6
8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7	0.18	acres	Box K7
9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2			0.28 acres

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	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 Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing 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 EAM 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 managed and enter result in Box L8 This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2	0.00	acres	Box L8

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area | sq ft
Subdrain Elevation | inches
Ponding Depth, inches | inches | 0.00 | acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs | drawdown_hrs_inf
Soil Infiltration Rate, in/hr | soil_inf_rate

Sizing Option 1: Capture Volume, acre-ft | 0.00 | capture_vol_inf | 0.00 | acres

Sizing Option 2: Infiltration BMP surface area, sq ft | 0 | soil_surface_area | 0.00 | acres

Basin or trench? | approximate BMP depth | 0.00 | ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.00 | A_{LIDc}

Runoff Management Credit (Step 3) | A_{LIDC}/A_T*200 = | 0.0 | pts

Total LID Credits (Step 1+2+3) | Warning: More LID Is Required | 53.5

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment | $A_T - A_C - A_{LIDC}$ = | 0.39 | A_{AT}

Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment | A_{AT} / A = | 0.51 | I_A

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 Area

Look up value for i in Table D-2c (Rainfall Intensity) | 0.18 | i

Obtain A_{AT} from Step 3 | 0.39 | A_{AT}

Use C = 0.95 | 0.95 | C

Flow = 0.95 * i * A_{AT} | 0.07 | cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1 | 0.76 | A | 12 | hrs | Specified Draw Down time

Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2. | 0.25 | P_0

Calculate treatment volume (acre-ft):

Treatment volume = A x (P_0 / 12) | 0.016 | Acre-Feet

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Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: DMA 2
Location of project: Sacramento

Fill in Blue Highlighted boxes

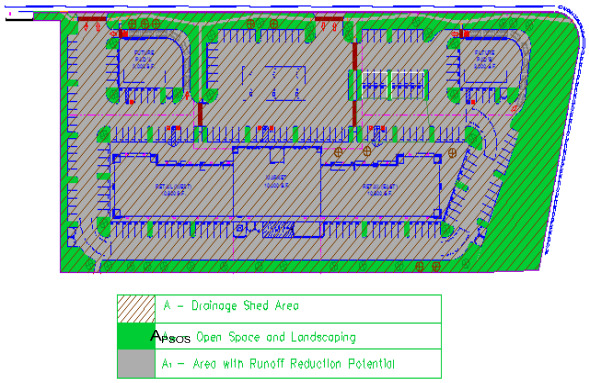
Step 1 - Open Space and Pervious Area Credits

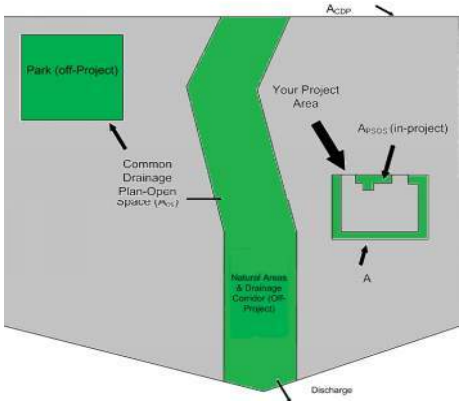
Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

1 a. Common Drainage Plan Area	0	acres	A_{CDP}	
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}	**see area example below**
a. Natural storage reservoirs and drainage corridors	0	acres		
b. Buffer zones for natural water bodies	0	acres		
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)	0.88	acres	A	
Project-Specific Open Space (In-project, communal)**	0.03	acres	A_{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00	acres		
b. Buffer zones for natural water bodies	0.00	acres		
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres		**see area example below**
d. Landscape area/park	0.03	acres		
e. Flood Control/Drainage basins	0.00	acres		

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS}$ =	0.85	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	0.97		I
Open Space & Pervious Area LID Credit (Step 1)	$(A_{OS}/A_{CDP}+A_{PSOS}/A)x100$ =	3	pts	





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)		acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits →					0.32	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)	0	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits →					0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.32	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100$ =		38	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement	0.45	acres	Box K1
3. Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porous Pavement)	0.40	acres	Box K2
4. Ratio of Areas (Box K1 / Box K2)	1.13		Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

0.71 — Box K4

6. Enter Efficiency of Porous Pavement (see table below)	0.75		Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6	0.30	acres	Box K6
8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7	0.24	acres	Box K7
9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2			0.32 acres

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	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 Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing 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 EAM 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 managed and enter result in Box L8 This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2	0.00	acres	Box L8

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area | sq ft
Subdrain Elevation | inches
Ponding Depth, inches | inches | 0.00 | acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs | drawdown_hrs_inf
Soil Infiltration Rate, in/hr | soil_inf_rate

Sizing Option 1: Capture Volume, acre-ft | 0.00 | capture_vol_inf | 0.00 | acres

Sizing Option 2: Infiltration BMP surface area, sq ft | 0 | soil_surface_area | 0.00 | acres

Basin or trench? | approximate BMP depth | 0.00 | ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.00 | A_{LIDc}

Runoff Management Credit (Step 3) | A_{LIDC}/A_T*200 = | 0.0 | pts

Total LID Credits (Step 1+2+3) | Warning: More LID Is Required | 41.5

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment | $A_T - A_C - A_{LIDC}$ = | 0.53 | A_{AT}

Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment | A_{AT} / A = | 0.60 | I_A

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 Area

Look up value for i in Table D-2c (Rainfall Intensity) | 0.18 | i

Obtain A_{AT} from Step 3 | 0.53 | A_{AT}

Use C = 0.95 | 0.95 | C

Flow = 0.95 * i * A_{AT} | 0.09 | cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1 | 0.88 | A | 12 | hrs | Specified Draw Down time

Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2. | 0.29 | P_0

Calculate treatment volume (acre-ft):

Treatment volume = A x (P_0 / 12) | 0.021 | Acre-Feet

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Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: DMA 3
Location of project: Sacramento

Fill in Blue Highlighted boxes

Step 1 - Open Space and Pervious Area Credits

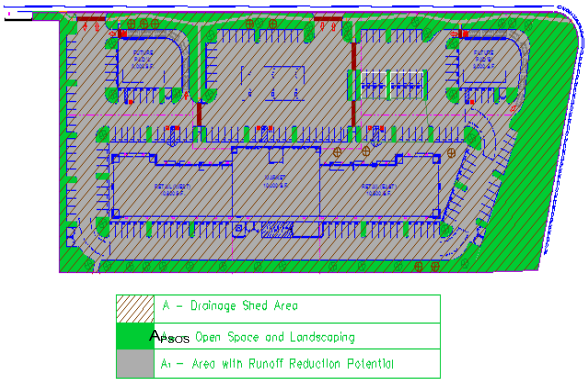
Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

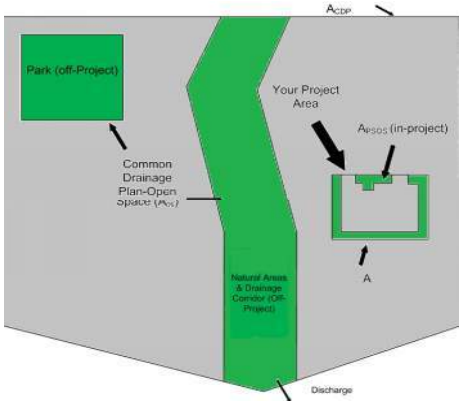
1 a. Common Drainage Plan Area	0	acres	A_{CDP}	
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}	**see area example below**
a. Natural storage reservoirs and drainage corridors	0	acres		
b. Buffer zones for natural water bodies	0	acres		
c. Natural areas including existing trees, other vegetation, 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)	1.31	acres	A	
Project-Specific Open Space (In-project, communal)**	0.02	acres	A_{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00	acres		
b. Buffer zones for natural water bodies	0.00	acres		
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres		**see area example below**
d. Landscape area/park	0.02	acres		
e. Flood Control/Drainage basins	0.00	acres		

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS}$ =	1.29	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	0.98		I

Open Space & Pervious Area LID Credit (Step 1)
$(A_{OS}/A_{CDP}+A_{PSOS}/A)x100$ = 2 pts





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)		acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits →					0.55	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)	0	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits →					0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.55	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100$ =		42	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement	0.50	acres	Box K1
3. Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porous Pavement)	0.80	acres	Box K2
4. Ratio of Areas (Box K1 / Box K2)	0.63		Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

0.83 — Box K4

6. Enter Efficiency of Porous Pavement (see table below)	0.75		Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6	0.60	acres	Box K6
8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7	0.31	acres	Box K7
9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2			0.55 acres

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	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 Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing 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 EAM 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 managed and enter result in Box L8 This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2	0.00	acres	Box L8

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area | sq ft
Subdrain Elevation | inches
Ponding Depth, inches | inches | 0.00 | acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs | drawdown_hrs_inf
Soil Infiltration Rate, in/hr | soil_inf_rate

Sizing Option 1: Capture Volume, acre-ft | 0.00 | capture_vol_inf | 0.00 | acres

Sizing Option 2: Infiltration BMP surface area, sq ft | 0 | soil_surface_area | 0.00 | acres

Basin or trench? | approximate BMP depth | 0.00 | ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.00 | A_{LIDc}

Runoff Management Credit (Step 3) | A_{LIDC}/A_T*200 = | 0.0 | pts

Total LID Credits (Step 1+2+3) | Warning: More LID Is Required | 43.9

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment | $A_T - A_C - A_{LIDC}$ = | 0.74 | A_{AT}

Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment | A_{AT} / A = | 0.57 | I_A

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 Area

Look up value for i in Table D-2c (Rainfall Intensity) | 0.18 | i

Obtain A_{AT} from Step 3 | 0.74 | A_{AT}

Use C = 0.95 | 0.95 | C

Flow = 0.95 * i * A_{AT} | 0.13 | cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1 | 1.31 | A | 12 | hrs | Specified Draw Down time

Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2. | 0.27 | P_0

Calculate treatment volume (acre-ft):

Treatment volume = A x (P_0 / 12) | 0.030 | Acre-Feet

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Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: DMA 4
Location of project: Sacramento

Fill in Blue Highlighted boxes

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 not, skip to 1 b.

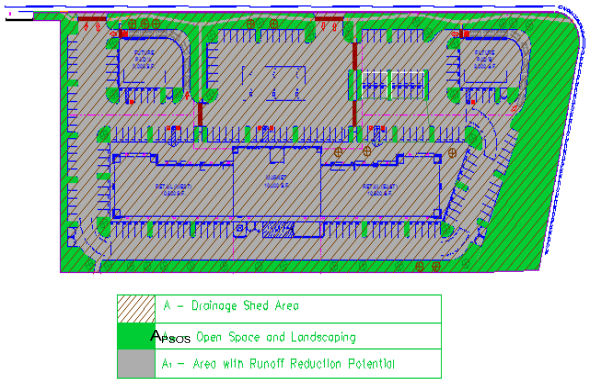
1 a. Common Drainage Plan Area	0	acres	A_{CDP}	
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}	**see area example below**
a. Natural storage reservoirs and drainage corridors	0	acres		
b. Buffer zones for natural water bodies	0	acres		
c. Natural areas including existing trees, other vegetation, 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)	0.65	acres	A	
Project-Specific Open Space (In-project, communal)**	0.00	acres	A_{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00	acres		
b. Buffer zones for natural water bodies	0.00	acres		
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres		**see area example below**
d. Landscape area/park	0.00	acres		
e. Flood Control/Drainage basins	0.00	acres		

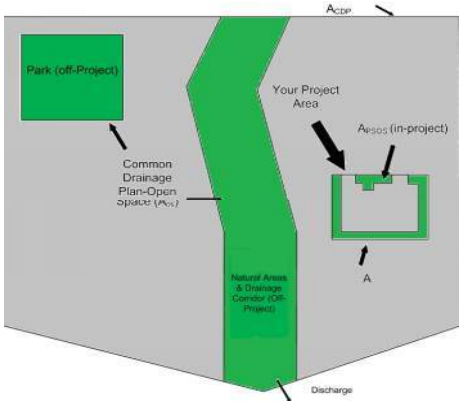
** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS}$ =	0.65	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	1.00		I

Open Space & Pervious Area LID Credit (Step 1)

$(A_{OS}/A_{CDP}+A_{PSOS}/A)x100$ = 0 pts





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)		acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits →					0.27	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)	0	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits →					0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.27	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100$ =		41	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement	0.25	acres	Box K1
3. Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porous Pavement)	0.39	acres	Box K2
4. Ratio of Areas (Box K1 / Box K2)	0.64		Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

0.83 — Box K4

6. Enter Efficiency of Porous Pavement (see table below)	0.75		Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6	0.29	acres	Box K6
8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7	0.16	acres	Box K7
9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2			0.27 acres

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	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 Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing 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 EAM 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 managed and enter result in Box L8 This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2	0.00	acres	Box L8

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area | sq ft
Subdrain Elevation | inches
Ponding Depth, inches | inches | 0.00 | acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs | drawdown_hrs_inf
Soil Infiltration Rate, in/hr | soil_inf_rate

Sizing Option 1: Capture Volume, acre-ft | 0.00 | capture_vol_inf | 0.00 | acres

Sizing Option 2: Infiltration BMP surface area, sq ft | 0 | soil_surface_area | 0.00 | acres

Basin or trench? | approximate BMP depth | 0.00 | ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) Mulched Infiltration Area, sq ft | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.00 | A_{LIDc}

Runoff Management Credit (Step 3) A_{LIDC}/A_T*200 = | 0.0 | pts

Total LID Credits (Step 1+2+3) Warning: More LID Is Required 41.4

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment $A_T - A_C - A_{LIDC}$ = 0.38 A_{AT}

Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment A_{AT} / A = 0.59 I_A

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 Area

Look up value for i in Table D-2c (Rainfall Intensity) | 0.18 | i

Obtain A_{AT} from Step 3 | 0.38 | A_{AT}

Use C = 0.95 | 0.95 | C

Flow = 0.95 * i * A_{AT} | 0.07 | cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1 | 0.65 | A | 12 | hrs | Specified Draw Down time

Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2. | 0.28 | P_0

Calculate treatment volume (acre-ft):

Treatment volume = A x (P_0 / 12) | 0.015 | Acre-Feet

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Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: DMA 5
Location of project: Sacramento

Fill in Blue Highlighted boxes

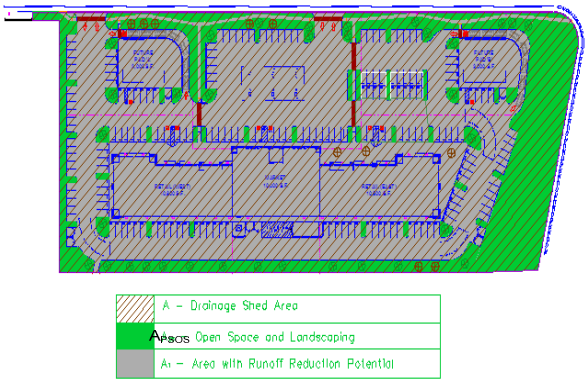
Step 1 - Open Space and Pervious Area Credits

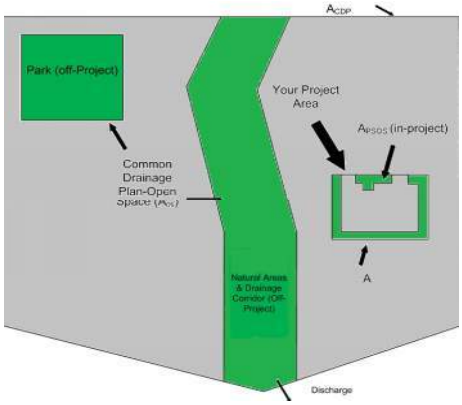
Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

1 a. Common Drainage Plan Area	0	acres	A_{CDP}	
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}	**see area example below**
a. Natural storage reservoirs and drainage corridors	0	acres		
b. Buffer zones for natural water bodies	0	acres		
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)	0.57	acres	A	
Project-Specific Open Space (In-project, communal)**	0.08	acres	A_{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00	acres		
b. Buffer zones for natural water bodies	0.00	acres		
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres		**see area example below**
d. Landscape area/park	0.08	acres		
e. Flood Control/Drainage basins	0.00	acres		

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS}$ =	0.49	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	0.86		I
Open Space & Pervious Area LID Credit (Step 1)	$(A_{OS}/A_{CDP}+A_{PSOS}/A)x100$ =	14	pts	





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)		acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits →					0.21	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)	0	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits →					0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.21	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100$ =		42	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement	0.20	acres	Box K1
3. Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porous Pavement)	0.29	acres	Box K2
4. Ratio of Areas (Box K1 / Box K2)	0.69		Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

0.83 — Box K4

6. Enter Efficiency of Porous Pavement (see table below)	0.75		Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6	0.22	acres	Box K6
8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7	0.12	acres	Box K7
9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2			0.21 acres

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	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 Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing Tree canopy in Box L5.	950	sq. ft.	Box L5
6. Multiply Box L5 by 0.5 and enter the result in Box L6	475	sq. ft.	Box L6

Total Interceptor Tree EAM Credits

Add Boxes L2, L4, and L6 and enter it into Box L7	475	sq. ft.	Box L7
Divide Box L7 by 43,560 and multiply by 20% to get effective area managed and enter result in Box L8 This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2	0.00	acres	Box L8

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area | sq ft
Subdrain Elevation | inches
Ponding Depth, inches | inches | 0.00 | acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs | drawdown_hrs_inf
Soil Infiltration Rate, in/hr | soil_inf_rate

Sizing Option 1: Capture Volume, acre-ft | 0.00 | capture_vol_inf | 0.00 | acres

Sizing Option 2: Infiltration BMP surface area, sq ft | 0 | soil_surface_area | 0.00 | acres

Basin or trench? | approximate BMP depth | 0.00 | ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.00 | A_{LIDc}

Runoff Management Credit (Step 3) | A_{LIDC}/A_T*200 = | 0.0 | pts

Total LID Credits (Step 1+2+3)

Warning: More LID Is Required 56.4

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment | $A_T - A_C - A_{LIDC}$ = | 0.28 | A_{AT}

Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment | A_{AT} / A = | 0.50 | I_A

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 Area

Look up value for i in Table D-2c (Rainfall Intensity) | 0.18 | i

Obtain A_{AT} from Step 3 | 0.28 | A_{AT}

Use C = 0.95 | 0.95 | C

Flow = 0.95 * i * A_{AT} | 0.05 | cfs

Table D-2c

Rainfall Intensity		
Roseville	i =	0.20 in/hr
Sacramento	i =	0.18 in/hr
Folsom	i =	0.20 in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1 | 0.57 | A | 12 | hrs | Specified Draw Down time

Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2. | 0.24 | P_0

Calculate treatment volume (acre-ft):

Treatment volume = A x (P_0 / 12) | 0.011 | Acre-Feet

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Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: DMA 6
Location of project: Sacramento

Fill in Blue Highlighted boxes

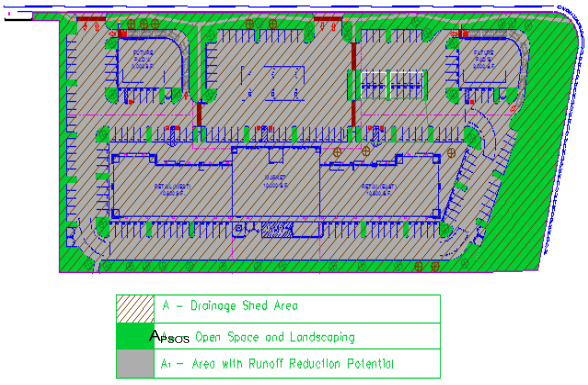
Step 1 - Open Space and Pervious Area Credits

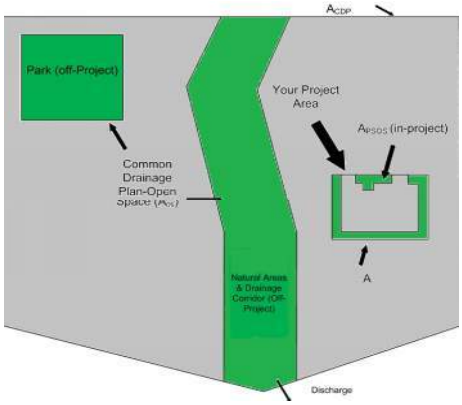
Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

1 a. Common Drainage Plan Area	0	acres	A_{CDP}	
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}	**see area example below**
a. Natural storage reservoirs and drainage corridors	0	acres		
b. Buffer zones for natural water bodies	0	acres		
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)	0.08	acres	A	
Project-Specific Open Space (In-project, communal)**	0.02	acres	A_{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00	acres		
b. Buffer zones for natural water bodies	0.00	acres		
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres		**see area example below**
d. Landscape area/park	0.02	acres		
e. Flood Control/Drainage basins	0.00	acres		

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS}$ =	0.06	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	0.75		I
Open Space & Pervious Area LID Credit (Step 1)				
	$(A_{OS}/A_{CDP}+A_{PSOS}/A)x100$ =	25	pts	





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)		acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits →					0.02	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)	0	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits →					0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.02	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100$ =		41	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement	0.03	acres	Box K1
3. Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porous Pavement)	0.03	acres	Box K2
4. Ratio of Areas (Box K1 / Box K2)	1.00		Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

	0.83		Box K4
6. Enter Efficiency of Porous Pavement (see table below)	0.75		Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6	0.02	acres	Box K6
8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7	0.02	acres	Box K7
9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2			0.02 acres

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	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 Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing 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 EAM 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 managed and enter result in Box L8 This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2	0.00	acres	Box L8

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area | sq ft
Subdrain Elevation | inches
Ponding Depth, inches | inches | 0.00 | acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs | drawdown_hrs_inf
Soil Infiltration Rate, in/hr | soil_inf_rate

Sizing Option 1: Capture Volume, acre-ft | 0.00 | capture_vol_inf | 0.00 | acres

Sizing Option 2: Infiltration BMP surface area, sq ft | 0 | soil_surface_area | 0.00 | acres

Basin or trench? | approximate BMP depth | 0.00 | ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.00 | A_{LIDc}

Runoff Management Credit (Step 3) | A_{LIDC}/A_T*200 = | 0.0 | pts

Total LID Credits (Step 1+2+3) | Warning: More LID Is Required | 66.2

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment | $A_T - A_C - A_{LIDC}$ = | 0.04 | A_{AT}

Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment | A_{AT} / A = | 0.44 | I_A

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 Area

Look up value for i in Table D-2c (Rainfall Intensity) | 0.18 | i

Obtain A_{AT} from Step 3 | 0.04 | A_{AT}

Use C = 0.95 | 0.95 | C

Flow = 0.95 * i * A_{AT} | 0.01 | cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1 | 0.08 | A | 12 | hrs | Specified Draw Down time

Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2. | 0.22 | P_0

Calculate treatment volume (acre-ft):

Treatment volume = A x (P_0 / 12) | 0.001 | Acre-Feet

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Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: DMA 7
Location of project: Sacramento

Fill in Blue Highlighted boxes

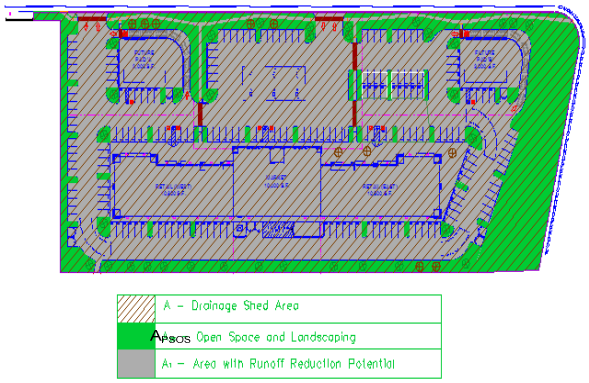
Step 1 - Open Space and Pervious Area Credits

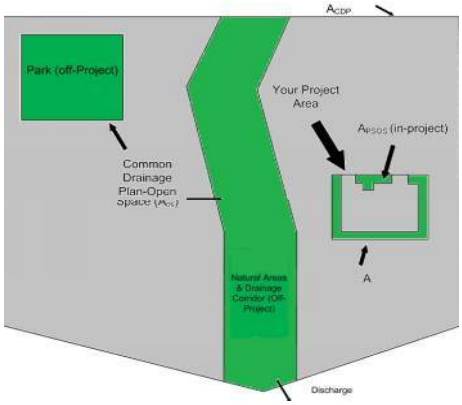
Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

1 a. Common Drainage Plan Area	0	acres	A_{CDP}	
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}	**see area example below**
a. Natural storage reservoirs and drainage corridors	0	acres		
b. Buffer zones for natural water bodies	0	acres		
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)	2.85	acres	A	
Project-Specific Open Space (In-project, communal)**	0.99	acres	A_{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00	acres		
b. Buffer zones for natural water bodies	0.00	acres		
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres		**see area example below**
d. Landscape area/park	0.99	acres		
e. Flood Control/Drainage basins	0.00	acres		

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS}$ =	1.86	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	0.65		I
Open Space & Pervious Area LID Credit (Step 1)	$(A_{OS}/A_{CDP}+A_{PSOS}/A)x100$ =	35	pts	





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)		acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits →					0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)	0	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits →					0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.00	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100$ =		0	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement		acres	Box K1
3. Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porous Pavement)		acres	Box K2
4. Ratio of Areas (Box K1 / Box K2)	0.00		Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

	1		Box K4
6. Enter Efficiency of Porous Pavement (see table below)			Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6	0.00	acres	Box K6
8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7	0.00	acres	Box K7
9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2			0.00 acres

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	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 Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing 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 EAM 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 managed and enter result in Box L8 This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2	0.00	acres	Box L8

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area	5,360	sq ft	
Subdrain Elevation	18	inches	
Ponding Depth, inches	12	inches	1.84 acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs		drawdown_hrs_inf	
Soil Infiltration Rate, in/hr		soil_inf_rate	
Sizing Option 1: Capture Volume, acre-ft	0.00	capture_vol_inf	0.00 acres
Sizing Option 2: Infiltration BMP surface area, sq ft	0	soil_surface_area	0.00 acres

Basin or trench? | approximate BMP depth 0.00 ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | | mulch_area | 0.00 acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 1.84 | A_{LIDc}

Runoff Management Credit (Step 3) | A_{LIDC}/A_T*200 = | 197.0 | pts

Total LID Credits (Step 1+2+3) LID compliant, check for treatment sizing in Step 4 231.6

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment	$A_T - A_C - A_{LIDC}$ =	0.03	A_{AT}
Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment	A_{AT} / A =	0.01	I_A

STOP: No additional treatment needed

Step 4a Treatment - Flow-Based (Rational Method)

Calculate treatment flow (cfs): Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18	i
Obtain A_{AT} from Step 3	0.03	A_{AT}
Use C = 0.95	0.95	C
Flow = 0.95 * i * A_{AT}	0.00	cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1	2.85	A	12 hrs	Specified Draw Down time
Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2.	0.00	P_0		
Calculate treatment volume (acre-ft): **Treatment volume = A x (P_0 / 12)**	0.00	Acre-Feet		

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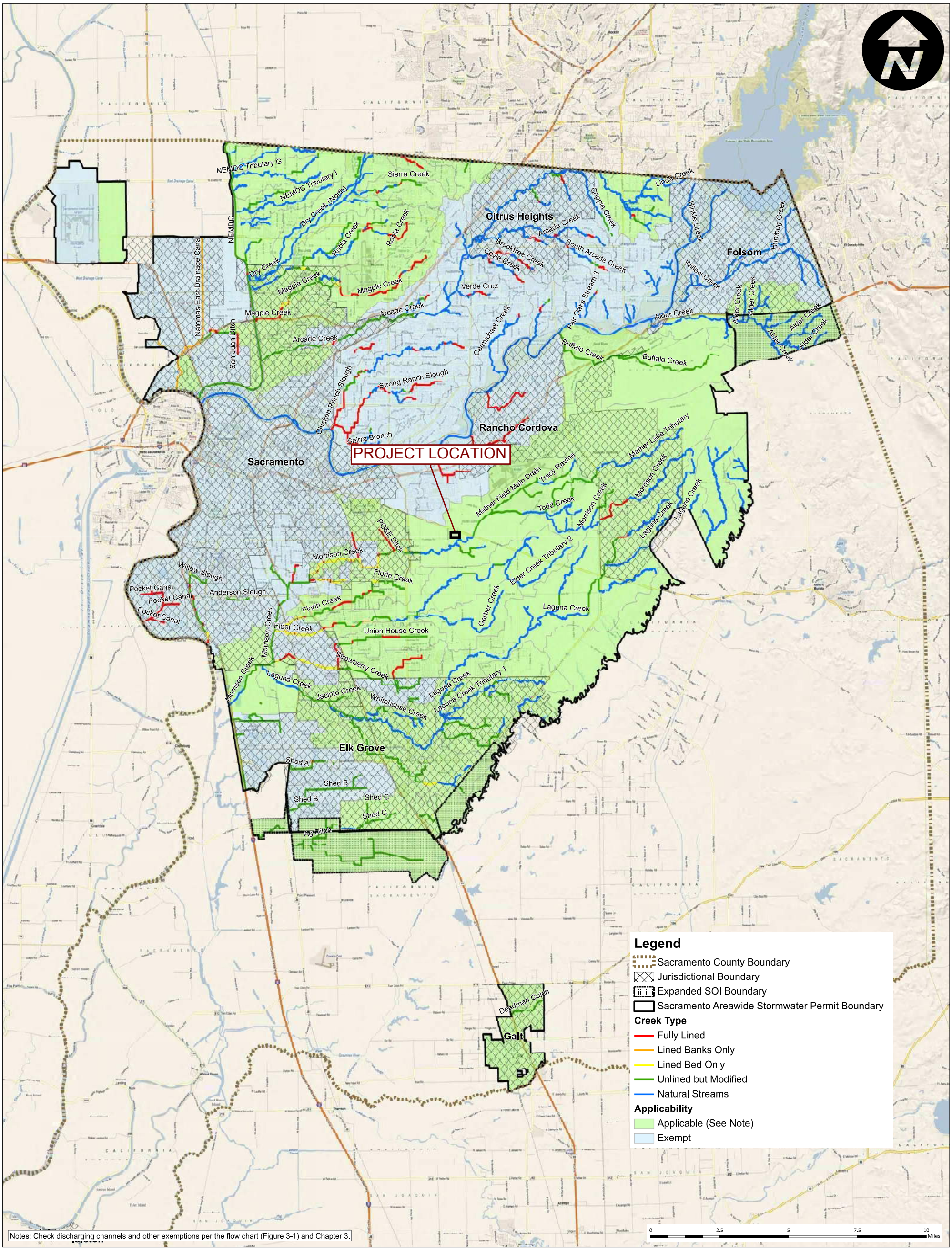
APPENDIX H:

Hydromodification Map



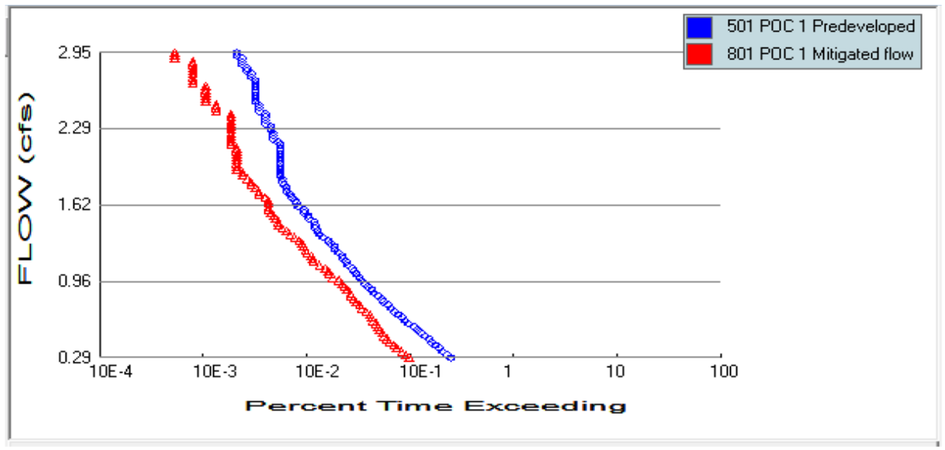
Notes: Check discharging channels and other exemptions per the flow chart (Figure 3-1) and Chapter 3.

APPENDIX I:

SAHM Project Report

SAHM Summary

						Porous Gravel						Bioretention Basin									
Development Condition	Shed	Area (Ac)	Pervious Area (HSG C, Grass Flat (0-1%)), ac	Pervious Area (HSG C, Grass Mod (1-2%)), ac	Impervious, Flat (0-1%), ac	Area, sf	Length, ft	Width, ft	Bottom Slope, ft/ft	Gravel Depth, ft	Sand Depth, ft	Basin Width,ft	Basin Length, ft	Bottom Area, sf	Underdrain Diameter, ft	Underdrain Orifice Diameter, in	Underdrain Orifice Offset, in	Riser Diameter, in	Riser Height, ft	Riser Orifice Diameter, in	Riser Orifice Height, ft
Pre-Project	ExShed	7.10	6.96	-	0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mitigated	DMA 1	0.76	-	0.09	0.29	16335	180.00	90.75	0.01	1.00	0.58	-	-	-	-	-	-	-	-	-	-
	DMA 2	0.88	-	0.03	0.45	17433	440.24	39.60	0.01	1.00	0.58	-	-	-	-	-	-	-	-	-	-
	DMA 3	1.31	-	0.02	0.50	34713	467.33	74.28	0.01	1.00	0.58	-	-	-	-	-	-	-	-	-	-
	DMA 4	0.65	-	0.00	0.25	17135	540.53	31.70	0.01	1.00	0.58	-	-	-	-	-	-	-	-	-	-
	DMA 5	0.57	-	0.08	0.20	12759	321.87	39.64	0.01	1.00	0.58	-	-	-	-	-	-	-	-	-	-
	DMA 6	0.08	-	0.02	0.03	1156	38.37	30.14	0.01	1.00	0.58	-	-	-	-	-	-	-	-	-	-
	DMA 7	2.85	-	1.11	1.74	-	-	-	-	-	-	8.00	660	5324	0.33	3.25	5.0	36.0	1.00	6.0	1.00



Layer 1 6" Sandy Loam
Layer 2 18" Amended Soil 5 in/hr
Layer 3 9" Gravel

SAHM

PROJECT REPORT

General Model Information

Project Name:	Bradshaw & Jackson
Site Name:	
Site Address:	
City:	
Report Date:	3/27/2024
Gage:	RANCHO C
Data Start:	1961/10/01
Data End:	2004/09/30
Timestep:	Hourly
Precip Scale:	0.944
Version Date:	2021/03/09

POC Thresholds

Low Flow Threshold for POC1:	25 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Pre-Project Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
D,Grass,Flat(0-1%)	6.96
Pervious Total	6.96

Impervious Land Use	acre
Imperv,Flat(0-1%)	0.14
Impervious Total	0.14
Basin Total	7.1

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

DMA 7 Basin

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C,Grass,Mod (1-2%)	1.66
Pervious Total	1.66

Impervious Land Use	acre
Imperv,Flat(0-1%)	1.19
Impervious Total	1.19
Basin Total	2.85

Element Flows To:

Surface	Interflow	Groundwater
Surface Bioretention	Surface Bioretention	

DMA 1 Lateral Basin

Bypass: No

GroundWater: No

Pervious Land Use	acre
C,Grass,Mod (1-2%)	.09

Element Flows To:

Surface	Interflow	Groundwater
DMA 1 Porous Pavement	DMA 1 Porous Pavement	

DMA 1 Lateral I Basin

Bypass:	No
Impervious Land Use	acre
Imperv,Flat(0-1%)	0.29

Element Flows To:

Outlet 1	Outlet 2
DMA 1 Porous Pavement	

DMA 2 Lateral I Basin

Bypass:	No
Impervious Land Use	acre
Imperv,Flat(0-1%)	0.45

Element Flows To:

Outlet 1	Outlet 2
DMA 2 Porous Pavement	

DMA 2 Lateral Basin

Bypass: No

GroundWater: No

Pervious Land Use	acre
C,Grass,Mod (1-2%)	.03

Element Flows To:

Surface	Interflow	Groundwater
DMA 2 Porous Pavement	DMA 2 Porous Pavement	

DMA 3 Lateral I Basin

Bypass:	No
Impervious Land Use	acre
Imperv,Flat(0-1%)	0.5

Element Flows To:

Outlet 1	Outlet 2

DMA 3 Porous Pavement

DMA 3 Lateral Basin

Bypass: No

GroundWater: No

Pervious Land Use	acre
C,Grass,Mod (1-2%)	.02

Element Flows To:

Surface	Interflow	Groundwater
DMA 3 Porous Pavement	DMA 3 Porous Pavement	

DMA 4 Lateral I Basin

Bypass:	No
Impervious Land Use	acre
Imperv,Flat(0-1%)	0.25

Element Flows To:

Outlet 1	Outlet 2
DMA 4 Porous Pavement	

DMA 5 Lateral I Basin

Bypass:	No
Impervious Land Use	acre
Imperv,Flat(0-1%)	0.2

Element Flows To:

Outlet 1	Outlet 2
DMA 5 Porous Pavement	

DMA 5 Lateral Basin

Bypass: No

GroundWater: No

Pervious Land Use	acre
C,Grass,Mod (1-2%)	.08

Element Flows To:

Surface	Interflow	Groundwater
DMA 5 Porous Pavement	DMA 5 Porous Pavement	

DMA 6 Lateral I Basin

Bypass:	No
Impervious Land Use	acre
Imperv,Flat(0-1%)	0.03

Element Flows To:

Outlet 1	Outlet 2
DMA 6 Porous Pavement	

DMA 6 Lateral Basin

Bypass: No

GroundWater: No

Pervious Land Use	acre
C,Grass,Mod (1-2%)	.02

Element Flows To:

Surface	Interflow	Groundwater
DMA 6 Porous Pavement	DMA 6 Porous Pavement	

Mitigated Routing

Bioretention Bioretention

Bottom Length:	660.00 ft.
Bottom Width:	8.00 ft.
Material thickness of first layer:	0.5
Material type for first layer:	Sandy loam
Material thickness of second layer:	1.5
Material type for second layer:	Amended 5 in/hr
Material thickness of third layer:	0.75
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.33
Orifice Diameter (in.):	3.25
Offset (in.):	5
Flow Through Underdrain (ac-ft.):	292.7
Total Outflow (ac-ft.):	305.802
Percent Through Underdrain:	95.72
Discharge Structure	
Riser Height:	1 ft.
Riser Diameter:	36 in.
Element Flows To:	
Outlet 1	Outlet 2

Landscape Swale Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.3712	0.0000	0.0000	0.0000
0.0467	0.3675	0.0023	0.0000	0.0000
0.0934	0.3632	0.0047	0.0000	0.0000
0.1401	0.3590	0.0072	0.0000	0.0000
0.1868	0.3547	0.0097	0.0000	0.0000
0.2335	0.3505	0.0124	0.0000	0.0000
0.2802	0.3462	0.0151	0.0000	0.0000
0.3269	0.3420	0.0179	0.0000	0.0000
0.3736	0.3377	0.0208	0.0000	0.0000
0.4203	0.3335	0.0237	0.0000	0.0000
0.4670	0.3293	0.0267	0.0000	0.0000
0.5137	0.3250	0.0300	0.0000	0.0000
0.5604	0.3208	0.0333	0.0000	0.0000
0.6071	0.3165	0.0367	0.0000	0.0000
0.6538	0.3123	0.0403	0.0000	0.0000
0.7005	0.3080	0.0438	0.0000	0.0000
0.7473	0.3038	0.0475	0.0000	0.0000
0.7940	0.2995	0.0513	0.0000	0.0000
0.8407	0.2953	0.0551	0.0000	0.0000
0.8874	0.2910	0.0590	0.0000	0.0000
0.9341	0.2868	0.0630	0.0000	0.0000
0.9808	0.2826	0.0671	0.0000	0.0000
1.0275	0.2783	0.0713	0.0000	0.0000
1.0742	0.2741	0.0755	0.0000	0.0000
1.1209	0.2698	0.0799	0.0000	0.0000
1.1676	0.2656	0.0843	0.0000	0.0000
1.2143	0.2613	0.0888	0.0000	0.0000
1.2610	0.2571	0.0934	0.0000	0.0000
1.3077	0.2528	0.0980	0.0000	0.0000

1.3544	0.2486	0.1028	0.0000	0.0000
1.4011	0.2443	0.1076	0.0000	0.0000
1.4478	0.2401	0.1125	0.0000	0.0000
1.4945	0.2358	0.1175	0.0000	0.0000
1.5412	0.2316	0.1226	0.0000	0.0000
1.5879	0.2274	0.1278	0.0000	0.0000
1.6346	0.2231	0.1330	0.0000	0.0000
1.6813	0.2189	0.1384	0.0000	0.0000
1.7280	0.2146	0.1438	0.0000	0.0000
1.7747	0.2104	0.1493	0.0000	0.0000
1.8214	0.2061	0.1549	0.0000	0.0000
1.8681	0.2019	0.1605	0.0000	0.0000
1.9148	0.1976	0.1663	0.0000	0.0000
1.9615	0.1934	0.1721	0.0000	0.0000
2.0082	0.1891	0.1780	0.0000	0.0000
2.0549	0.1849	0.1839	0.0000	0.0000
2.1016	0.1807	0.1899	0.0000	0.0000
2.1484	0.1764	0.1960	0.0136	0.0000
2.1951	0.1722	0.2022	0.0203	0.0000
2.2418	0.1679	0.2084	0.0361	0.0000
2.2885	0.1637	0.2148	0.0440	0.0000
2.3352	0.1594	0.2212	0.0561	0.0000
2.3819	0.1552	0.2277	0.0621	0.0000
2.4286	0.1509	0.2343	0.0651	0.0000
2.4753	0.1467	0.2410	0.0666	0.0000
2.5220	0.1424	0.2477	0.0725	0.0000
2.5687	0.1382	0.2545	0.0864	0.0000
2.6154	0.1339	0.2615	0.1023	0.0000
2.6621	0.1297	0.2685	0.1181	0.0000
2.7088	0.1255	0.2755	0.1331	0.0000
2.7500	0.1212	0.2819	0.4362	0.0000

Landscape Swale Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.7500	0.3712	0.2819	0.0000	0.2878	0.0000
2.7967	0.3755	0.2993	0.0000	0.2878	0.0000
2.8434	0.3797	0.3169	0.0000	0.3415	0.0000
2.8901	0.3839	0.3348	0.0000	0.3684	0.0000
2.9368	0.3882	0.3528	0.0000	0.3953	0.0000
2.9835	0.3924	0.3710	0.0000	0.4221	0.0000
3.0302	0.3967	0.3894	0.0000	0.4490	0.0000
3.0769	0.4009	0.4081	0.0000	0.4759	0.0000
3.1236	0.4052	0.4269	0.0000	0.5028	0.0000
3.1703	0.4094	0.4459	0.0000	0.5297	0.0000
3.2170	0.4137	0.4651	0.0000	0.5565	0.0000
3.2637	0.4179	0.4846	0.0000	0.5834	0.0000
3.3104	0.4222	0.5042	0.0000	0.6103	0.0000
3.3571	0.4264	0.5240	0.0000	0.6372	0.0000
3.4038	0.4307	0.5440	0.0000	0.6640	0.0000
3.4505	0.4349	0.5642	0.0000	0.6909	0.0000
3.4973	0.4391	0.5846	0.0000	0.7178	0.0000
3.5440	0.4434	0.6052	0.0000	0.7447	0.0000
3.5907	0.4476	0.6260	0.0000	0.7716	0.0000
3.6374	0.4519	0.6470	0.0000	0.7984	0.0000
3.6841	0.4561	0.6683	0.0000	0.8253	0.0000
3.7308	0.4604	0.6897	0.0000	0.8522	0.0000
3.7775	0.4646	0.7113	0.1450	0.8791	0.0000
3.8242	0.4689	0.7331	0.6429	0.9059	0.0000

3.8709	0.4731	0.7550	1.3367	0.9328	0.0000
3.9176	0.4774	0.7772	2.1804	0.9597	0.0000
3.9643	0.4816	0.7996	3.1493	0.9866	0.0000
4.0110	0.4858	0.8222	4.2264	1.0135	0.0000
4.0577	0.4901	0.8450	5.3980	1.0403	0.0000
4.1044	0.4943	0.8680	6.6519	1.0672	0.0000
4.1511	0.4986	0.8912	7.9768	1.0941	0.0000
4.1978	0.5028	0.9146	9.3612	1.1210	0.0000
4.2445	0.5071	0.9382	10.794	1.1478	0.0000
4.2500	0.5076	0.9409	12.264	1.1510	0.0000

Surface Bioretention

Element Flows To:

Outlet 1	Outlet 2
Bioretention	Bioretention

DMA 1 Porous Pavement

Pavement Area:0.3750 acre.Pavement Length:180.00 ft.
Pavement Width: 90.75 ft.
Pavement slope 1:0.01 To 1
Pavement thickness: 1
Pour Space of Pavement: 0.35
Material thickness of second layer: 0.58
Pour Space of material for second layer: 0.35
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Element Flows To:
Outlet 1 Outlet 2
Surface Bioretention

Porous Pavement Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.375	0.000	0.000	0.000
0.0203	0.375	0.002	0.061	0.000
0.0407	0.375	0.005	0.087	0.000
0.0610	0.375	0.008	0.107	0.000
0.0813	0.375	0.010	0.123	0.000
0.1017	0.375	0.013	0.138	0.000
0.1220	0.375	0.016	0.151	0.000
0.1423	0.375	0.018	0.163	0.000
0.1627	0.375	0.021	0.175	0.000
0.1830	0.375	0.024	0.185	0.000
0.2033	0.375	0.026	0.195	0.000
0.2237	0.375	0.029	0.205	0.000
0.2440	0.375	0.032	0.214	0.000
0.2643	0.375	0.034	0.223	0.000
0.2847	0.375	0.037	0.231	0.000
0.3050	0.375	0.040	0.239	0.000
0.3253	0.375	0.042	0.247	0.000
0.3457	0.375	0.045	0.255	0.000
0.3660	0.375	0.048	0.262	0.000
0.3863	0.375	0.050	0.269	0.000
0.4067	0.375	0.053	0.276	0.000
0.4270	0.375	0.056	0.283	0.000
0.4473	0.375	0.058	0.290	0.000
0.4677	0.375	0.061	0.296	0.000
0.4880	0.375	0.064	0.303	0.000
0.5083	0.375	0.066	0.309	0.000
0.5287	0.375	0.069	0.315	0.000
0.5490	0.375	0.072	0.321	0.000
0.5693	0.375	0.074	0.327	0.000
0.5897	0.375	0.077	0.333	0.000
0.6100	0.375	0.080	0.339	0.000
0.6303	0.375	0.082	0.344	0.000
0.6507	0.375	0.085	0.350	0.000
0.6710	0.375	0.088	0.355	0.000
0.6913	0.375	0.090	0.361	0.000
0.7117	0.375	0.093	0.366	0.000
0.7320	0.375	0.096	0.371	0.000
0.7523	0.375	0.098	0.376	0.000
0.7727	0.375	0.101	0.381	0.000
0.7930	0.375	0.104	0.386	0.000

0.8133	0.375	0.106	0.391	0.000
0.8337	0.375	0.109	0.396	0.000
0.8540	0.375	0.112	0.401	0.000
0.8743	0.375	0.114	0.406	0.000
0.8947	0.375	0.117	0.410	0.000
0.9150	0.375	0.120	0.415	0.000
0.9353	0.375	0.122	0.419	0.000
0.9557	0.375	0.125	0.424	0.000
0.9760	0.375	0.128	0.428	0.000
0.9963	0.375	0.130	0.433	0.000
1.0167	0.375	0.133	0.437	0.000
1.0370	0.375	0.136	0.442	0.000
1.0573	0.375	0.138	0.446	0.000
1.0777	0.375	0.141	0.450	0.000
1.0980	0.375	0.144	0.455	0.000
1.1183	0.375	0.146	0.459	0.000
1.1387	0.375	0.149	0.463	0.000
1.1590	0.375	0.152	0.467	0.000
1.1793	0.375	0.154	0.471	0.000
1.1997	0.375	0.157	0.475	0.000
1.2200	0.375	0.160	0.479	0.000
1.2403	0.375	0.162	0.483	0.000
1.2607	0.375	0.165	0.487	0.000
1.2810	0.375	0.168	0.491	0.000
1.3013	0.375	0.170	0.495	0.000
1.3217	0.375	0.173	0.499	0.000
1.3420	0.375	0.176	0.503	0.000
1.3623	0.375	0.178	0.506	0.000
1.3827	0.375	0.181	0.510	0.000
1.4030	0.375	0.184	0.514	0.000
1.4233	0.375	0.186	0.518	0.000
1.4437	0.375	0.189	0.521	0.000
1.4640	0.375	0.192	0.525	0.000
1.4843	0.375	0.194	0.529	0.000
1.5047	0.375	0.197	0.532	0.000
1.5250	0.375	0.200	0.536	0.000
1.5453	0.375	0.202	0.539	0.000
1.5657	0.375	0.205	0.543	0.000
1.5860	0.375	0.213	0.546	0.000
1.6063	0.375	0.220	0.550	0.000
1.6267	0.375	0.228	0.553	0.000
1.6470	0.375	0.236	0.557	0.000
1.6673	0.375	0.243	0.560	0.000
1.6877	0.375	0.251	0.564	0.000
1.7080	0.375	0.258	0.567	0.000
1.7283	0.375	0.266	0.570	0.000
1.7487	0.375	0.274	0.574	0.000
1.7690	0.375	0.281	0.577	0.000
1.7893	0.375	0.289	0.580	0.000
1.8097	0.375	0.297	0.584	0.000
1.8300	0.375	0.304	0.587	0.000

DMA 2 Porous Pavement

Pavement Area:0.4002 acre.Pavement Length:440.24 ft.
Pavement Width: 39.60 ft.
Pavement slope 1:0.01 To 1
Pavement thickness: 1
Pour Space of Pavement: 0.35
Material thickness of second layer: 0.58
Pour Space of material for second layer: 0.35
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Element Flows To:
Outlet 1 Outlet 2
Surface Bioretention

Porous Pavement Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.400	0.000	0.000	0.000
0.0203	0.400	0.002	0.061	0.000
0.0407	0.400	0.005	0.087	0.000
0.0610	0.400	0.008	0.107	0.000
0.0813	0.400	0.011	0.123	0.000
0.1017	0.400	0.014	0.138	0.000
0.1220	0.400	0.017	0.151	0.000
0.1423	0.400	0.019	0.163	0.000
0.1627	0.400	0.022	0.175	0.000
0.1830	0.400	0.025	0.185	0.000
0.2033	0.400	0.028	0.195	0.000
0.2237	0.400	0.031	0.205	0.000
0.2440	0.400	0.034	0.214	0.000
0.2643	0.400	0.037	0.223	0.000
0.2847	0.400	0.039	0.231	0.000
0.3050	0.400	0.042	0.239	0.000
0.3253	0.400	0.045	0.247	0.000
0.3457	0.400	0.048	0.255	0.000
0.3660	0.400	0.051	0.262	0.000
0.3863	0.400	0.054	0.269	0.000
0.4067	0.400	0.057	0.276	0.000
0.4270	0.400	0.059	0.283	0.000
0.4473	0.400	0.062	0.290	0.000
0.4677	0.400	0.065	0.296	0.000
0.4880	0.400	0.068	0.303	0.000
0.5083	0.400	0.071	0.309	0.000
0.5287	0.400	0.074	0.315	0.000
0.5490	0.400	0.076	0.321	0.000
0.5693	0.400	0.079	0.327	0.000
0.5897	0.400	0.082	0.333	0.000
0.6100	0.400	0.085	0.339	0.000
0.6303	0.400	0.088	0.344	0.000
0.6507	0.400	0.091	0.350	0.000
0.6710	0.400	0.094	0.355	0.000
0.6913	0.400	0.096	0.361	0.000
0.7117	0.400	0.099	0.366	0.000
0.7320	0.400	0.102	0.371	0.000
0.7523	0.400	0.105	0.376	0.000
0.7727	0.400	0.108	0.381	0.000
0.7930	0.400	0.111	0.386	0.000

0.8133	0.400	0.113	0.391	0.000
0.8337	0.400	0.116	0.396	0.000
0.8540	0.400	0.119	0.401	0.000
0.8743	0.400	0.122	0.406	0.000
0.8947	0.400	0.125	0.410	0.000
0.9150	0.400	0.128	0.415	0.000
0.9353	0.400	0.131	0.419	0.000
0.9557	0.400	0.133	0.424	0.000
0.9760	0.400	0.136	0.428	0.000
0.9963	0.400	0.139	0.433	0.000
1.0167	0.400	0.142	0.437	0.000
1.0370	0.400	0.145	0.442	0.000
1.0573	0.400	0.148	0.446	0.000
1.0777	0.400	0.151	0.450	0.000
1.0980	0.400	0.153	0.455	0.000
1.1183	0.400	0.156	0.459	0.000
1.1387	0.400	0.159	0.463	0.000
1.1590	0.400	0.162	0.467	0.000
1.1793	0.400	0.165	0.471	0.000
1.1997	0.400	0.168	0.475	0.000
1.2200	0.400	0.170	0.479	0.000
1.2403	0.400	0.173	0.483	0.000
1.2607	0.400	0.176	0.487	0.000
1.2810	0.400	0.179	0.491	0.000
1.3013	0.400	0.182	0.495	0.000
1.3217	0.400	0.185	0.499	0.000
1.3420	0.400	0.188	0.503	0.000
1.3623	0.400	0.190	0.506	0.000
1.3827	0.400	0.193	0.510	0.000
1.4030	0.400	0.196	0.514	0.000
1.4233	0.400	0.199	0.518	0.000
1.4437	0.400	0.202	0.521	0.000
1.4640	0.400	0.205	0.525	0.000
1.4843	0.400	0.207	0.529	0.000
1.5047	0.400	0.210	0.532	0.000
1.5250	0.400	0.213	0.536	0.000
1.5453	0.400	0.216	0.539	0.000
1.5657	0.400	0.219	0.543	0.000
1.5860	0.400	0.227	0.546	0.000
1.6063	0.400	0.235	0.550	0.000
1.6267	0.400	0.243	0.553	0.000
1.6470	0.400	0.251	0.557	0.000
1.6673	0.400	0.260	0.560	0.000
1.6877	0.400	0.268	0.564	0.000
1.7080	0.400	0.276	0.567	0.000
1.7283	0.400	0.284	0.570	0.000
1.7487	0.400	0.292	0.574	0.000
1.7690	0.400	0.300	0.577	0.000
1.7893	0.400	0.308	0.580	0.000
1.8097	0.400	0.317	0.584	0.000
1.8300	0.400	0.325	0.587	0.000

DMA 3 Porous Pavement

Pavement Area:0.7969 acre.Pavement Length:467.33 ft.
Pavement Width: 74.28 ft.
Pavement slope 1:0.01 To 1
Pavement thickness: 1
Pour Space of Pavement: 0.35
Material thickness of second layer: 0.58
Pour Space of material for second layer: 0.35
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Element Flows To:
Outlet 1 Outlet 2
Surface Bioretention

Porous Pavement Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.796	0.000	0.000	0.000
0.0203	0.796	0.005	0.061	0.000
0.0407	0.796	0.011	0.087	0.000
0.0610	0.796	0.017	0.107	0.000
0.0813	0.796	0.022	0.123	0.000
0.1017	0.796	0.028	0.138	0.000
0.1220	0.796	0.034	0.151	0.000
0.1423	0.796	0.039	0.163	0.000
0.1627	0.796	0.045	0.175	0.000
0.1830	0.796	0.051	0.185	0.000
0.2033	0.796	0.056	0.195	0.000
0.2237	0.796	0.062	0.205	0.000
0.2440	0.796	0.068	0.214	0.000
0.2643	0.796	0.073	0.223	0.000
0.2847	0.796	0.079	0.231	0.000
0.3050	0.796	0.085	0.239	0.000
0.3253	0.796	0.090	0.247	0.000
0.3457	0.796	0.096	0.255	0.000
0.3660	0.796	0.102	0.262	0.000
0.3863	0.796	0.107	0.269	0.000
0.4067	0.796	0.113	0.276	0.000
0.4270	0.796	0.119	0.283	0.000
0.4473	0.796	0.124	0.290	0.000
0.4677	0.796	0.130	0.296	0.000
0.4880	0.796	0.136	0.303	0.000
0.5083	0.796	0.141	0.309	0.000
0.5287	0.796	0.147	0.315	0.000
0.5490	0.796	0.153	0.321	0.000
0.5693	0.796	0.158	0.327	0.000
0.5897	0.796	0.164	0.333	0.000
0.6100	0.796	0.170	0.339	0.000
0.6303	0.796	0.175	0.344	0.000
0.6507	0.796	0.181	0.350	0.000
0.6710	0.796	0.187	0.355	0.000
0.6913	0.796	0.192	0.361	0.000
0.7117	0.796	0.198	0.366	0.000
0.7320	0.796	0.204	0.371	0.000
0.7523	0.796	0.209	0.376	0.000
0.7727	0.796	0.215	0.381	0.000
0.7930	0.796	0.221	0.386	0.000

0.8133	0.796	0.226	0.391	0.000
0.8337	0.796	0.232	0.396	0.000
0.8540	0.796	0.238	0.401	0.000
0.8743	0.796	0.243	0.406	0.000
0.8947	0.796	0.249	0.410	0.000
0.9150	0.796	0.255	0.415	0.000
0.9353	0.796	0.260	0.419	0.000
0.9557	0.796	0.266	0.424	0.000
0.9760	0.796	0.272	0.428	0.000
0.9963	0.796	0.277	0.433	0.000
1.0167	0.796	0.283	0.437	0.000
1.0370	0.796	0.289	0.442	0.000
1.0573	0.796	0.294	0.446	0.000
1.0777	0.796	0.300	0.450	0.000
1.0980	0.796	0.306	0.455	0.000
1.1183	0.796	0.311	0.459	0.000
1.1387	0.796	0.317	0.463	0.000
1.1590	0.796	0.323	0.467	0.000
1.1793	0.796	0.328	0.471	0.000
1.1997	0.796	0.334	0.475	0.000
1.2200	0.796	0.340	0.479	0.000
1.2403	0.796	0.346	0.483	0.000
1.2607	0.797	0.351	0.487	0.000
1.2810	0.797	0.357	0.491	0.000
1.3013	0.797	0.363	0.495	0.000
1.3217	0.797	0.368	0.499	0.000
1.3420	0.797	0.374	0.503	0.000
1.3623	0.797	0.380	0.506	0.000
1.3827	0.797	0.385	0.510	0.000
1.4030	0.797	0.391	0.514	0.000
1.4233	0.797	0.397	0.518	0.000
1.4437	0.797	0.402	0.521	0.000
1.4640	0.797	0.408	0.525	0.000
1.4843	0.797	0.414	0.529	0.000
1.5047	0.797	0.419	0.532	0.000
1.5250	0.797	0.425	0.536	0.000
1.5453	0.797	0.431	0.539	0.000
1.5657	0.797	0.436	0.543	0.000
1.5860	0.797	0.452	0.546	0.000
1.6063	0.797	0.469	0.550	0.000
1.6267	0.797	0.485	0.553	0.000
1.6470	0.797	0.501	0.557	0.000
1.6673	0.797	0.517	0.560	0.000
1.6877	0.797	0.533	0.564	0.000
1.7080	0.797	0.550	0.567	0.000
1.7283	0.797	0.566	0.570	0.000
1.7487	0.797	0.582	0.574	0.000
1.7690	0.797	0.598	0.577	0.000
1.7893	0.797	0.615	0.580	0.000
1.8097	0.797	0.631	0.584	0.000
1.8300	0.797	0.647	0.587	0.000

DMA 4 Porous Pavement

Pavement Area:0.3934 acre.Pavement Length:540.53 ft.
Pavement Width: 31.70 ft.
Pavement slope 1:0.01 To 1
Pavement thickness: 1
Pour Space of Pavement: 0.35
Material thickness of second layer: 0.58
Pour Space of material for second layer: 0.35
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Element Flows To:
Outlet 1 Outlet 2
Surface Bioretention

Porous Pavement Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.393	0.000	0.000	0.000
0.0203	0.393	0.002	0.061	0.000
0.0407	0.393	0.005	0.087	0.000
0.0610	0.393	0.008	0.107	0.000
0.0813	0.393	0.011	0.123	0.000
0.1017	0.393	0.014	0.138	0.000
0.1220	0.393	0.016	0.151	0.000
0.1423	0.393	0.019	0.163	0.000
0.1627	0.393	0.022	0.175	0.000
0.1830	0.393	0.025	0.185	0.000
0.2033	0.393	0.028	0.195	0.000
0.2237	0.393	0.030	0.205	0.000
0.2440	0.393	0.033	0.214	0.000
0.2643	0.393	0.036	0.223	0.000
0.2847	0.393	0.039	0.231	0.000
0.3050	0.393	0.042	0.239	0.000
0.3253	0.393	0.044	0.247	0.000
0.3457	0.393	0.047	0.255	0.000
0.3660	0.393	0.050	0.262	0.000
0.3863	0.393	0.053	0.269	0.000
0.4067	0.393	0.056	0.276	0.000
0.4270	0.393	0.058	0.283	0.000
0.4473	0.393	0.061	0.290	0.000
0.4677	0.393	0.064	0.296	0.000
0.4880	0.393	0.067	0.303	0.000
0.5083	0.393	0.070	0.309	0.000
0.5287	0.393	0.072	0.315	0.000
0.5490	0.393	0.075	0.321	0.000
0.5693	0.393	0.078	0.327	0.000
0.5897	0.393	0.081	0.333	0.000
0.6100	0.393	0.084	0.339	0.000
0.6303	0.393	0.086	0.344	0.000
0.6507	0.393	0.089	0.350	0.000
0.6710	0.393	0.092	0.355	0.000
0.6913	0.393	0.095	0.361	0.000
0.7117	0.393	0.098	0.366	0.000
0.7320	0.393	0.100	0.371	0.000
0.7523	0.393	0.103	0.376	0.000
0.7727	0.393	0.106	0.381	0.000
0.7930	0.393	0.109	0.386	0.000

0.8133	0.393	0.112	0.391	0.000
0.8337	0.393	0.114	0.396	0.000
0.8540	0.393	0.117	0.401	0.000
0.8743	0.393	0.120	0.406	0.000
0.8947	0.393	0.123	0.410	0.000
0.9150	0.393	0.126	0.415	0.000
0.9353	0.393	0.128	0.419	0.000
0.9557	0.393	0.131	0.424	0.000
0.9760	0.393	0.134	0.428	0.000
0.9963	0.393	0.137	0.433	0.000
1.0167	0.393	0.140	0.437	0.000
1.0370	0.393	0.142	0.442	0.000
1.0573	0.393	0.145	0.446	0.000
1.0777	0.393	0.148	0.450	0.000
1.0980	0.393	0.151	0.455	0.000
1.1183	0.393	0.154	0.459	0.000
1.1387	0.393	0.156	0.463	0.000
1.1590	0.393	0.159	0.467	0.000
1.1793	0.393	0.162	0.471	0.000
1.1997	0.393	0.165	0.475	0.000
1.2200	0.393	0.168	0.479	0.000
1.2403	0.393	0.170	0.483	0.000
1.2607	0.393	0.173	0.487	0.000
1.2810	0.393	0.176	0.491	0.000
1.3013	0.393	0.179	0.495	0.000
1.3217	0.393	0.182	0.499	0.000
1.3420	0.393	0.184	0.503	0.000
1.3623	0.393	0.187	0.506	0.000
1.3827	0.393	0.190	0.510	0.000
1.4030	0.393	0.193	0.514	0.000
1.4233	0.393	0.196	0.518	0.000
1.4437	0.393	0.198	0.521	0.000
1.4640	0.393	0.201	0.525	0.000
1.4843	0.393	0.204	0.529	0.000
1.5047	0.393	0.207	0.532	0.000
1.5250	0.393	0.210	0.536	0.000
1.5453	0.393	0.212	0.539	0.000
1.5657	0.393	0.215	0.543	0.000
1.5860	0.393	0.223	0.546	0.000
1.6063	0.393	0.231	0.550	0.000
1.6267	0.393	0.239	0.553	0.000
1.6470	0.393	0.247	0.557	0.000
1.6673	0.393	0.255	0.560	0.000
1.6877	0.393	0.263	0.564	0.000
1.7080	0.393	0.271	0.567	0.000
1.7283	0.393	0.279	0.570	0.000
1.7487	0.393	0.287	0.574	0.000
1.7690	0.393	0.295	0.577	0.000
1.7893	0.393	0.303	0.580	0.000
1.8097	0.393	0.311	0.584	0.000
1.8300	0.393	0.319	0.587	0.000

DMA 5 Porous Pavement

Pavement Area:0.2929 acre.Pavement Length:321.87 ft.
Pavement Width: 39.64 ft.
Pavement slope 1:0.01 To 1
Pavement thickness: 1
Pour Space of Pavement: 0.35
Material thickness of second layer: 0.58
Pour Space of material for second layer: 0.35
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Element Flows To:
Outlet 1 Outlet 2
Surface Bioretention

Porous Pavement Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.292	0.000	0.000	0.000
0.0203	0.292	0.002	0.061	0.000
0.0407	0.292	0.004	0.087	0.000
0.0610	0.292	0.006	0.107	0.000
0.0813	0.292	0.008	0.123	0.000
0.1017	0.292	0.010	0.138	0.000
0.1220	0.292	0.012	0.151	0.000
0.1423	0.292	0.014	0.163	0.000
0.1627	0.292	0.016	0.175	0.000
0.1830	0.292	0.018	0.185	0.000
0.2033	0.292	0.020	0.195	0.000
0.2237	0.292	0.022	0.205	0.000
0.2440	0.292	0.025	0.214	0.000
0.2643	0.292	0.027	0.223	0.000
0.2847	0.292	0.029	0.231	0.000
0.3050	0.292	0.031	0.239	0.000
0.3253	0.292	0.033	0.247	0.000
0.3457	0.292	0.035	0.255	0.000
0.3660	0.292	0.037	0.262	0.000
0.3863	0.292	0.039	0.269	0.000
0.4067	0.292	0.041	0.276	0.000
0.4270	0.292	0.043	0.283	0.000
0.4473	0.292	0.045	0.290	0.000
0.4677	0.292	0.047	0.296	0.000
0.4880	0.292	0.050	0.303	0.000
0.5083	0.292	0.052	0.309	0.000
0.5287	0.292	0.054	0.315	0.000
0.5490	0.292	0.056	0.321	0.000
0.5693	0.292	0.058	0.327	0.000
0.5897	0.292	0.060	0.333	0.000
0.6100	0.292	0.062	0.339	0.000
0.6303	0.292	0.064	0.344	0.000
0.6507	0.292	0.066	0.350	0.000
0.6710	0.292	0.068	0.355	0.000
0.6913	0.292	0.070	0.361	0.000
0.7117	0.292	0.073	0.366	0.000
0.7320	0.292	0.075	0.371	0.000
0.7523	0.292	0.077	0.376	0.000
0.7727	0.292	0.079	0.381	0.000
0.7930	0.292	0.081	0.386	0.000

0.8133	0.292	0.083	0.391	0.000
0.8337	0.292	0.085	0.396	0.000
0.8540	0.292	0.087	0.401	0.000
0.8743	0.292	0.089	0.406	0.000
0.8947	0.292	0.091	0.410	0.000
0.9150	0.292	0.093	0.415	0.000
0.9353	0.292	0.095	0.419	0.000
0.9557	0.292	0.098	0.424	0.000
0.9760	0.292	0.100	0.428	0.000
0.9963	0.292	0.102	0.433	0.000
1.0167	0.292	0.104	0.437	0.000
1.0370	0.292	0.106	0.442	0.000
1.0573	0.292	0.108	0.446	0.000
1.0777	0.292	0.110	0.450	0.000
1.0980	0.292	0.112	0.455	0.000
1.1183	0.292	0.114	0.459	0.000
1.1387	0.292	0.116	0.463	0.000
1.1590	0.292	0.118	0.467	0.000
1.1793	0.292	0.120	0.471	0.000
1.1997	0.292	0.123	0.475	0.000
1.2200	0.292	0.125	0.479	0.000
1.2403	0.292	0.127	0.483	0.000
1.2607	0.292	0.129	0.487	0.000
1.2810	0.292	0.131	0.491	0.000
1.3013	0.292	0.133	0.495	0.000
1.3217	0.292	0.135	0.499	0.000
1.3420	0.292	0.137	0.503	0.000
1.3623	0.292	0.139	0.506	0.000
1.3827	0.292	0.141	0.510	0.000
1.4030	0.292	0.143	0.514	0.000
1.4233	0.292	0.145	0.518	0.000
1.4437	0.292	0.148	0.521	0.000
1.4640	0.292	0.150	0.525	0.000
1.4843	0.292	0.152	0.529	0.000
1.5047	0.292	0.154	0.532	0.000
1.5250	0.292	0.156	0.536	0.000
1.5453	0.292	0.158	0.539	0.000
1.5657	0.292	0.160	0.543	0.000
1.5860	0.292	0.166	0.546	0.000
1.6063	0.292	0.172	0.550	0.000
1.6267	0.292	0.178	0.553	0.000
1.6470	0.292	0.184	0.557	0.000
1.6673	0.292	0.190	0.560	0.000
1.6877	0.292	0.196	0.564	0.000
1.7080	0.292	0.202	0.567	0.000
1.7283	0.292	0.208	0.570	0.000
1.7487	0.292	0.214	0.574	0.000
1.7690	0.292	0.220	0.577	0.000
1.7893	0.292	0.226	0.580	0.000
1.8097	0.292	0.232	0.584	0.000
1.8300	0.292	0.237	0.587	0.000

DMA 6 Porous Pavement

Pavement Area:0.0265 acre.Pavement Length:38.37 ft.
Pavement Width: 30.14 ft.
Pavement slope 1:0.01 To 1
Pavement thickness: 1
Pour Space of Pavement: 0.35
Material thickness of second layer: 0.58
Pour Space of material for second layer: 0.35
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Element Flows To:
Outlet 1 Outlet 2
Surface Bioretention

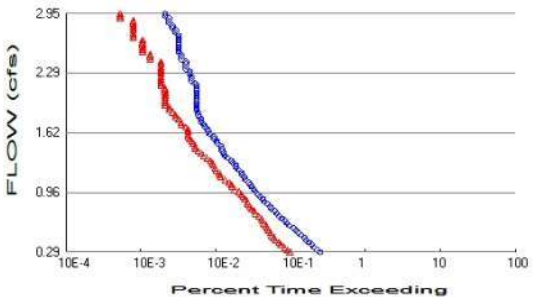
Porous Pavement Hydraulic Table

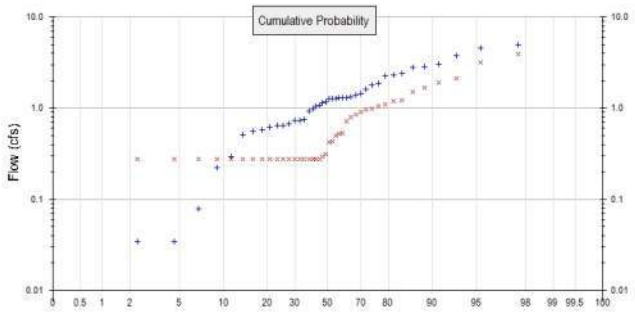
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.026	0.000	0.000	0.000
0.0203	0.026	0.000	0.061	0.000
0.0407	0.026	0.000	0.087	0.000
0.0610	0.026	0.000	0.107	0.000
0.0813	0.026	0.000	0.123	0.000
0.1017	0.026	0.000	0.138	0.000
0.1220	0.026	0.001	0.151	0.000
0.1423	0.026	0.001	0.163	0.000
0.1627	0.026	0.001	0.175	0.000
0.1830	0.026	0.001	0.185	0.000
0.2033	0.026	0.001	0.195	0.000
0.2237	0.026	0.002	0.205	0.000
0.2440	0.026	0.002	0.214	0.000
0.2643	0.026	0.002	0.223	0.000
0.2847	0.026	0.002	0.231	0.000
0.3050	0.026	0.002	0.239	0.000
0.3253	0.026	0.003	0.247	0.000
0.3457	0.026	0.003	0.255	0.000
0.3660	0.026	0.003	0.262	0.000
0.3863	0.026	0.003	0.269	0.000
0.4067	0.026	0.003	0.276	0.000
0.4270	0.026	0.004	0.283	0.000
0.4473	0.026	0.004	0.290	0.000
0.4677	0.026	0.004	0.296	0.000
0.4880	0.026	0.004	0.303	0.000
0.5083	0.026	0.004	0.309	0.000
0.5287	0.026	0.004	0.315	0.000
0.5490	0.026	0.005	0.321	0.000
0.5693	0.026	0.005	0.327	0.000
0.5897	0.026	0.005	0.333	0.000
0.6100	0.026	0.005	0.339	0.000
0.6303	0.026	0.005	0.344	0.000
0.6507	0.026	0.006	0.350	0.000
0.6710	0.026	0.006	0.355	0.000
0.6913	0.026	0.006	0.361	0.000
0.7117	0.026	0.006	0.366	0.000
0.7320	0.026	0.006	0.371	0.000
0.7523	0.026	0.007	0.376	0.000
0.7727	0.026	0.007	0.381	0.000
0.7930	0.026	0.007	0.386	0.000

0.8133	0.026	0.007	0.391	0.000
0.8337	0.026	0.007	0.396	0.000
0.8540	0.026	0.007	0.401	0.000
0.8743	0.026	0.008	0.406	0.000
0.8947	0.026	0.008	0.410	0.000
0.9150	0.026	0.008	0.415	0.000
0.9353	0.026	0.008	0.419	0.000
0.9557	0.026	0.008	0.424	0.000
0.9760	0.026	0.009	0.428	0.000
0.9963	0.026	0.009	0.433	0.000
1.0167	0.026	0.009	0.437	0.000
1.0370	0.026	0.009	0.442	0.000
1.0573	0.026	0.009	0.446	0.000
1.0777	0.026	0.010	0.450	0.000
1.0980	0.026	0.010	0.455	0.000
1.1183	0.026	0.010	0.459	0.000
1.1387	0.026	0.010	0.463	0.000
1.1590	0.026	0.010	0.467	0.000
1.1793	0.026	0.011	0.471	0.000
1.1997	0.026	0.011	0.475	0.000
1.2200	0.026	0.011	0.479	0.000
1.2403	0.026	0.011	0.483	0.000
1.2607	0.026	0.011	0.487	0.000
1.2810	0.026	0.011	0.491	0.000
1.3013	0.026	0.012	0.495	0.000
1.3217	0.026	0.012	0.499	0.000
1.3420	0.026	0.012	0.503	0.000
1.3623	0.026	0.012	0.506	0.000
1.3827	0.026	0.012	0.510	0.000
1.4030	0.026	0.013	0.514	0.000
1.4233	0.026	0.013	0.518	0.000
1.4437	0.026	0.013	0.521	0.000
1.4640	0.026	0.013	0.525	0.000
1.4843	0.026	0.013	0.529	0.000
1.5047	0.026	0.014	0.532	0.000
1.5250	0.026	0.014	0.536	0.000
1.5453	0.026	0.014	0.539	0.000
1.5657	0.026	0.014	0.543	0.000
1.5860	0.026	0.015	0.546	0.000
1.6063	0.026	0.015	0.550	0.000
1.6267	0.026	0.016	0.553	0.000
1.6470	0.026	0.016	0.557	0.000
1.6673	0.026	0.017	0.560	0.000
1.6877	0.026	0.017	0.564	0.000
1.7080	0.026	0.018	0.567	0.000
1.7283	0.026	0.018	0.570	0.000
1.7487	0.026	0.019	0.574	0.000
1.7690	0.026	0.020	0.577	0.000
1.7893	0.026	0.020	0.580	0.000
1.8097	0.026	0.021	0.584	0.000
1.8300	0.026	0.021	0.587	0.000

Analysis Results

POC 1





\+ Pre-Project x Mitigated

Pre-Project Landuse Totals for POC #1
Total Pervious Area: 6.96
Total Impervious Area: 0.14

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.9
Total Impervious Area: 5.19494

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Pre-Project. POC #1

Return Period	**Flow(cfs)**
2 year	1.16484
5 year	2.285182
10 year	2.95431
25 year	4.663007

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.316607
5 year	1.109459
10 year	1.802665
25 year	3.29896

Annual Peaks

Annual Peaks for Pre-Project and Mitigated. POC #1

Year	**Pre-Project**	**Mitigated**
1962	1.311	0.994
1963	0.674	0.274
1964	0.223	0.274
1965	1.267	0.317
1966	0.079	0.274
1967	1.273	1.214
1968	0.515	0.274
1969	1.150	0.435
1970	0.935	0.421
1971	1.387	1.059
1972	0.034	0.274
1973	2.782	0.538
1974	0.992	0.274
1975	1.311	0.274

1976	0.029	0.274
1977	0.034	0.193
1978	1.459	0.504
1979	0.560	0.274
1980	2.330	0.295
1981	0.293	0.274
1982	2.275	1.525
1983	2.833	2.145
1984	1.165	0.843
1985	0.736	0.791
1986	4.619	3.199
1987	0.648	0.274
1988	1.045	0.274
1989	1.601	0.274
1990	1.308	0.274
1991	1.086	0.715
1992	1.789	0.976
1993	1.279	0.520
1994	0.625	0.274
1995	4.941	3.933
1996	3.055	1.088
1997	3.741	1.667
1998	2.434	1.916
1999	0.756	0.274
2000	1.868	1.204
2001	0.644	0.274
2002	0.579	0.274
2003	0.730	0.274
2004	1.341	0.910

Ranked Annual Peaks

Ranked Annual Peaks for Pre-Project and Mitigated. POC #1

Rank	Pre-Project	Mitigated
1	4.9408	3.9327
2	4.6191	3.1989
3	3.7415	2.1449
4	3.0553	1.9158
5	2.8332	1.6669
6	2.7823	1.5249
7	2.4339	1.2138
8	2.3300	1.2039
9	2.2752	1.0885
10	1.8678	1.0593
11	1.7886	0.9937
12	1.6015	0.9759
13	1.4585	0.9101
14	1.3866	0.8431
15	1.3407	0.7911
16	1.3112	0.7151
17	1.3106	0.5376
18	1.3076	0.5204
19	1.2787	0.5043
20	1.2726	0.4349
21	1.2668	0.4209
22	1.1648	0.3166
23	1.1499	0.2946
24	1.0861	0.2742
25	1.0452	0.2742

26	0.9920	0.2742
27	0.9347	0.2742
28	0.7563	0.2742
29	0.7364	0.2742
30	0.7301	0.2742
31	0.6744	0.2742
32	0.6476	0.2742
33	0.6435	0.2742
34	0.6252	0.2742
35	0.5786	0.2742
36	0.5600	0.2742
37	0.5151	0.2742
38	0.2928	0.2742
39	0.2234	0.2742
40	0.0789	0.2742
41	0.0344	0.2741
42	0.0339	0.2741
43	0.0291	0.1929

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.2912	941	368	39	Pass
0.3181	864	338	39	Pass
0.3450	780	312	40	Pass
0.3719	722	279	38	Pass
0.3988	660	264	40	Pass
0.4257	614	239	38	Pass
0.4526	574	228	39	Pass
0.4795	529	212	40	Pass
0.5064	475	202	42	Pass
0.5333	443	189	42	Pass
0.5602	411	183	44	Pass
0.5871	365	178	48	Pass
0.6140	339	167	49	Pass
0.6409	314	159	50	Pass
0.6678	290	153	52	Pass
0.6947	268	142	52	Pass
0.7216	246	128	52	Pass
0.7485	230	123	53	Pass
0.7754	210	112	53	Pass
0.8023	199	108	54	Pass
0.8292	184	103	55	Pass
0.8561	171	100	58	Pass
0.8830	160	93	58	Pass
0.9099	148	87	58	Pass
0.9368	138	82	59	Pass
0.9637	127	77	60	Pass
0.9906	122	68	55	Pass
1.0175	114	62	54	Pass
1.0444	108	61	56	Pass
1.0713	105	57	54	Pass
1.0982	95	50	52	Pass
1.1251	90	44	48	Pass
1.1520	85	43	50	Pass
1.1789	83	42	50	Pass
1.2058	77	38	49	Pass
1.2327	72	37	51	Pass
1.2596	70	35	50	Pass
1.2865	64	34	53	Pass
1.3134	61	32	52	Pass
1.3403	54	29	53	Pass
1.3672	50	26	52	Pass
1.3941	48	24	50	Pass
1.4210	46	22	47	Pass
1.4479	46	20	43	Pass
1.4748	45	20	44	Pass
1.5017	40	19	47	Pass
1.5286	39	18	46	Pass
1.5555	36	17	47	Pass
1.5824	36	16	44	Pass
1.6093	31	16	51	Pass
1.6362	30	16	53	Pass
1.6631	29	16	55	Pass
1.6900	27	15	55	Pass

1.7169	26	13	50	Pass
1.7438	24	13	54	Pass
1.7707	24	12	50	Pass
1.7976	23	11	47	Pass
1.8245	22	11	50	Pass
1.8514	22	10	45	Pass
1.8783	21	9	42	Pass
1.9052	21	9	42	Pass
1.9321	21	8	38	Pass
1.9590	21	8	38	Pass
1.9859	21	8	38	Pass
2.0128	21	8	38	Pass
2.0397	21	8	38	Pass
2.0666	21	8	38	Pass
2.0935	21	8	38	Pass
2.1204	21	8	38	Pass
2.1473	21	7	33	Pass
2.1742	20	7	35	Pass
2.2011	18	7	38	Pass
2.2280	18	7	38	Pass
2.2549	18	7	38	Pass
2.2818	17	7	41	Pass
2.3087	17	7	41	Pass
2.3356	15	7	46	Pass
2.3625	15	7	46	Pass
2.3894	15	7	46	Pass
2.4163	15	7	46	Pass
2.4432	13	5	38	Pass
2.4701	13	5	38	Pass
2.4970	13	5	38	Pass
2.5239	12	4	33	Pass
2.5508	12	4	33	Pass
2.5777	12	4	33	Pass
2.6046	12	4	33	Pass
2.6315	12	4	33	Pass
2.6584	12	4	33	Pass
2.6853	12	3	25	Pass
2.7122	12	3	25	Pass
2.7391	11	3	27	Pass
2.7660	11	3	27	Pass
2.7929	10	3	30	Pass
2.8198	10	3	30	Pass
2.8467	9	3	33	Pass
2.8736	9	3	33	Pass
2.9005	9	2	22	Pass
2.9274	8	2	25	Pass
2.9543	8	2	25	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

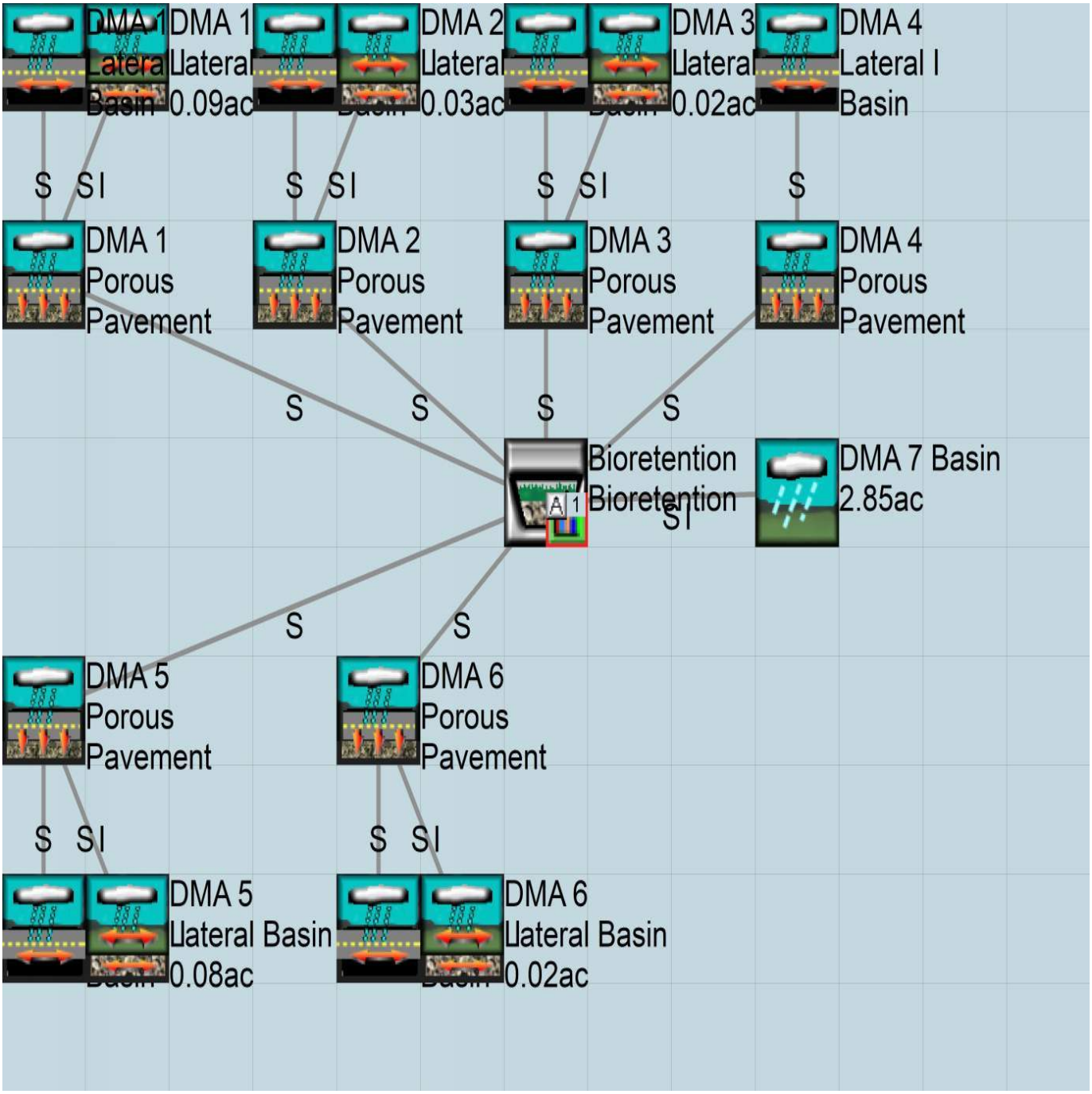
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Pre-Project Schematic

Mitigated Schematic



Pre-Project UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1961 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Bradshaw & Jackson.wdm
MESSU       25   PreBradshaw & Jackson.MES
            27   PreBradshaw & Jackson.L61
            28   PreBradshaw & Jackson.L62
            30   POCBradshaw & Jackson1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:60
      PERLND      49
      IMPLND       1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                  MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   49     D,Grass,Flat(0-1%)      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   49         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   49         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   49         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   49             0       4.4      0.03       400      0.01         3      0.92
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   49            40        35         2         2         0         0      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   49             0       0.3      0.25       0.7       0.5         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   49       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.45  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   49      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS       IFWS       LZS       AGWS      GWVS
   49             0         0      0.15          0         4      0.05         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                   in  out           ***
    1     Imperv,Flat(0-1%)       1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

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

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

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
  END IWAT-PARM1
```

```
  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            100      0.01      0.05       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
  END IWAT-PARM3

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

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK    ***
<Name>   #                 <-factor->     <Name>   #   Tbl#    ***
Basin  1***
PERLND  49                       6.96     COPY   501     12
PERLND  49                       6.96     COPY   501     13
IMPLND   1                       0.14     COPY   501     15

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

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                      in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

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

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
```

```
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                        ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.944          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.944          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.85           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.85           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     12.1     WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO      0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1961 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Bradshaw & Jackson.wdm
MESSU       25   MitBradshaw & Jackson.MES
            27   MitBradshaw & Jackson.L61
            28   MitBradshaw & Jackson.L62
            30   POCBradshaw & Jackson1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:60
      PERLND      34
      IMPLND       1
      PERLND      66
      IMPLND       8
      IMPLND       9
      PERLND      67
      IMPLND      11
      PERLND      68
      IMPLND      13
      IMPLND      15
      PERLND      70
      IMPLND      17
      PERLND      71
      IMPLND      14
      RCHRES       1
      IMPLND       7
      RCHRES       2
      IMPLND      10
      RCHRES       3
      IMPLND      12
      RCHRES       4
      IMPLND      16
      RCHRES       5
      IMPLND      18
      RCHRES       6
      GENER        8
      RCHRES       7
      RCHRES       8
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface Bioretention        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
```

```
  OPCODE
    #    # OPCD ***
    8        24
  END OPCODE
  PARM
    #    #         K ***
    8             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                        in  out           ***
   34     C,Grass,Mod (1-2%)      1    1    1    1   27    0
   66     C,Grass,Mod (1-2%)      1    1    1    1   27    0
   67     C,Grass,Mod (1-2%)      1    1    1    1   27    0
   68     C,Grass,Mod (1-2%)      1    1    1    1   27    0
   70     C,Grass,Mod (1-2%)      1    1    1    1   27    0
   71     C,Grass,Mod (1-2%)      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   34         0    0    1    0    0    0    0    0    0    0    0    0
   66         0    0    1    0    0    0    0    0    0    0    0    0
   67         0    0    1    0    0    0    0    0    0    0    0    0
   68         0    0    1    0    0    0    0    0    0    0    0    0
   70         0    0    1    0    0    0    0    0    0    0    0    0
   71         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   34         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   66         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   67         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   68         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   70         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   71         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   34         0    0    0    1    0    0    0    0    1    0    0
   66         0    0    0    1    0    0    0    0    1    0    0
   67         0    0    0    1    0    0    0    0    1    0    0
   68         0    0    0    1    0    0    0    0    1    0    0
   70         0    0    0    1    0    0    0    0    1    0    0
   71         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   34              0      4.45     0.043       400      0.02         3      0.92
   66              0      4.45     0.043       400      0.02         3      0.92
   67              0      4.45     0.043       400      0.02         3      0.92
   68              0      4.45     0.043       400      0.02         3      0.92
   70              0      4.45     0.043       400      0.02         3      0.92
   71              0      4.45     0.043       400      0.02         3      0.92
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
```

```
   34             40        35         2         2         0         0      0.05
   66             40        35         2         2         0         0      0.05
   67             40        35         2         2         0         0      0.05
   68             40        35         2         2         0         0      0.05
   70             40        35         2         2         0         0      0.05
   71             40        35         2         2         0         0      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   34              0      0.28      0.25      0.65      0.48         0
   66              0      0.28      0.25      0.65      0.48         0
   67              0      0.28      0.25      0.65      0.48         0
   68              0      0.28      0.25      0.65      0.48         0
   70              0      0.28      0.25      0.65      0.48         0
   71              0      0.28      0.25      0.65      0.48         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3          ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   34       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
   66       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
   67       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
   68       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
   70       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
   71       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3          ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   34      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
   66      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
   67      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
   68      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
   70      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
   71      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   34             0         0      0.15         0         4      0.05         0
   66             0         0      0.15         0         4      0.05         0
   67             0         0      0.15         0         4      0.05         0
   68             0         0      0.15         0         4      0.05         0
   70             0         0      0.15         0         4      0.05         0
   71             0         0      0.15         0         4      0.05         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out             ***
    1     Imperv,Flat(0-1%)       1    1    1   27    0
    8     Imperv,Flat(0-1%)       1    1    1   27    0
    9     Imperv,Flat(0-1%)       1    1    1   27    0
   11     Imperv,Flat(0-1%)       1    1    1   27    0
   13     Imperv,Flat(0-1%)       1    1    1   27    0
   15     Imperv,Flat(0-1%)       1    1    1   27    0
   17     Imperv,Flat(0-1%)       1    1    1   27    0
   14     Porous Pavement         1    1    1   27    0
    7     Porous Pavement         1    1    1   27    0
   10     Porous Pavement         1    1    1   27    0
   12     Porous Pavement         1    1    1   27    0
   16     Porous Pavement         1    1    1   27    0
   18     Porous Pavement         1    1    1   27    0
```

```
END GEN-INFO
*** Section IWATER***

ACTIVITY
  <PLS > ************* Active Sections ******************************
  # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  1          0    0    1    0    0    0
  8          0    0    1    0    0    0
  9          0    0    1    0    0    0
 11          0    0    1    0    0    0
 13          0    0    1    0    0    0
 15          0    0    1    0    0    0
 17          0    0    1    0    0    0
 14          0    0    1    0    0    0
  7          0    0    1    0    0    0
 10          0    0    1    0    0    0
 12          0    0    1    0    0    0
 16          0    0    1    0    0    0
 18          0    0    1    0    0    0
END ACTIVITY

PRINT-INFO
  <ILS > ******** Print-flags ******** PIVL  PYR
  # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  1          0    0    4    0    0    0    1    9
  8          0    0    4    0    0    0    1    9
  9          0    0    4    0    0    0    1    9
 11          0    0    4    0    0    0    1    9
 13          0    0    4    0    0    0    1    9
 15          0    0    4    0    0    0    1    9
 17          0    0    4    0    0    0    1    9
 14          0    0    4    0    0    0    1    9
  7          0    0    4    0    0    0    1    9
 10          0    0    4    0    0    0    1    9
 12          0    0    4    0    0    0    1    9
 16          0    0    4    0    0    0    1    9
 18          0    0    4    0    0    0    1    9
END PRINT-INFO

IWAT-PARM1
  <PLS >  IWATER variable monthly parameter value flags  ***
  # -  # CSNO RTOP  VRS  VNN RTLI     ***
  1          0    0    0    0    0
  8          0    0    0    0    0
  9          0    0    0    0    0
 11          0    0    0    0    0
 13          0    0    0    0    0
 15          0    0    0    0    0
 17          0    0    0    0    0
 14          0    0    0    0    0
  7          0    0    0    0    0
 10          0    0    0    0    0
 12          0    0    0    0    0
 16          0    0    0    0    0
 18          0    0    0    0    0
END IWAT-PARM1

IWAT-PARM2
  <PLS >       IWATER input info: Part 2         ***
  # -  # ***  LSUR     SLSUR      NSUR     RETSC
  1           100      0.01      0.05       0.1
  8           100      0.01      0.05       0.1
  9           100      0.01      0.05       0.1
 11           100      0.01      0.05       0.1
 13           100      0.01      0.05       0.1
 15           100      0.01      0.05       0.1
 17           100      0.01      0.05       0.1
 14           100      0.01      0.05       0.1
  7           100      0.01      0.05       0.1
 10           100      0.01      0.05       0.1
```

```
   12            100      0.01      0.05       0.1
   16            100      0.01      0.05       0.1
   18            100      0.01      0.05       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1               0         0
    8               0         0
    9               0         0
   11               0         0
   13               0         0
   15               0         0
   17               0         0
   14               0         0
    7               0         0
   10               0         0
   12               0         0
   16               0         0
   18               0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1               0         0
    8               0         0
    9               0         0
   11               0         0
   13               0         0
   15               0         0
   17               0         0
   14               0         0
    7               0         0
   10               0         0
   12               0         0
   16               0         0
   18               0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK    ***
<Name>   #                 <-factor->     <Name>   #   Tbl#    ***
DMA 7 Basin***
PERLND  34                      1.66     RCHRES   7      2
PERLND  34                      1.66     RCHRES   7      3
IMPLND   1                      1.19     RCHRES   7      5
IMPLND   7                     0.375     RCHRES   2      5
DMA 1 Lateral Basin***
PERLND  66                      0.24     IMPLND   7     54
PERLND  66                      0.24     IMPLND   7     55
DMA 1 Lateral I Basin***
IMPLND   8                    0.7733     IMPLND   7     53
DMA 2 Lateral I Basin***
IMPLND   9                    1.1244     IMPLND  10     53
DMA 2 Lateral Basin***
PERLND  67                     0.075     IMPLND  10     54
PERLND  67                     0.075     IMPLND  10     55
IMPLND  10                    0.4002     RCHRES   3      5
DMA 3 Lateral I Basin***
IMPLND  11                    0.6274     IMPLND  12     53
DMA 3 Lateral Basin***
PERLND  68                    0.0251     IMPLND  12     54
PERLND  68                    0.0251     IMPLND  12     55
IMPLND  12                    0.7969     RCHRES   4      5
DMA 4 Lateral I Basin***
IMPLND  13                    0.6355     IMPLND  14     53
```

```
IMPLND  14                      0.3934     RCHRES   1      5
DMA 5 Lateral Basin***
PERLND  70                      0.2731     IMPLND  16     54
PERLND  70                      0.2731     IMPLND  16     55
DMA 5 Lateral I Basin***
IMPLND  15                      0.6828     IMPLND  16     53
IMPLND  16                      0.2929     RCHRES   5      5
DMA 6 Lateral Basin***
PERLND  71                      0.7533     IMPLND  18     54
PERLND  71                      0.7533     IMPLND  18     55
DMA 6 Lateral I Basin***
IMPLND  17                        1.13     IMPLND  18     53
IMPLND  18                      0.0265     RCHRES   6      5

******Routing******
PERLND  34                        1.66     COPY     1     12
IMPLND   1                        1.19     COPY     1     15
PERLND  34                        1.66     COPY     1     13
RCHRES   7                           1     RCHRES   8      8
RCHRES   2                           1     RCHRES   7      6
RCHRES   2                                 COPY     1     16
RCHRES   3                           1     RCHRES   7      6
RCHRES   3                                 COPY     1     16
RCHRES   4                           1     RCHRES   7      6
RCHRES   4                                 COPY     1     16
RCHRES   1                           1     RCHRES   7      6
RCHRES   1                                 COPY     1     16
RCHRES   5                           1     RCHRES   7      6
RCHRES   5                                 COPY     1     16
RCHRES   6                           1     RCHRES   7      6
RCHRES   6                                 COPY     1     16
RCHRES   8                           1     COPY   501     16
RCHRES   7                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    8 OUTPUT TIMSER      .0002778     RCHRES   7     EXTNL  OUTDGT 1


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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
    1     DMA 4 Porous Pav-019    1    1    1    1   28    0    1
    2     DMA 1 Porous Pav-008    1    1    1    1   28    0    1
    3     DMA 2 Porous Pav-013    1    1    1    1   28    0    1
    4     DMA 3 Porous Pav-016    1    1    1    1   28    0    1
    5     DMA 5 Porous Pav-022    1    1    1    1   28    0    1
    6     DMA 6 Porous Pav-025    1    1    1    1   28    0    1
    7     Surface Bioreten-006    2    1    1    1   28    0    1
    8     Bioretention  Bi-005    1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

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

```
    5         1    0    0    0    0    0    0    0    0    0
    6         1    0    0    0    0    0    0    0    0    0
    7         1    0    0    0    0    0    0    0    0    0
    8         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
    4         4    0    0    0    0    0    0    0    0    0    1    9
    5         4    0    0    0    0    0    0    0    0    0    1    9
    6         4    0    0    0    0    0    0    0    0    0    1    9
    7         4    0    0    0    0    0    0    0    0    0    1    9
    8         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1       0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
    2       0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
    3       0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
    4       0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
    5       0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
    6       0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
    7       0  1  0  0    4  5  0  0  0       0  1  0  0  0        2  1  2  2  2
    8       0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO      LEN      DELTH     STCOR       KS      DB50        ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1       0.1       0.0       0.0       0.5       0.0
    2              2      0.03       0.0       0.0       0.5       0.0
    3              3      0.08       0.0       0.0       0.5       0.0
    4              4      0.09       0.0       0.0       0.5       0.0
    5              5      0.06       0.0       0.0       0.5       0.0
    6              6      0.01       0.0       0.0       0.5       0.0
    7              7      0.01       0.0       0.0       0.0       0.0
    8              8      0.13       0.0       0.0       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    4            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    5            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    6            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    7            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    8            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol8   RCHRES   8 VOL              4
  UVQUAN v2m8   GLOBAL     WORKSP  7        3
```

```
  UVQUAN vpo8   GLOBAL     WORKSP  8        3
  UVQUAN v2d8   GENER    8 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m8    1 WORKSP  7         1.0 QUAN
  UVNAME  vpo8    1 WORKSP  8         1.0 QUAN
  UVNAME  v2d8    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   8                                v2m8            =  13847.98
*** Compute remaining available pore space
  GENER   8                                vpo8            =  v2m8
  GENER   8                                vpo8           -=  vol8
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo8 < 0.0) THEN
  GENER   8                                vpo8            =  0.0
END IF
*** Infiltration volume
  GENER   8                                v2d8            =  vpo8
END SPEC-ACTIONS
FTABLES
  FTABLE      8
   60    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.371212  0.000000  0.000000
  0.046703  0.367466  0.002316  0.000000
  0.093407  0.363220  0.004711  0.000000
  0.140110  0.358974  0.007186  0.000000
  0.186813  0.354729  0.009741  0.000000
  0.233516  0.350483  0.012375  0.000000
  0.280220  0.346237  0.015089  0.000000
  0.326923  0.341991  0.017883  0.000000
  0.373626  0.337746  0.020757  0.000000
  0.420330  0.333500  0.023710  0.000000
  0.467033  0.329254  0.026743  0.000000
  0.513736  0.325008  0.029995  0.000000
  0.560440  0.320763  0.033330  0.000000
  0.607143  0.316517  0.036749  0.000000
  0.653846  0.312271  0.040251  0.000000
  0.700549  0.308025  0.043836  0.000000
  0.747253  0.303780  0.047505  0.000000
  0.793956  0.299534  0.051256  0.000000
  0.840659  0.295288  0.055091  0.000000
  0.887363  0.291042  0.059010  0.000000
  0.934066  0.286797  0.063011  0.000000
  0.980769  0.282551  0.067096  0.000000
  1.027473  0.278305  0.071265  0.000000
  1.074176  0.274059  0.075516  0.000000
  1.120879  0.269814  0.079851  0.000000
  1.167582  0.265568  0.084269  0.000000
  1.214286  0.261322  0.088770  0.000000
  1.260989  0.257076  0.093355  0.000000
  1.307692  0.252831  0.098023  0.000000
  1.354396  0.248585  0.102774  0.000000
  1.401099  0.244339  0.107608  0.000000
  1.447802  0.240093  0.112526  0.000000
  1.494505  0.235847  0.117527  0.000000
  1.541209  0.231602  0.122611  0.000000
  1.587912  0.227356  0.127779  0.000000
  1.634615  0.223110  0.133030  0.000000
  1.681319  0.218864  0.138364  0.000000
  1.728022  0.214619  0.143781  0.000000
  1.774725  0.210373  0.149282  0.000000
  1.821429  0.206127  0.154866  0.000000
  1.868132  0.201881  0.160533  0.000000
  1.914835  0.197636  0.166284  0.000000
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1.961538  0.193390  0.172118  0.000000
2.008242  0.189144  0.177964  0.000000
2.054945  0.184898  0.183893  0.000000
2.101648  0.180653  0.189904  0.000000
2.148352  0.176407  0.195998  0.013558
2.195055  0.172161  0.202174  0.020337
2.241758  0.167915  0.208432  0.036097
2.288462  0.163670  0.214772  0.043977
2.335165  0.159424  0.221195  0.056061
2.381868  0.155178  0.227700  0.062103
2.428571  0.150932  0.234287  0.065124
2.475275  0.146687  0.240957  0.066635
2.521978  0.142441  0.247709  0.072494
2.568681  0.138195  0.254543  0.086386
2.615385  0.133949  0.261459  0.102319
2.662088  0.129704  0.268458  0.118122
2.708791  0.125458  0.275539  0.133139
2.750000  0.121212  0.317906  0.436211
END FTABLE  8
FTABLE      7
 34    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
0.000000  0.121212  0.000000  0.000000  0.000000
0.046703  0.375458  0.017436  0.000000  0.287752
0.093407  0.379704  0.035070  0.000000  0.341508
0.140110  0.383949  0.052903  0.000000  0.368385
0.186813  0.388195  0.070934  0.000000  0.395263
0.233516  0.392441  0.089163  0.000000  0.422141
0.280220  0.396687  0.107590  0.000000  0.449019
0.326923  0.400932  0.126216  0.000000  0.475897
0.373626  0.405178  0.145040  0.000000  0.502775
0.420330  0.409424  0.164062  0.000000  0.529653
0.467033  0.413670  0.183283  0.000000  0.556531
0.513736  0.417915  0.202702  0.000000  0.583409
0.560440  0.422161  0.222319  0.000000  0.610287
0.607143  0.426407  0.242134  0.000000  0.637165
0.653846  0.430653  0.262148  0.000000  0.664043
0.700549  0.434898  0.282360  0.000000  0.690920
0.747253  0.439144  0.302770  0.000000  0.717798
0.793956  0.443390  0.323379  0.000000  0.744676
0.840659  0.447636  0.344186  0.000000  0.771554
0.887363  0.451881  0.365191  0.000000  0.798432
0.934066  0.456127  0.386395  0.000000  0.825310
0.980769  0.460373  0.407797  0.000000  0.852188
1.027473  0.464619  0.429397  0.145022  0.879066
1.074176  0.468864  0.451195  0.642943  0.905944
1.120879  0.473110  0.473192  1.336713  0.932822
1.167582  0.477356  0.495387  2.180380  0.959700
1.214286  0.481602  0.517780  3.149312  0.986577
1.260989  0.485847  0.540371  4.226429  1.013455
1.307692  0.490093  0.563161  5.398013  1.040333
1.354396  0.494339  0.586149  6.651932  1.067211
1.401099  0.498585  0.609336  7.976750  1.094089
1.447802  0.502831  0.632720  9.361249  1.120967
1.494505  0.507076  0.656303  10.79418  1.147845
1.500000  0.507576  0.659091  12.26414  1.151007
END FTABLE  7
FTABLE      2
 91    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.375000  0.000000  0.000000
0.020333  0.375000  0.002669  0.061913
0.040667  0.375000  0.005338  0.087558
0.061000  0.375000  0.008006  0.107237
0.081333  0.375000  0.010675  0.123826
0.101667  0.375000  0.013344  0.138442
0.122000  0.375000  0.016013  0.151656
0.142333  0.375000  0.018681  0.163807
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0.162667	0.375000	0.021350	0.175117
0.183000	0.375000	0.024019	0.185739
0.203333	0.375000	0.026688	0.195787
0.223667	0.375000	0.029356	0.205343
0.244000	0.375000	0.032025	0.214473
0.264333	0.375000	0.034694	0.223231
0.284667	0.375000	0.037363	0.231658
0.305000	0.375000	0.040031	0.239789
0.325333	0.375000	0.042700	0.247653
0.345667	0.375000	0.045369	0.255275
0.366000	0.375000	0.048038	0.262675
0.386333	0.375000	0.050706	0.269873
0.406667	0.375000	0.053375	0.276884
0.427000	0.375000	0.056044	0.283722
0.447333	0.375000	0.058713	0.290398
0.467667	0.375000	0.061381	0.296925
0.488000	0.375000	0.064050	0.303311
0.508333	0.375000	0.066719	0.309566
0.528667	0.375000	0.069388	0.315696
0.549000	0.375000	0.072056	0.321710
0.569333	0.375000	0.074725	0.327614
0.589667	0.375000	0.077394	0.333413
0.610000	0.375000	0.080063	0.339112
0.630333	0.375000	0.082731	0.344718
0.650667	0.375000	0.085400	0.350234
0.671000	0.375000	0.088069	0.355664
0.691333	0.375000	0.090738	0.361013
0.711667	0.375000	0.093406	0.366283
0.732000	0.375000	0.096075	0.371479
0.752333	0.375000	0.098744	0.376603
0.772667	0.375000	0.101413	0.381658
0.793000	0.375000	0.104081	0.386648
0.813333	0.375000	0.106750	0.391573
0.833667	0.375000	0.109419	0.396438
0.854000	0.375000	0.112088	0.401243
0.874333	0.375000	0.114756	0.405992
0.894667	0.375000	0.117425	0.410685
0.915000	0.375000	0.120094	0.415326
0.935333	0.375000	0.122763	0.419916
0.955667	0.375000	0.125431	0.424455
0.976000	0.375000	0.128100	0.428947
0.996333	0.375000	0.130769	0.433392
1.016667	0.375000	0.133438	0.437792
1.037000	0.375000	0.136106	0.442148
1.057333	0.375000	0.138775	0.446462
1.077667	0.375000	0.141444	0.450735
1.098000	0.375000	0.144113	0.454967
1.118333	0.375000	0.146781	0.459160
1.138667	0.375000	0.149450	0.463316
1.159000	0.375000	0.152119	0.467434
1.179333	0.375000	0.154788	0.471517
1.199667	0.375000	0.157456	0.475564
1.220000	0.375000	0.160125	0.479577
1.240333	0.375000	0.162794	0.483557
1.260667	0.375000	0.165463	0.487505
1.281000	0.375000	0.168131	0.491421
1.301333	0.375000	0.170800	0.495305
1.321667	0.375000	0.173469	0.499160
1.342000	0.375000	0.176138	0.502985
1.362333	0.375000	0.178806	0.506781
1.382667	0.375000	0.181475	0.510549
1.403000	0.375000	0.184144	0.514289
1.423333	0.375000	0.186813	0.518003
1.443667	0.375000	0.189481	0.521690
1.464000	0.375000	0.192150	0.525351
1.484333	0.375000	0.194819	0.528986
1.504667	0.375000	0.197488	0.532597
1.525000	0.375000	0.200156	0.536184
1.545333	0.375000	0.202825	0.539746
1.565667	0.375000	0.205494	0.543286

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1.586000  0.375000  0.213119  0.546802
1.606333  0.375000  0.220744  0.550296
1.626667  0.375000  0.228369  0.553768
1.647000  0.375000  0.235994  0.557218
1.667333  0.375000  0.243619  0.560648
1.687667  0.375000  0.251244  0.564056
1.708000  0.375000  0.258869  0.567444
1.728333  0.375000  0.266494  0.570811
1.748667  0.375000  0.274119  0.574159
1.769000  0.375000  0.281744  0.577488
1.789333  0.375000  0.289369  0.580797
1.809667  0.375000  0.296994  0.584088
1.830000  0.375000  0.304619  0.587360
END FTABLE  2
FTABLE      3
 91    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.400218  0.000000  0.000000
0.020333  0.400218  0.002848  0.061913
0.040667  0.400218  0.005696  0.087558
0.061000  0.400218  0.008545  0.107237
0.081333  0.400218  0.011393  0.123826
0.101667  0.400218  0.014241  0.138442
0.122000  0.400218  0.017089  0.151656
0.142333  0.400218  0.019938  0.163807
0.162667  0.400218  0.022786  0.175117
0.183000  0.400218  0.025634  0.185739
0.203333  0.400218  0.028482  0.195787
0.223667  0.400218  0.031330  0.205343
0.244000  0.400218  0.034179  0.214473
0.264333  0.400218  0.037027  0.223231
0.284667  0.400218  0.039875  0.231658
0.305000  0.400218  0.042723  0.239789
0.325333  0.400218  0.045572  0.247653
0.345667  0.400218  0.048420  0.255275
0.366000  0.400218  0.051268  0.262675
0.386333  0.400218  0.054116  0.269873
0.406667  0.400218  0.056964  0.276884
0.427000  0.400218  0.059813  0.283722
0.447333  0.400218  0.062661  0.290398
0.467667  0.400218  0.065509  0.296925
0.488000  0.400218  0.068357  0.303311
0.508333  0.400218  0.071205  0.309566
0.528667  0.400218  0.074054  0.315696
0.549000  0.400218  0.076902  0.321710
0.569333  0.400218  0.079750  0.327614
0.589667  0.400218  0.082598  0.333413
0.610000  0.400218  0.085447  0.339112
0.630333  0.400218  0.088295  0.344718
0.650667  0.400218  0.091143  0.350234
0.671000  0.400218  0.093991  0.355664
0.691333  0.400218  0.096839  0.361013
0.711667  0.400218  0.099688  0.366283
0.732000  0.400218  0.102536  0.371479
0.752333  0.400218  0.105384  0.376603
0.772667  0.400218  0.108232  0.381658
0.793000  0.400218  0.111081  0.386648
0.813333  0.400218  0.113929  0.391573
0.833667  0.400218  0.116777  0.396438
0.854000  0.400218  0.119625  0.401243
0.874333  0.400218  0.122473  0.405992
0.894667  0.400218  0.125322  0.410685
0.915000  0.400218  0.128170  0.415326
0.935333  0.400218  0.131018  0.419916
0.955667  0.400218  0.133866  0.424455
0.976000  0.400218  0.136715  0.428947
0.996333  0.400218  0.139563  0.433392
1.016667  0.400218  0.142411  0.437792
1.037000  0.400218  0.145259  0.442148
```

```
1.057333  0.400218  0.148107  0.446462
1.077667  0.400218  0.150956  0.450735
1.098000  0.400218  0.153804  0.454967
1.118333  0.400218  0.156652  0.459160
1.138667  0.400218  0.159500  0.463316
1.159000  0.400218  0.162349  0.467434
1.179333  0.400218  0.165197  0.471517
1.199667  0.400218  0.168045  0.475564
1.220000  0.400218  0.170893  0.479577
1.240333  0.400218  0.173741  0.483557
1.260667  0.400218  0.176590  0.487505
1.281000  0.400218  0.179438  0.491421
1.301333  0.400218  0.182286  0.495305
1.321667  0.400218  0.185134  0.499160
1.342000  0.400218  0.187982  0.502985
1.362333  0.400218  0.190831  0.506781
1.382667  0.400218  0.193679  0.510549
1.403000  0.400218  0.196527  0.514289
1.423333  0.400218  0.199375  0.518003
1.443667  0.400218  0.202224  0.521690
1.464000  0.400218  0.205072  0.525351
1.484333  0.400218  0.207920  0.528986
1.504667  0.400218  0.210768  0.532597
1.525000  0.400218  0.213616  0.536184
1.545333  0.400218  0.216465  0.539746
1.565667  0.400218  0.219313  0.543286
1.586000  0.400218  0.227451  0.546802
1.606333  0.400218  0.235588  0.550296
1.626667  0.400218  0.243726  0.553768
1.647000  0.400218  0.251864  0.557218
1.667333  0.400218  0.260002  0.560648
1.687667  0.400218  0.268140  0.564056
1.708000  0.400218  0.276277  0.567444
1.728333  0.400218  0.284415  0.570811
1.748667  0.400218  0.292553  0.574159
1.769000  0.400218  0.300691  0.577488
1.789333  0.400218  0.308828  0.580797
1.809667  0.400218  0.316966  0.584088
1.830000  0.400218  0.325104  0.587360
END FTABLE  3
FTABLE      4
 91    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.796907  0.000000  0.000000
0.020333  0.796907  0.005671  0.061913
0.040667  0.796907  0.011343  0.087558
0.061000  0.796907  0.017014  0.107237
0.081333  0.796907  0.022685  0.123826
0.101667  0.796907  0.028357  0.138442
0.122000  0.796907  0.034028  0.151656
0.142333  0.796907  0.039699  0.163807
0.162667  0.796907  0.045371  0.175117
0.183000  0.796907  0.051042  0.185739
0.203333  0.796907  0.056713  0.195787
0.223667  0.796907  0.062385  0.205343
0.244000  0.796907  0.068056  0.214473
0.264333  0.796907  0.073727  0.223231
0.284667  0.796907  0.079399  0.231658
0.305000  0.796907  0.085070  0.239789
0.325333  0.796907  0.090741  0.247653
0.345667  0.796907  0.096412  0.255275
0.366000  0.796907  0.102084  0.262675
0.386333  0.796907  0.107755  0.269873
0.406667  0.796907  0.113426  0.276884
0.427000  0.796907  0.119098  0.283722
0.447333  0.796907  0.124769  0.290398
0.467667  0.796907  0.130440  0.296925
0.488000  0.796907  0.136112  0.303311
0.508333  0.796907  0.141783  0.309566
```

```
0.528667  0.796907  0.147454  0.315696
0.549000  0.796907  0.153126  0.321710
0.569333  0.796907  0.158797  0.327614
0.589667  0.796907  0.164468  0.333413
0.610000  0.796907  0.170140  0.339112
0.630333  0.796907  0.175811  0.344718
0.650667  0.796907  0.181482  0.350234
0.671000  0.796907  0.187154  0.355664
0.691333  0.796907  0.192825  0.361013
0.711667  0.796907  0.198496  0.366283
0.732000  0.796907  0.204168  0.371479
0.752333  0.796907  0.209839  0.376603
0.772667  0.796907  0.215510  0.381658
0.793000  0.796907  0.221182  0.386648
0.813333  0.796907  0.226853  0.391573
0.833667  0.796907  0.232524  0.396438
0.854000  0.796907  0.238196  0.401243
0.874333  0.796907  0.243867  0.405992
0.894667  0.796907  0.249538  0.410685
0.915000  0.796907  0.255209  0.415326
0.935333  0.796907  0.260881  0.419916
0.955667  0.796907  0.266552  0.424455
0.976000  0.796907  0.272223  0.428947
0.996333  0.796907  0.277895  0.433392
1.016667  0.796907  0.283566  0.437792
1.037000  0.796907  0.289237  0.442148
1.057333  0.796907  0.294909  0.446462
1.077667  0.796907  0.300580  0.450735
1.098000  0.796907  0.306251  0.454967
1.118333  0.796907  0.311923  0.459160
1.138667  0.796907  0.317594  0.463316
1.159000  0.796907  0.323265  0.467434
1.179333  0.796907  0.328937  0.471517
1.199667  0.796907  0.334608  0.475564
1.220000  0.796907  0.340279  0.479577
1.240333  0.796907  0.345951  0.483557
1.260667  0.796907  0.351622  0.487505
1.281000  0.796907  0.357293  0.491421
1.301333  0.796907  0.362965  0.495305
1.321667  0.796907  0.368636  0.499160
1.342000  0.796907  0.374307  0.502985
1.362333  0.796907  0.379979  0.506781
1.382667  0.796907  0.385650  0.510549
1.403000  0.796907  0.391321  0.514289
1.423333  0.796907  0.396993  0.518003
1.443667  0.796907  0.402664  0.521690
1.464000  0.796907  0.408335  0.525351
1.484333  0.796907  0.414007  0.528986
1.504667  0.796907  0.419678  0.532597
1.525000  0.796907  0.425349  0.536184
1.545333  0.796907  0.431020  0.539746
1.565667  0.796907  0.436692  0.543286
1.586000  0.796907  0.452896  0.546802
1.606333  0.796907  0.469099  0.550296
1.626667  0.796907  0.485303  0.553768
1.647000  0.796907  0.501507  0.557218
1.667333  0.796907  0.517711  0.560648
1.687667  0.796907  0.533914  0.564056
1.708000  0.796907  0.550118  0.567444
1.728333  0.796907  0.566322  0.570811
1.748667  0.796907  0.582526  0.574159
1.769000  0.796907  0.598730  0.577488
1.789333  0.796907  0.614933  0.580797
1.809667  0.796907  0.631137  0.584088
1.830000  0.796907  0.647341  0.587360
END FTABLE  4
FTABLE      1
 91    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
```

0.000000	0.393361	0.000000	0.000000
0.020333	0.393361	0.002799	0.061913
0.040667	0.393361	0.005599	0.087558
0.061000	0.393361	0.008398	0.107237
0.081333	0.393361	0.011198	0.123826
0.101667	0.393361	0.013997	0.138442
0.122000	0.393361	0.016797	0.151656
0.142333	0.393361	0.019596	0.163807
0.162667	0.393361	0.022395	0.175117
0.183000	0.393361	0.025195	0.185739
0.203333	0.393361	0.027994	0.195787
0.223667	0.393361	0.030794	0.205343
0.244000	0.393361	0.033593	0.214473
0.264333	0.393361	0.036392	0.223231
0.284667	0.393361	0.039192	0.231658
0.305000	0.393361	0.041991	0.239789
0.325333	0.393361	0.044791	0.247653
0.345667	0.393361	0.047590	0.255275
0.366000	0.393361	0.050390	0.262675
0.386333	0.393361	0.053189	0.269873
0.406667	0.393361	0.055988	0.276884
0.427000	0.393361	0.058788	0.283722
0.447333	0.393361	0.061587	0.290398
0.467667	0.393361	0.064387	0.296925
0.488000	0.393361	0.067186	0.303311
0.508333	0.393361	0.069985	0.309566
0.528667	0.393361	0.072785	0.315696
0.549000	0.393361	0.075584	0.321710
0.569333	0.393361	0.078384	0.327614
0.589667	0.393361	0.081183	0.333413
0.610000	0.393361	0.083983	0.339112
0.630333	0.393361	0.086782	0.344718
0.650667	0.393361	0.089581	0.350234
0.671000	0.393361	0.092381	0.355664
0.691333	0.393361	0.095180	0.361013
0.711667	0.393361	0.097980	0.366283
0.732000	0.393361	0.100779	0.371479
0.752333	0.393361	0.103578	0.376603
0.772667	0.393361	0.106378	0.381658
0.793000	0.393361	0.109177	0.386648
0.813333	0.393361	0.111977	0.391573
0.833667	0.393361	0.114776	0.396438
0.854000	0.393361	0.117576	0.401243
0.874333	0.393361	0.120375	0.405992
0.894667	0.393361	0.123174	0.410685
0.915000	0.393361	0.125974	0.415326
0.935333	0.393361	0.128773	0.419916
0.955667	0.393361	0.131573	0.424455
0.976000	0.393361	0.134372	0.428947
0.996333	0.393361	0.137172	0.433392
1.016667	0.393361	0.139971	0.437792
1.037000	0.393361	0.142770	0.442148
1.057333	0.393361	0.145570	0.446462
1.077667	0.393361	0.148369	0.450735
1.098000	0.393361	0.151169	0.454967
1.118333	0.393361	0.153968	0.459160
1.138667	0.393361	0.156767	0.463316
1.159000	0.393361	0.159567	0.467434
1.179333	0.393361	0.162366	0.471517
1.199667	0.393361	0.165166	0.475564
1.220000	0.393361	0.167965	0.479577
1.240333	0.393361	0.170765	0.483557
1.260667	0.393361	0.173564	0.487505
1.281000	0.393361	0.176363	0.491421
1.301333	0.393361	0.179163	0.495305
1.321667	0.393361	0.181962	0.499160
1.342000	0.393361	0.184762	0.502985
1.362333	0.393361	0.187561	0.506781
1.382667	0.393361	0.190360	0.510549
1.403000	0.393361	0.193160	0.514289

```
1.423333  0.393361  0.195959  0.518003
1.443667  0.393361  0.198759  0.521690
1.464000  0.393361  0.201558  0.525351
1.484333  0.393361  0.204358  0.528986
1.504667  0.393361  0.207157  0.532597
1.525000  0.393361  0.209956  0.536184
1.545333  0.393361  0.212756  0.539746
1.565667  0.393361  0.215555  0.543286
1.586000  0.393361  0.223554  0.546802
1.606333  0.393361  0.231552  0.550296
1.626667  0.393361  0.239550  0.553768
1.647000  0.393361  0.247549  0.557218
1.667333  0.393361  0.255547  0.560648
1.687667  0.393361  0.263545  0.564056
1.708000  0.393361  0.271544  0.567444
1.728333  0.393361  0.279542  0.570811
1.748667  0.393361  0.287540  0.574159
1.769000  0.393361  0.295539  0.577488
1.789333  0.393361  0.303537  0.580797
1.809667  0.393361  0.311535  0.584088
1.830000  0.393361  0.319534  0.587360
END FTABLE  1
FTABLE      5
 91    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.292905  0.000000  0.000000
0.020333  0.292905  0.002085  0.061913
0.040667  0.292905  0.004169  0.087558
0.061000  0.292905  0.006254  0.107237
0.081333  0.292905  0.008338  0.123826
0.101667  0.292905  0.010423  0.138442
0.122000  0.292905  0.012507  0.151656
0.142333  0.292905  0.014592  0.163807
0.162667  0.292905  0.016676  0.175117
0.183000  0.292905  0.018761  0.185739
0.203333  0.292905  0.020845  0.195787
0.223667  0.292905  0.022930  0.205343
0.244000  0.292905  0.025014  0.214473
0.264333  0.292905  0.027099  0.223231
0.284667  0.292905  0.029183  0.231658
0.305000  0.292905  0.031268  0.239789
0.325333  0.292905  0.033352  0.247653
0.345667  0.292905  0.035437  0.255275
0.366000  0.292905  0.037521  0.262675
0.386333  0.292905  0.039606  0.269873
0.406667  0.292905  0.041690  0.276884
0.427000  0.292905  0.043775  0.283722
0.447333  0.292905  0.045859  0.290398
0.467667  0.292905  0.047944  0.296925
0.488000  0.292905  0.050028  0.303311
0.508333  0.292905  0.052113  0.309566
0.528667  0.292905  0.054197  0.315696
0.549000  0.292905  0.056282  0.321710
0.569333  0.292905  0.058366  0.327614
0.589667  0.292905  0.060451  0.333413
0.610000  0.292905  0.062535  0.339112
0.630333  0.292905  0.064620  0.344718
0.650667  0.292905  0.066704  0.350234
0.671000  0.292905  0.068789  0.355664
0.691333  0.292905  0.070873  0.361013
0.711667  0.292905  0.072958  0.366283
0.732000  0.292905  0.075042  0.371479
0.752333  0.292905  0.077127  0.376603
0.772667  0.292905  0.079211  0.381658
0.793000  0.292905  0.081296  0.386648
0.813333  0.292905  0.083380  0.391573
0.833667  0.292905  0.085465  0.396438
0.854000  0.292905  0.087549  0.401243
0.874333  0.292905  0.089634  0.405992
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0.894667  0.292905  0.091718  0.410685
0.915000  0.292905  0.093803  0.415326
0.935333  0.292905  0.095887  0.419916
0.955667  0.292905  0.097972  0.424455
0.976000  0.292905  0.100056  0.428947
0.996333  0.292905  0.102141  0.433392
1.016667  0.292905  0.104225  0.437792
1.037000  0.292905  0.106310  0.442148
1.057333  0.292905  0.108394  0.446462
1.077667  0.292905  0.110479  0.450735
1.098000  0.292905  0.112563  0.454967
1.118333  0.292905  0.114648  0.459160
1.138667  0.292905  0.116732  0.463316
1.159000  0.292905  0.118817  0.467434
1.179333  0.292905  0.120901  0.471517
1.199667  0.292905  0.122986  0.475564
1.220000  0.292905  0.125070  0.479577
1.240333  0.292905  0.127155  0.483557
1.260667  0.292905  0.129239  0.487505
1.281000  0.292905  0.131324  0.491421
1.301333  0.292905  0.133408  0.495305
1.321667  0.292905  0.135493  0.499160
1.342000  0.292905  0.137577  0.502985
1.362333  0.292905  0.139662  0.506781
1.382667  0.292905  0.141746  0.510549
1.403000  0.292905  0.143831  0.514289
1.423333  0.292905  0.145915  0.518003
1.443667  0.292905  0.148000  0.521690
1.464000  0.292905  0.150084  0.525351
1.484333  0.292905  0.152169  0.528986
1.504667  0.292905  0.154253  0.532597
1.525000  0.292905  0.156338  0.536184
1.545333  0.292905  0.158422  0.539746
1.565667  0.292905  0.160507  0.543286
1.586000  0.292905  0.166463  0.546802
1.606333  0.292905  0.172418  0.550296
1.626667  0.292905  0.178374  0.553768
1.647000  0.292905  0.184330  0.557218
1.667333  0.292905  0.190286  0.560648
1.687667  0.292905  0.196241  0.564056
1.708000  0.292905  0.202197  0.567444
1.728333  0.292905  0.208153  0.570811
1.748667  0.292905  0.214108  0.574159
1.769000  0.292905  0.220064  0.577488
1.789333  0.292905  0.226020  0.580797
1.809667  0.292905  0.231976  0.584088
1.830000  0.292905  0.237931  0.587360
END FTABLE  5
FTABLE      6
 91    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.026549  0.000000  0.000000
0.020333  0.026549  0.000189  0.061913
0.040667  0.026549  0.000378  0.087558
0.061000  0.026549  0.000567  0.107237
0.081333  0.026549  0.000756  0.123826
0.101667  0.026549  0.000945  0.138442
0.122000  0.026549  0.001134  0.151656
0.142333  0.026549  0.001323  0.163807
0.162667  0.026549  0.001512  0.175117
0.183000  0.026549  0.001700  0.185739
0.203333  0.026549  0.001889  0.195787
0.223667  0.026549  0.002078  0.205343
0.244000  0.026549  0.002267  0.214473
0.264333  0.026549  0.002456  0.223231
0.284667  0.026549  0.002645  0.231658
0.305000  0.026549  0.002834  0.239789
0.325333  0.026549  0.003023  0.247653
0.345667  0.026549  0.003212  0.255275
```

0.366000	0.026549	0.003401	0.262675
0.386333	0.026549	0.003590	0.269873
0.406667	0.026549	0.003779	0.276884
0.427000	0.026549	0.003968	0.283722
0.447333	0.026549	0.004157	0.290398
0.467667	0.026549	0.004346	0.296925
0.488000	0.026549	0.004535	0.303311
0.508333	0.026549	0.004723	0.309566
0.528667	0.026549	0.004912	0.315696
0.549000	0.026549	0.005101	0.321710
0.569333	0.026549	0.005290	0.327614
0.589667	0.026549	0.005479	0.333413
0.610000	0.026549	0.005668	0.339112
0.630333	0.026549	0.005857	0.344718
0.650667	0.026549	0.006046	0.350234
0.671000	0.026549	0.006235	0.355664
0.691333	0.026549	0.006424	0.361013
0.711667	0.026549	0.006613	0.366283
0.732000	0.026549	0.006802	0.371479
0.752333	0.026549	0.006991	0.376603
0.772667	0.026549	0.007180	0.381658
0.793000	0.026549	0.007369	0.386648
0.813333	0.026549	0.007558	0.391573
0.833667	0.026549	0.007747	0.396438
0.854000	0.026549	0.007935	0.401243
0.874333	0.026549	0.008124	0.405992
0.894667	0.026549	0.008313	0.410685
0.915000	0.026549	0.008502	0.415326
0.935333	0.026549	0.008691	0.419916
0.955667	0.026549	0.008880	0.424455
0.976000	0.026549	0.009069	0.428947
0.996333	0.026549	0.009258	0.433392
1.016667	0.026549	0.009447	0.437792
1.037000	0.026549	0.009636	0.442148
1.057333	0.026549	0.009825	0.446462
1.077667	0.026549	0.010014	0.450735
1.098000	0.026549	0.010203	0.454967
1.118333	0.026549	0.010392	0.459160
1.138667	0.026549	0.010581	0.463316
1.159000	0.026549	0.010770	0.467434
1.179333	0.026549	0.010959	0.471517
1.199667	0.026549	0.011147	0.475564
1.220000	0.026549	0.011336	0.479577
1.240333	0.026549	0.011525	0.483557
1.260667	0.026549	0.011714	0.487505
1.281000	0.026549	0.011903	0.491421
1.301333	0.026549	0.012092	0.495305
1.321667	0.026549	0.012281	0.499160
1.342000	0.026549	0.012470	0.502985
1.362333	0.026549	0.012659	0.506781
1.382667	0.026549	0.012848	0.510549
1.403000	0.026549	0.013037	0.514289
1.423333	0.026549	0.013226	0.518003
1.443667	0.026549	0.013415	0.521690
1.464000	0.026549	0.013604	0.525351
1.484333	0.026549	0.013793	0.528986
1.504667	0.026549	0.013982	0.532597
1.525000	0.026549	0.014170	0.536184
1.545333	0.026549	0.014359	0.539746
1.565667	0.026549	0.014548	0.543286
1.586000	0.026549	0.015088	0.546802
1.606333	0.026549	0.015628	0.550296
1.626667	0.026549	0.016168	0.553768
1.647000	0.026549	0.016708	0.557218
1.667333	0.026549	0.017248	0.560648
1.687667	0.026549	0.017787	0.564056
1.708000	0.026549	0.018327	0.567444
1.728333	0.026549	0.018867	0.570811
1.748667	0.026549	0.019407	0.574159
1.769000	0.026549	0.019947	0.577488

```
  1.789333  0.026549  0.020486  0.580797
  1.809667  0.026549  0.021026  0.584088
  1.830000  0.026549  0.021566  0.587360
  END FTABLE  6
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.944          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.944          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.85           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.85           IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    0.944          RCHRES   7     EXTNL  PREC
WDM      1 EVAP     ENGL    0.85           RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.85           RCHRES   2     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.85           RCHRES   3     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.85           RCHRES   4     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.85           RCHRES   5     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.85           RCHRES   6     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   7     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.595          RCHRES   8     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   8 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL       REPL
RCHRES   8 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL       REPL
RCHRES   7 HYDR   STAGE  1 1        1      WDM   1002 STAG     ENGL       REPL
RCHRES   7 HYDR   O      1 1        1      WDM   1003 FLOW     ENGL       REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL       REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL       REPL
END EXT TARGETS

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

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

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

  MASS-LINK        6
RCHRES     ROFLOW                          RCHRES         INFLOW
  END MASS-LINK    6

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

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

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

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

```
  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16

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

  MASS-LINK       53
IMPLND     IWATER SURO                     IMPLND         EXTNL  SURLI
  END MASS-LINK   53

  MASS-LINK       54
PERLND     PWATER SURO                     IMPLND         EXTNL  SURLI
  END MASS-LINK   54

  MASS-LINK       55
PERLND     PWATER IFWO                     IMPLND         EXTNL  SURLI
  END MASS-LINK   55


END MASS-LINK

END RUN
```

Disclaimer

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APPENDIX J:

Grading Plan

Porous Pavement

Porous Gravel Pavement

Porous gravel pavement (Figure PP-5) consists of a loose gravel surface installed with or without additional stabilization depending on anticipated loads and traffic. This type of pavement must be placed over a sufficient aggregate base to allow for storage and infiltration. Where drainage is slow, an underdrain may be required. It is ideal for temporary use areas where permanent pavement would be too costly, as well as rural and park settings, overflow parking lots, maintenance roads, fire access lanes, and materials storage areas. However, check with the local permitting agency, since some agencies in the Sacramento area don't allow gravel except for certain types of storage yards. Refer to Table PP-1 for design criteria for this type of porous pavement.

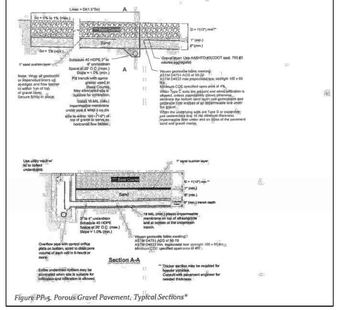


*Figure PP-5, Porous Gravel Pavement, Typical Sections**

JACKSON ROAD

BRADSHAW ROAD

GRAPHIC SCALE
40 20 0 40 80
1 in = 40 ft

PROJECT LIMIT LINE

063-0070-21
TEICHERT LAND CO.
IR

063-0070-04
AGUILERA FAMILY TRUST
M-2

063-0070-05
J&B STORAGE LLC
GC
NAPOTS

063-0070-06
JJ ENTERPRISE INC
GC

063-0070-07
J&B STORAGE LLC
GC
NAPOTS

063-0200-01
AMERICAN
PETROLEUM LL
GC

063-0200-02
BRADSON
DEVELOPMENT
GC

063-0070-17
GR TRUCKING LLC
IR

063-0070-18
HERBAUGH/WILCOX
GC

063-0200-07
TEICHERT
LAND CO.
M-1

VALLEY OAK
(TO REMAIN)

WATER TANK
PUMP
WELL
PUMP

BOTTOM ELEV = 60.40

EXISTING SEWER ESMT
PER 20070620 OR 1218

PROPOSED CURB & GUTTER

PROPOSED ROW LINE
(BACK OF CURB)

PROPOSED LANDSCAPE

PROPOSED ROW

PROPOSED 5' SIDEWALK

PROPOSED 30'
LANDSCAPE SETBACK

EXISTING PUBLIC ROAD & UTILITY
ESMT PER 19990519 OR 1261

EXISTING DITCH ESMT
PER 19990519 OR 1261

PROPOSED 20' PUPF
(TYP)

OFFICE
FF=65.20

DMH
66.52 RIM
63.12 18"(E)
62.67 18"(N)
62.62 24"(W)

DMH
66.27 RIM
63.07 18"(S)
62.87 18"(E)
62.72 18"(W)
62.52 18"(N)

DMH
66.20 RIM
60.00 18" IN
52.18 60" THRU

DMH
65.90 RIM
51.93 60" THRU
55.29 18" IN

SMH
66.50 RIM

SMH
65.06 RIM

DI
63.37 24"(W-E)

DI
65.56 GRT
63.09 18"(N)

DI
65.09 GRT
61.97 18"(W)
61.94 18"(E)

65.80 GR
61.10 12" INV

65.50 GR
61.30 12" INV

64.90 GR
60.90 15" INV

64.80 GR
60.70 18" INV

64.80 GR
60.80 12" INV

64.55 GR
60.60 12" INV

64.75 GR
60.75 10" INV

63.90 GR
60.70 12" THRU

63.90 RIM
60.50 18" THRU

63.69 GR
63.69 12" INV

64.20 GR
61.20 12" INV

61.40 RIM
57.75 18" INV

CMP
64.18 12"(IN)

CMP
64.09 12"(OUT)

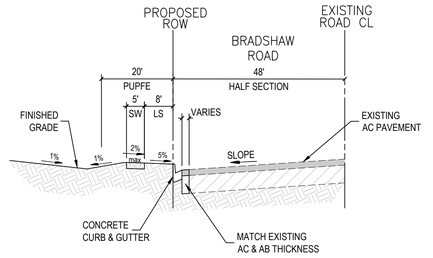
CMP
62.63 10"(IN)

CMP
62.56 12"(IN)

CMP
62.37 12"(OUT)

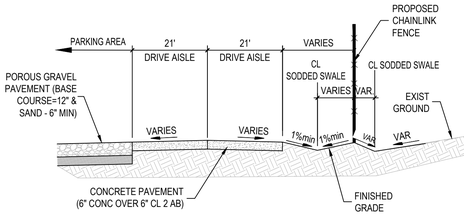
RIM=65.00±
(INV=59.39 12" IN
INV=59.28 18" IN
INV=59.28 18" THRU)
(FIELD VERIFY)

1.88%
1.72%
0.5%



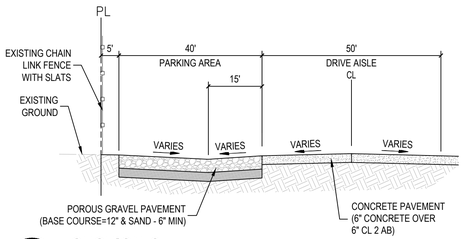
A SECTION A

NTS



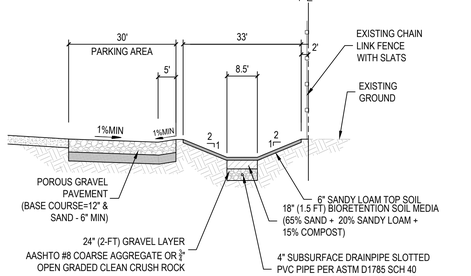
B SECTION B

NTS



C SECTION C

NTS



D SECTION D

NTS

OVERLAND RELEASE

ESTIMATED RAW CUT =	- CY.
ESTIMATED RAW FILL =	- CY.
ESTIMATED EARTHWORK EXPORT =	- CY.

VOLUME CUT / FILL INFORMATION

NOT FOR CONSTRUCTION

REVISIONS NO.	DESCRIPTION	APPD. ENGR.	DATE	APPD. E.U.	DATE
△					
△					
△					
△					
△					

SCALE:
HORIZ. 1" = 40'
VERT. 1" = N/A

BENCH MARK — COUNTY B.M. 1A-35
EL=65.63 (NAVD 88)
7/8" METAL DISC STAMPED "CO. B.M. 1A-35" LOCATED IN CHISELED SQUARE TOP OF CURB ABOVE DI AT SOUTH-EAST CORNER OF BRADSHAW RD. & JACKSON HWY. (NGVD ELEV. = 63.29)

COMPUTED	MJC
DESIGNED	DVG
DRAWN	CEC
PROJ. ENGR.	EKY

REGISTERED PROFESSIONAL ENGINEER — ALEXANDRIA KAY WILCOXON — No. C58345 — CIVIL — STATE OF CALIFORNIA

MORTON & PITALO, INC.
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING
Folsom ✶ Fresno
600 Coolidge Drive, Suite #140
Folsom, CA 95630
phone: (916) 984-7621
web: www.mpengr.com

PRELIMINARY GRADING AND DRAINAGE PLAN

J @ B STORAGE

5220 BRADSHAW ROAD & 9680 JACKSON ROAD

SACRAMENTO COUNTY, CALIFORNIA

DATE: APRIL 2024
SHEET: C-2
2 OF 6

JOB NO. 18-0053-00

Dwg: X:\2018\18-0053-00 (BRADSHAW @ JACKSON HWY)\DWG\PLAN\WORKING-RESTART\18005XC-102-PGD1.DWG | Saved: 04-08-24 03:24pm CCARRERA